



Habitat diversity as related to pheasant use on a game management area in Northwestern Montana
by Raymond Richard Austin

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE in FISH AND WILDLIFE MANAGEMENT

Montana State University

© Copyright by Raymond Richard Austin (1973)

Abstract:

The habitat use of the ring-necked pheasant (*Phasianus colchicus*) was studied in northwestern Montana during the summers of 1970 and 1971 and during the winter of 1971. Detailed vegetation maps were made of each of the three separate sections which comprised the study area.

Summer pheasant observations were plotted on these maps and the vegetation within a nine-acre block around them was analyzed. An index of diversity was calculated, as was the frequency of occurrence and average percent of area of each cover type within the nine-acre blocks. The results from the 631 observations of both summers were compared with the results of 200 randomly selected sites in each section, which were analyzed in the same manner as the observation sites. The average indices of diversity for pheasant observation sites were significantly higher than those of the random sites in the two sections where food, cover, and open areas were available throughout the section. Hen pheasant observations generally had the highest average index of diversity, followed by cocks, dusting sites, then roosting sites. A greater association than expected (if pheasants were randomly distributed) was shown for the following cover types: sweetclover-II, spring barley, winter wheat, cultivated grass, alfalfa, rush, summer fallow, pasture-hay, and county roads. An association index was calculated for each plant species on the study area, which compared the coverage provided by each species with its occurrence near pheasant observations. A positive association was generally shown for the grasses of the cultivated grass type and for the grasses and the plants of mesic sites. Roosting sites were generally located in the more open vegetation with lower canopy coverage, and dusting sites were associated with taller vegetation providing denser cover. At both the species and cover type level, barley was utilized to a greater extent than wheat, and the second year stage of sweetclover was apparently selected the most for use as cover. Average brood sizes were found to be 4.87 and 7.25 in 1970 and 1971, respectively, and the estimated peak of hatching in 1971 occurred around June 16. Wheat and barley occurred in 67 and 23 percent, respectively, of the crops which were collected during both falls, and made up 77 percent of the volume of all crop contents. Areas of winter concentrations of pheasants occurred mainly in cattails which were within 500 feet of a grain field. Sightings of the pheasants marked during the winter period indicated that the pheasants on the study area did not disperse very far from the wintering areas.

HABITAT DIVERSITY AS RELATED TO PHEASANT USE ON A GAME MANAGEMENT
AREA IN NORTHWESTERN MONTANA

by

RAYMOND RICHARD AUSTIN

A thesis submitted to the Graduate Faculty in partial
fulfillment of the requirements for the degree


of

MASTER OF SCIENCE

in

FISH AND WILDLIFE MANAGEMENT

Approved:


Head, Major Department


Chairman, Examining Committee


Graduate Dean

MONTANA STATE UNIVERSITY
Bozeman, Montana

March, 1973

In presenting this thesis in partial fulfillment of the requirements for an advanced degree at Montana State University, I agree that the Library shall make it freely available for inspection. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by my major professor, or, in his absence, by the Director of Libraries. It is understood that any copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Signature:

Raymond Richard Austin

Date:

January 23, 1973

ACKNOWLEDGEMENT

To the following, among others, I wish to express my sincere appreciation for their contributions to this study: Dr. Robert L. Eng, Montana State University, for technical supervision and guidance in preparation of the manuscript; Mr. Gerald Salinas, Montana Fish and Game Department, for initial project planning, use of facilities, and assistance; Mr. Robert Greene and Mr. Donald Sheppard, Montana Fish and Game Department, for advise and field assistance; Dr. Richard Mackie and Dr. William Gould, Montana State University, for critical reading of the manuscript; Mr. Harlen Hames and Mr. William Moore, Montana State University Computing Center, for computer programming and assistance in the analysis of field data; Mr. Kenneth Greer, Montana Fish and Game Department, for aid and use of facilities in the analysis of the pheasant crop contents; Dr. W. E. Booth, Montana State University, for verification of plant specimens; Mr. John Wiegand, Montana Fish and Game Department, and Mr. Marvin Kaschke, Manager of the Moiese National Bison range, for assistance in various phases of the study; Dr. Richard Lund, Montana State University, for assistance with the statistical analysis of the data; and to my wife, Sharon, for encouragement and assistance. During this study I was supported by the Montana Fish and Game Department under Federal Aid Project W-120-R-2 & 3.

TABLE OF CONTENTS

	<u>Page</u>
VITA	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	v
LIST OF FIGURES	vii
ABSTRACT	viii
INTRODUCTION	1
DESCRIPTION OF AREA	2
METHODS	4
RESULTS	12
Vegetation	12
Pheasant Habitat Selection	19
Diversity	20
Use of cover types	23
Associations with individual plant species	31
Density of Crowing Cocks	36
Brood Production	37
Crop Analysis	38
Areas of Winter Use	38
Trapping, Tagging, and Movements	42
DISCUSSION	44
APPENDIX	49
LITERATURE CITED	63

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. THE ACREAGE AND PERCENTAGE OF EACH COVER TYPE IN EACH SECTION (INCLUDING THE VEGETATION WHICH BORDERS AND LIES WITHIN 209 FEET OF EACH SECTION)	13
2. SUMMER OBSERVATIONS OF PHEASANTS AND PHEASANT-USE SITES MADE IN 1970 AND 1971	20
3. AVERAGE VALUES OF THE INDEX OF DIVERSITY FOR SECTIONS I, II, AND III	21
4. FREQUENCY OF OCCURRENCE AND AVERAGE PERCENT OF AREA OF EACH COVER TYPE WITHIN THE NINE-ACRE BLOCKS AROUND OBSERVATION SITES AND RANDOMLY SELECTED SITES	24
5. THE ANALYSIS OF THE PRESENCE OF EACH PLANT SPECIES IN THE NEAREST AND SECOND NEAREST VEGETATION TO PHEASANT OBSERVATIONS	32
6. THE NUMBER AND DENSITY OF CROWING COCKS ON THE STUDY AREA IN MAY, 1971	37
7. AVERAGE SIZES OF BROODS OBSERVED ON THE NINEPIPE GAME MANAGEMENT AREA AND VICINITY	38
8. CONTENTS OF PHEASANT CROPS COLLECTED ON THE STUDY AREA IN THE FALL OF 1970 AND 1971	40
9. PHEASANTS OBSERVED ON A DRIVE COUNT OF THE STUDY AREA ON JANUARY 23, 1971	42
10. COVER INDEX OF PLANTS FOUND ON THE STUDY AREA (PERCENT OF COVER PROVIDED BY EACH PLANT)	50
11. DISTRIBUTION OF THE INDICES OF DIVERSITY FOR THE ACTUAL OBSERVATIONS AND RANDOMLY SELECTED SITES IN EACH SECTION	54
12. FREQUENCY OF OCCURRENCE AND AVERAGE PERCENT OF AREA OF THE COVER TYPES WITHIN THE NINE-ACRE BLOCKS AROUND THE FOUR CLASSES OF OBSERVATIONS IN SECTION I	56

LIST OF TABLES
(Continued)

<u>Table</u>		<u>Page</u>
13.	FREQUENCY OF OCCURRENCE AND AVERAGE PERCENT OF AREA OF THE COVER TYPES WITHIN THE NINE-ACRE BLOCKS AROUND THE FOUR CLASSES OF OBSERVATIONS IN SECTION II	57
14.	FREQUENCY OF OCCURRENCE AND AVERAGE PERCENT OF AREA OF THE COVER TYPES WITHIN THE NINE-ACRE BLOCKS AROUND THE FOUR CLASSES OF OBSERVATIONS IN SECTION III.....	58
15.	MEASUREMENTS AND COVER VALUES OF THE NEAREST AND SECOND NEAREST VEGETATION TO PHEASANT OBSERVATIONS WHEN DOMINATED BY EACH SPECIES	59
16.	PLANTS PRESENT ON THE STUDY AREA, BUT NOT OCCURRING IN THE NEAREST OR SECOND NEAREST VEGETATION TO PHEASANT OBSERVATIONS	61

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1.	Section I (some cover units were present only in 1970 or 1971)	5
2.	Section II, northern 80-acre division	6
3.	Section II, except for northern 80-acre division	7
4.	Section III (some cover units were present only in 1970 or 1971)	8
5.	Cattail type, adjacent to winter wheat in Section I	16
6.	Old shelter belt in Section I with bluegrass type between the rows	16
7.	Computer printout of the calculation of the index of diversity and summarization of the cover types present around one observation, with portion of map considered...	22
8.	Estimated hatching dates of pheasant broods on the study area and vicinity, 1971	39
9.	Hen pheasant with poncho type neck tag and metal leg band	43

ABSTRACT

The habitat use of the ring-necked pheasant (Phasianus colchicus) was studied in northwestern Montana during the summers of 1970 and 1971 and during the winter of 1971. Detailed vegetation maps were made of each of the three separate sections which comprised the study area. Summer pheasant observations were plotted on these maps and the vegetation within a nine-acre block around them was analyzed. An index of diversity was calculated, as was the frequency of occurrence and average percent of area of each cover type within the nine-acre blocks. The results from the 631 observations of both summers were compared with the results of 200 randomly selected sites in each section, which were analyzed in the same manner as the observation sites. The average indices of diversity for pheasant observation sites were significantly higher than those of the random sites in the two sections where food, cover, and open areas were available throughout the section. Hen pheasant observations generally had the highest average index of diversity, followed by cocks, dusting sites, then roosting sites. A greater association than expected (if pheasants were randomly distributed) was shown for the following cover types: sweetclover-II, spring barley, winter wheat, cultivated grass, alfalfa, rush, summer fallow, pasture-hay, and county roads. An association index was calculated for each plant species on the study area, which compared the coverage provided by each species with its occurrence near pheasant observations. A positive association was generally shown for the grasses of the cultivated grass type and for the grasses and the plants of mesic sites. Roosting sites were generally located in the more open vegetation with lower canopy coverage, and dusting sites were associated with taller vegetation providing denser cover. At both the species and cover type level, barley was utilized to a greater extent than wheat, and the second year stage of sweetclover was apparently selected the most for use as cover. Average brood sizes were found to be 4.87 and 7.25 in 1970 and 1971, respectively, and the estimated peak of hatching in 1971 occurred around June 16. Wheat and barley occurred in 67 and 23 percent, respectively, of the crops which were collected during both falls, and made up 77 percent of the volume of all crop contents. Areas of winter concentrations of pheasants occurred mainly in cattails which were within 500 feet of a grain field. Sightings of the pheasants marked during the winter period indicated that the pheasants on the study area did not disperse very far from the wintering areas.

INTRODUCTION

The ring-necked pheasant (Phasianus colchicus) in the United States has largely been associated with agricultural lands (Hiatt 1946). Many irrigated areas in the West have held high pheasant densities when proper interspersions of food and cover have been available (Yeager, et al. 1951). During the past few decades, land use changes and more efficient farming practices have led to decreasing amounts of pheasant habitat. This is noticeably true in many of the irrigated areas of Montana. Many state and federally owned wildlife areas are managed to provide cover for game animals. My study was conducted on the Ninepipe Game Management Area, Lake County, Montana, where extensive farming is carried out for the production of food and cover for game birds. This area has been administered by the Montana Fish and Game Department since land acquisition began in 1953. The purpose of this study was to evaluate the pheasant use of the cultivated, native, and wetland vegetation on the managed area. The study included the summer periods (June-September) of 1970 and 1971, and the winter period (January-March) of 1971.

DESCRIPTION OF AREA

The study area was located in northwestern Montana near the town of Charlo. This region, lying west of the Mission Mountain Range, has been farmed intensively for many years. The land is relatively level but contains a considerable number of natural potholes, especially on and around the study area.

Average summer precipitation was 1.41 inches above and 0.35 inches below the normal (3.27 inches) in 1970 and 1971, respectively, at Saint Ignatius (U. S. Department of Commerce Weather Station), 11 miles south of the study area. Average temperatures during both summers were slightly below the normal of 63.5 degrees F. The average winter temperature of 31.7 degrees F for 1971 was 1.8 degrees above normal. A total of 29.6 inches of snow fell with a maximum depth on the ground of 5 inches.

Much of the study area was cultivated for the production of food and cover crops which were largely unharvested. Wheat (Triticum aestivum) and barley (Hordeum spp.) were the major food crops. Alfalfa (Medicago sativa), yellow sweetclover (Melilotus officinalis), orchard grass (Dactylis glomerata), smooth brome (Bromus inermis), and tall wheatgrass (Agropyron intermedium) were commonly seeded for cover. Shelter belts comprised of willow (Salix spp.), caragana (Caragana spp.), buffaloberry (Shepherdia argentea), Russian olive (Elaeagnus angustifolia), and a variety of other shrubs were also established on the area.

Quack grass (Agropyron repens), bluegrass (Poa spp.), and brome (Bromus spp.) were common native grasses. The major forbs were Canada

thistle (Cirsium arvense), prickly lettuce (Lactuca serriola), alsake clover (Trifolium hybridum), goosefoot (Chenopodium spp.), and willow-herb (Epilobium spp.). Wetland vegetation was characterized by cattails (Typha latifolia), rushes (Juncus spp.), climbing nightshade (Solanum dulcamara), and foxtail barley (Hordeum jubatum).

METHODS

The study area was divided into three separate sections. Section I (Figure 1) is north of Ninepipe Reservoir, Section II (Figures 2 and 3) is west of the reservoir, and Section III (Figure 4) is south of the reservoir. A detailed vegetation map of each section was made using aerial photographs and ground measurements. Each distinct cover unit was given a number-letter designation for specific identification. A cover unit may be described as any distinct field, strip, or plot of vegetation which is usually homogeneously one cover type and bordered by one or more other distinct units of vegetation of another cover type. The area of each of these cover units was determined with the use of a planimeter.

During the summers of 1970 and 1971, a list was made of the plant species present in each cover unit. The general cover type of each unit was also noted. Canopy coverage of each species in the cover units was visually estimated in 1971. The estimates were based on the coverage classes used by Daubenmire (1959): class 1 = 0-5 percent; class 2 = 5-25 percent; class 3 = 25-50 percent; class 4 = 50-75 percent; class 5 = 75-95 percent; and class 6 = 95-100 percent. The midpoints of these classes were used in the analysis of data. Plant nomenclature follows that of Booth (1950) and Booth and Wright (1959).

Pheasant observations were made while on established routes, and incidental to other field activities. In 1970, five vehicle routes ranging from 1.7 to 7.0 miles in length were used. In 1971, three vehicle

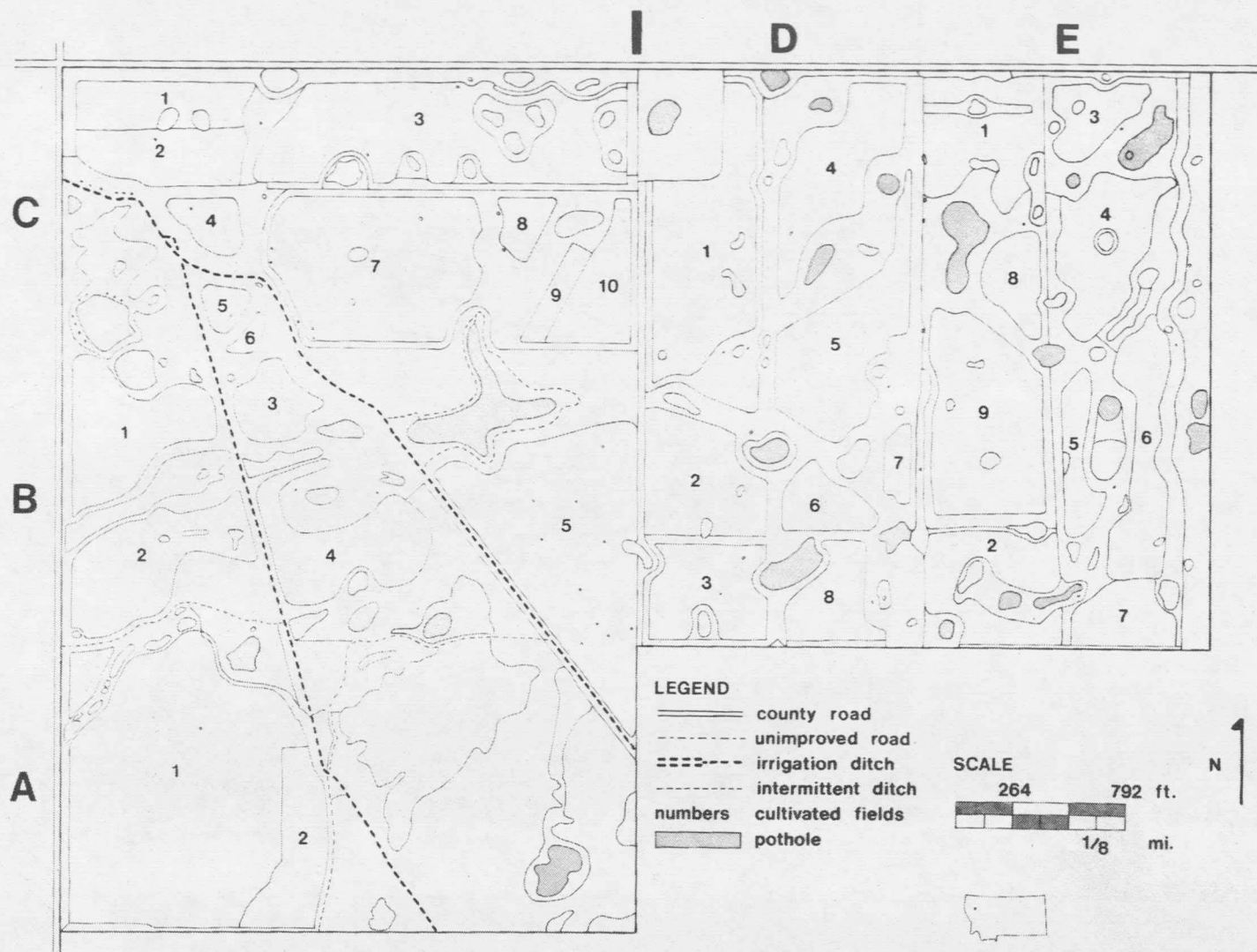


Figure 1. Section I (some cover units were present only in 1970 or 1971).

