White-headed Woodpecker monitoring for the Southern Blues Restoration Coalition CFLRP, Malheur National Forest, 2019 progress report

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To: Southern Blues Restoration Coalition, Malheur National Forest

Introduction

The Collaborative Forest Landscape Restoration Program (CFLRP) is a cooperative effort to restore ecological function to U.S. forests. Monitoring is a key component of the CFLRP and our work is designed to address how well the Southern Blues Restoration Coalition CFLRP is meeting their forest restoration and wildlife habitat conservation goals. The white-headed woodpecker (*Dryobates albolarvatus*; WHWO) is a regional endemic species of the Inland Northwest and may be particularly vulnerable to environmental change because it occupies a limited distribution and has narrow habitat requirements in dry conifer forests. Monitoring in CFLRPs, such as the Southern Blues Restoration Coalition (SBRC) project on the Malheur National Forest (MNF), also contributes to other ongoing, regional efforts to monitor effectiveness of silvicultural and prescribed-fire treatments for WHWOs throughout their range in Oregon (Lakeview Stewardship CFLRP, Fremont-Winema National Forest), Idaho (Weiser-Little Salmon Headwaters CFLRP, Payette National Forest), and Washington (Tapash Sustainable Forest Collaborative, Okanogan-Wenatchee National Forest). Standardized monitoring protocols are being used across this regional effort (Mellen-McLean et al. 2013), leveraging the SBRC results and aiding in adaptive management decisions. Vegetation and fuels data collection also support modeling of fire-climate impacts on future forest conditions, and wildlife habitat suitability based on nest-site selection and reproductive survival (Carnwath et al. 2013).

To meet their various ecological needs, WHWOs require heterogeneous landscapes characterized by a mosaic of open- and closed-canopied ponderosa pine forests (Wightman et al. 2010, Hollenbeck et al. 2011, Latif et al. 2015, 2020), similar to historical conditions described by Hessburg et al. (2005). Consequently, monitoring WHWO populations and their habitat associations is central to biological monitoring for the SBRC project on the MNF, a dry mixed-conifer forest within the range of this species. Prescribed burning and thinning treatments planned under this CFLRP are intended to improve the landscape heterogeneity required by WHWOs. Thus, the principal goal of monitoring is to verify the effectiveness of these treatments for improving habitat and populations of WHWOs. This report summarizes the data obtained during the sixth year (2019) of study and future plans for monitoring. We did not conduct surveys in 2018.

Methods

Detailed methods pertaining to all aspects of field data collection are available in Saab et al. (2014). We visited 300 survey stations twice to conduct point count surveys during the 2019 nesting season (1st visit: 20 May – 13 June; 2nd visit: 14 June – 2 July; Figures 1a and 1b) and completed 2 nest surveys for WHWO along each transect. We visited all WHWO nests twice per week on average to determine nest survival and productivity. Our field crew sampled vegetation at all nest locations and at 21 recently thinned survey points in treatment units.

Results
We conducted point count surveys, nest searches, and nest monitoring for WHWOs at 30 transects (300 points) in 2019. We detected WHWOs 45 times at 41 points. Thirty individuals were detected along control transects, 9 individuals were detected at pre-treatment transects, and 6 individuals were detected at post-treatment transects (Table 1). WHWOs were detected at 21 of 30 transects, during both visits at 9 transects, and during either visit 1 or visit 2 at 12 transects (Table 1). Only 2 points along 2 different transects had WHWO detections during both visits, whereas 9 transects (i.e., 90 points) had no detections during either visit. Detections were made aurally 14 times and visually 31 times. Thirty detections were <50 m distance, 11 detections were recorded between 50-150 m, and 4 detections were >150 m. Individuals were identified as female and male during 10 and 24 detections, respectively, and gender was not identified for 11 detections.

Outside of formal surveys, WHWOs were detected on 8 occasions before or after surveys, and 7 times while walking between point-count survey stations. Non-target woodpeckers (Williamson's sapsucker [*Sphyrapicus thyroideus*], red-naped sapsucker [*S. nuchalis*], downy woodpecker [*Dryobates pubescens*], hairy woodpecker [*D. villosus*], black-backed woodpecker [*Picoides arcticus*], northern flicker [*Colaptes auratus*], and pileated woodpecker [*Dryocopus pileatus*]) were commonly detected during point-count surveys.

We located and monitored the survival of 37 nests (Figures 1a and 1b, Appendix). Twenty-two nests were associated with control transects, 3 nests were associated with pre-treatment transects, and 6 nests were associated with post-treatment transects. The remaining 6 nests were found incidentally and were assigned a nest ID to the nearest transect, regardless of distance. Twenty-two nests survived to fledge 2.54 nestlings on average, based on the last accounts of nest contents (Appendix).

Vegetation data were collected at all nest locations and at 21 post-treatment point-count survey locations for 6 of 30 monitoring transects (ELKT2, PAWT1, WOLFTA1, WOLFTA2, WOLFTB2, and WOLFTB3; Table 2). Tree densities were variable at WHWO nests and non-nest point-count survey locations but decreased in all size classes following CFLRP treatments. Snag densities were consistently higher at nest locations for snags ≥ 10", compared to non-nest locations except for control locations. WHWOs generally selected larger diameter nest trees at all locations compared to those associated with non-nest locations, regardless of treatment (Table 2).

Of the 37 nests found in 2019, 27 were located in ponderosa pine snags, 8 were in live western juniper (*Juniperus occidentalis*), and 2 nest cavities were in quaking aspen (*Populus tremuloides*; 1 snag, 1 live tree). This pattern remains consistent with nest tree species selection from previous years for pre-treatment and control transects, though differs from nests associated with post-treatment transects where ponderosa pine remains the only tree species used for nest placement (n=13 nests, Table 2). Tree species composition within plots at nest locations and point count survey locations was diverse, but primarily dominated by ponderosa pine with lesser amounts of western juniper, curl-leaf mountain mahogany (*Cercocarpus ledifolius* var. *intercedens*), *Abies* spp., and Douglas-fir (Table 2). Western juniper was at least three times more abundant than other tree species at nest-site plots associated with control transects than all non-nest plots regardless of treatment. CFLRP treatments slightly decreased and increased the composition of ponderosa pine for ≥ 10-20" and ≥ 20" size classes, respectively, at non-nest treatment transects (Table 2). The ≥ 10-20" size class for ponderosa pine occupied the largest component of all vegetation plots for nest and point-count survey locations.

Discussion
Total detections of WHWOs were quite a bit lower in 2019 compared to previous years (Saab et al. 2014, 2015, 2017, 2018). Though total detections were down, detections at the transect level were similar to the average for all years of the study, and slightly higher than that reported for Oregon (i.e., 67%, Latif et al. 2015). Interestingly, nest numbers were the highest yet for our study in 2019, suggesting that survey conditions or observer experience may have contributed to low WHWO detectability. As well, our crew was delayed 11 days from our average start date due to the 2019 government shutdown, and this time period accounts for over 20% of total WHWO detections.

Since 2017, 6 transects received CFLRP thinning treatments with mixed responses by WHWO, in both point count survey detections and nests. Half of the transects yielded detections for the first time in 2-3 years, while others still lack any WHWO detections. Due to the paucity of treated areas associated with our transects, it is difficult to determine the effects of treatments without additional thinning activities and associated WHWO monitoring. We initially reported a 75% decline in nest numbers for 2 years following treatment at PAWT1 (Saab et al. 2017). In 2019, we located 3 WHWO nests associated with PAWT1, which may indicate a partial rebound since thinning treatments. Although WHWOs generally demonstrate high nest-site fidelity (returning to same nesting area year after year), WHWOs can move in subsequent years from one nesting area to a new nesting area, based on marked birds in Idaho. Causation of this movement away from PAWT1 immediately after treatment is unknown, but could be related to CFLRP harvest treatments, nest predation, or other factors. Future surveys associated with post-harvest transects will help determine how WHWO occupancy and nest density are related to CFLRP treatments.

Nest placement based on 2019 data was consistent with that reported elsewhere in Oregon (Wightman et al. 2010, Hollenbeck et al. 2011, Latif et al. 2015) and with previous years' results (Saab et al. 2014, 2015, 2017, 2018). WHWOs placed their nests primarily in ponderosa pine forest with relatively low percentage of canopy cover [< 40% at 1 ha (~ 2 ac) scale surrounding nests]. Western juniper continues to play an important role as nesting substrate for WHWOs. Though large diameter ponderosa pine snags are favored by WHWOs, naïve nest success is nearly 20% higher in western juniper and nests are similarly productive to ponderosa pine, 2.43 and 2.64 young per successful nest, respectively. We recommend maintaining live western juniper (mean 18.5", range 8.5 - 44") in forest openings as a supplement to ponderosa pine snags in the CFLRP.

Future Direction

Surveys for WHWO occupancy and nests are discontinued because pre-treatment data are adequate and few treatments have been completed to assess post-treatment woodpecker responses. Occupancy, nest density, nest survival data are being combined with data from the Lakeview Stewardship CFLRP (Fremont-Winema National Forest) and from the Weiser-Little Salmon CFLRP (Payette National Forest) to identify landscape and stand attributes important to WHWOs in relation to CFLRP treatments, and aid in the development of current and future forest restoration activities. With added nest survival data from the Southern Blues CFLRP, we are optimistic about making relevant inferences about the population status with the current pre-treatment data but ≥ 3 years post-treatment data are needed. Resumption of woodpecker monitoring is unknown at this time.

Pre- and post-treatment vegetation measurements are critical for understanding treatment effects on habitat suitability and for adaptive management. To date, we have completed pre-treatment vegetation measurements at all 15 treatment transects and post-treatment measurements at points available to safely measure during on-going logging activities (Table 2). Our current post-treatment measurements lack representation for all treatment transects, thus we emphasize the need to complete harvest prescriptions as originally planned. Future vegetation sampling will focus on collecting measurements at the remaining control transects and any points recently treated in the Wolf and Elk16 project areas.

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Figure 1a. Northeast portion of the Southern Blues Restoration Coalition CFLRP study area, nest locations, and transects for monitoring populations and habitats of white-headed woodpeckers on the Malheur National Forest, Oregon, 2014-2017, 2019.

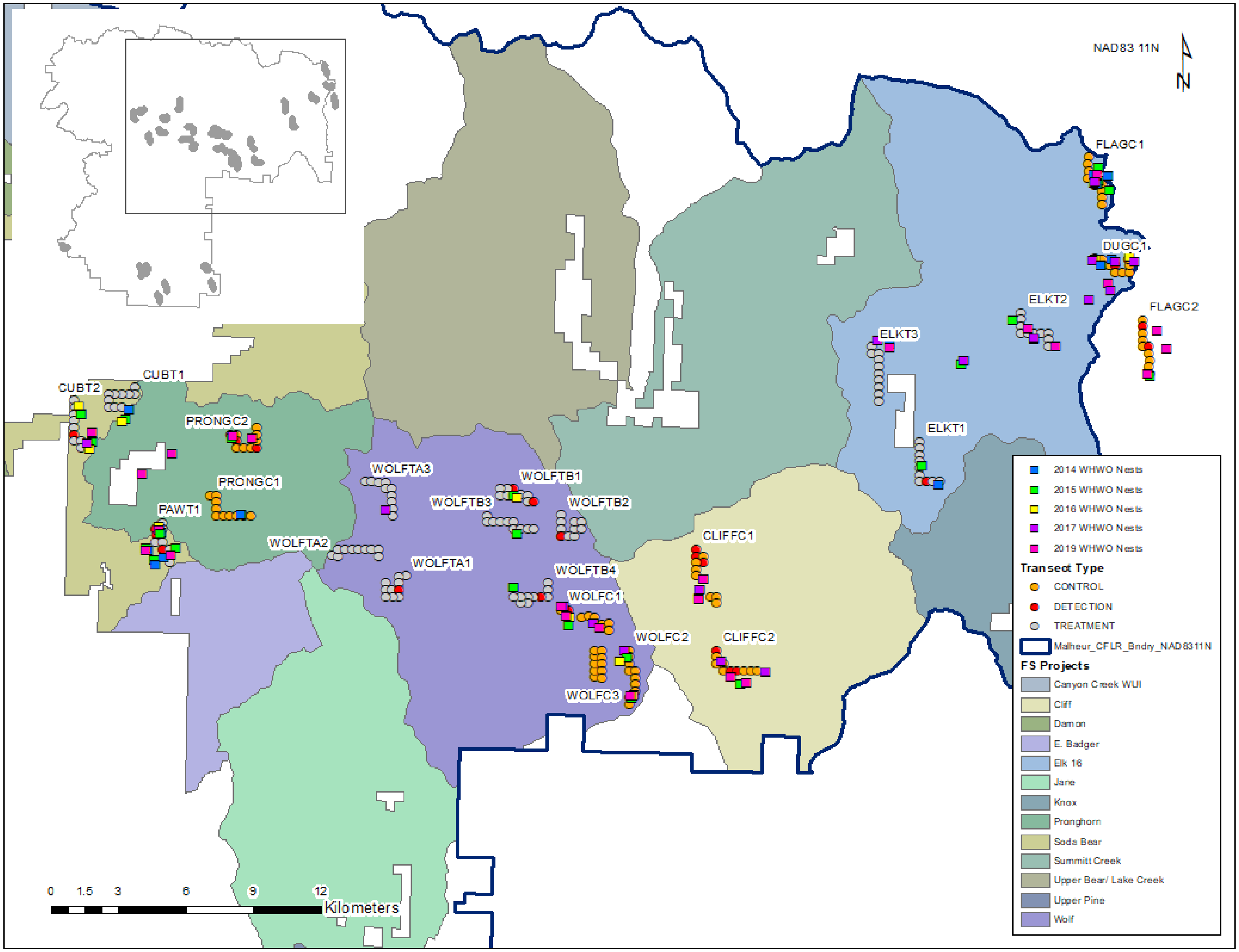

Figure 1b. Southern portion of the Southern Blues Restoration Coalition CFLRP study area, nest locations, and transects for monitoring populations and habitats of white-headed woodpeckers on the Malheur National Forest, Oregon, 2014-2017, 2019.

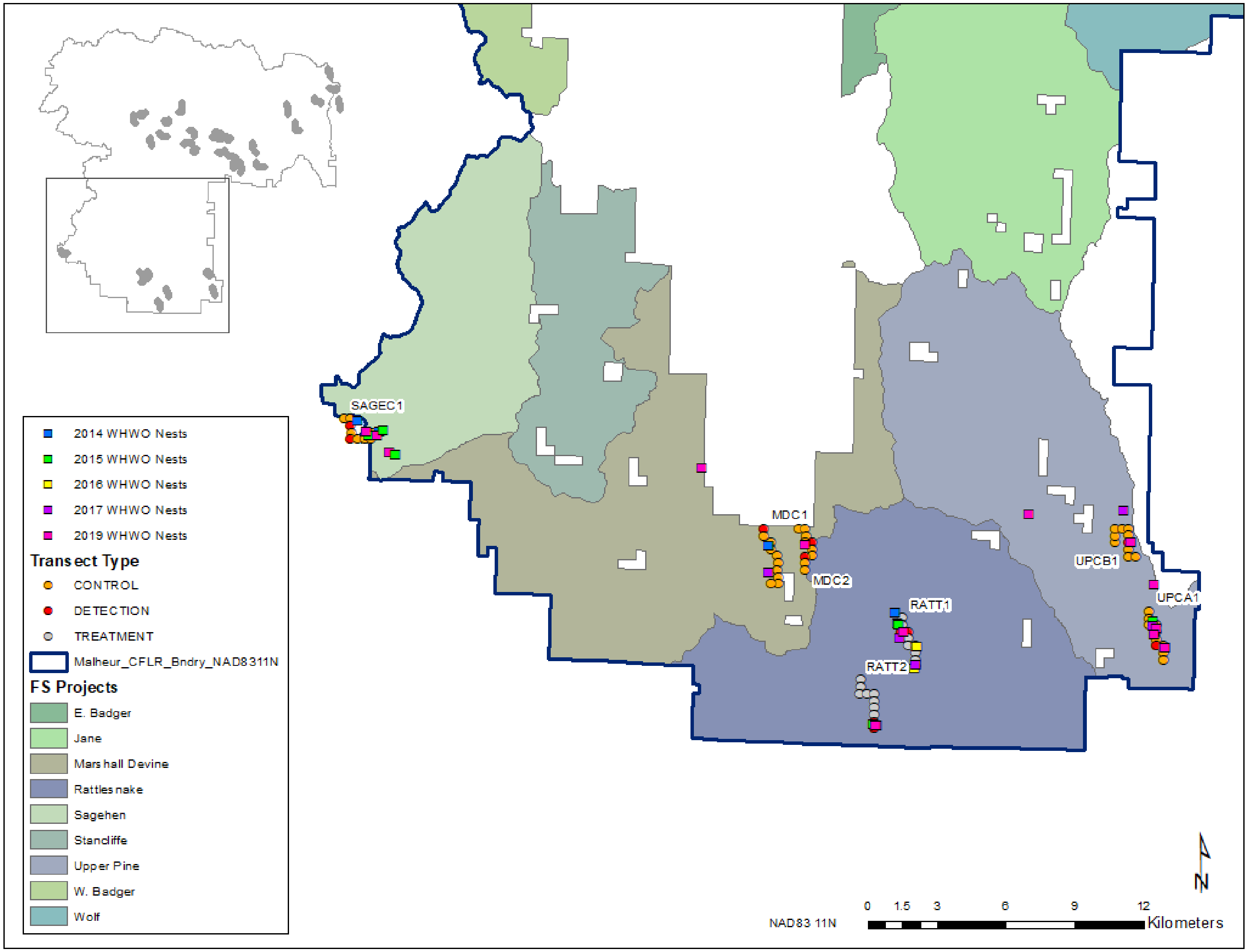

Table 1. Summary of white-headed woodpecker detections at survey transects (10 point-count survey locations each) in the Southern Blues Restoration Coalition CFLRP, Malheur National Forest, Oregon, 2019. Post-treatment transects are listed in italics.

Transect type Transect name	Number of WHWO Detections		
Treatment	Visit 1[a]	Visit 2[a]	Total
CUBT1	0	0	0
CUBT2[b]	0	1	1
ELKT1	0	1	1
ELKT2[b]	0	0	0
ELKT3[b]	0	0	0
PAWT1[b]	3	0	3
RATT1[b]	2	1	3
RATT2[b]	1	1	2
WOLFTA1	0	1	1
WOLFTA2	0	0	0
WOLFTA3	0	0	0
WOLFTB1	0	2	2
WOLFTB2	0	1	1
WOLFTB3	0	0	0
WOLFTB4	0	1	1
Sub-total	6	9	15
Control			
CLIFFC1[b]	1	3	4
CLIFFC2[b]	2	1	3
DUGC1[b]	1	1	2
FLAGC1[b]	0	0	0
FLAGC2[b]	0	3	3
MDC1[b]	0	1	1
MDC2 [b]	1	1	2
PRONGC1[b]	0	0	0
PRONGC2[b]	2	2	4
SAGEC1[b]	1	2	3
UPCA1[b]	0	2	2
UPCB1[b]	0	1	1
WOLFC1[b]	2	0	2
WOLFC2[b]	1	2	3
WOLFC3	0	0	0
Sub-total	11	19	30
Total	17	28	45

[a] Visit 1: 20 May – 13 June, visit 2: 14 June – 2 July.

[b] Transects associated with WHWO nests (see Figures 1a and 1b, Appendix).

Table 2. Summary statistics (mean, standard error) for control and pre- and post-treatment vegetation measurements at selected call-broadcast survey stations and all nest locations of white-headed woodpeckers in the Southern Blues Restoration Coalition CFLRP, Malheur National Forest, Oregon, 2014-2017, 2019. Data collected at point-count survey locations represent average landscape conditions and are used to measure habitat availability for evaluating nest-site selection. Diameter-at-breast height (dbh) and % tree species for point-count survey locations are from one tree selected at random within vegetation plots.

	Nest Location[a]									Point-Count Survey Location (non-nest)[b]								
	Pre-treatment (n=43)[c]			Post-treatment (n=13)[d]			Control (n=84)			Pre-treatment (n=40)[c]			Post-treatment (n=40)[d]			Control (n=90)[e]		
Dbh (in)[f]	16.7, 1.2			15.8, 1.4			20.8, 1.0			15.3, 1.2			15.4, 1.2			15.3, 0.7		
Diameter Class (in)																		
	≥ 4–10	≥ 10–20	≥ 20	≥ 4–10	≥ 10–20	≥ 20	≥ 4–10	≥ 10–20	≥ 20	≥ 4–10	≥ 10–20	≥ 20	≥ 4–10	≥ 10–20	≥ 20	≥ 4–10	≥ 10–20	≥ 20
Live trees (#/ac)	48.9, 5.8	27.7, 2.4	6.2, 0.9	14.8, 5.8	18.4, 3.9	4.0, 0.6	40.2, 4.4	19.0, 1.4	5.5, 0.6	74.6, 11.4	65.3, 6.2	8.8, 0.9	45.3, 11.4	31.6, 3.1	6.4, 0.7	55.0, 4.9	47.1, 2.6	6.5, 0.6
Snags (#/ac)	8.1, 1.3	3.4, 0.5	1.1, 0.2	4.2, 1.2	3.3, 0.7	0.5, 0.1	6.8, 1.1	3.4, 0.9	1.5, 0.2	7.2, 1.2	1.9, 0.3	0.5, 0.2	6.8, 1.3	2.4, 0.4	0.7, 0.3	12.6, 1.9	4.5, 0.6	1.0, 0.2
Single tree spp.(%)[g]																		
Abies spp.	0	3	5	0	0	0	0	0	0	0	3	10	8	5	5	1	1	0
CELEI	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	0	0
JUOC	3	18	5	0	0	0	0	35	18	0	0	0	0	0	0	0	9	3
PICO	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
PIPO	5	38	18	15	62	23	5	14	25	20	37	7	15	33	10	11	50	18
POTR5	0	3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
PSME	0	3	0	0	0	0	0	0	1	0	10	8	0	10	10	0	3	1
Plot tree spp. (%)[h]																		
Abies spp.	2.8, 1.2	3.6, 1.3	1.2, 0.4	0, 0	0, 0	0, 0	0.4, 0.4	0.3, 0.2	0.2, 0.1	4.4, 1.4	4.5, 1.5	3.1, 1.0	3.4, 1.3	4.5, 1.6	3.0, 1.1	2.0, 1.0	1.2, 0.4	0.5, 0.2
CELEI	4.2, 1.4	0.1, 0.1	0, 0	2.6, 1.4	0, 0	0, 0	7.8, 1.5	0.4, 0.2	0, 0	1.8, 1.0	0, 0	0, 0	2.2, 1.5	0.1, 0.1	0, 0	4.1, 0.9	0.1, 0.1	0, 0
JUOC	5.4, 1.7	4.4, 1.3	4.2, 1.3	0, 0	0.6, 0.6	0, 0	9.3, 1.4	12.7, 1.7	12.4, 1.7	0, 0	0.1, 0.1	0, 0	0, 0	0.1, 0.1	0, 0	4.1, 0.7	3.8, 0.9	2.7, 0.8
LAOC	1.0, 0.6	0.6, 0.5	0.2, 0.2	0, 0	0, 0	0, 0	0, 0	0.1, 0.1	0, 0	0.6, 0.5	0.3, 0.2	0.4, 0.2	0.8, 0.6	0.4, 0.2	0.3, 0.2	0, 0	0.1, 0.1	0.1, 0.1
NONE	0, 0	0, 0	3.1, 1.1	1.6, 1.6	0, 0	0, 0	2.0, 1.0	2.2, 0.9	0.2, 0.1	0.4, 0.4	0, 0	0.2, 0.2	2.0, 1.2	0, 0	0.6, 0.6	0.2, 0.2	0.6, 0.6	1.2, 0.6
PICO	1.2, 0.7	1.0, 0.5	0, 0	1.0, 1.0	0, 0	0, 0	0, 0	0, 0	0, 0	4.5, 2.1	1.0, 0.4	0, 0	3.4, 1.9	0.9, 0.4	0, 0	0.1, 0.1	0.2, 0.1	0, 0
PIMO3	0.1, 0.1	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
PIPO	16.6, 1.9	24.9, 3.4	16.4, 3.5	22.9, 4.5	41.5, 3.8	24.8, 4.3	15.7, 1.9	17.0, 1.9	16.6, 1.9	16.6, 2.6	36.4, 3.8	13.0, 1.5	18.7, 3.0	30.1, 3.3	17.5, 2.1	22.9, 2.0	37.8, 2.7	13.5, 1.3
POTR5	0.4, 0.4	0.7, 0.7	0, 0	0, 0	0, 0	0, 0	0, 0	0.7, 0.5	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0.1, 0.1	0, 0	0, 0
PSME	2.9, 1.2	3.2, 0.9	1.6, 0.5	0, 0	3.1, 3.1	1.6, 1.1	0.3, 0.2	0.9, 0.4	0.6, 0.2	1.2, 0.4	7.0, 2.0	4.5, 0.8	1.3, 0.6	6.3, 1.9	4.2, 1.0	1.2, 0.4	2.3, 0.8	1.3, 0.3
UNKN	0.7, 0.7	0, 0	0, 0	0, 0	0.4, 0.4	0, 0	0.3, 0.2	0, 0	0, 0	0, 0	0, 0	0.1, 0.1	0.1, 0.1	0, 0	0.1, 0.1	0, 0	0, 0	0, 0

[a] Nest location data include nests associated with control transects that received no recent harvest, and pre- and post-treatment transects that received harvest within the last 6 years and approximately 2.5 ac of nests. Harvest pertains to silvicultural prescriptions related to the CFLRP.

[b] Point-count survey location data include pre- and post-treatment comparisons of 39 survey stations from transects CUBT1 (6 pts), CUBT2 (10 pts), ELKT2 (5 pts), PAWT1 (10 pts), WOLFTA1 (3 pts), WOLFTA2 (2 pts), WOLFTB2 (2 pts), and WOLFTB3 (2 pts) receiving CFLRP treatments, and 9 untreated control transects.
[c] Measured 2014-2019.
[d] Measured 2016-2019.
[e] Measured 2017.
[f] Eight nests located in logs were not included in the sample because they do not have a diameter at breast height.
[g] Single tree species by size class used for nesting and a single, randomly selected tree from non-nest point-count survey locations; for example, 38% of nest trees were placed in PIPO in size class ≥ 10–20” dbh for nests associated with pre-treatment transects, compared to 62% of nests associated with post-treatment and 14% of nests associated with control transects; whereas 36% of pre-treatment, 31% of post-treatment, and 50% of control non-nest trees were PIPO in size class ≥ 10–20” dbh; *Abies* spp. = *Abies grandis* and *A. concolor*, CELEI = *Cercocarpus ledifolius* var. *intercedens*, JUOC = *Juniperus occidentalis*, PIPO = *P. ponderosa*, POTR5 = *Populus tremuloides*, and PSME = *Pseudotsuga menziesii*. Includes both live and dead trees.
[h] Mean percentage of trees (live or dead) by size class within 1 ac plots at nest locations and at non-nest point-count survey locations; LAOC = *Larix occidentalis*, NONE = no trees in the plot, PICO = *Pinus contorta* , PIMO3 = *P. monticola*, and UNKN = Unknown species.

Appendix. Summary data for white-headed woodpecker nests in the Southern Blues Restoration Coalition CFLRP, Malheur National Forest, Oregon, 2019. Post-treatment transects are listed in italics.

Transect Type Transect Name	Nest ID	Fate	# Fledged[a]	Nest Coordinates[b] Northing	 Easting	Initiation Date[c]
Treatment						
CUBT2	CUBT2-08A	Success	2	4887727	346131	May 24
ELKT2	ELKT2-05A	Success	3	4892339	387659	May 25
	ELKT2-10A	Success	2	4891555	388876	May 29
ELKT3	ELKT3-03A	Fail	0	4891496	381550	June 8
PAWT1	PAWT1-03A	Success	3	4883411	349074	May 17
	PAWT1-05A	Success	2	4882486	348527	May 25
	PAWT1-09A	Success	2	4882295	349654	May 17
RATT1	RATT1-03A	Unknown	--	4848347	352919	--
RATT2	RATT2-10A	Fail	0	4844260	351710	May 30
Control						
CLIFFC1	CLIFFC1-07A[d]	Success	1	4881226	373283	May 26
	CLIFFC1-08A[e]	Success	2	4880340	373075	June 2
CLIFFC2	CLIFFC2-06A	Success	2	4876878	374461	May 24
	CLIFFC2-08A	Success	3	4876640	375172	May 19
FLAGC1	FLAGC1-05A	Success	3	4899178	390744	May 30
FLAGC2	FLAGC2-03A	Success	2	4892277	393394	June 5
	FLAGC2-06A	Success	1	4891468	393823	June 12
	FLAGC2-10A	Success	3	4890341	392968	May 27
MDC2	MDC2-04A	Success	4	4852177	348663	June 1
PRONGC2	PRONGC2-01A	Fail	0	4887585	352376	--
	PRONGC2-08A	Fail	0	4887485	353234	June 1
SAGEC1	SAGEC1-08A	Success	3	4856207	330530	June 6
	SAGEC1-09A	Success	3	4857107	329518	May 18
	SAGEC1-10A	Success	2	4856957	329983	May 20
UPCA1	UPCA1-04A	Unknown	--	4848514	363954	May 28
	UPCA1-05A[f]	Unknown	--	4848257	363866	--
	UPCA1-08A[e]	Unknown	--	4847678	364306	May 26
UPCB1	UPCB1-07A[e]	Success	3	4852252	362829	May 30
WOLFC1	WOLFC1-01A	Success	3	4880002	366986	May 22
	WOLFC1-03A	Success	4	4879575	367148	May 28
	WOLFC1-08A	Fail	0	4879054	368660	May 17
WOLFC2	WOLFC2-09A	Unknown	--	4876047	370013	May 26
Incidental[g]						
	DUGC1-06A	Unknown	--	4855522	344131	--
	MDC1-01A	Unknown	--	4885872	348353	--
	PAWT1-01A	Fail	0	4894346	391254	May 30
	PRONGC1-01A	Success	3	4886770	349669	May 20
	UPCA1-01A	Unknown	--	4850403	363858	--
	UPCB1-03A	Unknown	--	4853479	358395	May 31

[a] Number of nestlings fledged is based on the last accurate count of nest contents obtained during nest monitoring.
[b] Nest coordinates are projected as North American Datum 1983, UTM zone 11N.
[c] Initiation date is the estimated date the first egg was laid.
[d] Nest tree previously used by WHWO in 2015, new cavity excavated in 2019.
[e] Nest cavity previously used by WHWO in 2017.
[f] Nest tree previously used by WHWO in 2017, new cavity excavated in 2019.
[g] Incidental nests are discovered outside of formal surveys and are generally not associated with a monitoring transect. Incidental nests are assigned a nest ID to the nearest transect survey point, regardless of distance.