Testimony to the U.S. House Committee on Natural Resources for the Hearing on "The Danger of Deception: Do Endangered Species Have A Chance?"

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Chairman Rahall and distinguished committee members. I am truly honored to speak to you today. I am Larry Irwin, Principal Scientist and Western Wildlife Program Manager for the National Council for Air and Stream Improvement, Inc., or NCASI. NCASI is a non-profit, 501(c)6 environmental management and research organization with headquarters in Research Triangle Park, North Carolina. Since 1986, I have conducted research and contracted other scientists to conduct research on topics associated with forestry and various wildlife species, including the threatened Northern Spotted Owl, or NSO. Approximately half of our research funding comes from member companies; the remainder comes from collaborating private, state, or federal natural resource organizations.

I have conducted scientific studies involving habitat relationships and population dynamics among Spotted Owls throughout the 3 affected states, emphasizing the NSO. I have published over 30 scientific papers on NSOs, some 2 dozen of which appeared in peer-reviewed publications. Also, I am currently conducting three cooperative studies that involve measuring details of habitat conditions for Barred Owls and NSOs that occupy the same areas. Barred Owls recently invaded the Pacific Northwest and are strongly implicated in ongoing declines of NSO populations via competitive interactions.

By invitation from Dr. Jack Ward Thomas, now an Emeritus Chief of the U.S. Forest Service, I served as an observer/advisor to the Interagency Committee of Scientists who proposed the primary conservation strategy for the NSO in 1990. I wrote the chapter on adaptive management for that conservation strategy. The fundamental premises of that strategy have endured through subsequent iterations, including the recovery plan that was released late last week.

Like many species, habitat loss and associated population declines were among the major reasons the NSO was listed under the ESA. Recovery for the Northern Spotted Owl is predicated on preserving and restoring late-successional and old-growth forests (LSOG). Yet, a recurring challenge with recovering the Northern Spotted Owl and many other species in peril involves reliable answers to questions regarding how many animals and how much habitat are needed.

No one questions that LSOG forests are highly important to the ecology of NSOs. Yet, it may surprise you that after at least $50million of investment in research and monitoring over the past 30 years, maps of LSOG forests do not predict NSO distributions very well. Perhaps more surprising, there are no strong correlations between NSO demographic performance and LSOG forests that would allow confident predictions of NSO population response to the recovery plan or to federal forest management plans based upon amounts and distributions of such habitat. Make no mistake, enormous scientific progress has been made, but an unsettling amount of scientific uncertainty remains.

Therefore, my purposes today are to address two topics described within the Final Recovery Plan for the Northern Spotted Owl that could be boosted by this Committee:

(1) Risk Assessment as a means of responding to threats to NSO populations in fire-prone forests; and

(2) Adaptive Management as a means of rapidly reducing scientific uncertainty by improving the ability to predict owl demographic performance in response to habitat provided through the recovery strategy.

A major take-home message is that there is a great deal of ecological variability within and among various forest types occupied by the NSO. Much of that variability was acknowledged but incompletely described in the Recovery Plan. Ecological variability means that a sustainable recovery strategy for NSOs must be multi-faceted and specifically orchestrated to learn from experience. I illustrate my points by briefly reporting on examples from research on NSOs.

I. RISK ASSESSMENT FOR SPOTTED OWLS IN FIRE-PRONE FORESTS

I concur with recent views expressed by Courtney et al. (2008) that the threat to NSO populations from uncharacteristically intense wildfires was been widely under-estimated in the draft recovery plan, and I find that remains true in the Final Recovery Plan as well. That may have occurred because habitat loss via clearcut logging was considered to be a greater and more immediate concern. Also, a significant portion of the geographic range of the NSO involves moist forests less prone to uncharacteristic fires. Or, it may have occurred because NSOs have been observed persisting through some wildfires. Moreover, it might have seemed logical that wildfires are natural and therefore perhaps an important part of sustaining some forest ecosystems. I share the latter view to a limited extent.

However, dry fire-prone forests comprise perhaps as much as 40% of the geographic range of the NSO, so their contributions to recovery are paramount. And we know that intense wildfires destroy habitats. For example, unnaturally intense fires such as the Tyee fires in the eastern Washington Cascades in 1994 and the Biscuit fires in southwestern Oregon in 2002 destroyed several dozen NSO sites. The NSOs in the most intensively burned areas either died or emigrated. With ongoing climate changes, we can expect more such severe fire events in the future.

The Final Recovery Plan, acknowledging significant threats to NSOs in dry, fire-prone forests, calls for a “landscape management” strategy for the eastern Cascades through the California Cascades part of the range of the owl, and recommended informal analyses of associated risks. Below, I use examples to summarize the need for pre-emptive management and scientific support for formal risk assessments associated with active management of NSO habitat. After that, I end my presentation with a section describing options for reducing scientific and management uncertainty via adaptive management experiments.

A majority of NSO nesting sites in Washington's eastern Cascades was selectively harvested several decades ago. These sites now support dense pole-sized thickets under the remaining, often disease-ridden trees. Such small-diameter thickets in the sub-canopies of Douglas-fir forests mixed with Ponderosa pine trees are consistent with changes that occurred after the onset of fire suppression. The combination of selective harvesting and fire suppression most likely inadvertently resulted in suitable NSO habitat. However, those owl sites are now at great risk of extensive habitat loss to uncharacteristic wildfires. The risk is of high concern because those forests include the areas where NSO reproductive rates are highest, a point left out of the Final Recovery Plan. An extended insect epidemic exacerbates the risk of intense wildfires.

The result is a "wicked" ecological problem in that the most productive NSOs exist in forests at greatest risk to uncharacteristic wildfires, yet fuel reduction treatments could conceivably reduce habitat quality for the owls, at least in the short run. That is a paradox of the first order.

It gets worse. Natural, late-successional dry forests in the eastern side of the Cascades and parts of the Klamath region contained frequent gaps in the forest canopies and patches of forest-floor shrubs. These features apparently resulted from frequent light- to moderate intensity fires. Now, after decades of fire suppression combined with recurring drought and epidemics of insects and forest diseases, the old Douglas-fir trees are gradually being replaced by grand fir or white fir trees, which are more shade-tolerant. Forest ecologists have labeled that process "fragmentation in reverse". It might also be labeled retrogressive succession.

These subtle and chronic changes resulted in negative consequences to NSOs that were not considered in the Final Recovery Plan. In a recent publication, we documented reduced reproductive performance by NSOs as well as site abandonment in such forests. Those events occurred even though the predominant overstory grand fir trees are old and large and no logging occurred during our study (the sites are in Late Successional Reserves, or LSRs, under the 1994 Northwest Forest Plan). Now, the increasing populations of Barred Owls seem likely to exacerbate the situation.

The negative effects of this subtle and chronic phenomenon of fragmentation in reverse or retrogressive succession on NSO population performance in dry grand fir or white fir forests are not widely understood or accepted. Possibly that has occurred because it runs counter to the preponderance of scientific research in the moist Douglas-fir/Western Hemlock zone that demonstrated the strong association between NSOs and pristine, late-successional and old-growth forests. The west-side paradigm has been extrapolated to dry-forests that are not pristine. Many of these eastside forests have features that characterize old forests, so they are deemed to be high-quality habitat. However, the owls are telling us otherwise. There, a custodial strategy for such forests is sub-optimal. The internal quality of those habitats has eroded over time and many owls (50 pairs in our study) have abandoned the affected stands.

The consequences of such chronic *habitat quality loss* to NSOs are seriously under-estimated. In the section below on relative risk assessment, I provide additional information that supports my view that the details of tree species composition and density matter greatly to NSOs, in addition to trees of large size and old age. To date, however, conservation planning and recovery for NSOs has made little or no distinctions among the species of trees that may dominate a forest. Fortunately, the Final Recovery Plan does acknowledge the possibility that composition may matter, and if so, it would be determined via adaptive management activities. I will get to that later.

It is important to note here that, in addition to providing for NSO recovery, the LSR network was developed to support other species that are associated with late-successional and old-growth forests. However, research by other scientists recently demonstrated that such unnaturally dense conditions and related compositional changes in dry grand fir forests are associated with reduced songbird species diversity and abundance, even though large old trees are present.

Both forest conditions that I've described—that is, forests at-risk to uncharacteristically intense wildfires and those in retrogressively advanced situations—are not sustainable. The decision to be made for such forests is not whether or not to manage them; the decision involves *how* to manage.

A. BUT WHAT SHOULD THE ACTIVE MANAGEMENT LOOK LIKE?

Aldo Leopold, the father of modern wildlife management, developed the central thesis of wildlife management, which holds that the same factors that historically destroyed wildlife and their habitats--logging, livestock grazing, farming, hunting, and wildfire--can be used judiciously and creatively to restore them. Many participants in endangered species recovery have forgotten that axiom. On the other hand, and in accordance with Leopold's view, many forest-wildlife scientists do suggest that careful harvesting of trees can emulate some spatial fire patterns, or can approximate stand structures and composition similar to those created by fires.

Mind you, judicious logging alone cannot be expected to replicate all aspects of natural fires, due, among other things, to multiple successional trajectories that depend upon a variety of ecological processes associated with soils, moisture, activities of herbivores and post-disturbance weather patterns. Therefore, it seems reasonable to anticipate that prescribed burning might well be part of the NSO recovery toolbox, at least in areas with natural fuel loads. Here, I emphasize forests where prescribed fires constitute an unacceptable risk of growing into catastrophic fires until distribution and abundance of forest fuels, both live and dead, are treated mechanically.

As noted in the 2008 Final Recovery Plan, there is indirect evidence to support silvicultural programs that emphasize fuel reductions in the Eastern Cascades ecological province. For example, we found that understory hardwood (shrubs) were comparatively abundant around NSO nest sites in fire-prone Douglas-fir/Ponderosa pine forests. These hardwood species all increase after forest thinning as well as burning. In addition, group seed-tree and patch-cut systems have been demonstrated to maintain the abundance, species richness and diversity of many small mammals, suggesting that important prey species can be maintained. In one eastern Washington Cascades study densities of northern flying squirrels, the NSO's primary prey, increased after partial harvesting that left large snags and downed woody debris.

B. EMBRACING RISK AND UNCERTAINTY: TECHNOLOGY EXISTS TO SUPPORT FORMAL COMPARATIVE RISK ASSESSMENTS

Recent assessments of the status of the NSO, such as the draft and final recovery plan and federal forest planning activities such as the BLM's Western Oregon Plan Revision (WOPR) included informal assessments of risks of uncharacteristic wildfire in fire-prone forests. To my knowledge, no assessments for the NSO have attempted formal risk analyses that might balance short- and longterm risks and benefits to NSOs of ecological restoration relative to minimizing uncharacteristically intense wildfires or reversing successional retrogression.

Fortunately, a special issue in Forest Ecology and Management in 2005 (vol. 211) illustrated analytical tools and decision-making procedures that can provide land and resource managers, and Congress, greater confidence in displaying short and longterm consequences of proposed actions. The special issue summarized the discipline of relative risk assessment, described state-or-the-art methods for predicting hazards and risks of uncharacteristic wildfires, and provided several case-histories for conservation of important ecosystems or species in peril that are subject to uncharacteristic wildfire. Two case-study examples were illustrated for spotted owls.

A lack of necessary and reliable analytical tools is often invoked by federal regulatory agencies to justify short-term custodial management (i.e., "preservation") over long-term restoration and dismiss formal risk assessment. NCASI, several federal and state agencies, and several private companies have been working since 1998 to develop new decision-support tools that can better quantify the relative risks of short-term preservation versus actively addressing long-term risks of uncharacteristic disturbances. In that endeavor, we asked a different question: "Do details for forest-stand structure and tree- and understory species composition matter to NSOs?" Such a question must be answered for describing habitat in terms understood by forest ecologists and managers. That effort, which I supervise, includes 9 individual study areas in western Oregon and northern California where over 250 spotted owls have been radio-tagged. That information has been combined into a model that now can be linked with established tools used by foresters for formal relative risk assessments: forest growth models, fire-risk models, and harvest scheduling with spatial constraints.

During that research we learned that habitat for spotted owls is more than late-successional and old-growth conifer forests. Hardwoods, particularly in forest stands near riparian zones in small-order watersheds are very important to spotted owls. In fact, habitat for the NSO is even broader than forests: in winter, some NSOs in the Medford, Oregon area descend to lower-elevations where they forage at night within south-slope manazanita brushfields. These brushfields contain only a few scattered trees and are maintained by frequent fires. There, they acquire woodrats, a major prey item.

We have also learned in early analyses that the likelihood of an owl using a forest stand varies with increases in basal area of Douglas-fir trees. As shown in the attachment graphics, the pattern is hump-backed, which means that Douglas-fir stands can be either too sparse or too dense. Other important factors include distance from nest sites, snag density, downed woody debris, understory shrubs, and tree species composition. For example, in mixed conifer stands, Ponderosa pine seems to exert a negative influence on NSOs. That suggests that ecological restoration that removes small-diameter Douglas-fir trees to promote old-growth Ponderosa pine is likely to work against recovery of the NSO. Importantly, densities of large trees and overstory canopy cover, 2 primary factors often used to map suitable NSO habitat, were not strong predictors.

In my opinion, deeper understanding and stronger technology for formal comparative risk assessments that include active management will help promote recovery of the NSO. It will also result in more-informed natural resource plans regarding treatments that provide satisfactory protection while also reducing risk of catastrophic wildfire.

Because of high variation among phsyiographic provinces, these topics are best addressed at the level of a national forest or BLM district. Thus, I encourage this committee to consider promoting and funding the necessary personnel and additional risk-assessment technology that could accelerate both the recovery efforts and judicious federal land management planning in forests occupied by NSOs that also are prone to uncharacteristic wildfires.

II. REDUCING SCIENTIFIC UNCERTAINTY: ADAPTIVE MANAGEMENT CAN PROMOTE A MORE SUSTAINABLE FOREST AND MORE EFFECTIVE RECOVERY

Prior to widespread application in site-specific or watershed planning for silvicultural intervention within or near NSO sites, models such as that described above should properly be considered as “working hypotheses” for testing and refinement via well-designed adaptive management experiments. Such ideas about utilizing adaptive management were emphasized in the Final Recovery Plan, but only for the Klamath region in southwestern Oregon and Northern California. However, I believe the Plan may have been overly optimistic in presuming that adaptive management will truly serve NSO recovery.

The Interagency Scientific Committee (ISC), the Forest Ecosystem Management and Assessment Team (FEMAT), and previous recovery plans all recognized and promoted adaptive management as a means for identifying silvicultural practices on federal lands that might hasten re-growth of LSOG forests and thereby sustain species such as NSOs. And 10 federal Adaptive Management Areas were established via President Clinton's Northwest Forest Plan in 1994. Unfortunately, recent reviews point out that adaptive management has become a buzzword and its promises have not been fully realized.

For example, it is now nearly 15 years since adoption of the Northwest Forest Plan, and no federal research has been undertaken to evaluate how NSOs might respond to habitat manipulation in an adaptive management framework. Wildlife scientists have repeatedly demonstrated the negative consequences clearcutting within owl habitats, but know almost nothing about the effects of numerous combinations of other forest management practices such as thinning, selection, or shelterwood systems of silviculture.

Further, the 1994 Northwest Forest Plan assumed that the interim no-touch, "default buffers" along stream courses would be altered and some management allowed once watershed assessments were completed. That would have afforded additional opportunities for "adaptive management tests". However, these redundant buffers remain in place, and are predicted to lose their hardwoods over the next 50 years. As stated above, this could have negative effects on NSO recovery because hardwoods are important to them via their prey.

The crucial aspects of the Northwest Forest Plan related to "adaptive management", that is, the 10 adaptive management areas, thinning or partial harvesting in stands in LSRs, and adjustments in widths and silvicultural practices related to riparian buffers, have not been aggressively utilized to provide practical insights and new technical information. There is little to suggest that yet another recommendation for adaptive management, as indicated in the Final Recovery Plan, will actually be implemented.

I remain firmly convinced that new scientific information is crucial to developing responsive management to promote recovery of NSOs over the long run, while taking into account the dynamic nature of their habitats. The "static habitat" approach has dominated and the risk of loss of those habitats from catastrophic fire or degradation of habitat quality via successional replacement, has progressively increased.

Diverging a bit from the Final Recovery Plan, I believe that the success of innovative forest management strategies for dry, fire-prone forests requires research and monitoring within an adaptive management framework in the eastern Cascades as well as the Klamath region. Success depends upon integrating the knowledge of forest managers and scientists. A complete agenda must address landscape-scale effects on northern spotted owls as well as other wide-ranging species.

However, some observers have wondered if it is truly possible that adaptive management, in concert with collaborative and social natural resource management, can account adequately for real and perceived risks and scientific uncertainty in addition to environmental and social values over long- and as well as the short term. The biggest challenge could well lie in promoting the public will for implementing active forest management programs that seek to balance short-term conservation needs with long term forest ecosystem sustainability. Yet, in practice, most of these “collaborative” efforts have not held together for long. To date, little interest has been forthcoming among federal regulatory wildlife biologists and scientists for conducting adaptive management experiments on behalf of the Northern Spotted Owl.

This Committee can do something about that. I concur with the Recovery Plan’s recommendation for a panel of wildlife ecologists, forest ecologists and forest managers to generate the salient questions and appropriate designs that can address them ways that maximize effective communications among what traditionally has been somewhat disparate disciplines. Basically, that requires significant investments in research funding. Active adaptive management requires simultaneously implementing more than one recovery option in areas such as the 10 federal Adaptive Management areas, the Klamath or eastern Cascades. Those options that demonstrably provide greater success can be refined and applied more broadly.

SOME POTENTIAL TOPICS FOR ADAPTIVE MANAGEMENT

The predictive relation between NSOs and habitat conditions is weak and must be improved if we are ever to use habitat as a surrogate for monitoring progress toward recovery. Doing so will require manipulative experiments within an adaptive management framework. Maps of LSOG forests provided a useful and commonsense place to begin designing a sustainable recovery strategy and articulating that strategy to Congress and the public. Yet, LSOG is a categorical description of a particular forest successional stage, and successional stages have never been demonstrated to have reliable predictive relationships with demography of any wildlife species. In fact, a habitat modeling effort in northwestern California that included only LSOG ranked about 50th among a suite of more than 100 candidate models that were tested against field data on NSO locations. In my opinion, habitat for the NSO, at least in fire-prone mixed composition coniferous forests, has been measured and modeled poorly, whereas NSO demography has been well-captured by sophisticated statistical models.

It is oft-stated that the “devil lurks in the details”. In the case of the Northern Spotted Owl recovery, details that matter greatly to the owl were overlooked in our zeal to protect LSOG forests. As noted above, details of composition of forest trees, tree density, understory vegetation and abiotic conditions must be accounted for. Linking those features with measures of NSO population performance involves detailed forest inventories, which generally have not been available to federal researchers at a spatial scale that has been matched temporally with information on the owl. Therefore, in addition to supporting formal relative risk assessments, I urge this committee to identify and allocate the necessary resources for improved forest inventories on federal lands. Such details also provide an important means for blending wildlife science with forest ecology.

Finally, a note about the invading Barrel Owl. As reported in the Final Recovery Plan, some observers believe, with some limited supporting evidence, that the Barred Owl is now the biggest threat to NSO recovery. As a result, some believe that lethal control of Barred Owls is necessary, at least in the short term. There is also evidence that the Spotted Owl might be better able to exploit drier, mixed conifer forests than Barred Owls. If that is so, it places an even greater premium on active management to restore dry, fire-prone forests at risk to uncharacteristic wildfires and those degraded by retrogressive succession. This will require adaptive management experiments to determine if forest restoration may tilt the balance in favor of the NSO.

The Northern Spotted Owl stands a good chance of recovery if the right questions are asked, if the habitat features that matter to owls are measured and provided, and if Congress directs regulatory and land management agencies in ways that can embrace and reduce scientific uncertainty. Without such direction and without adequate funding, I fear a legacy of benign neglect will prevail. We've made outstanding strides. Yet there is much work, good work, still to be done.

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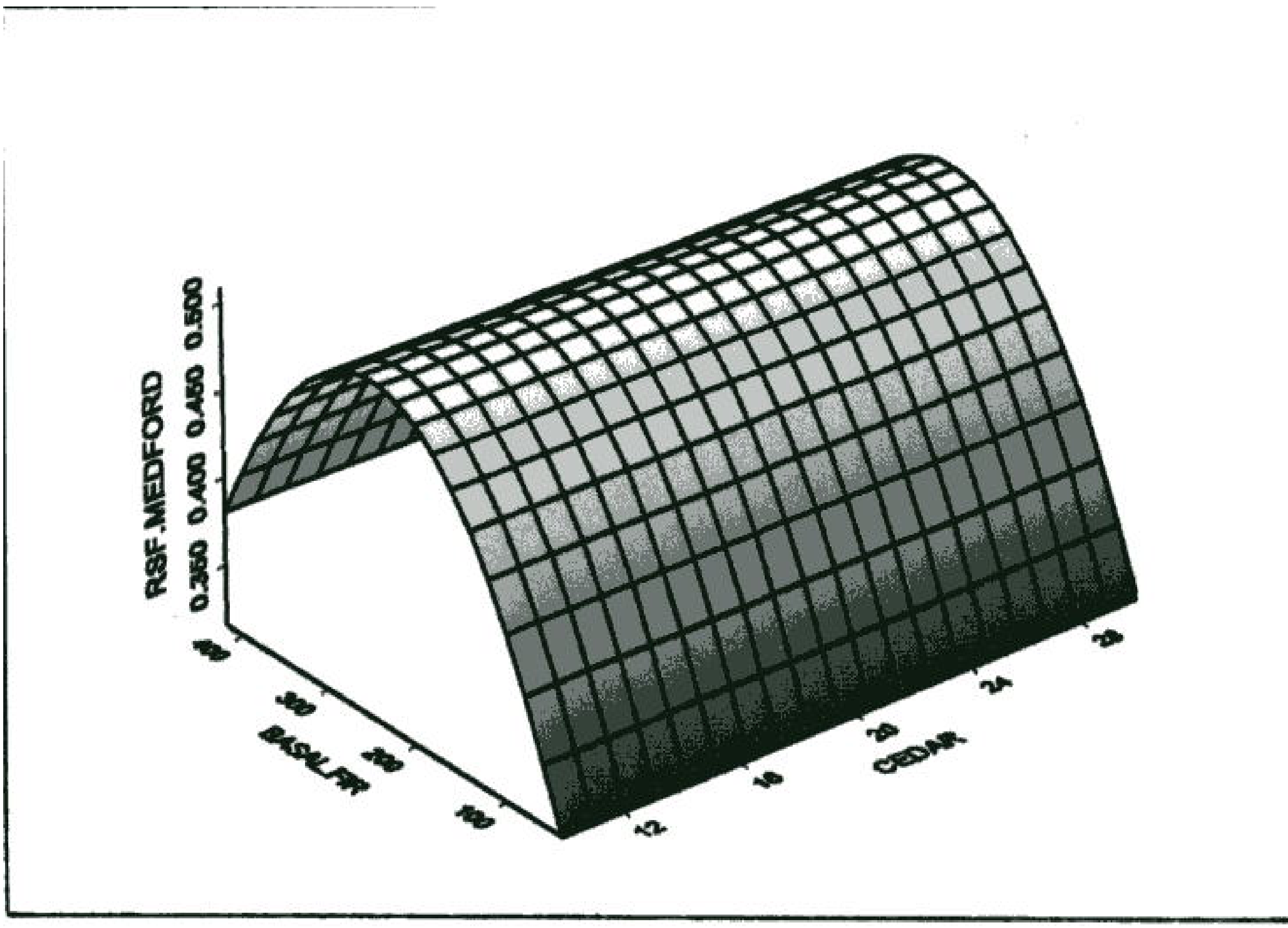
ATTACHMENT 1 TO TESTIMONY BY DR. LARRY L. IRWIN

This attachment provides graphics that display a portion of a computer-based model that summarizes factors influencing habitat selection by Northern Spotted Owls at Medford, Oregon (A), and by California Spotted Owls near Chico California (B). The data came from following radio-tagged spotted owls for up to 5 years in each area. The model is known as a “resource selection function, or RSF. The graphs show that forest stands can be too dense for optimal use by spotted owls, and also that different tree species have different effects on spotted owls.

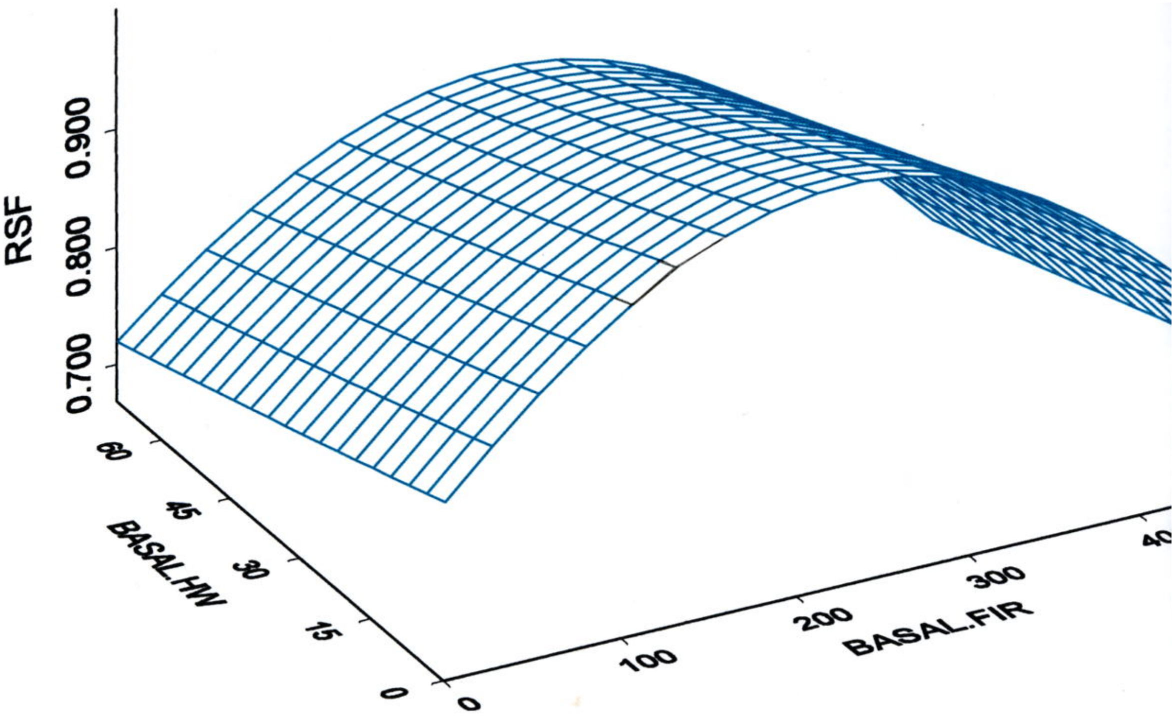
The vertical Y-axis in each graph represents the relative likelihood of a forest stand being used by a spotted owl for nocturnal foraging. The BASAL.FIR X-axis in each graph indicates likelihood of use of an individual forest stand by an owl is highest at intermediate levels of basal area of Douglas-fir trees, and suggests an optimal range of approximately 150-225 square feet of basal area per acre. Basal area is the sum of the cross-sectional area occupied by individual trees. In A, the CEDAR X-axis indicates that basal area of Incense cedar trees has a weak, but positive influence.

In B, the likelihood of use of a forest stand by a spotted owl increased with increasing basal area of hardwoods, exemplified in the graph by the axis labeled BASAL.HW. Hardwoods are known to be important to the owl’s small mammal prey.

The overall computer models include other factors, such as distance to streams and basal areas of other tree species. They can be used in conjunction with forest managers’ tools such as forest-growth and fire-risk models to estimate the relative effects on spotted owls in the short- and long runs from thinning or partial harvests that reduce tree densities or fuel loads. Both graphs indicate relatively high values for forest stands with high basal areas, which often characterize old-growth forests.


RSF.MEDFORD
0.350
0.400
0.450
0.500
400
300
200
100
BASAL.FIR
12
16
20
24
28
CEDAR

A.



RSF
0.700
0.800
0.900
BASAL.HW
60
45
30
15
0
BASAL.FIR
0
100
200
300
40

B.

ATTACHMENT 2. DISCLOSURES

1. Name: Larry L. Irwin

2. Business Address: P.O. Box 68, Stevensville, MT 59870

3. Business Phone Number: 406-777-7215

4. Organization you are representing: National Council for Air & Stream Improvement, Inc.

5. Any training or educational certificates, diplomas or degrees or other educational experiences which add to your qualifications to testify on or knowledge of the subject matter of the hearing: a) PhD--University of Idaho in Wildlife Science, 1979

6. Any professional licenses, certifications, or affiliations held which are relevant to your qualifications to testify on or knowledge of the subject matter of the hearing:
Professional member of The Wildlife Society.
Adjunct/Courtesy Professor, Department of Forest Science, Oregon State University.

7. Any employment, occupation, ownership in a firm or business, or work-related experiences which related to your qualifications to testify on or knowledge of the subject matter of the hearing:

Scientific research on Northern Spotted Owls—22 years
Advisor/Observer to Interagency Scientific Committee to address the Conservation of the Northern Spotted Owl.

8. Any offices, elected positions, or representational capacity held in the organization on whose behalf you are testifying: NONE

9. Any federal grants or contracts (including subgrants or subcontracts) from the Department of the Interior (and/or other agencies invited) which you have received in the last three years, including the source and the amount of each grant or contact: NONE

10. Any federal grants or contracts (including subgrants or subcontracts) from the Department of the Interior (and/or other agencies invited) which were received in the last three years by the organization(s) which you represent at this hearing, including the source and amount of each grant or contact:

US Fish and Wildlife Service: 2006-07: $7,000, $7,000;
USDI BLM: 2005-06: $60,000, $13,000; 2006-07: $13,000; 2007-08: $13,000, $35,000.

11. Any other information you wish to convey which might aid the members of the Committee to better understand the context of your testimony: NONE