Initial Effects of Intensive Forest Management on Bird Abundance and Diversity

Jake Verschuyl, NCASI
Matthew Betts, Oregon State University
Jim Rivers, Oregon State University
Jack Giovanini, Weyerhaeuser
Andrew Kroll, Weyerhaeuser
Research Objectives

Evaluate how bird abundance and diversity varies across a gradient in management intensity

*How can plantation management practices maintain biodiversity while still producing timber?*
Did we accomplish our treatment objectives?
2014 CONTROL: NO SPRAY
2014 LIGHT:
1 HERBACEOUS SPRAY (2011);
1 WOODY VEG SPRAY (2012)
2014 MODERATE:
1 SITE PREP WOODY SPRAY (2010);
1 HERBACEOUS SPRAY (2011)
2014 INTENSIVE:
1 SITE PREP WOODY SPRAY (2010);
2 HERBACEOUS SPRAYS (2011, 2012);
Control

Light

Moderate

Intensive

Google Earth; taken mid-summer 2014
Shrub Cover by Treatment and Year

![Graph showing shrub cover by treatment and year]

- Treatment: Control, Light, Moderate, Intensive
- Percent shrub cover (+/- 1 SD)

The graph illustrates the percent shrub cover for different treatments across various years, showing variations in shrub density and coverage.
Shrub Species Richness by Treatment and Year
Songbirds After Timber Harvest

• Most species are new colonizers, not birds from previous stands
• First few years of stand growth and bird community development are comparatively unstudied
• Which species colonize first?
• Which species stay as conifer cover increases?
• How is the trajectory of bird community development affected by management intensity?
Point Count Sampling

- Observations from census locations taken 4 times during the breeding season for 4 years (2011-2014)
- 96 point count stations
- 10 minute sampling (Ralph et al. 1995)
- 50-m fixed radius for analysis
Bird point count data analysis

N-mixture model (Royle 2004) to estimate detection probabilities and abundance

• Incorporates full study design including treatment x year interactions
• Block and site effects
• Bird detection allowed to vary with time of year and broadleaf cover

Multi-species occupancy model for species richness estimates
Total Bird Abundance

![Graph showing total bird abundance over years with different treatments: Control (green), Light (blue), Moderate (orange), Intensive (red). The x-axis represents years (2011 to 2014), and the y-axis represents total abundance (95% CI). The graph indicates variability in bird abundance across treatments and years.](image-url)
Generalists and Specialists

1. House Wren
2. White-crowned sparrow
3. Dark eyed junco
4. American goldfinch
5. Violet-green swallow
6. Rufus hummingbird
7. Song sparrow
8. Western bluebird
9. Wilson’s warbler
10. Orange-crowned warbler
11. Spotted towhee
12. Swainson’s thrush
13. Townsend’s solitaire

Early-seral associated species (Betts et al. 2013)

85% of all detections

Broadleaf early-seral associate – leaf gleaner or flower pollinator
Abundance of Habitat Generalists

Control vs. Treatment Contrasts
Abundance of Early-seral Specialists

Control vs. Treatment Contrasts
Control vs. Treatment Contrasts for Cumulative Abundance of 6 Early-seral Associated Species
Moderate vs. Treatment Contrasts for abundance of 6 early-seral associated species
Bird Species Richness Estimates
Bird Diversity in Young Productive Forests


Conclusions

- Dichotomy in shrub cover between Control and Light vs. Moderate and Intensive treatments
- Bird colonization effect was evident between 2011 and 2012
- Abundance for early seral species was reduced in relation to the Control for the first two years of stand growth
- 2013 and 2014 data suggest recovery...2015?
- Negative effect of moderate and intensive treatments still remains for orange-crowned warbler and rufus hummingbird
- Habitat generalists varied in response; Aerial insectivores responding positively to intensified treatments
- Conifer nesting species just now beginning to colonize
Thanks

Cooperating forest managers and biologists:

- Josh Johnson, Steve Keniston, Mike Rochelle and Tim Tompkins – Weyerhaeuser
- Jenniffer Bakke, Jeff DeRoss, Rudy Frazzini, Al Heimgartner, Tim McBride, Jake Thiemens and Andy Weathers – Hancock
- Don Irons and Jeff Light – Plum Creek
- Erick Finnell, Tona Mortensen, Mitch Taylor and Joe Travers – Oregon Dept. of Forestry
Thanks

Field assistants:

• 2011: Laurie Clark, Tristan Gingerich, Adam Kern, Anna Sample and Sachiko Schott
• 2012: Sean Clawson, Amy Comstock, Stephanie Doorley, and Kyle Pritchard
• 2013: Nathan Marcy, Chris Adlam, Lindsay Mangan
• 2014: Nathan Marcy, Chris Adlam, Marjorie MacIntosh