



The Western Section of The Wildlife Society and Wildlife Research Institute

Western Raptor Symposium
February 8-9, 2011
Riverside, California



Symposium
Sponsors



February 9 – 09:55-10:15 am Session: Raptor Management and Monitoring

Preliminary Results of Controlling the Barred Owl Threat after Two Decades of Research and Monitoring to Meet the Habitat Needs of Northern Spotted Owls

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A long-term capture-recapture demography study was initiated in 1990 on managed timberlands owned by Green Diamond Resource Company in coastal northern California. We estimated the trend in owl numbers and did analyses to determine the factors influencing spotted owl survival, fecundity and habitat fitness. The owl population was apparently stable or increasing until the late 1990's when owls appeared to begin a downward trend despite estimations of continuously improving habitat quality and quantity. The decline in spotted owls coincided with an apparent increase in barred owls and the barred owl covariate was included as a negative coefficient in the top models for both fecundity and survival. Given this new threat, we initiated the first test of the feasibility and effectiveness of doing lethal barred owl removal. In 2006, barred owls were removed from sites formerly occupied by spotted owls as "case studies" to determine the potential for the sites to be re-colonized by spotted owls. The dramatic positive response to these case studies led to the initiation of a barred owl removal experiment in 2009. Based on preliminary results, territorial barred owls were removed from the treatment areas with little effort and cost (mean 2.01 field hours per barred owl). The sharp increase in spotted owl occupancy rates in the treatment relative to the control areas has also provided very encouraging preliminary results.

The authors and institutions that have provided the following presentations are happy to share their information, data, and opinions. However, these are not, necessarily, peer-reviewed presentations and the potential to take something out of context also exists. In order to avoid that, you are requested to contact the respective lead author(s) before using specific information contained in any of the following papers. Once you have done that, the proper citation is: "[Author(s). Date. Title.] Presented at the Western Raptor Symposium. Jeffrey L. Lincer and David Bittner (Co-Chairs). Hosted by Wildlife Research Institute and The Wildlife Society, Western Section. Riverside Convention center, Riverside, California, USA. February 8-9, 2011

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Saga of the Northern Spotted Owl:
Did we solve the habitat issue only
to be trumped by a new threat?



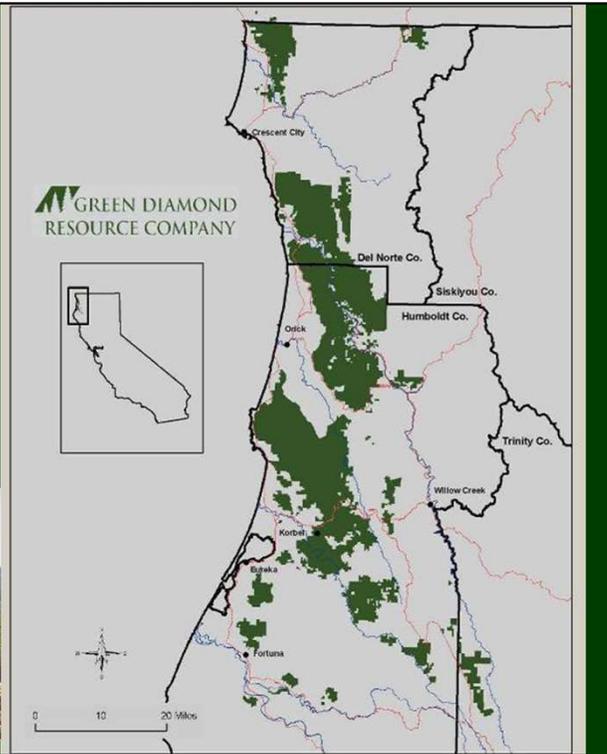
Lowell Diller, Keith Hamm & David Lamphear, Green Diamond Resource Company, Korb, CA

John (Jack) Dumbacher, California Academy of Sciences, San Francisco, CA

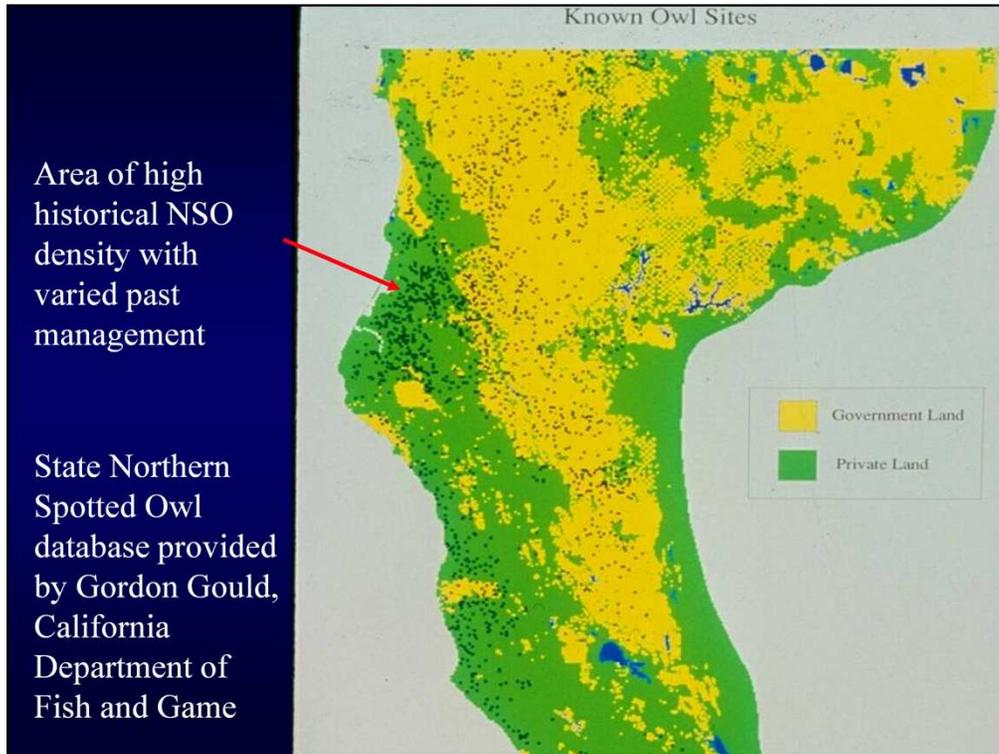
Trent McDonald, Western EcoSystems Technology, Cheyenne, WY

My co-authors from Green Diamond assisted with various aspects of 20+ years of spotted owl monitoring and research. Jack Dumbacher collaborated on the barred owl removal study and Trent McDonald assisted with the study design and provided all of the statistical analyses.

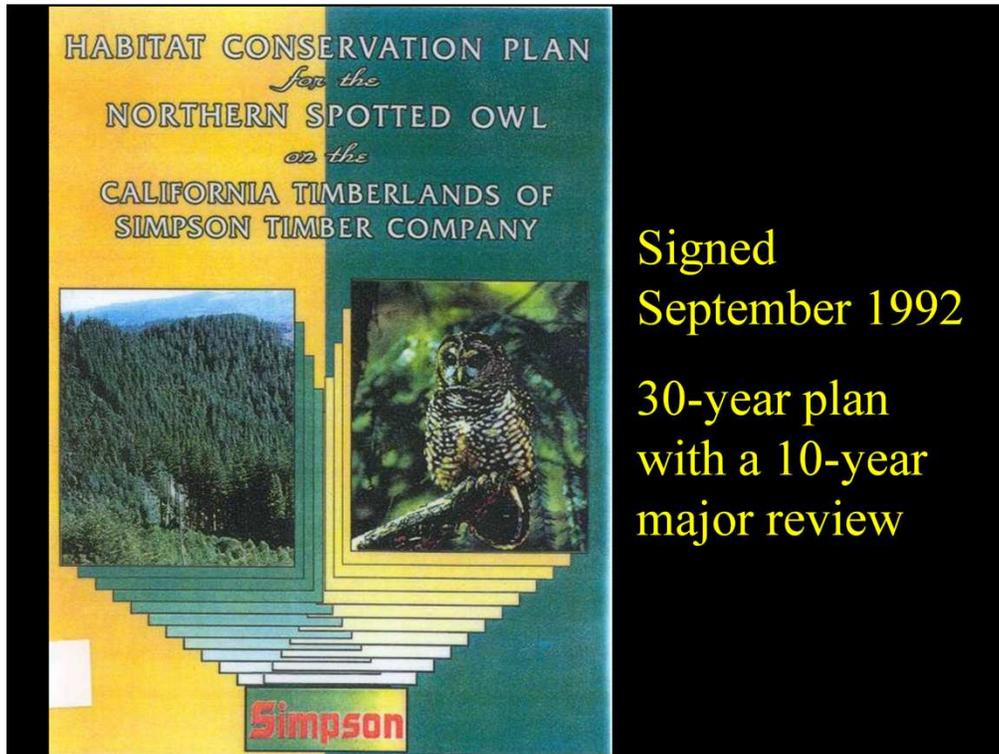
Approximately
400,000 acres of
managed
timberlands
composed primarily
of redwood and
Douglas-fir stands



The study occurred on the Green Diamond ownership in north coastal California. The more coastal regions are composed predominately of redwood, which grades into Douglas-fir and hardwood stands in the eastern portions of the ownership. With the exception of a few scattered small old growth stands (about 1% of the area), the age classes range from recently harvested even age third-growth stands to mature second-growth stands mostly 45-60 years old.



The region that includes Green Diamond's study area is composed of a variety of small private and large commercial timberlands with little public lands except for Forest Service lands on the eastern border. This north coastal region has a historically high density of spotted owls, but all of the factors responsible for these high owl densities are not known since the area has a wide range of past management activities.



The high density of spotted owls on Green Diamond's (formerly known as Simpson Timber Company) lands led to the creation of the first HCP for spotted owls in 1992. It was this conservation plan that committed Green Diamond to long term research and monitoring of spotted owls.

Studies and Monitoring on GD

On-going surveys since 1989 and demography study since 1990



Largest NSO dataset in existence: 1,785 captures, >4,000 total captures/recaptures



Dusky-footed woodrat

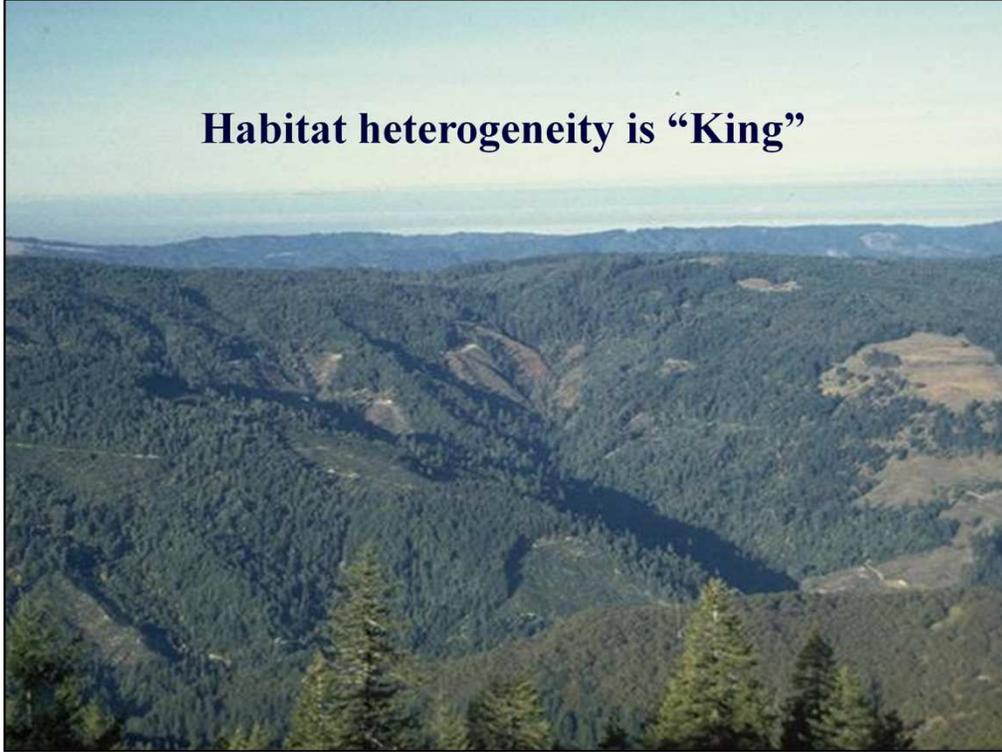
Numerous studies on habitat associations, prey base and demographic parameters

Initial surveys to support the spotted owl HCP started in 1989 and a mark-recapture demography study was initiated the following year in 1990. This long term study has led to the development of the single largest demographic dataset on spotted owls. The dusky-footed woodrat, primary prey of spotted owls in this region, has also been the focus of numerous studies and monitoring.

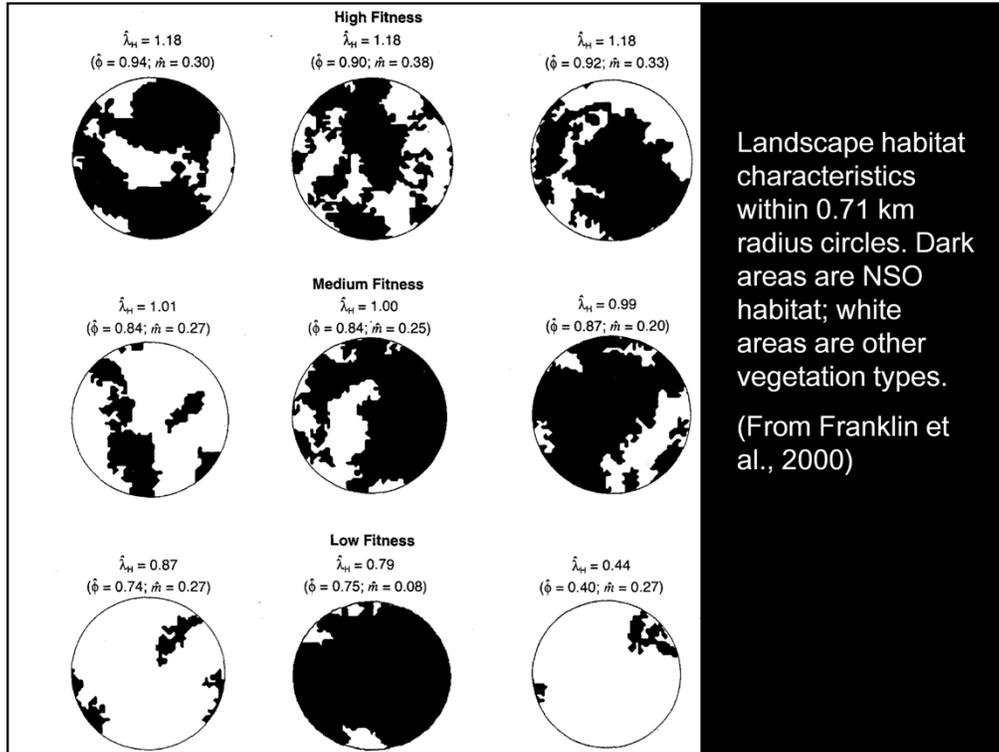


Unbroken mature forests are not good habitat for spotted owls in this region, because the dusky-footed woodrat is found primarily in young stands 10-40 years old regenerated from even-aged management or stand replacing natural disturbance events. Large tracts of unbroken forests may have an abundance of roosting and nesting habitat, but it lacks the woodrat prey base that is critical to spotted owls in this region.

Habitat heterogeneity is “King”



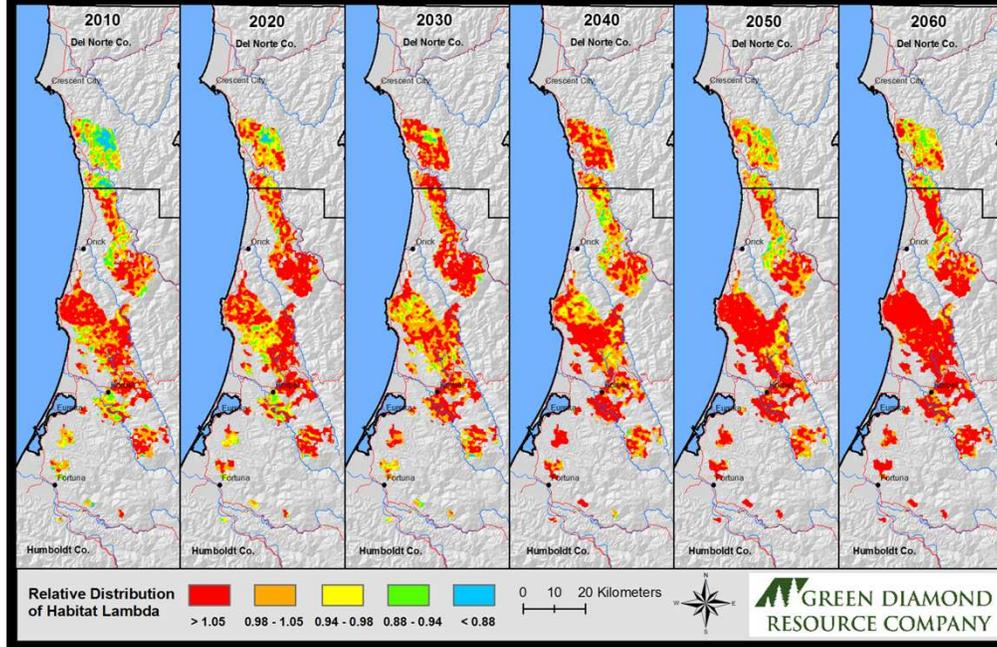
In contrast, regions with high habitat heterogeneity (i.e., the picture shows a landscape with natural prairies on the right and a mosaic of mature second growth and regenerating clearcuts to the left) have high densities of spotted owls. The mature stands provide roosting and nesting areas and the edge provides access to woodrats in the young stands.



Results from the long term Willow Creek spotted owl demographic study area provided the first evidence for the importance of habitat heterogeneity for spotted owls. The highest habitat fitness (i.e., habitat attributes that provide for high survival and fecundity) was provided for spotted owls that occurred in a mosaic of young and old stands.

From: Franklin, Alan, David Anderson, R.J. Gutierrez and Kenneth Burnham. 2000. Climate, habitat quality and fitness in northern spotted owl populations in northwestern California. *Ecological Monographs*. 70(4): 539-590.

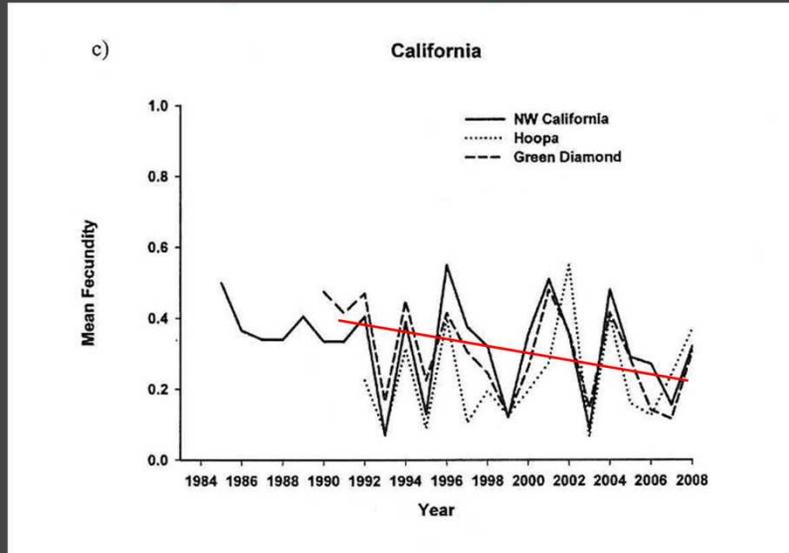
Projections of Habitat Fitness



We do not have time to go into the analysis and model development that led to these projections of habitat fitness for spotted owls on Green Diamond's ownership. However, the model developed following the Franklin et al. (2000) approach indicates a current and future abundance of high quality habitat for spotted owls.

Trends in Fecundity

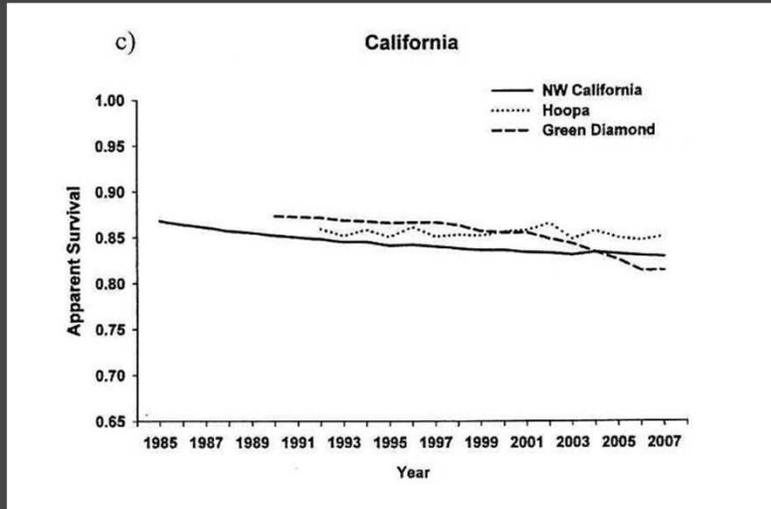
From: Forsman et al. *In press*. "Demographic Trends of Northern Spotted Owls: A Meta-analysis, 1985-2008."



Despite the apparent abundance of high quality habitat, spotted owls have been showing declining fecundity on Green Diamond's study area.

Trends in Apparent Survival

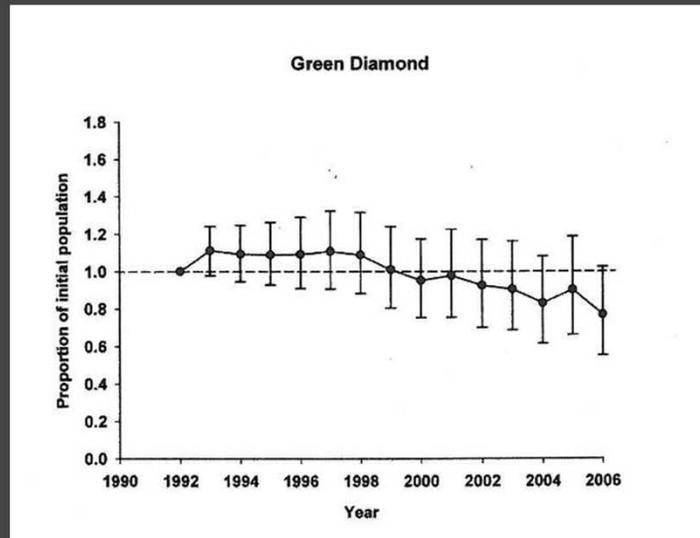
From: Forsman et al. *In press*. "Demographic Trends of Northern Spotted Owls: A Meta-analysis, 1985-2008."



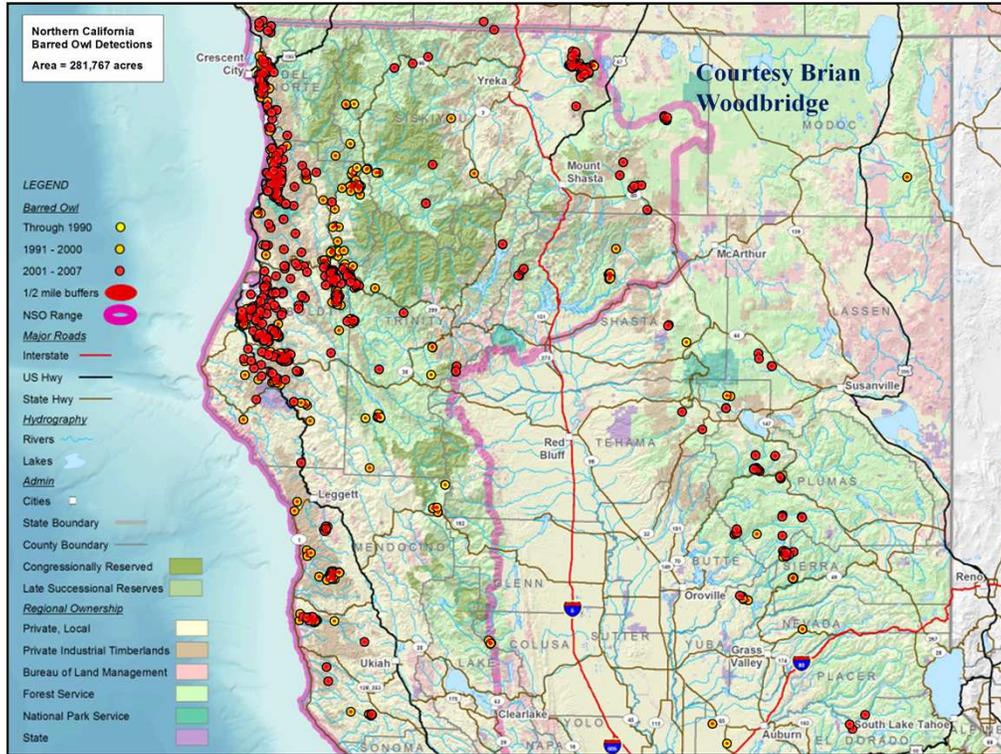
Adult survival that was fairly stable during the 1990's on Green Diamond's study area appeared to go into a substantial decline starting in the early 2000's.

Realized Rate of Population Change

From: Forsman et al. *In press*. "Demographic Trends of Northern Spotted Owls: A Meta-analysis, 1985-2008."



The realized rate of population change indicated that the spotted owl population was stable on Green Diamond's study area until 2001 when it went into an apparent decline.



The expansion of the closely related barred owl into northern California was documented from the 1970's, but their numbers did not start to dramatically increase until the early 2000's.

Conclusions

- Population of NSO has been declining on Green Diamond's study area since 2001
- Declines in both fecundity and survival are contributing to the trend – barred owl covariate entered the top model for both survival and fecundity
- Is cause of the decline due to barred owls increase? Only hypothesis with any analytical support



The population of spotted owls on the Green Diamond study area was apparently stable or increasing until 2001 when the population appeared to begin a downward trend (Forsman et al. *In Press*). Although the 2008 meta-analysis did not have the ability to determine cause and affect relationships, the barred owl covariate with a negative coefficient was included in the top Green Diamond model for fecundity and apparent survival of spotted owls. It also should be noted that the jump in barred owl numbers on Green Diamond's ownership approximately coincided with the apparent decline in spotted owls. At this time, the only hypothesis for the decline in the spotted owl population on Green Diamond's ownership with any analytical support is the increase in barred owls. This is a hypothesis that we believe is in urgent need of additional testing.

U.S. Fish & Wildlife Service

**2010 Draft Revised
Recovery Plan
for the
Northern Spotted
Owl
(*Strix occidentalis
caurina*)**

September 8, 2010

Region 1
US Fish and Wildlife Service
Portland, Oregon



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Although the 2008 Recovery Plan for the Northern Spotted Owl was withdrawn and a new 2010 revised plan is pending, both plans retained the same language relative to the barred owl threat.

Draft Revised NSO Recovery Plan Continued

- “It is the Service’s position that the threat from barred owls is extremely pressing and complex, requiring immediate consideration.”
- “As a result, the Service recommended in the 2008 Plan that specific actions to address the barred owl threat begin immediately and in a coordinated manner. These actions are currently underway.”
- “The Service is currently developing a draft Environmental Impact Statement to assess the effects of barred owl removal experiments proposed in this revised Plan.”

The Service is still in the process of developing an EIS for doing barred owl removal experiments designed to determine the impact of barred owls on occupancy, survival and fecundity of spotted owls.

BO/NSO Life History Comparisons

- Barred owls are approximately 10% (males) to 25% (females) larger than spotted owl
- Barred owls initiate nesting earlier in the season and have higher fecundity
- Barred owls take many of the same prey (small mammals), but have a much more diverse prey base including fish, herps and inverts (e.g., slugs, snails, millipedes, crayfish, earthworms)
- Presumably, broader prey base is responsible for the smaller home ranges and potentially greater population density of barred owls

Barred and spotted owls are very similar in most aspects except barred owls utilize a much more diverse prey base. They appear to be able to take advantage of anything that is locally abundant from skunks to snails.

Life History Comparisons Continued

- Both species tend to select mature and old growth stands for roosting and nesting, but barred owls tend to differ in selecting:
 - flatter slopes,
 - lower more mesic locations,
 - and have greater overall habitat flexibility

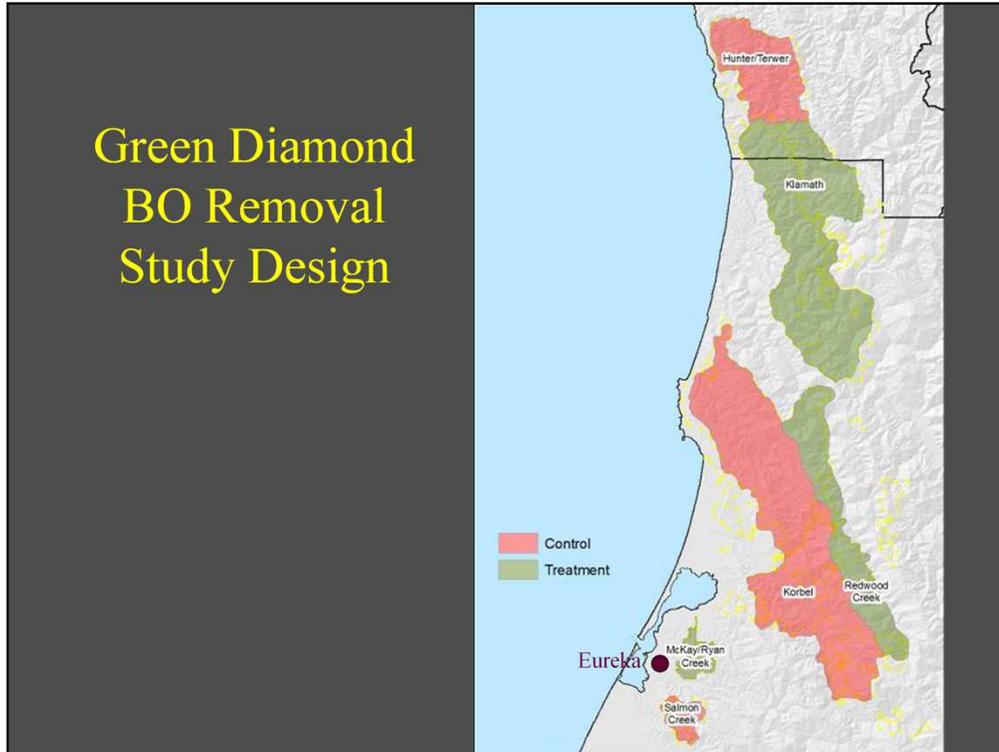
Contrary to early misconceptions, barred owls did not invade the Northwest because they can exploit highly fragmented forests. The pattern of barred owl colonization has shown that they tend to first occupy lower elevation old growth forests, but as the population grows in an area, other individuals are able to move into a broad range of forest types.

History of Barred Owl Collections on Green Diamond

- Initial collections in 2006 under California Academy of Sciences scientific collecting permit – allowed collection of 20; 9 taken on GD
- To maximize the scientific value of this action, collections were focused on historical NSO territories that had been colonized by BOs
- With support of the BOWG, 20 additional BOs collected in 2009 under Cal Academy permits to initiate removal study on GD study area
- A 3-year BO removal experiment was approved in 2010 on the GD study area: limit of 30 in any year with 70 total

The initial barred owls collected on Green Diamond were done through a Cal Academy permit. These owls were collected primarily at historical spotted owls sites that appeared to have been displaced by barred owls. These collections provided 'case studies' of the response of spotted owls to barred owl removal. With support of the Barred Owl Working Group (BOWG was formed from the 2008 NSO Recovery Plan), Green Diamond was encouraged to do additional collections in 2009 to serve as a pilot study for the federally proposed removal experiments. This pilot removal study was continued in 2010 with permits from the US Fish and Wildlife Service and California Department of Fish and Game to do a 3-year barred owl removal experiment.

Green Diamond BO Removal Study Design



The study design consists of paired treatment (barred owls removed) and control (no barred owls removed) areas within Green Diamond's long term demographic study area. The objectives are to determine the impact of barred owls on occupancy, survival and fecundity of spotted owls.



Given that the capture of barred owls is very labor intensive and ineffective, the only methodology to create treatment areas free of barred owls is through lethal control. The preferred method for achieving a humane kill while preserving a quality museum specimen is through the use of a shotgun. The dog insures recovery of specimens that may fall into dense shrubs at night and be impossible to see.



The remotely controlled digital caller is placed so that the barred owl will be drawn into landing at an appropriate location (approximately 30m away) so that identification is absolute and the shot is certain with virtually no probability of wounding. Given that barred owls are strongly territorial, playing high quality recordings of barred owl calls has been very effective in collecting all territorial barred owls from the treatment areas.



Besides the variety of scientific uses of the barred owl specimens by Cal Academy, a graduate student at Colorado State University (Krista Lewicki) is also using the specimens to do a comparative study of barred and spotted owl blood parasites.

Preliminary Results of BO Removal: Territory-specific “Case Studies”

NSOs apparently displaced from a historical site by BO pair using the same nest site or activity center. How do individual NSOs respond to the removal of the BOs?

- To date, 8 NSO territories that meet the above criteria
- Following BO removal, NSOs have re-occupied all of the sites
- Time for NSOs to re-occupy has ranged from 13 days to a year
- 3 sites re-occupied by original resident NSOs (including 1 female that hadn't been seen for 7 yrs) and the remaining sites re-occupied by new or unknown individuals
- NSOs were again displaced by BOs at 2 sites, 1 after 3 yrs and 1 after 4 yrs

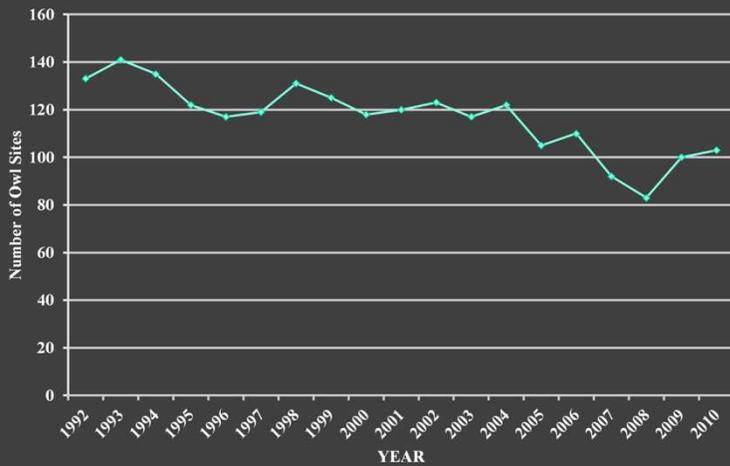
Tentative Conclusions from Removal Case Studies

- At least some resident NSOs apparently remain near their historical activity center for years following displacement by BOs
- High and often rapid re-colonization by both original resident and new NSOs suggests BOs tend to displace NSOs from high quality sites (i.e., BOs are taking sites that are in “high demand” by NSOs)

Preliminary results from the BO removal study

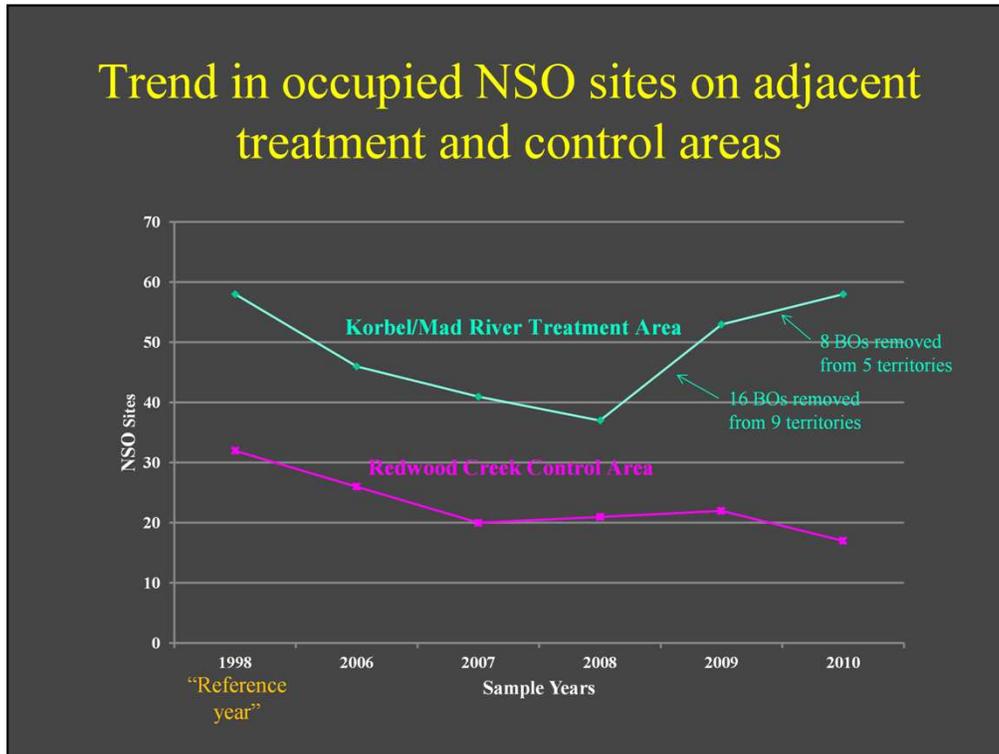
- 2009: 16 BOs were collected from 9 owl territories in the Korbel/Mad River treatment area (11 early and 5 late season)
- 2010: 8 BOs were collected from 5 territories in the same treatment area (all late season)
- Effort and cost was relatively low (e.g., initial collections of 100% of the known territorial barred owls were accomplished by 1 person with an average of 2.0 hours/BO (not including driving time to the site))

Trend in Occupied Sites on Green Diamond's Density Study Area

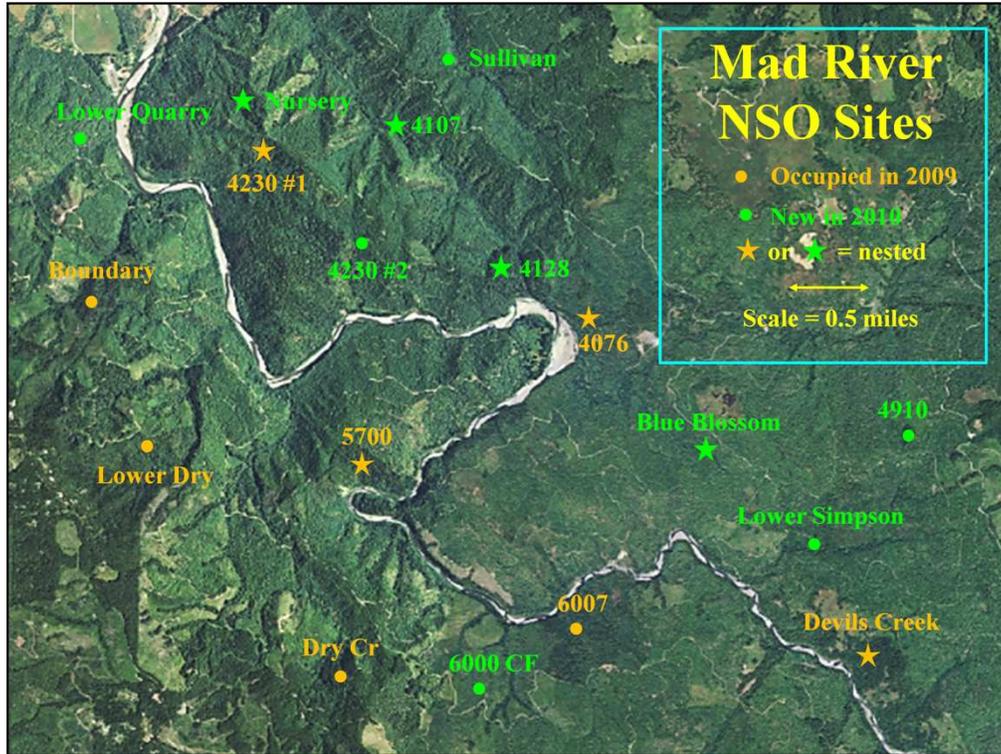


The overall trend in occupied spotted owl sites on Green Diamond's density study area (i.e., a portion of the study area that is completely surveyed each year) indicated a reversal in the downward trend in 2009 following the initiation of the barred owl removal experiment.

Trend in occupied NSO sites on adjacent treatment and control areas



The majority of this increase was due to the increase in the Korbelt/Mad River barred owl treatment area that has seen a dramatic increase in occupied spotted owl sites since 2009. In contrast, the Redwood Creek control area where no barred owls have been removed shows a continued downward trend.



The most dramatic increase in occupied owls sites occurred in the lower Mad River region where 10 new sites were colonized between 2009 and 2010. This cannot be explained by owl sites being ‘freed’ from barred owls and available for colonization by spotted owls, because most of these sites were not influenced by barred owls. We speculate that the removal area may be acting as a ‘refuge’ from barred owls that is causing spotted owls to be attracted to the area. Additional time will be required to fully understand this phenomenon.



Preliminary results suggest that we can control barred owls to recover spotted owls – but should we?

Ultimately society will make the decision, but don't we have an obligation to insure the decision is informed by science?

Courtesy Nick Nichols, NGM

Doing a barred owl removal experiment is highly controversial and any proposals to do range-wide barred owl management will be even more controversial. However, we believe the removal experiments are essential so that land managers and society at large will be able to make decisions informed by science.