WILDLIFE
IN MANAGED FORESTS

NORTHERN SPOTTED OWL

Wildlife in Oregon's Managed Forests
Outreach Project Overview

A great deal of research has been done by public and private organizations regarding wildlife and wildlife habitats in Northwest managed forests (i.e., forests where management such as thinning, harvesting, prescribed burning, tree planting and vegetation control is practiced). However, the research results and their implications have not been communicated in an accessible, systematic fashion. This publication is part of a new series from the Oregon Forest Resources Institute. The Wildlife in Managed Forests Outreach Project aims to synthesize current research findings and make information available to field practitioners in forest and wildlife management, and to other interested stakeholders such as conservation organizations, regulators and policy makers. In addition to publications, information will be disseminated through workshops, tours and conferences.

Project Partners include:

- Defenders of Wildlife (DOW)
- National Council for Air and Stream Improvement (NCASI)
- Oregon Department of Fish and Wildlife (ODFW)
- Oregon Department of Forestry (ODF)
- Oregon Forest Resources Institute (OFRI)
- Oregon State University College of Forestry (OSU-CoF)
- The Nature Conservancy (TNC)
- U.S. Forest Service Pacific Northwest Research Station (USFS-PNW)
- U.S. Geological Survey Forest and Rangeland Ecosystem Science Center (USGS-FRESC)
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Printed on recycled paper

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NORTHERN SPOTTED OWL

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INTRODUCTION

Swooping through the forest, the dark-eyed owl with chocolate brown plumage and white spots might seem an unlikely candidate for status as one of the best known, most studied birds in the world. Biologists began researching the Northern Spotted Owl in the 1970s, but its listing in 1990 as a Threatened Species triggered an unprecedented surge of innovative, rigorous, large-scale and long-term research into the owl's biology and habitats. Traditional life-history observation was combined with pioneering technologies and analytic techniques, resulting in a wealth of unique data.

Northern Spotted Owl with mouse captured from researcher.

The Northern Spotted Owl is regarded by some scientists as an "indicator species," meaning that its well-being is an indication of the health of its ecosystem. Others say there is no scientific basis for this concept and dispute the use of the term, or that the owl is an indicator species. Ultimately the quest for recovery and conservation of the owl became the catalyst for a new, reserve-based strategy of forest management.

Fourteen years after the listing, the research and data were re-examined as part of the U.S. Fish and Wildlife Service's (USFWS) five-year status review process. The resulting 2004 Scientific Evaluation of the Status of the Northern Spotted Owl involved 17 scientists, four public meetings, external peer reviews and the critique and discussion of more than 1,100 documents (Courtney and others, 2004). Research since the original listing has produced some surprises along with fresh ideas for habitat conservation in managed forests.

Range Map of Northern Spotted Owl.

Northern Spotted Owl

(Strix occidentalis caurina)

Size: A medium-sized owl, weighing an average 1.3 pounds, 18 inches in length, with a 45-inch wingspan.

Diet: Primarily northern flying squirrels and woodrats. Flying squirrels are the dominant prey in wetter western hemlock/Douglas-fir forests; woodrats are more important in drier, mixed-conifer/mixed-evergreen forests (Sztukowski and Courtney, 2004). Also known to eat a variety of other types of small mammals, such as deer mice and voles.

Habitat: Mostly found in western Oregon inhabiting older stands of riparian, mixed conifer and conifer-hardwood forest types. Older forest stands are preferred for nesting; older and middle-age stands are preferred for foraging and dispersing.

Range: Extends from southern British Columbia through northern California. In Oregon, the physiographic provinces in the owl's range include the Coast Range, Willamette Valley, Klamath, and the West and East Cascades (Lint and others, 2005). Owl pairs occupy large home ranges, up to 4,500 acres (OFRI 2006), and most often spend their entire lives beneath the forest canopy.

Reproduction: Owl pairs are monogamous and some pairs stay mated for long periods of time. Two eggs, on average, are laid in March or April in a cavity or platform in a large tree. Young hatch in 30 days, fledge in about five weeks, and leave the parents' territory in autumn.

Did you know… Northern Spotted Owls are particularly tame and will allow humans to approach within a few feet.

POPULATIONS CONTINUE TO DECLINE DESPITE HABITAT PROTECTIONS

As more habitat was reserved for the Northern Spotted Owl under the 1994 Northwest Forest Plan, it was expected that the 4.5% averaged annual decline (Lint and others, 2005) would be halted and populations would stabilize or increase over time. Instead, since the listing, populations have continued to show a 3.4% weighted average annual decline in the 10 demographic areas associated with land managed under the Northwest Forest Plan (Anthony and others, 2006). These population declines occurred despite having nearly six million acres of forest on federal lands protected from timber harvest (Northwest Forest Plan, 1994).

It is estimated that the Northern Spotted Owl population currently has 8,500-12,000 individuals across its range, most occurring in Washington, Oregon and California (IUCNNR, 2006; Forsman, unpublished data). The Canadian population is at a critically endangered state. In one study of 40 Spotted Owl nests, occupancy declined 49% from 1992 to 2001 (Blackburn and Harestad 2002). There may be only about 30 pairs remaining throughout all of British Columbia (Forsman, unpublished data), which is at the extreme edge of the species' historic range.

In 14 study areas analyzing data from 1985 to 2003 across the owl's geographic range, which included federal, tribal, private, and mixed federal and private lands, the average decline across all areas was 4.1% per year, with steeper declines in Washington. In Oregon, the mean annual decline was 2.9% in the Coast and southern Cascades ranges, but populations were stable in the north Cascades Range and in the dryer, east Cascades and Klamath regions (Anthony and others 2004). While the risk of species extinction is low for the short term (15-20 years), it remains a possibility over longer periods of time (Courtney and Gutiérrez, 2004).

Endangered Species Act listing

June 26, 1990

Listing of the Northern Spotted Owl was first proposed in 1973. During the 1970s and 1980s, Congress continually increased harvest levels of old forests on federal lands. Potential listing was reviewed again in 1982, 1987 and 1989 (Courtney, Ch. 1, 2004). By the late 1980s, harvest levels on federal lands in western Oregon and Washington rose to nearly 2.7 billion cubic feet per year (Anthony and others 2006). In a 1990 review, the Northern Spotted Owl was again proposed, and was listed as Threatened on June 23, 1990 (Courtney Ch. 1, 2004). Logging in national forests was significantly reduced by court order in 1991 (Brokaw, 1996).

U.S. Fish and Wildlife Service (USFWS):

"The northern spotted owl is threatened throughout its range by the loss and adverse modification of suitable habitat as the result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and wind storms."

Federal Register 44:28114

THE NORTHWEST FOREST PLAN
Adopted April 13, 1994

The Northwest Forest Plan was designed to protect habitat for the Northern Spotted Owl and other species associated with late successional (180 years and older) forests. It reduced the amount of commercial logging on federal lands by over 80 percent (Lint and others, 2005) and designated large amounts of land in the owl's range into riparian and late-successional reserves, known as LSRs.

An ambitious plan, it focused on conservation of a complex series of ecosystems over a large area. This shift — from timber production to maintaining biological diversity and ecological processes — was an almost complete reversal of management objectives on federal forest lands in the Pacific Northwest.

The plan has been a major contributor to the conservation of the Northern Spotted Owl by halting the logging of occupied and future potential recovery habitat on federal lands (Franklin and Courtney, 2004).

KEY FINDINGS

Habitat characteristics

Suitable habitat is one of the keys to conservation of the Northern Spotted Owl. While suitable habitat includes a range of conditions, old-growth forests are among the Northern Spotted Owl's best habitats. They often contain several canopy layers, a variety of tree sizes and species, and large snags. The older trees in such stands are commonly 180 years old and older. While spotted owls use a wide variety of forest types, studies previous to 1990 showed that the owls consistently used old-growth forests, or forests of mixed mature and old-growth. Numerous studies since then have substantiated that understanding (USFWS, 2004), indicating that these owls use mature and old-growth forest as much or more than expected from the relative abundance of different forest stages (Hicks and others, 2005).

Range-wide, there has been a 5.14% decline in suitable habitat due to all factors between 1994 and 2003. The total habitat loss was 380,040 acres: 168,301 due to fire, 155,000 due to timber harvest, 55,640 due to tree mortality caused by insects and disease, and 100 due to wind storms (Bigley and Franklin, 2004).

For the same years, 1994 to 2003, the 10-year Report for the Northwest Forest Plan found an annual 1.9% net rate of increase of "medium and large older forest," outpacing losses from all

Old growth forests are among the Northern Spotted Owl's best habitats.

sources. The gain, at the lower end of the diameter range for older forests, was 1.25 to 1.5 million acres, which appears to have met or exceeded Northwest Forest Plan expectations. (Moeur and others, 2005). In addition, reserved or dedicated habitat that is just now coming "on line" from unsalvaged wildfires in the 19th and early 20th century typically has biological legacies from original old-growth stands that should soon serve as suitable habitat (Bigley and Franklin, 2004).

At the time of listing, an assumption was made that there was very limited suitable habitat on non-federal lands. Since then, studies throughout the owl's range have broadened scientists' knowledge. In some cases, the assumptions about suitable habitat on non-federal lands were not validated. While many questions remain about why owls choose particular habitats, a significant amount of current research reveals some unexpected results.

Not only old growth

The Northwest Forest Plan focused on late successional (180 years and older) old-growth forests (LSOG), which at the time were considered optimal spotted owl habitat in all regards. Owls consistently use mature and old growth forests for roosting and nesting, and large patches of old growth within the owl's home range were believed to be necessary for survival and successful reproduction. However, a number of recent studies indicate that the developmental stage of a forest does not fully describe suitable owl habitat.

For one thing, when the big Douglas–firs in a westside old-growth forest begin to die, they are commonly replaced by western hemlocks that can grow in the shade of the old trees, which young Douglas-fir cannot do, and the forest's suitability as spotted owl habitat diminishes. Various studies have documented that, in the Klamath and Oregon Coast Range provinces, pristine old growth forest did not support a stable population of owls (Bigley and Franklin, 2004). In Plum Creek Timber Company's Central Cascades Habitat Conservation Plan in Washington, the spotted owl population declined while the available suitable habitat remained fairly constant (Hicks and others, 2005). Owls living in some areas of large, contiguous blocks of LSOG habitat had lower than average reproductive output (Franklin and others, 2000). In one study, 40% of Northern Spotted Owl nests were in a partially harvested area (Buchanan and others, 1993).

It's now believed that, as for many wildlife species, suitable owl habitat is a function of landscape complexity, not just individual stand characteristics.

Mosaic of stand structures

One of the most profound advances in scientific knowledge for conservation of the Northern Spotted Owl is the understanding of forest heterogeneity (Blakesley, Ch. 5, 2004). Recent evidence indicates that young (25-40 year) forests can contribute to suitable foraging habitat if appropriate structures associated with the owl's prey are available (Irwin and others, 2000). In northwestern California mixed conifer forests, some early-successional (0-20 year) conditions often known as "brush stage clearcuts" were found to support good reproductive success. There, a landscape mosaic of young stands with high densities of prey and mature stands that support survival under inclement weather demonstrated a high level of suitability, i.e., provided optimal conditions (Franklin and others, 2000). In the Oregon Coast Range, even non-forested areas benefited owls along with a mix of older and younger forests (Blakesley and others, 2004). Thus, in some areas, optimum spotted owl habitat may

Young stand as part of a habitat mosaic.

be a moderately mixed landscape composed of LSOG stands for nesting, roosting and foraging interspersed with young, brushy-stage forest patches that augment food available in the older patches.

Habitat value of hardwoods

While 88% of spotted owl nest trees in Oregon are Douglas-fir (Blakesley, Ch. 5, 2004), recent studies documented the importance of hardwoods such as red alder and bigleaf maple for roosting and foraging (Glenn and others, 2004). Likely because of greater prey diversity, owls selected stands with greater amounts of hardwood, particularly ones like tanoak that produce mast (acorns), food for the owl's prey. In one study, where woodrats composed 35% of the diet, owls preferentially used hardwood habitats, which are where the woodrats live. Northern Spotted Owl pairs have been observed foraging in pole-sized conifer and broadleaf-dominated stands near riparian zones along small streams (Glenn and others, 2004).

Young forest understory and prey

In one study, Northern Spotted Owls selected young forest stands that had more developed understory more often than old forests (Carey and Peeler, 1995). The owl's prey is more abundant and diverse in habitats with understory hardwood shrubs and herbaceous species than in habitats without these components (Carey and others, 1992). The numbers of northern flying squirrels have been tied to rich understories and snag density in older forests. Young forest stands that have abundant understory also support populations of dusky-footed woodrats. Both are major prey items in the owl's diet. Often owls selected young stands for foraging, and used them consistently and intensively but not exclusively (Carey and Peeler, 1995).

Legacy retention

Biological legacies are large standing trees, downed logs and large snags left from the previous stand after a disturbance such as harvest or fire. Later, when the second-growth forest develops and forms a dense canopy cover, legacies offer habitat for owl roosting and nesting, and support populations of prey. Combined with patchy regeneration of multiple species, and during the

periods following either a natural catastrophic disturbance by wind or fire or following partial cuts, legacy retention can aid in producing owl habitats where the diversity and abundance of prey equal or exceed that found in many old growth stands (Sztukowski and Courtney, 2004).

Forest fragmentation and ecotones

Another profound change is scientists' understanding of Northern Spotted Owl habitat associations provided by insights into forest fragmentation and heterogeneity. In 1990, little was known about the effects of forest fragmentation on the owl (Blakesley, Ch. 5, 2004). Limited levels of fragmentation, perhaps better described as patchiness, offer ecotones, or edges, that owls selected to hunt for dusky-footed woodrats (Franklin and others, 2000, Meyer and others, 1998). In one study area, owls preferred to perch and roost in a mature stand, but in close proximity to an edge with a high density of preferred prey (McDonald and others, 2006). Research therefore demonstrates that, within limits, in some areas patchiness may have positive consequences for Northern Spotted Owls by increasing prey abundance and availability (Sztukowski and Courtney, 2004).

Thinning

Northern Spotted Owls have been observed using forests where some stands had been thinned to create understory habitat and

Patchiness creates edge in the landscape.

increase growth in remaining trees. In one ongoing study, as many as 16 areas had been thinned and in no case did the owls leave (Irwin, personal correspondence, 2007). In another study of effects of commercial thinning on Northern Spotted Owl habitat use and home range, the single male shifted home range during breeding season; during non-breeding season, the home range was 2.3 times larger following harvest activity (Meiman and others, 2003). Commercial thinning, in another study, did not have any measurable short-term effects on flying squirrels, a key prey of owls, and scientists hypothesized that long-term effects would be neutral or positive (Gomez and others, 2005). In research that included 12 small mammal prey species, thinning stimulated the development of understory shrubs and did not have substantial detrimental effects on any of the species (Suzuki and Hayes, 2003). Variable density thinning to create varying densities of remaining trees across the landscape has the potential to generally increase populations of prey and also speed up the development of spotted owl habitat (Sztukowski and Courtney, 2004). A recent study suggested that there is an optimum range of density of trees that makes up prime habitat; one study suggests approximately 150-250 sq. ft. of basal area per acre (Irwin and others, 2007).

Much research has been done on thinning young forests to create the characteristics of Late Successional Habitat to benefit spotted owls and other species (Hunter 2001). Studies by Tappeiner and others (1997) and Poage (2001) have demonstrated that many late-successional Douglas-fir stands in Oregon developed from stands that had fewer trees per acre and grew faster than trees in typical plantations. Garman and others (2003) conducted a simulation study to provide information for defining thinning regimes for young Douglas-fir stands in west-central Oregon. Specifically, this study used computer simulation to evaluate effects of experimental thinning treatments on the development of late-successional attributes and on extracted merchantable volume. Results of this study confirm previous recommendations for accelerating development of late-successional attributes in young managed stands. Additionally, results show the potential for a range of thinning treatments to attain late-successional conditions in about the same amount of time, but with different tradeoffs in terms of merchantable volume and long-term stand conditions.

Threats

The invasion of Barred Owls

There are considerable unknowns and hypotheses about a closely-related owl, the Barred Owl (with bars rather than spots), which now appears to be a critical factor in the survival of Nothern Spotted Owls. Barred Owls' adaptability and aggressive nature may make them more successful in competing for the Northern Spotted Owl's ecological niches. The USFWS 2007 Draft Recovery Plan identifies competition from Barred Owls, not habitat loss, as the most serious threat currently facing the smaller spotted owl across its range (USFWS, 2007).

Prior to the 1950s, the range of the Barred Owl was confined to eastern North America. They have been expanding into the range of the Northern Spotted Owl since the 1960s (Courtney and Gutiérrez, 2004), and were first seen in Oregon in 1974 (Taylor and Forsman, 1976). In 1990, the extent of the Barred Owl's range was unclear, but by 2000 they had colonized and have been continually increasing throughout the entire range of the Northern Spotted Owl and may outnumber them in some areas. In the southern Oregon Cascades, the percentage of historic Spotted Owl territories having both Spotted Owls and Barred Owls or having Barred Owls only has increased from 3.0% to 17.3%. (Anthony and others, 2002). At Crater Lake National Park, Barred Owls have matched the population of Northern Spotted Owls, which have disappeared from some eastside locations during the same time period (Gutiérrez and others, 2004).

Barred Owls use and displace the Spotted Owl from what is believed to be its best habitat, old-growth and mixed conifer forests. Barred Owls have a smaller home range and a broader prey selection. Both use the same type of nest sites — broken-top snags, cavities and platform nests. Hybridization between Spotted Owls and Barred Owls has been known for many years, but has been low (Gutiérrez, and others, 2004). Not only are Northern Spotted Owls affected, but populations of other species of small owls such as Screech Owls are also declining throughout the range occupied by Barred Owls (Elliott, 2006).

Scientists have had a difficult time assessing the threat of the Barred Owls because there has not been sufficient research to determine their density or population trends, but the outlook is

not one of optimism for the Northern Spotted Owl. Some biologists believe that Northern Spotted Owls are silent in the presence of Barred Owls, so an area may be recorded as vacated when spotted owls are still present (Gutiérrez, and others, 2004). In one study, researchers inferred that Barred Owl calls caused Spotted Owls to change their vocalizing behavior, which affects Spotted Owls because they use vocalizations to establish and maintain breeding territories (Crozier and others, 2006).

Much is unknown regarding the Barred Owl, its competition for habitat and prey, and interactions between the two species. This threat to Northern Spotted Owl recovery challenges the conventional wisdom of managing threatened and endangered wildlife through emphasizing habitat protection. A surge in new research has already begun.

Northern Spotted Owl

Barred Owl

Range Map of Northern Spotted Owl.

Range Map of Barred Owl.

The USFWS 2007 Draft Recovery Plan stresses that immediate action is needed and recommends "removal experiments" across the range of the Northern Spotted Owl. More than 500 Barred Owls may be lethally removed across 18 study areas. The impetus for the experiment is based on results from research in northern California in 2005 and 2006, where resident spotted owls returned to their territory once Barred Owls were removed (USFWS, 2007).

Past and current timber harvest

The 1990 listing stated, "Given the loss of a substantial amount (60%) of historical habitat from timber harvesting, and continuing reduction and fragmentation of a large portion of remaining old growth and mature habitat, the Northern Spotted Owl will continue to decline unless steps are taken to offset these losses" (Courtney and Gutiérrez, 2004). Since that time, millions of acres of suitable habitat have been managed for owl conservation under the Northwest Forest Plan, as well as some additional protection measures invoked under the Endangered Species Act. Even so, six of eight panel members preparing the 2004 Scientific Evaluation of the owls' status considered past harvest a current threat. Effects of past harvest may persist because of time-lag effects, since owls are long-lived and may remain in disturbed habitat that is unlikely to be further colonized by others (Courtney and Gutiérrez, 2004).

Overall timber harvest of suitable habitat has been significantly reduced over the owl's range, especially on federal lands. In the opinion of panel members preparing the 2004 Scientific Evaluation, timber harvest continued to be considered a major cause of habitat loss in British Columbia, and western Washington and Oregon. Only one respondent considered timber harvest to be a significant contributor to habitat loss on federal lands. On tribal and private lands, timber harvest was still regarded as the major cause of habitat loss, while on state lands it was considered a less significant threat (Courtney, Ch. 10, 2004).

Uncharacteristically severe fire

Wildfires accounted for 75% of the loss of habitat from natural disturbance between 1994 and 2003 (Bigley and Franklin 2004). It was expected that significant areas of late-successional (180 years and older) reserves would be treated by thinning and prescribed underburning during the first decade of the Northwest

A densely-stocked warm mixed conifer forest with ladder fuels.

Forest Plan to reduce fuels and vulnerability to large, intense fires. Very few acres in LSRs have been treated, and none at an extensive landscape level. Thus, there has been limited progress in reducing the potential for uncharacteristic stand replacement fires on tens of thousands of LSR acres (Franklin and Courtney, 2004). The risk to habitat has continued to increase with every year of lack of active management designed to restore forest resilience. In particular, the eastern slope of the Cascades and the Klamath provinces are ripe for uncharacteristically severe stand

Stand replacement fire in densely-stocked warm mixed conifer forest.

replacement fire (Bigley and Franklin 2004). Densely-stocked, warm, mixed conifer forests with small trees create "ladder fuel," that lead to catastrophic wildfires instead of fires burning lightly through the stands (OFRI, 2004). The current dry phase of the Pacific Decadal Oscillation may cause larger, more intense fires (Franklin and Courtney, 2004) over the short term, and climate warming will increase risks over the long term.

Buildup of live and dead fuel is compounded by insects and tree diseases. Trees killed by spruce budworm contributed to the B&B Complex Fire in 2003, which displaced 15 pairs of Spotted Owls. In a 15-year time frame, spruce budworm combined with fires have impacted 18 out of 25 pairs of Northern Spotted Owls on the Sisters District of the Deschutes National Forest (Franklin and Courtney, 2004).

Prescribed fire and thinning, two means of reducing fuel buildup, are potential solutions to at-risk owl habitats. While some scientists consider these silvicultural treatments an urgent need in some areas, others are concerned that they may pose a threat to the owl unless all their effects are understood. In the short term, prescribed fire could adversely affect nesting owls directly or indirectly by affecting their prey, while over the long term could reduce the likelihood of catastrophic effects from fires (Bigley and Franklin, 2004). Prescribed fire might restore a historical range of fire disturbance and something more similar to

A warm mixed conifer forest after thinning and under burning.

natural conditions. On the other hand, it's argued that a lightly or moderately burned area does not always equate to complete habitat loss (Bond and others, 2002). One simulation, looking ahead 60 years, showed that thinning would not degrade canopy conditions, whereas lethal fires would have a lasting negative effect (Lee and Irwin, 2005). A further consideration is the lack of funding for such management measures, since thinning often does not produce wood of commercial value.

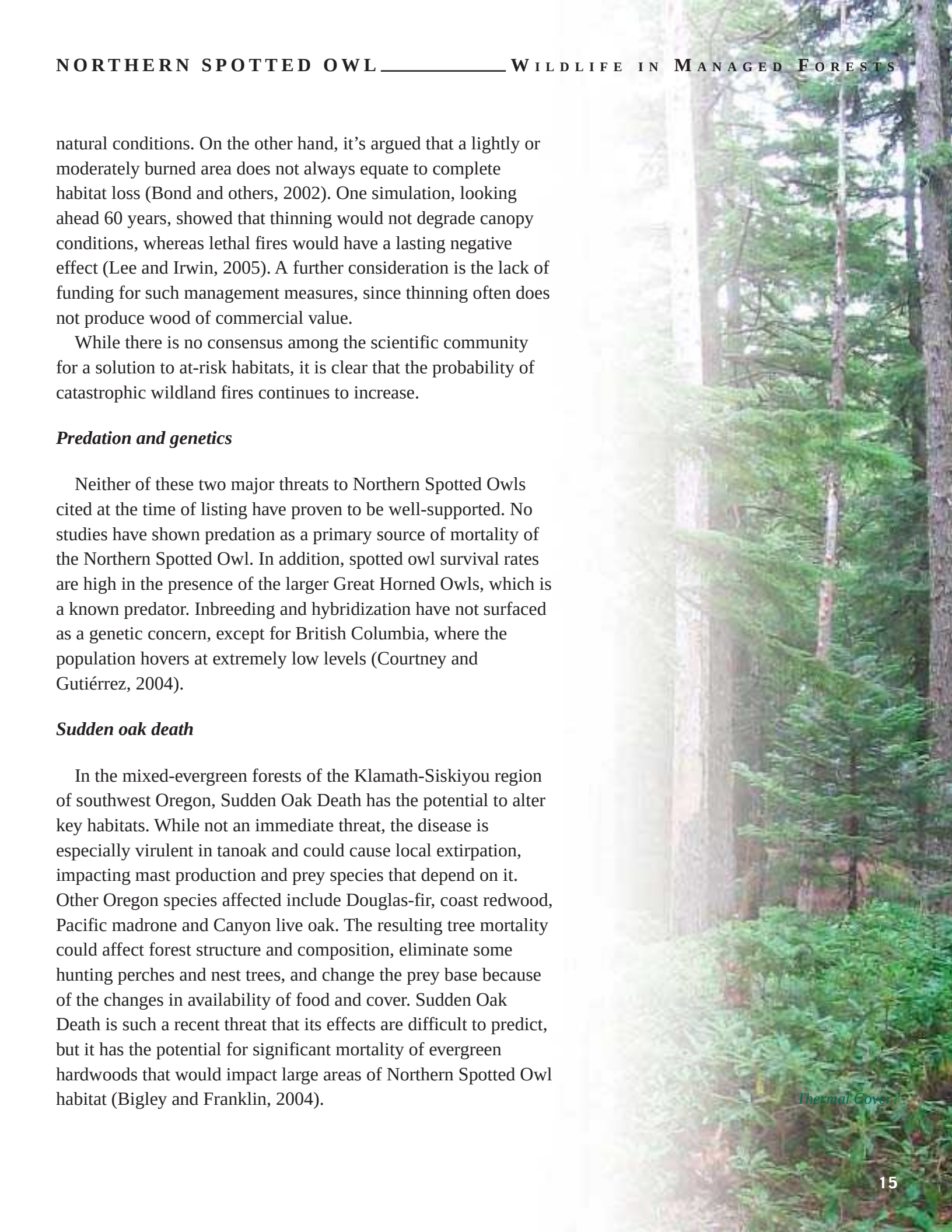
While there is no consensus among the scientific community for a solution to at-risk habitats, it is clear that the probability of catastrophic wildland fires continues to increase.

Predation and genetics

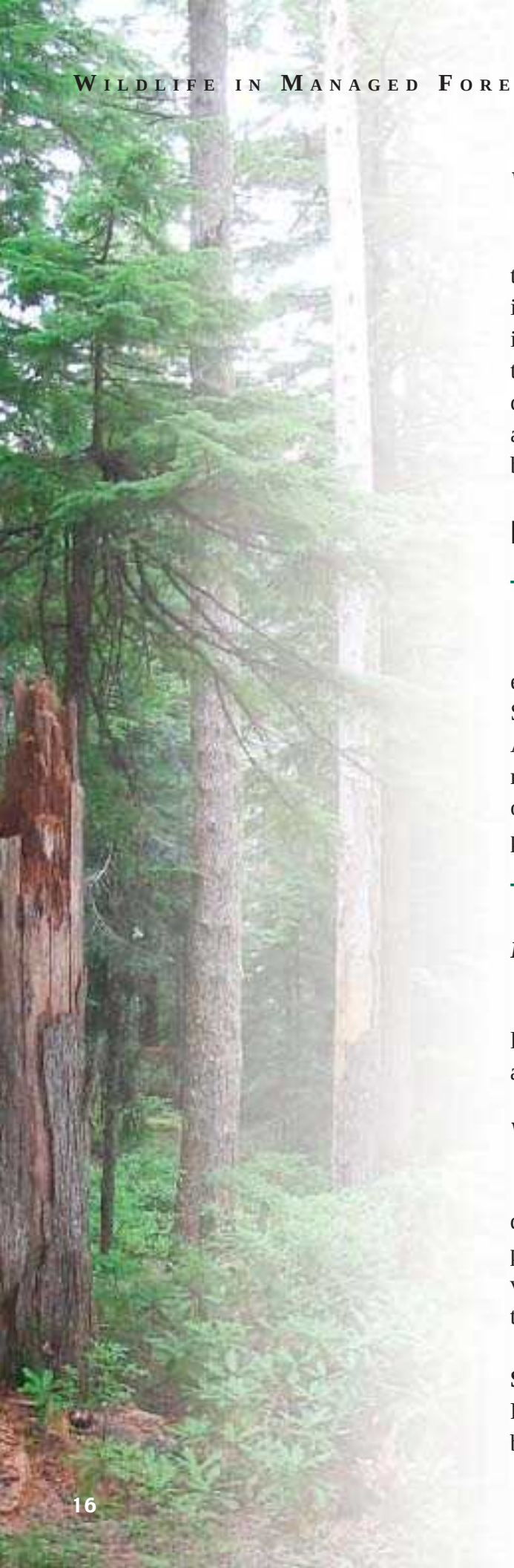
Neither of these two major threats to Northern Spotted Owls cited at the time of listing have proven to be well-supported. No studies have shown predation as a primary source of mortality of the Northern Spotted Owl. In addition, spotted owl survival rates are high in the presence of the larger Great Horned Owls, which is a known predator. Inbreeding and hybridization have not surfaced as a genetic concern, except for British Columbia, where the population hovers at extremely low levels (Courtney and Gutiérrez, 2004).

Sudden oak death

In the mixed-evergreen forests of the Klamath-Siskiyou region of southwest Oregon, Sudden Oak Death has the potential to alter key habitats. While not an immediate threat, the disease is especially virulent in tanoak and could cause local extirpation, impacting mast production and prey species that depend on it. Other Oregon species affected include Douglas-fir, coast redwood, Pacific madrone and Canyon live oak. The resulting tree mortality could affect forest structure and composition, eliminate some hunting perches and nest trees, and change the prey base because of the changes in availability of food and cover. Sudden Oak Death is such a recent threat that its effects are difficult to predict, but it has the potential for significant mortality of evergreen hardwoods that would impact large areas of Northern Spotted Owl habitat (Bigley and Franklin, 2004).



Thermal Cover?



West Nile virus

While not a current threat, West Nile Virus is known to be fatal to Northern Spotted Owls and is now within the range of the owl in Oregon, Washington and northwest California. It is of concern in Oregon, since infected mosquitoes can overwinter in much of the state, providing favorable conditions for rapid spread of the disease. One mosquito in particular, *Culex tarsalis,* abundant across the owl's range, is an efficient vector of the virus, and breeds in a variety of habitats (Blakesley and others, 2004).

HABITAT CONSERVATION STRATEGIES

The role of federal forestlands

The Northwest Forest Plan and the Draft Recovery Plan both place emphasis on federal lands in recovering and sustaining Northern Spotted Owls over time. On federal land, the Endangered Species Act (ESA) requires that full measures of broad-scale habitat restrictions are taken to provide recovery of a species. The bulk of the owl recovery will rely on what happens on federal lands, not on private lands.

The role of non-federal forestlands

Regulatory

Non-federal forestlands, including state, county and private lands, are subject to the requirements under the federal ESA as well as the requirements of the Forest Practice Act.

Voluntary

Some creative approaches to managing lands to accelerate the development of Northern Spotted Owl habitat are being tested by public agencies and other organizations. There are a number of voluntary measures and incentive programs that landowners can take to assist in owl recovery:

The **U.S. Fish and Wildlife Service awards Endangered Species Grants** for private landowners. The Private Stewardship Program provides grants and other assistance on a competitive basis to individuals and groups engaged in local, private, and

voluntary conservation efforts that benefit federally listed, proposed, or candidate species, or other at-risk species. [1]

The **Oregon Department of Fish and Wildlife offers a Landowner Incentive Program** that offers technical and financial assistance for projects that enhance, protect or restore habitats that benefit Strategy Species. With funds allocated by the U.S. Fish and Wildlife Service, competitive grants of up to $150,000 are awarded to private landowners to implement ODFW's Wildlife Strategy. [2]

The **Sustainable Forestry Initiative** is a forest and paper certification program that results in marketing clout while integrating the growing and harvesting of trees with the protection of wildlife, plants, soil, water and air quality.[3] Through this program, some private timberland owners/managers implement measures that go above and beyond state forest minimum practices to ensure protection of Northern Spotted Owls and other Threatened and Endangered species.

Habitat Conservation Plans (HCPs), created by landowners working in collaboration with the U.S. Fish and Wildlife Service, offer the opportunity to develop landscape-scale approaches to habitat conservation, rather than focusing on avoiding "take" of individual owl sites. An HCP and the corresponding incidental take permit "allows landowners to legally proceed with an activity that would otherwise result in the illegal take of a listed species." These plans are typically complex and large in scale and thus may only be appropriate for landowners with

PROTECTION POLICIES

Federal

The federal Endangered Species Act listing of the Northern Spotted Owl, administered and enforced by the U.S. Fish and Wildlife Service, requires that landowners not conduct actions that would result in the "take" of an owl. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect a listed species, or attempt to do so (USFWS, 1973).

The federal Northwest Forest Plan put in place a new approach to federal land management, which included a new set of land use allocations – late-successional reserves, matrix, riparian reserves, adaptive management areas and key watersheds. It is the cornerstone for conserving the Northern Spotted Owl on 24.4 million acres of federal land in Oregon, Washington and California.

The Bureau of Land Management's Western Oregon Plan, created in 2005, is an agreement with 10 state natural resource agencies to develop forest management plans for more than 2.5 million acres of BLM forestland in Western Oregon. Goals include maintaining healthy forest ecosystems and providing a sustainable supply of timber and other forest products. The plan is scheduled to be revised in 2008.

State

In addition to federal regulations, the Oregon Forest Practices Act requires landowners to protect 70 acres of suitable habitat around known nest sites of Northern Spotted Owls on state and private land. The 70-acre core area is based on scientific evidence which shows that spotted owl fledglings use at least 70 acres for daily activities. The protection afforded Spotted Owl nest sites is intended to adequately protect these specific sites to fledge young owls. These acres are constrained from any significant timber harvest unless the owls "abandon" the site. Learning if owls have abandoned the site is the responsibility of the land-owner, and can only be documented using strict protocols requiring surveys lasting at least three to five years.

The Oregon Department of Forestry is implementing Structure-based Management on some state-owned lands to help forests evolve more quickly into older stages.

[1] *http://www.fws.gov/endangered/grants/private_stewardship/index.html*
[2] *http://www.dfw.state.or.us/LIP/*
[3] *http://www.sfiprgram.org*

large tree farms. Generally speaking, HCP's have been difficult to obtain and can be more costly to develop for a landowner than simple take avoidance strategies. Currently there are 16 HCPs that address spotted owl conservation; only four cover lands in Oregon. [4]

Safe Harbor Agreements are another mechanism which non-federal landowners can use to get regulatory assurance that they won't be subject to "take" if they manage to actively promote development of habitat for spotted owls. The USFWS describes the purpose of a Safe Harbor agreement as "to promote voluntary management for listed species on non-federal property while giving assurances to participating landowners that no additional future regulatory restrictions will be imposed." Currently there are only two Safe Harbor Agreements for Northern Spotted Owls; neither is in Oregon.[5]

Managed forests can also contribute to conservation of Spotted Owls by emphasizing conditions that support the owl's prey base. That could involve retention of some large living Douglas-fir trees (greater than 30 inches in diameter) near lower-slope positions near riparian zones, promoting hardwoods such as big leaf maple or oaks, leaving some large downed and standing dead trees in ways that accord with safety concerns for forest workers, and modifying existing young stands via variable density thinnings that result in shrubby forest understories. Silvicultural techniques may produce suitable habitat structural characteristics earlier in a forest's life than would occur from natural stand development. Managed forests should maintain existing northern spotted owl nesting sites according to federal ESA take-avoidance and state forest practices rules.

Conservation and protection strategies on non-federal lands would increase the chances of owl survival. While no one plan will fit every landscape, foresters can seek opportunities to create features and conditions that lead to suitable owl habitat.

Northern Spotted Owl recovery

The 2007 USFWS Draft Recovery Plan poses two options for conservation, both relying on federal lands and the same underlying science. Along with other strategies, Option 1 maps Managed Owl Conservation Areas (MOCAs) with specific

[4] *http://www.ecos.fws.gov/docs/conservation_plans/HCP*
[5] *http://www.ecos.fws.gov/docs/conservation_plans/SafeHarbor.pdf*

boundaries. Option 2 has similar strategies, but instead of mapping owl conservation areas, it directs federal land managers to select areas for the owls according to set criteria. This allows local federal managers more flexibility to select the best habitat and to meet other goals (USFWS 2007). Yet, the owls now occupy non-federal forests and some of these lands can provide suitable habitat far into the future if managed to sustain nesting, roosting and foraging sites conducive to survival and reproduction. The proposed plan would reduce the 1992 designated habitat of 6.9 million acres to 5.3 million acres, a 23% cut.[6]

SUMMARY

The Northern Spotted Owl is one of the most-studied birds in the world (Courtney, Ch. 10, 2004), yet there is still much to learn. While the population decline continues over the owl's range and in some parts of Oregon, the latest findings offer surprising perspectives on owl home range and foraging preferences. They vary considerably, and averages do not characterize regional or local situations. These additions to the base of scientific knowledge increase the potential for reducing immediate threats and increasing suitable habitat on managed forests throughout the state. Invasion of the Barred Owl and ever-increasing potential for uncharacteristically intense, large fires pose the biggest threats to this species for the foreseeable future, but they also create unique opportunities for innovative studies and conservation strategies.

The research summarized in this publication shows that managed forests are important for Northern Spotted Owl habitat for three main reasons. First, a mosaic of forest ages including early seral forest conditions can provide excellent foraging habitat for owls and their prey. To ensure that habitat is as functional as possible, the research indicates retaining legacy components such as snags, and maintaining tree species diversity, including hardwoods, adds to suitability of the habitat. Second, thinning can accelerate the development of late seral characteristics in young stands. Finally, the risk of uncharacteristically severe wildfires in mixed conifer forests is a major threat to Northern Spotted Owls that can be reduced through active forest management including thinning and the use of prescribed fire.

[6] *www.fws.gov/pacific/ecoservices/nsopch.html*

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ACKNOWLEDGEMENTS

The Oregon Forest Resources Institute is grateful to the following reviewers: Matt Betts, OSU College of Forestry; Rick Brown, Defenders of Wildlife; Mike Cafferata, Oregon Department of Forestry; Dennis Creel, Hampton Tree Farms; Jake Gibbs, Lone Rock Timber Company; Joan Hagar, USGS Forest and Rangeland Ecosystem Science Center; Audrey Hatch, Oregon Department of Fish and Wildlife; Larry Irwin, National Council for Air and Stream Improvement; Rod Krahmer, Oregon Department of Fish and Wildlife; Richard Larson, Oregon Society of American Foresters; Ted Lorensen, Oregon Department of Forestry; Peter Loschl, OSU College of Forestry; Mike Rochelle, Weyerhaeuser Company; Pete Sikora, Giustina Resources; Hal Salwasser, OSU College of Forestry; Tom Snetsinger, OSU College of Forestry; Gary Springer, Starker Forests, Inc., and Jennifer Weikel, Oregon Department of Forestry. Graphic design by Mary Gorton, Oregon Publishing and Distribution.

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Michael and Josh Feinstein, cover background

John and Karen Hollingsworth, USFWS Image Library. http://images.fws.gov/, cover insert and page 11 (upper left)

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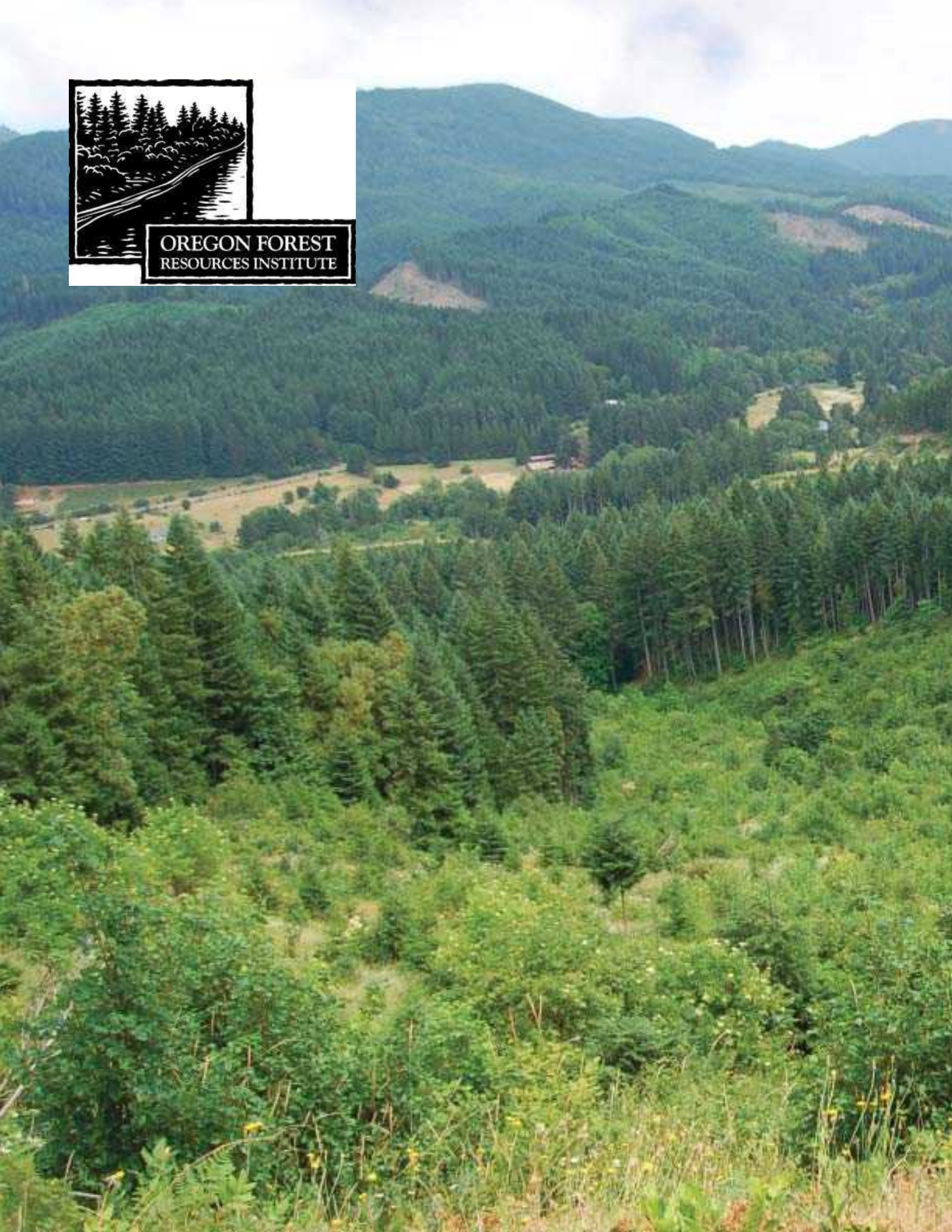
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