

## Title

Revisiting the CFIRP: Assessing long-term ecological value and characteristics of snags created for wildlife

## Investigators

Dr. James W. Rivers (CoF, OSU), Dr. Joan C. Hagar (USGS)

## Project duration

Our group initiated a two-year (2015-2016) study to assess snag characteristics, as well as foraging and breeding use of snags that were created as part of the College of Forestry Integrated Research Project (CFIRP).

## Objectives

1. Quantify contemporary foraging and nesting use of 25-year old snags by birds.
2. Assess whether silvicultural treatments undertaken at the time of snag creation have caused differences in contemporary snag characteristics.
3. Measure contemporary avian community response to created snags.

## Summary of accomplishments over past year

During the May-July 2015 breeding season we regularly surveyed snag use by birds for nesting and foraging in a large sample of created snags (n=136). We found 13 active bird nests belonging to 2 forest species (Table 1). The majority of nests belonged to the Chestnut-backed Chickadee (see Tables 1 and 2 for scientific names), an obligate cavity-nesting species; the other lone nest belonged to a Red-breasted Nuthatch (Table 1). Through the course of regular field work we also located an additional 16 nests in non-focal created snags of the Chestnut-backed Chickadee (n=14 nests), Northern Flicker (n=1 nest), and Northern Pygmy Owl (*Glaucidium gnoma*, n=1 nest); these supplemental data from non-focal snags were not used in use estimates because these snags were not included in the original sampling frame. All monitored nests appeared to successfully produce offspring based on behavioral observations made in the vicinity of nest sites.

Table 1. Number of active nests located in 836 created snags surveyed during the 2001 breeding season from Walter and Maguire (2005) contrasted with those located during the 2015 breeding season in 136 focal snags.

Species	2001		2015	
	# nests	% total nests*	# nests	% total nests
Chestnut-backed Chickadee ( <i>Poecile rufescens</i> )	56	33%	12	92%
House Wren ( <i>Troglodytes aedon</i> )	31	18%	0	0%
European Starling ( <i>Sturnus vulgaris</i> )	28	16%	0	0%
Red-breasted Sapsucker ( <i>Sphyrapicus ruber</i> )	21	12%	0	0%
Red-breasted Nuthatch ( <i>Sitta canadensis</i> )	15	9%	1	8%
Violet-green Swallow ( <i>Tachycineta thalassina</i> )	10	6%	0	0%
Northern Flicker ( <i>Colaptes auratus</i> )	7	4%	0	0%
Hairy Woodpecker ( <i>Leuconotopicus villosus</i> )	1	1%	0	0%
<b>All species combined</b>	<b>169</b>	<b>---</b>	<b>13</b>	<b>---</b>

\* Total does not sum to 100% because of rounding error.

Nest searching efforts conducted on created snags during the 2001 breeding season found active bird nests in 20.2% of the 836 created snags that were monitored (Walter, S. T., and C. C. Maguire, 2005, Journal of Wildlife

Management 69:1578-1591). In contrast, we found proportionally fewer snags harbored nests during the 2015 breeding season, with nests located in only 9.6% of 136 created snags (Table 1). Nests were found in all three silvicultural treatments, with more nests in the group selection (n=7) than either the clearcut (n=3) or the two-story treatments (n=3). Chickadee nests were found nesting in all three treatments whereas the lone nuthatch nest was found in a stand subjected to the group selection treatment. The relative composition of active nests used by Chestnut-backed Chickadee, a species classified as a weak cavity excavator, shifted from 33% in 2001 to 92% in 2015. Moreover, we detected a notable decline in strong excavators that nested in created snags in 2001 (i.e., Red-breasted Sapsucker, Northern Flicker, and Hairy Woodpecker), yet these species were detected regularly near created snags during the course of field work. Taken together, this suggests that the suitability of created snags as a nesting resource has decreased markedly in the ca. 25 years since their creation. Beginning in February 2016 we will begin measuring snag characteristics (see below) so we will be able to incorporate long-term data on how these attributes of created snags change over time.

In addition to nesting activity, we also quantified bird use of created snags in the context of foraging activities during the breeding season. We amassed >300 hours of observations on our 136 focal snags, documenting foraging on snags by 11 bird species on 32 separate occasions (Table 2). Thus, foraging was observed on 23.5% of the snags although the rate of foraging observations was rather low (0.105 observations/hour). The greatest number of foraging observations were made in the group selection treatment, followed by the clearcut, and the two-story treatments (Table 2). The Pileated Woodpecker was most commonly observed foraging on created snags (n=10 observations), followed by the Brown Creeper (n=6 observations) and the Chestnut-backed Chickadee (n=5 observations); 8 additional species were observed foraging on created snags 3 times or less.

We note that data collection for objective #2 is scheduled to take place in early 2016 (see below); we also note that data collection towards objective #3 is restricted to 2016 because of initial uncertainty about logistical constraints during 2015 (which have since been removed because of the availability of additional funding). Importantly, a single year of data is expected to be adequate to document long-term changes in the local avian community as a function of original silvicultural treatments, so we do not anticipate any issues in fulfilling all project objectives within our proposed timeline.

Table 2. Distribution of bird foraging observations collected during focal watches on 136 created snags from May-July 2015 relative to initial silvicultural treatment.

Species	# of foraging observations		
	Clearcut	Group selection	Two-story
Pileated Woodpecker ( <i>Hylatomus pileatus</i> )	6	3	1
Brown Creeper ( <i>Certhia americana</i> )	0	5	1
Chestnut-backed Chickadee	1	3	1
Red-breasted Nuthatch	0	3	0
Pacific Wren ( <i>Troglodytes pacificus</i> )	0	2	0
Northern Flicker	0	1	0
Red-breasted Sapsucker	0	0	1
Gray Jay ( <i>Perisoreus canadensis</i> )	0	1	0
Barred Owl ( <i>Strix varia</i> )	0	0	1
Swainson's Thrush ( <i>Catharus ustulatus</i> )	1	0	0
Black-throated Gray Warbler ( <i>Setophaga nigrescens</i> )	1	0	0

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

---

We did not experience any significant problems or barriers to field work during summer 2015. One minor issue that did arise is that the video cameras we borrowed to peer into nest cavities to quantify nest survival and record nesting data (e.g., clutch size) were too large and could not be used as planned. However, we were still able to quantify nest success using a more traditional manner by recording behaviors around the nest site that are indicative of successful nests (e.g., parents entering the cavity with food, begging calls of fledglings near the nest).

We plan to expand our study objectives in 2016 in two distinct ways. First, we were able to leverage this project to obtain additional funding for assistance with field work. This will also allow us to expand the number of created snags we will be able to monitor during the 2016 breeding season from n=136 snags to n=196 snags, an increase of 44%. Second, we are expanding our project to incorporate historical data on bird use and snag characteristics to evaluate how the physical characteristics of created snags have changed across a 25-year period, and examine how these characteristics are linked to changes in foraging and nesting resource for birds. In the past year we have obtained data on characteristics of individual snags (e.g., bark cover, decay class, standing/downed status) that were collected at the time of snag creation (1990-92) and at various points afterwards (1995, 2001, and 2008). We will collect the same measurements as previous studies that allow us to use an extensive time dataset that tracks changes in individual snag characteristics across their lifespan. Likewise, we will also be able to leverage historical data on breeding birds that allow us to follow avian community response to created snags (via nest counts) and silvicultural treatments (via point counts) at several points in time (i.e., 1990-92, 1995, and 2001). We are undertaking this additional objective after determining that historical data were available and were in a format that could be directly compared with contemporary data collection.

**Planned work**

---

Our planned work remains as outlined in the initial project proposal. At the current time, graduate student Amy Barry (née Comstock) is collating historical data from multiple sources, undertaking preliminary analysis, and preparing for an expansion of field work in 2016 made possible by additional funding. Snag characteristic surveys will be undertaken in late winter-spring 2016, and foraging observations, nest searching, and point counts will be conducted during late spring-summer 2016. We anticipate data collection on the project to be finished by August 2016; analysis and write-up will continue through spring 2017, at which time manuscripts should be finalized for submission to peer-review journals.

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

---

Amy Barry in the 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 use of created snags by wildlife, with a focus on understanding contemporary use of snags as foraging and nesting substrates by birds. In 2015 she hired and worked closely with two recent Oregon State University graduates to collect data on the project.

In addition, our group has provided outreach activities to high school students as part of the College of Forestry STEM Academy program. Students were taught about the importance of snags and cavity-nesting species in forested ecosystems and were introduced to research methodologies used to study forest birds. We also worked with videographers creating an outreach video for the College Forests, and informally presented research to Sarah Beldin with USGS (FRESC) for general use at USGS. Finally, we have also provided an

interview to Hannah O'Leary for an article for the Oregon Stater magazine focused on the history of the College Forest.

#### **List of presentations, posters**

---

Comstock, A. M. 2014. An investigation of long-term avian use of created snags in managed forests. Oral presentation to the AVES seminar group, Oregon State University, Corvallis, Oregon.

Comstock, A. M. 2015. An investigation of long-term use of created snag by cavity-nesting birds in timber stands in the Pacific Northwest. Poster presentation at the annual Western Forestry Graduate Research Symposium (WFGRS), Oregon State University, Corvallis, Oregon. **Won award for best overall poster.**

#### **List of publications, thesis citations:**

---

Barry, A. M. An assessment of the long-term ecological value and characteristics of snags intentionally created to provide habitat for wildlife. M.S. thesis, Department of Forest Ecosystems and Society, Oregon State University. Anticipated March 2017.

Barry, A. M., J. C. Hagar, and J. W. Rivers. Created snags provide long-term ecological value for birds breeding in managed Douglas-fir forests. For *Ecological Applications*. Anticipated March 2017.

Barry, A. M., J. C. Hagar, and J. W. Rivers. Long-term changes in physical characteristics of Douglas-fir snags intentionally created as wildlife habitat. For *Forest Ecology and Management*. Anticipated March 2017.