Feasibility and Effectiveness of a Pilot Barred Owl Removal Experiment on Private Timberlands

Northern Spotted Owl

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Barred Owl

Green Diamond Resource Company

How did the Barred Owl get here and was the expansion independent of human activities?

- BO separated from NSO for “millions of years” (G. Barrowclough, Amer. Mus. Nat. History, pers. comm.)
- Closest relatives to the BO are the Neotropical “Ciccaba” (now *Strix*) owls (Mottled, Black-and-white, Black-banded and Rufous-banded Owls)

Species Distributions

Spotted Owl

Barred Owl

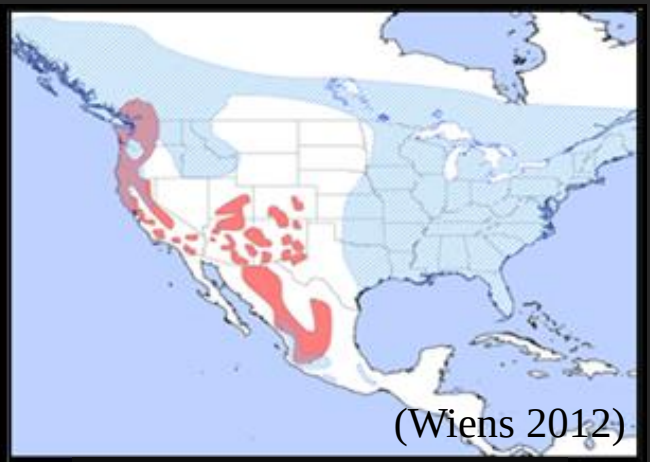
Mottled Owl

Two Major Hypothesis for Barred Owl Expansion

Boreal forest route is supported
by their current distribution

Barred owl range
(pre-1900)

Barred owl range (current)



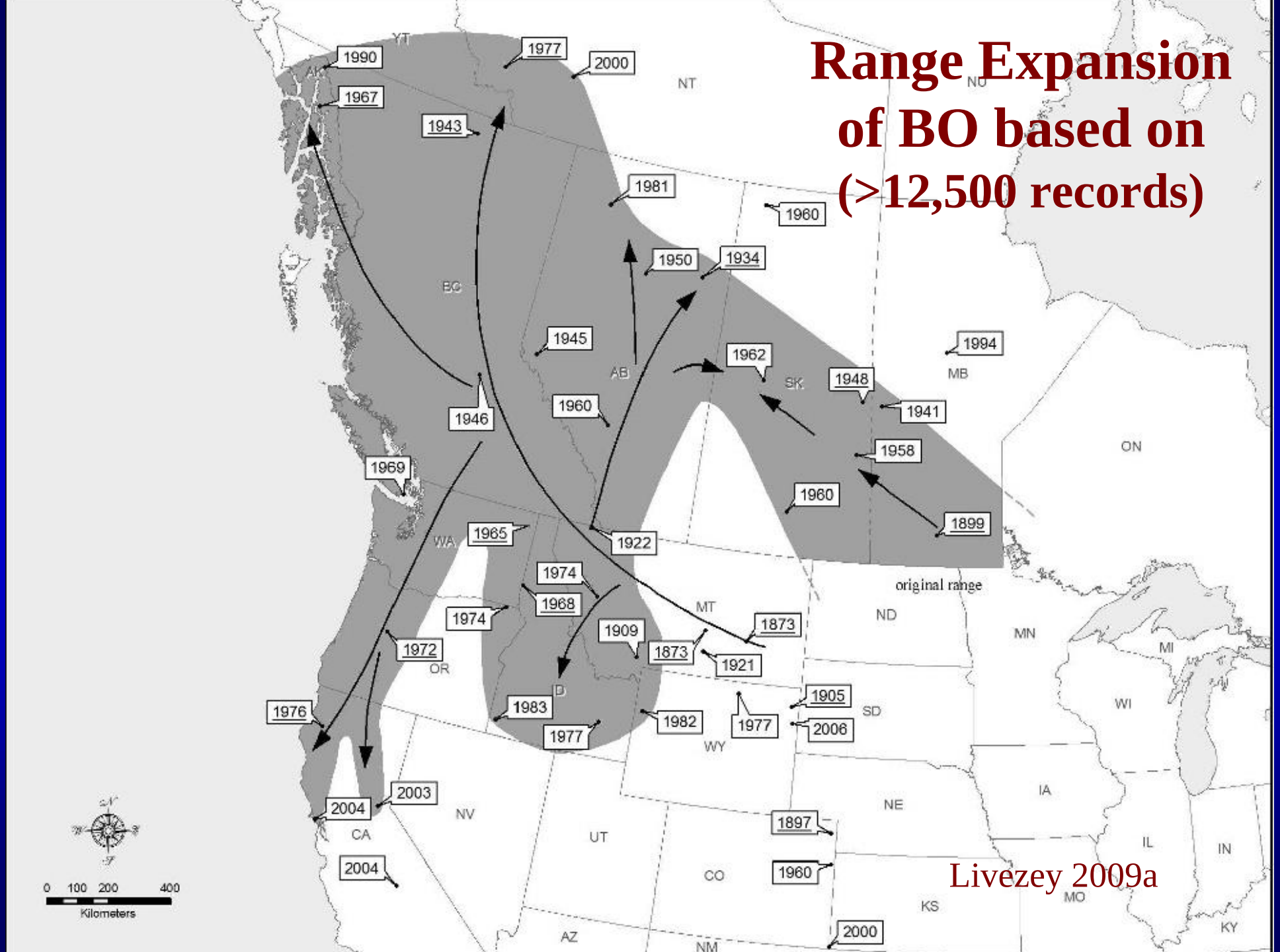
Barred owl/spotted owl
range overlap (current)

Possibly a “natural” expansion mediated
by global climate change

Stepping stone hypothesis of BO range expansion

- Great Plains route facilitated by European settlement – “stepping stones” created by alteration of the native flora and fauna
- Native Americans prevented from burning prairies, suppression of large ungulate populations, planting trees and more (Livezey 2009b)
- This hypothesis supported by historical BO records – BO were in Montana before 1900, CA in the 1970’s, but rapid expansion did not occur until the 1990’s (Livezey 2009a)

Range Expansion of BO based on (>12,500 records)



Livezey 2009a

Going with the Odds

- Although possible, what are the odds that after millions of years the Barred Owl just happened to naturally expand its range at the same time that European settlers were drastically modifying the Great Plains?
- Almost certainly a human-facilitated range expansion

NSO and BO Life History Comparisons

- Both species are strongly territorial, maintain lengthy pair bonds and vocalizations are essential in all their behaviors, but BO 10-25% larger

Wing: 333mm (male); 338mm (female)

Weight: 632 g (male); 801 g (female)

Wing: 320mm (male); 328mm (female)

Weight: 582 g (male); 637 g (female)

Johnsgard 1988

Reproductive Comparisons

- Similar reproductive strategies except BOs initiate nesting earlier in the season and have higher fecundity

NSO: typically nest biennially and fledge 1-2

BO: nest every year and fledge 3-4

Food Habits

NSO

Typically >90% small mammals composed of 2-3 species
Seldom feed on amphibians or other aquatic species

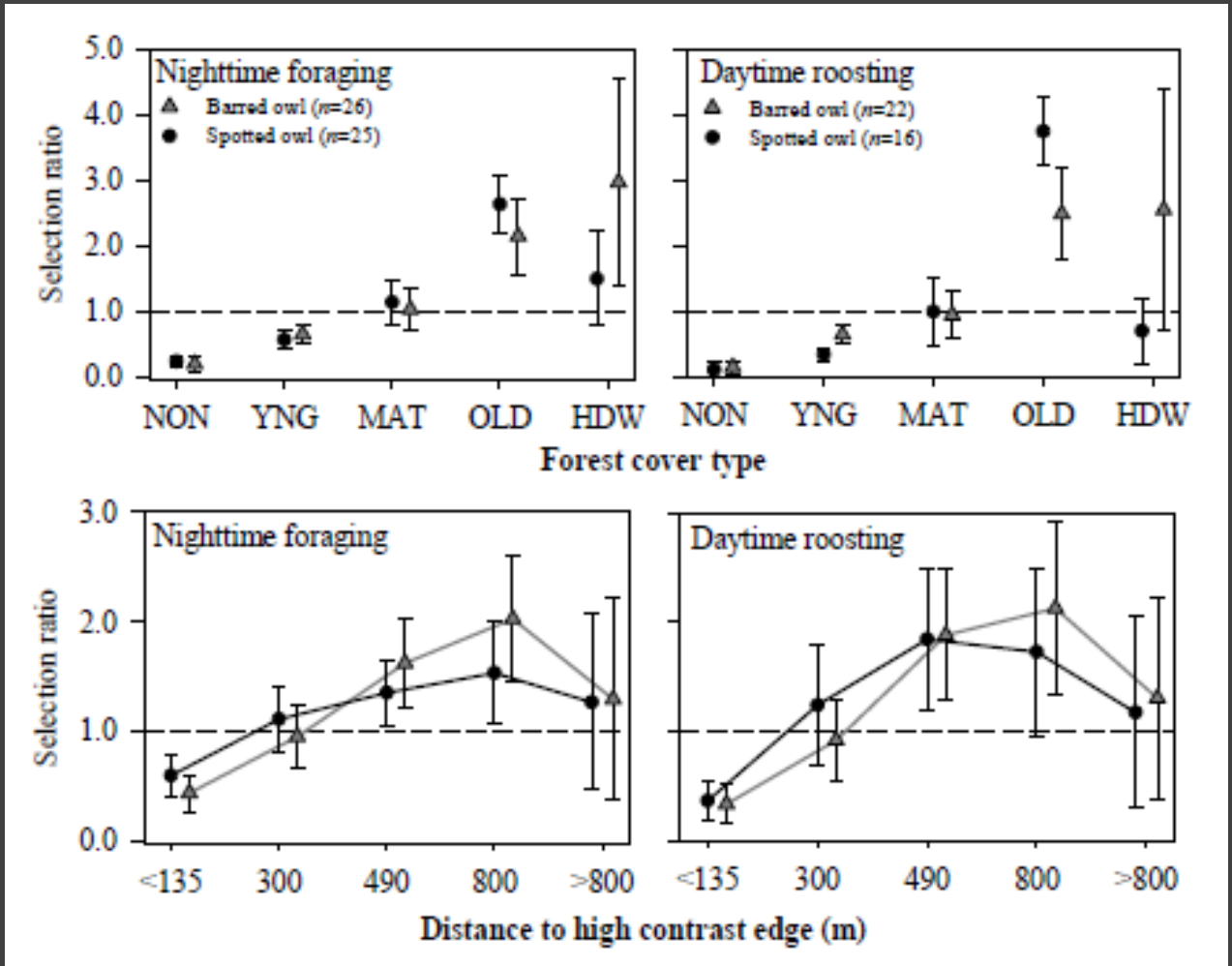
NBO

Typically <70% small mammals
Commonly take birds, amphibians, fish, crayfish, snails and earthworms

Habitat Comparisons

Commonly assumed that BO prefer or benefit from young and fragmented landscapes

No differences in habitat selection except for use of hardwood (riparian) areas



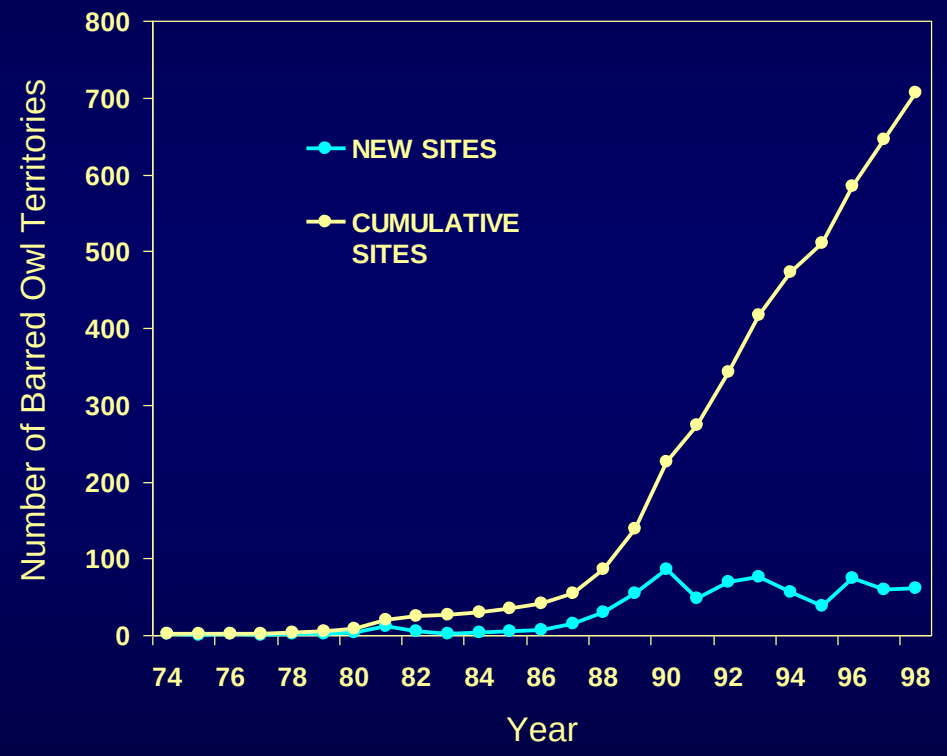
Wiens 2012

Summary of habitat comparisons

- Both species select mature and old growth stands for roosting and nesting, but barred owls tend to differ in:
  - spending more time in riparian areas,
  - and having greater overall habitat breath (i.e., able to occupy marginal habits when the preferred habitats are filled)
  - No evidence of any habitat that is exclusive to NSO (Dugger et al. 2011) – i.e., There is no known habitat solution!

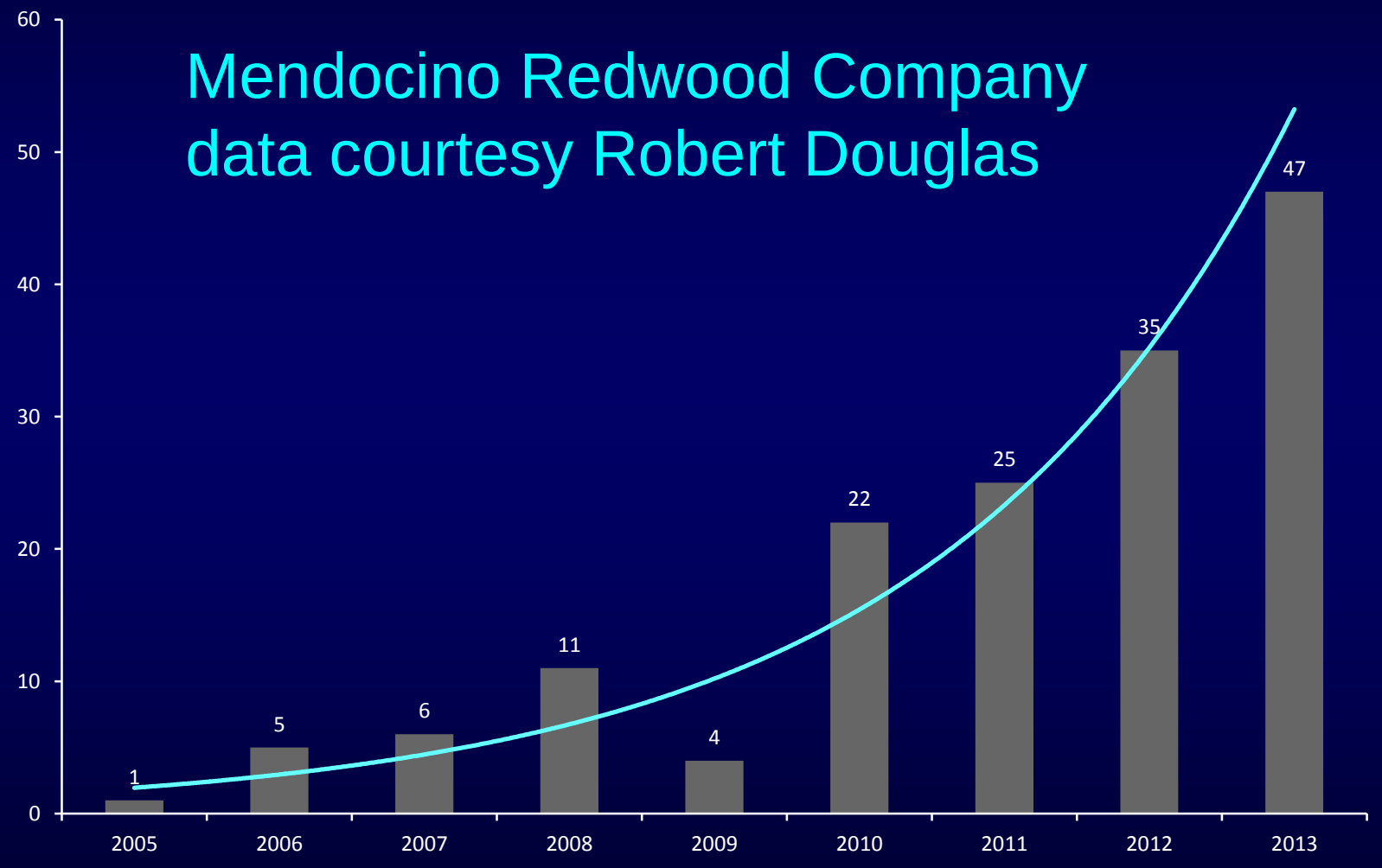
Trend in BO Numbers

New and Cumulative Barred Owl Territories in Oregon (1974 - 98) (Kelly et al. 2003)



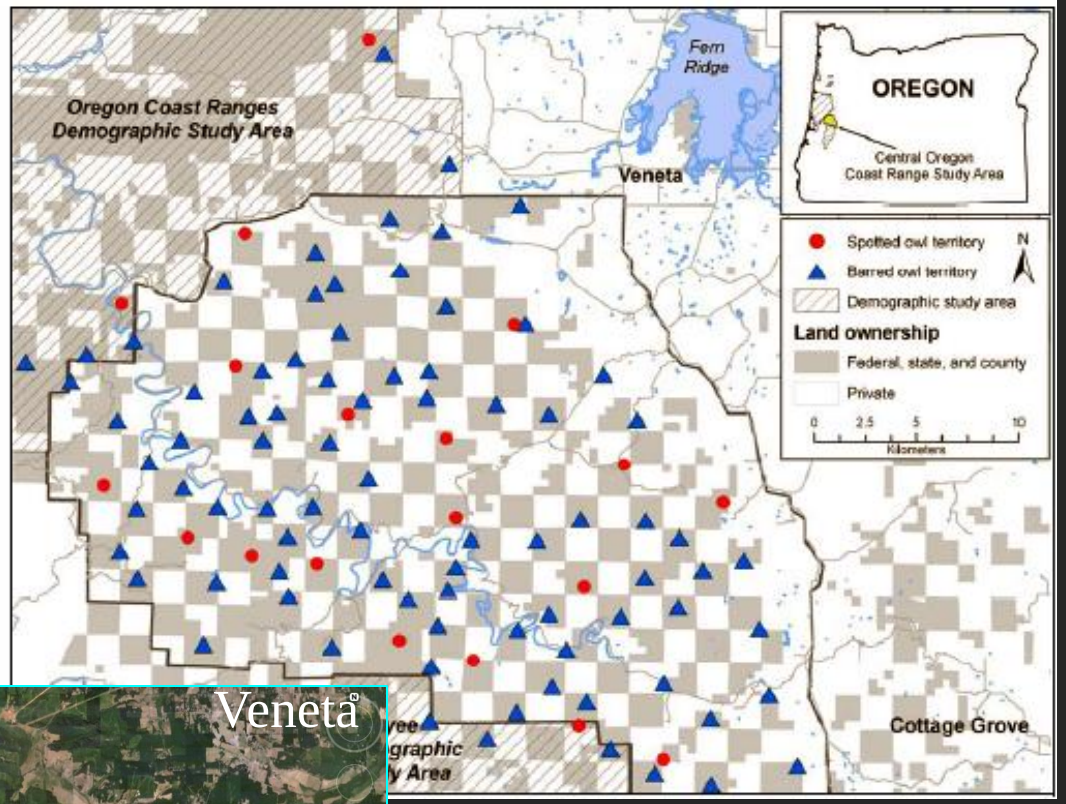
With delays in “taking off”, this same pattern has been repeated north to south from WA to coastal northern CA

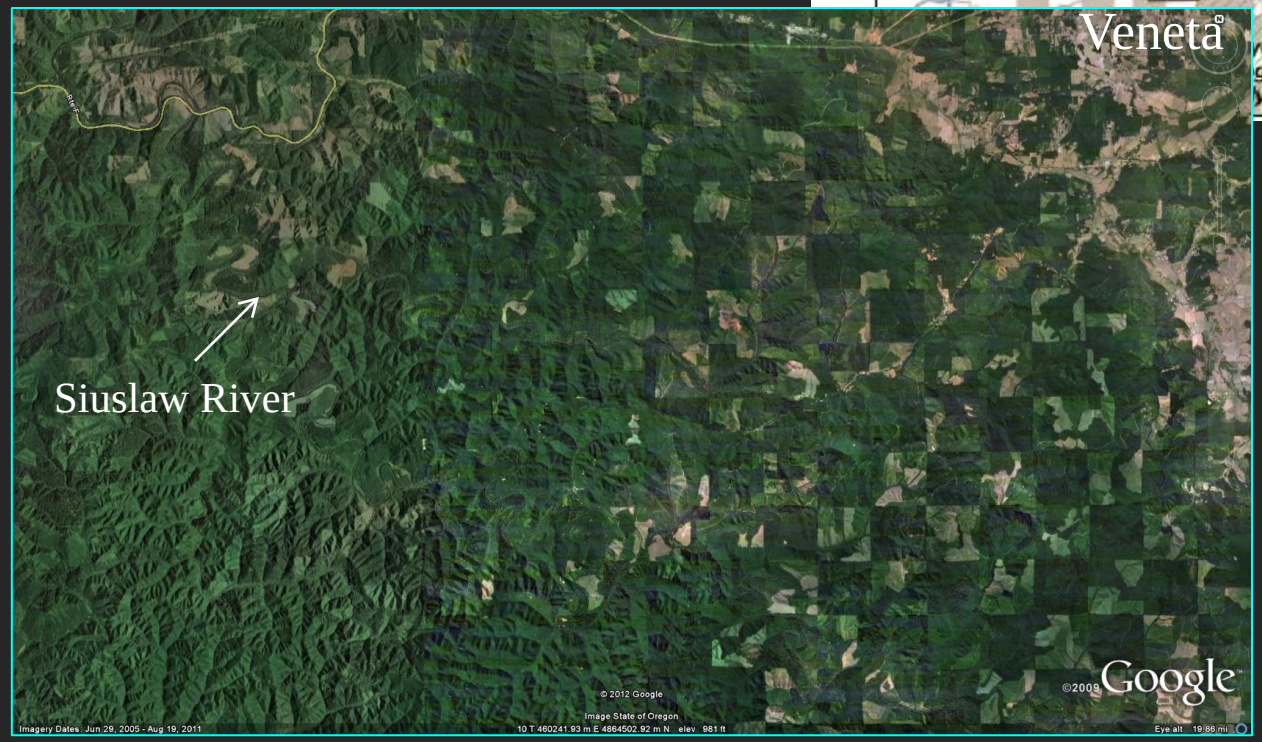
Trend in BO Numbers Continued



Trends in BO/NSO

Wiens Veneta NSO/B0 Study Area





1990's – 30 pairs NSO and a few BO
2007-2009: 15 NSO pairs produced 13 fledglings
82 BO territories – 20 monitored produced 80 fledglings (Wiens 2012)

Potential impacts of BO on NSO Hybridization

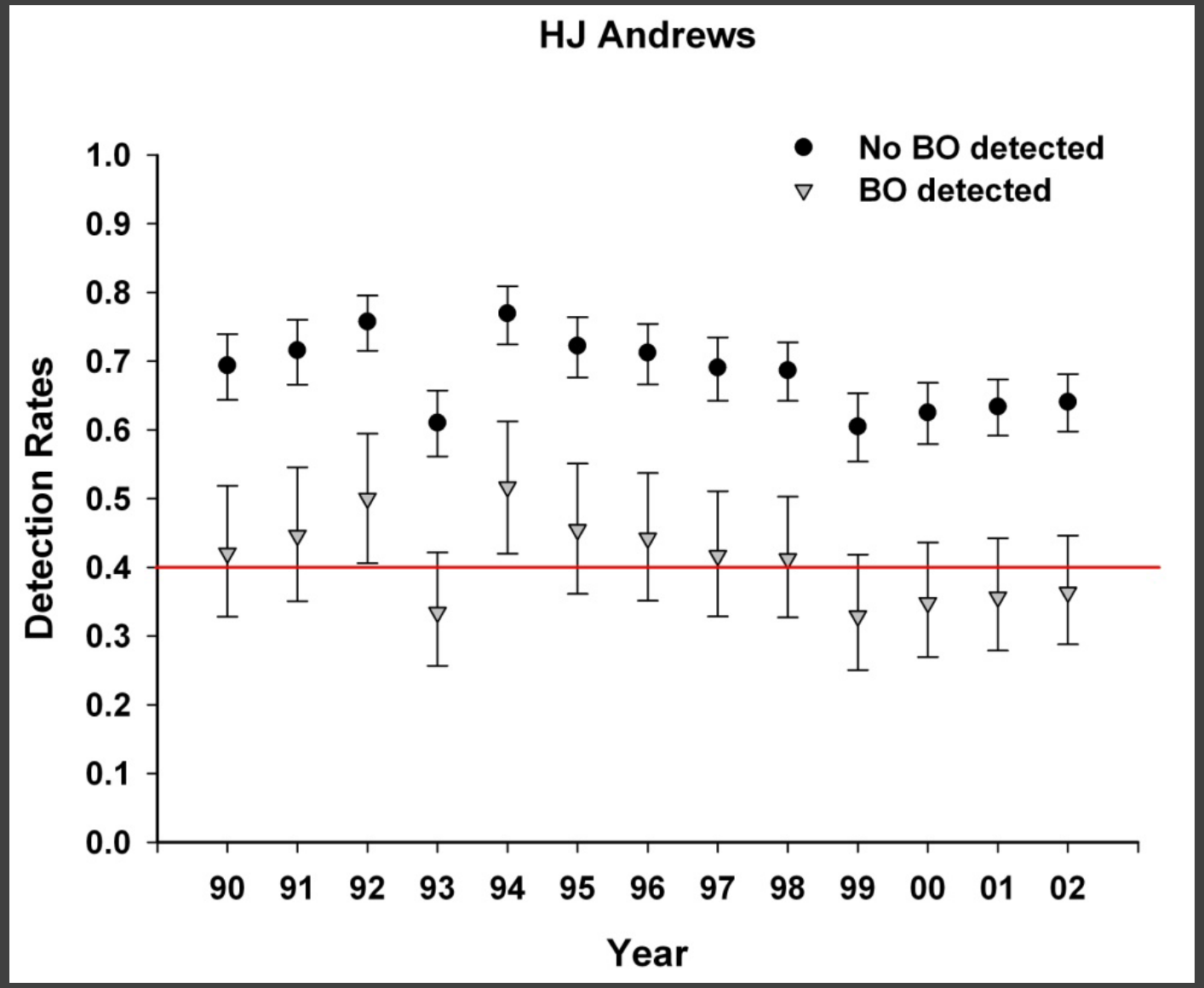
male NSO +
female BO =
Sparred Owl

Hybridization

Physical Attacks

Not commonly observed but ultimately shapes interactions between the two species (Van Lanen et al. 2011)

NSO get much harder to find



Summary of BO Impacts

- BO have much greater potential for population increase – higher fecundity and survival
- BO have more diverse prey base and smaller home ranges resulting in population densities that can be >5 times greater than NSO
- BO select the same habitat required by NSO for roosting and nesting
- Both species are strongly territorial, but BO are bigger and likely win most of the aggressive interactions

Likely Outcome of Competition

- “From our assessment of world-wide patterns of coexistence of owls, theory predicts that strong competition should occur between barred owls and northern spotted owls in their new area of sympatry, and that their stable coexistence seems unlikely.” (Gutierrez et al. 2007)
- In other words, without intervention, barred owls will likely drive NSO to extinction throughout much or all of its current range.

Likely future BO scenario for CA

- CA (Hoopa/Willow Creek) removal experiment started fall 2013, Oregon and Washington removal studies go into effect in 2015 (It took 5-7 years to complete EIS and initiate studies)
- At the federal level, no control of barred owls will occur until after the results of the removal experiments are known
- Assuming successful removal studies (scheduled for 4 years), another EIS will be required for range-wide BO management options (minimum of a decade before any BO management)
- Meanwhile, it is likely that NSO will be state listed and uplisted to endangered under the federal ESA.

Future scenario continued:

- NSO is long lived (20+ years), and even if nothing is done, it will likely continue to decline, but not go completely extinct for decades
- Social disruption by BO will result in an increasing number of "floater" NSO that will occasionally hoot, meaning 1 floater NSO will potentially "create" numerous NSO sites
- BOs cause a reduction in detection of NSO, which means 2-year surveys with 6 surveys/year to show NSO is absent will be increasingly difficult
- During this time, can expect increasing timber management restrictions associated with every NSO detection and ultimately more land locked up than before the BO
- Potential option is for private landowners to do voluntary BO management under an HCP or Safe Harbor agreement

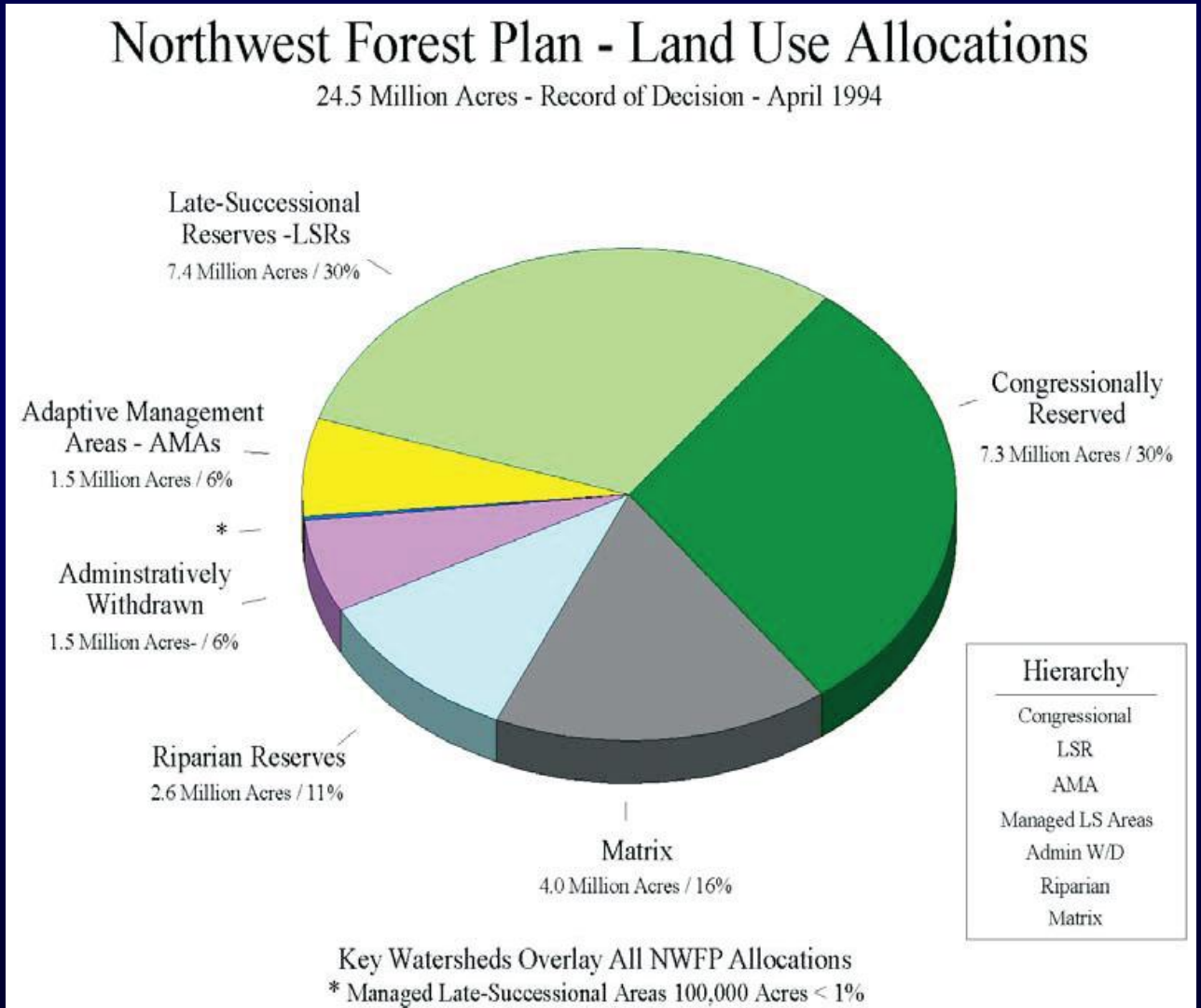
NSO demographic response to BO invasion

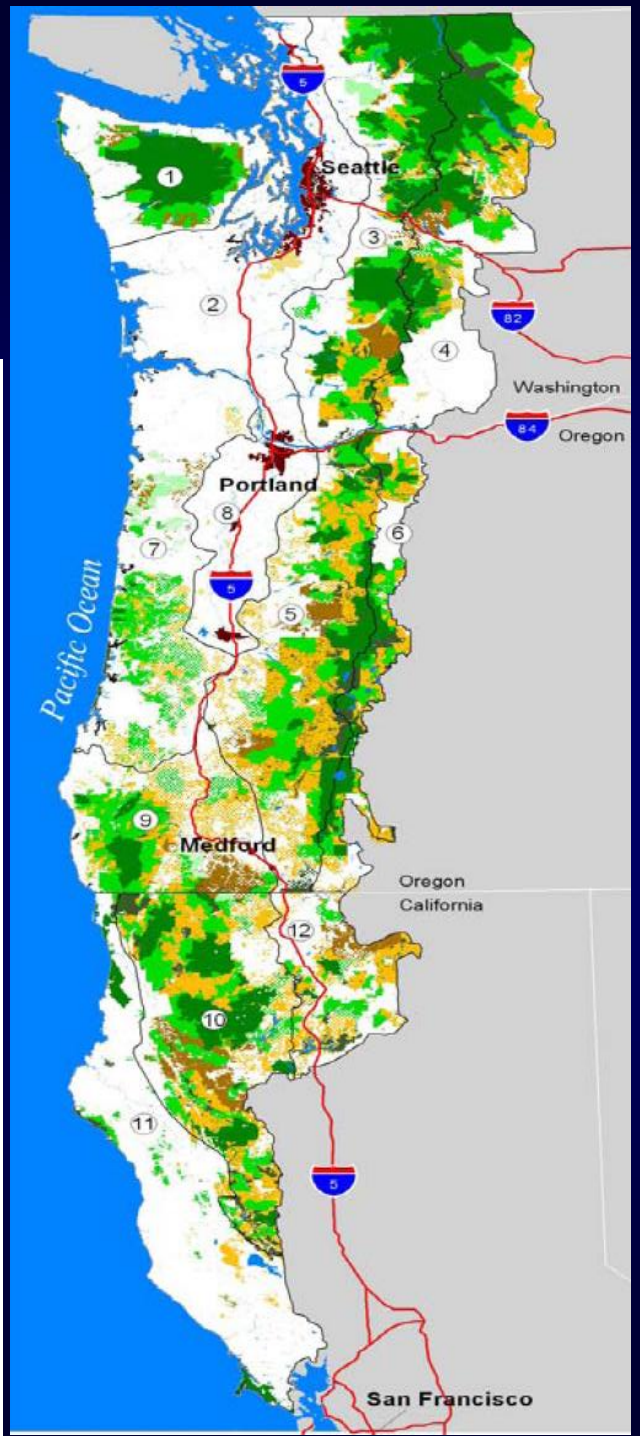
Credit M. Herse


At listing (1990), primary threat
to Northern Spotted Owl was
loss and fragmentation of habitat

Northwest Forest Plan – 1994

18.5 million acres in various reserves





Range wide habitat loss is still considered a threat (primarily from fire), but overall, it has been stabilized in the last two decades – What is the NSO population doing?

Realized rate of population change - WA

Forsman et al. 2011

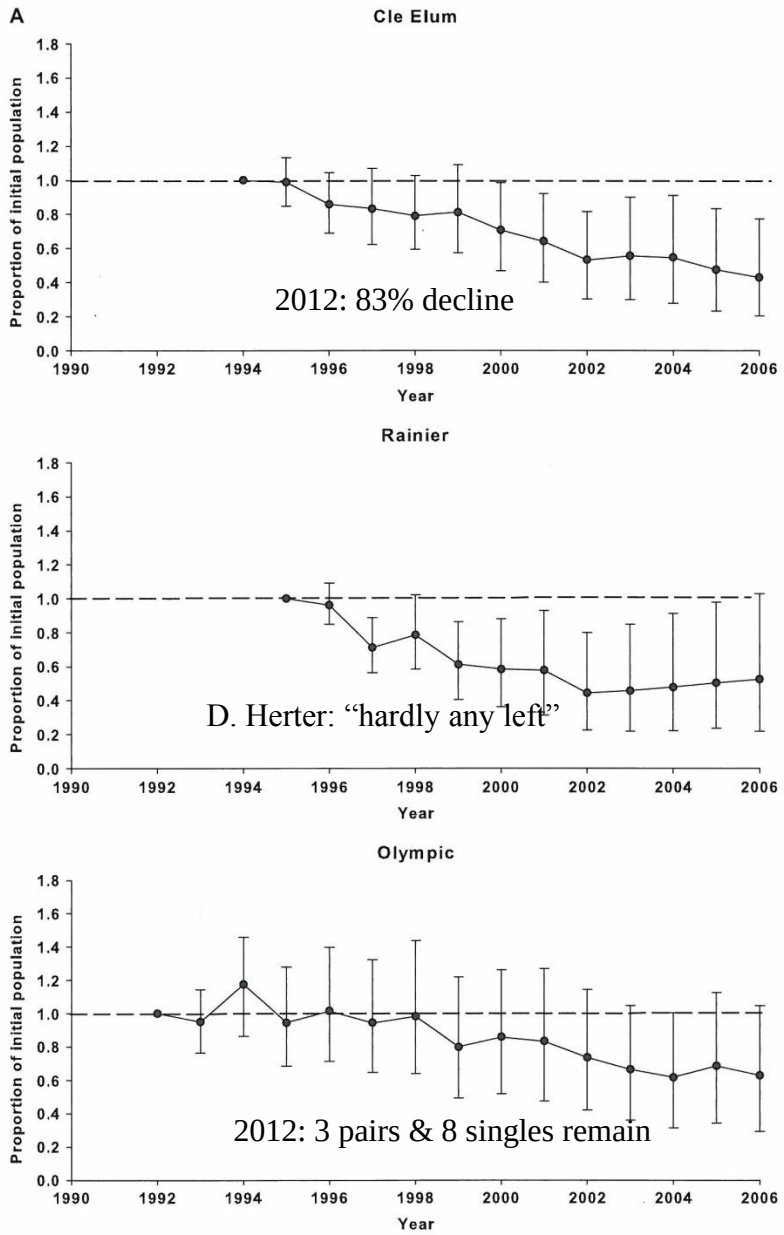
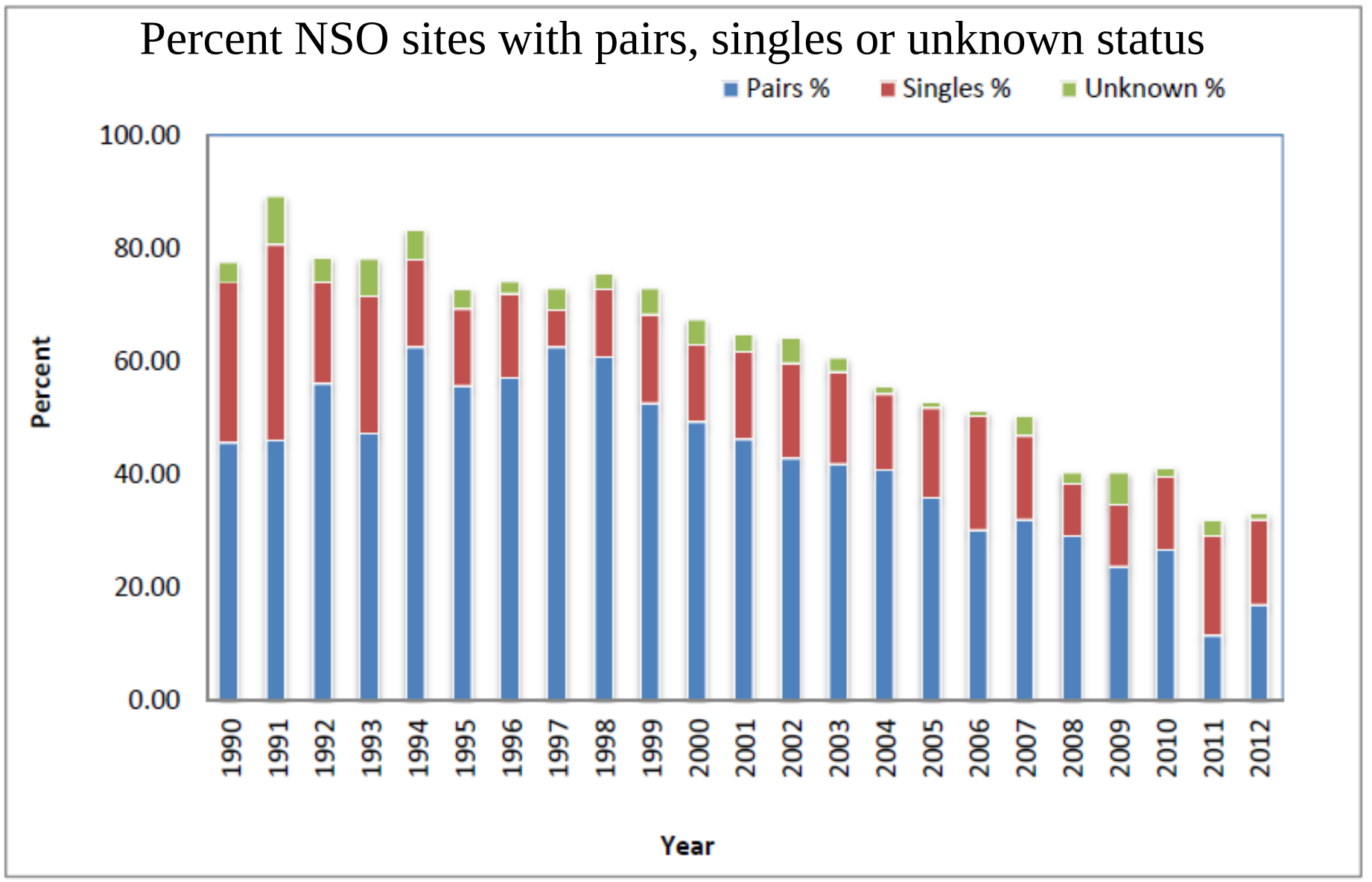
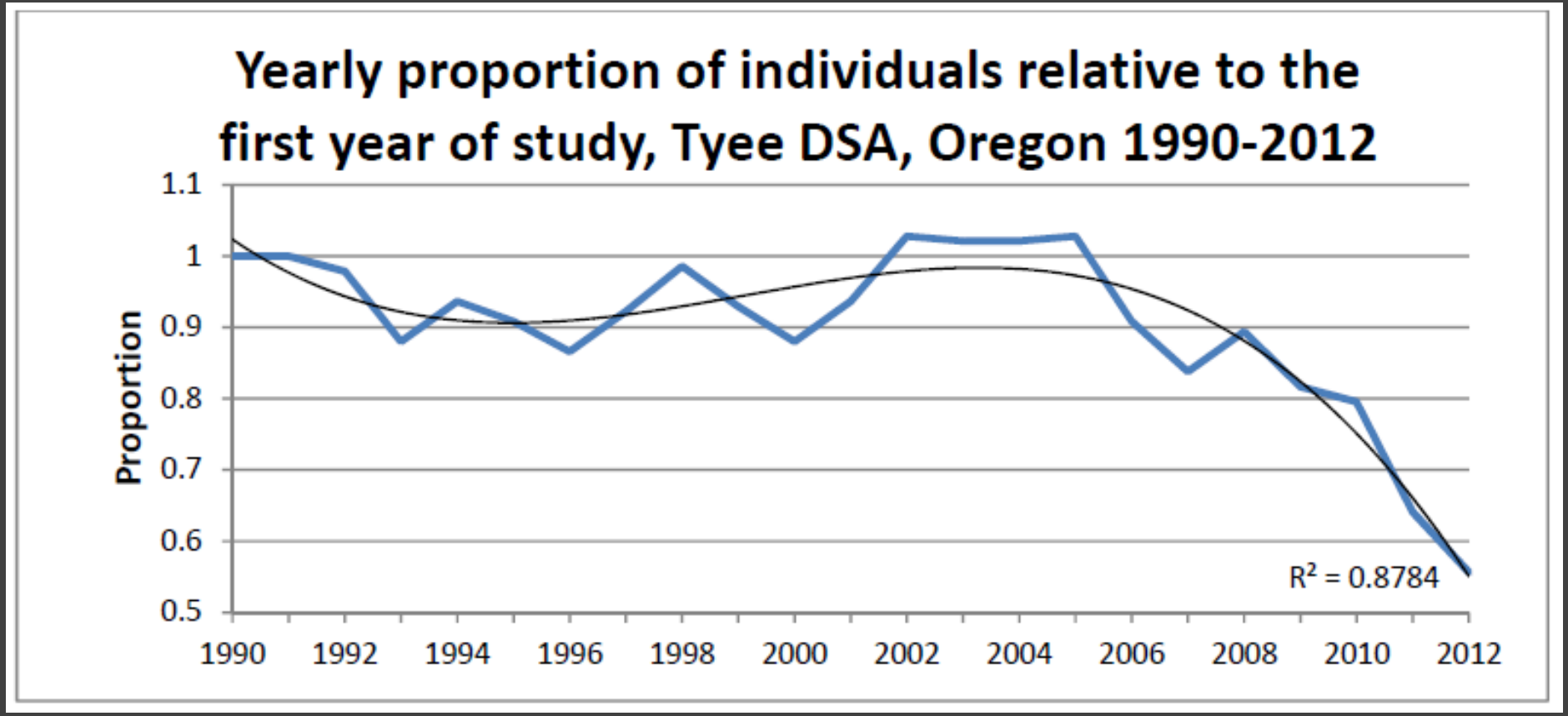


Figure 10. Estimates of realized population change, Δ_t, with 95% confidence intervals for Northern Spotted Owls at three study areas in Washington (A), five study areas in Oregon (B), and three study areas in California (C).

Oregon Coast Range 2012 Annual Report

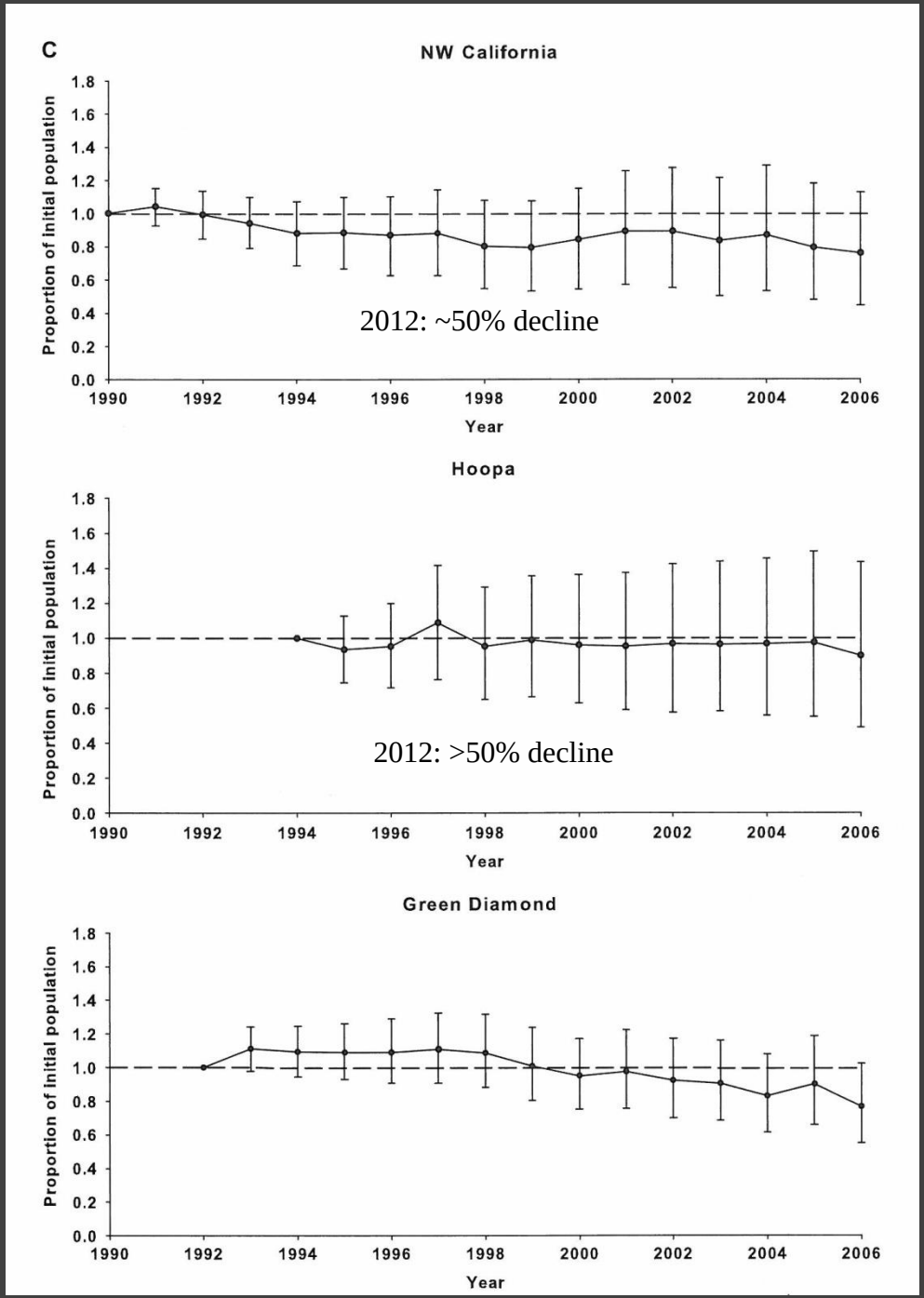


Tyee (Roseburg BLM) 2012 Annual Report



California trends in NSO numbers

Forsman et al. 2011



Actions to Address the Threat

- Regardless of how it got here, BO is not native to the NW and is acting as an invasive species in displacing a native threatened species and possibly affecting many other species
- Several federal actions have been taken to address the threat

U.S. Fish & Wildlife Service

Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*)

June 28, 2011

Region 1
US Fish and Wildlife Service
Portland, Oregon

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Experimental Removal of Barred Owls to Benefit Threatened Northern Spotted Owls

Final
Environmental Impact Statement

Prepared by

Oregon Fish and Wildlife Office
U.S. Fish and Wildlife Service
Portland, Oregon
July, 2013

www.fws.gov/oregonfwo

Federal Removal Experiments

- ROD was signed September 2013 (5 years to complete), which established four study areas – 1 in WA (Cle Elum), 2 in OR (Oregon Coast Range/Veneta and Union/Myrtle) and 1 in CA (Hoopa/Willow Cr.)
- Removal started immediately in Hoopa, but funding and other issues delayed start in the other study areas until 2015

Option for removing barred owls?
Non-lethal removal

Lethal Removal

Logistics

Remote controlled digital caller (Wildlife Technologies MA-15)

12 ga. “quiet” shotgun with illuminated aimpoint and mounted flashlight

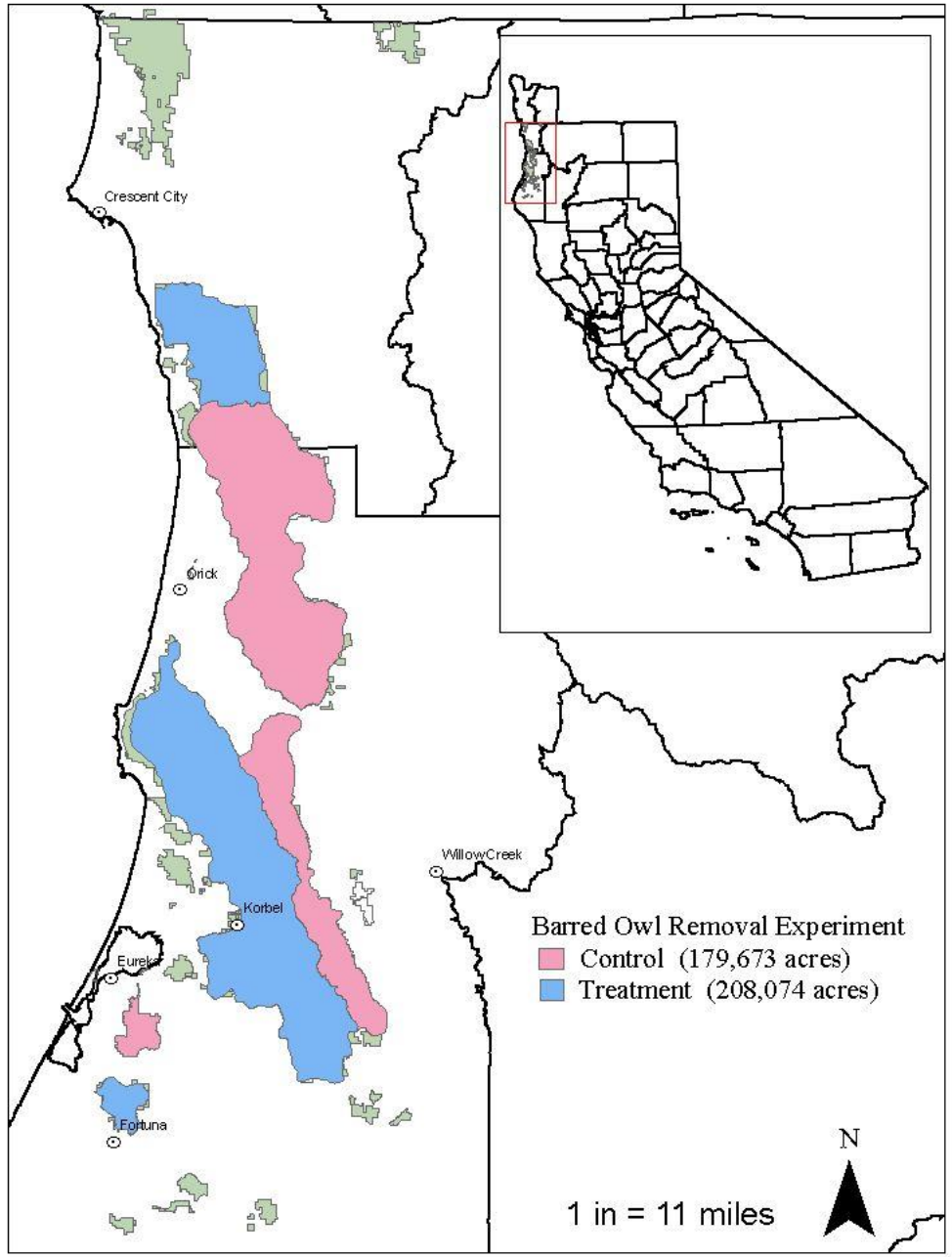
Collected birds are all processed and housed at Cal Academy Science

Supplemental Data Collection

- Oral and cloacal swabs for parasite and disease studies
- Blood samples for disease and genetics studies
- Liver samples for toxicology exams (rodenticides)
- Food habits and more

Green Diamond Pilot BO Removal Experiment Study Design

- Pilot removal experiment initiated in 2009 on GD NSO demographic study area
- BACI design with all BOs removed from treatment areas while they are undisturbed on control areas



Effort/cost and Efficiency of BO Removal

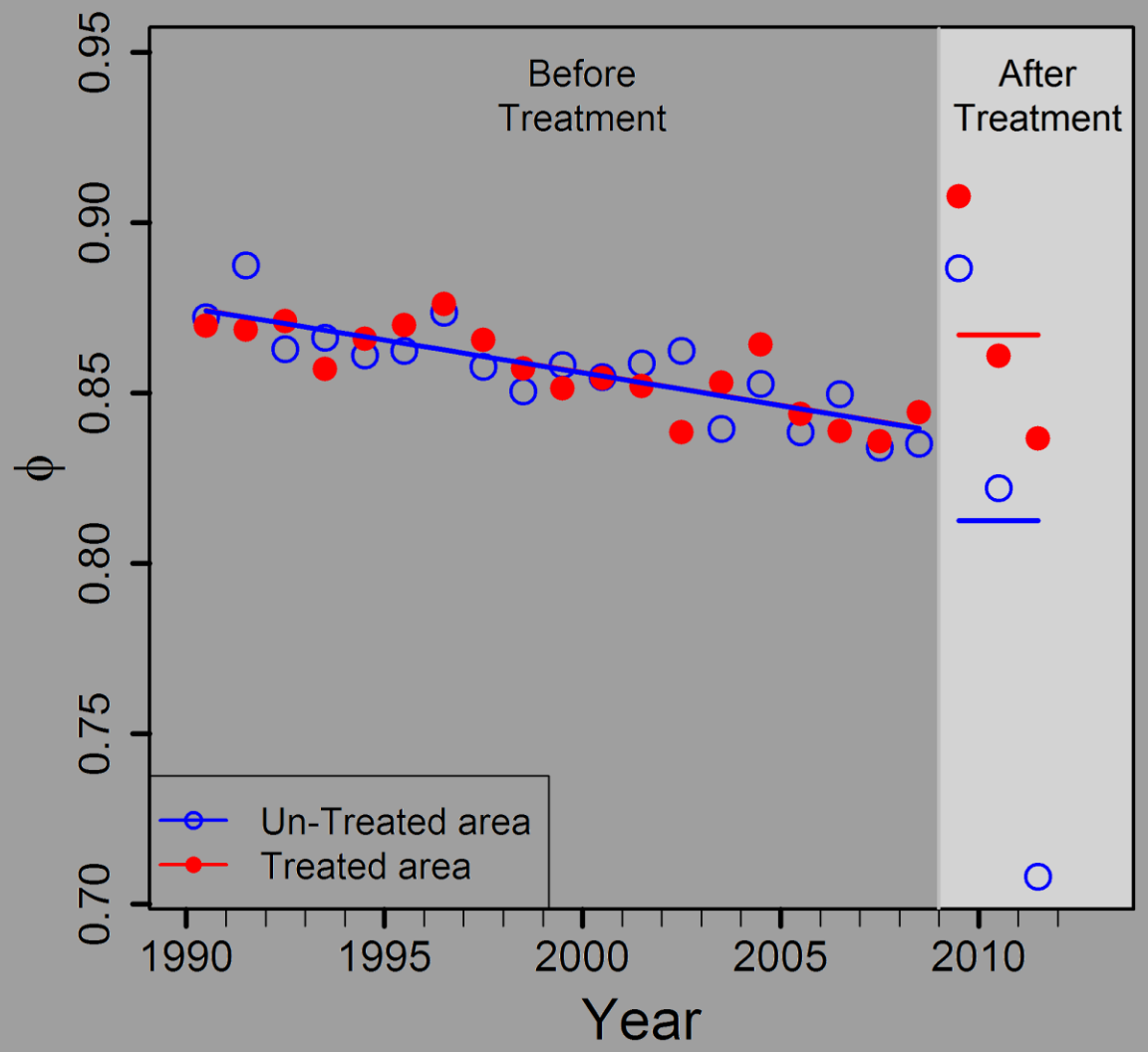
(Diller et al. 2013 Wildlife Society Bulletin)

Cost: average of 2 hours 23 minutes per owl collected but this included processing time and supplemental calling

Year	Visits	Mean time/visit (min)	BO collected	Mean time/BO removed (min)
2009	33	77.2	20	127.4
2010	26	85.7	13	171.5
2011	23	104.5	18	133.5
2012	40	81.2	22	147.7
Total	122	85.5	73	142.9

Efficiency: all (73) of the known territorial BOs collected except 8 ‘colonizers’ seen only once

Mean Adult Survival

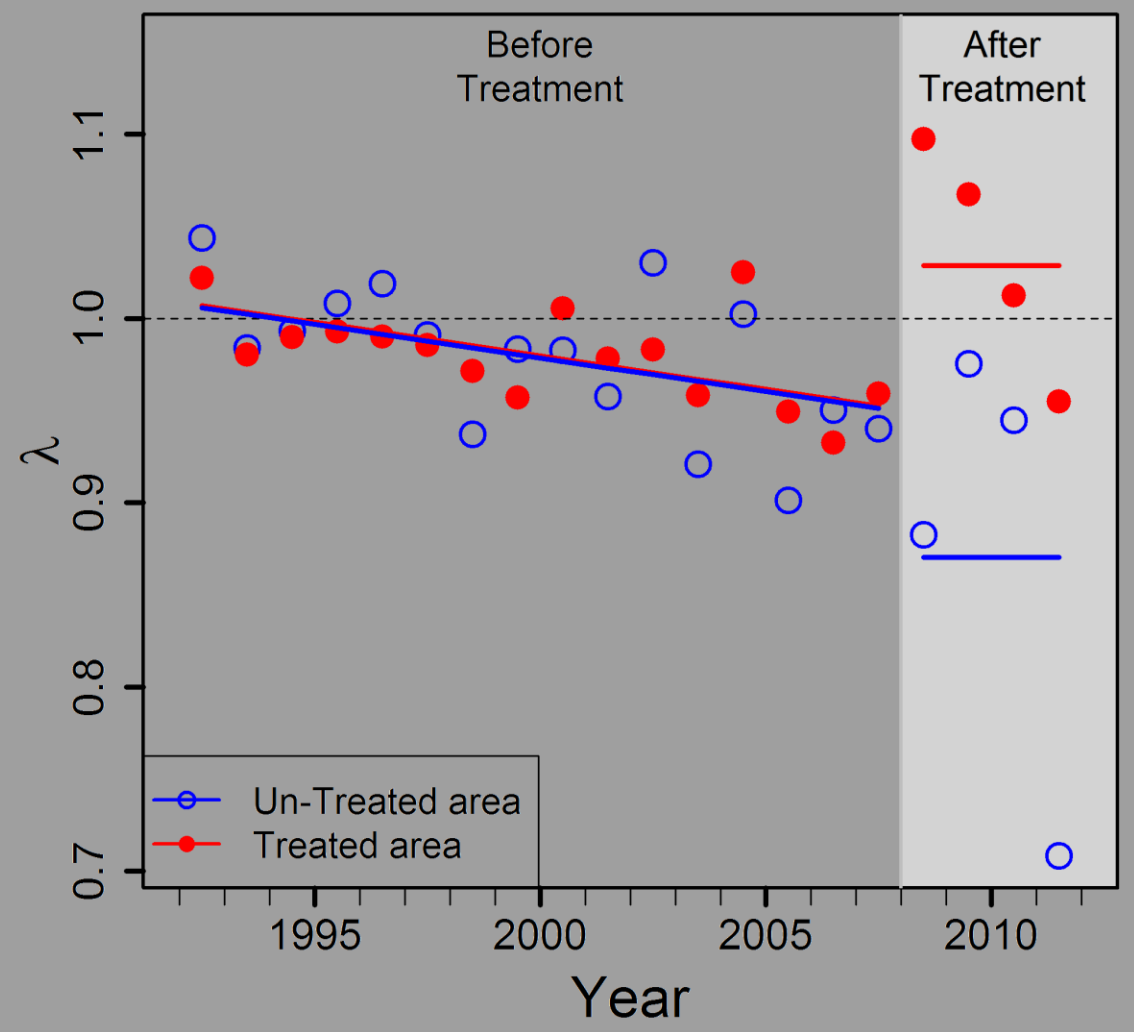


Mean = 0.8671

Significant p = 0.0211

Mean = 0.8125

Rate of Population Change

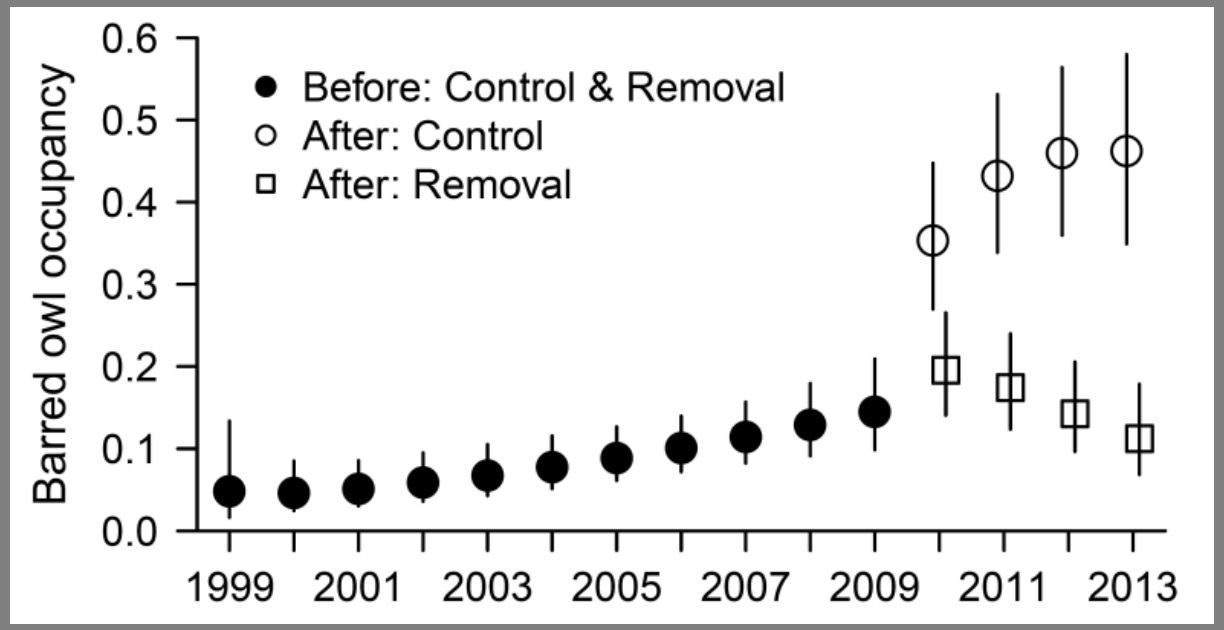


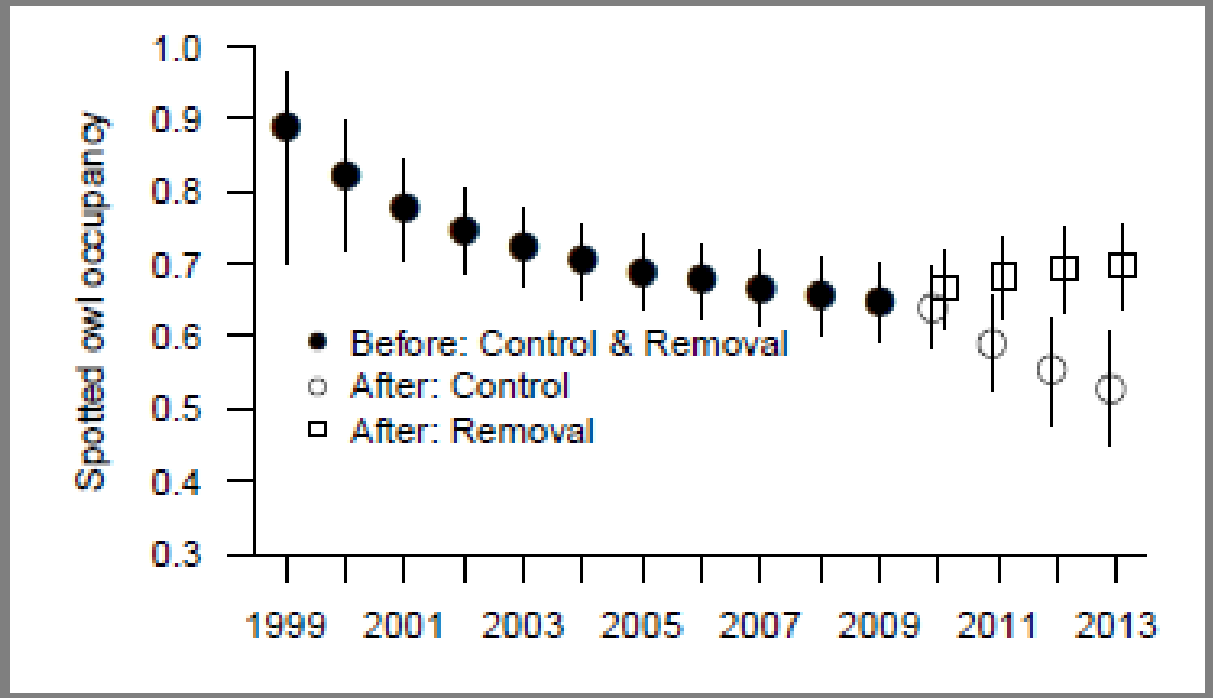
Mean = 1.00627

Significant p = 0.00005

Mean = 0.88370

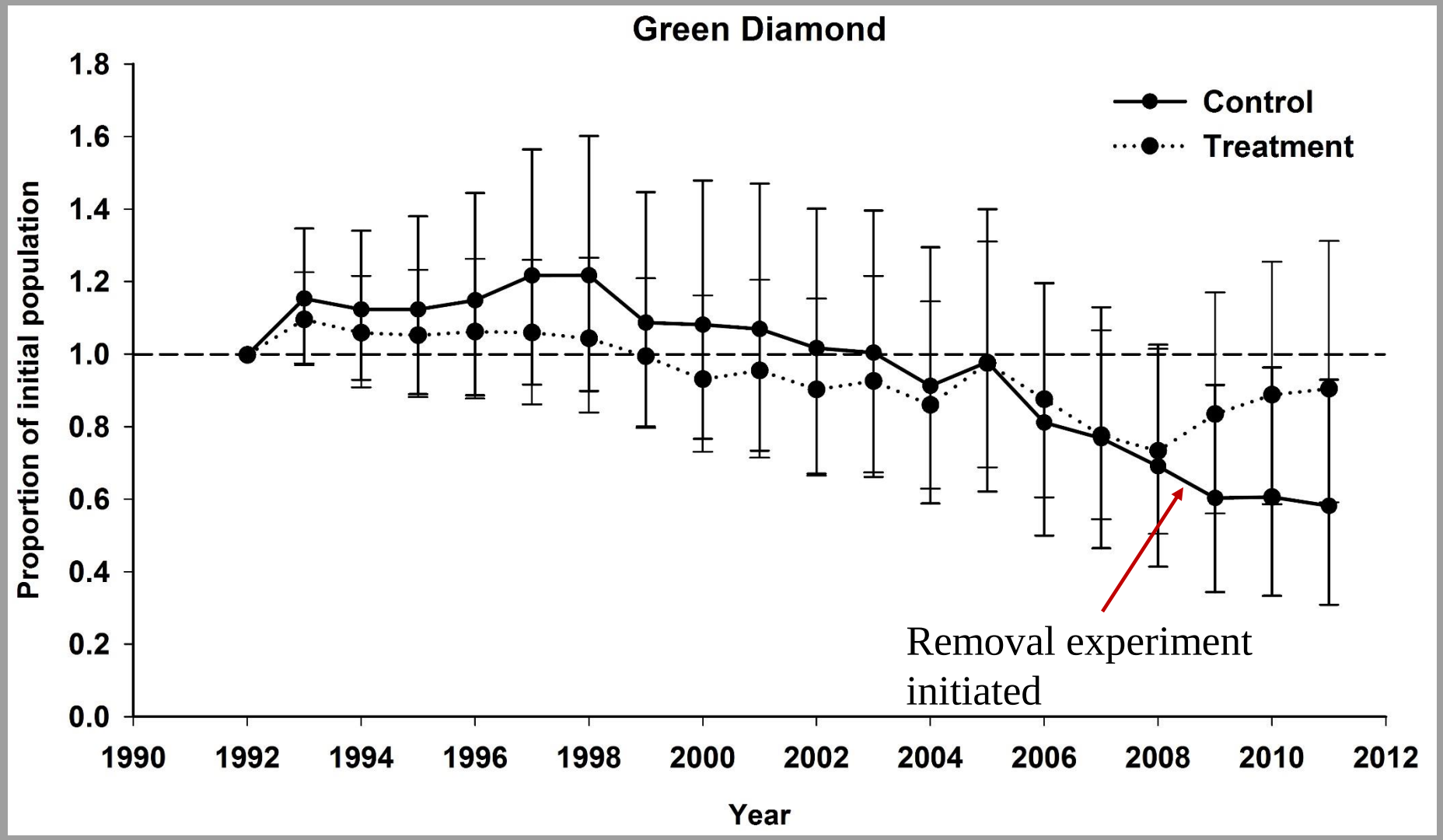
Barred and Spotted Owl Occupancy





Year

Realized Rate of Population Change




Conclusion: It is technically feasible and cost effective to remove barred owls, and there is a strong treatment effect.
However, it is controversial and may not be feasible in some areas, but the decisions we make now will likely determine the fate of the Northern Spotted Owl
Paul Bannick Photography