OREGON'S WILD TURKEY

MANAGEMENT PLAN

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AVAILABILITY OF PLAN

The Oregon Wild Turkey Management Plan is available in electronic format on the ODFW website or hardcopy by contacting the Oregon Department of Fish and Wildlife at the information provided on the title page.

EXECUTIVE SUMMARY

The mission of the Oregon Department of Fish and Wildlife (ODFW) is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. The Oregon Wild Turkey Management Plan (Plan) serves as both a historical record, detailing the history of wild turkey management in the state, and outlines the strategies ODFW will employ in the future to insure healthy wild turkey populations and their habitats for the benefit of the state. This document is a revision to the original Plan adopted in 2004.

The updated Plan also aligns with ODFW's Strategic Plan (2018) on several key points. This document addresses strategic goals specific to science-based stewardship of wildlife and their habitats, increased participation in wildlife use and enjoyment by the public, and maximizing budget resources by leveraging diverse partnerships.

The 2018 Plan builds on the previous version by shifting the focus from increasing distribution to maintaining existing flocks at socially sustainable levels. This Plan updates the Trap and Transplant Protocol to improve efficiency and disease testing. Since 2004, relevant research has increased the body of knowledge specific to wild turkeys. This document references more than 40 additional papers.

ODFW adopted the 2004 Plan in response to growing wild turkey populations and the need for direction in harvest management, nuisance abatement, and translocation protocols. Since 2004, wild turkey populations have grown in concert with human influence on the landscape. Nationwide, despite rapid human population growth, the percent of the population that hunts dropped from 7.3% in 1991 to 4.4% in 2016 (U.S. DOI 2016). While the reasons for declining hunters are many, turkey hunting as a pursuit enjoys a high approval rate (75%) among adult Americans, whether they hunt personally or not (Responsive Management 2017).

Oregon hosts abundant and robust wild turkey populations, presenting an excellent opportunity for hunters, new and experienced, to go afield. Dual wild turkey hunting seasons offer opportunity in both spring and fall. Spring turkey hunting is popular with Oregon youth hunters, accounting for 17% of spring harvest in 2016. Turkey hunting opportunities have expanded since 2004. Hunters can now take three turkeys during the spring season and two turkeys in the fall.

Thanks to the efforts of the National Wild Turkey Federation and related partnerships, wild turkeys have become a touchstone for large-scale hunter recruitment efforts and upland habitat restoration. The Hunter Recruitment, Retention, and Reactivation (R3) movement, a concerted effort to recruit, retain, and reactivate hunters, gained traction in 2010 with the creation of the Council to Advance Hunting and the Shooting Sports. An ideal species for R3 efforts, turkeys are abundant, widespread, enjoyable to hunt, and excellent table fare. Beginning in 2007, ODFW introduced the Mentored Youth

Hunter Program, allowing youths to hunt under the privilege of their mentor's license, permit, or tag without first completing a hunter education course. This try-it-first approach was instituted as a measure to increase recruitment of young hunters while maintaining safety with one-on-one mentoring. In 2018, ODFW eliminated the minimum gauge restriction for turkey hunting, removing an additional barrier for youth and small-framed turkey hunters. Recent improvements in tungsten-based ammunition have proven effective in minimizing crippling loss with smaller gauge shotguns. Additional strategies specific to hunter recruitment are included herein.

Wild turkeys rely on healthy forests and riparian areas for their annual needs. Investing in habitat enhancements via partnerships with other agencies and non-government organizations will increase the resiliency and productivity of these habitats. This Plan promotes the active management of these habitats for the benefit of multiple species.

The current occupied range of wild turkeys in Oregon encompasses approximately 35% of the state. While their current range is similar to 2004, density has increased, particularly in the Blue Mountains and the Willamette Valley. Growing turkey flocks coupled with expanding suburban areas has resulted in increasing nuisance complaints from landowners. In most cases, turkey nuisance or damage complaints near populated areas are caused by the presence of supplemental feed. ODFW utilizes the protocols outlined in the Wildlife Damage Policy (2008) to address nuisance and damage problems, but challenges still exist for addressing and resolving turkey issues in urban and suburban areas. ODFW will continue to seek innovative methods/strategies for reducing conflict between turkeys and private landowners.

Trapping and relocating turkeys is one of the tools for addressing turkey nuisance or damage problems while enhancing opportunity for turkey hunting. The 2004 Plan established specific protocols for trapping of birds from in-state depredation and nuisance complaints and relocating those turkeys to occupied habitat. Prior to 2004, ODFW followed interim trap and transplant guidelines. The 2018 Plan allows for region-specific transplant priorities, rather than a statewide priority list. This allows for reduced travel time from trap to release sites, improving efficiency and reducing stress on the birds. ODFW will also continue to monitor emerging poultry diseases and update testing protocols according to ODFW's Avian Holding and Translocation Guidelines.

The completion of an ODFW/Oregon State University (OSU) funded research project in 2013 examining turkey food habits in Oregon and Washington addressed concern about the impacts of foraging turkeys to native wildlife and plants. No evidence was found of significant competition between wild turkeys and other wildlife, or that turkeys negatively impact plant populations. The Oregon Fish and Wildlife Commission adopted State Wildlife Integrity rules that establish controls to protect native wildlife

and designates wild turkeys as game birds. Wild turkeys will continue to be treated by ODFW as a game bird, including management for the benefit of turkeys and associated wildlife.

Wild turkeys provide significant recreational opportunity and economic benefit to Oregon residents. During the spring 2015 season, 13,298 hunters pursued wild turkeys in Oregon. Based on a nationwide survey, each turkey hunter directly spends an average $1,197 per season (in 2015 dollars) on equipment and trip expenses, equating to about $15,900,000 for spring turkey hunting in Oregon. On average, each dollar spent by spring turkey hunters generates about $2.40 in economic activity, most often in rural communities. Considering the direct spending by turkey hunters and this multiplier effect, it becomes easy to understand why it is economically beneficial to maintain healthy turkey populations and the recreation they support.

To maintain this important resource, ODFW needs to better understand wild turkey distribution and population trends, and continually evaluate harvest goals and strategies. Research data, public input, statistically valid surveys, and adaptive management strategies will guide ODFW's stewardship of wild turkeys in the future. ODFW identifies several important management challenges in the 2018 Wild Turkey Management Plan. The strategies outlined emphasize a proactive approach using the best available science to make decisions related to management of Oregon's wild turkey resource.

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SECTION 1. INTRODUCTION

OREGON DEPARTMENT OF FISH AND WILDLIFE MISSION

The mission of the Oregon Department of Fish and Wildlife (ODFW) is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. This Plan was developed to provide ODFW guidance for appropriately managing Oregon's wild turkeys and to accomplish ODFW's mission.

PLAN PURPOSE & DEVELOPMENT

As wild turkey populations increased in Oregon over the past 40 years, the public also became more aware of wild turkeys. This awareness has resulted in increased demand and opportunity for recreational use associated with wild turkeys, but also increased conflict. To accommodate the demand for recreation and need for managing turkey populations, ODFW will focus efforts in the following areas:

1. Public education and awareness: For the successful management of wild turkeys in Oregon, ODFW will provide information to the public through printed media, presentations, and via the internet to promote public hunting and viewing opportunities of wild turkeys in Oregon. Education will also be provided regarding activities that lead to conflict such as unlawful release of pen-reared birds and providing supplemental feed to wild turkeys.

2. Monitoring and maintaining optimal wild turkey populations in suitable areas: ODFW will monitor harvest trends, maintain populations in appropriate areas, and establish productive working relationships with land management agencies, private landowners, agricultural producers, and conservation and sport hunting organizations.

3. Managing turkey populations in Oregon to balance optimum public recreational benefit with habitat capability and primary land uses.

HISTORY OF WILD TURKEYS IN OREGON

With European colonization of the U.S., turkey numbers declined drastically due to over-harvest for food and wild game markets, and the conversion of vast forest tracts to farmland. By 1920, 18 of the 39 states which once had native turkey populations no longer contained wild stock (Mosby and Handley 1943). Attempts to restore wild turkeys using pen-reared stock in the 1940s was a resounding failure due to poor survival (Kennamer et al. 1992). However, prospects for the wild turkey restoration brightened considerably with the development of the cannon or "rocket" net in the

1950s, making large-scale trapping and transplanting of wild birds more feasible. Wild turkey populations were restored in all 39 states within their historic range as well as being introduced beyond their native range to the remaining lower 48 states and Hawaii. All states, except Alaska, now manage wild turkey populations. In 2014, the number of wild turkeys in the nation was estimated at 6.0-6.2 million (Eriksen et al. 2015).

Oregon is not within the native range of extant subspecies of turkeys. Oregon's first documented involvement with turkeys dates to 1899 when private individuals made releases in southern Oregon. None of the early attempts were successful at establishing self-sustaining populations. Between 1926 and 1933, the Oregon State Game Commission raised and released 1,504 game farm-raised birds (eastern subspecies) in attempts to establish Oregon populations, but discontinued the program due to poor results. The turkeys either failed to survive or quickly became domesticated (ODFW leaflet). In the late 1950's, the Oregon State Game Commission decided to again introduce wild turkeys after seeing reports of turkey introduction success in other western states. These successes came from live-trapping wild birds and releasing them, with minimal delay, into appropriate habitat.

The modem era of wild turkey management began in Oregon in 1961 when wild-trapped turkey of the Merriam's subspecies was obtained from Colorado, Arizona, and New Mexico. Fifty-eight turkeys were received early in 1961 and released at three sites in eastern Oregon. Thirty-eight went to the White River Wildlife Area in Wasco County; thirteen were released at Garrison Butte in Jefferson County; and seven turkeys were released on the Wenaha Wildlife Area in Wallowa County. The most encouraging response was recorded at White River where 14 of 26 released hens were observed with broods the first year. Small populations also became established near the Wallowa and Jefferson County release sites (ODFW leaflet).

In the following years, Merriam’s were trapped from initial transplant sites or imported from other states (Montana and Nebraska) and liberated elsewhere in eastern Oregon with encouraging results. From 1961 through 1985, ODFW released 295 Merriam's turkeys at 18 sites on 22 occasions.

Aside from the unsuccessful attempts in the 1920's and 30's using game farm turkeys, little effort was expended to establish the eastern subspecies in Oregon. A small flock of wild-trapped eastern turkeys was imported in 1967 from Tennessee and released in the Rogue River Canyon near Galice. These birds established a local population for a short time but apparently declined and eventually disappeared.

The first release of the Rio Grande subspecies of wild turkey in Oregon occurred in 1975. That spring, 20 birds (15 hens and five gobblers) were received from northern

California and released in the foothills east of Medford (Figure 1). California had obtained initial stock of the Rio-Grande subspecies from Texas in 1968.

Following successful establishment from the 1975 release, ODFW began actively seeking additional Rio Grande turkeys from other states. From 1975 – 1997, 1,362 Rio Grande turkeys were trapped and imported from California, Kansas, Oklahoma and Texas and released at numerous locations throughout Oregon (Appendix B). In 1985, with turkeys well established in several areas of the state, efforts focused on trapping and transplanting from in-state flocks. ODFW acquired drop nets and rocket nets to facilitate this intensive trap-transplant program.

Figure 1. District Wildlife Biologist, Rick Werner, in 1975 with one of 20 Rio Grande turkeys obtained from California and released in Jackson County.

The Rio Grande subspecies has adapted to Oregon's wide variety of habitat and climatic types and consequently most management activities focused on this subspecies since the mid-1980's. In 1987, Rio Grande turkeys were released in most areas occupied by Merriam's turkeys to supplement populations that had ceased growing. Since 2000, efforts shifted to trapping and transplanting turkeys associated with nuisance or damage to existing flocks in need of supplementation (Appendix B). This effort accounts for the movement of over 7,000 wild turkeys within the state.

ODFW currently estimates a statewide population of approximately 40,000 – 45,000 turkeys of which 2,000 – 3,000 are likely Rio Grande : Merriam's hybrids. The current occupied range of wild turkeys in Oregon encompasses approximately 35% of the state; at least a few turkey occur in nearly all counties.

SECTION 2. WILD TURKEY ECOLOGY

DESCRIPTION

The wild turkey is the largest gallinaceous game bird found in Oregon. Like most gallinaceous birds, turkeys are characterized by having 1) strong feet and legs designed for digging and scratching, 2) short rounded wings for brief rapid flight, 3) a short fowl-like beak, 4) ten primary wing feathers, 5) a large crop associated with granivorous and herbivorous feeding behavior, and 6) males and females differ in physical appearance, size, and weight. Both genders of wild turkey have very few feathers on the head and upper part of the neck. In addition, the skin of this area has many small bumps called caruncles. The mature male (gobbler) can have red, white, or blue coloration on their head, while female (hen) head coloration is typically dark brown or grey. The feathers of the breast and upper back are black tipped on the gobblers, but buff colored on the outer edge for hens. Males will normally develop a bony growth (spur) on the backside of the lower leg, while hens typically will not. Additionally, males (and a few females) sprout a tuft of hair-like fibers called a beard from the upper midline of the breast. Beards average between 6 to 12 inches in length on gobblers, shorter on immature males (jakes) and are usually absent on hens. Adult males, with their body fully erect, stand approximately 40 inches tall. Adult females in the same posture are around 30 inches tall. Gobblers typically weigh 17 to 25 pounds, while adult hens weigh 8 to 12 pounds (Mosby and Handley 1943, Hewitt 1967).

TAXONOMY AND GENETICS

North America has five recognized wild turkey (*Meleagris gallopavo*) subspecies. Only four are common in the United States, and one occurs primarily in Mexico. None were native to Oregon since European settlement. A second species, the Ocellated wild turkey (*Meleagris ocellata*) occurs in the Yucatan peninsula of Mexico, Belize and northern Guatemala. The five recognized subspecies are:

1. Osceola (Florida) turkey, *Meleagris gallopavo osceola* - occurs only in Florida.

2. Eastern turkey, *M.g. silvestris* - inhabits the eastern and southern U.S.

3. Rio Grande turkey, *M.g. intermedia* - native range primarily in Texas, Oklahoma, and Kansas.

4. Merriam's turkey, *M.g. merriami* – native range primarily Arizona, New Mexico, and Colorado.

5. Gould's turkey, *M.g. mexicana* - occurs in north central Mexico, southeastern Arizona and southwestern New Mexico.

The five recognized subspecies can be distinguished based upon physical characteristics and by feather coloration on the lower back and tail margins. Two of the five subspecies of wild turkey may occur in Oregon; the Rio Grande turkey (*M.*g. *intermedia)* principally occupies riparian and oak savannah areas throughout many areas of the state. Most Merriam's turkeys (*M.g. merriami*) have hybridized with Rio Grandes, but historically Merriam's were typically associated with areas of ponderosa pine (*Pinus ponderosa*) in north-central and northeast Oregon. Oregon's Rio Grande turkeys have tan or buff-colored rump and tail feather tips, while Merriam's have lighter, ashy-white tipped feathers (Beasom and Wilson 1992, Schemnitz and Zeedyk 1992).

REPRODUCTION AND PRODUCTIVITY

Turkeys are polygamous, meaning a single male may breed multiple females. Male turkeys attract hens and establish breeding territories by gobbling and by a spectacular strutting display. Depending on location, gobbling may begin in mid-February and can run through late May. Wild turkeys develop social hierarchies for males and females. Although juvenile males are capable of reproduction, dominant mature males accomplish most breeding. Once mating takes place, the hens disperse to begin nesting and egg-laying activities, while the gobbler continues to seek additional hens.

Adult hens typically have a higher nesting rate than do juvenile hens (Vangilder 1992). In Oregon, minimum nesting rates for Rio Grande hens was 99% for adults and 94% for yearlings (Keegan and Crawford 1999). Only 75% of adult Merriam's hens attempted to nest and 25% of the yearlings did (Lutz and Crawford 1987a). Nesting hens will lay a clutch of 9 – 12 eggs, and begin incubation around mid-May in Texas and New Mexico (Cook 1972, Lockwood and Sutcliffe 1985). In southwest Oregon, nest initiation dates ranged from late March to mid-July with mean nest initiation dates between April 8 – 15 (Keegan and Crawford 2005a). Mean hatching dates for adult hens ranged from May 17 – 24 (Keegan and Crawford 2005a). Yearling hens typically initiated nests a few days to two weeks later than adults.

Hatch occurs after a 28-day incubation period (Williams et al. 1971, Healy and Nenno 1985). The proportion of nests that hatch at least one poult ranges from 30 – 40%. Of those nests, over 80% of the eggs hatch (Cook 1972, Lockwood and Sutcliffe 1985, Schemnitz et al. 1985, Ransom et al.1987). When nests fail, hens renest up to 37% of the time depending on when failure occurred (Schemnitz et al. 1985, Liedlich et al. 1991). Adult hens renested more frequently than yearling hens (Keegan and Crawford 1999). Renesting rates are lower for nests lost after incubation begins than nests lost during laying (Williams and Austin 1988), but hens may even renest after brood loss (Keegan and Crawford 1993).

Turkey poults are precocial; they hatch with a coat of downy feathers, imprint to the first living thing to provide parental care, move around freely within 24 hours of hatching, and will peck at food items while following the hen (Healy 1992). Young birds exhibit most of the adult behavioral characteristics such as feeding, body maintenance and reproductive mannerisms (strut, female crouch, and threat) within the first week of life (Healy 1992).

Poults start learning to fly 4 – 8 days post-hatch (Williams 1974), are capable of flight within two weeks following hatch, and begin to roost in trees with hens within three weeks. Roosting behavior is important in the reduction of poult predation that may occur during this time (Glidden and Austin 1975, Everett et at. 1980, Speake 1980, Speake et al. 1985, Exum et al. 1987). The critical period for poult survival is the first two weeks following hatch when the mortality rate can be nearly 70% (Williams and Austin 1988).

SURVIVAL

Life span of turkeys in the wild has been documented at 9 – 15 years (Mosby and Handley 1943, Ligon 1946, Powell 1965, Cardoza 1995). However, the average life expectancy is likely much less. As with most gallinaceous birds, turkeys can experience dramatic population fluctuations between years. Annual mortality rates can be 30% – 55%, with most mortality occurring in the first year of life. Annual survival rates for Rio Grande hens ranged from 50% – 80% in southwest Oregon (Keegan and Crawford 1999) and were higher than documented for Merriam's in northern Oregon (60%, Crawford and Lutz 1984). Survival of hens in southwest Oregon differed between years, but there was no difference in annual survival between yearlings and adult hens within years (Keegan and Crawford 1999). Mortality rates decline after the first year of life and remain somewhat stable for older birds. Most juvenile or yearling mortality occurs during the winter. Hen mortality is highest between March and June, which coincides with the peak of nesting and incubation, when hens are most vulnerable.

MORTALITY FACTORS

Weather – Annual weather conditions may be the greatest limitation on Oregon's wild turkey populations. Cold temperatures and rain can decrease survival of newly hatched poults, causing a decline in the annual production. At higher elevations and much of eastern Oregon, where snow influences food availability, winter mortality may cause short-term fluctuations by reducing the breeding population (Wunz and Hayden 1975, Porter et al. 1983, Healy and Powell 2000). Annual fluctuations, however, are most strongly related to variation in hen nesting success and poult survival, which determines recruitment into the population. Drought conditions can impact wild turkeys by stressing food resources, reducing the production of various fruiting shrubs,

an important winter food resource, and insects, protein necessary for poult feather production. Turkeys have proven to be adaptable to a variety of climatic gradients, thriving from dry, hot ecosystems in the southwest to long, cold winters as far north as Canada.

Predation – Predation can be a significant source of mortality for wild turkeys (Vangilder 1992:155, Roberts et al. 1995, Vangilder and Kurzejeski 1995). In southwest Oregon 73% of known mortality of radio-marked turkey hens was attributed to predation (Keegan and Crawford 1999). Mammalian predators (e.g. cougar, coyotes, bobcats,) account for most of the annual mortality of adult turkeys, but avian predators (e.g. great horned owls and golden eagles) also kill adult turkeys (Hughes et al. 2005, Lehman et al. 2005, Peyton et al. 2014). Additional species (e.g. foxes and hawks) are known to prey on juvenile, and newly hatched turkeys. Nest predators include coyotes, bobcats (Lehman et al. 2008, Martin et al. 2015), and raccoons, but depredation by raccoons is likely incidental (Byrne and Chamberlain 2015). Physiological and behavioral adaptations to minimize the effects of predation include large clutch sizes, large body size, flocking behavior, and night roosting in trees (Miller and Leopold 1992:126-127). In quality habitat, turkeys can withstand predation and even flourish. However, predation may have a significant influence on local turkey populations when (1) populations are low (especially during introductions); (2) nesting cover is poor; (3) inadequate food and/or water force turkeys into unfavorable habitat; (4) other prey species are less available; (5) birds are exposed to severe weather for prolonged periods of time; and/or (6) predator populations are abnormally high (Glazener 1967, Markley 1967, Miller and Leopold 1992:127).

Disease and Parasites – Bacterial, viral and parasitic diseases can and do affect wild turkeys, however, diseases and parasites are rarely limiting factors affecting turkey populations anywhere within their range including Oregon. As a matter of record, no wild turkeys have been associated to disease outbreaks in domestic poultry or cattle, and likewise, wild turkeys do not serve as reservoirs for domestic bird diseases. Many diseases that potentially threaten wild turkeys are present in domestic poultry and captive game birds. Turkeys are subject to a number of bacterial/viral infections. The most common visual infection is caused by an avian pox virus may be transmitted by mosquitoes and other blood-feeding insects and by direct contact between infected and uninfected birds. Several species of Mycoplasmosis , and Salmonellosis are important bacterial diseases due to the potential of transfer and impacts to domestic poultry (Davidson and Wentworth 1992). However, wild turkeys rarely have mortality events associated with these infections. ODFW veterinarians and biologists test for these diseases prior to any translocations of wild turkeys to augment or restore populations.

Prior to 2009, lymphoproliferative disease virus (LPDV) was not previously known from North America but had been detected in domestic poultry in Europe (Allison et al.

2014). LPDV was first detected in several wild turkeys in the eastern United States between 2009 – 2012 (Allison et al. 2014) and the Middle East. From spring 2011 through spring 2013, 47% of hunter-harvested wild turkeys tested in 17 eastern states tested positive for LPDV, but rates of infection ranged from 26% in Oklahoma to 83% in New Hampshire (Thomas et al. 2015). LPDV was first confirmed in Oregon from a sick turkey collected near Dallas in December 2015 and in a second turkey from Grant County in January 2016 (ODFW unpublished data). Turkeys with LPDV often do not show external signs of the disease. Given the prevalence of LPDV in the eastern states and the recent detections in Oregon, the disease is likely widespread. The potential impact of LPDV on the population dynamics of wild turkeys is unknown (Thomas et al. 2015).

Highly pathogenic avian influenza (HPAI) is another recent concern for wild game bird populations. Migratory species such as ducks and geese often don't show signs of illness but are capable of spreading the disease over large geographic areas, even from continent to continent because of their migratory behavior. Domestic poultry (chickens, turkeys) and wild gallinaceous birds are highly susceptible to the disease. A 2015 HPAI outbreak in domestic poultry caused significant concern, and economic loss in the Midwest U.S. During that same winter, there were two positive detections in backyard bird flocks in Oregon. In one case near Winston, Oregon (Dec. 2014), HPAI infected free-range guinea fowl and chickens and had the potential to expose wild turkeys to the disease. The effect of HPAI on wild turkeys is unknown. However, due to the severity of the disease, and high mortality experienced by domestic turkeys, it is not likely wild birds would serve as a reservoir for the disease. Many domestic poultry operators are fearful that wild turkeys may carry the disease and pose a threat to commercial poultry operations. However, avian influenza has never been found in wild turkeys.

Wild turkeys can, and often do experience infestation by a number of external parasites (lice and ticks) and internal parasites including flatworms (flukes), tapeworms, roundworms, acanthocephalans (thorny-headed worms), and protozoan blood parasites *(Haemoproteus*, *Leucocylozoon*, *Plasmodium*) transmitted by blood-feeding arthropods. Histomoniasis or "blackhead" disease is a complex infection that involves an intermediate host, an earthworm, but can cause severe symptoms in the liver or intestines of both wild and domestic turkeys. Most parasites typically cause only a nuisance, although particularly heavy infestations may cause physical impairment or secondary infections. Infections often do not produce clinical symptoms unless the bird is stressed or otherwise ill (Davidson and Wentworth 1992).

Disease and parasitic infections causing significant mortality events have not been documented in Oregon. With the exception of winter congregations, turkey flocks are naturally dispersed, so large portions of the population are never in close proximity to one another. In addition, birds incapacitated by disease and/or parasites are likely

removed quickly by predators and scavengers (Davidson and Nettles 1988, Davidson and Wentworth 1992).

Hunting – Due to the high annual survival rates of wild turkeys, mortality associated with spring hunting is generally considered to be additive (Vangilder 1992), and does not compensate for natural mortality in turkey populations. If managed properly, spring hunting typically does not have a long-term impact on population numbers (Vangilder 1992, Vangilder and Kurzejeski 1995). The length and timing of the spring season as well as the season bag limit can impact annual survival of wild male turkeys (Chamberlain et al. 2012). Typically, harvest rates of up to 30% of adult gobblers leave enough males for effective breeding and quality hunting the following season (Vangilder 1992). However, in Missouri, consecutive years of high harvest and high illegal harvest coinciding with several years of low reproduction (Kurzejeski and Vangilder 1992, Healy and Powell 2000) can lead to an insufficient number of adult male turkeys, which can depress local population productivity (Isabelle et al. 2016). Harvesting in excess of 25% of adult males each year would shift the population structure in favor of juvenile males (Healy and Powell 2000).

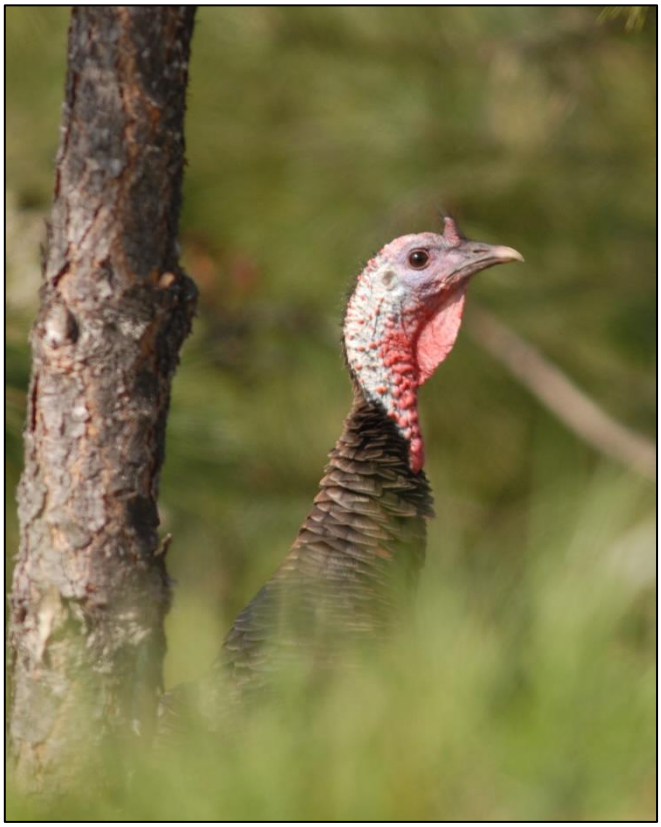

Figure 2. Turkeys are known for their keen eyesight, which makes hunting them a challenge.

The median initiation date of egg incubation by hens varies annually (Casalena et al. 2015), but usually occurs during the spring turkey season when males are actively gobbling. The strategy of setting opening dates of spring hunting to coincide with peak egg-laying is biologically sound. This addresses concerns surrounding potential effects of male harvest on productivity, while still meeting hunter expectations by allowing the season to occur when male turkeys are actively gobbling (Wild Turkey Working Group 2016).

Fall hunts can have a significant influence on local populations due to the direct impact on female survival. Fall seasons are therefore the most critical in terms of directing turkey population trajectories. Turkey population growth can be depressed due to the sensitivity of populations to fall either-sex harvest (Pack 1986, Healy and Powell 2000).

Population model simulations suggest that fall harvest rates of hens should be 9% or less if wildlife managers want to avoid population declines (McGhee et al. 2008). Based on a study of marked male turkeys in Virginia and West Virginia, it was determined fall hunting mortality of males did not reduce the availability of males during spring under season lengths that varied from 0 to 9 weeks, suggesting harvest mortality of males in the fall was not additive (Norman et al. 2004). However, fall hunting did reduce survival of female turkeys in those same states (Pack et al. 1999). In general, populations benefit more from management efforts to increase reproductive success of hens in the spring rather than increase survival of hens through the fall and winter (Hubbard et al. 1999). Strategies to manage fall either-sex seasons include regulating season length and timing, bag limits, hunter numbers, and hunting implement.

Poaching – Illegal harvest can play an important role in turkey population viability especially if hen mortality rates are significantly increased. Known and suspected illegal take varies by location, but annual mortality can range from 2% to greater than 60% (Wright and Speake 1975, Everett et al. 1980, Williams and Austin 1988). The illegal taking of hens in the spring can be minimized by timing the season when females are actively engaged in incubation and not in the presence of gobblers. When the spring gobbler season begins before the peak of incubation, hens are more vulnerable to illegal harvest (Kimmel and Kurzejeski 1985, Kurzejeski et al. 1987, Norman et al. 2001, Vangilder 1992). The illegal harvest rate of turkeys is not known for Oregon.

Hybridization – Hybridization can and does occur in wild turkey populations among subspecies. However, limited information is known about the impacts of hybridization to overall survival of established turkey populations. Maintaining genetic identity in populations has been a concern by some managers, but has not been specifically addressed in Oregon.

Habitat Fragmentation/Degradation – Wild turkeys have proven adaptable to a wide variety of habitats in Oregon, several of which are considered "Strategy Habitats" by the Oregon Conservation Strategy. Those habitats under threat within wild turkey range include oak woodlands, ponderosa pine woodlands, and riparian habitats. Oak woodland loss has been most severe in the Willamette Valley and Coast Range, with only 5-6% of the historical habitat remaining. Loss of oak woodlands is primarily due to conversion to residential and agricultural conversion and competition by Douglas-fir due to fire suppression (Oregon Conservation Strategy 2016).

Ponderosa pine woodlands are adapted to frequent, low-intensity fires coupled with intermittent higher-intensity burns. Large-scale fire suppression has resulted in a buildup of fuels in these woodlands coupled with a general lack of large structure and connectivity. Ponderosa pine woodlands are at high risk for uncharacteristically severe wildfires (Oregon Conservation Strategy 2016).

Riparian habitats are faced with numerous threats from water quality and quantity, invasive species, and passage barriers, to general degradation and loss to conversion (Oregon Conservation Strategy 2016). Turkeys are particularly dependent on the roosting structure provided by riparian habitats, especially large cottonwood trees. Recruitment of cottonwoods can be limited by overgrazing in riparian areas and related erosion of the stream channel. The Oregon Conservation Strategy lists numerous actions that could benefit the scope, quality, and resilience of these habitats.

Management practices on agricultural and timberlands can also impact wild turkey survival. Clearcuts are often selected for nesting by Rio Grande turkeys (Keegan and Crawford 1993). The reduction of clearcutting on federal lands and the extensive use of herbicides on private land clearcuts is one example of how the availability of a preferred habitat has been reduced. Turkeys rely heavily on cereal grains, particularly wheat, for their fall-winter diet in Oregon and Washington (Evans-Peters 2013). Conversion of traditional cereal grains to residential development or other agricultural crops would likely impact wild turkey fitness over winter, particularly in poor mast years.

Roads can be detrimental to turkey populations. When vehicles travel roads frequently, turkeys often avoid the adjacent habitat (Wright and Speake 1975). In addition, roads provide easy public access that can promote higher levels of legal and illegal harvest and crippling mortality (Holbrook and Vaughan 1985). Roads can be beneficial to turkeys by serving as travel corridors and feeding areas. Road rights-of-way will often contain many insects, seeds, fruit, and other food items. Undeveloped roads may be planted and/or maintained in native herbaceous vegetation, creating quality brood and feeding habitat (Hurst and Dickson 1992:281). Land management agencies should balance agency needs with habitat requirements of wildlife, including wild turkey, when planning and managing roads.

Fire suppression during the past century has promoted shrub and juniper tree encroachment into open habitats. This has led to a reduction in available brood habitat by inhibiting grass and forb growth. In addition, the build-up of understory woody growth allows catastrophic fires to dramatically reduce available timber habitat. Prescribed fire can play an important role in enhancing habitat, especially for broods, by opening up understory vegetation through the removal of thick shrub growth, while stimulating grass, forb and legume production. In the southeastern U.S., prescribed burning in pine forests has the benefit of reducing mat-forming perennial herbs and woody plants (Buckner and Landers 1979, Porter 1992). In addition, food availability is increased for all birds during the first three years post-burn (Hurst 1978). It is important that prescribed fires be planned outside of the nesting season so hens and nests are not impacted (Hoffman et al. 1993).

Timber harvest that removes trees from large areas can negatively impact wild turkey populations if roost sites, travel corridors and escape cover are limited. Fuel-wood harvest of oak and cottonwoods, especially in riparian areas, may remove valuable winter food sources. Private timber companies in some parts of Oregon selectively kill hardwoods to benefit the more profitable conifers. To benefit wild turkeys, timber harvest strategies need to produce vegetative mosaics with small openings, provide brood habitat, and protect known roost sites and travel corridors.

Intensive grazing for long periods reduces available food and cover, particularly brood habitat (Merrill 1975, Phillips 1982). However, moderate grazing can stimulate herbaceous growth and associated insect biomass, thereby improving brood habitat as well as year-round adult feeding areas (Hillestad and Speake 1970, Speake et al. 1975).

Herbicide and pesticide applications may reduce the ability of habitat to support wild turkeys. Insecticides may reduce or eliminate insect food sources. Herbicides can diminish insect cover, remove forbs essential for nutrition, reduce nesting cover, and kill mast-producing trees. Both insecticides and herbicides can poison turkeys, thus predisposing them to predation, reduced reproductive output, and cause direct mortality (Clawson 1958, Hoffman et al 1993, Nettles 1976).

In Oregon, many housing and community development projects occur within riparian and forested areas favored by wild turkeys. Some residents enjoy feeding birds, including turkeys. This generally leads to birds becoming concentrated and may lead to birds becoming dependent upon human provided food and increase vulnerability to poaching, predation, and disease/parasite transmission (Hurst 1992). It can also result in nuisance and damage complaints.

HABITAT CHARACTERISTICS

Wild turkeys are habitat generalists (Lewis 1992), adaptable to a variety of environmental and habitat conditions (Dickson et al. 1978). Optimum wild turkey habitat generally has a large variety of habitat types, successional stages, and plant species within their home range. Seasonal wild turkey habitat use varies considerably, especially during the fall and winter as food availability fluctuates. Diverse habitats provide a range of habitat conditions within their home range providing for varying seasonal life history requirements, and provide a variety of food sources that are less susceptible to complete failure during years of overall poor natural food production.

Both the Merriam's and Rio Grande subspecies of wild turkeys have been introduced to Oregon and each differs slightly in habitat preferences. In Oregon's 2004 Wild Turkey Management Plan, habitat preferences for each subspecies was described separately. Given the adaptability of the Rio Grande subspecies of wild turkey, and because pure

Merriam's likely no longer exist in Oregon, the habitat preferences described in the following are for Rio Grande turkeys, unless otherwise noted.

The Rio Grande turkey is an adaptable bird, persisting in a variety of habitat types. In Oregon, Rio Grande turkeys have survived in areas as diverse as the oak-conifer zones of Douglas County and mixed-conifer habitats of northeastern Oregon. Both areas are substantially different from habitat in the Texas panhandle, where the initial stock for most of Oregon's birds originated. Although wild turkeys are considered habitat generalists, there are three periods of distinct habitat needs: nesting, brood rearing/summer, and fall/winter.

Nesting – Nest site locations for wild turkeys are generally chosen based on undergrowth characteristics that provide visual obstruction to conceal the nest and hen but still allow the hen to identify potential predators or other dangers (Holbrook et al. 1987). One side of the nest will often be positioned next to a tree, log, rock, or heavy shrub/grass thicket. The surrounding lateral cover averages at least 18 inches in height and will obscure the nest so that it cannot be easily viewed. Canopy cover immediately over the nest commonly conceals at least 60% of the ground (as viewed from above). The nest site must have brood rearing habitat nearby to allow easy and unrestricted access by poults.

Across most of their range, Rio Grande turkey nests occur in dense grasslands near riparian zones. Cover plants may include little bluestem (*Schizachyrium scoparium*), buffalograss (*Buchloe dactyloides*), grama grasses (*Bouteloua* spp.), Canada wildrye (*Elymus canadensis*), Johnsongrass (*Sorghum halepense*), sand dropseed (*Sporobolus cryptandrus*), sunflower (*Helianthus* spp.), and buffalo gourd (*Cucurbita foetidissima*) (Ransom et al. 1987). In southwest Oregon, Keegan and Crawford (2005) observed Rio Grande nests in eight of 10 available cover types, but only recent (<10 yr old) clearcuts were used more than expected. In their native Texas range, Rio Grande wild turkeys avoided nesting in dense woodlands and usually selected sites that had been burned in the previous five to 10 years (Dreibelbis et al. 2015). Both studies suggest that disturbance in woodland/forest communities may be important for providing early seral nesting habitat for Rio Grande turkeys. During the incubation period, most of the turkey hens use a relatively small area (~3.6 acres) around nest sites for incubation breaks (Conley et al. 2015).

Brood rearing/Summer – Newly-hatched wild turkey poults require habitat that: (1) produces insects, which provide the calcium and protein essential for poult growth, (2) enables frequent foraging throughout the day and, (3) provides enough cover to effectively hide poults, but still allows the hen unobstructed vision for protection from predation (Porter 1992:206). Nearby tree cover is important to allow additional escape avenues, as well as shade and protection from inclement weather. Brood habitat comprises a relatively small area, with weekly home ranges averaging less than 75 acres (30 ha), and total summer home ranges averaging close to 250 acres (100 ha)

(Speake et al. 1975, Porter 1980). Rio Grande turkey broods use mixed grass-shrub areas between riparian woodlands and adjacent grassland/savannas (DeArment 1959). Bunchgrasses are particularly important, especially for young poults (less than 2 weeks old) that do not yet have flight capability (Beasom and Wilson 1992:317).

Poults are not capable of using tree-roosts until two weeks of age when they gain flight capability. Poults roost on the ground with the hen until they are capable of reaching a suitable tree roost (Spears et al. 2007). Horizontal visual obstruction at the ground level appears to be an important component of ground roosts and increases poult survival during the first two weeks post-hatch. Presence of shrubs 1 to 2 m in height were the most important variable for poult survival during their first several days after hatch in their native range in the Panhandle of Texas (Spears et al. 2007).

In southwestern Oregon three habitat types were used in greater proportion than their availability (i.e.selected) as brood-rearing sites; hardwood conifer woodland, meadow/pasture, and hardwood conifer savanna (Keegan and Crawford 1997). These three habitat types accounted for over 50% of the brood locations but represented only 11% of the available habitat.

Fall/Winter – Food and roosting cover are two critical components of turkey habitat during the fall and winter. Wild turkey habitat utilization shifts from open areas in the fall to more forested habitats during winter (Speake et al. 1975). Merriam's turkeys in south-central Washington selected conifers with high canopy coverage for winter roost trees, presumably to provide thermal cover (Mackey 1984). Lutz (1987) found that mature mixed conifers were used most often (92%) for roosting during winter in Oregon. In more southern climes hardwood stands with high tree diversity, intermixed with softwoods and field edges are used in winter. Each of these habitat types must have adequate, available food resources within close proximity to the roost areas.

In southwestern Oregon, Rio Grande hens utilized meadow and pastures, hardwood/conifer woodlands, and hardwood/conifer savannas more than expected during winter (Crawford and Keegan 1995). These three habitat types accounted for 56% of all daytime winter locations and are the same habitat types selected for brood rearing.

GENERAL HABITS

Movements – With the advent of GPS technology more precise information about the movements of turkeys is possible and these new data are just becoming available (Gross et al. 2015). Rio Grande turkeys exhibit gregarious and nomadic behavior. In the fall and winter they join together into larger winter flocks to utilize ripening mast in wooded riparian or shrub habitats. During this time they typically range 1-2 mi (1.6-3.2 km). When hens disperse in the spring to nesting habitat they may move 15-20 mi (24-32 km) (Glazener 1967:470, Watts 1969, Thomas et al. 1973). The home range size of Rio Grande female turkeys varies with the time of the year. In their native range of

southern Texas, annual home ranges for adult hens may exceed 3,800 acres, but on the same study site, the breeding and nesting home range size was closer to 1,500 acres (Ramirez et al. 2012).

Average daily movements of adult male Rio Grande turkeys in Texas during spring was 2.9 mi (4.6 km) (Gross et al. 2015). In their native range, adult male turkeys that moved the farthest between core use areas had the lowest survival. Adult male turkeys move farther and more often between core use areas during spring and fall and least often during summer (Holdstock et al. 2006).

Where winter conditions are mild, such as southwestern Oregon, turkeys often spend the entire year within the same general area. In areas with harsher winter conditions, represented by much of eastern Oregon, turkeys may winter at low elevations and move to higher country for breeding, nesting and brood rearing. Annual home range sizes in southwestern Oregon varied by season for Rio Grande hens; ranging from 2,990 – 6,879 ac, (1,210 – 2,784 ha) for adults, and from 4,495 – 13,101 ac (1,819 – 5,302 ha) for yearlings (Crawford and Keegan 1995).

Roost sites – Roost sites are typically tall trees with layered, widely spaced, horizontal branches. These trees also provide food, escape, and resting cover. In areas where natural roost sites are limited, turkeys will utilize man-made structures (utility poles, windmills, house roofs, etc.)

The importance of winter roost sites for Rio Grande turkeys has been well documented (Phillips et al. 2011, Swearingin et al. 2011). Roost trees for Rio Grande turkeys appear to be selected based on height rather than species (Crockett 1973, Haucke 1975), but a diversity of habitat in close proximity to the roost trees is also important (Phillips et al. 2011). In southwestern Oregon, roost habitat by adult Rio Grande flocks did not vary seasonally. Three forested habitat types (dense young conifer, dense mature conifer, and hardwood/conifer woodland) accounted for 88% of all roosts used by adult turkeys. Hens and poults roosted in those same three habitat types 97% of the time (Crawford and Keegan 1995). Adult Rio Grande turkeys in southwest Oregon roosted in 11 species of trees, but >90% of the roost trees were Douglas fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa).* Hen-poult flocks roosted in seven tree species, with Douglas fir accounting for 70% of total use (Crawford and Keegan 1995). In their analysis of 565 individual roost trees, Crawford and Keegan (1995) reported that characteristics of individual roost trees differed among cover types and social groups. Roost trees used by adults in mature conifer stands averaged 130 feet (40 m) tall, 26 inches (66 cm) DBH (diameter of tree at breast height), and were >150 years old. Adults roosted in smaller trees in dense young conifer and hardwood stands, ranging from 91 – 101 feet (28 – 31 m) tall, 17 – 20 inches (44 – 50 cm) DBH, and 87 – 118 years old. Among all cover types, the average roost tree was 107 feet (33 m) tall, 20 inches (50 cm) DBH, and 106 years old. Turkeys typically roosted in the trees that were as large, or larger, than others available in the stand (Keegan and Crawford

2005b). The number of trees used by adults at each roost site was related to flock size. Hens and poults tended to use a single tree. The mean number of adults, and hen and poults per tree was 1.7 and 4 birds, respectively (Crawford and Keegan 1995).

Food Habits - The wild turkey is omnivorous consuming five major food categories including reproductive parts of plants (fruits and seeds), leaf material, simple flowers, underground vegetative structures, and animals (invertebrates and vertebrates). Mast is the primary food during fall and winter (Porter 1992:209). Food items include oak acorns, juniper berries (*Juniperus spp.*), pine seeds (*Pinus spp*.), skunkbush sumac (*Rhus trilobata*), kinnikinnick berries (*Arctostaphylos uva-ursi*), hawthorn (*Crataegus spp.*), snowberry (*Symphoricarpos spp.),* and wild rose (*Rosa spp.*). During the winter and early spring, wild turkeys feed mostly on herbaceous vegetation and mast, such as juniper and manzanita berries, pine seeds, plant seeds, grasses and green forbs. During the summer and early fall, turkeys feed on grasses, forbs, soft mast (manzanita and juniper) and hard mast (pine seeds and acorns). Insects are important in the summer months, especially for young birds, which depend on this high protein diet for growth and development. For the first week of life, approximately 80% of the poult's diet consists of insects. Adults also readily utilize insects when available. Litton (1977) documented annual food utilization of Rio Grande turkeys as 36% grasses, 19% browse, 16% forbs and 29% insects. However, turkey food utilization varies seasonally, annually, and regionally and many variables affect food availability (Bailey and Rinell 1968).

Figure 3. Turkeys often forage in Oregon white oak habitats with open understories.

The wild turkey's cosmopolitan diet is readily illustrated by the success of Rio Grande turkeys in Oregon. Available forage species vary substantially in areas of the state occupied by turkeys and are quite different than the Texas Panhandle from which the majority of Oregon's initial stock of birds originated.

During 2009-2011, a comprehensive food habits study was conducted in Oregon and Washington by collecting wild turkey crops from hunter-harvested birds and from birds specifically collected for the study (Evans-Peters 2013). Samples were collected from four pre-determined study regions; Klamath Mountains (SW Oregon), East Cascades Foothills (N.

central Oregon and S. central Washington), Blue Mountains (NE Oregon and SE Washington), and Northern Rockies Plateau (NE Washington). From these four study areas, 462 crops were collected which contained food items consisting of 123 different plant taxa and 35 different invertebrate taxa (Evans-Peters 2013). In this study, the most commonly consumed plant parts were fruits/seeds at 54.7% aggregate dry mass of the diet, followed by leaf material (26%), flower (5.8%), invertebrates (5.5%), and underground plant parts (1.9%).

While no vertebrates were detected in the 462 crops from the study areas, 13 additional crops outside of the study area were examined. One of these crops collected near Bend contained a western fence lizard (*Sceloporus occidentalis*). In a comprehensive review of wild turkey food habits studies conducted between 1941 – 1996 across the United States, evidence of consumption of amphibians or reptiles were found in 15 of the 45,363 food habit samples (unpublished National Wild Turkey Federation report).

Turkeys will readily utilize agricultural crops such as corn, oats, and wheat for winter food (Porter 1977, Little 1980). In Oregon and Washington, wheat (*Triticum sp*.) was the most abundant seed found in turkey crops in fall and winter, and corn (*Zea sp*.) was among the most abundant seed consumed during spring in some regions (Evans-Peters 2013). Utilizing agricultural crops can significantly reduce winter deaths because corn (in particular) is higher in protein, lower in fats, and similar in carbohydrates compared to oak acorns (Crim 1981).

Supplemental feeding – Supplemental food for turkeys may be made available with the intent of reducing winter mortality. Feeding stations are not always effective in reducing mortality because: birds may have difficulty finding them, concentrating birds may result in increased mortality from predation and disease, and birds may become dependent upon sites (Stoddard 1963, Hurst 1992:81). However, some studies suggest that supplemental feeding can be an effective management tool to help reduce winter mortality in certain situations, such as during periods of low mast production (Ligon 1946, Gardner and Arner 1968, Billingsley and Arner 1970, Pattee and Beasom 1979). The best success has come from planting and maintaining fields of corn and mast producing shrubs (Porter et al. 1980, Crim 1981, Healy 1981, Clark 1985, Kulowiec and Haufler 1985, Kurzejeski and Lewis 1985). In addition, these plantings can be used to extend the northern distribution of translocated wild turkeys into areas that are limited by food in the winter (Kane et al. 2007).

Supplemental food is also provided throughout the year by some well-meaning individuals who enjoy viewing turkeys, or wish to feel closer to wildlife. In addition, agricultural feeding operations for livestock and poultry can also attract turkeys. Whether supplemental food is provided intentionally, or unintentionally (e.g. leaving pet food out), turkeys can become habituated to humans and ultimately become a

nuisance. Among other issues, animals that are habituated to humans are more likely to interact with humans in an aggressive manner. Access to supplemental food is the primary reason turkeys are attracted to human-inhabited areas and is almost always the cause of turkey nuisance and damage complaints (Starin 2016).

SECTION 3. PUBLIC INTEREST

HARVEST MANAGEMENT

Overview – Currently, there is abundant opportunity for hunting wild turkeys in Oregon. Hunters may purchase three spring turkey tags and two fall turkey tags without application and during the season. The statewide spring season is 47 days long (standardized dates). Daily bag limit for spring hunts is one male turkey or a turkey with a visible beard. In recent years, the number of active spring turkey hunters has averaged between 13,000 and 14,000 hunters with annual harvest between 4,000 and 5,000 spring turkeys (Table 1). Fall hunting opportunities are managed by limiting tag numbers and open areas, but most of western and northeastern Oregon offer fall turkey hunting. The average number of fall turkey hunters is around 2,000 and fall harvest is generally around 900 turkeys, which can be of either sex (Table 2).

Spring hunting seasons – Spring turkey hunting in Oregon has occurred annually since 1966. Spring hunting season dates were originally restricted to April but recent seasons have extended to May 31. During the 1960s and 1970s all spring hunting was by controlled hunts with limited tag numbers. As statewide turkey range and populations expanded, controlled hunts began to proliferate; in 1986 twelve controlled hunts were listed in the regulations synopsis.

In 1987, the entire state was opened to spring turkey hunting with a season bag limit of one male turkey. The change in season structure permitted a substantial increase in hunting opportunity; both in areas previously within controlled hunts and on numerous scattered flocks in other areas of the state. The transition from controlled hunting to general season hunting occurred over two years during which hunters were required to apply for controlled hunt tags;. however, there was no limit on tag numbers and all individuals who applied by the February 15 deadline received a tag. The tag application procedure was implemented so ODFW could evaluate the demand for turkey hunting and so hunter information would be available for a comprehensive harvest survey to evaluate the expanded season framework. The application procedure was dropped in 1989 and general season tags became available at license agents statewide.

Beginning with the 1990 spring season, hunters were allowed to purchase two tags prior to the opening day of season. This allowed hunters the opportunity to harvest two male turkeys during the season, but not more than one per day. An additional

"bonus" tag became available in 1993 for hunting gobblers in Douglas, Coos, Curry, and Josephine Counties. This permitted an individual to harvest three turkeys in the spring; two tags could be used statewide and the bonus tag only in specified counties.

Beginning with the 1994 season, the tag sale deadline became the last day of the season allowing hunters to buy additional tags during the season. The bonus hunt area expanded in spring 2003 with Jackson, Lane, Linn, Benton, Polk and Marion counties added to the hunt area. In 2010 the bonus tag was expanded to all of western Oregon Wildlife Management Units except, Saddle Mtn., Wilson, and Scappoose. In 2016, the three bird season bag limit was extended statewide, but the daily bag limit remained one male or bearded turkey. Southwest and Northeast Oregon currently offer the best spring turkey hunting opportunities in Oregon (Figure 5).

Hunter participation in spring turkey season in Oregon has increased dramatically since 1987, peaking in 2010 along with harvest (Table 1). Tag sales have continued to increase, but the harvest and number of active spring turkey hunters has stabilized between 13,000 and 14,000 hunters. The Adult Sports Pac license type (which includes big game tags and a spring turkey tag) now accounts for most of the turkey tags sold in Oregon, but only a small proportion (17.5% in 2015) of Sports Pac license holders actually go turkey hunting.

Figure 4. Spring 2016 youth turkey hunt was a success for Ryne Andreason who took this nice tom with archery equipment on public land in eastern Oregon.

A spring youth turkey season started in 2006 and occurs the first full weekend before the general season opens. In 2016, more than 2,000 youth held spring turkey tags, and 455 turkeys were harvested during the youth turkey season. Youth harvested an additional 423 turkeys during the 2016 general spring season. Youth accounted for 16.7% of spring harvest of turkeys in Oregon during 2016, and 16.6% of the spring harvest in 2015.

Table 1. Tags sold, participation, and harvest during Oregon's spring turkey seasons, 1987-2017.

YEAR		Tags Sold	Number of Hunters	Hunter Days	Harvest	Harvest Change
1987		8,308	5,003	16,514	425	
1988		3,749	3,055	11,600	563	32%
1989		3,864	2,623	9,788	313	-44%
1990		5,000	3,720	15,557	751	140%
1991		7,159	5,103	27,301	1,086	45%
1992		7,909	6,248	28,384	841	-23%
1993		9,942	7,242	33,117	1,354	61%
1994		9,594	7,531	38,408	1,524	13%
1995		9,947	7,498	35,852	1,631	7%
1996		8,873	6,859	29,661	1,647	1%
1997		9,371	7,396	34,302	1,851	12%
1998	*	12,888	9,037	40,806	2,621	42%
1999	*	18,092	8,240	37,056	2,543	-3%
2000	*	24,426	9,203	40,786	2,590	2%
2001	*	29,276	8,882	40,669	2,729	5%
2002	*	33,498	13,072	55,681	3,699	36%
2003	*	35,936	14,170	63,866	4,093	11%
2004	*	34,580	No Survey			
2005	*	35,662	No Survey			
2006	*	36,501	14,280	55,904	5,279	
2007	*	38,222	14,612	58,157	4,859	-8%
2008	*	36,483	14,320	53,998	4,330	-11%
2009	*	37,828	15,023	58,823	4,575	6%
2010	*	43,676	15,344	62,067	5,437	19%
2011	*	44,790	14,223	54,609	4,132	-24%
2012	*	44,472	12,806	49,832	3,860	-6.5%
2013	*	46,984	13,192	49,547	3,878	<1%
2014	*+	47,335	12,896	55,556	4,242	12%
2015	*+	48,735	13,298	56,490	4,695	10%
2016	*+	49,502	13,716	56,889	5,246	12%
2017	*+	48,538	12,890	54,716	4,797	-9%

* Includes Turkey Tags Sold with Sports Pac Licenses
+ Estimated using mandatory reporting data

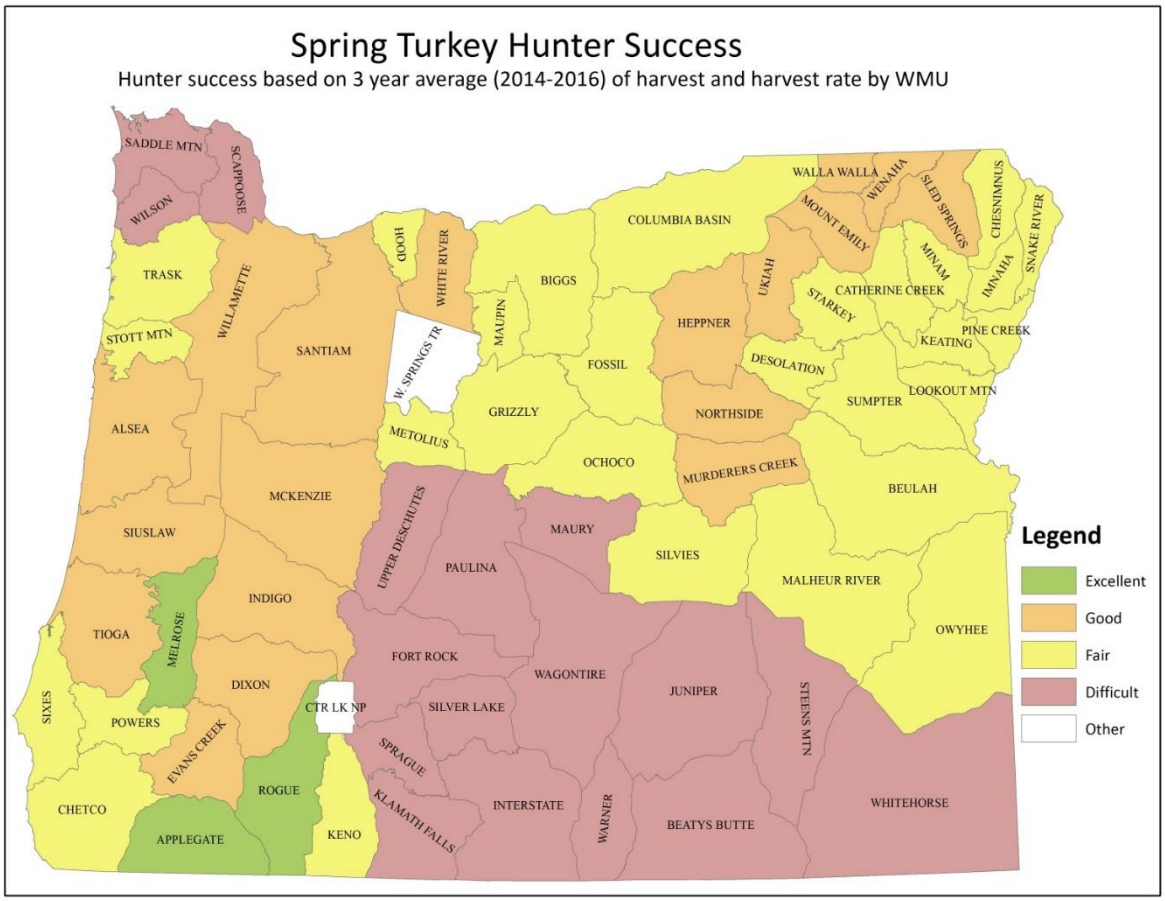

Figure 5. Total harvest and individual hunter success rates were used to rate turkey hunting success by wildlife management unit (WMU) in Oregon for the 2014 – 16 spring seasons. Data presented is the average for each WMU, consequently harvest opportunities may not be evenly distributed across each unit.

Fall Hunting Seasons – Oregon's first turkey hunting seasons were fall hunts. The first fall turkey hunt was in 1965, four years after the first release of Merriam's turkeys. Fall seasons occurred from 1965 – 1972 except for 1969, with a season bag limit of one turkey of either sex. Three hundred tags were issued the first year, 1,000 in the second, and no limit was placed on participation in fall hunts during the rest of that period. The fall hunt was limited to the Wasco Wildlife Management Unit (currently known as the White River WMU) the first three years, was expanded to include the Sled Springs Unit for the next two years, and then expanded to include all of Oregon north of Highway 26 and east of the Cascades summit. Fall hunting in this area was discontinued after 1972 (except for an experimental season in 1986) due to a population decline following a post-introduction peak.

Although fall hunting was discontinued in 1972, an experimental either-sex fall hunt occurred in 1986 in Douglas County, which was limited to 100 tag holders. However, large concentrations of turkeys observed in October dispersed during the fall hunt and did not regroup the remainder of the fall and winter. The fall season was not recommended in 1987 because the major management emphasis became trapping and transplanting which conflicted with fall hunting.

In 1994, the controlled fall season was reinstated in Douglas and Jackson counties. From 1994 – 2000, 900 permits were available annually, with an average of 262 issued each year. Since 2000, the number of first-come, first-served fall permits has increased dramatically; 1,000 tags in 2001, 2,000 tags in 2002, and 3,000 tags in 2003 (Table 2). These tags were valid for specified counties in western Oregon and in fall 2003, 10 counties were included in the hunt area. In 2009, the number of fall tags for western Oregon was increased to 4,000 and the open area was expanded to include all but three northwest Oregon Wildlife Management Units (WMUs) (Saddle Mt., Wilson, and Scappoose). As many as 3,000 of these tags have been issued for a single season, but in recent years it has been closer to 2,000 tags issued annually.

Additionally, in fall 2003, 100 tags were made available in two eastern Oregon controlled hunts (50 tags each). An additional controlled fall turkey hunt was added to eastern Oregon in 2006, and two more were added in 2008 with 725 tags available. By 2015, these five controlled hunts offered 1,000 controlled fall turkey tags. In 2016, four of the controlled hunts were combined into two general season hunts with 950 tags available over-the-counter on first-come, first-served basis. One controlled hunt remains for the White River WMU which typically receives three times the number of applicants as the available tags (50). ODFW will closely monitor changes in fall hunting regulations, as fall hunting has the potential to reduce turkey populations.

Table 2. Tags available, tags issued, hunter effort and harvest for fall turkey seasons in Oregon, 1994 – 2017.

Year	Tags Available	Tags Issued	Number of Hunters	Hunter Days	Harvest	Annual Harvest Change	Percent Success
1994	900	140	91	80	42		46%
1995	900	200	151	518	67	60%	44%
1996	900	200	104	435	66	-1%	63%
1997	900	276	212	540	135	105%	64%
1998	900	365	213	749	113	-16%	53%
1999	900	330	265	787	144	27%	54%
2000	900	322	243	676	122	-15%	50%
2001	1,000	1,000	662	2,437	257	111%	39%
2002	2,000	1,932	1,234	4,965	519	102%	42%
2003	3,000	2,613	1,666	5,949	755	45%	45%
2004	3,100	2,080	1,378	5,570	605	-20%	44%
2005	3,100	2,299	1,625	6,395	743	23%	46%
2006	3,425	2,537	1,708	6,562	694	-7%	41%
2007	3,525	2,673	1,881	8,135	779	12%	41%
2008	3,725	3,327	2,081	7,996	835	7%	40%
2009	4,725	3,718	2,595	10,426	1,138	36%	44%
2010	4,925	2,886	1,897	7,714	807	-29%	43%
2011	5,025	2,476	2,188	7,661	660	-18%	30%
2012	5,025	2,489	1,548	6,859	690	5%	45%
2013	5,025	2,752	1,715	7,576	692	0%	40%
2014	5,000	3,154	1,957	8,366	921	33%	47%
2015	5,000	3,388	1,929	8,086	880	-4%	46%
2016	5,000	3,468	1,888	8,122	847	-4%	45%
2017	5,100	3,359	1,932	8,424	926	9%	48%

ECONOMICS

As turkey distribution and populations increased nationally during the latter half of the 20th century, turkey hunting became the fastest growing form of hunting. Turkey hunting remains extremely popular in many states, despite recent (2009 – 2014) nationwide declines in spring turkey hunting participation (-2.3%) and harvest (-5.8%) (Eriksen et al. 2015). Southwick (2003) revealed that nationally, nearly 2.3 million spring turkey hunters were estimated to have spent $1.795 billion during the 2003 season.

Figure 6. The City of Lebanon Arts Commission celebrates the fact that their city is known for turkeys with the Great Quirky Turkey Pageant. Photo courtesy of the City of Lebanon.

In 2008, Oregon turkey hunters made 68,000 trips to hunt wild turkeys, 12,000 of which were overnight trips (Dean Runyan Associates 2009). The Western Association of Fish and Wildlife Agency's Wild Turkey Technical Committee extrapolated the findings of Southwick (2003) to 2015 and estimated that on average a spring turkey hunter in the west spends $1,197 each season. This indicates the 2015 spring season in Oregon generated about $16 million dollars in spending on goods, services, and travel. Every dollar spent by turkey hunters generates an additional $2.40 in economic activity (Southwick 2003).

The annual revenue for ODFW generated by the sales of turkey tags peaked in 2015 at $783,542, and has exceeded $700,000 since 2010. Turkey tag revenue for 2017 was estimated at $715,997. These monies are available for funding ODFW's general wildlife management actions and for leveraging additional federal dollars available through the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act).

WILDLIFE VIEWING

Approximately 1.4 to 1.7 million Oregonians engaged in wildlife viewing for recreation, the majority within 1 mile of their home (Department of the Interior et al. 2011, Dean Runyan Associates 2009). The large size of wild turkeys generally make these birds highly visible and popular with those that enjoying viewing wildlife. Though not mutually exclusive from those that hunt and fish, wildlife viewers represent the largest segment of Oregonians participating in wildlife-oriented recreation (Department of the Interior et al. 2011, Dean Runyan Associates 2009). There have been no specific studies that quantify economic contribution of those who enjoy viewing wild turkeys. However, as of this writing, contributors to the popular birding website, ebird.org had recorded 10,719 observations of wild turkeys in Oregon and had uploaded 176 photos and 4 audio recordings.

During winter, turkeys congregate in large flocks, often in more accessible areas at lower elevations, which enhance viewing or photography opportunities. As the range of wild turkeys and humans continue to overlap in suburban areas, viewing opportunities year round have increased, though not without corresponding nuisance concerns. During the spring, gobblers exhibit a magnificent breeding display and may be observed and/or photographed by patient individuals who learn proficient use of the hen call to lure birds within camera range.

Correspondence and telephone calls to ODFW from individuals pleased by having seen wild turkeys occurred as their distribution changed and numbers of turkeys increased in some areas. ODFW expects continued interest in opportunities for viewing and general enjoyment of wild turkeys. Some individuals who enjoy viewing turkeys and wish to extend their viewing opportunities, or simply want to be closer to wildlife, provide supplemental feed for the turkeys which inevitably leads to nuisance and damage issues.

NUISANCE AND DAMAGE

Each year, ODFW receives complaints about nuisance turkeys from agricultural producers, homeowners, and other land managers, and seeking information on how to alleviate various issues. Complaints received by ODFW are recorded in the Wildlife Damage Complaint database to track the number and type of complaints annually, as well as any actions taken. Based on the last three complete years of data (2015 – 2017) an average of 153 turkey-related complaints were received each year. The average annual number of turkey complaints (153) received in recent years is comparable to the average of 142 complaints received in 2002 and 2003 as reported in the 2004 Wild Turkey Plan. The "damage complaint" database also includes reports of injured turkeys, sick turkeys, or just observations of turkeys reported by the public, however these reports represent only 4% of the entries over the past three years.

Figure 7. Resourceful turkey hen feeding on songbird food in elevated bird feeder in Yamhill County, Oregon.

About 87% of turkey related complaints come from western Oregon, which is expected given that most of Oregon's residents are in western Oregon. It is not known what proportion of the landowners experiencing damage or nuisance issues from turkeys, or any other wildlife species, actually report to ODFW.

During the period of 2014 – 2016, the primary action by ODFW in response to turkey complaints was to issue a hazing permit. Hazing permits were issued in 53% of the cases. In every case ODFW offers advice and education to the complainant, but providing advice was the primary response by ODFW in 28% of cases. In 8% of the cases, depredation (kill) permits were issued and in 7% of the cases turkeys were trapped alive and translocated. Emergency hunts are also occasionally used to alleviate nuisance and damage. Emergency hunts are in addition to general or controlled hunting seasons. In 2016, three turkeys were harvested by emergency hunts, and 29 turkeys were harvested in 2015 through emergency hunts.

Protocol and alternatives for solving turkey damage complaints have been specifically addressed in ODFW wildlife damage policy (2008), and includes; providing advice, repellants (kites, mylar tape, balloons, predator decoys), hazing (noisemakers, distress

call recordings), barriers (fences, netting), altering habitat (remove security cover, attract animals away from site), removal of turkeys (trap and relocate), and hunting (designing seasons and harvest to reduce damage).

In addition, ODFW has worked with several municipalities (e.g. Corvallis, Dallas, Lebanon, Philomath, Pilot Rock) which have adopted city ordinances intended to prevent the feeding of turkeys. Some ordinances are specific to wild turkeys while others also include the feeding of other wildlife. In acute damage situations, the cities may also be issued kill permits by ODFW. Enforcement of the ordinances and execution the kill permits is typically conducted by city police. Community involvement and action is one the most effective, and perhaps the most necessary component in resolving turkey nuisance/damage in residential areas.

Fall turkey hunting can address damage or nuisance turkey issues, if hunters are able to gain access to, or safely hunt in the problem areas. Likewise, trapping and removing birds may not be feasible due to site logistics (e.g., too small of an area for safe rocket net operation). In situations where other preventive or corrective actions are infeasible, or in situations where turkeys are causing problems outside of hunting season, ODFW can issue to the landowner (or his agent) a Kill Permit to kill a specified number of wild turkeys. In some cases, taking one of the offending birds will sufficiently alter flock behavior and they will disperse from the site or cease offending activities. If trapping and removal is the chosen alternative to control a turkey damage complaint, ODFW has developed protocol for the handling of wild turkeys captured on damage complaints (see Appendix A for Trap and Transplant Guidelines).

Nuisance – The most common type of complaints (59%) received by ODFW during 2014 – 2016 was "general nuisance". Common nuisance complaints include turkey feces on homes, driveways, decks and undesired gobbling and commotion by turkeys during the breeding season. Turkeys in landscaping or gardens can be a nuisance or in some cases the birds may cause actual damage through their scratching or consumption of vegetation. Complaints of turkeys in landscaping represent 11%, and in gardens 7%, of all complaints received 2014 – 2016.

ODFW receives other types of nuisance complaints that are less common, such as concern for public safety (e.g. fear that turkeys are aggressive toward humans), concern for pets (fear turkeys will attack pets), and structural or fence damage. Most concern about "structural damage" is from having turkeys on roofs. Collectively, all of these additional concerns represent less than 8% of the complaints received during the period of 2014 – 2016.

As wild turkey populations demonstrate their ability to adapt and coexist in relatively high human-populated suburban settings, nuisance situations are likely to continue. While some people are pleased to see, and are protective of wild turkeys, adjacent

landowners may incur damage/nuisance issues and object to the concentrated presence of turkeys.

Agricultural Damage – Over the past three years, ODFW has received an average of 17 agricultural related complaints each year. The type of complaints vary but involve real or perceived damage to pasture, grass seed, small grains, stored hay, orchards, vineyards, and foraging in livestock feed bunks. Though given the option, few complainants provided an estimate of damage. Turkeys can cause damage to agricultural crops, but the damage is often less than perceived (Gabrey et al. 1993, MacGowan et al. 2006, Groepper et al. 2013). In many cases, landowners are concerned that if the birds are present they may be causing damage. Studies in vineyards, cornfields, and soybean fields found that most of the damage was done by nocturnal foragers such as raccoon and deer (MacGowan et al. 2006, Hughes and Eriksen 2015). Some landowners in southern Oregon have begun to value turkeys in their hay pastures because they have observed turkeys feeding on pests, such as grasshoppers and slugs (V. Oredson pers. comm.).

Impact on Native Wildlife Species – The potential biological impact of exotic (non-native) species on native wildlife is a concern among wildlife managers and others. Turkeys are native to most of the U.S. but are not native to Oregon. Some people have raised concerns about the possible impact of turkeys on native wildlife. ODFW has attempted to document, through literature review and/or conversation with turkey managers, competition for food between wild turkeys and other wildlife and determine if wild turkeys cause detrimental effects on the environment. Competition for food between wild turkeys, hogs, deer, squirrels, and other wildlife species has been discussed (Bailey et al. 1951, Shaffer and Gwynn 1967, Korschgen 1967). Foster (1992) indicates having observed Merriam's turkeys in Oregon competing with western gray squirrels for winter food. More recently, the investigation of food habits of turkeys in Oregon and Washington identified dietary overlap with many native species (Evans-Peters 2013). However, competitive relationships for food resources are difficult to establish because many species consume the same foods, but just by eating the same foods doesn't mean those resources represent a limiting factor for any species (Schoener 1982). Additionally, there are no data that indicate wild turkeys are intolerant of other birds or that wild turkeys exclude other gallinaceous species from an area. In their native range, wild turkeys co-exist with many of the same species (or their ecological equivalents) that occur in Oregon (e.g., ruffed grouse, deer, elk, quail, passerines, amphibians, and reptiles).

Turkeys could impact native species by selectively consuming the plant or animal species of concern. The accumulation of diet data from numerous studies (including from Oregon and Washington) about turkey food habits suggests that predation by turkeys on vertebrate species is rare and turkeys should not be considered a significant

threat to native vertebrate species of concern (Evans-Peters 2013). No threatened or endangered plant or invertebrate species were identified in the crops of wild turkeys from Oregon and Washington (Evans-Peters 2013). However, some plant taxa in the diet of turkeys were only identified to family or genus, some of which are the same genus of plant species of concern. Some invertebrate taxa consumed by turkeys were also similar to listed species or species of conservation concern, or in some cases the taxa of larval or chrysalis stages of invertebrates which could not be identified (Evans-Peters 2013). In Oregon, turkeys have not been documented consuming species of conservation concern, however given the similarity in taxa of foods that were consumed, it is possible turkeys could eat species of concern, but the likelihood is low by the very fact that species of concern are not common on the landscape.

Turkeys have the potential of impacting native plant and animal species if they alter habitat by consuming and distributing viable seeds of noxious weeds. To investigate the potential for seed dispersal by turkeys in Oregon and Washington, Evans-Peters (2013) collected 1,500 turkey fecal samples from 50 sites in four regions of these two states. Intact seeds were separated from the feces and tested for viability. Seeds from snowberry (*Symphoricarpos sp*.), hawthorn (*Crataegus sp*.), and manzanita (*Artcostaphylos sp*.) were most frequently found in the fecal samples (Evans-Peters 2013). Evans-Peters (2013) found seeds of 22 taxa in the fecal samples and each was tested for viable seeds. Nine of the 22 taxa tested had at least some viable seeds after passing through a turkey, but only three taxa had more than 10% viable seeds; the pea family at 70% viability, poison oak (*Toxicodendron sp*.) at 24.5%, and snowberry at 11.6% (Evans-Peters 2013). The large seeds of the pea family had the highest viability, but only 10 seeds were identified from the 1,500 fecal samples and all were tested for viability. This study likely did not identify all seeds consumed by turkeys in the northwest, and it did identify some viable seeds (~4.5%) from noxious weed species like Himalayan blackberry. However, the study suggests turkeys are not a common dispersal vector for most of the seeds they consume (Evans-Peters 2013) and viable seeds with highest frequency of occurrence were from native taxa (e.g. snowberry, manzanita). Turkeys have a large muscular gizzard which makes it unlikely viable seed will be passed.

SECTION 4: MANAGEMENT GUIDELINES

HARVEST MANAGEMENT

Turkey hunting contributes millions of dollars to Oregon's economy and is a popular activity for many Oregonians. Turkey hunting is also a popular opportunity for youth hunters, who account for nearly 20% of the spring harvest. The goal of Oregon's turkey harvest management is to maintain population levels to optimize recreational benefits while maintaining compatibility with the primary use of the lands and waters of the state. In some areas of the state, private land offers the best habitat for wild turkeys. State private lands access programs, such as the Access & Habitat Program, can improve turkey hunting opportunity on private land. Harvest management can be considered as three opportunities: spring, fall, and emergency hunts. The spring turkey season is designed to maximize recreational opportunity and maintain turkey populations. The fall turkey season is primarily designed as a population management tool by allowing the removal of breeding females from the population, while also offering additional hunting opportunity outside the spring gobbler season. Emergency hunts are utilized to strategically address acute nuisance or damage issues on specific properties utilizing OAR Chapter 635, Division 078: Emergency Hunting Regulations.

Spring Season harvest management strategies:

Strategy 1. Start spring turkey season on April 15, which is approximately the average start of incubation in Oregon.

Strategy 2. Limit spring season to the take of male turkeys, or turkeys with a visible beard.

Strategy 3. Continue to offer youth-only spring hunting opportunities for turkeys to attract new hunters and avoid competition from adults.

Strategy 4. Distribute harvest opportunity among hunters, limit daily bag limit for spring season to one legal bird.

Strategy 5. Monitor harvest and hunting effort trends through mandatory reporting of spring harvest.

Strategy 6. Seek agreements and easements to provide access to private land.

Strategy 7. When practical, translocate nuisance turkeys trapped during winter operations to areas where reasonable public hunting opportunity will exist during the subsequent spring hunting season.

Fall Season harvest management strategies:

Strategy 8. Use bag limits, length of season, and timing of season to manage turkey populations consistent with the primary uses of the lands and optimal recreational opportunity.

Strategy 9. Provide appropriate numbers of fall turkey tags through controlled hunts and limited first-come first-served general season hunts.

Strategy 10. Allow either-sex harvest to manage population growth with the understanding that harvesting 10% or more of the hen population may result in population decline.

Strategy 11. Monitor harvest and hunting effort trends through mandatory reporting of fall harvest.

Emergency Hunts:

Strategy 12. Emergency hunts for turkeys are conducted consistent with OAR (Chapter 635, Division 078).

Strategy 13. Number of hunters and tags will be limited to the minimum amount to achieve desired outcome (e.g. damage reduction).

Strategy 14. Where lawful and agreeable to the landowner(s), emergency hunts should be the preferred method for lethal removal rather than depredation (kill) permits.

Strategy 15. ODFW will explore additional tools via legislative and rulemaking processes to maximize the effectiveness and efficiency of wild turkey depredation relief hunts.

HABITAT MANAGEMENT

Wild turkeys are habitat generalists and adaptable to a variety of habitat types, but like all wildlife, turkeys have basic habitat needs to meet their annual life history requirements. Successful turkey populations have access to suitable roost sites, adequate and secure nesting areas, brood foraging areas, and winter food such as produced by mast-bearing shrubs and trees. Good turkey habitat, such as Oregon white oak savannah, open-canopy conifer forests, and healthy riparian areas are also beneficial to a wide variety of other wildlife species. Specific habitat enhancement projects most valuable to turkeys will depend on the limiting factors for a local area.

Collaborating on projects with other cooperators increases the chance that limited contributions from each cooperator can cumulatively make a meaningful difference.

Within the past year ODFW has partnered with the USFS, NWTF, OHA, RMEF, Burns-Paiute Tribe and others on habitat projects in Grant, Umatilla, Harney and Jackson counties. Projects included aspen and riparian restoration, chokecherry restoration, and the creation of a mosaic of early seral openings in forested habitat. For future opportunities to enhance habitat for wild turkeys and other wildlife, ODFW shall use the following strategies to identify the most valuable habitat projects to support

Habitat Management Strategies:

Strategy 1. Prioritize habitat enhancement projects addressing life history needs for turkeys and that additionally benefit species of conservation concern.

Strategy 2. Support habitat enhancement projects on properties open to public hunting.

Strategy 3. Prioritize turkey habitat enhancement projects involving other agencies and organizations (e.g. USFS, National Wild Turkey Federation, Oregon Hunters Association) which achieve multiple objectives.

Strategy 4. Prioritize enhancement projects which reduce complaints associated with nuisance of turkeys.

Strategy 5. ODFW will continue to participate on the Oregon NTWF Super Fund Committee as a non-voting member to provide technical assistance in evaluating Super Fund habitat project applications.

NUISANCE AND DAMAGE

Turkeys and other wildlife have a potential to cause damage since they feed on a wide variety of vegetation that can include agricultural or garden crops. Most agricultural-related complaints are of "nuisance" issues with landowners complaining of noise, birds feeding in pastures with or around livestock, or turkey feces in or on livestock feed. Additional problems occur in urban and suburban areas where turkeys are attracted by deliberate or unintentional placement of feed. In these areas, complaints are typically about turkey feces on decks, driveways, and vehicles, scratching for food in vegetable and flower gardens, and exhibiting aggressive behavior during the breeding season. Most of these problems occur during the winter when birds concentrate in flocks at lower elevations, but may occur year-round, particularly in temperate western Oregon.

Individual Wildlife Districts typically have the responsibility of implementing preventative or corrective actions to resolve turkey damage situations. Depending on the situation, ODFW District Wildlife Biologists have broad discretion to best deal with the problem, which may include working with landowners to discourage turkeys away from the attractant. Generally, problems can be effectively dealt with by allowing

hunting, hazing, removing attractants, issuing kill permits, or trapping and removal, but in urban/suburban areas many of these tools are not available because of safety concerns or local laws. ODFW's Damage Policy (2008) provides the guidance for wildlife damage control. The current policy includes the following options; advice, repellants, hazing, barriers, habitat alteration, removal of turkeys, hunting, and private animal control services. Currently, per OAR Chapter 635, Division 435, wild turkeys are not an allowed species for take by Wildlife Control Operators; USDA-APHIS is exempt from these rules.

Nuisance and Damage Reduction Strategies:

Strategy 1. Use protocol and alternatives for solving turkey damage complaints as specifically addressed in ODFW's Wildlife Damage Policy (2008) and any subsequent updates to the policy.

Strategy 2. ODFW will continue to educate the public about deliberately or unintentionally feeding wildlife which can attract turkeys to their property or neighboring properties where they are not welcome. Education will include online resources, personal contact, and printed material. Municipalities experiencing turkey nuisance and damage will be encouraged to enact feeding ordinances.

Strategy 3. Encourage complainants to keep a daily journal of the activities of the nuisance flock. Documentation will allow ODFW to assess the severity of the problem and plan the best time to make a site visit designed to resolve the situation. Trail cameras can also be a useful tool for documenting activity times and nuisance/damage.

Strategy 4. If trapping and removal is the chosen alternative to address a turkey nuisance/damage complaint, ODFW shall follow the Turkey Trap and Transplant Guidelines (Appendix A).

Strategy 5. Utilize either-sex fall turkey hunting seasons and emergency hunts to manage turkey populations to reduce conflict.

Strategy 6. Explore new and innovative ways and partnerships to address turkey complaints, particularly in urban and suburban areas.

Strategy 7. ODFW will examine options to reduce barriers for Wildlife Control Operators and USDA-APHIS to engage in wild turkey removal, particularly in municipal and commercial-type damage complaints.

EMERGENCY AND SUPPLEMENTAL FEEDING

Emergency and supplemental feeding is the intentional and artificial spreading of food to increase turkey survival. Emergency feeding is usually in response to severe winter conditions that limit turkeys' access to natural foods. Most wild turkey biologists agree that supplemental feeding does not enhance survival or reproductive performance of wild turkeys under normal winter conditions. Turkeys that become dependent upon supplemental foods may not receive a nutritionally balanced diet. Furthermore, feeding artificially concentrates birds and predisposes them to predation, diseases, and poaching.

Emergency and supplemental feeding should not to be confused with planting food plots, planting mast-producing trees and shrubs or leaving unharvested crops standing in fields. ODFW supports landowners that utilize these latter practices for providing wildlife habitat. In some cases, providing an alternative food source for turkeys, such as oat hay bales, may be a short-term solution to alleviate nuisance/damage by attracting turkeys away from a problem area. However, providing an alternative food source is not a long-term solution.

When wild turkeys are provided supplemental feed, they can easily lose their natural avoidance behavior and become a nuisance problem. Unintentional feeding may occur where turkeys visit songbird feeders, outside pet food bowls, barnyards or livestock feed lots. Even unintentional feeding can lead to unnaturally high turkey concentrations, disease, and potential damage. Planting of food producing trees/shrubs or plants and leaving unharvested crops are alternatives to emergency or supplemental feeding.

Supplemental Feeding Strategies:

Strategy 1. ODFW will discourage the deliberate placement of supplemental feed for turkeys as an attractant or intended benefit to the bird's general well-being.

Strategy 2. ODFW will continue to educate the public about the negative effects of feeding turkeys, which in many cases results in turkeys congregating in areas where they are not welcome.

Strategy 3. ODFW will provide advice to landowners and land managers to limit turkey access to unintentional sources of food (e.g. songbird feeders, pet food, livestock feed).

Strategy 4. ODFW may provide, or participate in, cooperative programs that offer alternate food sources to turkeys as a short-term solution to alleviate acute nuisance/damage issues.

Strategy 5. In exceptional circumstances, such as an usually severe winter, and after an evaluation to ensure nuisance issues won't be exacerbated, ODFW may sanction the placement of alternative food as a short term measure in an attempt to increase survival and/or reduce nuisance.

Strategy 6. ODFW will encourage municipalities experiencing turkey nuisance issues due to intentional feeding to enact ordinances prohibiting the feeding of wildlife.

RISK TO NATIVE WILDLIFE

The potential biological impact of exotic (non-native) species on native wildlife is a concern among wildlife managers across the western U.S. Based on extensive literature review and local research, to date there is no evidence wild turkeys negatively impact populations of native species of wildlife or plants in Oregon, or in other areas outside the native range of turkeys. However, as the aphorism goes, "the absence of evidence is not evidence of absence". Consequently, ODFW will continue to consider findings that document turkey population's potential to impact native species.

Native Wildlife Risk Reduction Strategies:

Strategy 1. ODFW will continue to evaluate the literature and research efforts to document potential interactions of turkeys that may negatively impact populations of Oregon's native plants and animals.

Strategy 2. ODFW will cooperate with land management agencies in development and implementation of population and habitat monitoring programs of wild turkey numbers and vegetative communities when and where appropriate.

Strategy 3. ODFW will cooperatively develop and implement appropriate management actions to protect species of concern if it is determined a population of native species or its habitat is being negatively impacted by wild turkeys.

Strategy 4. ODFW will follow the Turkey Trap and Transplant Guidelines that incorporate considerations for native species of conservation concern (Appendix A).

TURKEY HUNTER EDUCATION AND SAFETY

General hunting safety guidelines apply to turkey hunting, and specific attention should be given to target identification. Turkey hunters usually wear full camouflage, set decoys near their hunting setup and use calls to imitate turkeys in an effort to secure a close-

range shot (typically 15-50 yards). Because turkeys have exceptional eyesight and see color, blaze orange clothing is not required for Oregon youth hunters and adult hunters avoid it. Consequently, hunters need to be especially careful while turkey hunting and positively identify their targets to prevent a hunting incident. Although turkey-hunting incidents do occur, the risk of incident per participant is far less than many other forms of outdoor sports (e.g. skiing, swimming or boating) (Keck and Langston 1992). From 2000 – 2016, there were four reported turkey hunting incidents in Oregon (one each in 2002, 2008, 2011, & 2012). None were fatal.

Since 1991, the National Wild Turkey Federation (NWTF) has convened three wild turkey hunting safety task forces. Many states, Oregon included, have adopted safety recommendations from these task forces, and the safety recommendations likely contributed to the 64% reduction in turkey hunting incidents per capita from 1991 – 2005. This same period also saw rapid growth in the number of hunters pursuing turkeys.

Recent safety concerns regarding the practice of "fanning" or "reaping" led the NWTF Technical Committee to recommend reconvening the task force in 2018. Reaping is the technique of belly-crawling across an open field or pasture behind a turkey's fanned tail feathers. Some hunters use an actual turkey fan; others use one of the many fan decoys on the market. In 2017 in Kansas, two hunters hiding behind a turkey fan sustained injuries when they were shot by another hunter who mistook them for a gobbler. As of November 2018, the International Hunter Education Association (IHEA) does not have a formal position on reaping. ODFW does not ban the practice, but emphasizes in its hunting regulations and hunter education programs that hunters should always be sure of their target and what is in front and beyond it. ODFW emphasizes hunter safety through its website, brochures, news releases, contact with outdoor writers, discussion before sportsman's groups, and hunter education programs.

Hunter education is an ongoing priority for ODFW. The agency seeks to educate turkey hunters through a blend of print media, online courses and live workshops. Through these efforts, ODFW teaches turkey hunters about hunting strategies, weapons, ammunition, ethics, turkey hunting opportunities in the state, and methods for correctly identifying what turkeys are legal for harvest. ODFW values strategic partnerships and works with organizations such as the NWTF and the Oregon Hunters Association (OHA) to run public turkey hunting workshops statewide.

Safe Turkey Hunting Strategies:

Strategy 1. ODFW will use the Wild Turkey Hunting Safety Task Force final report (NWTF 2005), or the most recent updates, to guide turkey hunting regulations and requirements.

Strategy 2. ODFW will continue to develop and distribute information about turkey hunting methods, ethics, and safety through various media.

Strategy 3. ODFW will participate in workshops and seminars promoting safe and ethical turkey hunting.

WILD TURKEYS AS AN R3 SPECIES

Wild turkeys are an ideal pursuit species for new and relapsed hunters. They are abundant, require minimal gear to hunt. Harvesting and packing out a big game animal can be intimidating to a new hunter, but those with a modest skill level can still successfully bag a turkey. Turkeys are a manageable size while still offering plenty of table fare. Turkey hunting can take place in a controlled, safe, one-on-one environment between mentor and mentee. Because Oregon offers both spring and fall turkey seasons, hunters have multiple opportunities for success and skill building. The skills acquired in learning to turkey hunt can be translated to pursuit of larger game animals.

ODFW is proactively working to provide interested customers with the skills they need to hunt independently and confidently through the Outdoor Skills Program. The Program currently supports a youth turkey hunting clinic in partnership with the Oregon Hunters Association (OHA) and ODFW's White River Wildlife Area, an online adult self-learning course, and turkey hunting seminars at sporting goods stores. Youth-only hunts provide an opportunity for beginning hunters to learn safe, ethical, and responsible hunting techniques and behaviors without competition from adults. Hunting access remains a barrier for new turkey hunters, but there may be opportunities for programs that provide new hunters with a hunting mentor and land access.

OFDW also needs to understand the "customer journey" of the turkey hunter. Data from workshop attendees through turkey hunting and other pursuits can allow adaptive strategies to ensure the best outcomes for ODFW's programs.

Wild Turkeys and Hunter R3 Strategies:

Strategy 1. ODFW will maintain a youth-only spring hunt or time period.

Strategy 2. ODFW will continue to offer skill acquisition opportunities for new turkey hunters, including both youth and adult participants.

Strategy 3. ODFW will look for opportunities to pair mentored hunting with private lands access programs specific to turkey hunting.

Strategy 4. ODFW will examine possibilities to track wild turkey Outdoor Skills Program participants to determine success of hunter R3 strategies.

Strategy 5. ODFW will partner with interested non-governmental organizations to increase the scope and success of wild turkey hunting outreach programs.

UNAUTHORIZED TURKEY RELEASES

Well-meaning or careless individuals try to establish wild turkeys by rearing and releasing birds raised from eggs or poults purchased from breeders of "wild" stock. Although the release of wildlife is illegal without a permit (ORS 498.052), and ODFW does not issue permits for the release of domestically-raised turkeys, some people are unaware or do not care that their actions are unlawful.

The releasing of captive-reared, or game farm turkeys, into the wild has been, and remains, a concern for turkey biologists and managers. Releasing pen-raised turkeys is ineffective and creates unwanted issues for several reasons: (1) pen-raised birds often create nuisance issues because of familiarity with humans; (2) survival of captive-reared stock in the wild is very low (Bailey and Putnam 1979); (3) poults from captive stock do not learn the skills needed to survive in the wild, (4) pen-raised turkeys may harbor various poultry diseases that could be transmitted to wild stock; and (5) there is a chance that pen-raised "wild" turkeys are genetically inferior and could dilute the genetically desirable traits of wild stock. The past unsuccessful experience of many states, including Oregon, in attempting to establish wild flocks using pen-raised turkeys substantiates these concerns.

ODFW will continue public education efforts to disallow the release of pen-raised turkeys into the wild. To discourage unauthorized releases, enforcement action will be pursued when violations are found.

Prohibiting Release of Pen-reared Turkey Strategies:

Strategy 1. ODFW will not issue permits for the release of pen-raised or game-farm turkeys.

Strategy 2. ODFW will continue to educate the public about the biological problems associated with releasing pen-raised or game-farm turkeys.

Strategy 3. ODFW will advocate for enforcement action when unlawful releases occur.

DISEASE AND PARASITES

Wild turkeys are susceptible to many diseases of domestic turkeys and chickens including avian pox, mycoplasmosis, histomoniasis, trichomoniasis, and coccidiosis. Wild turkeys are likely susceptible to infection by viruses of domestic turkeys, however, most of these viruses are not known in wild turkeys or have been reported only rarely (Davidson and Wentworth 1992). Fortunately, wild and domestic turkeys seldom come into contact, thereby reducing the opportunity for disease to spread. Potential for the transmission of disease is a major reason why releasing domestic birds into the wild is greatly discouraged and illegal.

Although turkeys can contract many of the same diseases to which domestic poultry are susceptible, the hazards of living in the wild quickly eliminate unfit or ill birds from the population. For this reason, many diseases that can be devastating to domestic poultry operations are uncommon or have little effect in wild populations. Disease and parasitic infections causing significant mortality events in wild turkeys have not been documented in Oregon. To reduce the risk of such an event happening in the future ODFW will follow the management strategies list below.

Disease/Parasite Risk Reduction Strategies:

Strategy 1. Adhere to ODFW's Avian Holding and Translocation Guidelines (ODFW 2017).

Strategy 2. ODFW will not issue permits for the release of domestic or pen-raised turkeys.

Strategy 3. ODFW will work with private individuals to reduce the chances of disease transmission between wild turkeys and domestic fowl.

Strategy 4. ODFW will investigate the options and methods to remove flocks of pen-reared turkeys illegally released onto public lands.

Strategy 5. Birds scheduled for translocation outside of their home range will be held until disease testing is concluded and evaluation and health certification is provided by an ODFW veterinarian.

POPULATION MONITORING

Accurately estimating wild turkey population numbers has been a challenge for wildlife managers throughout the United States. Turkeys can be elusive, occupy inaccessible habitats, and roam widely. Currently, there is not a universally accepted method considered effective for estimating wild turkey populations (Cobb et al. 2001, Eriksen et al. 2015). State agencies utilize various methods for monitoring turkey populations including mark-recapture studies, direct counts of wintering populations, brood surveys, rural mail-carrier surveys, gobbling counts, turkeys per square kilometer of forest, hunter check stations, landowner turkey production surveys, and harvest as a percentage of total population.

Most information about Oregon turkey populations comes from upland game bird routes conducted each summer by ODFW personnel, hunter-harvest surveys (mandatory reporting), and wildlife damage reports. To assess population status, the number of broods observed during the routes, average brood size, composition and size of winter flocks, age composition of the harvest and hunter success are data useful in evaluating population trends. The direct relationship between summer production route survey data and turkey population size is not well understood, but given

sufficient survey effort, summer roadside surveys should provide production and abundance indices. Brood route survey effort for turkeys has greatly increased since the adoption of the Wild Turkey Management Plan in 2004. Specifically, increasing steadily from 122 miles of survey routes in 2003 to 1,067 miles of survey routes in 2017. Additionally, ODFW biologists use anecdotal information from random observations, brood sightings, and hunter reports to monitor turkey populations in their Districts.

The development of effective and statistically valid methods to assess turkey population trends continues to be a high priority for turkey managers nationwide, including Oregon. ODFW will cooperate with the Western Association of Fish and Wildlife Agencies Wild Turkey Workshop, the NWTF Wild Turkey Technical Committee and others to improve turkey enumeration techniques.

Population Monitoring Strategies:

Strategy 1. ODFW will participate in ongoing efforts to develop and implement statistically valid survey methods to monitor populations in cooperation with other agencies.

Strategy 2. ODFW will continue and expand efforts on annual summer (brood) surveys.

Strategy 3. ODFW will utilize hunters to collect information on harvest and biology of wild turkeys.

RESEARCH PRIORITIES

To appropriately manage wild turkeys, ODFW will evaluate the need for additional data about turkey biology and management issues. Research from other areas can inform management in Oregon, but in some cases research needs will be best served with original data from Oregon. In addition, research priorities will likely change over time to meet emerging management needs. The following issues have been identified as research needs in the past: (1) investigate competitive interaction between wild turkeys and native wildlife, (2) document interactions between nutritional resources and turkey populations (Robbins 1983), (3) build further on research by Lutz and Crawford (1987a,b) and Keegan and Crawford (1997, 2005a,b) to identify resource utilization of wild turkeys in Oregon to reduce conflict and identify appropriate turkey habitat, and (4) identify a valid survey method to monitor turkey populations. Research opportunities will be implemented based on feasibility, available funding, and agency priorities.

Research Strategies:

Strategy 1. Evaluate effectiveness of various techniques to reduce nuisance/damage in suburban/urban areas.

Strategy 2. Identify and adopt a cost effective, scientifically valid survey method to monitor wild turkey populations.

Strategy 3. Investigate the potential competitive interaction between wild turkeys and native wildlife which may limit native populations over time.

Strategy 4. Increase understanding of habitat selection by wild turkeys to reduce conflict and identify appropriate habitat or restoration needs.

Strategy 5. Understand prevalence or effect of diseases on local turkey populations, e.g. LPDV.

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APPENDICES

APPENDIX A. TRAP AND TRANSPLANT GUIDELINES

During fall through late winter when food resources are limited, turkeys usually concentrate in large flocks at lower elevations. At these times, turkeys can be attracted to bait sites for trapping and removal to address nuisance or damage issues. Drop nets, rocket nets, or walk-in traps are proven to be effective techniques at these sites to capture multiple turkeys in a single capture event. The development of these capture methods has made it possible to relocate wild turkeys.

Prior to the adoption of 2004 Oregon Wild Turkey Management Plan, ODFW followed interim trap and transplant guidelines. The interim guidelines and the 2004 Plan allowed for the continued trapping of birds from in-state depredation and nuisance complaints, and those turkeys could be used to augment existing populations. Following establishment of turkey flocks in suitable habitat statewide, release sites after 2000 were limited to areas known to be occupied by a breeding population of wild turkeys. Those trapping guidelines are continued in this Plan with some modification as it relates to disease risk reduction and the identification of suitable release sites.

1) Turkey trap sites will be developed from depredation and nuisance complaints only and trapping will be used to address those complaints.

2) The release of turkeys will be used for augmenting existing turkey populations in habitat identified as "currently occupied" habitat. "Currently occupied" shall mean that reproduction has been documented in two out of the previous three years within 10 miles of the proposed release site. For reference, Rio Grande hens may disperse up to 25 miles from winter flock locations.

3) Prior to turkey introduction into suitable unoccupied habitat, a site analysis will be conducted to evaluate potential negative impacts. At a minimum, site analysis will consider:

    a) Current damage or nuisance issues and likelihood of future nuisance complaints.

    b) Impacts to existing management actions, such as restoration efforts.

    c) Long-term survival of species of special concern. Species of special concern will include state and federally listed Threatened, Endangered, Candidate, and Sensitive Species and species identified as "Species of Greatest Conservation Need" in the 2017 Oregon Conservation Strategy (or most recent version).

In the case of previous occupation of a suitable site by wild turkeys where those birds are no longer present, a biological evaluation of the reason for die-off and if that reason can be mitigated in future flocks. "Potential negative impacts" will be based on credible and defensible methods such as niche overlap analysis, spatial habitat analysis, and literature review and will be interpreted at a "reasonable person standard". Measures will be taken to mitigate potential negative impacts. If potential negative impacts cannot be mitigated or mitigation measures cannot be identified, the site will not be used as a release site.

4) For all release sites, priority will be given to locations that will provide future opportunities for public hunting.

5) ODFW will create and periodically update a map of occupied turkey habitat (Appendix C) based on documented turkey reproduction submitted by the wildlife districts or other reliable sources. Time constraints have not allowed ODFW field staff to prioritize these observations. Alternative acceptable sources for juvenile wild turkey observations might include the Breeding Bird Survey, curated and confirmed observations submitted by recreational birders (such as eBird), the Christmas Bird Count, or the documented harvest of a juvenile wild turkey. Areas with suitable habitat, and not defined as currently occupied, shall be considered undocumented or suitable unoccupied habitat.

6) Annually, ODFW Watershed Managers, in consultation with their Wildlife Districts, will submit to the Wildlife Division a list of release sites in their order of priority. For each release site, Watershed Managers will identify that the release augments an existing wild turkey population in "currently occupied" habitat, as defined in 2) above. Wildlife Districts must have available documentation that the release site is "currently occupied" by wild turkeys.

7) The Wildlife Division in cooperation with Regions will prioritize a statewide release site list with a second tier of regional priorities. This list will be provided to the trap crew supervisor(s). All release sites will be selected from the statewide release list, and releases will be made in an order considering priority of site on the list and logistic efficiency (e.g. snow conditions at release site, weather or road conditions, and location of trap site relative to location of release site). ODFW will continue to seek cooperative funding to support the trap and transplant program.

8) ODFW recognizes that the Oregon Department of Agriculture (ODA), by statutory authority in ORS 596.020, is provided the ability to "take all measures necessary and proper, in its judgment, to control diseases within this state and to eradicate and prevent the spread of infectious, contagious and communicable diseases that may exist among livestock and to prevent the entry into this state of animals or materials liable to convey infectious, contagious and communicable disease to the livestock or people of this state". Within this general authority is the ability to require testing and diagnostic procedures and to control and eradicate exotic and emergency

diseases. ODFW will consult regularly with ODA regarding disease-testing protocols for wild turkey trap and transplants.

9) Turkey handling and testing shall adhere to ODFW's most current *Avian Holding and Translocation Guidelines* which includes a general physical evaluation of all birds, and if required, sampling for diseases such as *Salmonella* (Pullorum and Fowl Typhoid), *Mycoplasma gallisepticum* (MG), and *Mycoplasma synoviae* (MS). Birds scheduled for translocation will be held until results of any disease testing are known and birds are cleared for release by an ODFW veterinarian.

10) All captured wild turkeys will be aged, sexed, and banded. Male turkeys should be banded with lock-on leg bands.

11) All trapping information, capture location, numbers of birds released, release location, date of release, etc., will be provided to the Wildlife Division. These records will be kept indefinitely in a database at ODFW headquarters.

12) Wild turkeys captured to reduce damage or nuisance in numbers not sufficient to warrant the expense to transport to priority release sites, may be released in occupied habitat in the same county of capture to augment existing populations.

APPENDIX B. RELOCATION HISTORY OF TURKEYS IN OREGON 1961-2017

Number of wild turkeys released by year and by county; majority of birds were captured to alleviate nuisance/damage and relocated to currently occupied habitat.

Capture Year	Merriam's	Rio Grande	Total
1961-62	58	0	58
1962-63	8	0	8
1963-64	38	0	38
1964-65	9	0	9
1965-66	5	0	5
1968-69	29	0	29
1975-76	9	20	29
1976-77	8	0	8
1981-82	0	56	56
1982-83	41	52	93
1983-84	63	123	186
1984-85	35	0	35
1985-86	0	248	248
1986-87	0	153	153
1987-88	0	460	460
1988-89	0	318	318
1989-90	0	473	473
1990-91	0	256	256
1991-92	0	432	432
1992-93	0	808	808
1993-94	0	352	352
1994-95	0	848	848
1995-96	0	486	486
1996-97	0	698	698
1997-98	0	496	496
1998-99	0	711	711
1999-2000	0	889	889
2000-01	0	484	484
2001-02	0	368	368
2002-03	0	346	346
2003-04	0	612	612
2004-05	0	566	566
2005-06	0	397	397
2006-07	0	360	360
2008-09	0	268	268
2009-10	0	280	280
2010-11	0	273	273
2011-12	0	266	266
2012-13	0	457	457
2013-14	0	313	313
2014-15	0	396	396
2015-16	0	399	399
2016-17	0	324	324
2017-18	0	544	544
TOTAL	**303**	**14,096**	**14,399**

By County	Total
Baker	746
Benton	133
Clackamas	45
Clatsop	37
Columbia	25
Coos	118
Crook	1,399
Curry	471
Deschutes	68
Douglas	3,060
Grant	1,306
Harney	969
Hood River	50
Jackson	316
Jefferson	173
Josephine	179
Klamath	1,680
Lake	461
Lane	186
Lincoln	40
Linn	247
Marion	31
Morrow	278
Multnomah	0
Polk	339
Tillamook	88
Umatilla	483
Union	962
Wallowa	414
Wasco	569
Washington	114
Wheeler	46
Yamhill	156
Unknown	78

APPENDIX C: OREGON WILD TURKEY OCCUPIED HABITAT (2016)

Wild turkeys occur in nearly every county of the state, though likely few remain in Clatsop and Tillamook counties. Occupancy is determined by evidence of wild turkey reproduction in 2 out of 3 years. Although wild turkeys were not introduced to Malheur County (southeastern-most county) from Oregon, this population was established from expanding wild turkey flocks in Idaho.

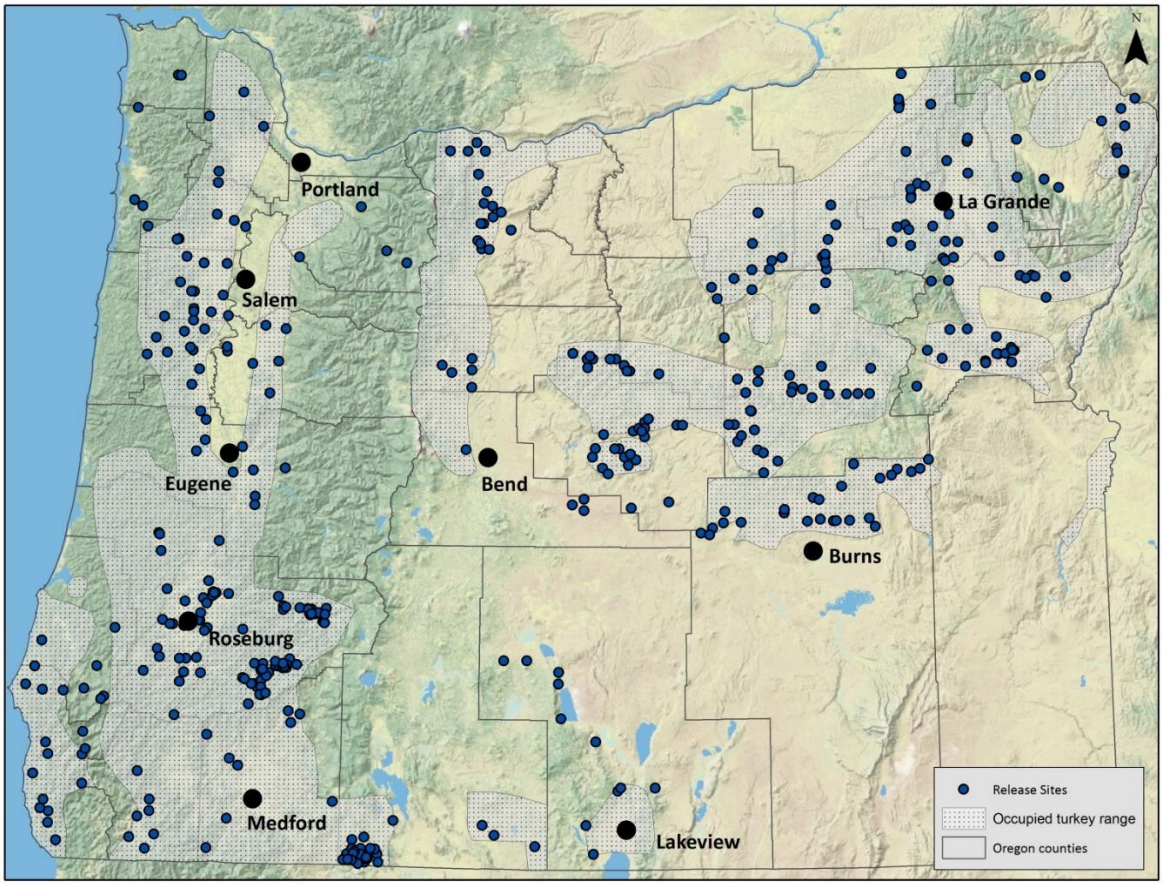

Figure 8. Wild turkey release sites (1961-2016) and current occupied range of wild turkeys in Oregon.