Fisheries & Wildlife Management Division

RESOURCE STATUS AND ASSESSMENT BRANCH

Status of the Northern Pygmy Owl (Glaucidium gnoma californicum) in Alberta

Kevin C. Hannah

Alberta Wildlife Status Report No. 20

Alberta Conservation Association

Alberta
ENVIRONMENTAL PROTECTION

Status of the Northern Pygmy Owl (*Glaucidium gnoma californicum*) in Alberta

Kevin C. Hannah

Alberta Wildlife Status Report No. 20

June 1999

Published By:

Alberta ENVIRONMENT

Alberta Conservation Association

Publication No. T/443
ISBN: 0-7785-0586-3
ISSN: 1206-4912

Series Editor: Isabelle M. G. Michaud
Senior Editor: David R. C. Prescott
Illustrations: Brian Huffman

For copies of this report, contact:
Information Centre - Publications
Alberta Environmental Protection
Natural Resources Service
Main Floor, Great West Life Building
9920 - 108 Street
Edmonton, Alberta, Canada T5K 2M4

Telephone: (780) 422-2079

OR

Information Service
Alberta Environmental Protection
#100, 3115 - 12 Street NE
Calgary, Alberta, Canada T2E 7J2

Telephone: (403) 297-3362

This publication may be cited as:

Hannah, K. C. 1999. Status of the Northern Pygmy Owl (Glaucidium gnoma californicum) in Alberta. Alberta Environmental Protection, Fisheries and Wildlife Management Division, and Alberta Conservation Association, Wildlife Status Report No. 20, Edmonton, AB. 20 pp.

PREFACE

Every five years, the Fisheries and Wildlife Management Division of Alberta Natural Resources Service reviews the status of wildlife species in Alberta. These overviews, which have been conducted in 1991 and 1996, assign individual species to 'colour' lists that reflect the perceived level of risk to populations that occur in the province. Such designations are determined from extensive consultations with professional and amateur biologists, and from a variety of readily available sources of population data. A primary objective of these reviews is to identify species that may be considered for more detailed status determinations.

The Alberta Wildlife Status Report Series is an extension of the 1996 *Status of Alberta Wildlife* review process, and provides comprehensive current summaries of the biological status of selected wildlife species in Alberta. Priority is given to species that are potentially at risk in the province (Red or Blue listed), that are of uncertain status (Status Undetermined), or which are considered to be at risk at a national level by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Reports in this series are published and distributed by the Alberta Conservation Association and the Fisheries and Wildlife Management Division of Alberta Environmental Protection, and are intended to provide detailed and up-to-date information which will be useful to resource professionals for managing populations of species and their habitats in the province. The reports are also designed to provide current information which will assist the Alberta Endangered Species Conservation Committee to identify species that may be formally designated as endangered or threatened under the Alberta Wildlife Act. To achieve these goals, the reports have been authored and/or reviewed by individuals with unique local expertise in the biology and management of each species.

EXECUTIVE SUMMARY

Mainly because of its secretive nature and dispersed populations, there is a lack of biological and population data for the Northern Pygmy Owl (Glaucidium gnoma californicum). The species has been classified as being of 'Status Undetermined' in Alberta. This report summarizes available information on the Northern Pygmy Owl as a step in updating the status of this species in the province.

The Northern Pygmy Owl is a year-round resident in the mountains, foothills, and southwestern portions of the boreal forest in Alberta. The Northern Pygmy Owl has demonstrated a preference for 'older' forest stands for nesting, although it seems to be flexible in its habitat selection in winter. Pygmy Owls nest in cavities, relying on woodpeckers, fungal decay, and insects to provide suitable cavities. The diet of the Northern Pygmy Owl is highly varied, with mammals, birds, and insects comprising the dominant prey.

Estimates of both population size and density for this species are scant in the literature. According to some estimates, populations may be increasing slowly, although small sample sizes make interpretation difficult and results potentially misleading. The rapid harvesting of older, structurally complex forest in both the foothills and boreal regions of Alberta are of utmost concern as these habitats are preferred by Northern Pygmy Owls. Basic research into the ecology, biology, population size and trend, and potential limiting factors of this species is necessary in order to establish and implement management strategies.

ACKNOWLEDGEMENTS

I would like to thank a very dedicated group of raptor enthusiasts in the province of Alberta whose extensive records were instrumental in the completion of this report. I would especially like to thank Doug Collister, Gordon Court, Ray Cromie, Edgar Jones, and Lisa Takats for providing both published and unpublished information used in this report. Jocelyn Hudon provided access to data from the Provincial Museum of Alberta. I would also like to thank Sue Cotterill and Roger Brown for providing some recent unpublished records. Peter Boxall (Canadian Forest Service), Gordon Court (Alberta Environmental Protection), Lisa Takats (Alberta Conservation Association), and Isabelle Michaud (Richardson) (Alberta Conservation Association) reviewed a preliminary draft of this document and provided many helpful comments. Special thanks to Theresa Morcos for providing some early editorial assistance. I would finally like to thank Katherine McKeever who first introduced me to owls and whose dedication and passion for these creatures is an inspiration to us all.

Preparation of this report was funded by the Wildlife Management Enhancement Program of the Alberta Conservation Association.

TABLE OF CONTENTS

INTRODUCTION

There are six races (i.e. subspecies) of the Northern Pygmy Owl (Glaucidium gnoma) recognized in North and Central America (Johnsgard 1988). Recent studies into genetic variation and vocalization differences, however, suggest that many races should be considered full species (AOU 1983, Heidrich et al. 1995, Howell and Webb 1995). In Canada, three races of the Northern Pygmy Owl are recognized. The races G. g. swarthi and G. g. grinnelli occur solely within British Columbia, and the third race G. g. californicum occurs in the mountainous interior of British Columbia and southwestern Alberta (Godfrey 1986). Because of the secretive and crepuscular (i.e. most active at dawn and dusk) nature of this species, the natural history and distribution of the Northern Pygmy Owl is poorly known (Holt and Norton 1986, Holt et al. 1990). In Canada, the Northern Pygmy Owl has not been designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 1998).

The lack of population and distributional data in Alberta has led to the Northern Pygmy Owl being classified as a 'Status Undetermined*' species (Alberta Wildlife Management Division 1996). This report summarizes current and historical information on the Northern Pygmy Owl as a step in determining the status of this species in Alberta.

HABITAT

The Northern Pygmy Owl uses a broad spectrum of forest habitat and prefers sites with low to intermediate canopy coverage (Hayward and Garton 1988, Johnsgard 1988). The Northern Pygmy Owl is most common near the edges of meadows, lakes and other similar clearings (Braly 1930, Verner and Boss 1980). In the Rocky Mountains, the Northern Pygmy Owl is usually found in the vicinity of meadows or other sizeable openings in the forest, probably never occurring in dense forest (Bent 1938, Webb 1982). Human development and habitat alteration appears not to have affected this owl's breeding activity or survival, and partial forest clearing may improve hunting opportunities for the species (Johnsgard 1988). In the central and northern Rocky Mountains, the pygmy owl may occur up to elevations of 3600 m. During the winter months the pygmy owl may be forced to move to lower elevations, including prairie foothills, sometimes well away from forested areas (Farley 1937, Bailey and Niedrach 1965, Sadler and Myres 1976).

In Alberta, the Northern Pygmy Owl is described as preferring dense stands of coniferous trees broken by small clearings, although mixedwood forests are tolerated provided there is a high proportion of spruce, pine, or fir (Salt and Salt 1976). Of 17 records from Banff and Jasper National Parks, nine owls were found in lodgepole pine (Pinus banksiana) forest, three in white spruce (Picea glauca), two in aspen (Populus tremuloides), and two in developed townsites (Holroyd and Van Tighem 1983). Many unpublished records of pygmy owls from the boreal mixedwood region of Alberta suggest that a mixed mosaic of aspen and spruce is acceptable breeding habitat. Winter records from Alberta suggest that pygmy owls can tolerate almost any habitat, provided there is adequate shelter and food available (Castle 1930, Farley 1937, Weseloh et al. 1976).

In British Columbia, the Northern Pygmy Owl

* See Appendix 1 for definitions of selected status designations

prefers edges of open coniferous forests or mixed woodlands during the breeding season (Campbell et al. 1990). Pygmy owls in British Columbia have been recorded in logged areas, orchards, riparian thickets, damp and dry meadows, farmlands, shores of rivers and lakes, vacant city lots, parks, cemeteries, and residential areas (Campbell et al. 1990). However, no information is provided as to whether these observations are of birds during the breeding season or in winter. Periodic winter observations in residential or developed areas have been recorded in British Columbia during periods of prolonged cold or during winters with large accumulations of snow (see Munro 1921). In particular, an all-time Canadian record of 17 pygmy owls was recorded during the Christmas Bird Count in Vernon on 26 December 1976 (Anderson 1978).

In the Douglas-fir region of western Oregon, pygmy owls were found to nest in 110 and 200 year-old forests, but were absent from 10, 35, and 75 year-old forests, and were also absent from logged areas (Mannan et al. 1980). In Montana, data from observations and vocalizations suggest that pygmy owls prefer mixed/fir or spruce/fir forests during the breeding season (Holt and Hillis 1987). Others have reported pygmy owls nesting in a variety of habitats such as poplar and aspen trees (Populus spp.) in California and Oregon (Bendire 1888, Braly 1930), western larch (Larix occidentalis) in Oregon (Munro 1919), and black oak (Quercus velutina) in California (Holman 1926).

CONSERVATION BIOLOGY

The Northern Pygmy Owl is one of the smallest owls in North America. It has a long, narrow, barred tail, with chestnut to chocolate-coloured upperparts, streaked breast, and a pair of black patches on the nape that vaguely resemble eyes. The Northern Pygmy Owl has yellow eyes, a yellowish to horn-coloured bill, and yellow feet. As with most owl species in North America, the Northern Pygmy Owl exhibits reversed sexual dimorphism, where the female of the species is larger in size and weight than the male (Earhardt and Johnson 1970). The Northern Pygmy Owl occurs in both a gray and red colour phase which is independent of both sex and geographical location (Johnsgard 1988). Northern birds are generally larger in size than southern birds, but are indistinguishable by plumage (Howell and Webb 1995). Tail length also varies geographically with northern races having longer tails than southern races (Voous 1988).

The most common territorial call of the Northern Pygmy Owl is a monotonous, repetitive series of *hoot* notes, given in one to two second intervals (Johnsgard 1988). There are distinct vocal differences amongst Northern Pygmy Owls in North and Central America (Howell and Webb 1995). Northern birds typically give single calls and southern birds give double calls (Howell and Webb 1995). Additionally, birds of the Pacific Slope give slower calls than those of more interior areas (Howell and Webb 1995). It appears that there are at least four distinct and recognizable vocal types for the Northern Pygmy Owl in North America (Howell and Webb 1995). The race californicum is also known to complete its advertising call with a series of two to three well-spaced *kew* or *too* notes (Johnsgard 1988).

In Alberta, recorded laying dates include 25 April (Holroyd and Van Tighem 1983), 4 May (E. Jones and R. Cromie, pers. comm.), and 7 May (K. Hannah, unpubl. data). Egg laying

dates for British Columbia include 24 and 27 April (Frost 1972), and 15 May. Incubation is believed to be approximately 28 (Baicich and Harrison 1997) or 29 days in length (Johnsgard 1988). Female pygmy owls do not begin incubation until the clutch is complete in order that the young may hatch synchronously (Norton and Holt 1982, Holt and Norton 1986, Johnsgard 1988). Johnsgard (1988) found average clutch sizes of 3.2 eggs for 18 nests (range 3-5). Hatching dates of 11 broods ranged from 9 June to 25 August, and brood sizes ranged from 1 to 7 young (Campbell et al. 1990). The fledging period is believed to last 29 to 32 days (Johnsgard 1988, Baicich and Harrison 1997). In Montana, a nest contained six eggs on 7 May, hatching synchronously on 13 May, with all six juveniles fledging between 5 and 6 June (Norton and Holt 1982). After fledging, juvenile pygmy owls will remain in the natal territory for an additional 20 to 30 days (Johnsgard 1988). Pygmy owls may begin to show signs of sexual maturity at approximately five months of age (Bergmann and Ganso 1965, Mikkola 1983).

Northern Pygmy Owls are secondary cavity nesters in that they build their nests in tree cavities excavated by woodpeckers or holes created by fungal decay or insects. Johngard (1988) reported average nesting height of 6.3 m for 19 nests (range 2.3 – 20 m). Of 17 nests, 12 were located in abandoned woodpecker holes, and five were located in cavities of dead trees. Holt and Norton (1986) reported average entrance hole dimensions of cavities as 4.8 cm high by 4 cm wide. They also describe the diameter at breast height of two nest trees as being 39 cm and 52 cm, with the diameter of the latter tree at the nest as 42 cm. The internal dimensions of the nest in question were 8 cm deep by 32 cm wide, with 5 cm of wood between the outside of the tree and the inner cavity. Given these dimensions, older aged trees (>100 yr.) would be required as nesting trees for the Northern Pygmy Owl in Alberta.

The Northern Pygmy Owl consumes a wide variety of prey throughout the year. According to Holt and Leroux (1996), mammalian prey account for 60.8% of the diet (based on biomass), and birds account for 36.6%. Similarly, the diet from a successful nest in Montana, in which six juveniles fledged, consisted of 64.5% rodents, 32.2% birds, and 3.2% insects (based on number of items; Norton and Holt 1982). Although rodents appear to be the dominant prey item during the breeding season, pygmy owls are highly opportunistic and will take almost any prey (Johnson and Russell 1962). A Northern Pygmy Owl was observed catching and killing a red squirrel (Tamiasciurus hudsonicus), and even taking a woodpecker nestling from inside a tree cavity (Holt and Norton 1986). Records of pygmy owls capturing birds as large as Gambel's Quail (Calipepla gambelii) and California Quail (C. californica), which are almost twice their body weight, is also evidence of this opportunism (Kimball 1925, Balgooyen 1969). In Alberta, pygmy owls have been observed feeding on Boreal Toads (Bufo boreas) and Columbia Spotted Frogs (Rana luteiventris) in the Canmore and Kananaskis areas (Salt 1979).

The Eurasian Pygmy Owl (G. passerinum), exibits a seasonal shift in diet from primarily rodents in summer to birds in winter (Mikkola 1970, Kellomäki 1977, Solheim 1984, Kullberg 1995). Avian prey consumption by the Northern Pygmy Owl in winter has been well documented in Alberta (Farley 1937, Weseloh et al. 1976, Schutz 1978) and may suggest a similar shift in prey selection in this species. Sexual differences in prey selection

also seem very likely in pygmy owls (Earhardt and Johnson 1970). Earhardt and Johnson (1970) found that on an annual basis, females preyed on significantly more mammals than males (52% vs. 37%), males preyed on significantly more birds than females (34% vs. 21%), and females preyed on more insects than males.

As with most dietary studies on owls, prey items are usually confirmed through pellet analyses. Insects, for the most part, are difficult to obtain and identify from pellet castings, especially when dealing with small owls that tear prey into small pieces before consuming. Pygmy owl pellets are also very small, making them extremely difficult to find. Therefore, it seems likely that insects are under-represented in the limited number of dietary studies on the Northern Pygmy Owl. Some estimates suggest that insects account for close to 30% of the diet during the breeding season (Bull et al. 1987); Coues (1874) also suggests that insects may be a large component in the diet of the pygmy owl. Observations of an adult male Northern Pygmy Owl during the breeding season in north-central Alberta suggest that insects, especially butterfly and moth larvae, are an important seasonal prey item (K. Hannah, unpubl. data).

Given the small size and crepuscular nature of the Northern Pygmy Owl, the species has many potential predators and competitors. The presence of larger, aggressive corvids (ravens, magpies, jays) may inhibit the hunting behaviour of the Northern Pygmy Owl (Weseloh et al. 1976). Diurnal birds of prey such as Cooper's Hawk (Accipiter cooperii), Sharp-shinned Hawk (A. striatus), Northern Goshawk (A. gentilis), Broad-winged Hawk (Buteo platypterus), and Red-tailed Hawk (B. jamaicensis) are most likely the dominant predators of the Northern Pygmy Owl. Other forest owls in Alberta, are predominantly nocturnal and are probably not important predators or competitors of the Northern Pygmy Owl (Hayward and Garton 1988, Holt and Leroux 1996). However, the Northern Saw-whet Owl (Aegolius acadicus) and Northern Hawk Owl (Surnia ulula) have been known to actively hunt during the day (Mueller and Berger 1967, Catling 1972), and predation of a Northern Pygmy Owl by a Northern Saw-whet Owl has been documented (Grove 1985). Given the pygmy owl's habit of nesting in cavities, mammalian predators are likely few. However, red squirrels and pine martens (Martes americana) may be responsible for some mortality during the nesting season when inexperienced young or incubating adults are more susceptible to predation.

DISTRIBUTION

1. Alberta. - The Northern Pygmy Owl was first described in Alberta from a specimen taken near Calgary sometime prior to 1901 (Bent 1938). During the breeding season, the Northern Pygmy Owl was first recorded in the mountainous southwestern portion of the province, especially in the Rocky Mountain National Parks assemblage (Seel 1969, Salt and Salt 1976, Karasiuk et al. 1978, Godfrey 1986). The first recorded nesting of the species in the province was near Rocky Mountain House in 1971 (Holroyd and Van Tighem 1983).

The Northern Pygmy Owl is currently known to occur throughout much of the Rocky Mountain, Foothill and southern Boreal Forest regions of Alberta (Figure 1). During the Alberta Breeding Bird Atlas project, Northern Pygmy Owls were observed most frequently (11 of 25 records) in the southwestern portion of the boreal mixedwood forest region

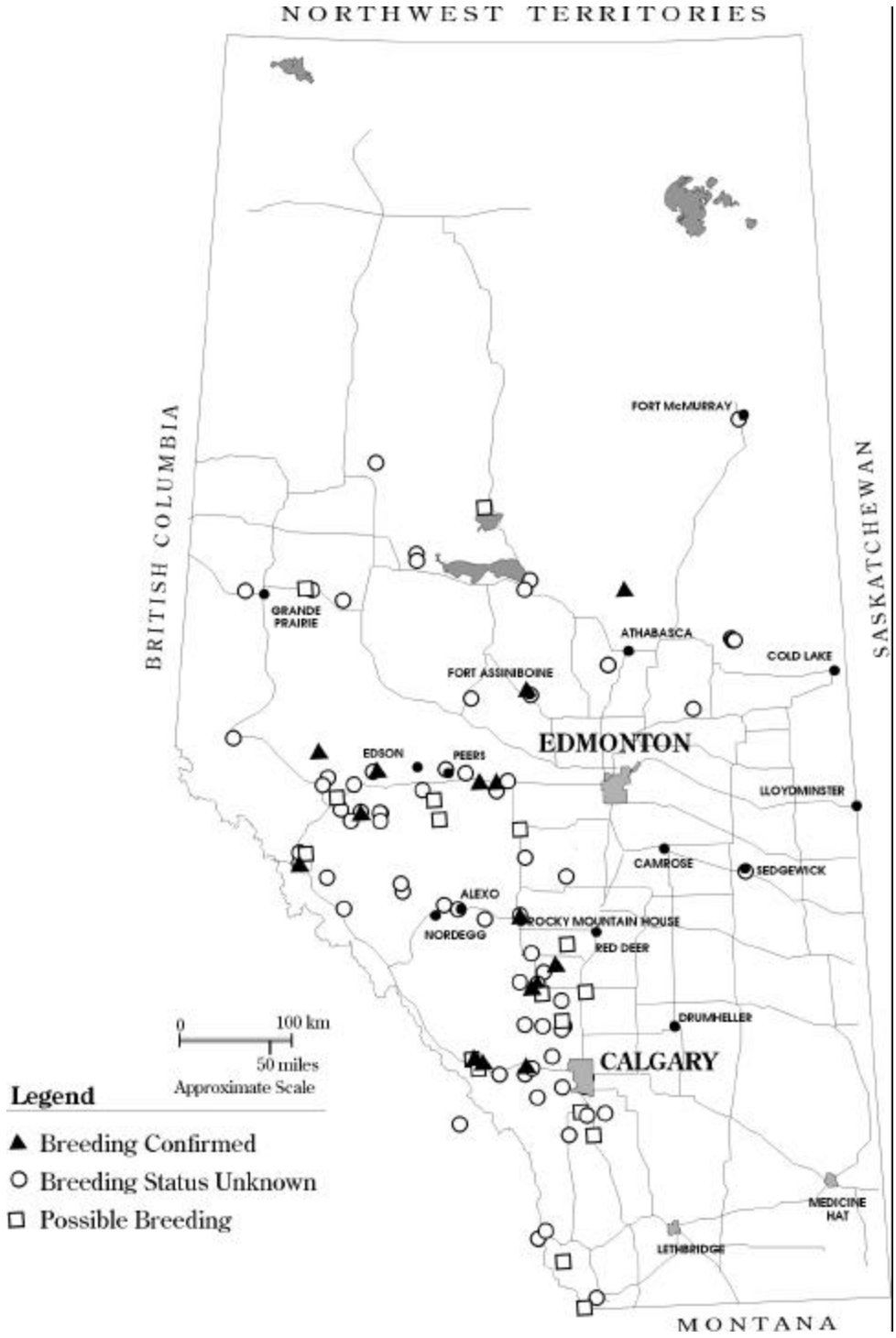

Figure 1. Northern Pygmy Owl (Glaucidium gnoma californicum) observations in Alberta from 1963-1999. See Appendix 1 for descriptions of locations.

(Semenchuk 1992), although a single 'probable' breeding record also came from the boreal mixedwood region of north central Alberta near Utikuma Lake (Semenchuk 1992). Several additional unpublished observations and confirmed nesting records of pygmy owls during the breeding season have been made in north central Alberta near Fawcett Lake and Long Island Lake (R. Cromie, pers. comm.), and Rock Island Lake forestry tower (G. Court, pers. comm.). A nest record at Calling Lake (north of Athabasca) is potentially the most easterly nesting record documented in Canada (K. Hannah, unpubl. data). However, records of pygmy owls during the breeding season in the Mons Lake and Shaw Lake areas near Lac La Biche and a record from along the Athabasca River in Fort McMurray suggest that pygmy owls may be breeding even further east in the province than previously suspected (L. Takats, unpubl. data).

The Northern Pygmy Owl usually occurs year-round within its Alberta range (Godfrey 1986). However, eastern and southern movements during winter are well documented in the province, especially in years with high snowfall and extreme cold. Winter records of Northern Pygmy Owls include Nordegg, Peers, Fort Assiniboine, Sedgewick, McLeod River Valley, Calgary, and Alexo (Godfrey 1986). Particularly large numbers of pygmy owls have been documented in western Alberta during the winter of 1932-33 (Farley, in Bent 1938), and in Water Valley in January 1978 (Holroyd and Van Tighem 1983).

It is unclear whether a range change for the Northern Pygmy Owl is occurring in Alberta. It may be that fire protection is maintaining larger and older trees thereby causing an easterly range expansion. More likely, however, the seemingly wider provincial distribution of the pygmy owl in the province is simply an artifact of increased research presence in the boreal forest. Many of the more recent records are extralimital than previous ones, but it is unlikely that the owls' presence in this area is a recent development.

2. Other Areas. **-** Alberta represents the northeastern corner of the Northern Pygmy Owl's range (Figure 2). In Canada, G. g. grinnelli occurs in coastal British Columbia north to southeastern Alaska, G. g. swarthi occurs solely on Vancouver Island, and G. g. californicum occurs from north-central British Columbia to western Alberta (Johnsgard 1988; Figure 2).

In the United States, G. g. grinnelli occurs from coastal northern Washington to coastal southern California (Johnsgard 1988), whereas G. g. californicum occurs from central Washington south to southern California and east to Colorado and central New Mexico (Johnsgard 1988, Sauer et al. 1996). The race G. g. gnoma occurs from southern Arizona south to Guerrero and Chiapas, Mexico (Johnsgard 1988). The race G. g. cobalense occurs in the highlands of Guatemala, and G. g. hoskinsii is found in the cape district of Baja, California (Johnsgard 1988). No evidence exists to determine whether the continental range of the pygmy owl is changing.

POPULATION SIZE AND TRENDS

1. Alberta. **-** There are no current estimates of the population size of the Northern Pygmy Owl in Alberta. The species has been described as being uncommon in the province (Semenchuk 1992). One of the only sources for abundance and distribution estimates in the province is the Breeding Bird Survey (BBS). However, because of the relatively low number of BBS

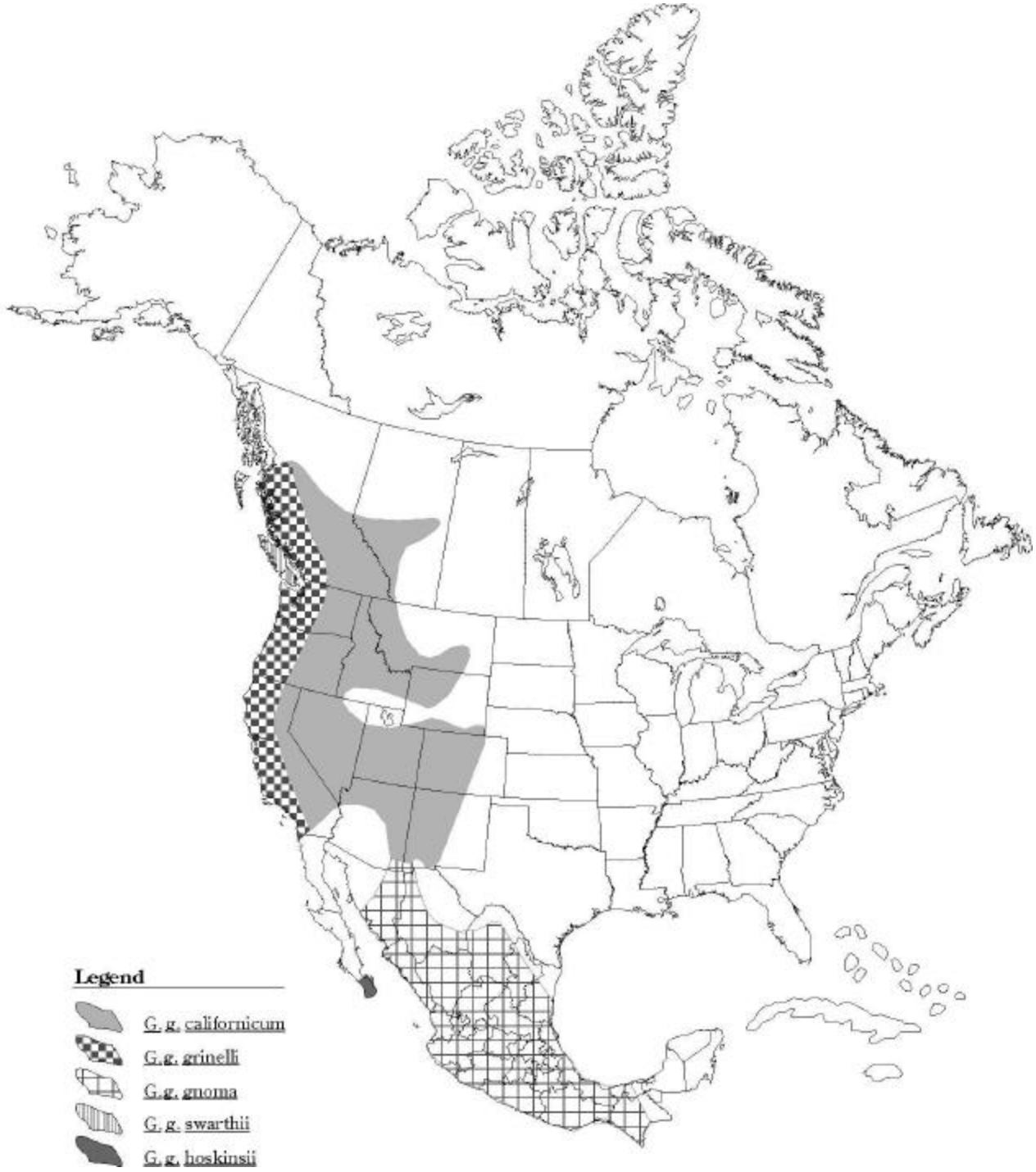

Figure 2. Distribution of the Northern Pygmy Owl showing approximated ranges of five races (adapted from Johnsgard 1988 and Sauer et al. 1997).

routes that encounter pygmy owls in Alberta, sample sizes are too low for accurate trend estimates (Sauer et al. 1997).

2. Other Areas. **-** The Northern Pygmy Owl occurs in low relative abundance in British Columbia, although the population appears to be stable (Fyfe 1975).

Johnsgard (1988) suggested that no estimates of territory size or breeding density existed for the species in North America. However, Hagar (1960) found that pygmy owls were common in the Douglas-fir forests of northwestern California, and estimated density at one territory per 100 acres (40.47 ha). Mannan et al. (1980) also estimated pygmy owl density in the Douglas-fir region of western Oregon to be three birds per 40 ha in both 110 and 200 year-old forests. According to survey-wide BBS results, pygmy owl populations may be increasing, although results are not significant and should be interpreted with caution in view of small sample sizes (Sauer et al. 1997). Results from the National Audubon Society Christmas Bird Counts do not support this population increase and suggest that in some areas populations may in fact be decreasing (Sauer et al. 1996). Again, considering the small sample sizes on which these estimates have been based, caution should be taken with interpretation of results.

LIMITING FACTORS

Limiting factors for the Northern Pygmy Owl are considered to be those that increase juvenile or adult mortality, decrease productivity or nesting success, or reduce habitat quality. Only those limiting factors that result from the direct or indirect activities of humans are discussed below.

Habitat loss and degradation is the primary limiting factor for the Northern Pygmy Owl throughout its range in North America. Pygmy owls are not primary excavators, so they rely on primary cavity nesters (i.e. woodpeckers), or holes created by fungal decay or insects for nesting cavities. In Alberta, the cavities excavated by Black-backed Woodpeckers (Picoides arcticus), Hairy Woodpeckers (P. villosus), Northern Flickers (Colaptes auratus), and to a lesser extent Pileated Woodpeckers (Dryocopus pileatus) are of prime importance to pygmy owls given the larger diameter of entrance holes created by these species. Shortages of older, large diameter trees limit the numbers of woodpeckers, wood boring insects, and fungal decay, thereby limiting the numbers of secondary cavity nesters (Newton 1994). In Alberta (Stelfox 1995), and elsewhere (Zarnowitz and Manuwal 1985, Newton 1994) older forests are being harvested first, and the structural complexity and heterogeneity (especially snag density) of these older stands has been correlated with high species diversity and specialization. The removal of snags and large diameter trees through intensive logging practices is detrimental to cavity nesting birds (Evans and Conner 1979, Bull et al. 1992, Bull and Holthausen 1993). Current provincial operating rules for harvesting of mixedwood forest in Alberta make no provisions for the retention of areas of forest older than 70 years, or greater than 10 ha in size, except where they exist along riparian buffer strips and other limited reserve lands (Schmiegelow and Hannon 1993). Given the density estimates for the Northern Pygmy Owl in California (Hagar 1960) and western Oregon (Mannan et al. 1980; see 'Population Size and Trend' section, above), the retention of areas 10 ha in size is not adequate to accommodate entire pygmy owl territories.

In western Oregon, pygmy owls avoid forests that are younger than 75 years of age and recent clearcuts (Mannan et al. 1980, see 'Habitat' section, above). Woodpeckers breeding in Virginia (especially the Northern Flicker) showed a marked preference for nesting in clearcut areas when suitable snags were available (Connor et al. 1975). The preference for logged areas by some woodpecker species may limit and reduce the amount of suitable nesting cavities for the Northern Pygmy Owl in preferred forest habitat. Further research into the habitat requirements of pygmy owls will be necessary before the magnitude of these differences in habitat preferences can be assessed fully. The careful placement of nest boxes can potentially help to alleviate shortages in nesting cavities (Newton 1994), although their use by the Northern Pygmy Owl has not been documented.

STATUS DESIGNATIONS

1. Alberta. **-** The Northern Pygmy Owl was considered a 'Status Undetermined' species in both the 1991 and 1996 reviews of the status of Alberta wildlife (Alberta Fish and Wildlife 1991, Alberta Wildlife Management Division 1996). The Northern Pygmy Owl is not known to be at risk of declining to non-viable population levels in the province of Alberta, or at eminent risk across the rest of its range. However, insufficient information currently exists to assign a status designation using existing criteria. The Northern Pygmy Owl is legally designated as a 'non-game animal' and is fully protected under the Alberta Wildlife Act. Such designations protect a species from being killed, possessed, bought or sold without a permit.

2. Other Areas. **-** The Northern Pygmy Owl is not listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 1998). The Nature Conservancy has assigned a global rank of G5, meaning the species is demonstrably secure throughout its global range (The Nature Conservancy 1998). The Northern Pygmy Owl is not listed as a species of concern in the province of British Columbia, although the race swarthi, because of its limited range, is on the 'Blue List' of species that are considered for 'threatened' or 'endangered' designation in that province (B.C. Conservation Data Centre 1998).

In Montana, the Northern Pygmy Owl is listed as a species of special concern (Montana Fish, Wildlife and Parks 1998). In Oregon, the Northern Pygmy Owl is listed as a sensitive species of 'undetermined status' (Oregon Department of Fish and Wildlife 1998). In both Colorado and California, however, the species is not listed (California Department of Fish and Game 1998, Colorado Division of Wildlife 1998).

RECENT MANAGEMENT IN ALBERTA

No specific management activities have been reported for the Northern Pygmy Owl in Alberta.

SYNTHESIS

The Northern Pygmy Owl is one of the least-studied owl species in North America. Although populations seem stable, the apparently low densities and lack of information in many areas has led several states and provinces to list the Northern Pygmy Owl as a 'sensitive species' or a 'species of special concern'. Management of this species clearly requires further research into its basic biology, and in particular, its habitat preferences,

population size, trend and distribution, and responses to forestry practices. Alberta may be a suitable location for such research Investigations in the Boreal Forest region of this province may be particularly important given the amount of 'older' forest that occurs in this area, and the relative ease of access available to researchers. Such work would help clarify the population status of the species in Alberta and would provide information necessary to integrate forest harvesting methods with the management of this, and other cavity nesting birds in the province.

LITERATURE CITED

Alberta Fish and Wildlife. 1985. A policy for the management of threatened wildlife in Alberta. Alberta Fish and wildlife, Edmonton, AB. 34 pp.

Alberta Fish and Wildlife. 1991. The status of Alberta wildlife. Alberta Fish and Wildlife, Edmonton, AB. 49 pp.

Alberta Wildlife Management Division. 1996. The status of Alberta wildlife. Alberta Natural Resources Service, Edmonton, AB. 44 pp.

American Ornithologists' Union. 1983. Checklist of North American birds. American Ornithologists' Union, Washington, DC. 877 pp.

Anderson, R. R. 1978. Summary of highest counts of individuals for Canada. Am. Birds 32:931-933.

Baicich, P. J., and C. J. O. Harrison. 1997. A guide to the nests, eggs, and nestlings of North American Birds. 2nd ed. Academic Press, San Diego, CA. 347 pp.

Bailey, A. M., and R. J. Niedrach. 1965. Birds of Colorado. 2 vols. Denver Museum of Natural History, Denver, CO. 895 pp.

Balgooyen, T. G. 1969. Pygmy Owl attacks California Quail. Auk 86:358.

Bendire, C. E. 1888. Notes on the habits, nests and eggs of the genus Glaucidium Boie. Auk 5:366-372.

Bent, A. C. 1938. Life histories of North American birds of prey. Pt. 2. U.S. Natl. Mus. Bull. 170:1-482.

Bergmann, H. H., and M. Ganso. 1965. (On the biology of the pygmy owl.) J. Ornithol. 106:255-284 (In German, English summary).

Braly, J. C. 1930. Nesting of the California Pygmy Owl in Oregon. Condor 32:304.

British Columbia Conservation Data Centre. 1998. B. C. Conservation Data Centre Home Page. British Columbia Ministry of Environment, Lands and Parks. URL: http://www. elp.gov.bc.ca/wld/cdc [Revision date: 21 Sept. 1998].

Bull, E. L., and R. S. Holthausen. 1993. Habitat use and management of Pileated Woodpeckers in northeastern Oregon. J. Wildl. Manage. 57:335-345.

Bull, E. L., J. E. Hohman, and M. G. Henjum. 1987. Northern Pygmy-Owl nests in northeastern Oregon. J. Raptor Res. 21:77-78.

Bull, E. L., R. S. Holthausen, and M. G. Henjum. 1992. Roost trees used by Pileated Woodpeckers in northeastern Oregon. J. Wildl. Manage. 56:786-793.

California Department of Fish and Game. 1998. California Dept. of Fish and Game Home Page. URL: http://www.dfg.ca.gov/dfghome.html/ [Revision date: January 1999].

Campbell, R. W., N. K. Dawe, I. McTaggart-

Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The birds of British Columbia. Vol. II. Non-passerines. Royal British Columbia Museum, Canadian Wildlife Service, Mitchell Press, Vancouver, BC. 636 pp.

Castle, G. B. 1930. The Rocky Mountain Pygmy Owl in Montana. Condor 39:132.

Catling, P. M. 1972. Food and pellet analysis studies of the Saw-whet Owl (Aegolius acadicus). Ont. Field Biol. 26:1-15.

Colorado Division of Wildlife. 1998. Colorado Division of Wildlife Home Page. URL: http://www.wildlife.state.co.us/ [Revision date: 21 Sept. 1998].

Connor, R. N., R. G. Hoper, H. S. Crawford, and H. S. Mosby. 1975. Woodpecker nesting habitat in cut and uncut woodlands in Virginia. J. Wildl. Manage. 39:144-150.

COSEWIC. 1998. Committee on the Status of Endangered Wildlife in Canada. URL: http:\\www.cosewic.gc.ca [Revision date: 24 Apr. 1998].

Coues, E. 1874. Birds of the Northwest. U.S. Geol. Surv. Terr. Misc. Publ. No. 3. Govt. Printing Office, Washington, DC. 791 pp.

Earhart, C. M., and N. K. Johnson. 1970. Size dimorphism and food habits of North American owls. Condor 72:251-264.

Evans, K. E., and R. N. Conner. 1979. Snag management. Pp. 214-225 in Management of north central and northeastern forests for nongame birds. (DeGraff, R. M., and K. E. Evans, compilers). USDA For. Ser. Gen. Tech. Rep. NC-51. St. Paul, MN.

Farley, F. L. 1937. The Pygmy Owl (Glaucidium gnoma pinicola) an Alberta bird. Can. Field-Nat. 51:86-87.

Frost, D. L. 1972. A recent nest record of a Pygmy Owl. Vancouver Nat. Hist. Soc. Discovery 1:35-36.

Fyfe, R. W. 1975. Status of Canadian raptor populations. Can. Field-Nat. 90:370-375.

Godfrey, W. E. 1986. The birds of Canada. Rev. ed. National Museum of Natural Sciences, National Museums of Canada, Ottawa, ON. 595 pp.

Grove, R. A. 1985. Northern Saw-whet Owl winter food and roosting habits in north-central Washington. Murrelet 66:21-24.

Hagar, D. C. 1960. The interrelationships of logging, birds, and timber regeneration in the Douglas-fir region of northwestern California. Ecology 41:116-125.

Hayward, G. D., and E. O. Garton. 1988. Resource partitioning among forest owls in the River of No Return Wilderness, Idaho. Oecologia (Berlin) 75:253-265.

Heidrich, P., C. Koenig, and M. Wink. 1995. Stuttgarter Beitraege zur Naturkunde

Serie A (Biologie) 0(534):1-47.

Holman, F. C. 1926. Nesting of the Pygmy Owl in Yosemite. Condor 28:92-93.

Holroyd, G. L., and K. J. Van Tighem. 1983. The ecological (biophysical) land classification of Banff and Jasper National Parks – volume III: the wildlife inventory. Canadian Wildlife Service, Edmonton, AB. 691 pp.

Holt, D. W., and W. D. Norton. 1986. Observations of nesting Northern Pygmy Owls. J. Rap. Res. 20:39-41.

Holt, D. W., and J. M. Hillis. 1987. Current status and habitat associations of forest owls in western Montana. Pp. 281 – 288 in Biology and conservation of northern forest owls (Nero, R., R. J. Clark, R. J. Knapton, and R. H. Hamre eds.) USDA For. Ser. Gen. Tech. Rep. RM-142, Rocky Mtn. For. and Range Exper. Stat., Ft. Collins, CO.

Holt, D. W., R. Kline, and L. S. Holt. 1990. A description of "tufts" and concealing posture in Northern Pygmy Owls. J. Rap. Res. 24:59:63.

Holt, D. W., and L. A. Leroux. 1996. Diets of Northern Pygmy Owls and Northern Saw-Whet Owls in west-central Montana. Wilson Bull. 108:123-128.

Howell, S. N. G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford University Press, New York, NY. 851 pp.

Johnsgard, P. A. 1988. North American owls: biology and natural history. Smithsonian Institution, Washington, DC. 295 pp.

Johnson, N. K., and W. C. Russell. 1962. Distributional data on certain owls in the western Great Basin. Condor 64:513-514.

Karasiuk, D. J., L. M. Cole, and R. E. Kaye. 1978. The wildlife inventory of Jasper National Park. Interim Report 1978. Canadian Wildlife Service, Edmonton, AB. 190 pp.

Kellomäki, E. 1977. Food of the pygmy owl Glaucidium passerinum in the breeding season. Ornis Fenn. 54:1-29.

Kimball, H. H. 1925. Pygmy Owl killing a quail. Condor 27:209-210.

Kullberg, C. 1995. Strategy of the Pygmy Owl while hunting avian and mammalian prey. Ornis Fenn. 72:72-78.

Mannan, R. W., E. C. Meslow, and H. M. Wight. 1980. Use of snags by birds in Douglas-fir forests, western Oregon. J. Wildl. Manage. 44:787-797.

Mikkola, H. 1970. On the activity and food of the pygmy owl Glaucidium passerinum during breeding. Ornis Fenn. 47:10-14.

Mikkola, H. 1983. Owls of Europe. Buteo Books, Vermillion, SD. 397 pp.

Montana Fish, Wildlife and Parks. 1998. Montana Fish, Wildlife and Parks home page. URL: http://www.fwp.mt.gov/ [Revision date: January 1999].

Mueller, H. C., and D. D. Berger. 1967. Observations on migrating Saw-whet Owls. Bird-Banding 38:120-125.

Munro, J. A. 1919. Notes on some birds of Okanagan Valley, British Columbia. Auk 36:64-74.

Munro, J. A. 1921. British Columbia bird notes, 1920-1. Murrelet 2:15-17.

National Research Council. 1995. Science and the Endangered Species Act. National Academy Press, Washington, DC. 271 pp.

Newton, I. 1994. The role of nest sites in limiting the numbers of hole nesting birds: a review. Biol. Conserv. 70:265-276.

Norton, W. D., and D. W. Holt. 1982. Simultaneous nesting of Northern Pygmy Owls and Northern Saw-Whet Owls in the same snag. Murrelet 63:94.

Oregon Department of Fish and Wildlife. 1998. Oregon Fish and Wildlife home page. URL: http://www.dfw.state.or.us/ [Revision date: 28 January 1999].

Pinel, H. W., W. W. Smith, and C. R. Wershler. 1991. Alberta birds, 1971-1980, Volume I: non-passerines. Provincial Museum of Alberta, Nat. Hist. Occ. Pap. No. 13, Edmonton, AB. 243 pp.

Sadler, T. S., and M. T. Myres. 1976. Alberta birds: 1961-1970. Provincial Museum of Alberta Nat. Hist. Occ. Pap. No.1, Edmonton, AB. 314 pp.

Salt, W. R., and J. R. Salt. 1976. The birds of Alberta. Hurtig Publishers, Edmonton, AB. 498 pp.

Salt, J. R. 1979. Some elements of amphibian distribution and biology in the Alberta Rockies. Alberta Nat. 9:125-126.

Sauer, J. R., S. Schwartz, and B. Hoover. 1996. The Christmas Bird Count home page. Version 95.1. Patuxent Wildlife Research Center. URL: http:\\www.mbr.nbs.gov/bbs/cbc.html [Revision date: 21 September 1998].

Sauer, J. R., S. Schwartz, B. G. Peterjohn, and J. E. Hines. 1997. The North American Breeding Bird Survey results and analysis. Version 96.4. Patuxent Wildlife Research Center. URL: http:\\www.mbr. nbs.gov/bbs/bbs. html [Revision date: 29 July 1997].

Saxena, A., and D. McIntyre. 1997. Southern Rockies landscape planning pilot project - breeding owl survey 1997. Unpubl. rept. for Alberta Environmental Protection, Edmonton, AB. 17 pp. plus appendix.

Schmiegelow, F. K. A., and S. J. Hannon. 1993. Adaptive management, adaptive science and the effects of forest fragmentation on boreal birds in northern Alberta. Trans. N. A. Wildl. Nat. Res. Conf. 58:584-598.

Schutz, F. 1978. Pygmy Owl dines on Black-capped Chickadee. Alberta Nat. 8:30-31.

Seel, K. E. 1969. An annotated list of the avi-fauna of Waterton Lakes National Park, Alberta. National Parks Branch,

Waterton Lakes, AB. 281 pp.

Semenchuk, G. P. (ed.). 1992. The atlas of the breeding birds of Alberta. Federation of Alberta Naturalists, Edmonton, AB. 391 pp.

Solheim, R. 1984. Caching behaviour, prey choices, and surplus killing by pygmy owls Glaucidium passerinum during winter, a functional response of a generalist predator. Ann. Zool. Fennici 21:301-308.

Stelfox, J. B. (ed.). 1995. Relationships between stand age, stand structure, and biodiversity in aspen mixedwood forest in Alberta. Alberta Environment Centre, Vegreville, AB, and Canadian Forest Service, Edmonton, AB. 308 pp.

The Nature Conservancy. 1998. Global element ranks. The Nature Conservancy. URL: http//www.consci.tnc.org/src.ranks.html [Accessed: 16 Oct. 1998].

Verner, J., and A. S. Boss. 1980. California wildlife and their habitats: Western Sierra Nevada. USDA, Forest Service, Gen. Tech. Rept. PWS-37.

Voous, K. H. 1988. Owls of the northern hemisphere. William Collins Sons and Co. Ltd., London, UK. 320 pp.

Webb, B. 1982. Distribution and nesting requirements of montane forest owls in Colorado. Col. Field Ornithol. J. 16:26-32, 58-64.

Weseloh, D. W., L. M. Weseloh, and W.E. Renaud. 1976. Pygmy Owl takes House Sparrow at Banff feeder. Alta. Nat. 6:103-105.

Zarnowitz, J. E., and D. A. Manuwal. 1985. The effects of forest management on cavity-nesting birds in northwestern Washington. J. Wildl. Manage. 49:255-263.

APPENDIX 1. Definitions of selected legal and protective designations.

A. Status of Alberta Wildlife colour lists (after Alberta Wildlife Management Division 1996)

Red	Current knowledge suggests that these species are at risk. These species have declined, or are in immediate danger of declining, to nonviable population size
Blue	Current knowledge suggests that these species may be at risk. These species have undergone non-cyclical declines in population or habitat, or reductions in provincial distribution
Yellow	Species that are not currently at risk, but may require special management to address concerns related to naturally low populations, limited provincial distributions, or demographic/life history features that make them vulnerable to human-related changes in the environment
Green	Species not considered to be at risk. Populations are stable and key habitats are generally secure
Undetermined	Species not known to be at risk, but insufficient information is available to determine status

B. Alberta Wildlife Act

Species designated as 'endangered' under the Alberta Wildlife Act include those defined as 'endangered' or 'threatened' by *A Policy for the Management of Threatened Wildlife in Alberta* (Alberta Fish and Wildlife 1985):

Endangered	A species whose present existence in Alberta is in danger of extinction within the next decade
Threatened	A species that is likely to become endangered if the factors causing its vulnerability are not reversed

C. Committee on the Status of Endangered Wildlife in Canada (after COSEWIC 1998)

Extirpated	A species no longer existing in the wild in Canada, but occurring elsewhere
Endangered	A species facing imminent extirpation or extinction
Threatened	A species likely to become endangered if limiting factors are not reversed
Vulnerable	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events
Not at Risk	A species that has been evaluated and found not to be at risk
Indeterminate	A species for which there is insufficient scientific information to support status designation

D. United States Endangered Species Act (after National Research Council 1995)

Endangered	Any species which is in danger of extinction throughout all or a significant portion of its range
Threatened	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range

E. Natural Heritage Element Rarity Ranks (after The Nature Conservancy 1998)

Global or G-rank: Based on the range-wide status of a species.
Sub-national or S-rank: Based on the status of a species in an individual state or province. S-ranks may differ between states or provinces based on the relative abundance of a species in each state or province.

G1 / S1	Critically imperiled because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction
G2 / S2	Imperiled because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range
G3 / S3	Either very rare or local throughout its range, or found locally in a restrcited range (21 to 100 occurrences)
G4 / S4	Apparently secure, though it might be quite rare in parts of its range, especially at the periphery
G5 / S5	Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery

APPENDIX 2. Northern Pygmy Owl observations and specimens from Alberta, 1963-1999.

Date	Source	Description
27-May-63	Edgar T. Jones	1 bird observed, Jasper N.P.
13-Jan-66	Seel (1969)	1 bird observed, Waterton Lakes N.P.
11-Jul-66	Seel (1969)	1 bird observed, Waterton Lakes N.P.
19-Apr-67	Seel (1969)	1 bird observed, Waterton Lakes N.P.
30-Apr-67	Seel (1969)	1 bird observed, Bragg Creek
21-May-67	Sadler and Myres (1976)	1 bird observed, Rocky Mountain House
2-Mar-69	Sadler and Myres (1976)	1 bird observed, Elbow Falls
18-Jun-71	Pinel et al. (1991)	nest with 5 downy young, Rocky Mountain House
17-Sep-72	Pinel et al. (1991)	1 bird observed, Dutch Creek
11-Mar-74	Pinel et al. (1991)	1 bird observed, Priddis
13-Oct-75	Pinel et al. (1991)	1 bird observed, Pigeon Mtn. Lookout
1-May-76	Pinel et al. (1991)	1 bird observed, Horseshoe Lk, Banff N.P.
1-May-76	Karasiuk et al. 1978	nesting near Jasper cemetery
25-Apr-77	Holroyd and Van Tighem (1983)	nest found Tunnel Mt., Banff N.P.
15-Jun-77	Pinel et al. (1991)	2 young at nest - Carrot Creek, Banff N.P.
19-Jul-77	Pinel et al. (1991)	2 immatures - West Castle River
18-Oct-77	Schutz (1978)	1 bird observed, Bluffton
11-Dec-77	Pinel et al. (1991)	1 bird observed, Dogpound
2-Jan-78	Pinel et al. (1991)	7 birds observed, Water Valley
9-Feb-78	Pinel et al. (1991)	1 bird observed, Longview
4-Sep-80	Provincial Museum of Alberta	adult female (skin) Ref.#Z81.146.57
12-Mar-84	Provincial Museum of Alberta	adult female (skin, skeleton) Ref.#Z85.9.3
1-Apr-84	D. M. Collister	1 bird calling, Sibbald Flats
18-Nov-84	Edgar T. Jones	1 bird observed, Cross Lake P.P.
30-Dec-84	D. M. Collister	1 bird photographed, Snakes's Head
11-Jan-86	D. M. Collister	1 bird calling, Winchell Lake
29-Mar-86	D. M. Collister	1 bird calling, Water Valley
2-Jan-87	D. M. Collister	1 bird observed, Hwy #68 - 5 km east ranger sta.
15-Mar-87	D. M. Collister	1 bird calling, Water Valley
22-Mar-87	D. M. Collister	1 bird calling, Bearberry
3-Oct-87	D. M. Collister	1 bird observed, Bragg Creek
22-Nov-87	D. M. Collister	1 bird observed, Fish Creek P.P.
6-Dec-87	D. M. Collister	1 bird calling, Water Valley
1-Feb-88	Lisa Takats	1 bird calling, Maligne Lake
23-Apr-88	D. M. Collister	1 bird calling, Water Valley
1-May-88	D. M. Collister	1 bird observed, Winchell Lake
1-May-88	D. M. Collister	1 bird observed, Sibbald Ranger Station
9-May-88	D. M. Collister	1 bird calling, Winchell Lake
19-May-88	D. M. Collister	1 bird calling, Water Valley
2-Oct-88	D. M. Collister	1 bird calling, Water Valley
10-Oct-88	D. M. Collister	1 bird calling, Water Valley
1-Nov-88	Edgar T. Jones	1 bird calling, Harrowing
26-Nov-88	D. M. Collister	1 bird observed, Bragg Creek
3-Dec-88	D. M. Collister	1 bird calling, Water Valley
4-Dec-88	D. M. Collister	1 bird observed, Water Valley
9-Dec-88	Edgar T. Jones	1 pair observed, Alder Flats
11-Dec-88	D. M. Collister	1 bird observed, Water Valley
27-Dec-88	D. M. Collister	1 bird observed, Water Valley

2-Jan-89	D. M. Collister	1 bird observed, Water Valley
15-Jan-89	D. M. Collister	1 bird observed, Water Valley
17-Jan-89	Edgar T. Jones, Bob Gehlert	1 bird caught and banded, Niton
17-Jan-89	Edgar T. Jones	1 bird collided with window, Evansburg
3-Feb-89	Provincial Museum of Alberta	adult female (skin) Ref.#Z89.34.1
8-Apr-89	D. M. Collister	1 bird calling, Cremona
10-May-89	Edgar T. Jones, Bob Gehlert, Hardy Pletz	nest located with 6 eggs, MacKay
1-Dec-89	Lisa Takats	1 bird calling, Sunwapta
18-Dec-89	Edgar T. Jones	1 bird observed, Wembley
19-Jan-90	D. M. Collister	1 bird observed, Bottrel
25-Feb-90	D. M. Collister	2 birds observed (pair - copulation), Morley
24-Mar-90	Ray Cromie, Bob Gerlach	1 female observed, Nojack
1-Apr-90	D. M. Collister	1 bird calling, Water Valley
21-Apr-90	Ray Cromie, Bob Gerlach	1 male observed, Nojack
6-May-90	D. M. Collister	1 bird observed, Water Valley
15-May-90	D. R. C. Prescott	1 bird calling, Young's Point Prov. Park
2-Jun-90	Edgar T. Jones	nest located with 6 nestlings, MacKay
3-Jun-90	Ray Cromie, Bob Gerlach	nest located with 6 young, Long Island Lake
28-Apr-91	D. M. Collister	1 bird at nest hole, Bergen
30-Apr-91	D. M. Collister	2 birds observed (mated pair - at nest), Bergen
8-May-91	D. M. Collister	1 bird observed at nest hole, Bergen
12-Oct-91	Ray Cromie	1 pair observed, Goodwin
1-Nov-91	Edgar T. Jones	1 bird observed, Peace River
1-Jan-92	Lisa Takats	1 bird calling, Pyramid Lake
11-Oct-92	Ray Cromie	1 bird calling, Goodwin
29-Dec-92	D. M. Collister	1 bird observed, Sheep River
16-Jan-93	Ray Cromie	1 bird observed, Carson Lake
3-Jun-93	Ray Cromie	nest located, Elford Lake
9-Oct-93	Ray Cromie	1 bird calling, Goodwin
1-Dec-94	Lisa Takats	1 bird calling, Kananaskis
7-Mar-95	Lisa Takats	1 bird observed
18-Mar-95	Lisa Takats	1 bird observed, TriCreeks
19-Apr-95	Lisa Takats	2 birds observed (copulation)
15-May-95	Lisa Takats	1 bird observed, Prest Creek
1-Jun-95	Gord Court	1 bird calling, Rock Island Lake
1-Jul-95	Lisa Takats	1 bird observed, Obed
2-Jul-95	Kevin Hannah	1 pair with 2 fledlings observed, Calling Lake
26-Sep-95	Lisa Takats	2 birds calling
21-Oct-95	Ray Cromie	1 bird calling, Cross Lake
29-Oct-95	Edgar T. Jones	1 bird observed, Cross Lake P.P.
3-Dec-95	Edgar T. Jones	2 birds observed, Niton
2-Mar-96	Ray Cromie	1 pair calling, Fawcett Lake
1-Apr-96	Lisa Takats	1 bird calling,
12-Apr-96	Lisa Takats	2 birds observed
24-May-96	Lisa Takats	1 bird observed, Hwy #93
29-May-96	Lisa Takats	1 bird observed, Maligne
31-Jul-96	Lisa Takats	1 bird observed
14-Mar-97	Lisa Takats, Jeff Adamyk	1 bird calling, TriCreeks
28-Mar-97	Saxena and McIntyre (1997)	2 birds calling
29-Mar-97	Saxena and McIntyre (1997)	2 birds calling
19-Apr-97	Lisa Takats, Jeff Adamyk	1 bird calling, Gregg Lake

1-Apr-98	Bruce Nielsen	1 bird calling, Mons Lake
10-Apr-98	Jen Gammond	1 bird calling, Shaw Lake
10-Apr-98	Jen Gammond	1 bird calling, Shaw Lake
20-Apr-98	Mark Heckbert	1 bird calling, Jackpines Natural Area
20-Apr-98	Mark Heckbert	1 bird calling, Jackpines Natural Area
21-Apr-98	Malcolm Bell	1 bird calling, Water Valley
22-Apr-98	Lisa Takats, Jeff Adamyk	1 bird calling, Gregg Lake
29-Apr-98	Lisa Takats, Jeff Adamyk	1 bird calling, Cold Creek
15-May-98	Jen Gammond	1 bird calling, Shaw Lake
7-Jun-98	Roger Brown	2 birds calling
7-Jun-98	Roger Brown	1 bird observed
24-Jun-98	Sue Cotterill	6 birds observed (family group)
Nov. 1998	Robert McDonald, Breeding Owl Survey	1 observed, Fort McMurray
1-Jan-99	Volker Schelhaus, Breeding Owl Survey	2 observed, Maligne Canyon area
no date	Semenchuk (1992)	probable nesting, Utikuma Lake
no date	Semenchuk (1992)	bird observed, Grande Prairie
no date	Semenchuk (1992)	possible nesting, Hinton
no date	Semenchuk (1992)	confirmed nesting, Edson area
no date	Semenchuk (1992)	bird observed, Edson area
no date	Semenchuk (1992)	probable nesting, Edson area
no date	Semenchuk (1992)	possible nesting, Edson area
no date	Semenchuk (1992)	confirmed nesting, Chip Lake area
no date	Semenchuk (1992)	confirmed nesting, Chip Lake area
no date	Semenchuk (1992)	confirmed nesting, Chip Lake area
no date	Semenchuk (1992)	confirmed nesting, Chip Lake area
no date	Semenchuk (1992)	bird observed, Evansburg
no date	Semenchuk (1992)	probable nesting, Buck Creek area
no date	Semenchuk (1992)	confirmed nesting, Sundre area
no date	Semenchuk (1992)	possible nesting
no date	Semenchuk (1992)	confirmed nesting
no date	Semenchuk (1992)	probable nesting
no date	Semenchuk (1992)	probable nesting
no date	Semenchuk (1992)	possible nesting
no date	Semenchuk (1992)	possible nesting
no date	Semenchuk (1992)	bird observed
no date	Semenchuk (1992)	probable nesting
no date	Semenchuk (1992)	bird observed
no date	Semenchuk (1992)	probable nesting
no date	Semenchuk (1992)	possible nesting
no date	Godfrey (1986)	bird observed, Nordegg
no date	Godfrey (1986)	bird observed, Peers
no date	Godfrey (1986)	bird observed, Fort Assiniboine
no date	Godfrey (1986)	bird observed, Phoenix
no date	Godfrey (1986)	bird observed, Sedgewick
no date	Godfrey (1986)	bird observed, McLeod River Valley
no date	Godfrey (1986)	bird observed, Calgary
no date	Godfrey (1986)	bird observed, Alexo

List of Titles in This Series
(as of June 1999)

No. 1 Status of the Piping Plover (Charadrius melodus) in Alberta, by David R. C. Prescott. 19 pp.

No. 2 Status of the Wolverine (Gulo gulo) in Alberta, by Stephen Petersen. 17 pp.

No. 3 Status of the Northern Long-eared Bat (Myotis septentrionalis) in Alberta, by M. Carolina Caceres and M. J. Pybus. 19 pp.

No. 4 Status of the Ord's Kangaroo Rat (Dipodomys ordii) in Alberta, by David L. Gummer. 16 pp.

No. 5 Status of the Eastern Short-horned Lizard (Phrynosoma douglassii brevirostre) in Alberta, by Janice D. James, Anthony P. Russell and G. Lawrence Powell. 20 pp.

No. 6 Status of the Prairie Rattlesnake (Crotalus viridis viridis) in Alberta, by Sheri M. Watson and Anthony P. Russell. 26 pp.

No. 7 Status of the Swift Fox (Vulpes velox) in Alberta, by Susan E. Cotterill. 17 pp.

No. 8 Status of the Peregrine Falcon (Falco peregrinus anatum) in Alberta, by Petra Rowell and David P. Stepnisky. 23 pp.

No. 9 Status of the Northern Leopard Frog (Rana pipiens) in Alberta, by Greg Wagner. 46 pp.

No. 10 Status of the Sprague's Pipit (Anthus spragueii) in Alberta, by David R. C. Prescott. 14 pp.

No. 11 Status of the Burrowing Owl (Speotyto cunicularia hypugaea) in Alberta, by Troy I. Wellicome. 21 pp.

No. 12 Status of the Canadian Toad (Bufo hemiophrys) in Alberta, by Ian M. Hamilton, Joann L. Skilnick, Howard Troughton, Anthony P. Russell, and G. Lawrence Powell. 30 pp.

No. 13 Status of the Sage Grouse (Centrocercus urophasianus urophasianus) in Alberta, by Cameron L. Aldridge. 23 pp.

No. 14 Status of the Great Plains Toad (Bufo cognatus) in Alberta, by Janice D. James. 26 pp.

No. 15 Status of the Plains Hognose Snake (Heterodon nasicus nasicus) in Alberta, by Jonathan Wright and Andrew Didiuk. 26 pp.

No. 16 Status of the Long-billed Curlew (Numenius americanus) in Alberta, by Dorothy P. Hill. 20 pp.

No. 17 Status of the Spotted Frog (Rana luteiventris) in Alberta, by Janice D. James. 21 pp.

No. 18 Status of the Ferruginous Hawk (Buteo regalis) in Alberta, by Josef K. Schmutz. In preparation.

No. 19 Status of the Red-tailed Chipmunk (Tamias ruficaudus) in Alberta, by Ron Bennett. 15 pp.

No. 20 Status of the Northern Pygmy Owl (Glaucidium gnoma californicum) in Alberta, by Kevin C. Hannah. 20 pp.

No. 21 Status of the Western Blue Flag (Iris missouriensis) in Alberta, by Joyce Gould. 22 pp.