

**STATUS OF THE VANCOUVER ISLAND  
NORTHERN PYGMY-OWL  
(*Glaucidium gnoma swarthi*)  
IN BRITISH COLUMBIA**

by  
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**BRITISH  
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## EXECUTIVE SUMMARY

### Species information

The Northern Pygmy-Owl (*Glaucidium gnoma*; Order Strigiformes, Family Strigidae) is a small, long-tailed forest owl. Various authors describe it as an uncommon resident throughout most of its range in western North America. Taxonomy of the subspecies is complex and requires further clarification.

### Distribution

*Glaucidium gnoma swarthy* is endemic to Vancouver Island and probably the Gulf Islands. *G.g. swarthy*, like other Northern Pygmy-Owl subspecies, is non-migratory; however, reports document movement from mountain forests to lowland habitats in the fall.

### Habitat

The Northern Pygmy-Owl is a habitat generalist; it is found in mature and old-growth coniferous, mixed or deciduous forests that have natural and man-made openings and sufficient numbers of natural or excavated cavities for nesting. Habitat loss and degradation may be occurring at a sufficient rate on Vancouver Island to be a threat to the long-term survival of the subspecies.

### Biology

The Northern Pygmy-Owl is a diurnal or crepuscular hunter that preys on small birds and mammals. These owls live in mature forests and nest in natural cavities and cavities excavated and abandoned by woodpeckers. They typically produce three to five eggs each spring. Very little or nothing is documented about productivity, nest success, longevity, survival, or special physiological adaptations.

### Population sizes and trends

Population estimates for *G.g. swarthy* have not been made. Throughout British Columbia, Northern Pygmy-Owls are considered rare or uncommon. This may be a reflection of their inconspicuous nature and not their actual density. Population trends of rare, uncommon, secretive and inconspicuous species are

difficult to ascertain. Current and future loss and degradation of adequate habitat for Northern Pygmy-Owl on Vancouver Island is likely to cause population declines.

### Limiting factors and threats

Populations are likely limited by suitable habitat, especially the availability of cavities for nesting. These cavities are typically excavated in large-diameter trees that historic and current logging practices (e.g., clearcutting and selection logging) remove from the landscape. Snags and dangerous trees that are suitable for cavities are often removed around human developments in suburban and rural settings. Habitat fragmentation, degradation and loss are the major threats to long-term conservation of Northern Pygmy-Owls in British Columbia. Habitat loss due to forestry and urbanization is a major issue on Vancouver Island.

### Special significance of the species

*Glaucidium gnoma swarthy* is endemic to Vancouver Island. It is popular with birders because it is an owl that can be observed during the day, when it is active.

### Existing protection or other status designations

The Northern Pygmy-Owl in British Columbia is protected from harm under Section 34 of the British Columbia Wildlife Act. *G.g. swarthy* is Blue-listed (Vulnerable) in British Columbia. Recommendations for management of wildlife habitat during forest harvesting are included in the Biodiversity Guidelines and the Riparian Management Area guidelines that support British Columbia's Forest Practices Code. The subspecies is listed in the draft of Volume 2 of the Identified Wildlife Management Strategy, under which special management practices may be recommended. Much of the range of the Northern Pygmy-Owl falls on provincial or federal land, including provincial parks, but much of the provincial land is under forest land-use tenure (TFL or TSA). Management of non-timber resources is guided by non-legislated guidelines.

## **Summary of status report**

The Vancouver Island Northern Pygmy-Owl is and always has been uncommon. Population estimates continue to be low. Northern Pygmy-Owl populations may be declining and are expected to decline in the future as a direct result of habitat fragmentation, degradation and loss especially related to lack of suitable nest cavities as snags and large-diameter trees are removed and not replaced across the landscape.

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## 1 SPECIES INFORMATION

### 1.1 Name and Classification

The Northern Pygmy-Owl is a member of the Strigidae family. The systematics of the genus *Glaucidium* are extremely complex. Marks et al. (1999) state that “Classification of *Glaucidium* is complicated by the fact that some taxa exhibit intraspecific plumage dichromatism, some are very similar in plumage and morphology, and many are unstudied in the wild. Consequently, the taxonomy within the group is in greater flux than is that of any other genus of owl.” The Northern Pygmy-Owl (*Glaucidium gnoma*) is one of two species of *Glaucidium* recognized by the American Ornithologists Union (AOU) (1998) in North America. Marks et al. (1999) recognize 31 species of world-wide and split *G. gnoma* into four species, giving the Northern Pygmy-Owl the scientific name *G. californicum*. These four species are considered three subspecies groups by the AOU (1998) and two species by Monroe and Sibley (1993). This report will follow the AOU (1998) in its species taxonomy.

Variations in colour and morphology separate the subspecies. The Northern Pygmy-Owl is represented by three subspecies in Canada, *G.g. swarthy* Grinnell, *G.g. californicum* Sclater and *G.g. grinnelli* Ridgway (AOU 1957, Holt and Petersen 2000). Along with *G.g. pinicola* of the midwestern and southwestern states, the three Canadian subspecies comprise the “*californicum*” group, whose characteristic single-note song distinguishes it from the other two groups in North and Central America (AOU 1998).

At various times, *G.g. swarthy* has been considered a separate subspecies or part of a larger subspecies grouping. Munro and McTaggart-Cowan (1947) considered *G.g. grinnelli* synonymous with *G.g. swarthy*, retaining the name *G.g. swarthy* for the subspecies found within their combined ranges. The current taxonomic information available from the Heritage Programs of North America (NatureServe 2001) is based on Sibley and Monroe (1990), who considered *G.g. grinnelli* synonymous with *G.g. californicum*. However, the AOU (1998) and Holt and Petersen (2000) both continue to recognize *G.g. swarthy* and *G.g. grinnelli* as valid subspecies. *G.g. grinnelli* is also recognized in recent web and printed publications

regarding species of concern in British Columbia (Cannings 1998; CDC 2002); therefore this report also recognizes its separation from *G.g. swarthy*.

The current French name for Northern Pygmy-Owl (*Glaucidium gnoma*) is *Chevechette naine* (Holt and Petersen 2000); previously it was called *Chouette naine* (Godfrey 1986) and *Petit Hibou* (Taverner 1926).

### 1.2 Description

The Northern Pygmy-Owl (*G. gnoma*) is a small (16-18 cm, 54-87 g), grayish-brown owl with yellow eyes and whitish spots on its head, nape, mantle, scapulars, and wing coverts (Earhart and Johnson 1970; Holt and Petersen 2000). Females are not distinguishable from males by plumage but are 1-2 cm longer and an average 11 g heavier than males (Earhart and Johnson 1970). The white belly is sharply streaked with brown, and there are two distinctive black patches with white borders on each side of the back of the head, suggesting false eyes. The head is proportionately smaller than that of other owls, and the dark brownish tail is relatively long, with five to six narrow, complete white bars. In keeping with observed distributions of colour morphs (predominately greyish in the Rocky Mountains and brownish along the Pacific Coast [Holt and Petersen 2000]), *G.g. swarthy* is noticeably darker than the other subspecies in British Columbia.

## 2 DISTRIBUTION

### 2.1 Global Range

The Northern Pygmy-Owl (*G. gnoma*) occurs year-round in appropriate forest habitats of western North America. In Canada and the USA, the species is resident in British Columbia, Alberta, Alaska, Washington, Oregon, Idaho, Montana, California, Nevada, Wyoming, Utah, Arizona, Colorado and New Mexico. In Mexico and Central America, its range includes 25 Mexican states, Guatemala and Honduras (AOU 1998; Holt and Petersen 2000). Reduction or expansion of the species' range apparently has not occurred or is not documented in the literature.

The Vancouver Island subspecies of Northern Pygmy-Owl (*G.g. swarthy*) is thought to occur throughout Vancouver Island and the Gulf Islands in



appropriate forest habitats (Figure 1). Like the species, the subspecies is non-migratory (except for local movements), and breeding range includes wintering range.

## 2.2 Canadian Range

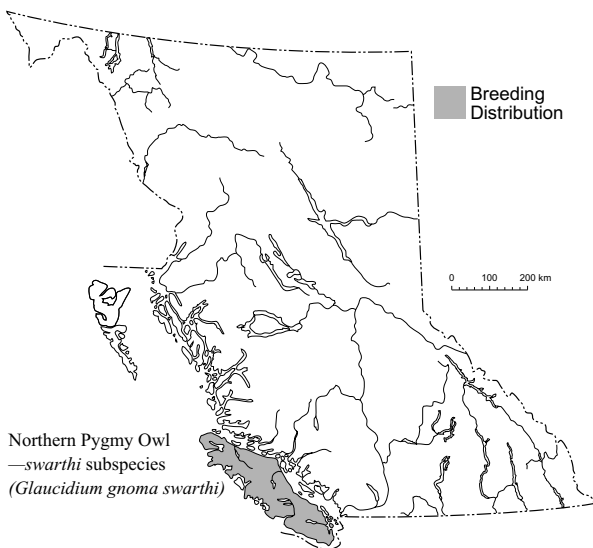
In Canada, *G.g. swarthy* is restricted to Vancouver Island and adjacent Gulf Islands in COSEWIC's Pacific Ecological Area (AOU 1957; Campbell et al. 1990; Cannings 1998; Holt and Petersen 2000). The extent of its occurrence is approximately 32 200 km<sup>2</sup>. The area of occupancy for *G.g. swarthy* on Vancouver Island is unknown.

The range of *G.g. swarthy* in Canada is apparently continuous, and range expansion or contraction is not documented in the literature. Undoubtedly, because of changes in habitat availability caused by human disturbances, *G.g. swarthy* no longer occurs in some locations where it occurred in the past. Presence or absence of the subspecies could go unnoticed for many years, particularly in less-inhabited regions.

## 3 HABITAT

### 3.1 Habitat Requirements

Little information is available on the habitat requirements of *G.g. swarthy*. Call-playback surveys for owls have been conducted at a number of locations on



**Figure 1. Distribution of the Vancouver Island Northern Pygmy-Owl (*Glaucidium gnoma swarthy*).**

Vancouver Island (and the Gulf Islands) during the past decade. They provide an indication of habitats used by *G.g. swarthy* during the breeding season (Manning 1993; Balke et al. 1997; Bryant 1997; Holroyd and Egan 1997; Settingington 1998; Joy et al. 1999; Manley 1999; Cannings 2000; Mico and van Enter 2000; Cannings 2001; Preston and Campbell 2001). However, these studies were designed as inventories rather than as assessments of habitat use, and all were carried out at night, an inappropriate protocol for a crepuscular or diurnal owl. Habitat studies are required.

Balke et al. (1997) observed Northern Pygmy-Owl (*G.g. swarthy*) in unharvested and partially cut second-growth forests dominated by Douglas-fir (*Pseudotsuga menziesii*) in the Coastal Western Hemlock (CWH) biogeoclimatic zone, very dry maritime (xm1) biogeoclimatic subzone on Quadra Island. The Northern Pygmy-Owl was the most common owl species documented, but the authors considered it very uncommon (total count not provided in the report).

Mico and van Enter (2000) detected one Northern Pygmy-Owl (*G.g. swarthy*) also in the CWHxm1 subzone variant in the Campbell River watershed; the study area was highly dominated by trees 41 to 60 years old (age class 3) and in the 19.5-28.4 m height class (class 3). However, no Northern Pygmy-Owls (*G.g. swarthy*) were detected during owl playback surveys in the CWHxm1 subzone in the Beaver Lodge Forest Lands just south of Campbell River in 1998 (Manley 1999).

Only one Northern Pygmy-Owl (*G.g. swarthy*) was recorded during Holroyd and Egan's (1997) surveys in the CWHvh1 (southern very wet hypermaritime) subzone variant in Clayoquot Sound, but no habitat details are provided beyond this. Also in the Clayoquot Sound area, Manning (1993) reported finding Northern Pygmy-Owls (*G.g. swarthy*) in CWHvm1 (submontane very wet maritime) and CWHvm2 (montane very wet maritime) subzone variants. However, Bryant (1997) reported zero incidental observations of Northern Pygmy-Owls (*G.g. swarthy*) in either of two watersheds in the Clayoquot Sound area.

In owl surveys in the Nimpkish Valley on northern Vancouver Island (Settingington 1998), the greatest number of observations of all owl species was made in the CWHxm2 subzone; however, preference cannot be implied because the sampling effort among the subzones was not determined. Northern Pygmy-Owl (*G.g. swarthi*) responded to call playbacks in all subzones surveyed: CWHxm2 (very dry maritime), CWHvm1 (submontane very wet maritime), CWHvm2 (montane very wet maritime) and MHmm1 (Mountain Hemlock zone, windward moist maritime subzone variant). The following habitat attributes were determined from forest-cover polygons at estimated locations of Northern Pygmy-Owl responses: basal area 49 m<sup>2</sup>/ha, age 159 years, height 27 m and crown closure 50%. These values were slightly higher than those determined for Western Screech-owls and consistently lower than for Barred Owls, Northern Saw-whet Owls and Great Horned Owls. Settingington (1998) compared these attributes in 40-ha plots at the observation point and at random points and found that the attributes at random points were higher, suggesting that Northern Pygmy-Owls select younger, less dense, and shorter forests than are available in the landscape (though it is possible that the owls were attracted to the site by the tape player). In one year of the Nimpkish study, Matkoski (1997) determined that 29% of Northern Pygmy-Owl detections were in second-growth forest and 71% were in old-growth forest (however, proportions of the survey points or study area in either age class were not determined).

In a different study near Woss within the Nimpkish Valley, Northern Pygmy-Owls (*G.g. swarthi*) were detected seven times in winter 1997 at elevations of 644-1170 m in old-growth montane forests in the CWHvm1, CWHvm2 and MHmm1 subzones (Joy et al. 1999).

Preston and Campbell (2001) detected two Northern Pygmy-Owls in surveys on Vancouver Island (*G.g. swarthi*) and the Sunshine Coast. The island individual was detected in the CWHxm2 subzone variant. The subspecies has been detected at only one site on Vancouver Island on the BC Nocturnal Owl Survey (Nimpkish Valley, near Claude Elliot Lake, CWHvm1 subzone variant) (R. J. Cannings, pers. comm.; Cannings 2000, 2001).

Generally, the Northern Pygmy-Owl (*G. gnoma*) is

a habitat generalist that occupies mature and old-growth forests. The species is widespread but uncommon wherever suitable habitat is available within its range. Natural or excavated cavities are crucial habitat elements for nesting.

Northern Pygmy-Owls (*G. gnoma*) select various forest habitats for breeding, including deciduous bottomlands and high-elevation coniferous forests (Holt and Petersen 2000). The species is known to breed in mature and second-growth coniferous forests, mixed riparian forest and pure deciduous stands. Gyug and Bennett (1995) detected Northern Pygmy-Owls in mature coniferous forests in interior British Columbia at frequencies similar to those in regenerating forest with retained seed tree patches. In western Montana, Holt and Hillis (1987) observed a preference for mixed fir or spruce-fir forests, but Hayward and Garton (1988) concluded that the species is a habitat generalist in Idaho – most often associated with open, large-diameter conifer stands but having substantial variation in habitats used. Ehrlich et al. (1988) report that Northern Pygmy-Owls on the Pacific Coast tend to occupy the forest canopy, whereas birds are found elsewhere in the sub-canopy and understory. They tend to nest near the edge of forest openings rather than in the interior forest. Nests have been found from California to Alaska in a variety of tree species up to 3000 m elevation (Holt and Petersen 2000).

Northern Pygmy-Owls (*G. gnoma*) require habitat with abandoned woodpecker holes and natural tree cavities for nesting cavities and roost sites. Based on body size and field observations by many authors, Northern Flicker (*Colaptes auratus*) and Hairy Woodpecker (*Picoides villosus*) excavations may be best suited to subsequent use by the Northern Pygmy-Owl (Hannah 1999); however, smaller cavity entrance holes than those created by Flickers may be preferred (R. J. Cannings, pers. comm., Feb. 2002). Campbell et al. (1990) documented five nests in British Columbia in old woodpecker cavities in conifers (Douglas-fir, western hemlock [*Tsuga heterophylla*], and western larch [*Larix occidentalis*], 3-18 m above the ground. These nest sites were in western redcedar [*Thuja plicata*], western hemlock, ponderosa pine [*Pinus ponderosa*], lodgepole pine [*Pinus contorta*], and western larch) from near sea level to 1220 m elevation and

often on steep hillsides, precipitous talus slopes, or steep ravines not far from water. No further nests have been documented in British Columbia (R. J. Cannings, pers. comm. Feb. 2002; J. Hobbs, pers. comm., Feb. 2002). They have been detected during the breeding season on Vancouver Island, British Columbia, between 50 and 950 m elevation (Deal and Lamont 1996; Matkoski 1997; J. Hobbs, pers. comm., Feb. 2002). Slope and aspect are quite varied among the few nest records for the species continent-wide (Holt and Petersen 2000).

Foraging habitats of Northern Pygmy-Owls (*G. gnoma*) are usually associated with forest edges, such as road edges, clearcut edges and natural openings, rather than continuous forest (Campbell et al. 1990; Holt and Petersen 2000). In the interior of British Columbia, Northern Pygmy-Owls have been observed foraging along the edges of open coniferous forests, lakes or clearings (Cannings et al. 1987; Campbell et al. 1990). Foraging has also been observed at natural openings such as steep, exposed rock outcrops in contiguous forests and at man-made openings such as abandoned, grown-over fields in coastal and interior British Columbia (J. Hobbs, pers. comm., Feb 2002). Other habitats used include clearcuts, orchards, riparian areas, river and lake shores, meadows, cultivated fields, parks, cemeteries and residential areas (Campbell et al. 1990).

Northern Pygmy-Owls are believed to move from forested mountain habitats to lower elevations and slightly lower latitudes in the fall and return to breeding sites in very early spring on Vancouver Island (Guiguet 1978) and in the interior (Cannings et al. 1987; Campbell et al. 1990). They may be more visible during this non-breeding period. Guiguet (1978) reports more frequent use of semi-open slash in the spring and open mature fir forests in the fall. Cannings et al. (1987) report movement down from forested mountains to open woods, farms and orchards.

### 3.2 Trends

Because there have been very few habitat or natural history studies of *G. gnoma*, little is known about habitat requirements, so an assessment of impacts of trends in habitat on *G.g. swarthy* is speculative.

Fragmentation and loss of mature forest habitats

stemming from forestry activity or urban development are on-going. Forestry practices have changed in the past decade to favour smaller clearcuts, protection of stands in riparian areas, alternate silviculture such as partial cutting, and retention of patches of wildlife trees on harvested areas – all of which favour cavity-nesters like the Northern Pygmy-Owl. Current forestry activities may provide suitable foraging habitat because the Northern Pygmy-Owl uses edge habitats for foraging. Careful planning of wildlife-sensitive practices that protect high quality nest trees and nest-site habitat may reduce logging impacts on Northern Pygmy-Owls, but there are fewer undisturbed areas across the landscape. Preston and Campbell (2001) considered this species an ideal indicator species to study the effects of variable-retention forestry practices. Urban sprawl and removal of snags in suburban forest stands will continue to increase in extent and intensity, especially on southern Vancouver Island where exponential human population growth is predicted.

### 3.3 Protection/Ownership

Most (approximately 66%) of the forested land base with suitable habitat for the Vancouver Island Northern Pygmy-Owl is under provincial ownership, managed by industry under forestry tenures (Timber Supply Areas, Tree Farm License). Private forest lands represent approximately 33% of the island. Current forest practices are guided by principles of sustainable forestry and conservation of all forest resources, but no specific actions are required to protect inactive nest trees or suitable habitat of most owl species. *G.g. swarthy* is proposed as an Identified Species in the draft of Volume Two of the Identified Wildlife Management Strategy (K. Paige, pers. comm., Feb. 2002), under which special management practices will be recommended. Approximately 11% (approximately 4700 km<sup>2</sup>) of the land area of Vancouver Island is protected in parks or ecological reserves, but not all of this area would consist of suitable habitat for *G. gnoma swarthy*.

## 4 BIOLOGY

### 4.1 General

The Northern Pygmy-Owl is one of the least studied owls in North America (Holt and Petersen 2000).

Other than multiple-species inventories that documented the species at very broad habitat scales, little is known about the biology of the Vancouver Island subspecies, *G.g. swarthi*. Except where noted, the following descriptions have been extrapolated from the more general literature describing the species.

The Northern Pygmy-Owl is a secondary cavity-nester, dependent on natural cavities and cavities excavated by woodpeckers. It inhabits mature and old-growth deciduous, coniferous or mixed forests where it forages diurnally at edges of openings by gliding or diving quietly down from its perch.

#### 4.2 Reproduction

Northern Pygmy-Owls begin breeding activity (nest cavity advertising) in late winter (February), but it is not known which sex selects the site (Holt and Petersen 2000). They lay three to five eggs (reports of up to seven; Johnsgard 1988) at two-day intervals in a cavity nest from April through June. Incubation lasts 28 to 29 days but is delayed until all eggs have been laid, so the owlets hatch within a day or two of each other (Campbell et al. 1990; Holt and Petersen 2000). Nestlings remain in the nest for 29 to 32 days (or as few as 23 days [Holt and Petersen 2000]) and can be found in the nest from early June through late August; parental care lasts 20 to 30 days longer (Johnsgard 1988; Campbell et al. 1990). The male provides food to the female on the nest, who feeds the nestlings, but when the young have fledged, both adults will feed them (Holt and Petersen 2000).

These owls are not known to lay a second brood (Holt and Petersen 2000). Nest cavities may be used for several consecutive years, but this is not well documented (Holt and Petersen 2000). This species is usually widely distributed in appropriate habitats—pairs are spaced 600 to 1600 m apart (Holt and Petersen 2000).

First signs of sexual maturity may be noted when Northern Pygmy-Owls are five months old, so they likely produce eggs at one year of age and every year thereafter (Johnsgard 1988; Holt and Petersen 2000). Pairs are bonded at least for the breeding season, and polygamy and extra-pair copulations have not been reported (Holt and Petersen 2000).

There is no information available on sex ratio, population structure (age and sex), life span, survivorship,

average age of reproducing individuals, or annual or lifetime reproductive success (Holt and Petersen 2000).

#### 4.3 Survival

Nothing is documented or known about factors affecting Northern Pygmy-Owl survival, differential survival of different age or sex classes, the balance between mortality and reproduction and recruitment, potential for growth, or ability to withstand years of zero recruitment (Holt and Petersen 2000).

Causes of mortality are poorly known (Holt and Petersen 2000). The Barred Owl (*Strix varia*) is thought to be a predator (Cannings et al. 1987; Campbell et al. 1990), though the likelihood of an attack by the nocturnal Barred Owl on the largely diurnal Northern Pygmy-Owl may be small. Other than anecdotal records of Barred Owls being attracted to playback calls and/or fewer observations of Northern Pygmy-Owl concurrently with increases in Barred Owl observations (various sources, Vancouver Island and the Lower Mainland, and elsewhere), there is little empirical evidence, though Cannings et al. (1987) report an actual attack. Spotted Owl (*Strix occidentalis*) is also a suspected predator in the lower mainland and the southern interior of the province, but not on Vancouver Island where Spotted Owl does not occur (Campbell et al. 1990).

#### 4.4 Physiology

Little is documented or known about special physiological adaptations that the Northern Pygmy-Owl has developed to withstand particular environments. It is resident in harsh winter climates in the mountains of northern Vancouver Island and in cold winter climates of British Columbia and Alberta. Adaptations appear to be behavioural (uses cavities for roosting in winter; see below regarding seasonal elevational movements) rather than physiological.

#### 4.5 Movements/Dispersal

Like the other subspecies, *G.g. swarthi* is considered resident throughout its range in Canada (Campbell et al. 1990; Semenchuk 1992; Hannah 1999; Holt and Petersen 2000). However, like the other subspecies, *G.g. swarthi* commonly undergoes seasonal elevational migrations from higher-elevation forests to lower-elevation habitats and locations in which it does not

necessarily breed (Cannings et al. 1987; Campbell et al. 1990; Hannah 1999; Holt and Petersen 2000). This movement occurs in fall and spring on Vancouver Island (Guiguet 1978), or more specifically, in late October to early November and returning in mid-to-late February (Campbell et al. 1990). Sex and age classes of the migrants are unknown.

No information is available regarding distance of juvenile dispersal of Northern Pygmy-Owl from the nest site (Holt and Petersen 2000). There is no information about nest-site or home-range fidelity. Although occupied territories are usually re-occupied the following breeding season, there is no evidence that it is the same pair or individual (Holt and Petersen 2000). There is no information on distances of seasonal dispersal of adults from the nest site (Holt and Petersen 2000).

#### 4.6 Nutrition and Interspecific Interactions

Though little is known about the diet of *G.g. swarthi*, a wide range of Northern Pygmy-Owl prey is reported in the literature, including insects, amphibians, mammals and birds (Holt and Petersen 2000). Avian prey may be up to two-thirds of the owl's own body weight (Holt and Petersen 2000). The species is likely adaptable to natural fluctuations in prey populations and prey community composition. Many authors report a preponderance of birds in the diet (Earhart and Johnson 1970; Guiguet 1978; Hayward and Garton 1988; Holt and Petersen 2000), while others report that mammals comprise the greatest portion of the diet (Norton and Holt 1982; Holt and Leroux 1996). Amphibian prey is also documented (Hannah 1999). The diverse prey list is likely a reflection of opportunism in various locations and habitats.

Sufficient prey is required near the nest tree site for the male to supply the female and nestlings (about 40 days from egg-laying until the female may leave the nestlings to hunt). The larger-bodied females may be better able to capture and subdue small mammal prey than the smaller male, which can capture agile avian prey (Earhart and Johnson 1970).

Northern Pygmy-Owls apparently prey on a wider selection of prey and more on avian prey than the sympatric Northern Saw-whet Owl (Holt and Petersen 2000). Guiguet (1978) believed that being diurnal and

sometimes crepuscular hunters, Northern Pygmy-Owls would be less likely to find small mammals, especially on the coast where most small mammals are nocturnal. However, they commonly catch voles and shrews, which are both present on the British Columbia coast and active throughout the day and night (R. J. Cannings, pers. comm. Feb. 2002).

Guiguet (1978) indicated that Northern Pygmy-Owls in British Columbia feed primarily on birds during the breeding season and a variety of prey the rest of the year. However, Holt and Petersen (2000) observed that individuals that undergo seasonal elevational movements often feed on birds at bird feeders in winter. Dependence on avian prey in winter is documented in Alberta (Hannah 1999). A shift from mammalian prey in summer to avian prey in winter has been found in the Pygmy-Owl in Sweden (*Glaucidium passerinum*) (Kullberg 1995); therefore birds may also contribute substantially to the winter diets of these opportunistic hunters. The diet of Northern Pygmy-Owls in winter likely changes with the associated change in habitat, as they move to lower elevations.

Potential avian predators of the Northern Pygmy-Owl on Vancouver Island include Barred Owl, Great Horned Owl (*Bubo virginianus*), Cooper's Hawk (*Accipiter cooperii*), Sharp-shinned Hawk (*A. striatus*), Northern Goshawk (*A. gentilis*), and large nest-raiding corvids (ravens or jays). Potential mammalian predators that may kill young or incubating adults at the nest include Red Squirrels (*Tamiasciurus hudsonicus*), Pine Marten (*Martes americana*) and Raccoon (*Procyon lotor*). Great Horned Owl, Barred Owl and other predator populations may have increased in response to the introduction of Eastern Grey Squirrels (*Sciurus carolinensis*), another nest predator, and Eastern Cottontails (*Sylvilagus floridanus*), which have become well established on Vancouver Island (D. Fraser, pers. comm.). As a result, these predators may be imposing a greater impact on small owls such as the Northern Pygmy-Owl.

There are no reports of obligate or facultative associations with other species. There is little or no information on diseases and parasites (Holt and Petersen 2000).

## 4.7 Behaviour/Adaptability

The Northern Pygmy-Owl is apparently tolerant of human activity at a perch tree or around the nest tree (Salt and Salt 1976; Holt and Petersen 2000); however, long-term impacts of such activity on nesting success or productivity are unknown. It is not often associated with rural or suburban human housing development; such developments would probably not be selected because of their disturbance levels and the lower habitat quality (e.g., lack of trees with cavities).

Northern Pygmy-Owls have been observed foraging in clearcuts on Vancouver Island (M. Chutter, pers. comm., Feb. 2002) and other man-made forest-edge habitats (Campbell et al. 1990; Holt and Petersen 2000). However, they remain dependent on old forest habitats to provide suitable cavity trees.

Northern Pygmy-Owls are territorial during the breeding season (Holt and Petersen 2000), protecting cavity trees and nearby foraging areas. In Colorado, territories are approximately 75 ha, and Northern Pygmy-Owls in Arizona and California are separated by 1.6 km (Holt and Petersen 2000). Home ranges of Eurasian species average 1.4 km<sup>2</sup> in size (Johnsgard 1988). There is no information on the size of the home ranges of Vancouver Island Northern Pygmy-Owls.

As with most owls, Northern Pygmy-Owls respond to conspecific and other species' calls, and they will respond to taped calls and human imitations of their calls. Most of the calling that owls do is during their breeding season to notify others of their breeding territory. Although habituation to outside stimuli (e.g., taped calls) may occur, there is potential for increased stress (and subsequent nest failure) or vulnerability to predation as a result of disturbance.

Northern Pygmy-Owls, because they are active during the day, are seen more often than other species of owl in the southern interior of the province, and they are quite regularly reported (Cannings et al. 1987; R. J. Cannings, pers. comm., Feb. 2002). Some observers have found them quite approachable while foraging in the day (J. Hobbs, pers. comm., Feb. 2002). Their flight pattern (undulating, similar to woodpecker flight with rapid wing beats interrupted by gliding), small size, and body form (short wings and relatively long tail) are not typical of owls, so though active during the day, they may not be recognized as an owl. Their size and solitary

nature make them less vulnerable to human persecution than other owls or predatory birds.

## 5 POPULATION SIZES AND TRENDS

### 5.1 Historic

There have been no population estimates for the Northern Pygmy-Owl on Vancouver Island. Kirk and Hyslop (1998), however, recently estimated the total population in Canada (i.e., British Columbia and Alberta) to be 2000 to 10 000 pairs, based on expert opinion and limited data from Christmas Bird Counts and Breeding Bird Surveys. Based on a rough proportion of the provincial range (one-quarter), this estimate could be extrapolated to 500 to 2500 pairs on Vancouver Island. For the purpose of this report, adjectives describing relative abundance (rare, uncommon, common, abundant) must be used.

Early records of Pygmy-Owls are scarce, but the species was recorded in early Christmas Bird Counts on Vancouver Island (e.g., Buchanan Simpson 1925; Fryer and Pearse 1949). A population decline was noted for Pygmy-Owls around Comox in the 1940s: "The pigmy (sic) owl (*Glaucidium gnoma swarthi*) is never seen or heard now except at higher elevations. Twenty years ago it was frequently heard at lower elevations and became numerous in 1922" (Pearse 1946:7). Population fluctuations were not unheard of before this—there were unusually high numbers of owls, including Pygmy-Owls, observed on the coast of British Columbia in the fall of 1897 (Fannin 1897). This observation was probably made on British Columbia's south coast. In the mid-1900s, the coastal Northern Pygmy-Owl was considered simply "resident" (Munro and McTaggart-Cowan 1947).

In the mid-1970s, Pygmy-Owl abundance was described as relatively low in British Columbia, but based on assessments by local and regional experts, the population was considered stable (Fyfe 1975). It was assessed as "stable?" (sic) in the mid-1990s (Kirk and Hyslop 1998). Subspecies were not assessed separately in these analyses.

### 5.2 Current

Today, *G.g. swarthi* is considered an uncommon resident on Vancouver Island, widely but sparsely

distributed (Cannings et al. 1987; Campbell et al. 1990, Fraser et al. 1999).

Fraser et al. (1999) estimated that there are over 100 widely scattered occurrences<sup>1</sup> (not individuals or pairs) of *G.g. swarthi* on Vancouver Island and suggested that this low estimate of occurrences stems from limited inventory effort for a species that breeds at low densities.

Although historic population estimates are lacking for the species and subspecies, current populations on Vancouver Island are thought to be declining because of habitat loss associated with timber harvesting (Fraser et al. 1999). Small sample sizes in the Breeding Bird Survey data and the Christmas Bird Count data preclude accurate trend estimates for Northern Pygmy-Owl on Vancouver Island.

Several recent multi-species owl inventories on Vancouver Island reported that Northern Pygmy-Owls were not abundant. Balke et al. (1997) determined that Northern Pygmy-Owls, though the most common owl species documented, were uncommon year-round residents in her three-year study on western Quadra Island. Mico and van Enter (2000) detected only one Northern Pygmy-Owl during surveys at five study areas in the Campbell River watershed, while Manley (1999) detected no Northern Pygmy-Owls on the Beaver Lodge Forest Lands just south of Campbell River. At Clayoquot Sound on the central western coast of Vancouver Island, Holroyd and Egan (1997) found that the Northern Pygmy-Owl was the least common owl species. However, they received 11 recent incidental records in the general area from local observers. In a related study (Bryant 1997), no Northern Pygmy-Owls were detected during inventories for songbirds and woodpeckers in two watersheds of Clayoquot Sound. Manning (1993) detected five Northern Pygmy-Owls during owl and songbird surveys in the Tofino Creek watershed of the Clayoquot Sound area. In the nearby Pacific Rim National Park, Hatler et al. (1978) reported six incidental observations of Northern Pygmy-

Owls from summer 1972 to spring 1973 and concluded the species was a rare resident.

In contrast, Setterington (1998) concluded, on the basis of number of responses to call-playback surveys, that Northern Pygmy-Owls were common in the Nimpkish Valley in Northern Vancouver Island. Northern Pygmy-Owls provided 16% of all observations and represented 19% of the estimated number of individual owls heard in the three years of surveys.

Interpretation of data from standard night-time call-playback multi-species surveys for owls, as presented above, can be misleading in regards to population estimates or trends for the diurnal Northern Pygmy-Owl. Few, if any, of the surveys done in British Columbia use a survey protocol that would result in a high likelihood of detecting Northern Pygmy-Owls. Daytime or dusk-and-dawn surveys with a single species focus may be more appropriate.

## 6 LIMITING FACTORS AND THREATS

Forest harvesting, which leads to habitat fragmentation, degradation and loss, is considered a moderate threat for Northern Pygmy-Owl populations on Vancouver Island (Fraser et al. 1999). Timber harvesting is cited as the cause of extirpation of Northern Pygmy-Owl in a California redwood forest (Marshall 1988). Large-scale timber harvesting and short rotation periods reduce available mature forest habitat and the populations dependent on it. However, along with mature forests, Northern Pygmy-Owls require openings for foraging, and Smith et al. (1997) suggest that the species has adapted to a landscape of large, open cuts and young coniferous forests in Washington.

The major habitat parameter lost to harvesting is trees with (or potential for) natural or woodpecker-excavated cavities that Northern Pygmy-Owl use for nesting. Current innovative alternative practices such as partial cutting, leave-tree patches and riparian reserve zones may reduce the impact of traditional

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<sup>1</sup> Occurrence is defined as a unit of land and/or water with practical conservation value for the species, on which the element [species, subspecies] is, or was, present. For species, the occurrence often corresponds with the local population, but when appropriate may be a portion of a population (e.g., long distance dispersers) or a group of nearby populations (e.g., metapopulation) (NatureServe 2001). An occurrence does not translate to a fixed number of individuals or pairs, and cannot be extrapolated to a population estimate.

clearcutting practices by retaining large, old trees through a rotation. However, though woodpeckers may excavate cavities in snags in clearcuts, their acceptance by owls is not documented. Second-growth forests, though able to provide roost sites, often do not have large trees suitable for cavity excavation by woodpeckers, and these forests are lower quality or unsuitable habitat for secondary cavity-nesters, including the Northern Pygmy-Owl.

Predation is another potential threat to long-term survival of Northern Pygmy-Owl populations. The Barred Owl expanded its range from east of the Rocky Mountains into the Lower Mainland in the late 1960s and to Vancouver Island in the 1970s (Campbell et al. 1990), possibly in response to forest fragmentation following timber harvesting. It is now considered common in southwestern British Columbia (Dunbar et al. 1991). The larger Barred Owl is thought to prey on and possibly compete with the smaller forest owls of British Columbia for prey and nest cavities, thereby potentially causing declines in their populations. Several surveyors have observed Barred Owls responding to taped calls of smaller species by flying toward the source silently as if in surprise attack.

The Northern Pygmy-Owl likely competes for nest cavities with other secondary cavity-nesters, including Western Screech-Owl (*Otus kennicottii*), Northern Saw-whet Owl (*Aegolius funereus*) and Red Squirrel (*Tamias hudsonicus*). Introduced species such as European Starling (*Sturnus vulgaris*) and Eastern Grey Squirrel (*Sciurus carolinensis*) provide additional competition for nest cavities.

## 7 SPECIAL SIGNIFICANCE OF THE SPECIES

The *G.g. swarthy* subspecies is endemic to Vancouver Island and thus is endemic to Canada. It is not a relict population, and the species is not at risk world-wide.

The subspecies is not of special importance for scientific reasons. It is not hunted, harvested, exploited, traded, or used for medicinal purposes, and it has no known special traditional value to First Nations. It is popular with birders because it is an owl that can be observed when it is active during the day.

## 8 EXISTING PROTECTION OR OTHER STATUS

The Northern Pygmy-Owl on Vancouver Island (*Glaucidium gnoma swarthy*) is considered vulnerable in British Columbia (Fraser and Cannings 1998). Its provincial Heritage status rank is S3: that is, vulnerable provincially either because it is very rare and local throughout its range or found only in a restricted range (even if abundant at some locations), or because of other factors that make it vulnerable to extinction. Typically there are 21 to 100 occurrences (or between 3000 and 10 000 individuals). *G.g. swarthy* is on the province's Blue List, which includes species of special concern because of characteristics that make it particularly sensitive to human activities or natural events. Blue-listed species, such as *G.g. swarthy*, are likely to become threatened (Red-listed) if current threats to the survival of their population are not dealt with and trends reversed. Species on the provincial Red List are under consideration for more formal designation as Endangered or Threatened under the British Columbia *Wildlife Act*. Listing under the Act enables the establishment of critical Wildlife Management Areas for protection of important habitats and/or enables a fine (up to 10 times higher than for not-listed species) to be levied against anyone who willfully kills a listed species, with the proceeds being applied to conservation of the listed species.

Species on the provincial Red and Blue lists are recognized under the *Forest Practices Code of British Columbia Act*. The *Biodiversity Guidebook* (Ministry of Forests and BC Environment 1995a) and the *Riparian Management Area Guidebook* (Ministry of Forests and BC Environment 1995b) that support the Forest Practices Code provide a coarse filter approach to protection of suitable habitat for Northern Pygmy-Owl through Old Growth Management Areas, Wildlife Tree Patches and Riparian Management Areas. Species on the Red and Blue lists are also candidates for listing as Identified Wildlife under the Identified Wildlife Management Strategy, whereby special management practices may be recommended on a species-by-species basis. *G.g. swarthy* is currently on the draft list of Identified Wildlife proposed for inclusion in Volume 2 of the Identified Wildlife Management Strategy (K. Paige, pers. comm., Feb. 2002).



The Northern Pygmy-Owl is protected under the British Columbia *Wildlife Act* – it is an offence to possess, take, injure, molest or destroy the birds, their eggs or occupied nests. Owls and other raptors are not protected under the federal *Migratory Birds Convention Act*.

The Northern Pygmy-Owl is not listed nor proposed under the U.S. *Endangered Species Act*, nor is it listed in the IUCN Red Book, although all owls (Strigiformes) are listed as a group under Appendix II of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). Appendix II species are not necessarily threatened with extinction but may become so without careful control of trade.

Heritage status ranks for the Vancouver Island Northern Pygmy-Owl (*G.g. swarthi*) are assigned at global, national and state/provincial levels as follows.

State /Province	Rank
Global	G5T3Q
Rounded Global	T3
National – Canada	N3
Provincial – BC	S3

Source: NatureServe (2001), using the Biological and Conservation Data System developed by The Nature Conservancy (NatureServe 2001; CDC 2002).

In British Columbia, the rank assigned to the species (thereby including *G.g. swarthi*, *G.g. grinnelli* and *G.g. californicum*) is: S4S5B, SZN (NatureServe 2001).

## 9 SUMMARY OF STATUS REPORT

The Northern Pygmy-Owl is one of the least studied avian species in North America. Further information is required regarding basic biology; habitat preferences; population size, trend and distribution; and response to forestry activities before a status designation can be applied with any certainty.

Although some inventory surveys have been conducted recently on Vancouver Island, little is known about how *G.g. swarthi* differs ecologically from the mainland subspecies.

Because of its secretive behaviour, its diurnal activity period, its small size and un-owl-like body

form and flight pattern, the Northern Pygmy-Owl may go unnoticed by many observers. Historic records suggest that the species was never abundant but that occasional population fluctuations (or winter concentrations) did occur. Current observations and surveys indicate that the populations are relatively low and that it is a rare or uncommon species throughout its range. Records do not indicate that densities differ between the Vancouver Island and the mainland populations.

The principle threat to long-term survival of Northern Pygmy-Owl populations is habitat fragmentation, degradation and loss. Forestry activities and urban development are the primary factors in habitat change and are large-scale threats on Vancouver Island and the coastal mainland. Northern Pygmy-Owls are cavity-nesters and are dependent on woodpeckers to supplement the number of available natural cavities in the forested landscape. Shortages of mature, large-diameter trees limit the numbers of woodpeckers, wood-boring insects and fungal pathogens, thereby limiting the numbers of secondary cavity-nesters. Removal of snags and large-diameter trees through intensive logging activities and urban forest sanitation reduces available cavities for cavity-nesters.

The Vancouver Island Northern Pygmy-Owl is and always has been uncommon, as have the other subspecies throughout their range in British Columbia, Washington and Alberta. Populations continue to be low. Northern Pygmy-Owl populations may be declining and are expected to decline as a direct result of habitat fragmentation, degradation and loss, especially related to lack of suitable nest cavities as snags and large-diameter trees are removed and not replaced across the landscape.

## 10 MANAGEMENT RECOMMENDATIONS

The Northern Pygmy-Owl, *swarthi* subspecies, is a candidate for inclusion in the draft of Volume 2 of the Identified Wildlife Management Strategy (K. Paige, pers. comm. 2002). Wildlife provisions may be proposed similar to those proposed for the Western Screech-Owl, which include implementation of Wildlife Habitat Areas (WHA) around large-diameter snags (particularly black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), trembling aspen (*Populus*

*trichocarpa*), water birch (*Betula occidentalis*) and broad-leaf maple (*Acer macrophyllum*) with suitable cavities. For the Western Screech-Owl, a 10-ha core area is proposed, 200 m wide by 250 m on either side of the known active or historic nest site, surrounded by a 100-ha buffer that includes habitat suitable for foraging. The draft guidelines suggest applying General Wildlife Measures (GWM) within a WHA to (1) maintain an adequate supply of suitable snags and associated nest and roost cavities, (2) maintain a healthy riparian habitat, (3) minimize disturbance to roost and nest sites, and (4) maintain native vegetation. The GWM prohibit road construction or stream crossings in a WHA, prohibit harvesting in the core, restrict harvesting in the buffer, restrict construction of recreational trails, limit livestock grazing, protect riparian and adjacent range vegetation, and promote restoration and enhancement of natural habitat. Results of baseline surveys of wildlife trees and possible nest-cavity trees should be used in selecting wildlife tree patches.

Alternatively, guidelines drafted for Northern Pygmy-Owl in Volume 2 of the Identified Wildlife Management Strategy (K. Paige, pers. comm. Feb. 2002) are based on the assumption that habitat protection will be partially addressed through Old Growth Management Areas and wildlife tree retention patches recommended in the *Biodiversity Guidebook* (Ministry of Forests and BC Environment 1995a). No WHA is proposed; rather GWM are described that require centering wind-firm wildlife tree patches of mature or old forest on active nest sites or potential nest trees in areas where Northern Pygmy-Owls are present. The guidelines recommend that potential nest trees should contain abandoned woodpecker cavities (i.e., Northern Flicker (*Colaptes auratus*) or Hairy Woodpecker (*Picoides villosus*), be >30 cm dbh, include a mix of dead and live trees, and be located near riparian areas, gully and ravine complexes and/or forest-meadow edges that provide both nesting and foraging habitat. Partial-cut harvesting systems such as variable retention, shelter-wood, seed-tree or clearcut with reserves that retain individual trees and/or groups of trees for >60 years will benefit woodpeckers and subsequent secondary cavity nesters, including the Northern Pygmy-Owl. Decadent trees should be included within any areas constrained for other management

objectives at the stand or landscape level.

Implementation of the General Wildlife Measures proposed for the Northern Pygmy-Owl in the draft guidelines is the more conservative approach of the two outlined above. The measures aim to protect known and potential habitat across the landscape rather than at known active or historic nest trees, and they support suitable habitat into the future. However, the effectiveness of neither method has been studied.

Many of the known nest sites, particularly in the areas with the greatest threats, are on private land. Many of the remaining tracts of suitable habitat are protected in Crown Lands such as provincial parks. Stewardship and education should be promoted. Nest box programs could be initiated. Hazardous tree programs in parks and urban areas need to be reassessed with a better understanding of the role of wildlife trees.

Very little is known about the basic biology, natural history, habitat use or reproductive biology of Northern Pygmy Owls in British Columbia, and particularly on Vancouver Island. Baseline inventories are essential, and more information is needed on specific habitat parameters (e.g., proximity to openings, canopy cover or density of large-diameter, rotting trees with natural or excavated cavities) that are required for successful reproduction and maximum productivity. Without the basic habitat requirements, it will be impossible to develop protective prescriptions to conserve the species (or subspecies) in its historic range. Further research and inventory needs are detailed in Fraser et al. (1999).

## 11 EVALUATION

*G.g. swarthi* is a species of concern in British Columbia because (1) it is endemic to Vancouver Island, (2) there have been few breeding records, (3) the population size is unknown but is presumed small, (4) populations are generally believed to be declining although trend data are lacking, and (5) nesting habitat is thought to be threatened (Campbell et al. 1990; Fraser et al. 1999).

The provincial ranking derived in 1999 remains valid for *Glaucidium gnoma swarthi* and is presented here verbatim (Fraser et al. 1999:118-119).

**Rank: S3**

Comments: This species is widely but sparsely distributed on Vancouver Island.

**Rank in British Columbia: B**

The *swarthi* subspecies of Northern Pygmy-Owl is endemic to Vancouver Island (AOU 1957) and presumably the Gulf Islands.

**Estimated occurrences: D**

There are likely over 100 occurrences widely scattered throughout Vancouver Island. Scarcity of known breeding occurrences probably reflects a lack of inventory effort, since it is thought to breed at low densities throughout its range.

**Abundance: U**

Population size for the *swarthi* subspecies is unknown. The status of Northern Pygmy-Owl populations in general is poorly understood.

**Trend: U**

Populations are believed to be declining from loss of habitat due to extensive timber harvesting, but empirical data are lacking.

**Protected occurrences: C**

Several breeding areas are believed to be protected in various national and provincial parks (e.g., Goldstream Provincial Park, Strathcona Provincial Park, Carmanah Walbran Provincial Park, Pacific Rim National Park), but many of these remain to be confirmed by inventory.

**Threats: B**

This subspecies is moderately threatened by large-scale forest harvesting that is likely reducing available habitat and associated breeding populations. Young regenerating forests may be suitable for roosting but could well lack the structural features necessary for breeding habitat (e.g., snags). The effect of the recently established Barred Owl, a potential predator, is unstudied.

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