

## Title

Assessing the demographic response of early seral songbird species to intensive forest management

## Investigators

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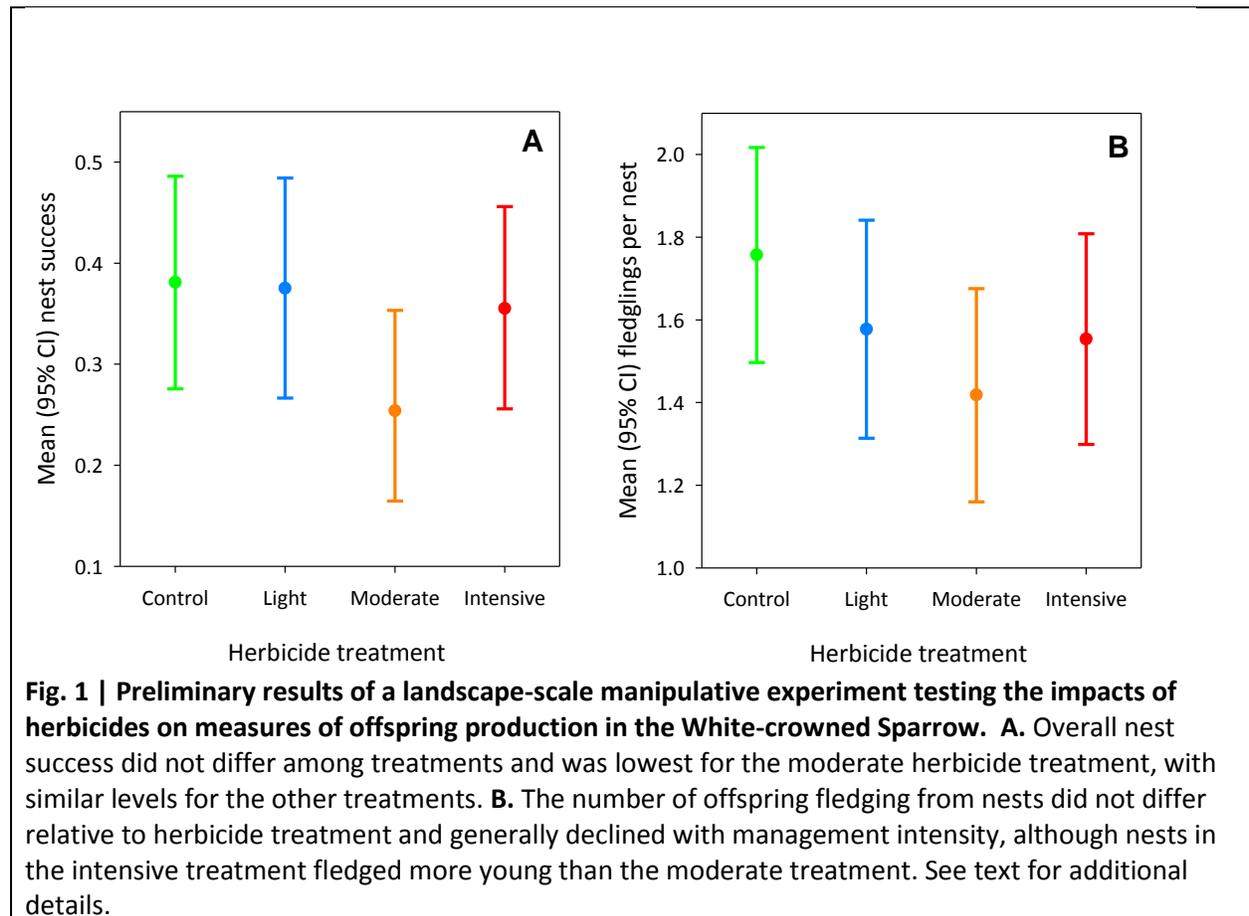
## Project duration

Our group initiated a two-year (2013-14) landscape-scale manipulative experiment to assess how IFM impacts songbirds that require early seral forests. Funding from FWHMF funding was obtained to expand this work by supporting field operations to be undertaken during the 2015 field season (May-August).

## Objectives

1. Determine whether the intensity of herbicide application is linked to songbird nesting success.
2. Quantify juvenile survival during the critical period immediately after young fledge from the nest.
3. Assess survival of adults that depend on early seral habitats to raise their young.

## Summary of accomplishments over past year





The avian demography study finished its second field season during May-August 2014 with a very successful campaign. We used a smaller but more experienced crew than was used in 2013, allowing us to markedly increase the amount of data relative to that collected in 2013. Specifically, we (1) estimated nest survival and offspring production for 535 White-crowned Sparrow nests to evaluate how the intensity of herbicide application is linked to songbird nesting success, (2) assessed post-fledgling

survival and habitat use for 45 nestling sparrows to understand how survival is impacted by herbicide use, and (3) marked and measured 230 adult sparrows and 820 nestling sparrows to quantify return rates and apparent survival. During the course of our field operations we also (4) evaluated survival of >170 nests of 21 additional open-cup nesting bird species. In addition, we also (5) monitored >285 House Wren nests for survival and offspring production, (6) quantified the body condition of >690 wren nestlings to evaluate the interactive effects of intensive forest management practices and ambient temperature on offspring production as part of a related study serving as the M.S. thesis project of graduate student Kristin Jones. Finally, we filmed >110 wren nests to collect adult feeding data to evaluate how food provisioning to offspring varied relative to herbicide treatment as part of a related study serving as the honors thesis project of undergraduate student Jonah Powell.

Our preliminary results have revealed that herbicide treatment had a marginal difference on sparrow nest success ( $\chi^2 = 7.27$ ,  $P = 0.637$ ; Fig. 1A), with no significant pair-wise differences between treatments. Of note, the moderate treatment had the lowest estimate of nest survival, whereas other treatments had similar estimates. In addition, we did not detect a significant treatment effect on the number of sparrow fledglings produced per nest ( $F_{3,755} = 7.27$ ,  $P = 0.637$ ; Fig. 1B), although there was a linear decline with increasing herbicide intensity across all treatments except the intensive herbicide treatment.

#### **Problems, barriers, proposed changes to objectives:**

We did not experience any noteworthy problems or barriers to field work during summer 2014; this was due largely due to refinement of procedures that were undertaken during our initial year of field work in 2013 and will insure success during future field operations. However, we do have one proposed change that pertains to the timing of field work. Observations made during summer 2014 indicated that the expected post-herbicide green-up is currently in process but has not advanced at the rate initially expected for all treatments. Because of this, we propose to shift our investigation of this response so that field work is conducted during 2016 breeding season (May-August), instead of the 2015 breeding

season (as outlined in our original proposal). Adopting this change should provide us with the best opportunity to detect the effect of long-term herbicide treatments on demographic measures and, in particular, the green-up that occurs after chemical control of hardwood plants is terminated.

**Planned work:**

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Our planned work remains as outlined in the initial project proposal. We plan to assess the demographic parameters of White-crowned Sparrows during the breeding season on our established study sites in the Oregon Coast Range by searching for sparrow nests, monitoring them for survival, and assessing the quality and quantity of offspring produced. For a subset of nests that produce young, we will attach VHF radio tags to nestlings to quantify survival, movement, and habitat use during the juvenile period. Additionally, we will measure vegetation at nests and post-fledging locations to assess how vegetation use varies relative to herbicide treatment. Finally, we will capture adult sparrows, take morphological measurements, and obtain blood samples to measure stress hormone levels using standard procedures. Prior to release, we will band each adult with a unique color band combination that allows for assessing local survival without recapturing individuals.

**List of names and brief overview of graduate and/or undergraduate engagement in project:**

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Kristin Jones (Department Forest Ecosystems and Society, Oregon State University) is involved with the project as a graduate student and is collecting data toward her M.S. thesis by investigating the interactive effects of intensive forest management and temperature on offspring production in the House Wren.

Jonah Powell (Department of Fisheries and Wildlife Science, Oregon State University) is involved with the project as an undergraduate student and is collecting data towards his Honors thesis by studying how offspring provisioning behavior of the House Wren is influenced by the intensity of forest management practices.

During summer 2014, 10 enrolled and recent graduates from colleges and universities across the United States were hired to undertake field data collection for project objectives. In addition, during the 2014-15 academic year an additional 17 undergraduate students from Oregon State University will obtain research experience on the project by collecting House Wren adult provisioning data from videos made during summer 2014.

**List of presentations, posters:**

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Betts, M. G. 2014. Introduction to the Intensive Management Study. Invited oral presentation at the Wildlife in Managed Forests: Songbirds and Early Seral Habitats Symposium, Oregon Forest Resources Institute, Albany, Oregon.

Betts, M. G. 2014. Are changes in bird abundance likely to influence insect abundance and herbivory on trees? Invited oral presentation at the Wildlife in Managed Forests: Songbirds and Early Seral Habitats Symposium, Oregon Forest Resources Institute, Albany, Oregon.

Jones, K. N., J. W. Rivers, and M. G. Betts. 2014. Effects of intensive forest management on reproductive success in a cavity-nesting songbird. Poster presentation at the 132<sup>nd</sup> meeting of the American Ornithologists' Union, Estes Park, Colorado.

Rivers, J. W. 2014. Songbird demography in early seral habitats. Invited oral presentation at the Wildlife in Managed Forests: Songbirds and Early Seral Habitats Symposium, Oregon Forest Resources Institute, Albany, Oregon.

Rivers, J. W., J. Verschuyf, A. J. Kroll, and M. G. Betts. 2014. Quantifying the demographic consequences of intensive management practices on breeding birds in early seral plantation forests. Invited oral presentation at the 2014 Annual Meeting of the Oregon Chapter of The Wildlife Society, Bend, OR.

Rivers, J. W., and M. G. Betts. 2014. Intensive forest management practices reduce nest survival and offspring production: evidence from a landscape-scale experiment. Oral presentation at the 132<sup>nd</sup> meeting of the American Ornithologists' Union, Estes Park, Colorado.

Verschuyf, J., A. J. Kroll, J. W. Rivers, K. Jones, and M. G. Betts. 2014. A manipulative study of the effects of forest herbicide use on nest success of early seral birds. Oral presentation at the 2014 Annual Meeting of the Washington Chapter of The Wildlife Society, Pasco, WA.

**List of publications, thesis citations:**

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Jones, K. N. Investigating interactions between elevation and forest management: microclimate influences breeding in a cavity-nesting songbird with implications for avian response to climate change. M.S. thesis, Department of Forest Ecosystems and Society, Oregon State University.

Powell, J. K. An experimental test of how intensive forest management impacts parental provisioning of young in the House Wren. Honors thesis, Department of Fisheries and Wildlife Science, Oregon State University.