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# Introduction

In March 1997, the U.S. Fish and Wildlife Service listed the Arizona population of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) as endangered under the Endangered Species Act (U.S. Fish and Wildlife 1997). Federal listing for the owl in Arizona resulted from a petition submitted in 1992 to the U.S. Fish and Wildlife Service (Galvin et al. 1992, U.S. Fish and Wildlife 1994). It was finalized based on historical and current evidence suggesting a significant population decline of this subspecies had occurred in Arizona and the owl population in this state was now nearly extirpated (see Phillips et al. 1964, Johnson et al. 1979, Monson and Phillips 1981, Rea 1983: 65-66, Hunter 1988, Millsap and Johnson 1988, U.S. Fish and Wildlife 1997). The loss and alteration of the owl's habitat was identified as the primary threat to the remaining population (e.g., Johnson et al. 1979, Millsap and Johnson 1988, Hunter 1988, U.S. Fish and Wildlife 1997). In July 1999, critical habitat for the cactus ferruginous pygmy-owl was also designated on 296,240 ha (731,712 acres) of federal, state, and private lands in Pima, Pinal, and Maricopa counties.

The primary goal of this report is to document and explore the conservation needs of the cactus ferruginous pygmy-owl in Arizona. Although it is intended for a broad audience, one specific objective of this conservation assessment is to provide the U.S. Forest Service and other agencies and stakeholders with the

information necessary to ensure the conservation of the owl and its critical habitat. In 1996, the Southwest Region of the U.S. Forest Service requested assistance from the Rocky Mountain Research Station in developing a conservation assessment for the pygmy-owl. Because historical owl habitat existed on national forests of southern and central Arizona, the region believed an analysis of owl status and habitat would be of benefit in managing habitats to recover owls on national forests. Our product is the outcome of this original request. Experts from state and federal agencies, universities, and other institutions were invited to participate in writing the report. For more information about individual authors, see the *Authors* section of this report.

A recovery team for the cactus ferruginous pygmy-owl was appointed by the U.S. Fish and Wildlife Service in 1998. Its function is to develop a recovery plan that identifies delisting criteria and recommends a course of action to restore sufficient, stable, and self-maintaining population levels of the owl. Thus, another objective of the conservation assessment is to assist the recovery team by providing information for use in the development of the recovery plan while also discussing important issues and suggesting research needs.

The conservation assessment for the cactus ferruginous pygmy-owl is primarily a literature review, yet original data are presented in several chapters. It

relies extensively on information gathered in Arizona by the Arizona Game and Fish Department since 1995 and in Texas by researchers from the Cesar Kleberg Wildlife Research Institute since 1992. In Arizona, efforts focused initially on population surveys but have also recently included nest monitoring, habitat sampling, and telemetry (Abbate et al. 1996, Richardson pers. comm.). In Texas, where a sizeable population of the owl has been located (Wauer et al. 1993, Mays 1996), research continues to document the natural history of the owl and determine demographic parameters and habitat use in this state (Proudfoot 1996, Proudfoot and Beasom 1997, Proudfoot and Radomski 1997). Unquestionably, the research in Arizona and Texas has provided some important information. Yet, at the same time, many questions remain unanswered.

Chapter 1 focuses on the taxonomy, distribution, and natural history of the cactus ferruginous pygmy-owl. In particular, this chapter consolidates an important amount of published and unpublished data on the breeding biology and diet of the owl. As indicated, behavioral observations suggest that much of the biology of the owl revolves around an opportunistic hunting strategy and on predator avoidance. Observed and potential causes of owl mortality are described; they include predation, parasites, and human-related factors. Throughout the chapter, the authors outline areas of uncertainty, such as genetic relatedness of the Arizona and Texas populations, habitat requirements, competition for cavities with other species, demographic parameters, and seasonal movements.

The ferruginous pygmy-owl (*Glaucidium brasilianum*) reaches the northern edge of its distribution in the southwestern U.S. Early studies establish the presence of the owl along rivers and streams of central and south Arizona around the turn of the 20<sup>th</sup> century (Bendire 1888, 1892, Breninger 1898). The owl population decline in Arizona, which is the focus of Chapter 2, has been reported to have occurred around 1950 (see Monson and Phillips 1981). Using both the existing literature and museum specimen records, the authors indicate that a sharp decrease in the number of owls probably began earlier, at least in central Arizona. Chapter 2 also examines the possible effects of biogeography and habitat loss on the population decline.

Chapter 3 is a review of the current survey effort in Arizona, with sections on the survey protocol, survey results, and habitat description in survey areas. Population surveys have become a priority for federal and state agencies, as well as private development interests. An initial survey protocol was developed by the Arizona Game and Fish Department. It provided recommendations on the timing of surveys, distance between call points, and broadcast and listening times

at each call point. Due to changes in management needs and the results of ongoing research, the initial survey protocol has been revised and will likely be revised in the future in order to maximize survey effectiveness. The present distribution of the cactus ferruginous pygmy-owl in Arizona is not well understood, but in the last two years, much information has been obtained. Although more owls have been located due to the increased survey effort, population size still appears to be small.

Chapter 4 explores habitat preferences and requirements of the ferruginous pygmy-owl using descriptions of vegetation types that are reportedly associated with higher densities of the owl in various parts of its range. Because an essential conservation issue is whether the owl should be managed as a riparian species or an upland species, the authors also examine the possible respective roles and importance of these two vegetation types. As indicated in Chapter 2, the owl was historically reported chiefly from riparian woodlands and thickets in Arizona. Recently, however, it has been primarily found in desert scrub (e.g., Lesh and Corman 1995, Abbate et al. 1996, Chapter 3). Despite the persistence of what seems like suitable riparian habitat, there are few owl records from riparian areas in recent years.

Several attributes of the cactus ferruginous pygmy-owl make this bird difficult to detect and study. With the use of broadcasted conspecific calls, however, population surveys have located a higher number of owls than previously estimated, both in Texas and Arizona. In Texas, tools such as radiotransmitters, video cameras, and nest boxes have also proven valuable for conducting studies on this bird (Proudfoot 1996, Proudfoot and Beasom 1996, 1997). Chapter 5 is a description of the equipment selected for research on the cactus ferruginous pygmy-owl in Texas, along with a review of the methodology and applications for the use of that equipment.

Chapter 6 concludes the conservation assessment and reviews research needs for the conservation of the cactus ferruginous pygmy-owl in Arizona. The recent increase in the number of pygmy-owls located (Chapter 3) indicates surveys are key to a better understanding of the size, distribution, and structure of the Arizona owl population. Demographic and habitat use studies are also needed. One management issue discussed in the chapter and tied to research is the possible use of nest boxes in some riparian areas. Nest boxes may be useful to 1) locate more owls, 2) conduct habitat studies, and 3) improve habitat quality where nest sites may be limited.

The historical range of the owl in Arizona represents only the northern edge of the species' wide distribution. In the tropics, the ferruginous pygmy-owl is one of the most common birds of prey (Chapter 1). In

contrast to the California condor (*Gymnogyps californianus*) or the whooping crane (*Grus americana*), the fate of the Arizona owl population likely does not condition the viability of the entire species. Yet, it should also be noted that in recent times species have often become extinct or endangered as a result of human activities leading to incremental range contractions. An important provision of the Endangered Species Act is to list those disappearing populations whose loss would lead to a significant gap in the range of the species. Throughout the conservation assessment, no attempt is made to rank the need to preserve the Arizona population of the cactus ferruginous pygmy-owls among other conservation demands. With the federal listing comes a legal obligation to develop and implement a plan for the conservation of this owl.

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