

RELATIONSHIPS BETWEEN HOLE-NESTING
BIRDS, FOREST SNAGS, AND DECAY IN
WESTERN LARCH-DOUGLAS-FIR FORESTS
OF THE NORTHERN ROCKY MOUNTAINS

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CHAPTER XIV

SUMMARY AND CONCLUSIONS

Characteristics of Nest Trees

1) A total of 273 active nest trees were located on the study area (on and near the Flathead National Forest, northwestern Montana) during 1974 through 1976.

2) Fourteen tree species were represented in the total. Western larch constituted 56% of the nest trees, aspen 14%, and paper birch 13%.

3) Ponderosa pine, grand fir, and black cottonwood are locally important nest tree species.

4) Douglas-fir is often important as a feeding site, but less often used as a nest tree. None was used for nesting by Pileated Woodpeckers. Douglas-fir snags are important as nest sites for the Brown Creeper, which nests between the bole of a tree and a piece of loose bark.

5) Nest trees were evaluated on the basis of "status" categories related to the physical condition of the tree tops, and whether the tree was alive or dead.

Status 1 intact top	}	snags
Status 2 broken top		
Status 3 broken top	}	broken tops
Status 4 intact dead top		
Status 5 intact live top	}	live trees

6) Of the total 273 nest trees, 52% were snags (status 1 and 2) and 48% live trees (status 3, 4, and 5); 74% of the 273 were broken tops (status 2 and 3).

7) Eighty-five percent of the nest snags were broken tops (status 2).

8) Intact-top snags (status 1) were no more commonly used than live trees with intact dead tops (status 5) (8% of total for each).

9) Seventy-one percent of western larch nest trees were broken tops (status 2 and 3); only 7% were intact-top snags (status 1).

10) All paper birch nest trees were broken tops (status 2 and 3); 39% were snags (status 2).

11) Chi-square tests of independence supported (as highly significant) the hypotheses that broken tops were selected over intact tops and western larch was selected over Douglas-fir for nest trees. These preferences hold whether the nest trees (snags or culls) are compared with samples from the Coram Experimental Forest or with samples based on the four snags nearest each nest tree.

12) Stubs (less than 25 feet tall) are selected against. Snags

or culls greater than 25 feet tall are highly preferred.

13) Twenty-one percent of the larch nest trees (snags and culls) had evidence of fire at the base of the tree. Deeply charcoaled snags are not often used as nest sites.

14) Sixty-eight percent of all nest trees were surrounded by trees with a mean dbh in the sawtimber size class (greater than 9 inches). The same pattern prevailed at 74% of western larch nest trees.

15) Few nests were found in sites where pole (dbh less than 9 inches) or smaller size trees predominated.

16) Nearly 70% of larch nest trees had three or more other nest-type holes, indicating reuse from year to year.

17) Mean dbh for western larch nest trees was 26.4 inches, for paper birch 14.4 inches, and for aspen 13.9 inches.

18) Eleven percent of the nest trees (83) located in 1974 had fallen or been cut by autumn 1976.

19) Western larch is preferred as a nest tree because of its decay characteristics. Extensive heartwood decay caused by Fomes laracis and F. pini precedes successful nest excavations by woodpeckers.

20) Paper birch and aspen nest trees were affected by Fomes ignarius or F. fomentarius.

21) Fungus conks were present in 44% of paper birch, 22% of aspen, and 21% of larch nest trees.

Results Related to Bird Species

22) Twenty bird species were represented in 339 active nests or roosts. Nest and/or roost trees of the following bird species were located:

Goldeneye
 American Kestrel
 Saw-whet Owl
 Common Flicker
 Pileated Woodpecker
 Lewis' Woodpecker
 Yellow-bellied Sapsucker
 Williamson's Sapsucker
 Hairy Woodpecker
 Downy Woodpecker
 Black-backed Three-toed Woodpecker
 Northern Three-toed Woodpecker
 Tree Swallow
 Black-capped Chickadee
 Mountain Chickadee
 Chestnut-backed Chickadee
 Red-breasted Nuthatch
 Brown Creeper
 House Wren
 Mountain Bluebird

23) The Yellow-bellied Sapsucker was the most common woodpecker in the study area--111 active nests were located.

(24) Twenty-five Pileated Woodpecker nests were located. This species is the most sensitive hole nester since it requires old-growth larch, ponderosa pine, or black cottonwood for successful nesting. The Pileated can be considered as key to the welfare of

most hole-nesting species. If suitable habitat for its perpetuation is provided, most other hole-nesting species will be accommodated.

25) The Yellow-bellied Sapsucker and Pileated Woodpecker are "pathfinders," drilling a new nest cavity each year. Abandoned cavities are used by secondary hole-nesting species and small mammals.

26) Pileated Woodpeckers use nest trees with the largest dbh: mean 32.5 inches; Black-capped Chickadees use the smallest: mean 8.3 inches.

27) Pileated Woodpeckers use the tallest nest trees: mean 94.6 feet; Black-capped Chickadees use the lowest: mean 24.6 feet.

28) Mountain Chickadees use the highest nest holes: mean 66 feet; Black-backed Three-toed Woodpeckers used the lowest: mean 7 feet. The lowest individual nest was a Black-capped Chickadee, only 2 feet above the ground.

29) Williamson's Sapsuckers and Pileated Woodpeckers used highest basal area forests: mean for Williamson's Sapsucker 150 sq feet/acre and for Pileated Woodpecker 125 sq feet/acre. Lewis' Woodpecker and Mountain Bluebird used nest trees where the surrounding basal area was 0, but they may also nest where the basal area is quite high if an opening is nearby.

(30) The nest tree search image of the Pileated Woodpecker is a western larch, ponderosa pine, or black cottonwood snag with a

broken top (status 2), greater than 24 inches dbh, taller than 60 feet (usually much taller), with bark missing on at least the upper half of the snag, heartwood substantially affected by Fomes laracis or Fomes pini decay, and within an old-growth stand with a basal area of at least 100 sq feet/acre, composed of large dbh classes.

31) The nest tree search image of the Yellow-bellied Sapsucker is a broken-top western larch or paper birch infected with Fomes decay. Either snags or culls (status 2 or 3) are chosen.

32) The search images perceived in Montana proved useful in locating nests on the Priest River Experimental Forest, Idaho.

33) Twenty nest trees were shared by different bird species nesting at the same time. Yellow-bellied Sapsuckers, Mountain Chickadees, and Pileated Woodpeckers were most often involved in the shared trees.

34) Nest trees, particularly western larch and paper birch, are commonly reused by the same or different bird species from year to year. Fifty-one percent of 1974 western larch nest trees were reused in 1975. Thirty-five percent of 1974 paper birch nest trees were reused in 1975.

35) A cluster analysis based on a nine-dimensional ordination of nest tree traits and habitat traits revealed close association between Yellow-bellied Sapsuckers, Mountain Chickadees, and Red-breasted Nuthatches. These three species plus the Pileated

Woodpecker and Hairy Woodpecker are relatively grouped by coincident occurrence in old growth. Tree Swallows, Black-capped Chickadees, and Common Flickers are separated from the above five species by their preference for more open areas and their frequent use of small dbh nest trees.

36) No strong preference for direction which the nest hole faces was exhibited by Yellow-bellied Sapsuckers, but westerly was slightly favored. The Pileated Woodpecker showed a strong preference for south and east. Mountain Chickadees were unique in favoring north and northwest orientations. Black-capped Chickadees occasionally have vertical nest entrances on the top of stubs.

37) Density of hole nests was greatest near water and in productive forests in valley bottoms.

38) Western larch snags (status 1) were preferred as drumming sites by woodpeckers.

Limiting Factors

39) In old-growth, western larch-Douglas-fir forests, snags or culls suitable for nest sites do not seem to be generally limiting. Winter food sources are thought to be generally limiting for resident hole nesters and territoriality for migrants. Territoriality may also limit residents where winter food is abundant. Limiting factors vary from year to year and site to site. Probably no single

factor limits hole nesters, but rather a complex interplay of factors. Either nest trees or food supply may be limiting in logged areas.

Management Implications

40) In general, adverse impact on most hole-nesting bird habitat increases (a) the nearer the silvicultural system approaches clearcutting and slashing, (b) as the utilization standard is increased (in terms of higher percentage of logs, snags, and culls utilized), (c) with the degree of disruption caused by the harvesting method, and (d) as the intensity of the slash treatment increases (e. g., intensity of burning).

41) Thinning is detrimental to hole-nesting birds when snags and culls are removed and when feeding sites on the ground are covered by cut trees and branches.

42) Sanitation cuttings can be expected to have adverse effects on hole-nesting birds. This group of birds requires diseased trees as nest sites.

43) Old-growth western larch-Douglas-fir (cover type) supported the greatest number of hole-nesting bird species in the study area.

44) Riparian habitat which includes large black cottonwoods often supports a high density and diversity of hole nesters.

45) Aspen groves provide excellent habitat for the small

woodpeckers and secondary hole nesters. Such groves may serve as "refugia" for hole nesters when there are no surrounding old-growth conifers or snags.

46) Lewis' Woodpeckers, Mountain Bluebirds, American Kestrels, Common Flickers, and Yellow-bellied Sapsuckers may be temporarily and locally benefited by clearcutting--where snags are left.

47) Wildfire has been the major process which has perpetuated western larch (a seral species) and created larch snags in the study area.

48) Reserved forest on the Flathead National Forest has a high concentration of subalpine fir and Engelmann spruce--relatively poor habitat for hole nesters. Optimum habitat for this group of birds is in the most productive valley-bottom forests, which are classified primarily as standard commercial. These areas have been subjected to heavy cutting with little concern for the avifauna.

49) Management recommendations from other regions emphasize leaving a certain number of snags per acre. Most guidelines have called for leaving one to six snags per acre. If a "rule of thumb" is required, two or three large snags per acre are generally sufficient in larch-Douglas-fir forests. The snags per acre approach is not a long-term answer because it concentrates on the products of ecosystem processes rather than the processes themselves. It does

not address the most critical issue--long-term perpetuation of diverse forest habitats, a mosaic pattern which includes stands of old-growth larch. The processes that produce suitable habitat must be retained or reinstated by managers. Snags are the result of these processes (fire, insects, disease, flooding, lightning, etc.).

50) It is recommended that general guidelines adopted for Forest Service Region Six be adopted for all forests in the Northern Rocky Mountains. The recommended objective reads in part:

On a continuing basis, on at least a majority of commercial forest acres on each National Forest, provide dead standing and down trees and culls that will support self-sustaining populations of snag-dependent wildlife species.

51) The Pileated Woodpecker appears to be the most sensitive species subject to nesting habitat disturbance. Its feeding territories range between 500 and 1,000 acres in the study area. The Pileated Woodpecker can be considered an indicator taxon, an indicator of ecosystem integrity.

52) A minimum of about 100 acres of contiguous old growth are considered necessary for suitable long-term nesting habitat for a pair of Pileated Woodpeckers in the western larch--Douglas-fir cover type. The spatial arrangement of such old-growth stands is important; i. e., stands should be well scattered rather than grouped into a few areas or isolated with miles of intervening clearcut or young growth. Old growth in existing wilderness and parks is insufficient to sustain

healthy bird populations when considering a broad geographic area.

(53) There is an urgent need to identify blocks of old growth to be managed on long-term rotations or with selection cuttings. A minimum rotation age of 300 to 400 years in western larch-Douglas-fir may be necessary to support a self-perpetuating community of hole nesters in old-growth areas.

54) Woodcutting permits should be mandatory. Each woodcutter should receive instructions on where to cut and what types of snags or logs to cut.

55) Primary hole nesters seldom use nest boxes. Nest boxes may be useful as an interim measure for secondary hole nesters, where no suitable nest trees exist. Boxes are expensive, aesthetically inferior, and offer no panacea.

56) It is recommended that wildlife habitat survey crews identify important nest trees and nesting habitat at an early stage, before land use decisions have been made.

57) Interdisciplinary teams can best evaluate habitat needs for hole-nesting birds on a unit-by-unit basis. Time is critical. Nearly all commercial old-growth western larch-Douglas-fir may be cut within 20 to 40 years. The Pileated Woodpecker could be extirpated from all but reserved forest stands unless a substantial acreage is managed on long rotation (300 to 400 years). Nearly all hole nesters will be absent from areas where snags or culls are

eliminated.

58) Only with a holistic perception of the forest can the components be rationally managed. The ecological interrelationships between birds, snags, decay, and insects will probably never be completely understood. Recognition of the ecosystem concept requires that hole-nesting birds and their habitats be perpetuated. If for no other reason, they should be perpetuated simply because (to paraphrase Aldo Leopold, 1949) the first precaution in intelligent management is to keep every cog and wheel.

59) Mosaic forest patterns of diverse habitats, including old-growth stands, are essential if all native hole-nesting birds and other wildlife species are to be perpetuated on a widespread, self-perpetuating basis.