

**WILDLIFE HABITAT RELATIONSHIPS
IN WASHINGTON AND OREGON
FY2008**

1. Title: Demographic characteristics of northern spotted owls (*Strix occidentalis caurina*) on the Tyee Density Study Area, Roseburg, Oregon: 1985–2008.

2. Principal Investigator(s) and Organization(s): Dr. E. D. Forsman (PI), Lead Biologist: J. A. Reid, Pacific Northwest Research Station Biologists: J. S. Mowdy, M. E. Oleri, A. L. Price.

3. Study Objectives:

- a. Elucidate the population ecology of the spotted owl on the Tyee Density Study Area (DSA), northwest of Roseburg, Oregon, to include estimates of population age structure, reproductive rates, survival rates, and population trends.
- b. Document trends in numbers of spotted owls in a bounded study area.
- c. Document social integration of juveniles into the territorial population, to include age at pair formation and age at first breeding.
- d. Document trends in barred owl numbers and interactions with spotted owls.

4. Potential Benefit or Utility of the Study:

The Tyee DSA on the Roseburg District of the Bureau of Land Management (BLM) was designed to monitor age-specific birth and death rates of spotted owls, thereby allowing estimates of population trend over time. From these trends we make inferences regarding the suitability of the current habitat conditions and the effects of different landscape conditions on spotted owls. This study is one of eight long-term demographic studies that constitute the federal monitoring program for the northern spotted owl.

Management of forest lands by the BLM and private landowners within the boundaries of the Tyee DSA has led to a reduction of suitable owl habitat during the last 40–50 years (Thomas et al. 1993). Although rates of timber harvest on BLM lands have declined since 1988, spotted owl habitat conditions are still changing in the study area, particularly on private lands, where timber harvest has resulted in declining spotted owl habitat. Although habitat is still an important factor contributing to population stability, other factors such as climate change, increasing barred owl (*Strix varia*) numbers, and new pathogens such as West Nile Virus may also affect the numbers of spotted owls in the study area. While the data collected during this study cannot be used to predict future conditions, they can be used to assess predictive models that examine population projections under varying landscape conditions or management regimes (Anthony et al. 2006).

We have attempted to band all known fledglings produced in the study area since 1985. As a

result, we know the origin and age of most individuals that are recruited into the population, and have detailed information on population age structure and internal and external recruitment in the study area.

5. Research Accomplishments:

Study Area and Methods

The Tye DSA northwest of Roseburg, Oregon, includes a mixture of federal lands administered by the BLM and intervening sections of private land (Fig. 1). Total size of the study area is approximately 1025 km². We also monitor known spotted owl territories within a 6-mile buffer area outside the eastern and western boundaries of the DSA to reduce the amount of unknown emigration from the DSA (Reid et al. 1996). The study area includes all or part of 4 Late-Successional Reserves as identified in the Northwest Forest Plan land-use allocations (USDA and USDI, 1994).

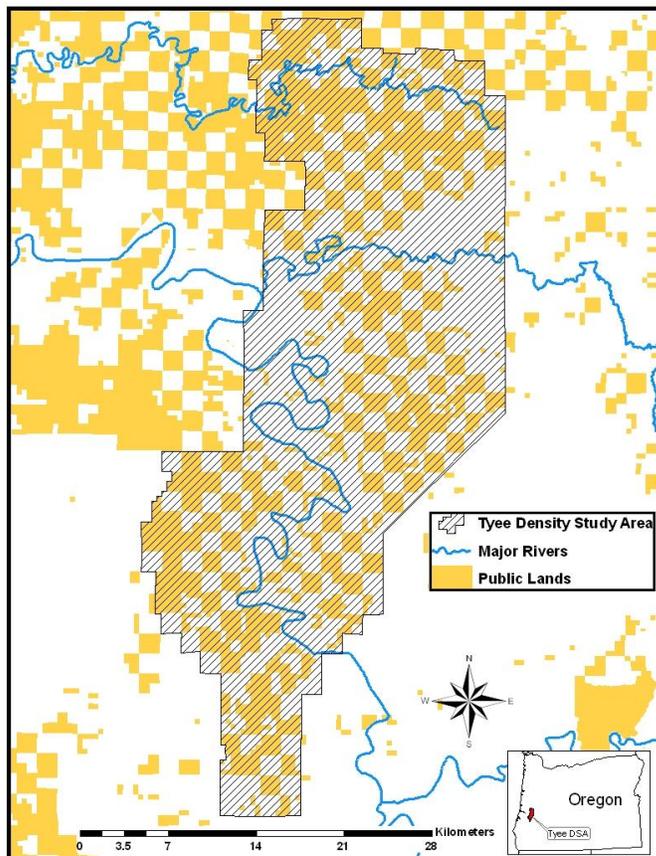


Figure 1. The hatched area represents the Tye DSA, Roseburg, Oregon.

Banding of spotted owls was initiated on the study area in 1983 and increased substantially in 1985. Survey increased in the study area to include suitable spotted owl habitat in 1987. In 1989, the study area was expanded to include the northern portion of the present area (Fig. 1). In 1990, a density study was initiated. The primary goal was to survey all area within a bounded study area each year. We divided the study area into survey polygons as part of our survey approach. The number of survey polygons within the DSA (160) has remained relatively constant among years and was determined by the location of historical spotted owl site centers. The size of each survey polygon varied, depending on topography and land ownership, but was roughly equal to the area of a spotted owl territory. Areas between known spotted owl territories are delineated for survey depending on topography, road access, and distance from known spotted owl sites. In all surveys we document spotted owls as well as all other owl species that are seen or heard. Based on these surveys we estimated the actual annual number of territorial spotted owls within the DSA.

Methods used in this study and other demographic studies of spotted owls have been described in a variety of published sources (e.g., Forsman 1983, Franklin et al. 1990, Franklin 1992, Franklin et al. 1999). Protocols used for determination of reproductive parameters were described in Lint et al. (1999). Resightings and recaptures of previously banded owls are used to estimate survival rates

(Anthony et al. 2006, Pradel 1996).

In 2007, a barred owl/spotted owl interaction study was initiated to the north of the Tye DSA. Individual radio-marked spotted owls from this study were infrequently located within the Tye DSA during the demographic surveys. Radio-marked individuals were included in our analysis only when they responded to normal survey technique. Information gathered solely through the use of radio-telemetry was not included in any of our study area calculations.

Numbers of owls on the DSA

Between March 1983 and October 2008, we banded 974 previously unbanded spotted owls on the DSA, including 665 juveniles, 86 subadults (1–2 yrs old), and 184 adults (>2 yrs old). The sex ratio of the >2-year-old owls in the banded sample was slightly skewed towards males. By comparison, the sex ratio of subadults was skewed toward females (Appendix 1). The disproportionate number of males in the adult sample was most likely because males, especially unpaired males, are more detectable than females (Reid et al. 1999).

In 2008, we documented 128 non-juvenile owls in the DSA, including 47 pairs and 34 unpaired owls. Subadults comprised 13% of the population in the DSA in 2008, up slightly from 2007 (Fig. 2, Appendix 2). Banding juveniles provides data related to age structure of the population which would not be available otherwise. Data on known age individuals from 4 study areas was used in understanding the lifetime reproductive success of female spotted owls in the population and in estimating lifespan (Loschl, 2008). We calculated average lifespan as 7.7 for females and 7.5 for males from 1990–2008. These results are similar to those reported by Loschl (2008).

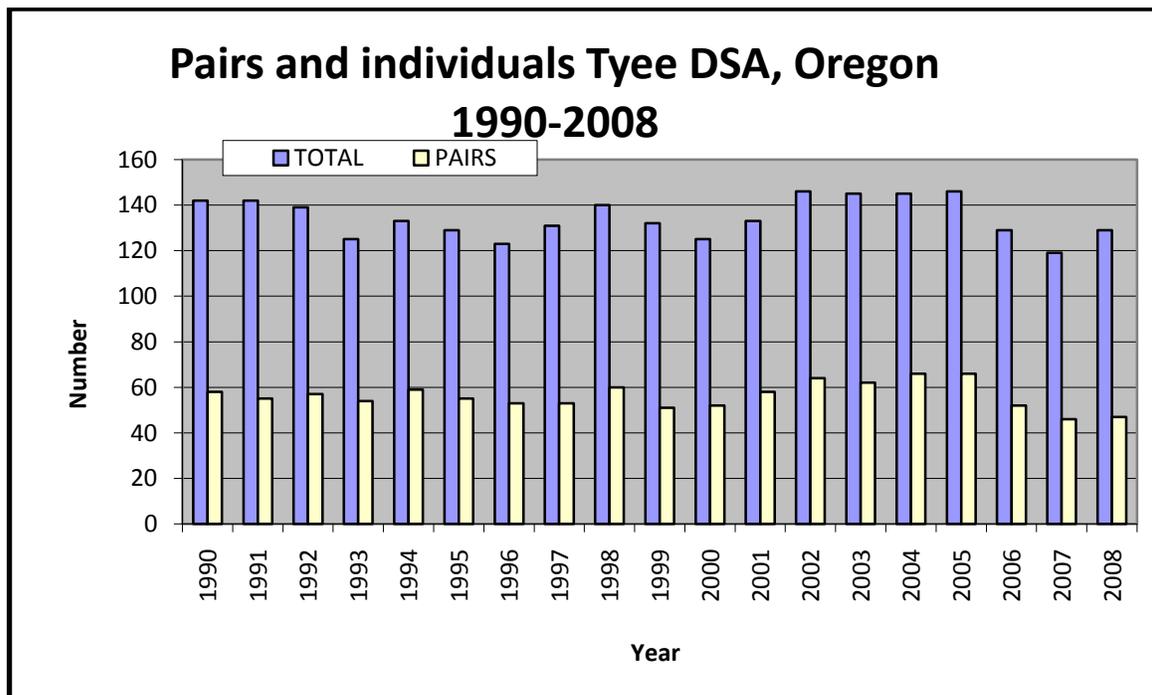


Figure 2. Numbers of non-juvenile spotted owls and territorial pairs in the Tye DSA, Roseburg, Oregon, 1990-2008.

Between 2007 and 2008, we documented 20 movements of individuals within the Tye DSA. Of the owls that moved, 12 were banded as juveniles and had not been previously documented in the territorial population (new recruits). Younger owls or subadults move more often than adults but make up a small proportion of the overall population in the Tye DSA (Appendix 2). Although the numbers of individuals that move within the Tye DSA has decreased, the number of individuals in the DSA has decreased as well, such that the annual proportion of individuals that move actually increased (Fig. 3).

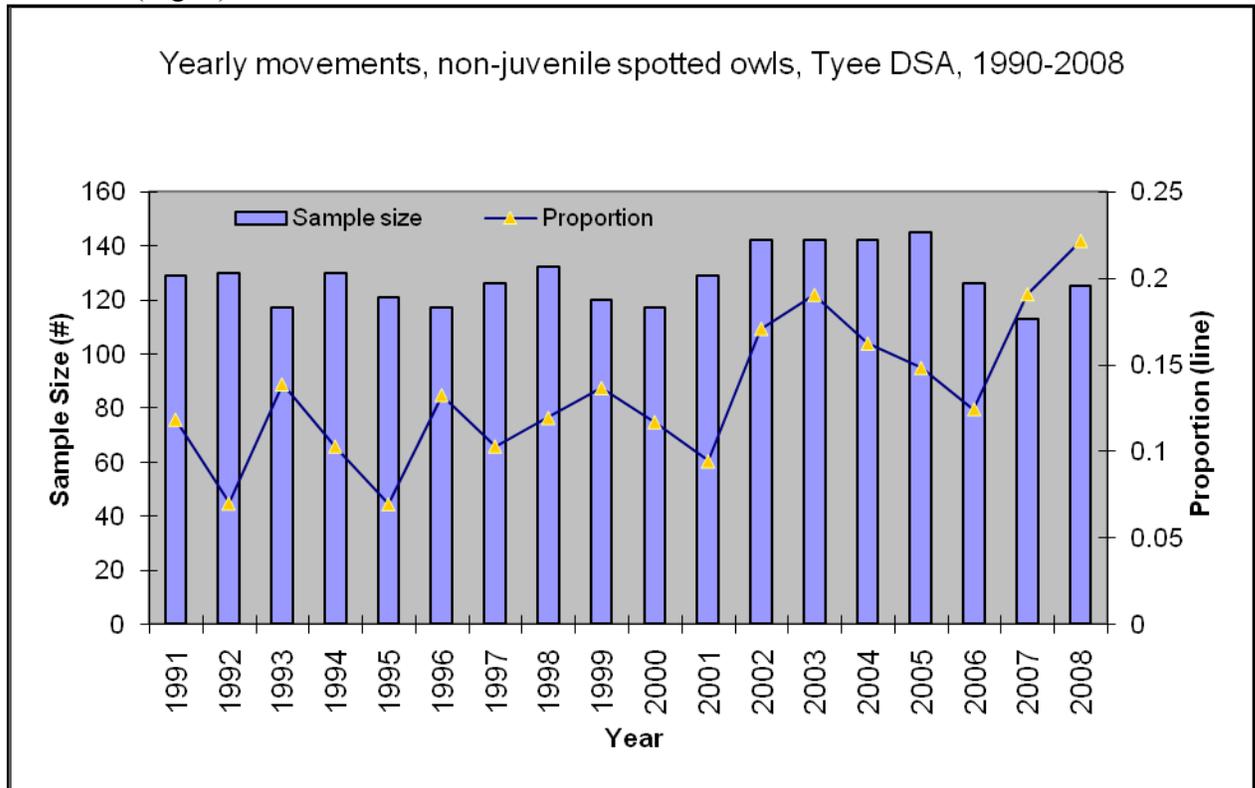


Figure 3. Yearly numbers and proportion of non-juvenile spotted owls that were known to have moved within the Tye DSA, Roseburg, OR 1990–2008.

Site occupancy

We defined a site as an area where a pair of spotted owls was documented in at least one year in the survey history. We defined a pair as 2 individuals of opposite sex that clearly associated during the survey year in accordance to the protocol (Lint, 1999). The number of sites with pairs declined rapidly after 2005 and has not recovered (Fig 2). In 2008 we documented the second lowest number of pairs on the DSA since the beginning of the study (Appendix 2).

In the northern portion of our study area that encompassed the Smith River drainage, we documented 7 pairs in 2005, 3 pairs in 2006 and 2007 and 2 pairs in 2008. Approximately 83% of the 2008 spotted owl site centers and 90 % of the pairs in the Tye DSA are located on federal land. Nearly all (94%) of the nesting pairs are located on federal land.

Reproduction

Nesting in 2008 was higher than the previous year, with 71% of females nesting, and 31% of females

fledging young (Table 1). The number of young produced was higher than in 2007 (Appendix 2). For all years combined the percentage of females that nested averaged 54%, and the percentage of females that fledged young averaged 36% (Table 1).

Average female fecundity (the estimated number of female offspring produced per resident female) in 2008 was 0.255. This estimate was below the overall average for 1990–2008 of 0.280 (Appendix 3). Mean brood size (number of young produced per female that successfully fledged young) was 1.63 in 2008, and 1.55 for all years combined (Appendix 3). Nesting success, which we defined as the proportion of nesting females that fledged young, was 0.467 in 2008, down considerably from the previous year and well below the average of 0.682 for 1990–2008 (Table 1). The data continue to indicate that most measures of reproductive performance of spotted owls are lowest for 1-yr-old owls, intermediate for 2-yr-old owls, and highest for adults (Tables 2–3). Sample size of 1-yr-old females was too small to estimate some parameters (Table 2–3). In contrast to some other study areas, the pattern for reproductive performance has not consistently followed an even-odd year pattern (Anthony et al, 2006). In 2008, the reproductive performance increased but was still below average (Appendix 3).

Banding juvenile owls can give us insight into first year survival, average and maximum lifespan, and age composition of the population. Tabular display of the known age distribution of individuals in the Tyee DSA from 1990–2008 indicates that no female owls from the 1995 cohort were resighted in our study area during the survey period (Appendix 4). The cause of this type of occurrence is unknown, but could be related to environmental factors. This information can also be helpful in assessing trends in the number and age composition of the future population. Information on recruitment into the breeding population can be used to assess the health of the population. The trend in age at which individuals are recruited into the population provides information on the potential number of non-territorial individuals in the study area. This can be important in assessing the availability of future recruits and future population size (Appendix 4).

Table 1. Annual reproductive statistics for female spotted owls on the Tyee DSA, Roseburg, Oregon: 1990–2008.

Year	Proportion nesting ¹			Proportion fledging young ²			Proportion nesting that fledged young		
	N	Prop.	95% C.I.	N	Prop.	95% C.I.	N	Prop.	95% C.I.
1990	53	0.736	0.61–0.86	61	0.475	0.35–0.60	41	0.707	0.56–0.85
1991	56	0.446	0.31–0.58	58	0.241	0.13–0.35	25	0.560	0.35–0.77
1992	59	0.593	0.46–0.72	63	0.476	0.35–0.60	37	0.811	0.68–0.94
1993	47	0.255	0.13–0.38	53	0.132	0.04–0.23	13	0.538	0.22–0.85
1994	58	0.569	0.44–0.70	60	0.383	0.26–0.51	34	0.676	0.51–0.84
1995	54	0.407	0.27–0.54	59	0.203	0.10–0.31	23	0.522	0.30–0.74
1996	48	0.813	0.70–0.93	55	0.618	0.49–0.75	43	0.791	0.66–0.92
1997	51	0.588	0.45–0.73	54	0.333	0.20–0.46	30	0.600	0.41–0.79
1998	61	0.557	0.43–0.69	63	0.429	0.30–0.55	34	0.794	0.65–0.94
1999	45	0.533	0.38–0.68	53	0.340	0.21–0.47	25	0.720	0.53–0.91
2000	50	0.500	0.36–0.64	54	0.315	0.19–0.44	27	0.630	0.43–0.82
2001	54	0.796	0.69–0.91	58	0.672	0.55–0.80	46	0.848	0.74–0.96
2002	56	0.571	0.44–0.71	63	0.397	0.27–0.52	35	0.714	0.56–0.87
2003	58	0.379	0.25–0.51	66	0.197	0.10–0.30	23	0.565	0.35–0.78
2004	63	0.540	0.41–0.67	66	0.424	0.30–0.55	36	0.778	0.64–0.92
2005	61	0.639	0.52–0.76	65	0.446	0.32–0.57	39	0.744	0.60–0.89
2006	54	0.222	0.11–0.34	58	0.138	0.05–0.23	12	0.667	0.35–0.98
2007	44	0.432	0.28–0.58	47	0.298	0.16–0.43	19	0.737	0.52–0.95
2008	53	0.714	0.57–0.86	51	0.314	0.18–0.45	42	0.467	0.28–0.66
Mean	19	0.542		19	0.359		19	0.682	

¹ Estimates were calculated for females whose nesting status was determined by protocol.² Estimates were calculated for females whose reproductive status was determined by 31 August.³ Estimates were calculated for females whose reproductive status was determined to protocol and reproductive status by 31 August.

Table 2. Average age-specific reproductive parameters of female spotted owls on the Tyee DSA, Roseburg, Oregon: 1990–2008.

Age	Proportion nesting ¹			Proportion fledging young ²			Proportion nesting that fledged young		
	N	Prop.	95% C.I.	N	Prop.	95% C.I.	N	Prop.	95% C.I.
1 st year subadult	51	0.176	0.07–0.28	66	0.045	0.00–0.10	9	0.333	0.00–0.72
2 nd year subadult	77	0.403	0.29–0.51	87	0.218	0.13–0.31	31	0.581	0.40–0.76
Adult	874	0.576	0.54–0.61	947	0.395	0.36–0.43	505	0.701	0.66–0.74
Unknown	10	0.600	0.23–0.97	18	0.278	0.05–0.51	6	0.167	0.00–0.60

¹ Estimates were calculated for females whose nesting status was determined to protocol.

² Estimates were calculated for females whose reproductive status was determined by 31 August.

³ Estimates were calculated for females whose reproductive status was determined to protocol and reproductive status by 31 August.

Table 3. Average age-specific fecundity and brood size of female spotted owls on the Tyee DSA, Roseburg, Oregon: 1990–2008.

Age	Fecundity ¹			Brood size		
	N	Mean	SE	N	Mean	SE
1 st year subadult	66	0.045	0.026	3	2.000	0.000
2 nd year subadult	87	0.184	0.039	20	1.600	0.134
Adult	947	0.307	0.013	377	1.544	0.027
Unknown	18	0.194	0.082	6	1.167	0.307

¹ Fecundity was defined as number of female young produced per female. We assumed a 1:1 sex ratio for fledglings.

Barred Owls

We have documented barred owl detections in the study area since its inception. Although we do not actively survey for barred owls, our methods for spotted owl surveys have enabled us to document trends in the barred owl population as well (Lint et. al. 1999). The Tye DSA has been consistently surveyed in terms of area, intensity, and methods since 1990. In 2008 the number of survey areas where barred owls were found continued to increase (Fig 4). The proportion of survey areas with spotted owl detections increased some from the previous year but not as dramatically as barred owl detections (Fig. 5). The estimate of barred owls was considered conservative since our method of survey was directed toward documenting spotted owls.

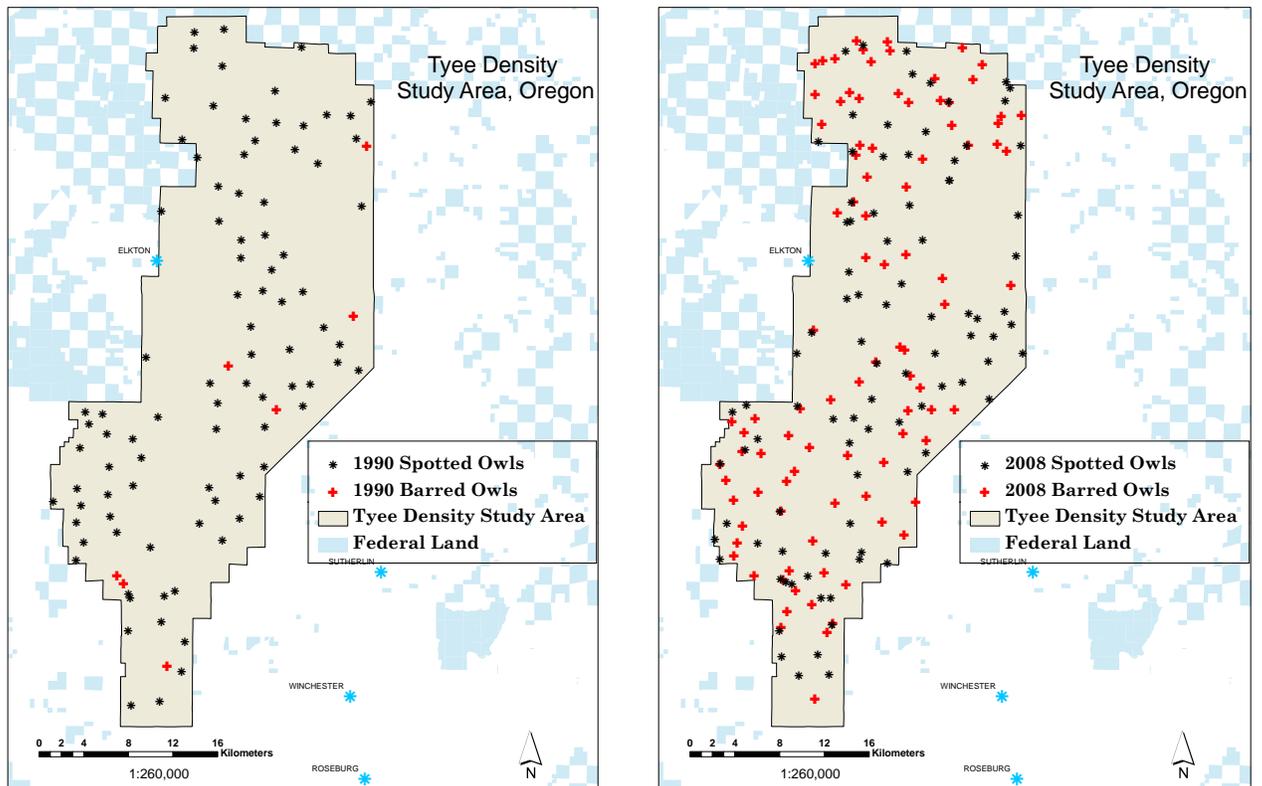


Figure 4. Spotted owl and barred owl locations in Tye DSA, Oregon, 1990 (left), 2008 (right).

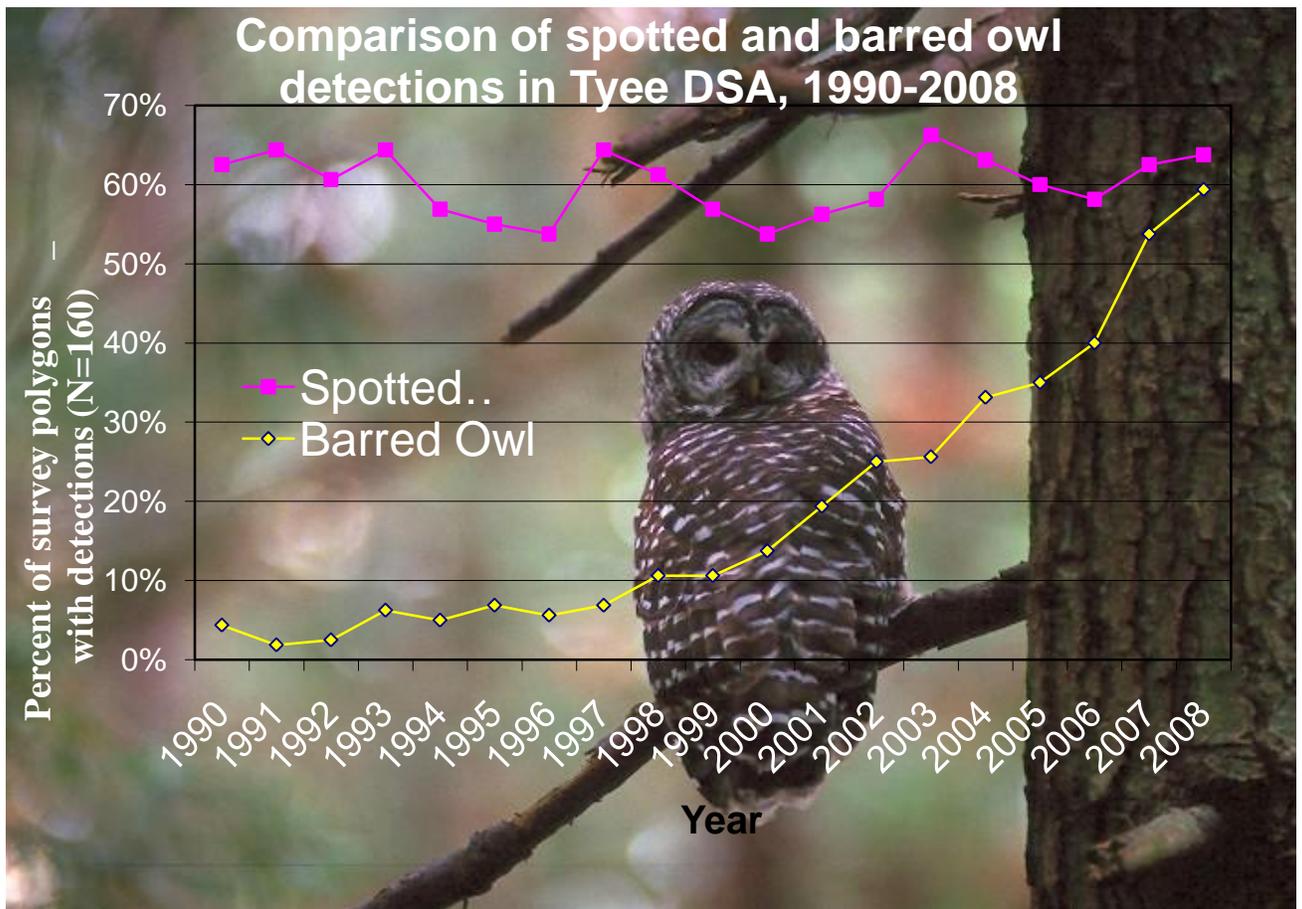


Figure 5. Number of territories where barred owls and spotted owls were detected, Tye DSA, Roseburg, Oregon: 1990–2008.

There appears to be no major change in the number of territories where spotted owls were detected (Fig 6). These estimates were based on detections throughout the 6 month survey season and may include the same individuals at multiple (Fig. 3). As the number of barred owls in the study area increases, the impact the barred owls may have on the future population of spotted owls is unclear. In 2008, barred owls were documented confronting least 2 nesting pairs of spotted owls which subsequently produced no young. Direct observation of such an event was difficult to document as an observer must be present when the confrontation occurs. The high rate of spotted owl nesting failure in 2008 could be linked to the dramatically increasing numbers of barred owls in the study area (Table 1, Fig. 6).

The number of territories that produced spotted owl young has been below average for the last 3 consecutive years (Fig. 7). At the same time, the number of territories where barred owls have been detected has exponentially increased ($R^2= 0.9466$, Fig. 7).

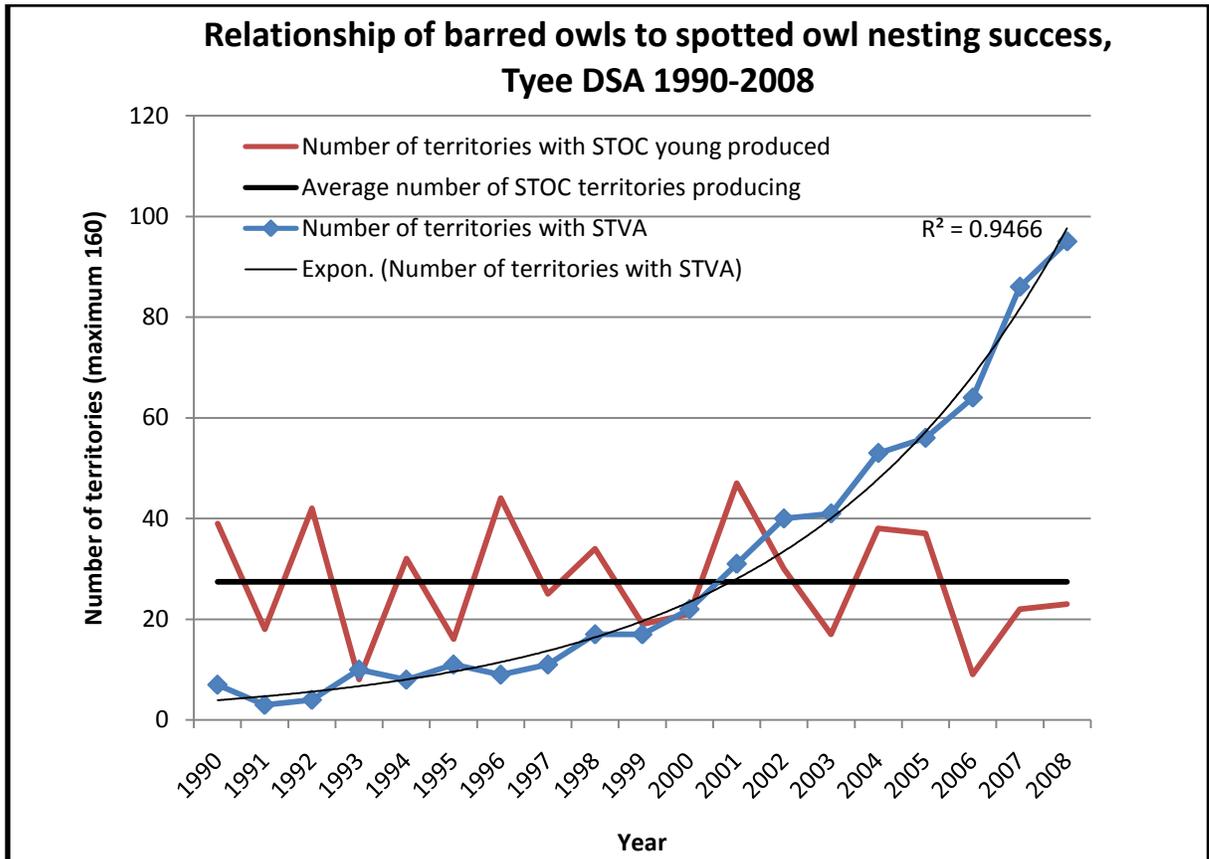


Figure 6. Yearly number of territories in the Tye DSA where barred owls were detected and where spotted owl reproduction was documented, 1990-2008.

Spotted Owls

In 2003, we reported a case where we fostered 2 juvenile spotted owls that were hatched in captivity. One of the fostered juvenile spotted owls was re-observed outside of the study area in 2004, and paired with a male inside the DSA in 2005. She paired with a different male and has remained with the same mate since 2006. She nested in 2008, but failed to reproduce young.

In 2007, we documented a severely injured female spotted owl in the DSA. The cause of her injury was unknown. In 2008, this female was not located. Her mate was located at the same site where she was previously.

In 2008, we documented 3 cases where an additional unrelated non-juvenile spotted owl was present within a spotted owl nest site. In each case, the resident spotted owl pair was aware of the additional individual and exhibited no aggressive behavior. Observations of this type are unusual but have occurred in the past. We have documented 6 other instances between 1990 and 2007 in which an additional unrelated individual was known to be present at a nest site and the resident pair did not exhibit any observed aggressive behavior toward the additional bird.

In January 2009, a workshop was held to assess the status and trends of the northern spotted owl population. Data was assembled for many of the long term spotted owl studies and analyzed in a meta-analysis. Data pertaining to that workshop will be presented in a separate publication.

6. Summary

Total number of individual spotted owls in the study area has fluctuated in the last few years, but the number of pairs decreased substantially from 66 pairs in 2005 to 47 pairs in 2008 (Appendix 2). Many of the traditional measures of reproductive performance are provided in this report, but some measures of reproductive performance can be misleading. The total number of individuals in the study has been an important measure that provides insight into the past and present population level, however, the number of pairs is more important for assessing the trends in future population estimates. Fecundity remained below the average for all years combined. As the number of spotted owl pairs declines, estimates based on proportions may appear to be high, but when based on declining sample size, can be a poor comparison across years. The low reproductive output in the past several years suggests that number of pairs and individuals is unlikely to increase substantially in the near future. Population increases occur in years following those with high reproductive output (Appendix 5). Future recruitment into the spotted owl population depends on the reproductive output of previous years. When factors including habitat availability remain constant, the overall number of pairs in the study area is directly related to the previous reproductive output and is one of the more important metrics to assess future population levels. Low reproductive years, or years with poor first year survival, can have a negative impact on the future population size (Appendix 4).

Barred owls compete for resources with spotted owls directly and indirectly. Our study area has recently experienced rapid increases in barred owl detections and it appears that this may be causing increased social instability within the spotted owl population both in the number of pairs detected and the number of non-juvenile movements (Fig. 3). If habitat remains the same or decreases, and barred owl numbers continue to increase, the spotted owl population will experience increased competition from the barred owls for nesting sites which would result in a declining numbers of pairs of spotted owls. Fewer pairs of spotted owls will result in lower reproductive output and consequently, a declining spotted owl population.

7. Coordination, Publications and Presentations:

- a) We provided information to Ron Gaines, Environmental Services Northwest, biological consultant for Lone Rock Timber Company.
- b) We provided survey information to Roseburg, Coos Bay, and Eugene Districts of the BLM for the sites that we surveyed in their district.
- c) We provided historical data on spotted owl and barred owl locations to David J. Wiens of Oregon State University for his PhD on spotted owl and barred owl interactions. We also gathered some radio-telemetry locations.
- d) We provided food habits samples from barred owls to Scott A. Graham for his master's thesis on barred owl food habits at Boise State University, Idaho.
- e) We provided spotted owl survey information to Oregon Department of Forestry.
- f) We provided spotted owl locations, photos, nest tree information, capture information, and visit records to Linda Galas, private landowner.

- g) Loschl, P.J. 2008. Age-specific and Lifetime Reproductive Success of Known Age Northern Spotted Owls on Four Study Areas in Oregon and Washington [Master's thesis]. Corvallis, OR: Oregon State University. 141pp.
- h) Presentation by Raphael, M.G. 2008. Assumptions and assessments of northern spotted owl viability under the Northwest Forest Plan. Northern spotted owl recovery plan review workshop, Sustainable Ecosystems Institute, Portland, OR. 9 January.
- i) Presentation by Raphael, M.G. 2008. Potential stressors on the northern spotted owl: an investigation at the demographic study area scale. Northern spotted owl recovery plan review workshop, Sustainable Ecosystems Institute, Seattle, WA. 11 February.
- j) Presentation by Raphael, M.G. 2008. Relative influences of habitat and barred owls on demographics of the northern spotted owl. Annual Meeting, American Ornithologists' Union and Cooper Ornithological Society, Portland, OR, 5 August.

8. Acknowledgments

This study was funded by the USDI BLM Oregon State Office and the USDA Forest Service, Pacific Northwest Region. The Roseburg District of the BLM provided invaluable support in all phases of the research. We would like to thank the Weyerhaeuser Company, Roseburg Resources, Lone Rock and Juniper Properties, Seneca Timber Company, Giustina Resources, Bear Creek Timber and Starfire Lumber for allowing us access to their lands. Westside Ecological provided spotted owl visit information to us. Several small private landowners have provided invaluable access through and to their property.

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Appendix 1. Number of previously unbanded spotted owls banded, Tyee Density Study Area, Roseburg, Oregon: 1990–2008.

Year	>2-year-old		Subadults		Fledglings
	Male	Female	Male	Female	
<1986 ¹	15	14		1	5
1986	13	9			19
1987	7	5	2	4	6
1988	14	15	7	5	6
1989	17	8	3	2	22
1990	14	7	4	7	31
1991	4	5	5	3	23
1992	3	5	2	3	44
1993	1	0	2	1	11
1994	0	2	2	2	28
1995	1	1	0	0	16
1996	1	0	0	0	53
1997	2	0	0	0	26
1998	1	0	1	2	34
1999	0	2	2	1	26
2000	1	1	1	0	28
2001	2	0	0	2	68
2002	2	1	1	4	40
2003	0	1	1	2	18
2004	1	2	0	1	37
2005	0	1	0	1	45
2006	2	0	2	0	10
2007	1	0	1	2	20
2008	1	1	2	2	29
Total	104	80	39	47	665

¹Includes those owls banded 1983–1985. The analysis for the DSA focuses on 1990–2008 data.

Appendix 2. Number of spotted owls detected within the Tyee Density Study Area (DSA), Roseburg, Oregon: 1990–2008.

Year	Pairs	>2-year-old		1– 2-year-old		Age Unknown		Fledglings	Non-Juveniles
		Male	Female	Male	Female	Male	Female		
1990	58	61	49	7	10	7	8	34	142
1991	55	60	51	12	6	7	6	26	142
1992	57	60	52	10	8	4	5	48	139
1993	54	56	44	8	9	4	4	11	125
1994	59	60	51	10	9	1	2	33	133
1995	55	63	54	1	3	2	6	18	129
1996	53	56	51	5	5	4	2	60	123
1997	53	57	49	14	6	4	1	29	131
1998	60	53	46	18	14	5	4	38	140
1999	51	58	50	8	4	9	3	29	132
2000	52	57	53	5	2	5	3	28	125
2001	58	61	51	9	8	1	3	67	135
2002	64	60	48	17	17	3	1	67	146
2003	62	64	46	15	17	1	2	16	145
2004	66	73	60	4	5	1	2	40	145
2005	66	71	59	8	7	1	0	43	146
2006	52	58	50	10	9	2	0	10	129
2007	46	59	42	4	7	5	2	20	119
2008	47	63	43	9	8	2	3	28	128

Appendix 3. Estimated fecundity and mean brood size of female spotted owls on the Tyee Density Study Area: 1990–2008.

Year	Fecundity			Mean brood size		
	N	Mean	SE	N	Mean	SE
1990	61	0.287	0.043	29	1.207	0.077
1991	58	0.207	0.051	14	1.714	0.125
1992	63	0.381	0.055	30	1.600	0.091
1993	53	0.104	0.039	7	1.571	0.202
1994	60	0.275	0.050	23	1.435	0.106
1995	59	0.153	0.042	12	1.500	0.151
1996	55	0.545	0.063	34	1.765	0.074
1997	54	0.269	0.056	18	1.611	0.118
1998	63	0.310	0.050	27	1.444	0.097
1999	53	0.245	0.052	18	1.444	0.121
2000	54	0.259	0.056	17	1.647	0.119
2001	58	0.603	0.061	39	1.795	0.075
2002	63	0.325	0.054	25	1.640	0.098
2003	66	0.129	0.035	13	1.308	0.133
2004	66	0.333	0.052	28	1.571	0.095
2005	65	0.362	0.054	29	1.621	0.092
2006	57	0.096	0.034	8	1.375	0.183
2007	48	0.208	0.051	14	1.429	0.137
2008	51	0.255	0.0567	16	1.625	0.125
Mean	19	0.280		19	1.544	

Fecundity was defined as the number of female young produced per female owl assuming a 1:1 sex ratio. Estimates were calculated for individual females for which reproductive output was documented by 31 August.

Appendix 4. Age class distribution of spotted owls, based on banding data, Tyee DSA, 1990–2008.

Annual number of male spotted owls by age.

Year↓	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	22
1990	3	6	18	17	10	4	8	5	1												
1991	4	8	9	15	16	7	3	5	5	1											
1992	6	5	11	9	9	13	4	3	5	4	1										
1993	4	5	8	10	8	9	12	4	2	3	1										
1994	1	9	8	6	9	8	8	10	3	2	3	1									
1995	1		12	8	6	9	8	7	6	3	1	2	1								
1996	2	3	1	12	7	6	8	6	4	6	2	1	2	1							
1997	13	3	4	1	13	6	6	7	6	5	6	2			1						
1998	3	16	5	5	1	11	5	7	5	6	3	6	1								
1999	4	5	13	5	3	1	9	5	6	4	6	1	4								
2000	1	4	8	12	3	3	1	8	4	6	4	6	1	3							
2001	6	4	7	6	14	4	2	1	8	4	5	4	5		3						
2002	7	10	6	5	5	12	4	2	1	7	4	4	3	4		3					
2003	4	10	11	6	5	5	13	3	2		6	3	2	3	3	1	3				
2004	2	2	13	11	6	3	5	12	3	2		5	4	2	3	2		2			
2005	4	2	3	14	10	5	3	4	13	3	1		5	4	2	3	1		2		
2006	5	7	4	4	10	6	5	2	2	10	3			3	2	2	1	1		2	
2007	1	4	13	5	4	7	5	5	2	2	9	4				1	2				
2008	8	1	10	12	5	5	8	3	5	2	2	7	3				1	2			1

Annual number of female spotted owls by age.

Year↓	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
1990	3	7	11	11	11	5	6	5	1												
1991	5	1	11	8	10	9	5	4	3	1											
1992	4	5	7	10	8	9	8	3	4	2	1										
1993	6	4	7	5	9	6	9	6	1		1	1									
1994	3	7	6	7	5	9	5	10	4	1		1	1								
1995	2	1	9	6	9	4	8	6	7	2	1		2	1							
1996		6	1	9	4	8	3	8	6	7	2	1		1							
1997	5		4		9	3	8	3	6	6	7	3	1								
1998	3	11		6		9	1	7	2	6	4	7	3			1					
1999	1	4	14		5		7	1	5	3	4	3	5	1			1				
2000	1	1	5	13		4		7	1	5	3	5	3	6							
2001	6	4	1	4	11		3		8	1	4	3	4	3	5	1					
2002	10	9	4	1	3	11		3		8	1	3	2	3	3	5	1				
2003	3	12	5	3	1	3	10		3		9	1	3	3	3	2	5				
2004	2	3	17	5	3	1	2	10		3		7	1	3	2	1	1	4	1		
2005	3	4	4	16	5	4	1	1	7		3		7		3	2	1	1	3	1	
2006	4	5	4	3	14	4	4		1	5		3		5		2	1			2	1
2007	1	5	7	3	2	12	4	4		1	5		2		2		1				
2008	7	1	6	6	3	2	10	5	3		1	2		1		3		1			

