**Susan L. Tank**[1] and **Winifred B. Sidle**[2], Department of Fish and Wildlife Resources
University of Idaho, Moscow, Idaho 83843

# Habitat Relationships of Wintering Passerines in the River of No Return Wilderness Area of Central Idaho

## Abstract

Populations of wintering passerine birds and vegetation structural attributes were sampled in five vegetation types within the Big Creek Drainage, River of No Return Wilderness Area (now the Frank Church River of No Return Wilderness Area), central Idaho, in 1980 and 1981. Species occurrence differed between the two years. Most species used two or more vegetation types, with forested habitats receiving more use than open habitats. Stepwise discriminant analysis identified which of 21 vegetation variables were associated with presence or absence of bird species. No consistent patterns emerged to suggest that birds may have selected habitat in response to specific structural features of vegetation. We suggest that food supply may require birds to be opportunistic in their use of habitats in winter, and this opportunism may be reflected in the patterns observed in the Big Creek Drainage.

## Introduction

Numerous studies in temperate North America have focused on the habitat use patterns of birds during the breeding season. Results have shown strong relationships between species abundance and structural characteristics of the habitats used. Studies of wintering passerines and their patterns of habitat use are comparatively few, especially in remote areas offering pristine habitat conditions.

A study of wintering passerines was conducted in 1980 and 1981 in the River of No Return Wilderness Area of central Idaho. We sampled bird species abundance and habitat characteristics in five vegetation types to determine what species wintered within the area; what patterns of habitat use were exhibited; and whether patterns of use could be related to structural characteristics of vegetation.

## Methods

The study was located along Big Creek, a major tributary of the Middle Fork of the Salmon River. Field work was based at the Taylor Ranch, a wilderness facility operated by the University of Idaho. The terrain in this area is rugged, and winter weather can be severe. The topographically diverse terrain supports a mosaic of vegetation types, of which five were selected as representative of the study area. These vegetation types were: (1) open Douglas-fir (*Pseudotsuga menziesii*) forest; (2) closed Douglas-fir forest; (3) riparian woodland of black cottonwood (*Populus trichocarpa*), Douglas-fir, water birch (*Betula occidentalis*), thinleaf alder (*Alnus incana*), and Rocky Mountain maple (*Acer glabrum*); (4) shrubfields of sagebrush (*Artemisia tridentata*) with interspersed grasses; and (5) bunchgrass meadows of *Agropyron spicatum, festuca idahoensis,* and forbs.

A fixed-radius plot method (Dawson 1981) was used to obtain count data for birds. Transect lines totalling 2000 m were established within each of the five vegetation types. Permanent bird count stations were established every 100 m. In 1980, counts were initiated in late January and terminated in mid-April, with the arrival of spring migrants and summer residents. Sampling in 1981 extended from mid-January to early April. Counts were restricted to daylight hours (0630-1600). No counts were conducted during conditions of snow or rainfall, or if wind velocity exceeded 6 km per hour. All birds detected within 50 m radius of each station were recorded during a 3-minute period. Information recorded for each bird observation included station number, time of day, species, distance from observer, and type of detection (audial, visual, or both). Temperature, wind velocity, and percent cloud cover were recorded periodically. Each vegetation type was visited 10 times in 1980 and 7 times in 1981. Direction traveled along transects was reversed on successive visits.

[1]Current address: Washington Dept. of Game, 600 N. Capitol Way, Olympia, WA 98504.
[2]Current address: USDA Forest Service, P.O. Box 1628, Juneau, Alaska 99802. Author has previously published as Winifred B. Kessler.

Each bird station served as plot center for a vegetation sampling plot of 50 m radius. Subplots were used to sample vegetation strata within the main plot (Figure 1). Species, numbers, and height classes were recorded for shrubs. Diameter at breast height (DBH) was used to classify trees as saplings (<10.5 cm), poles (10.5-28.1 cm), and mature trees (>28.1 cm). Tree crown volumes were estimated following the method of Mawson *et al.* (1976).

The bird and vegetation data were analyzed by step-wise discrimination procedures (Klecka 1975) to test whether specific vegetation variables were associated with presence or absence of bird species. Only the most abundant bird species each winter, and the vegetation types where they occurred frequently, were used in the analysis.

Our source of nomenclature for birds was the A.O.U. check-list and supplement (American Ornithologists' Union 1982).

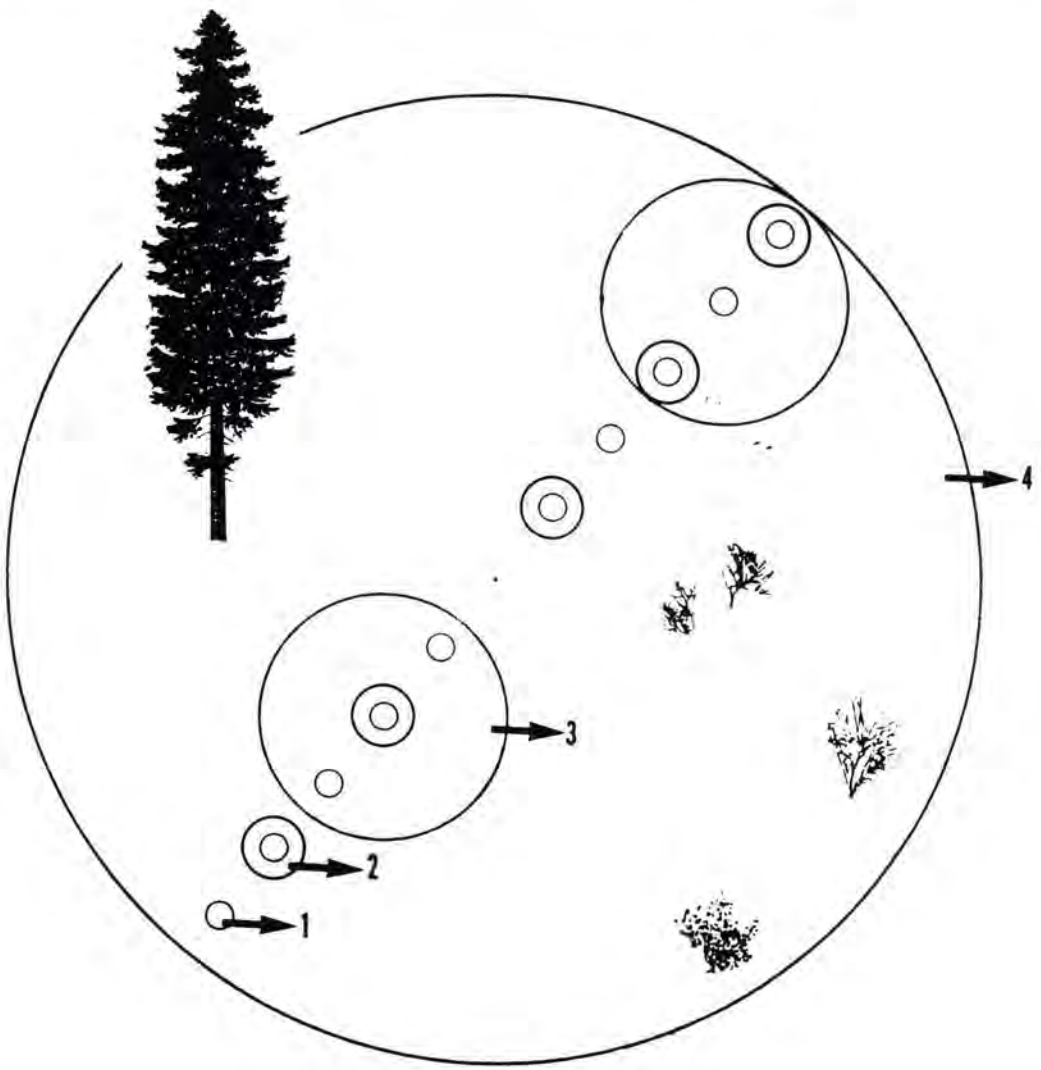


Figure 1. Schematic of nested plots used in vegetation sampling in each of 5 vegetation types. Numbers designate plots of differing radii and the life forms sampled: 1 = 4m², shrubs <1.5m; 2 = 5.6m², shrubs >1.5m; 3 = 12.6m², trees; 4 = 50m, the size of each bird census plot within which the vegetation plots were established.

## Results

Obvious differences in bird species occurrence were observed between the two winters of the study (Table 1). In 1980, a total of 289 observations were recorded of 7 species. The 1981 counts yielded 508 total observations of 12 species. Less than half of all species were observed in both years. The two most abundant species in 1980, the mountain chickadee (*Parus gambeli*) and golden-crowned kinglet (*Regulus satrapa*), were observed much less frequently in 1981, and the Steller's jay (*Cyanocitta stelleri*) was not observed at all in the second year of the study. The two most abundant species in 1981, the pine siskin (*Carduelis pinus*) and red-breasted nuthatch (*Sitta canadensis*), had not been observed in the study area the preceding year. Other species appearing for the first time in 1981 were the black-capped chickadee (*Parus atricapillus*), song sparrow (*Melospiza melodia*), dark-eyed junco (*Junco hyemalis*), and red crossbill (*Loxia curvirostra*). The brown creeper (*Certhia americana*) was infrequently observed in all forested habitats in both years.

Wintering birds made greater use of forested habitats than of open habitats. Twelve species were observed in the riparian woodland, and 11 in each Douglas-fir forest type. Only the Clark's nutcracker (*Nucifraga columbiana*), black-billed magpie (*Pica pica*), and mountain chickadee were repeatedly observed in the open sagebrush-grass and bunchgrass habitats. Most species distributed their use over two or more habitats. The exceptions were the American dipper (*Cinclus mexicanus*) and song sparrow, which were observed only in association with riparian woodland.

Stepwise discriminant analysis was used to identify which of 21 vegetation variables that we had measured were associated with occurrence (presence or absence) of bird species observed. Significant relationships ($p < 0.05$) were found only for the open Douglas-fir and riparian vegetation types, and for an "overall" category that included all vegetation types in which a species occurred (Table 2). Eleven variables showed an association with presence or absence of the most abundant species in 1980 (mountain chickadee, golded-crowned kinglet) and in 1981 (red-breasted nuthatch, pine siskin). However, we did not find consistent patterns of association among the habitats in which a species occurred to suggest that birds may have selected habitat in response to the structural vegetation variables tested.

TABLE 1. Species and numbers of wintering birds observed in the riparian woodland (RW), open Douglas-fir (ODF), closed Douglas-fir (CDF), sagebrush-grass (SG), and bunchgrass meadow (BM) vegetation types of the Big Creek Drainage in 1980 and 1981.

| | Vegetation Type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | RW | | ODF | | CDF | | SG | | BM | |
| Species | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 |
| Steller's Jay | 8 | | 7 | | 2 | | | | | |
| Clark's Nutcracker | 3 | 4 | 2 | 7 | 3 | 17 | 8 | 2 | 2 | |
| Black-billed Magpie | | | 2 | | 2 | | 4 | 1 | 14 | 1 |
| Mountain Chickadee | 55 | 28 | 46 | 18 | 22 | 16 | 8 | 2 | | 2 |
| Black-capped Chickadee | | 2 | | 1 | | 3 | | | | |
| Red-breasted Nuthatch | | 16 | | 24 | | 52 | | | | |
| Brown Creeper | 4 | 4 | 1 | 3 | 2 | 1 | | | | |
| Dipper | 5 | 3 | | | | | | | | |
| Golden-crowned Kinglet | 40 | 1 | 47 | 2 | 8 | | 3 | | 1 | |
| Song sparrow | | 3 | | | | | | | | |
| Dark-eyed Junco | | 9 | | 7 | | 17 | | 2 | | |
| Red Crossbill | | 1 | | 9 | | 9 | | | | |
| Pine Siskin | | 8 | | 123 | | 125 | | | | |
| Totals | 115 | 79 | 105 | 194 | 39 | 240 | 23 | 7 | 17 | 3 |

TABLE 2. Habitat variables significantly related ($p < 0.05$) to presence (P) or absence (A) of the Mountain Chickadee, Golden-crowned Kinglet, Red-breasted Nuthatch, and Pine Siskin in the open Douglas-fir (ODF), riparian woodland (RW) and overall habitat categories of the Big Creek Drainage in 1980 and 1981.

| | 1980 | | | | 1981 | | | |
|---|---|---|---|---|---|---|---|---|
| | Chickadee | | Kinglet | | Nuthatch | | Siskin | |
| Vegetation Variable | ODF | Overall | RW | Overall | ODF | Overall | ODF | Overall |
| No. trees | P | | | | | | | |
| Tree height | | | | | | | | A |
| Tree DBH | | P | | | | | A | |
| Tree crown density | | P | | | P | P | P | P |
| Tree canopy volume | | | P | | P | P | A | |
| No. poles | | A | A | | | P | A | |
| Pole height | | | | | P | | A | A |
| Pole crown density | | P | P | | P | | A | A |
| Sapling crown density | | | P | | | A | P | P |
| No. shrubs <1.5 m | | | P | P | A | | | |
| No. shrubs 1.5-3.1 m | A | | P | | | A | | A |

## Discussion

In our study of wintering birds in the Big Creek drainage, we found patterns of species occurrence that were variable between years, indicated use of two or more habitats by most species, and suggested that habitat use was not strongly associated with specific structural features of vegetation. Other studies of wintering birds have suggested that food supply, and its interactions with environmental conditions, may be the most important factor affecting activities, local distribution patterns, and habitat use by birds in winter (Hilden 1965, Kricher 1975, Lack 1954, Smith 1980). If food is limiting, birds may be better able to survive by being opportunistic in their search for food within their winter range. This opportunism may be reflected in the patterns of species occurrence that we observed in the Big Creek drainage: bird occurrence may have been associated with patterns of food abundance, distribution, and availability that we did not measure.

We suggest cone production as one food-related factor that may have affected occurrence and abundance of certain species in 1981. Though not sampled, cones were conspicuously abundant in the study area in 1981 compared to the previous winter. The pine siskin, red-breasted nuthatch, red crossbill, and Clark's nuthatch are altitudinal migrants that have been reported to occur in association with locally abundant cone crops (Bent 1964a and 1964b, Burleigh 1972, MacArthur 1964, Smith 1980).

Differing weather conditions between the two winters of the study may have influenced food availability and, subsequently, occurrence of some species. In 1980, the study area was blanketed by a snow cover that persisted throughout the sampling period. In 1981, although average temperatures were lower, a snow cover was completely lacking throughout the study area. The difference in snow conditions between the two winters may explain why a ground-foraging species, such as the dark-eyed junco, was absent in 1980 but commonly observed in 1981.

In summary, our observations of wintering passerines in the Big Creek Drainage did not suggest that birds were using habitats in response to specific structural features of the vegetation. The need to locate food supplies may require birds to be opportunistic in where they occur, and in their habitat use patterns within these localities. Studies of food supply and food exploitation are needed to develop a better understanding of the habitat relationships of wintering birds.

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