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THE RELATION OF SPRING BIRD DISTRIBUTION TO A VEGETATION MOSAIC
IN SOUTHEASTERN WASHINGTON

INTRODUCTION

Climax vegetation is of particular interest for study since it is the oldest and most stable vegetation of a region and should be expected to have a distinctive complement of animals. The purpose of this investigation was to observe the predilection of birds for stands representing climax plant associations in a remnant of native grassland in southeastern Washington.

The grasslands of this region were rapidly converted from grazing use to wheat production beginning about 65 years ago (Daubenmire 1942) and as a result only a few scattered remnants of native vegetation remain today. Associated with changes in vegetation there have been changes in the animal complement of the region (Buechner 1953; Buss and Dziedzic 1955).

Opportunities to observe birds in native grassland are scarce. Published records on breeding birds in native *Festuca idahoensis* grassland are those of: (1) Wing (1949), (2) Booth (1952) who described the ecological distribution of birds in the grassland areas of the Blue Mountains region of Washington and Oregon but failed to differentiate between the *Agropyron* and *Festuca* grassland zones, and (3) Dumas (1950) who also determined the distribution of breeding birds in southeastern Washington and largely followed the classification of vegetation proposed by Daubenmire (1942).

LOCATION AND VEGETATION OF THE STUDY AREA

The study area is a 28-acre tract of native *Festuca idahoensis* grassland vegetation located 13 miles southwest of Pullman, Washington, and is situated near the southern edge of the *Festuca* grassland zone (Daubenmire 1942). The area has been preserved from plowing by fortuitous circumstances and consists primarily of an east-west ridge estimated to be about 75 feet higher than the surrounding landscape.

The area lies at the ecotone between the *Festuca* grassland and the *Agropyron* grassland which borders the north bank of the Snake River. The south-facing slopes and exposed ridges are occupied by stands representing the *Agropyron* / *Poa* association while the north-facing slopes and protected sites are occupied by stands of two more-mesophytic associations, *Symphoricarpos* / *Festuca* and *Festuca* / *Symphoricarpos*. These latter associations are distinguished by physiognomy for they both have essentially the same species composition.

Stands of the *Symphoricarpos* / *Festuca* association are dominated by deciduous shrubs, *Symphoricarpos rivularis*, *Rosa spaldingii*, *Rosa ultramontana* and *Prunus virginiana* var. *melanocarpa* with occasional inclusions of *Crataegus douglasii* and *Amelanchier alnifolia*. These shrubs form dense thickets usually 0.5 to 1 meter in height. The herbaceous plants subordinate to the shrub canopy are for

the most part the same as those in the adjacent grassland.

The *Festuca / Symphoricarpos* association, forming the matrix around the thickets, is dominated by the tall perennial grasses, *Festuca idahoensis* and *Agropyron spicatum*, with a rich assortment of forbs such as *Hieracium albertinum*, *Helianthella douglasii*, *Senecio integerrimus* var. *exalta*, *Potentilla flabelliformis*, *Geum ciliatum* and others. The shrubs present are the same as those in the thickets; however, they are scattered, strongly dwarfed and short lived. They seldom attain the height of the mature grasses, hence the physiognomy appears as a more or less even herbaceous sward.

The *Agropyron / Poa* association occupying the south-facing slopes presents a characteristic "bunchy" physiognomy as a result of the wide spacing and caespitose habit of *Agropyron spicatum*, the dominant plant of this habitat. *Balsamorhiza sagittata*, a large perennial forb, may be locally abundant. The *Poa* union consists of *Poa secunda* and dwarf annual dicots such as *Draba verna* and *Collinsia parviflora* which occur between the *Agropyron* bunches. These plants are small and they dry earlier in the season than do other vascular plants.

METHODS

Twelve trips were made to the study area from March 26 to June 22, 1955, inclusive; the first two trips were separated by a two-week interval, the remaining ten were at weekly intervals. A map showing the distribution of the plant associations occurring on the area was prepared. All birds observed on the area, with the exception of those seen only in flight, were located on this map, thus

aiding in relating field observations to territorial boundaries. In addition, records were taken for total birds observed, by associations, during each visit.

OBSERVATIONS

Total bird-use in each of the three associations is indicated in Table I. In this table, "Total" equals the total individuals of each species recorded for a given association, and "Frequency" equals the percentage of trips for which a particular species was recorded in a given association. Only species with frequencies greater than 10% are included in his table. The species are arranged according to habitat preferences from xeric to mesic, i.e. *Agropyron / Poa*, *Festuca / Symphoricarpos*, *Symphoricarpos / Festuca* (McMinn 1952; Murdock and Rickard 1956).

Wing (1949) determined the size of the study area as approximately 28 acres. Of this 50 percent is estimated to be occupied by stands of the *Festuca / Symphoricarpos* association. Each of the other two associations is estimated to cover approximately 25 percent. As a means of providing an adequate comparison between associations, bird abundance has been calculated on the basis of total birds per estimated 10 acres. This calculation indicates that the *Symphoricarpos / Festuca* association is approximately 20 times as useful to birds as is either of the other two associations. Since some duplication probably occurred this estimate must not be considered to be a census figure. However, as duplication can be assumed to be nearly proportional among the associations, the comparison of relative abundance seems a valid one.

TABLE I. Bird distribution, March 26-June 22, 1956. Species having maximum frequencies of less than ten per cent omitted

	Agropyron/Poa (7 acres)	Festuca/Symphoricarpos (14 acres)	Symphoricarpos/Festuca (7 acres)
	Total/Frequency	Total/Frequency	Total/Frequency
Vesper Sparrow..... (<i>Pooecetes gramineus</i>)	2/17	8/33	2/17
Ring-necked Pheasant..... (<i>Phasianus colchicus</i>)	6/25	8/33	12/42
Grasshopper Sparrow..... (<i>Ammodramus savannarum</i>)	2/17	....
Savannah Sparrow..... (<i>Passerculus sandwichensis</i>)	2/17	16/33
Brewer Sparrow..... (<i>Spizella breweri</i>)	1/8	59/75
Lazuli Bunting..... (<i>Passerina amoena</i>)	32/50
White-crowned Sparrow..... (<i>Zonotrichia leucophrys</i>)	24/25
Little Flycatcher..... (<i>Empidonax traillii</i>)	21/42
Tolmie Warbler..... (<i>Oporornis tolmiei</i>)	21/42
Song Sparrow..... (<i>Melospiza melodia</i>)	3/17
Say Phoebe..... (<i>Sayornis saya</i>)	3/17
Yellow-throat..... (<i>Geothlypis trichas</i>)	3/17
Eastern Kingbird..... (<i>Tyrannus tyrannus</i>)	3/17
Arkansas Kingbird..... (<i>Tyrannus verticalis</i>)	3/17
Cowbird..... (<i>Molothrus ater</i>)	3/17
Total/ten acres.....	11	15	293

The above comparison refers to all bird species observed in the study area, including migrants. If only species known to breed in the region are taken into consideration, an additional comparison can be made. To estimate total breeding pairs it was necessary to draw in probable territories for each breeding species. A minimum requirement of at least three observations of a species (usually a singing male) in a restricted area was selected for designating a probable territory. These figures were then converted into "Estimated territories per 10 acres" (Table II). Degree of "Fidelity" to a particular association was determined by calculating the total individuals of each species recorded for a given association as a percentage of the total individuals of that species recorded for all three associations.

TABLE II. Estimated territories per ten acres, March 26-June 22, 1956, based on a minimum of three observations per estimated territory

	Agropyron/Poa	Festuca/Symphoricarpos	Symphoricarpos/Festuca
	Pairs/Fidelity	Pairs/Fidelity	Pairs/Fidelity
Ring-necked Pheasant	1/23	1/31	1/46
Vesper Sparrow	0/12	1/75	0/12
Savannah Sparrow	.....	1/11	0/89
Brewer Sparrow	.....	0/2	17/98
Lazuli Bunting	.....	.....	9/100
Tolmie Warbler	.....	.....	7/100
Little Flycatcher	.....	.....	7/100
Total territories/ ten acres	1	3	31

A comparison of the total estimated breeding pairs per 10 acres reveals a significant variation in the relative value of the different associations. The *Symphoricarpos* / *Festuca* association is apparently over 30 times more valuable to breeding birds than the *Agropyron* / *Poa* association and about 10 times more valuable than the *Festuca* / *Symphoricarpos* association. It should not be overlooked, however, that species such as the Savannah sparrow may nest on the ground in the *Festuca* / *Symphoricarpos* association but utilize the *Symphoricarpos* / *Festuca* association for territorial perches.

A comparison of the bird populations observed during this study with those observed by Wing (1949) shows that there has been almost no change in the total numbers of breeding birds utilizing the study area. During the years 1942-1947 Wing found little variation in total numbers of breeding bird pairs from year to year (i.e. from 32 to 36.5 pairs), although there were minor variations in species composition. Nevertheless, in each of the years studied, the Brewer sparrow and lazuli bunting were first and second in abundance respectively. As indicated in Table III, the four most abundant species observed in 1956 were in almost identical sequence and density as Wing's five-year averages. The conclusion is that a distinctive and stable bird population is associated with this tract of climax vegetation.

A direct comparison of bird utilization with all three plant associations with Wing's findings is not possible. Although Wing indicated that the most common breeding birds were associated with the brush patches (i.e. stands of the *Symphoricarpos* / *Festuca* association) he recognized only two vegetation types for the study area; (1) *Agropyron* / *Festuca* which included stands of both the *Festuca* / *Symphoricarpos* and *Symphoricarpos* / *Festuca* associations and (2) *Agropyron* / *Poa*.

TABLE III. Total estimated breeding pairs

	5 Yr. Ave. (1942-47)*	1956
Brewer Sparrow	13.2	12
Lazuli Bunting	6.8	6
Tolmie Warbler	5.0	5
Little Flycatcher	2.6	5
Song Sparrow	2.5	.....
Grasshopper Sparrow	2.0	.....
Ring-necked Pheasant	0.7	3
Marsh Hawk	0.6	.....
Western Meadowlark	0.5	.....
Chat	0.2	.....
Short-eared Owl	0.2	.....
Vesper Sparrow	0.2	1
Savannah Sparrow	.....	1
Total	34.7	33

*Data from Wing (1949).

The small amount of bird usage of the *Agropyron* / *Poa* association (Table I) corroborates the findings of Wing who observed that only one native bird, the vesper sparrow, nested in stands of this association.

DISCUSSION

The difference in bird usage observed between the three plant associations studied is striking. The discrepancy between the value of the *Symphoricarpos* / *Festuca* and the *Festuca* / *Symphoricarpos* associations is of particular importance, since the major difference between these two associations is their physiognomy.

Reasons for the value of a shrub-dominated plant community become apparent when one considers the importance of protective cover, territorial perches, and nest sites for species such as the Brewer sparrow, lazuli bunting, and Tolmie warbler. The Brewer sparrow well illustrates the principle of importance of community physiognomy rather than dependence on a particular plant species. In the *Artemisia* / *Agropyron* association of more arid regions the Brewer sparrow is common (Dumas 1950; Booth 1952); here *Artemisia tridentata* provides the necessary shrub component. In the semi-stabilized dune area of the Moses Lake "Potholes" region and in the *Agropyron* / *Poa* zone, the presence of *Chrysothamnus* satisfies the perch requirements of the Brewer sparrow (Johnsgard 1955). In the present study area *Crataegus*, *Prunus*, and *Amelanchier*, which tend to rise above the level of the other shrubs, are the usual perches and nest sites for the species. The Brewer sparrow is thus found in different plant associations, but always those with shrubs to serve as perches. Dumas (1950) found the lazuli bunting and Tolmie warbler to be abundant in nine bark (*Physocarpus*) thickets, which are similar in their physiognomy to the *Symphoricarpos* thickets, but which have a different floristic composition and occur in a more moist region.

Fence lines in the *Festuca* grassland zone, by contributing to the preservation of shrub communities in territory planted to wheat or peas, have great value as cover for game birds and nesting sites for certain song birds that would otherwise be extirpated from the upland portions of the *Festuca* grassland zone.

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SUMMARY AND CONCLUSIONS

A 28-acre relict stand of native vegetation located near Pullman, Washington, was studied between March 26 and June 22, 1956 to determine bird distribution patterns. Birds were classified as to their occurrence in the three climax plant associations: *Agropyron* / *Poa*, *Festuca* / *Symphoricarpos*, and *Symphoricarpos* / *Festuca*. It was found that the *Symphoricarpos* / *Festuca* association provided a habitat that showed approximately 20 times greater utilization than either of the other two associations. On the basis of estimated breeding pairs, the *Symphoricarpos* / *Festuca* association showed approximately 30 times more utilization than the *Agropyron* / *Poa* association and about 10 times more utilization than the *Festuca* / *Symphoricarpos* association. Breeding bird density and species composition were similar to those of populations observed on the same study area by Wing (1949) during the years 1942-1947, indicating a stability of bird populations in this climax mosaic. It was further concluded that the shrubby physiognomy of the *Symphoricarpos* / *Festuca* association, rather than its particular floristic composition, accounted for its more frequent utilization.

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