White-headed Woodpecker Monitoring

Pacific Northwest Region
Rocky Mountain Research Station
USDA Forest Service

Annual Monitoring Report - FY 2011

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Introduction

The white-headed woodpecker (WHWO) is a Regional Forester's sensitive species in Region 6 (R6) of the USDA Forest Service (USFS). The WHWO has also been identified as a focal species, or indicator species, for mature dry forests based on its strong association with open, dry forest habitat, and its dependence on mature ponderosa pine. WHWO feed almost exclusively on ponderosa pine seeds during fall and winter, and mature trees produce more abundant and reliable seed crops.

Populations of WHWO are thought to be declining in the Pacific Northwest. In a Central Oregon study, reproductive success of WHWO was too low to offset adult mortality, thus the population declined to the point that occupancy of known territories steadily decreased over the 6-year study period (Frenzel 2004). Research in the Blue Mountains in the late 1970s and early 1980s found the birds to be relatively common, whereas research conducted in the early 2000s in the same areas found no WHWO (Altman 2000, Bull 1980, Nielsen-Pincus 2005).

Mature, open, dry forests (primarily ponderosa pine) have declined more dramatically than any other forested ecosystem in the Interior Columbia Basin (Wisdom et al. 2000). The Interior Columbia Basin Ecosystem Management Project (ICBEMP) found WHWO was one of only 8 of the 97 species analyzed that showed strong declines in habitat (>60% decline from historical conditions). WHWO also use large snags (primarily ponderosa pine) for nesting and roosting, and according to ICBEMP, large snag amounts have declined across the basin compared to historic amounts (Korol et al. 2002). Currently, these forests continue to be at high risk due to drought stress on mature pine, insect outbreaks, and uncharacteristically severe wildfires. Climate change is likely to exacerbate the risk.

Most of the R6 USFS restoration treatments occur in these dry forest types. Restoration is designed to reduce stand density, open up canopies, and reduce ground fuels to more closely resemble historical, sustainable conditions. Active management treatments are necessary to reduce the risk of losing what is left of mature, dry forests to uncharacteristically severe wildlife events. However, treatments have the potential to either have beneficial or negative effects on WHWO habitat. With some treatments there is a potential for loss of large ponderosa pine trees and snags, especially with the use of prescribed fire. Large pines, in particular, are critical structural components of this ecosystem and take centuries to re-create. These components are important characteristics of mature, dry forests, which provide habitat for species associated with these ecosystems. In addition, fuels treatments that reduce shrub and down wood cover may reduce populations of small mammals (Smith and Maguire 2004), which are the main nest predators of WHWO (Frenzel 2004).

The Rocky Mountain Research Station (RMRS) has developed habitat suitability index (HSI) models of WHWO nesting habitat in central and south central Oregon (Hollenbeck et al. 2011). The models need to be field validated in unburned forests and then calibrated for other areas in Oregon and Washington. This validation procedure will result in habitat suitability maps used to predict likely nesting areas that can be managed for breeding WHWOs.

Methods

The Monitoring Strategy

A WHWO monitoring strategy was developed for dry forest habitats. R6 has worked closely with RMRS to develop the strategy. The regional monitoring strategy focuses on:

- Broad-scale occupancy monitoring - designed to provide reliable, standardized data on the distribution, site occupancy, and population trends for WHWO across their range in Oregon and Washington.
- Treatment effectiveness monitoring – designed to assess effectiveness of stand-level treatments on WHWO occupancy and reproductive success.
- Validation monitoring – designed to validate nesting HSI models developed by RMRS and the resulting maps of habitat suitability across WHWO range in Oregon and Washington.

The purpose of the strategy is to provide guidelines and protocols for inventory and monitoring of WHWO on FS and USDI Bureau of Land Management (BLM) lands in Oregon and Washington. The strategy is designed to ensure consistent and scientifically credible sampling, data collection, and analysis protocols used by the agencies in WHWO inventorying and monitoring activities. The strategy and protocol are designed to meet standards required under the Data Quality Act.

The monitoring strategy and the protocols were developed using peer reviewed guides and protocols (Dudley and Saab 2003, Manley et al. 2006, Vesely et al. 2006, Wightman and Saab 2008). The guides and protocols used were developed by experts in ecological principles and biostatistics. This strategy was developed in consultation with WHWO species experts, research scientists, and biostatisticians.

Data analysis is conducted in coordination with Rocky Mountain Research Station (RMRS).

Broad-Scale Occupancy and Distribution Monitoring

This protocol is designed to provide reliable, standardized data on the distribution and site occupancy for WHWO across their range in Oregon and Washington. The data can be used to better define habitat associations of WHWO at the stand and landscape

scales in the 2 states. Once base data are obtained, this protocol can be used to monitor change in the distribution and occupancy of WHWO.

The protocols for the occupancy and distribution monitoring are based on Management Indicator Species (MIS) survey protocols for WHWOs developed for the Payette NF in Idaho (Wightman and Saab 2008). The basic sample design is a point count/playback response survey at 10 points along 2700-meter transects established within potential habitat for WHWO. Two surveys are conducted beginning as early as April 20 with the 2 visits completed by July 7 (Wightman et al. 2010). Surveys start just after dawn and are to be completed by 11 am.

The standards for precision for WHWO were set at the ability to detect 20% change in occupancy with a statistical confidence and power of 80%. Higher statistical confidence would reduce power to detect change. The worst-case scenario of failure to detect change could be failure to intervene, which could ultimately result in species extirpation.

Based on 2010 Pilot Data, 30 transects were monitored across the region in 2011, the first year of a 6-year study. Based on this initial sample, the number of transects may need to be increased or decreased to meet the desired level of precision as stated above. Transects receive 2 repeat visits per year, based on detection probabilities calculated from 2010 Pilot data.

Vegetation data are collected at each WHWO survey station along transects. One third of transects are sampled for vegetation each year. Vegetation sampling protocols are modified from those used for the Birds and Burns project (Saab et al. 2006), from Bate et al. (2008a, 2008b), and Keane and Dickinson (2007). The sample design uses variable radius rectangular plots, and/or transects to sample trees, snags, down wood, and shrubs. Canopy cover, slope, aspect, and topographic position are derived from remotely-sensed data (e.g., USGS and GNN).

Treatment Effectiveness Monitoring

This protocol is designed to provide reliable, standardized data on the effectiveness of treatments to restore or enhance habitat for WHWO, and the impacts of treatments with other objectives (e.g., fuels reduction, salvage logging) on WHWO across their range in Oregon and Washington. The data can be used to better define habitat associations of WHWO, and to design treatments at the stand and landscape scales in the 2 states.

Specifically, this protocol is designed to answer the following questions:

- Do WHWOs occupy treated stands in the same proportion to untreated (control) stands?

- Is the reproductive success of WHWO in treated stands different than WHWO using untreated stands?
- What are stand and landscape attributes of areas used by successfully reproducing WHWOs versus unsuccessful sites?

Occupancy of stands by WHWO is determined using point count/playback stations along transects using the same techniques as for the broad-scale occupancy monitoring. Nests are located during systematic nest surveys conducted within 200 m (656 ft) of the transects, across treatment and control units (Dudley and Saab 2003). Nests are monitored during multiple visits until it is determined if the nest was a Failure or a Success. A successful nest is one where at least 1 young fledges from the cavity (i.e. a feathered nestling leaves the nest cavity on its own).

Vegetation data are collected at nest locations and non-nest random stations that are placed 250 m apart in both treatment and control units. The vegetation sampling uses the same plot design as for the occupancy monitoring described above.

A BACI (before-after/control-impact) study design is the preferred monitoring design. In this design units are sampled before and after a treatment in both treatment and control units. Monitoring of treatment and control units should continue for at least 3 years post-treatment. Pre-treatment monitoring should occur for 1 year prior to treatment.

A BACI approach is not always possible. In those cases a retrospective monitoring design can be implemented in which treatment and control units are monitored only after the treatment has occurred.

Validation Monitoring

Habitat suitability models have been developed for nesting WHWO in unburned and post-fire forests by the Rocky Mountain Research Station (Hollenbeck et al. 2011, Wightman et al. 2010). A leave-one-out cross validation approach was used to confirm model performance of the models, however, validation and refinement still should be done with an independent data source. In addition, the predictive ability of the models will be lower in landscapes outside of the model origin area, thus the models need to be refined for other areas outside central and southeast Oregon. New data on additional known WHWO nesting locations in both burned and unburned landscapes are needed to accomplish model refinement and validation for other areas. Validation and refinement of the unburned forest model is a priority due to the applicability to assessing and prescribing fuels reduction activities. Validation of the post-fire model is a lower priority at this time.

Specific objectives of the model validation monitoring are:

- Assess and refine applicability of current WHWO models to other landscapes across Oregon and Washington.

- Validate the model for unburned forests with known WHWO nesting locations to better understand the predictive ability of the model.
- Verify and refine the utility of using a presence-only niche modeling approach for management purposes.

Survey transects are established in study areas using the methods described for Broad-scale Distribution and Occupancy Monitoring. Nests are located by searching an area within a 400 m radius of any WHWO detection. Nest monitoring protocols are the same as for the Effectiveness Monitoring protocols. Data collected for WHWO nests through Effectiveness Monitoring protocols can also be used to calibrate and validate the habitat model for unburned forests.

Vegetation data are collected at nest locations using the same plot design as for the other types of monitoring as described above.

Results

Accomplishments prior to FY11

Broad-scale occupancy monitoring

- Development of survey protocols
- Pilot survey

Treatment effectiveness monitoring

- Sisters Ranger District – conducted by Ranger District employees
- Development of monitoring protocols

Validation monitoring

- Validation using Sisters RD nest locations

FY11 Accomplishments

Broad-scale occupancy monitoring

Survey transects were identified at the regional scale by randomly selecting points for survey locations from center points of GNN pixels determined to be in potential habitat based on tree list data assigned to each pixel. Pixels were validated as meeting habitat criteria using NAIP Imagery. The AlaskaPac Toolkit was used in ArcMAP to establish random transects within potential habitat.

Thirty transects were established in the field using starting and ending points, along with azimuth provided by the Regional Office. Following the azimuth, 10 points were established, 300 m apart on each transect.

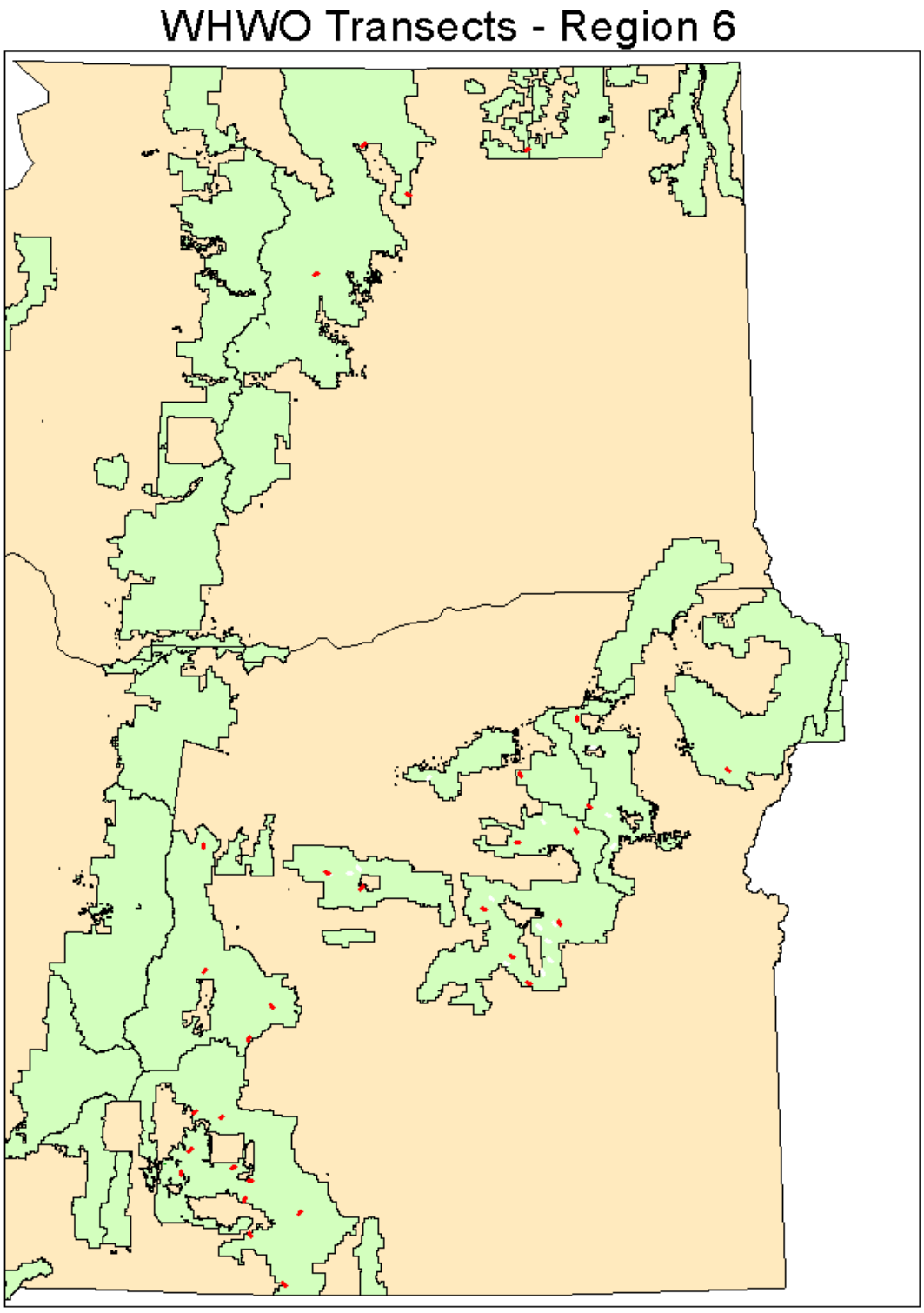

Figure 1. The 30 FY11 WHWO transects are shown here in eastern Oregon and Washington as red dots. The National Forests are the green polygons.

Playback surveys were conducted twice on each transect. Vegetation measurement data were collected on 1/3 of transects. Data were entered into PDAs and then transferred to spreadsheets in the office.

A total of 27 WHWO were detected on 10 of the 30 transects. Five nests were also located adjacent to transects.

Treatment effectiveness monitoring

Sisters Ranger District, Deschutes NF – conducted by Ranger District employees
1,383 acres of treatments in the Metolius Basin were monitored. Eight WHWO were detected and 3 nests were located. This study was not funded adequately to have control stand treatments.

Pringle Falls – PNW and RM Research Stations
Pre-treatment data were collected on the Deschutes NF, Pringle Falls Experimental Forest. Point counts, nest searches, and vegetation sampling occurred in a treatment unit, Lookout Mountain (LM), and a control unit, Wake Butte (WB).

Point counts were conducted at 98 points along 20 transects. Point counts were visited 3 times. Only 3 WHWOs were detected.

Nest surveys were conducted twice in each control and treatment unit. A total of 1,571 ha were surveyed (913 ha at LM, 658 at WB). Only 1 WHWO nest was located, in the LM unit.

Validation monitoring

Occupancy and nest surveys for WHWO were conducted on the Fremont-Winema NF to validate nesting habitat suitability previously modeled for WHWO in central/southern Oregon (Hollenbeck et al. 2011).

Occupancy monitoring was completed on 20 transects. There were a total of 29 WHWO detections, 13 on the first visit and 16 on the second visit.

Nest surveys were conducted on 1,080 ha twice during the breeding season. A total of 17 nests were located. Nine nests fledged young, six failed, and two never initiated. Mean clutch size was 4 and mean number of young fledged per successful nest was 2.63.

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