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Summer birds reaching the margins of their range at the Cedarburg Bog and the UWM Field Station

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SUMMER BIRDS REACHING THE MARGINS OF THEIR RANGE AT THE CEDARBURG BOG AND THE UWM FIELD STATION

In a previous article, Reinartz and Reinartz (1981) described the monocot and gymnosperm plants that reach their range limits at the Cedarburg Bog. The bog forest consists primarily of white cedar (Thuja canadensis) and tamarack (Larix laricina) and includes a string bog plant community, all typical of wetlands further north. The summer fauna also possesses an ecologically northern relict flavor. This is especially true of the most conspicuous vertebrates, the birds. Many bird species found in the bog are more closely associated with the transitional and boreal forests of Canada and northern Wisconsin than with the deciduous forests and fields that predominate in the Field Station area. The surrounding uplands, as well as the bog, also have species of nesting birds that are typical of southeastern Wisconsin, including those often associated with prairie and deciduous forest. While other bogs in southeastern Wisconsin support some species with northern affinities (Beimborn 1970), Cedarburg Bog has the greatest diversity as well as the greatest abundance of such species.

The rough vegetational delineation of the northern hardwood transitional forest, the prairie and the southern deciduous forest is the plant "tension zone" (Curtis 1959) (Fig. 1). Beimborn (1970) described the range margins of various bird species in regard to this zone which extends into southeastern Wisconsin where the cooling effect of Lake Michigan creates an environment suitable to a more northern type of plant community. The range maps for some of the bird species illustrate how their distributions coincide with the plant tension zone. The purpose of this paper is not only to document avian boreal relicts, but also to indicate species typical of the eastern deciduous forest, the prairie and other habitats which reach the edge of their ranges at Cedarburg Bog and the UWM Field

Station. A few species will be mentioned that are not really marginal, but are of local distribution or have recently been found in the Field Station area.

Marginal populations of birds are not often distinctly different morphologically or behaviorally than more central populations. However, species with disjunct or peripheral distributions are of special interest to biologists as they often have smaller effective population size and show little gene flow with the central portion of the range. The songs of birds in marginal populations may differ from those in the central part of the range and are of interest to the ethologist exploring song dialects. Habitat usage may be different, illustrating the range of adaptability of the species; the nesting cycle and population regulating mechanisms may differ due to varying ecological pressures. As a result of isolation, the initial stages of speciation may take place in these marginal groups.

The data included in this paper are based not only upon my own field observations, but especially those of Charles M. Weise. I have also used Weise (1973) and Gustafson (1976) for quantitative data on bird numbers, Udvardy (1963) for biome associations and Barger, et al. (1975) as well as Peterson (1980) for ranges in Wisconsin.

Due to space limitations, only a representative sample of range maps is given; this selection illustrates the typical pattern of incursions of northern species into southeastern Wisconsin, as well as the general northern limits of southern species. For many species, the short description is sufficient to obtain a picture of the species' distribution. See Weise (1973) and Reinartz and Reinartz (1981) for more detailed descriptions of the plant communities. Peterson (1980)

is an excellent guide to use in conjunction with this paper. Idzikowski and Herbert (1976) described where to find birds at the Cedarburg Bog and nearby areas and mentioned nearly all of the marginal species.

All references to species presence is during the breeding season; generally June 15 was used as the end of spring migration. Fall migrants appear at the Field Station in late July; these are omitted. Within the ranges shown on the maps, a species is found only where proper habitat conditions exist. For complete ranges of all species listed, see the American Ornithologist's Union "Checklist of North American Birds" (1957).

NORTHERN SPECIES ON THE SOUTHERN LIMITS OF THEIR RANGE

Green-winged Teal. Anas crecca. No map.

Found in Wisconsin in summer sparsely in the northern and central counties. Weise found this species once in the marshes near Mud Lake on 6 June 1978; nesting was not verified. It should be watched for in the future, possibly in upland areas or in habitat away from the marshland of other puddle duck nesting sites (Belrose 1976).

Ruffed Grouse. Bonasa umbellus. No map.

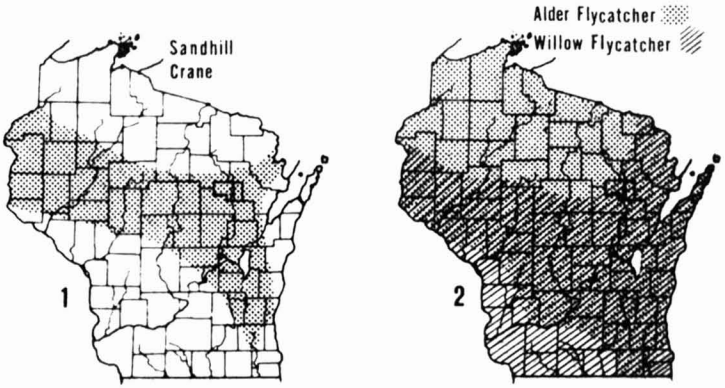
In the Cedarburg Bog this permanent resident species reaches its southeastern-most extent in the state being absent only in Milwaukee, Racine and Kenosha Counties.

Ruffed Grouse have been extirpated from much of their former range due to hunting and deforestation (U. S. Fish and Wildlife Circular No. 34). The Cedarburg Bog population is a fragment of the former range as it was once distributed throughout the midwest in forested tracts of land.

Numbers of this species have been observed to vary at the bog from year to year, possibly following a ten year cycle similar to that found in other parts of the species' range (Keith 1963; Kubisiak, et al. 1980). The numbers of drumming males as recorded by Weise (1973) indicate that the overall population in the early 1970's was relatively low compared to other study sites, but his data were collected during a period when grouse populations over the entire state had crashed or were about to crash (Kubisiak, et al. 1980). The population cycle of this species has yet to be adequately explained. Rusch and Keith (1971) offer a summary of the various explanations that have been published.

A survey of the drumming males in the bog each year would be of long-term value in determining if the essentially marginal and possibly isolated population in the bog follows the same sort of cycle as does the species in more central parts of its range. If such a cycle is found that differs from other parts of Wisconsin, what are the factors that predispose the Cedarburg Bog population to differing fluctuations?

In addition to hearing drumming males, hens with partially grown chicks can occasionally be flushed from the paths through the bog forest in June and July.



Sandhill Crane. Grus canadensis. Map 1.

Very local in its distribution in the range indicated. One of the more isolated southward extensions of the breeding range is in the marshes surrounding Mud Lake. One pair returns in late March each year; their trumpeting duets can be heard for several miles. The nest has never been directly observed, but both C. M. Weise and J. R. Meyer have seen flightless young in dense shrubbery near the first island in the bog. In 1974, two pairs were in the marshes surrounding Mud Lake; the birds were very vocal due to territorial conflicts and neither pair was apparently successful in attempts at nesting. In late summer and fall, the adults can often be seen flying over the Field Station with one or two young.

Common Snipe. Capella gallinago. No map.

Found throughout Wisconsin in marshland and wet meadow habitat. From a very extensive range in Canada beyond the treeline, this species reaches south to northern Illinois. At Cedarburg Bog, it can be found in the string bog and possibly the marshes of Mud Lake. Its spring courtship display flight can best be heard and seen from the boardwalk in the string bog. Nesting is suspected, but has never been proven.

Least Flycatcher. Empidonax minimus. No map.

A species of the northern transitional hardwood forests, found throughout Wisconsin, but much more commonly in the northern counties in shrubby understory. In the area near the Field Station, the species seems to be more common along the Milwaukee River. It has been seen regularly in shrubby areas in the bog and in upland areas in scattered locations. In Beyer's Woods, a tract of mature forest continuous with the Field Station's upland woods, Weise has for several years found two males singing in close proximity to Acadian Flycatchers. Nesting has never been confirmed.

Alder Flycatcher. Empidonax alnorum, and Willow Flycatcher. Empidonax traillii. Map 2.

In 1973, the bird then known as Traill's Flycatcher (Empidonax traillii) was

divided by taxonomists into the two above mentioned sibling species. The Willow Flycatcher sings its "whee-cheer" song from willow-dogwood shrub habitat and is generally found throughout southern Wisconsin. The Alder Flycatcher is characteristic of alder shrub habitat of more northern counties in the state where it sings its "fee-bee-o" song. Stein (1963) described these two song types, leading to the realization that these are two species. In Wisconsin, Robbins (1974) has described preliminarily the extent of the Willow's range. The marginal portions of the ranges for both species only roughly coincide with the plant tension zone with incursions into the "wrong side" of the zone by both species. The Willow seems to be more restricted, being absent in the northwest and northern counties. The Alder is absent only in the most southwestern part of the state where field coverage of birds has been lacking.

At the Cedarburg Bog it is possible to find both species often nesting in close proximity where the proper habitats are located close together. The Alder population in the bog is probably the largest in the entire southward range of the species in Wisconsin. Alders may be found in the edge of the swamp hardwoods near the lab, along Blue Goose Road south of the manager's residence and in the string bog and the bog shrub community. Willow flycatchers are found along the channel into Mud Lake from the floating bridge. It is necessary to know the songs well of both species in order to be sure of identification.

Yellow-bellied Flycatcher. Empidonax flaviventris. No map.

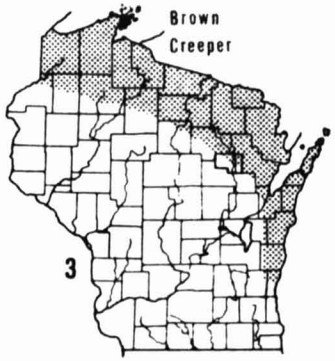
A small flycatcher of the boreal forest biome that is usually found locally in northern Wisconsin bogs. Weise has found this species as late as mid-June in different years; there was no evidence of nesting in any of his sightings, although one early June record was repeated in the same location on June 18. The most interesting record was from 1967 when Weise found 2 birds, one on 8 July and one on 22 July, both in different locations in the bog. These sightings did not result in any evidence of nesting, which if documented here, would truly be marginal and extralimital. This species should be watched for in the future.

Olive-sided Flycatcher. Nuttalornis borealis. No map.

In summer, the "whip-three-cheers" song of this species is generally heard only in the northern counties of Wisconsin in bogs and wet shrub habitat. It is a late spring migrant throughout the state; one singing bird was found in the bog along the channel to Mud Lake on June 18 in 1976. This record did not result in any further evidence of nesting. Several other sightings were made between June 1 and June 15 with none resulting in any suspicion of breeding activity; any nesting would be extralimital. This species should be watched for in the future.

Brown Creeper. Certhia familiaris. Map 3.

A boreal forest species following the southeastern extent of the tension zone from its more extensive range in northern Wisconsin. In the coniferous forest of Cedarburg Bog, one can hear the high-pitched warbler-like song by late March; the species is a regular, but not common breeder here. Its nest is difficult to locate as it is usually placed behind a loose piece of bark of a dead tree. Weise has found several active nests as well as fledglings with parents.



Red-breasted Nuthatch. Sitta canadensis. No map.

This is the boreal forest counterpart of the common deciduous forest species, the White-breasted Nuthatch, Sitta carolinensis. It has a local distribution in northern Wisconsin and generallydoes not follow the tension zone into southeastern Wisconsin in its breeding range. Summer populations and ranges are somewhat unpredictable due to the little understood population fluctuations which this species exhibits. At the Field Station, Weise has found it in the bog forest in early June in 1977. In 1981, a possible pair was found on June 6; one bird was found in the same location in July. There was no breeding suspected, but this species should be looked for, especially following winters when the species is common in southern Wisconsin.

Winter Wren. Troglodytes troglodytes. Map 4.

This smallest of the wrens is found most commonly in the northern counties of the state in transitional and boreal forests. Along Lake Michigan shoreline forests it is local, reaching its southernmost extent in the Cedarburg Bog where one or two singing birds can be found nearly every summer in the coniferous forest or swamp hardwood forest. Weise confirmed nesting on 27 June 1970 when a family group was sighted; he believes, however, that most of the summer records are of unmated singing males.

Veery. Catharus fuscescens. No map.

Found throughout Wisconsin except in the far southwestern counties, this species of thrush is the only thrush to be seen and heard in the bog and the swampy edge during the summer at the Field Station. It is a species of the northern transitional hardwoods, not strictly following the limits of the tension zone into southern Wisconsin. Nests and families have been found by Weise.

Solitary Vireo. Vireo solitarius. No map.

A species of the transitional and boreal forests rather uncommon in northern Wisconsin; it does not follow the tension zone into the southeastern counties. Weise found one singing bird on June 13, 1975 in the bog forest which is an

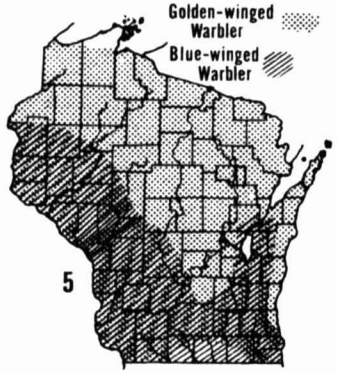
interesting record as this is a relatively early spring migrant that is usually through southern Wisconsin by June 1. No nesting was suspected.

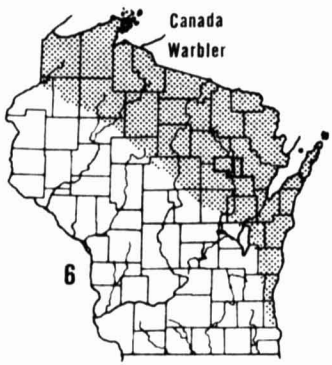
Golden-winged Warbler. Vermivora chrysoptera, and Blue-winged Warbler. Vermivora pinus. Map 5.

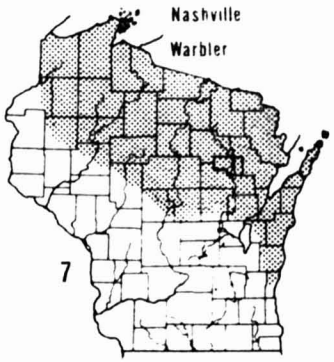
Of these two rather closely related species, the Golden-winged has a more northerly distribution in the state, being absent only in the very south-central counties. The Blue-winged Warbler, which commonly hybridizes the the Golden-winged, has a more southerly distribution, but is slowly moving north, displacing the Golden-winged (Gill 1980). In Wisconsin, the Blue-winged is moving northward mostly in the extreme west and in the east where it is restricted to the south-eastern counties. At the Cedarburg Bog, the Golden-winged is usually found in the thickets in the bog or in second growth popple habitat in old fields near the Field Station, but according to Weise, the bog population is not as abundant as it was in the late 1960's and has apparently declined since the early 1970's. The males that can be heard from bog thickets early in the summer are seldom found later in the season; breeding which has previously been documented may no longer occur. Blue-wings are more numerous and can be found in the swampy thickets just west of the lab building where family groups have been trapped and banded in late summer. Other pairs have been regularly observed in woodland edge habitat throughout the area.

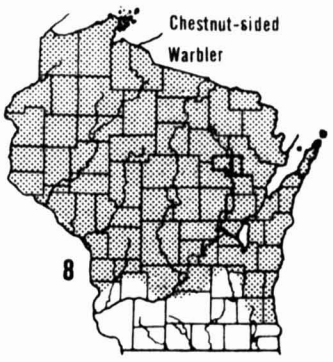
Canada Warbler. Wilsonia canadensis. Map 6.

A species associated with the transitional forest, this warbler can be found in northern Wisconsin as well as in the forests near the shoreline of Lake Michigan, rarely south to Milwaukee and possibly Racine Counties. This species can be found rather commonly in the bog forest and in the string bog to a lesser extent. Families have been found in most summers.









Nashville Warbler. Vermivora ruficapilla. Map 7.

The Nashville is a bird of the wet shrublands in the transitional forests of Wisconsin and south along the boundary of the tension zone in the larger bogs of southeastern Wisconsin. In Cedarburg Bog, Weise has estimated up to 47 pairs in the string bog with lesser numbers in the bog forest and dead bog forest. The Nashville is probably the most abundant of the relict species of warblers that regularly breeds in the bog. Both nests and families have been found, mostly in the string bog.

Black-throated Green Warbler. Dendroica virens. No map.

According to Udvardy, this is a species of the boreal forest, but it does follow the extent of the plant tension zone into southeastern Wisconsin where it can be found nesting in the tall pines along Lake Michigan. Weise has recorded it three times in the bog forest, in the summer of 1972 and during the first week of June in 1970 and 1976. Because of its preference for pines, it is probably not to be expected regularly; there was no evidence of nesting.

Black-throated Blue Warbler. Dendroica caerulescens. No map.

A warbler of the boreal forest, it is uncommon in far northern Wisconsin and generally does not follow the tension zone into southern Wisconsin. Weise recorded what was possibly a late spring migrant on 1 June 1974; nesting was not suspected.

Chestnut-sided Warbler. Dendroica pensylvanica. Map 8.

A transitional forest species ranging into southeastern and west-central Wisconsin in localized areas, sometimes away from forests of the tension zone. Singing males are frequently heard in summer in the shrub understory of the upland deciduous forest of the Field Station, but they are seldom found twice in the same place and are believed to be non-breeding "floaters".

Northern Waterthrush. Seiurus noveboracensis. Map 9.

This species of the boreal forest is found primarily in bogs in northern Wisconsin, but relict populations follow the plant tension zone into southeastern Wisconsin in suitable and large enough expanses of habitat. The Cedarburg Bog

has the largest and most southern population of this species in this southern extension of its range. It is rather common every summer in the bog forest where its loud, ringing song is heard during late May through early July. In the string bog, it has been found in smaller numbers around the larger forested clumps. The nests of this species are usually well hidden among the roots of a hummock or windfall; family groups have been found.

Mourning Warbler. Oporornis philadelphia. Map 10.

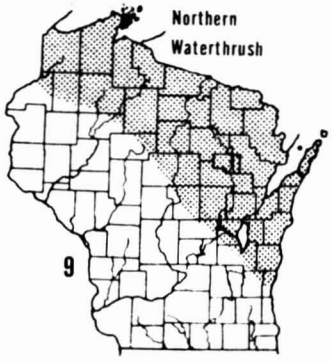
According to Udvardy, this species is a member of the boreal forest fauna. In Wisconsin, it is found into southeastern Wisconsin in wet shrub or swamp forest habitat, sometimes well away from relict plant communities associated with the bogs and forests near Lake Michigan. At the Field Station, it can be most easily found by listening for its "churry-churry-churry" song in the swamp hardwood forest shrubs along the edge of Cedarburg Bog as well as in other nearby swamps and bogs. Weise has found families of this species in the areas described above.

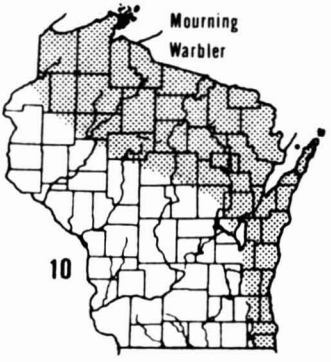
Swamp Sparrow. Melospiza georgiana. No map.

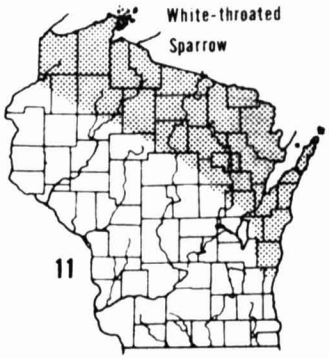
Found throughout Wisconsin, this very common wet shrub species need hardly be mentioned. Udvardy includes it as a species of the boreal forest as it has an extensive range through Canada, and in southern Wisconsin, it is near the southern edge of its overall range in the midwest. At the Field Station, its musical trill can be heard from wet shrubby areas throughout the area.

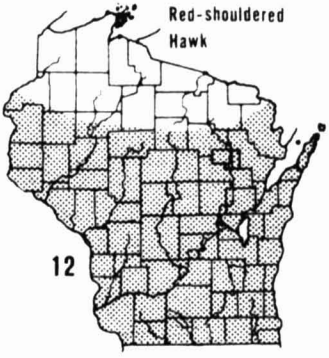
White-throated Sparrow. Zonotrichia albicollis. Map 11.

A species of the boreal forest, it is common in the bogs of northern Wisconsin south into the southeastern extent of the tension zone in the larger bogs. The largest southern population of this species occurs at the Cedarburg Bog; throughout the midwest there are no other more southern relict groups. Its "Oh Canada, Oh Canada" song can be heard from the boardwalk in the string bog where Weise estimated 72 pairs in 1972. Both nests and fledglings have often been found.









OTHER MARGINAL SPECIES AND SPECIES OF LOCAL DISTRIBUTION

Black Tern. Chlidonias niger. No map.

A declining Wisconsin tern, the Black Tern is found locally in marshes and lakes throughout the state. It formerly nested in Long Lake until about 1975, but is now extirpated from the area. If nesting platform programs in other areas succeed, it may be possible to reintroduce or attract terns into the marshes near the Cedarburg Bog, including the Forster's Tern (Sterna forsteri) which is an endangered Wisconsin white tern which nests very locally in eastern Wisconsin. It, however, has not been recorded as a nesting bird in Mud Lake in recent times.

Upland Sandpiper. Bartramia longicauda. No map.

Found throughout Wisconsin in fallow fields, this species has a very local distribution in the state and is now considered threatened. It has been regularly found in fields, probably nesting, within several miles of the Field Station, but no nests have been found at the Field Station itself.

Red-shouldered Hawk. Buteo lineatus. Map 12.

A soaring hawk of the eastern deciduous forest that has the northward edge of its range in Wisconsin, very local in moist and riverbottom woods and now considered a threatened species in the state. The Field Station has had at least one pair in the upland woods each year. During the early part of the nesting cycle, the pair is very vocal and easily seen during courtship displays.

Red-bellied Woodpecker. Melanerpes carolinus. Map 13.

A southern forest species just reaching central Wisconsin as a permanent resident. At the Field Station, one or two pairs have been present in the upland woods since at least 1960.

Sharp-shinned Hawk. Accipiter striatus. No map.

This small "bird hawk" once had a very extensive range throughout Canada, Wisconsin and the East in deciduous, transitional and boreal forests. Its range is now highly fragmented due to deforestation and pesticides, with scattered nesting being

reported only from extensively forested areas; it is more common in northern Wisconsin. At the Field Station, it has been noted in early June at least once in the bog and can be expected again. Breeding has never been proven.

Cooper's Hawk. Accipiter cooperii. No map.

The history of this species in Wisconsin is very similar to that of the Sharp-shinned Hawk; Cooper's Hawks are now less common and are considered an endangered species in the state. In early May of 1982, Weise found an active nest with an apparently incubating female near the Field Station property. This nesting is unprecedented in this area.

Pileated Woodpecker. Dryocopus pileatus. No map.

This crow-sized Woodpecker of North American forests is very local in its distribution, being found only where there are extensive tracts of wooded land. In southern Wisconsin it is rather uncommon. In fall, 1976 one male took up permanent residence in the upland woods, possibly as a result of the March, 1976 ice storm which resulted in much dead wood (Matthiae and Whitford 1975). It has advertised each spring with its loud Flicker-like call, but has never mated. This individual ranges widely throughout the Field Station area and can be seen flying from one wooded tract to another.

Barred Owl. Strix nebulosa. No map.

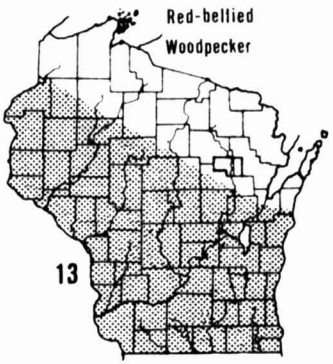
Very local in its distribution throughout southeastern Wisconsin, but fairly common throughout the rest of the state. The permanent resident population at the Field Station and surrounding areas is one of the largest in the eastern urbanized counties. Two or three pairs used to nest each spring in the upland woodlots near the Field Station or in the bog forest, but it seems to be less numerous in recent years.

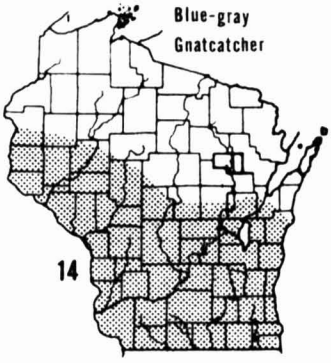
Acadian Flycatcher. Empidonax acadicus. No map.

If one considers the rare Yellow-bellied Flycatcher as a member of the Cedarburg Bog avifauna, plus the other three Empidonax flycatchers already mentioned, it is apparent that the Field Station and the nearby Cedarburg Bog is probably one of the few places where the northern members of this genus can meet the southern ones. The Acadian flycatcher is a southern species of moist forests and riverbottom woods that is found locally in southern Wisconsin. In eastern Wisconsin, it is not found much farther north than the Field Station, but in the western counties, it can be found in woodlands, especially along the Mississippi River, to central Wisconsin. At the Field Station, one or two pairs can be found in the upland woods. Weise has found family groups there on several occasions. The singing birds can be heard giving their "spit-chee" song from just beneath the canopy of the woods.

Blue-gray Gnatcatcher. Polioptila caerula. Map 14.

A small flycatcher-like species of southeastern United States forests that reaches into central Wisconsin; it is fairly common in the moist woods along the Milwaukee River several miles to the west of the Field Station, but has never been found nesting there. It should be watched for in the upland woods.





Short-billed Marsh Wren. Cistothorus platensis. No map.

Found locally in wet and grassy fields throughout Wisconsin. The spring arrival dates of this species vary considerably, with some birds notoccurring in apparent breeding areas until early July. At the Field Station, several pairs can be found in the wet meadows east and west of the lab building each summer; nests have been found in several years.

Yellow-throated Vireo. Vireo flavifrons. No map.

Although this southern and eastern deciduous forest species reaches through most of Wisconsin in the breeding season, it is rather local, apparently requiring woods with a sufficient amount of understory shrub. At the Field Station, it is seen and heard only irregularly. In years of its appearance in the upland woods, only one or two singing birds have been noted. Breeding has never been confirmed.

Black-and-white Warbler. Mniotilta varia. No map.

Found throughout Wisconsin in deciduous and more commonly in transitional forests farther north. It reaches southern Canada and is at the western edge of its range in Wisconsin; it is not really marginal in this area in terms of being a relict species from the north, but is a localized species being found in forests throughout the eastern United States. At the Cedarburg Bog, it is a regular, but widely scattered species of the bog forest and less commonly the string bog; evidence of nesting is the presence of family groups.

Prothonotary Warbler. Protonotaria citrea. No map.

A southern species that nests in tree cavities near water, it is most common along larger rivers in western Wisconsin. Weise found a singing male on 4 June 1974 in Beyer's Woods near a woodland pond; it was clearly attracted to a potential nest hole but had no mate and was not seen again in the area.

Cerulean Warbler. Dendroica cerulea. Map 15.

A species of the eastern deciduous forest found in mature stands of woods as far north as the central part of the state. This species is as local in southeastern Wisconsin as are the mature stands of woods it requires for breeding.

The upland woods at the Field Station has one or two breeding pairs each year. The males can be heard singing their rapid, buzzy song from just beneath the canopy of the forest.

Kentucky Warbler. Oporornis formosus. No map.

A southern species, quite rare in southeastern Wisconsin in deciduous forest understory. Weise has found this species but once in a small hardwood swamp (an atypical habitat) 0.25 miles northwest of the Field Station property on 10 June 1975. Care must be taken not to confuse the song of this species with that of the Ovenbird.

Summer Tanager. Piranga rubra. No map.

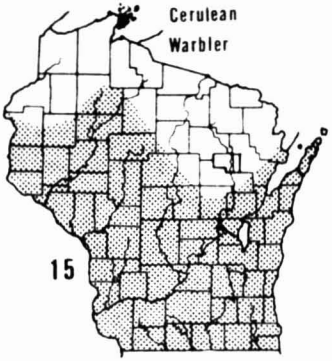
Very rare in southern Wisconsin, this southern species can be found in deciduous forests with the common Scarlet Tanager. It is probably often missed in southern Wisconsin as its song is similar to the Scarlet's and the bird is not easily seen in the canopy of the forest. Weise trapped one bird on 5 May 1968 at the Field Station for the only Field Station record (Weise 1968). There was no evidence of breeding.

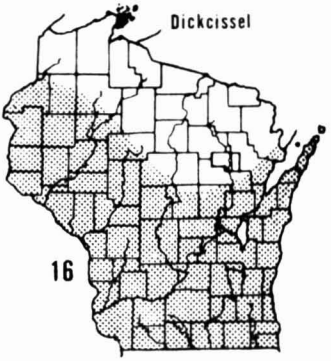
Dickcissel. Spiza americana. Map 16.

This western prairie species shows yearly population fluctuations especially at the eastern edge of its range which occurs in southeastern Wisconsin. Some fallow fields north of the Field Station had 4 singing birds in 1980. It should be watched for in the prairie restoration areas of the Field Station. Successful nesting of these occasional birds is doubted.

Western Meadowlark. Sturnella neglecta. No map.

A prairie species found in habitat similar to that of the common Eastern Meadowlark. It ranges into Michigan and is distributed throughout Wisconsin, but is rather local in southeastern Wisconsin. It has occasionally been found in the fields near the Field Station and should be listened for as its plumage is very similar to that of the Eastern Meadowlark, but its song is different.





Henslow's Sparrow. Ammodramus henslowii.

Distribution in Wisconsin is similar to that of the Dickcissel, Map 16. A grassland species reaching into central Wisconsin, it is found in fallow fields rather locally. At the Field Station 3 or 4 pairs nest in the fields west and south of the lab each year. The Grasshopper Sparrow (Ammodramus savannarum) is another grassland species which has recently been found about 2 miles north of the Field Station as has the Clay-colored Sparrow (Spizella pallida) a bird of young pine stands in old fields. Both of the above species are rather local in southeastern Wisconsin, but could be expected at the Field Station.

CONCLUSIONS

Forty-eight species of birds are listed here as being marginal or local in their distribution at the UWM Field Station and the Cedarburg Bog. Of these, 19 have close associations with either the boreal or transitional forests of Canada and northern Wisconsin. Twelve of these marginal species from the north probably reach the absolute southern extent of their overall range, at least in the Midwest, in Cedarburg Bog. Six of these 12 are regular and breed in the bog every year. Included in this group are Brown Creeper, Northern Waterthrush, Nashville Warbler, Canada Warbler, Mourning Warbler and White-throated Sparrow; the other six species of the northern forests are irregular or have been recorded in the bog only once or twice and are not known to have bred. One species, the Black Tern, is now extirpated from Long Lake in the bog.

Twelve deciduous forest species are also marginal or local, although none have summer occurrences in the Field Station that are at the absolute ends of their ranges. Ten prairie or fallow field species are also mentioned, plus seven others of local occurrence from various habitats.

It can be seen that in addition to the larger marginal assemblages representing the prairie and deciduous forest that occur at the Field Station there are 19 species that are characteristic of boreal and transitional forests, illustrating the fact that the marginal geographical limits of these species ranges are ecologically defined by the relict plant communities of the Cedarburg Bog.

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