

The effects of barred owls on spotted owls in Olympic National Park, Washington

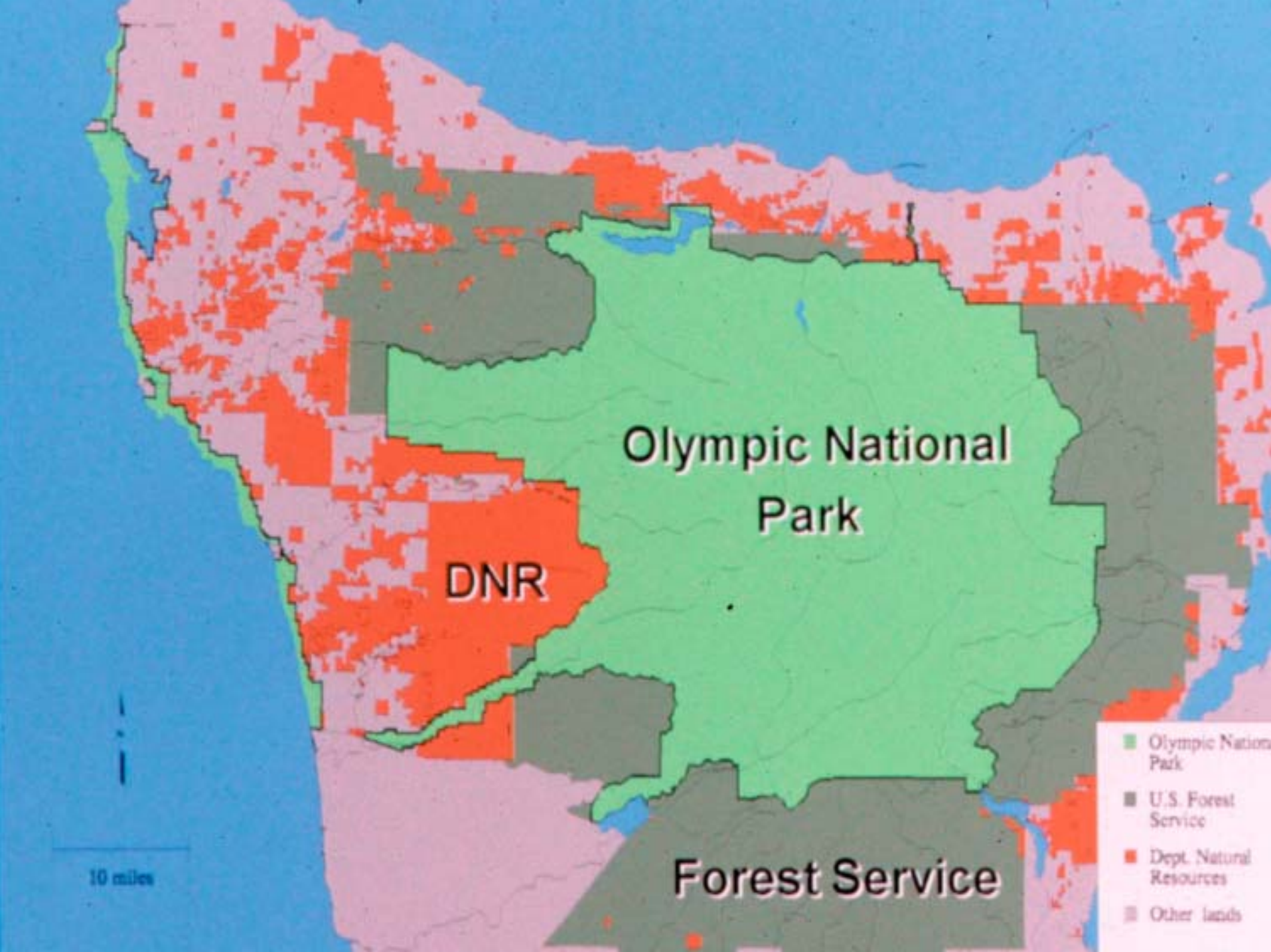
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Olympic National Park**



Acknowledgements:

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- None of these results would have been possible without the efforts of over 75 paid and volunteer technicians over the past 12 years





Olympic National Park

DNR

Forest Service

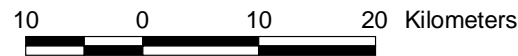
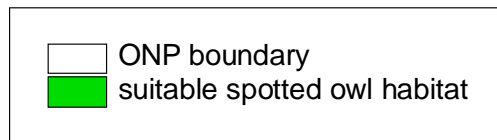
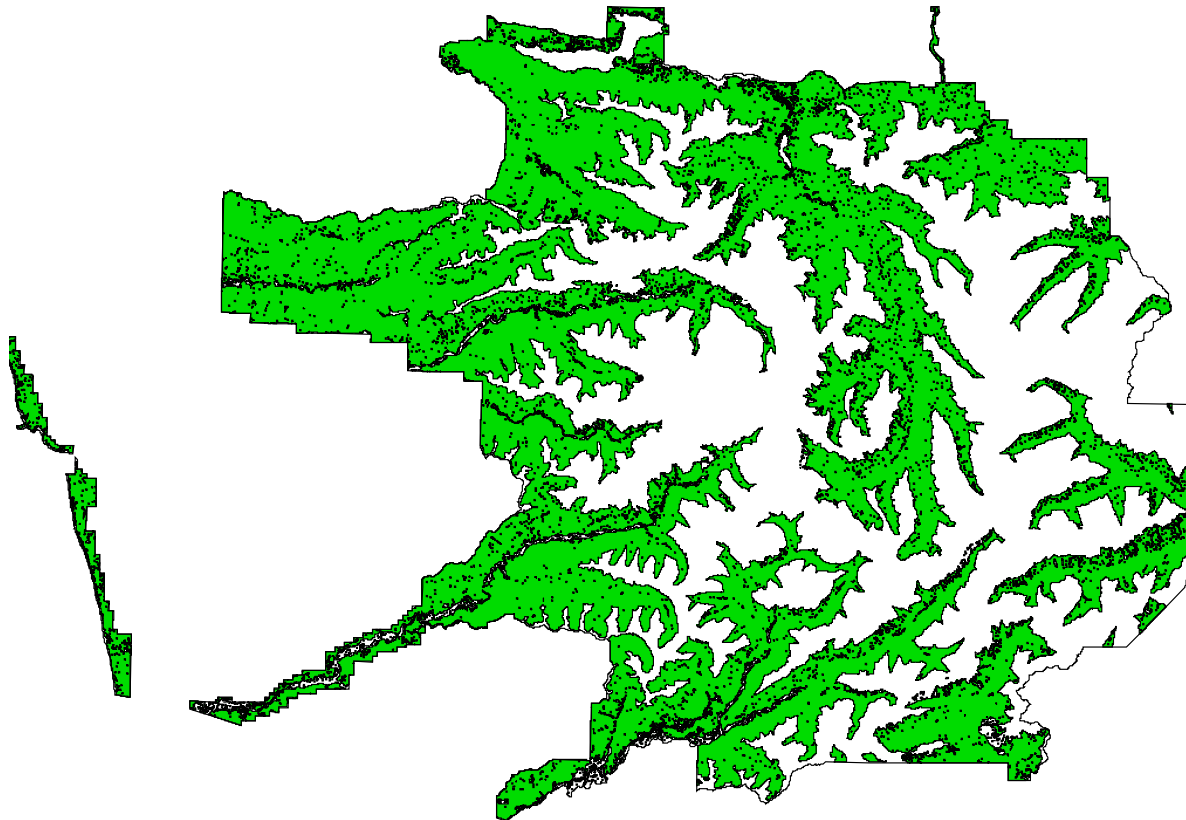
- Olympic National Park
- U.S. Forest Service
- Dept. Natural Resources
- Other lands

10 miles

Suitable spotted owl habitat in Olympic National Park:

-Total area =
922,000 acres

-52% suitable for
spotted owls





Mid-Elwha Valley, Eastern Olympics
Mix of 100 and 300 year-old Douglas-fir, elevation 2600'



Hoh River Valley: Western Olympics

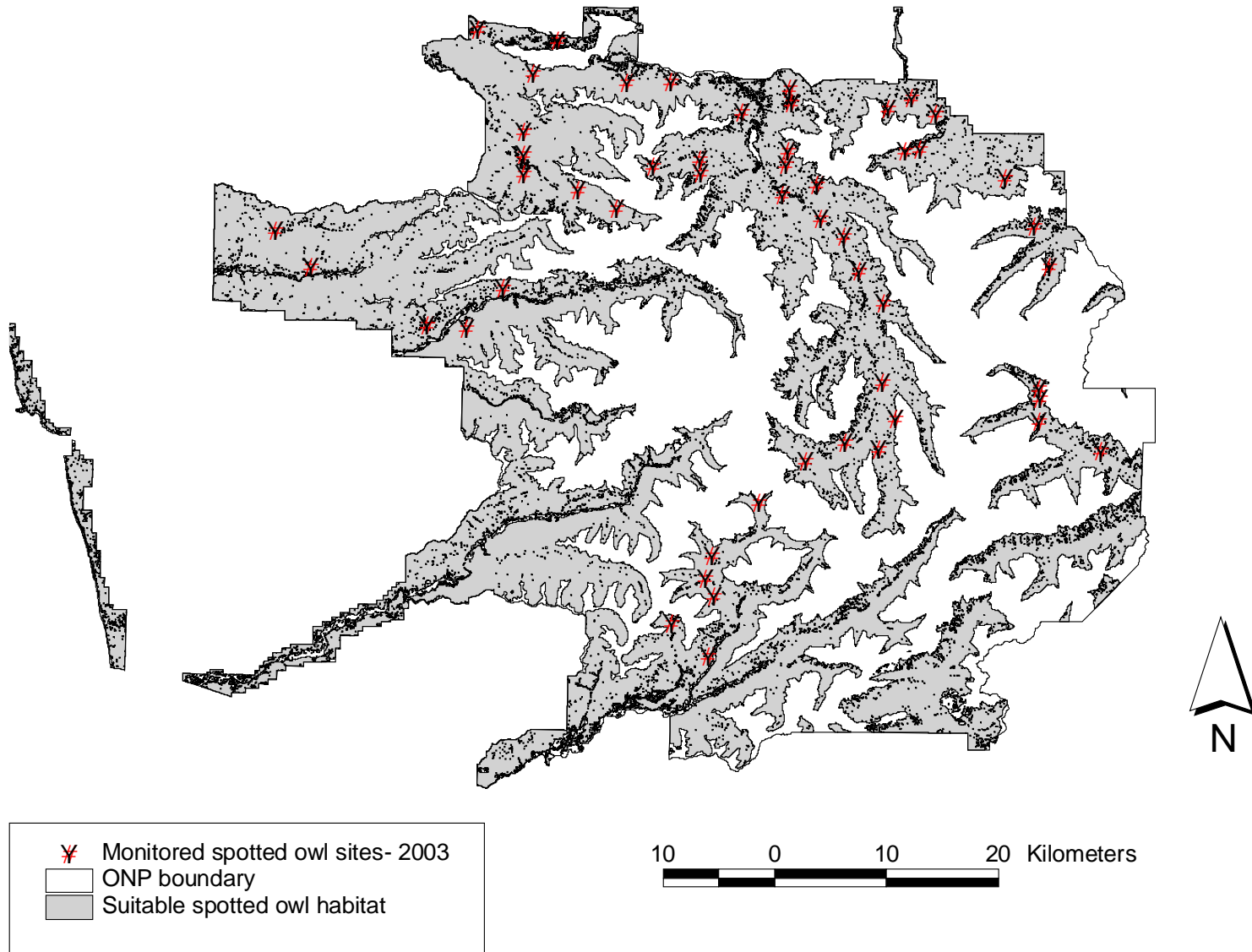
Mix of 530 year old forest, with 30% 340 year old Douglas-fir,
elevation 1200'

Olympic Peninsula demographic study

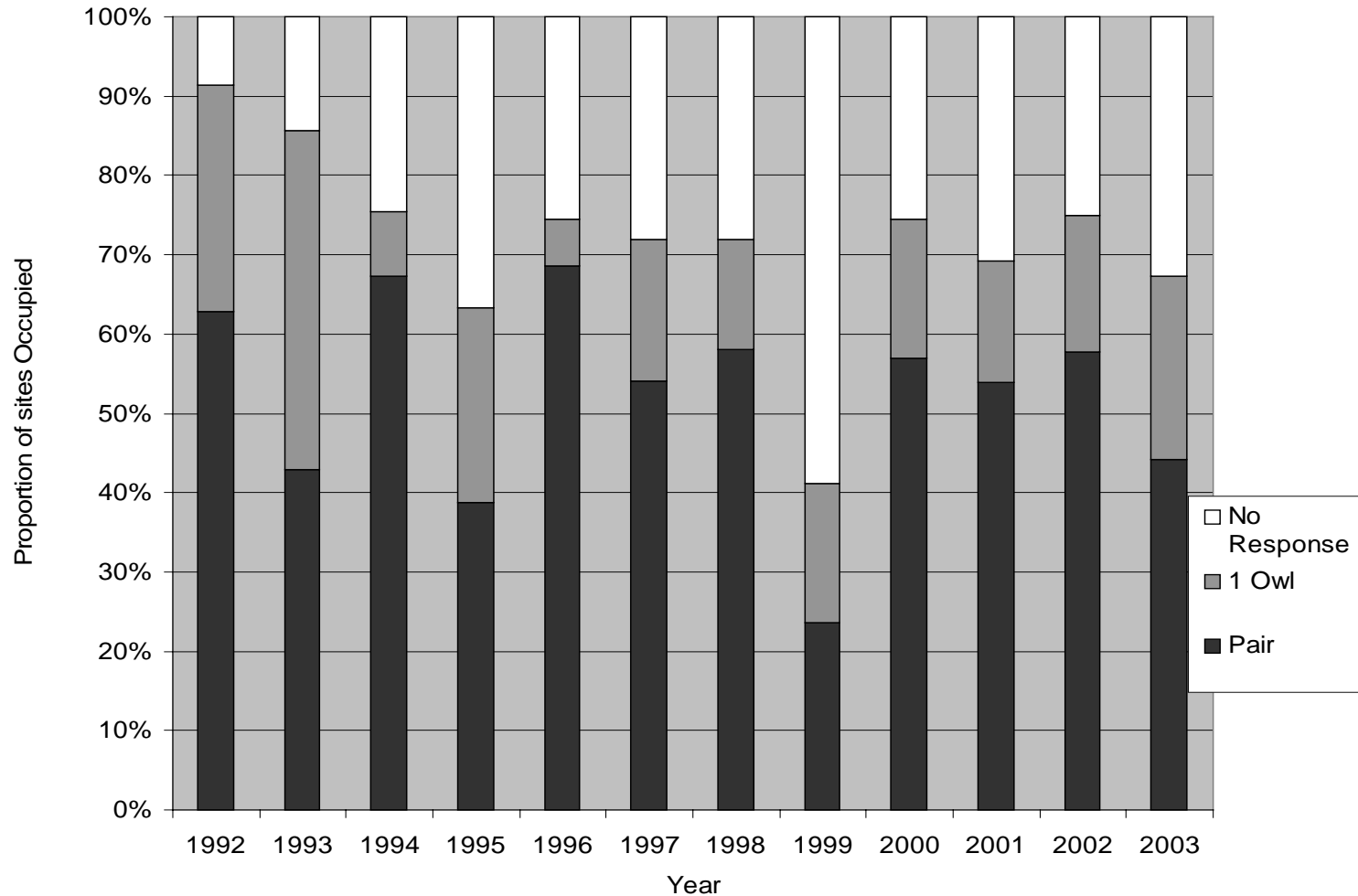
- Cooperative Park and Forest Service effort
- USFS Pacific Northwest Research Lab now monitors roughly 90 spotted owl sites in Olympic National Forest
- Park Service currently monitors 52 spotted owl sites in Olympic National Park
- Most recent analysis of demographic data for the Olympic Province (1998) estimated an annual population decline of 5.9%, when corrected for juvenile emigration



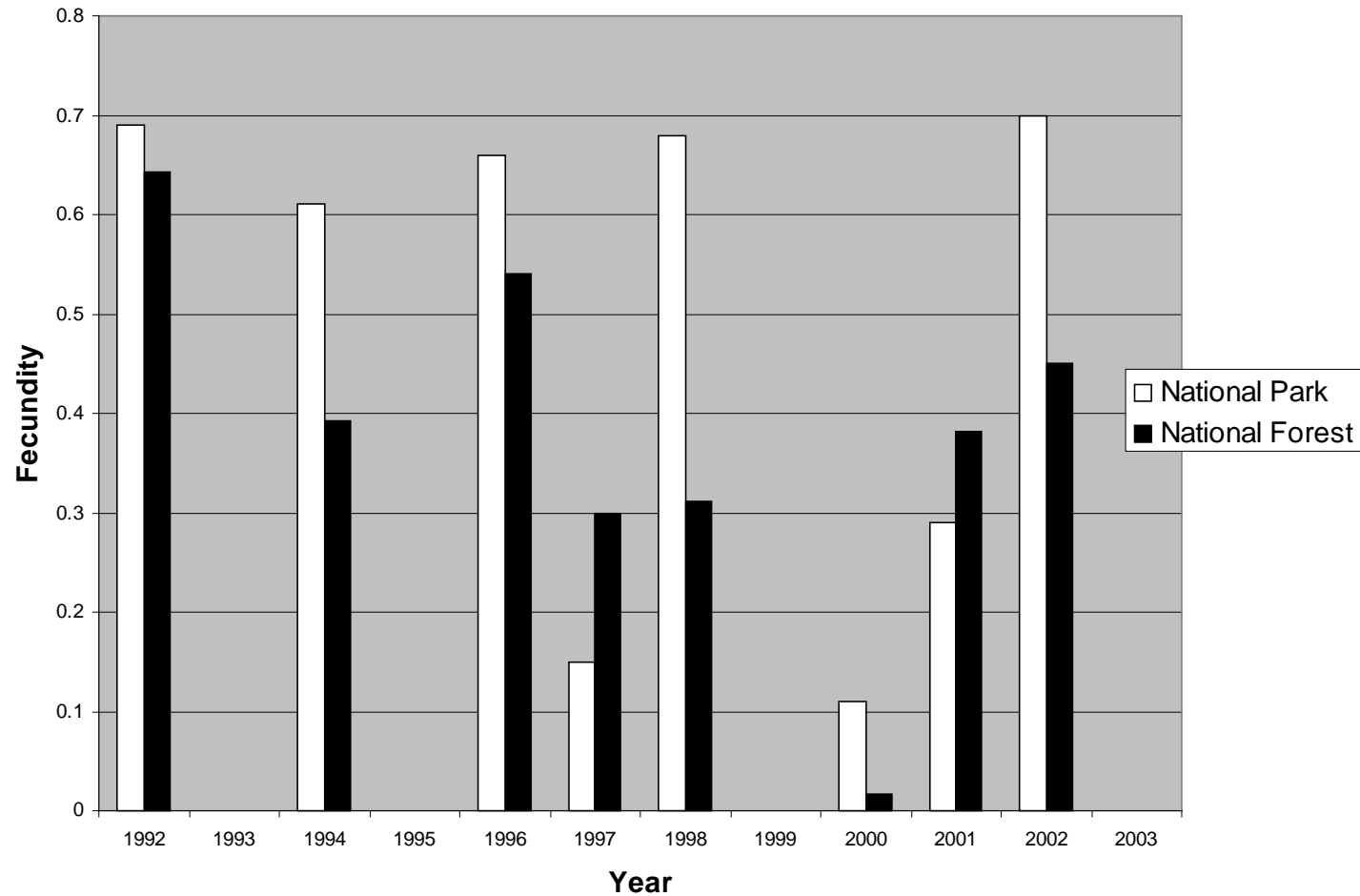
Distribution of monitored spotted owl sites in 2003



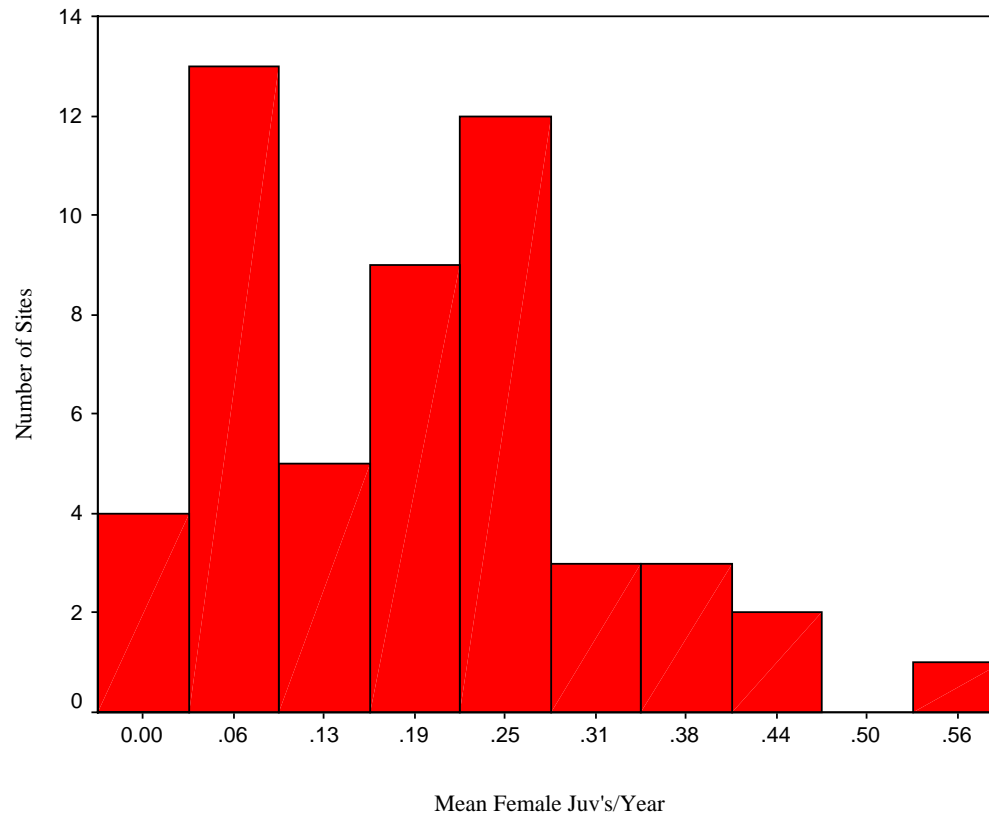
Percent of spotted owl sites occupied by 0, 1, or 2 territorial owls, including all sites with at least one visit recorded.
Olympic National Park, 1992-2003.



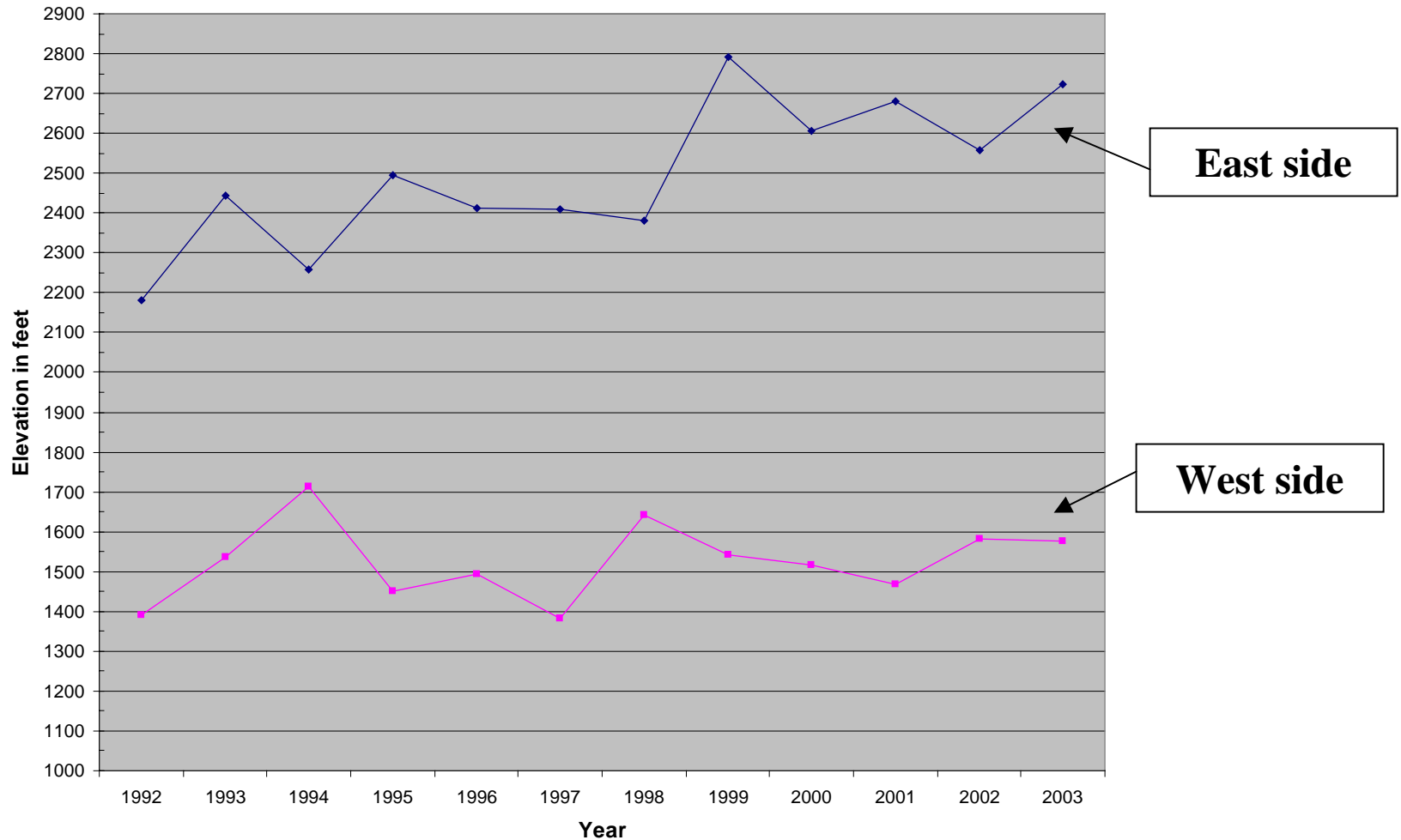
Annual average fecundity for territorial female spotted owls monitored on the Olympic Peninsula, 1992-2003



Mean number of female young fledged annually from all monitored sites, $n = 52$. Olympic National Park, 1992-2002.



Mean elevation of occupied spotted owl sites: Olympic National Park, 1992-2003

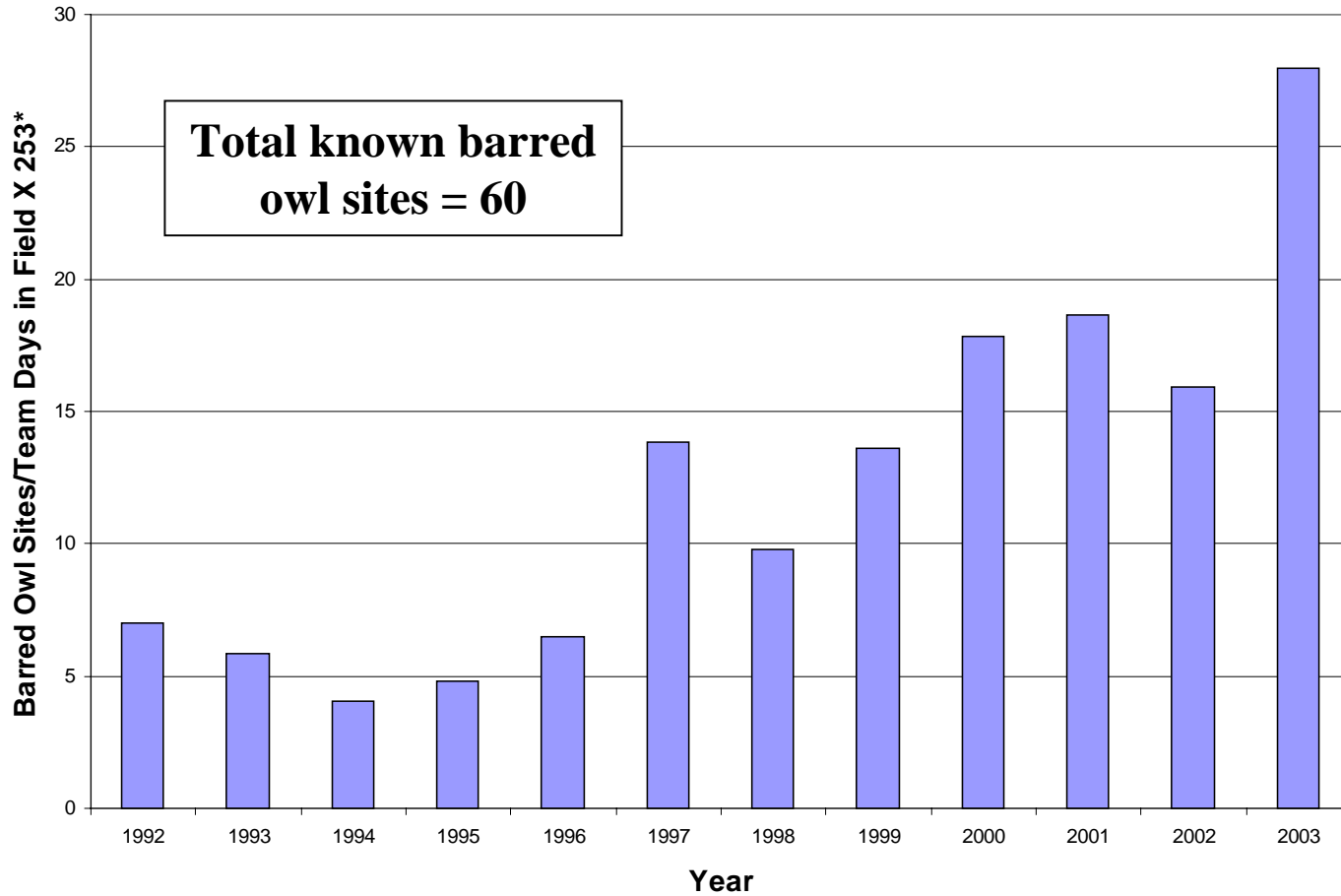


Spread of barred owl

- First record eastern WA-1965
- First record western WA-1973
- First occurrence and breeding Olympic Peninsula-1985
- Now found across entire range of northern spotted owl

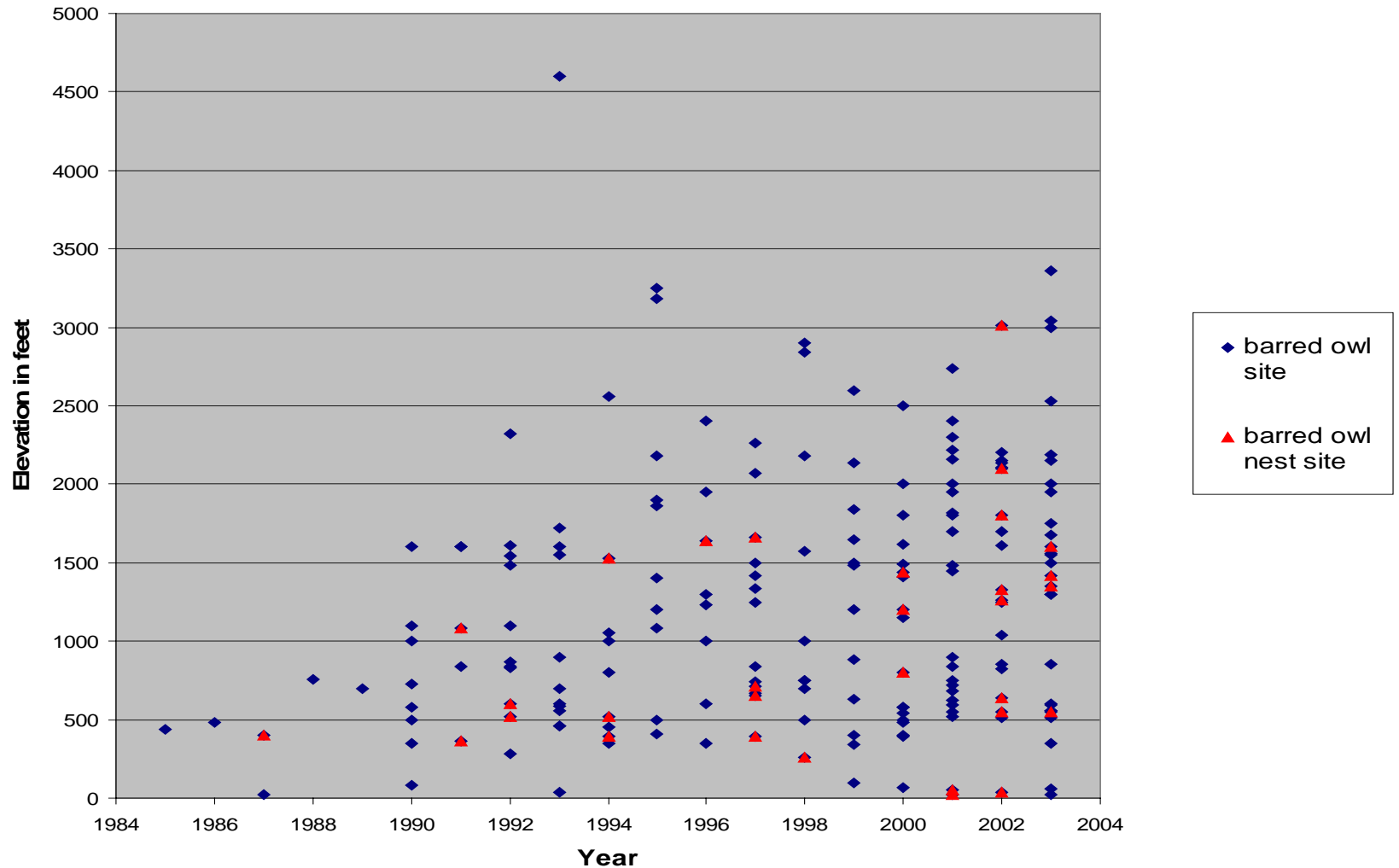


Number of barred owl sites detected annually in ONP, 1992-2003, standardized by intensity of survey effort.

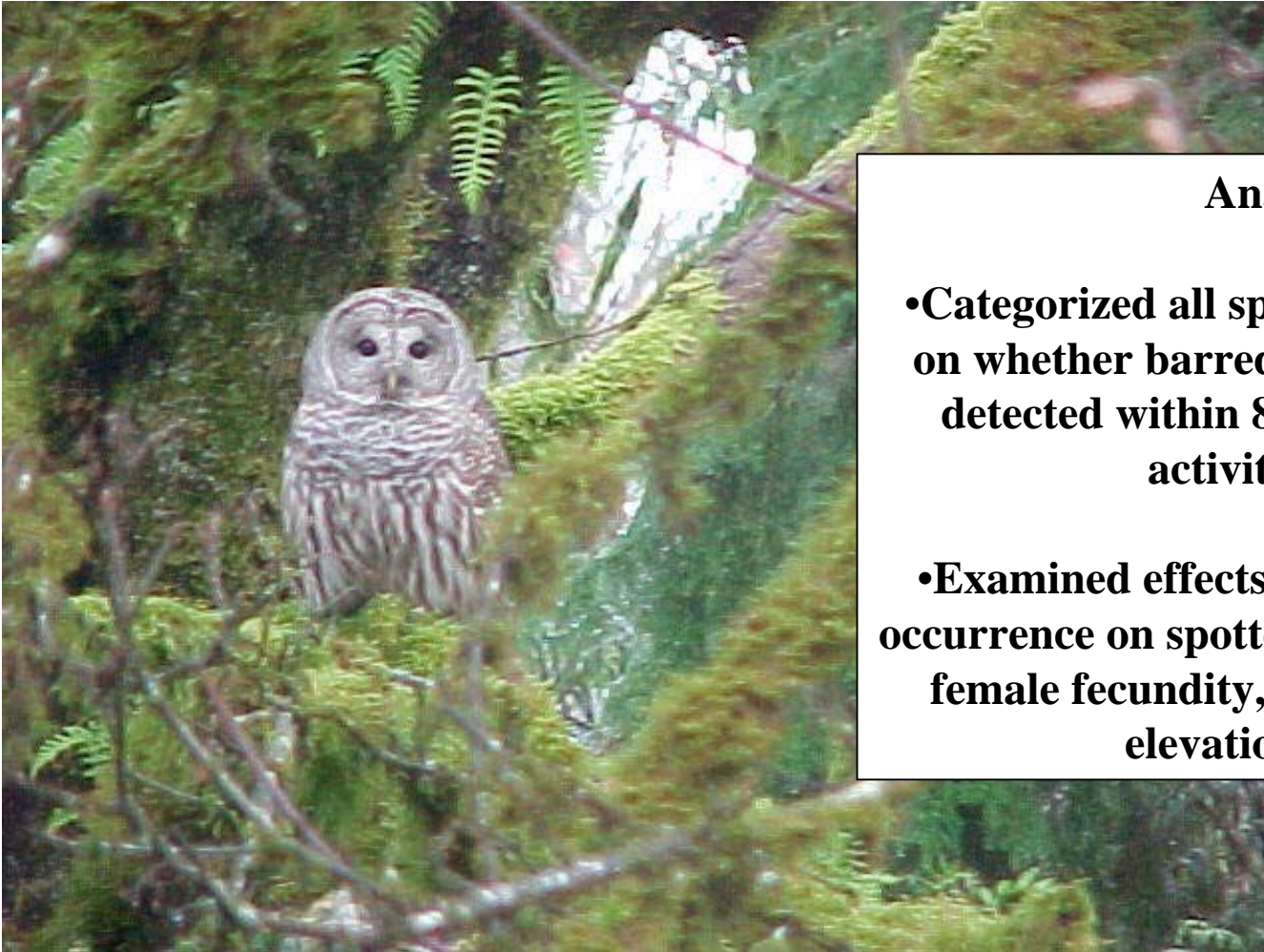


* Team days in field ranged from 396-560 in early 90's, and 223-318 from 1996-2003

Elevation of known barred owl territories in ONP: 1985-2003



The effects of barred owls on spotted owls



Analysis

- Categorized all spotted owl sites based on whether barred owls had ever been detected within 800 m of any years' activity center
- Examined effects of prior barred owl occurrence on spotted owl site occupancy, female fecundity, site movement and elevation change

Spotted owl pair occupancy, 2003

Comparisons between sites:

-Spotted owl sites with barred owls were significantly less likely to be occupied by pairs. The rate of occupancy at these sites is now less than half that of sites without barred owls.

-10 spotted owl sites have not been occupied by pairs for 5 or more years. 9 of these are sites with barred owls.

	Spotted owl pair occupancy (%)		
	Barred present: mean (n)	Barred absent: mean (n)	X^2 p (with continuity correction)
East-side	0.33 (30)	0.73 (11)	0.058
West-side	0.33 (6)	0.60 (5)	0.782
All sites	0.33 (36)	0.69 (16)	0.038

It is possible that barred owls are only occupying spotted owl sites that have lower occupancy rates, perhaps those in marginal habitat. What are the trends within these spotted owl sites before and after barred owls?

Within-site changes in spotted owl pair occupancy

- No time trend at the 16 spotted owl sites with no history of barred owl activity
- 5 sites had barred owl detections prior the first year of monitoring, so no data pre-barred
- Wilcoxon signed-rank test performed on remaining 31 sites, comparing rate of occupancy before and after first barred owls, $Z = -2.574$, $p = 0.010$
- Mean occupancy rate declined from 61% at spotted owl sites prior to barred owls, to 42% after

Spotted owl site movement

-sample is all sites occupied by a pair or single spotted owl in 2003, $N = 35$

-analysis compares mean distance moved since 1992, or first year monitored if later, between sites with and without barred owls

-spotted owl sites with barred owls have moved over twice as far as those without

	Spotted owl site movement (meters)		
	Barred present: mean (n)	Barred absent: mean (n)	ANOVA p
East-side	1264(17)	637 (11)	0.026
West-side	1569 (3)	536 (4)	0.177
All sites	1310(20)	610 (15)	0.003

Spotted owl site elevation change

-sample is all sites occupied by a pair or single spotted owl in 2003, $N = 35$

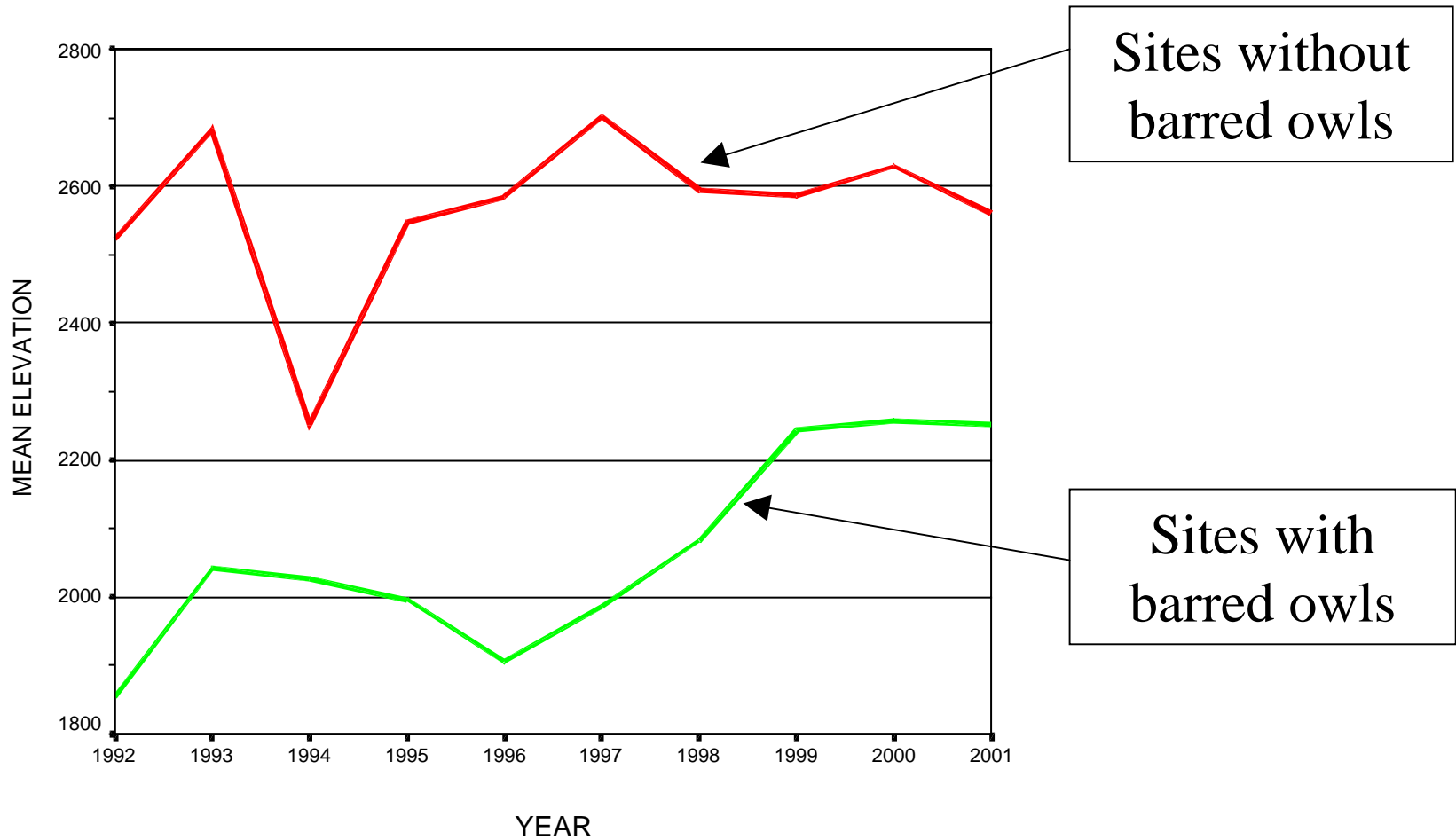
-analysis compares mean elevation change since 1992, or first year monitored if later, between sites with and without barred owls

-occupied spotted owl sites with barred owls have moved upslope nearly 300' in this time

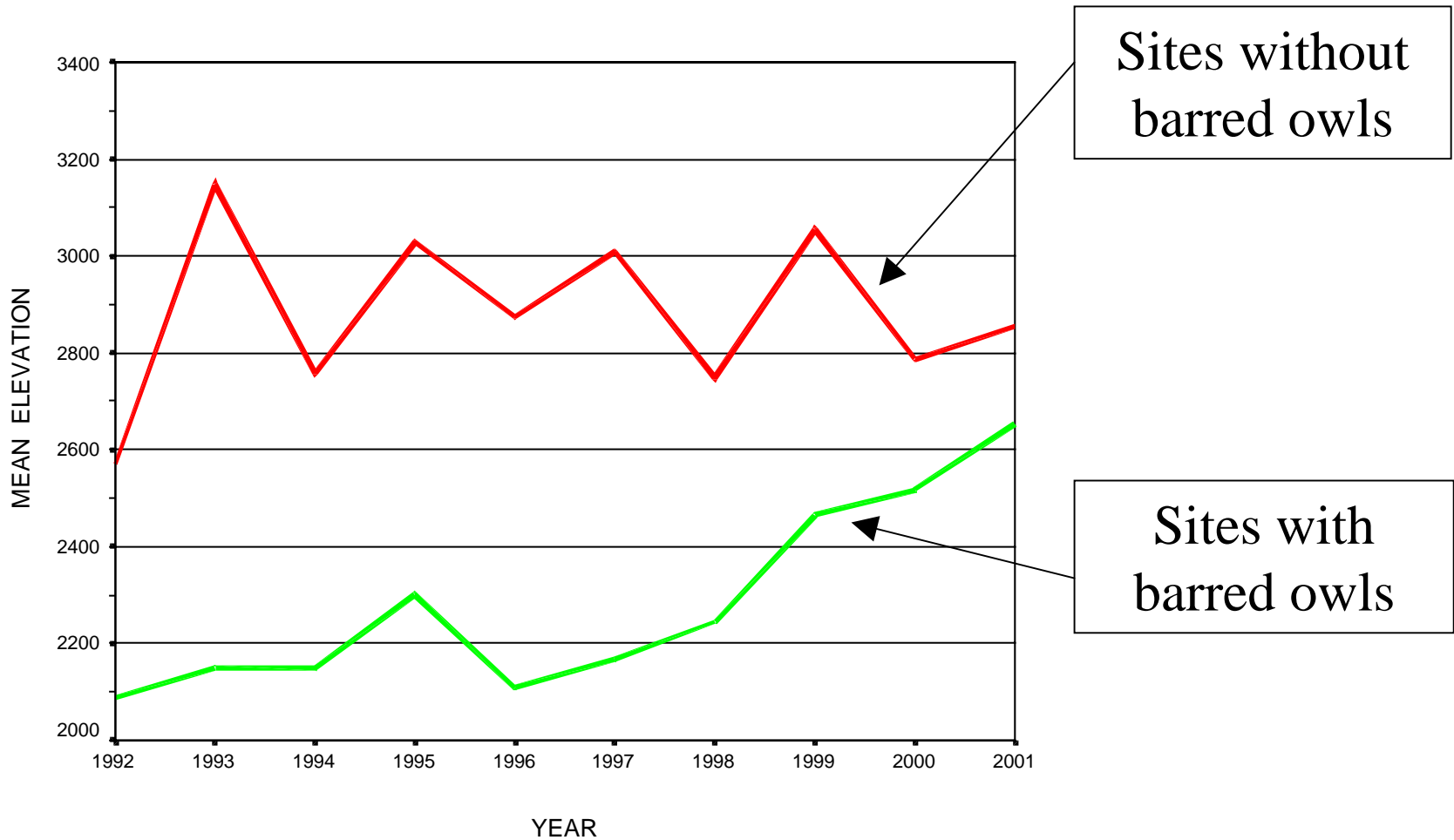
-spotted owl sites without barred owls have decreased in elevation, likely due to some bias in locating spotted owls during monitoring compared to the random survey transects where most sites were first discovered

	-----Spotted owl site elevation change (feet)-----		
	Barred present: mean (n)	Barred absent: mean (n)	ANOVA p
East-side	386(17)	-249 (11)	0.011
West-side	-240 (3)	-246 (4)	0.985
All sites	293 (20)	-248 (15)	0.010

Elevation trends in occupied spotted owl sites westside ONP: 1992-2001



Elevation trends in occupied spotted owl sites eastside ONP: 1992-2001



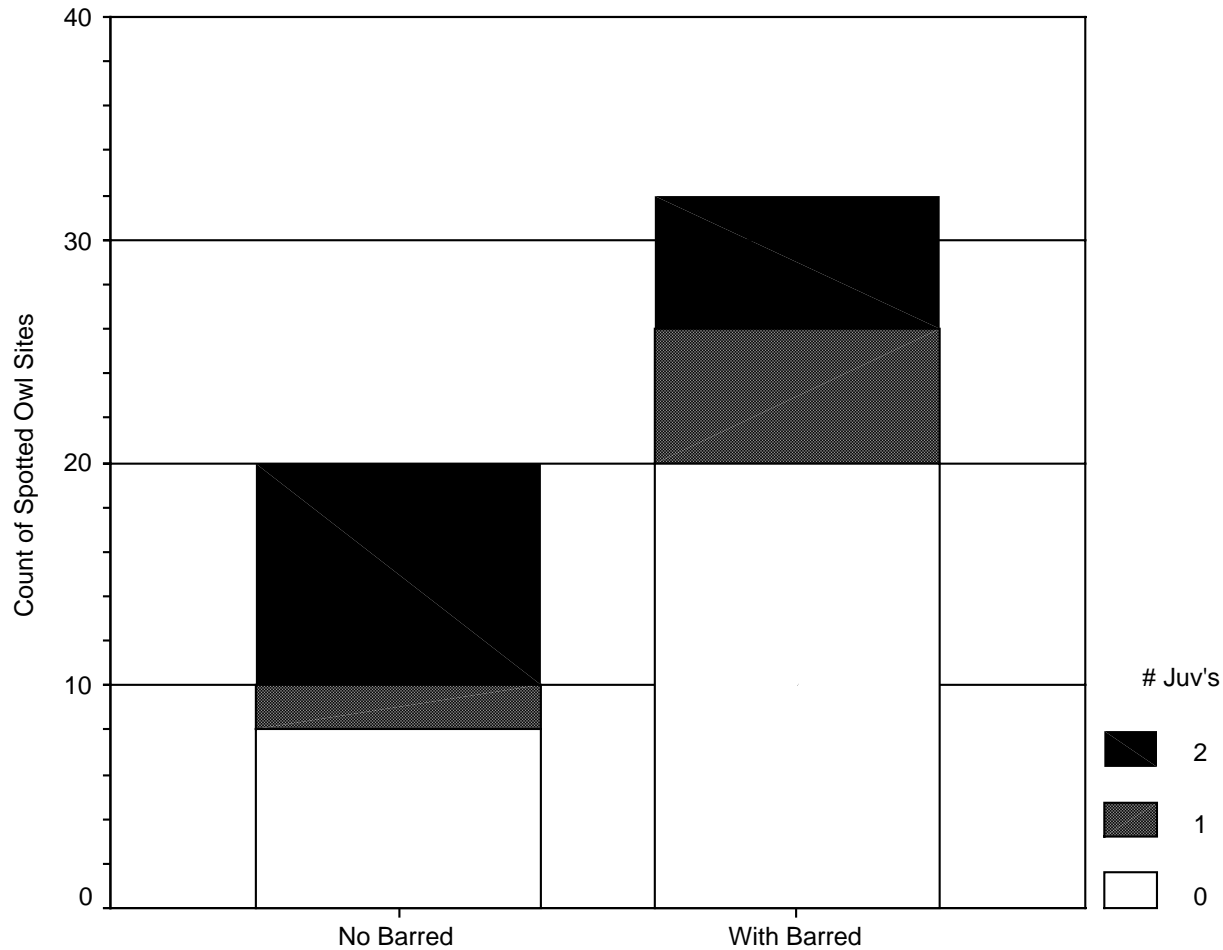
Fecundity in 2002

	Spotted owl fecundity (female young/territorial female)	
	Barred present: mean (n)	Barred absent: mean (n)
All sites	0.65 (16)	0.75 (12)

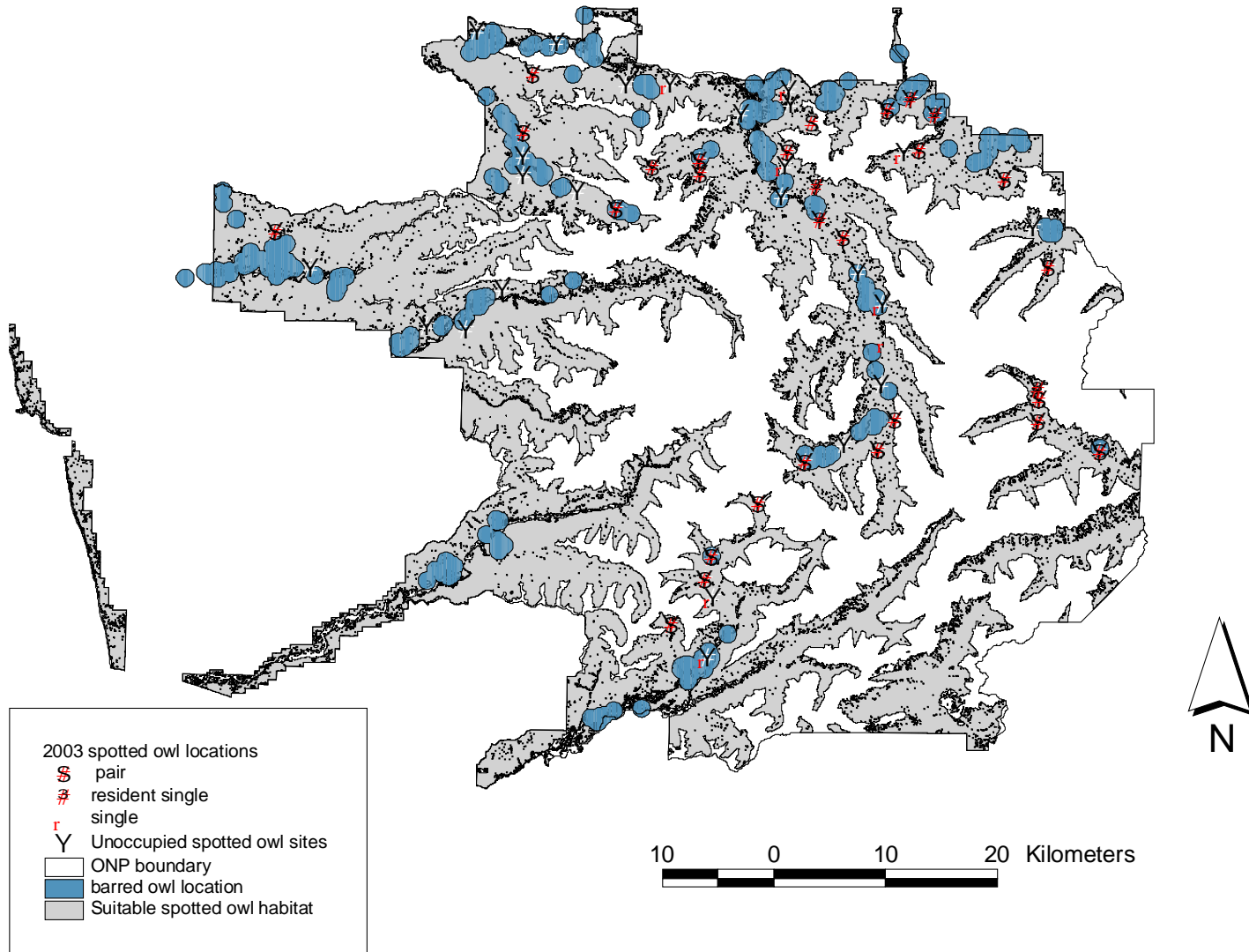
Within-site changes in fecundity

- Analyzed change in pair productivity through 2001
- 17 sites with some data on spotted owl fecundity before and after barred owls
- Wilcoxon signed rank $Z = -1.305$, $P = 0.192$
- Mean spotted owl fecundity declined from .47 before to .31 after barred owls detected, however there was also a negative time trend at sites without barred owls

Territory (rather than female) productivity, by prior presence or absence of barred owls. ONP, 2002



Barred and spotted owl locations: 2003





Spotted vs barred, final score....



- Of all monitored spotted owl sites, 31% have not yet had barred owls documented nearby.
- Roughly 20% of spotted owl sites have been unoccupied for more than 5 years, probably due to barred owl competition
- There is evidence of temporary displacement of spotted owls by barred owls at 10% of sites, all in the silver fir zone
- Activity centers appear to have shifted at the remaining spotted owl sites, avoiding areas of barred owl activity
- Overlap between occupied barred and spotted owl activity centers appears to be rare, occurring at less than 5% of sites

Elwha River Valley

Total area of suitable habitat
98,000 acres

Area occupied by barred owls
25,000 acres

