

WHITE-HEADED WOODPECKER

Picoides albolarvatus

Original¹ prepared by Martin Gebauer

Species Information

Taxonomy

The White-headed Woodpecker is currently placed in the genus *Picoides*, a genus poorly understood phylogenetically and subject to frequent revisions over the years (Garrett et al. 1996). Eight other *Picoides* species occur in North America: Ladder-backed (*P. scalaris*), Red-cockaded (*P. borealis*), Nuttall's (*P. nuttallii*), Strickland's (*P. stricklandi*), Downy (*P. pubescens*), Hairy (*P. villosus*), Three-toed (*P. tridactylus*), and Black-backed (*P. arcticus*) woodpeckers (AOU 1998).

Two subspecies of White-headed Woodpecker are recognized: one occurring in the mountains of southern California (*P. albolarvatus gravirostris*), and the other from British Columbia to the Sierra Nevada in central California (*P. albolarvatus albolarvatus*) (Garrett et al. 1996; Cannings 1998).

Description

The White-headed Woodpecker is unique among North American woodpeckers in having entirely black body plumage and tail, with only the face, throat, crown, and large patch at the base of the primaries white. Males have a red patch at the back of the head; juvenile males have a variable patch of red on the crown (Garrett et al. 1996; NGS 1999).

Clark's Nutcracker (*Nucifraga columbiana*), a corvid with pale grey head, and woodpecker-like bill and behaviour, is occasionally mistaken for the White-headed Woodpecker (Cannings 2000).

Distribution

Global

The White-headed Woodpecker is restricted to western North America, ranging from extreme southcentral British Columbia southward, primarily east of the Cascades, to southern California (Garrett et al. 1996).

British Columbia

The White-headed Woodpecker is a very rare resident in the Okanagan Valley from Naramata south, and occasionally resides in the Similkameen Valley, Grand Forks area, and the Kootenays (Weber and Cannings 1976; Cannings et al. 1987; Campbell et al. 1988; Campbell et al. 1990). Sightings in suitable habitat have also been reported from Lytton, Manning Park, Bummers Flats north of Cranbrook, and south of Golden but have not been substantiated by detailed descriptions or photos (Weber and Cannings 1976; Campbell et al. 1990).

Forest region and districts

Southern Interior: Arrow Boundary, Cascades, (incidental – Kootenay Lake), Okanagan Shuswap

Ecoprovinces and ecosections

SIM: SCM, SFH

SOI: OKR, SOB, SOH, NOB, NOH, (incidental – NTU, STU, THB)

Biogeoclimatic units

BG: xh (breeding)

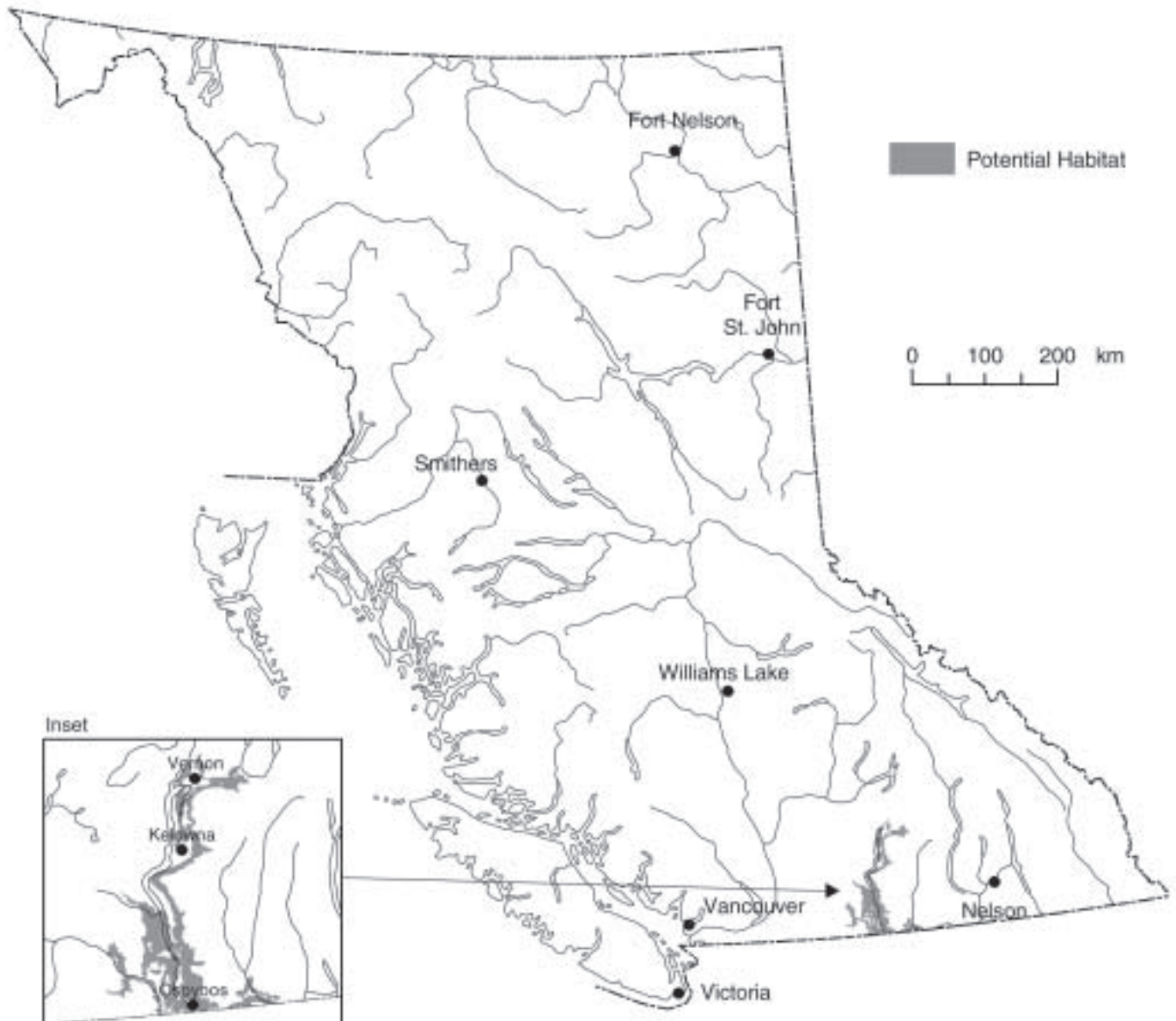
ESSF: mc, mk, mm, mv, mw (very incidentally if at all—only 2% of sightings)

ICH: dw (very incidentally if at all—only 2% of sightings)

IDF: dk, dm, xh, xm, xw (very incidentally)

¹ Volume 1 account prepared by T. Manning and V. Stevens.

White-headed Woodpecker (*Picoides albolarvatus*)



Note: This map represents a broad view of the distribution of potential habitat used by this species. The map is based on several ecosystem classifications (Ecoregion, Biogeoclimatic and Broad Ecosystem Inventory) as well as current knowledge of the species' habitat preferences. This species may or may not occur in all areas indicated.

MS: dc, xk (very incidentally if at all—
only 2% of sightings)

PP: xh (breeding)

Broad ecosystem units

DP, PP, (very rarely uses DL, ER, EF, and LP in BC;
not common in DF)

Elevation

350 to 1300 m; rarely seen above 1000 m

Life History

Diet and foraging behaviour

In early summer, the White-headed Woodpecker forages for insects mainly on the lower portions of large, live ponderosa pine (*Pinus ponderosa*) trees in the puzzle bark stage (>60 cm dbh) (Dixon 1995b; Garrett et al. 1996). However, insects (ants, wood-boring beetles, spiders, fly larvae) make up a small proportion of the diet relative to other *Picooides* woodpeckers (Ligon 1973; MELP 1998). For most of the year, White-headed Woodpecker forages primarily for seed in the cones of ponderosa pine. Ponderosa pine seeds are generally only available in late summer and fall, except in years with heavy cone crops (Dahms and Barrett 1975). Pine seeds are a major source of food throughout the range of White-headed Woodpecker (Bent 1939; Curtis 1948; Koch et al. 1970; Ligon 1973).

When foraging for insects on conifer trunks or branches, the White-headed Woodpecker flakes and chips bark away rather than striking the wood directly like some woodpeckers (Ligon 1973). It generally flies to the bottom of a tree and works its way to the top while feeding (Bent 1939). Other foraging behaviours are varied and include gleaning foliage in terminal needle clusters (Ligon 1973; Raphael and White 1984), scratching bark loose with its feet (Ligon 1973), feeding on stalks of great mullein (*Verbascum thapsus*) (Weber and Cannings 1976), and visiting suet feeders (Cannings et al. 1987). Compared with the Hairy Woodpecker, the White-headed Woodpecker fed more on living trees, consistent with their habit of gleaning rather than drilling and excavating (Morrison and With 1987).

Reproduction

The White-headed Woodpecker is a primary excavator, making its cavities in dead or dying trees, with a preference for large ponderosa pine (usually >60 cm dbh) (Thomas 1979; Dixon 1995a; Dixon 1995b).

Typically a new nest cavity is excavated each year but in exceptional cases a cavity may be reused (Garrett et al. 1996).

In British Columbia, eggs have been found in nests from mid-May to mid-June. Clutch size ranges from three to nine eggs (av. 4–5). The incubation period usually lasts for 14 days. In British Columbia, young have been recorded at nests from 30 May to 16 July (Campbell et al. 1990). Nestlings may fledge as early as late June. Typically there is one brood per breeding season.

Site fidelity

Pairs of White-headed Woodpecker do not exhibit much site fidelity from year to year in British Columbia, often breeding at a site for only 1–2 years and then moving on (Cannings 2000). No information is available on where breeding pairs move and whether the same breeding areas are reused.

Home range

No information on home range or territory size of White-headed Woodpecker exists for British Columbia. Breeding territories averaged 104 ha in continuous old-growth pine forest and 321 ha in fragmented sites in central Oregon (Garrett et al. 1996), suggesting that breeding territories in British Columbia, where much of remaining ponderosa pine forest is fragmented, may be larger than in other areas of the range.

Movements and dispersal

The White-headed Woodpecker is at the northern limit of its distribution in the southern Interior. It is considered a year-round resident in British Columbia and has a relatively even distribution of observations by month (Weber and Cannings 1976; Cannings et al. 1987). Because of the small resident population and few sightings in British Columbia, seasonal movement and dispersal patterns are not

known, although, presumably young birds wander in search of breeding areas. It is likely that populations in the Okanagan could increase after a year of high breeding success in Washington State as young birds disperse northwards. Records of this species at higher elevations and outside the Okanagan Valley are likely the result of these dispersal movements.

Habitat

Structural stage

6: mature forest

7: old forest

Important habitats and habitat features

The White-headed Woodpecker prefers mature and old forests (i.e., structural stage classes 6–7) (Mannan and Meslow 1984). These forests are structurally complex, typically contain snags and coarse woody debris at all stages of decomposition, and have open or patchy understoreys.

Nesting

Only seven nest cavities have been found in British Columbia. Of these, five were in ponderosa pine (live and dead), one nest was found in Douglas-fir (*Pseudotsuga menziesii*), and one in a stump (Campbell et al. 1990). Of 43 nests found in central Oregon, 36 were in ponderosa pine (*Pinus ponderosa*) snags, 2 in ponderosa pine stumps, 2 in aspen (*Populus tremuloides*) snags, and 1 each in live quaking aspen, white-fir (*Abies concolor*) snag, and dead top of live ponderosa pine tree (Dixon 1995b).

The more decayed, large diameter snags (wildlife tree classes 5–6), often with broken tops, are preferred trees for nesting. Leaning or broken-topped snags or stumps are commonly used as nest trees, often where heart rot has created a soft interior but left the exterior hard. Raphael and White (1984) found that White-headed Woodpeckers nested in the oldest snags with advanced decay. Similarly, Milne and Hejl (1989) found only six of 176 nest sites in live trees. In south-central Oregon, 37% of the nest trees were in snags, 56% in stumps, and 6% in leaning logs ($n = 16$) (Dixon 1995a). The majority of nests found in central Oregon were in moderately

decayed substrates (Dixon 1995a). See Table 1 for nest tree characteristics of White-headed Woodpeckers.

The nest cavities in British Columbia ranged in height from 2.4 to 9 m above ground (Cooper 1969; Cannings et al. 1987; Campbell et al. 1990). In the Sierra Nevada, Raphael and White (1984) found that White-headed Woodpecker nested at low heights (i.e., 1.9 m) compared with other cavity nesters. High-cut stumps were readily used for nesting in California (Morrison et al. 1983).

According to Thomas (1979), the White-headed Woodpecker has a requirement for high snag densities, with 558 snags/100 ha (or about 45 snags/territory) needed for maximum population densities. Most nests were found in large trees ranging in size from a mean dbh of 56 cm in west-central Idaho (Frederick and Moore 1991), to 65 cm in central Oregon (Dixon 1995a; Dixon 1995b) and 73 cm in the Sierra Nevada, California (Milne and Hejl 1989). Most of the White-headed Woodpecker nests found by Raphael and White (1984) in the Sierra Nevada were <50 cm dbh.

All seven nests found in British Columbia were found in relatively open-canopied stands (<70% canopy cover) of mature ponderosa pine forest from 450 to 600 m elevation, with most located in or on the edge of forest clearings (Campbell et al. 1990). Milne and Hejl (1989) found that the White-headed Woodpecker tended to nest in open-canopied stands with 40% of nests in stands with <42% cover and 42% in stands with 41–69% forest cover. Dixon (1995a) found forests with canopies >51% to be selected by White-headed Woodpecker in Oregon. In central Oregon, mean canopy closure was 24% at nests and 44% at roosts. The majority of nests were in partial cut old-growth (31%) and overstorey removal (44%) ponderosa pine stands; the majority of roosts were in uncut and partial-cut old-growth ponderosa pine stands (70%) (Dixon 1995a).

Roosting

Roosts were located in cavities, under sloughing bark of large ponderosa pine, and in cracks and crevices of trunks (Dixon 1995a; Garrett et al. 1996).

Information on roosting requirements for this species in British Columbia is lacking.

Foraging

In British Columbia and throughout its range, White-headed Woodpecker appears to be very dependent on ponderosa pine, particularly stands with a significant mature or old-growth component (Garrett et al. 1996). In British Columbia, the White-headed Woodpecker forages in open ponderosa pine and mixed pine – Douglas-fir forests up to 1000 m elevation, very rarely moving into Engelmann spruce (*Picea engelmannii*) – lodgepole pine (*Pinus contorta*) forests up to 1300 m. White-headed Woodpecker appears most abundant where more than one species of large-seeded pine is present (Garrett et al. 1996).

Of 115 British Columbia sightings reviewed by Weber and Cannings (1976), 85% were in ponderosa pine forests, 5% in ornamental gardens (primarily at feeders), 4% in mixed ponderosa pine/Douglas-fir forests, 3% in Douglas-fir forests, 2% in Engelmann spruce/lodgepole pine forest, and 1% in a black cottonwood (*Populus balsamifera*) stand. In other areas of their range, White-headed Woodpeckers have been found at higher densities in mixed-conifer forests (Beedy 1981; Raphael and White 1984; Milne and Hejl 1989), but mature ponderosa pine forest is still extremely important (Thomas 1979). Foraging habitat in central Oregon was mainly in ponderosa pine habitat with mean canopy closure of 54%, and a mean shrub cover of 25% (Dixon 1995a). In this area, White-headed Woodpeckers spent 79% of their time foraging on live trees with a mean dbh of 74 cm.

Conservation and Management

Status

The White-headed Woodpecker is on the provincial *Red List* in British Columbia. It is designated as *Endangered* in Canada (COSEWIC 2002).

Summary of ABI status in BC and adjacent jurisdictions (NatureServe Explorer 2002)

BC	WA	ID	Canada	Global
S1	S3	S2B, S2N	N1	G4

Trends

Population trends

In British Columbia, White-headed Woodpecker populations have apparently fluctuated widely this century with population peaks in the 1960s and 1970s (Campbell et al. 1990). Campbell et al. (1990) reported only five records of this species between the 1890s and 1950, 15 in the 1950s, 112 in the 1960s, 68 in the 1970s and only 16 between 1980 and 1987. Very few sightings of White-headed Woodpeckers have been reported between 1987 and 2001. Recent breeding records come from the Rock Creek-Bridesville area just east of Anarchist Mountain (1998 and 1999) and a few kilometres northwest of Oliver (1998) (Cannings 2000). Recent surveys by Preston (1990), Joy et al. (1995), and Ramsay (1997) failed to locate any individuals, although Gyug (1996) reported two near Naramata. The decline in

Table 1. Characteristics (mean) ±SD of White-headed Woodpecker nest trees from three locations

Location	Forest type	n	dbh (cm)	Height (m)	Nest height (m)	Citation
South-central Oregon	Ponderosa pine	16	80 ± 32	3 ± 4	3 ± 4	Dixon 1995a
Idaho	Ponderosa pine	6	56		2.8	Frederick and Moore 1991
Central Oregon	Ponderosa pine	43	65	14	4.4	Dixon 1995b

woodpecker sightings is apparent despite an increasing number of naturalists and surveys looking for this species.

Based on the absence of population trends indicated from Breeding Bird Survey (Sauer et al. 1999) and Christmas Bird Count (Sauer et al. 1996) data, White-headed Woodpecker populations across their range appear to be stable over the last 30 years (Garrett et al. 1996). Populations in Oregon and Idaho have declined due to habitat loss caused by logging (Garrett et al. 1996).

Habitat trends

Of the approximately 27 500 ha of ponderosa pine-dominated forests in the south Okanagan and lower Similkameen valleys, only about 9500 ha (~ 35%) are classified as old forest, compared with the mid-1800s when the percentage old forest was likely in excess of 75% (Cannings 2000). Summaries of merchantable ponderosa pine in the British Columbia interior indicated that 3 921 450 m³ was available in 1917, compared with only 715 761 m³ by 1957 (Cannings 2000).

Threats

Population threats

The White-headed Woodpecker has a small population (estimated <100 pairs) in British Columbia (Cannings 2000). The long-term viability of the population is likely dependent on the breeding success of birds in Washington State and their dispersal north to British Columbia.

Habitat threats

The greatest threat to the White-headed Woodpecker in British Columbia is the ongoing loss of old ponderosa pine due to forest harvesting and urbanization (Garrett et al. 1996; Fraser et al. 1999). Old pine forests provide snags for nesting and roosting and cones for foraging. Seed production appears to be a particularly important habitat component for White-headed Woodpecker. Reductions of mature, cone-producing ponderosa pine stands could jeopardize critical winter food supplies. Ponderosa pine only produce heavy cone crops beginning at

60–100 years of age and at 4–5 year intervals in the Pacific Northwest (Oliver and Ryker 1990). As a result of logging and subsequent fire suppression, many ponderosa pine forests in the Okanagan are characterized by dense stands of young trees (Cannings et al. 1998; Turner and Krannitz 2001), presumably resulting in poor cone production. Most seeds are produced by large, dominant trees in open situations (Dahms and Barrett 1975).

Firewood cutting can also remove suitable trees for nesting and foraging (Scott and Oldemeyer 1983; Garrett et al. 1996; MELP 1998; Fraser et al. 1999).

Due to its partially insectivorous food habits, the White-headed Woodpecker is potentially affected by pesticide applications in breeding and foraging habitat (Cannings 1995; Fraser et al. 1999).

Legal Protection and Habitat Conservation

The White-headed Woodpecker, its nests, and its eggs are protected in Canada and the United States from hunting and collecting under the *Migratory Birds Convention Act*. In British Columbia, the same are protected by the provincial *Wildlife Act*.

The total area of potentially suitable habitat in the south Okanagan is 66 000 ha (MELP 1998) of which 9% is within lands managed for conservation, 42% is on provincial Crown land, 28% on Indian Reserve lands, and 21% on private land. Additional suitable habitat found east (Princeton) and west (Grand Forks and Kootenays) of the south Okanagan likely amounts to no more than 40 000 ha (Cannings 2000).

Habitat is protected within provincial parks and within lands managed and owned by the Nature Trust and the Ministry of Water, Land and Air Protection. The greatest portion of protected lands within the range of White-headed Woodpecker is in Okanagan Mountain Provincial Park (10 542 ha). Other protected areas include the Vaseux-Bighorn National Wildlife Area and various properties owned by the Nature Trust around Vaseux Lake. A number of new protected areas that have been announced in the south Okanagan through the Okanagan-Shuswap Land and Resource Management Plan process should result

in an additional 5716 ha of potential protected habitat. Some of the more important parks for White-headed Woodpeckers include White Lake Grasslands (3627 ha), South Okanagan Grasslands (9700 ha), Anarchist, Vaseux, and Adra Tunnel.

Under the results based code, the riparian and old forest retention guidelines provide some protection of habitat for this species. Old growth management areas (OGMAs) in the ponderosa pine zone, in particular, will protect important habitats for the White-headed Woodpecker. Current policy, however, directs the establishment of OGMA to be established within the non-timber harvesting land base wherever possible. Therefore the potential overlap between OGMA and suitable habitat for the White-headed Woodpecker is currently unknown.

Identified Wildlife Provisions

Sustainable resource management and planning recommendations

Since this species prefers wildlife trees and mature and old forest, it is best managed at the landscape level through wildlife tree and old forest retention objectives.

- ❖ Maintain high suitability habitat (i.e., ponderosa pine, structural stages 6 or 7) in patches between 20 and 1000 ha. Because of this species' relatively large home range size (100–400 ha), larger patches are more suitable.
- ❖ Maximize connectivity between suitable habitats. Linkages should be composed of large areas of connecting habitats, rather than merely corridors (e.g., relatively large reserve areas containing drier, open-canopied mature and old ponderosa pine).
- ❖ Blocks should be assessed to identify potentially suitable wildlife tree retention areas. Table 2 provides recommendations for selecting wildlife tree retention areas designed to meet the needs of the White-headed Woodpecker.

Table 2. Preferred wildlife tree retention area features for the White-headed Woodpecker

Attribute	Preference
Size (ha)	≥8 ha
Location	350–750 m in elevation, PPxh
Tree features	leaning or broken-tops; heartrot
Tree species	ponderosa pine, aspen, Douglas-fir
Wildlife tree class	5 and 6
Tree size (dbh)*	≥80 cm where available; ≥45 cm for recruitment

* After Dixon 1995a.

Wildlife habitat area

Goal

Maintain historic, current and future suitable nesting habitat.

Feature

Establish WHAs at, or close to, known occurrences within suitable habitat or habitats that will provide the desired attributes in a short time period if the attributes do not currently exist.

Size

Typically between 20 to 80 ha.

Design

A WHA should include mature or old ponderosa pine forest, preferably with 40–70% canopy closure where it exists, but can range from 6 to 75% (i.e., crown closure classes 1–7) with a mix of large (≥60 cm dbh preferred, minimum 25 cm dbh) live and standing dead trees (i.e., ponderosa pine, Douglas-fir, aspen; lodgepole pine and Engelmann spruce) suitable for nesting.

General wildlife measures

Goals

1. Provide and recruit an adequate supply of suitable large diameter live and dead wildlife trees for foraging and nesting.
2. Maintain mature or old stand structure with open canopy.
3. Maintain mature cone-producing ponderosa pine to ensure non-breeding food supplies.
4. Minimize new access development (i.e., roads) to prevent habitat fragmentation and to reduce firewood cutting.

Measures

Access

- Do not construct roads. Deactivate and/or close temporary roads immediately after logging.

Harvesting and silviculture

- Do not salvage timber. When harvesting is approved follow the measures below.
- Protect and retain all ponderosa pine live and dead trees ≥ 50 cm dbh. Ensure recruitment of ponderosa pine > 50 cm dbh.
- Maintain at least six standing dead trees/ha. Where it is not possible to retain six ≥ 60 cm, use the largest available. The highest practical density of snags is preferred. Hazardous snags or trees can be incorporated into group reserves (plan as no work zones if appropriate); otherwise, maintain snags within the operational setting as described in the *Wildlife/Danger Tree Assessor's Course Workbook*.
- Use partial cutting silvicultural systems to maintain 40–70% canopy cover, late seral ponderosa pine. On average, removal should be 35% but may be greater where Douglas-fir makes up a greater percentage of the stand. Group selection (openings 0.5 ha), with group reserves, or single tree selection with group reserves are the recommended silvicultural systems.
- Thin young stands to maximize growth and cone production of retained trees. When thinning, retain aspen.
- Replant with ponderosa pine.

Pesticides

- Do not use pesticides.

Additional Management Considerations

Suitable habitat could be created in currently marginal habitats using a number of forest management practices. Areas selected for enhancement should have a high density of young to mature ponderosa pine and ideally be linked to other areas of potentially suitable habitats. Potential enhancement techniques could include thinning to create an open-canopied stand leaving the largest and oldest trees, and prescribed burning to reduce densities of shade-tolerant Douglas-fir, stimulate cone production, and mimic natural cycling of the ecosystem (Joy et al. 1995).

In actively harvested areas outside of WHAs, consideration should be given to retaining all snags and a component of mature pines. Snags are an important component of the ecosystem for woodpeckers and will gradually be lost and may not be replaced under current forest management practices (Ohmann et al. 1994). Buffers around each snag would address safety concerns and provide potential habitat for woodpeckers and other wildlife. Where buffers are not possible, leaving high-cut stumps may be an option (Ohmann et al. 1994; Joy et al. 1995). Morrison et al. (1983) found that high cut stumps in Tahoe National Forest, California, were readily accepted as nest locations by White-headed Woodpecker.

Stand-replacement fires destroy potential habitats for White-headed Woodpecker. On the other hand, frequent ground fires reduce the young tree component of the forest, and will eventually lead to open stands dominated by mature and old-growth trees. Prescribed burning in potential White-headed Woodpecker habitats is an excellent habitat enhancement tool.

Additional potential nest sites in intensely managed stands may be provided by leaving some high-cut (5 m in height) stumps of large (≥ 60 cm dbh) ponderosa pine.

Information Needs

1. Specific habitat preferences, both botanical and structural, as well as territory size and basic population demographics of White-headed Woodpecker (Garrett et al. 1996; Fraser et al. 1999; Krannitz and Gebauer 2003).
2. The impacts of fire suppression and the effectiveness of using prescribed burning to improve habitats for White-headed Woodpecker (Turner and Krannitz 2001).

Cross References

Lewis's Woodpecker

References Cited

- American Ornithologists' Union (AOU). 1998. Check-list of North American birds, 7th ed. Washington, D.C. 829 p.
- Beedy, E.C. 1981. Bird communities and forest structure in the Sierra Nevada of California. *Condor* 83:97–105.
- Bent, A.C. 1939. Life histories of North American woodpeckers. U.S. Natl. Mus. Bull. 3.
- B.C. Ministry of Environment, Lands and Parks (MELP). 1998. Habitat atlas for wildlife at risk: South Okanagan & Lower Similkameen. Penticton, B.C.
- 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: Nonpasserines. Diurnal birds of prey through woodpeckers. Royal B.C. Mus., Victoria, B.C., and Can. Wildl. Serv., Delta, B.C.
- Campbell, R.W., K.H. Morgan, and C. Palmateer. 1988. Species notes for selected birds. Vol. 2 in Wildlife habitat handbooks for the Southern Interior Ecoprovince. A.P. Harcombe (technical editor). B.C. Min. Environ. and B.C. Min. For., Victoria, B.C. 135 p.
- Cannings, R.A., R.J. Cannings, and S.G. Cannings. 1987. Birds of the Okanagan Valley, British Columbia. Royal B.C. Mus., Victoria, B.C.
- Cannings, R.J. 1995. Status report on the White-headed Woodpecker, *Picoides albolarvatus*, in British Columbia. B.C. Min. Environ., Victoria, B.C. Wildl. Bull. B-80.
- _____. 1998. The birds of British Columbia: a taxonomic catalogue. B.C. Min. Environ., Lands and Parks, Wildl. Br., Resour. Inventory Br., Victoria, B.C. Wildl. Bull. B-86.
- _____. 2000. Update COSEWIC Status Report on White-headed Woodpecker (*Picoides albolarvatus*). Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ont.
- Cannings, R.J., E. Durance, and L. Scott. 1998. South Okanagan Ecosystem Recovery Plan: scientific assessment. B.C. Min. Environ., Lands and Parks, Penticton, B.C. Unpubl. rep.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2002. Canadian Species at Risk. www.speciesatrisk.gc.ca
- Cooper, J.K. 1969. First breeding record of the White-headed Woodpecker in Canada. *Can. Field-Nat.* 83:276–277.
- Curtis, J.D. 1948. Animals that eat ponderosa pine seed. *J. Wildl. Manage.* 12:327–328.
- Dahms, W.G. and J.W. Barrett. 1975. Seed production of central Oregon ponderosa and lodgepole pines. U.S. Dep. Agric. For. Serv., Res. Pap. PNW-191.
- Dixon, R.D. 1995a. Density, nest-site and roost-site characteristics, home-range, habitat-use, and behaviour of White-headed Woodpeckers: Deschutes and Winema National Forests, Oregon. Oreg. Dep. Fish Wildl. Nongame Rep. 93-3-01.
- _____. 1995b. Ecology of White-headed Woodpeckers in the central Oregon Cascades. M.S. thesis. Univ. Idaho, Moscow, Idaho.
- Fraser, D.F., W.L. Harper, S.G. Cannings, and J.M. Cooper. 1999. Rare birds of British Columbia. B.C. Min. Environ., Lands and Parks, Wildl. Br. and Resour. Inventory Br., Victoria, B.C. 244 p.
- Frederick, G.P. and T.L. Moore. 1991. Distribution and habitat of White-headed Woodpecker (*Picoides albolarvatus*) in west central Idaho. Idaho Dep. Fish Game, Conserv. Data Cent., Boise, Idaho.
- Garrett, K.L., M.G. Raphael, and R.D. Dixon. 1996. White-headed Woodpecker (*Picoides albolarvatus*). In *Birds of North America*, No. 252. A. Poole and F. Gill (editors). Birds of North America, Inc., Philadelphia, Penn.
- Gyug, L.W. 1996. Forest development plan: Red- and Blue-listed species inventory for woodpeckers. B.C. Min. Environ., Lands and Parks, Penticton, B.C. Unpubl. rep.

- Joy, J., R. Van den Driessche, and S. McConnell. 1995. 1995 White-headed Woodpecker population and habitat inventory in the South Okanagan. B.C. Min. Environ., Lands and Parks, Penticton, B.C. Unpubl. rep.
- Koch, R.F., A.E. Courchesne, and C.T. Collins. 1970. Sexual differences in foraging behaviour of White-headed Woodpeckers. *Bull. South. Calif. Acad. Sci.* 69:60–64.
- Krannitz, P.G. and M. Gebauer. 2003. White-headed Woodpecker Recovery Strategy. *Environ. Canada, Delta, B.C.*
- Ligon, J.D. 1973. Foraging behavior of the White-headed Woodpecker in Idaho. *Auk* 90:862–869.
- Mannan, R.W. and E.C. Meslow. 1984. Bird populations and vegetation characteristics in managed and old-growth forests, northeastern Oregon. *J. Wildl. Manage.* 48(4):1219–1238.
- Milne, K.A. and S.J. Hejl. 1989. Nest-site characteristics of White-headed Woodpeckers. *J. Wildl. Manage.* 53(1):50–55.
- Morrison, M.L., M.G. Raphael, and R.C. Heald. 1983. The use of high-cut stumps by cavity-nesting birds. *In* Snag habitat management: Symp Proc. J.W. Davis, G.A. Goodwin, and R.A. Ockenfels (editors). U.S. Dep. Agric. For. Serv., Gen. Tech. Rep. RM-99, pp. 73–79.
- Morrison, M.L. and K.A. With. 1987. Interseasonal and intersexual resource partitioning in Hairy and White-headed woodpeckers. *Auk* 104:225–233.
- National Geographic Society (NGS). 1999. Field guide to birds of North America. Washington, D.C.
- NatureServe Explorer. 2002. An online encyclopaedia of life. Version 1.6. NatureServe. Arlington, VA. Available at <http://www.natureserve.org/explorer/>
- Ohmann, J.L., W.C. McComb, and A.A. Zumrawi. 1994. Snag abundance for primary cavity-nesting birds on nonfederal forest lands in Oregon and Washington. *Wildl. Soc. Bull.* 22:607–620.
- Oliver, W.W. and R.A. Ryker. 1990. Ponderosa pine. *In* *Sylvics of North America, Volume 1: Conifers*. R.M. Burns and B.H. Honkala (editors). U.S. Dep. Agric. For. Serv., Agric. Handb. 654, pp. 413–424.
- Preston, A. 1990. Canyon Wren, Sage Thrasher, White-headed Woodpecker, Gray Flycatcher and Grasshopper Sparrows in the South Okanagan. B.C. Min. Environ., Penticton, B.C. Unpubl. rep.
- Ramsay, L. 1997. White-headed Woodpecker survey in the South Okanagan, BC (1996 and 1997). B.C. Min. Environ., Lands and Parks, Wildl. Br., Penticton, B.C. Unpubl. rep.
- Raphael, M.G. and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. *Wildl. Monogr.* 86. 66 p.
- Sauer, J.R., J.E. Hines, I. Thomas, J. Fallon, and G. Gough. 1999. The North American Breeding Bird Survey, results and analysis 1966–1998. Version 98.1. Laurel, Md. Available from: www.mbr-pwrc.usgs.gov/bbs.
- Scott, V.E. and J.L. Oldemeyer. 1983. Cavity-nesting bird requirements and responses to snag cutting in ponderosa pine. *In* Snag habitat management: Symp. Proc. J.W. Davis, G.A. Goodwin, and R.A. Ockenfels (editors). U.S. Dep. Agric. For. Serv., Gen. Tech. Rep. RM-99, pp. 19–23.
- Thomas, J.W. 1979. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. U.S. Dep. Agric., Washington, D.C. Agric. Handb. 553. 512 p.
- Turner, J.S. and P.G. Krannitz. 2001. Conifer density increases in semi-desert habitats of British Columbia in the absence of fire. *Northwest Sci.* 75:176–182.
- Weber, W.C. and S.R. Cannings. 1976. The White-headed Woodpecker (*Dendrocopos albolarvatus*) in British Columbia. *Syesis* 9:215–220.