

# STATUS AND TRENDS IN DEMOGRAPHY OF NORTHERN SPOTTED OWLS, 1985-2003

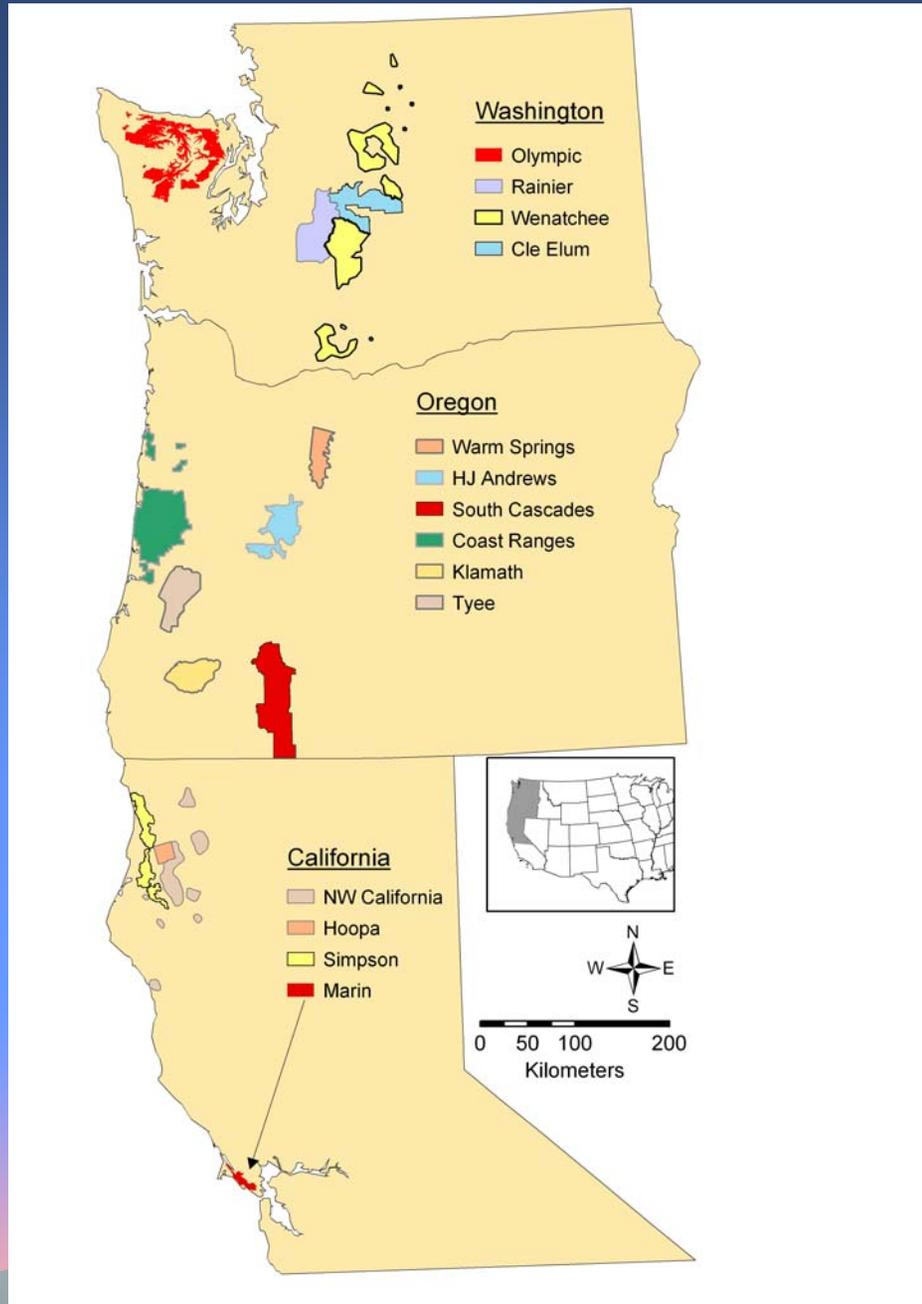
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the views of the funding agencies

# Cooperators

- U.S. Forest Service
- U.S. Bureau of Land Management
- U.S. Fish and Wildlife Service
- U.S. National Park Service
- U.S. Geological Survey
- Oregon State University
- Colorado State University
- University of Minnesota
- Simon Fraser University
- Hoopa Tribe
- Warm Springs Tribe
- Raedeke Associates
- National Council For Air & Stream Improvement
- Sage Science
- Plum Creek Timber Co.
- Simpson Resource Co.
- Point Reyes Bird Observatory



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# Spotted Owl Study Areas

Study area		Years	Area (km <sup>2</sup> )	# Banded	#Cap/Recap
Wenatchee	WEN	1990-2003	4,650	1,200	2,556
Cle Elum	CLE*	1989-2003	1,784	724	1,570
Rainier	RAI	1992-2003	2,133	217	530
Olympic	OLY*	1987-2003	3,289	985	3,568
Coast Ranges	COA*	1990-2003	3,919	1,025	3,386
HJ Andrews	HJA*	1987-2003	1,526	1,095	3,151
Warm Springs	WSR	1992-2003	1,100	381	867
Tyee	TYE*	1985-2003	1,741	1,032	3,293
Klamath	KLA*	1985-2003	1,384	1,147	2,964
S. Cascades	CAS*	1991-2003	3,375	881	2,141
NW California	NWC*	1985-2003	1,790	1,026	2,865
Hoopa	HUP	1992-2003	356	279	851
Simpson	SIM	1990-2003	1,265	1,344	4,087
Marin	MAR	1998-2003	217	96	225
<b>All areas</b>			<b>28,430</b>	<b>11,432</b>	<b>32,054</b>

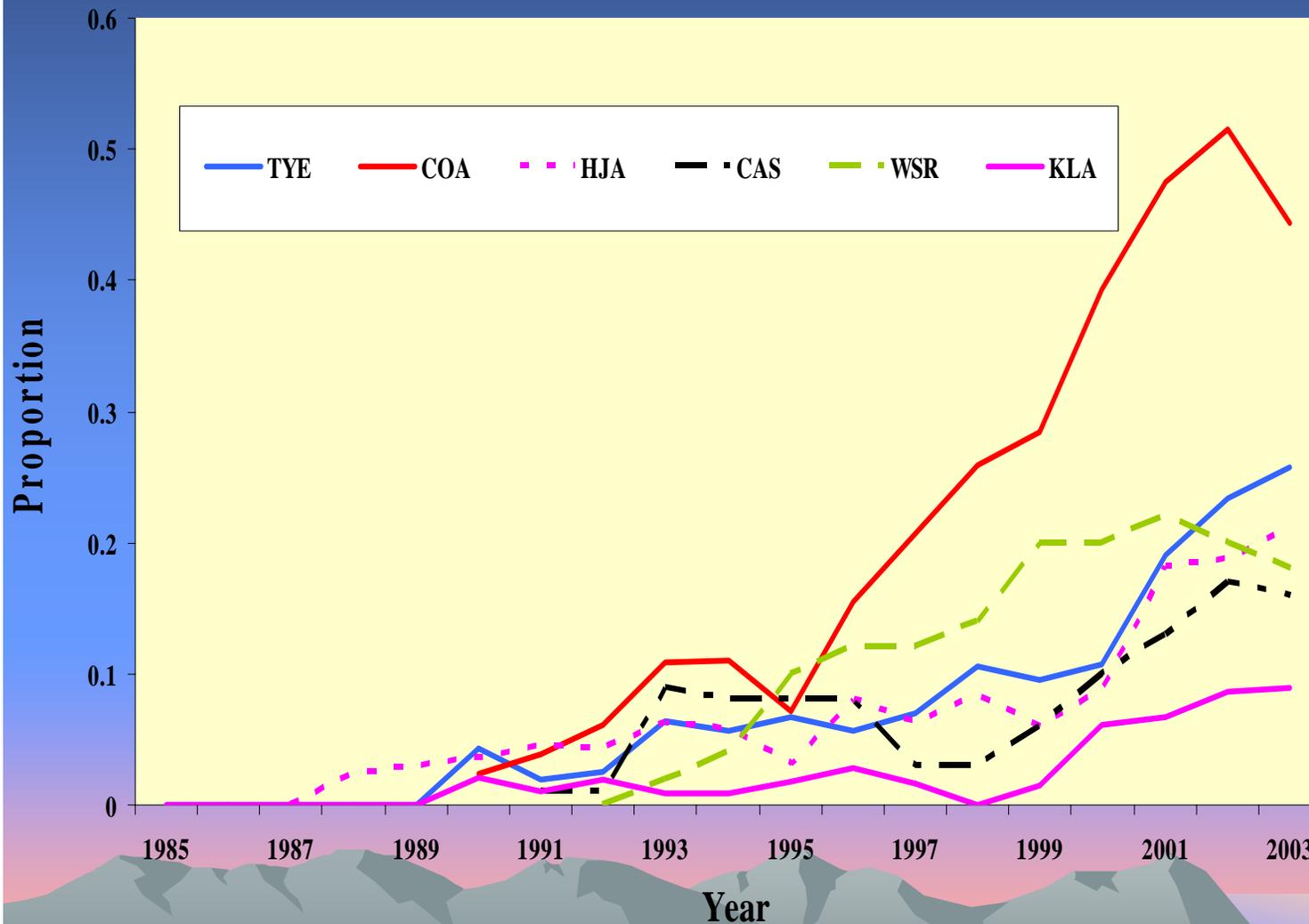
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# Variables examined

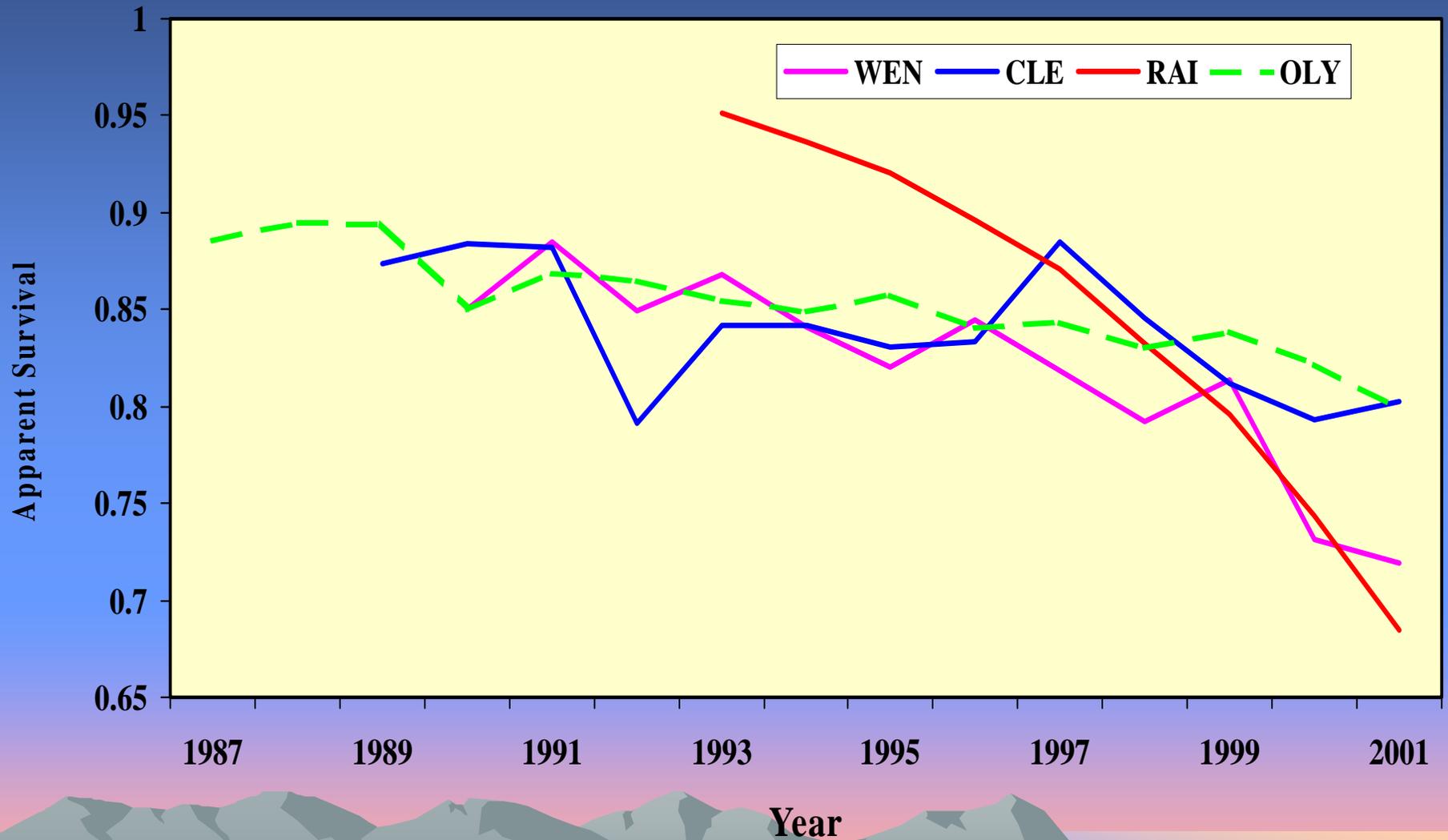
- Sex effects (s)
- Time effects (t, T, TT, EO )
- Age effects
  - S1 = 1-yr-old owls
  - S2 = 2-yr-old
  - Adult =  $\geq 3$  yrs old
- Barred Owl effects (BO)
- Reproduction effects (r)
- Regional effects
- Latitude effects
- Ownership effects

# Proportion of spotted owl territories in which barred owls were detected



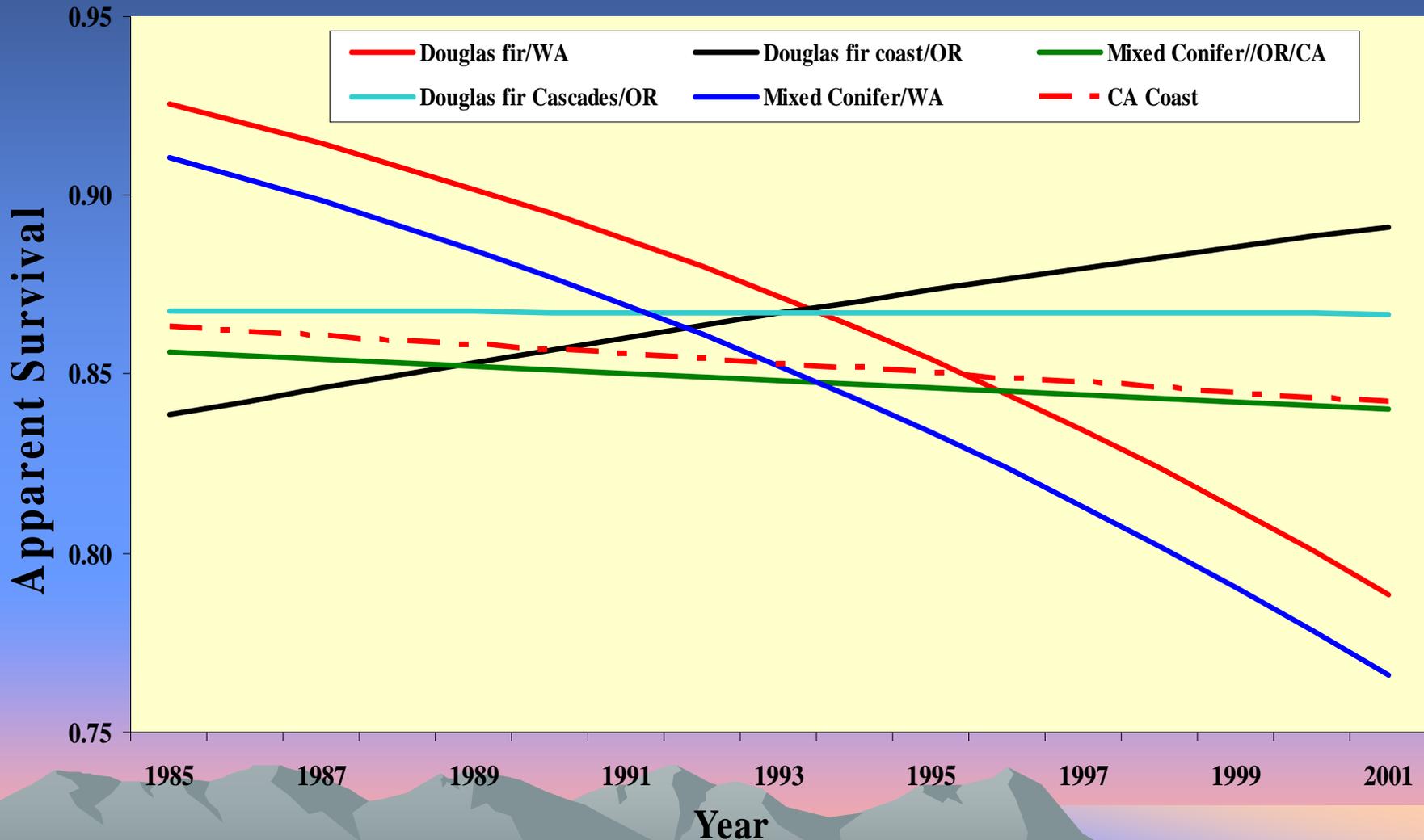
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# Model averaged estimates of non-juvenile female survival in Washington



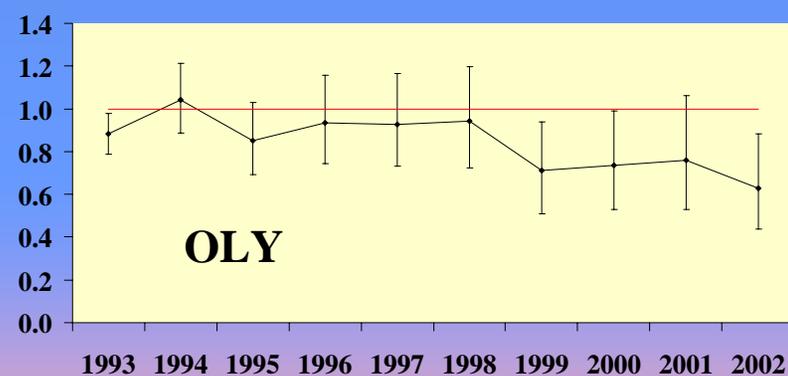
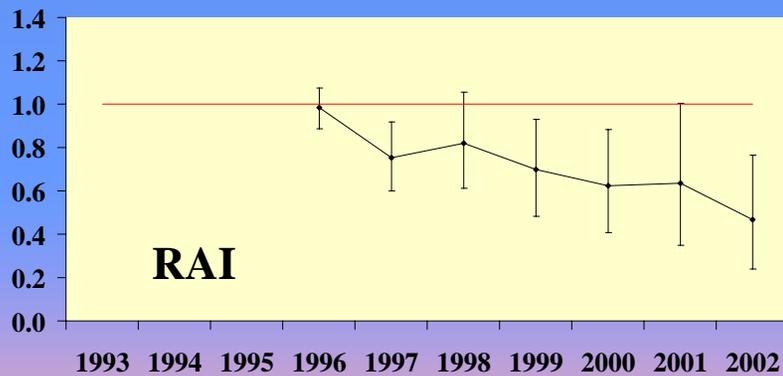
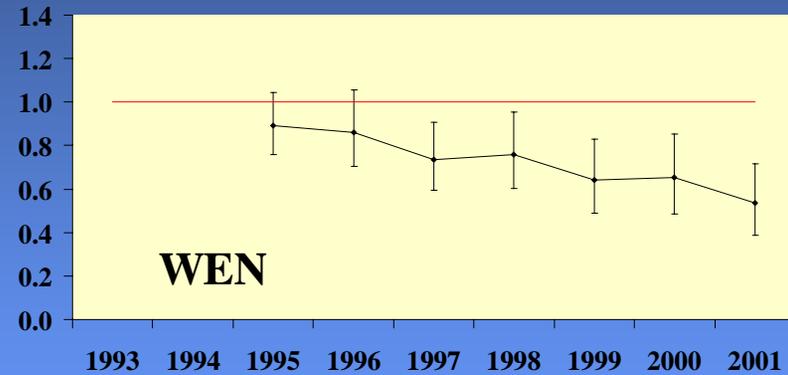
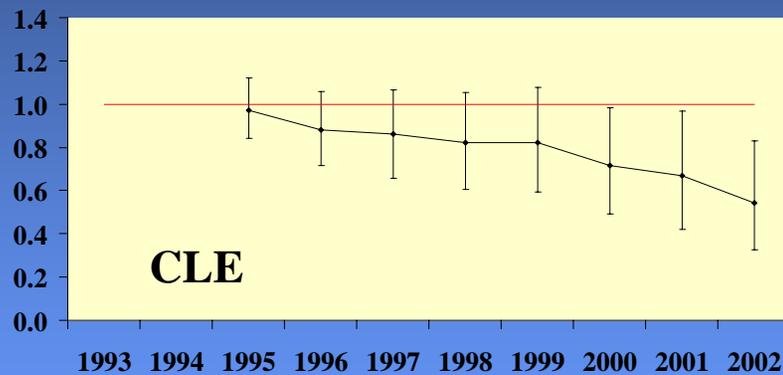
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# Estimates of apparent survival of adult spotted owls from meta-analysis of 14 areas model $\Phi(\text{region} * T)$



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# Estimates of realized population change ( $\Delta\lambda$ ) on study areas in Washington



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# Summary of trends in demographic parameters

Area	Fecundity	Survival	$\lambda_{RJS}$	Population change
WEN	Stable	Declining	0.917	Declining
CLE	Declining	Declining?	0.938	Declining
RAI	Stable	Declining	0.896	Declining
OLY	Stable	Declining	0.956	Declining
COA	Declining?	Stable	0.968	Declining
HJA	Stable?	Stable	0.978	Declining
WSR	Stable	Stable	0.908	Declining
TYE	Increasing	Stable	1.005	Stationary
KLA	Stable	Stable	0.997	Stationary
CAS	Declining	Stable	0.974	Stationary
NWC	Declining	Declining	0.985	Declining?
HUP	Increasing	Stable	0.980	Stationary
SIM	Declining	Stable	0.970	Declining
MAR	Stable	Stable	NA	NA

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# HOME RANGES AND HABITAT USE BY SPOTTED OWLS AND BARRED OWLS IN AN AREA OF SYMPATRY 1986-1989

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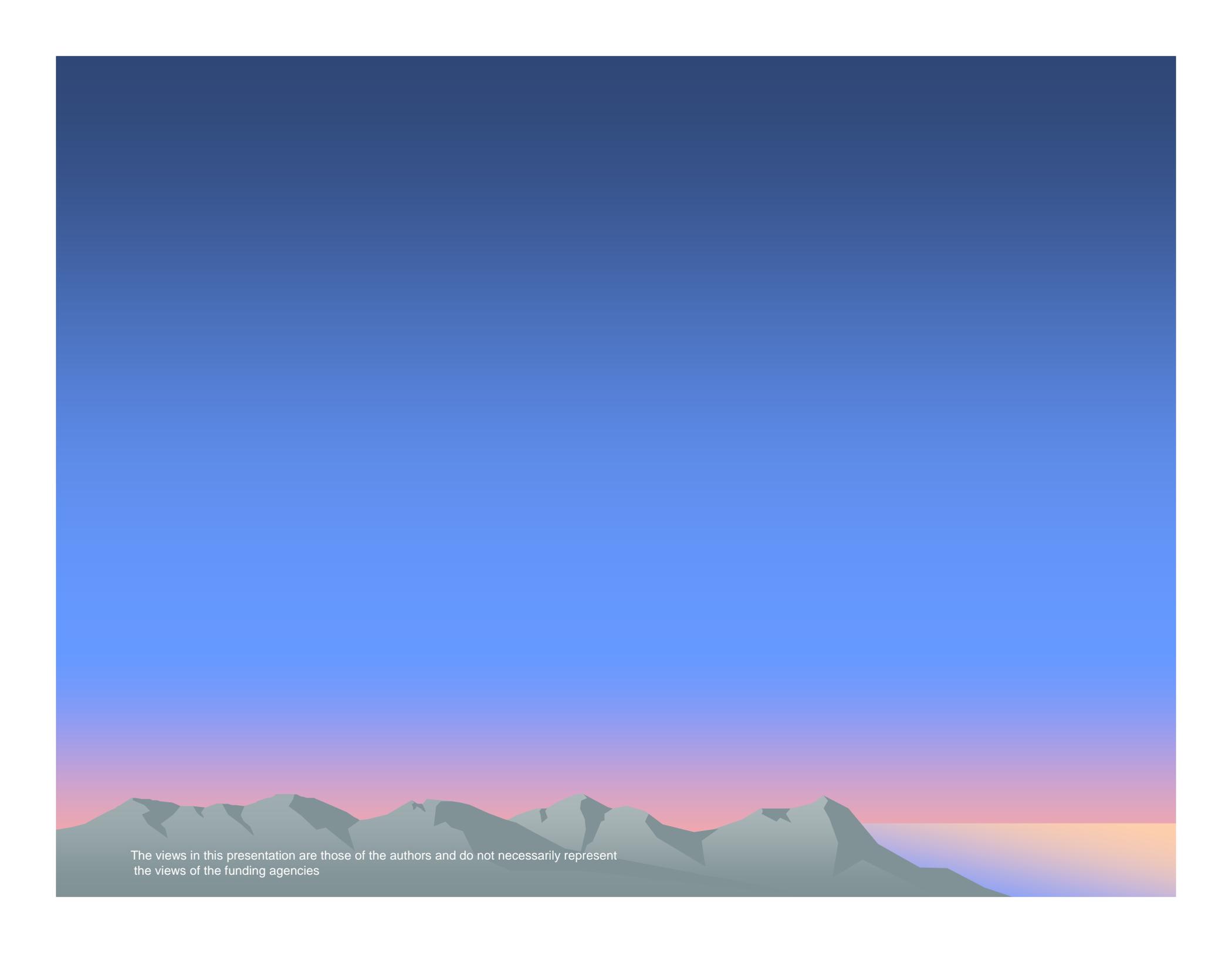
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# Cooperators

- USFS Pacific Northwest Research Station
- Washington Department of Wildlife
- Puget Sound Power and Light Company
- Western Washington University
- North Cascades Audubon Society
- USFS Mt. Baker Ranger District

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# Objectives

- Describe and compare home range areas
- Examine seasonal and annual changes in areas used
- Examine overlap of seasonal and annual ranges
- Compare habitat use, including use of different forest cover types, use of edges, use of riparian areas, and partitioning based on elevation

# Sample Size

- 23 barred owls and 14 spotted owls.
- Avg. of 1 relocation every 2.2 days.
- Mean tracking periods were:
  - BO = 407 days (range = 94-1,064 days)
  - SO = 413 days (range = 127-775 days)

# Analysis

- Combined all foraging/roosting locations for analyses.
- Adaptive Kernel HR estimates (95% isopleth).
- Compositional analysis of habitat selection.
- Neu et al. analysis of habitat selection.
- Median telemetry error = 100m.

# Home Range Model Selection

- Mixed-models ANOVA used to evaluate effects of species, year, season, sex, number of days sampled, number of relocations, and amount of mature/old forest on home range size.

# 6 cover types used in analysis of habitat selection

- Old Forest (OLD): Conifer forests with qmd >75cm dbh.
- Mature Forest (MAT): Conifer forests with qmd 51-75 cm dbh.
- Mid-age Forest (MID): Conifer forests with qmd 26-50 cm dbh.
- Young Forest (YNG): Conifer forests with qmd 0-25 cm dbh.
- Hardwoods/shrubs (HDW): Hardwood shrubs or trees growing on recent clear-cuts or lowland riparian areas.
- Non-forest (NON): Non-forest openings covered by rocks, snowfields or water.

# Top AIC-selected models for analysis of annual home range size (95% Adaptive Kernel)

Models	$AIC_c$	$\Delta AIC_c$
spp + old + spp*old	901.00	0.00
spp + old	907.21	6.21

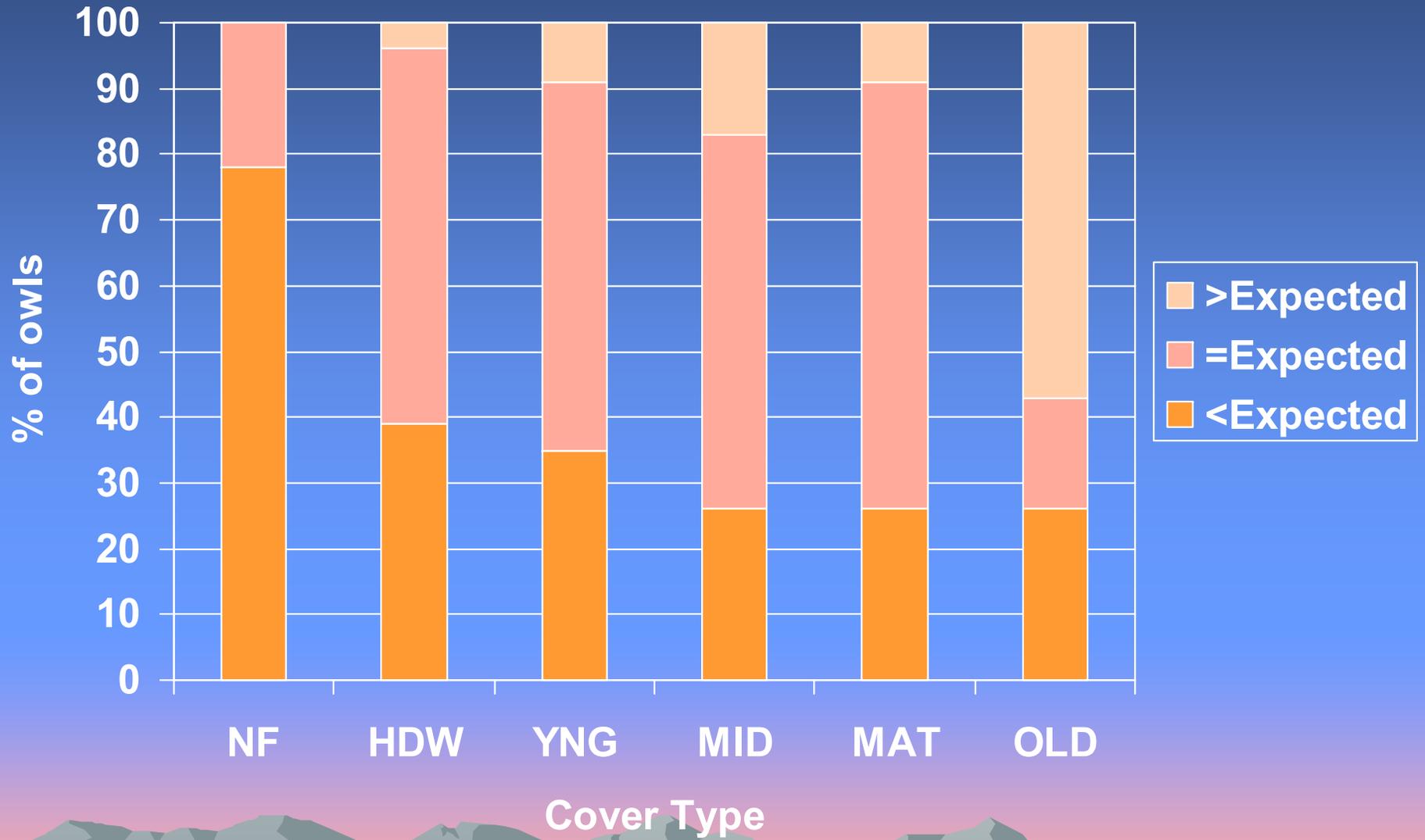
# Mean home range areas (95% AK).

Period	Mean $\pm$ SE (hectares)	
	Barred owls	Spotted owls
Summer	299 $\pm$ 30	1505 $\pm$ 288
Winter	950 $\pm$ 268	2920 $\pm$ 868
Annual	781 $\pm$ 216	2659 $\pm$ 626

# Interspecific overlap of summer ranges of owls on adjacent territories (95% AK)

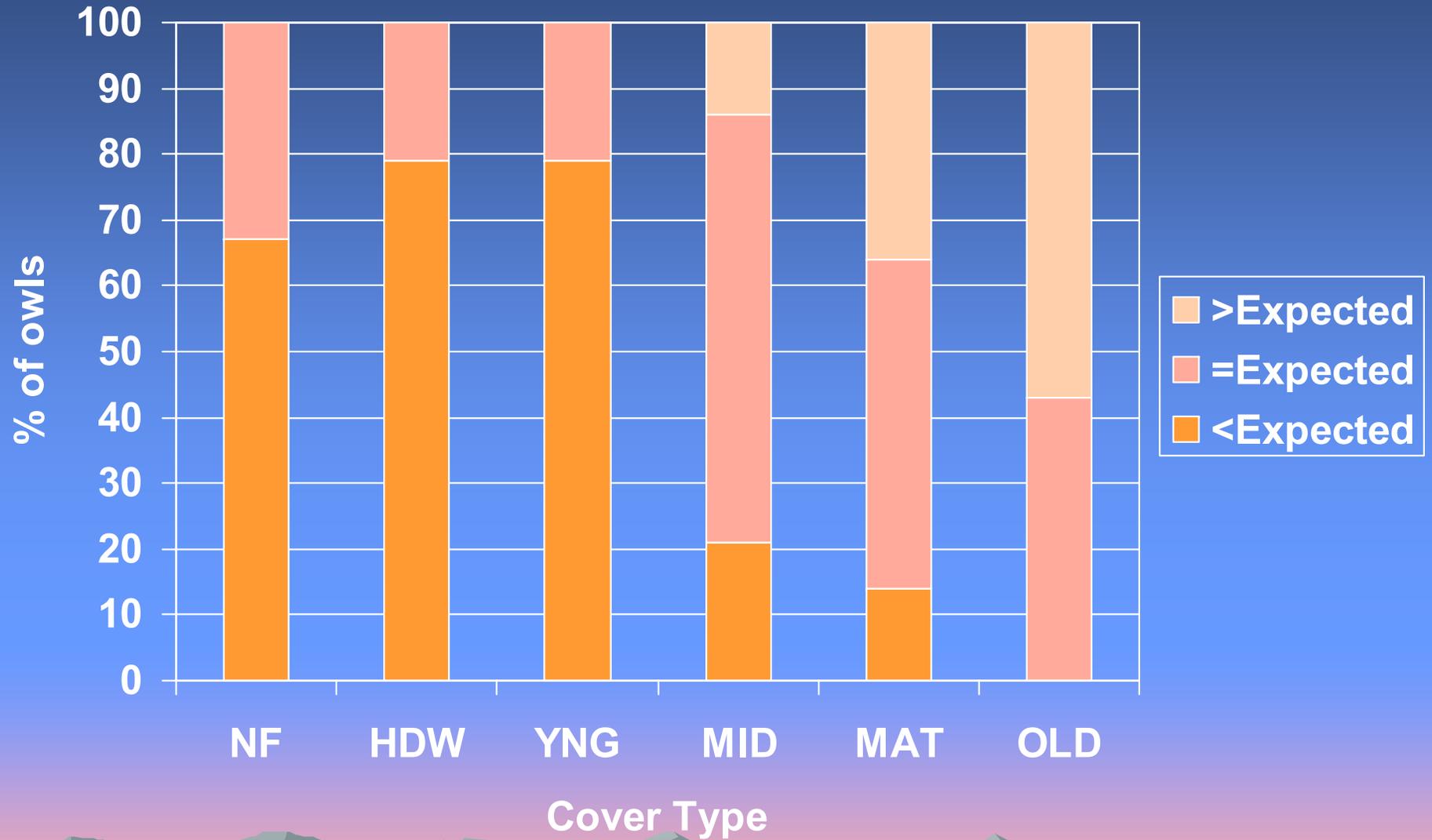
Overlap type	Mean $\pm$ SE	
	BO/SO	SO/BO
M/M	5.7	14.0
F/F	8.9	20.5
M/F	5.8	16.9
F/M	4.4	13.4

# Use of cover types by Barred Owls



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# Use of cover types by Spotted Owls



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# Average elevation of relocations

BO =  $386 \pm 27$  m

SO =  $750 \pm 68$  m



## Mean distance to nearest edge with opening (m)

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Species	Observed	Random	P-value
BO	173 ± 18	174 ± 18	P=0.92
SO	184 ± 11	173 ± 18	P=0.32

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## Mean distance to nearest perennial stream (m)

Species	Observed	Random	P-value
BO	319 ± 26	327 ± 18	P=0.71
SO	367 ± 34	460 ± 13	P=0.02

# Conclusions

- Barred owls have home ranges that are 3-4 times smaller than spotted owls
- Barred owl appear to exclude spotted owls from their territories
- Both species seem to like old forests, but patterns of habitat selection by BO's indicate that they are more of a habitat generalist than is the spotted owl.
- No evidence that either species prefers areas near edges with openings



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