



Waterfowl and hunter use of Freezout Lake game management area, Teton County, Montana
by Kenneth David Lorang

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 Kenneth David Lorang (1979)

Abstract:

Waterfowl and hunter use of the state owned Freezout Lake Game Management Area were studied in 1977 and 1978.

The peak of spring migration for whistling swans, Canada geese and snow geese occurred in mid-March, when the area was entirely frozen. Ducks were present in greatest numbers in April, when ice-out occurred. One hundred and seven nests of Canada geese were located in 1978. Nest success averaged over 90% and gosling production was estimated at 459 birds. Islands were the preferred nest sites. Nest searches conducted in eight types of nesting habitat located 224 duck nests of 11 species. Islands were the most productive habitat, having both the greatest nest density and success.

Native grasslands contained the greatest diversity of nesting species and nests in this type were more successful than those located in other upland types. The distance of upland duck nests from water was inversely related to nest success and directly related to overland mortality of duck broods.

Nest success in upland habitats was poor, averaging 19.6%. Predation by striped skunks was the most significant cause of nest loss. Observations were made of 823 duck broods in 1977 and 1978. Peak hatching dates were calculated for each species and major brood areas determined. Data from vegetation analysis indicate a reduction in vigor in the major upland nesting habitats as a result of long term idling and a lack of habitat manipulation. Management recommendations were made for nesting habitat improvement. Fall migration chronology was monitored in 1978. Duck numbers peaked in late September just prior to opening of waterfowl season.

Mild weather throughout October followed by a rapid early November freeze-up resulted in a large overflight of whistling swans and snow geese. Interviews were obtained from 860 hunters and 1847 birds were checked during the fall water-fowl season. An estimated 5018 birds were harvested on the management area during the 1978 season. Mallards and pintails combined made up over 55% of the total harvest.

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. I understand that any copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Signature

Kenneth D. Lorange

Date

May 22, 1979

WATERFOWL AND HUNTER USE OF FREEZOUT LAKE
GAME MANAGEMENT AREA, TETON COUNTY, MONTANA

by

KENNETH DAVID LORANG

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

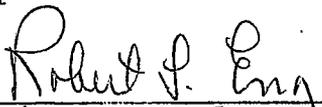
of

MASTER OF SCIENCE

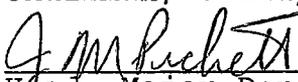
in

Fish and Wildlife Management

Approved:



Chairman, Graduate Committee



Head, Major Department



Graduate Dean

MONTANA STATE UNIVERSITY
Bozeman, Montana

April, 1979

ACKNOWLEDGEMENTS

To the following, among others, the author wishes to express his most sincere appreciation for their contributions to this study: Dr. Robert L. Eng, Montana State University, for project planning, technical supervision and aid preparation of the manuscript; Mr. Dale Witt, Montana Dept. of Fish and Game, for project planning; Dr. Richard Mackie and Dr. William Gould, for critically reviewing this manuscript; Mr. Merrill Hirsch, Montana Dept. of Fish and Game, for aid in obtaining necessary field equipment; Mr. Keith Aune, formerly of the Montana Dept. of Fish and Game, for personal interest in the study and aid in collection of field data; and to my wife, Cynthia, for her aid in typing, data reduction and her patient support for the duration of this study.

This study was funded by the Montana Dept. of Fish and Game through funds provided by Pittman-Robertson project number W - 120 - R.

TABLE OF CONTENTS

	<u>PAGE</u>
VITA	ii
ACKNOWLEDGEMENTSiii
LIST OF TABLES	v
LIST OF FIGURESvii
ABSTRACT	viii
INTRODUCTION	1
DESCRIPTION OF STUDY AREA	2
METHODS	5
Spring Migration	5
Vegetation Analysis	5
Nesting Study	7
Broods	9
Fall Migration and Hunter Harvest	9
RESULTS	11
Spring Migration	11
Vegetation Analysis	16
Nesting Study	20
Broods	34
Fall Migration and Hunter Harvest	42
DISCUSSION AND CONCLUSIONS	52
Spring Migration	52
Vegetation Analysis	54
Nesting Study	55
Broods	64
Fall Migration and Hunter Harvest	65
APPENDIX	67
LITERATURE CITED	75

LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
1. First observation date and period of peak migration of waterfowl at Freezout Lake, 1978	12
2. Residual cover in four nesting habitats	16
3. Species present and their percentage of total plant cover in the greasewood type	17
4. Species present and their percentage of total plant cover in the grassland type	19
5. Canada goose nest success and location	21
6. Egg success and average clutch size for Canada goose nests	21
7. Canada goose nest success by individual ponds	23
8. Densities of duck nests by types of habitat	23
9. Percent composition of ducks nesting in each type of habitat	27
10. Percent duck nests of each species in various types of habitat	28
11. Densities of successful duck nests by types of habitat	29
12. Number and percent success of duck nests by species	30
13. Egg success and average clutch size by species	31
14. Causes of unsuccessful duck nests	32
15. Average distances of upland duck nests from water	35
16. Average size and age class of broods	39

LIST OF TABLES (cont.)

<u>TABLE</u>	<u>PAGE</u>
17. Average temperature and precipitation at Fairfield, Montana, 1977 and 1978	40
18. Hatching dates of broods observed in 1977 and . . . 1978	41
19. Overland mortality of duck broods	42
20. Hunter utilization and waterfowl harvest	47
21. Species composition of waterfowl checked during the 1978 season	50
22. A comparison of vegetational data taken at Freezout Lake in 1952 and 1978	54
23. Plant species present in vegetation types in riparian and emergent zones	74

LIST OF FIGURES

<u>FIGURE</u>	<u>PAGE</u>
1. Map of the study area	3
2. Chronology of spring migration of whistling swans and Canada geese, 1978	13
3. Chronology of spring migration of snow geese and ducks, 1978	14
4. Locations and extent of areas searched for duck nests	24
5. Locations of major duck brood areas	37
6. Chronology of fall migration of whistling swans and Canada geese, 1978	43
7. Chronology of fall migration of snow geese and ducks, 1978	44
8. Locations of major hunter access points	48
9. Distribution of vegetation types in the emergent and riparian zones of Pond 1.	68
10. Distribution of vegetation types in the emergent and riparian zones of Pond 2	69
11. Distribution of vegetation types in the emergent and riparian zones of Pond 3	70
12. Distribution of vegetation types in the emergent and riparian zones of Pond 4	71
13. Distribution of vegetation types in the emergent and riparian zones of Pond 5	72
14. Distribution of vegetation types in the emergent and riparian zones of Pond 6	73

ABSTRACT

Waterfowl and hunter use of the state owned Freezout Lake Game Management Area were studied in 1977 and 1978. The peak of spring migration for whistling swans, Canada geese and snow geese occurred in mid-March, when the area was entirely frozen. Ducks were present in greatest numbers in April, when ice-out occurred. One hundred and seven nests of Canada geese were located in 1978. Nest success averaged over 90% and gosling production was estimated at 459 birds. Islands were the preferred nest sites. Nest searches conducted in eight types of nesting habitat located 224 duck nests of 11 species. Islands were the most productive habitat, having both the greatest nest density and success. Native grasslands contained the greatest diversity of nesting species and nests in this type were more successful than those located in other upland types. The distance of upland duck nests from water was inversely related to nest success and directly related to overland mortality of duck broods. Nest success in upland habitats was poor, averaging 19.6%. Predation by striped skunks was the most significant cause of nest loss. Observations were made of 823 duck broods in 1977 and 1978. Peak hatching dates were calculated for each species and major brood areas determined. Data from vegetation analysis indicate a reduction in vigor in the major upland nesting habitats as a result of long term idling and a lack of habitat manipulation. Management recommendations were made for nesting habitat improvement. Fall migration chronology was monitored in 1978. Duck numbers peaked in late September just prior to opening of waterfowl season. Mild weather throughout October followed by a rapid early November freeze-up resulted in a large overflight of whistling swans and snow geese. Interviews were obtained from 860 hunters and 1847 birds were checked during the fall waterfowl season. An estimated 5018 birds were harvested on the management area during the 1978 season. Mallards and pintails combined made up over 55% of the total harvest.

INTRODUCTION

A major concern in waterfowl management is the preservation of adequate habitat for breeding and migrating waterfowl. One result of this concern has been the purchase of waterfowl management areas by state and federal agencies.

Ellig (1955) studied waterfowl relationships at Freezout Lake during 1951 and 1952. In 1953 the area was acquired by the Montana Fish and Game Department, and since then has been developed and managed as a public hunting and waterfowl production marsh. This study of current waterfowl and hunter usage was initiated to assess the long term impact of the management program at Freezout Lake, knowledge of which could be useful in setting guidelines for future management decisions.

The specific objectives of this study were: 1) to determine the chronology and magnitude of spring migration; 2) to document the vegetative characteristics of the area and relate these to waterfowl activity; 3) to document the degree and success of nesting; 4) to estimate production by the occurrence of broods; 5) to monitor fall migration and hunter harvest; 6) to compare current waterfowl activity on the management area to that which occurred prior to development; 7) to make management recommendations to enhance future waterfowl use of the area.

DESCRIPTION OF THE STUDY AREA

Freezout Lake (formerly known as Greenfield's Lake) is located approximately 3 km northwest of Fairfield in north-central Montana. The lake is bordered on the east by the Fairfield Bench, a Bureau of Reclamation irrigation project, and to the west by rolling uplands. The lake lies in a natural sump in the lower portion of a glacial basin (Giesecker 1937). The major water supplies to the area are spring runoff and return water from adjacent irrigated land. Ellig (1955) presented a history and description of the area prior to development.

In 1953, following Ellig's (1955) study, the Montana Department of Fish and Game began to develop the area for waterfowl. This development included the construction of a drainage ditch from Freezout Lake to Priest Lake, and on to the Teton River. The placement of seven retention dikes with water control structures resulted in the formation of six pond units. Islands were constructed in each of these ponds. Currently the management area consists of Freezout Lake and six contiguous pond units (Figure 1) and Priest Lake which is separate from the rest of the management area, lying approximately 8 km to the north. A total of approximately 1900 ha of water is present on the area.

The management unit also includes approximately 2,560 ha

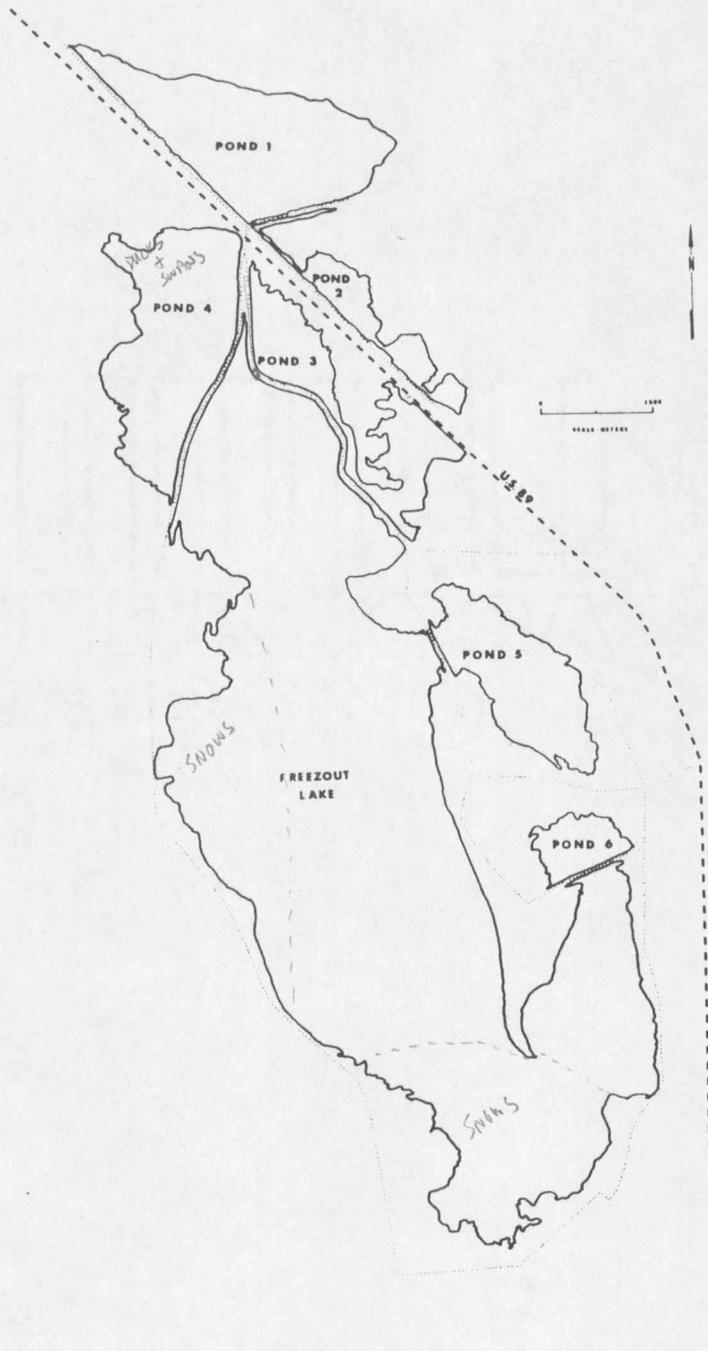


Figure 1. Map of the study area.

of upland habitat adjacent to the water. The majority of upland habitat is native grasslands. These grasslands have remained ungrazed for nearly 20 years (Dale Witt, pers.comm.). Greasewood (Sarcobatus vermiculatus) is dominant on alkaline areas near the interior of the project. Nesting cover plantings are present on disturbed soil along dike and drainage ditch banks and also in plots in certain upland areas. Two hundred and seventeen hectares are farmed for small grain intended to act as buffer crops to alleviate damage to private croplands by field feeding waterfowl. Shelter belts have been planted in several areas to enhance upland game bird habitat.

The climate at Freezout Lake is characterized by wide fluctuations in daily and seasonal temperatures, and relatively low annual precipitation (Gieseke 1937). The average annual precipitation is 31.7 cm (U.S. Dept. of Commerce 1977), with 105 frost free days per year (Caprio 1965).

METHODS

Field work for this study was conducted full time from June through August 1977, part time (four days/week) in March and April 1978, and full time May through November 1978.

Spring Migration

Migration chronology was monitored by ground observations made during March, April, and May 1978. Dates of first occurrence and the week of peak migration were recorded for major species observed on the area. Total numbers of waterfowl and relative abundance of each species were estimated weekly.

Vegetation Analysis

During the summer of 1977, a general survey of the area was made to determine the major types of habitat available to nesting ducks. The following types were identified and later searched for the presence of nests: native grassland, greasewood, dense nesting cover (upland areas seeded into grass-legume mixtures), retention dike banks, drainage ditch banks, agricultural land, islands and emergent vegetation.

Six study plots, 150 by 300 m, were established in each of the grassland, greasewood, and dense nesting cover types. Grassland and greasewood plots each included 150 m of shoreline. Six dikes, six ditches, and forty-five islands were chosen as representatives of these types of habitat. All

islands which were searched for duck nests were located in pond unit 4.

During the spring of 1978, a modification of the technique described by Robel et. al. (1970) was used to measure residual vegetation present on grassland, dike, ditch, and dense nesting cover areas. Height-density readings were taken along two 100 m transects in six areas in each of these types of habitat. Total visual obstruction was recorded to the nearest 0.5 dm at 10 m intervals along the transect. Readings were taken from a height of 1 m and a distance of 4 m in each cardinal compass direction at each station.

The line intercept method was used to measure shrub canopy coverage in the greasewood type (Canfield 1942). Three 100 m transects were established perpendicular to the shoreline in each of the six plots. Species composition and relative ground cover of other plants, excluding greasewood, were measured by the point intercept method (Copeland 1950) using three additional transects, 300 m long, established perpendicular to the shoreline in each plot. A ten-point reading was taken at 10 m intervals along each transect. The procedure was repeated to determine relative ground cover and composition on grassland areas. Planted areas were examined to determine kinds of plants present and their relative abundance.

Aerial photographs were taken of the study area in the summer of 1978. Color infra-red photos aided in delineating vegetational features. Maps were prepared showing the extent of major upland types of habitat, emergent vegetation, and vegetational types in riparian areas. Plant nomenclature follows Booth (1950), Booth and Wright (1959), and Booth (1972).

Nesting Study

Searches were conducted in late April and early May 1978 to determine the number and location of nesting Canada Geese on the study area. At the time of the search, the majority of nests were well into incubation. All islands and shorelines were searched for the presence of nests. Upon locating a nest, the attending goose was flushed, and the clutch size and general characteristics of the nest were noted. The locations of nests were marked and revisited in mid-May when nesting activity was believed terminated, to determine fate. A nest was considered successful if at least one egg hatched.

Some duck nests were located incidental to other activities in 1977, but systematic searches for nests were not made until 1978. From May 15 through July 15, 1978, an intensive search was conducted in major types of habitat on the study area, including the vegetational study plots. The size of

the area searched was limited to the amount that could be effectively covered in a three-week period. Each area, with the exception of the agricultural type, was searched three times. Late spring plowing eliminated the agricultural type as nesting cover after one search was completed.

Grassland, agricultural, and dense nesting cover areas were searched using a 53 m cable-chain drag device (Higgins et. al. 1977). Dike and ditch banks were searched either on foot or by using a flushing bar mounted on a small tractor. Greasewood areas and islands were searched on foot. Because of manpower limitations, emergent vegetation was searched only as time permitted.

Upon locating a nest, a field candler was employed to determine the incubation stage of the eggs (Weller 1956). The location of the nest was marked and the eggs were covered with the nest lining to lessen the chance of predation and embryonic death (Higgins and Kantrud 1973). Nests were revisited shortly after the projected hatching date to determine fate. Any nest in which at least one egg hatched, was considered successful. If a nest was unsuccessful due to predation, the nest site and surrounding area were examined in an attempt to determine the nest predator (Sooter 1946, Reardon 1951). The distance was paced from the nest site to the nearest permanent water.

Total area of each type of habitat searched was determined by planimeter readings from aerial photos. The nesting density and success between types of habitat was tested with the chi-square test for independence (Snedecor 1956).

Brood Observations

Weekly observations of broods were conducted during June, July, and August of 1977 and 1978. Observations were made during early morning hours by walking shorelines, driving a vehicle along project roads, and from a boat. Brood size was recorded and duckling age determined by the method described by Gallop and Marshall (1954). Hatching dates were back-calculated to find peak periods of hatch for each species. Major brood areas and associated aquatic and vegetational features were noted.

Fall Migration and Hunter Harvest

From mid-September until November an aerial census was made each week to monitor migration chronology on the study area. Estimates were made of total waterfowl numbers and relative abundance of each species and crosschecked with ground surveys following each flight.

Hunter check stations were operated at two major access points between sunrise and 1:00 P.M. on opening weekend of waterfowl season. Thereafter check stations were operated

each weekend and three days during the week at various points on the area. Information collected from hunting parties included: county of residence, number of hunters per vehicle, number of hours spent hunting, and the number, species and sex of waterfowl taken. Hunting pressure was estimated from vehicle counts taken twice daily throughout the season.

RESULTS

Spring Migration

The first recorded observations of waterfowl at Freezout Lake in 1978 were made 8 March by Fish and Game personnel, when whistling swans, Canada geese, and mallards were noted (Keith Aune, pers. comm.). At this time all pond units and the main lake were entirely frozen, but sheetwater from local runoff could be found in limited areas on top of the ice and in adjacent lowlands.

Table 1 lists the dates of first observations and the week of peak migration for all major species. In addition to the species listed, occasional observations were made of the wood duck (Aix sponsa), white-winged scoter (Melanitta fusca deglandi), and European wigeon (Anas penelope). By the end of March, all resident breeding species had arrived with the exception of blue-winged and cinnamon teal.

Break-up of the ice sheets began during the last week of March and by 1 April the main lake and pond units 2, 3, and 4 were ice free. Units 1, 5, and 6 remained frozen until 7 April.

Figures 2 and 3 depict chronology of spring waterfowl migration on the study area. The peak migration of whistling swans, Canada geese, and snow geese occurred prior to spring breakup. Swans remained on the area throughout the day

Table 1. First observation date and period of peak migration of waterfowl at Freezout Lake, 1978

Species	First Observation Date	Peak Migration
Canada Goose - <u>Branta canadensis</u>	3/8	3/12-18
Lesser Snow Goose - <u>Anser caerulescens</u>	3/14	3/19-25
Whistling Swan - <u>Cygnus columbianus</u>	3/8	3/12-18
Mallard - <u>Anas platyrhynchos</u>	3/8	4/2-8
Pintail - <u>Anas acuta</u>	3/9	3/26-4/1
Common Goldeneye - <u>Bucephala clangula</u>	3/10	3/16-4/1
American Wigeon - <u>Anas americana</u>	3/16	4/2-8
Canvasback - <u>Aythya valisineria</u>	3/16	4/2-8
R. B. Merganser - <u>Mergus serrator</u>	3/16	4/9-15
Redhead - <u>Aythya americana</u>	3/22	4/9-15
Bufflehead - <u>Bucephala albeola</u>	3/22	4/2-8
A.G-W. Teal - <u>Anas crecca carolinensis</u>	3/22	4/9-15
Northern Shoveler - <u>Anas clypeata</u>	3/23	4/30-5/6
Gadwall - <u>Anas strepera</u>	3/23	5/14-20
Ruddy Duck - <u>Oxyura jamaicensis</u>	3/27	4/16-22
Lesser Scaup - <u>Aythya affinis</u>	3/29	4/23-5/1
Ring-Necked Duck - <u>Aythya collaris</u>	4/1	4/9-15
Cinnamon Teal - <u>Anas cyanoptera</u>	4/6	5/7-13
B-W. Teal - <u>Anas discors</u>	4/22	5/7-13

