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## Nocturnal Communal Winter Bird Roosts in Northwestern Arkansas

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Massive nocturnal bird roosts have attracted the interest of ornithologists from the early days (Widmann 1895, M'Gregor 1897, Emlen 1902, MacReynolds 1917, McAtee 1926, Monk 1933 Bailey 1938, Loefer and Patten 1941, Kalmbach 1932, Cruickshank 1937) and have continued to be a nuisance for the general public. Large nocturnal roosts occupied by a mixture of blackbird species plus European Starlings (*Strunus vulgaris*) are a common occurrence in winter in eastern Arkansas where lowland agricultural acreages are prevalent (Neff and Meanley 1957, Meanley 1971). A roost near Slovac, Arkansas, in Prairie County, harbored over 15 million birds. Meanley began investigations in Arkansas during the mid 1950s to mid 1960s. Later he reported a survey of roosts throughout the USA, totaling 538 million blackbirds and starlings, mostly occupying the eastern part of the nation (Meanley and Webb 1965, Meanley and Royall 1976). Meanley told me that in the winters from 1960 to 1965 there were 17 roosts numbering at least one million blackbirds and starlings in 13 counties in the eastern half of Arkansas, and 12 of these roosts contained over a million birds of which 5 had 4 million birds and 2 had 6 and 8 million respectively (Meanley, *pers. comm.*). Studies of roosts usually led to developing methods for controlling them to reduce the amount of crop depredation (Neff and Meanley 1957, Meanley 1971, Pierce 1973).

The roost situation is quite different in the northwestern part of Arkansas where the winter nocturnal mixed species roosts are much smaller than in the eastern part of the state. However, the attention to winter roosts in northwestern Arkansas has compiled perhaps the longest record in existence; a total of 21 roosts counted in 25 years from 1985 through 2009. The counts also are unique in that each winter a group of observers simultaneously counted birds at the same roost arriving at day's end thus enabling the calculation of a mean population plus a variance and standard error for each count. This made it possible to perform standard statistical analyses concerning the roosts, something that had never been done previously.

Visiting a local roost in the Fayetteville or Springdale, Washington County, area in late January or

early February was an annual exercise in the General Ecology course at the University of Arkansas in Fayetteville. The class reached the roost site in the afternoon before the birds began arriving and stayed there until darkness when all the birds had roosted. The class was positioned where there was a broad view of the landscape in order to see birds arriving from all directions. The students were given instructions concerning how to count arriving birds, beginning with counting low numbers building up to counting units of 100 birds and then to units of 1000. This produced multiple counts of the same roosts, the number corresponding to the number of students in the class each year, and allowed standard analysis of variance of the roost data employing Duncan's multiple range procedure, which calculates significant differences, or non significance, between the mean counts of the various roosts. The number of students counting varied from 10 to 37 yearly, averaging 21. It sometimes happened that a student's results was an outlier compared to the rest of the class giving obvious low counts from students who were not paying attention or high counts from overzealous students. These outliers were removed from the data sets.

The students were also taught to recognize the silhouettes and flight patterns of starlings, Common Grackles (*Quiscalus quiscula*), combined blackbird species, mostly Red-winged Blackbirds (*Agelaius phoeniceus*) and Brown-headed Cowbirds (*Molothrus ater*), and American Robins (*Turdus migratorius*). These counts only produced relative abundances of birds at the roost and were not subjected to standard statistical analyses.

There was commonly only one large roost in the Fayetteville-Springdale area, and that is the one that was counted. Most of the roosts were in and around Fayetteville. Sometimes the nearest roost was in or near Springdale.

The largest roosts in northwestern Arkansas were a little over 150,000 birds in size and roosts this size were significantly larger than all the other roosts encountered (Table 1). This is much smaller than roosts commonly reported in the eastern part of the state. The next roost sizes in the northwest were from

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over 10,000 birds to over 12,000 which overlapped in significance with the 9000+ roost. There were many roosts encountered that were below 6000 birds down to a low count of 564 birds showing much overlap in the variance analysis, but the roosts below 7000 birds were significantly smaller than the rest.

Table 1. Mean population at the roosts through the years. N is the number of observers independently counting birds at roosts. Means opposite the same letters are not significantly different, opposite different letters are significantly different. The columns with C and E further differentiate medium sized roosts, (Robn is a roost of only robins, Fall is the only fall roost, which was in November.)

	Mean	N	Year
A	151991	20	1992
A	151527	15	1986
B	123523	15	2000
B	117658	21	1991
B	117147	33	1993
C B	104701	13	2003
C	95275	17	1988
D	51543	25	1985
E D	31153	34	1994
E D	31119	10	2008
E D	30417	24	1998
E F	22357	34	1997
E F	16130	22	1999
F	6885	13	2007
F	5440	26	2001
F	4079	17	1987
F	2030	16	2009Robn
F	1416	25	2001Fall
F	1152	21	2006
F	694	37	1996
F	564	13	1990

The habitats occupied by the bird roosts were predominantly in dense cane thickets (Table 2), often exotic cane species planted as landscaping in home owners' yards in town, but native cane (*Arundinaria gigantea*) growing along a nearby river was used too. Next in order of use were dense woody deciduous stands followed by pine groves and dense stands of eastern red cedar (*Juniperus virginiana*).

Composition of the bird species on roosts was not recorded for every roost session. Table 3 shows this information for the roosts for which the information was available. It is evident that populations of different species changed considerably from year to year with starlings usually dominating in overall numbers. The

Table 2. Bird roost habitats (2 roosts were noted where birds were not counted).

Habitat	Number of Roosts	Percent
Cane thicket	13	56
Dense deciduous	5	22
Cedar copse	2	9
Pine grove	3	13
Total	23	100

Table 3. Groups of birds occupying roosts in different years (bird groups listed in order of decreasing abundance). Consult Appendix for specifics on bird species present.

Groups of birds on roosts	Year(s)
Starlings, blackbirds, grackles, robins	1991 2001
Grackles, blackbirds, starlings, robins	1996
Starlings, blackbirds, grackles	1992 1993 2000
Grackles, starlings, blackbirds	2003 2007
Starlings, blackbirds	1986 2008
Starlings, grackles	1987 1999
Starlings, robins	2006
Starlings only	1990
Robins only	2009

absence of grackles during some years was reflected on the Fayetteville Christmas Bird Counts during the same period when no grackles or only a few were found. However, robins roosted every year using an evergreen broadleaf hedge at a Fayetteville cemetery even though they were absent at the main roost. Robins regularly started the roosts in early winter later joined by starlings, grackles, and blackbirds forcing the robins to the roost periphery and finally out of the roost. In 2009 there was a huge roost in a very dense stand of cedars, but before the class arrived there was a massive ice storm that completely glazed the cedar thicket causing roost abandonment. Therefore, the class studied a robin roost in 2009 that survived the storm in a pine grove.

Year to year consistency of roost sites was also noted. Out of 24 roost sites found, only 6 were repeats at the same site. Two were at the same site as the year before, 4 were at the same site after skipping some years. Returning to traditional roost sites was therefore infrequent.

Linear regression analysis with regard to roost

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sizes through the years showed that the relationship was not significant ( $P>0.05$ ) indicating that roosts did not increase or decrease in size through the flow of years.

The significance of this study is that it describes the characteristics of the winter nocturnal bird roosts in northwestern Arkansas, a part of the state where roosts are moderate to small in size. European Starlings dominate the roosts (Table 3). The study is also remarkable in that the data was compiled for 21 individual years over a 25 year period making it a unique long term study in the study of winter bird roosts. And most importantly a group of counters simultaneously and independently counted the birds as they arrived in the afternoon to occupy the roosts thus making it possible to generate mean population levels and standard errors enabling standard statistical analyses (Table 1). This is a first in the study of communal nocturnal bird roosts.

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**Appendix**

Clarification of avian terminology in Table 3:

The word "Starlings" refers to the European Starling (*Sturnus vulgaris*).

The word "Blackbirds" refers to large mixed flocks containing both Red-winged Blackbirds (*Agelaius phoeniceus*) and Brown-headed Cowbirds (*Molothrus ater*) plus small numbers of other dark species in the Family Icteridae.

The word "Grackles" refers to the Common Grackle (*Quiscalus quiscula*).

The word "Robins" refers to the American Robin (*Turdus migratorius*).