

September 28, 1935). NOVA SCOTIA (Cape North, Cape Breton Island, September 5, 6, 11, 1935; Frizzleton, October 6, 1935; Black River, near Wolfville, May 23, 1907). NEW YORK (Cayuga, May 9, 1914). INDIANA (Winona Lake, October 4, 1913). MICHIGAN (Detroit, April 15, 1906; September 30, 1906; October 2, 1904, October 8, 1905).

Melospiza georgiana georgiana (Latham). Southern Swamp Sparrow.

June-July specimens of *Melospiza georgiana georgiana* have been examined from the following localities:

ONTARIO (Long Point, Norfolk County, 3; Port Sydney, Muskoka, 3; Hallowell, 2; Kingston, 1; Laird, 1; MacLennan, 1; Biscotasing, 2; London, 2; Pottageville, York County, 2; Toronto, 1; Eganville, Renfrew County, 1). QUEBEC (Kazabazua, 1). NOVA SCOTIA (Yarmouth, 1). PENNSYLVANIA (Black Swamp, Lawrence County, 2; Sandy Lake, Mercer County, 2; Sugar Lake, Crawford County, 1; Somerset, 2). WEST VIRGINIA (Cranesville, 1; Cranberry Glades, Pocahontas County, 1).

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BREEDING BIRDS OF VIRGIN PALOUSE PRAIRIE

BY LEONARD WING

THE Palouse Prairie is perhaps the largest prairie type west of the Rocky Mountains. The term "Palouse" is generally used to designate the bunch-grass prairie of southeastern Washington and adjacent parts of Idaho and Oregon. However, identical vegetation occurs near by in southern British Columbia and western Montana. Thus, it is bounded by the timber country of the Blue Mountains on the south, the central Washington desert on the west, the timber area stretching from the Cascades to northern Idaho on the north, and the timbered outlines of the Bitterroots on the east.

In a more narrow sense, the term Palouse Country locally designates

the bunch-grass area lying north of the Snake River in eastern Washington and northern Idaho. Rolling hills, usually less than 100 feet high, dominate the area, but sometimes deeper canyons, such as that of the Snake River (two thousand and more feet deep) cut through the Palouse Country. The elevation ranges from a low of about 2500 feet on the breaks of the Snake River to 3000 to 4000 feet near the mountains. Farther west the country gradually drops in elevation to 700 feet where it merges into the sagebrush-grass type of desert.

The rainfall varies from an average of 14 inches on the western side (less in the desert) to perhaps 25 inches near the mountains on the eastern border. Pullman, 12 miles north by east of this study area, has an annual rainfall that varies from 13 to 30 inches, but averages about 20 inches. The winter rainfall that characterizes the climate carries through the dry summer, partly because the heavy soil is a loess of considerable thickness. Another characteristic of the climate influencing rainfall effectivity is the general cloudiness of winter, in marked contrast to the general clearness of summer.

The grassland type varies with slope and altitude. Daubenmire (An Ecological Study of the Vegetation of Southeastern Washington and Adjacent Idaho. *Ecol. Monog.*, 12: 53-79, 1942) establishes three vegetation zones for the Palouse area. Representatives of two of these appear in my bird-census plot. The south-facing slopes, because of greater dryness, rather faithfully portray the *Agropyron-Poa* association characteristic of the drier (more western and lower) parts. Breeding birds make little use of the *Agropyron-Poa* type on the census area, and confine themselves to the *Festuca-Agropyron* type, which covers most of the area.

Of importance in the area are the many brushy spots found in the *Festuca-Agropyron* type. Because the area lies along a critical rainfall margin, the brush is by nature restricted to protected slopes. The principal brush species are *Symphoricarpos*, *Rosa*, and *Prunus*, with some *Amelanchier* and *Crataegus*.

Grazing seems to increase the amount of brush in the Palouse, for cattle and horses prefer the less-resistant herbaceous plants. Disturbance of the soil by ground squirrels also favors brush increase. Because moisture is a critical factor, boundary fences often markedly increase the amount and growth of brush by increasing deposition of snow. Plowing adjacent fields often throws furrows against the fence-rows and increases the amount and growth of brush by deepening the top soil. Brush is noticeably more prevalent along the west boundary fence where snow drifts into the breeding-bird area rather than the north side where snow drifts into the adjacent plowed field.

It should not be understood that brush is only a recent characteristic of the Palouse Prairie; brush has always been abundant. There is hardly a square yard in the *Festuca-Agropyron* type that does not possess a stunted member of one of the brush species, generally but a few inches high.

The specific area used in this study of the breeding birds in the Virgin Palouse Prairie lies immediately back from the north breaks of the Snake River about 12 miles south-by-west of Pullman, Washington (Sec. 29, T. 38 N., R. 44 E. W. M.), at an altitude of about 2850 feet. I have not determined the relief, but it appears to be not more than 75 feet, which, though a little steeper of slope than the average, is within the average range of the Palouse Country. As determined by plane-table mapping, the area embraces 28.2 acres.

This census area has been preserved from plowing only because a sharp ridge cuts diagonally across the northwest corner of a ranch property. The sharpness of the slope has made it inconvenient to cross with the heavy farm equipment used in this country—even in the days of horse-drawn plows, harrows, headers, and combines. It was used for horse pasture, however, rather consistently until 1931, but has not been used by stock since, except as a few head have been permitted to roam at will over the entire ranch in the fall after the crop has been harvested.

Plowing of the sod in the adjoining land began in the late 1870's and was well underway by the 1880's. Old residents report a considerable increase in brush with the coming of horse-pasturing, and it may be that the area today has somewhat more brush than before the coming of the white man. Cattle grazed little even in the early days, for the land switched very rapidly from sod to wheat, the present major crop. Of late years dry peas have also been raised in considerable quantity.

The breeding pairs of birds counted on the area are listed on the basis of average number on a hundred acre basis, in order of abundance as follows (1942-1947). (For details of yearly data, see Audubon Field Notes.)

Brewer's sparrow (<i>Spizella breweri</i>).....	46.8
Lazuli bunting (<i>Passerina amoena</i>).....	24.1
Tolmie warbler (<i>Oporornis tolmiei</i>).....	17.7
Song sparrow (<i>Melospiza melodia</i>).....	9.2
Little flycatcher (<i>Empidonax traillii</i>).....	9.2
Grasshopper sparrow (<i>Ammodramus savannarum</i>).....	3.9
Marsh hawk (<i>Circus cyaneus</i>).....	2.1
Western meadowlark (<i>Sturnella neglecta</i>).....	2.1
Short-eared owl (<i>Asio flammeus</i>).....	0.7
Chat (<i>Icteria virens</i>).....	0.7
Vesper sparrow (<i>Poocetes gramineus</i>).....	.7
Pheasant (<i>Phasianus</i> sp.).....	2.5

The commonest birds, Brewer's sparrow, lazuli bunting, Tolmie warbler, song sparrow, and little flycatcher, are associated with the brush patches. It is customary to associate the little flycatcher with stream-sides and damp meadows, but on this sample of Palouse vegetation, the little flycatcher lives on hillsides. Stream bottoms supporting low trees and shrubs are uncommon in the Palouse, but little flycatchers are also found in such places. Presumably the little flycatcher has always lived on the dry brush hillsides of the Palouse Prairie.

The grasshopper sparrow occupies the edge between the *Agropyron-Poa* type and the *Festuca-Agropyron* type. In this type the marsh hawk and short-eared owl nest, the former in brushy spots, the latter in the open herbaceous growth. The only breeding bird found in the *Agropyron-Poa* type was the vesper sparrow.

The year to year averages have been consistent, which indicates stability in the climax type of biota as represented by the Palouse Prairie:

<i>Year</i>	<i>Birds per Hundred Acres</i>
1942	248
1944	227
1945	258
1946	248
1947	248
Average	246

The Brewer's sparrow fluctuated from a high of 15 in 1946 to a low of 12 in 1945. The years 1942, 1944, and 1947 had 13 pairs each. Tolmie warbler fluctuated from four to six pairs while the lazuli bunting fluctuated from five to eight. The consistency in the total perhaps indicates that in a stabilized community, such as we seem to find in the Virgin Palouse Prairie, changes in abundance of one species are reflected by adjustment changes in other species, so that the combined total remains substantially the same from year to year.

Chats, it might be added, are regularly found in the brush along the Snake River some 2000 feet below and six miles from the census area. They were not found up on the plateau area studied until the summer of 1947, and then only in the *Festuca-Agropyron* type of brush.

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