

Chapter 1

Approach: The Flammulated, Boreal, and Great Gray Owl Assessments

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This forest owl conservation assessment focuses on three species of forest owls that occur on national forest lands in the United States. Sixteen other species of owls also regularly breed in the United States, but these three species were designated "sensitive" on forests in more than one region of the Forest Service in 1992. Within the National Forest System, "sensitive species" are plants and animals whose population viability is identified as a concern by a regional forester. Sensitive species require special management, so knowledge of their biology and ecology is critical. The inter-regional distribution of these owls necessitates a coordinated approach to management. Therefore, the forest owl conservation assessment addresses the biology of these owls throughout their range within the United States. The broad nature leads to some constraints on the specificity of information for particular locales. Furthermore, completing the assessments promptly required establishment of some sideboards concerning the geographic scope of particular aspects of the assessment and further analysis of existing (but unanalyzed) field data. These sideboards are described later in this introduction. This brief chapter outlines the scope of the assessments and describes the process used in producing the assessments.

GOALS

First, the authors sought to provide forest managers, research biologists, and the public with a thorough discussion of the biology, ecology, and conservation status of these forest owls based on scientific knowledge accumulated prior to March 1993. This discussion includes the authors' interpretation of the strength of scientific evidence for particular conclusions concerning the biology or ecology of the species. Second, the authors sought to provide an overview of research necessary to broaden current scientific knowledge before presenting scientifically based conservation strategies for the species.

The assessment goals explicitly limit the scope of this document to critical summaries of scientific

knowledge, discussion of broad implications of that knowledge, and outlines of information needs. As such, we do not provide management guidelines. The assessments are management tools in that they provide the biological basis for management. The assessments provide the catalyst to integrate research and management activities. The research direction outlined in each assessment is designed to meet specific management needs. Much of this research can be accomplished most effectively if undertaken as part of active management programs on national forest lands. For example, when researchers and managers work together, research can effectively address current management problems, and research can use the large-scale "treatments" that result from carefully planned management actions. Therefore, we felt that focusing the assessments on these goals would provide the information needed by both managers and researchers to move toward developing a conservation strategy for these species in the shortest possible time.

SCOPE OF ASSESSMENT

The forest owl conservation assessment consists of three major sections (individual owl assessments), each designed to stand alone. The assessments were written from a common outline, however, to facilitate comparison of the scientific understanding of the three owls. Each conservation assessment consists of five chapters: Current Management Situation, Review of Technical Knowledge, Dynamics of Important Vegetation Communities, Conservation Status, and Information Needs. The Current Management Situation provides the history that led to the recognition that a particular owl species required special attention in research and management planning. The Review of Technical Knowledge chapter provides a summary of scientific knowledge on the target species. The review includes a critical assessment of the strength of scientific evidence upon which conclusions are based and therefore was written by recognized experts for each owl species. Be-

cause a majority of management activities influence these owls indirectly through changes in habitat conditions, each assessment includes a Vegetation Communities chapter. It provides an important link in understanding the relationship between the species' ecology and its conservation status. Forest dynamics set limits on management options for these owls and must be understood before management is formulated.

The Conservation Status chapter provides a synthesis of the scientific knowledge presented in the previous two chapters from the perspective of biological conservation. By conservation status, we mean the demographic condition of the species as it relates to the likelihood of local and national persistence of wild populations over the long term. Are populations of these owls in the United States currently threatened? Are current land management practices likely to imperil local or regional populations? This chapter is organized around critical questions concerning the biology of the owl. After answering these questions, which together define the status of the species, management considerations are discussed and the species' conservation status is summarized.

The final chapter, Information Needs, systematically examines the available knowledge to assess the need for new information before developing a conservation strategy for the species. The research identified through this process is then placed in the context of a research program.

We have approached the assessment process as a first step toward managing these species in the context of ecosystem management. Therefore we have organized the scientific knowledge reviewed in each assessment to answer particular questions necessary in formulating a conservation strategy. The degree to which these questions can be answered indicates the strength of scientific support for management decisions.

STANDARD FOR KNOWLEDGE

What is the basis for scientific knowledge? In producing the assessments, we reviewed refereed literature, nonrefereed publications, research reports, and data accumulated by resource management agencies. Not all publications on a species are referenced in the assessments, nor was all published material considered equally reliable. The topics reviewed were those judged most important in understanding the conservation status of a species and in formulating future management strategies. Because particular literature is not referenced does not

suggest that the work was judged inferior. Rather, the results may not have been directly relevant in a conservation framework or another paper may have demonstrated a similar result more directly.

The assessments emphasize refereed literature because this is the accepted standard in science. Nonrefereed publications or reports were regarded with greater skepticism. We chose to use some nonrefereed literature in the assessments, however, because of the paucity of peer reviewed research on forest owls in North America. Nonrefereed literature was particularly important in describing habitat use patterns across geographic regions. Data accumulated by resource management agencies, much of which are not contained in publications or written reports, were important in estimating the geographic distribution of the owls. These data required special attention because of the diversity of persons and methods used to collect the data. To maintain quality control, we followed up (by phone or mail interviews) on most cases where information from a single observation significantly extended the estimated distribution of a species.

LIMITATIONS

We emphasized research conducted in the United States and sought new distribution information largely for areas within the United States. Although we focus on owl populations within the United States, we recognize the influence of populations in Canada and south of the United States on the dynamics of owls in this country. Thus, we gathered broad distributional information on the species throughout North America and considered how variation in the biology of the species within, and outside, the United States might influence their status.

Boreal and great gray owls occur in circumboreal distributions so a majority of their ranges encompass lands in Europe and Asia. Research on these species in Europe and Asia is more extensive than in North America. We drew upon this literature in describing the general biology and ecology of the species, noting when information was derived from distant geographic areas. We expect that the ecology of these owls varies geographically, so we have been careful in drawing conclusions based largely on studies from Europe or Asia.

Because we sought to produce these assessments rapidly, we did not analyze existing unpublished data or attempt to conduct meta-analysis to synthesize information from published literature. Instead, the assessments are limited to literature summaries.

The timeline established for completing the assessments and resources available to write this report did not allow us to gather some critical information. In particular, we were unable to examine current federal land management plans to discern the direction of forest management and the potential impacts on the forest owls. We were also unable to gather sufficient information to assess trends in the abundance of old forest. Finally, although we recognize the utility of demographic analysis in assessing species' status, we were unable to build and examine demographic models for these owls based on existing demographic data.

DEFINITIONS

Several terms used throughout these assessments are defined below:

1. A "forest stand" is a homogeneous portion of forest that can be differentiated from surrounding units by variation in age, composition, structure, and/or geography (Daniel *et al.* 1979). For this report I suggest that a stand must be at least 0.25 ha.

2. "Microhabitat" refers to conditions within an area usually smaller than a forest stand—a site where an individual owl performs a single activity such as roosting, nesting, or foraging.

3. "Habitat use" refers to the occupation of a site by a species for some function. This term does not imply anything about the quality of the site to support the species.

4. "Habitat quality" refers to a continuous gradient in the ability of a site to support a species. High quality habitat provides conditions for a population to experience positive population growth.

5. "Suitable habitat" refers to conditions where the long-term balance between birth and death rates results in an expected finite rate of increase greater than 1. Conversely, unsuitable habitat refers to conditions where population growth over the long term results in λ less than 1 (see Chapter 2).

6. "Mature forest" refers to a forest stand that has developed long enough since catastrophic disturbance that mortality and regeneration are prominent processes and regeneration results from parent trees in the stand. The mature stand has tree-fall gaps created after stand establishment and an uneven tree diameter distribution (Hayward 1991).

7. "Old forest" or "old growth" refers to a forest stand in later stages of succession whose age and physical structure is currently influenced by processes within the stand rather than the last catastrophic disturbance. Old forest will have a wide variety of tree sizes and ages and a patchy structure resulting from tree mortality and regeneration (Hayward 1991).

In Chapter 2 we discuss the distinction among habitat requirements, preferred habitat, and selected habitat.

REFERENCES

- Daniel, T. W., J. A. Helms, and F. S. Baker. 1979. Principles of silviculture. New York. McGraw-Hill.
- Hayward, G. D. 1991. Using population biology to define old-growth forests. Wildlife Society Bulletin 19:111-116.