Wildlife in Moist Mixed-Conifer Forests

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Introduction

- Talk Overview:
  - Wildlife community associated with MMC
  - Considerations for wildlife associated with MMC: Broad-, Meso-, and Fine-scale
  - Applying these concepts to management: The Northern Spotted Owl Example
  - Conclusions & take-home messages

Species associated with MMC

- Listed Federal T&E:
  - Northern Spotted Owl
  - Grizzly Bear
  - Gray Wolf
  - Lynx
- Sensitive Species
  - Total ~38 species of birds, mammals, amphibians, or reptiles designated as state or federal endangered, threatened, candidate, or species of concern








Species associated with MMC

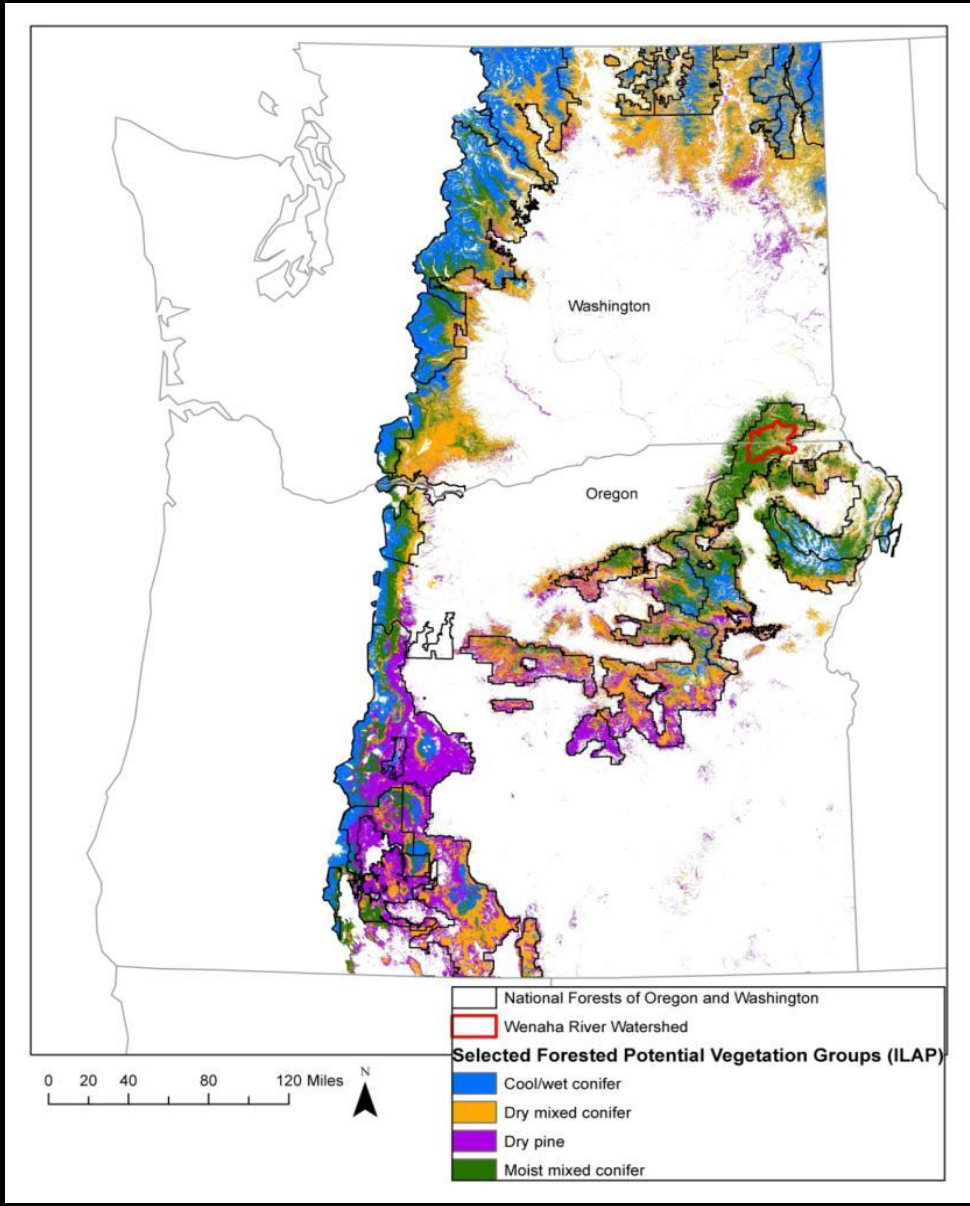
- Economically Important:
  - Elk
  - Mule Deer
  - Black Bear
  - Migratory songbirds
- Ecological Keystones:
  - Cavity nesters
  - Small mammals
  - Herbivores
  - Insectivorous birds
- Invasive Species:
  - Barred Owl

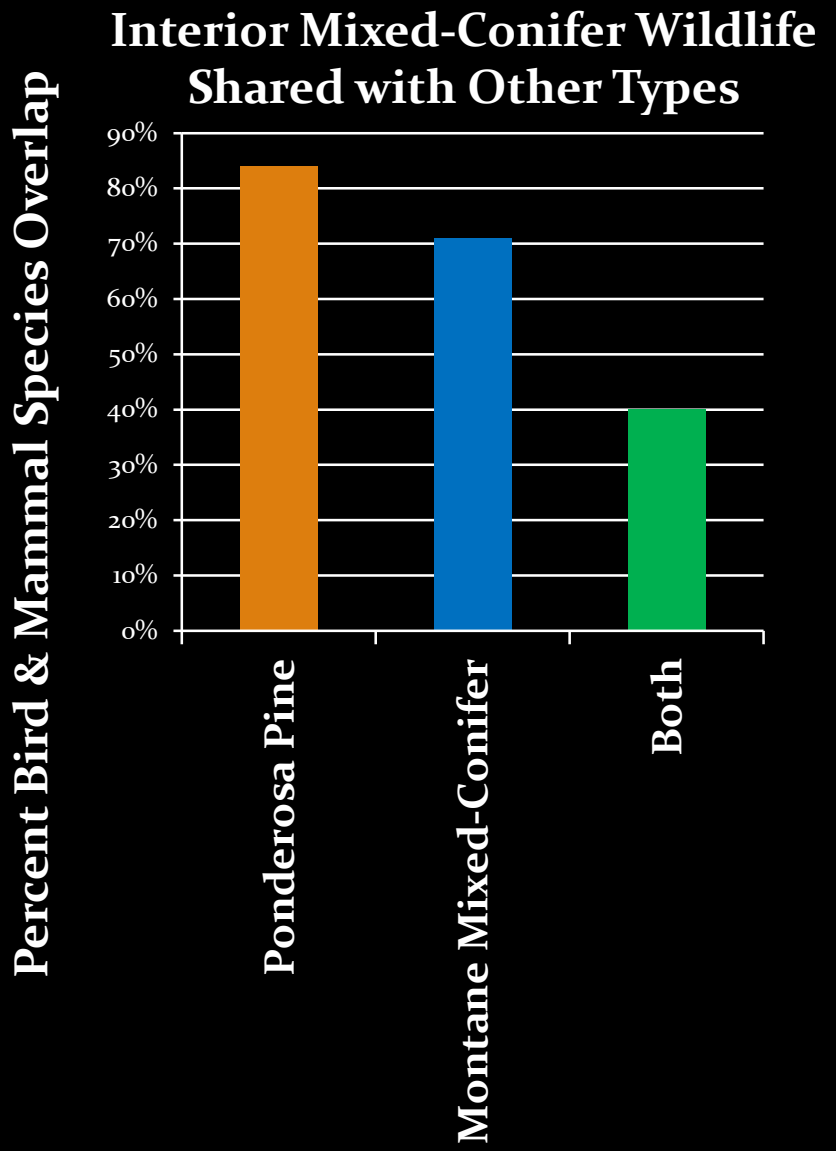
Species associated with MMC

- Multi-species Assessments:

- Thomas et al. 1979. Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington. USFS Ag. Handbook No. 553.
- Wisdom et al. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Columbia Basin. PNW-GTR-485.
- Johnson & O'Neil 2001. Wildlife Habitat Relationships in Oregon and Washington. OSU Press.
- Suring et al. 2011. Assessing the sustainability of terrestrial wildlife species through land management planning: a case study. Journal of Wildlife Management 75:945-958.
- Gaines et al. In Press. Terrestrial Species Assessments for the National Forests in NE Washington. PNW-GTR-XXX.

Species associated with MMC

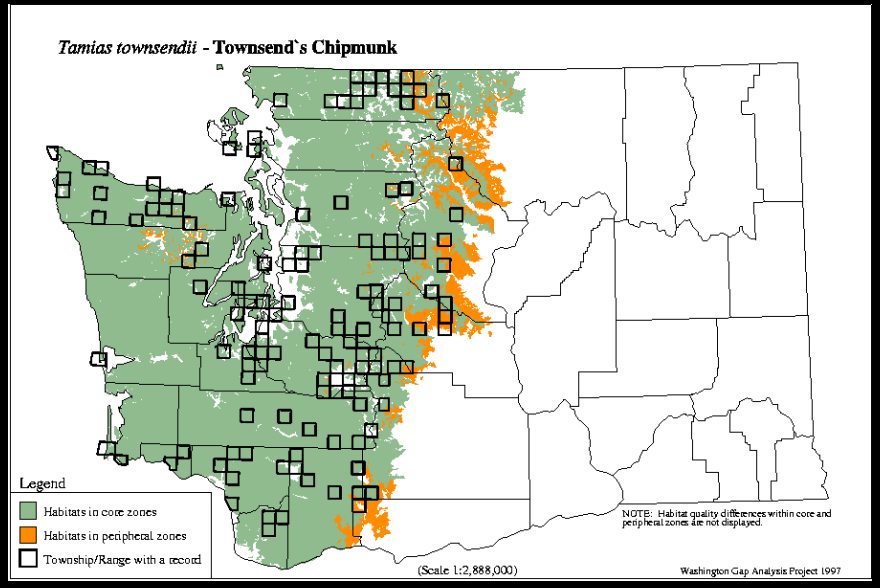




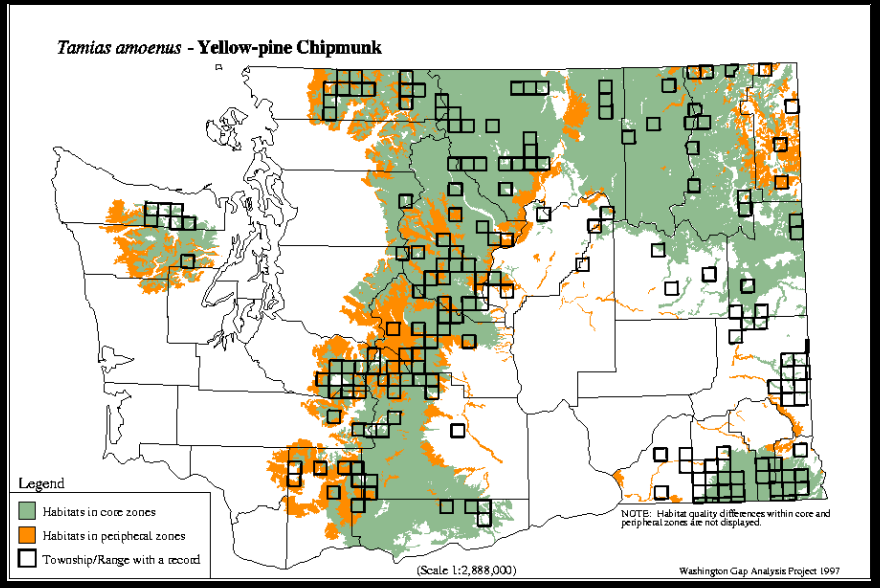
From: Lehmkuhl 2005. Based on data from Johnson & O'Neil 2001. See MMC Synthesis for complete citation.

Species associated with MMC

Townsend's Chipmunk

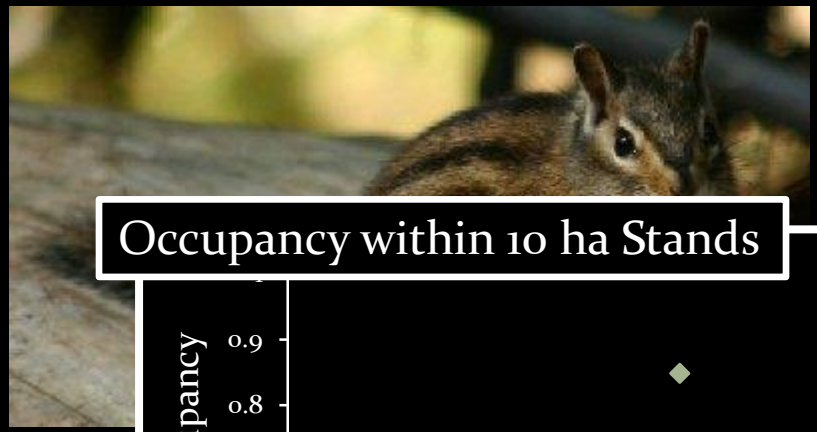


Yellow Pine Chipmunk



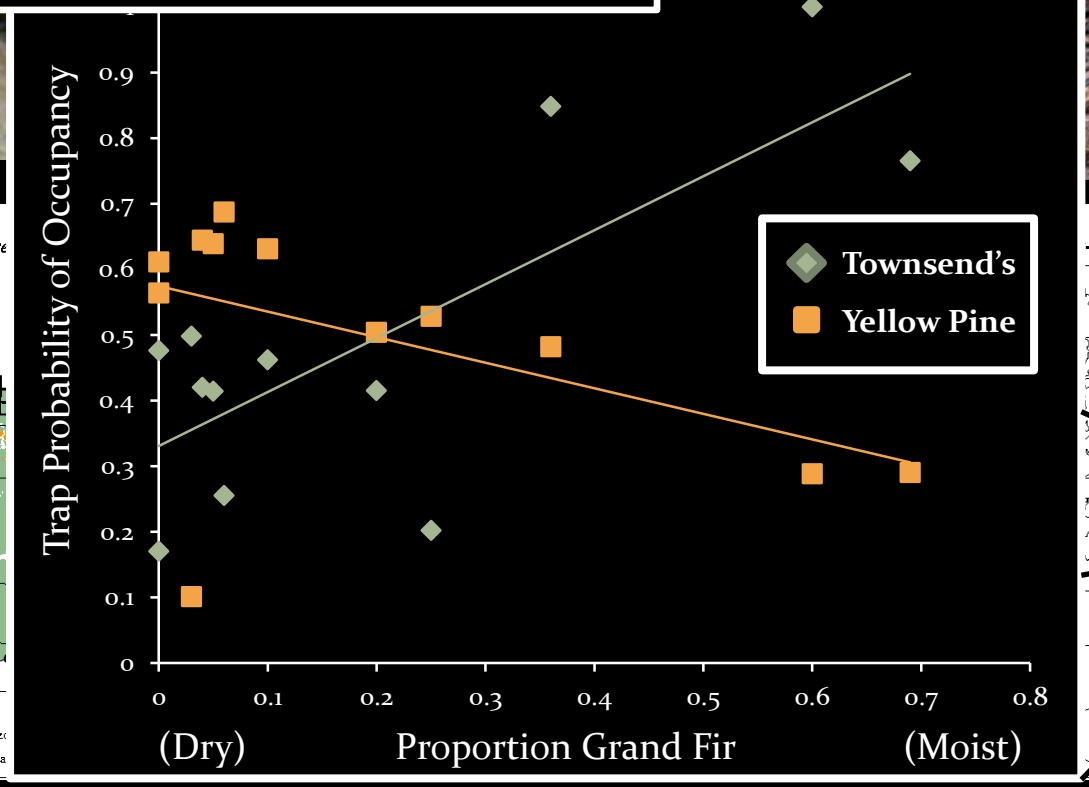
Species associated with MMC

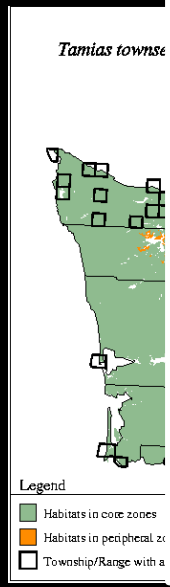
Townsend's Chipmunk

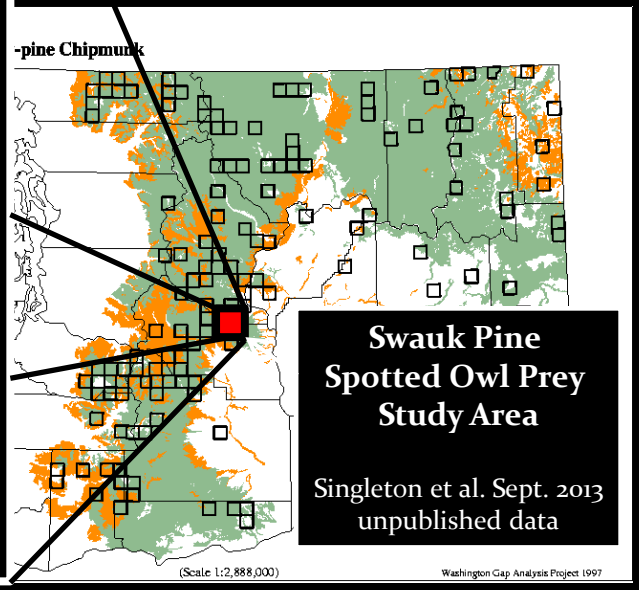


Yellow Pine Chipmunk

Occupancy within 10 ha Stands

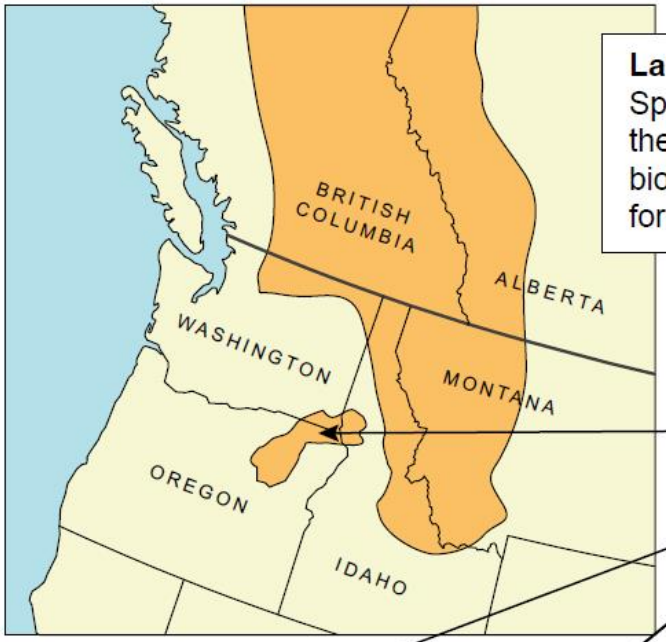




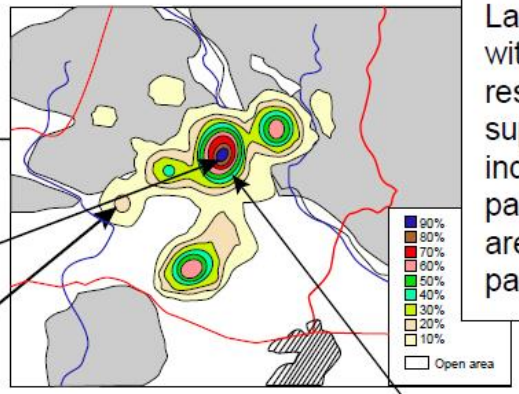


Scales of habitat selection

Habitats Within Habitat – Multi-scale habitat Selection: Canada Lynx Example



Large-scale
Species range represents the distribution of appropriate biotic and abiotic conditions for the species.



Meso-scale
Landscape unit with sufficient resources to support an individual or pair. These units are inherently patchy.

Denning

Foraging

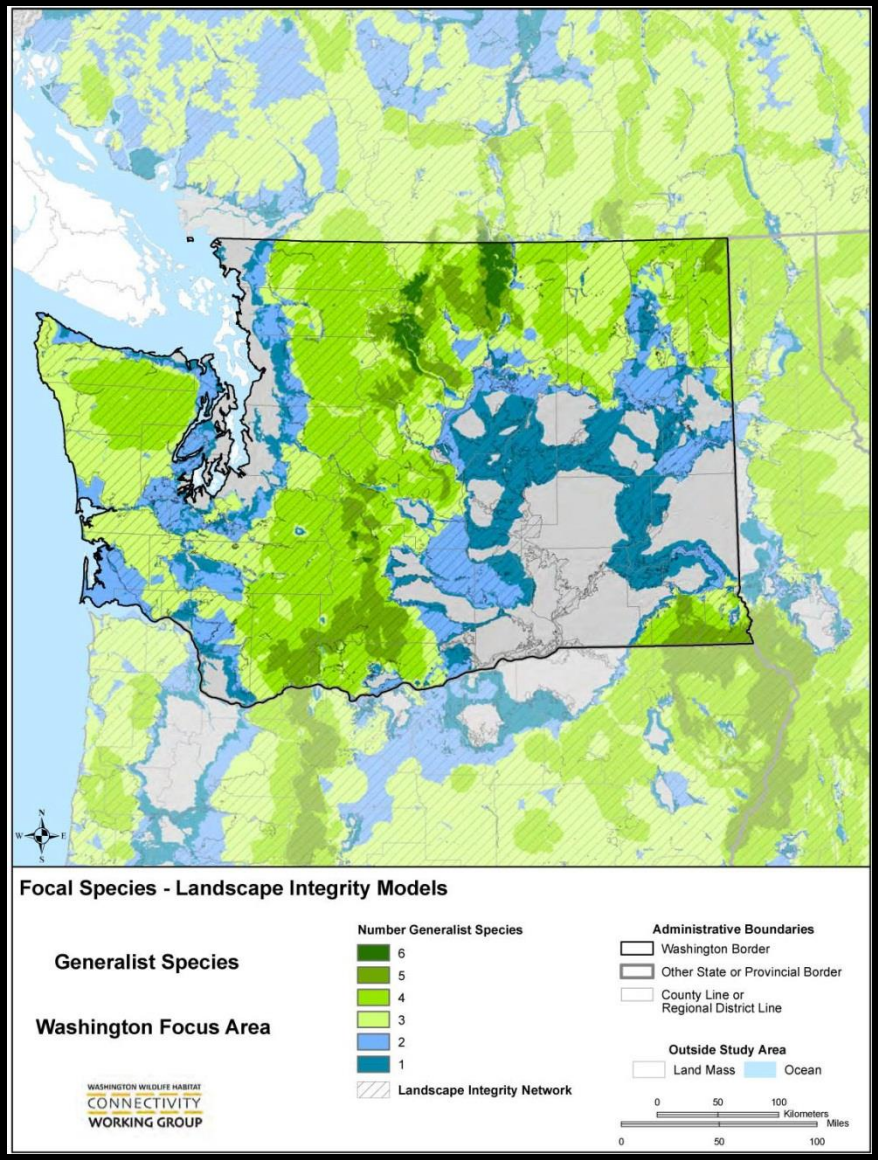
Fine-scale
Habitat features that provide specific habitat components for survival and reproduction.

Cover

Based on: Johnson 1980. The Comparison of Usage and Availability Measurements for Evaluating Resource Preference. Ecology 61:65-71.

Scales of habitat selection

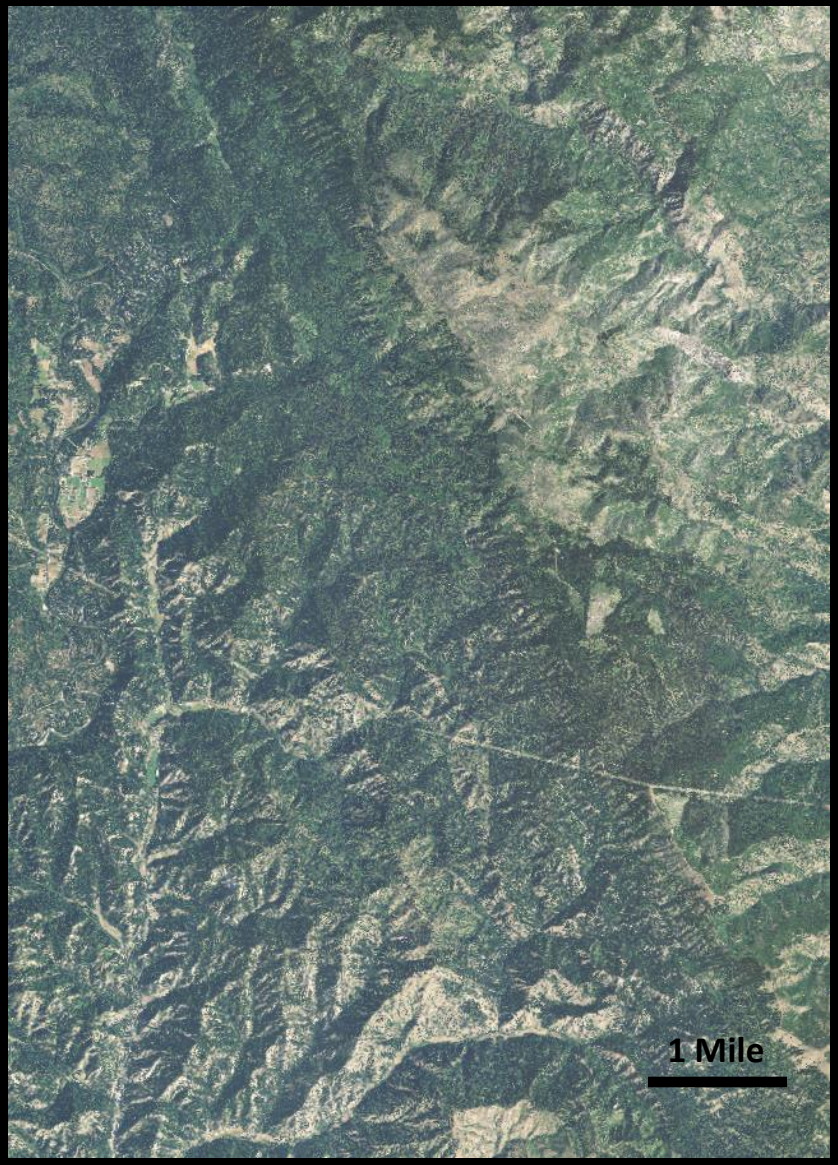
- Broad Regional-scale considerations: Species distributions, metapopulation function, and range shifts
  - Species distribution is determined by regional gradients in climate, topography, soils, and vegetation, in conjunction with…
  - Patterns of human land use: residential development, agriculture, and transportation networks



From: Wa. Wildlife Habitat Connectivity Working Group 2010 Statewide Assessment. www.waconnected.org

Scales of habitat selection

- Meso Landscape-scale considerations: Juxtaposition and configuration of habitat elements
  - Animals need to be able to access all of the habitat elements to meet their life-history needs: food, water, shelter, space, & security.
  - Landscapes with mixed-severity fire regimes had highly fragmented patch patterns but were still quite permeable for most native species (largely because of spatial and structural diversity).
  - Natural range of variability can be a good guide, but not a prescription.
  - Sustainability of special habitat features needs to be considered in the context of landscape-scale disturbances.
  - Landscapes after large-scale, high-intensity disturbances can be greatly simplified.

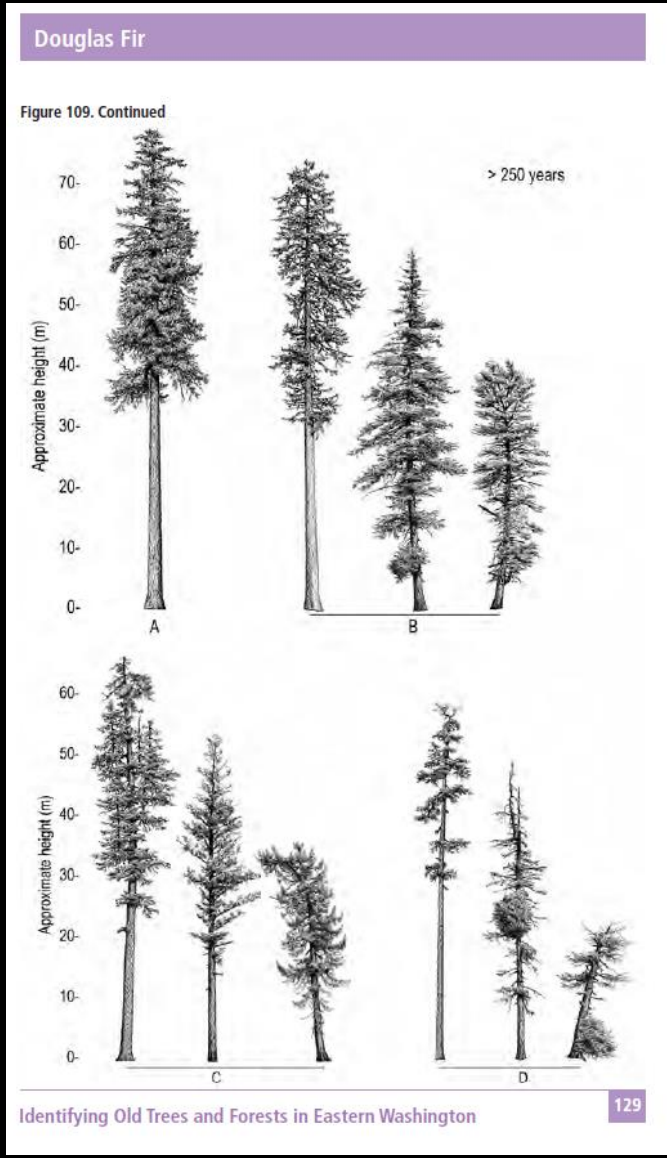


Scales of habitat selection

- Fine Stand-scale considerations: Different MMC stand development stages provide different habitat features
  - Stand initiation: Highest spp. diversity & abundance
    - High elk summer forage productivity
    - Deciduous vegetation for migratory birds
  - Stem exclusion: Lower spp. diversity & abundance
    - Small mammal & big game security
  - Old growth: Higher spp. diversity & abundance
    - Defects, logs & snags provide nest & den structures
    - Diverse understory vegetation and fungal community provide abundant food for small mammals

Scales of habitat selection

- Fine Stand-scale considerations: stand structure habitat characteristics of MMC
  - Big old trees (live and dead) are particularly important stand structure components – they provide unique features (cavities, platforms, etc.), they take a long time to replace when they are removed, and they provide important habitat functions across all of the stand development stages



From: Van Pelt 2008. Wa DNR

Northern Spotted Owl Food Web

Landscape/stand-scale processes:

Nesting & Denning Structures

Predator Avoidance

Northern Spotted Owls

Prey Vulnerability

Bushy-Tailed Woodrats

Flying Squirrels

Fruiting Vegetation

Truffles
EM Fungus

See: Lehmkuhl et al. 2007. Seeing the forest for the fuel: Integrating ecological values and fuels management. Forest Ecology and Management 246:73-80.

Northern Spotted Owl Example

- Fine-scale habitat components
  - Nesting structures
  - Multi-story canopy
  - Adequate food resources

Northern Spotted Owl Example

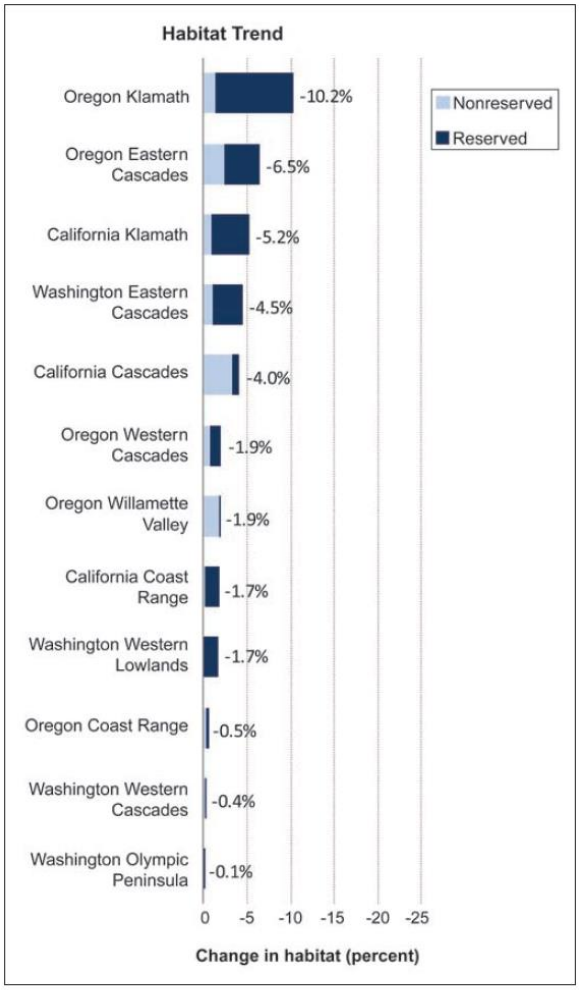


Figure 3-12—Nesting/roosting habitat trends (based on the LandTredr analysis) from 1994/96 to 2006/07 by physiographic province for reserved and nonreserved federal lands.

Wildfire is the leading cause of spotted owl habitat loss, but…

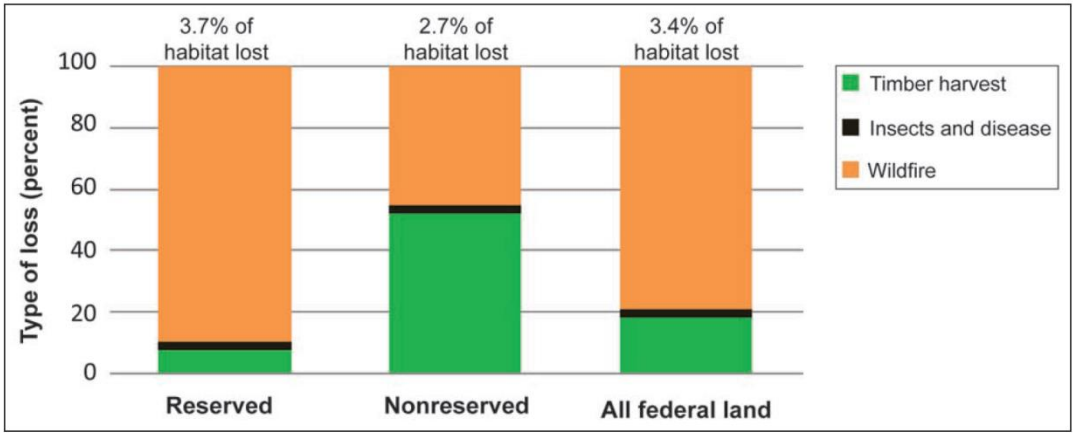


Figure 3-11—Causes of nesting/roosting habitat loss on federally administered lands.

From: Davis et al. 2011. Status and Trends of Northern Spotted Owl Populations and Habitats. PNW-GTR-850.

Northern Spotted Owl Example

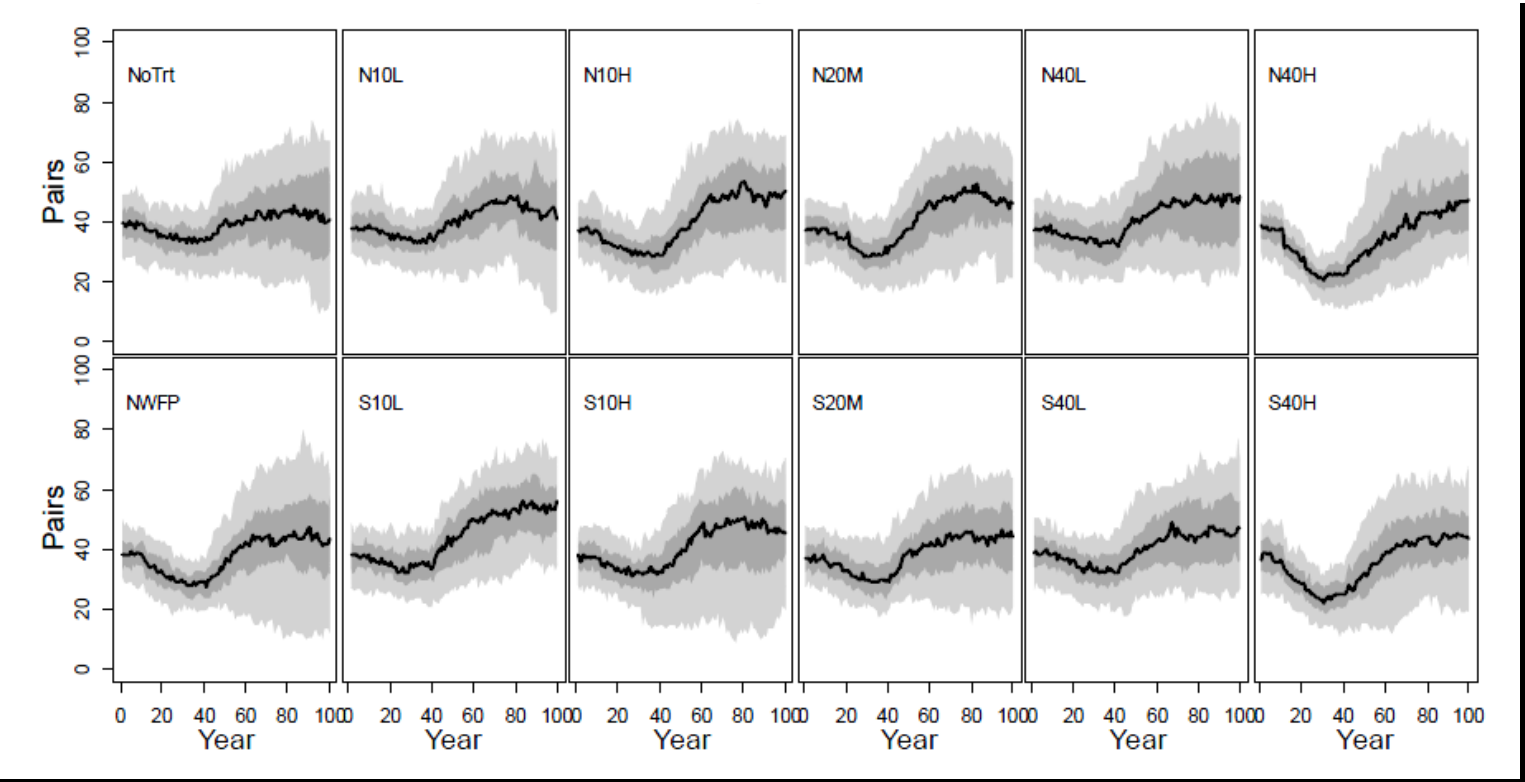
…all fire effects are not equal!

See: Clark et al. 2013. Relationships between wildfire, salvage logging, and occupancy of nesting territories by northern spotted owls. Journal of Wildlife Management 77:672-688.

Northern Spotted Owl Example

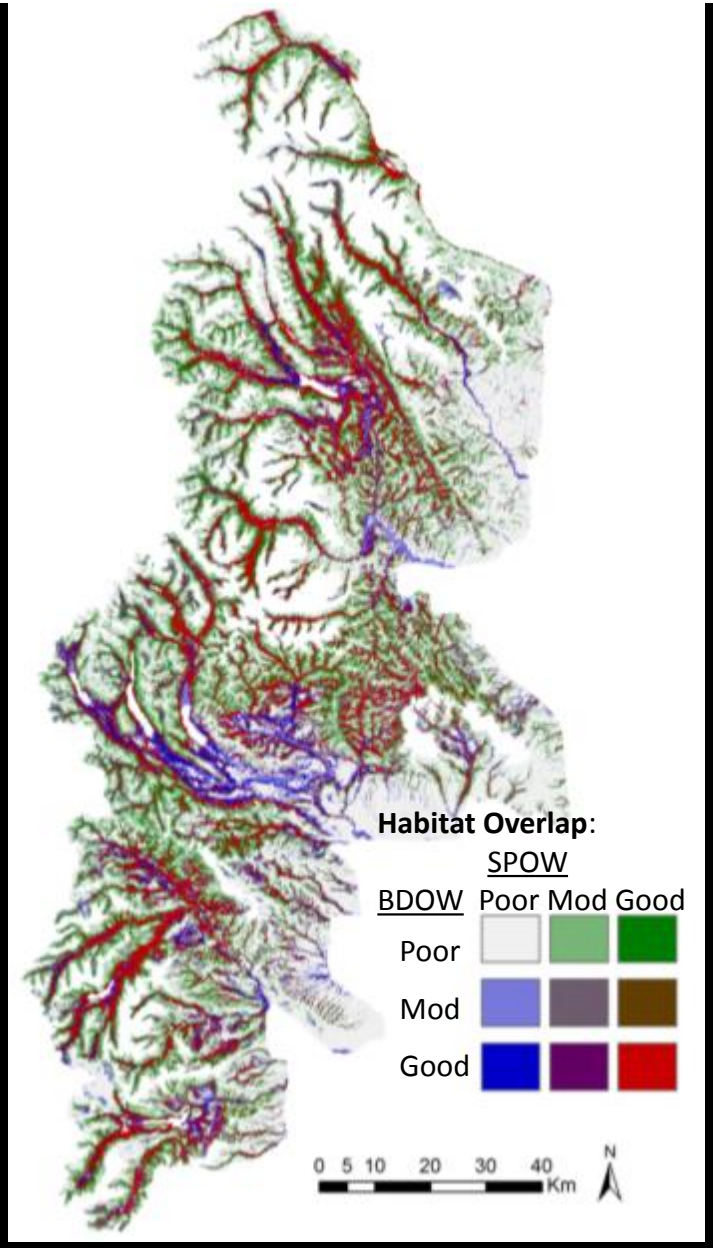
- How do we best manage for sustainable owl populations?

Deschutes N.F. Spotted Owl Population Trajectories Under 12 Management Scenarios



From: Raphael et al. 2013. Assessing Compatibility of Fuel Treatments, Wildfire Risk, and Conservation of Northern Spotted Owl Habitats and Populations. JFSP Project 09-1-08-31 Final Report.

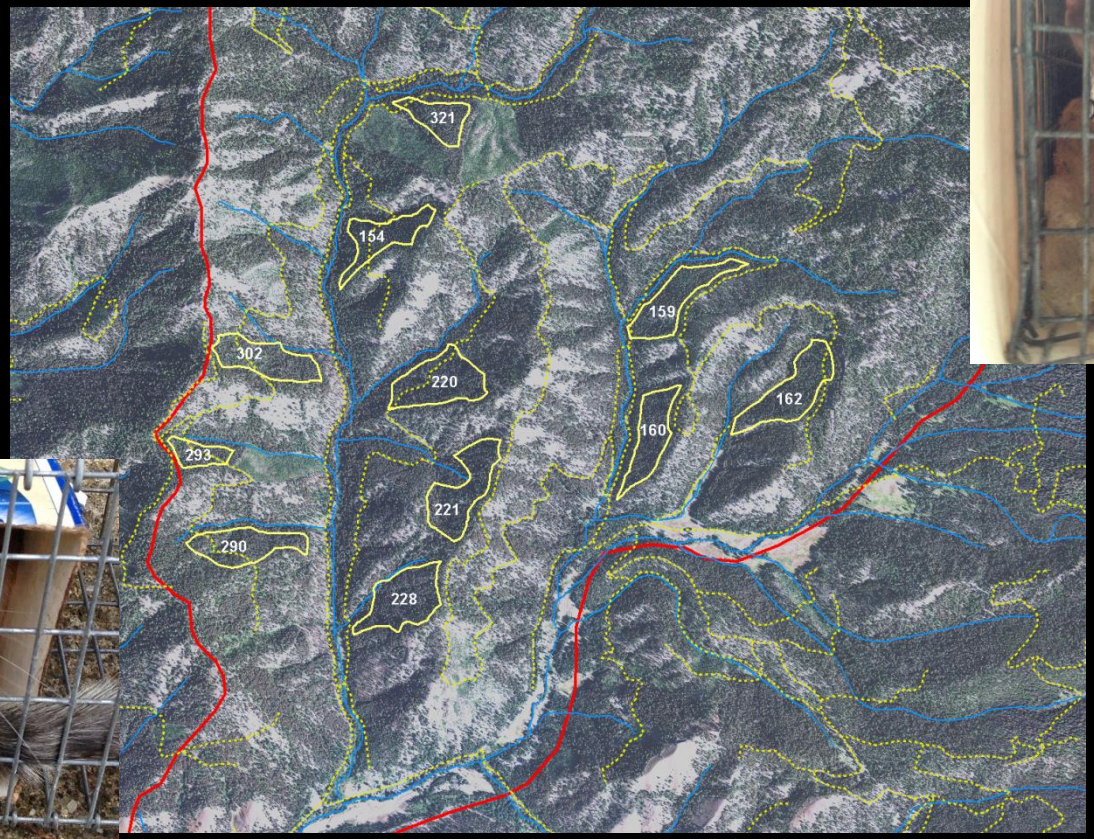
Habitat Overlap for Barred Owls and Spotted Owls in the Okanogan-Wenatchee N.F.



From: Singleton 2013. Barred Owls and Northern Spotted Owls in the Eastern Cascade Range, Washington. PhD Dissertation, Univ. of WA.

Northern Spotted Owl Example

- Swauk Pine Forest Restoration Project & Spotted Owl Prey Study - developing creative silvicultural approaches for meeting multiple resource objectives



Take-home messages:

- Scale is important: Habitat Structures within Landscapes within Regions.
- Moist mixed-conifer is just one forest type within a complex landscape mosaic that needs to be considered as a whole.
- Natural range of variation is useful as a guide but not a target:
  - Range of variability measures provide good side-boards for understanding landscape patterns that contribute to desirable conditions for a variety of ecological processes, but there may be circumstances where we want to diverge from NRV to achieve specific objectives for wildlife or other ecological services.
- Sustainability of special habitat features needs to be considered in the context of landscape-scale disturbances.
- Small-scale disturbances (e.g. pathogens, wind damage, etc.) can contribute to stand structural diversity, but large-scale high-intensity disturbances can simplify the landscape to the detriment of habitat values.
- Old forest structures, particularly big trees (both living and dead, vertical and horizontal), are especially valuable for wildlife across all stages of stand development and take a very long time to replace when they are removed.