PHEASANT NESTING STUDIES ON PUBLIC LANDS

Study Completion Report
Wildlife Research and Surveys Projects
Federal Aid Project No. W-115-R-1 (1973)

by

Allen L. Farris

Iowa Wildlife Research Bulletin No. 9

Iowa Conservation Commission
Wildlife Section

Des Moines, Iowa
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Phase A, Study No. 6

Job No. 1: Pheasant Nesting in Brome Grass Vegetated Rights-of-Way on Interstate 80

Job No. 2: Pheasant Nesting in Hayfields on the Rathbun Wildlife Management Area

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ABSTRACT

Job No. 1: Pheasant Nesting in Brome Grass Vegetated Rights-of-Way on Interstate 80

The study was conducted in east-central Iowa in Poweshiek and Iowa Counties. During the two years of study 35 sample plots were searched totaling 23.7 acres (9.6 hectares). The average nest density was 0.97 nests per acre (2.40 per hectare) and there were 0.38 successful nests per acre (0.94 per hectare). Sample plots with vegetation rated as good nesting cover contained more nests than other plots. Brome grass was the dominate vegetation on most plots and around most nests. A small, but disproportionate, number of nests were located in switchgrass. It was estimated that about 1,000 juvenile pheasants were produced into the fall population on this 37 mile (59.5 kilometer) study area. Recommendations are made for future seedings and management of highway roadsides.

Job No. 2: Pheasant Nesting in Hayfields on the Rathbun Wildlife Management Area

The study was conducted on the Rathbun Wildlife Management Area in south-central Iowa. In the two year study 31 pheasant and 5 quail nests were located in harvested hayfields. Only 16 pheasant and 4 quail nests provided usable data. Six of the 16 pheasant and two of the four quail nests did or would have hatched before July 4. Recommendations are made for the management of nesting cover on state wildlife management areas in Iowa.

STATE OF IOWA

PROJECT NO. W-115-R-1 PHASE A STUDY NO. 6

JOB NO. 1

Title of Job: Pheasant Nesting in Brome Grass Vegetated Rights-of-Way on Interstate 80

Period Covered: Nesting seasons of 1972 and 1973.

Objective:

To determine pheasant nesting density and success on Interstate 80 rights-of-way in Poweshiek and Iowa Counties that are vegetated primarily with brome grass.

Background:

Roadsides represent large land acreages that have the potential to provide safe nesting habitat for ring-necked pheasants. However, these areas must be established in suitable cover crops and maintained with proper management. To date little is known about the number of pheasants produced in roadside vegetation on Iowa's primary highways and interstates. Nomsen (1960) found, in a one year study, unmanaged secondary roadsides contributed significantly to pheasant production in northern Iowa. Studies from Illinois have reported on the management of secondary roadsides as pheasant nesting cover (Joselyn 1970; Joselyn and Tate 1972; and Joselyn, Warnock and Etter 1968). These studies have shown that the density of successful nests per acre are higher on managed seeded roadsides (0.8) than on unmowed controls (0.5-0.6) and mowed control roadsides (0.2) (Joselyn 1970).

The Iowa Highway Commission, in cooperation with the Conservation Commission, has agreed to delay mowing of highway rights-of-way until after early July each year. However, no other management is occurring on these highway roadsides. This study was designed to obtain estimates of pheasant nesting density and productivity on these highway roadsides. Also, data collected should provide a basis for recommendations relating to future management of Iowa roadsides as pheasant nesting areas.

Procedures:

Initially, potential sample plots were located by cruising the Interstate and noting the plot locations on a county highway map. Plots that were not located near secondary access roads were eliminated because there was

no access. Areas that were very narrow or on steep side-hills were also eliminated.

Sample plots that were searched were located on both sides of Interstate 80 between the Grinnell exit, Poweshiek County, and the Williamsburg exit, Iowa County, a distance of 37 miles (59.54 kilometers). Sample plots were approximately 710 feet (216.5 meters) long and of variable width, averaging about 38 feet (11.6 meters). All plots that were searched in 1972 were searched in 1973, with one exception. Additional plots were searched in 1973. Most of the search effort was in June of both years, and each plot was searched only once each year. Searching for nests was accomplished by a crew on foot parting the vegetation with sticks. For each nest located a form was completed recording the date, plot number, dominant vegetation on the plot and within three feet (0.91 meters) of the nest bowl, distance and direction from the boundary fence, number of eggs and current status, if known. Whenever possible, the following additional data for each nest was recorded: date established, date hatched, number of fertile eggs, number of eggs hatched, days of incubation and ultimate fate. Nests that were active when found were checked periodically to determine their fate.

During the searching operation each plot was subjectively rated as poor, fair or good for pheasant nesting cover. This subjective evaluation was based upon vegetation height and density, litter depth and if vegetation had fallen down and matted or remained standing.

Vegetation:

Brome grass was the dominant plant species on most of the plots. There were, however, other species that were present in sufficient amounts to warrant mention. When present, switchgrass generally occurred as scattered isolated clumps in the brome except on plot 14 where one-sixth of the area was a block of switchgrass. Alfalfa, when present, was usually widely scattered and not present in large blocks. Sweet clover occurred as fairly small, widely scattered clumps within the brome. Birds-foot trefoil was the most abundant legume. In places it formed extensive dense mats. Two plots were in low lying areas and were vegetated with a combination of sedges, horsetail, trefoil and fescue. These two plots had very poor nesting cover.

Results and Analysis:

In 1972, 14 plots totaling 9.9 acres (4.0 hectares) yielded 9 pheasant nests, 2 of which hatched (Table 1). During 1973, 21 plots were searched and they contained 13.8 acres (5.6 hectares) and 14 pheasant nests. Seven of these nests hatched. During the two-year study, sample plots contained about one nest per acre (2.4 per hectare) and 0.38 hatched nest per acre (0.94 per hectare).

Table 1. Pheasant nesting density and success on Interstate 80 rights-of-way.

Year	No. plots searched	Searched acres	Searched (hectare)	No. nests	Nests/ acre	Nests/ (hectare)	No. hatched nests	Hatched nests/ acre	Hatched nests/ (hectare)	Average No. chicks/ hatched nest
1972	14	9.9	(4.0)	9	0.91	(2.25)	2	0.20	(0.49)	14.0
1973	21[a]	13.8	(5.6)	14	1.02	(2.52)	7	0.51	(1.26)	13.0
Combined	35	23.7	(9.6)	23	0.97	(2.40)	9	0.38	(0.94)	13.2

[a]Thirteen of the plots searched in 1972 were also searched in 1973.

Other studies of pheasant nesting in roadsides are not directly comparable to this study because they have involved secondary roadsides. However, the number of hatched nests found per acre in this study is slightly less than results from other unmanaged roadsides (Table 2). The density of successful nests found in this study exceeds those found by Klonglan in the 1962 study. Highest nesting densities were reported by Klonglan and Joselyn in managed, seeded roadsides. However, the alfalfa roadsides Klonglan reported on were mowed, and the resulting density of successful nests reflects this disturbance.

Evaluation of subjective cover ratings shows increased nest density in plots rated as good nesting cover (Table 3). Plots rated as good nesting cover accounted for 49 percent of all acreage searched.

During two years of study 22 different plots were searched for pheasant nests. On 20 of these plots brome grass was the dominant plant species; however, on 5 of these plots other plant species were common (Table 4). Twenty-three nests were found on these 22 different plots. The dominant vegetation within 3 feet (0.91 meter) of each nest was recorded (Table 5). Most of the nests (15) were located in vegetation dominated by brome and 5 nests were located in switchgrass. It is surprising to find this many nests in switchgrass considering the extremely small amount of this species present on the plots. The proportion of nests located in switchgrass far exceeded the proportion of the total land searched that was vegetated with switchgrass. Part of the apparent attractiveness of switchgrass is the residual cover it provides early in the spring. Even though this warm season plant does not start new growth early in the spring it does provide excellent residual cover because the stems are very stiff and not mashed down by winter snows.

It is enlightening to use the data collected during this study to estimate production of pheasants on the 37 mile (59.5 kilometer) study area on Interstate 80. A conservative figure of 35 feet (10.7 meters) was used for the average width of the right-of-way. The other data necessary were collected from this study except an estimate of chick survival to the fall. Baxter and Wolfe (1973) compared data from several authors with their Nebraska data and found that about 50 percent of the chicks hatched survive until fall. Using these data, it is estimated that about 1,000 juvenile pheasants are produced into the fall population from this segment of Interstate (Table 6). It can be seen that the number of pheasants would be substantially increased if all the vegetation were similar to that rated as good nesting cover in this study. Comparison with the hatched nest density in managed secondary roadsides in Illinois reveals a doubling of production.

Conclusions:

This study has shown that pheasant nesting density on the Interstate 80 roadside study area is comparable to nesting densities reported for secondary roadsides by other authors where no special cover plantings have been made. Also, the density of hatched nests was similar to or

Table 2. Summary of findings from roadside pheasant nesting studies.

Study	State	Nests/ acre	(hectare)	Years of study	Hatched nests/ acre	(hectare)	Type of road	Treatment
Baskett (1947)	Iowa	1.09	(2.69)	3	0.53	(1.31)	Secondary	Mowed late in June
Klonglan (1962)	Iowa	1.04	(2.57)	2	0.11	(0.27)	Secondary	Not mowed
Nomsen (1960)	Iowa	1.40	(3.46)	1	0.47	(1.16)	Secondary	Unknown
Klonglan (1954)				1				
Alfalfa	Iowa	3.93	(9.71)		0.30	(0.74)	Secondary	Mowed
Other	Iowa	0.60	(1.48)		0.30	(0.74)	Secondary	Unknown
Joselyn (1970)	Illinois			8				
Managed		2.6	(6.42)		0.80	(1.98)	Secondary	Not mowed
Control		1.8	(4.45)		0.50	(1.24)	Secondary	Not mowed
		0.8	(1.98)		0.20	(0.49)	Secondary	Mowed
This study	Iowa	0.97	(2.40)	2	0.38	(0.94)	Interstate	Not mowed

Table 3. Pheasant nest densities in relation to cover quality for 1972 and 1973 combined.

	Cover rating					
	Poor		Fair		Good	
Number plots	10		8		17	
Number acres (hectares)	7.3	(2.95)	4.9	(1.98)	11.6	(4.69)
Number nests	3		3		17	
Number hatched nests	2		1		6	
Nests/acre (hectare)	0.41	(1.01)	0.61	(1.51)	1.47	(3.63)
Hatched nests/acre (hectare)	0.28	(0.69)	0.23	(0.57)	0.52	(1.28)

Table 4. Dominant vegetation on 22 different plots.

Dominant species	Number of plots
Brome total	20
Brome	15
Brome and alfalfa	1
Brome and trefoil	3
Brome with a block of switchgrass	1
Low area with sedges, horsetail, trefoil	2

Table 5. Dominant vegetation within 3 feet of 23 different pheasant nests.

Dominant species	Number of nests
Brome	13
Brome and alfalfa	2
Switchgrass	4
Switchgrass and alfalfa	1
Not recorded	3

Table 6. Calculated production of pheasants on the Interstate 80 study area.

$$\frac{\text{35 feet right-of-way x 5,280 feet per mile}}{\text{43,560 square feet per acre}} = \text{4.24 acres per mile (1.07 hectares per kilometer)}$$

4.24 acres per mile x 74 miles of right-of-way = 313.9 acres of right-of-way (127.1 hectares)

313.9 acres x 0.38 hatched nests per acre[a] = 119.3 hatched nests
313.9 acres x 0.52 hatched nests per acre[b] = 163.2 hatched nests
313.9 acres x 0.80 hatched nests per acre[c] = 251.1 hatched nests

119.3 hatched nests x 13.2 chicks per hatched nests = 1,574.7 chicks produced
163.2 hatched nests x 13.2 chicks per hatched nests = 2,154.6 chicks produced
251.1 hatched nests x 13.2 chicks per hatched nests = 3,314.8 chicks produced

1,574.7 chicks produced x 0.60 chick survival = 995 juveniles added to fall population
2,154.6 chicks produced x 0.60 chick survival = 1,293 juveniles added to fall population
3,314.8 chicks produced x 0.60 chick survival = 1,989 juveniles added to fall population

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[a]Figure based on all plots.

[b]Figure based on plots rated as good.

[c]Figure based on managed secondary roadsides in Illinois from Joselyn (1970).

slightly lower than those reported in the literature. Good nesting cover occupies only about one-half the roadside but about 57 percent of the pheasants are produced in this cover. Brome grass was the dominant plant species on the right-of-way, and most nests were located in this vegetation. Based on a small sample, there is an apparent preference by pheasants to nest in or near switchgrass because the proportion of nests located in switchgrass far exceeded the proportion of the roadside covered with this grass. The Interstate roadsides provide nesting cover, and many pheasants are produced in the vegetation on these roadsides. In many places the litter accumulation is becoming quite deep and no doubt detracts from the roadside as a nesting area.

Recommendations:

The recommendations put forth are a result of data and experience gained from this study as well as insight gained from other authors. Although

the study was limited to a section of Interstate 80 in east-central Iowa, recommendations derived from this study should be applicable to most major highway roadsides in Iowa.

1. Cooperation be enhanced and continued between the Iowa Highway and Conservation Commissions.

2. In the future highway and interstate roadsides be seeded with:

   a. A combination of smooth brome and vernal alfalfa or
   b. Blackwell switchgrass and vernal alfalfa, or
   c. Blackwell switchgrass.

3. Seeding of crowned-vetch, birds-foot trefoil and similar mat-forming species be limited to steep slopes and other areas with high erosion potential. These plant species offer little suitable nesting cover for pheasants. Among the grasses, fescue is not a desirable nesting cover.

4. The present policy of not mowing roadides until after July 1, other than spot mowing for weed control, should be continued and if possible delayed until July 31.

5. Ideally, roadside vegetation should be burned periodically (every 5 or 6 years) in February, March or early April to reduce litter accumulation and rejuvenate vegetative cover. An alternative method of reducing litter accumulation would be to mow the roadside vegetation every other year with a rotary mower after July 31.

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STATE OF IOWA

PROJECT NO. W-115-R-1 PHASE A STUDY NO. 6

JOB NO. 2

Title of Job: Pheasant Nesting in Hayfields on the Rathbun Wildlife Management Area

Period Covered: Nesting seasons of 1972 and 1973.

Objective:

To determine, more precisely, periods of establishment and potential hatching of pheasant nests on public management lands in relation to hay harvest after July 1.

Background:

The basic goal of a state-owned wildlife management area should be the maximum production of wildlife within economic limitations. Most wildlife areas contain cropfields that are managed in a rotation system to provide both food and cover. Current management plans on these public wildlife management lands allow hay harvest after July 1. No hay cutting is allowed after August 1 on these wildlife areas. This is designed to provide residual cover in the spring to attract hens early in the season. Klonglan (1962) found, on private lands in southern Iowa, that 90 percent of the pheasant nests hatched by the end of June. However, this hatching data is probably skewed toward early summer because most late nests would be destroyed by haying operations. The current management program of mowing hayfields after July 1 could be detrimental in two ways:

1. The date of mowing may be early enough to destroy late first nesting attempts, and

2. Mowing could be destroying renesting attempts of hens whose first nest was abandoned or destroyed.

Procedures:

During 1972 three periods were established when the farm cooperators could harvest the hay crop. These periods were: June 12-17, after July 1, and July 24-29. The hay crops that were left unharvested until the third period were very undesirable and the farm cooperators did not attempt to harvest these fields. In 1973 all farm cooperators were allowed to harvest the hay crops after July 1.

Project personnel maintained periodic contact with the farm cooperators during the haying seasons. If possible, one of the project personnel rode the tractor during hay cutting; otherwise the fields were walked by a crew after mowing, raking and/or baling. In most cases the fields were checked twice - once during or after cutting and again after raking and/or baling. When a nest was found, an attempt was made to determine the stage of incubation so establishment and projected hatching dates could be determined.

Results and Analysis:

During the two years of this study 31 pheasant and 5 quail nests were located (Table 7). Of these, only 16 pheasant and 4 quail nests provided usable data. Four pheasant and 2 quail nests had hatched before mowing occurred. All four of the pheasant nests had hatched before July 4. One quail nest hatched before July 2 and the other one before July 10.

Table 7. Fate of pheasant and quail nests found in hayfields on the Rathbun Wildlife Management Area in 1972 and 1973.

Fate of nest	No. of nests (percent)			
	Pheasant		Quail	
No data obtainable	9	(29)	0	
Abandoned	2	(6)	1	(20)
Abandoned and/or destroyed	4	(13)	0	
Active and destroyed by mowing	12	(39)	2	(40)
Hatched	4	(13)	2	(40)

Twelve of the 31 pheasant nests found were active when they were destroyed by mowing operations. Of these twelve nests only two would have hatched before July 4 (Table 8). Two quail nests were destroyed by mowing operations. One quail nest would have hatched by July 11 and the other after August 5.

If we assume that all hatched nests would have hatched before mowing and no mowing occurred before July 4, we find that most of the nests would still be destroyed by mowing (Table 9). The nesting season of 1973 was later than normal because of a cold, rainy spring. This bias no doubt affects the data presented in this report. However, this also illustrates part of the year-to-year variation that affects nesting success.

Table 8. Relation of incubation stage and earliest possible hatching date to mowing date of 12 pheasant nests found destroyed in hayfields on the Rathbun Wildlife Management Area in 1972 and 1973.

Mowing date	Incubation	Earliest possible hatching date
June 12	None	July 5
June 15	9 days	June 29
June 15	None	July 8
June 19	19-20 days	June 22-23
July 4	Unknown	Post July 4
July 6	18 days	July 11
July 7	13 days	July 17
July 7-9	Unknown	Post July 4
July 16	23 days	July 16*
July 16	None	Post August 8
July 16	None	Post August 13
July 27	18 days	August 1

*Hit by mower when hatching - 3 chicks in the nest.

Table 9. Number of pheasant and quail nests that did or would have hatched before and after July 4 on the Rathbun Wildlife Management Area in 1972 and 1973.

	Pheasant		Quail	
Year	Before July 4	After July 4	Before July 4	After July 4
1972	5	5	1	0
1973	1	5	1	2
Combined	6	10	2	2

To further illustrate the possible impact of hay mowing after July 1 we should incorporate the data given by Klonglan (1962). By recalculating Klonglan's data it can be seen that 51 percent of all nests established would be safe from mowing disturbance if no mowing occurred before July 1 (Table 10). Also, 23 percent of the nests would be destroyed. Twenty-six percent fall in the June 21 to July 5 hatching period. Of this 26 percent approximately one-third would be subject to disturbance with hay mowing occurring after July 1. From this it can be seen that by mowing after July 1, 68 percent of all nests established would have had enough time to hatch, but 32 percent would have been destroyed. Klonglan (1962)

Table 10. Data recalculated from Klonglan (1962) illustrating dates of nest establishment and potential hatching dates.

Date	Percent nests established	Average clutch size	Total days for laying and incubation	Hatching dates
April 1-15	4	14.6	43	May 13-May 27
April 16-30	21	13.4	42	May 27-June 10
May 1-15	26	11.6	39	June 8-June 22
May 16-31	26	10.0	37	June 21-July 5
June 1-15	15	9.1	36	July 6-July 20
June 16-30	5	8.4	35	July 20-August 3
July 1-15	3	7.3	33	August 2-August 16

also noted the difference in pheasant nesting success in red clover fields mowed at different times. He found that 19 percent of the nests in fields mowed in late June (June 19-28) were successful. However, 33 percent of the nests in fields mowed in early July (July 5-16) were successful. Nomsen (personal communication) in 5 years of study, on the Hancock County Area in northern Iowa, found active nests in hayfields that were not chopped until the last two weeks of July and the first two weeks of August. Nomsen found 75 nests, the fate of which could be determined, in these late chopped fields. Of these 75 nests, 52 were successful but 23 (30%) were active when destroyed by the hay harvest.

Recommendations:

The results of this study combined with those of Klonglan (1962) and Nomsen provide a basis for recommendations on management of pheasant nesting cover on state wildlife management areas in Iowa.

1. Mowing of legume or grass-legume crop fields should be stopped. This can be accomplished by:

   a. Advising the farm cooperator to lower his bid on the remaining cropland since he will not get a hay crop or
   b. Having the state furnish the legume seed for the farm cooperator.

   The fields can be put into a regular 3 or 4 year crop rotation (with no hay harvest) or certain key fields can be put into long-term seedings (6-10 years) while the remaining fields are kept on a 3 or 4 year rotation (with no hay harvest). If a field is to be uncultivated for 6-10 years, it should be burned in February or March of one of the middle years. The long-term seedings could be established in brome-alfalfa, switchgrass, brome-sweetclover, switchgrass-alfalfa, brome-alfalfa-sweetclover, or tall wheatgrass-intermediate wheatgrass-sweetclover-alfalfa.

2. All land not in cropfields or winter cover should be maintained in permanent grasslands and managed as nesting cover. In some cases the existing vegetation can be managed by periodic burnings, but in most cases new seedings need to be established. Seedings of brome and alfalfa or switchgrass could be established as permanent grasslands. These areas must be burned periodically (every 5th or 6th year). Too often the management effort is aimed at only that portion of a wildlife management area that can be manipulated by crop rotation and not at all the land available. On many state wildlife areas a significant portion of the land is not croppable and has been ignored as potential nesting cover. This land that cannot be cropped should be looked upon as valuable permanent nesting cover to be managed as an integral part of the entire area.

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Prepared by: Allen L. Farris
Dr. Allen L. Farris

Approved by: Gene Klonglan
Dr. Gene Klonglan
Wildlife Research
Supervisor

Date: June, 1974

Bob Barratt
Bob Barratt, Supt.
Wildlife Section