White-headed Woodpecker monitoring for the Weiser – Little Salmon CFLRP, Payette National Forest, 2013 progress report

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To: Payette National Forest
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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 CFLR program and our work is designed to address how well CFLRs are meeting their forest restoration and wildlife habitat conservation goals. The white-headed woodpecker (*Picoides 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 coniferous forests. Monitoring in CFLRs, such as the Weiser-Little Salmon Headwaters project on the Payette National Forest (PNF), also contributes to other ongoing, regional efforts to monitor effectiveness of silvicultural and prescribed-fire treatments for white-headed woodpeckers throughout their range in Idaho, Oregon, and Washington. Vegetation and fuels data collection also support modeling of fire-climate impacts on future forest conditions and wildlife habitat suitability.

To meet their various ecological needs, white-headed woodpeckers require heterogeneous landscapes characterized by a mosaic of open- and closed-canopied ponderosa pine forests (Wightman et al. 2010, Hollenbeck et al. 2011), which are expected to benefit vascular plant and vertebrate wildlife populations (e.g., Noss et al. 2006). Consequently, monitoring white-headed woodpecker populations and their habitat associations is central to biological monitoring for the Weiser-Little Salmon Headwaters project on the Payette National Forest, a dry mixed-conifer forest within the range of this species. Prescribed burning and thinning treatments planned under this CFLR 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 WHWO. This report describes the monitoring protocol, the data obtained during the first two years, and future plans for monitoring.

Methods

The current monitoring plan relies on estimating WHWO occupancy rates, occupancy dynamics, nest survival, and nest site selection in both treated and untreated forests. Four timber sale units (areas expected to be treated; Cottonwood, Rocky Bear, Weiser River Fuels, and Lick Creek) and two control units (areas not expected to be treated; Bear and Middle Fork Weiser River) were selected for CFLR monitoring.

Establishment of CFLR transects is described in our 2012 progress report (Saab et al. 2012). Each transect consists of 10 survey points spaced 300 m apart, similar to the Management Indicator Species (MIS) transects for the Payette National Forest (PNF) (Wightman and Saab 2008). MIS transects differ from CFLR transects in that all MIS survey points were placed in habitats assumed to be highly suitable based on published habitat suitability models (Wightman et al. 2010, Hollenbeck et al. 2011), with the intent on maximizing WHWO detections as part of a long-term monitoring program. In 2012, we established 20 transects (hereafter CFLR transects), Of the 20 transects established in 2012, we placed 15 transects in the four timber sale units and five transects in the two control units, for a total of 200 survey points. Based on our 2012 results, we removed one transect (Cottonwood transect, C-F) for subsequent surveys because it was determined to be a poor fit based on vegetation type and structure criteria. We replaced that transect with a new transect in 2013 in the Weiser River Fuels treatment (WRF-N; Figure 1). In addition, RMRS conducted surveys at eight MIS transects (80 points; Bear, Cuprum, Deer/Lick Creek, Lick Creek, Shingle Flat, Steve's Creek, Warm Spring 1, and Warm Spring 2; Figure 1), which were previously established by the PNF as part of their long-term woodpecker monitoring (Wightman and Saab 2008). In exchange, PNF crews conducted surveys at three of the CFLR transects established by RMRS in 2012 in the Rocky Bear treatment (Rocky Bear transects RB-H, RB-I, RB-J; Figure 1). In total, we surveyed 28 transects in 2013 (20 CFLR [3 of these surveyed by PNF] and 8 MIS).

We selected the MIS transects because they have been consistently occupied by WHWO in recent years and each contain points that are in close proximity (within 1.2 km) to CFLR transects. By comparing occupancy and locations of color-banded birds (see description below) at these close-proximity transects, results might suggest movements of WHWO from presumed, highly suitable habitat that is currently occupied into newly created (i.e., treated) unoccupied habitats for foraging and nesting activities.

To further improve our ability to track individual movements of WHWOs, we color-banded adults and nestlings in 2013. During follow-up visits to treatment units and neighboring MIS transects, we searched for banded individuals and when found, recorded their location and associated habitat use. While banding birds, we recorded various morphometrics and collected 1-2 contour feathers from adults to be used for future genetics research.

We visited each survey point three times during the 2013 nesting season, (1st visit: 9 – 28 May; 2nd visit: 29 May – 14 June; 3rd visit: 14 June – 3 July). During each visit, the surveyor broadcasted a series of WHWO vocalizations and silent periods at each point to elicit responses by territorial breeding pairs (Mellen-McLean et al. 2012). In 2012, we ran the survey for 4.5 minutes, which included 2.5 minutes of broadcast followed by 2 minutes of silent listening (Mellen-McLean et al. 2012). In 2013, we extended the broadcast series to 6.5 minutes, which included 2.5 minutes of broadcast followed by 4 minutes of silent listening. Surveyors recorded the distance to WHWO detections during this period and noted the distance as <50 m, 50-150 m, or >150 m. Surveyors also recorded whether WHWOs were detected aurally or visually. Concurrent with call-broadcast surveys at points, we searched for nests within a radius of at least 150 m of surveyed points and up to 1 km when following adults (Dudley and Saab 2003, Mellen-

McLean et al. 2012). We conducted nest searching daily from May – July. During this period, we searched in the vicinity of all survey points, but focused especially in areas where WHWO had been observed or previously nested. Once located, we monitored nests every 2-4 days on average until the nest fate (success or failure) was determined. Finally, following the conclusion of nest and call-broadcast surveys, we measured habitat features at survey points and nest locations following the protocol established for the Region 6 WHWO monitoring program (Mellen-McLean et al. 2012). We measured vegetation at all nests. Additionally, we measured vegetation associated with 50 survey points in 2012 and 28 survey points in 2013 within proposed treatment units. We focused measurements on treatment units to ensure pre-treatment vegetation data collection. Vegetation in control and post-treatment units will be measured in future years.

Results

Of the 28 transects surveyed in 2013, we detected WHWO 33 times during 27 surveys at 20 points along 12 transects (Table 1). WHWOs were detected 15 times during only one visit and three points each had detections during two visits. Two points had detections during all three visits and only one point had a detection in both 2012 and 2013. Detections were made aurally 25 times and eight times visually. Males were identified during five detections, females during seven; gender was not identified for 21 detections. Fourteen detections were <50 m distance, 17 from 50-150 m, and two detections were >150 m. Outside of formal surveys, WHWO were detected on 11 occasions before (6) or after (2) surveys (i.e., at the station), or while walking between survey points (3). Detections of non-target woodpeckers (Williamson's sapsucker [*Sphyrapicus thyroideus*], red-naped sapsucker [*Sphyrapicus nuchalis*], Hairy woodpecker [*Picoides villosus*], black-backed woodpecker [*P. arcticus*], northern flicker [*Colaptes auratus*], and pileated woodpecker [*Dryocopus pileatus*]) also occurred during surveys and were similar to 2012. As expected, MIS transects disproportionately contributed to WHWO detections, accounting for 70 % (23) of detections, whereas CFLR transects accounted for 10 detections from six transects. Increasing the survey period to 6.5 minutes accounted for four additional detections, all at MIS transects.

In 2013, we located and monitored the survival of 23 nests (Figure 1; Appendix). Eight nests were associated with five transects established in two treatment units (Cottonwood and Weiser River Fuels) and one control unit (Bear). The remaining nests were located in association with MIS monitoring transects, either as a result of broadcast surveys or by performing searches in areas associated with 2012 nest locations, or found opportunistically (Appendix). Sixteen nests survived to fledge at least two young ($\bar{x}$ = 2.75 fledglings/successful nest). Ponderosa pine was selected 96% of the time as nest trees compared to 52% as a tree randomly selected from survey points (Table 2). Nest locations were associated with fewer trees than the 78 survey points measured in 2012-2013 (Table 2). Survey point plots contained higher percentages of Douglas-fir and grand fir and lower percentages of ponderosa pine than nest plots.

In 2013, we color-banded 63 WHWO, consisting of 36 adults (18 breeding pairs) and 27 nestlings (17 males and 10 females based on the extent of red crown patch; from 11 nests). Adult males on average weighed more than adult females (males: $\bar{x}$ = 61.2 g, range 55 - 69 g, n = 17; females: $\bar{x}$ = 56.8 g, range 52 - 63 g, n = 18). The same pattern was also observed with nestlings at the time of banding (approximately 1 - 10 days prior to fledging), where male nestlings outweighed female nestlings (males: $\bar{x}$ = 56.4 g, range 40.5 – 65.5 g, n = 16; females: $\bar{x}$ = 49.1 g, range 42 – 65.5 g, n = 10). Observations of banded birds were few in 2013 and occurred primarily around nest locations. We documented a successful second nesting attempt by a banded pair, following an early-nestling-period failure at their first nest (Cottonwood transect CW-D, Appendix).

Discussion

Call-broadcast survey data collected in 2012 were sparse, which raised concerns about our ability to make strong inferences regarding treatment effectiveness. Call-broadcast data were not adequate for quantitative analysis of relevant population parameters (i.e., occupancy rates corrected for detection). WHWO were detected at relatively few sites, and where detected, they were usually detected once, suggesting both low occupancy rates and low detectability. Sparse data in general, and low detectability and occupancy rates in particular, lead to imprecise and biased parameter estimation, interfering with our ability to detect changes in parameters over time. Sparse call-broadcast data during the initial year of effectiveness monitoring is not surprising because transects were located in habitat targeted for restoration, which is currently of low suitability and where managers intend treatments to improve suitability. In 2013, 70% of detections were along MIS transects in areas of relatively high suitability compared to treatment transects, suggesting that detectability might improve following restoration treatments if habitat alone currently limits occupancy and detection rates. If habitat suitability is improved and WHWO respond strongly and positively to silvicultural treatments, abundant call-broadcast in subsequent years will improve our ability to make inferences about forest restoration. Given a weak or non-existent response, however, we would be uncertain whether treatments were indeed ineffective, or if broader-scale population processes were at play. Specifically, WHWO may be absent in neighboring areas, leaving little potential for a response within a few years to treatments regardless of how much habitat suitability is improved. Hence, a species may lag in response to restoration based on demographic reasons.

Due to low detection and occupancy rates in 2012, we modified our study design by conducting broadcast surveys at MIS transects that have had consistent WHWO occupancy in the past. In the future, we expect that color-banded birds will improve our ability to track individual movements and assist the call-broadcast data to help make relevant inferences. We also expect several treatment units to create suitable habitat that will be colonized by WHWOs. The addition of MIS transects in 2013 improved our ability to detect more WHWOs. Also, the additional two minutes added to the call-broadcast survey in 2013 enabled us to attain two detections that would not have been possible with the shorter survey period. Nest placement

based on our 2012 and 2013 data was consistent with that reported in Oregon (Wightman et al. 2010, Hollenbeck et al. 2011), whereby WHWOs tended to place their nests in habitat with relatively low densities of ponderosa pine and adjacent to relatively closed canopied forests.

Future Direction

To maximize our ability to make relevant inferences about WHWO responses to restoration treatments and gain insight into their foraging site and home range selection, we will be adding an additional element to the overall project. Over the next two field seasons (2014 and 2015), Adam Kehoe will be conducting a radio-telemetry study for his master's thesis at Montana State University. He will focus on quantifying habitat selection at multiple spatial scales and estimating home range size of WHWOs in relation to dry-forest restoration treatments. The radio-telemetry analysis in conjunction with occupancy and nest location data will help us identify landscape and stand attributes important to WHWOs, and aid in the development of current and future forest restoration activities. With the addition of radio-telemetry data, we should be able to make relevant inferences even if call-broadcast data remain sparse throughout the monitoring period.

Figure 1. Weiser-Little Salmon CFLRP study area, nest locations, and transects for monitoring populations and habitats of white-headed woodpeckers on the Payette National Forest, ID.

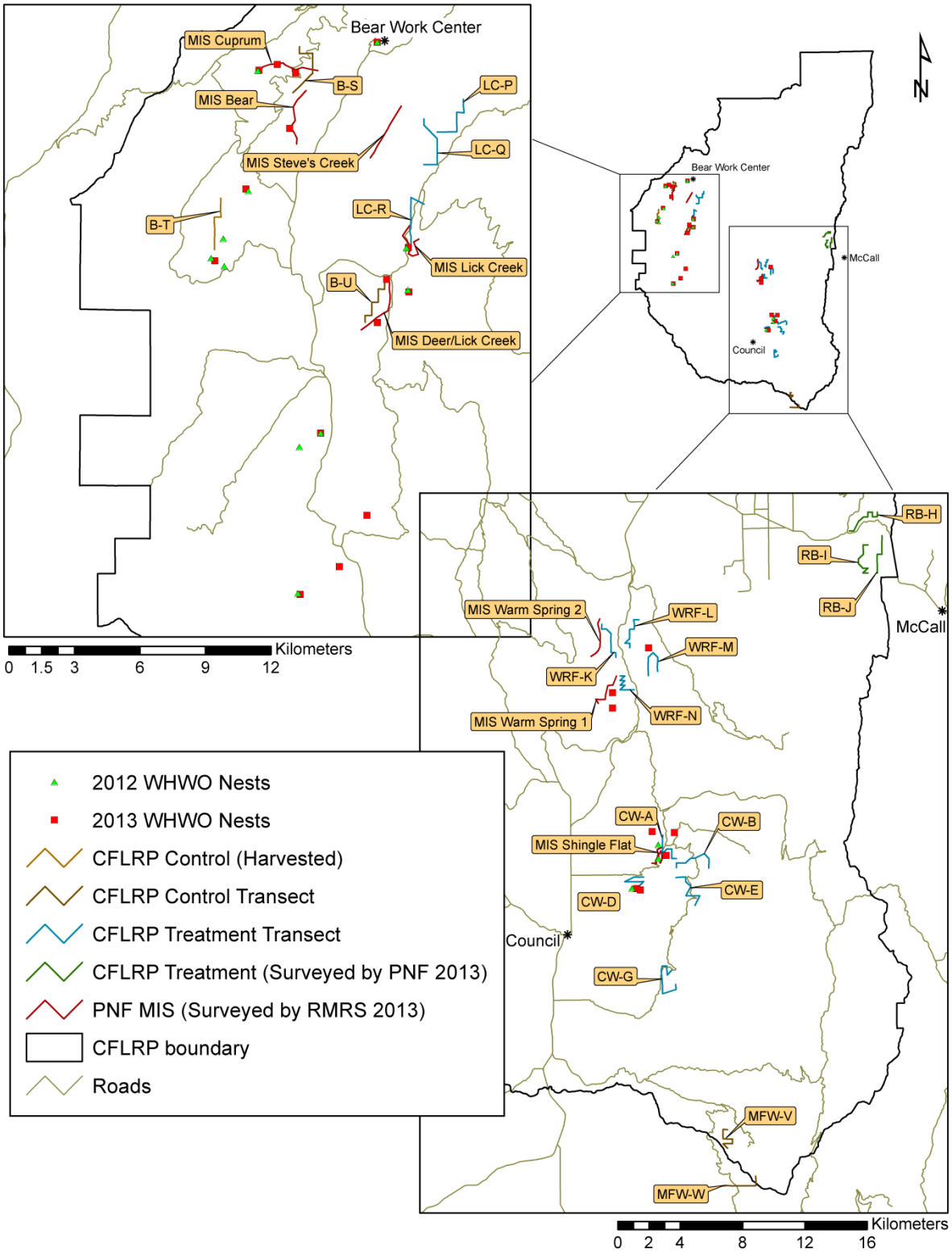

Table 1. Summary of white-headed woodpecker detections at call-broadcast survey stations in the Weiser-Little Salmon CFLRP, Payette National Forest, Idaho, 2013.

Transect type Transect name	Number of WHWO Detections			
Treatment	Visit 1	Visit 2	Visit 3	Total
Cottonwood D	1	0	0	1
Weiser River Fuels M	0	1	0	1
Lick Creek R	2	0	0	2
Control				
Bear S	2	0	1	3
Bear T	0	1	1	2
Bear U	0	0	1	1
MIS				
Bear	0	1	1	2
Cuprum	3	3	1	7
Deer/Lick Creek	1	4	0	5
Lick Creek	2	2	1	5
Shingle Flat	2	0	0	2
Warm Spring 1	2	0	0	2
Total	15	12	6	33

Table 2. Summary statistics (mean, SE) for vegetation measurements at call-broadcast survey stations and nest locations of white-headed woodpeckers in the Weiser-Little Salmon CFLRP, Payette National Forest, Idaho, 2012-2013. Single-tree statistics (diameter breast height [dbh] and tree spp.) for survey station locations are from one tree selected at random within vegetation plots.

	Nest (n=36)			Survey Station (n=78)		
Dbh (in)	19.4, 1.4 (n=34)			18.4, 0.9		
	Diameter Class (in)					
	3.94–9.83	9.84–19.68	≥ 19.69	3.94–9.83	9.84–19.68	≥ 19.69
Live trees (#/ac)	12.6, 2.6	10.1, 2.0	4.9, 0.7	55.1, 5.5	47.8, 2.5	14.8, 1.1
Snags (#/ac)	3.5, 1.0	3.0, 0.6	0.9, 0.2	5.4, 0.7	3.5, 0.4	1.1, 0.2
Tree spp.(%)[a]						
ABGR	0	0	0	3	4	6
PICO	0	0	0	1	1	0
PIEN	0	0	0	1	0	0
PIPO	6	56	32	3	22	27
POTR	0	0	0	0	1	0
PSME	0	3	3	1	18	12
Plot tree spp. (%)[a]						
ABGR	0.4, 0.3	0.2, 0.2	0.2, 0.2	2.3, 0.4	6.3, 1.1	3.9, 0.9
LAOC	0, 0	0.1, 0.1	0.4, 0.3	0.1, 0	0.2, 0.1	0.1, 0
NONE	2.4, 0.9	0.6, 0.6	0.4, 0.4	0.3, 0.1	0, 0	0, 0
PICO	0, 0	0, 0	0, 0	0.5, 0.4	1.0, 0.5	0, 0
PIEN	0, 0	0, 0	0, 0	0.1, 0.1	0.1, 0.1	0.2, 0.2
PIPO	13.1, 1.8	33.8, 3.3	35.3, 3.9	6.6, 0.7	26.3, 2.4	18.7, 1.7
Populus spp	0.9, 0.7	0, 0	0, 0	0.5, 0.2	0.6, 0.3	0, 0
PSME	2.9, 0.9	4.5, 1.4	2.7, 1.0	4.6, 0.6	15.4, 1.6	9.9, 1.0
OTHER[b]	1.4, 0.7	0.8, 0.4	0.1, 0.1	1.2, 0.2	0.8, 0.2	0.3, 0.1

[a] Includes both live and dead trees, ABGR = *Abies grandis*, LAOC = *Larix occidentalis*, PICO = *Pinus contorta*, PIEN = *Picea engelmannii*, PIPO = *Pinus ponderosa*, POTR = *Populus tremuloides*, and PSME = *Pseudotsuga menziesii*; NONE = no trees in the plot; n = 34 for tree spp. at nest locations.

[b] OTHER includes *Prunus emarginata*, *Salix scouleriana*, and Unknown spp (snags) for nest locations, and *Acer glabrum*, *Amelanchier alnifolia*, *Crataegus douglasii*, *Prunus* spp., *Salix scouleriana*, and Unknown spp (snags) for survey stations.

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Appendix. Summary data for white-headed woodpecker nests in the Weiser-Little Salmon CFLRP, Payette National Forest, Idaho, 2013.

Transect type Transect name	Nest ID	Fate	# Fledged	#Adults Banded	# Nestlings Banded	Initiation Date
Treatment						
Cottonwood A	NCW-A01A	Success	3	2	0	5 Jun
	NCW-A01B	Success	3	2	0	4 Jun
Cottonwood D	NCW-D09A[a]	Success	2	0	2	28 Jun
	NCW-D10A[a]	Fail	0	2	0	26 May
Weiser River Fuels M	NWRF-M06A	Success	3	2	0	9 Jun
Control						
Bear T	NB-T10A	Success	1	2	1	31 May
Bear U	NB-U01A	Success	4	2	4	6 Jun
	NB-U02A	Fail	0	0	0	27 May
MIS						
Bear	NBR04A	Success	4	2	4	13 Jun
Cuprum	NCU04A	Success	3	2	3	8 Jun
	NCU07A	Success	2-4	2	0	29 May
	NCU10A	Success	2	2	2	22 May
Deer/Lick Creek	NDL03A	Success	3-4	2	0	4 Jun
Lick Creek	NLC04A	Success	3	2	3	4 Jun
Shingle Flat	NSF08A	Success	2	2	2	12 Jun
Warm Spring 1	N1WS05A[b]	Success	2	2	2	28 Jun
	N1WS07A[b]	Fail	0	0	0	26 May
Opportunistic						
Bear Work Center	NBWC01A	Fail	0	2	0	3 Jun
Cottonwood Corrals	NCC07A	Fail	0	0	0	4 Jun
Crooked River	NCR07A	Fail	0	0	0	12 Jun
Peck Mountain	NPM09A	Success	2	2	2	9 Jun
Summit Gulch	NSG10A	Fail	0	2	0	8 Jun
West Mill	NWM03A	Success	4	2	2	27 May

[a] The adults at CW-D10A failed early during the nestling period then re-nested at NCW-D09A based on band sightings.

[b] The adults at N1WS07A failed early during the nestling period then likely re-nested at N1WS05A based on known WHWO behavior in close proximity to N1WS07A and timing of nest initiation at N1WS05A relative to the failure.