

South Dakota State University
**Open PRAIRIE: Open Public Research Access Institutional
Repository and Information Exchange**

Theses and Dissertations

1959

Nesting of Mourning Doves in Eastern South Dakota

Lloyd E. Oldenburg

Follow this and additional works at: <http://openprairie.sdstate.edu/etd>

 Part of the [Natural Resources and Conservation Commons](#)

Recommended Citation

Oldenburg, Lloyd E., "Nesting of Mourning Doves in Eastern South Dakota" (1959). *Theses and Dissertations*. 192.
<http://openprairie.sdstate.edu/etd/192>

This Thesis - Open Access is brought to you for free and open access by Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.

1951

NESTING OF MOUENING DOVES IN EASTERN SOUTH DAKOTA

BY

LLOYD E. OLDENBURG

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science, Department of
Entomology-Zoology, South
Dakota State College
of Agriculture and
Mechanic Arts

December, 1959

NESTING OF MOURNING DOVES IN EASTERN SOUTH DAKOTA

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

ACKNOWLEDGMENTS

The writer wishes to express his appreciation to several persons for help and suggestions while conducting this study.

To Dr. Donald E. Progulske, Assistant Professor of Zoology and Wildlife Conservation, the writer's major advisor, for his supervision in setting up this study, conducting the survey and preparing this manuscript.

To Marvin O. Allum, Assistant Professor of Zoology and Wildlife Conservation for his many constructive suggestions and assistance, especially during the review of literature.

To my wife, Edna, for her continuous support, both moral and monetary, and for her assistance in preparing and typing this manuscript.

To Maurice Anderson, Biologist for the Department of Game, Fish and Parks, who assisted in the initial investigation, secured the bands from the U. S. Fish and Wildlife Service and recorded all banding records.

To the South Dakota Department of Game, Fish and Parks for its financial aid to carry on the study.

L. E. O.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
II. REVIEW OF LITERATURE	6
Dove Nesting Seasons and Productivity .	6
Earliest Nesting Attempts . . .	6
Latest Nesting Attempts	7
Duration of Nesting	7
Peak of Nesting	8
Eggs, Young and Hatching Success	8
Nest Re-use	10
Nesting Densities	11
III. DESCRIPTION OF PLANTINGS STUDIED	12
IV. METHODS OF STUDY	17
V. INVESTIGATION	21
VI. SUMMARY AND CONCLUSIONS	30
LITERATURE CITED	32
APPENDICES	34
A. SCIENTIFIC NAMES OF BIRDS, PLANTS AND ANIMALS USED IN THE TEXT	35
B. TYPICAL MOURNING DOVE NESTS	37
A Typical Nest Containing Two Eggs . .	37
A Typical Nest Containing Two Young Doves	38

LIST OF TABLES

Table	Page
I. THE NUMBER AND PER CENT OF UNSUCCESSFUL NESTS AND THEIR APPARENT CAUSE OF DESTRUCTION	22
II. THE NESTS, EGGS AND YOUNG DESTROYED IN VARIOUS WAYS RECORDED BY MONTHS	22
III. SUMMARY OF NESTING ATTEMPTS BY DOVES IN THE ENTRANCE PINE AND WEST CONIFERS	25
IV. AVERAGE NEST AND TREE HEIGHTS AS THEY OCCURRED IN EACH SPECIES OF TREE	27
V. SUMMARY OF TREE SPECIES AND DOVE NESTS LOCATED IN THE ENTRANCE PINE AND WEST CONIFERS	28

LIST OF FIGURES

Figure	Page
1. West Conifer Subarea Showing the Location and Proximity of Individual Trees and Observed Dove Nests	4
2. Entrance Pine Subarea Showing Location and Proximity of Individual Trees and Observed Dove Nests	5
3. The Ground Cover Between the Rows of Pine in the West Conifers	15
4. Some Blue Spruce, Red Cedar and Interrow Cover in the Entrance Pine	15
5. West Exposure of the Hill Shelterbelt	16
6. A Tag as it Appeared Attached to a Blue Spruce	19
7. Two Tags Attached to Cedar Trees in the West Conifers	19
8. A Tag of the Type Used to Mark Each Nest . . .	20
9. A Nest on Which the Adult Dove was Killed and Eaten	24

CHAPTER I

INTRODUCTION

The mourning dove¹, not presently a game bird in South Dakota, is gaining support toward that status. During the 1959 state legislative session a bill sponsored by the Department of Game, Fish and Parks to place the mourning dove on the game bird list was passed by the House and defeated by the Senate.

In a special dove issue of Outdoor California, January 1959, W. H. Kiel (9) stated there are currently 30 states which allow dove hunting. No state bordering South Dakota has an open dove season. However, in a special memorandum of March 7, 1958, the Nebraska Game, Forestation and Parks Commission (1) stated they were actively supporting efforts to obtain legislation from the 1959 session of the Nebraska Legislature to allow the hunting of mourning doves. This bill failed to pass. There was also proposed legislation in Iowa in 1959 to place the mourning dove on the game bird list (Anonymous, 2). This also failed to pass.

In light of progress toward game bird status, knowledge of production of mourning doves in South Dakota is

¹Scientific names are listed in Appendix A.

necessary for proper management. Manipulations of hunting seasons and bag limits must be related to annual production and to the over-all dove population, for no other population tools have been developed for the management of mourning doves (Southeastern Association of Game and Fish Commissioners, 19). The duration of the nesting season is an important consideration in establishing the opening date of a hunting season.

Very little research has been done on nesting intensities and length of nesting seasons of mourning doves in the north central states (Boldt and Hendrickson, 3 and Randall, 18). The apparent number of doves in South Dakota could allow the species to become a very popular game bird and possibly supplement some waterfowl hunting during dry years. The only study of nesting doves in South Dakota was a banding program carried on by the Department of Game, Fish and Parks in 1955, 1956 and 1957.

The present study was restricted to eastern South Dakota, therefore it did not include nesting of mourning doves on the prairies of the western part of the state. The study was initiated in the spring of 1959 to determine the duration of the nesting season and the productivity of mourning doves in a restricted locality.

Lake Herman State Park in Herman Township (T-106-N, E-53-W) of Lake County, South Dakota, was selected as the

study area. Three of six conifer areas in the park were selected on the basis of previous dove banding done there. These three subareas were two block-plantings of conifers and one eight-row shelterbelt of mixed coniferous and deciduous trees. One of the coniferous subareas contained ten deciduous trees while the other had coniferous trees only. The shelterbelt contained 50 per cent coniferous and 50 per cent deciduous trees.

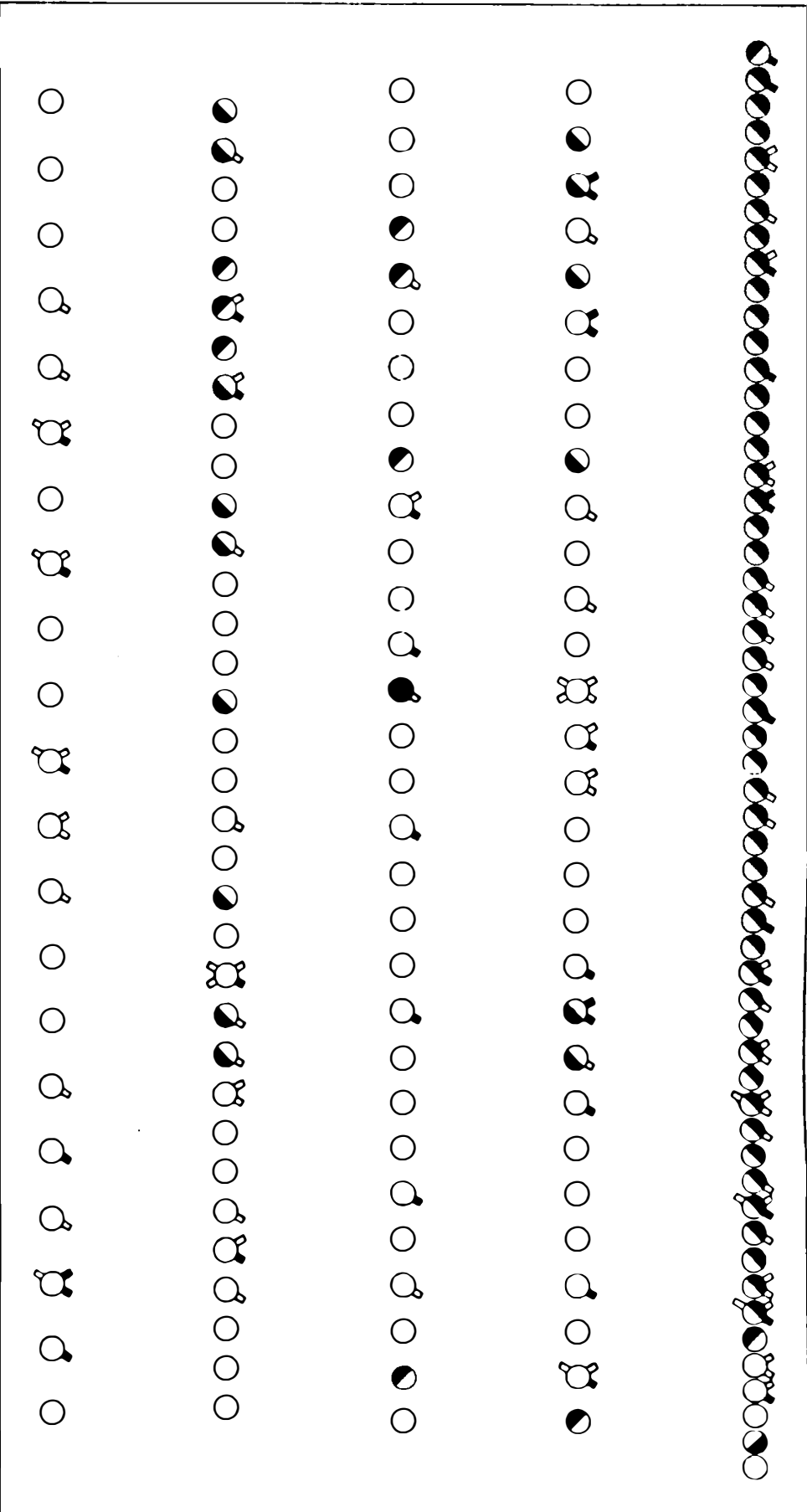


Figure 1. A sequence of 100 circles arranged in four rows. The circles are filled with different patterns of black and white segments, representing a binary sequence.

- Fixe
- Advice
- Gerber
- Tip
- 100
- Successful Test
- Incomplete Test

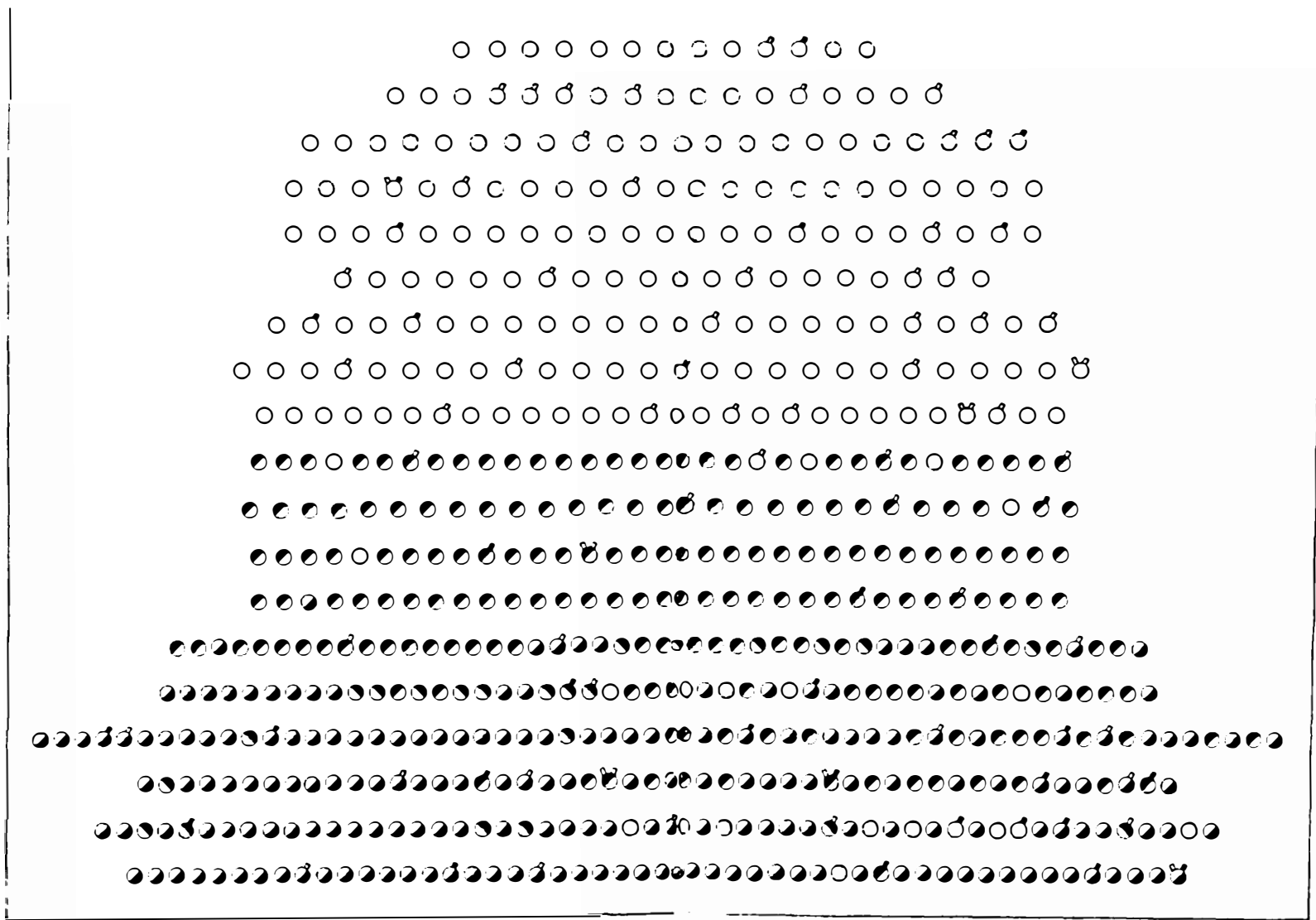


Figure 2. Entrance Pine Subarea Showing Location and Proximity of Individual Trees and Observed Dove Nests

- | | | |
|---------|----------|---------------------|
| ○ Pine | ◐ Spruce | ◑ Elm |
| ◒ Cedar | ◓ Fir | ◆ Successful Nest |
| | | ◇ Unsuccessful Nest |

CHAPTER II

REVIEW OF LITERATURE

Dove Nesting Seasons and Productivity

Many states have completed studies on doves to determine productivity and duration of the nesting season; however, little work has been done in the northern plains states.

The largest dove study was done in the southeastern United States on a cooperative basis by Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee. Also cooperating were the United States Fish and Wildlife Service and the Wildlife Management Institute. This study was conducted from 1948 through 1956.

States which have carried on independent studies include Arizona, California, Iowa, Nebraska and North Dakota. Some of the earliest work on doves was undertaken by Nice in Oklahoma in 1922.

Earliest Nesting Attempts

The first nest found in Arizona on a study conducted by Stair (20) was on March 23. In Alabama the nesting season generally begins in late February (Pearson and Moore, 16). McClure (14) found in Kern County, California, the

average date of building the first nest was March 14; at Lewis, Iowa, it was April 4; and at Ord, Nebraska, April 20. Nesting activity of consequence was first noticed in April in Florida except in the southern part where volume production apparently occurs almost the year around (Southeastern Association of Game and Fish Commissioners, 19). LaPointe (10) reported April 16 was the earliest date he found a nest during his study near Grand Island, Nebraska. The first containing eggs in North Dakota was observed on May 18 by Randall (13).

Latest Nesting Attempts

In 1956, at Lewis, Iowa, Hendrickson (6) recorded 6.5 per cent of his observed dove nestings occurred during September. There were still three nests active on September 22, when his study was terminated. At Ord, Nebraska, the average date when young left the last nest was September 21. Studies by McClure (12) at Lewis, Iowa, indicated October 10, as being the average date young left the last nest. He found the date to be September 14, in Kern County, California. LaPointe (10) working near Grand Island, Nebraska, recorded the last new nest on August 24. In two different areas in North Dakota Randall (13) observed that nesting ceased on September 5 and September 21, respectively.

Duration of Nesting

McClure (14) stated the nesting season in Iowa extended

over 159 days, in Nebraska 154 days, and in Kern County, California, 124 days. Studies by Randall (19) showed the duration of the nesting season in North Dakota was 126 days. In Nebraska the mourning dove nesting season was reported to be 130 days by LaPointe (10). Over 20 per cent of the young do not leave the nest until after September 1 in northern latitudes, according to McClure (13).

Peak of Nesting

In Iowa Hendrickson (6) found that the peak of nesting activity occurred during May. Studies by Lowe (11) in Georgia indicated the nesting activity peaked in May. Pearson and Moore (15) discovered the peak nesting period to be in late May in Alabama. Also in Alabama, Pearson and Rosene (17) noted June as the most active dove nesting month. In Nebraska, LaPointe (10) stated that June was the peak nesting month, while in North Dakota Randall (18) indicated a peak of dove nesting was reached on August 9. The cooperative dove study in the southeast revealed June as the peak month of dove production in Florida (Southeast Association of Game and Fish Commissioners, 19). Fichter (4) stated the peak nesting activity in southeastern Idaho occurred during the latter two-thirds of July.

Eggs, Young and Hatching Success

In Georgia Lowe (11) reported an average of 2.0 eggs

per nest. The average eggs per nest was 2.01 with a range of from one to three in 203 nests at Lewis, Iowa, in 1955 (Jumber, Kozicky and Carter, 8). One nest had one egg and three nests had three eggs each. Of the total nests the average young fledged was 1.11 per nest.

Studies by Hendrickson (6) revealed that 10 (3.1 per cent) of 321 nests contained more than two eggs. Two nests contained four eggs each and the other eight nests held three eggs each. In one of the nests containing four eggs two of the eggs hatched, but the young were not fledged. In the other such nest two eggs hatched and the young were raised successfully. Three of the nests containing three eggs fledged three young each; one nest produced two young and only one young was fledged from the other. Three nests containing three eggs were wholly unsuccessful.

In Arizona of 62 nests found by Stair (20) only one contained three eggs; one of these did not hatch. Of 312 eggs checked by Randall (18) on one area in North Dakota, 72.1 per cent hatched; of the 225 which hatched, 93.8 per cent fledged. Sixty eggs which he observed on another study area were 80 per cent successful in hatching and all young reached the flying stage. The studies by McClure (14) showed that 54.6 per cent, 53.6 per cent and 67.1 per cent of the observed dove eggs hatched in Iowa, Nebraska and California respectively. His records involving over 8,000

eggs indicated a hatch of 59 per cent was attained. His data showed that 85 per cent of the doves studied in Iowa fledged. In Nebraska the comparable figure was 83 per cent. He also found the number of young raised per nest was 1.18 in Iowa, 1.00 in Nebraska and 1.13 in California.

Hendrickson (6) reported a 60.3 per cent success of 247 nestings in Iowa. A total of 52.2 per cent of 592 nests observed in Alabama were successful (Pearson and Moore, 16). Of 203 nests, 61 per cent were successful at Lewis, Iowa, in 1955 (Jumber, Kozicky and Carter, 8). McClure (14) indicated the nesting success in Iowa and Nebraska as 47.9 per cent and 47 per cent respectively while in California success averaged 55.2 per cent. According to Randall (18) 77.4 per cent and 69.9 per cent success was attained in 31 and 156 nesting attempts respectively on two study areas in North Dakota. LaPointe (10) found the over-all nesting success to be 26 per cent in Nebraska.

Nest Re-use

Hendrickson (6) found 0.1 per cent of the study nests were used more than once; one was used four times. In a total of 62 nests found in Arizona by Stair (20) a second use of nests occurred only 7 times with one of these nests being used four times. McClure (14) pointed out that nests in Iowa were used 1.38 times, in Nebraska 1.18 times and in California 1.08 times.

Nesting Densities

Densities of dove nests per acre listed by the Southeastern Association of Game and Fish Commissioners (19) included 15 nests on five acres in Alabama and 400 nests on 3.03 acres in Mississippi in 1950. The latter was an average of 132 nests per acre.

LaPointe (10) found 75.3 nests per acre in a shelter-belt near Grand Island, Nebraska in 1957. Lowe (11) working in Georgia in 1956 located 0.05 nests per acre. In Randall's (18) study in North Dakota 26.5 nests per acre were tallied.

CHAPTER III

DESCRIPTION OF PLANTINGS STUDIED

There were six mixed-conifer areas, a large shelter-belt and a large number of scattered mature deciduous trees in Lake Herman State Park which is comprised of about 160 acres of land.

For convenience of this study the tree plantings were designated as subareas as follows: West Conifers, a small block-planting; Entrance Pine, a larger block-planting; and Hill Shelterbelt.

The West Conifers (Figure 1) were made up of four rows of ponderosa pine and one row of eastern red cedar. The combined rows contained 95 pines, 48 cedars, 15 blue spruce, 10 American elms and one Douglas fir. The rows were 270 feet long and the five of them were contained in an area 66 feet wide. This area totaled 0.49 acres. The interrow ground cover included bluegrass, foxtail barley and mullein (Figure 3). This subarea's interrows were mowed three times during the summer. The West Conifers were bordered on the north by a 20 row planting of blue spruce plus ten mixed rows of stag-horn sumac and wild plum. It was bordered on the west by a road and a bluegrass meadow which had many mature boxelders scattered about. It was bordered on the south by a bluegrass meadow and mature boxelder trees. The lake was 50

yards northwest of the plot.

The Entrance Pine (Figure 2) subarea consisted of ten rows of ponderosa pine, four rows of mixed ponderosa pine and red cedar, and six rows of mixed ponderosa pine, red cedar, blue spruce and Douglas fir. The interrows contained blue grass, foxtail barley and kochia (Figure 4). This area was also mowed three times during the study. The shortest row was 32 yards long and the longest row was 197 yards long. The area had a total of 5.5 acres. Of the 633 trees in this area, 224 were pine, 196 cedar, 195 spruce and 18 fir. The Entrance Pine was bordered on the east and south by a mixed wild plum, honeysuckle and Russian olive cover area; on the west by a gravel road and the park maintenance buildings; and on the north by six rows of black walnut trees. The shore of Lake Herman was 80 yards beyond the walnut trees.

The Hill Shelterbelt was composed of seven mixed rows of red cedar, ponderosa pine, blue spruce, hackberry, American elm, boxelder, wild plum and European white poplar. About 50 per cent of these trees were deciduous and the remainder coniferous (Figure 5). The rows in this planting were 15 feet apart and 0.4 of a mile long. Until the year of study the area between the rows had been cultivated several times each summer. During the study it grew up to kochia. The shelterbelt was bounded on the north and east by a pasture which was on private land; on the south by a

bluegrass meadow and on the west by a gravel road and bluegrass meadow. A portion of Lake Werten was 200 yards southwest of this subarea. This subarea was abandoned at the end of May due to the limited time available to conduct this study.



Figure 3. The Ground Cover Between the Rows of Pine in the West Conifers



Figure 4. Some Blue Spruce, Red Cedar and Intertrow Cover in the Entrance Pine



Figure 5. West Exposure of the Hill Shelterbelt

CHAPTER IV

METHODS OF STUDY

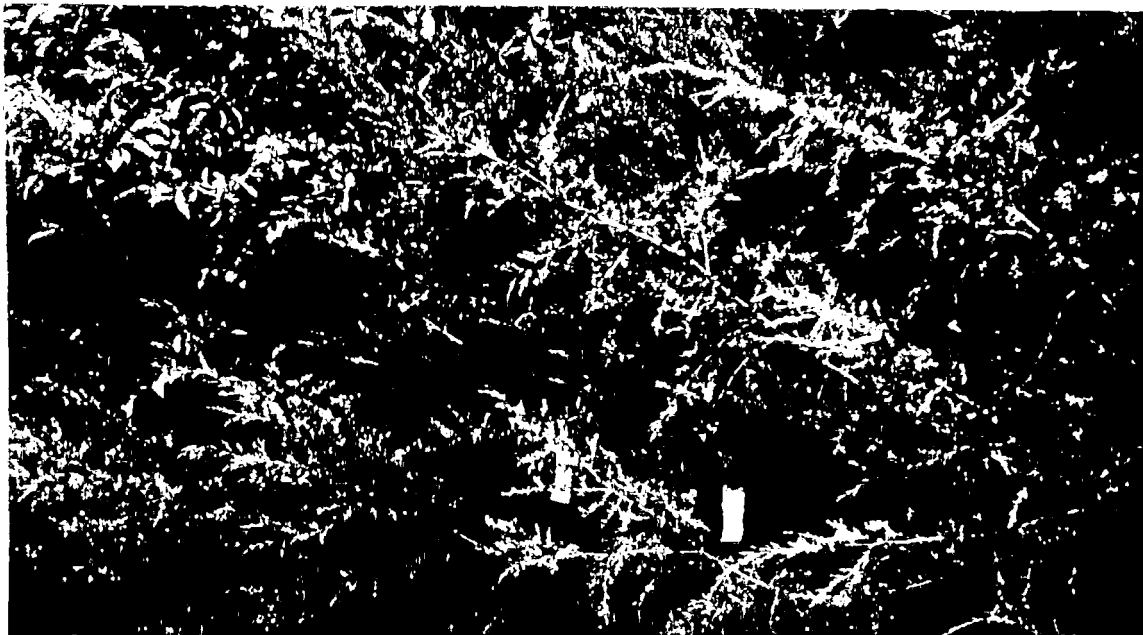
The study was begun on March 15, after which date frequent visits were made to the study area to record the earliest arriving doves. After the first dove was sighted on the study area March 31, frequent visits were made to determine when nest building began. On April 20, the first nest was found in an eastern red cedar and contained two eggs. Five other nests containing eggs were also found the same day.

Once a nest had been located, it was marked by tying a manila tag to a lower branch in the tree (Figures 6 and 7). The date, status of the nest and nest number were written on the tag with a ballpoint pen. All nests were numbered consecutively. Each tag was pre-stamped "Please Do Not Disturb South Dakota Department of Game, Fish and Parks" (Figure 8). After the first nest was located a visit was made to the area once every seven days whenever possible. During each visit, the rows of trees were walked and each tree examined individually for nests. The status of each nest, date found, row number, tree number from one end of row, species of tree, nest height and tree height were recorded on a field form. On subsequent visits the observation number, the date and the current status of the nest was recorded. Band numbers were

recorded if young were banded. Following each day of field observations, the data were transferred from the field sheets to summary sheets. Maurice Anderson, Waterfowl Biologist of the South Dakota Department of Game, Fish and Parks, furnished U. S. Fish and Wildlife Service bands which were used for banding the nestling doves. During the study, 121 young doves were banded.



Figure 6. A Tag as it Appeared Attached to a Blue Spruce



**Figure 7. Two Tags Attached to Cedar Trees
in the West Conifers**



Figure 8. A Tag of the Type Used to Mark Each Nest

CHAPTER V

INVESTIGATIONS

A total of 241 nests was found between April 20 and September 5. Of this total, 117 nests were found in the West Conifers, 96 in the Entrance Pine and 28 in the Hill Shelterbelt.

Seventy-four nests were successful in fledging at least one young, giving a success of 31 per cent. There were several factors noted which caused the other 167 nests to be unsuccessful. In some the eggs were pecked by birds. The wind blew some nests from the trees while in other nests the young birds were killed by predators. The eggs or young birds disappeared from the remaining nests. There was no human depredation noted even though there was heavy daily use of the park facilities near each subarea. In Mississippi in 1957 Handley and Edwards (5) found 71.2 per cent of 973 nests to be successful. Fichter (4) noted 67 per cent success in 208 nests in Idaho.

Of 142 nests which were destroyed on the study plantation before the eggs hatched, 115 were destroyed by an unknown cause, 19 by avian predators, 5 by wind and 3 by mammal predators (Table I). Most of the eggs disappeared from the nests destroyed by unknown forces; there was no evidence of the eggs being broken and eaten on or near the

TABLE I. THE NUMBER AND PER CENT OF UNSUCCESSFUL NESTS
AND THE APPARENT CAUSE OF DESTRUCTION

Cause of Destruction	Number of Nests	Per Cent
Unknown cause	115	90.9
Bird destroyed	19	13.3
Wind destroyed	5	3.5
Mammal destroyed	3	2.3

ests. The eggs destroyed by birds had small holes pecked in them. The wind-destroyed nests were simply blown to the ground or blown into lower branches of the tree.

There were 328 eggs in the 167 unsuccessful nests. Of these, 43 hatched and the young were killed before they fledged (Table II). This represents 23.1 per cent that

TABLE II. THE NESTS, EGGS AND YOUNG DESTROYED IN
VARIOUS WAYS RECORDED BY MONTHS

Month	Number of Nests	Number of Eggs	Number of Young
April	8	16	4
May	108	216	19
June	31	56	16
July	15	29	4
August	6	11	0
September	0	0	0

hatched but perished prior to fledging. McClure (12) found in Iowa that of 3580 young which hatched, 495 (13.7 per cent) were lost prior to fledging. He also found four times as many eggs as young being destroyed as compared to the current study which showed 7.4 times as many eggs as young were destroyed.

Some species of birds which nested in the same areas were purple grackle, red-winged blackbird and blue jay. The mammals observed on the area were two families of feral house cats.

Four adult and eighteen juvenile doves were found killed on the nests or directly under them (Figure 9). Ten of the eighteen young had previously been banded and five of the bands were recovered. In all cases either the gizzard, the tarsus, or both were found with the feathers where the dove was eaten. On July 10, an adult cat was observed in a small blue spruce tree which contained a nest with two young doves. The cat was chased away and the doves were banded. On the next visit (July 16) feathers, the gizzards from both doves and one tarsus with a band were found in the nest. The same cat was seen with five kittens near this tree shortly afterward. In Iowa Jumber, Kozicky and Carter (8) reported 59.9 per cent of unsuccessful nests were destroyed by wind; 19.7 per cent were deserted; 4.2 per cent were destroyed by house cats; and 21.2 per cent were de-



**Figure 9. A Nest on Which the Adult Dove
was Killed and Eaten**

stroyed by undetermined causes. Pearson and Moore (16) list blue jays and flying squirrels as the chief predators of dove nests in Alabama.

Dove nesting increased rapidly at the beginning of May and remained at a high level throughout the month. The greatest number of nests (120) was found in May (Table III).

TABLE III. SUMMARY OF NESTING ATTEMPTS BY DOVES
IN THE ENTRANCE PINE AND WEST CONIFERS

Month	Total Number of Nests	Per Cent of Total Nests	Number of Nests Successful	Per Cent of Nests Successful
April	9	4.2	2	22.2
May	120	56.4	35	29.2
June	49	23.1	19	38.8
July	27	12.6	13	48.2
August	7	3.3	1	14.3
September	1	0.4	1	100.0

This was 53.3 per cent of all the nests found in the Entrance Pine and West Conifers. The greatest number of nests located on one day was 47 on May 8. On May 15, 25 and 29 there were 18, 31 and 24 nests located respectively. Finding May the month of peak nesting in eastern South Dakota agrees with results obtained in Alabama (Pearson and Moore, 16), Georgia (Lowe, 11) and Iowa (Hendrickson, 6).

There was a steady increase in success from May through July while nesting attempts decreased over the same period. However, the number of total successful nests occurring each month decreased at the same rate as did the total nests (Table III).

In his Nebraska studies LaPointe (10) listed the percentage of successful nests for successive months as follows: April, 0; May, 38; June, 15; July, 20; and August, 42.

Two nests were found in April in the Hill Shelter-belt, but only one was successful. Of the 26 nests located in this area during May, again only one was successful. This was a rate of 3.8 per cent success.

There were 96 nests found in the 5.58 acres of the Entrance Pine. This was a density of 17.0 nests per acre. In the 0.49 acres of the West Conifers there were 117 nests for a density of 238.7 per acre.

Of the 117 nests in the West Conifers, 45 were in individual trees; 20 trees held two nests each; eight trees held three nests each; and two trees contained four nests each (Figure 1). The 96 nests in the Entrance Pine were located in 67 individual trees. Seven trees held two nests each, one contained three nests and the remaining nests were found in separate trees (Figure 2). The greatest number of successful nests observed in one tree was two, while one

tree contained four unsuccessful nests. One tree contained two active nests at the same time. Of 592 nests in one study in Alabama, only once was there two active nests in one tree at the same time (Pearson and Moore, 16).

One nest was used three times during the current study. In 29 instances (12 per cent) the same nest was used for two nesting attempts. Seven nests used were known to have been used in 1958.

The average height of nests from the ground was computed according to the species of tree in which they were found. The average height of each species of tree was also derived separately (Table IV).

TABLE IV. AVERAGE NEST AND TREE HEIGHTS AS THEY OCCURRED IN EACH SPECIES OF TREE

Tree Species	Average Nest Height	Average Tree Height
Ponderosa pine	5.2 feet	12.2 feet
Red cedar	4.6 feet	10.3 feet
Blue spruce	3.7 feet	6.2 feet
Douglas fir	4.2 feet	10.3 feet
American elm	7.5 feet	25.0 feet

Of the 802 trees in the Entrance Pine and West Conifers, the majority was ponderosa pine but red cedar was nearly as abundant. Doves preferred ponderosa pine over the

other species of trees in the study areas as nesting sites. The number of successful nests was in direct proportion to the number of nests found in each respective species of tree (Table V). This relationship of nesting success to tree species is not fully understood.

TABLE V. SUMMARY OF TREE SPECIES AND DOVE NESTS LOCATED IN THE ENTRANCE PINE AND THE WEST CONIFERS

Tree Species	Number of Trees in Plantings	Number of Nests in Plantings	Number of Successful Nests
Ponderosa pine	319 (39.6) ¹	117 (54.9) ²	38 (52.8) ³
Red cedar	244 (34.1)	60 (28.2)	17 (23.6)
Blue spruce	210 (26.0)	29 (13.6)	14 (19.4)
Douglas fir	19 (0.2)	5 (2.4)	2 (2.8)
American elm	10 (0.1)	2 (0.9)	1 (1.4)

¹Per cent of total trees

²Per cent of total nests

³Per cent of total successful nests

In the Hill Shelterbelt the 28 nests were in coniferous trees. Fifteen were found in red cedar and 13 in ponderosa pine. Little can be based on this as the deciduous trees in this area were just beginning to leaf out when the study on this subarea was terminated.

There was a period of 138 days from the time the first nest was found until the last one was located. How-

ever, the first nest found had been incubated four days when located on April 20. The young in this nest hatched on April 28 and 29. Counting the period of incubation as 14 days, as shown by Pearson and Moore (16), places the outset of incubation at April 16. The last nest was located on September 5. The dove fledged from it on September 25, therefore the overall period of active nesting was 162 days. McClure (12) found the nesting season began in southwestern Iowa on April 16 and ended on October 15 in 1938. He found it to span from March 23 to October 11 on the same area in 1939. In southeastern Idaho Fitcher (4) found nesting commenced during the first week of May and terminated sometime near the end of the first week of September.

During the current study the longest observed period of time any nest contained eggs was 69 days. A particular nest contained three eggs when found on May 8. On May 25 one egg was found broken. On May 29 there were again three eggs in the nest and these remained until July 31 when they all were found broken in the nest. At no time was a dove observed on the nest.

CHAPTER VI

SUMMARY AND CONCLUSIONS

1. This study was conducted to establish the duration of the nesting season and the productivity of mourning doves in east central South Dakota.

2. The study was carried on at Lake Herman State Park in Lake County from mid-March until mid-October, 1959. The nesting season was found to be 162 days, from April 16 to September 25.

3. Two small coniferous block-plantings and one shelterbelt were selected as study plots. Once the first nest was found on April 20, weekly visits were made to the area and each tree was searched for nests. The study of the shelterbelt was discontinued at the end of May. The subareas were named the West Conifers, the Entrance Pine and the Hill Shelterbelt.

4. The individual areas were plotted on a map and each nest was recorded by location. Each was also recorded by its status, height above ground, tree species, tree height, and nest fate. The young were banded and the nests were marked to learn if re-nesting was carried on in the same nest.

5. The peak nesting activity was found to take place in May. The nesting success was highest in July with the exception of September when the one and only nest was suc-

cessful. The overall success was 31 per cent in the Entrance Pine and West Conifers. The success in the Hill Shelterbelt was 3.8 per cent.

6. The factors found to influence success were wind, bird predation, mammal predation and desertion. The cause of many destroyed nests was undetermined.

7. Doves showed a preference to nest in ponderosa pine in the Entrance Pine and West Conifers. These pines made up 39.6 per cent of the total trees and contained 54.9 per cent of the nests. The number of successful nests in the various species of trees was in direct correlation with the number of nests found in each species of tree.

8. The West Conifers had the highest nesting density with 238.7 nests per acre. The Entrance Pine had 17.0 nests per acre.

9. The average nest height above ground ranged from 3.7 feet in blue spruce to 7.5 feet in American elm. The average in ponderosa pine was 5.2 feet while in fir and cedar it was 4.2 and 4.6 feet respectively.

10. It is recommended that if the mourning dove becomes a game bird in South Dakota the season open on September 1, and it would not interfere with the nesting season. This is contrary to McClure's (13) statement that over 20 per cent of the mourning doves do not leave the nest until after September 1, in northern latitudes.

LITERATURE CITED

- (1) Anonymous, "Mourning Doves", 3 pp. mimeo. memorandum, Nebraska Game, Forestation and Parks Commission, Lincoln, Neb., 1958.
- (2) Anonymous, "The Mourning Dove in Iowa", 8 pp. mimeo., 1958.
- (3) Boldt, William J. and George O. Hendrickson, "Mourning Dove Production in North Dakota Shelterbelts", Journ. Wildl. Mgmt., 16(2):187-191, The Wildl. Soc., 1950.
- (4) Fichter, Edson, "Mourning Dove Production in Four Idaho Orchards and Some Possible Implications", Journ. Wildl. Mgmt., 23(4):438-447, The Wildl. Soc., 1959.
- (5) Handley, Rolland B. and Wm. R. Edwards, "Mourning Dove Nesting Studies in Mississippi", mimeo., Mississippi Game Commission, Jackson, Miss., 1957.
- (6) Hendrickson, George O., "Production of the Mourning Dove at Lewis, Iowa", Quarterly Report of the Iowa Cooperative Wildl. and Fish. Res. Units, Vol. 22, No. 4, Ames, Iowa, 1956. (Cited by permission).
- (7) Hopkins, Milton H. and Eugene P. Odum, "Some Aspects of the Population Ecology of Breeding Mourning Doves in Georgia", Journ. Wildl. Mgmt., 17(2): 132-143, The Wildl. Soc., 1953.
- (8) Jumber, J. F., E. L. Kozicky and D. L. Carter, "Factors Influencing Mourning Dove Production at Lewis, Iowa, 1955", Reprint from Iowa Bird Life, 26(3): 59-61, Ia. Agric. Exp. Sta., Ames, Ia., 1956.
- (9) Kiel, W. H. Jr., "Mourning Doves - An International Resource", Outdoor California, Vol. 20, No. 1, Calif. Dept. of Fish and Game, Sacramento, Calif., 1959.
- (10) LaPointe, Donald F., "Mourning Dove Production in a Central Nebraska Shelterbelt", Journ. Wildl. Mgmt., 22(4):439-440, The Wildl. Soc., 1959.

- (11) Lowe, Jack I., "Breeding Density and Productivity of Mourning Doves on a County-wide Basis in Georgia", Journ. Wildl. Mgmt., 20(4):428-433 The Wildl. Soc., 1956.
- ✓ (12) McClure, H. Elliott, "Mourning Dove Production in Southwestern Iowa", Auk, 59(1):64-75, 1942.
- ✓ (13) _____ "Mourning Dove Management", Journ. Wildl. Mgmt., 8(2):129-134, The Wildl. Soc., 1944.
- ✓ (14) _____ "An Eleven-year Summary of Mourning Dove Observations in the West", Trans. N. Amer. Wildl. Conf., 15:335-343, Amer. Wildl. Instit., Wash., D. C., 1950.
- (15) Nice, Margaret H., "A Study of Nesting Mourning Doves", Auk, 39:457-474, 1922.
- (16) Pearson, Allen M. and George C. Moore, "Nesting Habits of the Mourning Dove in Alabama", Trans. N. Amer. Wildl. Conf., 4:468-473, Amer. Wildl. Instit., Wash., D. C., 1939.
- (17) Pearson, Allen M. and Walter Rosene, Jr., "Observations on the Breeding Season of the Mourning Dove in the South", Trans. N. Amer. Wildl. Conf., 3:865-868, Amer. Wildl. Instit., Wash., D. C., 1938.
- ✓ (18) Randall, Robert H., "Mourning Dove Production in South Central North Dakota", Journ. Wildl. Mgmt., 19(1):157-159, The Wildl. Soc., 1955.
- (19) Southeastern Association of Game and Fish Commissioners "Mourning Dove Investigations, 1948-1956", Southeastern Association of Game and Fish Commissioners, Tech. Bull. No. 1., 166 pp., Columbia, S. C., 1957.
- (20) Stair, John, "Nesting Chronology and Nesting Success of Mourning Doves and White-winged Doves in Southern Arizona", Quarterly Report of the Arizona Cooperative Wildlife Research Unit., 1955.

APPENDICES

APPENDIX A

SCIENTIFIC NAMES OF BIRDS, PLANTS
AND MAMMALS USED IN THE TEXT

Birds

Mourning dove	<u>Zenaidura macroura</u>
Purple grackle	<u>Quiscalus quiscula</u>
Blue jay	<u>Cyanocitta cristata</u>
Red-wing	<u>Agelaius phoeniceus</u>

Plants

Bluegrass	<u>Poa pratensis</u>
Boxelder	<u>Acer negundo</u>
Eastern red cedar	<u>Juniperus virginiana</u>
American elm	<u>Ulmus americana</u>
Douglas fir	<u>Pseudotsuga taxifolia</u>
Foxtail barley	<u>Hordeum jubatum</u>
Hackberry	<u>Celtis occidentalis</u>
Tatarian honeysuckle	<u>Lonicera tatarica</u>
Kochia	<u>Kochia scoparia</u>
Mullein	<u>Verbascum thapsus</u>
Russian olive	<u>Elaeagnus angustifolia</u>
Ponderosa pine	<u>Pinus ponderosa</u>
European white poplar	<u>Populus alba</u>
Wild plum	<u>Prunus americana</u>

Blue spruce

Picea pungens

Staghorn sumac

Rhus hirta

Black walnut

Juglans nigra

Mammals

House cat

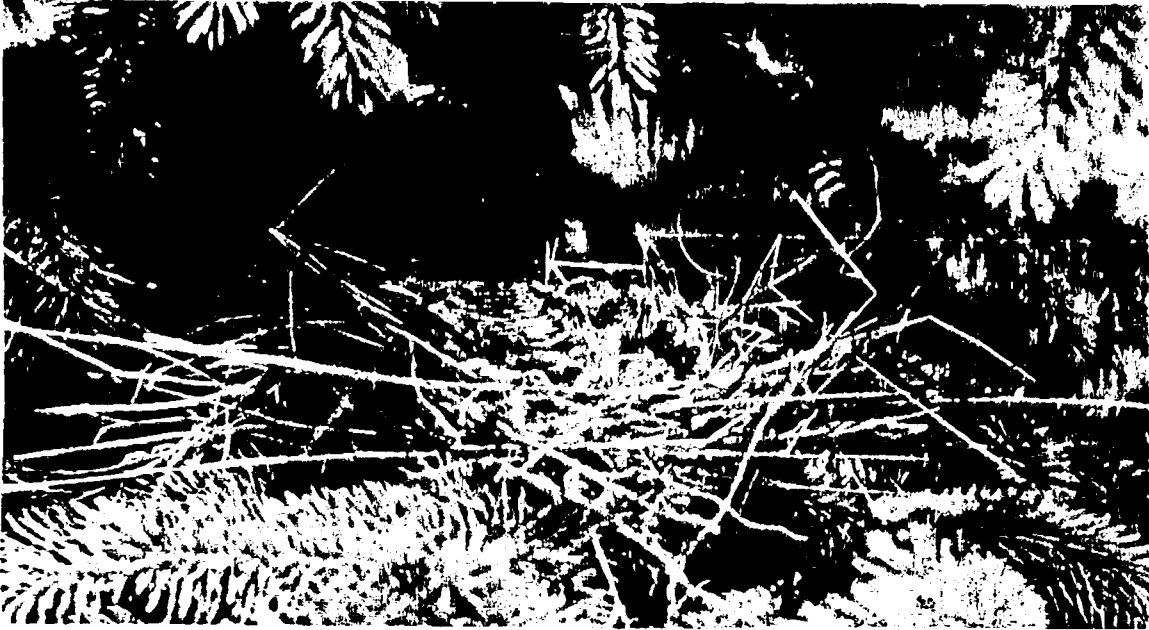
Felis catus

APPENDIX B

TYPICAL MOURNING DOVE NESTS



A Typical Nest Containing Two Eggs



A Typical Nest Containing Two Young Doves