



# Barred Owl Habitat Selection in West Coast Forests

NSO Stakeholder Forum, Santa Rosa, CA

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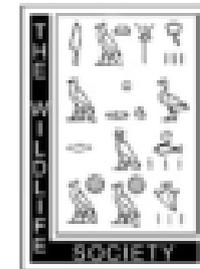
*Research Article*

## Barred Owl Habitat Selection in West Coast Forests

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- Barred owl westward expansion of the 20<sup>th</sup> century
- Downward NSO demography trends (Anthony et al. 2006, Forsman et al. 2011) linked to increasing barred owl density
- Reviews (Buchanan et al. 2007, Gutierrez et al. 2007, Dugger et al. 2016) and revised recovery plan (USFWS 2011) identify barred owls as a primary threat to NSO



**Goal:** Identify combinations of vegetative and environmental factors associated with foraging habitat selection across varied landscapes

- Radio 8-10 pairs of barred owls per study area (WA, OR, CA)
- Quantify detailed habitat and physical environmental conditions available within home ranges
- Develop Resource Selection Functions (RSFs) for foraging and compare among study areas (between nesting/non-nesting seasons)
- Develop a general RSF, pooled across 3 study areas
- Estimate cumulative home ranges and core-area sizes

## Chehalis, WA

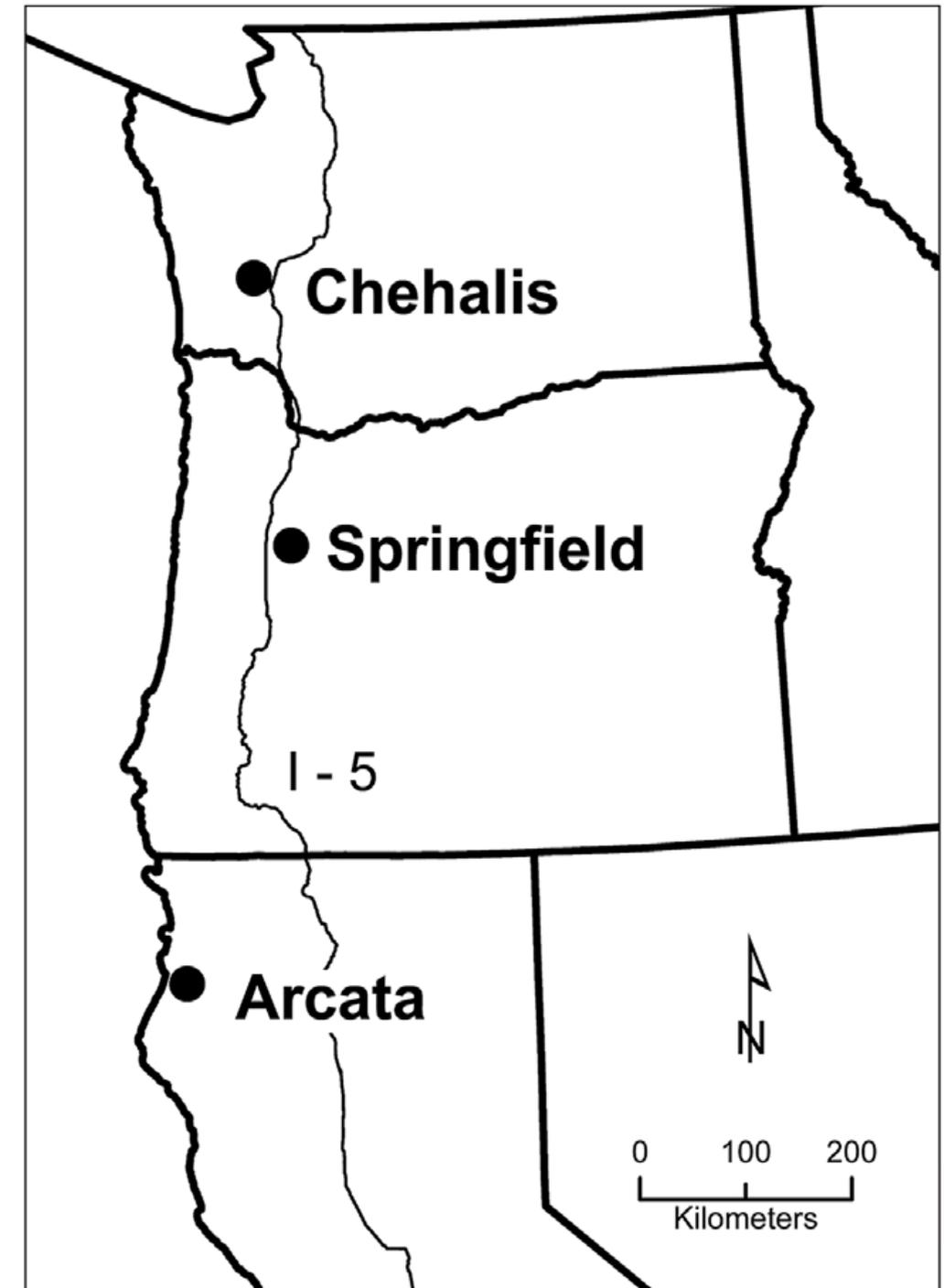
- Washington DNR, Weyerhaeuser
- Douglas-fir-western hemlock zone

## Springfield, OR

- BLM (10%), private, USFS
- Douglas-fir-western hemlock zone

## Arcata, CA

- Redwood National & State Parks, Green Diamond Resource Company, city of Arcata, BLM (Arcata Headwaters Reserve), Humboldt Redwood Company
- Redwoods, mixed redwood/Douglas-fir, mixed Douglas-fir/oak woodlands



## Radio-Tracking (Consistent Design Across Study Areas)

### Telemetry Data:

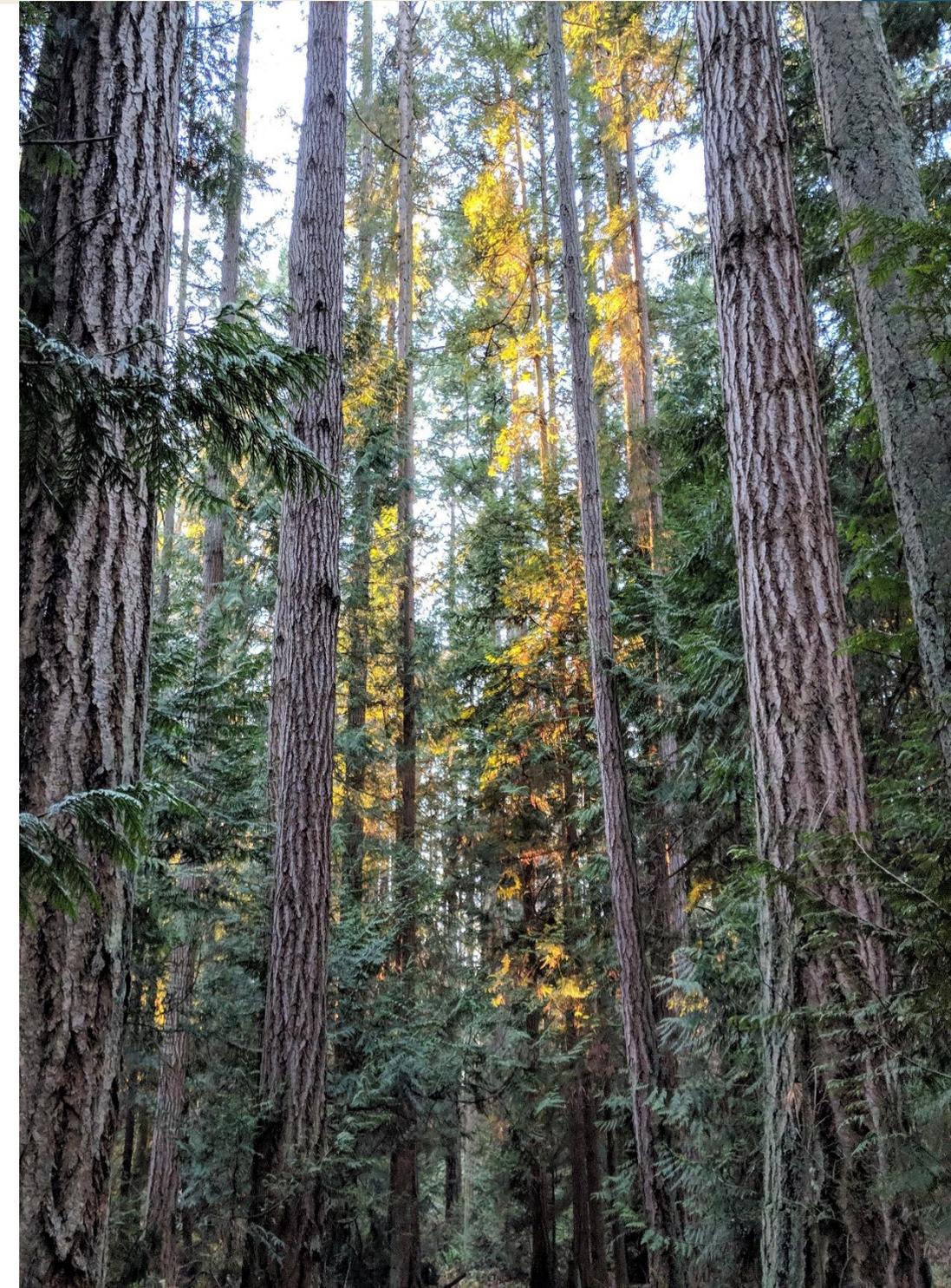
- Chehalis-2007-2010
- Springfield-2007-2011
- Arcata-2008-2012



- Barred owls were captured via nets, noosepole
- VHS backpack transmitters
- Located 1-3X/wk, nocturnal (foraging)

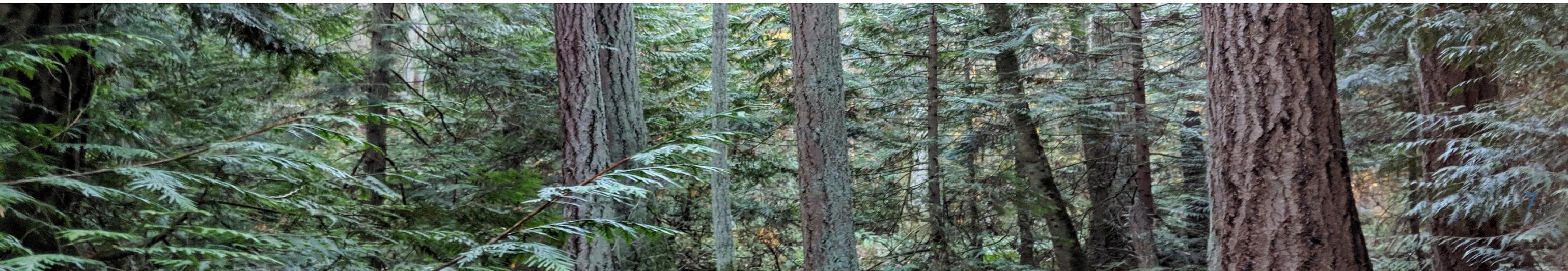


- Quantified seasonal and annual foraging habitat choices
  - Abiotic factors
    - Distance from streams, roads, nests
    - Slope, aspect
  - Forest vegetation structures
  - Tree density, species composition, DWD
- Used 120m grid within 95%MCP home ranges
- Plot density=1 plot/1.6ha, variable radius forest inventory plots, 40BAF



## Resource Selection Functions (RSFs)

- Created discrete-choice RSF models
  - Linked forest-telemetry data across landscapes & habitat
  - Used home ranges w/ >30 locations/season or year
  - Each bird = independent sample
- RSFs constructed in stages
- Seasonal influences
- Applied top RSF for each area to habitat plots within territories of other 2 areas



	Chehalis, WA	Springfield, OR	Arcata, CA
Territories	13	12	11
Females Tracked	6	10	8
Males Tracked	10	12	9
Telemetry Points	2803	2810	2454
Habitat Plots	3978	2431	1919

## Median Home Ranges (>150 locations)

95% MCP	95% FK	50% FK
<ul style="list-style-type: none"> <li>• Chehalis = 564 ha (n=16)</li> <li>• Springfield = 446 ha (n=11)</li> <li>• Arcata = 290 ha (n=13)</li> </ul>	<ul style="list-style-type: none"> <li>• Chehalis = 559 ha</li> <li>• Springfield = 347 ha</li> <li>• Arcata = 195 ha</li> </ul>	<ul style="list-style-type: none"> <li>• Chehalis = 88 ha</li> <li>• Springfield = 34 ha</li> <li>• Arcata = 35 ha</li> </ul>

RSF models shared two common covariates among the 3 sites:

- Distance from nests/site centers (-)
- Elevation (-)
- Barred owls preferred areas closer to nests/site centers and at lower elevations
- Otherwise, covariates in top RSF models varied among study sites

## Chehalis-Douglas-fir, Western Hemlock Zone

**INCREASED PROBABILITY OF SELECTION**

**DECREASED PROBABILITY OF SELECTION**

**NEUTRAL/UNIMPORTANT**

**INTERACTION TERM**

- Greater basal area of western redcedar/alder
- Increased basal area of trees 25-55cm dbh
- Density of young trees (<12.7 cm dbh)
- Increased distance from roads
- Higher elevation and steeper slopes
- Distance to streams
- Heatload
- BA of hemlock, Douglas-fir, Sitka spruce, hardwoods
- Basal area of large diameter trees (>66cm dbh) became important with proximity to nests

## Springfield-Douglas-fir, Western Hemlock Zone

### INCREASED PROBABILITY OF SELECTION

- Low lying areas (lower slope positions)
- Increased basal area of bigleaf maple
- Increased basal area Douglas-fir, western hemlock

### OTHER POSITIVE ASSOCIATIONS

- Increased densities of western redcedar
- Greater basal area of bigleaf maple with distance from nests

### DECREASED PROBABILITY OF SELECTION

- Higher elevations
- Increased distance to streams

## Arcata-Redwoods, Douglas-fir, Mixed Douglas-fir, Oak Woodlands

### INCREASED PROBABILITY OF SELECTION

- Increased basal area of California redwood

### INTERACTION TERM

- Increased basal area of trees >66cm dbh with increased proximity to nests

### DECREASED PROBABILITY OF SELECTION

- Increased elevation
- Increased density of Douglas-fir
- Increased basal area of tanoak

Probability of selection increased with:

- Increased slope, southerly aspects, increased QMD, and basal area of alder

Probability of selection decreased with:

- Increased distance from nests, streams, and increased density of small diameter trees



## Seasonal Effects

### Nesting

- Foraging concentrated near nest sites and at lower elevations
- Large diameter trees important
- Small trees (-) association (Arcata)
- Alder important (Chehalis, Arcata)
- Tanoak (-) association (Arcata)

### Non-Nesting

- Less restricted to low areas
- Large trees remained important (Chehalis, Arcata) or Douglas-fir (Springfield) near nest sites
- Probability  $\uparrow$  w/greater basal area of trees 25.5-56 cm dbh and greater basal area alder (Chehalis)
- Basal area of bigleaf maple, western hemlock, Douglas-fir important (Springfield)

## Conclusions

- Location-location...availability affected use
- Barred owls exhibit strong patterns of habitat selection
- Use concentrated near nesting sites, flat, low elevations (also Wiens et al. 2014), proximity to permanent streams (mixed hardwoods, more prey)
- Patches w/greater basal area of alder (Chehalis), bigleaf maple (Springfield) important
- Foraging strongly associated w/dense patches large conifers near nest sites (thermal/predation benefits)
- Minimal seasonal shifts in habitat selection
- Most foraging on southerly aspects
- Barred owls showed associations w/specific tree species
- (-) association w/young, dense Douglas-fir (also Wiens et al. 2014)

## What Does This All Mean?

- Fine-scale habitat details matter
  - General RSFs are useful
  - Thinning young conifer to increase tanoak/madrone may benefit NSO,
- BUT...
- No studies evaluating barred owl response to reduced tree densities

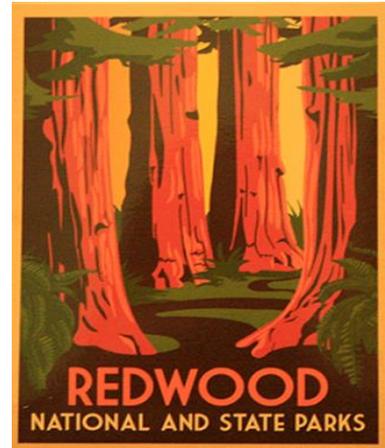


# THANK YOU TO ALL COOPERATORS AND FIELD CREWS



Weyerhaeuser

afrc



OREGON FOREST &  
INDUSTRIES COUNCIL



MENDOCINO • HUMBOLDT  
Redwood Companies



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# Questions, Comments?

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