

INTERPRETIVE ANALYSIS OF STAKEHOLDER RESPONSE THE U.S. FISH
AND WILDLIFE SERVICE'S PROPOSED REMOVAL EXPERIMENTS OF
BARRED OWLS IN THE ENDANGERED NORTHERN SPOTTED OWL'S
HABITAT RANGE

By

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Abstract

This paper will explore the underlying value conflicts in wildlife conservation policy in the United States through an examination of the Fish and Wildlife Service's proposed experimental removal of barred owls from Northern spotted owl (NSO) habitat range in Oregon. Northern Spotted Owl recovery has been called "one of the most complex resource issues in this nation's history." The objective of this study was to understand the ethics and values conflicts articulated by stakeholders through qualitative analysis of 75 public scoping comments submitted to the FWS in response to the proposed experiments. Additionally, interviews were conducted with members of an ethical scoping focus group, the Barred Owl Stakeholders Group, to expand upon the issues raised by the scoping comments. This paper discusses the key paradigm differences underpinning conflicting stakeholder positions, and presents the policy implications of openly and directly addressing values conflicts in conservation issues.

Introduction

This paper explores the underlying value conflicts in wildlife conservation policy in the United States through an examination of the Fish and Wildlife Service's (FWS) proposed experimental removal of barred owls from Northern spotted owl (NSO) habitat range in Oregon. The removal experiments are one of several actions proposed by the Service to facilitate the recovery of the threatened NSO. The proposal has added another dimension to a long-standing battle over conservation of old growth forests that the spotted owl inhabits. This conflict has been called "one of the most complex resource issues in this nation's history" (John Turner,

former director of the US Fish and Wildlife Service, quoted in Lange 1998: 136). The origins of the fight over NSO protection in the Pacific Northwest began long before the species was listed under the Endangered Species Act and became synonymous with the protection of old growth forests. In fact, the foundation for this controversy was laid down even before the Endangered Species Act was signed into law. The key moment for the future of the spotted owl was in the hands of the United States Forest Service and its national forest policy developed in the late 19th century.

Development of a national forest policy

To early American settlers and pioneers, wild forests held a great number of threats, both real and imagined (Nash 2001). Clear-cutting of forests in North America during Westward Expansion was both a symbolic act of conquering the land and a physical necessity for a young, expanding nation. Beginning in the mid-19th century, early voices for the preservation of wilderness began to be heard, most notably Henry David Thoreau, Ralph Waldo Emerson, and John Muir. The Forest Reserve Act of 1891 granted the federal government authority to set aside forests reserves in the public domain, however it allowed for those forests to be managed for commercial uses. The Forest Management Act of 1897 further articulated that one of the primary purposes of the forest reserves was for timber supply. Initially, conservationists were aligned with the forestry agenda, as it was at least a better alternative than unregulated clear-cutting of forests, and supported the management ideas that would become the hallmark of Gifford Pinchot's illustrious career in the United States Forest Service (USFS). Those management ideas, still the

predominant guiding policy of the USFS and other natural resource management agencies, are referred to as “wise use”: the forests should be managed in a way that they can be utilized indefinitely to meet the needs of future generations.

The post-war era saw a huge increase in demand for lumber to build new homes. Such demands led to pressure to harvest on national forests and other government-owned lands. Timber production became a primary organizational objective for the USFS and particularly the Bureau of Land Management (BLM) in Oregon and Washington (Yaffe 1994). The leading philosophy of the newly expanded USFS was to couple wise use with multiple use: managing forests for timber sales also encouraged abundance of game animal populations and created roads that increased access into forests for recreation. The multiple use policy allowed for the government to auction timber lots to private companies for harvest. Preservation of wilderness, setting aside land for a single use, was in conflict with the goal of maximizing use, efficiency, and commercial value of the forests (Yaffe 1994). Multiple use policy for the management of public lands became mandated by law in the National Forest Management Act of 1976, but it has become largely controversial as forest managers have to juggle preservation, recreation, grazing, management against fires and insect infestation, and timber harvest (Lange 1998).

The old growth forests of the Pacific Northwest were initially viewed by the USFS as inefficient because once harvested it would be a long time before replacement trees could be regenerated; in contrast to the productivity of highly managed forest stands grown in scheduled rotations (Yaffe 1994). Old growth forests were inaccessible and contained large amounts of down decaying wood –

increasing risk of insect infestation and wildfires (Yaffe 1994). Furthermore, the wildlife that inhabited these ancient forests was not regarded as important – there were few if any game species or charismatic species. The plan implemented by the USFS in this region was to replace old growth forests with profitable even-aged stands of Douglas fir on strictly managed 60-80 year rotations (Yaffe 1994).

These forestry management practices prevailed until widespread shift in public opinion on environmental and species protection issues became public policy in the 1970's and 1980's. The National Environmental Policy Act of 1970 (NEPA), and the Endangered Species Act of 1973 (ESA) were two major legislative victories for the burgeoning environmental and wildlife conservation movements. These laws severely limited the ability of government agencies to manage forests primarily with the goal of production in mind. The consequence of the tension between timber production and environmental preservation would have major implications for the national forests of the Pacific Northwest and the iconic Northern Spotted Owl.

The Endangered Species Act

The Endangered Species Act of 1973 (ESA, the Act), as amended (16 USC 1531 *et seq.*) provides for the conservation of fish, wildlife, and plants that are threatened or endangered. The ESA establishes policies and procedures for listing plants and wildlife that are endangered or threatened with extinction. It also gives authority to the United States Fish and Wildlife Service (FWS) and the United States National Marine Fisheries Service (NMFS) to develop and implement recovery plans

for listed plants and wildlife, and enforce penalties against prohibited acts committed against listed wildlife.

Section 4(f) of the ESA empowers the Secretary (FWS or NMFS) to develop and implement recovery plans for listed species. In developing and implementing these plans, the ESA directs the Secretary to:

1. Give priority to species that are most likely to benefit from plans, particularly species that are or may be in conflict with construction, development, or other forms of economic activity.
2. Develop and implement recovery plans that are site specific, include objective measurable criteria for success, and include estimates of time and cost.

The Service may appoint recovery teams of appropriate public and private agencies and institutions or other qualified persons to provide services for the development of recovery plans. This may take the form of formal committees or informal groups. The Barred Owl Stakeholders Group that is the focus of this paper is one such informal implementation team for the NSO Recovery Plan. When writing a recovery plan, the FWS must use the best scientific and commercial information available. Due to the nature of scientific advancement and knowledge generation, “the best scientific and commercial information available” may be a moving target. Thus, the Secretary views species recovery as a dynamic process and utilizes an adaptive management approach (USFWS 2008).

There may be multiple revisions to a recovery plan for a species, as new information becomes available or recovery actions prove unsuccessful. Frequently, the information available does not fully address questions raised in the

development of a recovery plan, hence, the Secretary must engage in a significant degree of risk management when making recommendations for recovery actions (USFWS 2008). Due to scientific uncertainty, recovery plans also require the Secretary to make assumptions regarding current information and future magnitude of threats and make decisions based upon these assumptions weighed against the risks of making a poor recommendation (USFWS 2008). Risk management is relevant here because the competitive effect of barred owls on spotted owls is not conclusively supported in peer-reviewed, academic literature; although it is accepted as common knowledge for anyone engaged with the spotted owl and forests in the Northwest (Monahan and Hijmans, 2007, Livezey et al. 2008, Gutierrez et al. 2007, Pearson and Livezey 2003, Hamer et. al. 1989). Based on the available information and in consideration of the potential risks of inaction, the FWS decided to include a recovery action to address the competitive effect of barred owls in the 2008 Recovery Plan for the Northern Spotted Owl (USFWS 2008).

Despite being heralded by the United States Supreme Court as “the most comprehensive legislation for the preservation of endangered species ever enacted by any nation” (Tenn. Valley Auth. V. Hill, 437 U.S. 153, 180, 1978 cited in Wood 2004), the language of the ESA is notably vague. It does not provide specific guidance as to how the Secretary should go about fulfilling its mandate to develop programs for the conservation of listed species. It does not define whether recovery actions should be specifically designed to combat human-caused threats to the survival of the species, or if recovery actions should also be targeted towards natural threats to the survival of the species. This gives considerable latitude to the

Service in carrying out its mandate, but also leaves plenty of room for disagreement over recovery actions. The decades-long conflict over recovery of the NSO is a perfect illustration of this consequence.

The Northern spotted owl

The Northern spotted owl (*Strix occidentalis caurina*) is one of three subspecies of spotted owls and inhabits the coniferous forest along the Pacific Coast of North America (Gutierrez et al. 1995 in USFWS 2008). Adult NSO's are highly territorial and acquire home ranges when they are 1-3 years old (Franklin 1992). NSO's have a high rate of juvenile mortality, though they can live a long time if they survive to adulthood; reproduction is also highly variable in this species (Anthony *et al.* 2006). The spotted owl is a specialist feeder; in Washington and Oregon they feed primarily on northern flying squirrels, but in southwestern Oregon and California they feed primarily on woodrats. They physically resemble the barred owl (*Strix varia*) with which they can hybridize (Kelly and Forsman 2004). All confirmed hybrid pairs have been between female barred owls and male spotted owls (Kelly and Forsman 2004). NSO's exhibit reverse sexual dimorphism, with males being smaller than females, and barred owls overall are larger than NSO's. Hybridization can potentially have a significant evolutionary effect on species (Mooney and Cleland 2001, cited in Monahan and Hijman 2007). Hybridization has been implicated in species extinction (Rhymer and Simberloff 1996 in Monahan and Higman 2007) as well as new species evolution (Seehausen 2004 in Monahan and Hijmans 2007). However, the literature suggests that hybridization between the barred owl and the NSO is a relatively rare event and does not pose a significant

threat to the future of either species when compared to the threat of competition over limited food and habitat between the two species (Kelly and Forsman 2004).

Northern spotted owls and old growth forests

Historically, the NSO subspecies was believed to be dependent on old forests, because the scientific literature had only described the species in such habitat throughout its range (Forsman et al. 1984, Thomas et al. 1990, cited in Anthony et al. 2006). Old growth forests are generally defined as uncut trees between 200 and 1,000 years old (Lange 1998). Though the age at which old growth characteristics are achieved depends on species; Douglas Fir, the predominant species in Oregon forests, becomes old growth at 150 years (Strittholt et al. 2006). More recently, the NSO has also been found to inhabit young forests in northwestern California (Diller and Thome 1999, cited in Anthony 2006) and in the northern Oregon Coast Range (Glenn et al. 2004, cited in Anthony 2006). The FWS first questioned the importance of old-growth forests to NSO populations in 1989 (54 FR 26668). More recent publications using spatial modeling methods that better account for environmental and population effects than traditional habitat modeling methods found a positively correlated relationship between old growth habitat and NSO abundance, with the linear relationship greatest in the Northern part of the NSO's range and less direct in the Southern parts (Carroll and Johnson 2008). Yet, in the public debate, the NSO is still synonymous with old-growth forests (e.g. *The Oregonian* 2/19/2011).

The scientific literature establishes that the complex structure of old-growth forests is the preferred habitat for the species (USFWS 2010), but the connection between the NSO and old growth is equally a result of policy. The National Forest

Management Act of 1976, which wrote the multiple use policy into law (and helped to ensure that protection of biodiversity would be one of those uses), required the USFS to identify “indicator species” that they could use to monitor the health of the forest ecosystem in the interest of protecting and maintaining biological diversity (Lange 1998). The USFS chose the NSO as the indicator species for old growth forests and catapulted the small, timid raptor into infamy. The association between NSO’s and old growth forests made it necessary to protect old growth forest to ensure conservation of the species (and vice versa), which was in direct conflict with the forest management plans to harvest old forests and replace them with more productive stands (Anthony et al. 2006).

The majority of the country’s remaining old growth forests in the West are on public lands managed by the USFS and the BLM (Lange 1998). Approximately 10 percent of the old growth forest that historically covered the Oregon landscape remains, according to the Oregon Wild website.¹ Twenty-eight percent of the original old growth forest in the entire Pacific Northwest remains (Strittholt et al 2006). This is not enough habitat to sustain NSO populations, as indicated by continuing decline, thus government agencies are forced to choose between limiting more tree harvests on public forests, or extending recovery responsibilities onto private and state lands in order to recruit more habitat. Both are being pursued, but neither is a simple and straightforward path.

¹ (http://www.oregonwild.org/oregon_forests/old_growth_protection/what-is-an-old-growth-forest)

Protection of the spotted owl

Little was known about the NSO until Eric Forsman, a biologist at Oregon State University, noticed consistent overlap between spotted owl habitat and timber sale markers in old growth forests of the Pacific Northwest during the late 1970's (Yaffe 1994). As his work continued, it became apparent to Forsman that timber harvest was having a significant impact on spotted owl numbers; however, his attempts to alert various governmental agencies were futile because there was not enough information available at the time on the ecology and status of the species. Although the spotted owl was not yet granted legal protection, the USFS demonstrated a good-faith attempt at protecting the owl on national forests by temporarily setting aside habitat and conducting research. However, the agency continued on its mission to maximize timber yield even in the face of changing public values regarding what should be done with national forests (Yaffe 1994).

The NSO is a symbol for decades of policy struggle over old growth forests in the Pacific Northwest. The NSO was granted protection as a threatened species under the ESA in 1990, though not without a court battle and much public debate (55 FR 26114). The listing of the species was a great boon to environmental groups seeking protection for old growth forests, because of the biological and political connection between the NSO and old growth. Meanwhile, the conflict between forest preservation and timber harvests continued to rage, leading to the passage of the 1994 Northwest Forest Plan by President Clinton. Although the plan explicitly regulated forest management in spotted owl habitat and served as the de facto government spotted owl management plan for some time, it did little to quell the

conflict over timber resources in the region and spotted owl protection that continues today (Yaffe 1994).

In 1992 the FWS released a draft Recovery Plan for the Northern Spotted Owl, but it was never finalized (USFWS 2008). In 2007, the Service produced a draft Recovery Plan and a Critical Habitat Designation for the northern spotted owl, and both were finalized in 2008 (75 FR 56132). In that same year, the Inspector General of the Department of the Interior issued a report, “Investigative Report of the ESA and the Conflict Between Science and Policy” that indicated the 2008 Recovery Plan could have been affected by political pressure under the G.W. Bush administration (75 FR 56132). Additionally, a lawsuit from the Carpenters’ Industrial Council resulted in the recovery plan being remanded to the Service and the critical habitat designation vacated (75 FR 56132). The Service released a draft Revised Spotted Owl Recovery Plan in September of 2010, followed by a 90-day public comment period. Currently, the FWS has just released the Revised Recovery Plan for the Northern Spotted Owl (76 FR 38575 38576) in compliance with the ESA, and is working on a draft Environmental Impact Statement in compliance with the NEPA.

Threats to Northern spotted owl recovery and the role of the barred owl

The range-wide habitat of the NSO declined 60-88 percent from the early 19th century to 1990, mostly due to timber harvest and other forms of landscape modification (USFWS 2008). Since 1990, there has been an annual decline in spotted owl habitat of 2.11 percent with 75 percent of that habitat destruction occurring in Oregon (USFS 2008). Range-wide habitat loss due to human activity is the primary threat to spotted owl survival in the wild, both historically and

currently. The FWS first noted potential competition pressure on the NSO from the barred owl in 1989; however the long-term impact was unknown at that time. As published in the Proposed Threatened Status Listing of the NSO, prior to the final listing determination: “The long-term impact to the spotted owl is unknown, but of considerable concern” (54 FR 26114, p. 26190). In the 2010 draft Revised Northern Spotted Owl Recovery Plan; barred owls were listed with past and present habitat loss as the top three threats facing the NSO (USFWS 2010).

The barred owl (*Strix varia*) is native to eastern forests of North America. Like the spotted owl, the barred owl is classified under the genus *Strix*, a group that includes nocturnal, forest-dwelling owls. They are larger than the NSO, and exhibit sexual dimorphism with males being larger than the females. Unlike the NSO, barred owls are habitat generalists; they inhabit early successional forests (Hamer 1988 and Iverson 1993, cited in FWS 2008), as well as older forests (Pearson and Livezey 2003, Gremel 2005, Schmidt 2006, Hamer et al. 2007, and Livezey 2007, cited in FWS 2008). Additionally, barred owls more readily use fragmented or disturbed forest habitats (Hamer 1988, Dunbar et al. 1991, cited in Dark et al. 1998), compared to NSO’s (Johnson 1992, cited in Dark et al. 2001). Barred owls are food generalists, and their diets overlap with that of the spotted owl by 76 percent (Hamer et al 2001 cited in FWS 2008). According to one study comparing barred owls and spotted owls over a three-year period, barred owls nest more often, are more fecund, and have a greater survival rate (Weins et al. 2009, cited in USFWS 2010).

Barred owls were first seen on the West coast in 1969 and were documented in the range of the NSO in Washington beginning in 1970 (Taylor and Forsman 1976, cited in Livezey et al. 2008). Since 1973, the barred owl has been steadily colonizing habitats of the spotted owl in Washington, Oregon, and Northern California (Monahan and Hijman 2007). Barred owl presence is negatively correlated with NSO colonization of old-growth habitat, and positively correlated with NSO extinctions. However, some evidence indicates that the amount of contiguous habitat available can mitigate against both of these effects (Dugger et al. in press). Barred owls are outcompeting spotted owls because the former are habitat and prey generalists, while the latter are specialists; but the specifics of barred owl effect on NSO prey base is unknown (Gutierrez et al. 2007). Barred owl presence also negatively impacts NSO fecundity (Olson et al. 2004). In some instances, barred owls are physically attacking spotted owls (Pearson and Livezey 2003, cited in USFWS 2008) and aggressively keeping them from habitat and nesting sites (Hamer et al. 1989, cited in USFWS 2008). Because they are more adaptable and aggressive, barred owls now occur in greater numbers than the NSO in a significant portion of the latter's range in the Pacific Northwest (Pearson and Livezey 2003).

An indirect effect that has significant implications not only for the NSO but for policy and forest preservation is that the presence of barred owls suppresses the likelihood of NSO's responding to calls during surveying (Crozier et al. 2006, Kroll et al. 2010). The protocol for surveying for the presence of NSO's in forest areas targeted for timber harvest or other forest management activities is by playing

digital recordings of spotted owl calls (USFWS 2011). Because the NSO is a listed species under the ESA, their presence within a targeted area would require government agencies to undergo consultation and obtain a special pursue in order to permit any forest management activities that area. Additionally, any timber harvests that did occur in NSO habitat without a permit from the FWS would constitute a “take” – a criminal offense under the ESA (16 USC 1531 *et seq.*). Barred owls suppress the response of NSO’s, and respond to the digitalized NSO calls during surveys (Crozier et al. 2006). Their presence does not inhibit the ability of governmental agencies to allow harvest or development to occur in the targeted habitat because the barred owl is not a listed species. Therefore, barred owls causing NSO’s to stay silent and go undetected could result in NSO-occupied habitat being destroyed (74 FR 65546).

Over the past century the barred owl has been expanding its range westward, and currently occupies all known NSO territory (USFWS 2010). Some believe range expansion was facilitated through natural processes (Monahan and Hijmans 2007) while others believe that expansion was facilitated by human alteration of the landscape (Dark et al. 1998, Livezey et al. 2008). The natural facilitation hypothesis suggests that climate change towards warmer temperatures occurring in the range-expansion corridor (which is believed to be through the forests of Southern Canada) lowered metabolic-energy demand for barred owls thus allowing them to expand opportunistically into new areas (Monahan and Hijmans 2007). This hypothesis is vulnerable to the criticism that climate change during the period of range expansion could have been affected by human activity, as global

temperature increase has been escalating since 1855 (IPCC 2007, cited in Livezey et al. 2008). Another theory suggests that range expansion was facilitated by barred owls adapting to coniferous forests (Boxall and Stepney 1982, cited in Monahan and Hijmans 2007).

Hypotheses for human facilitated expansion maintain that increased availability of trees in the Great Plains could have allowed the barred owl to migrate westward (Dark et al. 1998). Logging in Western Canada and the Pacific Northwest has also been implicated in facilitating colonization of the barred owl (Dark et al. 1998). Others suggest that human suppression of forest fires could have created more abundant forest areas, thereby creating corridors for barred owl migration (Mazur and James 2000, cited in Livezey et al. 2008). In the 2008 NSO Recovery Plan, the FWS chose not to take a side in this debate, stating, “to what extent the barred owl range expansion is a result of humans altering the environment is unknown” (USFWS 2008: 64). However, in the 2010 draft version of the Revised NSO Recovery Plan, it seems clear that human actions set the stage for barred owl colonization of the NSO:

“This range expansion evidently was facilitated by increases in distribution of trees in the Great Plains due to exclusion of fires historically set by Native Americans, fire suppression, tree planting, and, during some periods and areas, extirpation of bison and other factors” (USFWS 2010: B10).

For some conservation biologists, whether or not the range expansion of the barred owl into NSO habitat was naturally or anthropogenically facilitated has significant policy implications. Livezey et al. (2008) pose the concern that acceptance of the natural range expansion hypothesis could lead to inaction to

address the barred owl threat to NSO's and other species within its range. Alternatively, belief that humans are responsible for the barred owl invasion could justify focusing on recovery action that is targeted at another species rather than enforcement of regulatory measures against other human activities (e.g. logging). However, causes for barred owl range expansion do not have policy implications in the eyes of the law; the FWS is bound regardless by the ESA to implement recovery actions (such as barred owl population management). Furthermore, wildlife managers in the Oregon FWS office do not agree with Livezey et al. (2008) regarding the policy implications of various hypotheses for barred owl range expansion; that the barred owl is a threat to the NSO is reason enough to address it (USFWS 2011: personal communication). But, because barred owls will need to be removed from the environment, most likely by lethal means, there are significant implications for public acceptance of the policy.

Proposed experimental barred owl removal

On December 10th, 2009, the FWS published a notice in the Federal Register that it would begin to prepare an environmental impact statement on the proposed barred owl removal experiments and requested public comments. This process of receiving comments from the public is a regulatory requirement of both the NEPA and the ESA. Called "scoping," this process is a way for the public to air any questions, comments, and concerns regarding governmental response to specific policy issues. The Service is required by law to address all substantive scoping comments received during the public comment period.

The Federal Register notice stated that “the best available information now suggests that competition from barred owls poses a significant threat to the northern spotted owl...Therefore, securing habitat alone may not result in the recovery of the northern spotted owl” (74 FR 65546). Foreseeing that this proposed action would be controversial, the Service undertook an interdisciplinary approach that considered the ethical, legal, social, and biological implications of lethal removal of barred owls. The Service assembled a recovery plan implementation team, the Barred Owl Stakeholders Group specifically to address the ethics and values concerns that dominated the scoping comments received in response to the notice of intent to prepare an EIS of for barred owl removal experiments (USFWS 2011: personal communication). Representatives from Federal and State agencies, Indian Tribes, the timber industry, universities, and non-governmental organizations were invited to share their opinions and concerns regarding the ethics of barred owl removal and the methodology of the removal experiments (USFWS 2011). The BOSG was a voluntary process and was facilitated by a bio-ethicist, hired to provide insight into the philosophical frameworks for considering the significant ethical questions raised by the consideration of managing one species to save another (USFWS 2011: personal communication).

In order to address the threat of the barred owl on the recovery of the NSO, the FWS outlined eleven distinct recovery actions specific to the barred owl in the 2010 Draft Recovery Plan for the NSO. These actions include data mining, public education, establishment of protocols, maintaining older forest habitat, and “implementing large-scale control experiments to assess the effects of barred owl

removal on spotted owl site occupancy” (USFWS 2010). Although not specifically outlined in the Recovery Plan, the experiments could entail the lethal removal of thousands of barred owls, and the method of lethal removal could be to shoot them with a 12-gauge shotgun (USFWS 2011: personal communication and *The Oregonian* 2/19/2011). It should be noted that non-lethal removal techniques are being considered, but are severely limited because of unavailability of alternative sites to move the barred owls (USFWS 2011: personal communication). Also, alternative methods of lethal removal, such as trapping and humane euthanasia were considered, but the trapping is highly stressful, so an instantaneous death delivered by a professionally administered shot was considered the most humane way to remove the barred owls (USFWS 2011: personal communication). These methodology considerations have shifted in the eight months since I became aware of the proposed barred owl experiments and began asking questions about them, and this shift is in no small part due to the opportunity given stakeholders to voice their opinions. For example, when I first began talking to the FWS in January of 2011 in order to learn more about the issue, non-lethal removal was essentially precluded because there was nowhere to relocate the barred owls to, but now it is being considered. I believe this was a direct response to both public and organizational stakeholder demand for a non-lethal option that persuaded the FWS to go above and beyond in searching for a way to be able to include it.

The proposed barred owl removal experiments were initially met with much negativity and suspicion, perhaps because of the political controversy surrounding the remanded 2008 Recovery Plan, which first introduced the concept of barred owl

removal experiments. Though the controversy over forestry practices and the battle over old growth forests and the NSO have been extensively covered in the policy analysis literature (e.g. Lange 1998, Yaffe 1994), barred owl management is a new chapter in this policy saga that has yet to be explored. The controversy over barred owl management and the FWS's novel and potentially precedent setting response to the ethical concerns raised during the scoping process demonstrate that this issue is still very much at the forefront of environmental and endangered species conservation and management. This conflict is a rich example of how environmental and natural resources interest groups may have taken a key from the second-wave feminist slogan, "the personal is political"; indeed, in many ways the biological is political.

Methods

The FWS received 55 scoping comments² in response to a notice published in the Federal Register on Thursday, December 10th, 2009 explaining the proposed removal experiments. Additionally, 21 scoping comments that substantively addressed the proposed barred owl removal experiments were submitted to the FWS in response to the 2010 Draft Northern Spotted Owl Recovery Plan. All scoping comments submitted to the FWS are a matter of public record and were obtained by the researcher via an email request. I analyzed the 75 total comments for key themes arising from both the articulated and implicit reasons for approval or disapproval of the proposed experiments. Interviews with members of the BOSG were conducted to better understand the process of the

² For analysis, two comments submitted by the same individual and each containing largely similar content were treated as one, therefore the number of scoping comments analyzed was 54.

stakeholder group from their perspective and to augment analysis of the issues and themes that were raised in the scoping comments.

Interview subjects were recruited from the Barred Owl Stakeholders Group convened by the FWS as part of the pre-scoping process for the proposed barred owl removal experiments. Contact information for members is a matter of public record and was furnished by the FWS. A recruitment email describing this study and inviting participation was sent to a list of 30 representatives of stakeholder groups who were present at one or more BOSG meetings and/or conference calls. Of those 30 invitees, 5 interviews were completed. The interviewees included: a representative from a commercial timber industry association, a biologist from an animal welfare organization, a representative from a conservation organization, a biologist from an Indian Tribe³, and a biologist from a private timber company. Interviews were conducted via an Internet phone calling software (Skype). Interviews were semi-structured and open-ended. With permission, interviews were recorded then transcribed.

This qualitative research project utilized methodology established in the field of interpretive policy analysis (Yanow 2000). Qualitative policy analysis methodology begins with acknowledgement of the inherent values and biases of the analyst because no interpretation is free from those influences (Yanow 2000). Public policy analysis is the study of institutional behavior; Dye (1992) defines public policy as “whatever governments choose to do or not to do” (cited in Birkland

³ This Indian tribe manages forests on its land as an economic resource under regulations imposed by the Northwest Forest Plan, thus many views were similar to those expressed by the timber industry.

2005). When an analyst constructs a narrative of a particular policy issue, it is unavoidably subjective. I come from a position that was, at least initially, deeply sympathetic to preservation and animal rights views, yet conflicted in those values because they are in direct contradiction with the natural resource consumption that defines the American lifestyle. This acute sense of contradiction and tension between values concerning environmental and conservation issues and behavior is the perspective that underlies the following analysis.

Data and discussion

Public scoping comments: overview

The authors of the scoping comments were grouped into categories describing who they were: timber industry, affiliated public⁴ (they provided information about their personal or professional affiliation with the natural resources community), unaffiliated public (no information was provided or the comment was anonymous), Indian tribes, conservation non-governmental organization (NGO), animal welfare NGO, forestry NGO, and government agency.

To provide a cursory descriptive overview of these groups: 81% of the unaffiliated, public comments stated opposition to the barred owl removal experiments; 54% of the affiliated public comments were opposed; whereas 87% of conservation NGO comments gave support for barred owl removal experiments; as well as 62% of Timber industry comments. A number of conservation, timber, and

⁴ I initially used the term general public, but it was pointed out by a FWS employee that the “general public” doesn’t really exist and that it is a misleading and inaccurate term to describe anyone that would take the time to write a scoping comment regarding a management issue. They could be more accurately described as an “interested public.”

animal welfare group comments asserted they had no position on the proposal. For the purposes of this study, the directly oppositional views on this issue held by the interested public versus the natural resource community⁵ are more intriguing than the statistics. It is possible that what accounts for this huge difference is an information gap: that the more knowledgeable that one is about the dire situation of the NSO, the complicity of the barred owl in exacerbating it, the more likely one is to support the experiments. If this is true, then the BOSG process is even more important because the members can take the information presented to them and in turn educate their respective organizations' superiors as well as constituents. However, this idea that more information will inevitably lead us to a rational policy is too simplistic and actually tends to not play out in political realities. It is a false assumption that more information, especially more of the "best" information, alone will make for rational (good) reactions to policy proposals as opposed to emotional (bad) reactions; there are many other factors at play that can help to explain this gap.

The concept of an experiment

One such factor that also cannot be accounted for in a simple for/against quantitative assessment of the scoping comments is the confusion over whether comments were responding to the proposed experimental removal *only* or to the

⁵ "The Resources Management Community" is meant to be an encompassing term to include scientists, academics, federal/state agency employees, and other policy agents involved in the fields of resource use, wildlife and environmental conservation, and conservation sciences in some professional or academic capacity.

prospect of long term barred owl management.⁶ This lack of distinction between the two is particularly evident in many of the scoping comments submitted by the interested public that referred to these proposed experiments as if they were permanent management solutions, or “culling,” rather than as scientific experiments. Furthermore, some of the comments from the public clearly expressed disagreement with the benefit of scientific experimentation more generally and, by extension, distrust of any kind of human manipulation and interference:

“Humans have tampered with earth’s natural systems far beyond our capacity to repair the damage...By now we must surely realize that the threads of interconnection in the natural world are far too complex for the bureaucratic mind to ‘control’. Please don’t put any more systems, populations, and natural balances at risk with blind experiments!” (E.R.⁷ 2010)

Conversely, in some of the other scoping comments (mainly articulated by conservation and animal welfare groups), the fact that barred owl removal will be carried out as a clearly defined, research experiment is a reason to support it. To these stakeholders, the potential gain of information and its significance for NSO conservation outweighs the costs. Many conservation groups submit their tentative approval of the proposed experiments, but are bearish on the prospect of long-term management, for example:

⁶ The FWS asserts that they are not currently entertaining conversations regarding long term management because they cannot begin that conversation without the information that they hope to get from conducting the barred owl removal experiments (USFWS 2011: personal communication)

⁷ Although these comments, and all the information provided in them, are a matter of public record I feel compelled to use initials only to try to provide some anonymity for members of the public that submitted comments. Organization names will be cited, but not the individual authors of comments submitted on behalf of organizations or associations.

“While we support the scientific investigation regarding effects of barred owl removal, we are not at this time condoning specific management actions with regard to barred owls...for although we see the utility in understanding the efficacy of removing barred owl’s from spotted owl habitat, even solving this issue fails to address the long-term ongoing declines of spotted owls” (The Wildlife Society 2009).

Many of the timber groups and wildlife managers want the FWS to avoid wasting precious time with experiments and establish barred owl removal as the primary recovery action for NSO. In the comments submitted by Weyerhaeuser Natural Resources Company, the barred owl removal experiments are a nice “academic approach” but don’t actually do anything about the issue (Weyerhaeuser 2010). In agreement with the timber industry on this issue is the Arcata Fish and Wildlife Office. They assert that the information is sufficient to support management, and further experimental evidence is not necessary because delaying action is likely to decrease the opportunity for barred owl removal to benefit spotted owls. On the other hand, the Humane Society of the United States (HSUS) questioned the scale of the study – suggesting a slower and more observational approach - and stressed the need for further academic, peer-reviewed literature on the relationship between barred owl and NSO populations (HSUS 2010). Yet another perspective is that the proposed barred owl removal experiments are the wrong type of research that we should be conducting. As this public comment proposes:

“Becoming inhabitant humans is the real challenge we face, and killing barred owls will not help us do that. The desensitization required to look down the barrel of a twelve-gauge at a bird we have no intention of eating and no real reason to kill is what we must truly overcome. We must re-sensitize and reintegrate *ourselves* into the greater trends and processes of the land, trends and processes that the dance of the

spotted owl and barred owl can help us see as we have not allowed ourselves to see before. That is the real study we need to undertake. Shooting barred owls is nothing but another study in futility and callousness like thousands of others we have attempted over the ages most often with far-reaching and deleterious repercussions” (T.F. 2009).

This comment does not find justification for killing the barred owl that exists in the current conservation policy, not that it will give us more information nor that it will save the NSO. A similar comment was submitted by an individual who identifies himself as an environmental educator: ““Is there really value in interrupting this experiment that man and nature has thrust upon us by muddling the data with further anthropogenic factors?” (T.A. 2009). What these comments are saying is that seeing what happens is also an experiment and one that we have more to learn from than the proposed experiment to see if management is an option.

Although these comments may be compelling arguments for the way humans should engage with and envision ourselves as a part of the natural world they are also in direct contradiction with the directive that our conservation laws lay out: *to do something* to prevent species extinction. For our society to have a policy representing a duty and responsibility to prevent species extinction – no matter what the cause - necessitates that we view ourselves as privileged in the natural world, yet dependent on it. The ESA is often compared to the biblical story of Noah’s Ark (e.g. Mann and Plummer 1995), an analogy which supports man’s position as unique among the rest of the animals, choosing who lives and who dies. The comments cited above refuse to give humans that distinction and rather make an appeal for a conservation policy that is subversive in issuing a challenge to the duty to save individual species placed on us by the ESA – and how we’ve chosen to

carry out that duty by killing other animals. As we turn to an analysis of the comments supporting barred owl removal experiments and opposing them, this paper will look at the different ways that stakeholders negotiate the role of humans in the natural world and what that means for conservation policy.

Support for barred owl experiments

The primary reason articulated in the public scoping comments in support of the barred owl removal experiments is that the ends justify the means. This utilitarian philosophy rests on the calculation that it is ok to kill barred owls because there will be measurable benefits to the NSO. The public, conservation organizations, timber industry, and the animal welfare group's scoping comments articulate this in different ways. For the public, the potential negative of killing barred owls is outweighed only because it will help prevent NSO extinction:

"I am writing to express strong support for your study of determining if killing barred owls will improve spotted owl demographics. Avoiding extinction of the spotted owl is very important and avenues such as this need to be explored. Please do not back down if there is a lot of opposition to your study. Please do the study!" (D.T. 2010)

Members of conservation organizations make a slightly different calculation, based on the scientific merits of the experiments rather than saving the NSO, but come to a similar utilitarian justification for supporting the proposed removal:

"Rigorous, controlled scientific methods and protocols must be adhered to, so that the undertaking will have true scientific merit and a meaningful, useful outcome. Shoddy science such as that used as an excuse for 'experimental whaling' must be avoided at all costs" (Pilchuck Audubon Society 2010).

This utilitarian philosophy also overlaps with a species level view of animal welfare, because the level of individual harm does not weigh as heavily as the harm

to the entire barred owl species (which is minimal), nor does it outweigh the potential species level benefit to the NSO. In other words, killing a few (thousand) barred owls here is justified because it will not jeopardize the survival of the barred owl as a species but could potentially save the entire NSO species. Another layer of utilitarian argument, made here by the conservation community, is that the means (“rigorous, controlled scientific methods”) must justify the ends (sacrifice of barred owl lives)⁸. This idea was also articulated in my interview with an Indian Tribe biologist:

“I tend to look at things from an end result standpoint, I have no problem with managing the population of one species if it’s done in what I would call an ethical manner. If we have to remove individuals lethally, if we have to kill animals, I want it done in a humane way and I want a distinct, clear, and logical reason behind it.”

Another utilitarian calculation for whether the means justify the ends is the question of the most humane methods possible for lethal removal. This issue was covered quite extensively in the BOSG meetings and different options were vetted. There was an inclination throughout the stakeholder interviews to pin the concern for humaneness of lethal removal on the animal welfare/animal rights groups; and to say that the FWS had those conversations just for those groups and the BOSG meetings were dominated by their concerns. But an analysis of the scoping comments and interview transcripts suggests that many people who would not

⁸ Also noteworthy here is the implicit definition of “shoddy” science is that which is clouded by political agendas of resource harvesting, the analogous example given is “experimental whaling” where “research” is used as a façade for the commercial whaling. In other words, there is a belief that there exists a pure discipline of scientific inquiry that would justify almost any sacrifice made in the name of experimentation because the intentions are pure – the production of “truth” and the expansion of “objective knowledge.” The assumption being made here is that conservation is not a political agenda in the same way that resource use is.

identify themselves as being part of the animal welfare community also consider humaneness as part of their conservation ethic. In addition to the HSUS: Oregon Wild, Klamath-Siskiyou Wildlands Center, Audubon Society, Conservation Congress, American Bird Conservancy, Environmental Protection Information Center, North Carolina Museum of Natural Sciences, Massachusetts Division of Fisheries and Wildlife, the Raptor Center, The Wildlife Society, Society for Conservation Biology all made demands that the experimental removal be conducted in as humane a manner as possible. This value was also mentioned in the interviews with the biologist from the Indian Tribe as well as the representative from the conservation NGO. This shows that the ecosystem approach and the individual/animal rights approach to conservation issues are not as mutually exclusive as is sometimes portrayed in public policy debates. There is a tendency for many scientists to distance themselves in the public discourse from “the animal rights movement” (i.e. “extremists”) by articulating only utilitarian arguments to justify the need to conserve species (such as the need to preserve biodiversity or use of these species by future generations). But some theorists argue that the great emotional and fiscal extent to which we pursue recovery of individual species belies another reason for our conservation policies. As Mann and Plummer (1995) point out,

“This suggests...the entire discussion of utilitarian value, though often invoked as a reason to conserve biodiversity, is a red herring. We humans do not worry about losing endangered species in the same pragmatic way we might worry about losing our wallets ... a feeling that has led some conservationists to argue that other species have a right to exist” (Mann and Plummer 1995:133-134).

My interpretation of the public scoping comments and the conversations I had with BOSG members leads me to suggest that the red herring here is not only

the utilitarian argument for conservation. The red herring is actually the denial that the “species [and animals] have a right to exist” justification for conservation holds equal weight and is not antithetical to the ecological arguments or any other reason to protect species. That is why there is much concern to ensure that the justification to kill barred owls is valid and compelling. Stakeholders across the spectrum of the conservation community want policy makers to consider some aspects originating from animal rights philosophy; specifically the consideration of individual animal welfare, such as providing barred owls with a humane death if we do need to manage them.

The primary cause of NSO decline

The utilitarian argument that the potential for benefits of this study outweigh the potential for harm rests upon the acceptance that the barred owl is one of, if not the most, pressing cause of decline for the NSO. This is the second argument made in support of the proposed barred owl removal experiments, and the one more frequently utilized by the timber industry, for example:

“If you strip away all the program funding issues, alternative agendas, political considerations, and simply ask: how do you save the spotted owl? It is now clear that controlling the barred owl is the overwhelming answer. We urge the Service to eliminate all the distractions and focus on the barred owl” (Rayonnier, Inc. 2010).

This viewpoint is also expressed by other scoping comments and by a representative of a timber industry association, a biologist from a private timber company, and a biologist for an Indian Tribe I interviewed. For these people and the entities that they represent, the perspective is that the barred owl threat is

paramount and, currently, protecting more acres of habitat becomes irrelevant because, as the timber association representative points out:

“it doesn’t matter how much habitat we label as spotted owl habitat, and restrict it as much as you want, the spotted owl is going to keep going down until something happens to the barred owl. The barred owl is the limiting factor right now, I have not heard anybody that would dispute that.”

Hand-in-hand with this perspective is the criticism that the proposed policy of conducting long term,⁹ site-specific feasibility experiments is not doing enough and may cause the FWS to fall short of its ESA-directed duty to promote the recovery of the endangered NSO. The basis provided for this opinion that common sense and the perseverance of the NSO on private timberlands where barred owl management has been carried out as part of habitat conservation plan¹⁰ are clear and ample proof of what “needs to be done.”

Many of the scoping comments from conservation NGO’s, as well as the conservation group and animal welfare representative who I interviewed, state that the best available science is limited regarding the specifics of population level interactions between the barred owl and the NSO. Therefore, these groups support the experiments in part as an effort to solve that question, but maintain that the primary cause of continued NSO decline is habitat loss, not the barred owl, and that

⁹ The proposed time line for the experiments in the 2010 draft recovery plan was 10 years.

¹⁰ A habitat conservation plan is a contracted agreement between private landowners and the Service, where the private landowner receives regulatory assurances against incidental take of endangered species on their property in exchange for managing a portion of their land to maintain habitat for a listed species. The HCP cited here is being carried out in Northern California by Green Diamond timber resources and the FWS.

no amount of barred owl removal would be justified without complimentary habitat protections.

There is much concern that barred owl removal would be used as a substitute for habitat protection and that logging would be allowed to continue on suitable but uninhabited spotted owl habitat on private and federal land. As the conservation NGO representative stated, “I do see the barred owl as a factor but again it is secondary and habitat is still really the fundamental equation and the reasons why the competitive interactions have been so negative for the spotted owl is because the habitat is so limited.” In each interview, I asked what in their personal opinion was the current most pressing cause of NSO decline; anyone with timber harvesting interests stated the barred owl, while anyone with conservation interests stated past and present loss of habitat.

These views, which on the surface may seem obvious from an interest-based framework for policy analysis, are actually indicative of deeper ways in which these individuals and groups interpret the science. And we can better understand them by trying on the lens through which their own personal experiences impact their observations. Timber groups are bringing to the table their experience of living intimately with the forest blocks upon which they make their living. Because they as an industry have been forced by Northwest Forest Plan and ESA regulations to conduct NSO surveys in order to conduct timber harvests, they have seen first-hand the influx of the barred owl in the forests of the Pacific Northwest. As it was explained to me, “I’ve seen the site that used to have spotted owls, now every time I show up I get barred owls right on top of me, hooting over my head, and trying to

chase me away.” This kind of intimate, real-life experience is always going to be more formative for an individual than any amount of abstract acreage estimates of how much habitat is left, or any modeling estimates of how much habitat is needed by the NSO population. Simply saying that the timber industry views the barred owl and not habitat as the primary threat to NSO recovery only because of their commercial interests in the forests is overly simplistic and also unfairly dismisses the conservation ethic of the biologists who work for the timber industry. Although the economic impacts of additional forestry restrictions and access to more timber output to create jobs and meet demand for lumber products is going to mean a lot to the timber industry, their interpretation of the available evidence is also a result of their valid personal experiences.

Similarly, the conservation groups’ perspective comes from firsthand accounts of dwindling wilderness and their personal experiences with devastating clear cuts or other modes of environmental destruction. These things are arguably more of a driver for their belief that habitat loss is the primary reason for NSO decline and not the barred owl. It is equally over-simplistic and counterproductive to claim that their interests in locking up land for preservation solely accounts for their perspective. An illustrative example of how differences in perspective and worldview colors each individual’s interpretation of the relationship between NSO decline, barred owl invasion, and habitat is in the description by two stakeholders I interviewed of a field trip that the BOSG went on. The field trip was to a site where one of the few pivotal research studies of the impact of barred owl colonization on

NSO population parameters and demographics was being conducted. Here is the account from the timber association representative:

“I thought the field trip we went on with the stakeholders group was really good, we went to this area where they’d done massive surveys of both species and they gave us maps of where both of them were. And the SO was relegated to living in this little bitty corner, they couldn’t reproduce, they couldn’t do anything because they were just barely hanging on and trying to eat enough. They were getting harassed by barred owls left and right.”

Compare to that of the conservation NGO representative:

“Going out on the field trip, I thought, was very valuable to me if nothing else because I saw and photographed one of the nastiest clear cuts ... I was very impressed with that study because just seeing the powerpoint and the maps and how the birds move around [the NSO being pushed out of best habitat and more and more into marginal habitat as the barred owl populations increased] I just thought was really fascinating.”

They are both describing the exact same field trip, but note how different of a picture each one paints. They both begin by saying how great the field trip was for reaffirming their own previously held beliefs. It would be irresponsible to chalk this up to mere interest-based differences. It would be more beneficial for the purposes of policy analysis to underscore the importance of individual lived experiences for stakeholder value systems. Interest-based interpretations are a rhetorical tool commonly utilized in policy conflicts to invalidate an opponent’s statements, and by extension also undermines the unique authenticity and earnestness of their values.

Opposition to barred owl experiments

No matter whom you ask about the barred owl situation in the Pacific Northwest, they inevitably start talking about habitat. That habitat was the “real” problem was by far the most often cited argument made by members of the

interested public and the natural resources community in opposition to the proposed barred owl removal experiments: “The whole problem is habitat, habitat, habitat” (S.H. 2009). If loss of habitat is the “real” cause of NSO decline, then it’s not fair to kill any barred owls in order to try and save the NSO no matter what effect barred owls may have on the NSO population. Generally, we abhor punishing an innocent for another’s crime: “Blowing away Barred owls with shotguns to help the Spotted owls deal with the invasion of their territory DUE TO LOGGING is so unfair and unnecessary” (K.C. 2010). The more profound implications of this argument were articulated by the animal welfare organization representative that I interviewed: “...we, as a group of stakeholders, don’t feel that the true battle has been fought and won the way it could be and that is the habitat loss battle; that we might be killing all of these BOs for nothing if we don’t win the big war, and that’s the habitat war.” One interpretation of this argument is an interest based one that assumes conservation groups would try to reframe the barred owl issue as a habitat one in order to forward their agenda, but again I don’t think this interpretation is satisfactory.

Underpinning this argument that habitat is the real problem, and that we need to preserve more, is the belief that barred owl management may not be necessary if the two species can coexist. The theory giving rise to this belief is that, if given enough habitat, a threshold will be attained where the ecosystem can sustain both species: “It is my feeling that instead of killing them we must look toward allowing for less logging so that the environment they share can sustain

them both” (B.H. 2009). The animal welfare representative I interviewed also expressed this hope:

“You know there’s always a possibility, and there are people at the FWS that are willing to consider this, that these animals coexist in [other] places, and there’s always the possibility ... that there will eventually be created some sort of coexistence with them [in the Pacific Northwest]. Everybody is terrified to wait and then find out that it didn’t. And yet, that probably would be the best approach ethically because there is no guarantee that the BO is going to be the last nail in the coffin for the SO.”

Another way of saying this, which was brought up in the public scoping comments as well as by the conservation NGO and animal welfare NGO representatives I interviewed, was that if there was enough habitat for both, the NSO would not be suffering so much from the barred owl intrusion. This notion is supported by the theoretical conclusions of empirical evidence from elsewhere in the literature, and not from direct observation of barred owls in NSO range within the Northwest. The first study ever undertaken of these effects does conclude that larger amounts of contiguous habitat does mitigate the effects of the barred owl invasion on NSO populations, has not yet been published nor replicated (Dugger et al. in press). The HSUS public scoping comment cited a study that a subspecies of spotted owl and barred owl are sympatric in other parts of their range, though that study concluded that the same situation would be unlikely in the Pacific Northwest (Gutierrez et al. 2007). The Forest Service Employees for Environmental Ethics (FSEEE), in their scoping comment on the 2010 Draft Recovery Plan, cites theoretical evidence that competitive exclusion – the main interaction between barred owls and NSO’s that has been observed – does not have a causal relationship to the extinction of a resident species:

“inexplicably, the draft plan is silent on this basic ecological principle that interspecies competition for resources (not to be confused with predation and disease, which are often extinction threats) is rarely the cause of extinction ... the draft plan provides no theoretical justification for its conclusion that competition with bo’s threatens the so’s survival” (FSEEE 2010).

Many of those who support not only the experimental removal of the barred owl but also management of barred owl populations in order to recover the NSO do not agree that coexistence is likely nor that preserving more habitat would make a difference. Whether or not one believes that the two species can coexist also depends as much on the available literature as on one’s view of nature: whether nature is an ecological system striving towards balance and equilibrium, or if nature is a chaotic struggle for survival of the fittest. The argument more often espoused by the timber industry that the barred owl will cause the extinction of the spotted owl no matter how much habitat you set aside, is a survival of the fittest view. If one accepts the premise that the barred owl will extirpate the NSO, then the concern that the FWS is not doing enough to address the threat and that haggling over additional blocks of habitat protection is a distraction becomes valid:

“The Service needs to shift its primary focus from habitat to control of the barred owl in this recovery plan as the primary threat ... focus on habitat has distracted and delayed biologists, scientists, agencies, and policy makers, and the public from understanding and acting on the real threat to the spotted owl” (Rayonier, Inc. 2010).

The classic ecological theory that ecosystems trend towards equilibrium and that nature has a way of “balancing itself out” has found contention from a growing literature of an “ecology of chaos”. The equilibrium view provided the philosophical foundation for the radical environmental movement of the 1960’s and 1970’s that pushed for regulatory reforms such as the ESA and the NEPA. This view also

established a narrative of a struggle between “pristine nature, delicately balanced in ... beautifully rational ecosystems and a human race bent on mindless, greedy destruction” (Worster 1993). In the ecology of chaos theory, disturbances like fire, natural disasters, invasive species, and species extinction are not seen as aberrations, but part of how nature works. The idea is that nature is not on any particular course towards order, rather, organisms constantly and actively alter their environment in order to adapt to a constantly shifting landscape (or else they go extinct). Subsequently, nature is not predictable nor does it balance itself out by fitting as many happy species as possible into a variety of ecological niches. To the contrary, nature is a random struggle for existence between species and the environment, and between competing species. The consequence of this empirical shift in understanding nature is significant, but has not yet taken hold in much of the public discourse about conservation. It is essentially the opposite of the directive of the ESA – the idea that “we cannot prevent environmental change or species extinction ... what we can do is to try to affect the rate of extinction and direction of environmental change in such a way to make as decent a life for human beings as possible. What we cannot do is to keep things as they are” (Lewontin 2001: 68).

This is a key criticism of the desire to preserve species and ecosystems as we found them, and a view that may potentially shake the very foundations for the ESA. That potential then raises some anxiety over what the point of conservation is if we cannot keep the NSO around for future generations; Donald Worster (1993) articulates the essence of this anxiety:

“For [the influential conservationist, John Muir], the clear lesson of cosmic complexity was that humans ought to love and preserve

nature just as it is. The lessons of the new ecology, in contrast, are not all clear ... does it promote a less hierarchical view of life, and a set of “new relations between man and nature and between man and man?” Or does it increase our alienation from the world ... What is there to love or preserve in a universe of chaos? If that is the kind of place we inhabit, why not go ahead with all our private ambitions, free of any fear that we may be doing special damage? What, after all, does the phrase ‘environmental damage’ mean in a world of so much natural chaos? Does the tradition of environmentalism to which Muir belonged, along with so many other nature writers and ecologists of the past ... make sense any longer?” (p. 169-170).

The answer to one of these questions, whether the new ecology promotes a new relationship between man and nature, was present in this scoping comment:

“Becoming inhabitant humans is the real challenge we face ... We must re-sensitize and reintegrate *ourselves* into the greater trends and processes of the land” (T.F. 2009).

This comment goes on to say that even after the NSO is gone, the forest will integrate the barred owl to suit its needs, and that nature will do the same to us in our due time. “Becoming inhabitant humans,” means relinquishing the “hierarchical view of life” – and we have a long way to fall. This view is self-described as being an ecosystem-based approach, and directly oppositional to the institutionalized species-based approach to conservation ethics. It also has the potential to relieve us from Noah’s burden of gathering the animals for the ark. However, the price of this is to relinquish our claim to the natural world as existing for our privileged use and control; that is to “reintegrate with the land.” Other similar ways this view is articulated in the public scoping comments is as a resignation that the landscape has been irreversibly altered – through deforestation and the arrival of the barred owl – and both are here to stay:

“Obviously humans have changed the Forest over time by harvesting large areas of old growth. This will likely never be reversed and the

spotted owl may never have what it apparently needs which is vast old growth Forests. As an ordinary citizen I would rather have the opportunity to see an owl out in the woods, even if it is a barred one, rather than very few as the F&W shoots them in an attempt to save the spotted owl which is perhaps not suited to survive in the changed forests...I believe we should let nature and evolution take its course” (K.C. 2010).

Apparently, it is not a contradiction to this author that, although humans have impacted the environment to such an extent, what we need to do now is to “let nature take its course.” Still more arguments aligned with this worldview stated that we should “let nature take care of the situation” (G.W. 2010) and “let nature decide” (V.Z 2010). This view appears to be a manifestation of the worldview that humans, for better or for worse, are part of the landscape¹¹; and that conservation issues are no longer viewed as a war of man vs. nature, as in the discourse of the 1970’s environmental movement. Put another way by the animal welfare NGO representative, “our way of thinking, and I think conservationists in general think in this way, is [not] that [we should] not take anything from the land to use for ourselves, we are a part of the land. [It is] not to take humans out of the equation but to use it [the land] in a sustainable way.” I believe this represents a fundamental shift in conservation theory, though some would argue it is a more faithful interpretation of the “land ethic” espoused by the father of the conservation philosophy and environmental ethics, Aldo Leopold. This view also builds upon Leopold’s land ethic because it incorporates the ecology of chaos by challenging the assumption of nature as static or idealized state. As stated by the Indian Tribe biologist:

¹¹ As opposed to dominators, or the stewards of the landscape.

“You know what? I think its extremely arrogant on our part to think that the way things were when we first saw them are the way things are supposed to stay and naturally, species change, habitats change things become better or worse for one species and better or worse for another... I don't know if it's our responsibility to prevent nature from taking its course.”

Yet this view is far from ubiquitous in the response to the proposed barred owl removal experiments. In many of the scoping comments, the human hand in species decline was morally relevant: “Until we are positive just why the barred owl is now in this formerly exclusive territory, and certain that the reason is not human-triggered, killing off barred owls is not the solution to the extinction of the spotted owl” (L.S. 2010). And also: “they [barred owls] shouldn't be killed for a HUMAN-CAUSED problem, should they?” (K.C. 2010). This moral distinction of what is a natural, as opposed to a human-caused conservation crisis was articulated many times in the public scoping comments in several ways. One was a criticism of past management decisions: “Nature keeps finding ways to adapt to our well intentioned but misguided attempts to manipulate our natural resources...The cull idea is a band aid to cover a larger problem of poor forest management decisions in the past. To further alter the natural process will only aggravate the situation” (P.B. 2010). Other comments implored the Service to “leave it alone” (C.C. 2009), to stop “Playing God” (K.C. 2010), and that “when there's human intervention, we end up with other negative consequences” (S.P. 2009). These comments are essentially saying that wildlife management, even in order to benefit other species is more meddling and

that we should be eliminating the human activity that causes species extinctions rather than attempting to mitigate for it¹².

Because of the ongoing academic discourse regarding emerging ecological theories and their consequences for our duty to nature, and because the moral distinctions regarding the culpability of human action on species extinction prevailed throughout the scoping comments, I expected to see a similar distinction in the interviews with the stakeholders. I asked each individual who I interviewed whether or not knowing if the barred owl range expansion was anthropogenically facilitated mattered for consideration of going through with these removal experiments. Consider the following responses:

1. Animal welfare NGO representative: “I would say no because, here’s the thing, its human action that caused the spotted owl to be in peril to begin with. ... We’ve got to try the best that we can to mitigate what was done in the past and try to fight to put something back that is going to allow those animal to have sustainable population with as little human intervention as possible ... You cant take out the fact that humans are a part of nature. We are part of the natural world, we have the ability to manipulate the environment that we live in far beyond any other creature that exists but the fact remains that we are one

¹² Ironically, many of the individuals that expressed these non-interventionist views were members of the public that worked or volunteered in wildlife rescue and rehabilitation facilities. Some might argue that wildlife rehabilitation is unwarranted human intervention in nature and evolution because it seeks to return individuals to the population that would otherwise be eliminated. Furthermore, some might argue that rehabilitation is the ultimate imposition of society’s values onto nature because it is the taking of wild animals into captivity (even if only to save their lives) and is predicated on the shaky assumption that the animal is better off just being alive – sometimes with physical impairments or living the rest of their lives in captivity because they would not survive in the wild. This is not meant to be a criticism of wildlife rehabilitators (I have volunteered at a clinic and believe they play a very valuable ethical role because in practice what they do most often is provide fatally injured animals a more humane death than they would experience without intervention) but rather my goal here is to point out some inconsistencies in what we say and what we do. This inconsistency is a crucial and constant struggle in conservation policy.

of the creatures ... There are people that have theories out there about whether it was natural or not ... but it would be really difficult to prove it and since it would I think its best to assume that this is something that happened that can't be undone."

2. Indian Tribe biologist: "I think you could make an argument both ways ... What we have now is two separate species, that are competing and one's outcompeting the other, so, it's a matter of do we want to take the steps that seem to be necessary... do we want to see what we need to do in order to help the spotted owl persist or do we want to just sit back and watch the barred owl take over. And that seems to be the question that we're at now. I personally I think it would be good to go ahead and do these studies and see how the spotted owl's react."
3. Private timber industry biologist: "No, in a philosophical manner I think it does make a difference, whether they got here through our actions or not. Legally I don't think it does matter, the difference there is that legally under the ESA we have to recover the spotted owl, and so in that context it doesn't matter how the barred owl got here it is [one of], if not the, major threat and a very significant threat and somehow has to be dealt with, legally. So, like I said, philosophically if this was simply something that was not required ... if there wasn't a law requiring us to do that then it would be, in my mind anyway, quite important if the barred owls got here naturally versus if they got here through some anthropogenic effect."
4. Conservation NGO Representative: "Not to us completely, I mean, to us it kind of is just another indication of how humans can really mess things up, but it does look like human land use changes probably facilitated their movement across ... we're obviously focused on the conservation of species and ecosystems as a whole. So in that sense we think that's the highest ethical consideration."
5. Timber industry Association Representative: "The ESA doesn't allow you that type of distinction ... If it's a natural range expansion then we have to let the owl go extinct because it's natural. If the ESA allowed something like that then it [whether or not the barred owl range expansion is natural] would be a great discussion. But the ESA doesn't allow that. It doesn't care why its declining, it just matters that it is ... If the

ESA cared, then I would care. But aside from the ESA, I think we have a responsibility to take care of species that we are impacting and causing the decline of. If it's us that's doing it then we should do everything we can to maintain the species. If it's a natural evolution thing, then I don't think we should. ... But to spend an incredible amount of time and money and effort to try to stop a natural process from happening ... I question that."

The Indian tribe biologist, the private timber company biologist, and the timber industry association representative all articulated that, personally and/or philosophically, anthropogenic causes would make a difference for our duty to interfere with the barred owl invasion and more generally to prevent species extinction; but that natural causes would absolve us from that duty¹³. However they each pointed out that it didn't matter anyway because we are obligated by the ESA to recover species and the law does not allow for such a distinction¹⁴. Nonetheless, implicit in the view that it does matter at all is the assumption that we could parse out natural versus anthropogenic factors for species endangerment. The conservation and animal welfare representatives make the opposite assumption that we could never separate the natural and anthropogenic factors because the human effect on the environment at this point is so pervasive and far reaching that it would be futile to even try. They both responded that it did not matter if humans

¹³ What these individuals also have in common is that the ESA restricts their industry's primary economic function. Natural resource usage provides a service for the public but is also sometimes vilified by the public for the necessary extraction in order to provide that service. As a result they find themselves severely restricted by civic sense of morality that finds a particular dilemma in human-caused species extinction.

¹⁴ I don't think anyone would dispute that the ESA is this way because of pragmatism and not ethics – if it did matter then nothing would ever get done because the FWS would be so consumed with having to prove causal relationship between some anthropogenic activity and a species decline and the litigation would simply never stop.

facilitated the range expansion of the barred owl for this very reason. However, at other points in the conversation these stakeholders revealed that they felt at least in part that management of one species to counter the effect of human actions on another species is morally questionable; suggesting that maybe it does matter after all:

“We’re willing to not do anything to curb our actions at all, therefore conservationists are left with the only option that they have in order to keep what [species] we have left. And that’s not fair ... when we haven’t in good faith done due diligence to minimize the human hand involved that caused the problem in the first place and we continue to have animals pay the price for our mistakes, that’s where I think ethics has to come into play. We need to be dead honest with ourselves as a society on what we’ve done and not continue to have animals pay the price for our mistakes.”

This ambiguity over our moral duty and what prescribes it could be both a cause and effect of the ambivalence of our views of ecology (the debate between the ecology of equilibrium and the ecology of chaos described above) and the normative and prescriptive effect of each of these paradigms. There is a tension here that could be described as lack of consensus over how much a part of nature we are. Saying that if a species is endangered because of human causes, then we do have moral obligation, but if it is a natural process, then we don’t place humans in a position separate from (and almost always above) nature and the rest of the animals. This view is more in line with the belief that we have a right to use of natural resources, but that we must be stewards of the land in doing so. On the other hand, saying that there is no difference at all between a natural or anthropogenic extinction places us deeply within nature and asserts that we don’t

have any more of a right to natural resources than any other species. Both views fall short of explaining our undeniable desire as a society to prevent species extinction.

I posit that the entirety of the sites of conflict over the proposed barred owl removal experiments to benefit the endangered NSO demonstrate that humans are not entirely separate from nature nor entirely part of it, but that we occupy a liminal space. We are a part of nature and we are just like other species because we alter and adapt to the environment around us but we are also beyond the other species because of our unprecedented ability to alter the environment more than any other species in our recent geological time, as well as our ability to feel deeply unsettled over this and our peculiar habit of letting emotions drive many of our decisions. This liminal space is where our ethics and our myriad values come from, as well as the tension arising from them.

Conclusion: policy implications

In the Balcones Canyon National Wildlife Refuge in Texas, 250-400 Brown-headed cowbirds per year are killed. In Oklahoma's Wichita Mountains National wildlife Refuge, the number is 1000-2000. And in Fort Hood, Texas, 1500-3500 cowbirds are removed annually. (USFWS 2007, Sexton, Chuck; Munsterman, Walter; and Summers, 2008, Eckrich, Gil, Summers, Scott; respectively, cited in Livezey 2010). These actions are part of the effort to promote recovery of a number of listed species, but most notably the Kirtland's Warbler. In Ohio, the Double-crested cormorant has been lethally removed by the thousands to mitigate its effect on species that aren't even listed under the ESA, such as the Great Blue Heron (ODNR,

2009, cited in Livezey 2010).¹⁵ These examples are by no means an exhaustive list of lethal management activities. Additionally, everyone who I talked to in the course of my study, whether they worked for the FWS, the timber industry, conservation organizations, or an Indian Tribe, could provide off-hand a unique example of lethal management of one species for the benefit of another. There is a tendency by those in the natural resources community to stress how commonplace lethal control is in wildlife management, but this is another argument in which this community diverges greatly with the public on the proposal to conduct experimental removal of barred owls.

This kind of discourse engaged in by the natural resource community is a variation of the logical fallacy of *argumentum ad populum* – lots of people do it, so it must be right. The problem is that biologists are trained to see patterns and then generalize or develop theories based on these assumptions, which eventually become normative. Therefore, to biologists and others trained in the natural and social sciences (e.g. those who make and implement conservation policies on the behalf of the rest of the citizenry) it may seem obvious that, because lethal management for the benefit of an endangered species is observed *X* amount of times, and often with desirable outcomes for recovery, it is therefore an acceptable norm and not a cause for outrage - *as long as* the action is backed by rigorous science. Consider for a moment that this may not be so obvious to “general public” (i.e. the majority of the population and those for whom natural resources are

¹⁵ But it should be noted that just because a species isn't listed on the ESA doesn't mean it is not endangered.

managed and endangered species are preserved by the government as a trust on their behalf). People not familiar with the literature on species management¹⁶, may not be as highly tuned to seek out patterns and postulate from them, and consequently they may not perceive lethal management as just one of several commonly used conservation tools. Thus their reaction to the notion is likely to be more extreme. This is consistent with the data analysis presented here that a much greater majority of the public opposed these experiments (89% of the unaffiliated public voicing opposition, compared to 87% of the conservation community voicing support). This point that *argumentum ad populum* is not an acceptable justification for lethal management and does not speak to the public is relevant for making sense of the often negative and emotional response to each new proposal of population management.

The steps taken by the FWS in this particular issue: providing a notice in the Federal Register of intent to prepare an environmental impact statement for the proposed experiments and requesting public comment, and convening and facilitating the BOSG represent a profound new direction for natural resources and species conservation policy. We cannot hide anymore behind a façade of “objective” science when passing judgment on public policy. Even more importantly, we need to accept that science alone is not going to bring us to the promised land of objective truth. Even though the ESA directs the Service to use the “best available scientific and commercial data” to implement species recovery – in practice that will only

¹⁶ Or even if they are familiar with the information, it typically has been filtered through the sensationalizing mouthpiece of the media.

inform our policies but will never decide them. Rather, an inclusive dialogue (that is augmented by the best available science rather than determined or constrained by it) will lead to the best we can do, which is a compromise between myriad values that apply best to a given policy problem – in other words, situated ethics¹⁷.

Situated ethics is a way of negotiating the various policy drivers for a given issue without relying on any one normative stance. The best available science identifies specific conservation problems to be solved and provides government agencies with the methodology for implementing recovery plans; but it is not the only horse in the race precisely because the ESA and NEPA also mandate that conservation policy be a public process. It has been speculated that if the FWS had utilized this ethical scoping process and openly addressed the value-laden concerns ten years ago in the controversy over wolf recovery, they would be in an entirely different place with conflict resolution on that issue (USFWS 2011: personal communication). The FWS, in directly and openly addressing ethical side of the issue through the BOSG and extensive ethical scoping is finally pointing to the (endangered) elephant in the room that social values determine conservation policy as much as science does. Being more inclusive, and transparent, in the process of making policy decisions is

¹⁷ I borrow the application of this term to conservation issues from Dr. William Lynn. According to Lynn, situated ethics has three major implications: “First, a situated ethic uses geographical insight into the importance of context to avoid the major pitfalls (as I see it) of analytic moral thought -- universalism and anthropocentrism -- while navigating the equally problematic grounds of their binary opposites -- relativism and misanthropism. Second, and in contrast to ethical theories stressing rigorous deduction from unitary moral principles, a situated ethic emphasizes a plurality of moral concepts contextually suited to a moral problem. Third, a situated ethic seeks a moral understanding that values the well-being of animals, humans and the rest of nature, which is to say the community of life in a more-than-human world” (Lynn, 2000). These are the implications that I have attempted to trace out of the debate over proposed barred owl removal experiments.

only going to be of greater and greater importance to us as we hurtle towards unprecedented environmental conundrums – climate change and massive loss of biodiversity leading to the collapse of ecosystems. If we go back to the old “owls vs. jobs” type of policy debate, we have no hope of getting out of the other side of the emerging environmental crisis unscathed.

Works Cited

- Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, D.P. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Killer, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R.J. Gutierrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern (2006) Status and trends in demography of northern spotted owls, 1986-2003. *Wildlife Monographs* No. 163.
- B.H. (2009). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. December 20th, 2009.
- Birkland, Thomas A. (2005) An Introduction to the Policy Process: Theories, Concepts, and Models of Public Policy Making – 2nd ed. M.E. Sharpe, Inc.: New York, New York.
- Boxall, P. C, and P. H. R. Stepney (1982). The distribution and status of the Barred Owl in Alberta. *Canadian Field-Naturalist* 96:46-50.
- Carroll, C. and Johnson, D.S. (2008). The Importance of Being Spatial (and Reserved): Assessing Northern Spotted Owl Habitat Relationships with Hierarchical Bayesian Models. *Conservation Biology* 22(4): 1026-1036.
- C.C. (2009). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. December 18th, 2009.
- Dark, S.J., R.J. Gutierrez, G.I. Gould, Jr. (1998). The barred owl (*strix varia*) invasion in California. *The Auk* 115(1): 50-56.
- Diller, L. V., and D. M. Thome (1999). Population density of northern spotted owls in managed young-growth forests in coastal northern California. *Journal of Raptor Research* 33:275-286.
- D.T. (2010). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. January 11th, 2010.
- Dugger, K.M., Anthony, R.G., Andrews, L.S. (in press). Transient dynamics of invasive competitions: barred owls, spotted owls, habitat, and the demons of competition present.
- Dunbar, D. L., B. P. Booth, E. D. Forsman, A. E. Hetherington, And D. J. Wilson (1991). Status of the Spotted Owl, *Strix occidentalis*, and Barred Owl, *Strix varia*, in southwestern British Columbia. *Canadian Field-Naturalist* 105:464-468.

- Dye, Thomas R. (1992). *Understanding Public Policy* – 7th ed. Prentice Hall: Englewood Cliffs, New Jersey.
- E.R. (2010). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. January 17th, 2010.
- E.W. (nd). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal.
- Forest Service Employees for Environmental Ethics (2010). Public Scoping Comment: 2010 Draft Recovery Plan for the Northern Spotted Owl. November 10th, 2010.
- Forsman, E. D and H. M. Wight (1984). Distribution and biology of the spotted owl in Oregon. *Wildlife Monographs* 87.
- Franklin, A.B. (1992). Population regulation in northern spotted owls: theoretical implications for management. In *Wildlife 2001: Populations* D.R. McCullough and R.H. Barred (eds.) Elsevier Applied Sciences: London, England.
- Glenn, E. M., M. C. Hansen, and R. G. Anthony (2004) Spotted owl homerange and habitat use in young forests of western Oregon. *Journal of Wildlife Management* 68:33-50.
- Gremel, S. (2005). Factors controlling distribution and demography of northern spotted owls in a reserved landscape. M.S. thesis, University of Washington, Seattle. 49 pp.
- Gutierrez, R. J., A. B Franklin, and W.S. LaHaye (1995). Spotted owl (*Strix occidentalis*) in A. Poole and F. Gill (editors), *The birds of North America*, No. 179. The Academy of Natural Sciences and the American Ornithologists' Union, Washington, D.C. 28 pp.
- Gutierrez, T. J. M. Cody, S. Courtney, and D. Kennedy (2004). Assessment of the potential threat of the northern barred owl. Chapter 7 in S. Courtney (ed.), *Scientific evaluation of the status of the northern spotted owl*. Sustainable Ecosystems Institute, Portland, Oregon.
- Gutierrez, R. J., M. Cody, S. Courtney, and A. B. Franklin (2007). The invasion of barred owls and its potential effect on the spotted owl: a conservation conundrum. *Biological Invasions* 9:181-196.
- Hamer, T.E. S.G. Seim, and K.R. Dixon (1988). Home range size of the northern barred owl and northern spotted owl in Western Washington. M.S. thesis. Western Washington University, Bellingham.

- Hamer, T.E., D.L. Hays, C.M. Senger, and E.D. Forsman (2001). Diets of northern barred owls and northern spotted owls in an area of sympatry. *Journal of Raptor Research* 35:221-227.
- Hamer, T.E., E.D. Forsman, and E.M. Glenn (2007) Home range attributes and habitat selection of barred owls and spotted owls in an area of sympatry. *The Condor* 109: 750-768.
- Humane Society of the United States (2010). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. January 11th, 2010.
- Intergovernmental Panel on Climate Change (2007) Climate change 2007: The physical science basis. Contributions of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (S. Solomon, D. Qin, M. Manning, M. Marquis, K. Averyt, M. M. B. Tignor, H. L. Miller, Jr., and Z. Chen, Eds.). Cambridge University Press, Cambridge, United Kingdom.
- Iverson, W.F. (1993). Is the barred owl displacing the spotted owl in western Washington? M.S. thesis, Western Washington University, Bellingham.
- Johnson, D. H. (1992). Spotted Owls, Great Horned Owls, and forest fragmentation in the central Oregon Cascades. M.S. thesis, Oregon State University, Corvallis, Oregon.
- K.C. (2010). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. January 4th, 2010.
- Kelly, E.G. and E.D. Forsman (2004). Recent records of hybridization between barred owls (*Strix varia*) and northern spotted owls (*S. occidentalis caurina*). *The Auk* 121:806-810.
- Lange, J.I. (1998). The Logic of Competing Information Campaigns: Conflict Over the Spotted Owl. In *Landmark Essays on Rhetoric and the Environment*, Craig Waddel (ed.) Lawrence Erlbaum Associates, Inc: Mahwah, New Jersey.
- Lewontin, Richard C. (2001). The Triple Helix: Gene, Organism, and Environment. Harvard University Press: Cambridge, Massachusetts.
- Livezey, K.B. (2007). Barred owl habitat and prey: a review and synthesis of the literature. *Journal of Raptor Research* 41: 177-201.
- Livezey, K.B., T. L. Root, S.A. Gremel, and C. Johnson (2008). Natural range expansion of Barred Owls? A critique of Monahan and Hijmans (2007). *The Auk* 125:230-232.

- Livezy, Kent, B. (2010). "Killing Barred Owls to Help Spotted Owls I: A Global Perspective" *Northwestern Naturalist* 91:107-133.
- L.S. (2010). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. January 6th, 2010.
- Lynn, William (2000). Situating Ethics. PDF available at <http://www.practicaethics.net>
- Mann, Charles C. and Plummer, Mark L. (1995). Noah's Choice: The Future of Endangered Species. Alfred A. Knopf: New York, New York.
- Mazur, K.M, and P.C. James (2000). Barred Owl (*Strix varia*). In *The Birds of North America*, no. 508 (A. Poole and F. Gill, eds.)
- Monahan, W.B. and R.J. Hijmans (2007). Distributional dynamics of invasion and hybridization by *Strix spp.* in western North America. *Orinthological Monographs* 63:55-66.
- Mooney, H. A., and E. E. Cleland (2001). The evolutionary impact of invasive species. *Proceedings of the National Academy of Sciences USA* 98: 5446-5451.
- Nash, Roderick Frazier (2001). Wilderness and the American Mind. Yale Universtiy Press: New Haven, Connecticut.
- Olson, G.S., E.M. Glenn, R.G. Anthony, E.D. Forsman, J.A. Reid, P.J. Loschl, J.A. Reid, W.J. Ripple (2004) Modeling demographic performance of northern spotted owls relative to forest habitat in Oregon. *Journal of Wildlife Management* 68: 1039-1053.
- The Oregonian* (2/19/2011) Owl vs. Owl. Accessed at: http://www.oregonlive.com/opinion/index.ssf/2011/02/owl_vs_owl.html
- P.B. (2010). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. January 9th, 2010.
- Pearson, R.R. and K.B. Livezey (2003). Distribution, numbers, and site characteristics of spotted owls and barred owls in the Cascade Mountains of Washington. *Journal of Raptor Research* 37:265-276.
- Pilchuck Audubon Society (2010). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. January 11th, 2010.
- Rayonier, Inc. (2010). Public Scoping Comment: 2010 Draft Northern Spotted Owl Recovery Plan. December 15th, 2010.

- Rhymer, J. M., and D. Simberloff (1996). Extinction by hybridization and introgression. *Annual Review of Ecology and Systematics* 27:83-109.
- Sandøe, Peter and Christiansen, Stine, B. (2008). Ethics of Animal Use. Blackwell Publishing: United Kingdom.
- Schmidt, K. (2006). Northern spotted owl monitoring and inventory, Redwood National and State Parks, 2005 annual report. Redwood National and State Parks, Orick, California.
- Seehausen, O. (2004). Hybridization and adaptive radiation. *Trends in Ecology and Evolution* 19: 198-207.
- S.H. (2009). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. December 10th, 2009.
- S.P. (2009). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. December 15th, 2009.
- Strittholt, J.R., Dellasala, D.A., and Jiang, H. (2006). Status of Mature and Old-Growth Forests in the Pacific Northwest. *Conservation Biology* 20(2): 363-374.
- T.A. (2009). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. December 29th, 2009.
- Taylor, A.L., Jr. and E.D. Forsman (1976) Recent range extensions of the Barred Owl in western North America, including the first records for Oregon. *Condor* 78:560-561.
- T.F. (2009). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. December 29th, 2009.
- Thomas, J. W., E. D. Forsman, J. B. Lint, E. C. Meslow, B. R. Noon, and J. Verner (1990) A conservation strategy for the northern spotted owl: report of the Interagency Scientific Committee to address the conservation of the northern spotted owl. U.S. Forest Service, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, and U.S. National Park Service, Portland, Oregon, USA.
- United States Fish and Wildlife Service (1989). The northern spotted owl; a status review supplement. USDI Fish and Wildlife Service, Portland, Oregon.
- United States Fish and Wildlife Service (2008). Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). USDI Fish and Wildlife Service, Portland, Oregon.

- United States Fish and Wildlife Service (2011). Personal Communication. USDI Fish and Wildlife Service, Portland, Oregon.
- United States Fish and Wildlife Service (2010). Draft Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). USDI Fish and Wildlife Service, Portland, Oregon.
- United States Fish and Wildlife Service (2011). 2011 Northern Spotted Owl Survey Protocol. USDI Fish and Wildlife Service, Portland, Oregon.
- United States Fish and Wildlife Service (2011). Revised Final Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). USDI Fish and Wildlife Service, Portland, OR.
- V.Z. (n.d.) Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal.
- Weyerhaeuser Natural Resources Company (2010). Public Scoping Comment: 2010 Draft Northern Spotted Owl Recovery Plan. December 15, 2010.
- The Wildlife Society (2009). Public Scoping Comment: Notice of Intent to Prepare an EIS for Experimental Barred Owl Removal. December 16, 2009.
- Worster, Donald (1993). The Wealth of Nature. Oxford University Press: New York.
- Yaffe, Steven Lewis (1994). The Wisdom of the Spotted Owl. Island Press: Washington D.C
- Yanow, Dvora (2000). Conducting Interpretive Policy Analysis. Sage: Thousand Oaks, California.