EDUCATIONAL POTE
OF THE
KELLOCG BIRD SANCTUARY

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
Harold Z. Snyder
1961

This is to certify that the

thesis entitled

AN INVESTIGATION OF THE
EDUCATIONAL POTENTIAL
OF THE
KELLOGG BIRD SANCTUARY

presented by

Harold Z. Snyder

has been accepted towards fulfillment
of the requirements for

Ph. D. degree in Fisheries and Wildlife

G Mouser
Major professor

Date May 18, 1961

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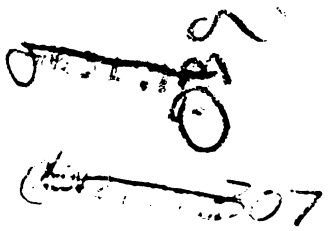

AN INVESTIGATION OF THE EDUCATIONAL POTENTIAL OF THE KELLOGG BIRD SANCTUARY

BY

HAROLD Z. SNYDER

AN ABSTRACT

Submitted to the School for Advanced Graduate Studies of
Michigan State University of Agriculture and
Applied Science in partial fulfillment of
the requirements for the degree of

DOCTOR OF PHILOSOPHY

Department of Fisheries and Wildlife

1961

Approved Grouser

AN ABSTRACT

This study is concerned with the educational potential of the W. K. Kellogg Bird Sanctuary.

The Kellogg Bird Sanctuary is owned and operated by Michigan State University. It is located on the east side of Gull Lake, in Kalamazoo county, 12 miles northwest of Battle Creek and 16 miles northeast of Kalamazoo. The Sanctuary is a wildlife habitat in which may be found many wild waterfowl and a number of captive birds and mammals. There is also an educational museum. In addition, selected plantings and natural cover provide food and habitat for many small birds and mammals.

The purposes of the Sanctuary are threefold: 1, to provide an area where the public can come and view our native birds and waterfowl in as near natural surrounding as possible; 2, carry out a program of wildlife studies which will provide information for the better management of our natural resources; and 3, to carry out a science and outdoor education program for teachers, students, farmers, sportsmen, etc., so that they may be given insight into biology in its many phases.

The experimental part of this study deals particularly with the educational program of the Sanctuary as it relates to school groups. Each year thousands of children and their teachers come to tour the public area of the Sanctuary. Because of the small amount of time allotted by the classes for their tour, inability of the teacher to explain or interpret the out-of-doors, shortage of personnel at the Sanctuary to conduct tours, and lack of pre-trip orientation materials,

the children's tour of the Sanctuary often becomes a mere look and run experience. It is felt that in many cases the child leaves the area with little better appreciation of wildlife and its importance to man than he had before he came.

The chief purpose of this study is to determine how the educational potential of the Kellogg Bird Sanctuary can be more effectively utilized to produce an increase in knowledge of conservation of natural resources. This involves three minor problems:

1. To determine what other programs are now in operation that would in any way lend direction to the solution of the problem at hand.

2. To prepare and investigate the effectiveness of certain teaching aids to be used in a pre-trip orientation program.

3. To prepare recommendations.

Since at the time of initiation of this study the funds available to the Sanctuary were inadequate to enlarge the educational program by hiring additional staff, etc., the writer decided to develop an alternative. To arrive at this alternative an experiment was carried out.

The experimental procedure was carried out in the following manner: 1. Development of a questionnaire designed to find out to what extent the teachers were interested in using preparatory materials. 2. Development of Sanctuary tour guide sheets. 3. Development of a preparatory unit on waterfowl, trees, mammals, and conservation practices. 4. Development of a second unit on the specific birds and waterfowl at Kellogg Bird Sanctuary.

Returns from the questionnaire indicated a unanimous desire by the teachers for preparatory materials.

A testing program was carried out with fourth grade classes which indicated that the groups receiving pre-trip training with preparatory helps gained significantly more from their Sanctuary trip than the untrained group. Accordingly, a second unit of a more specific nature was developed by the writer and recommended for use by the Kellogg Bird Sanctuary in its educational program.

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Thanks is also extended to the other members of the Doctoral Committee, Dr. Peter I. Tack, Dr. Charles W. Boas, Dr. Jack A. Elliot, Dr. Wilbert E. Wade, and Dr. John M. Mason for their helpful suggestions and assistance.

Particular gratitude is extended to Mr. R. D. VanDeusen, Director of the Kellogg Bird Sanctuary, for his helpful cooperation in the carrying out of this study at the Bird Sanctuary, and in the supplying of pertinent background information about the Sanctuary.

The writer is also indebted to the teachers of the classes cooperating in the experimental testing program of this study, since without their careful attention to the directions supplied by the writer, the test would not have been possible.

Others to whom the writer is indebted include Dr. Baten, statistician for the Agriculture Experiment Station of Michigan State University, for his help in validating the test used in the study; Dr. Andrew Hansson of Grand Rapids Junior College for his assistance with the statistical work of this study; Mr. Paul Schneider of Michigan State University for his assistance with photography and drafting; Miss Mary Jane Dockeray of the Grand Rapids Public Museum for supplying information on the Audubon Camps; my colleagues, Dr. Jerome Miller and Dr. Agnes Lisle of the Grand Rapids Junior College for their helpful

suggestions; the many staff members of colleges, universities, nature centers, etc., who supplied pertinent materials used in this study; my parents for their financial help and encouragement; and my wife Ellen for her understanding and encouragement throughout the entire period of this Doctoral Program.

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I. INTRODUCTION

The Problem

The chief purpose of this study is to determine how the educational potential of the Kellogg Bird Sanctuary can be more effectively utilized to produce an increase in knowledge of conservation of natural resources. This involves three minor problems:

1. To determine what other programs are now in operation that would in any way lend direction to the solution of the problem at hand.

2. To prepare and investigate the effectiveness of certain teaching aids to be used in a pre-trip orientation program.

3. To prepare recommendations.

The Need for the Study

The Kellogg Bird Sanctuary is a unique place. It is situated in the midst of wild land and farm country which contains much forest and many ponds and marshes. This is a condition which is conducive to the attraction of waterfowl and other birds, both during nesting seasons and migration flights. Specifically, the Sanctuary is located on the east side of Gull Lake, in Kalamazoo county, 12 miles northwest of Battle Creek and 16 miles northeast of Kalamazoo. Wintergreen Lake, around which the Sanctuary is built, lies one mile north of M 89. Large cities such as Battle Creek, Kalamazoo, and Grand Rapids are within an hour's driving time. Small cities such as Hastings, Marshall, Albion, and Vicksburg are only a short distance from the Sanctuary. These cities, along with many others, both nearer and farther, contain thousands of young people and adults who are interested in seeing wildlife in a natural setting. Almost every day throughout the year people are seen walking through the public area of the

Bird Sanctuary appreciating the sights and sounds of this wildlife haven (Figure 1). The Sanctuary is especially crowded on weekends, particularly in the spring and fall when waterfowl migration is taking place and hundreds of waterfowl are stopping off at the Sanctuary.

Many groups visit the Sanctuary. Families and their friends come because of their own interest or for a sightseeing tour. Many club groups visit, including children's nature clubs, women's clubs, men's sport clubs, boy scouts, girl scouts, campfire girls, etc. Most of the groups visiting the Sanctuary come from the public schools. Thousands of children visit with teachers to learn about the wildlife (Figure 2). Judging from a careful observation of many of these groups it may be said that most of these classes come to the Sanctuary as part of a day's tour which includes visits to the Kellogg and the Post Cereal Companies in Battle Creek and the Kellogg Experimental Farm near the Sanctuary.

Because of the small amount of time allotted by the classes for their tours, inability of the teacher to explain about the many exhibits and varied waterfowl, shortage of personnel at the Sanctuary to conduct tours, and lack of preparatory helps, the children's tour of the Sanctuary often becomes a mere hurried, look-and-run experience. It seems likely that often the child leaves the area with little better appreciation of wildlife and its importance to man than he had before he came.

When this study was begun, it seemed evident that adequate funds and an increase of personnel were not available to enlarge the educational program of the Sanctuary. In order for the Sanctuary to provide a better educational experience, an extended program, utilizing existing personnel and funds, seemed desirable.

Figure 1. Part of the water front at Kellogg Bird Sanctuary.

Figure 2. Students accompanied by their teacher and the writer leave the sandhill crane pen.

History and Development of the Kellogg Bird Sanctuary

The Kellogg Bird Sanctuary was started in 1927 by Mr. W. K. Kellogg. The initial project was chiefly an aviary display of foreign pheasants, peacocks, quail, swans, geese and ducks.

On January 1, 1930, the Sanctuary was given to Michigan State University. Its first director was Dr. Miles D. Pirnie. The operation of the Sanctuary was at first under the direction of the Division of Applied Sciences. (1931-1943). In 1943 it was put under the supervision of the conservation Institute of Michigan State University. When the Conservation Institute was dissolved in 1951, the Sanctuary administration was taken over by the Department of Fisheries and Wildlife, through which the Sanctuary is presently being administered. Dr. Pirnie served as director of the Sanctuary from 1931-1947. When he returned to the campus, the leadership was assigned to Dr. Arthur E. Staebler, who is presently associated with Fresno State Teachers College in California. Dr. Staebler served as director from 1947-1954. The present director, Mr. R. D. VanDeusen, was appointed in 1954.

The Sanctuary has changed somewhat from the original plan as envisioned by Mr. Kellogg. As the captive native waterfowl began to raise families and become established, the Sanctuary became less a display of exotic birds and more a place where large flocks of migratory waterfowl gathered. Through the years the waterfowl have increased to the extent that now, during fall and spring migrations, thousands of ducks and geese may be seen on Wintergreen Lake.[1]

There are still many captive foreign species at the Sanctuary, but

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[1]Dr. Miles D. Pirnie, Report of the W. K. Kellogg Bird Sanctuary of Michigan State College, 1931-1947, p. 2.

they are now outnumbered by the native birds and mammals. Since many foreign and domestic species are caged, their exhibition has proven useful for visitors wishing to learn more about Michigan birds and mammals.

Public attendance at the Sanctuary has increased greatly during the past twenty-nine years from 70 in 1931 to 180,000 in 1960 (Table I, p. 6).

The Sanctuary is seen as a unique thing by Dr. Pirnie in his 1947 Sanctuary report: "To a great extent a 'bird sanctuary' is what you make it. For the past 15 years our chief aim and objective has not been protection alone, but also to use this unique set-up to foster greater appreciation of the outdoors, a necessary preliminary to understanding the details of wise land use and other effective conservation."[2]

These objectives are still being carried out by Mr. R. D. VanDeusen, the Sanctuary's present director.

Through the years the Kellogg Bird Sanctuary has served as a place for wildlife research projects. A record of the varied and many investigational projects for the years 1955-1960, as furnished by the present director, appear in Table II, p. 7.

The Sanctuary has provided many services and activities. It has given guided tours to groups by appointment. It has played host for conferences in fields related to wildlife management. It has offered special lectures by the Sanctuary director. It has provided advisory service for numerous sports clubs. It has made available photographs to newspapers and periodicals, and has loaned slides and films to teachers and community leaders.

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[2]Pirnie, loc. cit., p. 3

TABLE I*

PUBLIC USE OF THE SANCTUARY 1931-60

Years	Number of Persons
1931-42	70 to 100,000
1949-50	110,000
1952-53	133,000
1956-57	150,000
1959-60	180,000

Annual Visitation to W. K. Kellogg Bird Sanctuary

1931-42, 46-47 Average 70 Groups

1948-54 Average 40-60 Groups

1955-60 Average 97-279 Groups

Registered Group Visitations At W. K. Kellogg Bird Sanctuary

The above averages include all grade levels as well as university and college classes. Adult extension classes, home demonstration groups, school officials, garden clubs, farm organizations and service clubs are also included in this number.

Groups are coming from greater distances. Chartered bus trips are more common today; attraction to large companies nearby lends added incentive for a trip. Registered groups make up approximately one-third of those visiting the area.

*Compiled by R. D. VanDeusen

TABLE II*

INVESTIGATIONAL PROJECTS FOR THE FIVE YEAR PERIOD 1955-1960

Armstrong, William H. MS Thesis	1957	Nesting and Food Habits of the Long-Eared Owl in Michigan
Brocke, Rainer H. MS Thesis	1957	An Evaluation of Strip Census Methods for Cottontail Rabbit Populations In Southern Michigan
Caldwell, Larry D. MS Thesis	1955	A Nesting Study of the Mourning Dove In Kalamazoo County, Michigan
Geis, Aelred D. PhD Thesis	1956	A Population Study of the Cottontail Rabbit In Southern Michigan
Geis, Aelred D. & Earl L. Atwood Manuscript	1957	Problems Associated With Attempts to Increase the Recovery Rate of Waterfowl Bands
Gillem, Lowell Manuscript	1956	The Painted Turtle
Mainone, Robert F. Manuscript	1957	A Student of Zoological Parks Looks At Portions of the W. K. Kellogg Station of Michigan State University
McNeil, Richard Jerome MS Thesis	1957	Ecological Distribution of the Herpeto-fauna of Kalamazoo County, Michigan
Rudersdorf, W. J. & R. D. VanDeusen Manuscript	1955	A Suggested Technique For Making Waterfowl Neck Bands Using Rubber-Styrene. Presented 17th Annual Midwest Wildlife Conf. Dec. 12-14, 1955, Purdue Univ., Lafayette, Ind.
Schlichting, H. E. & T. W. Porter Manuscript	1955	Research-Kellogg Biological Station
Schlichting, H. E. PhD Thesis	1958	The Role of Waterfowl In the Dispersal of Algae
Smith, Herman & R. D. VanDeusen Manuscript	1958	Progress Report On the Acceleration of Pairing of Canada Geese Following Injection With Testosterones Proportionate and Pelleting With Estrogen

*Compiled by R. D. VanDeusen

TABLE II (continued)

Smith, Herman & R. D. VanDeusen Manuscript	1958	Preliminary Investigations of the Suitability of Various Breeds of Chickens and Certain Crosses For the Production of Feathers For Fly-Tying
VanDeusen, R. D. Manuscript	1958	Progress Report On Habitat Improvement For Canada Goose Management of Small Wet Lands
VanDeusen, R. D., J. L. Wagner & R. H. Winkler Manuscript	1958	Preliminary Test of Driving and Herding Waterfowl By Aid of Swimmers
VanDeusen, R. D. Printed	1959	Development of New Bands and Markers For Use On Experimental Stock At the W. K. Kellogg Bird Sanctuary. Modern Game Breeding, pp. 6-8, July, 1959
VanDeusen, R. D. Printed	1956 1957 1958	The Michigan Christmas Bird Census Publ., Jack Pine Warbler, March, 1957, March, 1958, and March, 1959.
Wood, Jack S. Manuscript	1958	Effects of Land Utilization On Waterfowl In the Kellogg Bird Sanctuary Area
Wood, Jack S. MS Thesis	1960	Land Use Changes In the Gull Lake Area and Their Influence on Waterfowl Use

Staff, Program and Facilities of Kellogg Bird Sanctuary

The Kellogg Bird Sanctuary is under the direction of Biologist R. D. VanDeusen (Figure 3). All administration and experimental work is under his immediate direction. The administration of the Sanctuary itself is the responsibility of the Department of Fisheries and Wildlife of Michigan State University, and Mr. VanDeusen works closely with the staff of this department in directing the activities of the Sanctuary.

Two full-time maintenance men are employed to carry out the actual animal care and building-and-grounds maintenance. A part-time secretary helps with the clerical work. Other part-time help is employed during the periods when work is heaviest.

Figure 3. Biologist R. D. VanDeusen instructs a school group on bird banding.

The Sanctuary, including Wintergreen Lake, consists of about 180 acres. The area is divided into a public and non-public area. The map on page 12 shows how the area is laid out, and the pictures accompanying the map show some of the buildings and pens. It may be seen from the map that the public area contains the water front where the waterfowl are fed by visitors, the lakeside museum and the many pens of birds and mammals, the director's home, and the red pine and spruce plantations. The back area provides secluded spots for nesting waterfowl and other birds and a private location for the lodge which is used for waterfowl observation, conferences, study groups, etc. The back area is also used for experimental plantings which not only provide food and shelter for animals, but also demonstrate a type of erosion control and generally improve the landscape.

Most of the people visiting the Bird Sanctuary spend their time in the public area but groups on request may be taken on a mobile guided field trip through the back area.

The program of the Sanctuary is threefold. It provides an area where the public can come and view native birds and waterfowl in as near natural surroundings as possible. Also, wildlife research studies are carried out here to provide information for the better management of our natural resources. Finally, a science and out-door education program is being carried out for teachers, students, farmers and sportsmen so they may be given an insight into biology in its many phases. This phase of the program is somewhat limited because of shortage of funds and staff.

The Sanctuary is open during the daylight hours every day of the year (Figure 4). During these hours both scheduled and unscheduled groups tour the Sanctuary. Groups which register before coming to the Sanctuary receive the services of the director who spends time orienting the group concerning the things which can be seen and the experimental work which is being carried out at the Sanctuary.

Another service of the Sanctuary is evidenced in the special lectures and demonstrations given by Mr. VanDeusen. These lectures are given at the request of schools, teachers' groups, women's clubs, sportsmen's clubs, etc.

The proximity of the Bird Sanctuary to the Kellogg Biological Station makes an ideal arrangement for students and conference groups to make use of the Sanctuary for increasing their knowledge of conservation practices and wildlife management, techniques, and policies.

Figure 4. Sign at the entrance of the Sanctuary.

1. Bulletin Board
2. Office
3. Rest rooms
4. Refreshments
5. Squirrels, badger porcupine
6. Eagle pen
7. Hawks & Owls
8. Storage
9. Lakeside Museum
10. Feed Waterfowl
11. Sandhill Crane
12. Pheasant & Quail
13. Red Fox & Raccoon
14. Pheasant & Peafowl
15. White-tailed Deer

This map shows the Sanctuary as it appeared at the time of this study.

Figure 5. Sanctuary office

Figure 6. Pheasant and pea fowl pen

Figure 7. Deer yard

Figure 8. Red pine plantation providing erosion control, bird habitat and landscape improvement

Information Concerning the Type, Size and Numbers of Groups Presently Visiting the Sanctuary

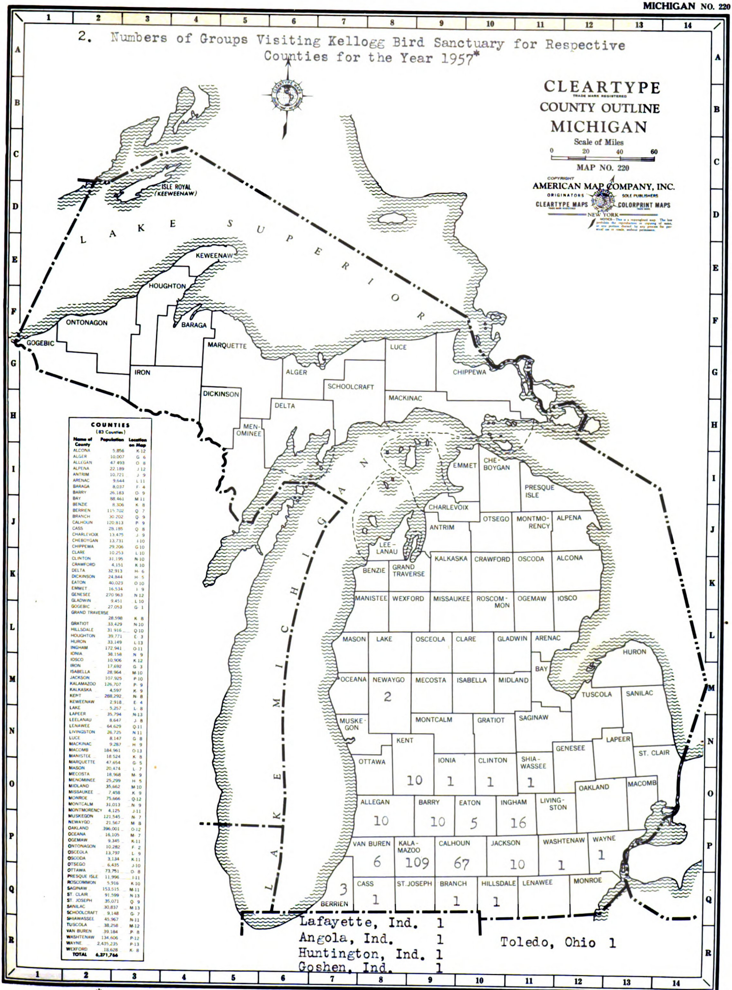
The maps and tables on the following pages have been included to show how the Kellogg Bird Sanctuary has been used during the years 1957-1959. The maps show the number of groups coming from the various counties in Michigan. A few groups come from outside the state. Tables III, IV, and V show the number of groups attending classified according to specific grade, undetermined grade, high school, college, church, or club or adult groups. These tables represent the years 1957, 1958 and 1959 respectively. It may be seen from the map and tables that numbers of groups attending the Sanctuary were lower during 1958 than in either of the other years. This is likely due to the state financial situation in 1958, at which time schools had difficulty in obtaining their funds from the state. As a result, many schools curtailed their transportation outlay and thus field trips such as the one to the Kellogg Bird Sanctuary were eliminated. It is interesting to note that in 1959 the Sanctuary had more groups coming from greater distances than in either of the other two years. It may also be seen that the Sanctuary is being used by many different grade levels and many kinds of groups from all over lower Michigan and by some groups from out of state. The adult groups, as well as many youth clubs, often arrange to have use of the Sanctuary lodge where, after their tour of the Sanctuary, they may have their refreshments and a program, perhaps with Mr. VanDeusen present to lecture or show slides or films.

Persons within these groups represent only part of the thousands of visitors who come to the Sanctuary. Many of the visitors, both individuals and groups, do not register since, as previously indicated, the

Sanctuary is open to the public every day of the year daylight to dusk; and, thus, they come at their own convenience. The numbers of the groups shown on the maps and tables do not necessarily represent the complete number of grades attending since some groups contain several classes of the same grade. Also, some of the schools do not give their grade when they register or they may be a rural school: thus they are listed in the tables as undetermined grades.

These educational helps are designed to serve primarily those groups represented in these tables, the pre-registered groups. These are the groups who likely could gain much from their trip if they had some materials to orient them before they came to visit the Bird Sanctuary. This applies primarily to the elementary and junior high school groups since many of the high school and college groups have their own study plans in mind as part of their work.

2. Numbers of Groups Visiting Kellogg Bird Sanctuary for Respective Counties for the Year 1957*

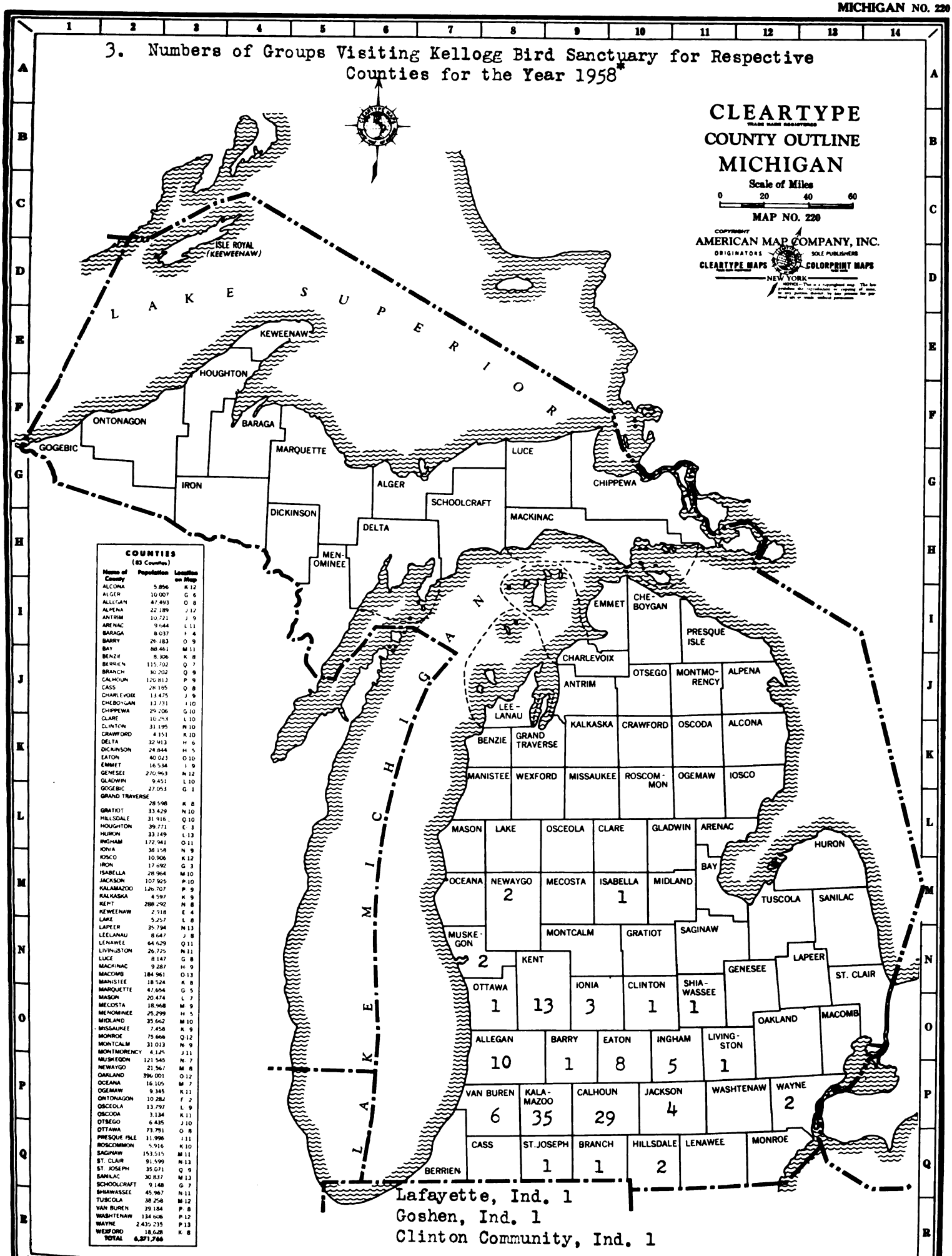


COUNTIES
(83 Counties)

Name of County	Population	Location on Map
ALCONA	5,856	K-12
ALGER	10,007	G-6
ALLEGAN	47,493	O-8
ALPENA	22,189	J-12
ANTRIM	10,721	J-9
ARENAC	9,644	L-11
BARAGA	8,037	F-4
BARRY	26,183	O-9
BAY	88,461	M-11
BENZIE	8,306	K-8
BERRIEN	115,702	Q-7
BRANCH	30,202	Q-9
CALHOUN	120,813	P-9
CASS	28,185	Q-8
CHARLEVOIX	13,475	J-9
CHEBOYGAN	13,731	I-10
CHIPPEWA	29,206	G-10
CLARE	10,253	L-10
CLINTON	31,195	N-10
CRAWFORD	4,151	K-10
DELTA	32,913	H-6
DICKINSON	24,844	H-5
EATON	40,023	O-10
EMMET	16,534	I-9
GENESEE	270,963	N-12
GLADWIN	9,451	L-10
GOGEBIC	27,053	G-1
GRAND TRAVERSE	28,598	K-8
GRATIOT	33,429	N-10
HILLSDALE	31,916	Q-10
HOUGHTON	39,771	E-3
HURON	33,149	L-13
INGHAM	172,941	O-11
IONIA	38,158	N-9
IOSCO	10,906	K-12
IRON	17,692	G-3
ISABELLA	28,964	M-10
JACKSON	107,925	P-10
KALAMAZOO	126,707	P-9
KALKASKA	4,597	K-9
KENT	288,292	N-8
KEWEENAW	2,918	E-4
LAKE	5,257	L-8
LAPEER	35,794	N-13
LEELANAU	8,647	J-8
LENAWEE	64,629	Q-11
LIVINGSTON	26,725	N-11
LUCE	8,147	G-8
MACKINAC	9,287	H-9
MACOMB	184,961	O-13
MANISTEE	18,524	K-8
MARQUETTE	47,654	G-5
MASON	20,474	L-7
MECOSTA	18,968	M-9
MENOMINEE	25,299	H-5
MIDLAND	35,662	M-10
MISSAUKEE	7,458	K-9
MONROE	75,666	Q-12
MONTCALM	31,013	N-9
MONTMORENCY	4,125	J-11
MUSKEGON	121,545	N-7
NEWAYGO	21,567	M-8
OAKLAND	396,001	O-12
OCEANA	16,105	M-7
OGEMAW	9,345	K-11
ONTONAGON	10,282	F-2
OSCEOLA	13,797	L-9
OSCODA	3,134	K-11
OTSEGO	6,435	J-10
OTTAWA	73,751	O-8
PRESQUE ISLE	11,996	I-11
ROSCOMMON	5,916	K-10
SAGINAW	153,515	M-11
ST. CLAIR	91,599	N-13
ST. JOSEPH	35,071	Q-9
SANILAC	30,837	M-13
SCHOOLCRAFT	9,148	G-7
SHIAWASSEE	45,967	N-11
TUSCOLA	38,258	M-12
VAN BUREN	39,184	P-8
WASHTENAW	134,606	P-12
WAYNE	2,435,235	P-13
WEXFORD	18,628	K-8
TOTAL	6,371,766	

*Compiled by R. D. VanDeusen

3. Numbers of Groups Visiting Kellogg Bird Sanctuary for Respective Counties for the Year 1958*



COUNTIES
(83 Counties)

Name of County	Population	Location on Map
ALCONA	5,856	K 12
ALGER	10,007	G 6
ALLEGAN	47,493	O 8
ALPENA	22,189	J 12
ANTRIM	10,721	J 9
ARENAC	9,644	L 11
BARAGA	8,037	F 4
BARRY	26,183	O 9
BAY	88,461	M 11
BENZIE	8,306	K 8
BERRIEN	115,702	Q 7
BRANCH	30,202	Q 9
CALHOUN	120,813	P 9
CASS	28,165	Q 8
CHARLEVOIX	13,475	J 9
CHEBOYGAN	13,731	J 10
CHIPPEWA	29,206	G 10
CLARE	10,253	L 10
CLINTON	33,195	N 10
CRAWFORD	4,151	K 10
DELTA	32,913	H 6
DICKINSON	24,844	H 5
EATON	40,023	O 10
EMMET	16,534	J 9
GENESEE	270,963	N 12
GLADWIN	9,451	L 10
GOGEBIC	27,053	G 1
GRAND TRAVERSE	28,598	K 8
GRATIOT	33,429	N 10
HILLSDALE	31,916	Q 10
HOUGHTON	39,771	E 3
HURON	33,149	L 13
INGHAM	172,941	O 11
IONIA	38,158	N 9
IOSCO	10,906	K 12
IRON	17,692	G 3
ISABELLA	28,964	M 10
JACKSON	107,925	P 10
KALAMAZOO	126,707	P 9
KALKASKA	4,597	K 9
KENT	288,292	N 8
KEWEENAW	2,918	E 4
LAKE	5,257	L 8
LAPEER	35,794	N 13
LEELANAU	8,647	J 8
LENAWEE	64,629	Q 11
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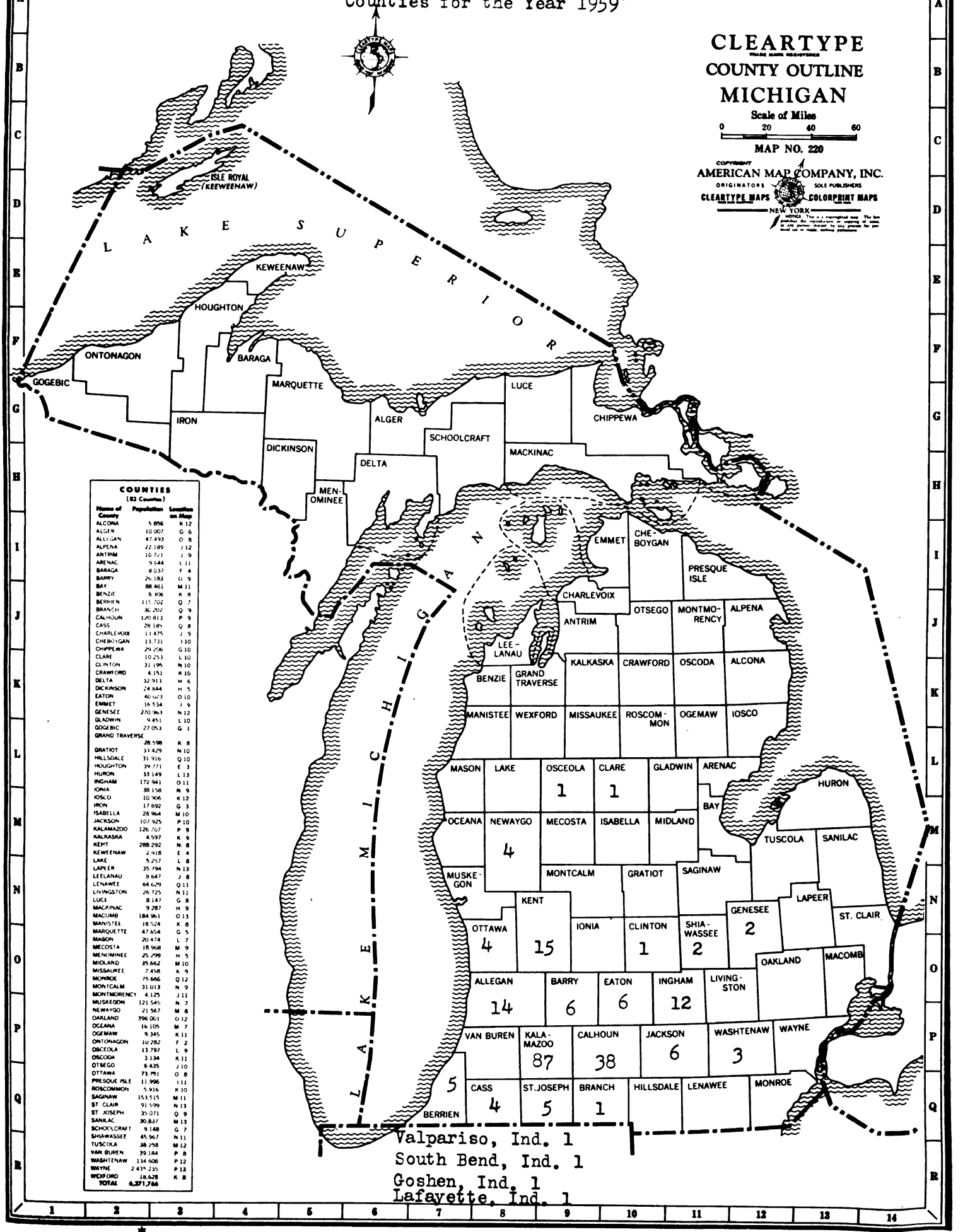
LUCE	8,147	G 8
MACKINAC	9,287	H 9
MACOMB	184,961	O 13
MANISTEE	18,524	K 8
MARQUETTE	47,654	G 5
MASON	20,474	L 7
MECOSTA	18,968	M 9
MENOMINEE	25,299	H 5
MIDLAND	35,662	M 10
MISSAUKEE	7,458	K 9
MONROE	75,666	Q 12
MONTCALM	31,013	N 9
MONTMORENCY	4,125	J 11
MUSKEGON	121,545	N 7
NEWAYGO	21,567	M 8
OAKLAND	396,001	O 12
OCEANA	16,105	M 7
OGEMAW	9,345	K 11
ONTONAGON	10,282	F 2
OSCEOLA	13,797	L 9
OSCODA	3,134	K 11
OTSEGO	6,435	J 10
OTTAWA	73,791	O 8
PRESQUE ISLE	11,996	J 11
ROSCOMMON	5,916	K 10
SAGINAW	153,515	M 11
ST. CLAIR	91,599	N 13
ST. JOSEPH	35,071	Q 9
SANILAC	30,837	M 13
SCHOOLCRAFT	9,148	G 7
SHIAWASSEE	45,967	N 11
TUSCOLA	38,258	M 12
VAN BUREN	39,184	P 8
WASHTENAW	134,606	P 12
WAYNE	2,435,235	P 13
WEXFORD	18,628	K 8
TOTAL	6,371,766	

Lafayette, Ind. 1
Goshen, Ind. 1
Clinton Community, Ind. 1

*Compiled by R. D. VanDeusen

4. Numbers of Groups Visiting Kellogg Bird Sanctuary for Respective Counties for the Year 1959*



COUNTIES
(83 Counties)

Name of County	Population	Location on Map
ALCONA	5,856	K 12
ALGER	10,007	G 6
ALLEGAN	47,493	O 8
ALPENA	22,189	J 12
ANTRIM	10,721	J 9
ARENAC	9,644	L 11
BARAGA	8,037	F 4
BARRY	26,183	O 9
BAY	88,461	M 11
BENZIE	8,906	K 8
BERRIEN	115,702	Q 7
BRANCH	36,202	Q 9
CALHOUN	120,813	P 9
CASS	28,186	Q 8
CHARLEVOIX	13,475	J 9
CHEBOYGAN	13,731	J 10
CHIPPEWA	29,206	G 10
CLARE	10,253	L 10
CLINTON	31,195	N 10
CRAWFORD	4,151	K 10
DELTA	32,913	H 6
DICKINSON	24,844	H 5
EATON	40,023	O 10
EMMET	16,534	J 9
GENESEE	270,963	N 12
GLADWIN	9,451	L 10
GOGEBIC	27,053	G 1
GRAND TRAVERSE	28,598	K 8
GRATIOT	33,429	N 10
HILLSDALE	31,916	Q 10
HOUGHTON	39,771	E 3
HURON	33,149	L 13
INGHAM	172,941	O 11
IONIA	38,158	N 9
IOSCO	10,906	K 12
IRON	17,692	G 3
ISABELLA	28,964	M 10
JACKSON	107,925	P 10
KALAMAZOO	126,707	P 9
KALKASKA	4,597	K 9
KENT	288,292	N 8
KEWEENAW	2,918	E 4
LAKE	5,257	L 8
LAPEER	35,794	N 13
LEELANAU	8,647	J 8
LENAWEE	64,629	Q 11
LIVINGSTON	26,725	N 11
LUCE	8,147	G 8
MACKINAC	9,287	H 9
MACOMB	184,961	O 13
MANISTEE	18,524	K 8
MARQUETTE	47,654	G 5
MASON	20,474	L 7
MECOSTA	18,968	M 9
MENOMINEE	25,299	H 5
MIDLAND	35,662	M 10
MISSAUKEE	7,458	K 9
MONROE	75,666	Q 12
MONTCALM	31,013	N 9
MONTMORENCY	4,125	J 11
MUSKEGON	121,545	N 7
NEWAYGO	21,567	M 8
OAKLAND	396,001	O 12
OCEANA	16,105	M 7
OGEMAW	9,345	K 11
ONTONAGON	10,282	F 2
OSCEOLA	13,797	L 9
OSCODA	3,134	K 11
OTSEGO	8,635	J 10
OTTAWA	73,791	O 8
PRESQUE ISLE	11,996	H 11
ROSCOMMON	5,916	K 10
SAGINAW	153,515	M 11
ST. CLAIR	91,599	N 13
ST. JOSEPH	35,071	Q 9
SANILAC	30,837	M 13
SCHOOLCRAFT	9,148	G 7
SHIAWASSEE	45,967	N 11
TUSCOLA	38,258	M 12
VAN BUREN	39,184	P 8
WASHTENAW	134,606	P 12
WAYNE	2,435,235	P 13
WEXFORD	18,628	K 8
TOTAL	6,371,766	

Valpariso, Ind. 1
South Bend, Ind. 1
Goshen, Ind. 1
Lafayette, Ind. 1

* Compiled by R. D. VanDeusen

TABLE III

TYPES OF REGISTERED GROUPS ATTENDING KELLOGG BIRD SANCTUARY DURING 1957, BY MONTHS

Month	K	1st	2nd	3rd	4th	5th	6th	7th	8th	High School	College	Church	Youth Clubs	Adult Clubs	Undetermined Grade
Jan.													3	5	
Feb.													1		
Mar.	2						2						1		
Apr.			1	1	1			1	1	1	2		8	3	
May	8	11	9	16	11	3	7	3	1	4	4	1	5	4	11
June	3	6	5	4			1	2		2	2	2	4	12	2
July													8	10	
Aug.											2	1	6		
Sept.									1			1		14	
Oct.		2		2	2	2	1	4		2	3	2	3	5	3
Nov.			1							1	4		1	4	
Dec.										1	1			1	
Total	13	19	16	23	14	5	11	10	3	11	18	7	40	58	16

TABLE IV

TYPES OF REGISTERED GROUPS ATTENDING KELLOGG BIRD SANCTUARY DURING 1958, BY MONTHS

Month	K	1st	2nd	3rd	4th	5th	6th	7th	8th	High School	College	Church	Youth Clubs	Adult Clubs	Undetermined Grade
Jan.															
Feb.														1	
Mar.							2						2	1	
Apr.	1	1	1	1			1	1	1				4	4	4
May	3	6	9	14	11	1	6			2	2		6	3	18
June	1	1	2	3	1		2	1					1	13	3
July														8	
Aug.														8	
Sept.												3		6	
Oct.			1	3	2		1			1	1	3	5	5	4
Nov.											5		1	3	1
Dec.															
Total	5	8	13	21	14	1	12	2	1	3	8	6	19	52	30

Month
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Total

TABLE V

TYPES OF REGISTERED GROUPS ATTENDING KELLOGG BIRD SANCTUARY DURING 1959, BY MONTHS

Month	K	1st	2nd	3rd	4th	5th	6th	7th	8th	High School	College	Church	Youth Clubs	Adult Clubs	Undetermined Grade
Jan.										1					
Feb.													2		
Mar.			1			1	1							2	
Apr.				1			4	3		4	1		4		2
May		4	2	5	15	5	13	6	4	7	3		5	8	17
June		1	2	2	1		4			2		2	8	9	2
July											7		2	7	1
Aug.											2		1	4	
Sept.								2	2		2	2	1	7	2
Oct.			3	2				4		3	1		5	5	1
Nov.				1				2	2		2	1	8	2	1
Dec.														1	
Total		5	8	11	16	6	22	17	8	17	18	5	36	45	26

II. REVIEW OF SOME OUTSTANDING CONSERVATION EDUCATION PROGRAMS IN VARIOUS PARTS OF THE UNITED STATES

As a preliminary portion of the study a survey was conducted to determine the existance of educational programs being carried forth in any natural area specifically set aside for study, preservation and public enjoyment.

Three types of information were sought: (1) the location of the area (2) whether an organized educational program was being conducted within the area (3) identification of associated educational procedures which might well have a counterpart in the program under study.

The investigation showed that many and varied types of natural areas throughout the United States are being set aside and designated as preserves, sanctuaries, demonstration areas, out-door laboratories, field campuses, school camps, etc. More significant were the educational programs other than those being administered in the areas indicated above. These were also located. (Pp. 24-31).

By far the most significant finding in each case was that of outstanding educational techniques. Accordingly, by way of presenting and summarizing the findings, educational techniques are listed and identified with the organization credited with employing the technique.

The list is not presented with the idea of evaluating educational programs, but rather with the intent to list unusual and appropriate educational techniques for teaching conservation of natural resources.

Each technique or illustration cited has been considered significant and applicable to the problem for one or more of the following reasons:

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1. The area and associated physical surroundings (buildings, pens, etc.) which are being employed compares directly with the Kellogg Bird Sanctuary and is operated as an off-campus type of natural area or possesses many comparable plant and animal forms to that found at the Sanctuary.

2. The techniques represent a type of educational endeavor appropriate to any natural area and thus is applicable to solution of the problem.

3. The technique possesses some particular feature which would make it especially applicable to the problem at hand.

4. The illustration emphasizes an unusual type of use to which such a natural area might be put.

Through information gained from leading out-door and conservation educators who have reason to work with or be in contact with such organizations across the nation, 25 such projects were found which would have bearing upon this study.

Letters were sent to each organization; 13 responded and, of the 13 respondents, 9 seemed to present facilities or programs sufficiently similar with the Kellogg Bird Sanctuary so as to be of value to the study at hand.

Listed are the significant findings designated as "Items".

Crab Orchard Lake Preserve, Carbondale, Illinois[1]

Item 1. Southern Illinois University has at their command several thousand acres in this preserve. Large acreages of land, water, and unrestrained wildlife are to be found in the area and are available

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[1]Information Packet, Department of Recreation and Outdoor Education, Southern Illinois University.

for study. This program has special significance to the problem at hand in that 21 college courses are, at least in part, taught at the preserve.

Glen Helen Facilities, Yellow Springs, Ohio[2]

Item 2. Facilities include a "Trailside Museum", a lodge, and housing facilities for camping groups. Over 5,000 school children and adults spend time living and studying at the center. This area, like the Kellogg Bird Sanctuary, has a forest and a farm making up part of the area. The area differs from the Kellogg Bird Sanctuary in that wildlife is not a feature to the extent that it is in the program under study. Much teacher training is carried on in the camp at the Glen.

Perhaps the most significant development, outside of the college programs, in the effort to promote an understanding and appreciation of our natural resources has come through the efforts of John Ripley Forbes, the promoter, founder and present director of Nature Centers for Young America. Some extremely fascinating work is now being done in these nature centers in various parts of the United States. Collectively, the contributions of several centers illustrate many good teaching procedures and it is with such the remainder of the list is concerned.

The Academy of Natural Sciences of Philadelphia[3]

Item 3. The Museum features four floors of exhibits, depicting plant, animal and prehistoric life.

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[2]Information Packet and personal letter received from Jean R. Sanford, Director of out-door Education Center, Antioch College, Yellow Springs, Ohio.

[3]Information Packet and personal letter from William R. Overlease, former chairman, Department of Education, The Academy of Natural Sciences of Philadelphia.

Item 4. The museum sponsors and directs regularly scheduled field trips to areas of outstanding and unusual natural history interest. Staff and guest professors are directing the study.

Item 5. A free film program for children is conducted weekly on Saturday in the fall of the year.

Item 6. A film program of a natural history travelogue nature for older youth and adults is also offered.

Item 7. A program of illustrated talks and demonstrations for elementary and junior high school children is given during the week (school time) at the museum. Such demonstrations are designed to acquaint the young student with wildlife in general and natural history of the Delaware Valley in particular. Special effort in this phase of the museum program is extended toward covering topics of special interest to individual classes not otherwise covered in the regular museum Lessons Program.

Item 8. The museum Lessons Program consists of special lessons taught by museum teachers for classes of children who come to the museum from the schools of Philadelphia and nearby cities. Each lesson lasts about an hour. These lessons may be used for (1) Motivation for a new unit of study, (2) A source of renewed interest in a unit already begun, (3) A climax or review of the unit of study. Visual aids, including specimens, slides, films, museum exhibits and often live animals are used in teaching the lessons. Classes may tour the exhibit halls in the museum at the close of the lesson. Preliminary sheets are available for most of the lessons and are sent to teachers when they make an appointment.

Item 9. Field training for high school student. A trip is offered to students who qualify in an essay contest on any phase of aquatic biology or geology. This is an all day chartered bus trip to outstanding natural science areas. Activities consist of collecting, studying, and identifying specimens, and discussing college problems and career opportunities with men now working in natural science research.

Item 10. The Museum Summer Workshop consists of a series of ten meetings for children. There are two series, one in natural history for ages 9-12 and one in astronomy for ages 10-14. Some activities of the Academy are free and others carry a small fee to cover operation expense.

The Children's Museum at Nashville, Tennessee[4]

The museum offers, along with similar services as listed relative to the Philadelphia Museum, the following additional services:

Item 11. Publication of a "Teacher's Bulletin" containing:

a. Information about the museum.

b. Direction and suggestion concerning museum trips.

c. A list of subjects and materials which are expected to be of interest to each grade level.

d. An appointment blank.

Item 12. Pet Shows - (Could include a fish, a frog, etc.)

Item 13. Loan of pets for children to take home. (Service includes training on how to care for the particular pet.)

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[4]Information Packet, Children's Museum, Nashville, Tennessee.

Sacramento Junior Museum, Sacramento, California[5]

Item 14. Participation in educational television programs.

The Audubon Nature Center of Connecticut, Greenwich, Connecticut[6]

Item 15. This program is similar to those of the various museums except that it is administered in a semi-rustic and natural outdoor setting in 430 acres of natural habitat for deer, fox, mink, racoon, skunk, opossum, and 90 species of nesting birds. A 127 acre wildflower sanctuary is also part of the teaching area.

Item 16. At the trailside museum are found large habitat murals, work-it-yourself exhibits and ingenious display tables.

Item 17. The Graded Field-Trip Plan: In order to avoid repetition and to gear the field trips to the children's ages, different trails and themes are used with each grade from Grade 3 through Grade 12. Typical field trip topics are: Plant and Animal Homes; Adventurous Plants and Animals; The 3 P's - Prey, Predation, Population; Rushing Waters and Living Soils; Rock Stories and How to Read Them; and Habitats and Inhabitants.

The Stamford Museum and Nature Center, Connecticut[7]

Item 18. This museum offers a farm program which was established and organized so that children of the region might observe as well as actually participate in the farm work by assisting in chores and other forms of farm animal care.

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[5]Information Packet, Sacramento Junior Museum, Sacramento, Calif.

[6]Information Packet, Audubon Center of Connecticut, Greenwich, Conn.

[7]Information Packet, Stamford Museum and Nature Center, Inc., Stamford, Conn.

The Stamford Museum also has:

Item 19. An Astronomical observatory

Item 20. An amateur radio and camera club

Item 21. An exploration club

Item 22. A Winter Guided Walks Program

Item 23. Exhibits for loan to schools

Arizona Sonora Desert Museum, Tucson, Arizona[8]

This unusual museum enables visitors to gain knowledge in several hours that would otherwise require years of wilderness searching. The following items are found here:

Item 24. A display of over forty species of small birds native to the area, in circular aviaries.

Item 25. A small animal room with living creatures ranging in size from centipedes, scorpions, and tarantulas to rodents in cut-away cages.

Item 26. The most complete collection of desert snakes and lizards extant.

Item 27. A unique underground tunnel which takes the visitor twelve feet below the earth's surface for close-up looks into the daytime hiding places of living desert animals. Included are the smaller mammals such as the kit fox ring-tailed cats and badgers, a beehive, an extensive ant exhibit, and a rattlesnake den. Also featured is a large bat cave complete with stalactites and a colony of fruit eating bats. Exhibits of plant root systems help complete the story of life underground.

Item 28. Nature trails in a botanical garden.

Item 29. An Amphibian Room with four living dioramas complete with painted backgrounds, showing life in different types of aquatic communities.

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[8]Information Packet, Arizona Sonora Desert Museum, Tucson, Arizona.

Item 30. Small tanks displaying aquatic insects.

Item 31. An aquarium exhibit of nine tanks which provide the country's first display of native desert fishes.

Item 32. A collection of local rocks and minerals, including one section with specimens that visitors are encouraged to handle.

Item 33. A watershed exhibit. Water Street is the center of the first comprehensive watershed exposition in the world. Eighteen exhibit areas offer a wonderland of electronic instrumentation, spotlighting our most critical resource, water. The purpose is to show dramatically the importance to mankind of such natural forces as evaporation, erosion, infiltration and other related factors. This unique project was constructed by the Charles Lathrop Pack Foundation, with the cooperation of the U. S. Forest Service, U. S. Soil Conservation Service, Armour Research Foundation, and the University of Arizona.

Item 34. A "Beehive House" such as Papago Indians once used, is on the museum grounds. Constructed by the Indians themselves, it is authentic in every detail and includes what is probably the only Papago sand painting on permanent public exhibit.

Item 35. The wildlife blind, said to be nationally famous, offers members rare opportunities for photographing elusive desert animals.

Item 36. The desert Ark is a mobile menagerie that takes semi-tame wild animals to schools, other youth groups, service clubs, etc., for programs designed to promote an interest in and a respect for wildlife. According to Hal Gras, public relations director, the approach used is this: "Fear promotes needless killing and unhappiness; respect promotes fuller enjoyment and greater happiness; the best way to change fear

to respect is by learning the truth."[9]

This program in Arizona is an excellent example of the use of mass educational media. Hundreds of thousands of dollars have been spent to produce some of the most ingenious live exhibits and self education devices found anywhere in the United States.

Rock Creek Nature Center, Washington, D. C.[10]

Item 37. Reading corner.

Item 38. Glassed beehives.

III. DESCRIPTION OF THE EXPERIMENTAL PROCEDURE AND RESULTS ASSOCIATED WITH THIS STUDY

The Procedure and Results

The experimental work was carried out in the following manner: A questionnaire was designed to find out first, whether teachers wanted orientation materials; second, how much help they desired; and thirdly, what understandings or concepts they wished the students to gain from their Sanctuary trip. Other questions were included which helped determine something of the teacher's interest and past participation in the Sanctuary trip. Teachers who know something of the present program would likely have more understanding of what is needed now.

During the fall of 1958 this questionnaire was sent to 68 teachers of both upper and lower elementary grades. Most of these teachers had visited the Sanctuary the previous year with their classes. (The questionnaire appears in appendix A, pp. 61-62)

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[9]Personal letter from Hal Gras, Public Relations Director, Arizona-Sonora Desert Museum, Tucson, Arizona.

[10]Information Packet, Rock Creek Nature Center, Washington, D. C.

Sixty-eight questionnaires were sent out; forty-four were returned. The questions and the tabulations of the answers appear in Table VI below

TABLE VI

SUMMARY OF QUESTIONNAIRE RESULTS

Range of Answers	Questions
0 to 25	1. How many times have you brought groups to the Sanctuary?
33 yes; 10 no	2. Was the trip a part of a unit of study? Ex., birds, plants, conservation. State the specific title of your unit.*
19 yes; 23 no	3. Was your visit planned as a separate educational trip rather than as a part of a definite unit?
7 yes; 35 no	4. Was the trip a result of a precedent already set by the school?
37 yes; 4 no	5. If adequate helps were provided by the Sanctuary, would you like to incorporate them and the trip as part of a unit of study?
(1) (2) (3) (4) 2 13 14 14	6. Would you prefer to use the Sanctuary (1) as a beginning activity in the unit of study, (2) as a conclusion, (3) as an activity in the course of your study, or (4) all three of them?
20 yes; 23 no	7. If you could be certain the children could gain something in terms of new interests, understandings and enjoyment each time they came, would you be likely to visit the Sanctuary more than once during the school year? (Series of trips). If your answer is no, why?**
43 yes; 1 no	8. Would you use pre-trip preparatory materials in your school if they were available?
25 yes; 10 no	9. Do you think your school would be interested in a progressive series of trips and materials, so that students could have sequential training at the Sanctuary possibly through grades 4-10?
6 yes; 31 no	10. Do you feel children would get more from their trip if they could discover more about the wildlife at the Sanctuary for themselves, rather than being told about it?
First Choice / Second Choice	11. Which of the following do you feel are most desirable in terms of understanding gained from a day at the Bird Sanctuary?
1 / 0	1) History and background information on the developments of Kellogg Bird Sanctuary.
3 / 3	2) Discussion of research projects and activities as they pertain to individual birds and animals.
20 / 3	3) Factual knowledge of birds and other animals.
3 / 12	4) Factual knowledge of plants, as well as birds and other animals.
4 / 11	5) Understanding relationships involving both plants and animals.
4 / 6	6) Conservation understandings.

TABLE VI (continued)

*Titles of units listed in questionnaires
Birds 11
Conservation 4
Birds, Trees and Conservation 1
Seeds and Signs of Fall 1
Birds and Wildlife 1
Living Creatures, Their Homes and Habitats 1
Birds and Signs of Spring 1
Nature Study 1
Michigan 2
Birds and Animals of Michigan 1
Birds and Conservation 1
Bird Migration 2
Wildlife 2
Out-door Education 1

** Of those that said no, many replied to the why of the question by saying they could afford only one trip per year.

An Analysis of Questionnaire Results

An analysis of the results of the questionnaire appears below in order of the questions.

1. It is evident that many of the teachers who returned the questionnaire had been to the Sanctuary a number of times. For this reason they would likely understand something of the educational needs of the Sanctuary program.

2. Over two-thirds of the teachers who returned the questionnaire use the Kellogg Bird Sanctuary trip as a part of a unit of study. This is evidence that the Kellogg Bird Sanctuary does play some part in the science instruction program of many schools.

3. The returns on this question are not too helpful, since there seemed to be some misunderstanding of the question. One might logically assume, however, that some schools do use the Sanctuary trip as an over-all educational trip, rather than as part of a definite unit of study.

4. Over three-fourths of the teachers indicated that the Sanctuary trip was of their own doing and had not been a part of previous school policy. This indicates that the teacher personally feels that the trip is of value to her teaching program.

5. Over three-fourths of the teachers indicated by their response to this question that they would use Sanctuary helps as part of a unit of pre-trip study if they were available. This would seem to indicate that the teacher would like a closer tie-in between her study materials and learning opportunities at the Sanctuary.

6. The replies to this question indicated that the majority of the teachers would use the Sanctuary trip either as a conclusion of their study or as an activity in the course of their unit of study. (This may have something to do with the time that they are able to make the trip.)

7. The responses to question seven, regarding making more than one trip a year, were divided about equally. It seems logical to assume that the "yes" answers were from those who are closer to the Sanctuary and have the freedom to make more than one trip a year. These people evidently feel that if the Sanctuary could offer more in an educational process, they would be happy to take advantage of it.

8. All but one of the teachers said that they would use pre-trip materials if they were available. This does not necessarily mean entire units of instruction, but rather preparatory helps to orient the class before their trip.

9. More than half of the teachers indicated that they would be interested in seeing a progressive series of trips developed so that students could have sequential training at the Sanctuary. This indicated

that some teachers feel there are adequate resources at the Sanctuary to benefit students in their natural science education during grades four to ten.

10. Most of the teachers did not feel that the students would gain more by exploring the Sanctuary by themselves rather than being told about it. The response to this question is interesting since with the present large numbers visiting the Sanctuary it is impossible, with the limited staff, to give adequate personal guidance to a tour. Thus groups touring the Sanctuary are learning, whatever they do gain, by themselves. The writer has observed that the teachers supply very little help to the children in terms of interpreting the out-of-doors. The answers to this question further indicate that the teachers feel the need of being directed in their tour by someone who knows the answers.

11. From an analysis of the responses to question eleven it is evident that teachers feel a combination of items three, four, and five is most desirable in terms of understandings to be gained from a day at the Sanctuary. Putting the three items together, one comes out with the following concept as the most desirable understanding to be gained: an understanding of factual knowledge concerning plants, birds and other animals and a knowledge of some of the relationships between these organisms.

Several things become apparent from the foregoing analysis. They may be stated as follows:

1. The teachers responding to the questionnaire are familiar with the Sanctuary and its program.

2. Many of the teachers use the Sanctuary trip as part of a unit of wildlife or natural history study.

3. Most of the teachers would like preparatory materials for either use in a unit of study or for general orientation purposes.

4. Most of the teachers take the Sanctuary trip because they want to and not because they have to.

5. Some teachers would like to visit the Sanctuary more often if there were something new to be gained by each trip.

6. Most teachers are primarily interested in having their students gain "an understanding of factual knowledge concerning plants, birds and other animals and a knowledge of some of the relationships between these organisms."

Since the answers to the questionnaire indicate that many teachers who have visited the Sanctuary would like orientation study helps, and since it is within the purpose of this study to prepare teaching aids and investigate their effectiveness, the writer subsequently developed several study helps. In the following pages each of these helps is described with reference to its development and use.

Development of Area Tour Guides

The material described here is found in appendix B, pages 64-68. The public area of the Bird Sanctuary is somewhat naturally divided into four different area; therefore, study guides were developed in the same way. A symbol was chosen to represent each area, and each symbol was placed on a sign pointing to the particular area (Figure 9, page 37). The symbol that was placed on the area sign was also placed on the tour guide so that the student could associate the tour guide with the proper area. Each tour guide tells the student to look for the sign of the particular animal or plant which is on the area guide. Each symbol represents an important component of the area.

Figure 9. Two of the four area signs constructed by the writer.

The purpose of these area guides is to show the students where things may be found at the Sanctuary, precisely what may be found in each area, and what the students should observe carefully in the area. To accomplish this the writer developed a map for each area and numbered and listed each major item in the area. Following the map, the things to look for in the area were listed. In order to encourage close observation the writer developed a series of questions about the wildlife which should be answered by the student as he observes the animal. These questions were kept simple so that in most cases they could be readily answered by simply observing the animals and, in area four, also the trees. The questions were designed to help the student identify the wildlife and trees, and to help him gain more concepts concerning conservation.

Development of First Preparatory Unit

This unit appears in appendix D, pages 84-110. The development of this unit was guided by several criteria. The first one was that the analysis of the questionnaire indicated that the teacher's desire was that the children gain an understanding of factual knowledge concerning plants, birds, and other animals in addition to gaining knowledge of some of the relationships between these organisms. The second criterion was that the unit should contain actual work experiences that the student can do, so that he will enjoy it more and learn about the living things while doing his work. The third criterion is that the unit should not involve the teacher in a lot of extra work in finding answers to questions that are in the unit or that might arise from the unit. The unit is intended to be a help to the teacher, not a burden. To help solve this problem the teacher's unit includes additional material which does not appear in the student's unit. This material consists of an overview of the different sections of the unit providing general and specific information about the living things and also information on how to use the unit. The unit is of a general nature and is intended to focus the child's attention upon Michigan mammals waterfowl and trees, and upon good conservation practice. With this type of orientation the student will likely be better prepared to gain new understandings from his tour of the Sanctuary.

The unit, entitled "Studies of Some Michigan Mammals, Trees and Conservation Practices", is composed of four sections. The section on mammals includes pictures of sixteen well known mammals found in Michigan. The names of the mammals are listed on a folded flap on the bottom of the page. The student is instructed to cut out the names and place

them under the right pictures. The idea is to keep the child's interest focused on the animals throughout a working period. Thus, he is likely to become familiar with them and will be prepared to identify the mammals he sees at the Sanctuary.

The second section of the unit is on waterfowl and seeks to acquaint the child with the various kinds of waterfowl he may observe at the Sanctuary and also seeks to give an idea of how these birds differ in their feeding habits. In the study of ducks, the child is instructed to color in the head and shoulders of the line drawing of the bird on the right side of the page. He is to use the natural colors so that he can give accurate identification. He is also instructed to state whether the bird is a diver or a dabbler and to place the common name of the bird under the picture. With the waterfowl other than ducks the child is to color the bird on the right side of the page with its natural color, state to which group the bird belongs, and give its common name, e. g., geese : blue goose.

The manipulative work of this section enables the student to focus his attention upon the bird for a period of time and thus gain information which should help him in future waterfowl identification. The other information is required in order to give the child an idea of the difference in habits of waterfowl and to show that all waterfowl are not included in one grouping, but may differ considerably from each other.

The third section of the unit is on trees. Here attention is directed toward the identification of the leaf and the fruit. Further study is required of the student so that he may find out the uses of these trees by man and to animals. There are many species of interesting

trees at the Bird Sanctuary. It is felt that a study of some of these trees prior to a tour through the Sanctuary might develop in the mind of the student an appreciation of the relationship between trees and animal life.

The fourth and last section of the unit is concerned with good and bad uses of natural resources. Various activities are suggested to the student to help him gain an understanding of proper conservation practices. A study of conservation practices prior to a Sanctuary trip may cause the student to observe various good uses and bad uses of land as he travels to the Sanctuary. It may also enable the student to be more conscious of the conservation practices which are in effect at the Bird Sanctuary.

This unit was developed to teat the effectiveness of teaching aids in producing increased knowledge of conservation of natural resources.

Testing the Preparatory Materials

The experimental work was carried out in the following manner: Twelve fourth grade classes were selected for the test. Four classes were put in each one of the three following groups: group I (handled as all other registered groups in the present program, group II (received tour guides and pre-trip study units, group III (received tour guides and study units to use as a follow-up study). The classes were assigned to a group in their order of registration to give a random sample effect. Some adjustment was necessary, however, to assure that there was not a loading of one group with schools from high income status and vice versa. There were approximately 100 children in each group. The cooperating schools appear in Table VII, p. 41.

TABLE VII

Group I	Group II	Group III
Teacher: Mrs. Pangburn School: Bently, Flint Number of children: 17	Teacher: Mrs. Carr School: Gordon, Marshall Number of children: 28	Teacher: Mrs. Chapin School: Wilson, Kalamazoo Number of children: 27
Teacher: Mrs. Winfield School: Lakeside Grand Rapids Number of children: 25	Teacher: Mrs. Camp School: Gordon, Marshall Number of children: 29	Teacher: Mrs. Brownell School: Wilson Kalamazoo Number of children: 26
Teacher: Mrs. Ambs School: Colon Community Number of children: 27	Teacher: Miss Klomparens School: Lakeside Grand Rapids Number of children: 25	Teacher: Mrs. Miller School: Woodcliff Grand Rapids Number of children: 21
Teacher: Miss Parlberg School: Lakeside Grand Rapids Number of children: 26	Teacher: Miss Bergh School: Sibley Grand Rapids Number of children: 31	Teacher: Mrs. Blanchard School: Woodcliff Grand Rapids Number of children: 22

Group I was handled according to the plan used for several years. Under this arrangement the teacher registers her group for a visit on a particular day. When the class arrives at the Bird Sanctuary, the director, Mr. VanDeusen, orients the children on the purpose, history, animal life, management practices, etc., at the Bird Sanctuary (Figure 3, p. 9). The various areas and exhibits to visit are pointed out to the class and they are then free to roam the public area with their teacher. Neither the tour guides nor any of the preparatory materials ever got into the hands of students or the teacher of this group.

Group II received tour guides and the study unit. The tour guides were given to the class two or three days before their trip so that they might become familiar with the area and know what to look for. The study unit was given to the classes approximately three weeks prior to

their trip to the Sanctuary. An attempt was made to get the units to the teachers sooner, but this was not possible since most of the teachers did not know for certain if and when they were going to make the trip until several weeks before the actual trip. This procedure was used to determine if children who had these teaching aids to study before their trip would gain more than those who did not have such aids. This group received no orientation aid from Mr. VanDeusen, but was accompanied by the writer throughout their stay at the Sanctuary.

Group III received the tour guides a few days before attendance. The study unit was given to the teachers after completion of their tour and was used as a follow-up study. This procedure was employed to determine whether there was an advantage in receiving materials after the trip as compared to receiving them before the trip. Group III was also accompanied by the writer throughout their stay at the Sanctuary, and no orientation aid was received from Mr. VanDeusen.

The tour guides were used with 8 fourth grade classes to see to what extent they would be used by the students. The classes received the guides 2 to 3 days before they came to the Sanctuary. Each group was then accompanied as they toured the Sanctuary and was observed in this: to what extent did they use the guide? The observation check lists appear in appendix C, pp. 70-81. The results were quite disappointing. See Table VIII, p. 43.

In almost every case the students simply carried the guides with them and used them very little or not at all. The teachers made little or no effort to help the children answer the questions or use the tour guides at all. The children, as well as the adults, seemed interested

only in looking at the wildlife, feeding them where possible and, in some instances, taking pictures of them.

Some teachers mentioned that they went over the questions in the classroom after they had had their trip and that some children returned on weekends with their parents and used the guides at that time.

TABLE VIII

SUMMARY OF THE OBSERVATION CHECK LISTS

School	Attention and Interest of Children	Amount of Outdoor Interpretation Supplied by the Teacher	Children's Use of the Tour Guide	Teachers' Interest in Their Guide	
Bently	Good	Little	(Group I did not receive the Tour Guide)		Group I
Colon	Good	Little			
Lakeside	Good	Fair			
Lakeside	Good	None			
Lakeside	Good	None	None	Neutral	Group II
Sibley	Fair	Little	Little	Neutral	
Gordon	Good	A little	Some	Positive	
Gordon	Good	A little	Some	Positive	
Woodcliff	Fair	A little	Some	Positive	Group III
Woodcliff	Fair	A little	Some	Positive	
Wilson	Good	None	Little	Positive	
Wilson	Good	None	Little	Positive	

Several conclusions arose from this observation of the classes and experiment with the tour guides. The first was that perhaps the guides were above the level of interest and understanding of fourth grade children. The second was that one smaller, simpler guide might have been more easily handled than four separate sheets of paper. The third was that teachers do not seem interested in guiding the children or conducting a field trip. They seem mainly interested in keeping order and meeting their time schedule.

A test was devised by the writer in order to find out how the groups compared with each other in terms of factual knowledge, attitudes, and

understandings gained from their Sanctuary trip. This test is found in appendix E, pp. 112-113.

The test is a true-false test. The test items consist of information which can be gotten by a trip through the Sanctuary. Thus, a student who did not receive any preparatory helps would not lack an opportunity to gain the necessary information to answer the questions correctly if he were properly motivated. The test must be made up of such items in order to make the test results valid, since the object of the experiment was to see to what extent, if any, learning at the Sanctuary was increased due to the use of pre-training and orientation materials.

This test was approved by Dr. Baten, statistician for the Agriculture Experiment Station of Michigan State University, and considered adequate and valid for its use. The test was administered to the classes for a testing of more permanent understandings, those understandings that were apt to stay with the child longer.

The test results were analyzed statistically and computations are shown in Tables X, XI, and XII.

A further statistical analysis of the data revealed that there is a significant difference between the pre-trained group and the non-trained group and between the pre-trained group and the group receiving follow-up material. In the first comparison it was found that the mean for the pre-trained group was 37.50 and the standard deviation was 5.53, while the mean for the non-trained group was 35.23 and the standard deviation was 5.82 (Table IX). A comparison of these data (see Computation of Degree of Reliability, p. 49) reveals that the difference of the means is significant at the .56% level. That is to say that in only .56% of the cases could this difference have occurred through chance alone. In the

second comparison (see Computation of Degree of Reliability, p. 50) it can be noted that the difference is even more significant. In this case it was found that the mean for group III was 34.75 and the standard deviation was 5.78, while the mean and the standard deviation of group II were as in the first comparison, 37.50 and 5.53 respectively (Table IX). The difference of the means in this case is significant at the .1% level. Thus in the second comparison in only .1% of the cases could this difference have occurred through chance alone.

From this data it can be concluded that the group which received pre-training was better oriented for their trip to the Bird Sanctuary than the other two groups and thus they retained more in the way of factual knowledge of trees and animals and understanding of conservation concepts.

It should be noted that the information in the study unit apparently did not affect the validity of the test since group III as well as the pre-trained group, group II, had access to this information before the test was given. Thus the pre-trip study unit apparently served as an orientation device to enable the student to gain more from the tour of the Sanctuary than he would have gained had he not had this help.

Inasmuch as group III had the tour guides before their trip (as did the pre-trained group) and inasmuch as there was still a significant difference in the means of the two groups, it seems logical to assume that the study unit was more influential in causing the difference between the means than the tour guide was.

TABLE IX

DATA FOR INTERPRETING RELIABILITY OF DIFFERENCE

Group	Mean Score	Standard Deviation	Standard Error of the Mean	Number of Cases
I	35.23	5.82	.59	90
II	37.50	5.53	.57	95
III	34.75	5.78	.61	96

TABLE X

DETERMINATION OF STANDARD DEVIATION & MEAN FOR GROUP I

Interval (h)	Frequency (f)	Deviation (d)	fd	fd^2
50-52				
47-49				
44-46	4	3	12	36
41-43	14	2	28	56
38-40	20	1	20	20
35-37	12	0		
32-34	18	-1	-18	18
29-31	9	-2	-18	36
26-28	8	-3	-24	72
23-25	2	-4	- 8	32
20-22	3	-5	-15	75
17-19				
	N = 90		$\Sigma fd = -23$	$fd^2 = 345$

Standard deviation = σ Mean = M

$$\sigma = \sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2} \cdot h \quad \text{or} \quad \sigma = \sqrt{\frac{345}{90} - \left(\frac{23}{90}\right)^2} \cdot h$$

$\sigma = 5.82$

Point of arbitrary origin = 36

$$M = A\,0 + \frac{fd}{N} \cdot h$$

$$M = 36 + \frac{-23}{90} \cdot 3$$

$M = 5.82$

TABLE XI

DETERMINATION OF STANDARD DEVIATION & MEAN FOR GROUP II

Interval (h)	Frequency (f)	Deviation (d)	fd	fd^2
50-52				
47-49	3	4	12	48
44-46	10	3	30	90
41-43	15	2	30	60
38-40	22	1	22	22
35-37	20	0		
32-34	13	-1	-13	13
29-31	7	-2	-14	28
26-28	2	-3	-6	18
23-25	2	-4	-8	32
20-22		-5		
17-19	1	-6	-6	36
	$N = 95$		$\Sigma fd = 47$	$\Sigma fd^2 = 347$

Standard deviation = σ Mean = M

$$\sigma = \sqrt{\frac{fd^2}{N} - \left(\frac{fd}{N}\right)^2} \cdot h \quad \text{or} \quad \sigma = \sqrt{\frac{347}{95} - \left(\frac{47}{95}\right)^2} \cdot 3$$

$\sigma = 5.53$

Point of arbitrary origin = 36

$$M = A\,0 + \frac{fd}{N} \cdot h$$

$$M = 36 + \frac{47}{95} \cdot 3$$

$M = 5.53$

TABLE XII

DETERMINATION OF STANDARD DEVIATION & MEAN FOR GROUP III

Interval (h)	Frequency (f)	Deviation (d)	fd	fd^2
50-52				
47-49				
44-46	1	3	6	18
41-43	13	2	26	52
38-40	20	1	20	20
35-37	22	0		
32-34	12	-1	-12	12
29-31	12	-2	-24	48
26-28	8	-3	-24	72
23-25	4	-4	-16	64
20-22	2	-5	-10	50
17-19	1	-6	- 6	36
	N = 96		Σfd = -40	Σfd^2 = 372

Standard deviation = α Mean = M

$$\alpha = \sqrt{\frac{fd^2}{N} - \left(\frac{fd}{N}\right)^2 \cdot h} \quad \text{or} \quad \alpha = \sqrt{\frac{372}{96} - \left(\frac{40}{96}\right)^2 \cdot 3}$$

α = 5.78

Point of arbitrary origin = 36

$$M = A\,0 + \frac{\Sigma fd}{N} \cdot h$$

$$M = 36 + \frac{-40}{90} \cdot 3$$

M = 34.75

COMPUTATION OF DEGREE OF RELIABILITY FOR COMPARISON BETWEEN THE MEANS OF GROUP I AND II

Standard error of the mean $\frac{\text{Standard deviation}}{\text{Number of cases}}$

Standard error of deviation $\sqrt{(S.E.M_I) - (S.E.M._{II})^2}$

$\sqrt{(.59)^2 - (.57)^2}$

S.E.D. .82

Degree of reliability is determined by dividing the difference between the means, 2.27, by the S.E.D., .82. The standard error of difference (the figure resulting from the division), is then used with the table defined as the 'Fractional parts of the total area under the normal probability curve'.* The figure obtained of .4972 is then multiplied by 2, since it represents only half of the probability curve. The degree of reliability is then found to be .9944 or 99 & $\frac{44}{100}$ %.

*Henry E. Garrett, Statistics In Psychology, Table A, p. 424.

COMPUTATION OF DEGREE OF RELIABILITY FOR COMPARISON BETWEEN THE MEANS OF GROUP II AND III

Standard error of the mean $= \frac{\text{Standard deviation}}{\text{Number of cases}}$

Standard error of deviation $= \sqrt{(\text{S.E.M.}_{II})^2 - (\text{S.E.M.}_{III})^2}$

$= \sqrt{(.57)^2 - (.61)^2}$

S.E.D. .83

Degree of reliability is determined by dividing the difference between the means, 2.75, by the S.E.D., .83. The resultant figure, the standard error of difference, 3.3, is then used with the table defined as the 'Fractional parts of the total area under the normal probability curve'.* The figure obtained of .4995, is then multiplied by 2, since it represents only half of the probability curve. The degree of reliability is then found to be .9990 or 99 & $\frac{90}{100}$ %.

*Henry E. Garrett, Statistics In Psychology, Table A, p. 424.

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Because of the apparent value of the study unit as a pre-trip orientation method, the candidate decided after consultation with his committee to construct a second study unit for recommended use by the Kellogg Bird Sanctuary in its services to teachers planning to visit the Sanctuary.

Development and Use of Second Study Unit

This study unit (found in appendix F, pp. 117-175), is more specific in nature than the first unit in that it deals only with the particular birds and mammals that are to be found at the Sanctuary. There is much emphasis upon waterfowl since there are very few places in Michigan where one could so conveniently study many different kinds of waterfowl in a natural habitat. It does not include any material on trees as did the first unit, since it was felt that tree study could likely be done in the children's own school area. This is not to say that tree study is not recommended at the Sanctuary, but it was found from observation of the previous study groups that many groups do not have enough time to cover tree study in their Sanctuary tour.

This unit is designed for distribution to teachers with the suggestion that they use it as a reference from which to develop study sheets or student units. The teacher can adapt the material to her particular grade level.

The unit is composed of three sections: waterfowl, birds of prey, and mammals. More material is included in the unit than a teacher would likely be able to cover in one pre-trip orientation study. It is felt, however, that some teachers may want to focus on one section and some on another. Each section contains an overview of the subject

including factual information and general conservation understandings, sketches of the native Michigan wildlife found at the Sanctuary, selected information about the animals, student research questions, and answers to student research questions. The section on waterfowl has information on bird migration and waterfowl hunting regulations in addition to the other materials. At the end of the unit is a list of selected films, books, and pamphlets which the teacher might find helpful in her study.

All information in this unit was chosen so that the teacher could thereby give the students a knowledge of the animals at the Sanctuary. Thus, the student will know something of the importance and position of the organisms in nature and have a general understanding of the conservation concepts applying to them.

It is felt that a student who knows many interesting things about the organisms, and who knows how to identify them, will be likely to gain much more from his Sanctuary trip than those who merely look at the wildlife having little or no understanding of them.

Judging from the way the tour guide was used by the test groups, it is evident that a more thorough preparation of the student and the teacher by use of units such as suggested here is of more value to the class than the placing of something in their hand to use when they arrive at the Sanctuary.

IV. CONCLUSIONS AND RECOMMENDATIONS

Since the major purpose of this study has been to investigate the educational potential of Kellogg Bird Sanctuary, and since the educational potential of such a place as the Kellogg Bird Sanctuary is so great in that it essentially involves the whole of the out-of-doors, it has been possibly only to begin the investigation in this study.

Because of the apparent desire for preparatory helps on the part of most of the teachers replying to the questionnaire, it was considered advisable to devote the majority of this study to developing and testing materials to see how significant they were to the students in terms of learning, appreciation, and attitudes gained from their visit to the Sanctuary. It has been shown on preceding pages of this study that the use of preparatory material has produced significantly better results in learning, appreciation, and attitudes than occur without their use. Because this is true, the second, more extensive unit was developed for recommended use by the Sanctuary. None of these materials are at present in use by the Sanctuary. The writer recommends that, upon conclusion of this study, the teaching aids entitled "Tour Guides","Studies of Some Michigan Mammals, Waterfowl, Trees and Conservation Practices", and "Conservation In School and At Kellogg Bird Sanctuary" be put out in sufficient quantities so that they are available to all schools requesting them. The materials for producing these are all owned by the Fisheries and Wildlife Department of Michigan State University. Inasmuch as there will be expense involved in producing these units, it might be well to require the schools to pay a small fee to cover this.

The tour guides should be made available to the students. The preparatory unit on waterfowl, mammals, trees and conservation practices is designed for individual use also. The unit entitled "Conservation In School and At Kellogg Bird Sanctuary" is designed for distribution to the teachers only. Since this unit provides more material than a teacher would likely be able to cover in preparing one class for a trip to the Sanctuary, the unit is intended to be used as a reference for the teacher. Instructions in the unit suggest that the teacher use only certain sections of the unit at any particular time. It is suggested that the teacher use this unit as a master and produce student's units from it on ditto run-offs. The students can make their own covers and thus incorporate some art work in their study. The unit is intended for use with later elementary students, and perhaps could even be used at the junior high level. It is conceivable, however, that a teacher could, in reproducing student units, adapt the work for use with younger children. Any teacher possessing this unit could, with some effort on her part, provide a good orientation study for her class before they visit the Kellogg Bird Sanctuary.

These preparatory helps are intended for use by the teacher who sincerely desires to spend some time on pre-trip study to make the visit more profitable to the children. There have been and likely will continue to be teachers who take this trip as an outing and a look-and-run experience in the spring of the year. The type of help suggested in this study will be of little value to these teachers.

To make the various helps and aids which the Sanctuary has available to the public, the writer recommends that a leaflet be sent out to the schools who registered the previous year. This leaflet should contain

general information about the location, purpose, facilities, and staff of the Sanctuary, and also a description of the materials available to the school for pre-trip preparation. A blank should be enclosed providing a place to check those items desired and a place to put down a choice of first, second, and third dates for attending the Sanctuary. When the Sanctuary receives these requests, the materials requested can then be mailed back with a confirmation of the date for attending.

For those who do not receive this leaflet because of not having been on the previous year's registration list, it would be advisable to provide in the administration building a display of these materials and services that are available with a brief description of how to obtain them.

As indicated in an earlier part of this study there are many excellent conservation education programs throughout the United States. The activities of these programs are similar in that they all are aimed (at least in part) at more and better means of educating the public concerning the conservation of our natural resources. The methods are varied, however, since the areas, the groups served, the finances available, etc., all differ to some extent.

Some things being done in many of these programs are noticeably absent from the Kellogg Bird Sanctuary. This, if desired, would be corrected by satisfying the following recommendations:

1. Develop several good nature trails in now restricted portions of the Sanctuary. (See item 17, page 28.)
2. Develop many self-operating or self-interpreting outdoor educational media. Many of the outdoor-education centers across the United States employ self-operating and self-interpreting devices to teach about natural resources. The work being done at the

Arizona Sonora Desert Museum is particularly outstanding. Much could be done along this line at the Kellogg Bird Sanctuary, both in the present public area and in the above proposed nature trails.

3. Develop more pre-trip and follow-up orientation and study units for teacher and student use. Some of the conservation education programs studied had several types of tours of the natural area. This necessitates study helps, both pre-trip and follow-up. Thus, as the field trip program expands at Kellogg Bird Sanctuary so must the development of educational helps be increased.
4. Set up graduate assistant stipends in order to obtain graduate assistants during the fall and spring term (when visitation is heaviest) to conduct organized tours. The majority of the outdoor-education centers studied by the writer had sufficient staff available to conduct pre-registered groups on guided field trips. This type of activity was an important part of the conservation education programs of these nature centers, since it provided outdoor interpretation which the children's teachers were not able to give.
5. Develop several types of tours so that a class might profitably visit the Sanctuary several times. (See item 11, p. 27 and item 17, p. 28.)
6. Restrict unregistered groups to attendance on weekends and holidays; this would eliminate running, noise, and disturbances which have a tendency to interrupt study groups.
7. Eliminate picnicking and selling of ice cream, pop, and candy from the Sanctuary proper so that the Sanctuary atmosphere may be more secluded and wild.
8. Move more rapidly in the direction of replacing all foreign bird exhibits with native Michigan wildlife.

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APPENDIX A

MICHIGAN STATE UNIVERSITY

OF AGRICULTURE AND APPLIED SCIENCE · EAST LANSING

DEPARTMENT OF FISHERIES AND WILDLIFE

A Questionnaire For The Purpose of Studying Educational Potentials At The Kellogg Bird Sanctuary

The questionnaire at hand is an initial step preparatory to a doctoral study of "educational potentials" at the sanctuary. The study is being directed by Dr. G.W. Mouser of the department of Fisheries and Wildlife, Michigan State University. The project will be conducted with the cooperation of Mr. R.D. Van Deusen, Biologist in charge of the Kellogg Bird Sanctuary.

The results of this study should indicate how we may most profitably expand our services to the public schools, clubs and service groups at the Kellogg Bird Sanctuary. It is the departments desire to develop various educational helps to be used at the school and at the sanctuary. We hope to have parts of this service available for spring visitations and in order to accomplish this, we do need your help. Would you kindly fill in the questionnaire and return it to me at the address shown below.

_____1. How many times have you brought groups to the sanctuary?

Yes____NO_____2. Was the trip a part of a unit of study? Examples—birds, plants, conservation.
State the specific title of your unit_____.

Yes____No_____3. Was your visit planned as a separate educational trip rather than as a part of a definite unit?

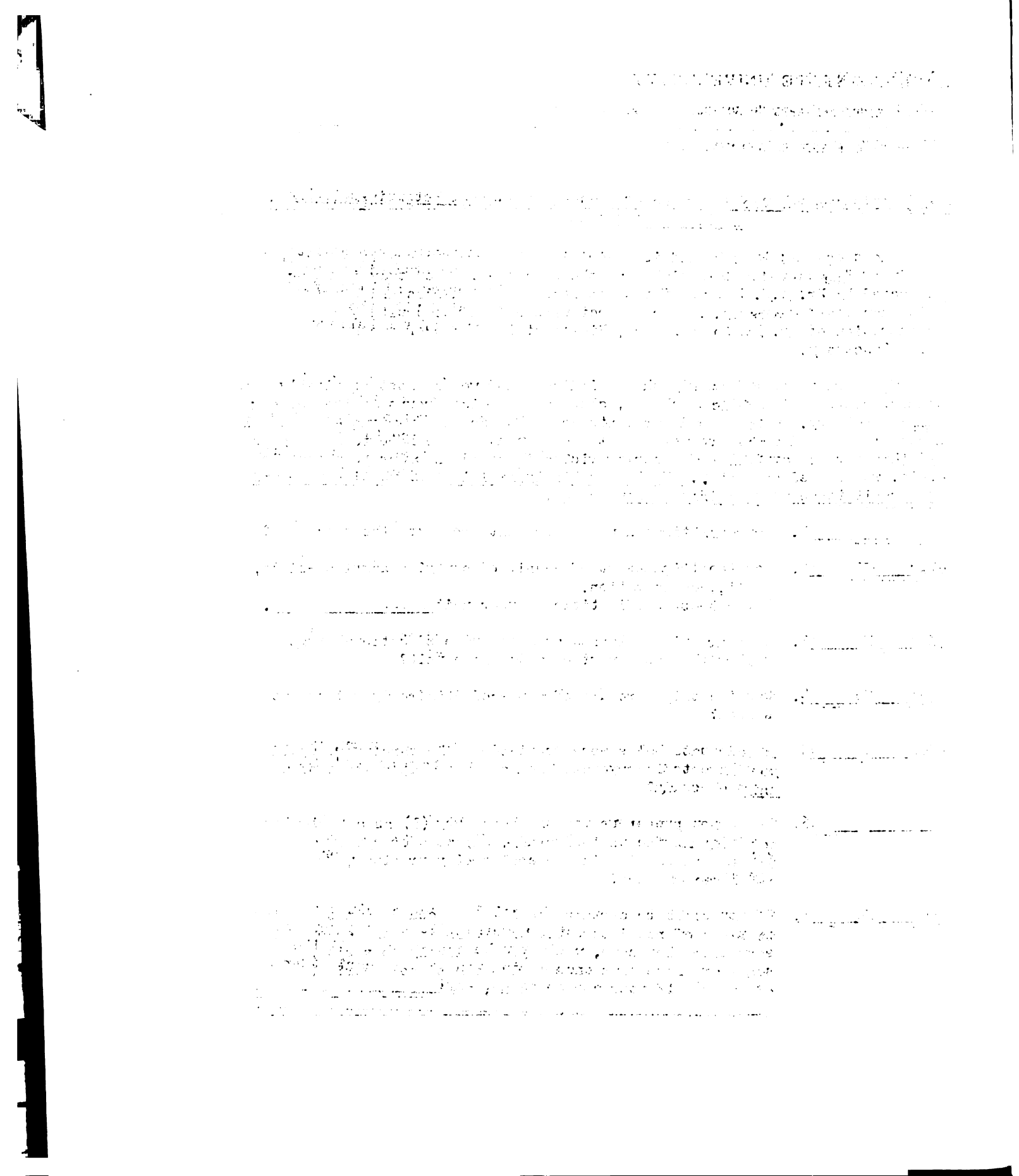
Yes____No_____4. Was the trip a result of a precedent already set by the school?

Yes____No_____5. If adequate helps were provided by the sanctuary, would you like to incorporate them and the trip as part of a unit of study?

_____6. Would you prefer to use the sanctuary (1) as a beginning activity in the unit of study, (2) as a conclusion, (3) as an activity in the course of your study, or (4) all three of them?

Yes____No_____7. If you could be certain the children could gain something in terms of new interests, understandings and enjoyment each time they came, would you be likely to visit the sanctuary more than once during the school year? (Series of trips) If your answer is no, why?_____

_____



Questionnaire—Kellogg Bird Sanctuary

- 2 -

Yes____No____8. Would you use pre-trip preparatory materials in your school if they were available?

Yes____No____9. Do you think your school would be interested in a progressive series of trips and materials, so that students could have sequential training at the sanctuary possibly through grades 4-10.

Yes____No____10. Do you feel children would get more from their trip if they could discover more about the wildlife at the sanctuary for themselves, rather than being told about it?

11. Which of the following do you feel are most desirable in terms of understanding gained from a day at the bird sanctuary. Please number in order of importance.

_____1. History and background information on the developments of Kellogg Bird Sanctuary.

_____2. Discussion of research projects and activities as they pertain to individual birds and animals.

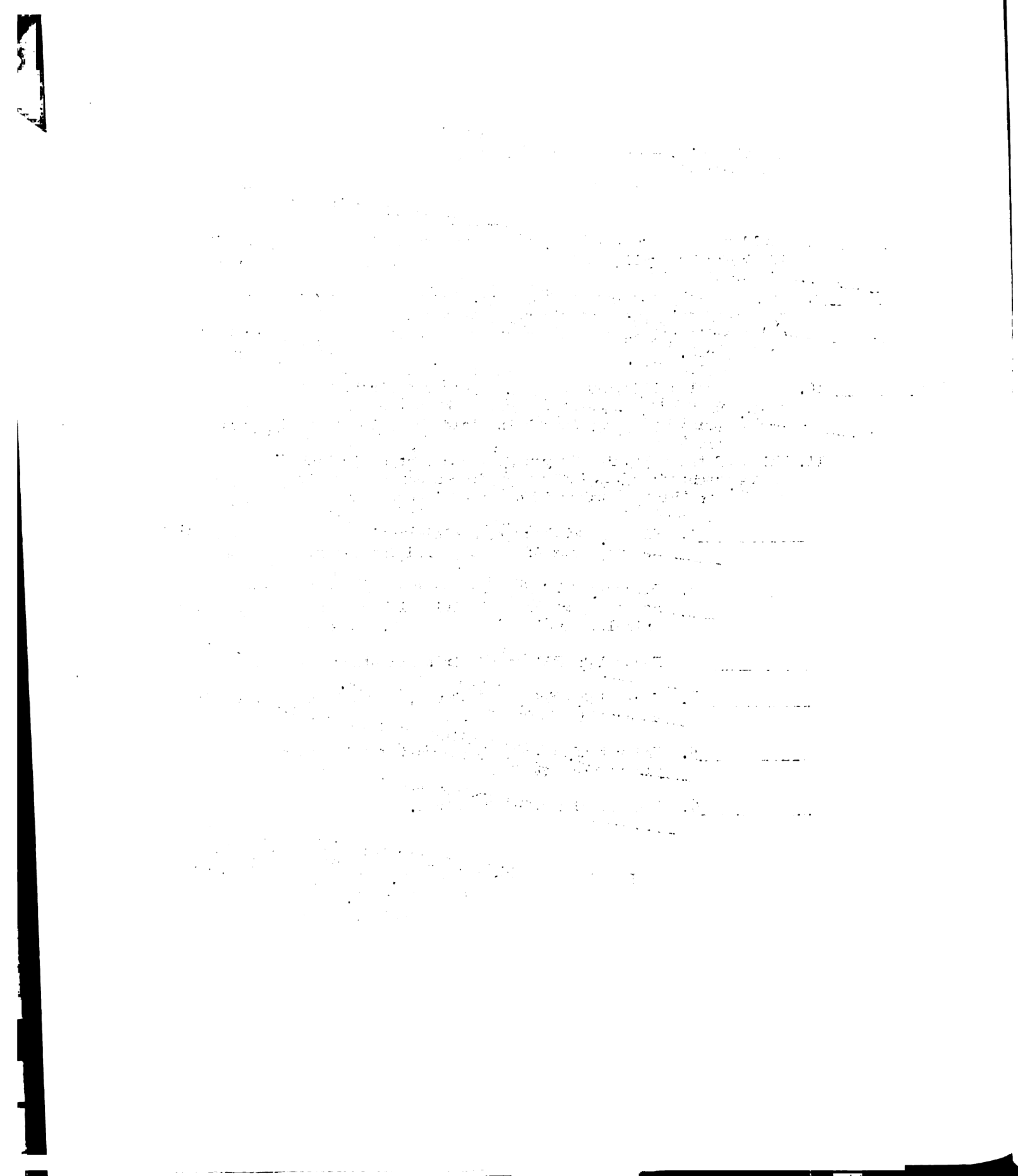
_____3. Factual knowledge of birds and other animals.

_____4. Factual knowledge of plants, as well as birds and other animals.

_____5. Understanding relationships involving both plants and animals.

_____6. Conservation understandings.

PLEASE RETURN TO: HAROLD Z. SNYDER
357 Bailey St.
East Lansing, Michigan



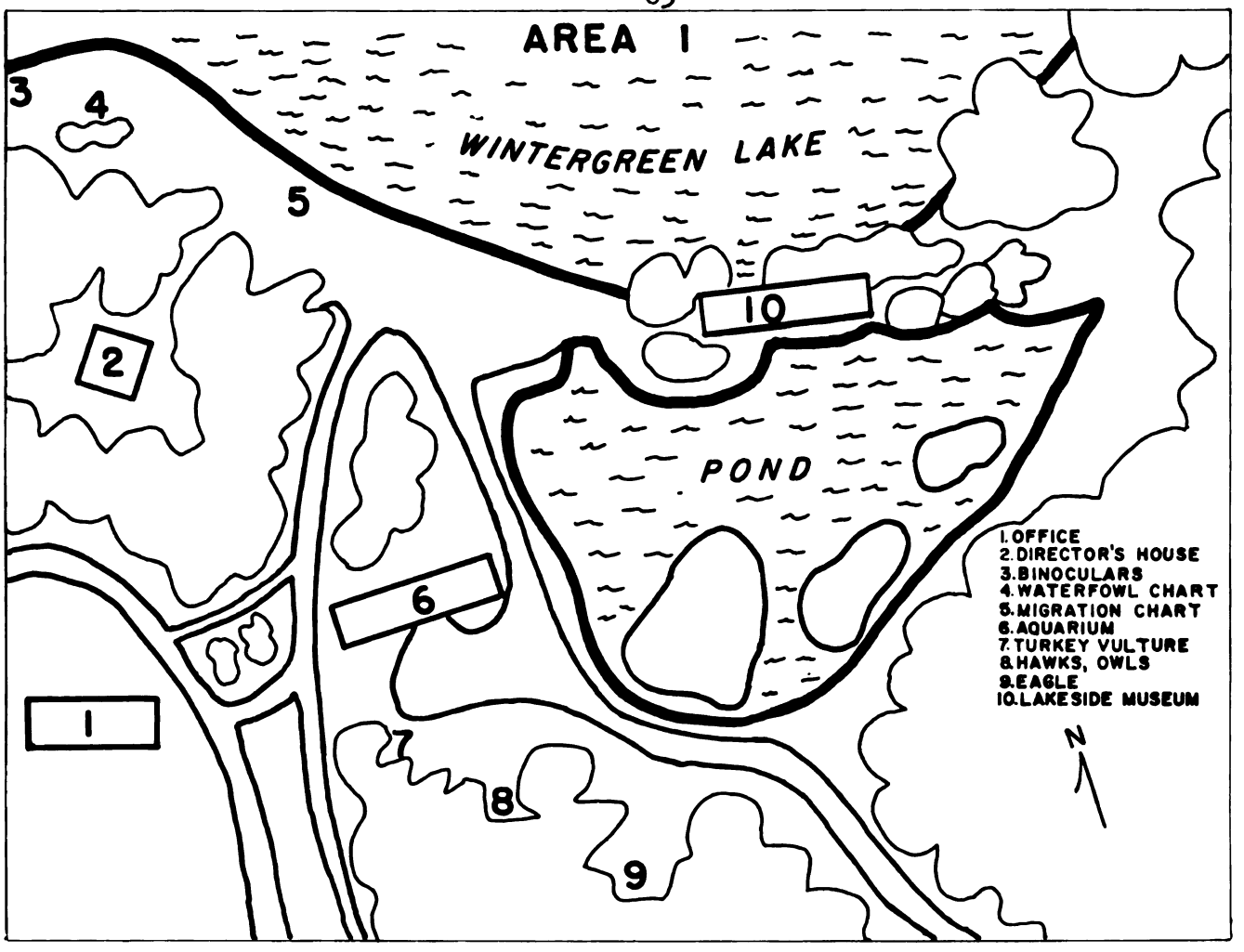
APPENDIX B

Materials Used In the Compilation of the Tour Guides on the Succeeding Pages Are From the Following Sources:

Michigan Wildlife Sketches, published by the Michigan Department of Conservation.

Michigan Trees, by Charles Herbert Otis.

Kellogg Bird Sanctuary Map, produced by R. D. VanDeusen.



AREA ONE

LOOK FOR THE SIGN OF THE CANADIAN GOOSE

HERE YOU WILL FIND

WATERFOWL*

GEESE	SWANS	DUCKS	GREBES
Canadian goose	Whooper swan	Black duck	
Hutchins goose	Whistling swan	Mallard duck	
Alaska cackler	Mute swan	Wood duck	
Barnacle goose	Black swan	Pintail duck	
Blue goose		Canvasback duck	
Snow goose		Redhead duck	
White fronted goose		Ring-necked duck	
Chinese goose		Lesser scaup duck	
Egyptian goose			

*Waterfowl periodically feed in back areas and nearby fields and thus all may not be seen at once.

EDUCATIONAL BULLETIN BOARDS

Migration Chart
Waterfowl Chart

LAKESIDE MUSEUM

Wildlife Exhibits:

Swan Display	Birds of Prey
Migratory Ducks, Coot, Grebe & Mergansers	Life History of Canada Goose
Mammals of Michigan	

Pictures of various sanctuary activities and research projects carried on at the sanctuary.
Automatic projector with 30 color slides showing general activities of the sanctuary.
Nature books and teaching aids on sale weekends and holidays, available at office at other times.
Michigan game law digest. (Your teacher may take a few back to your classroom)

LARGE BIRDS OF PREY

Bald Eagle Osprey Great Horned Owl Redtailed Hawk Turkey Vulture

THERE IS MUCH TO SEE HERE

<u>WATCH THE WATERFOWL</u>

Are swans bigger than geese?

Are geese bigger than ducks?

There are several kinds of swans. How many can you count?

There are several kinds of geese. How many can you count?

There are several kinds of ducks. How many can you count?

Some of the birds have plastic or metal bands on their necks or bills. Why do you think this is?

How many kinds of these birds do you think we can hunt? If you want to know more about this, have your teacher pick up a few Michigan game law digests in the lakeside museum.

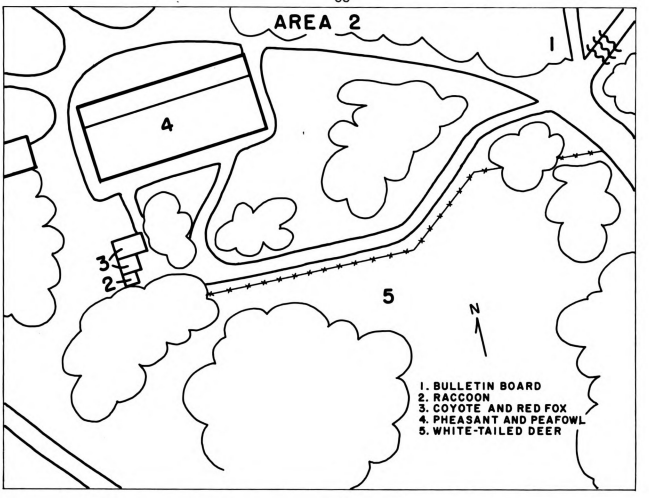
Some waterfowl dive down under the water looking for food. Others look for food by tipping their tail up and putting their head under the surface. Can you tell which ducks are divers and which ones are dabblers?

<u>LOOK CLOSELY AT THE BIRDS OF PREY</u>

Can you tell which parts of the birds body assist them in attacking their prey?

If these birds are "bad" as some people think they are, why do you think our game laws protect them?

What reasons can you think of for these birds being in cages while the waterfowl are not?



AREA TWO

LOOK FOR THE SIGN OF THE RED FOX

HERE YOU WILL FIND

PHEASANTS AND PEAFOWL COYOTE RED FOX RACCOON WHITE TAILED DEER

Blue peafowl
White peafowl
Golden pheasant
Lady Amherst pheasant
Chinese Ringneck pheasant
Blacknecked pheasant
Mongolian pheasant
Mutant pheasant
Francolin

GET AQUAINTED WITH THE PHEASANTS AND PEAFOWL

One kind of pheasant is hunted in Michigan. Can you tell which one?

Some birds are raised like chickens and turned loose on farms to hunt. Do you think the pheasant would be a good bird to use for this?

Where do you think these pheasants would go if released from their pens?

From observing these pheasants in their pens, can you tell what would be a good food to put out in your backyard for them in the winter?

What animals in this area are enemies of the pheasant?

Why do you think the peafowl do not go away from the area?

Do you think it would make any difference if they were all let out?

Do the bright colors of the peafowl fit in better with Michigan surrounding or tropical surroundings?

Do you think the peafowl are native to Michigan?

WAYS OF THE COYOTE AND RED FOX

These animals are called mammals because they have hair and nurse their young.

Do these animals eat meat or grain?

Do you think these animals are helpful or harmful to our game animals which we hunt?

These animals have a bounty placed on them. What does this mean?

What part of these animals' bodies would enable them to capture and kill other animals?

HABITS OF THE RACCOON

Raccoons often dip their food in water before they eat it. Is this because they are naturally clean or do you think there is another reason?

Raccoons eat small animals such as frogs and insects and may also prey on young ducklings.

Study the raccoon fur. Why do you think it would make a nice fur coat or coon skin cap?

What distinctive markings do you look for when identifying the raccoon?

THE WHITE TAILED DEER FAMILY

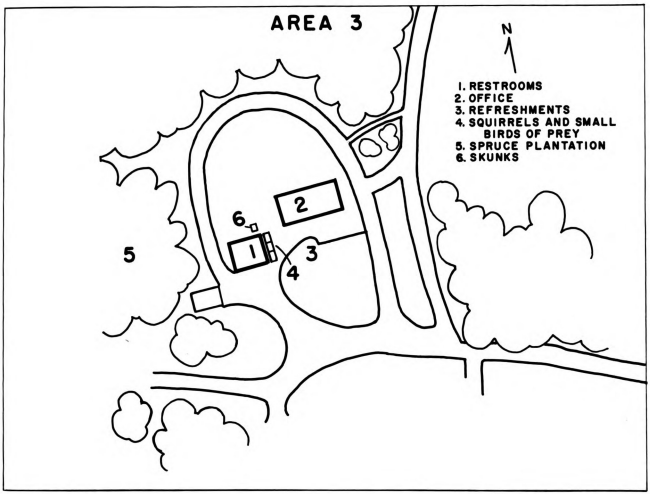
Are these deer in a habitat which is natural to them?

By seeing the area in which the deer are found, can you tell what they feed on?

Are there any "bucks" among these deer?

Do you think we should allow no hunting of deer in Michigan? If your answer is no, can you give good reasons why?

What parts of a deer's body does he use for escape and protection against his enemies?



AREA THREE

LOOK FOR THE SIGN OF THE FOX SQUIRREL

HERE YOU WILL FIND

FOX AND BLACK SQUIRREL SPARROW HAWK SCREECH OWL SKUNK

OBSERVATIONS TO MAKE IN THIS AREA--HERE WE HAVE MUCH TO LEARN

<u>SEE THE SQUIRRELS</u>

How do the fox and black squirrels differ, other than in color?

What parts of the squirrels body enable them to collect, store, and eat nuts?

What animals do squirrels sometimes molest?

Do you think the houses provided here are similar to the ones squirrels use in nature?

Are we allowed to hunt these squirrels in Michigan?

VISIT THE SPARROW HAWK

Why do you think this bird is called a sparrow hawk?

Do you think this hawk could kill animals bigger than itself?

How is this bird equipped to attack its prey?

Do you think this bird is more harmful than good?

STUDY THE SCREECH OWL

What kind of a noise do you think this owl makes?

How does the owls vision differ from other birds?

What can you remember about this owl to help you recognize it if you should see it in the wild?

If you watch the owl blink, you can see a second eye lid. What do you think this is for?

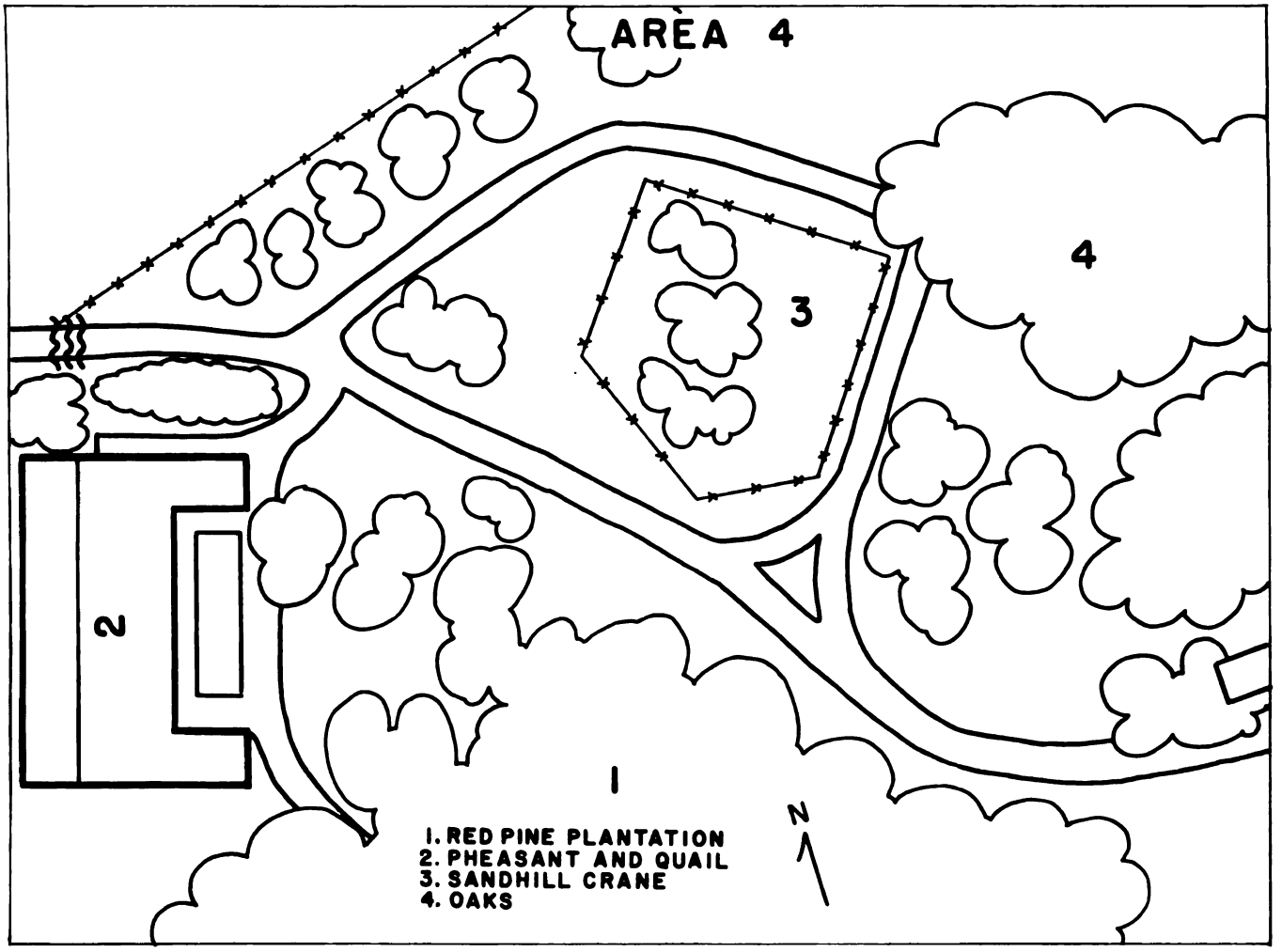
WATCH THE SKUNK

Why don't these skunks squirt people with their "perfume"?

What is the main value of skunks to man?

Which of the following foods do you think the skunk would eat?
Insects---Grain---Mice---Birds

Would a skunk be likely to attack other animals with his claws and teeth?



AREA FOUR

SANDHILL CRANE

LOOK FOR THE SIGN OF THE MAPLE LEAF

HERE YOU WILL FIND

PHEASANT, QUAIL AND PARTRIDGE

Bobwhite
California Valley Quail
Chukar Partridge
Versicolor Pheasant
Reeves Pheasant
Mongolian-Reeves cross
Mutant and White cross
Golden pheasant
Lady Amherst hen
Silver Pheasant

TREES

Japanese Walnut
Redbud
Hickon
White Cedar
Black Walnut
Heart nut
White Pine
Pecan
Scotch Pine
Japanese Crab Apple
Red Mulberry
Red Cedar
Pignut Hickory
Chinese Chestnut
White Birch
Largetooth Aspen
Black Locust
Weeping Willow
Spruce Plantation
Red Pine Plantation
Oak Grove (Red Oak)

DO YOU KNOW

"Homer" the SANDHILL CRANE

This bird is a native of Michigan.

Why do you suppose this bird has such a long bill and long legs?

What kind of a habitat would you expect this bird would enjoy?

Do you think this bird would be a swift flyer or a slow one?

Why doesn't this bird fly out of his pen?

Which of the following kinds of food do you think this bird would eat?
Frogs---Mice---Seeds---Water Weeds

Why do you think the birds nose openings are located so far up his beek instead of down at the end?

STUDY THE PHEASANTS, QUAIL AND PARTRIDGES

All of these birds, except the Bobwhite, come from outside of Michigan.

Do you think the color of these birds would allow them to blend in well with plants and other objects of the fields in Michigan?

What do we mean when we say a bird is a native of Michigan?

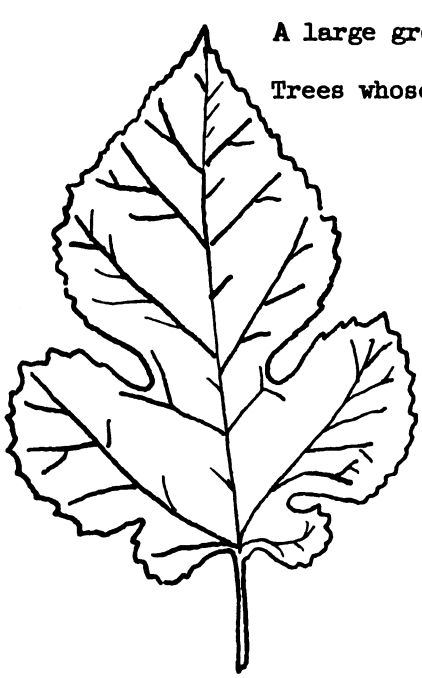
Do these birds look anything like our Michigan quail or bob-white?

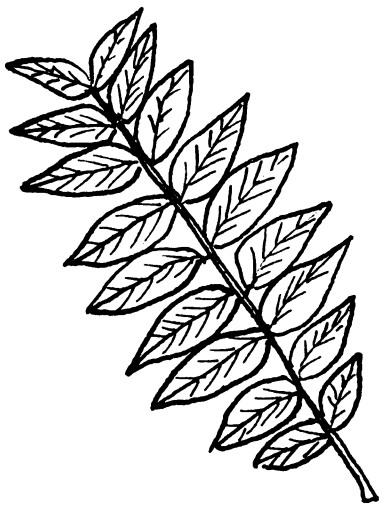
Do we have any partridge in Michigan which are considered native to our state?

HOW SOME OF OUR TREES DIFFER

MANY OF THE TREES IN THIS AREA ARE IMPORTED FROM OUTSIDE THE STATE AND ARE NOT NATIVE OF MICHIGAN.

FIND: A pine tree with two needles in a cluster.
A pine tree with five needles in a cluster.
A large group of evergreens with short needles.
Trees whose leaves look like this.





APPENDIX C

OBSERVATION CHECK LIST

TEACHER Mrs. Pangburn GROUP I

SCHOOL Bently

SCHOOL LOCATION Flint

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 18

NUMBER OF ADULTS IN GROUP 4

TIME SPENT AT THE SANCTUARY One hour and a quarter

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER Little

USE OF TOUR GUIDE Control group did not receive it

TEACHERS INTEREST IN TOUR GUIDE Did not receive it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 0

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP?
One stop

TEACHER Mr

SCHOOL Co

SCHOOL LOCAT

GRADE

NUMBER OF CH

NUMBER OF AD

TIME SPENT A

ATTENTION AN

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One stop

OBSERVATION CHECK LIST

TEACHER Mrs. Ambs GROUP I

SCHOOL Colon Community

SCHOOL LOCATION Colon

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 27

NUMBER OF ADULTS IN GROUP 7

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER Little

USE OF TOUR GUIDE Control group did not receive it

TEACHERS INTEREST IN TOUR GUIDE Did not receive it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 0

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP?
One stop

OBSERVATION CHECK LIST

TEACHER Mrs. Winfield GROUP I

SCHOOL Lakeside

SCHOOL LOCATION East Grand Rapids

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 25

NUMBER OF ADULTS IN GROUP 8

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER Fair

USE OF TOUR GUIDE Control group did not receive it

TEACHERS INTEREST IN TOUR GUIDE Did not receive it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 3

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP?
Part of a series of stops

OBSERVATION CHECK LIST

TEACHER Miss Parlberg GROUP I

SCHOOL Lakeside

SCHOOL LOCATION East Grand Rapids

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 26

NUMBER OF ADULTS IN GROUP 10

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER None

USE OF TOUR GUIDE Control group did not receive it

TEACHERS INTEREST IN TOUR GUIDE Did not receive it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE Not determined

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? Part of a series of stops

OBSERVATION CHECK LIST

TEACHER Miss Klomparens GROUP II

SCHOOL Lakeside

SCHOOL LOCATION East Grand Rapids

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 25

NUMBER OF ADULTS IN GROUP 4

TIME SPENT AT THE SANCTUARY One hour and a quarter

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER None

USE OF TOUR GUIDE None

TEACHERS INTEREST IN TOUR GUIDE Mildly interested

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 0

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? Part of a series

OBSERVATION CHECK LIST

TEACHER Miss Bergh GROUP II

SCHOOL Sibley

SCHOOL LOCATION Grand Rapids

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 31

NUMBER OF ADULTS IN GROUP 5

TIME SPENT AT THE SANCTUARY One and one-half hour

ATTENTION AND INTEREST OF CHILDREN Fair

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER Little

USE OF TOUR GUIDE Very little

TEACHERS INTEREST IN TOUR GUIDE Neutral

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 0

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? Only stop

OBSERVATION CHECK LIST

TEACHER Mrs. Carr GROUP II

SCHOOL Gordon

SCHOOL LOCATION Marshall

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 28

NUMBER OF ADULTS IN GROUP 7

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER A little

USE OF TOUR GUIDE Used it in part

TEACHERS INTEREST IN TOUR GUIDE Positive reaction to it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 5

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? One stop only

OBSERVATION CHECK LIST

TEACHER Mrs. Camp GROUP II

SCHOOL Gordon

SCHOOL LOCATION Marshall

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 29

NUMBER OF ADULTS IN GROUP 5

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER A little

USE OF TOUR GUIDE Used it in part

TEACHERS INTEREST IN TOUR GUIDE Positive reaction to it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 8

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? The only stop

OBSERVATION CHECK LIST

TEACHER Mrs. Miller GROUP III

SCHOOL Woodcliff

SCHOOL LOCATION East Grand Rapids

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 21

NUMBER OF ADULTS IN GROUP 3

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Fair

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER A little

USE OF TOUR GUIDE Used it in part

TEACHERS INTEREST IN TOUR GUIDE Positive reaction to it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 2

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? Part of a series of stops

OBSERVATION CHECK LIST

TEACHER Mrs. Blanchard GROUP III

SCHOOL Woodcliff

SCHOOL LOCATION East Grand Rapids

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 23

NUMBER OF ADULTS IN GROUP 3

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Fair

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER A little

USE OF TOUR GUIDE Used them in part

TEACHERS INTEREST IN TOUR GUIDE Positive reaction to it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 3

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? Part of a series of stops

OBSERVATION CHECK LIST

TEACHER Mrs. Chapin GROUP III

SCHOOL Wilson

SCHOOL LOCATION Kalamazoo

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 27

NUMBER OF ADULTS IN GROUP 3

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER None

USE OF TOUR GUIDE Very little

TEACHERS INTEREST IN TOUR GUIDE Positive reaction to it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 5

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? Only stop

OBSERVATION CHECK LIST

TEACHER Mrs. Brownell GROUP III

SCHOOL Wilson

SCHOOL LOCATION Kalamazoo

GRADE Fourth

NUMBER OF CHILDREN IN GROUP 28

NUMBER OF ADULTS IN GROUP 3

TIME SPENT AT THE SANCTUARY One hour

ATTENTION AND INTEREST OF CHILDREN Good

AMOUNT OF OUT-DOOR INTERPRETATION SUPPLIED BY TEACHER None

USE OF TOUR GUIDE Very little

TEACHERS INTEREST IN TOUR GUIDE Positive reaction to it

NUMBER OF CHILDREN WHO HAVE ATTENDED KELLOGG BIRD SANCTUARY BEFORE 2

WAS THE SANCTUARY TRIP PART OF A SERIES OF STOPS OR THE ONLY STOP? Only stop

APPENDIX D

Materials used in the Compilation of the Unit Shown In The Succeeding Pages Are From The Following Sources:

Michigan Wildlife Sketches, published by Michigan Department of Conservation.

Michigan Trees, by Charles Herbert Otis.

Michigan Waterfowl Identification Guide, published by the Mississippi Flyway Council.

New York State Conservationist, Dec.-Jan. Issue, 1958-1959.

STUDIES OF SOME MICHIGAN MAMMALS, WATERFOWL, TREES AND CONSERVATION PRACTICES

MICHIGAN STATE UNIVERSITY
DEPT. OF FISHERIES AND WILDLIFE

COVER PICTURE USED BY PERMISSION
MICHIGAN DEPT. OF CONSERVATION

ON THE PAGES THAT FOLLOW ARE THINGS TO DO WHICH WILL HELP YOU LEARN MORE ABOUT MICHIGAN PLANTS AND ANIMALS. BY USING SOME BOOKS THAT YOUR TEACHER WILL KNOW YOU CAN FIND OUT ALL THE INFORMATION YOU NEED TO COMPLETE THIS UNIT. READ THE DIRECTIONS BEFORE YOU START.

ALL MAMMAL PICTURES IN THIS BOOKLET

ARE FROM

MICHIGAN WILDLIFE SKETCHES

AND HAVE BEEN USED WITH THE PERMISSION OF

THE MICHIGAN DEPARTMENT OF CONSERVATION

TO THE TEACHER

We have planned it so, and sincerely hope that this unit will not require lengthy lesson preparation time. For the most part, the students can complete the work on their own. It will be necessary for you to familiarize yourself with the unit and read the brief information sections entitled "For the Teacher". You then will need to be a resource person to guide the children in the use of suggested references.

This material is not intended to supplant your science program, rather to supplement it. We offer this to you to use as you see fit as an aid to learning in conjunction with your visit to Kellogg Bird Sanctuary.

FOR THE TEACHER

Information to Accompany the Mammal Sheet

Actions and antics of our Michigan mammals rarely fail to get an audience with young and old alike. Recognition of our mammals is relatively easy. However, there are many fascinating facts about these interesting animals that have remained obscure to the average individual.

Here are some facts you might like to help your children discover. Answers will be found in Michigan Wildlife Sketches.

1. Which animal is the size of a Michigan navy bean at the time of birth? Opossum
2. Which animal has been in some instances forced to move its home from hollow trees (which are no more) to field tile? Racoon
3. Which of the animals belong to the dog family? Fox, coyote, wolf.
4. Which animal probably does most of its hunting from trees yet catches its food on the ground. Bobcat
5. Which animal or animals get much of their food from trees? Squirrels
6. Which animal is old man "ground hog". Woodchuck
7. Does the raccoon always wash its food before eating it. Generally, but not always.
8. Which is the most valuable fur bearing animal? The muskrat, since it outdistances all other animals in number and total value of pelts marketed.
9. Which of our Michigan mammals have disappeared from Michigan? p. 57
10. Which animal can cause another to be temporarily blind? Skunk

Here are ways to group these animals:

A. Night feeders

B. Day feeders

C. Ground dwellers

D. Tree dwellers

E. Water dwellers

F. Meat eaters

G. Vegetable eaters

H. Meat and vegetable eaters

I. Those that have several young at a time

J. Those that have one or two young at a time

K. Cat family

L. Dog family

Uses to man (Conservation) grouping:

1. Predators to keep pest animals such as mice under control.

2. Meat for man.

3. Furs for man.

4. Sport in hunting them.

5. Nuisance animals--How? Are they always?

SOME MICHIGAN MAMMALS
















NE NAMES AND PASTE UNDER THE RIGHT PICTURES

SQUIRREL	WOODCHUCK	OPOSSUM	BOBCAT	MUSKRAT
MOLE	DEER ELK	PORCUPINE	MOOSE	RED FOX
WOLVERINE	RACCOON	SKUNK	COYOTE	BEAVER

FOR THE TEACHER

Instructions for the use of Bird Sketches

There is real satisfaction in knowing Michigan's waterfowl:

I. A simple outline of study:

A. Clues for recognition

B. Behavior Patterns

C. Uses and Abundance

D. Management Techniques

II. Some suggestions for the teacher:

A. Recognition

1. Your students have been supplied with a set of pen and ink drawings which if studied provide simple yet adequate "quick check" clues to the recognition of a goodly number of Michigan waterfowl. Effective use of these sketches along with a set of flash cards should set the stage for an interesting experience at the sanctuary, as practically all of these birds are to be seen at the sanctuary.

2. You can acquaint your students with the main groups of waterfowl since representative species are included in the sketches--these also are to be found at the sanctuary.

B. Behavior Patterns

1. Some ducks are surface feeders or dabblers--their characteristics are as follows:

a. They tip up to feed.

b. Their legs are placed near the center of their

body--they can walk on land.

c. They usually swim with their tail held clear of water.

d. They spring into the air as they take off from the water.

2. Some ducks are divers or deep water feeders.

a. They dive completely under the water.

b. Their legs are placed far back on their body--they experience difficulty in walking on land.

c. They usually swim with their tail held close to the water.

d. They run on the surface of the water in their take off.

3. Individual species of ducks have other interesting behavior patterns. The following books tell other interesting facts about ducks. (See list below).

C. Use and Abundance

Some of our ducks are more palatable (tasty) than others.

Some ducks have values other than meat for the table.

Individual research will shed more light on these topics.

1. The Ducks, Geese and Swans of North America. c.f. color plates in back of book. By Kortright, pub. by Am. Wildlife Institute.

2. Audubon Bird Guide. Doubleday and Co., by Richard Pough.

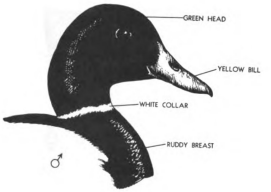
3. A Field Guide to the Birds. By R. T. Peterson, Pub. by Houghton Miflin Co.

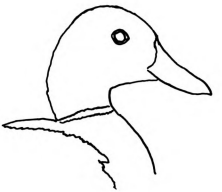
The following aids are being supplied for teacher reference:

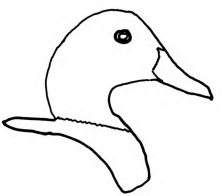
1. Michigan Waterfowl Identification Guide. Pub. by Mississippi Flyway Council.

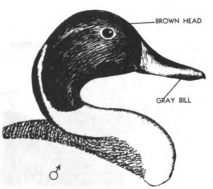
2. Know Your Ducks & Geese. Pub. by Sports Afield.

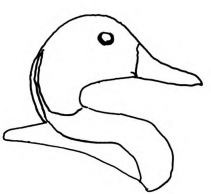
IDENTIFYING WATERFOWL











Directions: The birds on the right are the same as the ones on the left. Study colored pictures of these birds and color in the birds on the right. Be careful to put their natural colors in. Under the picture on the left state whether the bird is a diving bird or a dabbling bird. Under the picture on the right, write the bird's common name.

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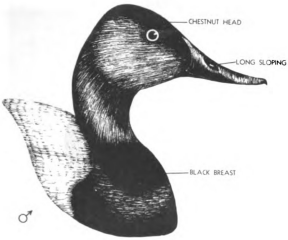

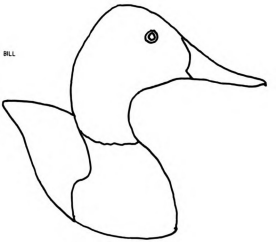

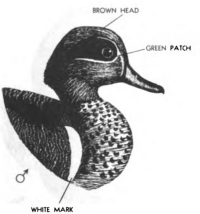

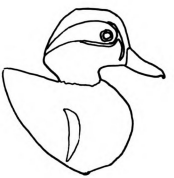

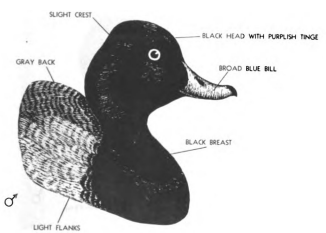

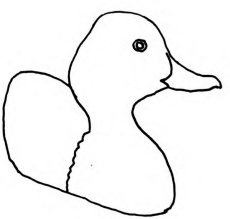

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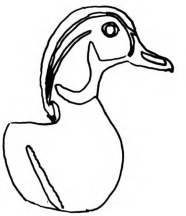

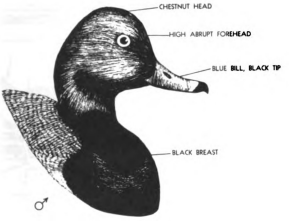

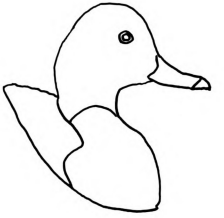

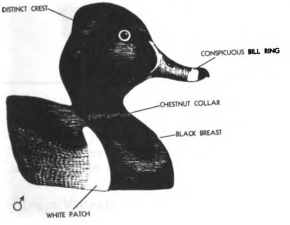

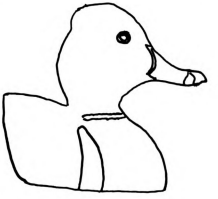

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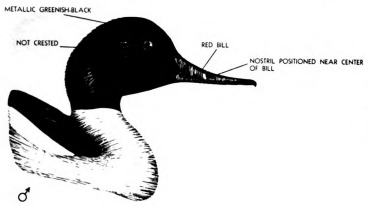

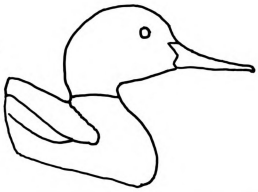

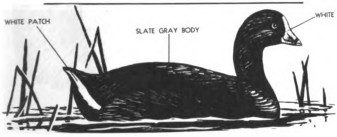

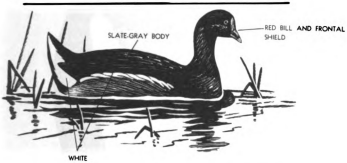

Directions: Place the name of the group to which the bird belongs under the picture on the left and the common name of the bird under the picture on the right. example: geese Blue Goose Color in the birds on the right according to their natural coloration.

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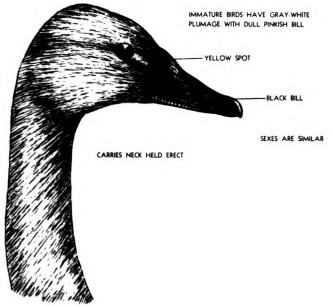

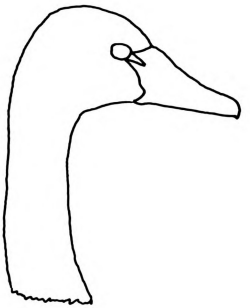

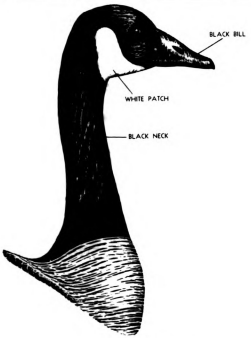

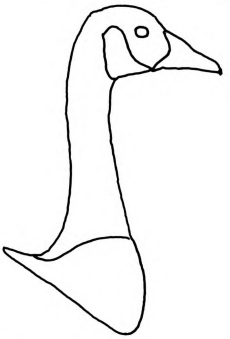

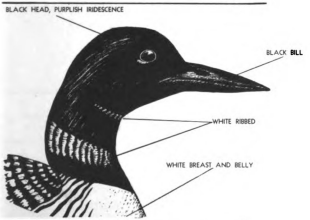

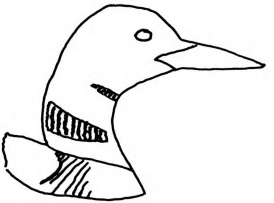

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O-2753-5

FOR THE TEACHER

Instructions for using the tree plates

The four pages of tree leaves and their fruits are examples of common trees in Michigan which are useful to man and animals alike.

One of the common means of identifying trees is by the shape of the leaf. By studying the examples of leaves and fruits shown and comparing them with the trees shown in the references provided, the student should be able to properly identify the trees.

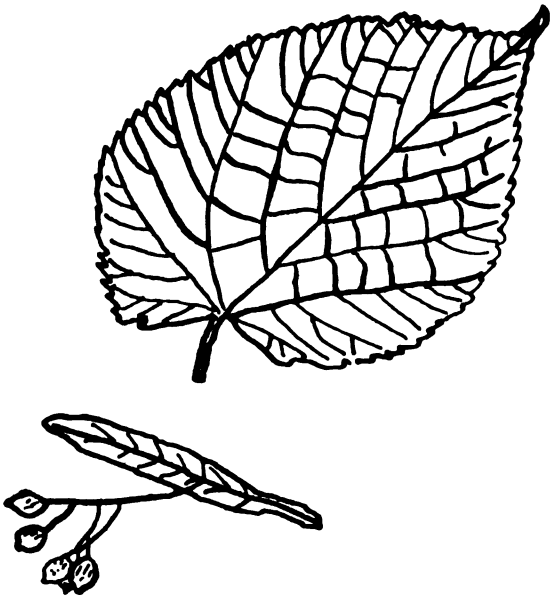
It is good when a student can identify a tree but still better if he knows something of its value to man and animals. For this reason, the exercise calls for two examples of what the tree is used for and two examples of animals which receive food from the tree. In certain instances any given animal may secure food from more than one of the trees shown. This information may be obtained by the student when he reads about the trees in the references provided.

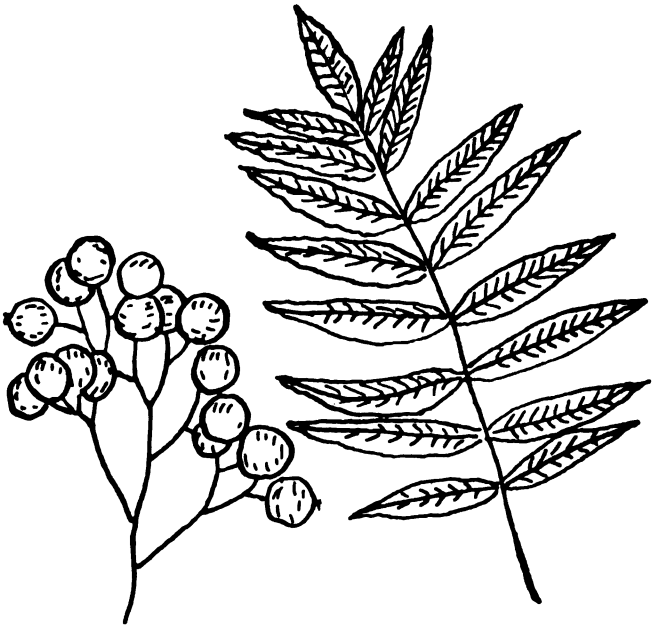
It is very likely that the students will gain additional information and appreciation concerning trees while they are seeking the specific answers.

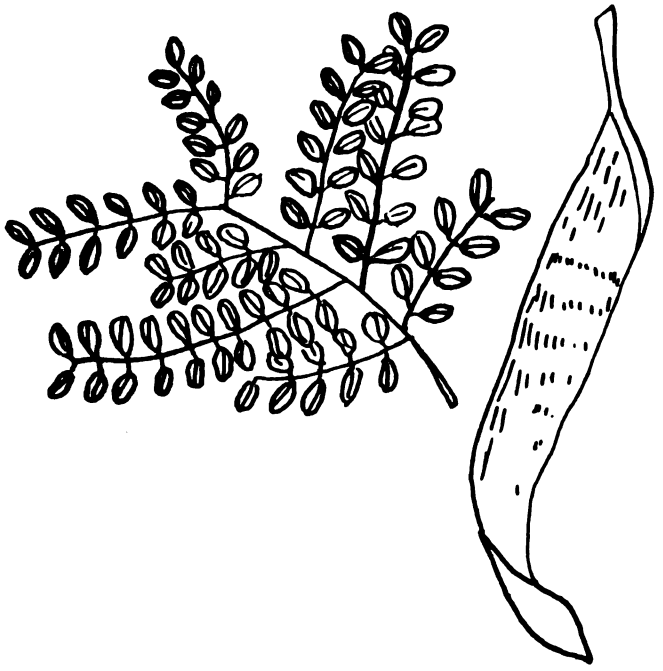
References provided to aid in tree study:

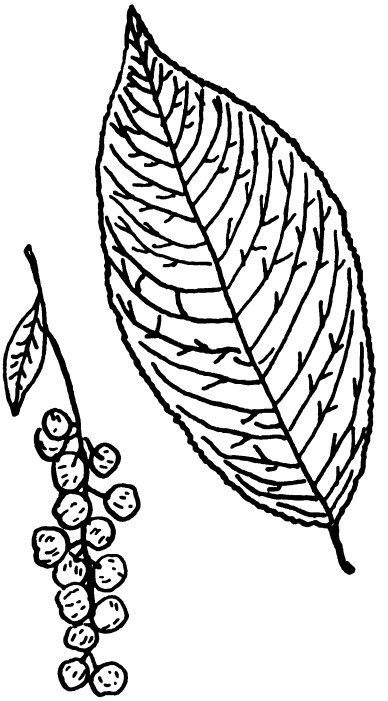
1. Michigan Trees Worth Knowing. Pub. by Michigan Department of Conservation. Cost 30¢
2. Golden Nature Guide.

SOME COMMON TREES AND THEIR USES

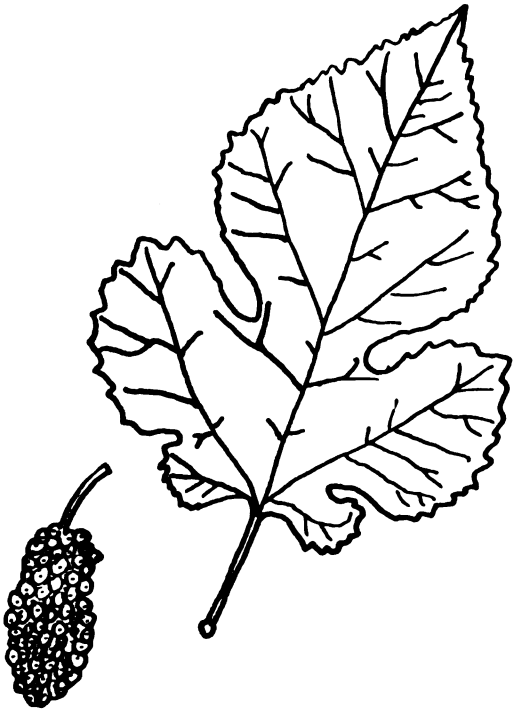


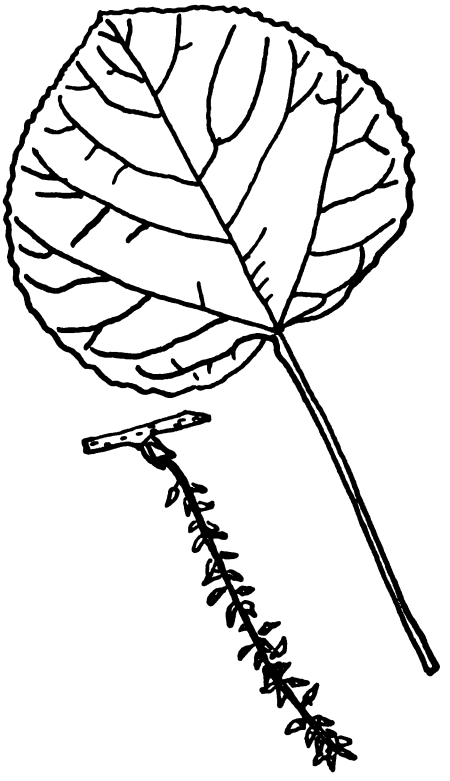


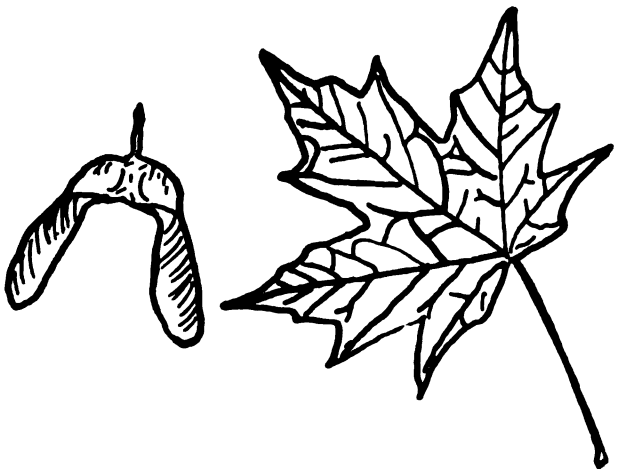


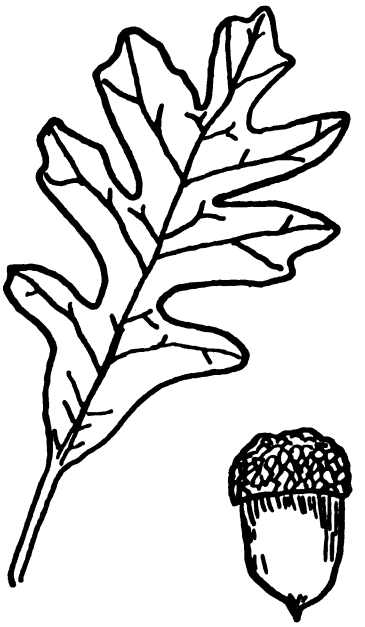


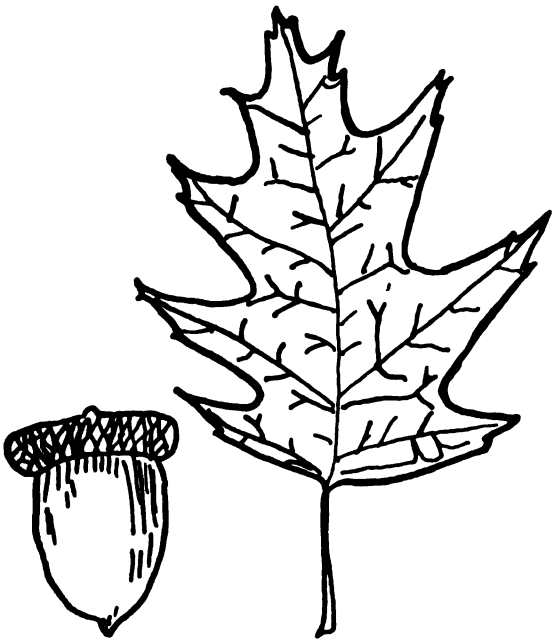
Directions: In each of the above examples there is shown one or more leaves of a common Michigan tree and the fruit of that tree. On the first line below the picture write the common name of the tree from which the leaf and fruit come. On the second line give two examples of what the tree or its parts can be used for. On the third line give two examples of animals which use some part of this tree for food.











THINGS TO DO WHEN STUDYING THE NATURAL RESOURCES CHART

A. Good Use

1. Talk about natural resources with the teacher.
2. Study the part of the chart which shows good land use. List the numbers which have to do with tree conservation.
3. List the numbers which have to do with soil conservation.
4. List the numbers which have to do with conservation of fish and wildlife.
5. List the numbers which have to do with conservation of water.
6. Many of these practices will be found in the area of the sanctuary. After you have been to the sanctuary, make a list of those you saw in the area.

B. Misuse

1. Study the part of the chart showing misuse of the land. Tell why you think each example of misuse is harmful.
2. What is your responsibility in keeping our country from looking like this area?

FOR THE TEACHER -- SUGGESTIONS FOR USE OF THE NATURAL RESOURCES CHART.

Read these information sheets. They should serve as a guide to pointing out good and bad use of the land as illustrated by the chart.

ADDITIONAL EXPLANATIONS OF THE LEGEND SHOWN ON THE NATURAL RESOURCES CHART.

Good Use

1. Fire protection--During the dry season look out men keep watch on the acreage assigned to them to detect rising smoke. If further inspection reveals a forest fire, men and equipment are immediately sent to put it out.

2. Watershed Protection--Water runs to the rivers and lakes from the higher elevations. The combined hills which provide this water are termed the watershed. Trees, shrubs and grasses help reduce the rapid run-off of water from these areas. Protecting these plants against destruction is actually protecting the watershed.

3. Good forestry--Selective cutting is shown in this area. Trees that have reached adequate growth are cut out, leaving room for younger trees.

4. Fenced woodlot--This woodlot has been fenced in so that cattle may not graze in it. Farm animals in a woodlot destroy the young trees, injure roots of older trees and make paths that serve as paths for water as well as animals. Thus encouraging gulley erosion in the woodlot.

5. Fencerow cover--When the farmer does not mow or cultivate close to the fence but allows weeds and small shrubs to grow along the fencerow, the animals may receive food and shelter (cover) in these areas.

6. Farm pond--Farm ponds are good on most any farm. Farm animals may obtain water here, fish may be stocked for fishing, wild animals may find water to drink and habitat here. Scenic beauty is also added to the farm.

7. Gully cover--Growing grasses and shrubs or trees in a gully prevents further erosion and provides food and shelter for wildlife.

8. Contour farming--Plowing, cultivating and planting around the slope often referred to as on the level, instead of up and down, reduces water run-off and soil loss.

9. Watershed reservoirs for town--Because of good cover on the land the water runs off slowly and constantly or percolates into the ground and can be stored in ample supply for the town's needs.

10. Public fishing--Good clean waters may be used for producing good game fish. Many other uses can be made of clean bodies of water. What are they?

11. Wildlife marsh--Shallow waters if not polluted are good habitats for wildlife such as the muskrat, ducks, geese and various song birds.

12. Clear stream--Cover on the land and protection from pollution keeps this stream clear and useful to man and animals.

13. Stream bank deflectors--Stones and logs may be used to protect the banks from eroding but do increase the speed of stream flow at that point. Rapid flow increases the oxygen content and serves other functions which attract trout.

14. V-dam--Increases the speed of flow, thus increasing the oxygen content and attracting trout. Also directs main stream of flow to any desired point or course.

15. Stream bank cover--This protects the banks from erosion and provides shade to keep water cooler.

16. Good farm with pond--Wise use and planned management of the soil, water, forests and wildlife on a farm result in a productive and beautiful farm.

17. Reforestation on steep slope--Some slopes are too steep for field crops so serve best for permanent forest type cover. Lumber may be harvested from this and wildlife find shelter here. Trees protect soil and conserve water.

18. Public beach, bath houses and parking lot--At this point the stream has been dammed up to produce a small lake. Its proximity to the town makes it a good area to use for this purpose. Good land use for recreation.

19. Sewage treatment plant--This illustrates the right way to deal with sewage materials that will eventually make their way into the stream. The release of untreated sewage into rivers and streams produces pollution with all associated problems.

20. Industrial waste purification--Treatment of industrial waste renders them less harmful so that they cannot pollute the rivers and streams so readily.

21. Clean river and bank cover--The clean river below the city is unusual and is a credit to the city's good conservation practices. The bank cover serves to prevent bank erosion and crumbling.

22. Strip farming--This allows for planting crops which would not otherwise be grown on a slope. The short distance between strips prohibits the fast flow of water (makes running water walk). The cover strips catch any small amount of soil which might run off.

23. Fishing in river--Good clean game fish may be caught here because the river is clear and as a result has a good food chain developed of which the fish are a part.

24. Wildlife food and cover--Cover near the fields of grain allows the animals a chance to get their fair share of grain thus producing a good hunting crop.

25. Woodlot with wildlife openings--The openings provide for growth of shrubs with tender shoots for wildlife food, grasses for grazing of deer, shrubs with berries, etc.

26. Herd of healthy deer--This habitat provides ample food and cover for the development of a healthy deer herd.

27. Deer hunting--Part of the wise use of natural resources involves harvesting the surplus animals which might otherwise overpopulate the area.

28. Good crops--This piece of land is fertile enough and level enough for growth of a grain crop.

29. Marsh area on lake--Such an area provides habitat for aquatic insects, frogs, reptiles and such small animals which contribute to the food chain of the lake.

30. Woodduck nest box--Woodducks naturally nest in a cavity in a hollow tree. Where this type of situation is not present it is a good thing to provide nest boxes which substitute very nicely for the hollow tree.

31. Clear lake--The lake is clear because the banks are not being eroded and the stream emptying into the lake is clear water.

32. Lake fishing for game fish--Unpolluted waters provide habitats for game fish. Fishing provides good recreation and food for the table.

33. Game plentiful--Small game abounds in regions where adequate food, water, shelter and cover protection are found.

34. Adequate harvest of game--Harvest of surplus game is good conservation and provides recreation and food for the sportsman.

35. Grass sod--No erosion--Continuous cover on the land is one of the most effective ways of reducing erosion.

36. Cottontail at woodchuck hole--Rabbits utilize abandoned woodchuck holes for daytime cover.

Misuse

A. Burned over forests--In areas where there has been inadequate fire protection and conservation education, burned over forests may be the result.

B. Clearcut forests (poor forestry)--This type of lumbering leaves no vegetation for existing wildlife and does not provide parent trees for re-seeding of the cut-over areas.

C. Hillside erosion--No cover in gullies and exposed soil allows rapid run-off of water which soon causes much erosion.

D. Grazed woodlot--Grazing animals kill off young plants which might otherwise replace old and dying trees. (See Number 4)

E. Plow furrows with the slope--These furrows are small man made gullies which allow water to run off too rapidly and carry soil with it.

F. No cover along stream--Lack of cover allows stream banks to erode rapidly and provides no attraction for wildlife. (See Number 15)

G. Poor orchard--Run down uncared for orchards become habitat for insects and disease which infect neighboring orchards.

H. Poor farm--There is usually reason for a run down farm incapable of significant production. What is probably the reason here?

I. Sewage emptying into stream--Sewage builds up heavy bacterial growth reducing the oxygen content for useful aquatic plants and animals. Pollution also renders the water useless for bathing, city water supply, and various forms of recreation.

J. Unfenced pond and no bank cover--Cattle wade in water causing pollution and muddying. Banks erode because of paths and weight of animals filling pond with sediment.

K. Domestic pollution--Same as I.

L. Industrial pollution--Chemicals and other industrial wastes poison aquatic animals and hinder growth of aquatic plants. (See I above)

M. Town dump on river bank--This produces an eye sore for the community and will likely also produce river pollution.

N. Poor agricultural practices--No fence row cover (See Number 5)

O. Abandoned farm--The land left in poor condition may continued to undergo erosion until the land reaches a point at which it is quite difficult to reclaim.

P. Trash along road--Mosquitoes breed in partly filled tin cans and the trash is an ugly mark on the landscape.

Q. Muddy, polluted river--This is the natural result of eroded hills and fields. The water emptying into the river carries much mud and silt.

R. No roadside cover--River banks erode and wildlife do not have cover.

S. Bare gully--The gully will continue to erode producing an irreparable ravine.

T. Bare fencerow--No wildlife will be found around these fields since there is no cover for them when fields are mowed.

U. Eroded stream bank--Meandering streams cut into uncovered banks undercutting and eroding them.

V. Eroded hill--Hills left unprotected by cover crops soon erode due to the unchecked flow of water.

W. Small game scarce--Wild game will not frequent uncovered land and polluted water.

X. Carp from muddy lake--Carp are scavengers and can live off waste products found in muddy and polluted waters.

Y. Erosion--Same as V.

Z. Eroded leeched land does not have proper mineral content to produce good crops. Obviously it becomes difficult if not impossible to operate machinery on such land.

AA. No woodchucks or burrows for cottontails--Woodchucks will not be found here because adequate food and cover are lacking.

NATURAL RESOURCES

GOOD USE

1 Fire protection
2 Watershed protection
3 Good forestry
4 Fenced woodlot
5 Fencerow cover
6 Farm pond
7 Gully cover
8 Contour farming
9 Watershed reservoir for town
10 Public fishing
11 Wildlife marsh
12 Clear stream
13 Stream bank deflectors
14 V-dam
15 Stream bank cover
16 Good farm with pond
17 Reforestation on steep slope
18 Public beach, bath houses, and parking lot
19 Sewage treatment plant
20 Industrial waste purification
21 Clean river and bank cover
22 Strip farming
23 Fishing in river
24 Wildlife food and cover
25 Woodlot with wildlife openings
26 Herd of healthy deer
27 Deer hunting
28 Good crops
29 Marsh area on lake
30 Woodduck nest box
31 Clear lake
32 Lake fishing for game fish
33 Game plentiful
34 Adequate harvest of game
35 Grass sod—no erosion
36 Cottontail at woodchuck hole

MISUSE

A Burned over forests
B Clearcut forests (poor forestry)
C Hill erosion, No cover in gullies
D Grazed woodlot
E Plow furrows with slope
F No cover along stream
G Poor orchard
H Poor farm
I Sewage emptying into stream
J Unfenced pond, no bank cover
K Domestic pollution
L Industrial pollution
M Town dump on river bank
N Poor agricultural practices—no fence row cover
O Abandoned farm
P Trash along road
Q Muddy, polluted river
R No roadside cover
S Bare gully
T Bare fencerow
U Eroded stream bank
V Eroded hill
W Few, small deer
X Small game scarce
Y Carp from Muddy lake
Z Erosion
(AA) Poor crops
(BB) No woodchucks—no burrows for cottontails

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O-2766

APPENDIX E

A TEST OVER YOUR TRIP TO THE KELLOGG BIRD SANCTUARY

Answer true or false

WATERFOWL

1. Full grown geese are bigger than full grown swans. _____
2. There are many different kinds of ducks at the sanctuary. _____
3. Ducks can not eat while in the water. _____
4. Waterfowl can not walk on dry land. _____
5. Waterfowl are always banded only on the leg. _____
6. Swans can always be recognized because they are always white. _____
7. Migration means to fly from one place to another. _____
8. All ducks feed mainly on grain. _____
9. The ducks and geese never leave the sanctuary. _____
10. Birds of prey is another name for waterfowl. _____

SOME OTHER BIRDS

11. The hawk's beak and feet help it to catch and hold small birds and other animals. _____
12. The agle is bigger than the osprey. _____
13. The peacock is not a native of Michigan. _____
14. Pheasants are found in the wild in Michigan. _____
15. All pheasants seen in the pens are found in the fields of Michigan _____

SOME OTHER ANIMALS

16. The deer at the sanctuary are in a place that is very much like the kinds of places that wild deer live in. _____
17. All the deer we saw are buck deer. _____
18. The tail of the deer is white on top. _____
19. Deer have no way of protecting themselves. _____
20. The animal with a black mask on his face and rings on his tail is the coyote. _____
21. A fox would be more likely to attack a pheasant than it would a deer. _____
22. The raccoon is an animal that very often attacks man and large animals. _____
23. Squirrels are gray and brown but never any other color. _____
24. Squirrels sometimes live in hollow trees. _____
25. Squirrels are very fond of fresh meat. _____
26. Skunks are all black in color. _____
27. Skunks can be kept in pens and fixed so that they can not give off their "perfume". _____
28. Skunks fur looks like it might make a nice coat. _____

"HOMER THE SANDHILL CRANE"

29. The beak or bill of the sandhill crane has two small holes near the very end. _____
30. "Homer" is a small bird. _____
31. The sandhill crane lives in low wet areas. _____

TREES

32. Red pine and red oak trees have red leaves. _____
33. Pine trees never lose their leaves. _____
34. Oak trees lose their leaves in the spring of the year. _____
35. Some trees have seeds in nuts, some have seeds in berries. _____
36. There are many evergreen trees at the bird sanctuary. _____
37. All evergreen trees have needles at least three inches long. _____

WHAT I THINK ABOUT THE SANCTUARY

38. A sanctuary is another name for a zoo. _____
39. Animals at the sanctuary are fed here because they could not find food any place else. _____
40. Many birds and other animals are studied at the sanctuary only because it is fun. _____
41. If we learn more about birds and animals we can help them live better in the wild. _____
42. A sanctuary is a better place for picnics than for a place of study. _____
43. A better use of a sanctuary is to make it a place to study birds, plants, and other animals. _____
44. Sanctuaries would be fun if we didn't have to learn about the animals. _____
45. All animals in a sanctuary should be in cages. _____
46. The peacock does not belong in a sanctuary of Michigan birds. _____
47. Deer do not belong in a Michigan wildlife sanctuary. _____
48. Many of the ducks at the sanctuary come there of their own accord. _____
49. I can learn everything at the sanctuary in about an hour. _____
50. If I walk quietly at the sanctuary I might learn more about the wild life in the bushes and trees. _____

APPENDIX F

Materials Used In the Compilation of This Unit Are From the Following Sources

A Field Guide to The Birds, by Roger Tory Peterson.

Ducks, Geese, and Swans of North America, by Francis H. Kortright.

Fundamentals of Ornithology, by Josselyn VanTyne and Andrew J. Barger.

Hammond's Nature Atlas of America, by E. L. Jordan.

Invitation to Birds, by Virginia S. Eifert.

Michigan Waterfowl Identification Guide, published by the Mississipi Flyway Council.

Michigan Waterfowl Management, by Miles D. Pirnie.

Michigan Wildlife Sketches, published by the Michigan Department of Conservation.

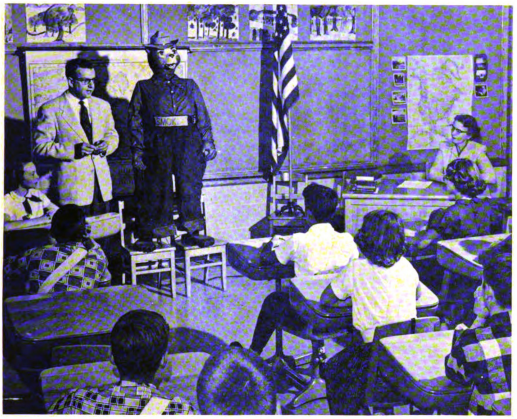
Michigan Game Law Digests, 1955-1960.

Migration of Birds, Circular 16, Fish and Wildlife Service.

The Nature Library-Game Birds, by Neltje Blanchan.

World Book Encyclopedia, Vols, B.D.G.S.

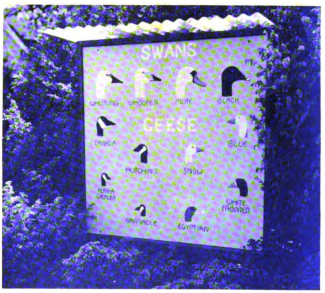
CONSERVATION



IN SCHOOL

AND AT

KELLOGG BIRD SANCTUARY



The following material has been prepared as part of a doctoral study of "educational potentials" at the Kellogg Bird Sanctuary. The results of this study should indicate how services might be profitably expanded to the public schools and other groups visiting the bird sanctuary.

This is the third portion of the study. The first, a unit entitled "Studies of Some Michigan Mammals, Waterfowl, Trees and Conservation Practices", is of a general nature and seeks to orient the teacher and student to the plant and animal life at the Sanctuary. The second, a tour guide, shows where the animals and exhibits are located. Questions and information which should help the child to observe more carefully have been incorporated.

The unit at hand is of a more specific nature and seeks to acquaint the student in more detail with the appearance and life habits of many types of native animals at the Sanctuary. It is hoped that through an understanding of living organisms the child may be able to identify and associate conservation understandings with the living things he has been studying.

This booklet is designed for the teachers use and contains information on how to direct the students in preparation of their own pre-trip study book. There is little question that if the student works on the preparation of his own booklet and does some pre-trip research, he will gain considerably more from the trip. At the end of this report will be found a list of books and films which may be helpful in this study. These may be obtained by writing to the addresses given. In order for the

student to profit from this study his answers should be based on reading research, rather than trying to answer the questions superficially.

When a group visits the Sanctuary they should bring their booklets with them. Mr. VanDeusen, the director of Kellogg Bird Sanctuary, will greet the group and orient them, explaining the history, purpose, and function of the Sanctuary. He will also give instruction on how to tour the grounds and gain additional knowledge concerning the things the students have been studying.

The class may be instructed to locate each animal at the Sanctuary that is portrayed in their booklet. The teacher may wish to suggest that the student make brief notes on the back of each page concerning additional information he may gain about the organisms at the Sanctuary. Included in this may be such things as activities of the animal, additional descriptive notes regarding color, size, shape of beaks, feet, etc.

This unit is concerned with the bird and mammal life at the Sanctuary which is native to Michigan and which is easily observable. It is also concerned with how these animals in this unique setting may be used to teach conservation. These animals may be separated into four groups. WATERFOWL - LARGE BIRDS OF PREY - SMALL BIRDS OF PREY - MAMMALS. In addition there are many small wild birds in the trees and bushes at the Sanctuary and a careful watcher and listener may be rewarded by hearing and seeing some of them as he walks through the Sanctuary.

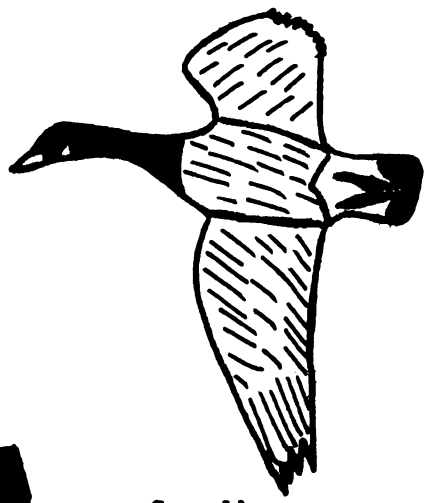
There is much to learn about these animals. On the pages that follow are sketches of many of the living things at the Sanctuary. Questions and informational material accompany the pictures. If the student applies himself to finding out the answers to these questions he will learn much about the animals habitat, food, enemies, range, value to mankind, place in nature, etc.

The teacher may easily reproduce this booklet, or any part of it, for her students use. The following simple directions may be of value:

Place the page over a ditto sheet and draw over the sketch with a ballpoint pen. The questions and informational statements may then be typed on the ditto. The teacher may use her own judgment as to how much of the information and questions she wishes to reproduce for her group. The teacher may wish to have the children design and make their own cover as part of their art work.

In addition to these study pages there are general and specific informational items for the teacher. The general information concerns the organisms in relation to other animals, plants, and man and emphasizes conservation understandings in relation to the animals. The specific information provides the teacher with the answers to the questions which have been given to the student for his investigation. This information for the teacher is included to assist the teacher in carrying out this study with the class.

GEESE



Canadian goose

Snow goose

Blue goose

Things to Know and Understand

About forty different kinds of geese live in different parts of the world.

Thirteen kinds of wild geese live in the United States and Canada.

Eight different kinds of geese may be found at the Kellogg Bird Sanctuary.

Some of the geese have had one wing pinioned so that they will not fly away from the area.

During migration time in the spring and fall, large numbers of wild geese stop at the Sanctuary.

The three types of geese shown above are easily observed at the Sanctuary.

At the end of this section on geese you will find sketches of all the native geese which are to be seen at the Kellogg Bird Sanctuary. In addition to those already mentioned, these are: Hutchins goose, Alaska cackler, Barnacle goose, and the White-fronted goose. You will want to read about the habits of each of these birds, possibly what migration routes they take, where they spend the summer and winter, what they eat, who are their enemies and other interesting facts about them.

All birds are best identified by color, size and markings. Notice how the geese mentioned above differ in markings.

Study the markings so that you can easily recognize these geese at the Kellogg Bird Sanctuary.

Investigations for the Student.

1. Observe the sketch in the upper left corner of the preceding page. If you were to see these geese flying in this manner over your home, what would you say is taking place?
2. How far north and south do Canadian geese fly in summer and winter respectively?
3. What kind of sounds do geese make while flying high in the air?
4. What reasons can you give for geese migrating?
5. How would you describe the natural habitat or living area of the wild goose?
6. Which one of the tree geese shown in the preceding pictures are most abundant in Michigan during hunting season?
7. Find out the kinds of food that geese eat and list them here.

8. Try to find out how old geese may get. It may surprise you.
9. Have you ever seen a wild Canadian goose? If so, where? How did you know it was a Canadian goose?

A Birds Eye View of Waterfowl (Supplementary help for the Teacher)

The term waterfowl may be applied to swimming game birds as distinguished from upland game birds and shore birds. Nearly two dozen kinds of ducks, three species of geese and one swan migrate through the Great Lakes region. They are: Whistling Swan--Canada Goose, Blue Goose, Snow Goose--Mallard, Black, Bluewinged Teal, Greenwinged Teal, Pintail, Baldpate, Shoveller, Gadwell, Wood Duck, Redhead, Canvasback, Ring-necked, Scaup Duck, American Goldeneye, Bufflehead, Ruddy Duck, White-winged scoter, King Eider, Mergansers.

Waterfowl are a migratory bird and thus are in the northern states only during the warmer months of the year. The most obvious reason for waterfowl migration is that their habitat is so severely changed by the winter that they must move elsewhere to obtain food and be on water, two things which make up a very important part of their habitat.

During migration periods great quantities of waterfowl accumulate in selected and well known water areas. Because of this, they become easy prey of the hunter, and for this reason hunting laws are rigidly enforced to limit the hunters kill to what is termed the annual harvest or surplus of the flocks. Killing only the annual surplus in relation to food and habitat available for the flock is considered good management or conservation.

The numbers of migratory waterfowl have fluctuated greatly with the spread of population. Many factors have a bearing on this. Some of these factors are draining of ponds and swamps, unrestricted hunting, pollution of lakes, rivers, and ponds, influx of population in previously wilderness areas, and disease.

Waterfowl provides much pleasure to man. Endless hours of relaxing sport are enjoyed by hunters of ducks and geese. Many lovers of the wilderness capture waterfowl on film and carry their pleasant experiences to others via the screen.

Various measures have been taken to insure a continued adequate goose population in this country. One of these measures is the establishment of sanctuaries. These sanctuaries, such as the Kellogg Bird Sanctuary on Wintergreen Lake, seek to contribute to wise management of waterfowl. They provide security to the wild birds from gunners, pleasure boats and fishing boats. Here also there is opportunity to trap and leg band waterfowl for migratory study purposes. Attention also is given to the predators, diseases, feeding habits, and parasites of wild waterfowl. In addition the sanctuaries provide thousands of visitors the opportunity to see waterfowl at close range and appreciate the waterfowl and to learn about good conservation and management practices.

Answers to Student Questions.

Canadian Goose - called also Gray Goose, Honker

1. A flying wedge of Canadian geese is a flock moving south for the winter or going north for the summer.

2. The range of the Canadian goose is North America at large. It nests in northern parts of the United States and in the British possessions; winters southward to Mexico.
3. In spite of their great height, one can still hear the loud mellow honk of the Canadian goose.
4. Various theories have been advanced regarding bird migration. None of them have had convincing proof. The most obvious reason for migration seems to be that the approach of cold weather brings with it a loss of food supply and open water so necessary for the survival of the flock. Yet migration, in the case of many species of birds, starts long before a critical date arrives--so we still lack valid answers.
5. Wild geese seek out secluded marshes, lakes, streams and ponds of the northern parts of the United States and Canada. Here, far from the habitations of man, the goose lays her 4 or 5 pale buff eggs in a mass of sticks lined with grass and feathers and sits very closely while the gander keeps guard near by.
6. The Canadian goose is the only species of goose which is sufficiently abundant to be hunted in Michigan.
7. The foods of many waterfowl are much the same. The following is a list of some of the things consumed by geese.

   Aquatic plants

   a. Eel-grass
   b. Sedges
   c. Roots of many kinds of aquatic plants
      1. Pond weed

2. Grasses

3. Sedges

d. Insects

e. Small fish

f. Aquatic larvae

g. Snails

h. Small mollusks

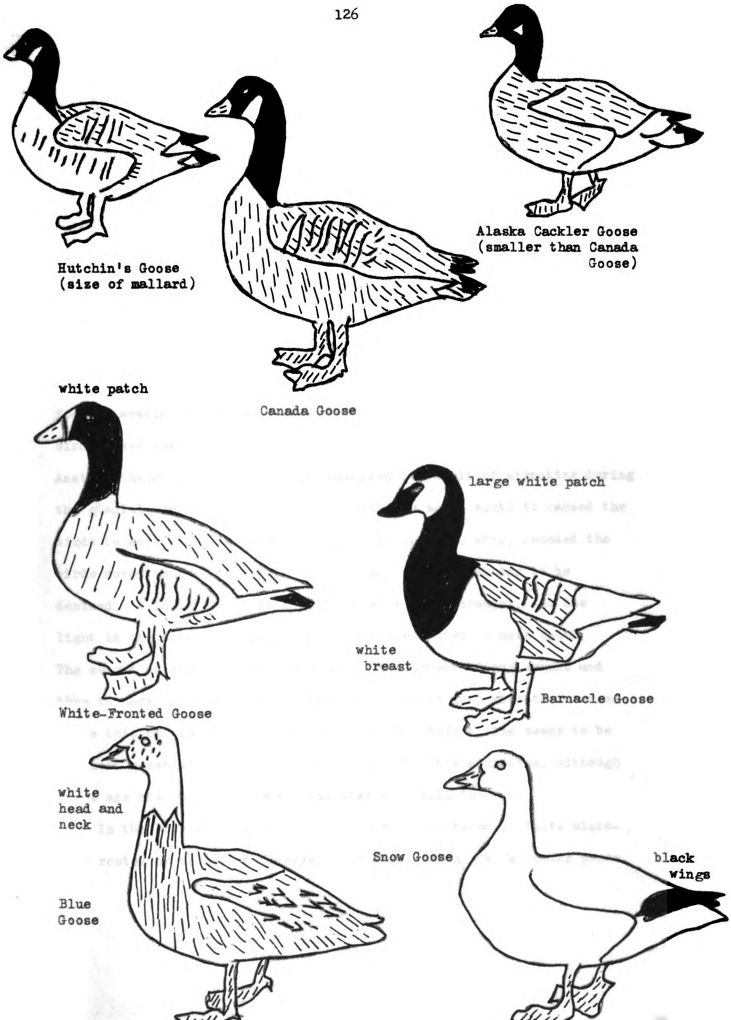
i. Wheat, corn, oats

j. Grasses and leaf buds

k. Gravel to aid in the digestion process

8. Geese are long lived, sometimes reaching the age of 65 in captivity.

9. Canadian geese may be readily identified by their black head and neck with the white throat band which extends up both sides of the head.


Hutchin's Goose
(size of mallard)
Canada Goose
Alaska Cackler Goose
(smaller than Canada
Goose)
white patch
White-Fronted Goose
large white patch
white
breast
Barnacle Goose
white
head and
neck
Blue
Goose
Snow Goose
black
wings

BIRD MIGRATION

Most people are aware of the fact that many birds migrate in the spring and fall to a different climate. The subject of migration has for many years been somewhat of a mystery. Scientists know where birds migrate, and how they migrate, but they are not exactly sure of why birds migrate. Many theories have been advanced as to why birds migrate. One theory states that birds migrate because their food supply becomes limited due to climatic changes, and thus they must move to areas where food is available. This is partly questionable, however, since some birds leave their area long before their food supply becomes diminished. Another theory states that birds developed the habit of migrating during the glacial ages. As the cold, ice, and snow moved south it caused the birds to move south in search of food. As the ice, etc., receded the birds moved back north. This theory also leaves something to be desired. A third theory is associated with light changes. As the light in the north decreases the birds are agitated to move south. The amount of light is associated with development of sex organs and thus to carry on their life activities the birds must migrate to areas where this can be accomplished. This at the present time seems to be the most reasonable theory or explanation for bird migration, although there are also some problems associated with this theory.

In the course of migration birds have established definite migratory routes or so-called flyways. The drawings on the following pages

show the four principal flyways as determined by studies carried out by ornithologists. Inasmuch as we are primarily concerned with waterfowl migration in this unit, examples of the kind of waterfowl using these flyways are shown on the sketches. Some species of waterfowl may be found in two or more of the flyways since nesting grounds of a species may be in several places.

THE ATLANTIC FLYWAY

1. Canada Cackler Goose
2. Snow Goose
3. Redhead Duck
4. Canvasback Duck
5. Canada Goose
6. Black Duck
7. Wood Duck
8. Wood Duck
9. Black Duck
10. Canvasback Duck
11. Redhead Duck

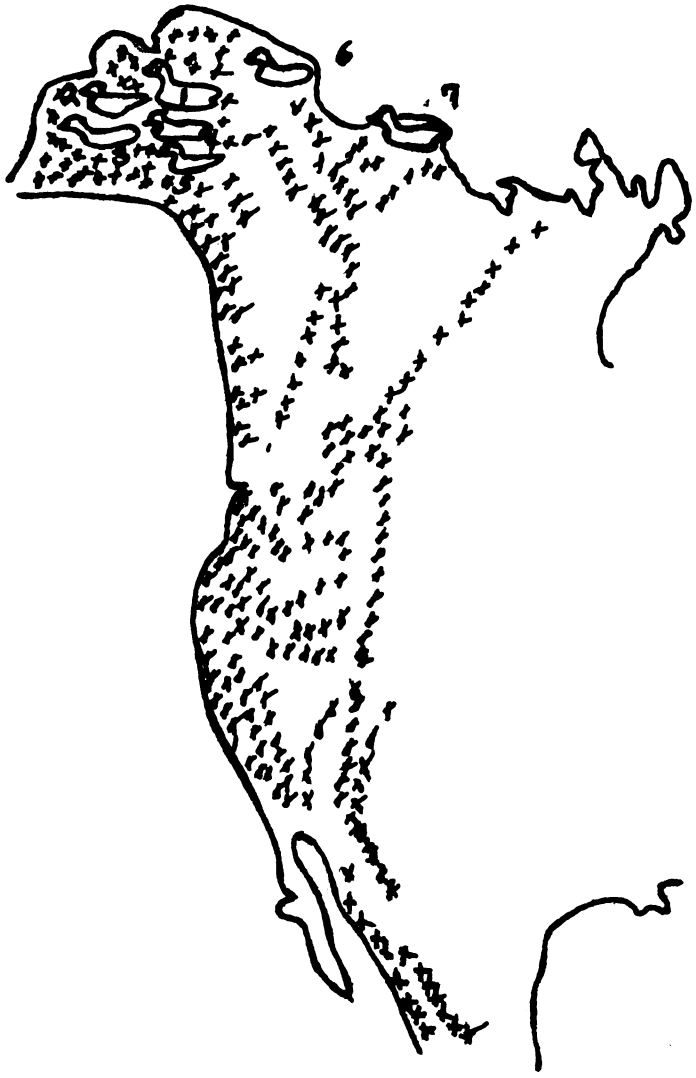
THE CENTRAL FLYWAY

1. White-Fronted Goose
2. American Pintail Duck
3. Mallard Duck
4. Canada Goose
5. Redhead Duck
6. Shoveller Duck
7. Canada Goose
8. White-Fronted Goose

THE MISSISSIPPI FLYWAY

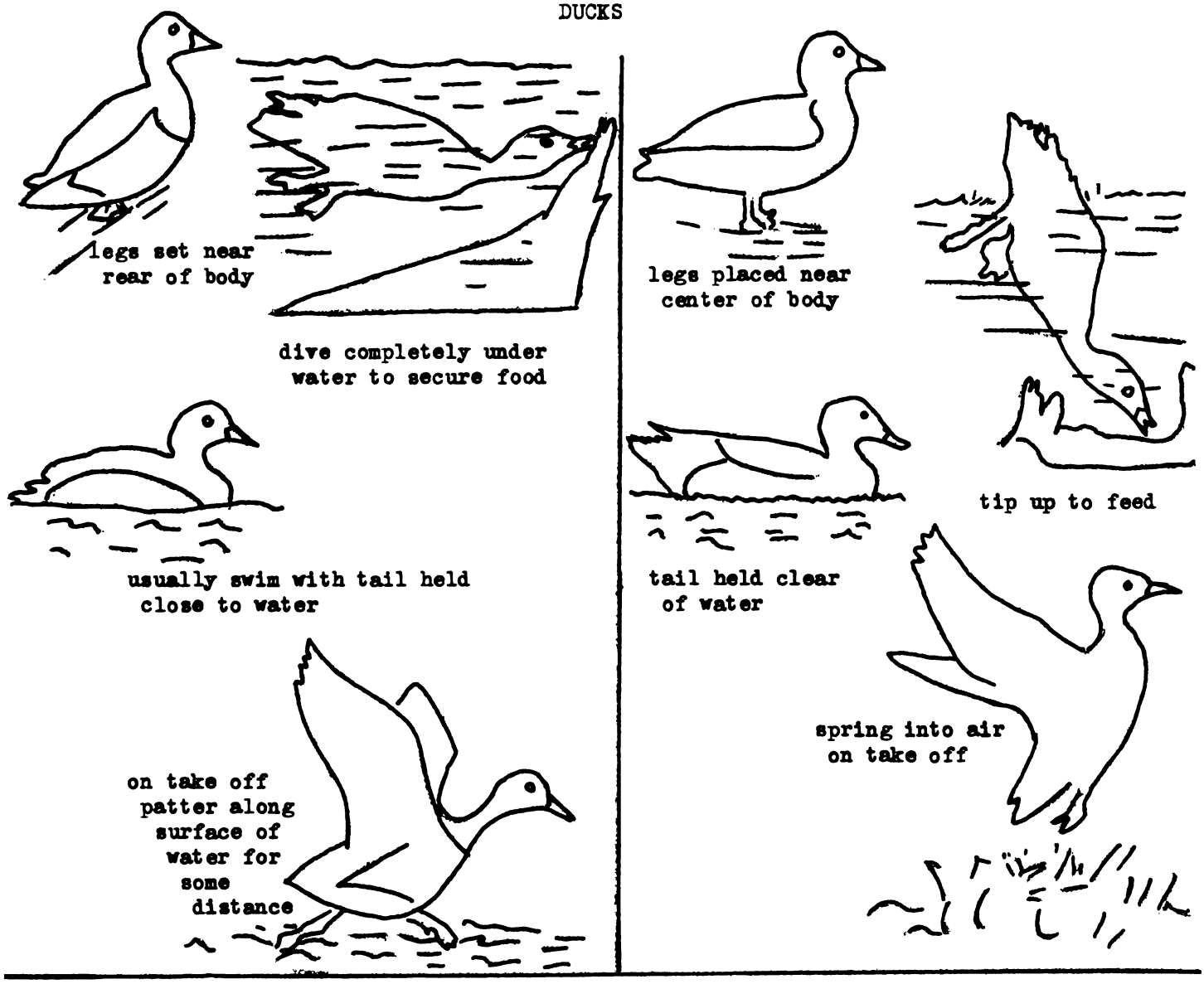
1. Blue Goose
2. American Pintail Duck
3. Redhead Duck
4. Canvasback Duck
5. Canada Goose
6. Blue-Winged Teal Duck
7. Wood Duck
8. American Pintail Duck
9. Wood Duck
10. Redhead Duck
11. Blue-Winged Teal Duck
12. Mallard Duck

THE PACIFIC FLYWAY



1. Canada Goose
2. American Pintail Duck
3. Mallard Duck
4. Baldpate Duck
5. Wood Duck
6. Canada Cackler
7. Snow Goose

DUCKS



Diving Ducks

Dabbling Ducks

Things to Know and Understand

More than forty different kinds of ducks live along the lakes and streams and in the marshes of the North American continent.

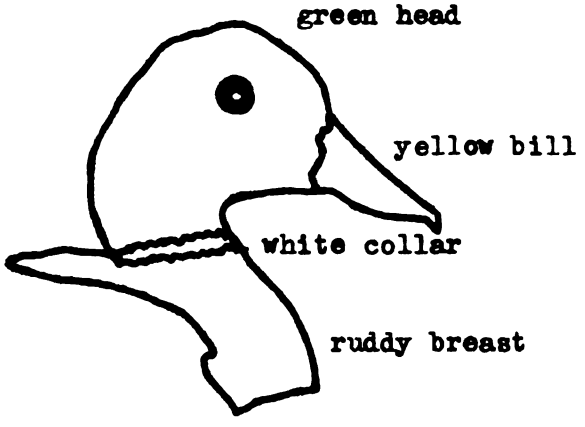
All ducks may be classified as either divers or dabblers. The distinguishing feature between the two is that one dives and completely disappears pursuing fish and other under water forms of food while the other just thrusts its head and shoulders under the water as it tips down to secure its food.

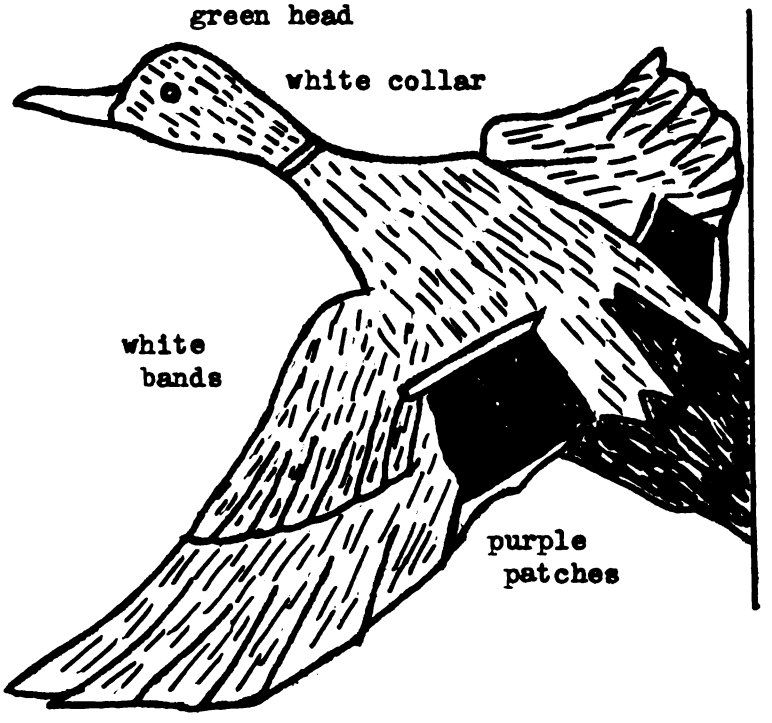
Study the drawings shown. Do you see how the habits of the ducks pictured are different?

When you visit Kellogg Bird Sanctuary look for these characteristics. Much time can be spent at the lake side observing the habits of the ducks. If you learn to observe carefully you will be on your way to becoming a junior scientist.

At least 8 different kinds of ducks frequent the water at the Kellogg Bird Sanctuary. Become familiar with the ducks on the following pages. They are some of the more easily recognized at the Sanctuary. When you visit the Sanctuary look for the following ducks: Mallard, black, pintail, redhead, canvasback, wood duck, ring-necked, and lesser scaup.

MALLARD DUCK





Things to Know and Understand

In Michigan the Mallard ranks second in abundance only to the black ducks.

The male Mallard duck is among the most beautiful of all ducks.

The female Mallard is less colorful and is quite similar in appearance to the black ducks except for a white band on the edge of the purple wing patch on the female mallard. Male and female black ducks are colored alike. Notice the distinguishing marks of the Mallard duck. Are they more outstanding than those of the black duck?

Mallard ducks may be hunted in Michigan.

Color in the duck head and shoulders on the left.

This is probably one of the first ducks you will see when you visit the bird sanctuary.

Nature Investigations for the Students

1. How does the female mallard differ in appearance from the male and female black ducks? Note the purple patches on both before you answer.

2. Is the duck a diver or a dabbler?

3. Where would you be likely to find wild Mallard ducks?

4. Is the distribution of the mallard wider than that of the Black duck in the United States?

5. List some things that are being done to conserve or manage the mallard and other ducks.

Answers to Student Questions (for the Teacher)

1. The Mallard is classed as a dabbler. It dabbles on the surface of the water for food and tips its tail upward and stretching head downward in the shallow water, probes the muddy bottom for food.
2. The Mallards food is mostly vegetable matter, consisting of pond weeds, smartweeds, bulrush seeds, duck weeds, wild celery, wild rice, sagittaria, and acorns. On the plains Mallards feed on the stubble fields of barley, wheat, and corn. They also take grasshopper, mosquito larvae and other insects in substantial quantities. The food consumed by the Mallard duck is very similar to that eaten by the black duck. When a good mouthful of food has been taken

from the muddy lake or stream bottom the bill is closed tight, thus forcing the mud and water that were taken in with the food out through the gutters along the side that act as strainers.

3. Mallard ducks may be found on small grassy ponds, slow-moving streams, sloughs, and the labyrinths of lakes and rivers that are thickly grown with wild rice and rushes.

4. The Mallard duck has a wider distribution than the black duck, being found in the whole of the Northern Hemisphere, while the black is limited more to the area East of the Mississippi.

5. a) The establishment of waterfowl sanctuaries along the migratory route of waterfowl provides the birds with protection from gunners, and from disturbance by fishing and pleasure boats.

   b) Tagging and banding of waterfowl makes it possible to study the migration patterns of waterfowl and to determine to some extent the annual kill within a species.

   c) The study of waterfowl predators, diseases, food habits, and parasites is carried out at sanctuaries to improve management policy.

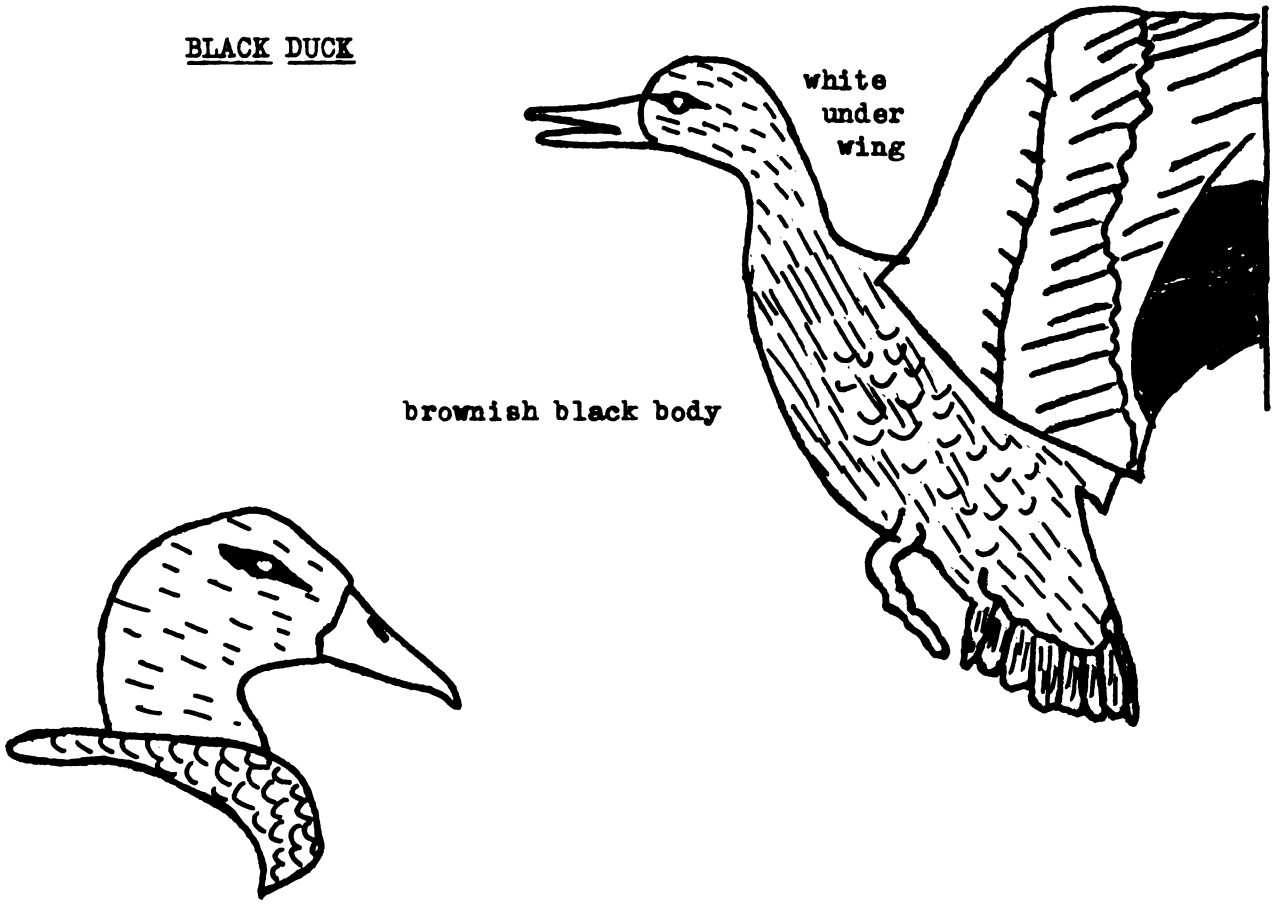
   d) Spring and fall planting of duck foods is carried out by various agencies to provide waterfowl with adequate food supplies in areas where the water may be adequate but the food supply low.

   e) Increasing the amount of habitat by flooding, damming, construction of artificial ponds, etc.

f) Control of predators by trapping.

g) Emergency feeding is carried out at sanctuaries and other areas to carry the waterfowl over critical periods.

BLACK DUCK



Things to Know and Understand

The black duck is one of the more common ducks seen and hunted in Michigan.

The male and female black ducks are practically identical.

Observe the distinguishing markings of the black ducks.

Study colored pictures of the black duck from your reference books (color in duck head and shoulder on left if you wish).

You will want to be looking for this duck when you visit the bird sanctuary.

Nature Investigations for the Students

1. Find out whether this duck is a diving duck or a dabbling duck.

2. List the kinds of food eaten by this duck.

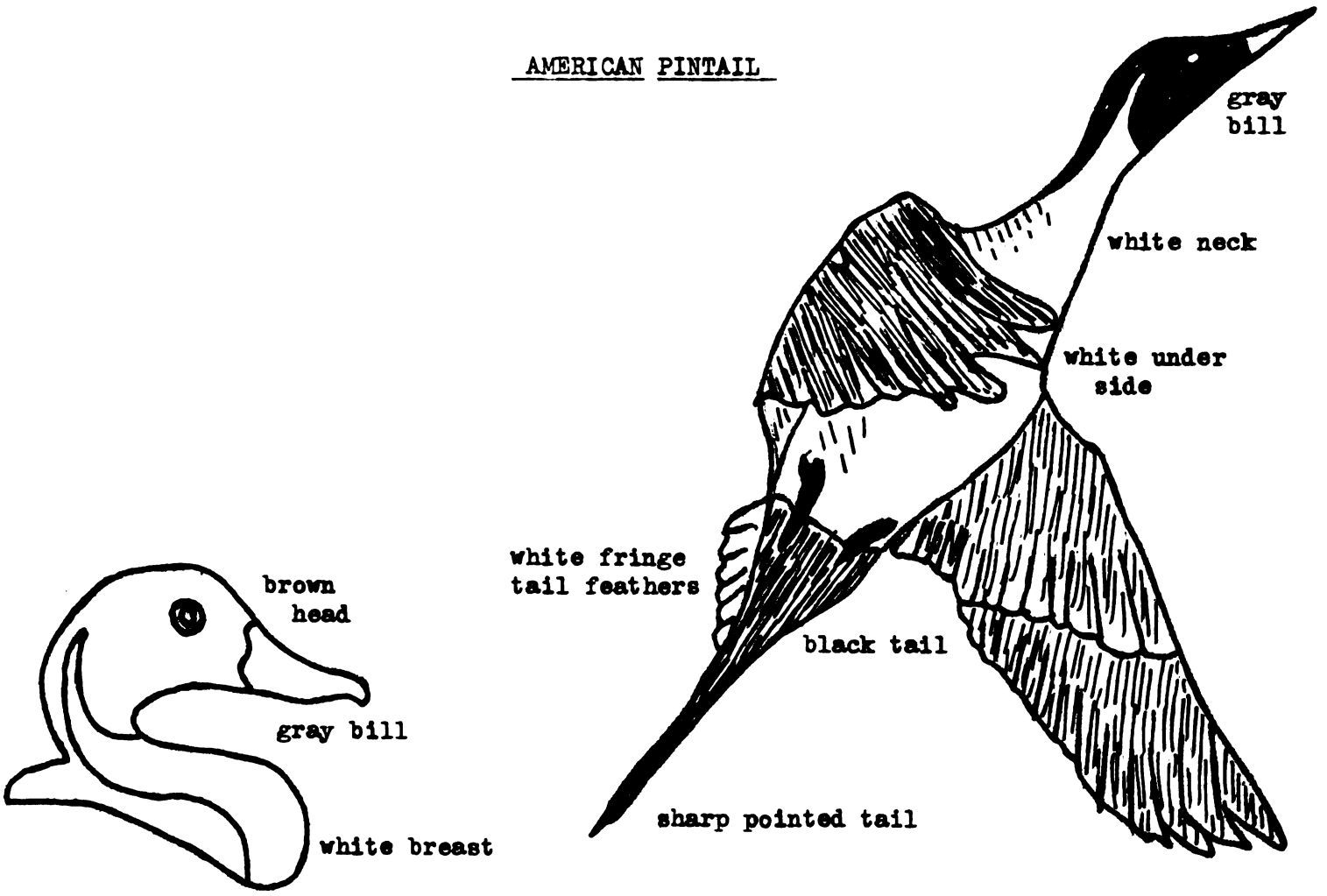
3. What is the range of this duck in the United States?

4. What can you find out about the nesting habits of this duck?

Answers to Students Questions

1. The Black duck dabbles on the surface for his food and also tips his head and neck under water in search of food.
2. The food of the black duck is mostly vegetable matter differing very little from the diet of the Mallard.
3. The black ducks breeding range is from North Carolina west to Indinia, Minnesota; north to the northern parts of Manitoba, Ontario, Quebec and Labrador. It winters from the Great Lakes to the New England states south to the Gulf coast states.
4. Colony nesting of this duck is unknown in any part of its range and seldom is more than a single nest found at a small pond or marsh.

AMERICAN PINTAIL



Things to Know and Understand

This strikingly handsome bird cannot be mistaken for any other North American duck. Its long pointed black tail, its white belly and neck, with the white extending up along the side of the head, all help to distinguish this bird from others.

The female Pintail is more subdued in color and less striking but marked much the same, being brown where the male is black.

This duck visits in northwestern states and up into arctic places such as the islands of the Bering Sea.

The Pintail spends some time in Michigan on its spring and fall migrations.

Color in the picture on the left. When you go to the bird sanctuary look for the long pointed tail and white neck of this duck.

Nature Investigations for the Students

1. Indicate whether this duck dives for his food or simply tips up putting his head underwater in search of food.

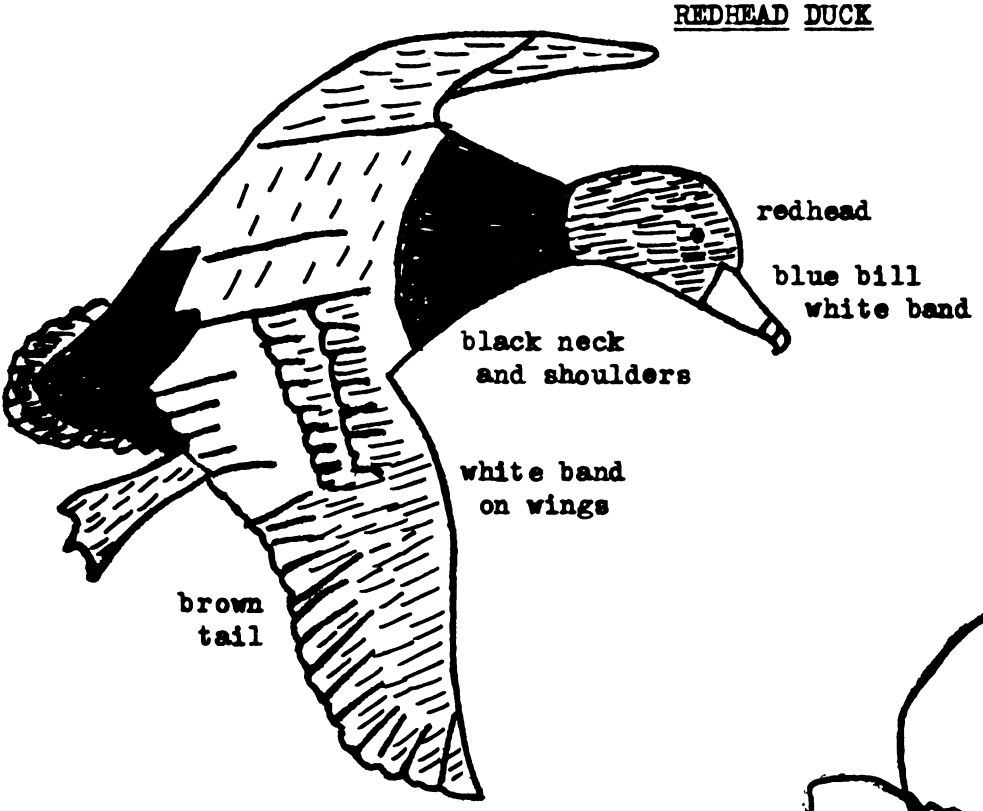
2. Find information on the food of this duck. Go to a pond if time permits and collect some of the aquatic plants eaten by ducks.

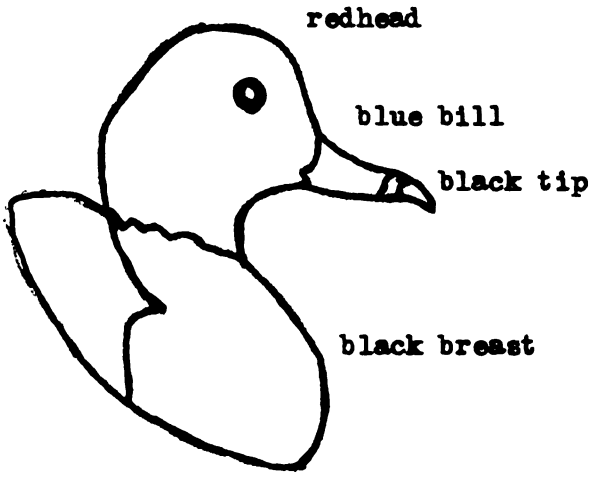
3. Look up information on the distribution of this duck and list some of the places where the Pintail winters.

Answers to Student Questions

1. The Pintail like the black and the mallard is a dabbling duck and either feeds along the surface or tips its tail up and probes the muddy pond bottom for food.
2. Feeds largely on aquatic plants, also field grains and aquatic and upland insect life. If time permits look for pictures of some of the aquatic plants eaten by ducks, have the pupils make sketches of some of the simpler ones. Also take a field trip to a pond to collect examples of duck food.
3. This duck is the most wide ranging of all North American ducks. They are circumpolar in distribution. They breed chiefly west of the Mississippi from the mid-western states to the Rockies and mountain valleys, north to the Arctic coast at Queen Maud gulf, Mackenzie river delta, Alaska and Islands of the Bering sea. The Pintail winters on the Pacific slope from British Columbia south to Central America and from Delaware to Florida.

REDHEAD DUCK





Things to Know and Understand

The Redhead is rated with the Canvasback and Mallard as prize game.

The Redheads have long been hunted at large lakes such as Houghton, Gun, and Lake St. Clair.

The greatest number of birds arrive in October. The male Redhead is identifiable by its red puffy head, black chest and white breast. The female Redhead is more brownish and drab appearing than the male.

Note the distinguishing marks of the Redhead.

Color in the picture on the right.

You will be able to pick out the Redhead duck quite readily at the bird sanctuary.

Redhead ducks nest in many states including Michigan.

Nature Investigations for the Students

1. Does this bird fly directly out of the water or run along the surface before it flies?

2. What outstanding characteristic would you look for if identifying the male Redhead duck?

3. List some of the areas where the Redhead may be found in the summer.

4. How does the Redhead obtain its food and what does it eat?

5. Shooting of the Redhead and Canvasback is prohibited this year since the ponds and marshes were so low in their Canadian resting grounds. What reason can you think of for prohibiting shooting for a year or two? How does the amount of water influence the number of ducks?

Answers to Students Questions

1. The Redhead is a diving duck and as such has the characteristic peculiar to divers of running or paddling along the surface before taking off into the air.
2. The male Redhead is distinguished by its large red puffy head, its black chest and white breast. Also it has a blue bill tipped with black.

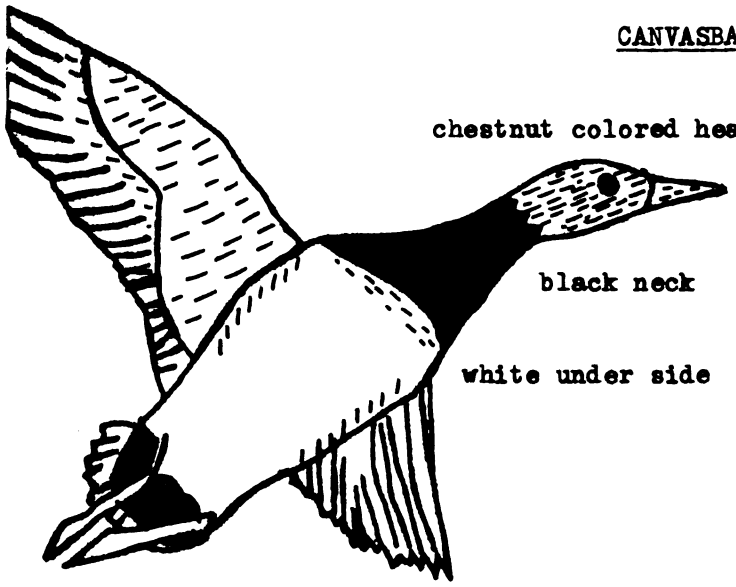
3. The Redhead is concentrated in the summer in central Canada being found in the following localities.

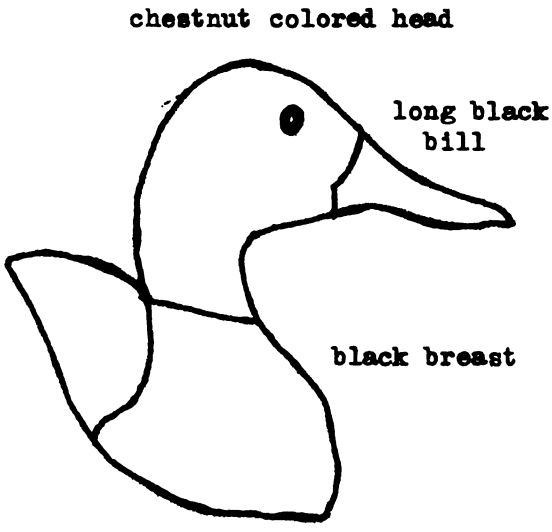
   Southern British Columbia, northern Alberta, central Saskatchewan, central Manitoba. It is also found in many midwestern states of the United States.

4. The Redhead is a diving duck and procures most of its food in that manner. Ninety per cent of its food is aquatic plants, leaves, seeds, roots, and the balance mollusks and insects.

5. Because of drought in the nesting area, reproduction was reduced considerably due to lack of adequatic nesting sites and available food. It is hoped that a closed season will provide ample stocks to reproduce a good crop of birds next year, provided the habitat improves.

CANVASBACK DUCK





Things to Know and Understand

The Canvasback is one of the larger ducks. Its average weight is 3 pounds.

The male and female differ somewhat, the male being the most striking. On migration the Canvasbacks often fly in perfect "V" formation, their long pointed wings carrying them forward with speeds up to 55 miles per hour.

The Canvasback does not rest in Michigan but does spend some time here while migrating.

The Canvasback duck could profit by shorter hunting season and lower bag limits due to its lower numbers.

Nature Investigations for the Students

1. How does the duck obtain its food? Does its food differ

from the other ducks? Do you think what a duck eats would change the taste of the ducks when roasted?

2. The Canvasback and the Redhead are somewhat similar in looks. State a few ways in which they are different.

3. What features will you select to identify the Canvasback duck when you visit the bird sanctuary?

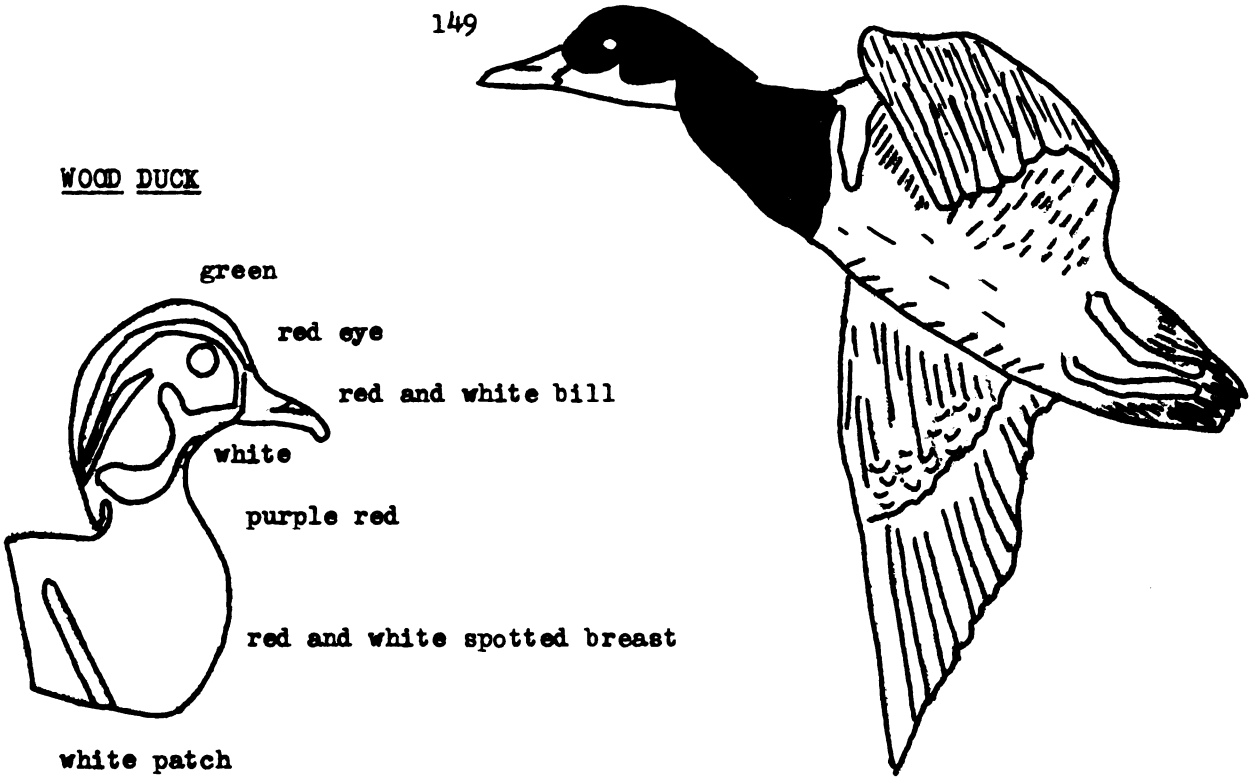
4. Color in the picture on the right to help you remember its appearance.

Answers to the Students Questions

1. The Canvasback secures most of its food by diving and remaining a long time under water obtaining buds and roots of aquatic plants. Often other ducks rob them of their prize when they emerge. The chief items of this ducks food are pondweeds, wild celery, duck potato, grasses (including fox tail and wild rice), sedges, water lily, bur seeds, water mil foil and muskgrass (Chara). Some animal matter is also consumed such as mollucks, insects, and small fish. The flesh of ducks which feed primarily on fish is not tasty and thus mergansers or fish ducks are not prize game.
2. The bill of the Canvasback is a full half-inch longer than that of the redhead. The longer, narrower head of the Canvasback slants gradually backward from the bill, while that of the Redhead rises more abruptly, giving it a full round forehead.

The plumage on the head and neck of the Redhead is decidedly red without any black, whereas the Canvasback is reddish brown on these parts except on the chin and crown which are blackish.

3. Perhaps the best characteristics to look for in identifying the Canvasback is a white appearing back, a black breast, a long bill and slanting forehead, the head being rust colored.



WOOD DUCK

Things to Know and Understand

The male Wood duck is highly colored and has a crested head.

The female is not as highly colored as the male and appears gray brown when on the water.

The Wood duck is no longer completely protected, but one duck per hunter per day during hunting season is now permitted. It is partially protected because of its smaller numbers.

This duck while few in number is nevertheless found in the summer in almost every state in the Union.

The Wood duck is unusual among ducks in that it lays its eggs in the hallows of trees.

The Wood duck may be easily recognized by its plaintive squeaking call notes.

Nature Investigations for Students

1. Why do you suppose this duck is called the Wood duck?

2. Why do you suppose the Wood duck was at one time in danger of extinction?

3. Find out how this duck compares in size with the other ducks.

4. How does the Wood duck obtain its food and what are some of the things it eats?

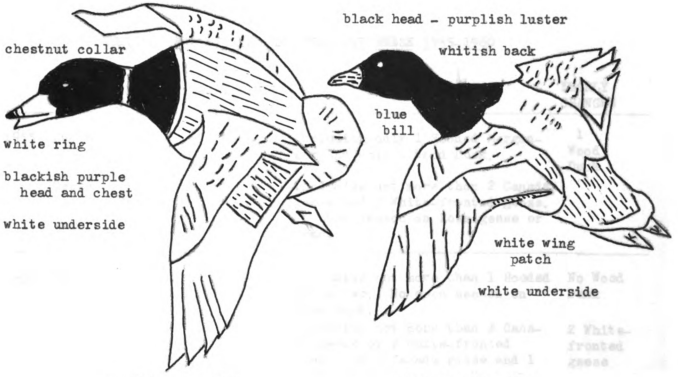
5. What can you find out about management practices which are being applied to the Wood duck.

Answers to Students Questions

1. This bird is called the Wood duck because it nests in trees rather than on the ground and walks about the limbs like any song bird. It selects as its home in the trees an abandoned hole where an owl, a woodpecker, a squirrel, or a blackbird has once nested. If a hole is not available, twigs, grasses, leaves, and feathers are woven into a bulky nest among the branches. Deep woods near water are preferred localities.
2. The beautiful plumage of this bird undoubtedly accounted for a large take among hunters of this bird in the past.
3. Compared with the other ducks in this unit the Wood duck is quite small. Its average weight is 1 lb. 8 oz. compared with the average weight of the mallard which is 2 lbs. 11 oz.
4. The Wood duck is a dabbler and obtains much of its food on the surface of the water and on land. It eats many dragon and damsel flies and nymphs, bugs, bettles, grasshoppers, crickets,

flies, wasps, and spiders. The bulk of its food, however, is composed of aquatic plants.

5. The Wood duck is the only dabbling duck completely protected by law. Once considered in danger of extermination it is now by no means a rare breeder in Michigan. It is now reported nesting at numerous streams, beaver ponds, and wooded lakes. Many sports groups, such as conservation clubs, 4 H Clubs and scout troops make Wood duck houses and set them out in suitable habitat to encourage nesting of Wood ducks in these areas.



RING-NECKED DUCK LESSER SCAUP DUCK

Things to Know and Understand

In size the ring-necked duck is almost identical with the lesser scaup or 'little bluebill', but it is easily recognized by the dark gray, not white, patch on its wing. The drake or male duck has a black back and its head appears tufted. The females are quite similar but the plumage is a bit more subdued.

The ring-necked duck is a diving duck and may be readily seen at the Bird Sanctuary as it dives for corn thrown to it by visitors.

The lesser scaup is colored much like its close relative the greater scaup, size is the principal difference. The scaup ducks furnish more than half of the kill of diving ducks during October hunting.

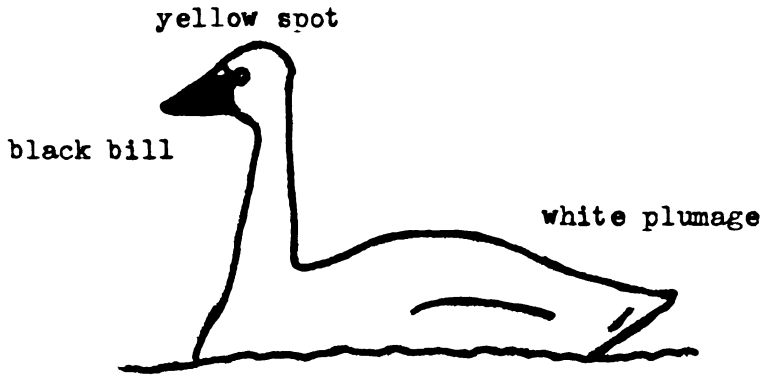
The lesser scaup and ring-necked rarely weigh much more than two pounds.

What kind of food do you think these ducks are after when they dive under water? Does the diet of the ring-necked duck differ any from that of the lesser scaup? If so, in what way?

HUNTING REGULATIONS FOR DUCKS AND GEESE 1955-1960

	BIRD	SEASON	DAILY LIMIT	EXCEPTIONS	YEARLY CHANGES
1955	Ducks	Oct. 1-Dec. 9	4	Including only 1 Hooded Merganser and only 1 Wood Duck.	1 Wood Duck
	Geese	Oct. 1-Dec. 9	5	Including not more than 2 Canada geese and 1 White-fronted goose. No open season on Ross geese or Brant	
1956	Ducks	Oct. 1-Dec. 9	4	Including not more than 1 Hooded Merganser. No open season on Wood Duck.	No Wood Duck
	Geese	Oct. 1-Dec. 9	5	Including not more than 2 Canada geese or 2 White-fronted geese, or 1 Canada goose and 1 White-fronted goose. No open season on Ross geese or on Brant.	2 White-fronted geese
1957	Ducks	Oct. 1-Dec. 9	4	Including not more than 1 Hooded Merganser. No open season on Wood Ducks.	Same as 1956
	Geese	Oct. 1-Dec. 9	5	Including not more than 2 Canada geese or 2 White-fronted geese, or 1 Canada goose and 1 White-fronted goose. No open season on Ross geese or on Brant.	
1958	Ducks	Oct. 1-Dec. 9	4	Including not more than 1 Hooded Merganser and not more than 2 Redhead or Canvasback ducks or 1 of each. Including not more than 1 Hooded Merganser and not more than 4 Redheads and Canvasback singly or combined. No open season on Wood ducks.	Restriction on Redhead & Canvasback
	Geese	Oct. 1-Dec. 9	5	Including not more than 2 Canada geese or 2 White-fronted geese or 1 Canada goose and 1 White-fronted goose. No open season on Ross geese or on Brant.	

SWANS



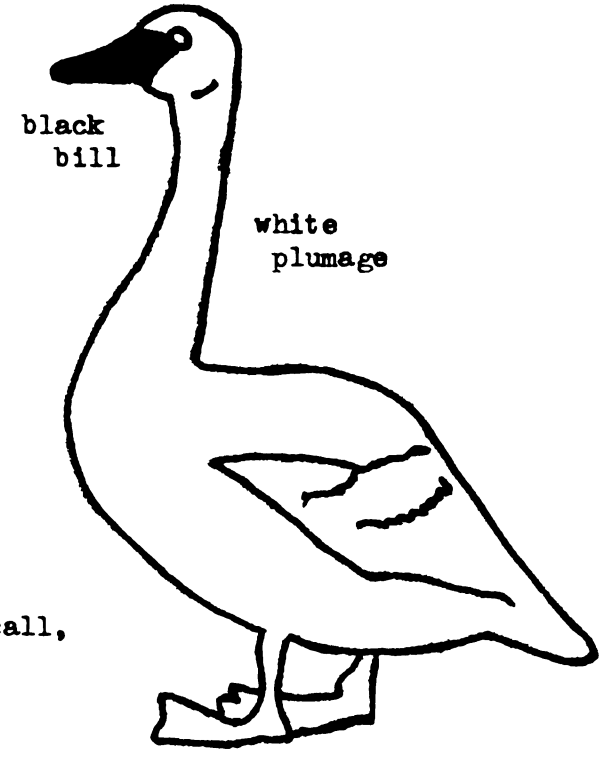
Whistling Swan

Mute Swan

Things to Know and Understand

Only two species of swan are native to North America, the trumpeter and the whistling swan. At present all wild swans are protected in all parts of Canada, the United States and Alaska by a complete closed season throughout the year.

The trumpeter is the largest of all the North American wildfowl. The trumpeter, so named because of its loud bugle-like call,



Trumpeter Swan

has been gradually receding before the advance of civilization and agriculture.

The whistling swan is the common swan of North America. In size this magnificent snow white bird ranks among our waterfowl as second only to the trumpeter swan.

The mute swan (see illustrations) is a native of Europe. It is kept in captivity in this country. Some have escaped captivity and may at times be reported as wild swans. The whooper swan and the black swan are also present at the bird sanctuary. Find out in your reference books how they differ from the three swans shown on the preceding page. Swans are kept at the Sanctuary to enable the visitor to see these birds which are so few in number and are not all native to our country.

Better conservation practice in the past would have preserved larger flocks of these majestic birds.

Investigations for the Student

1. How do swans compare in size with geese? Give measurements of the Canadian goose and whistling swan.

2. Where does the whistling swan go in summer and winter, and where is it found in Michigan?

3. What is the name given to the young swan?

4. List some of the foods eaten by the swan.

5. How fast can whistling swans fly?

Answers to Students Questions

1. Swans are generally larger than geese. The Canadian goose varies from 36 to 43 inches in length. The whistling swan measures from 55 to 60 inches.
2. The nesting grounds of this majestic bird are found in the Arctic Ocean region. It is found in Michigan only in October and April when it stops periodically while migrating.
3. The young swans are called cygnets.
4. The food of the swan is composed of mollusks, worms, and roots which they take from the pond mud by extending their long necks under the waters surface.
5. Whistling Swans may reach speeds up to 100 miles per hour.

Birds of Prey - An overview for the teacher

In the following paragraphs we apply the term 'birds of prey' only to those birds which attack other birds or mammals to obtain their food.

On the accompanying pages are sketches of some common large and small birds of prey found in Michigan. The sketches, along with the factual statements and questions, are supplied to help acquaint the student with the identification of the birds and to give some idea of the part these birds play in the balance of nature. The vulture is not technically a bird of prey since it feeds on dead animals. This distinction should be pointed out to the student.

Contrary to public opinion birds of prey do far more good than harm. The few chickens captured by hawks is small loss indeed compared with the tremendous amount of harmful rodents that are destroyed by these birds.

Birds of prey have bodily characteristics which enable them to capture and dissect their prey easier. These adaptations include excellent eyesight, enabling them to see their prey from afar, a hooked beak which helps them to tear the flesh of their prey and strong talons to help hold their struggling victim.

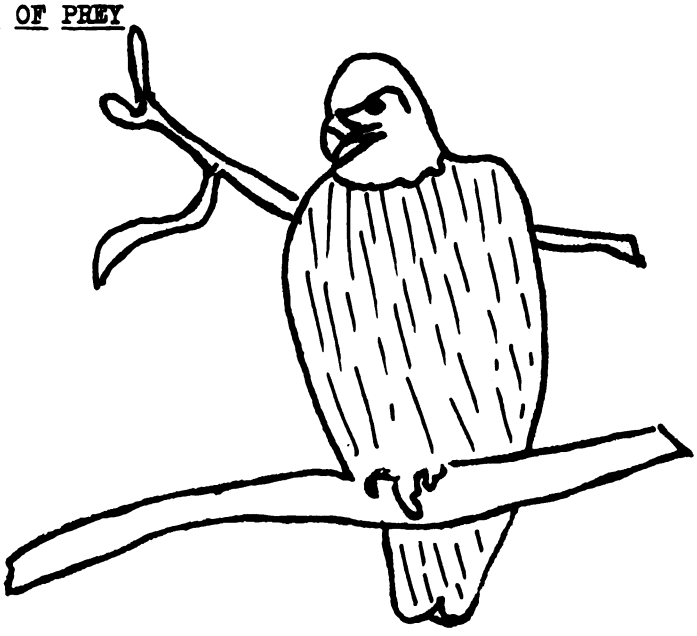
Many of these birds of prey are not often seen since some live in high secluded spots and others roam about in the night.

Because conservationists recognize the value of birds of prey, many of them are protected by law from the guns of the hunter.

A study of these birds should produce better attitudes toward prevailing conservation practices and a greater appreciation on the part of the student for the value of these birds to man.

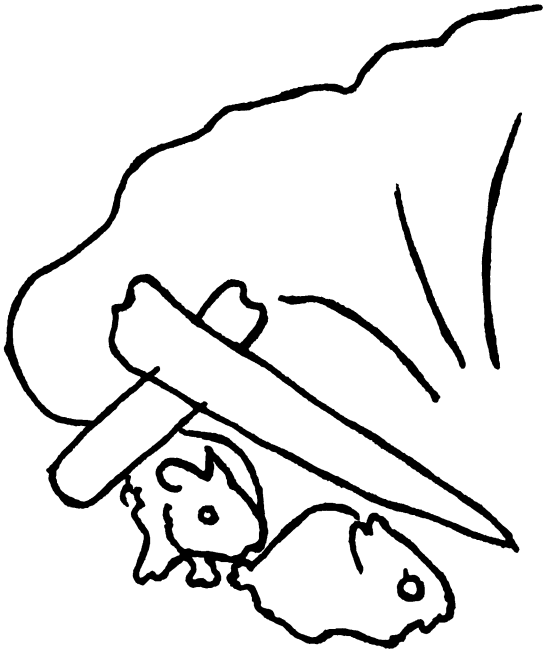
LARGE BIRDS OF PREY

OSPREY



BALD EAGLE

TURKEY VULTURE



Facts and Questions Concerning Large Birds of Prey

The bald eagle, the osprey and the turkey vulture are all found at the Kellogg Bird Sanctuary.

These wild birds necessarily are kept in cages.

Bald Eagle - Things to Know and Understand

On June 20, 1782, Congress adopted the bald eagle as our national emblem.

The bald eagle has a wing spread of 7 feet; length $2\frac{1}{2}$ to 3 feet.

The eagle uses the same nest year after year.

The bald eagle is found in Michigan.

The young eagle does not get a white crown until it is 3 years old.

Nature Investigations for the Student

1. What reasons can you suggest for America selecting the bald eagle as our national emblem?

2. How does the eagle contribute to the balance of nature?

3. Why do you think the eagle is called bald?

4. Where else is the eagle found besides Michigan?

5. Describe the appearance of the eagle's nest.

6. Describe the natural habitat of the eagle.

7. Does the bald eagle migrate?

Answers to Students Questions

1. The range of the bald eagle is the continent of North America.

2. The eagle preys on fish, small mammals and waterfowl helping to keep their number in balance. Its control of rodents is perhaps its greatest contribution.
3. The eagle's nest is an immense accumulation of sticks, sod, weeds, cornstalks, hay, pine tops, moss and other coarse materials. It is a flat structure 4 or 5 feet in breadth and sometimes of even greater height after a succession of annual repairs.
4. The eagle's habitat is extremely varied but, regardless of the section of the country he is in, the bald eagle seeks the high points such as cliffs, tall trees, etc., of the wild areas.
5. The bald eagle does not migrate but is a permanent resident.

Osprey - Things to Know and Understand

Another name for the osprey is the fish hawk.

The osprey is called a solid citizen because it minds its own affairs and does not molest smaller birds.

The osprey chases crows and other pests from the neighborhood.

The osprey plunges for fish from distances of 30 to 100 feet.

The osprey's claws are as strong as steel hooks.

Nature Investigations for the Student

1. Where may the osprey be found?

2. Describe the appearance and location of the osprey's nest.

3. Why do you think farmers in coastal regions want the osprey to nest on their farms?

4. What is the major food of the osprey?

Answers to Students Questions

1. The whole of North America is the Ospreys range; during the winter it migrates south when its northern feeding grounds freeze over. Its local habitat is near water. The Osprey builds its nest in high places much like the eagle. Farmers in the coastal regions often erect long poles with an old wagon wheel on top, an invitation to the Osprey to build its nest there.
2. The Osprey's nest consists of a hugh structure of twigs, sticks and cornstalks, so big that sometimes in its lower tiers, grackles arrange their own nests.
3. The farmer welcomes the Osprey since it chases crows and other pests from its neighborhood.
4. Fish are practically the only food of the Osprey; they are caught by 30 to 100 foot plunges. Emerging from the water the bird holds its prey with both claws which are as strong as steel hooks. They twist the fish lengthwise in the direction of flight to decrease wind resistance. Usually the meal is eaten on a favorite, frequently visited perch under which the ground is strewn with fish bones. The source of the fish does not make much difference, it may be salt water or fresh water.

Turkey Vulture - Things to Know and Understand

Vultures eat dead flesh, garbage or other organic material.

These large birds are protected by law since they are so vital to us as scavengers or clean up teams.

Vultures have a wing spread of nearly 6 feet and are among the worlds most graceful soarers, sometimes gliding above the clouds.

Vultures travel in flocks of from 8 to 2 dozen.

Nature Investigations for the Student

1. What is another name for the vulture?

2. How is the vulture's nesting habit different from the other birds of prey?

3. Where in the United States may vultures be found?

4. Why do vultures glide so much instead of exerting themselves?

5. Do you think the vulture is of any value to man? If so, why?

Answers to Students Questions

1. The turkey vulture is also called the buzzard.
2. The vultures do not trouble themselves with building nests but lay their brown-spotted white eggs usually one to three on rocky ledges, hollow branches, or on the ground.
3. The range of the turkey vulture is the territory of the United States, except in its northern most portions.
4. Vultures require such a large quantity of food that they must conserve their energy by gliding instead of flapping their wings as they cover many miles in search of dead organisms.
5. The work of vultures in cleaning nature of undesirable carrion is so valuable that they are protected by law in many places, particularly in the south.

Many birds are birds of prey because they eat other living organisms. The term 'bird of prey' is, however, limited in common terms to birds which attack other birds or mammals.

The birds on the foregoing page are three of the smaller birds of prey which eat small animals.

These birds are easily observed at the Sanctuary and you may wish to take pictures of them to include in your study booklet.

Schreech Owl - Things to Know and Understand

The screech owl is a city owl. It spends most of the day secluded in a hole of a tree, waiting for evening when it goes in search of food.

This bird is small compared to other owls, being approximately 9 inches long.

The screech owl does not screech, it wails plaintively.

Nature Investigations

1. Where in your neighborhood would you look for a screech owl?

2. Do you think some folks are superstitious about the screech owl? If so, why?

3. Does the screech owl migrate?

4. List some foods which the screech owl eats.

Answers to Students Questions

1. Screech owls rest by day in the hollows of trees.
2. This small owl does not screech. It wails plaintively, it quivers tremulously, it utters a long melancholy whinny. Some

southern folks are greatly disturbed when the shivering owl dolefully cries near their cabin. To them it means the sure approach of death or trouble; fortunately they have their counter measures, to cast a handful of salt into the fire is one way to nullify the evil forebodings.

3. The screech owl does not migrate and may use the same nest winter and summer.

4. The screech owl hunts its food at night. It preys upon mice and other rodents, snails and snakes and an occasional small bird. Because of this latter characteristic, the screech owl has many enemies among jays, cardinals, gold finches, etc.

Barn Owl - Things to Know and Understand

This bird frequents not only barns but most any abandoned building. The barn owl's erie looking face, its noiseless flight and its subdued scream all combine to make some superstitious people associate it with spooks, witches and haunted houses.

The barn owl is fully at ease in the night, having an excellent sense of sound and sight in the dark.

Nature Investigations for the Student

1. Is there any reason to be afraid of the barn owl?

2. Have you ever seen a barn owl in nature? If so, where?

3. What does this bird eat?

4. Do you think this bird is of any value to man? Why?

5. List any other unusual things you have found out about this bird.

Answers to Students Questions

1. While the barn owl gives a ghostlike appearance in the night, yet it should throw a fright only into the small organisms which it attacks for food.
2. The food of the barn owl consists largely of mice and other rodents harmful to fields and garden crops. For this reason this bird should be a welcome resident of the farm.
3. The value of this bird is obvious since the rodents which inhabit a barn are destructive annually to hundreds of dollars of farm crops.

Sparrow Hawk - Things to Know and Understand

This bird often comes into cities and may be seen catching sparrows in business districts.

In the sketch this bird is shown about the same size as the barn owl and screech owl, but in real life it is not much larger than a robin. It is the only common small hawk that hovers on rapidly beating wings like a humming bird.

A good place to look for sparrow hawks is on telephone poles.

Nature Investigations for the Student

1. Describe the appearance of the face of the sparrow hawk.
2. Can you find out one thing which distinguishes these hawks from all other hawks?
3. What is the food of this bird?
4. Can you find out any historical facts about the sparrow hawk?

Answers to Students Questions

1. The face of the sparrow hawk is very distinctive since it has a black mustache mark curving on each cheek.
2. In flight the long rail and long sharp wings and the unique habit of hovering for minutes at a time distinguishes it from all the other hawks.
3. The chief food of the sparrow hawk consists of mice.
4. In England the sparrow hawk was often used in the sport of falconry. In Egypt it was considered a sacred bird, symbol of the sun god, and was carved in splendid massive statues which are as recognizable as hawks today as they were to the people of Egypt thousands of years ago.

MICHIGAN MAMMALS AT KELLOGG BIRD SANCTUARY

There is much to learn about our common Michigan mammals. Books abound with interesting accounts of these friends of the wild.

On the next two pages are sketches of animals which may be easily observed at Kellogg Bird Sanctuary. These are wild animals and must necessarily be kept in pens or they would escape into the surrounding woods and fields. The reason for keeping these animals in pens is so that many people who do not have a chance to observe these animals in the wild may see them and learn about them.

On the pages following the sketches of the animals there is space for you to record what you learn about these animals through your study.

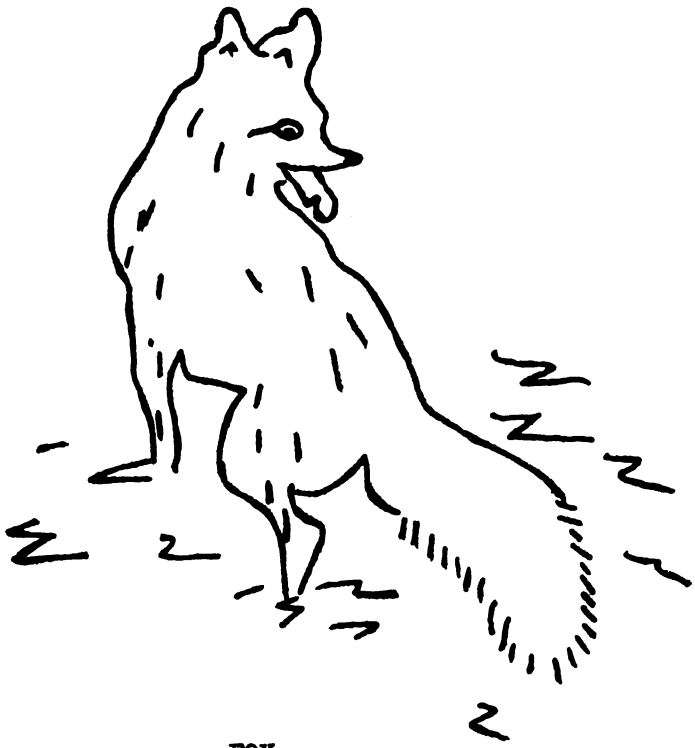
Find out as much as you can about these animals; homes, food, enemies, value to man, habits, likes and dislikes, and the conservation practices being carried out in their behalf.

If you do this you will appreciate and understand more about these wonderful creatures of the wild when you see them at Kellogg Bird Sanctuary.

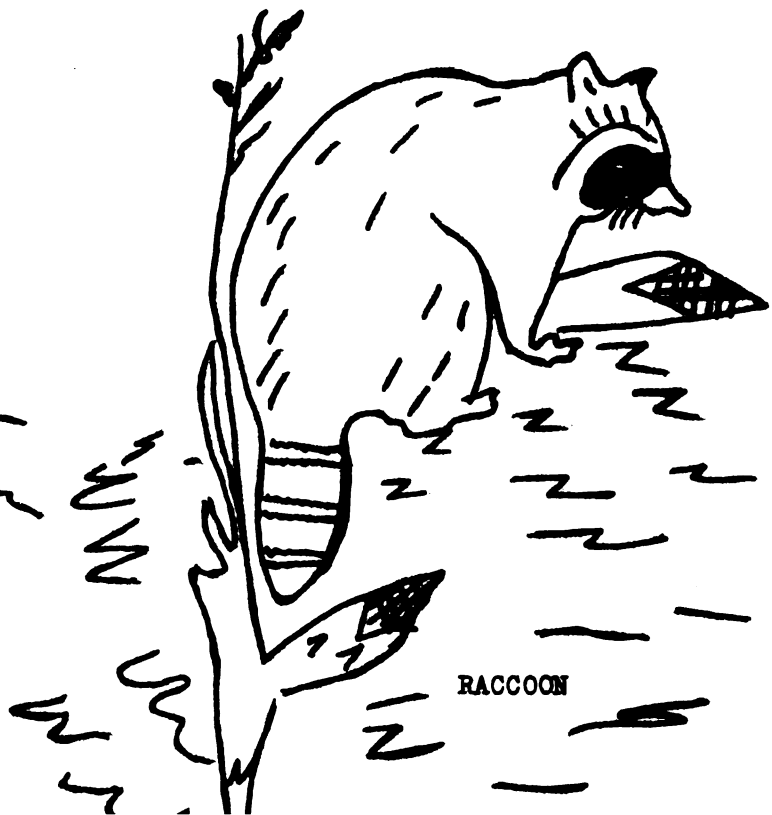
MICHIGAN MAMMALS AT KELLOGG BIRD SANCTUARY

SKUNK

BADGER



FOX



RACCOON

MICHIGAN MAMMALS AT KELLOGG BIRD SANCTUARY

GREY SQUIRREL

PORCUPINE

WHITE TAILED DEER

STUDENT RESEARCH CONCERNING THE

SKUNK

BADGER

FOX

RACCOON

GREY SQUIRREL

PORCUPINE

WHITE TAILED DEER

SUGGESTED BOOKS AND FILM REFERENCES

Assist in Studying this Unit

Books and Booklets

* Indicates those of immediate practical value in completing the unit.

*1. World Book Encyclopedia

*2. Hammonds Nature Atlas of America, School or Public Library

*3. A Field Guide to the Birds, by Peterson, School or Public Library

*4. Michigan Wildlife Sketches, send to Michigan Department of Conservation, Ed. Division, Steven T. Mason Bldg., Lansing 26, Mich., cost 25¢

5. Illinois Mammals, Virginia S. Eifert, Illinois State Museum, Springfield, Ill.

*6. Invitation to Birds, Virginia S. Eifert, Illinois State Museum, Springfield, Ill.

*7. Know Your Ducks and Geese, Sports Afield, 250 West 55th Street, New York 19, N. Y., cost 50¢

8. Southern Michigan Wildlife, Michigan Department of Conservation

9. Enjoying Birds in Michigan, Michigan Audubon Society Bookshop, c/o Miss Monica Evans, Kalamazoo College, cost $1.29 (incl. tax)

10. Our Wildlife Legacy, by D. L. Allen, Funk and Wagnall, New York

11. Deer and Aspen, American Box Board Co., Grand Rapids, Michigan

12. Michigan White Tails, Jerkens and Bartlett, Michigan Department of Conservation, Lansing 26, Michigan

13. Tracks and Trailcraft, Ellsworth Jaiger, Macmillan Co., New York

14. Migration of Birds, Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

15. Migration Routes of Waterfowl, Michigan State University, Coop Ext. Service, E. Lansing, Michigan

*16. Hawks and Owls of the U. S. in Relation to Agriculture, Fisher, U. S. Dept. of Agriculture, Washington, D. C., Bulletin No. 3.

*17. Control of Nuisance Wild Animals and Birds, Charles Schiek, Michigan Department of Conservation

*18. The Farmer and Wildlife, Wildlife Management Institute, 709 Wire Building, Washington 5, D. C.

Films

1. Michigan Deer Story, 27 min., sound, color, Film Loan Service, Michigan Department of Conservation, Lansing 26, Michigan
2. Camouflage In Nature Through Form and Color Matching, Audio Visual Center, Michigan State University, East Lansing, Michigan
3. Camouflage in Nature Through Pattern Matching, Michigan State University
4. This is Michigan, 15 min., color, sound, Film Loan Service, Michigan Department of Conservation, Lansing, Michigan
5. Marsh Waters, Waste or Wealth, 20 min., color, sound, University of Minnesota, Minneapolis, Minn.
6. The Chain of Life, 11 min., color, sound, Film Loan Service, Michigan Department of Conservation, Lansing 26, Michigan
7. Wings Across the Border, Ducks Unlimited, 34 Madison Avenue, New York 17, N. Y.
8. Behind the Flyways, 25 min., color, sound, U. S. Fish and Wildlife Service, Washington 25, D. C.