Final report, Joint Fire Science Program, AFP 2004-2

Project Number: 04-2-1-95

Project Title: The influences of post-fire salvage logging on wildlife populations.

Project Location: Davis Lake Fire, Deschutes National Forest in central Oregon

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This final report details findings to date, and lists proposed and accomplished deliverables. Details on the study background, objectives, and methods are presented in the Annual Report of the Co-operative Forest Ecology Research (CFER) program (at http://www.fsl.orst.edu/cfer/research/pubs/06AnnualReport/pdfs/Manning.pdf) which can be considered a contribution to the final report.

SUMMARY OF FINDINGS TO DATE

Bird population responses

- A total of 34 species of birds registered during two seasons of point counts. Of these, 15 species and one genus were abundant enough to warrant analysis.
- Significant effects of salvage logging on bird abundance were demonstrated for 6 species.
- For species whose abundances did differ, differences were probably related to effects on foraging and nesting habitat components.
- Several species (brown creepers, yellow-rumped warblers, and 2 species of woodpeckers) were more abundant in unsalvaged stands. The western wood pewee also trended in that direction. While this response might be expected for woodpeckers and creepers which feed primarily on insects found in dead trees, and which nest in cavities of dead trees, the responses of warblers and pewees is harder to explain.
- Species which feed and nest primarily on the ground, specifically the fox sparrow and the dark-eyed junco, were more abundant in salvaged stands. This may be due to greater percent cover of shrubs in these stands. The post-fire shrub community was dominated by fire-adapted crown-sprouting species, primarily snowbrush (*Ceanothus velutinus*) and chinkapin (*Chrysolepis chrysophylla*), which recovered very quickly and provided large amounts of cover in salvaged stands. The apparent greater rapidity of this recovery in heavily salvaged stands may be due to previous management history more than to snag density.
- Intensity of salvage had no apparent effect on differences in bird abundance, where such were measured. This may be because our two salvage intensities were not distinctive enough in terms of snag densities.

Rodent population responses

- We captured a total of 11 species of small mammals in the two summers we sampled at Davis. This represents over 8700 captures of 2887 individuals.
- Four species occurred in every study area and were abundant enough to analyze. These were the yellow-pine chipmunk (*Tamias amoenus*), Siskiyou chipmunk (*T. siskiyou*), golden-mantled ground squirrel (*Spermophilus lateralis*) and deer mouse (*Peromyscus maniculatus*).
- Species captured in numbers too small for population analyses were: vagrant shrew (*Sorex vagrans*), northern flying squirrel (*Glaucomys sabrinus*), Belding ground squirrel (*Spermophilus beldingi*), bushy-tailed woodrat (*Neotoma cinereus*), heather vole (*Phenacomys intermedius*), snowshoe hare (*Lepus americanus*) and ermine (*Mustela erminea*).
- For each of the 4 widespread/common species, we analyzed for salvage effects on 3 population parameters: abundance, probability of survival, and recruitment. We also computed two indices of species diversity (Simpson's index and the Shannon-Weiner function). We used a repeated-measures analysis of variance design to investigate both treatment effects and interannual patterns for these 3 population parameters and two diversity measures.
- In not a single case did we find a significant effect of salvage logging, or the intensity of salvage, on any population or community parameter for the 4 species analyzed. This is true even though we used a "relaxed" ecological criterion for Type I error, $\alpha = 0.10$. However, there was a trend for Siskiyou chipmunks to have slightly lower survival in heavily-salvaged treatment areas ($P = 0.1006$).
- Between the two years (2005 and 2006) of our sampling, there were highly significant increases in abundance for golden-mantled ground squirrels and yellow-pine chipmunks. Deer mice increased as well, but the significance of this increase is marginal ($P = 0.097$). Species diversity did not change significantly during this time.
- Recruitment was significantly higher in 2005 than in 2006 for deer mice and Siskiyou chipmunks, and golden-mantled ground squirrels trended in this direction ($P = 0.1005$).

Bat activity in relation to salvage intensity

- We recorded over 20,000 bat echolocation calls in 2005 and about 37,000 in 2006.
- Analysis of these call data are still in progress. At the time of this report, several weeks' worth of call identification work remains.
- Preliminary analysis suggests that bat activity, as indexed by numbers of echolocation calls per unit of recording effort, is higher in heavily-salvaged treatment areas than in moderately-salvaged or uncut areas. ***But it must be emphasized that this pattern may not hold up once all calls are identified.***

Proposed	Delivered	Status
Final report to BLM on aborted Timbered Rock work	Wildlife detections at the Timbered Rock Fire, Spring 2004.	Delivered to BLM 3 March 2005
JFSP annual report	2006 Annual Report	Done
CFER annual reports 2005 and 2006	http://www.fsl.orst.edu/cfer/pdfs/CFER_ar.pdf http://www.fsl.orst.edu/cfer/research/pubs/06AnnualReport/pdfs/Manning.pdf	Done
Project updates on CFER website	http://www.fsl.orst.edu/cfer/research/resproj/structr/str-stdy/s15.html	Done
Field tour with oral presentations	Sept 29, 2005	Done
Oral Presentation	Cahall, R., Hayes, J. Comparing avian communities after fire and salvage logging. 4th Annual Symposium on Research Advances in Fisheries, Wildlife and Ecology. Nov 8 2006. Oregon State University, Corvallis	Done
Oral Presentation	Cahall, R., Hayes, J. Influences of post-fire logging on avian populations. Workshop on The Scientific Foundations of Post-Fire Policy. Mar 12 2007, Oregon State University, Corvallis	Done
Oral Presentation	Cahall, R., Hayes, J. Influences of salvage on avian populations at Davis Lake, OR. The Wildlife Society OR/WA joint annual meeting. Pendleton, OR. April 12 2007	Done

Oral Presentation	Cahall R. and Hayes J., The influence of salvage logging on avian populations after the Davis Lake fire. Graduate Student Symposium, Dept of Forest Science, OSU, May 16, 2007.	Done
Oral Presentation	Cahall R., Hayes J., June 2007. Presenting at North American Forestry Ecosystems Workshop. Vancouver, BC.	Pending
Contribution to Special Report	Wildlife and Ecosystem Dynamics: protecting wildlife in dynamic, unpredictable ecosystems. Oregon Forest Resources Institute Special Report	Done
Master's thesis on bird work	Defense May 31 2007. Thesis to be submitted July 6, 2007	In progress
Publication	Cahall, R., J. Hayes, and J. Cissel. The effects of salvage logging after fire on forest songbirds in the Oregon Cascade Range.	To be submitted to Forest Ecology and Management in August 2007
Publication	Cahall, R., J. Hayes, and J. Cissel. Foraging ecology of two species of woodpeckers in a post-fire forest after salvage logging.	To be submitted to the Journal of Field Ornithology in August 2007
Publication	Manning, T., J. Hayes and J. Cissel. Rodent population and community responses to post-fire salvage logging.	To be submitted to Ecological Applications in late 2007
Publication	Manning, T., J. Hayes and J. Cissel. Influence of post-fire salvage on bat foraging activity.	To be submitted to Ecological Applications in late 2007
USGS Fact Sheet	Influence of post-fire salvage logging on wildlife.	To be synthesized once the main publications are finished, in early 2008.