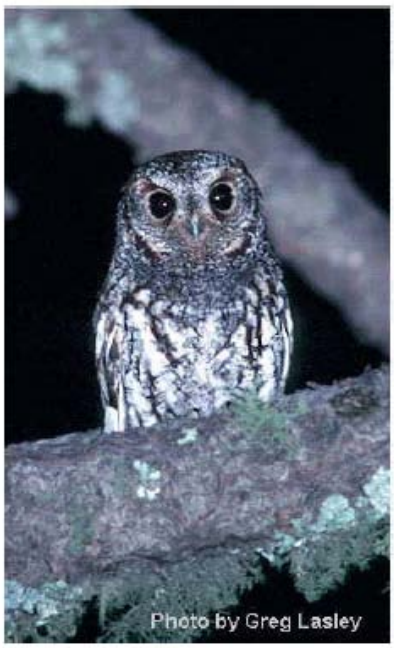
STATUS OF THE FLAMMULATED OWL, GREAT GRAY OWL, NORTHERN GOSHAWK, AND PILEATED WOODPECKER ON THE PAYETTE NATIONAL FOREST

REPORT OF 2004-2007 FINDINGS



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25 August 2009

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This document reports the results of an ongoing study of four bird species on the Payette National Forest (PNF). Three of these species; flammulated owl (*Otus flammeolus*), northern goshawk (*Accipter gentilis*), and great gray owl (*Strix nebulosa*), are designated "sensitive species"[1] by the Forest Service Intermountain Region. The fourth species, the pileated woodpecker (*Dryocopus pileatus*), is a "management indicator species"[2] (MIS) under the PNF Land and Resource Management Plan ("Forest Plan"). This study was initiated following a court order (Idaho Sporting Congress et al. v. Madrid, CV-99-217-S-BLW, February 4, 2005) to conduct a study of the populations of the above species, to render an opinion on the viability of those species and to recommend restorative measures if necessary to promote viability on the PNF.

The process used by the PNF for this study relies on monitoring data gathered from on-the-ground surveys, habitat models, and current conservation science. The PNF determined that the most comprehensive approach to studying these four species would combine these components. Study objectives included:

1. Conduct monitoring studies for the four species to improve knowledge of species distribution, relative abundance, and trends across the Payette National Forest,
2. Use species monitoring information, habitat modeling, conservation principals and risk factors to assign a sustainability outcome for each species and to render an opinion on viability.
3. Identify factors that present risks to long term viability and develop restoration strategies to mitigate or minimize these risks where necessary.

Formal monitoring of pileated woodpeckers, flammulated owls, northern goshawks, and great gray owls has been conducted since 2004. When the PNF Forest Plan was revised (USFS 2003), the plan set forth new monitoring techniques for pileated woodpeckers. These surveys have been conducted annually since 2004. Following the court order, biannual monitoring of flammulated owls and great gray owls was begun in 2005 and repeated in 2007. The results of flammulated owl monitoring were compared with monitoring conducted on the west side of the PNF in 1991. Monitoring of goshawks via survey stations on transects was initiated in 2005. Based on the low number of responses to broadcast calling surveys, we also monitored known nest sites.

Monitoring results varied for all four species. In general, flammulated owls were detected relatively frequently; 55% of transects surveyed in 2005 and 85% of transects surveyed in 2007. Pileated woodpeckers were detected less frequently, but in increasing amounts over four years of survey from about 25% of transects in 2004 and 2005 to 36% in 2006 and 44% in 2007. In 2005, northern goshawks were detected only on transects on the west side of the PNF. Relatively low

[1] Sensitive species are those plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by: a.) significant current or predicted downward trends in population numbers or density, b.) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

[2] Management Indicator Species are representative species whose habitat conditions or population changes are used to assess the impacts of management activities on similar species in a particular area.

detection rates (20% of transects) led to a monitoring focus on nest site surveys. Between 1 and 13 active nests were located each year between 2000 and 2007, but no known nest sites occur on the east side of the PNF. Great gray owls were detected only once in 2005 and twice in 2007. Monitoring results are likely influenced by the repeatability of the methodology, weather, surveyor expertise, habitat suitability and species' habits as well as actual changes in animal numbers.

Detections of flammulated owls and pileated woodpeckers combined with data in the PNF wildlife database supports our conclusion that these two species are widely distributed in appropriate habitat. Detections of each of these species were relatively constant or increased slightly over time. Although northern goshawks were detected at relatively low rates and only on transects on the west side of the Forest, this is not considered indicative of actual goshawk numbers, based on other information such as nest sites and observations recorded in the PNF wildlife database. Great gray owl detections were extremely low in both 2005 and 2007. Lack of response does not indicate absence of this species as evinced by the number of occurrences of great gray owls in the PNF wildlife database. Additional measures are recommended to better detect great gray owls.

The PNF also determined that a more intensive study design was needed to better monitor the MIS pileated woodpecker. The Forest is working with the Rocky Mountain Research Station (RMRS), to revise the study design for pileated woodpeckers and another MIS; the white-headed woodpecker. The revised technique for these species was instigated in 2008. The first year results are included in a separate report. The PNF is also reassessing survey techniques for flammulated owl, goshawk, and great gray owl. Monitoring for all four species (using revised techniques) will be continued in 2009.

All four species discussed in this document have wide distributions in North America and occupy relatively large home ranges. While monitoring for species such as these can be accomplished at a local or forest level, a true assessment of populations, trends and viability should be done at large scales, such as the bioregion, rather than the individual Forest. A number of studies have noted that an individual national forest is often too small a geographic area in which to evaluate viability of a species. Thus, it is most appropriate to render an opinion on how the national forest contributes to viability at broader scales.

For a number of reasons, monitoring data are useful and necessary, but do not fully address the question of viability. The 1982 NFMA Regulations[3] stated that "…wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area" and further defines a viable population as one for which the estimated number and distribution of reproductive individuals would "insure its continued existence." Forest management focuses on habitat and the provision of sufficient habitat to maintain existing populations. Recent science has found viability to be best represented through varying levels of risk (Cleaves 1994), and assurance that a population will be maintained is described in terms of management of sufficient habitat.

[3] These regulations are no longer in effect.

The Payette National Forest is conducting supplemental analysis of wildlife management direction in the 2003 Forest Plan. The Forest is developing a plan amendment in the form of a Wildlife Conservation Strategy (WCS). Incorporation of the WCS into the PNF Forest Plan is currently being analyzed in a separate Environmental Impact Statement (EIS). The WCS analysis generated species habitat models comparing historic to current conditions and resulting species sustainability ratings based on the departure of these source habitats. Preliminary results from the WCS effort, in conjunction with monitoring data, were used to estimate the status of habitat for these species across the planning unit. Factors believed to present risks to viability were identified. Following completion of the WCS, restoration measures or strategies to minimize these risks will be incorporated into the Forest Plan.

Habitat modeling results indicate the following:

- For pileated woodpeckers, the modeled decrease in historic source habitat was greater than 60% in approximately half the watersheds on the Forest. Loss of habitat may be due to factors such as the loss of large trees preferred by the species and to changes in density of the potential vegetation groups (PVGs) used by this species.

- Modeled source habitat for flammulated owl decreased between 20-60% in 30 watersheds, 9 remained neutral, 9 watersheds increased or decreased more than 60%. This species is associated with large trees, like the pileated woodpecker. However, modeled source habitat shows a lower departure when compared to historic source habitat estimates – an average decrease of 40% across the entire PNF.

- Habitat for great gray owls declined 20-60% in 22 watersheds and more than 60% in 27 watersheds. The source habitat model for the great gray owl is unable to account for the juxtaposition of meadows used for foraging with adjacent dense forested stands used for nesting, but over the entire PNF, source habitat is estimated to have declined 60%. The lack of documented occurrences of this species combined with modeled large declines in habitat indicates that the PNF should implement habitat conservation for this species.

- Modeled habitat for northern goshawks across the entire PNF declined approximately 32% from historic to current source habitat. This species is widespread across the west side of the Forest, although locations are lacking on portions of the east side.

Conservation principles derived from the published literature, and an analysis of habitats on the Payette National Forest, were used to assess threats and risks to these species' habitats. Table E-1 summarizes the risk ratings for six conservation principles analyzed for each of the four bird species. A tally of the conservation principles conbined with an analysis of current habitat conditions resulted in a qualitative rating of sustainability outcomes (from A through E) for each species. These outcomes were derived from Raphael et al. (2001)[4].

[4] The sustainability outcomes are:

A. Source environments are either broadly distributed or of high abundance compared to their historic distribution. The combination of distribution and abundance of environmental conditions provides opportunity for continuous or nearly continuous intraspecific interactions for the focal species. Species with this outcome are likely well-distributed throughout the planning area.

Three species; the flammulated owl, northern goshawk, and pileated woodpecker, received a sustainability outcome of B. These species are widely distributed in appropriate habitats and the Payette National Forest provides habitat that contributes to viable populations on a larger scale. Because habitat models are based on the mid-scale (i.e., watershed), we are unable to detect if essential fine-scale habitat features, such as snags, are lacking. For that reason, until more fine-scale habitat data are available, it is recommended that current source habitats for species with a B rating not be moved further away from the historic range of variability. Existing Forest Plan direction provides the necessary focus for the PNF to maintain and/or improve habitat for flammulated owls and northern goshawks.

One species, the great gray owl, received a sustainability outcome of C. Locations of this species were not as widely distributed. Habitats have declined from historic estimates and mid-scale habitat models cannot detect the proximity of meadow and adjacent forest habitat preferred by this species. The PNF provides habitat which contributes to viable populations on a larger scale, but with a greater degree of uncertainty. Additional conservation measures are warranted.

B. Source environments are either broadly distributed or of high abundance compared to their historical distribution, but there are gaps where source environments are absent or only present in low abundance. However, the disjunct areas of suitable environments are typically large enough and close enough to permit dispersal among subpopulations and to allow the species to potentially interact as a metapopulation. Species with this outcome are likely well-distributed throughout most of the planning area.

C. Source environments are distributed frequently as patches and/or exist in low abundance. Gaps where source environments are either absent or present in low abundance are large enough such that some subpopulations are isolated, limiting opportunity for intraspecific interactions. There is opportunity for subpopulations in most of the planning area to interact, but some subpopulations are so disjunct or of such low density that they are essentially isolated from other populations. For species for which this is not the historical condition, reduction in the species' range in the planning area may have resulted. Species with this outcome are likely well-distributed in only a portion of the planning area.

D. Source environments are frequently isolated and/or exist at very low abundance. While some of the subpopulations associated with these environments may be self-sustaining, there is limited opportunity for population interactions among many of the suitable environmental patches. For species for which this is not the historical condition, reduction in species' range in the planning area may have resulted. Species with this outcome are likely not well-distributed in the planning area. Source environments are highly isolated and exist at very low abundance, with little or no possibility of population interactions among suitable environmental patches,

E. Source environments are highly isolated and exist at very low abundance, with little or no possibility of population interactions among suitable environmental patches, resulting in strong potential for extirpations within many of the patches, and little likelihood of recolonization of such patches. There has likely been a reduction in the species range from historical, except for some rare, local endemics that may have persisted in this condition since the historical time period. Species with this outcome are not well distributed throughout much of the planning area.

Table E1. Conservation Principles Risk and Sustainability Ratings for Four Bird Species on the Payette National Forest

Species	Conservation Principles Risk Rating						Current Acres Habitat	Historic Acres Estimate	Sustain-ability Rating[5]
	CP #1: Species well distributed across native range are less susceptible to extinction than species confined to small portions of their range.	**CP #2:** Habitat in contiguous patches is better than fragmented habitat.	**CP #3:** Large patches of habitat containing large populations of target species are superior to small blocks with small populations.	**CP #4:** Patches of habitat close together are better than patches far apart.	**CP #5:** Interconnected patches of habitat are better than isolated patches, and dispersing individuals travel more easily through habitat resembling that preferred by the species.	**CP #6:** Patches of habitat that are roadless or otherwise inaccessible to humans are better than roaded and accessible blocks.			
Pileated woodpecker	Low	High	High	Moderate	Moderate	Moderate	93,150 (avg. 60% decrease)	230,919	B-
Flammulated owl	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	188,688 (avg. 40% decrease)	316,232	B
Northern goshawk	Moderate	Moderate	Moderate	Moderate	Moderate	Low-Moderate	430,060 (avg. 32% decrease)	633,844	B+
Great gray owl	High	High	High	Moderate-High	Moderate	Moderate	290,430 (avg. 60% decrease)	765,301[6]	C

[5] Plus or minus signs added based on amount of departure from historic
[6] Does not account for species need for juxtaposition of meadow habitats for foraging with denser forests for nesting hence habitat is likely overestimated

INTRODUCTION

This study was undertaken as a result of a court order issued in 2005 (Idaho Sporting Congress et al. v. Madrid, CV-99-217-S-BLW, February 4, 2005). This court order identified three tasks to be completed by the Forest Service:

1. Conduct a study of the population of the flammulated owl, great gray owl, northern goshawk, and pileated woodpecker in Circles 29 through 61 in the Payette National Forest, using the standards set forth in the 2003 Plan.
2. Render an opinion on the viability of those species, and
3. Set forth restorative measures, if any, deemed necessary to ensure viability.

The monitoring studies analyzed in this report consist of on-the-ground surveys for the bird species to provide a better understanding of distribution and relative abundance of the four species on the PNF over time. Monitoring protocols follow direction in the 2003 Forest Plan, use standardized monitoring techniques[7], and are designed to be long-term.

In this report, an integrated analysis combining monitoring information, habitat modeling, and current conservation science was used to render an opinion on viability. Risks to viability were assessed to develop recommended restorative measures where needed.

The PNF Plan was revised in 2003, and the Plan standards are currently being updated. The Forest proposes to develop a Forest Plan-level comprehensive Wildlife Conservation Strategy (WCS). [8] The WCS utilizes habitat model information and analysis to devise strategies to maintain and restore habitat for wildlife species, particularly habitats for species believed to be of greatest conservation concern. [9]

[7] e.g., Ralph et al. 1993, 1995; Hamel et al. 1996; Huff et al.2000; Kennedy et al. 1999; Takats et al. 2001

[8] The WCS completes analyses similar to those conducted by the Interior Columbia Basin Ecosystem Management Project (Raphael et al. 2001, Wisdom et al. 2000), but at a smaller scale. ICBEMP analyses were conducted at the basin and subbasin scale. WCS analyses were conducted at the watershed (5^{th} hydrologic unit) scale.

[9] The procedure combines evaluations of both habitat and population status and characteristics. It is designed to provide a well-reasoned evaluation of the likelihood that habitat and other environmental conditions will allow maintenance of well-distributed populations contributing to viability and is adapted and modified from Samson (2002), Andelman et al. (2001), and Wisdom et al. (2000).

CHAPTER 1: MONITORING OF THE FLAMMULATED OWL, GREAT GRAY OWL, NORTHERN GOSHAWK, AND PILEATED WOODPECKER

A. Techniques Common to All Species

Study Area

The study area for all four species was the entire PNF. Although the Court Order stated "The study shall be conducted on the east side circles, constituting circles 29 through 61," it also directed that the study be "governed by the standards set in the 2003 Plan." The 2003 Plan pertains to the entire PNF, so the monitoring study included sampling units in suitable habitats across the entire Forest (Figure 1).

Methods

The basic monitoring technique used for all species from 2004 through 2007 was adapted from the point count method, which is widely used in North America and is considered an efficient method of counting many species of birds (Ralph et al. 1993, 1995). PNF point count survey techniques were modified as described in Gordon 2004, 2005; Nutt 2004, and Egnew 2006. Surveys were conducted during the breeding season. Surveys were not conducted during inclement weather conditions that substantially influenced the ability to hear birds. Such conditions are generally steady rain or winds exceeding 20 km/hour. Surveys cancelled for weather were repeated at a later date.

Monitoring was conducted at specific points or stations along transect routes by listening, or broadcasting recorded vocalizations and then listening for responses. A detection, or presence, consisted of vocalization or visual observation by an individual while at a station. Up to 2007, pileated woodpecker surveys were conducted by listening at transect points during early morning hours. Beginning in 2007, broadcast calling was added to provide a comparison between different survey methods. Broadcast calling was used in all years for surveys of flammulated owls, great gray owls, and northern goshawks.

A transect consists of approximately 10 survey points or stations located at specified distances from one another. For each species, approximately 25 transects (250 points or stations) were established across the Forest in suitable habitat. A stratified random design was used to place transects similar to the method used in the Region One flammulated owl monitoring program design (Hutto and Young 2002, Cilimburg and Young 2005, Cilimburg 2007).

Transects were distributed within suitable habitat within the documented historical range for the species. Suitable breeding habitat was described using relevant research studies (Moore and Frederick 1991; Groves et al. 1997), field observations (i.e., observations by PNF and IDFG resource specialists), recorded observations (FAUNA and CDC databases), and the literature. Suitable habitat was spatially delineated using Potential Vegetation Groups (PVGs) as described in the Payette Forest Plan (USDA Forest Service 2003, Appendix E) and/or "strata" and

"working group"[10]. Additional information on the selection criteria for location of survey routes is contained in Gordon 2004, 2005.

Personnel Qualifications and Training

One of the most important considerations in planning a monitoring program is to ensure that trained technicians, working under the supervision of qualified biologists, perform data collection and analytical procedures (Vesely et al. 2006).

Field personnel were qualified in a professional or technical resource series, generally wildlife or forestry. Most surveys were conducted by Forest Service or Idaho Fish and Game professional wildlife biologists. All personnel were trained in the use of broadcast callers, geographical positioning systems (GPS), and bird identification. Safety was emphasized in training and through a Job Hazard Analysis (JHA) completed and reviewed before survey work commenced.

Data Collection, Storage, and Mapping

Monitoring data results were recorded on standardized data sheets and located on maps and/or aerial photos. Detections were recorded in Universal Transverse Mercator (UTM) coordinates and mapped in ArcGIS. Detection data are stored in the PNF Wildlife database.

B. Pileated Woodpecker Monitoring Studies

Monitoring of the pileated woodpecker (PIWO) began in 2004 following the methodology set forth in the revised PNF Forest Plan (USDA Forest Service 2003). The pileated woodpecker is a PNF Management Indicator Species (MIS). Under the Forest Plan (USDA Forest Service 2003, p. IV-6), standardized monitoring of MIS species is conducted annually.

Methods Specific to Pileated Woodpecker Surveys

The monitoring technique used from 2004 through 2007 was a modified point count method (Ralph et al. 1993 as modified in Gordon 2004, 2005; Nutt 2004, and Egnew 2006). Based on the low detection rates resulting from this method, the monitoring technique was expanded in 2007 to include the use of broadcast calling. Bird species that are inconspicuous, nocturnal, or occur at low densities may not be captured by general "listening" point counts. In 2007, monitoring was conducted using the listening technique, and then each station was re-sampled using broadcast calling. The PNF has requested that the Rocky Mountain Research Station (RMRS) design a study to test this new method against the previously used method and recommend a long-term monitoring technique for this species.

The initial number of transects and point stations was based on the recommendation in Ralph et al. (1993) for a minimum of 250 plots. The original study design attempted to space individual points along the transect at appropriate distances to ensure that a bird recorded at a previously

[10] Strata, combined with working group, describe vegetation types based on crown density, tree size class (structure), past management, species composition, and stand productivity's as determined from aerial photo interpretation.

sampled point is not recorded again (Ralph et al. 1993). The PNF established approximately 25 transects of 10 points each, with points spaced approximately 500 m apart, with some variation. General transect locations are shown in Figure 1.

The RMRS review in 2008 determined that points were not spaced widely enough to be considered independent, so data were combined for the 25 transects rather than 250 independent points. In 2008, additional transects were established based on the revised study design provided by RMRS. Habitat data were collected for all pileated woodpecker survey points in 2005 and 2006. Habitat data were obtained for the expanded pileated woodpecker survey points in 2008.

Results

Between 2004 and 2007, pileated woodpeckers were detected each year, but numbers and locations varied from year to year (Table 1). The detection rate by transect using the standard protocol (detection for each transect/number of transects surveyed) ranged from 24% in 2005 to 44% in 2007. Using broadcast calling, the detection rate increased to 52% in 2007. The detection rate has increased by approximately 10% each year since 2005, but the variability of detections for each transect (Table 2) suggests that other factors influence these results and they are not solely due to increases in numbers.

Table 1. PNF summary of pileated woodpecker monitoring results 2004-2007.

Year	No. of Transects	No. of Detections by Transect	Detection Rate by Transect	No. of Points	No. of Detections by Points	Detection Rate by Points
2004	22	6	0.27	220	9	0.041
2005	25	6	0.24	250	9	0.036
2006	25	9	0.36	250	15	0.060
2007 - standard	25	11	0.44	250	16	0.064
2007 – broadcast	25	13	0.52	250	21	0.084

(Note: In 2004, 24 transects were established, but 2 were not accessible due to snow and flooding. In 2005, these 2 transects were relocated and another was added for a total of 25.)

Table 2 summarizes detections for all four years (2004 – 2007) by transect and by point. Only detection rates by transect are discussed here. We attempted to determine patterns in occurrence across the Forest (Table 2). In 2004, pileated woodpecker detections were highest on the Krassel and McCall Ranger Districts with pileated woodpeckers detected on 6 transects. In 2005, pileated woodpeckers were detected on 6 transects, most of which were located on the Council Ranger District. In 2006, more pileated woodpeckers were detected on transects on the New Meadows Ranger District. No pileated woodpeckers were found on the 3 transects on the Weiser Ranger District in 2004, 2005, and 2007. However, 2 pileated woodpeckers were detected there in 2006.

Pileated woodpeckers were detected on only one transect; Thorn Creek, every year of the survey. On Cow Creek and Lost Valley transects pileated woodpeckers were detected 3 of the 4 years of survey. On seven transects, woodpeckers were detected only during one survey year. On eleven transects, woodpeckers were detected during two survey years. Four transects had no detections.

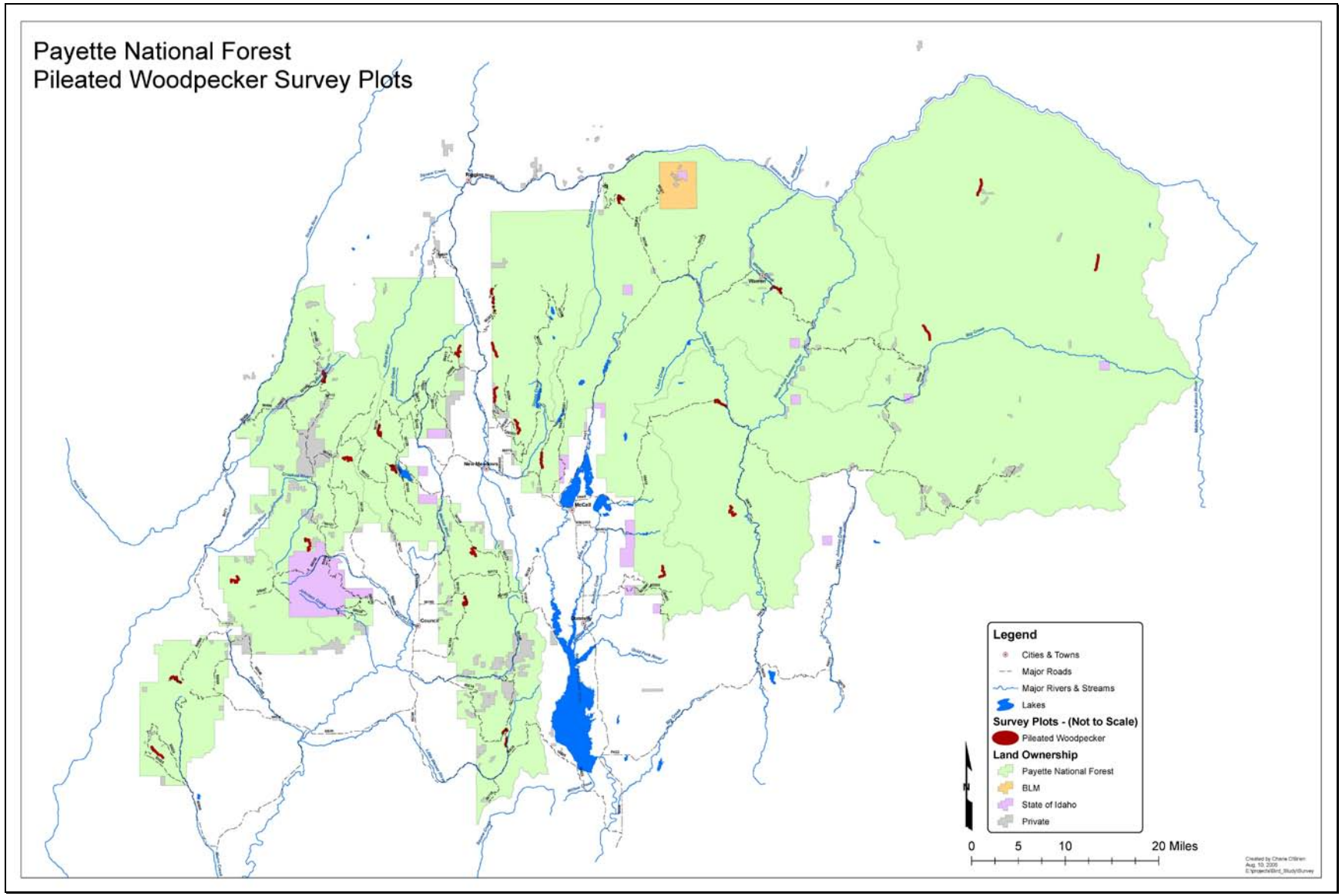

Figure 1. General location of pileated woodpecker monitoring transects on the PNF 2004-2007

Discussion

Frequency of detection was relatively low in the first 2 years of the survey, but increased by about 10% year over the next 2 years. Detections rates increased nearly an additional 10% to 52% when broadcast calling was added as a survey methodology in 2007. Using the standard monitoring technique from 2004 to 2007, slight increases in detections were recorded each year.

With the guidance of the RMRS, we have expanded the number of transects and improved the monitoring technique. We anticipate that detection rates will continue to increase as a result of these monitoring improvements.

Based on four years of point count surveys and one year of modified point count surveys, combined with occurrence records in the PNF wildlife database, pileated woodpeckers are present and widely distributed across the Forest mostly in older-aged mixed conifer forests. The total number of pileated woodpeckers detected by transect in any one year was not high and the total number of transects (n=25) across the Forest was too low to make an estimate of total bird population numbers.

Table 2. Number of detections of pileated woodpeckers on the PNF by ranger district and transect.

District	Transect	2004	2005	2006	2007	2007 broadcast
Council	Cow Creek	0	3	1	2	1
	Frog Pond	0	0	0	0	0
	Gaylord	0	2	0	1	0
	Indian Creek	0	1	0	1	1
	Little Weiser	0	1	0	2	0
	West Mill	0	0	0	0	2
Weiser	Grade Dukes	0	0	1	0	0
	Stacy Creek	0	0	0	0	0
	W. Brownlee	0	0	1	0	4*
New Meadows	Bally Mtn.	N/A	0	1	0	0
	Hard Creek	0	0	0	0	1
	Hazard Teepee	N/A	0	3	0	0
	Lost Valley	1	0	2	0	1
	Potty's Hole	N/A	0	2	1	2
	Round Valley	0	0	3	2	1
	Upper Lost	1	0	0	0	2
McCall/Krassel	Big Creek	0	1	0	0	1
	Chamberlain	2	0	0	0	1
	Fall Creek	2	0	0	2	3
	Cold Meadows	0	0	0	0	0
	Paddy Flat	0	0	0	2	1
	Secesh	0	0	0	0	0
	Teapot	1	0	0	1	0
	Thorn Creek	2	1	1	1	0
	Warren	0	0	0	1	0
PNF Total		**9**	**9**	**15**	**16**	**21**

*2 different pairs of pileated woodpeckers verified

C. Flammulated Owl Monitoring Studies

Monitoring for this species is conducted every 2 years. Monitoring for flammulated owls (FLOW) occurred in 2005 and 2007. Additional monitoring was conducted in 2008 in a subset of transects that were burned by large-scale fires in the summer of 2007. The results of the 2008 surveys are available in a separate report (Bond 2008). Monitoring was conducted by Idaho Fish and Game (IDFG) under a challenge cost share agreement with the PNF. Additional goals of the of flammulated owl monitoring were to survey areas on the west of the Forest that had been surveyed by IDFG in 1991 and to assess changes in habitat along transects surveyed in both years as a correlative to owl numbers. Similar transect locations and monitoring techniques were used to compare the data gathered in 2005 to the data collected in 1991. For more information see the complete reports in Evans Mack (2005) and Evans Mack and Bond (2007).

Methods Specific to Flammulated Owl Surveys

In 2005 and 2007, flammulated owl surveys were conducted at night using broadcast calling from mid May until early July. Flammulated owls are nocturnal and males vocalize regularly during the breeding season, hence nocturnal playback surveys are an effective census technique (Reynolds and Linkhart 1984). A similar census technique is used by the Forest Service Region 1 Landbird Monitoring Program (Cilimburg 2007). The playback sequence was changed in 2007 to conform to Region 1's protocol (Evans Mack and Bond 2007).

In 2005, a total of 38 transects with 303 points were surveyed between May 17 and late July (Figure 2). In 2007, a total of 33 transects with 269 stations were surveyed (Figure 3). Objectives in 2007 were to build on surveys conducted in previous years by revisiting transects to assess changes, adding new transects to expand effort, and documenting flammulated owl occurrence and distribution Forest-wide. Habitat was characterized along transects in 2005 and 2007.

During each year of survey, methods were used to avoid counting the same owl at more than one point. In 2007, an experiment was conducted to determine how far broadcast calls and flammulated owl responses could be heard. Survey results are reported by point as well as by transect.

Results

2005

Flammulated owls were detected on 21 of 38 transects (55%) across the Forest. As was the case with pileated woodpecker detections, owls were detected both early and late in the survey period, beginning on May 17 and ending on July 15. The adjusted flammulated owl counts, excluding the possibility of detections from the same individual and excluding owls detected outside the survey protocol resulted in 56 birds detected across 303 point stations (Table 3). The frequency of occurrence by points (number of detections/number of points) was 18%. The frequency of occurrence by transect (number of detections/number of transects) was 55%.

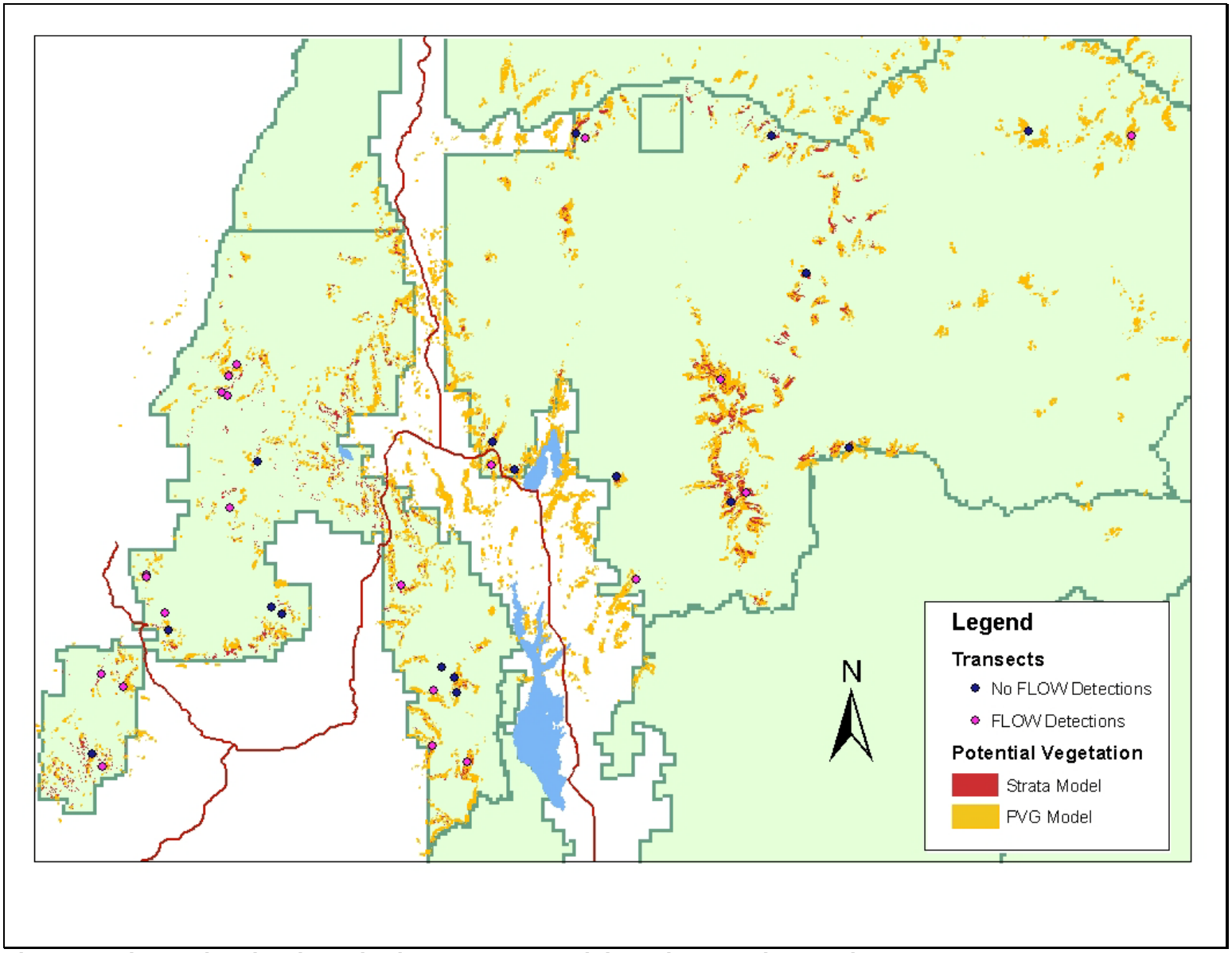

Figure 2. Flammulated owl monitoring transects and detections on the PNF in 2005.

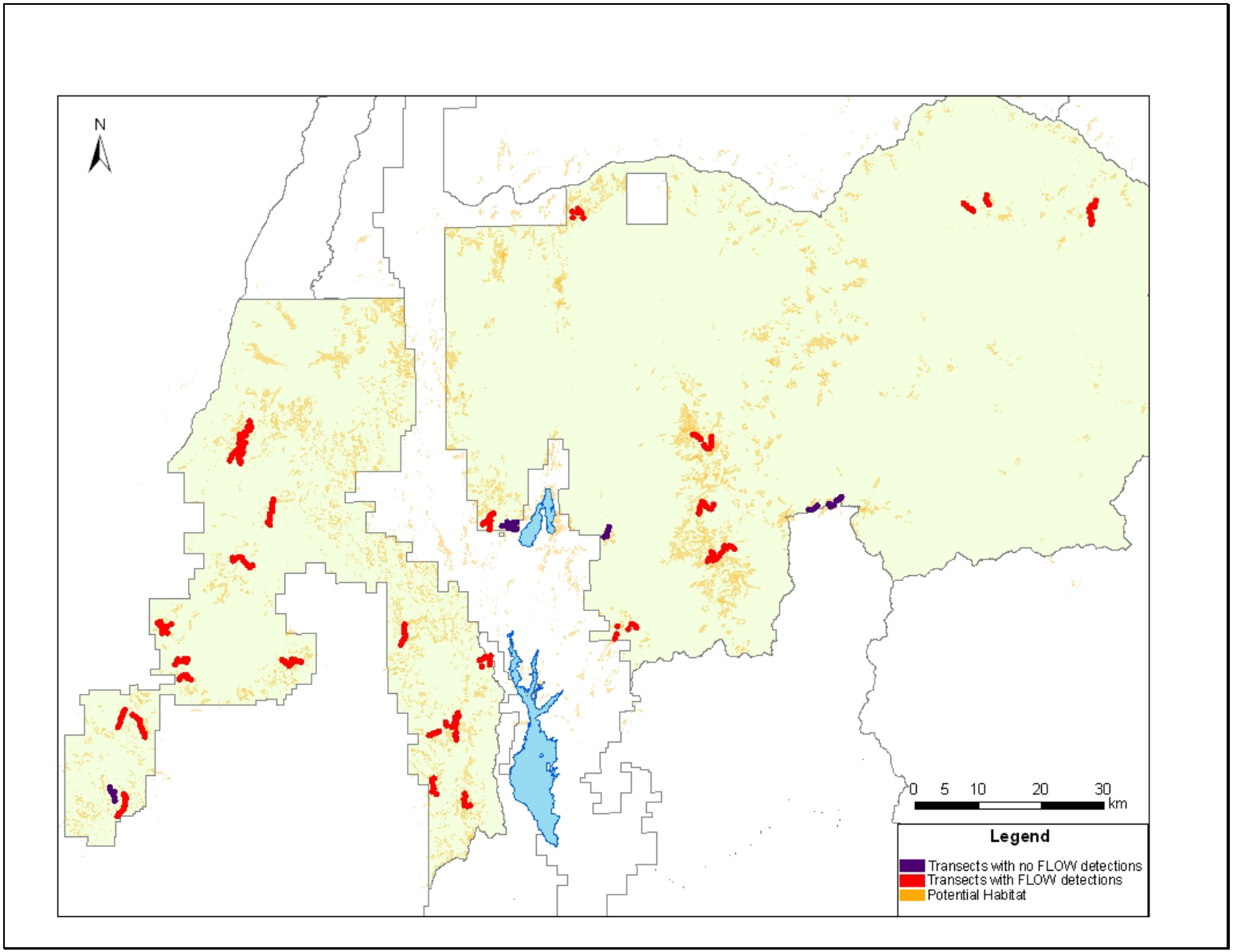

Figure 3. Flammulated owl monitoring transects and detections on the PNF in 2007

Occurrence of flammulated owls in 2005 was compared between transects and points on the east, central, and west areas of the Forest. Transects on the Council and Weiser districts comprised the west side, New Meadows Ranger District was central, and the McCall and Krassel districts were the east side districts (Table 3). The greatest number of detections occurred on the west side with 35 detections across 174 points for a frequency of occurrence by point of 20%. The greatest numbers of owls on one transect (n=8) were found on the Dukes Creek Original transect on the west side and on the Grass Mountain transect on the east side. Detections were also widespread on the west side: 15 of 23 transects had at least one owl, resulting in a frequency of occurrence of 65% by transect. The central portion had the highest frequency of occurrence with 5 owls found at 20 stations (25%). On the east side, flammulated owls were detected less frequently on 5 of 13 transects (38%).

Results of the comparison between owl numbers and habitat in 1991 and 2005 are fully reported in Evans Mack (2005). In 2005, 20 of the 22 transects surveyed in 1991 on the west side of the Forest were resurveyed. In 1991, owls were located on 12 of 22 transects (55%). In 2005, owls were located on 13 of 20 transects (65%). In general, the number of owls detected on a transect varied by only 1 or 2 birds, with the exception of the Boulder Creek transect that declined from 7 to 0 and the Crooked River transect that declined from 5 to 1.

Habitats around owl detections consisted mostly of ponderosa pine (*Pinus ponderosa*) and/or Douglas-fir (*Pseudotsuga menziesii)* types (71% total) and most owls were detected in areas classified as large tree stands or containing a large tree component (73% total).

2007

Surveyors detected 95 flammulated owls (29 on the east side, 66 on the west side) along or near 269 points (or stations) on 28 of 33 transects. In 2007, compared with 2005, more owls were detected by points (35% versus 18%) and transects (85% versus 55%) (Table 3).

Detections increased in the Salmon River Mountains with the addition of 2 new transects and decreased in the Frank Church River of No Return Wilderness. Compared to previous surveys in 1991 and 2005, detections increased in the Bear Creek and Cuddy Mountain regions and were fewer in the West Mountains. The highest concentrations were at Crooked River on the Council Ranger District, Dukes Creek on the Weiser Ranger District, and Moorehead Flat on the New Meadows District.

To better understand the variability of the detection technique, 8 transects were surveyed twice. No transect had the same number of flammulated owl detections twice.

As in 2005, most flammulated owls were detected in ponderosa pine, Douglas-fir, or mixed pine/Douglas-fir forest types in areas with a large tree component. About half of the time (56%), the habitat around owl locations was classified as having 40-70% canopy cover, indicating use of stands with a variety of canopy cover classes. Compared with 2005, fewer owls were mapped in forests with older, larger trees (60% versus 73%).

Table 3. Number of detections of flammulated owls on the PNF by ranger district and transect in 1991, 2005, and 2007.

District	Transect	1991	2005 # obs.	2007 (initial/resurvey)
Council	Bear	0	1	2
	Boulder Creek	7	0	NS
	Cabin Creek	NS	0	1
	Crooked River	5	1	11
	Cuprum	3	3	4
	Deer Creek	1	0	1
	Huntley Gulch	0	3	6
	Little Weiser	3	1	2
	Lower Johnson	1	0	0/3
	Mica Creek	1	0	0/0
	Middle Fk Weiser	3	2	1
	Potato Knob	NS	3	2
	Shingle Flat	0	1	2
	Summit Gulch	0	1	5
	Upper Johnson	0	0	NS
Weiser	Brownlee	2	2	1
	Dukes Creek*	11	8	8
	Mann Creek	2	0	0
	Mid. Brownlee Ck	3	2	2
	Mill Creek	0	1	1
	Seid Creek	0	0	1
New Meadows	Morehead Flat	NS	5	8
	Bear Basin	NS	0	0
McCall/Krassel	Chamberlain+	NS	0	0
	Fall Creek 2	NS	2	4
	Grass Mtn	NS	8	1
	Jakie Creek	NS	0	1
	James Creek	NS	0	1
	Kennelly Creek	NS	1	1/0
	Lick Creek	NS	0	0
	N. Fork Camp Ck	NS	5	4
	Yellow Pine	NS	0	0
	Zena Creek	NS	2	¼

* Dukes Creek Original in 1991, moved to Dukes Creek New in 2005, 2007

+ One owl detected each year off transects.

Discussion

Detections of flammulated owls increased from 2005 to 2007. Survey results in 2007 are comparable to results of surveys conducted in 1991. This may be due to slight changes in the broadcasting and listening duration that were believed to increase the chances of detecting flammulated owls. In 2007, owls were detected close to previous detections in 2005 and 1991. This is consistent with the findings of numerous studies that flammulated owls tend to return to the same home range each year (Reynolds and Linkhart 1990, McCallum et al, 1995, Powers et al. 1996, Marti 1997).

Shifts in flammulated owl habitat use may be the result of localized habitat changes or presence of predators. For example, portions of the Dukes Creek transect were harvested following the

1991 surveys. Owl locations in 2005 and 2007 did not occur in harvested units where owls had been detected in 1991, although the number of owls detected in subsequent years on relocated transects was still high (Table 3).

Habitat use results should be viewed cautiously due to variability of the data used (aerial imagery at a finer scale, and on the ground observations and measurements). In addition, some owls moved in response to the broadcast calls. In general, owl detections continued to show the importance of mature and older-aged ponderosa pine and Douglas-fir forests, although use of medium aged and partially harvested stands occurred as well.

The relatively high detection rates in 2007, combined with occurrences in the wildlife database, support our conclusion that flammulated owls are present and widely distributed across the PNF in appropriate habitat (old forest ponderosa pine and Douglas fir).

D. Northern Goshawk Monitoring Studies

Monitoring for this species was conducted via transects in 2005. Because of the low number of responses, most of which were associated with nest sites, the broadcast calling survey methodology was replaced with monitoring of known nest sites.

Methods Specific to Goshawk Surveys

In 2005, northern goshawk (NOGO) survey techniques followed the PNF *Forest Owls and Northern Goshawk Monitoring Protocol* (Gordon 2005). Twenty-five transects, each containing 10 stations were surveyed using broadcast calling from May through July. Surveys started early in the morning and usually ended by 11 am.

In 2007, the monitoring technique for this species was modified to focus on nest surveys. Beginning in the early 1990s, the PNF began to locate and record goshawk nests. The forest also conducted a study of nest site characteristics at 42 nest sites (Hayward 1997). By 2000, the data set included 97 nest sites[11], but over time a number of these sites became unsuitable for nesting due to logging or other disturbance. Approximately 58 nest sites were visited at least once in the period between 2000 and 2007 to document goshawk territory occupancy and reproduction.

Results

2005

This species was detected only on transects on the west side of the Forest (Table 4, Figure 4). No goshawks were located on the 16 transects with 159 points[12] on the New Meadows, McCall, and Krassel Ranger Districts. Detections were highest on the Weiser Ranger District where 6 birds were detected at 3 of 30 points on 3 different transects. This equals a detection rate of 10% by point (or station) and 100% by transect for the Weiser Ranger District. On the Council Ranger District, 4 birds were detected at 2 of 60 points on 2 of 6 transects. This equals a

[11] Goshawks typically have a number of nest sites in their home range, Thus, the number of nest sites does not equate to the number of nesting goshawk pairs.
[12] One point on the Harlan Meadows transect was not surveyed.

detection rate of 3% by point and 33% by transect on this district. When analyzed across the entire PNF, detection rates were 2% by point and 20% by transect.

2007

In 2007, goshawk monitoring focused on known nest sites on the Council, Weiser, and New Meadows ranger districts. Between 2000 and 2007, 58 of 84 known nest sites were visited at least once. Approximately one-third to one-half of the sites were monitored in a year. Active territories ranged from 1 in 2001 to 13 in 2007. Surveyed sites and results are shown in Table 5.

Table 4. Number of detections of northern goshawks on the PNF by ranger district and transect in 2005.

District	Transect	# obs.
Council	Bear Creek	0
	Beaver Creek	0
	Clifton Spring	2
	Frog Pond	0
	King Hill	0
	Orchid Canyon	3
Weiser	Tamarack Ck	2
	Grade Dukes	1
	W. Brownlee	3
New Meadows	Brown's Ck	0
	Elk Meadow	0
	Price Valley	0
McCall/Krassel	Bear Basin	0
	Big Creek	0
	Brundage Reservoir	0
	Burgdorf	0
	Chamberlain	0
	Cold Meadows	0
	Fall Creek	0
	Harlan Meadows	0
	Paddy Flat	0
	Pony Meadows	0
	Secesh	0
	Teapot	0
	Twenty-mile Creek	0

Table 5. Active and inactive northern goshawk nest sites on the PNF 2000-2007.

Year	Active	Inactive	Unknown/Not Surveyed
2000	2	4	52
2001	1	5	52
2002	7	5	46
2003	6	26	26
2004	3	9	46
2005	7	8	43
2006	5	10	43
2007	13	14	31

Discussion

Northern goshawks are consistently present on the west side of the PNF. Forest records (wildlife database) show some occurrences of goshawk on the east side of the Forest, but the distribution is patchy.

Goshawk monitoring has been addressed in a number of publications (Joy et al. 1994, Kennedy and Stahlecker 1993, USDA Forest Service 2000), and most recently in Hargis and Woodbridge (2006) who report on the USDA Forest Service (USFS) monitoring protocol for goshawk population trends on national forest lands at bioregional scales (i.e., northern Rockies or Intermountain Great Basin). While smaller scales were considered, the authors believe the bioregion scale is the best scale for analysis of goshawk monitoring data. They considered individual national forests to be too small for evaluating goshawk populations or trends, because goshawks on one Forest are not isolated from goshawks on adjacent national forest and other lands, and because, due to the inherent variability in population estimates, obtaining a sufficient sample size to detect a significant change in abundance at the forest scale is unaffordable for individual Forests (Hargis and Woodbridge 2006).

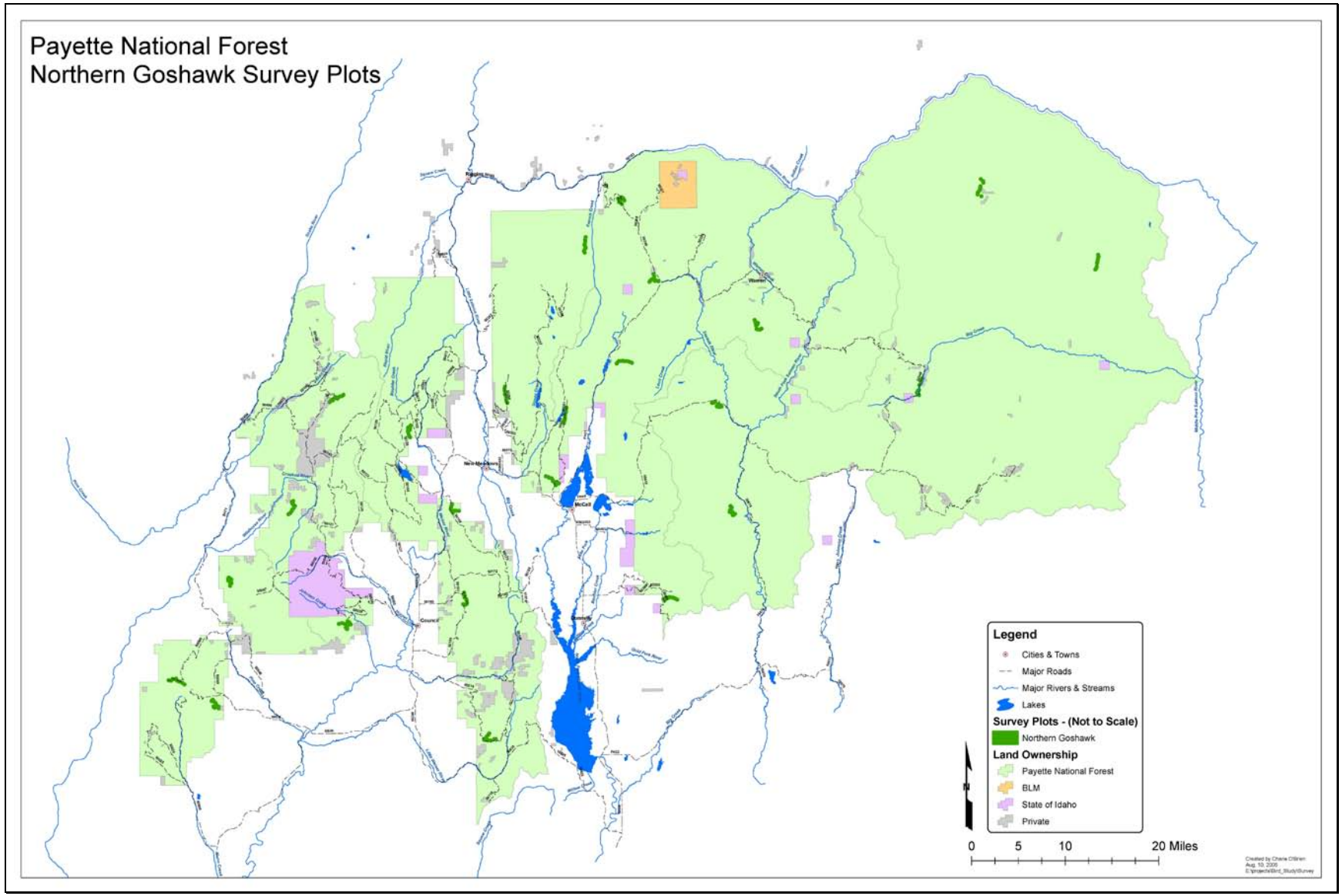

Figure 4. Northern goshawk monitoring transects on the PNF in 2005

E. Great Gray Owl Monitoring Studies

Monitoring for this species began in 2005. Monitoring in 2007 was conducted by the IDFG under a challenge cost share agreement with the PNF. Complete results of the 2007 monitoring study are available in a separate report (Evans Mack and Bond 2007).

Methods

Great gray owls (GGOW) typically defend and call from a small area around their nest site (Bull and Duncan 1993). The primary territorial call can be heard as far away as 400 m under ideal conditions, but typically it is heard within 200 m. To maximize the likelihood of eliciting a response, great gray owl stations were spaced approximately 160 m apart along the transect (Quintana-Coyer et al. 2004), usually around a meadow or other opening, and placed approximately 50-100 m into the trees. Each transect contained 10 stations.

In 2005, 25 transects were established across the PNF, with the exception of the Weiser Ranger District because it lacks suitable habitat components. Ultimately, 22 transects were surveyed because the remaining 3 were inaccessible. Nocturnal playback surveys were designed to be conducted once at each station from mid February through March.

In 2007, the original 22 transects were resurveyed along with 3 new transects (Figure 5). All great gray owl transects were located in forested areas adjacent to large meadows. In addition to monitoring for owls, a review of the habitats associated with owl locations was completed.

Results

2005

Only one detection of a great gray owl occurred in Chamberlain Basin in the FCRONR Wilderness on May 12 (Table 6). Recommended survey times for great gray owls are March through the end of April. Surveys began on April 14 and concluded on May 26, so most of the surveys were conducted outside the optimum time to detect great gray owls.

2007

Two great gray owls were detected during the 6-week survey period (mid-February through March), one at Bear Basin and one at Squaw Meadows. These two detections were fewer than expected but similar to 2005 when only 1 owl was located on the Chamberlain Basin transect (Table 6).

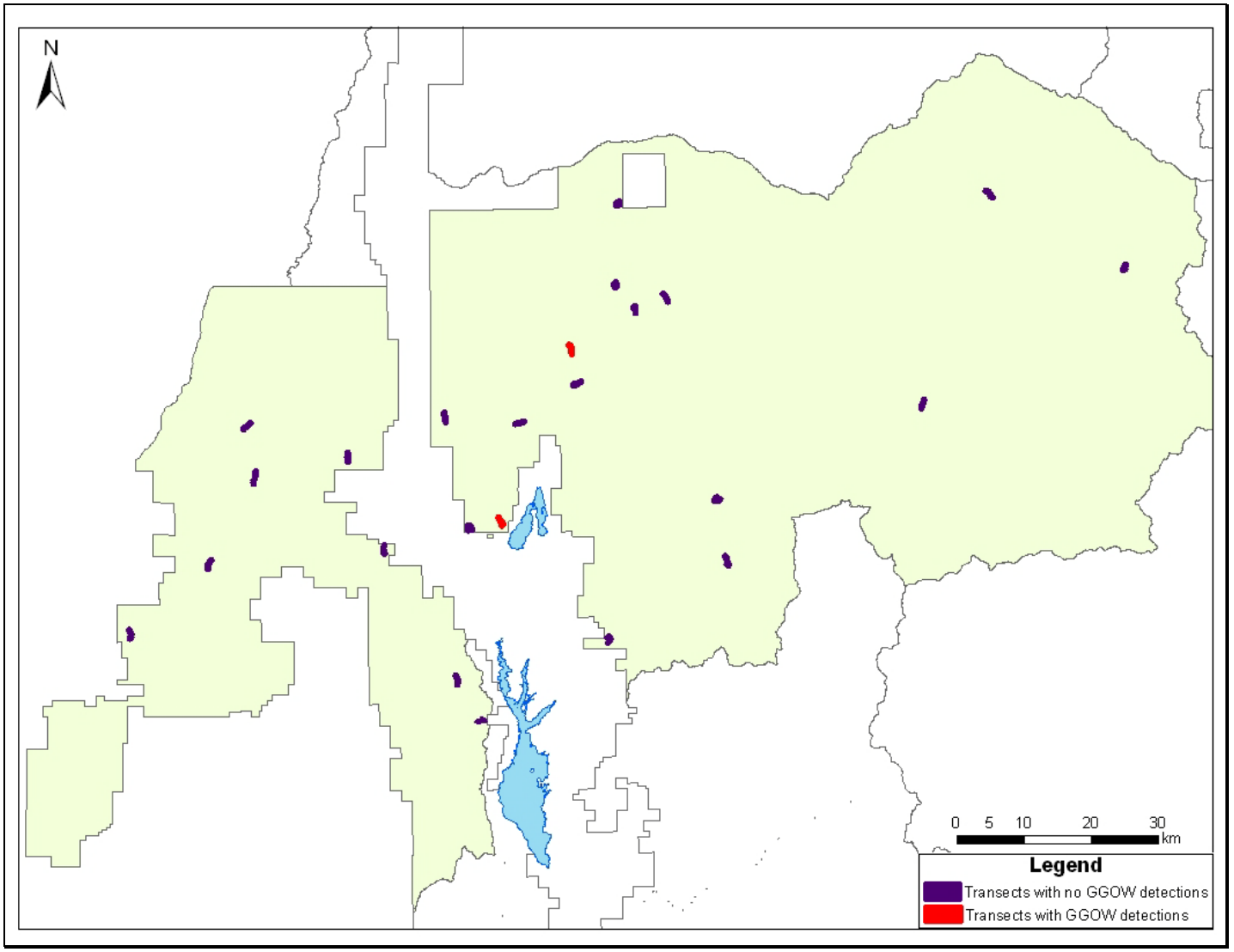

Figure 5. Great gray owl monitoring transects and detections on the PNF in 2007.

Table 6. Number of detections of great gray owls on the PNF by ranger district and transect in 2005 and 2007.

District	Transect	2005	2007
Council	Bear Creek	0	0
	Beaver Creek	0	0
	Crooked River	0	0
	Grade Dukes	0	0
	Lick Creek	0	0
	Middle Fk Weiser	0	0
New Meadows	Browns Creek	0	0
	Hard Creek	0	0
	Price Valley	0	0
	Sater Meadows	0	0
McCall and Krassel	Bear Basin	0	**1**
	Big Creek	0	0
	Burgdorf	0	0
	Chamberlain	**1**	0
	Krassel G.S.	0	0
	Marshall Lake	0	0
	Paddy Flat	0	0
	Ruby Meadows	0	0
	Sesech	0	0
	Squaw Meadows	0	**1**
	Twentymile	0	0

Discussion

Great gray owls detections were extremely low in both 2005 and 2007. Monitoring the presence of great gray owl has been challenging. This is due to a number of factors including the time of year when the species is vocal (mid-February to mid-March), the difficulty of access in winter, and the fact that the Payette national Forest occurs on the extreme southern periphery of the species' range. Effective monitoring is also dependent on timing and such factors as nesting, snow depth, and type and quality of broadcast calls. The lack of a response does not necessarily indicate absence of this species. A review of the Payette National Forest wildlife database shows observations of this species have occurred across the Forest.

CHAPTER 2: USE OF CONSERVATION PRINCIPALS, HABITAT MODELING AND EVALUATION OF RISK FACTORS TO DERIVE SUSTAINABILITY OUTCOMES

A. Introduction

For many reasons, monitoring data are useful, but do not fully address the question of viability. Difficulties in monitoring are related to a species' detectability, sufficient numbers and time to assess population trends, species rarity, the context of local populations to broader populations, the scale at which monitoring occurs, year-to-year variability of populations, the highly variable nature of environmental conditions, and other factors. Hence, in addition to the species monitoring data collected from on-the-ground surveys, habitat models were used to assess each species in relationship to the departure of historic to current habitats, and the implications of the abundance and distribution of these habitats to allow species persistence on the PNF. The PNF also evaluated risks to the persistence of the species by characterizing habitat risks. Forest management focuses on habitats and the provision of sufficient habitat to maintain populations. Recent science has found viability to be best represented through assessing varying levels of risk (Cleaves 1994), and assurance that a population will be maintained is described in terms of management of sufficient habitat.

B. Conservation Principles

This assessment adopted products in development for the Wildlife Conservation Strategy, including conservation concepts derived from the published literature and an analysis of habitats on the Forest to assess threats and risks to the four subject species' habitats. This analysis was used to develop a sustainability outcome and as a basis for rendering an opinion on the likelihood of persistence of the habitat and the continued existence of the species on the forest within its range and distribution.

A matrix was used to support the assess risks to species (rated as low, moderate, and high) and to develop sustainability outcome determinations. Completed matrices are located in the PNF wildlife files and summarized in Table E-1 (see page 7 above). The following conservation principles form the basis of the matrix:

1. *Species well distributed across their range are less susceptible to extinction than species confined to small portions of their range.*

    - Less susceptible to stochastic events
    - Probability of a species becoming locally extinct is greater in an isolated patch
    - Maintaining populations across a wide geographic range in a variety of patches preserves genetic and phenotypic diversity.

2. *Habitat in contiguous patches is better than fragmented habitat*.

    - Provides for multiple interacting individuals

- Contiguous patches facilitate movement and dispersal of individuals

3. *Large patches of habitat containing large populations of target species are superior to small blocks of habitat containing small populations.*

    - The larger the population size, the greater the chance of persistence.
    - Higher likelihood of supporting area-sensitive species and intact disturbance regimes and ecological processes

4. *Patches of habitat close together are better than patches far apart.*

    - The closer patches of habitat are to each other, the more likely individuals will be able to move among them.
    - Population recovery potential is greater the closer you are to a source population.

5. *Interconnected patches of habitat are better than isolated patches, and dispersing individuals travel more easily through habitat resembling that preferred by the species in question.*

    - Chances of successful emigration can be increased through improvements to matrix habitat and/or by reducing the amount of matrix habitat that species must move through.
    - Isolation is a function not only of distance but also of the characteristics (i.e., resistance) of the intervening matrix habitat.
    - A goal is to maintain exchanges of individuals among adjacent populations or metapopulations.

6. *Patches of habitat that are roadless or otherwise inaccessible to humans are better than roaded and accessible blocks.*

    - Roaded habitat patches can be indicative of habitat loss or fragmentation
    - Some species are displaced or exhibit avoidance of source habitats with roads in relation to motorized traffic and associated human activities
    - Roaded source habitat patches increase the likelihood of mortality due to increased contact with humans, as facilitated by road access

C. Habitat Modeling

Source Habitat

Information on changes in source habitat for the four subject species was also reviewed. Source habitats comprise those characteristics of macrovegetation that contribute to stationary or positive population growth for a species in a specified area and time. It is distinguishable from habitats that may be used by species but do not provide all the elements needed to provide for stationary or positive population growth. Focusing analyses on the subset of habitat used by the species which is needed to provide for stationary or positive population growth provides an indication change and risk to species.

Changes in habitat were determined at the scale of the Forest Plan 5th hydrologic code watershed (generally 50,000–100,000 acres). Only watersheds with at least 25% of the area on the PNF were included in the analysis. Current habitat was based on the Forest Plan GIS database vegetation layer which has been updated to include the effects of recent wildfires (i.e., 2000 and 2007 wildfires) and management (i.e., timber harvest). Historic habitat was determined as described below.

Historical Range of Variability

Reference conditions for forested vegetation are based on estimates of historical range of variability (HRV), using the time prior to Euro-American settlement as a reference point (Morgan et al. 1994). Estimates of historical size classes and species composition are based on modeling conducted by Morgan and Parsons (2001) for PVGs in the Southern Idaho Batholith. Morgan and Parsons (2001) did not determine canopy closure (or other density measures). Historical canopy closure was approximated using other sources (Steele et al. 1981, Sloan 1998) and examining average canopy closure classes from across different habitat types within a PVG (for a detailed discussion refer to the vegetation diversity discussion in the SWIEG FEIS in USDA Forest Service 2003). HRV is compared to current habitat estimates in order to assess changes in habitat over long periods of time.

Risk Factors by Species

Risk factors were considered for each species based on a review of conservation assessments and strategy documents (see Literature Cited). The risk factors identified here were developed regionally and verified locally.

D. Habitat Modeling Results

Pileated Woodpecker

Source Habitat

Wisdom et al (2000) identified source habitat for pileated woodpeckers using forest cover types and structural stages. That description was compared to Potential Vegetation Groups (PVGs) and structural stages (crown closures and tree size classes) to characterize and assess vegetation in the 2003 Payette National Forest Plan Revision (vol. 3, Appendix 6). Under historic disturbance conditions, PVGs 3, 6, 8, and 9 in large–tree structural stages (50.8 cm dbh) and in moderate and high (>40%) crown closure conditions can provide source habitat for pileated woodpeckers when functioning inside their range of variability (HRV) (personal observation). In addition, PVGs 2, 3, 5 and 6 in large–tree structural stages and in moderate and high crown closure conditions (functioning outside HRV) are capable of developing source habitat conditions that pileated woodpeckers may utilize.

This species is documented in the literature as being associated with large diameter (>21 inches dbh) snags or hollow trees for nesting, roosting, or both; and large standing dead and downed trees for foraging. The mid-scale model cannot take these fine-scale parameters into account and, therefore, may overestimate the amount of suitable habitat for this species.

Modeled Change in Source Habitat

Table 7 shows that historically pileated woodpecker habitat was less than 25% of the area of a watershed and 48 of 49 watersheds contained habitat for this species. Typically the amount of historic habitat in each watershed was estimated at 5-10,000 acres. Currently, pileated woodpecker habitat is less than 25% of the area of a watershed (Table 8). While the category of amount of habitat (0-≥25%) of a watershed generally has not changed from historic to current; the decrease in amount of habitat was ≥60% in 24 watersheds (Table 9). Watersheds showing large declines (>60%) are primarily distributed throughout the central and western portion of the Forest. Watersheds where habitat increased or remained relatively stable occur mostly on the Krassel Ranger District.

Loss of habitat is due to loss of large trees, and to changes in forest density. Historically, the PVG and large tree size class preferred by this species mostly supported a moderate canopy closure. Forests may have become more dense (high canopy closure) or more open (low canopy closure) compared to historic conditions.

Risk Factors

1. Declines in late–seral forests of subalpine, montane, and lower montane communities and associated attributes such as large trees, large snags, and large down logs (Wisdom et al. 2000).
2. Management that restores departed landscapes to provide source habitat for Family 1 species may decrease habitat for Family 2 species (Wisdom et al. 2000). For example, Family 2 species (e.g., pileated woodpeckers) currently use vegetative conditions outside historic range of variability. As these PVGs are restored to support Family 1 species, some Family 2 species may be affected.
3. Broad–scale departures from historical landscape patterns (e.g., large transitions from shade–intolerant to shade-tolerant species) (Wisdom et al. 2000, USDA Forest Service 1996).
4. Negative effects of road–related human activities that encourages development, recreation, timber harvest, and mining (IDFG 2005, Wisdom et al. 2000).

   Snag reduction – Reduction in density of snags due to their removal near roads, as facilitated by road access (Hann et al. 1997, Quigley et al. 1996).

   Negative edge effects – Species presumably responds negatively to openings or linear edges created by roads (such as habitat-interior species [Marcot et al. 1997]).

   Down log reduction – Reduction in density of large logs due to their removal near roads, as facilitated by road access.
5. Fragmentation of habitat (IDFG 2005, Wisdom et al. 2000).

Flammulated Owl

Source Habitat

Under historic disturbance conditions, PVGs 1, 2, 3, 5, and 6; structural stages medium or large (>30.48 cm dbh) and moderate crown closure (40 – 69%) can provide source habitat for flammulated owls (PNF wildlife files). Habitat was identified along flammulated owl transects in 2005 and 2007. See Evans Mack (2005) and Evans Mack and Bond (2007) for a complete description.

Snags are a special habitat feature for this species. Flammulated owls nest in cavities in both snags and live trees (Bull et al 1990, McCallum and Gehlbach 1988). The literature also shows occupied habitat for this species is strongly associated with the upper slopes (upper 1/3) or ridges of the terrain (Groves et al 1997, Moore and Frederick 1992, Reynolds and Linkhart 1992, Bull et al 1990). The mid-scale model cannot take these parameters into account and, therefore, likely overestimates of the amount of source habitat for this species.

Modeled Change in Source Habitat

Table 7 shows that historically flammulated owl habitat was less than 25% of the area in 39 watersheds and between ≥25 - <50% in 9 watersheds. Table 9 displays the change class from historic to current. Most watersheds (n=30) decreased between 20-60%, 9 remained neutral, 4 increased, and 5 decreased more than 60%. This species is associated with medium and large trees. Habitat for this species varies less than that for pileated woodpecker when compared to historic conditions. This may be due to such factors as a sufficient number of large and moderate trees on the landscape and preferred PVGs remaining in an open condition.

Risk factors

1. Declines in late–seral forests of subalpine, montane, and lower montane communities and associated attributes such as large trees, large snags, large down logs, and cavities. This has occurred primarily in montane and lower montane community types (Wisdom et al. 2000).
2. Management that restores departed landscapes to provide source habitat for Family 1 species may decrease habitat for Family 2 species (Wisdom et al. 2000).
3. Broad–scale departures from historical landscape patterns (e.g. large transitions from shade–intolerant to shade–tolerant tree species) (Wisdom et al. 2000 and USDA Forest Service 1996).
4. Negative effects of road–related human activities that encourage timber harvest, recreation (Wisdom et al. 2000).

   Snag reduction – Reduction in density of snags due to their removal near roads, as facilitated by road access (Hann et al. 1997, Quigley et al. 1996)
5. Fragmentation of habitat (IDFG 2005, Wisdom et al. 2000).
6. Declines in the overall extent of aspen and cottonwood–willow community types, and shifts from early– and late–seral to mid–seral stages of these cover types (Wisdom et al. 2000).

7. Livestock grazing degrades the composition and structure of upland deciduous forest habitats, and promotes the invasion of invasive plant species on disturbed sites (IDFG 2005).
8. Fire suppression contributes to the build-up of fuels, creates more homogenous landscapes, and allows conifer encroachment in aspen habitats (IDFG 2005, Wisdom et al. 2000).

Northern Goshawk

Source Habitat

Under historic disturbance conditions, PVGs 3, 4, 6, and 7 in structural stages medium to large (>30.48 cm dbh) and in moderate crown closure conditions (40 – 69%) and PVGs 8 and 9 in structural stages medium and large and in moderate to high crown closures conditions (>40%) can provide source habitat for northern goshawks (PNF wildlife files). In addition, when outside their historic range of variability, PVGs 2, 3, 5, 6, 7, and 11 in medium and large structural stages and in high crown closure condition (>70%) can develop source habitat characteristics (PNF wildlife files).

It is expected the parameters used by this species, which include both medium and large tree size and moderate and high crown closure conditions in all PVGs (whether or not within HRV), are broad enough that the model's depiction of total acres fairly represents the amount of habitat for this species.

Modeled Change in Source Habitat

The modeled source habitat for this species encompasses a broad array of PVGs, tree size classes and canopy closures. 37 watersheds contained between 25 and 50% source habitat historically (Table 7), this has dropped to 13 watersheds currently (Table 8). A decrease in source habitat of 20-60% occurred in 29 watersheds. Another 10 watersheds showed a neutral trend and 6 watersheds showed an increase in source habitat.

Risk Factors

1. Declines in late–seral forests of subalpine, montane, and lower montane communities and associated attributes such as large trees, large snags, and large down logs. This has occurred primarily in montane and lower montane community types (Wisdom et al. 2000).
2. Management that restores departed landscapes to provide source habitat for Family 1 species may decrease habitat for Family 2 species (Wisdom et al. 2000).
3. Broad–scale departures from historical landscape patterns (Wisdom et al. 2000 and USDA Forest Service 1996).
4. Negative effects of road–related human activities (Wisdom et al. 2000).

   Negative edge effects – Species presumably responds negatively to openings or linear edges created by roads (such as habitat-interior species [Marcot et al. 1997]).
5. Fire suppression contributes to the build-up of fuels, creates more homogenous landscapes, and allows conifer encroachment in aspen habitats (Wisdom et al. 2000).

6. Encroachment of conifers into natural meadow systems, eliminating potential foraging habitat (Wisdom et al. 2000).
7. Fragmentation of habitat (Wisdom et al. 2000).
8. Declines in overall extent of aspen and cottonwood- willow, and shifts from early– and late–seral to mid–seral stages of these cover types (Wisdom et al.2000)
9. Decline in suitable foraging areas around goshawk nest sites (Wisdom et al. 2000).

Great Gray Owl

Source Habitat

Under historic disturbance conditions PVGs 3, 7 and 11 with structural stages medium to large (30.5 – 50.8 cm dbh) and low to moderate crown closure (10 – 69%); PVG 6 with structural stages medium to large and moderate crown closure; and PVGs 8 and 9 with structural stages medium and large; and moderate to high crown closures (>40%) can provide source habitat for great gray owls (PNF wildlife files). In addition, when outside their historic range of variability, PVGs 3, 6, 7, and 11; structural stages medium and large; and high crown closure condition (>70%) develop source habitat characteristics as does PVGs 8 and 9; structural stages medium and large; and low crown closure condition (10 – 39%) (PNF wildlife files).

This species is documented in the literature as being a contrast species, requiring proximity of different habitats used for foraging and for nesting and roosting. The mid-sale model cannot take these parameters into account and, therefore, the low and high ends of HRV, and projected trends, are likely overestimates of the amount of source habitat for this species.

Modeled Change in Source Habitat

Table 9 displays the estimated change in source habitat for great gray owls by watershed on the PNF. Habitat for this species decreased more than the other species analyzed in this document; declining 20-60% in 22 watersheds and more than 60% in 27 watersheds.

Table 7. Watersheds that historically provided source habitat on the Payette NF

Number of Watersheds with Historic Source Habitat						
Species	No Source Habitat	>0 - 25% area as Source Habitat	≥25 - <50% area as Source Habitat	≥50 - <75% area as Source Habitat	≥75% area as Source Habitat	Total
Pileated woodpecker	1	48	0	0	0	49
Flammulated owl	1	39	9	0	0	49
Northern goshawk	0	19	29	1	0	49
Great gray owl	1	11	37	0	0	49

Table 8. Watersheds that currently provide source habitat on the Payette NF

Number of Watersheds with Current Source Habitat						
Species	No Source Habitat	>0-<25% area as Source Habitat	≥25 - <50% area as Source Habitat	≥50 - <75% area as Source Habitat	≥75% area as Source Habitat	Total
Pileated woodpecker	2	47	0	0	0	49
Flammulated owl	2	47	0	0	0	49
Northern goshawk	0	36	13	0	0	49
Great gray owl	2	47	0	0	0	49

Table 9. Change in source habitat watersheds from historical to current on the PNF

Change in Source Habitat Watersheds from Historic to Current							
Species	No Source Habitat	Decrease ≥ 60%	Decrease >20 - <60%	Neutral + or – 20%	Increase >20 - <60%	Increase ≥ 60%	Total
Pileated woodpecker	1	25	16	2	2	3	49
Flammulated owl	1	5	30	9	1	3	49
Northern goshawk	0	5	29	10	5	1	49
Great gray owl	0	27	22	0	0	0	49

Risk Factors

1. Declines in late–seral forests of subalpine, montane, and lower montane communities and associated attributes such as large trees, large snags, and large down logs. This has occurred primarily in montane and lower montane community types (Wisdom et al. 2000).
2. Management that restores departed landscapes to provide source habitat for Family 1 species may decrease habitat for Family 2 species (Wisdom et al. 2000).
3. Broad–scale departures from historical landscape patterns (Wisdom et al. 2000 and USDA Forest Service 1996).
4. Negative effects of road–related human activities (Wisdom et al. 2000).

   Negative edge effects – Species presumably responds negatively to openings or linear edges created by roads (such as habitat-interior species, [Marcot et al. 1997]).
5. Fire suppression contributes to the build up of fuels, creates more homogenous landscapes, and allows conifer encroachment in aspen habitats (Wisdom et al. 2000).
6. Encroachment of conifers into natural meadow systems, eliminating potential foraging habitat (Wisdom et al. 2000).

7. Fragmentation of habitat (Wisdom et al. 2000).
8. Declines in overall extent of aspen and cottonwood- willow, and shifts from early– and late–seral to mid–seral stages of these cover types (Wisdom et al.2000).

Sustainability Outcomes

Conservation principle risk ratings (low, moderate, high) were used to facilitate the development of sustainability outcomes (see table E-1, page 9). One of five outcomes[13] was assigned to each species. These outcomes are listed in footnote 4, page 7, *infra*. The outcomes range from A to E; A being the most abundant and well distributed, to E being the least abundant and isolated subpopulations of species. The sustainability outcome captures the status of the species in relationship to the quantity and distribution of its habitat, and was used to render an opinion on the viability of the species within its range on the Payette National Forest.

[13] Five outcomes used by Raphael et al. (2001) in the analysis of planning alternatives in the ICBEMP were adopted, with minor modifications in terminology, to describe likely sustainability outcomes for focal species.

CHAPTER 3: VIABILITY OPINION AND MANAGEMENT RECOMMENDATIONS

A. Introduction

Because the four subject species occupy habitats at scales that transcend national forest boundaries, the opinion of viability rendered in this report focuses on the likelihood of persistence of the species on the Forest within its historic range and distribution.

In order to issue recommendations for restorative measures, where necessary, to ensure viability, risks to viability were analyzed and recommendations to minimize those risks were considered. Factors that may present risks to viability were determined from a review of assessments and conservation strategies (see Chapter 2 and Literature Cited).

Pileated Woodpecker

Habitat models indicate the species habitat has declined an average of 60% from historic to current conditions. For this species, the presence of large diameter trees (>20 in dbh), both living and dead, and coarse wood on the forest floor are key fine-scale habitat features that can not be accounted for by the modeling. High road densities have been correlated with a reduction in snag and coarse wood abundance. Moderately high open road densities in watersheds on the west side of the PNF encourage activities such as timber harvest and fuelwood cutting that decrease these habitat features.

The species was assigned a sustainability outcome of B. There are concerns with the departure (approximately 60%) from historical to current habitats, and the availability of fine-scale forest features (i.e., large trees and snags), that may not be detectable in the source habitats analysis. Habitat models show that habitat is still broadly distributed but is not as abundant. There are gaps, particularly on the west side of the PNF, where habitat is absent or scarce. Disjunct areas of suitable environments are typically large enough and close enough to permit dispersal among subpopulations supporting maintenance of metapopulations.

Viability Opinion

Pileated woodpecker habitat on the PNF is well distributed, occupied, and capable of supporting the species' continued presence on the forest. These habitats contribute positively to species viability at eco-regional scales. Pileated woodpeckers are assigned global and state rankings of G5 and S4, respectively. Globally, the species is considered common, wide-spread, and abundant. In Idaho it is considered relatively secure.

Supporting Rationale

1. Observation data indicate the species is widespread on the Forest (occurrences in 69% of the watersheds on the Forest).
2. Habitats appear to be sufficiently connected to support dispersal across the Forest landscapes.

3. Pileated woodpeckers were documented on up to 52% of surveyed transects in any one year, and on approximately 80% of transects over the four years of monitoring.
4. The species is not identified as "species-of-conservation concern" in the Idaho Comprehensive Conservation Strategy (IDFG 2005). The species is considered apparently secure at both range-wide and state scales (G5/S4).
5. The species has not merited ranking as a sensitive species in the Intermountain Region of the Forest Service.[14]
6. A recently completed conservation assessment in Forest Service Region 1 showed that short-term viability is not an issue for the pileated woodpecker (Samson et al. 2006)

Management Recommendations

Based upon the viability opinion for this species, there are no restorative measures needed to ensure the continued existence of the pileated woodpecker. However, the following recommendations are included for consideration as part of the Wildlife Conservation Strategy:

- Continue monitoring this species.
- Maintain old forest habitat (as defined by the WCS) within forest types occupied by this species.
- Allow management actions to the extent they do not preclude restoration of old forest habitat.

Flammulated Owl

This species is a sensitive species for Region 4[15] of the USFS and is identified as a state species of conservation concern for Idaho[16]. Habitat models show a decline in habitat from historic to current in many watersheds. In general, habitat patch size has also decreased in watersheds with declining trends. Quality of habitat may be degraded as a result of high open road densities and fuelwood cutting, which can result in decreases in snags, coarse wood amounts, and size classes.

The species was assigned a sustainability outcome of B. There are concerns with the decline, by approximately 40%, of habitat from historic levels. The availability of fine-scale forest features, such as large trees and snags, may not be detectable in the source habitats analysis. Habitat models show that habitat is still broadly distributed although not necessarily as abundant as historically documented. There are gaps, particularly on the west side of the PNF; conservation principle ratings for these indicators showed moderate risk. Disjunct areas of suitable environments are typically large enough and close enough to permit dispersal among subpopulations supporting maintenance of metapopulations.

Viability Opinion

Flammulated owl habitat on the PNF is well distributed, occupied, and capable of supporting the species' continued presence on the forest. These habitats contribute positively to species viability at eco-regional scales. Flammulated owls are assigned global and state rankings of G4

[14] Intermountain Region Sensitive Species List
[15] Intermountain Region Sensitive Species List
[16] IDFG 2005

and S3B[17], respectively. Globally, the species is relatively secure. In Idaho it is considered vulnerable, and it is listed in Idaho as a species-of-conservation concern[18].

Supporting Rationale

1. Observation data indicate the species is widespread on the Forest (occurrences in 63% of the watersheds on the Forest).
2. Habitats appear to be sufficiently connected to allow dispersal across the Forest landscapes.
3. Flammulated owls were detected on 85% of transects surveyed in 2007.
4. The species is identified as "species-of-conservation concern" in the Idaho Comprehensive Conservation Strategy[19] and as a sensitive species by Forest Service Regions 1 and 4, but recent work in Region 1 and on the Boise NF[20] indicates it may be more widespread and potentially more secure than believed.
5. A recently completed conservation assessment in Forest Service Region 1 showed that short-term viability is not an issue for the flammulated owl[21].

Management Recommendations

- Conduct field surveys in project areas that contain suitable habitat to determine species presence and adjust project design, as necessary.
- Maintain old forest habitat (as defined by the WCS) in forest types used by this species. Allow management actions which permit old forest habitat to remain.
- Permit management actions within forested stands which may become old forest habitat for this species to the extent they do not preclude restoration of old forest habitat.
- Retain large diameter ponderosa pine trees that are categorized as "Legacy Trees" (as defined by the WCS).

Northern Goshawk

This species is identified as a sensitive species for Region 4 of the U.S. Forest Service.[22] Region 1 removed the Goshawk from its sensitive species list. The primary concern for this species is quality, rather than the quantity, of source habitat. Concerns for the habitat include loss of large trees and canopy closure resulting from fire suppression. A high density of small diameter understory trees may reduce foraging and nesting habitat quality by obstructing flight corridors and by suppressing tree growth needed to produce large-diameter trees suitable as nest sites. In addition, modification of the herbaceous understory can affect potential prey species (Reynolds et al. 1992).

[17] ICDC 2005, IDFG 2005, NatureServe 2007
[18] IDFG 2005
[19] IDFG 2005
[20] Samson et al. 2006, Barnes 2007, Cilimburg 2007
[21] Samson et al. 2006
[22] Intermountain Region Sensitive Species List

While occurrence data appears robust across much of the PNF, occurrences are predominantly on the west side of the Forest. Watersheds east of these occurrences that historically provided some of the most abundant source habitat are lacking occurrence data, leaving gaps in our understanding of distribution of the species on the Forest.

Whether habitat quantity is within the historic range of variability (HRV) is unknown. Source habitat trends have varied, and the number of watersheds exhibiting downward trends exceeds the number of watersheds with stable or increasing trends. Road densities are not a critical factor affecting this species although reductions in road densities are believed to benefit this species.

The northern goshawk was assigned a sustainability outcome of B based on the analysis conducted. Habitats for this species are considered reasonably secure and well-distributed across the Forest, with most conservation principle indicators rated moderate risk. Models indicate habitat is somewhat departed from historic levels with a decline of 32%. Disjunct areas of suitable environments are typically large enough and close enough to permit dispersal among subpopulations supporting maintenance of metapopulations.

Viability Opinion

Northern goshawk habitat on the PNF is well distributed, occupied, and capable of supporting the species' continued presence on the forest. These habitats contribute positively to species viability at the eco-regional scale. The northern goshawk is assigned global and state rankings of G5 and S4, respectively.[23] Globally, the species is considered common, wide-spread, and abundant. In Idaho, it is considered relatively secure.[24]

Supporting Rationale

1. Observation data indicate species' occurrences in 55% of the watersheds on the Forest.
2. Approximately 68 % of the historic source habitat currently exists on the Forest.
3. Habitats have a high degree of connectivity to support dispersal and inter-connectedness of territories at the Forest scale.
4. Monitoring consistently located birds in suitable habitats on the west side of the PNF.
5. Although listed as a sensitive species by Forest Service Region 4, recently this species was removed from the Region 1 sensitive species list because that Region considered it status as secure.
6. The species is not identified as "species-of-conservation concern" in the Idaho Comprehensive Conservation Strategy. The species appears to be secure, range-wide, even though it is considered vulnerable in Idaho (G5/S3).
7. A recently completed conservation assessment in Forest Service Region 1 concluded that short-term viability is not an issue for the northern goshawk[25].

[23] ICDC 2005, IDFG 2005
[24] ICDC 2005
[25] Samson et al. 2006

Management Recommendations

- Conduct field surveys in project areas that contain suitable habitat to determine species presence and adjust project design, as necessary.
- Maintain old forest habitat (as defined by the WCS) in forest types used by this species. Allow management actions which permit old forest habitat to remain.
- Permit management actions within forested stands which may become old forest habitat for this species to the extent they do not preclude restoration of old forest habitat.
- Retain large diameter ponderosa pine and western larch trees that are categorized as "Legacy Trees" (as defined by the WCS).

Great Gray Owl

This species is a sensitive species for Region 4 of the USFS[26]. Idaho does not consider it a state species of conservation concern, but does consider it as vulnerable and at moderate risk because of restricted range, relatively few populations, or other factors[27]. On the PNF, the primary concern for this species is the sufficiency of related nesting and foraging habitat. Modeling assessed acres meeting source habitat criteria, but was unable to consider the proximity of late seral habitat to early seral forests or open meadows used for foraging. Given this, it is likely that modeling efforts overestimated the abundance of source habitat.

Changes in the distribution and abundance of early seral habitat on the Forest have been analyzed elsewhere and findings indicate an abundance of early seral forest habitat is present but not necessarily in the patch sizes that would historically be present. Moreover, due to data and modeling limitations, it is unknown whether the habitat is situated in proximity to late seral, or nesting habitat.

Habitat models show a decrease from historic to current in many watersheds. Finer scale modeling should be used to assess nesting/foraging habitats and to determine whether roads are a problem for this species. Three conservation principles are rated as high risk and two are rated moderate risk, with one receiving a moderate-high risk rating. The sustainability outcome for great gray owl on the Payette National Forest is Outcome C.

Viability Opinion

Great gray owl habitat on the PNF is well distributed and capable of supporting the species' continued presence on the forest in the short term, but only limited areas have been found occupied. The great gray owl is assigned global and state rankings of G5 and S3, respectively.[28] Globally, the species is considered common, wide-spread, and abundant.[29] In Idaho, the great gray owl is considered vulnerable.

[26] Intermountain Region Sensitive Species List
[27] IDFG 2005
[28] ICDC 2005
[29] NatureServe 2007.

Supporting Rationale

1. The Payette National Forest is on the southern periphery of the species' geographic distribution[30]. The primary breeding range for this species is in Canada, with populations occurring at high elevation mountain ranges in the Cascade/Sierra Nevada Mountains and Rocky Mountains.
2. The Idaho State Comprehensive Wildlife Conservation Strategy (CWCS) does not include great gray owls in the list of species-of-greatest conservation concern, possibly due to the fact that Idaho is the extreme southern periphery for the species, and it was never a common species in the state.
3. Human disturbances such as road density impact a very small percentage of potentially suitable habitats.
4. Although mid-scale analyses suggest habitats are well-distributed and abundant, fine scale forest features considered important for this species are not measurable in this study.

Management Recommendations

- Conduct field surveys in project areas that contain suitable habitat to determine species presence and adjust project design, as necessary.
- Maintain old forest habitat (as defined by the WCS) in forest types used by this species. Allow management actions which permit old forest habitat to remain.
- Permit management actions within forested stands which may become old forest habitat for this species to the extent they do not preclude restoration of old forest habitat.
- Develop a strategy to address retention of nesting areas in old forest stands in proximity to early seral forest areas for foraging.
- Emphasize retention of snags, particularly large snags such as ponderosa pine and Western larch to maximize the longevity of standing snags.

[30] Hayward and Verner 1994, Duncan and Hayward 1994

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