



An inventory of the avifauna in the Long Pines of southeastern Montana
by Kristi Lynn DuBois

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE
in Fish and Wildlife Management
Montana State University
© Copyright by Kristi Lynn DuBois (1979)

Abstract:

Songbird populations within the Long Pines of southeastern Montana were censused during 1977 and 1978 to provide baseline data prior to possible uranium mining. Breeding pair densities, species composition and relative abundance of birds were determined in grassland, ponderosa pine savannah, ponderosa pine forest, and deciduous draw forest formations. Censuses were taken at 22 stations on a road route, on three 16 ha plots, and on two 31 ha strip-plots. Breeding pair density and number of breeding species were lowest in grasslands (59 pairs/ 100 ha, 2 species), higher in savannah (109 pairs/100 ha, 8 species) and ponderosa pine forest (312 pairs/100 ha, 11 species), and highest in deciduous draw forests (413 pairs/100 ha, 19 species). Species diversity and breeding bird density were related to the structural diversity of the vegetation and interspersed of different plant communities. Habitats which would probably be most heavily impacted from uranium mining are the deciduous draw and ponderosa pine forest which support the highest bird densities and diversity.

STATEMENT OF PERMISSION TO COPY

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 Kristi DuBois

Date April 30, 1979

AN INVENTORY OF THE AVIFAUNA IN THE
LONG PINES OF SOUTHEASTERN MONTANA

by

KRISTI LYNN DUBOIS

A thesis submitted in partial fulfillment
of the requirements for the degree

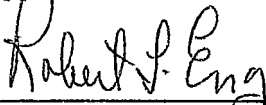
of

MASTER OF SCIENCE

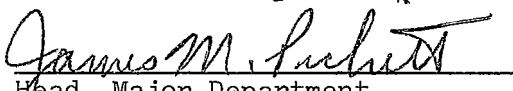
in

Fish and Wildlife Management

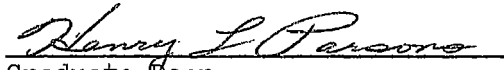
Approved:



Chairperson, Graduate Committee



Head, Major Department



Graduate Dean

MONTANA STATE UNIVERSITY
Bozeman, Montana

May, 1979

ACKNOWLEDGMENT

I would like to express my sincere thanks to Dr. Robert L. Eng, Montana State University, for his assistance in preparation of the manuscript; Drs. William R. Gould and Robert E. Moore, Montana State University, for critically reviewing the manuscript; and Dr. Theodore W. Weaver, Montana State University, for his many helpful suggestions and criticisms. I would also like to thank Gary Dusek and Bob Martinka, Montana Fish and Game Department; George Allen; Dale Becker; Bill and Helen Woodcock; Gary Braun; Bob Hamner and Ron Nordberg, U. S. Forest Service; pilots Keith Stevens and Wally Malone; John and Susan Ramsey; the Byrne Family of Mill Iron, Montana; and the hospitable people of Ekalaka, Montana and Camp Crook, South Dakota. This study was supported by the U.S. Fish and Wildlife Service, Western Energy and Land Use Team, and Montana Fish and Game Department.

TABLE OF CONTENTS

	<u>Page</u>
VITA	ii
ACKNOWLEDGMENT	iii
LIST OF TABLES	
LIST OF FIGURES	
ABSTRACT	
INTRODUCTION	1
DESCRIPTION OF STUDY AREA	2
METHODS	7
Vegetation	7
Birds	9
Breeding Bird Survey Route	9
Breeding Bird Density Plots	9
RESULTS	11
Vegetation	11
Breeding Bird Survey Route	11
Breeding Bird Density Plots	13
Birds	32
Breeding Bird Survey Route	32
Breeding Bird Density Plots	47
DISCUSSION	58
LITERATURE CITED	65
APPENDIX	71

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 PERCENT COMPOSITION AND FREQUENCY OF OCCURRENCE OF BIRDS ALONG THE BREEDING BIRD SURVEY ROUTE	33
2 SUMMARY OF MEASUREMENTS ON VEGETATION AND AVIFAUNA ON THE BREEDING BIRD SURVEY ROUTE STATIONS	35
3 NUMBERS OF SPECIES AND BIRDS, AND SPECIES DIVERSITY AND EQUITABILITY IN THE FOUR MAIN VEGETATIONAL FORMATIONS ALONG THE BREEDING BIRD SURVEY ROUTE	37
4 SPECIES COMPOSITION AND RELATIVE ABUNDANCE OF BIRDS OBSERVED ON FIVE SURVEY ROUTE STATIONS IN GRASSLAND AREAS	40
5 SPECIES COMPOSITION AND RELATIVE ABUNDANCE OF BIRDS OBSERVED ON FIVE SURVEY ROUTE STATIONS IN SAVANNAH AREAS	42
6 SPECIES COMPOSITION AND RELATIVE ABUNDANCE OF BIRDS OBSERVED ON FIVE SURVEY ROUTE STATIONS IN PONDEROSA PINE FOREST	43
7 SPECIES COMPOSITION AND RELATIVE ABUNDANCE OF BIRDS OBSERVED ON FIVE SURVEY ROUTE STATIONS IN DECIDUOUS DRAWS	44
8 INDICES OF SIMILARITY OF THE BIRD SPECIES FOUND IN THE FOUR MAJOR VEGETATIONAL FORMATIONS ALONG THE BREEDING BIRD SURVEY ROUTE	46
9 SPECIES COMPOSITION OF BIRDS OBSERVED ON THE SURVEY ROUTE STATION IN A FIELD WITH PONDEROSA PINE SAPLINGS	48
10 SPECIES COMPOSITION OF BIRDS OBSERVED ON THE SURVEY ROUTE STATION WITH A SMALL CLIFF	49
11 BREEDING STATUS OF BIRD SPECIES OBSERVED ON THE FIVE BREEDING BIRD DENSITY PLOTS	52
12 INDICES OF SIMILARITY OF THE BIRD SPECIES FOUND BREEDING ON THE FIVE BREEDING BIRD DENSITY PLOTS	56

LIST OF TABLES (Con't.)

<u>Tables</u>	<u>Page</u>
13 CLIMATOLOGICAL DATA FOR EKALAKA, MONTANA FROM JANUARY 1977 THROUGH AUGUST 1978	71
14 PLANT SPECIES OBSERVED ON THE BREEDING BIRD SUR- VEY ROUTE STATIONS AND BREEDING BIRD DENSITY PLOTS	72
15 BIRD SPECIES OBSERVED IN THE STUDY AREA	77
16 PERCENT OF TOTAL AREA COVERED BY THE PLANT COMMUNI- TIES FOUND ON THE BREEDING BIRD DENSITY PLOTS . . .	81
17 RESULTS OF POINT-QUARTER ANALYSES ON THE BREEDING BIRD DENSITY PLOTS	82
18 PERCENT FREQUENCY AND COVER OF SHRUBS AND SAPLING TREES (0.5 - 2 m TALL) ON THE BREEDING BIRD DENSITY PLOTS (ESTIMATED WITHIN 25 m ² CIRCLE AT 20 POINTS IN EACH STAND)	83
19 PERCENT FREQUENCY AND COVER OF GROUND VEGETATION IN MIXED GRASSLAND (TWELVE STANDS SAMPLED)	84
20 PERCENT FREQUENCY AND COVER OF GROUND VEGETATION IN PONDEROSA PINE - SKUNKBUSH FOREST (SIX STANDS SAMPLED)	88
21 PERCENT FREQUENCY AND COVER OF GROUND VEGETAION IN PONDEROSA PINE - SNOWBERRY FOREST (NINE STANDS SAMPLED)	92
22 PERCENT FREQUENCY AND COVER OF GROUND VEGETATION IN SNOWBERRY DRAWS (FIVE STANDS SAMPLED)	95
23 PERCENT FREQUENCY AND COVER OF GROUND VEGETATION IN ASPEN DRAWS (FIVE STANDS SAMPLED, INCLUDED ONE BIRCH STAND)	97
24 PERCENT FREQUENCY AND COVER OF GROUND VEGETATION IN BOXELDER-ASH DRAWS (NINE STANDS SAMPLED)	100

LIST OF TABLES (Con't.)

<u>Tables</u>	<u>Page</u>
25 AVERAGE HEIGHT (cm) OF GROUND COVER IN THE MAJOR PLANT COMMUNITIES FOUND ON THE BREEDING BIRD SUR- VEY ROUTE AND DENSITY PLOTS	103
26 AVERAGE HEIGHT (m) OF TREES AND TALL SHRUBS ON THE BREEDING BIRD DENSITY PLOTS	104

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1 Map of study area including survey route stations and breeding bird plots.	3
2 Plant communities found on the grassland plot.	14
3 Western wheatgrass - meedle-and-thread community (mixed grassland) on the grassland plot.	15
4 Plant communities found on the savannah plot	16
5 Ponderosa pine - skunkbush stand on the savannah plot	18
6 Plant communities found on the ponderosa pine forest plot	19
7 Ponderosa pine - snowberry community on the ponderosa pine forest plot	20
8 Plant communities found on the Maverick Gulch deciduous draw strip-plot.	22
9 Relict birch stand in Maverick Gulch	25
10 Plant communities found on the Ward Spring deciduous draw strip-plot	26
11 Boxelder - ash community on the Ward Spring strip-plot	30
12 Number of species versus frequency for birds observed along the breeding bird survey route	34
13 Change in abundance of yellow-rumped warblers, chipping sparrows, and western meadowlarks with increasing percentage of grassland along the breeding bird survey route	39
14 Locations of bird sightings on the grassland plot	105
15 Locations of bird sightings on the savannah plot	106

LIST OF FIGURES (Con't.)

<u>Figure</u>		<u>Page</u>
16	Locations of bird sightings on the ponderosa pine forest plot	107
17	Locations of bird sightings on the Maverick Gulch deciduous draw strip-plot	108
18	Locations of bird sightings on the Ward Spring deciduous draw strip-plot	111

ABSTRACT

Songbird populations within the Long Pines of southeastern Montana were censused during 1977 and 1978 to provide baseline data prior to possible uranium mining. Breeding pair densities, species composition and relative abundance of birds were determined in grassland, ponderosa pine savannah, ponderosa pine forest, and deciduous draw forest formations. Censuses were taken at 22 stations on a road route, on three 16 ha plots, and on two 31 ha strip-plots. Breeding pair density and number of breeding species were lowest in grasslands (59 pairs/100 ha, 2 species), higher in savannah (109 pairs/100 ha, 8 species) and ponderosa pine forest (312 pairs/100 ha, 11 species), and highest in deciduous draw forests (413 pairs/100 ha, 19 species). Species diversity and breeding bird density were related to the structural diversity of the vegetation and interspersed of different plant communities. Habitats which would probably be most heavily impacted from uranium mining are the deciduous draw and ponderosa pine forest which support the highest bird densities and diversity.

INTRODUCTION

Increasing demand for energy and oil shortages have stimulated development of atomic energy. As energy costs rise, exploitation of lower-grade uranium ore becomes more economical. One method of exploiting low-grade ore is known as in-situ, or solution mining. This entails leaching the uranium compounds by pumping a sulphuric acid solution directly into the bedrock. Several companies are engaged in exploratory drilling for uranium in the Long Pines of southeastern Montana, to determine the feasibility of in-situ mining.

Songbirds are often used as indicators of environmental change due to their wide distribution and abundance, and sensitivity to habitat changes (Graber and Graber 1976). This study was undertaken to provide baseline data on songbirds in the Long Pines for future reference in monitoring the effects of uranium mining or other land disturbance. Specific objectives were to determine breeding bird densities, relative abundance and species composition of songbirds in the various habitats found within the Long Pines. Field work was conducted from mid-June to mid-August 1977, and from early April to early September 1978.

DESCRIPTION OF STUDY AREA

The Long Pines is a small range of hills located approximately 39 km (24 mi) southeast of Ekalaka in Carter County, Montana. The range is L-shaped, about 24 km (15 mi) long, 11 to 19 km (7 to 12 mi) wide, and rising 366 m (1200 ft) above the surrounding plains to a maximum elevation of 1280 m (4200 ft). The Long Pines, together with several other isolated pine hills, is included in the Sioux Division of the Custer National Forest. The range consists of flat-topped hills with some exposed rimrock, steep ridges and V-shaped valleys. Vegetation consists primarily of grasslands and forests of ponderosa pine (*Pinus ponderosa*). The study area (Figure 1) included 263 sq km (65,000 ac) of National Forest land and some surrounding private land, for a total of 544 sq km (210 sq mi).

Soils in the Long Pines are generally shallow and rocky, often with a high clay content. The surface bedrock is mostly sandstones and clay "gumbo" of the Arikaree Formation (Miocene) and the Fort Union Formation (Paleocene). Underlying beds of the Fox Hills Formation (Upper Cretaceous) contain the uranium deposits (AAPG 1972).

The major drainages in the area are Boxelder Creek, which cuts across the northwest corner of the study area, and the Little Missouri River, several km southeast of the study area. Many of the drainage-ways in the Long Pines contain intermittent streams. Numerous springs

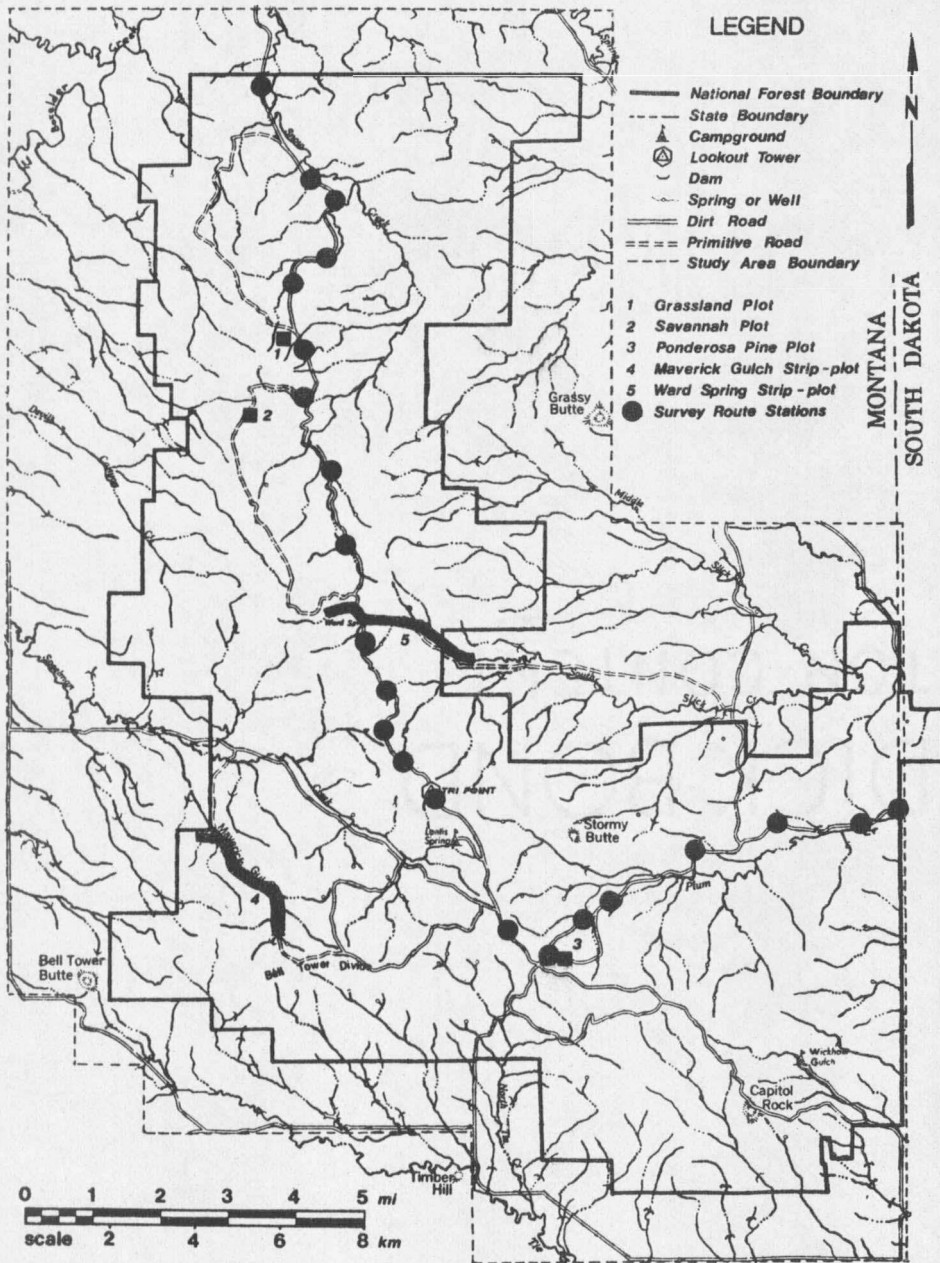


Figure 1. Map of study area including survey route stations and breeding bird plots.

and seeps are found in the draws, providing sufficient water to support many small beaver ponds. Standing water has been increased by the addition of man-made stockdams and tanks. High turbidity is common due to erosion.

The climate is continental with hot, dry summers and cold, dry winters. The mean annual temperature for Ekalaka, Montana is 6.6°C (43.8°F), with means for January and July being -8.1°C (17.5°F) and 21.4°C (70.5°F) respectively. The mean annual precipitation is approximately 38 cm (15 in), with just over half occurring in May, June, and July (U.S.D.C., 1977, 1978).

The summer of 1977 was very hot and dry, with precipitation 7.6 cm (3 in) below normal and mean temperatures averaging 2.8°C (5°F) above normal for April through July (Appendix Table 13). The spring and summer of 1978 were cool and wet, with mean temperatures slightly below normal and precipitation 5.1 cm (2 in) above normal for April through August. The precipitation for May 1978 was extremely high at 15.04 cm (5.92 in), almost ten cm above normal.

The major land uses within the Long Pines are cattle grazing, logging, and recreation. All of the National Forest land is grazed, with individual pastures being grazed for two to three months between May and October. Most of the recreational use is by hunters and campers. Vehicle trails are abundant throughout the Long Pines, attracting off-road vehicle recreationists. Such trails are a potential source of

silt in the ponds and creeks. The private land in the study area is used primarily for sheep and cattle ranching and production of small grains.

The fauna and flora of the Long Pines have been little-studied due to the area's isolation and low human density. Cameron (1907), Saunders (1916), and Visher (1911, 1912, 1913) mentioned the Long Pines in their annotated bird lists for the region. Skaar (1975) and supplements listed 151 species of birds as occurring in the latilong containing Carter County. The mammals of Carter County were described by Lampe et al. (1974).

The vegetation of the Long Pines was described by Jonas (1966). Well-developed ponderosa pine forest covers the higher elevations, grading into a savannah with interspersed patches of ponderosa pine forest and grassland at lower elevations. The forested areas are characterized by even-aged stands of ponderosa pine with many scattered grassland parks. The understory is predominately snowberry (*Symphoricarpos sp.*), kentucky bluegrass (*Poa pratensis*), and oregon grape (*Berberis repens*) on the more mesic slopes; and skunkbush sumac (*Rhus trilobata*) and bluebunch wheatgrass (*Agropyron spicatum*) predominate on the dryer slopes. The shrub layer is poorly developed, giving most stands an open park-like appearance. Similar ponderosa pine forests in North Dakota were described by Potter and Green (1964).

The grasslands are a mixed-grass prairie with a variety of both

bunchgrasses and sod-forming grasses. The dominant type is a western wheatgrass (*Agropyron smithii*) - needle-and-thread (*Stipa comata*) community. A large number of forb species are present, mostly of the composite and legume families. Silver sage (*Artemisia cana*) and big sage (*Artemisia tridentata*) dominate small areas of sagebrush-grassland.

Mesic draws running through the Long Pines support several different deciduous plant communities. Draws running through ponderosa pine forest at higher elevations contain stands of trembling aspen (*Populus tremuloides*), and several north-facing draws contain relict stands of paper birch (*Betula papyrifera*). Draws at lower elevations in more open areas with abundant moisture support boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanicus*), and fleshy hawthorne (*Crataegus succulenta*). Dry draws running through prairie contain homogeneous stands of snowberry (*Symphoricarpos* sp.).

METHODS

Vegetation

Vegetational analyses were conducted at stations along a breeding bird survey route and on the five breeding bird density plots. Vegetational formations (grassland, savannah, ponderosa pine forest, deciduous draw forest) were delineated at each station along the breeding bird survey route within a circle of 400 m (0.25 mi) radius from aerial photos. A dot grid was used to determine the percentages of each formation.

Three 16 ha (approximately 40 acres) breeding bird plots were established, one each in mixed grass prairie, ponderosa pine savannah, and ponderosa pine forest. Each plot was 400 m on a side, gridded and staked at 50 m intervals. Two strip plots were established, one each along two draws containing deciduous overstory. Each strip-plot was approximately 31 ha in size, 100 m wide and approximately 2950 m long, with stakes at 50 m intervals down the center along the draw. The plant communities were mapped from large-scale color infrared photos. The percentage of each community was determined with a dot grid.

Ground vegetation (including shrubs under 0.5 m) was sampled quantitatively at each survey route station and on the five plots using a modification of the method described by Daubenmire (1959). Twenty points were sampled at 2 m intervals along a 40 m line in vegetation which was characteristic of the community type. Percent cover of the

