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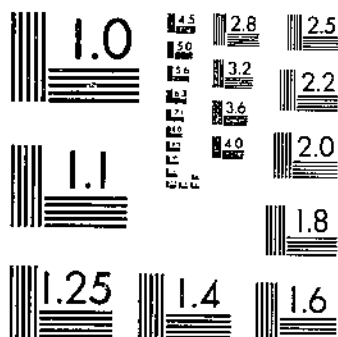
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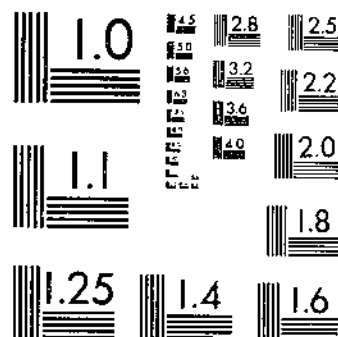
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UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

WILD-DUCK FOODS OF NORTH DAKOTA LAKES

By FRANKLIN P. METCALF, formerly Assistant Biologist, Division of Food Habits
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¹ Mr. Metcalf resigned, effective June 30, 1933.

INTRODUCTION

North Dakota has long been known as a favorite resort for wild ducks. The State contains a maze of lakes, sloughs, and ponds, well stocked with duck foods and with plenty of cover for breeding wild fowl. Hunters from the East and West visit these hunting grounds every year.

To gather detailed information on the food plants of migratory waterfowl in the State, and to determine the value and possibilities of the improvement of the marsh and aquatic areas as feeding grounds for the birds, a survey was conducted during the summer of 1917 by Douglas C. Mabbott² and the writer. Work was begun on July 22 at Hankinson, where eight days were spent, and then Mabbott worked north and northeast while the writer surveyed the northwestern part of the State. About 500 lakes were surveyed. The itineraries of the two investigators are given in Table 1.

TABLE 1.—Itineraries of investigators, 1917

F. P. Metcalf			D. C. Mabbott		
Headquarters	Counties surveyed	Dates	Headquarters	Counties surveyed	Dates
Elsie Lake	Richland	July 21-29.	Elsie Lake	Richland	July 21-29.
Napoleon	Logan	Aug. 1-6.	Moon Lake	Barnes	Aug. 2-7.
Dawson	Burleigh (north-east)	Aug. 6-21.	Eckelson Lake	do.	Aug. 7-10.
Do.	Kidder	Do.	Spiritwood Lake	Stutsman (east)	Aug. 11-12.
Do.	Stutsman (west)	Do.	Jim Lake	do.	Aug. 13-16.
Bismarck	Emmons	Aug. 22-27.	Addie Lake	Griggs	Aug. 17-19.
Do.	Morton	Do.	Red Willow Lake	do.	Aug. 19-21.
Taylor	Burleigh (west)	Do.	Wanish Lake	Foster	Aug. 21-23.
Underwood	Dunn	Aug. 28.	Drake	Sheridan (north)	Aug. 24-Sept. 3.
Do.	McLean	Sept. 1-8.	Do.	Pierce	Do.
Do.	Burleigh (north)	Do.	Do.	McHenry (west)	Do.
Max	Sheridan	Sept. 8.	Veiva	do.	Sept. 4-5.
Ryder	McLean	Sept. 9-12.	St. John	Rolette (Turtle Mountains)	Sept. 6-14.
Bottineau	Bottineau (Turtle Mountains)	Sept. 19.	Do.	Towner (north)	Do.
Kenmare	Burke	Oct. 1-11.	Do.	Cavalier	Do.
Do.	Ward	Do.	Grand Forks	Grand Forks	Sept. 15-21.
Do.	Mountain (north)	Do.	Grafton	Walsh	Sept. 21-22.
Columbus	Burke	Oct. 12.	Cando	Towner (south)	Sept. 24-27.
Fortuna	Divide	Oct. 13.	Do.	Ramsey (north)	Do.
Orenora	Williams	Oct. 14.	Rolette	Rolette (south)	Sept. 28-Oct.
Powers Lake	Mountain (west)	Oct. 15.	Do.	Pierce (north)	Do.
Stanley	Mountain (south)	Oct. 16.	Do.	McHenry (north)	Do.
Pleasant Lake	Benson (west)	Oct. 17-19.	Tolna	Nelson	Oct. 5-8.
Leeds	Benson (north)	Oct. 20.	Devils Lake	Ramsey	Oct. 9-16.
Devils Lake	Benson (south-east)	Oct. 21.	Do.	Benson (north-west)	Do.
Minnewaukan	Benson (south-west)	Oct. 23.			
Leeds	Benson (north)	Oct. 24.			

A list of the plants mentioned in this bulletin is presented on page 65, arranged alphabetically in the order of common names. These are for the most part as given in Standardized Plant Names (1).³ Since scientific names of these are given in the list, they are omitted throughout the text, except in tables, other lists, or where omission would cause difficulty of identification. They have been carefully revised by S. F. Blake, botanist of the Bureau of Plant Industry.

¹ Killed in action, Battle of St. Mihiel, Sept. 15, 1918.

² Italic numbers in parentheses refer to Literature Cited, p. 71.

IMPORTANT DUCK-FOOD PLANTS OF THE STATE

The most abundant plant in North Dakota that is an important wild-duck food is sago pondweed. This plant is found both in the fresh-water and alkaline-saline lakes, being capable of adapting itself to unfavorable conditions. The abundance of its seeds and underground tubers makes this plant an excellent all-round duck food. Widgeon grass and bayonet grass are next in importance, both being good duck foods and rather abundant throughout the State. In Table 2 are presented the most important duck-food plants found in North Dakota.¹

TABLE 2.—The most important duck-food plants in North Dakota

Common name	Scientific name	Occurrence
Stonewort	<i>Chara</i> sp.	Common on floor of lakes.
Sago pondweed	<i>Potamogeton pectinatus</i>	Abundant.
Leafy pondweed	<i>Potamogeton foliosus</i>	Frequent in shallow fresh water.
Widgeon grass	<i>Ruppia maritima</i>	Abundant.
Western wapato	<i>Sagittaria arifolia</i>	Frequent in shallow margins.
Three-square	<i>Scirpus americanus</i>	Abundant on sandy beaches.
Bulrush	<i>Scirpus occidentalis</i>	Abundant.
Soft bulrush	<i>Scirpus validus</i>	Frequent.
Nevada bulrush	<i>Scirpus nevadensis</i>	Common in sandy meadows.
Bayonet grass	<i>Scirpus paludosus</i>	Abundant in alkali sloughs.
Duckweeds	<i>Lemma minor</i> and <i>L. trisulca</i>	Fairly common.
Water smartweed	<i>Polygonum amphibium</i>	Frequent in fresh water.
Coontail	<i>Ceratophyllum demersum</i>	Fairly common in fresh water.

Whitetop seems almost to deserve a place in the foregoing list of important duck foods. This plant is exceedingly abundant in almost all the sloughs in northern North Dakota. It fruits early; in fact, the seeds have usually all fallen into the water by the end of June. Observations indicate that the ducks feed extensively on these seeds, for ducks were numerous wherever this plant was abundant. Definite proof of their actions, however, can be had only from analyses of stomach contents, which unfortunately could not be obtained.

Besides the plants mentioned the supplementary list in Table 3 includes plants that are considered fairly good as duck foods.

TABLE 3.—Supplementary list of plants of North Dakota fairly good as duck foods

Common name	Scientific name	Occurrence
Clasping-leaf pondweed	<i>Potamogeton perfoliatus</i>	Abundant in slightly alkaline lakes.
Bur-reed	<i>Sparganium eurycarpum</i>	Fairly common.
Sedges	<i>Carex</i> (many species)	Do.
Switch grass	<i>Panicum virgatum</i>	Frequent in meadows.
Barnyard grass	<i>Echinochloa crusgalli</i>	Frequent in sandy meadows.
Cord grass	<i>Spartina nitens</i>	Common.
Bushy knotgrass	<i>Polygonum ramosissimum</i>	Fairly common.
Pale smartweed	<i>Polygonum lapathifolium</i>	Do.
Water milfoil	<i>Myriophyllum spicatum</i>	Abundant.

¹ The identifications of the plants collected in North Dakota were made by the writer with assistance in difficult groups as follows: Gramineae, A. S. Hitchcock and Mrs. Agnes Chase; Salix, C. R. Ball; Junceae, F. V. Coville, all of the Bureau of Plant Industry; and Crataegus and Amelanchier by K. M. Wiegand, of Cornell University. The algae were identified by J. R. Schramm, of the National Research Council; and one species of moss by Mary F. Miller.

Interesting features of the aquatic flora of North Dakota are the absence of wildcelery and northern wildrice, both of which are excellent duck foods and abundant in adjoining Minnesota. Northern wildrice has been reported only from the James and Red Rivers along the extreme eastern boundary of the State. The inability of this plant to withstand alkali undoubtedly explains its rarity in North Dakota, since practically all the lakes contain at least a small quantity of alkali. Wildcelery, on the other hand, is reported as capable of withstanding a low proportion of salt, growing with sago pondweed in slightly brackish waters, so it is possible that this plant could be introduced throughout the State in mildly alkaline waters, thereby increasing the quantity of food available for wild ducks. Information in regard to the propagation of these plants is given in two publications of the United States Department of Agriculture (5, 6).

TOLERANCE OF AQUATIC PLANTS TO CONCENTRATIONS OF SALTS

Samples of water were collected from 75 of the lakes surveyed, and these were analyzed in the water laboratory of the Bureau of Chemistry of the United States Department of Agriculture. Table 4 gives these analyses arranged to show the relative tolerance of various aquatic plants to the total concentrations of salts.

ERRATA

Technical Bulletin 221, United States Department of Agriculture

WILD-DUCK FOODS OF NORTH DAKOTA LAKES

(May be pasted at foot of p. 4)

The conversion of the concentration of salts from parts per million to percentages should be changed on pages 8 to 10 by moving the decimal point in the parentheses two places to the right in each case.

TABLE 4.—List of lakes of North Dakota, from which water samples were taken, arranged to show the relative tolerance of various aquatic plants to the total concentration of salts

Lake and locality	Vegetation and occurrence ¹													Total concentration of salts
	<i>Elaeagnus canadensis</i>	<i>Potamogeton zosterifolius</i>	<i>Potamogeton heterophyllus</i>	<i>Najas marina</i>	<i>Potamogeton perfoliatus</i>	<i>Myriophyllum spicatum</i>	<i>Zannichellia palustris</i>	<i>Alisma geyeri</i>	<i>Ranunculus aquatilis capillaceus</i>	<i>Ceratophyllum demersum</i>	<i>Potamogeton foliosus</i>	<i>Utricularia vulgaris americana</i>	<i>Clara</i> sp.	
Ranch Lake, Kidder County						F							A	Parts per million 350
Clear Lake, Wing, Burleigh County					A	C				C			C	453
Long Lake, Underwood, McLean County					A	C			R	R	C	R	A	457
Red Willow Lake, Bimford, Griggs County					A	C	R			C	C			458
Jim Lake, Stutsman County	A	C			A	C				C	C			501
Wanitah Lake, ² Foster County					R							R		510
Swan Lake, Robinson, Kidder County						A								547
Arrowood Lake, ² Stutsman County					R					R				550
Large Slough, Underwood, McLean County			A						C			A		618
Mud Lake, Hankinson, Richland County				A		F				F	A	A	F	624
Williams Lake, ² Kidder County														630
Doctor Lake, ² McHenry County			F			A							R	809
Dawson Slough, Dawson, Kidder County						F					F	A	A	902
Crooked Lake, Underwood, McLean County					A									929
Doyle Lake, Napoleon, Logan County					C	F								992
Elsie Lake, ² Hankinson, Richland County				A			C						C	1,030
Powers Lake, Burke County														1,047
Gurr Lake, Rolette County														1,048
Sweetwater Lake, Ramsey County					A	C				R		F	A	1,065
Elsie Lake, ² Hankinson, Richland County				C		C						C		1,089
Brush Lake, Drake, McHenry County					R	A				R			A	1,103
St. Marys Lake, Valley City, Barnes County					A	A	C							1,245
Sections 1-2, Coville—section 36, Clear, Burke County					R	A				R			A	1,383
Sweetwater Lake, Barnes County						R								1,385
Sections 27-34, Wallace, Kidder County					F	A	C	C	F	A	A		A	1,431
Allee Lake, Towner, McHenry County														1,458
Spiritwood Lake, Stutsman County						F	F	R		F			A	1,465
Priscoll Lake, Kidder County									R					1,469
Sections 13-14, Frettin, Pettibone, Kidder County										A				1,517
Spring Lake, Pierce-Rolette Counties													C	1,609
George Lake, ² McHenry County													C	1,713

¹ A, abundant; C, common; F, fairly common; R, rare.

² Collected in November, 1920; analyses made by the Bureau of Chemistry, U. S. Department of Agriculture, January-February, 1921. All others were collected in summer and fall of 1917; analyses made in spring of 1918.

TABLE 4.—List of lakes of North Dakota, from which water samples were taken, arranged to show the relative tolerance of various aquatic plants to the total concentration of salts—Continued

Lake and locality	Vegetation and occurrence															Total concentration of salts
	<i>Elodea canadensis</i>	<i>Potamogeton zosterifolius</i>	<i>Potamogeton heterophyllus</i>	<i>Najas marina</i>	<i>Potamogeton perfoliatus</i>	<i>Myriophyllum spicatum</i>	<i>Zannichellia palustris</i>	<i>Alisma geyeri</i>	<i>Ranunculus aquatilis capillaceus</i>	<i>Ceratophyllum demersum</i>	<i>Potamogeton foliosus</i>	<i>Utricularia vulgaris americana</i>	<i>Chara</i> sp.	<i>Potamogeton pectinatus</i>	<i>Ruppia maritima</i>	
Louise Lake, ² Stutsman County.....											R	A		C	A	Parts per million 1,811
Rice Lake, ² McLean County.....												A	A	C		1,845
South Napoleon Lake, Logan County.....												A		C	A	1,882
Isabel Lake, Dawson, Kidder County.....											A	R	A	C		2,490
Bunkhouse Slough, Hankinson, Richland County.....											A		A			2,512
Free Peoples Lake, ² Benson County.....												C				2,690
Long Lake, Burleigh County.....																2,710
Round Lake, ² McHenry County.....														A	C	2,795
Lake near Riga, McHenry County.....												R		A	A	2,927
Stack Slough, Hankinson, Richland County.....												C		A		3,012
Swan Lake, Hankinson, Richland County.....														A		3,281
Nelson Lake, McLean County.....														A	C	3,803
Salt Lake, South, Kidder County.....														A		3,906
Girard Lake, Pierce County.....														A		4,338
Moran Lake, Hankinson, Richland County.....													A	F		5,081
Alkali Lake, Napoleon, Logan County.....																5,223
Valley City, Barnes County.....													F	A	A	5,779
Turtle Lake, McLean County.....														A		6,110
Sections 26-27, Merkel, Kidder County.....														R		9,422
Kelly Slough, Grand Forks County.....															A	11,760
Smoky Lake, McHenry County.....															C	11,978
Sibley Lake, Dawson, Kidder County.....														C		12,610
Keyes Lake, Sanborn, Barnes County.....															A	16,463
Bird Lake, Kidder County.....															A ³	17,570
Salt Lake, Walsh County.....															A	19,140
Devils Lake, Ramsey County.....														C		20,774
Lake Mercer No. 1, McLean County.....															A	21,931
Sections 17-20, Anna, Ryder, Ward County.....														A		23,231
Stump Lake, Nelson County.....														C	A	23,757
Minto Lake, Walsh County.....															A ³	25,210
Salt Lake, Kidder County.....														A		26,606
Hobart Lake, Valley City, Barnes County.....														C		30,269
Eckelson Lake (north of railroad), Barnes County.....														A	R ³	31,085

[illegible]

¹ Collected in November, 1920; analyses made by the Bureau of Chemistry, U. S. Department of Agriculture, January-February, 1921. All others were collected in summer and fall of 1917; analyses made in spring of 1918.

• Fruiting abundantly, seeds.

This concentration is used since it is almost impossible to draw any conclusions with regard to the effect of the various hypothetical chemical compounds in these lakes. Kearney (4) adopts about the same view as a result of his studies of plant life on saline soils, namely, that "it is usually not so much the chemical composition of the soil solution as its concentration and the resulting osmotic pressure which affects vegetation." He further states, however, that sodium carbonate, or "black alkali," is an exception, since this salt is "much more toxic than the other sodium salts."

Table 4 may be considered as a contribution to knowledge of the total concentration of salts that aquatic plants are able to withstand.

From the information at hand, however, it is evident that a total concentration of salts of approximately 1,500 parts per million (0.0015 per cent), seems to be the upper limit for a definite group of freshwater plants, namely: Claspingleaf pondweed, water milfoil, horned pondweed, Geyer's waterplantain, common white water buttercup, and coontail.

Again, the first three plants in Table 4, namely, waterweed, eelgrass pondweed, and variable pondweed, seem unable to withstand any such concentrations, although these occurred only in one or at most two lakes from which water samples were available. There were a few other lakes in North Dakota where these plants were seen that were decidedly of the same type, and if examined, would undoubtedly be found to contain about the same proportion of salts; that is, 500 to 800 parts per million (0.0005 to 0.0008 per cent).

Leafy pondweed and common bladderwort both can withstand a higher total concentration of salts; this is especially noticeable for the latter, the maximum being 3,012 parts per million (0.003 per cent). The abundance of bladderwort in waters toward the uppermost part of the scale (Table 4) shows that this plant can withstand even a higher concentration of salts.

Such is undoubtedly the case with stonewort, which was found in water with a maximum concentration of 5,779 parts per million (0.0057 per cent). Lakes apparently with a higher concentration of salts in which this plant was growing were seen, but water samples were not obtained. The different unidentified species of stoneworts probably are not uniform in resistance to salts.

So far as resistance to alkalis is concerned, by far the most interesting plants are sago pondweed and widgeon grass. The latter can withstand the higher total concentration of salts, namely, 77,386 parts per million (0.077 per cent). The maximum that was recorded for sago pondweed, on the other hand, was 35,873 parts per million (0.035 per cent).⁵ Neither of these figures, however, can possibly represent the upper limit of endurance of the plants, as the lakes in which they were found later during the same year, and especially in dry years, increase greatly in concentration. The plants must, therefore, be able to adapt themselves to this increase in concentration or else they would

⁵ The presence of these plants in water having such high concentrations of salts shows that the total of dissolved salts is not an entirely trustworthy index to tolerance of the plants. Thus, neither widgeon grass nor sago pondweed will live in sea water with a total concentration of 31,613 parts per million (24,589 sodium chloride), while the latter grows in Swamp Lake with a salt content of 35,873 (4,583 sodium chloride, 16,168 sodium sulphate, 11,955 magnesium sulphate, and 3,105 calcium sulphate), and the former in Live Lake with a concentration of 77,386 (2,634 sodium chloride, 65,799 sodium sulphate, 6,936 magnesium sulphate, 1,259 magnesium bicarbonate, and 1,313 magnesium carbonate). Evidently sodium chloride has a more definitely inhibiting effect upon aquatic plants than the other salts occurring in quantity in these waters.—W. L. MCATEE.

have been killed out long ago. Drought in extreme cases would possibly increase the total concentration 20 to 25 per cent, if not more.

A few water samples taken by the North Dakota biological station (7) in 1911-12 in the Turtle Mountains also add interesting data to this discussion of the relationship between alkalinity and limitations of various aquatic plants. The plants, however, were collected or observed in the summer of 1917, six years later, so no definite conclusions can be drawn. The Turtle Mountain lakes, however, ordinarily remain approximately the same and at most would not change during the seasons so markedly as the alkaline-saline lakes. Floating pondweed was observed in the following four lakes from which available water analyses show the indicated total concentration of salts:

	Parts per million
Metegoshe Lake.....	432.7
Fish Lake (Upsilon).....	452.0
Carpenter Lake.....	613.6
Jarves Lake.....	519.0

Fries's pondweed was observed in two lakes from which available water analyses show the total concentration of salts as follows:

	Parts per million
Upsilon.....	452
Jarves Lake.....	519

These analyses show that these two plants can well be placed with the group (waterweed, eelgrass pondweed, and variable pondweed), which probably has as the upper limit a total concentration of salts of approximately 800 parts per million (0.0008 per cent).

CLASSES OF LAKES SURVEYED

To harmonize so far as possible the results of field observation, laboratory analysis of water samples, and study of the plant specimens collected, the following classification of North Dakota lakes is adopted for the purposes of this bulletin:

- Group 1. Saline lakes.
- Group 2. Alkaline-saline lakes.
 - Type A. Characterized primarily by milky water.
 - Type B. Characterized by an abundance of bayonet grass throughout.
 - Type C. Characterized by clear water, with sandy bottoms and shores.
- Group 3. Fresh-water lakes.
 - Type A. Prairie lakes.
 - Type B. River lakes (Des Laes, Missouri, and James Rivers).
- Group 4. Sloughs.
 - Type A. Cattail sloughs.
 - Type B. Whitetop, or mallard, sloughs.
 - Type C. Stagnant sloughs.
- Group 5. Lakes of the Turtle Mountains.
- Group 6. Unclassified lakes.

The lakes where only sago pondweed and widgeon grass were capable of growing, namely, lakes with a total concentration of approximately 10,000 parts per million (0.01 per cent), belong, with few exceptions, to the group of saline lakes (1) that could be so distinguished in the field. The decidedly salty taste of the water and the occurrence of the two saline plant indicators, Nevada bulrush and inland cord grass, were the criteria adopted in the field.

The lakes below the concentration of the saline lakes, those with 10,000 parts of salts per million (0.01 per cent), and above that of the limit for the so-called fresh-water lakes, namely, 1,500 parts per

million (0.0015 per cent), seemed to be a fairly uniform group. In them, besides widgeon grass and sago pondweed, only stonewort, common bladderwort, leafy pondweed, and algae are found. This group is readily recognized in the field as the alkaline-saline lakes, and is divided into three natural subgroups, characterized as follows: (A) By milky water; (B) by an abundance of bayonet grass throughout; and (C) by clear water, with sandy bottoms and shores.

Lakes with a total concentration of salts less than 1,500 parts to the million (0.0015 per cent) are called fresh-water lakes and are not altogether uniform; one type locally abundant in Burke County and frequent elsewhere includes hundreds of small lakes with water milfoil, sago pondweed, and clasping-leaf pondweed abundant; these on the whole are sloughlike. The lakes along the rivers are classed in a separate subgroup (3, B); insufficient water samples are on hand to determine whether all these have a lower concentration of salts than the prairie lakes (3, A).

True sloughs have been isolated in a group (4) by themselves; and there are three characteristic and easily distinguishable subdivisions, of which the second is by far the most abundant: (A) Cattail sloughs, (B) whitetop, or mallard, sloughs, and (C) stagnant sloughs. Analyses of the few water samples taken show that sloughs are mostly of the fresh-water type, the stagnant sloughs, however, having a higher concentration than the other two groups and often approaching the alkaline-saline lakes (2).

The Turtle Mountain lakes (5) have been treated separately. They contain a more northern type of vegetation, have wooded borders, and are distinctly fresh-water lakes; in fact, the few analyses obtainable show that they have on the average a smaller total concentration of salts than the prairie lakes (3, A).

Any classification has some obvious faults, and in the case of these lakes difficulty will always be found in distinguishing in the field the milky-water lakes of Group 1, with a high total concentration of salts (0.01 to 0.09 per cent), from lakes of similar appearance in Group 2, with a lower total concentration of salts (0.0015 to 0.01 per cent), the milky color being due to turbidity. Again, a clear-water lake with scanty vegetation may belong in Group 2, C, with a relatively high total concentration of salts, or Group 3, A, with a low total concentration of salts. In some cases lakes of this sort could only be correctly classified by a chemical analysis of the water. A few lakes of doubtful classification are placed separately in Group 4.

GROUP 1, SALINE LAKES

The group of saline lakes is more easily defined than those of the alkaline or fresh-water types. The characteristic that indicates certainly lakes of this group is the decided salty taste of the water. The alkaline lakes lack sodium chloride in sufficient quantity to be detected by the taste, although chemical analysis reveals that a large number have some sodium chloride.

The group of saline lakes, while fairly uniform, has two general types that can be readily distinguished. The first and most common is characterized by deep, clear-as-crystal water; the second is somewhat shallower with murky or milky water. This turbidity is due mainly to the washing up and suspension of material from the soft

clay bottoms of these shallow lakes, a phenomenon that does not occur in the deeper lakes with gravel or sandy bottoms.

The vegetation growing in these lakes is restricted to widgeon grass, which is usually very abundant; algae, almost always present; and rarely sago pondweed. The widgeon grass usually is limited to a dense, luxuriant growth forming a band 20 to 150 feet wide in water averaging from 3 to 7 feet deep. Where the center of the lake, however, is shallow or has shallow spots, widgeon grass is also found in abundance. Even from the tops of the surrounding hills this characteristic dark band of vegetation can easily be seen paralleling the shoreline. In the case of Minto and Salt Lakes, Walsh County, and a few other lakes, stunted specimens of widgeon grass were found growing in water only a few inches deep.

In a few lakes the total concentration of salts is apparently too great to allow even the growth of widgeon grass. Good examples of this type are Miller Lake, Divide County, and Palermo Lake, Mount-rail County, section 4, township 157-89 - section 33, township 158-89. In the former the floor of the lake is loosely covered to a depth of 2 to 10 inches with white salts, mostly sodium sulphate, with some magnesium sulphate and sodium chloride.

The algae growing in the saline lakes are of a characteristic bright green and are usually species of *Enteromorpha*. In a few lakes the water itself is a deep olive green, due in some cases to the abundance of a small filamentous alga. Vanville Lake, section 16, Vanville Township, Burke County, is a good example of this. In other cases this color is caused by the abundance of a unicellular alga, *Synechococcus*, as is found in Mercer Lake No. 1. In still another case, Salt Lake, near Tappen, Kidder County, the alga *Clathrocystis* is pink.

Sago pondweed is found in only a few of the salty lakes. In the exceptional cases in which the plant is abundant the lakes have clay bottoms. For example, in Salt Lake (south), Kidder County, where sago pondweed is abundant, the bottom is clay and the water milky. This lake is separated from Salt Lake (north), a typical alkaline-saline lake, by only a low strip of sand about 200 yards wide. If the water level should be raised $2\frac{1}{2}$ feet, these two lakes would be merged into one. The difference in vegetation seems to be due to the character of the bottoms. Sago pondweed can grow in sandy soil but clay is more favorable.

The only decidedly characteristic shore or marsh plants of the saline lakes are Nevada bulrush and inland cord grass; other plants, which will be taken up later, are very abundant, but they can be found also near alkaline lakes. The two species just mentioned, however, appeared to be extremely good plant indicators of a saline soil. They are always found in sandy areas along the shore, the bulrush being the more abundant.

The Nevada bulrush has the appearance of a stunted three-square with thicker spikes but can be readily distinguished from that plant by its round stem. This species always occurs in large patches. The other salt indicator, inland cord grass, is never very abundant, occurring only as scattered solitary plants and with rootstocks not spreading far, as they do in the remarkably stoloniferous Nevada bulrush. The inland cord grass (*Spartina gracilis*) must not, however, be confused with cord grass (*S. michauxiana*), the common

species found throughout North Dakota near fresh-water or alkaline lakes. This latter grows in clumps to a height of $3\frac{1}{2}$ to 7 feet, while the salt-loving species, inland cord grass, is solitary, never more than $2\frac{1}{2}$ feet high, and has 2 to 4 (rarely 5) spikes, while cord grass has normally anywhere from 7 to 40 spikes. The parts of the flowering heads, or spikes, of both these species are compactly arranged, somewhat like the segments of a feather, an appearance that distinguishes them from all other marsh grasses of the region.

In some of the dried-out lakes of this group (Stink and Round Lakes in Barnes County, and others) bayonet grass was very abundant, so that they resembled in many ways Group 2, B; however, the larger lakes in the same vicinity of approximately the same type had a very high total concentration of salts, as shown by chemical analysis of samples taken.

In the saline sandy meadows the following plants, besides the two just described, are abundant: Baltic rush, rough-leaf dropseed, and seaside arrowgrass. On the barren flats, samphire is fairly common, as well as a low, depauperate form of sea blite (*Dondia depressa*). When the sandy association just described is absent, a clearly defined line exists between the samphire flats and the next association of plants. This possibly can be better understood by referring to Figure 1. Along this line and extending back from the lake, the following species are common: Slender meadow grass, orach, red goosefoot, sea blite (*D. depressa*), squirreltail grass, and reed canary grass. In some cases a border of slender meadow grass comes first; in other cases squirreltail grass, and rarely reed canary grass. Back of this line all are more or less abundant, especially the last two. Salt grass, not previously mentioned, is the most abundant of all the salt-loving plants and grows more or less abundantly in all the foregoing situations (Table 4); in fact, it seems capable of growing where other plants can not, evidently being able to endure a high degree of salinity or alkalinity. Another salt-loving plant, sea milkwort, is found along the border of two or three lakes only and in very small quantities.

Back of the sandy shores or meadows of the saline lakes the vegetation is very different; first there is a region of flat or gently sloping land where only Canada goldenrod, gum plant, and rarely prairie thistle and Woods's rose are found. Beyond, on the sloping or steep hillsides, the following shrubby plants are most abundant: Silverberry, western snowberry, and Woods's rose; besides these, little bluestem grass and quack grass are present, as well as two species of wormwood, or sage (*Artemisia frigida* and *A. ludoviciana*).

The plants already discussed are by no means all that are found in the vicinity of the saline lakes; only those of importance have been taken up in detail. On pages 47 to 64 will be found a complete list of all plants seen in North Dakota during the summer of 1917 for this group and for other groups, listed under the families in systematic order.

In order that the information relating to the saline lakes may be more advantageously used, a complete list of all the lakes in this group is added, showing name, exact location, area (if more than 1 square mile), date visited, and abundance of the aquatic and marsh plants and any other plants important as duck food. (Table 5.)

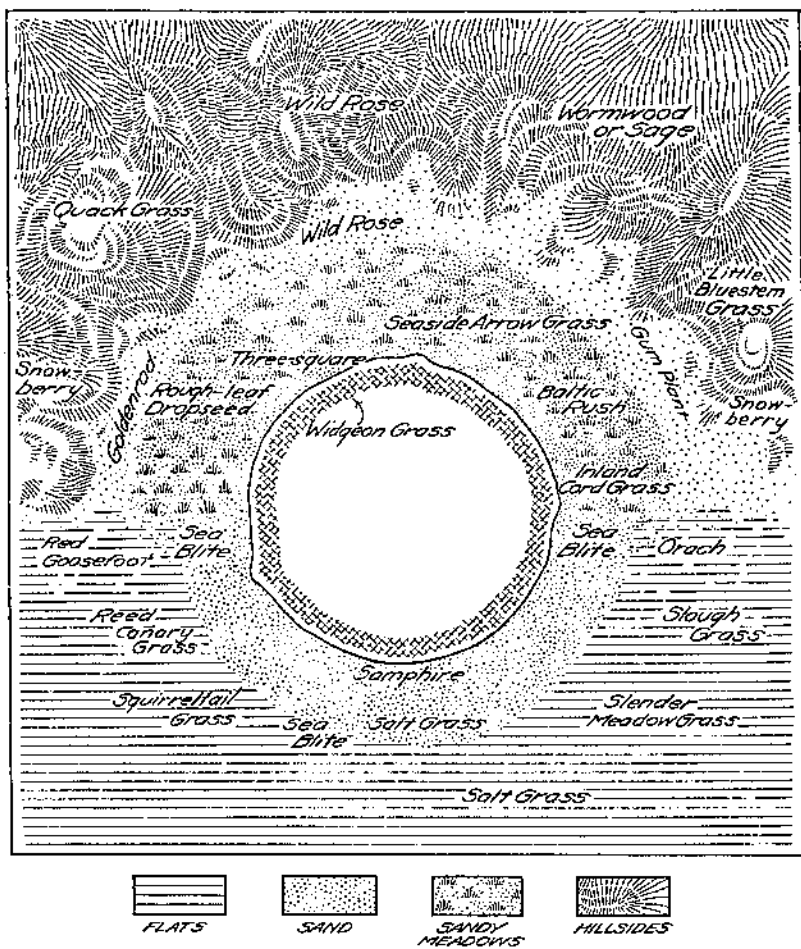


FIGURE 1.—Plant associations found in the vicinity of a typical saline lake of North Dakota

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TABLE 5.—*Saline lakes of North Dakota and their vegetation, Group 1*

[illegible]

Griggs County:																			
Addie (1) ⁷	Binford (4 mi. SE.)	Aug. 18					A			R	C		C	R	R	F			
Jessie	do	do									C								
Pierce-McHenry Counties:																			
Smoky (3) ⁹	Drake (24 mi. NE.)	Aug. 29					A	A		R	F				A	R			
McHenry County:																			
Round (1) ^{7, 9}	Drake (9 mi. NE.)	Aug. 25	C		A	C			C			C			C				
Slough	Drake (28 mi. N.)	Sept. 1				A		C											
Pierce County:																			
East Smoky	Drake (24 mi. NE.)	Aug. 29							C	C		C			C				
Kilgore	Orrin (6 mi. N.)	do					C	C	C										
Stony ⁸	do	do																	
Silver	Orrin (4 mi. NE.)	do			R	C				A	F	F			A				
Orrin	Orrin (1 mi. SW.)	do				C			C										
Antelope (2) ⁸	Drake (12 mi. E.)	do							C										
Wolford ⁸	Wolford (5 mi. SW.)	Sept. 29				C			C		R				R	R			
Soap ⁸	Rugby (3 mi. NE.)	do				A			A						R	R			
Goose ⁸	Rugby (5 mi. NE.)	do				A			A										
McLean County:																			
Holmes (east)	Turtle Lake (2 mi. NW.)	Sept. 5				A		A	A										
Holmes (west)	do	do	A			A		A	A										
Williams (1) ^{8, 7}	Turtle Lake (2 mi. N.)	do				A		A	A										
Blue (2)	Turtle Lake (2 mi. NE.)	do	R						C			C							
Brecken	Turtle Lake (3 mi. N.)	do		G															
Nos. 1, 2, 3, 4 (southwest to northeast)	Mercer (6 mi. N.)	do		A			A	A				A	C						
Ward County:																			
Anna, secs. 5-6 (1)	Ryder (9 mi. NW.)	Sept. 11	A																
Anna, secs. 17-20	Ryder (6 mi. NW.)	do			R								C			C			
Shenley, secs. 34-35	Ryder (17 mi. NNW.)	do	G	C			F												
Hesnault, secs. 5-8 (3)	Ryder (15 mi. NNW.)	do	A				C								C	R	C		
Rice, secs. 27-35 (1)	Ryder (9 mi. NE.)	Sept. 12						A				C				C	C	A	
Rice, sec. 27	do	do		R				A				C				C	C	A	
Grand Forks County:																			
Kellys Slough (1)	Grand Forks (10 mi. NW.)	Sept. 20	A								A		A	A	C	A			
Walsh County:																			
Minto (2)	Minto (3½ mi. SE.)	Sept. 21	A	A							A		C			A	A	C	
Salt	Grafton (7 mi. NE.)	Sept. 22	A								A		A			A	A	C	
Salt ⁸	Grafton (10 mi. NE.)	do											A	F		A	A	F	
Burke County:																			
Vanville, secs. 21-28 (2)	Lostwood (6 mi. N.)	Oct. 3	F	F		C	C					C							
Vanville, sec. 16 (1)	Lostwood (7 mi. N.)	do		A		C	C					C							
Larsen Slough	Columbus (12 mi. WSW.)	Oct. 12					A											A	
Banson Slough	Columbus (10 mi. WSW.)	do											A						
Mountain County:																			
Lostwood, secs. 4-5 (1)	Lostwood (4 mi. N.)	Oct. 3	A			C						F							
Lostwood, secs. 5-17 (1)	Lostwood (2½ mi. N.)	do	A			C						F							
T. 157 N., R. 89 W., secs. 33-34	Palermo (3 mi. NE.)	Oct. 9	F		F					F									
T. 157 N., R. 89 W., secs. 27-16 (2) ⁸	Palermo (5 mi. NE.)	do					A											F	

See footnotes at end of table.

TABLE 5.—Saline lakes of North Dakota and their vegetation, Group 1—Continued

County and lake	Location	Date visited	Vegetation and occurrence											
			<i>Ruppia maritima</i>	Algae	<i>Potamogeton pectinatus</i>	<i>Scirpus americanus</i>	<i>Scirpus nevadensis</i>	<i>Scirpus occidentalis</i>	<i>Scirpus paludosus</i>	<i>Spartina gracilis</i>	<i>Spartina michauxiana</i>	<i>Phragmites communis</i>	<i>Salicornia rubra</i>	<i>Triglochin maritima</i>
Montrall County—Continued.														
T. 157 N., R. 89 W., secs. 21-32 (2).	Palermo (4 mi. N.)	do.					A			A				F
T. 157 N., R. 89 W., secs. 8-17 (2).	Palermo (8 mi. N.)	do.		R			C			C				
T. 157 N., R. 89 W., sec. 4; T. 158 N., sec. 33 (1).	Palermo (9 mi. N.)	do.				A	C			C				
White (3)	Powers Lake (8 mi. S.)	Oct. 16.								C				
Cottonwood (2)	Powers Lake (12 mi. SE.)	do.	F	F						C			A	
Alkali	Stanley (2½ mi. E.)	do.		R						C			A	
Alkali	Palermo (1½ mi. NW.)	do.	C	C									A	
Olson (west)	Palermo (1½ mi. SW.)	do.	C	C						A			A	
Alkali (2)	Palermo (10 mi. SE.)	do.			A	F	A			R				C
Kickapoo (2)	Blaisdell (8 mi. SE.)	do.					A			A				
Kickapoo (2)	Tagus (8 mi. S.)	do.	F				A			A				
Nelson County:														
Stump (18)	Tolna (N.)	Oct. 5, 6.	A	A	A	R							R	
Divide County:														
Kermit ¹	Kermit (1 mi. E.)	Oct. 12.					A			C			A	
Johnson	Fortuna (8 mi. SW.)	Oct. 13.			A				C	C			C	
Miller (2)	Fortuna (12 mi. SW.)	do.		R			C			C			A	C
North (1)	Fortuna (11 mi. SW.)	do.					C			A			A	C
Ramsey-Benson Counties:														
Devils (60) ²	Devils Lake	Oct. 12.	A	C	A	R				F		C	F	C
Benson County:														
Free Peoples ³	Warwick (NW.)	Oct. 21.		R		C								

¹ A, abundant; C, common; F, fairly common; R, rare.² Usually *Enteromorpha*; rarely *Synechococcus* as in No. 1 Mercer Lake.³ Numbers in parentheses represent approximate area in square miles.⁴ Springs along edges of lakes had the following: *Chara* sp., rare; *Ruppia maritima*, rare; *Zannichellia palustris*, abundant; *Lemna minor*, fairly common; *Scirpus validus*, fairly common; *Typha latifolia*, fairly common.⁵ Springs along edges of lakes had the following: *Chara* sp., rare; *Zannichellia palustris*, rare; *Lemna minor*, rare; *Scirpus validus*, rare; *Typha latifolia*, rare.⁶ Dry when visited.⁷ *Typha latifolia*, rare.⁸ These lakes have *Chara* sp. present (fairly common and even abundant in Bird Lake); however, they should still be considered members of this group, as three out of four had the two saline indicators, *Scirpus nevadensis* or *Spartina gracilis*, present, and the fourth was very salty. Chemical analysis will probably show later that *Chara* can withstand a higher concentration of salt than is shown at present from samples thus far analyzed.⁹ *Scirpus validus*, very rare.

GROUP 2, ALKALINE-SALINE LAKES

Under Group 2 are three types of lakes. In the majority of cases the type to which a certain lake belongs is clear, but there are occasional intermediates. Type A is characterized by milky water, type B by bayonet grass growing throughout, and type C by clear water, sandy bottoms, and sandy shores, with widgeon grass and sago pondweed dominant. Type B occasionally has milky water, but the great abundance of bayonet grass still serves to distinguish it from type A. Under unfavorable conditions the lakes characterized by bayonet grass become similar to those of type A. Bayonet grass requires a reasonable quantity of water during the first part of the growing season, but drought during the middle of the season does not affect its ability to reproduce itself. On the other hand, if for a few years sufficient water is not present during the spring, bayonet grass is undoubtedly killed out. Evidence of this was seen in many cases.

TYPE A, CHARACTERIZED PRIMARILY BY MILKY WATER

Throughout North Dakota, the type A lake is the most abundant of all; and the number of lakes it is possible to list in this group gives no idea as to their actual number. On all trips throughout the State hundreds were constantly seen, only the largest and most important of which were listed or described. If all such lakes were taken into consideration, probably 90 per cent of them would be found dry during the late summer months of August and September. Lakes of this type are always shallow, and water, when present, is always milky. When dry they can be distinguished readily by a glaring, snow-white bottom exceedingly dazzling in bright sunlight. Occasionally saline lakes have this appearance but are readily distinguished by the two saline indicators, Nevada bulrush and inland cord grass. The surface of these dried-out lakes is a mass of dry alkali dust 2 or 3 inches deep. On windy days this dust is continually being blown about, making great clouds of smokelike dust very irritating to the mouth and eyes, and far from beneficial to neighboring cultivated lands. Below this dry, alkali dust there is usually a mass of sticky blue or greenish clay.

When water is present the aquatic vegetation consists of sago pondweed and algae only. Sago pondweed is more abundant, occurring in 65 per cent of the lakes, whereas algae are present in 54 per cent.

The marsh vegetation is very restricted. Three-square is most abundant, especially in sandy areas; the only other plants at all common are bayonet grass and bulrush (*Scirpus occidentalis*). The former, although found in almost all the lakes of this type, is rarely abundant or even common, usually being confined to small patches. Bulrush has in general the same distribution as bayonet grass.

The shore vegetation of the alkaline-saline lakes is characteristic; the two most abundant species are salt grass and sea blite (*Dondia depressa*). Sea blite has two forms: One is a low-spreading, depauperate form occurring on the dried-out flats and extending beyond the widely spreading salt grass where nothing else will grow. The other form is high, erect, with elongate inflorescence, and is restricted to a narrow fringe back of the area in which salt grass grows. On the outer edge of this dry flat, samphire, which is limited to large patches

forming a broken band around the lake, is also found. As the season progresses this fleshy plant turns bright red and is a distinguishing feature of the alkali flats late in summer. Not only can these three plants apparently withstand more alkali than any of the others, but they also require less moisture for their growth. This is especially noticeable on lake bottoms that are completely dry. Samphire is usually found in the soils that contain a large percentage of sodium.

Back of this dry flat association from a clearly marked line extending shoreward the following plants are abundant: Squirreltail grass, slender meadow grass, reed canary grass, and orach (*Atriplex patula* var. *hastata*). Besides these the following are somewhat common: Red goosefoot, oak-leaf goosefoot, and cord grass. The distribution of these plants is very similar to that on the flats bordering the saline lakes, as illustrated in Figure 1; the sandy areas, however, are extremely limited and when present are characterized by three-square and rough-leaf dropseed.

Since the alkaline-saline group of lakes is for the most part located in shallow depressions, hillside vegetation is usually lacking. In the few cases where present the following plants are the most characteristic: Woods's rose, western snowberry, and silverberry.

For detailed information in regard to individual lakes see Table 6; for distribution of other plants see annotated list beginning on page 47.

TABLE 6.—*Alkaline-saline lakes of North Dakota and their vegetation, Group 2, type A*

County and lake	Location	Date visited	Vegetation and occurrence ¹							
			Potamogeton pectinatus	Algae	Scirpus americanus	Scirpus paludosus	Scirpus occidentalis	Phragmites communis	Typha latifolia	Spartina michauxiana
Logan County:										
Alkali (1) ²	Napoleon (16 mi. SE.).....	Aug. 2		A	F	F	F			
Kidder County:										
Long Alkali (2).....	Robinson (7 mi. N.).....	Aug. 17		C			R			
Kickapoo (sections 4-33) (1).....	Tuttle (6½ mi. NW.).....	do	R	A	A		R			
South Alkali (1) ²	Wing (10 mi. NNE.).....	do					R			
Norway (section 9).....	Arena (6 mi. E.).....	Aug. 18	A	A						
Norway (section 4).....	do.....	do	A	A						
McHenry County:										
Alkali No. 1 (1) ²	Drake (14 mi. N.).....	Aug. 29			A	R				
Alkali No. 2.....	do.....	do			A	R				
Long ²	Drake (15 mi. N.).....	do			A	R				
Pierce County:										
Alkali ²	Orrin (1 mi. S.).....	do			A	R				
Twin ²	Orrin (8 mi. SE.).....	do			A	R				
Petrified ²	Aylmer (17 mi. NE.).....	Aug. 31			A	C				
Long (1) ²	Aylmer (21 mi. NE.).....	do			A					
Mud ²	Wolford (2½ mi. SW.).....	Sept. 29	R			F				F
Pierce-Rolette Counties:										
Twin (1) ²	Nansen (SW.).....	do			R					
McLean County:										
Nettle (1).....	Underwood (13 mi. NE.).....	Sept. 1	A	C			C			
Nettle, East.....	do.....	do		O	A				A	
Nettle, Northeast (1) ²	do.....	do	R	A	C	C	A	A		
Nettle, Southeast.....	do.....	do	R	A	C		R			
Nelson.....	Turtle Lake (3 mi. NE.).....	do		A						
Turtle (2).....	Turtle Lake (4 mi. W.).....	do	A	C	A	R			C	
Falkirk.....	Falkirk (W. of railroad).....	Sept. 3	R			R			A	
Alkali (2) ²	Dogden (2 mi. E.).....	Sept. 5								
Mud (1).....	Coal Harbor (6 mi. NE.).....	Sept. 8	A	R	C			F		
Alkali (2) ²	Coal Harbor (6 mi. ENE.).....	do								
Anna (section 28).....	Ryder (4 mi. N.).....	Sept. 11	A			A	A			
Tolgen (sections 18-19).....	Ryder (19 mi. NNW.).....	do				R				C
Sheridan County:										
Alkali Nos. 1-3 (6) ²	Kief (2-4 mi. S.).....	Sept. 5								

¹ A, abundant; C, common; F, fairly common; R, rare.² Numbers in parentheses represent approximate area in square miles.³ Dry when visited.⁴ Whitetop, fairly common.

TABLE 6.—Alkaline-saline lakes of North Dakota and their vegetation, Group 2, type A—Continued

County and lake	Location	Date visited	Vegetation and occurrence								
			Potamogeton pectinatus	Algae	Scirpus americanus	Scirpus paludosus	Scirpus occidentalis	Phragmites communis	Typha latifolia	Spartina michauxiana	Salicornia rubra
Burke County:											
Diamond (section 27).....	Kenmare (16 mi. W.).....	Oct. 2	A	C							F
Vanville (sections 28-29).....	Kenmare (19 mi. SW.).....	Oct. 3	F	F	A				R		
Lucy, section 20.....	Kenmare (24 mi. W.).....	do.	A				A				
Beauvert.....	Lignite (3 mi. SW.).....	Oct. 12	A	R	C		C			A	
Keller.....	Larsen.....	do.	F		C						
East Kermi (1) ¹	Kermi (3 mi. E.).....	do.				C					
Mountrail County:											
Lostwood (section 4).....	Kenmare (20 mi. SW.).....	Oct. 3									
Palermo (section 12).....	Palermo (2 mi. NW.).....	Oct. 9		R							
Shallow.....	Palermo (7 mi. SE.).....	Oct. 16	A				C			C	
Ramsey County:											
Fox ¹	Crary (12 mi. N.).....	Oct. 12				F	R	R		F	F
West Fox ¹	do.....	do.			F	F	F	F	R		
Divide County:											
Elkhorn (section 13).....	Fortuna (5 mi. WNW.).....	Oct. 13	F			R	A				R
Westby (section 17).....	Alcabo (4 mi. W.).....	do.				R	A				F
Alkali (6) ¹	Westby (14 mi. SSE.).....	do.		R							

¹ Dry when visited.

TYPE B, CHARACTERIZED BY AN ABUNDANCE OF BAYONET GRASS THROUGHOUT

Lakes of type B are somewhat similar to those of type A. In most cases the whole lake is covered with a luxuriant growth of bayonet grass. The depth of water averages 2 to 2½ feet, a condition apparently most favorable to the growth of this sedge. Later in summer a large number of these lakes become dry, but the percentage is far less than of type A. Of the lakes surveyed, about 10 per cent were dry during August or September; however, if all the lakes that were seen were considered, the dry lakes would be less than 30 per cent of the total, as compared with 90 per cent or more of type A.

Bulrush is found in approximately half of the lakes, but in almost all cases is represented by only a few small patches. Three-square, however, is rather common on the sandy beaches. Bog rush is frequent. Giant reed grass in small quantities is also found occasionally.

The aquatic vegetation is restricted to three species. One of these, common bladderwort, was found only four times, which might be considered accidental or at least not necessarily typical of this group of lakes. The other two species are sago pondweed and algae. Not considering the dry lakes, 49 per cent contain algae and 65 per cent sago pondweed.

The shore vegetation, as would be expected, does not differ greatly from that of type A. Squirreltail grass, orach, and the high form of sea blite (*Dondia depressa*) are the most abundant. These are located usually back from the denuded, dried-out flats. Salt grass was found growing in all situations, while red goosefoot, oak-leaf goosefoot, reed canary grass, and slender meadow grass are common and associated with squirreltail grass. Seaside buttercup, Baltic rush, and seaside heliotrope are frequent, and the following are rare: Arrowgrass, gum plant, rough-leaf dropseed, and samphire.

The hillside vegetation when present was found identical with that of type A.

For detailed information in regard to individual lakes see Table 7.

TABLE 7.—Alkaline-saline lakes of North Dakota and their vegetation, Group 2, type B

County and lake	Location	Date visited	Vegetation and occurrence ¹										
			Potamogeton pectinatus	Algae	Scirpus paludosus	Scirpus occidentalis	Scirpus americanus	Phragmites communis	Eleocharis palustris	Typha latifolia	Spartina Michauxiana	Salicornia rubra	Triglochin maritima
Richland County:													
Round ²	Hankinson (10 mi. SW.)	July 27	R	A	A	R	C	C	C	F	F	C	
Gooleys	Hankinson (11 mi. SW.)	do.	R	A	C	C	C	C	C	F	F		
Logan County:													
North Napoleon (3) ^{3 4}	Napoleon (1½ mi. NW.)	July 31	C		A	F	A	A	R	F			
South Napoleon (3) ^{4 5}	Napoleon (1 mi. SW.)	Aug. 1	F	A	A	A	A	F	C		F	R	
Alkali (4) (4 in all)	Napoleon (16 mi. SE.)	Aug. 2	C		A	F	C	F					
King	Napoleon (21 mi. ESE.)	do.		A	A	C	C	F		R			
Alkali (1)	Napoleon (14 mi. ENE.)	Aug. 3		A	A	C	C	F		R			
Emmons County:													
Goose (1)	Napoleon (8½ mi. W.)	Aug. 4	F	A	A	F	C					C	
Burleigh-Kidder Counties:													
Long (30) ^{4 6}	Napoleon (20 mi. NW.)	Aug. 6		A	A	A	A	A		C		F	F
Kidder County:													
Big Alkali (20)	Dawson (16 mi. SE.)	Aug. 6		A	A	C	A	A	R				F
Isabel Slough (1) ^{4 6}	Dawson (4 mi. SW.)	Aug. 8		A	A	C	A	A	A	A	R		C
Prettin	Lake Williams (7 mi. N.)	Aug. 16	F	A	A	C	A		A		R		
Prettin (SW. ¼ sec. 12)	Lake Williams (6 mi. N.)	do.	F	A	A	A	A	A					
Wallace (N. secs. 35-36)	Lake Williams (9 mi. N.)	do.	A	A	A	A							
Merkel (S. secs. 21-28) (1)	Robinson (4½ mi. NW.)	Aug. 17	F	A	A							C	
Twin, South	Arena (7 mi. N.)	Aug. 18		A	A	A	A			C		C	
Green (2)	Arena (4 mi. NE.)	do.			A								
Alkali (2) ⁷	Arena (SW.)	do.			A								
Alkali (1) ⁷	Arena (W.)	do.			A								
Alkali ⁷	Arena (6 mi. E.)	do.			A								
Ashley	Dawson (2 mi. NE.)	Aug. 20	A		A	A	A	A					
Alkali Slough	Dawson (3 mi. NE.)	do.			A			A	A				
Crystal Springs	Crystal Springs (2 mi. NW.)	do.			A	R							
Burleigh County:													
McKensie Sloughs (10) ⁸	McKensie (N., E., W., S.)	Aug. 24	C	R	A	R			A	C	C		
Dunn County:													
Myers Slough	Richardton (13 mi. NE.)	Aug. 28			A								
Sheridan County:													
Denhoff Sloughs (1) ⁷	Denhoff (6 mi. W.)	Sept. 3			A								
Sheridan-McLean Counties:													
Alkali Sloughs (3)	Dogden (SE.)	Sept. 5			A								

McLean County:													
Nettle Slough.....	Underwood (15 mi. NE.)	Sept. 1			A	A			A				
Alkali Slough (1).....	Max (3½ mi. SW.)	Sept. 8	A		A								
Anna (sec. 33).....	Ryder (2½ mi. N.)	Sept. 11	C		A	C			C				F
Anna (sec. 28) (3).....	Ryder (4 mi. N.)	do	A		A	R							F
Lund, sec. 35—Orleans, sec. 4	Ryder (10 mi. NW.)	do	A		A	A			C		C		
Lund (sec. 22 and sec. 10)	Ryder (14 mi. NW.)	do			A	P							
Spring (sec. 17).....	Douglas (5 mi. NE.)	Sept. 12	C		A	A							
Bottineau County:													
Lords.....	Bottineau (12 mi. ESE.)	Sept. 18	A		A	A	A	R				C	
Rolette County:													
Long (3) ¹	Rolette (5 mi. SE.)	Sept. 29	A		A	A			R				
Pierce County:													
Round (5) ² ³	Barton (1½ mi. S.)	Oct. 2			A								
Burke County:													
Cushion Slough (1).....	Kenmare (9 mi. SW.)	Oct. 3		A	A	R	C		C			A	
Mountrail County:													
Blaisdell (sec. 10).....	Kenmare (23 mi. S.)	Oct. 9	F		A	A			F			F	
T. 157 N., R. 89 W., sec. 27	Palermo (5 mi. NE.)	do	A		A	A							
Ramsey County:													
Black Slough.....	Southam (6 mi. NNW.)	Oct. 12	R		A	C		R				F	
Divide County:													
Sloughs (3).....	Westby (4¼-6 mi. S.)	Oct. 13			A								
Ward County:													
Tagus Slough.....	Tagus (4 mi. NE.)	Oct. 16			A								
Benson County:													
Mud.....	Leeds (SSW.)	Oct. 24		R	A	F							

¹ A, abundant; C, common; F, fairly common; R, rare.

² Whitetop, rare.

³ Numbers in parentheses represent approximate area in square miles.

⁴ *Utricularia vulgaris* var. *americana*, fairly common.

⁵ This lake in addition has the following: Whitetop, common; bladderwort, abundant; *Lemna trisulca*, rare; *Ilypopsis vulgaris*, rare.

⁶ *Scirpus validus*, rare.

⁷ Dry when visited.

⁸ Whitetop, common; *Sagittaria latifolia*, rare.

⁹ Whitetop, common; *Scirpus validus*, common; *Myriophyllum*, abundant; the last named seems out of place, but this lake can be better classified here on account of the great abundance of *Scirpus paludosus*.

TYPE C, CHARACTERIZED BY CLEAR WATER WITH SANDY BOTTOMS AND SHORES

Lakes of type C are very uniform, distinct, and characterized by deep, clear water and sandy bottoms and shores. The majority of these lakes are well known throughout the State, since they are extensively used by near-by towns for swimming pools and summer resorts.

The aquatic vegetation is limited to the following species: Widgeon grass, sago pondweed, stonewort, and algae. Of these, widgeon grass and sago pondweed are the most abundant. Widgeon grass was found in 27 of the 46 lakes and sago pondweed in 33. Widgeon grass as a rule is the more abundant of the two and generally grows luxuriantly, being found, as in the saline lakes, in a band near shore in water varying from 3 to 8 feet deep. The habitat of sago pondweed is possibly more inclusive. Algae were seen in 15 of 46 lakes, and stonewort was found in 6. There is no doubt that the latter plant is more abundant than this number would indicate, since it occurs very often only in scattered patches, making its detection exceedingly difficult. In one case, Moran Lake, it is very abundant, occupying the center of the lake and covering in all from 50 to 60 acres to a depth of 6 or 7 feet. In this case the stoneworts are very large, exceedingly coarse and stiff, and reach a height of 7 or 8 feet. This is a very unusual form, as all the other stoneworts seen in North Dakota are of two distinct types: A small, yellow-green, tufted form, 3 to 5 inches high, rather common on the sandy bottoms of lakes of Group 4 (p. 35); and a larger, brownish form, 1 to 1½ feet high⁶ occurring in dense masses that cover the entire floor of some fresh-water lakes.

Marsh vegetation about type C lakes in most cases is very scanty. Bulrush, for example, although found in 60 per cent of the lakes, usually occurred in infrequent small patches. Giant reed grass, common cattail, and cord grass were found in 20 to 30 per cent of the lakes, but less abundantly than the bulrush. Bog rush and bayonet grass are rare. On the other hand, three-square is fairly abundant but usually confined to the sandy shores, rarely extending into the lakes.

The shore and hillside flora is very diverse—more so than for any other group of lakes, with the possible exception of Groups 3 and 5 (p. 28 and p. 41, respectively). More than 150 species of shore plants were listed from this group of lakes alone. A large number of these are abundant; it will therefore be possible to take up here only the most important, others being listed at the end of this bulletin. The reason for this large number is that there is present a combination of two or three distinct plant associations; those of the slightly alkaline flats, meadows, and sandy shores; dry and barren hillsides; and another association not previously discussed in this bulletin, namely, wooded slopes. Although the diversity of the vegetation of the wooded areas is not very pronounced, yet when combined with the others, the number of species is noticeably increased.

The following, given in their order of importance, are the most abundant shore plants: Squirreltail grass, western snowberry, Woods's rose, reed canary grass, silverweed, silverberry, southern cottonwood, fringed wormwood, and bugleweed (*Lycopus lucidus* var. *americanus*). The first is a plant of the flats and meadows; the next two are charac-

⁶ Many attempts were made to find some one capable of identifying the specimens of Characene collected but without success.

teristic of dry hillsides; reed canary grass prefers sandy meadows; silverweed is restricted to sandy shores, silverberry to dry hillsides, southern cottonwood to wooded slopes, fringed wormwood to dry barren hillsides; and bugleweed is a plant found along the border of the meadow vegetation.

As there are so many other plants that are exceedingly abundant, they will merely be listed here in the order of their abundance according to the association in which they are found:

SLIGHTLY ALKALINE FLATS ⁷

Squirreltail grass (<i>Hordeum jubatum</i>).	Bugleweed (<i>Lycopus lucidus</i> var. <i>americanus</i>).
Red goosefoot (<i>Chenopodium rubrum</i>).	Rayless aster (<i>Aster brachyactis</i>).
Pale smartweed (<i>Polygonum lapathifolium</i>).	Panicled aster (<i>Aster paniculatus</i>).
Golden dock (<i>Rumex persicarioides</i>).	

MEADOWS AND SANDY SHORES ⁷

Silverweed (<i>Potentilla anserina</i>).	Reed canary grass (<i>Phalaris arundinacea</i>).
Bluegrass (<i>Poa triflora</i>).	Cord grass (<i>Spartina michauxiana</i>).
Rough-leaf dropseed (<i>Sporobolus asperifolius</i>).	Prairie thistle (<i>Cirsium undulatum</i>).
Seaside buttercup (<i>Ranunculus cymbalaria</i>).	Torrey's rush (<i>Juncus torreyi</i>).
Baltic rush (<i>Juncus balticus</i> var. <i>littoralis</i>).	Licorice (<i>Glycyrrhiza lepidota</i>).

DRY AND BARREN HILLSIDES ⁷

Western snowberry (<i>Symphoricarpos occidentalis</i>).	Woods's rose (<i>Rosa woodsii</i>).
Silverberry (<i>Elaeagnus commutata</i>).	Fringed wormwood (<i>Artemisia frigida</i>).
Canada goldenrod (<i>Solidago canadensis</i>).	White sage (<i>Artemisia ludoviciana</i>).

WOODED SLOPES ⁸

Southern cottonwood (<i>Populus deltoides</i>).	Green ash (<i>Fraxinus lanceolata</i>).
Shadblow (<i>Amelanchier florida</i>).	Smooth gooseberry (<i>Ribes oxycanthoides</i>).
Sand-bar willow ⁹ (<i>Salix interior</i>).	Mossycup oak (<i>Quercus macrocarpa</i>).
Chokecherry (<i>Prunus virginiana</i>).	American elm (<i>Ulmus americana</i>).
Hawthorn (<i>Crataegus chrysoarpa</i>).	Quaking aspen (<i>Populus tremuloides</i>).
Boxelder (<i>Acer negundo</i>).	Nannyberry (<i>Viburnum lentago</i>).

For detailed information in regard to individual lakes see Table 8.

⁷ All plants mentioned occurred in approximately 20 to 25 per cent of the lakes.

⁸ The first 4 mentioned occurred in approximately 20 per cent of the lakes, the remaining 8 in 10 to 20 per cent.

⁹ Six other species of willow were found, most of which were only frequent or rare; see list at end of bulletin.

TABLE 8.—*Alkaline-saline lakes of North Dakota and their vegetation, Group 2, type C*

County and lake	Location	Date visited	Vegetation and occurrence ¹										
			Rup- pla mar- tima	Pota- mo- geton pecti- natus	Algae	Chara sp.	Scir- pus ameri- canus	Scir- pus occi- den- talis	Scir- pus pulu- dosus	Phrag- mites com- munis	Typha lati- folia	Spar- tina mi- chau- xiana	Eleo- charis palu- stris
Richland County:													
Swan (2) ¹	Hankinson (12 mi. W.)	July 29		R	A		C	C	C	F	F	C	
Moran (1) ¹	Hankinson (7 mi. WSW.)	July 31		R	A	A		C		R	F		
Barnes County:													
Moon	Valley City (8 mi. SW.)	Aug. 3	A	A	F	F	A	F	F	F	F		C
North Sweetwater ¹	Sanborn (4 mi. S.)	Aug. 9	F	A			F	F	F	F	F		
Kidder County:													
Pursian	Napoleon (18 mi. NW.)	Aug. 4										C	
Salt, North (2) ¹	Dawson (15 mi. SE.)	Aug. 6	F	A	A		C	F	R	R	R	C	
Isabel (1)	Dawson (2½ mi. S.)	Aug. 8	A	A	F	C	C	F	C	C	F		
Round	Pettibone (2 mi. NE.)	Aug. 16	F	C	A		C	C	C	C			
Fretin (NE. ¼ sec. 12)	Pettibone (14 mi. NW.)	do.	F	C	A		C	C	C	C			
West Woodhouse	Turtle (10 mi. N.)	Aug. 17	R	C	A		C	C	C	F	F		
Mitchell ¹	Wing (2 mi. NW.)	Aug. 18	C	A	A		C	C	C	F	F		
Stutsman County:													
Marston	Chase Lake (3 mi. N.)	Aug. 10	A	A									
McHenry County:													
George ¹	Drake (15 mi. N.)	Aug. 28	C	A			A	A		A	C		R
Long, Northwest	Drake (15½ mi. N.)	Aug. 29		A			A	A					
Denbigh ¹	Denbigh (N.)	Oct. 2	A	A		C	F	A		A			
Riga (1) ¹	Riga (3 mi. NW.)	do.	A	A				A					
Pierce County:													
Freshwater	Orrin (5 mi. N.)	Aug. 29		R			C	C	C	R			
Sections 27-28	Orrin (2 mi. S.)	do.		F			C	C	C	R			R
McDonough	Orrin (2¼ mi. SE.)	do.					A	A	A				F
Girard (3) ¹	Aylmer (14 mi. NE.)	Aug. 31		C			A	A	A	C	C	C	
Buffalo (1) ¹	Aylmer (17 mi. NE.)	do.		A			R	F		R	F		
Spring	Wolford (18½ mi. W.)	Sept. 29	C	C				C					
McLean County:													
Cherry	Turtle Lake (3 mi. W.)	Sept. 1		F			C		F	A		F	C
Ordway (1)	Turtle Lake (3 mi. SW.)	do.		R			A			C			
Billows	Turtle Lake (NNE.)	Sept. 5	A				A	R					
Margaret	do.	do.		A		A		C		R		C	
Brush (1)	Turtle Lake (E.)	do.	A	C	R		C						C
Peterson (1)	Turtle Lake (ENE.)	do.			C		C						C
Pelican (2)	do.	do.	A	C			C						
Stuart	Mercer (10 mi. N.)	do.					C						
North Stuart	Mercer (10½ mi. N.)	do.	A	C			A	R					

Underdahl (1).....	Ryder (12 mi. N.).....	Sept. 11	A	A				R					R
Anna (secs. 17-18).....	Ryder (6 mi. NE.).....	do.		F									
Nelson.....	Douglas (7 mi. NE.).....	Sept. 12		A									
Carlson, Southeast.....	do.	do.		R		R							
Carlson, Northwest.....	do.	do.	A	R			C						
Vernon (1).....	Douglas (9 mi. N.).....	do.	F			A		A				C	
Rice (sec. 14).....	Douglas (10 mi. N.).....	do.	A			A						C	
Rice (2).....	Douglas (10½ mi. N.).....	do.	F	R			F						
Burke County:													
Thompson (1).....	Kenmare (15 mi. W.).....	Oct. 2	A										
Vanville (secs. 33-34).....	Kenmare (25 mi. SW.).....	Oct. 3		R		R		A	A				
Coville (sec. 1).....	Kenmare (25 mi. WSW.).....	Oct. 5	R					A			R		
Mountrail County:													
Clear.....	Palermo (6 mi. NNW.).....	Oct. 9	A	C			C						
Blaisdell (sec. 9).....	Blaisdell (1 mi. N.).....	do.		F		R							
Divide County:													
Skjermo.....	Fortuna (5 mi. NW.).....	Oct. 13	F					A					
Sandon.....	Fortuna (5 mi. W.).....	do.	A	F				R					

¹ A, abundant; C, common; F, fairly common; R, rare.

² Numbers in parentheses represent approximate area in square miles.

³ In addition, this lake had the following, found in springy places: *Scirpus validus*, fairly common; *Lemna minor*, fairly common.

⁴ Whitetop, rare.

⁵ Along the border of this lake were found *Scirpus nevadensis* and *Spartina gracilis*; Salt Lake, South, however, with a total concentration of salts of more than 26,000 parts per million, was only 75 yards distant. This undoubtedly accounts for the presence of these 2 plants, since this lake is more characteristic of Group 2, type C, than of Group 1, as its total concentration of salts was only 3,906 parts per million and sodium chloride was low.

⁶ *Scirpus validus*, rare.

⁷ *Citricularia vulgaris* var. *americana*, rare.

⁸ *Lemna minor*, frequent in springy places.

⁹ Also has whitetop, common; and *Scirpus validus*, common.

¹⁰ *Scirpus fluviatilis*, very rare.

GROUP 3, FRESH-WATER LAKES

The fresh-water lakes will be discussed under two divisions, namely, type A, prairie lakes; and type B, river lakes. Lakes of type A are as nearly fresh as any group of lakes in the State and if slightly alkaline, not enough so to hamper seriously the growth of any fresh-water vegetation. A few of the river lakes of type B appear slightly alkaline. Other distinguishing characters of these fresh-water lakes will be discussed separately by type.

TYPE A, PRAIRIE LAKES

Botanically, the prairie lakes are the most interesting of all lakes in North Dakota. In general, they have as fresh water as can be found in the State; in fact, the majority of them are far less alkaline than the group of river lakes (type B), with the possible exception of the lakes along the James River. Throughout the western part of the State the majority of the lakes of this type are small and slough-like; in the eastern part, however, they are large, having wooded slopes and a diversified aquatic vegetation.

Of the various fresh-water indicators, water milfoil is the most abundant, occurring in 66 per cent of the lakes; next in abundance is clasping-leaf pondweed, occurring in 40 per cent of the lakes. These two and the familiar sago pondweed form a trio very characteristic of the lakes of Burke and adjoining counties in the northwestern part of the State. The protected, shallow bays are the favorite habitats of water milfoil, the plant thriving best in water 1 to 3 feet deep. In such places the water milfoil is capable of driving out everything else. Where the water is deeper, sago pondweed is more often found. Of the clasping-leaf pondweed there are two forms, a large-leaved form confined to the same general region as sago pondweed, and a small-leaved variety usually associated with water milfoil or rarely found growing alone in sandy areas under shallow water. In general, however, these three species prefer muddy or mucky bottoms.

Next in importance among the fresh-water indicators is coontail, occurring in 27 per cent of the lakes, and especially abundant in a large number of the shallow, fresh-water sloughs, where in many cases it completely chokes up the whole slough. Besides this, there are waterweed and variable pondweed, the former being abundant in six shallow, sloughlike lakes, especially Bismarck and Max, and apparently rare in the deeper lakes (Ward and Mercer No. 6). Variable pondweed is found in four shallow lakes and sloughs and in one deep lake. Fries's pondweed and eelgrass pondweed were each found in one lake. The names and locations of the lakes in which these plants and other aquatics were found are given in Table 9.

Among the aquatic vegetation there are in addition a large number of species not considered fresh-water indicators, of which the most abundant are sago pondweed and algae; the former was found in 77 per cent of the lakes and the latter in 50 per cent. Horned pondweed and stonewort were found in 10 to 12 per cent of the lakes; the former grows in 2 to 3 inches of water on sandy bottoms along the borders of the lakes; the latter is of two types, one growing in deep water and completely covering the floor of the lake, the other growing as small, scattered, bushy plants apparently limited to sandy bottoms. In some of the shallower parts of the lakes and sloughs leafy pondweed is found and is exceptionally abundant in King Slough near Bismarck. Widgeon grass was found in a few of the deeper lakes, being noticeably abundant in St. Mary, Sweetwater, and Spiritwood Lakes. In some of the shallow, quiet bays a few plants of common bladderwort were seen but more abundantly in Dawson and Pummels Sloughs. The common white water buttercup also is found in a few of the small sloughs and in Long and Red Willow Lakes. The distribution of this plant is variable; it seems to prefer shallow, fresh water and yet often, as the lakes or sloughs dry up, is capable of healthy growth on a partly dried-out mud flat. The two duckweeds (*Lemna trisulca* and *L. minor*) are occasionally present, the former being by far the more common and in fact rather abundant in Pummels and King Sloughs.

Most interesting is the distribution of Geyer's waterplantain, which belongs to the same genus as the common waterplantain but is capable of growing entirely under water; a number of times it was found in water 2 or 3 feet deep. The leaves are of two kinds, long and slender ones with parallel margins, and short elliptical ones. The former type often grows to a length of 8 to 24 inches and resembles eelgrass in general features. When under water the elliptical leaves are uncommon or entirely absent, but when the water level has fallen considerably and left these plants on a mud flat they lose the long delicate leaves and develop short, stiff, elliptical ones. The two forms are quite dissimilar in appearance.

Moss was found in four lakes and water smartweed once.

Among the marsh plants, bulrush is the most abundant, being found in 63 per cent of the lakes. Next in importance are three-square, the two species of spike-rush—bog rush and needle rush—and the western wapato. The latter is usually found in shallow water around the edges of the lake. Next in abundance are cord grass and reed canary grass. Besides these, giant reed grass, whitetop, common cattail, water smartweed, and river bulrush are fairly common. Soft bulrush, bur-reed (*Sparganium eurycarpum*), and waterplantain are rare. These marsh plants indicate as surely as the aquatic vegetation that these lakes are of the fresh-water type, for in no other group previously discussed have western wapato and river bulrush been reported common, and these two marsh plants are fairly good fresh-water indicators.

The vegetation in the vicinity of the lakes is similar to that of the slightly alkaline-saline lakes (Group 2, C), so much so that a detailed discussion is not necessary. The wooded-slope flora is the same but less abundant; although the same species were listed, they were reported from only a few lakes. Among the meadows and flats the vegetation is equally abundant and almost identical with that of the

alkaline-saline lakes except for the greater prevalence of field mint. The remaining plants are noted in the list beginning on page 47. See also Table 9.

TYPE B, RIVER LAKES

The river lakes are confined to the Des Lacs, Missouri, and James Rivers.

LAKES OF THE DES LACS RIVER

The Des Lacs rises apparently from the foot of "The Hill of the Murdered Scout," Canada, and soon broadens out into the Upper Des Lacs Lake, which is about a quarter of a mile wide and extends 25 to 30 miles southeastward, reaching almost to Kenmare and terminating in a marsh with a narrow creek flowing into the Middle Des Lacs Lake, about 4 miles in length and three-quarters of a mile wide. At the south and north ends of this lake is a large marsh characterized by an abundance of giant reed grass, river bulrush, and bulrush. A stream flows from this lake to the Lower Des Lacs Lake—north of Baden—a shallow lake about 2 miles long and three-quarters of a mile wide. This last is more of a marsh than a lake, since bulrush and whitetop cover almost the whole, except for a narrow strip through the center. The Des Lacs River flows southeastward, joining with the Mouse River north of Minot, Ward County. The Mouse River flows a short distance southeastward, then to the northeast through Velva and Towner, and finally returns northward into Canada. The river itself seems devoid of aquatic vegetation.

Upper Des Lacs Lake is characterized by an abundance of sago pondweed, apparently confined to the vicinity of peninsular points and to shallow borders, since the lake is so deep that growth throughout is impossible. In places this lake is reported to be more than 25 feet deep.

Middle Des Lacs Lake also has a great abundance of sago pondweed, confined mostly to the northern end near the large, marshy area. Interspersed with the bulrush and the occasional patches of giant reed grass are a little algae and duckweed (*Lemna minor*). This lake is not more than 5 feet deep.

Lower Des Lacs Lake, in addition to an abundance of sago pondweed, has a little clasping-leaf pondweed. The two species of duckweed (*Lemna minor* and *L. trisulca*) are fairly common mixed with a great abundance of bulrush, whitetop, giant reed grass, and common cattail.

These lakes are slightly alkaline, more so than the other river lakes to be discussed. The shore vegetation, on account of the steep slopes of the surrounding hillsides and comparative absence of flats, is similar to that of the nonfluvial fresh-water lakes. The plants most abundant are sand-bar willow, green ash, Woods's rose, western snowberry, American elm, and nannyberry.

LAKES OF THE MISSOURI RIVER

All the larger lakes along the Missouri River throughout the State of North Dakota were visited. Riverside Marsh is located about 12 miles southwest of Bismarck. This is an immense marsh, miles in extent, located between the Little Heart and the Missouri Rivers. When visited the river was so low that most of the marsh was dry.

Reed canary grass is abundant but is confined to the drier areas of the shore margins and islands in the center. Giant reed grass, common cattail, and bulrush occur abundantly in large patches throughout. Slough grass is common. In the open places scattered throughout the marsh are associations in which western wapato, waterplantain, water parsnip, and bur-reed (*Sparganium eurycarpum*) are very abundant. Reed meadow grass and sedge (*Carex trichocarpa* var. *aristata*) are frequent. In pools, sago pondweed, clasping-leaf pondweed, and leafy pondweed are fairly common.

About 17½ miles southeast of Bismarck is Robinson Lake and 23 miles southeast is John Wilde Lake. Robinson Lake is plainly a cut-off bend of the Missouri River filled during spring floods or other high water. John Wilde Lake is nearer to the high bluff but still shows signs of floods. In Robinson Lake the marsh vegetation is almost limited to three plants, a shrubby growth of sand-bar willow and two marsh plants, giant reed grass and bulrush. The first two are confined to the center island while the last is found along the outer circle only, near the shore. Western wapato is frequent. Sago pondweed is locally common, usually associated with the bulrush.

John Wilde Lake, on the other hand, lacks marsh vegetation except a few plants of western wapato and a number of dead and half-dead willows that have evidently been drowned out. The aquatic vegetation is more abundant. Clasping-leaf pondweed is common, and sago pondweed and leafy pondweed are abundant. Besides these, water milfoil is frequent and waterweed is very rare.

Painted Woods Lake is another lake of this general type. At present it drains apparently into the Painted Woods Creek, which flows into the Missouri River south of Washburn. During the spring floods this is probably in direct connection with the Missouri River. This incomplete elliptical lake, partly surrounding a smaller lake in the center of the ellipse, is somewhat different from the other Missouri River lakes. (Fig. 2.) The center lake, in addition to sago pondweed and clasping-leaf pondweed, has a great abundance of water milfoil and eelgrass pondweed, the latter of which is exceedingly abundant and seems to be actually driving out the water milfoil, a very fortunate circumstance, since the eelgrass pondweed is much better as a duck food than water milfoil. In the shallower spots water milfoil still holds its own. Coontail is frequent. A little duckweed (*Lemna minor*) is found along the edges associated with giant reed grass and cattail, both of which are abundant. Bulrush and river bulrush are common. Western wapato and reed meadow grass are frequent. Mare's-tail is rare. All the aquatic vegetation is extremely dirty, apparently being loaded with silt. The outer portion of the lake, or the broken ellipse, 5 or 6 miles in circumference, is similar to the

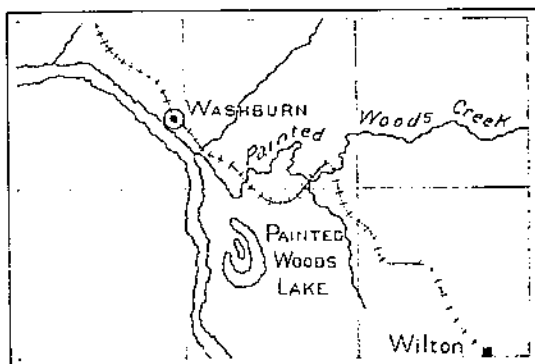


FIGURE 2.—Painted Woods Lake is in the form of an incomplete ellipse, partly surrounding a smaller lake

center lake in respect to marsh vegetation but entirely lacks aquatic plants. This circumstance is undoubtedly due to the depth of the water and the current developed in this lake during flood seasons, which are sufficient to extirpate any such growth.

The vegetation of the river banks and open woods near these two lakes is very diverse, more species of trees and shrubs being found here than in any other region outside of Red Willow Lake and the Turtle Mountains. On the drier slopes or banks, Woods's rose, western snowberry, chokecherry, and silver buffaloberry are common. On the wooded slopes and river bottoms green ash, boxelder, southern cottonwood, and sand-bar willow are very common, the last like the heartleaf willow always preferring the river or lake margins. American elm, nannyberry, shadblow, and silky dogwood are fairly common; riverbank grape, poison ivy (*Rhus radicans*), American bittersweet, and virgins-bower are frequent. Wherever the borders of the lakes are not wooded, two species of goldenrod (*Solidago canadensis* and *S. rigida*), fringed wormwood, white sage, birdsfoot trefoil, and licorice are fairly common.

LAKES OF THE JAMES RIVER

The lakes of the James River (sometimes known as the Dakota or "Jim" River) are the least alkaline of all the river lakes. The James River rises southwest of Fessenden, Wells County, flows northeast through New Rockford, Eddy County, and then south to Jamestown and Lamoure, and on into South Dakota. Three important lakes are located on this river: Lake Wanitah, 8 miles west of Mellenry, Foster County; Arrowood Lake, $4\frac{1}{2}$ miles west of Kensal; and Jim Lake, 4 miles east of Pingree, Stutsman County.

Jim Lake, which, of the three lakes, is the farthest down the river, has the most abundant vegetation and the greatest variety of fresh-water plants. This possibly can be explained by the greater flow of water and better drainage, which would tend to keep the lower lake less alkaline than the others. Sago pondweed and clasping-leaf pondweed are found in all three lakes but both most abundantly in Jim Lake. Water milfoil is common in Lake Wanitah and Jim Lake. Algae and small duckweed are infrequent or rare in Lake Wanitah, absent in Arrowood Lake, and common or abundant in Jim Lake.

An interesting point is the distribution of coontail and common bladderwort. Coontail is rare in Lake Wanitah and Arrowood Lake and abundant in Jim Lake. A few plants of common bladderwort are found in Lake Wanitah, which may be considered additional proof of poorer drainage in the uppermost lake. The most interesting and noteworthy feature of all, however, is the presence and abundance of a few fresh-water plant indicators in Jim Lake and their total absence in the two upper lakes. Waterweed is abundant, and eel-grass pondweed common. Besides these, a few plants of horned pondweed are seen, and leafy pondweed is common.

The marsh vegetation is similar to that of the other fresh-water groups. Giant reed grass, western wapato, and bog rush are fairly common in all three lakes. Common cattail, whitetop, and bulrush occur in small patches in Wanitah and Arrowood Lakes. Bur-reed is rare throughout. Soft bulrush and river bulrush are also rare.

The shore vegetation, in general, is similar to that previously discussed under the Missouri River group. For additional, detailed information see Table 10 and appended list.

TABLE 10.—*Fresh-water lakes of North Dakota and their vegetation, Group S, type B*

River and lake	Location	Date visited	Vegetation and occurrence ¹													
			<i>Potamogeton pectinatus</i>	<i>Potamogeton perfoliatus</i>	<i>Potamogeton foliosus</i>	<i>Potamogeton zosterifolius</i>	<i>Myriophyllum spicatum</i>	<i>Ceratophyllum demersum</i>	Algae	<i>Elodea canadensis</i>	<i>Zannichellia palustris</i>	<i>Utricularia vulgaris americana</i>	<i>Lemna trisulca</i>	<i>Lemna minor</i>	<i>Scirpus occidentalis</i>	<i>Phragmites communis</i>
Missouri River:																
Riverside Marsh (2) ²	Mandan (12¼ mi. SE.).....	Aug. 31	C	C	C									A	A	A
Robinson (2).....	Bismarck (17½ mi. SE.).....	Aug. 24	C	C										A	A	
John Wilde (1).....	Bismarck (23 mi. SE.).....	do.	A	C	A		F	F		R						
Painted Woods (4).....	Washburn (S.).....	Sept. 3	C	C		A	A	F					C	C	A	A
Des Lacs River:																
Upper Des Lacs (6).....	Kenmare (N. and NW.).....	Oct. 9	A											F	F	
Middle Des Lacs (1).....	Kenmare.....	Oct. 1	A						R				R	F	C	F
Lower Des Lacs (1).....	Baden.....	Oct. 9	A	R					C			F	F	A	A	A
James River:																
Wanitah.....	McHenry (8 mi. W.).....	Aug. 22	C	R			C	R	C		R		R	R	C	F
Arrowood (3).....	Jim Lake (4½ mi. N.).....	Aug. 15	F	R			C	R	C				R	R	F	R
Jim (1).....	Pingree (4 mi. E.).....	Aug. 14	A	A	C	C	C	A	A	A	R		F	C	A	

¹ A, abundant; C, common; F, fairly common; R, rare.² Numbers in parentheses represent approximate area in square miles.

TABLE 10.—Fresh-water lakes of North Dakota and their vegetation, Group 3, Type B—Continued

River and lake	Location	Date visited	Vegetation and occurrence—Continued													
			<i>Sagittaria arifolia</i>	<i>Sparganium eurycarpum</i>	<i>Sparganium americanum</i>	<i>Scirpus fluviatilis</i>	<i>Fluminea festuacea</i>	<i>Eleocharis palustris</i>	<i>Spartina michauxiana</i>	<i>Scirpus validus</i>	<i>Eleocharis acicularis</i>	<i>Phalaris arundinacea</i>	<i>Panicularia grandis</i>	<i>Polygonum muhlenbergii</i>	<i>Alisma plantago-aquatica</i>	<i>Hippuris vulgaris</i>
Missouri River:																
Riverside Marsh (2) ²	Mandan (12½ mi. SE.).....	Aug. 31	C		C					A	A	C		C	R	C
Robinson (2).....	Bismarek (17½ mi. SE.).....	Aug. 24	C						C				C			
John Wilde (1).....	Bismarek (23 mi. SE.).....	do								C					F	
Painted Woods (4).....	Washburn (S.).....	Sept. 3	F			C						R				C
Des Lacs River:																
Upper Des Lacs (6).....	Kenmare (N. and NW.).....	Oct. 9						C								
Middle Des Lacs (1).....	Kenmare.....	Oct. 1				F	F		F		F					
Lower Des Lacs (1).....	Baden.....	Oct. 9					A		C							
James River:																
Wanitah.....	McHenry (8 mi. W.).....	Aug. 22	C	R			F	C								
Arrowood (3).....	Jim Lake (4½ mi. N.).....	Aug. 15	C		R	C	F	C								
Jim (1).....	Pingree (4 mi. E.).....	Aug. 14	F	R				C	F	F				F		

² Numbers in parentheses represent approximate area in square miles.

GROUP 4. SLOUGHS

In some parts of North Dakota the sloughs are so numerous and so important from the viewpoint of duck food that they have been placed in one group separate from all bodies of water. In the central and western parts of the State, in Kidder, McLean, Burke, Ward, and Mountrail Counties, they are exceptionally numerous. In the east-central and eastern portions of the State they are very rare. Only two are considered important enough to be listed by Mabbott, who surveyed that part of the State. These two, Eckelson Lake No. 5 and Island Lake, will be taken up with the unclassified lakes, as they are not typical examples of any type of this group. As would be expected, there is some difficulty in classifying the sloughs, but in general the following types hold: Type A, cattail sloughs, with *Typha latifolia* dominant; type B, whitetop, or mallard, sloughs, characterized by a great abundance of *Fluminea festuacea*; type C, stagnant sloughs, usually characterized by an abundance of the marsh plants, bulrush and giant reed grass, and the aquatics, algae and common bladderwort.

The shore vegetation of all three groups is very uniform, resembling so much in nearly all features that of the fresh-water lakes (Group 3, A) that a separate discussion will be unnecessary.

TYPE A, CATTAIL SLOUGHS

Cattail sloughs make the smallest and least satisfactorily distinguished group of all, but it will be easier to discuss a certain few lakes here together than to take them up individually at the end of the bulletin along with the unclassified lakes. In all, there are only seven of these sloughlike lakes, and whitetop is as abundant as common cattail in only one of them. There are no other marsh plants of importance besides the two mentioned, with the possible exception of two species of sedge (*Carex aquatilis* and *C. rostrata* var. *utriculata*). Among the aquatic plants two species of duckweed (*Lemna minor* and *L. trisulca*) are fairly common, as well as common bladderwort. (Table 11.)

TYPE B, WHITETOP, OR MALLARD, SLOUGHS

The whitetop sloughs are an exceedingly abundant type; 65 of them have been listed, but in the hilly region of Burke and Mountrail Counties they are very numerous. In the hilly areas there are many of them, since there is no drainage, with the evident result that in every valley there is a slough or lake of some kind. In this region they are of three general kinds: Lakes characterized by water milfoil and clasping-leaf pondweed (Group 3); lakes characteristically stagnant or without any aquatic vegetation at all; and lakes or sloughs characterized by whitetop. The whitetop sloughs are apparently most frequented by ducks. On some of the smallest sloughs, comprising 30 acres or less, a thousand ducks can often be seen feeding.

TABLE 11.—*Cattail sloughs*¹ of North Dakota and their vegetation, Group 4, type A

County and slough	Location	Date visited	Vegetation and occurrence ²											Scirpus paludosus
			Algae	Lemna minor	Lemna trisulca	Utricularia vulgaris americana	Myriophyllum spicatum	Typhalatifolia	Flumina festucae	Eleocharis palustris	Spartanium eurycarpum	Carex aquatilis	Carex rostrata utriculata	
Logan County:														R
Typha.....	Swamp Lake (½ mi. S.).....	Aug. 2						A						
Stutsman County:														
Crandall.....	Chase Lake (5 mi. SE.)....	Aug. 10	A	R	R			A		F				
McLean County:														
Underdahl.....	Underdahl Lake (E.).....	Sept. 11			C	C	C	A			C	C	C	
Burke County:														
Arvidson.....	Arvidson Lake (SE.).....	Oct. 2			A			A				A		
Mountrail County:														
Lostwood (secs. 17-20).....	Lostwood (2 mi. NW.).....	Oct. 3						A	C					
Lostwood (secs. 19-20).....	Lostwood (2 mi. WNW.).....	do.		F		C		A	A					
Lostwood (sec. 19).....	Lostwood (2½ mi. WNW.).....	do.		F		C		A	A					

¹ The average size of these sloughs is from one-sixth to one-fourth of a section.² A, abundant; C, common; F, fairly common; R, rare.

The characteristic and most abundant plant is whitetop. This plant prefers water 1 to 2½ feet deep, and reaches a total height of 4 to 6 feet. It blossoms in June or early in July so that by July 22, the time the first lakes in North Dakota were visited, the seeds had already been shed and the inflorescence had a white, frayed-out appearance characteristic of this plant in midsummer and fall. A large number of the hunters throughout the State call this plant wildrice, which causes much confusion, for, so far as known, genuine wildrice has been reported from only two rivers in eastern North Dakota. Any other records would be interesting in throwing more light on its distribution throughout the State and would possibly help in determining also the degree of alkalinity that this plant can withstand. All the cases reported by hunters were systematically investigated, but no wildrice was seen; in every case the plant proved to be the familiar whitetop.

Associated with whitetop and occurring in 40 of the 65 lakes listed is bulrush. In almost all cases this is fairly common and occasionally quite abundant. Common cattail and bog rush were each reported five times. In two of the lakes where cattail was reported, this plant is rather abundant, but it seems best to place these lakes here rather than in type A, since whitetop in both cases is the more abundant. One other plant, water smartweed, was occasionally found growing on dry land, in other cases on partly dried-out mud flats or in the water.

Among the aquatic vegetation three plants are by far the most abundant: Common bladderwort, algae, and sago pondweed, occurring in 66 per cent or more of the sloughs. Although each is found in about the same number of sloughs, common bladderwort and algae are exceedingly abundant, whereas, sago pondweed usually is rare or at most only frequent. Moss is present in six of the sloughs. In some cases there is a solid mass of this plant completely filling parts of the slough to a depth of 2 to 6 feet, making a home for thousands of aquatic insects. Water milfoil is rare or frequent in four sloughs and star duckweed common in two. Besides these, the following are very rare and were reported from only one slough each: Small duckweed, coontail, clasping-leaf pondweed, common white water buttercup, and variable pondweed.

For detailed information in regard to individual sloughs see Table 12.

TABLE 12.—White-top sloughs of North Dakota and their vegetation, Group 4, type B

County and slough	Location	Date visited	Vegetation and occurrence ¹											
			<i>Utricularia vulgaris americana</i>	<i>Potamogeton pectinatus</i>	Algae	Moss	<i>Myriophyllum spicatum</i>	<i>Flumea festuacea</i>	<i>Scirpus occidentalis</i>	<i>Typha latifolia</i>	<i>Eleocharis palustris</i>	<i>Spartina Michauxiana</i>	<i>Polygonum nuttallianum</i>	<i>Carex</i> sp. ²
Logan County:														
Whitewall	Napoleon (20 mi. E.)	Aug. 2	A		A			A	R	R	F	F	C	C
Kidder County:														
Whitewall	Turtle (3½ mi. NE.)	Aug. 17	F		F			A						
Mallard (4)	Wing (NW.)	do	A					A	A	F				
McLean County:														
Mallard	Long Lake (S.)	Sept. 1	F		F			A						
Brush Lake	Brush Lake (S.)	Sept. 5		A				A						C
Big (3)	Underwood (7½ mi. SW.)	Sept. 6	A					A			A			C
Burke County:														
Kandogohi (secs. 5) [2]	Kenmare (4½ mi. WSW.)	Oct. 2	A	R	A	C		A			R		R	R
Thompson Lake	Kenmare (13 mi. W.)	do	A	A	F			A	A		R			
Diamond (secs. 9-10)	Kenmare (16 mi. W.)	do				A		A				C		C
Lucy (secs. 2-3) [5]	Kenmare (21 mi. WNW.)	do	A	R	A	A		A						
Kandogohi (secs. 16-21) [6]	Kenmare (12 mi. SW.)	Oct. 3	F	F	F			A	R					
Lucy (secs. 4, 8, 17, 20) [7]	Kenmare (23 mi. W.)	Oct. 5	F		F			A						
Garrison (secs. 4, 6, 9) [4]	Kenmare (24 mi. WSW.)	do	F		F			A						
Cleary (secs. 25 and 13) [5]	Kenmare (25 mi. W.)	do	F		F			A						
Foot hills (secs. 17-33) [6]	Kenmare (26 mi. WNW.)	do	A		C			A					F	A
Leaf Mountain (secs. 35-26) [8]	Kenmare (28 mi. WNW.)	do	F		F			A						
Cleary (sec. 5)	Kenmare (29 mi. WNW.)	do	A		F			A					A	
Leaf Mountain and Cleary	Kenmare (25-35 mi. W.)	do	F		F			A						
Beauvert (3) [2]	Lignite (SW.)	Oct. 12		R			F	A	A	A				
Mountrail County:														
T158N, R35W, sec. 33 [2]	Kenmare	Oct. 9	A		R			A		A				A
Palermo (secs. 14-11)	Palermo (E. and NE.)	do	F		F			A						
T158N, R35W, sec. 32	Palermo (9 mi. N.)	do	F	C	A			A	A					
T158N, R35W, sec. 19	Palermo (11 mi. N.)	do	F		F		C	A						
Divide County:														
DeWitt (sec. 19)	Fortune (NW.)	Oct. 13						A	A					
Williams County:														
Mallard (1)	Grenora (5 mi. NW.)	do	F		F			A						

¹ A, abundant; C, common; F, fairly common; R, rare.² Usually *Carex rostrata* var. *utriculata*; rarely *C. lanuginosa* or *C. diandra* var. *ramosa*.³ Also has the following: *Chara*, common; *Alisma plantago-aquatica*, rare.⁴ *Lemna minor*, abundant in one small bay.⁵ Numbers in parentheses represent approximate area in square miles.⁶ *Phragmites communis*, abundant.⁷ Also has the following: *Sagittaria arifolia*, common; *Alisma plantago-aquatica*, common; *Eleocharis acicularis*, common; *Lemna trisulca*, common; *Ranunculus aquatilis* var. *capillareus*, common; *Potamogeton heterophyllus*, common.⁸ Numbers in brackets indicate the number of lakes in group.⁹ Also *Eleocharis acicularis*, common; *Lemna trisulca*, common; *Potamogeton nutans*, rare.¹⁰ Also *Sparganium eurycarpum*.¹¹ Also *Lemna trisulca*, common; and *Ceratophyllum demersum*, very rare.

TYPE C, STAGNANT SLOUGHS

Two species, common bladderwort and algae, are the most characteristic of this group of stagnant sloughs. The former occurs in 79 per cent and the latter in 73 per cent of the 33 sloughs listed in this group, both when present being exceedingly abundant. Sago pondweed in small quantities was reported from 45 per cent of the sloughs. A large number of sloughs lack any vegetation, especially some of those in the Burke County hills. Star duckweed is next in abundance, occurring in 11 per cent of the sloughs. A few other aquatic plants were each found in only two or three lakes and then rarely in abundance; among these are the following: Moss, water smartweed, water milfoil, small duckweed, leafy pondweed, stonewort, and butter-flywort. The last three were found in only one slough each.

Bulrush is by far the most abundant of all the marsh plants, being present in 60 per cent of the lakes. Next in importance are giant reed grass, bayonet grass, whitetop, and three-square, none of which was found in more than seven sloughs (11 per cent). Common cat-tail and bog rush are rare.

For detailed information in regard to individual sloughs refer to Table 13.

TABLE 13.—Stagnant sloughs of North Dakota and their vegetation, Group 4, type C

County and slough	Location	Date visited	Vegetation and occurrence ¹											
			Utricularia vulgaris americana	Algae	Potamogeton pectinatus	Lemna minor and L. trisulca	Scirpus occidentalis	Phragmites communis	Flumea festuacea	Scirpus americanus	Scirpus paludosus	Spartina michauxiana	Typha latifolia	Eleocharis palustris
Richland County:														
Backhouse 1 2 3	Hankinson (1½ mi. S.)	July 23	A	A	F	F	A	A	C	A		C	A	F
Stack 1	Hankinson (10 mi. W.)	July 30	A	C	F	R	A	C	C	C	C	C	R	C
Logan County:														
Red Lake	Red Lake (SE.)	Aug. 2	A	A			A		F					
Kidder County:														
Deer 1 4	Lake Williams (2 mi. NE.)	Aug. 15	C	C		C	C	A						
Willow 2	Robinson (11 mi. N.)	Aug. 16	A	A	A		A	A						
Tillson	Round Lake (N.)	do.	F	F		F	A	A						
Slough	Robinson (3½ mi. NW.)	Aug. 17	A	A			C	C						
Kidder-Burleigh Counties:														
Black Rush 5	Arena (5 mi. NE.)	Aug. 18	F	A	F	C	A			C	F	C		
McLean County:														
Long Lake	Long Lake (E.)	Sept. 1		A			A							
Anna (secs. 4-9)	Ryder (7 mi. N.)	Sept. 11	A	A			F			C	F			
Shealy (sec. 25) 6	Ryder (16 mi. NNW.)	do.	A	A								F		
Tolgen (secs. 18-19) [3] 7	Ryder (17 mi. NNW.)	do.	A	A										
Tolgen (sec. 31) 8 [2]	Ryder (16½ mi. NNW.)	do.	C	F	F		F					F		
Hesnault (secs. 9-10) 9 [4]	Ryder (12 mi. N.)	do.	A	A								F		F
Spring Lake (sec. 29)	Douglass (4 mi. E.)	Sept. 12	A		A							F		
Sheridan County:														
Alta	Alta (NE.)	Sept. 3	A		A		A		A					
Burke County:														
Martin, North	Kemmare (13 mi. WSW.)	Oct. 2		A	R		F		R					
Vanville (secs. 9-16) 10	Kemmare (17 mi. WSW.)	do.	A	A	R		R							
Diamond (secs. 9, 10, 15) 10 [4]	Kemmare (16 mi. W.)	do.	C	C	F		C		C					
Kandogobi (sec. 12) 11	Kemmare (8 mi. SW.)	Oct. 3	A											C
Lucey (sec. 6)	Kemmare (25 mi. W.)	Oct. 5	C	C			A					A		
Foot hills (secs. 33, 17) 11 [2]	Kemmare (25-27 mi. WNW.)	do.	A	F					C					

¹ A, abundant; C, common; F, fairly common; R, rare.² Numbers in parentheses represent approximate area in square miles.³ In addition this lake had the following: *Potamogeton foliosus* and *Chara* sp., common.⁴ Also *Ricciella fluitans*, common.⁵ Also *Alisma geyeri*, rare.⁶ Also *Polygonum amphibium*, rare to fairly common.⁷ Numbers in brackets indicate number of lakes in group.⁸ Also one had moss abundant.⁹ Also *Myriophyllum spicatum*, rare.¹⁰ Also one had *Sagittaria arifolia*, rare; *Hippuris vulgaris*, rare; and *Polygonum amphibium*, fairly common; another had *Myriophyllum spicatum*, fairly common.¹¹ Also *Lemna trisulca*, abundant.

TABLE 14.—Turtle Mountain lakes and their vegetation

[illegible]

! A, abundant; C, common; F, fairly common; R, rare.

¹ Usually *Carex rostrata* var. *ultraculata*; rarely *C. aquatilis*, *C. sychnocephala*, *C. cristata*, or *C. vulpinoidea*.

¹ Numbers in parentheses represent approximate area in square miles.⁴ Strongly alkaline lakes.

! Numbers in brackets indicate number of lakes in group.

^b Also *Eleocharis acicularis*, common.

GROUP 5, LAKES OF THE TURTLE MOUNTAINS

The Turtle Mountains are located in Bottineau and Rolette Counties in North Dakota along the Canadian boundary. These so-called mountains reach a maximum elevation of 2,150 feet. The plains, however, at Bottineau just south of these hills have an elevation of 1,650 feet, and at St. John, east of the hills, the elevation is 1,950 feet, so that the total apparent elevation varies only from 200 to 500 feet. Even this small increase in elevation has caused a very decided change in the appearance of the country, for instead of plains and occasional barren hills, there are heavily wooded slopes and clear, mountain lakes. The land where cleared is far more productive than that of the near-by plains.

The region is so different from the rest of North Dakota that the lakes have been placed in a group by themselves. The only lake elsewhere in the State that resembles the Turtle Mountain lakes to any extent is Red Willow Lake, Griggs County. A wood flora somewhat similar to that in the Turtle Mountains was found in occasional isolated spots in addition to the lake mentioned. Two of these are the banks of the Missouri River and wooded areas just south of Devils Lake.

Of the 84 lakes surveyed in the Turtle Mountains, 69 are listed from Bottineau County and 15 from Rolette County. The majority of the lakes conform to Group 3, B, the distribution in many cases being rather difficult to draw. The water throughout these lakes seems very uniform in quality, and other factors must have been more important in promoting differences in aquatic vegetation. In Cordelia Township in a rather low area are a group of three dry alkaline lakes with an abundance of bayonet grass conforming to Group 2, B.

Throughout all the Turtle Mountain lakes sago pondweed and water milfoil are by far the most abundant plants, occurring in more than 77 per cent of the lakes. Both are much more abundant in Rolette than in Bottineau County; in fact, sago pondweed was reported in all the lakes that were listed from Rolette County. Next in abundance are yellow waterlily and clasping-leaf pondweed, occurring in 30 to 33 per cent of the lakes. The abundance of the yellow waterlily is rather striking, since it has not been found in any of the other lakes listed, and even in the Turtle Mountain region it was confined almost entirely to Bottineau County. Clasping-leaf pondweed, on the other hand, is more abundant in Rolette County. Algae are next in importance but never very abundant, with the possible exception of those of Cordelia Township, section 10 southwest.

Cootail, widgeon grass, stonewort, and floating pondweed are fairly common, occurring in 10 per cent of the lakes. The interesting feature in regard to these plants is the great difference in abundance noted between the two counties. Rolette County has lakes that are probably less alkaline than those in Bottineau County, although all are called fresh-water lakes. The most abundant aquatic plant in Bottineau County, and one quite tolerant of alkali, namely stonewort, occurs in only 6 per cent of the lakes, whereas in Rolette County this species as well as the other three mentioned occur in 30 to 40 per cent.

Star duckweed and small duckweed are fairly common. Fries's pondweed is found in only two lakes, Jarves and Upsilon. The following are found only in one lake each: Moss, common bladderwort, common white water buttercup, leafy pondweed, and horned pondweed. For detailed information in regard to individual lakes see Table 14.

Among the marsh plants, bulrush is the most abundant, occurring in 75 per cent of the Turtle Mountain lakes. Common cattail is next in abundance, occurring in 40 per cent. This plant is of especial interest as occurring in all the 15 lakes listed from Rolette County. Bur-reed, western wapato, and giant reed grass are present in 21 to 26 per cent of the lakes, all being the most abundant in Rolette County. Next in importance are soft bulrush, bog rush, and whitetop. Soft bulrush is absent from Bottineau County; whitetop is found in that county only.

The variety and abundance of the shore vegetation of the lakes of the Turtle Mountains are so great that space will be taken to list only the most abundant of the trees, shrubs, and herbaceous plants. Notes in regard to the less common ones will be found in the list given on pages 47 to 64.

The characteristic and dominant vegetation in the mountains is the trees and shrubs, which give a better idea of the flora as a whole than do the herbaceous plants. In the following list the plants have been grouped according to their abundance:

TREES AND SHRUBS

ABUNDANT

Mossycup oak (<i>Quercus macrocarpa</i>).	Sand-bar willow (<i>Salix interior</i>).
Quaking aspen (<i>Populus tremuloides</i>).	American hazelnut (<i>Corylus americana</i>).
Balsam poplar (<i>Populus tacamahacca</i>).	Western snowberry (<i>Symphoricarpos occidentalis</i>).
Chokecherry (<i>Prunus virginiana</i>).	

FAIRLY COMMON OR FREQUENT

Shadblow (<i>Amelanchier florida</i>).	Wild rose (<i>Rosa blanda</i> and <i>R. woodsii</i>).
Cranberrybush (<i>Viburnum trilobum</i>).	Glaucous willow (<i>Salix prinoides</i>).
Pussy willow (<i>Salix discolor</i>).	American black currant (<i>Ribes americanum</i>).
Beak willow (<i>Salix bebbiana</i>).	Green ash (<i>Fraxinus lanceolata</i>).
Boxelder (<i>Acer negundo</i>).	Pin cherry (<i>Prunus pensylvanica</i>).
Canoe birch (<i>Betula papyrifera</i>).	Autumn willow (<i>Salix serissima</i>).
Beaked hazelnut (<i>Corylus rostrata</i>).	
Red-osier dogwood (<i>Cornus stolonifera</i>).	

HERBACEOUS PLANTS

ABUNDANT IN MEADOWS AND SANDY SHORES

Reed canary grass (<i>Phalaris arundinacea</i>).	Bluegrass (<i>Poa triflora</i>).
Nodding wild-rye (<i>Elymus canadensis</i>).	Slough grass (<i>Beckmannia erucaeformis</i>).
Canada thistle (<i>Cirsium arvense</i>).	Silverweed (<i>Potentilla anserina</i>).
Panicled aster (<i>Aster paniculatus</i>).	Squirreltail grass (<i>Hordeum jubatum</i>).

ABUNDANT IN WOODLAND BORDERS

Smooth aster (<i>Aster laevis</i>).	Bunchberry (<i>Cornus canadensis</i>).
Pyrola (<i>Pyrola asarifolia</i>).	Sidebells pyrola (<i>Pyrola secunda</i>).
Wild-sarsaparilla (<i>Aralia nudicaulis</i>).	

GROUP 6, UNCLASSIFIED LAKES

Unfortunately no classification devised seems capable of including all the lakes that were seen in North Dakota, and out of the 600 or more lakes seen (500 listed) some 15 must necessarily be treated in lesser groups or individually. Information in regard to location of these lakes is given in Table 15.

TABLE 15.—List of unclassified lakes of North Dakota

Lake	Location	County	Date surveyed
Elsie (2) ¹	Hankinson (1¼ mi. SW.)	Richland	July 25
Mud (2)	Hankinson (2 mi. WSW.)	do.	July 27
Stink	Napoleon (15 mi. NW.)	Emmons	Aug. 4
Eckelson No. 5	Sanborn (4½ mi. SW.)	Barnes	Aug. 9
Wallace (SW. ¼ sec. 35)	Robinson (11 mi. NE.)	Kidder	Aug. 16
Cherry (1½)	Dawson (17 mi. NNW.)	do.	Aug. 18
Big Slough (2)	Taylor (22 mi. N.)	Dunn	Aug. 28
Guinbo Slough	Taylor (9 mi. N.)	do.	Do.
Rock (4)	Rock Lake (NE.)	Towner	Sept. 13
Rush (15)	Wales (NW.)	Cavalier	Sept. 14
Alice ²	Churchs Ferry (NE.)	Ramsey	Sept. 25
Irvin ²	do.	do.	Sept. 26
Chlain ²	do.	do.	Do.
Island (2)	Rolette (SE.)	Rolette	Sept. 29
Horseshoe (1)	Pleasant Lake (S.)	Benson	Oct. 18
Broken Bone (1)	do.	do.	Oct. 19
Stink	Leeds (SE.)	do.	Oct. 20
Elbow	Tokie (SE.)	do.	Oct. 21
Shinbone	Warwick (E.)	do.	Do.
Spring	Tokie (N.)	do.	Do.

¹ Numbers in parentheses represent approximate area in square miles.² Combined area of Alice, Irvin, and Chlain Lakes approximately 16 square miles

LAKE ELSIE AND MUD LAKE, RICHLAND COUNTY

These two lakes are the only ones in North Dakota in which naiad was found in abundance. The only other lake in which it was found at all is John Wilde Lake on the Missouri River, and there only a single fragment was seen. The other aquatic vegetation is similar to that of lakes of the freshwater type (Group 3, A), water milfoil, sago pondweed, and stonewort being common in both lakes. In Mud Lake, leafy pondweed and coontail also were found. The marsh vegetation is of a familiar type, characterized by an abundance of bulrush, giant reed grass, reed canary grass, sedges (*Carex lanuginosa*, *C. aquatilis*, and *C. rostrata* var. *utriculata*), and slough grass. Groves bordered parts of both lakes. The dominant trees were mossycup oak, southern cottonwood, peachleaf willow, and green ash, with a few trees of American elm, boxelder, and hackberry.

STINK LAKE, EMMONS COUNTY

This strongly alkaline lake gives off a disagreeable odor that is easily detected half a mile away. The border of the lake is dry, consisting of a fine white residue 3 or 4 inches deep under which is a layer of dark-green clay. A sample taken from the residue on shore showed on analysis 66.5 per cent sodium sulphate. The vegetation is extremely limited around the border, being restricted to sea blite (*Dondia depressa*), salt grass, and seaside arrowgrass.

ECKELSON LAKE NO. 5, BARNES COUNTY

This small slough of 30 acres could hardly be placed with any of the types of the slough group (4). Comparison with other groups also shows no clear-cut relationships. Common cattail, giant reed grass, bulrush, three-square, and bayonet grass are fairly common. Algae are only frequent. Common bladderwort and mare's-tail are rare. Whitetop is absent.

SW. ¼ SECTION 35, WALLACE LAKE, KIDDER COUNTY

This lake might possibly have been included with the stagnant lakes; however, common bladderwort, highly characteristic of such lakes, is only frequent, while star duckweed and moss are exceedingly abundant. Throughout most of this 20-acre lake star duckweed is present in a solid, floating mass, varying from 4 to 7 inches thick. More than 1,200 ducks were seen feeding here.

CHERRY LAKE, KIDDER COUNTY

With an area of more than 1½ sections this large lake is peculiar in many ways: (1) Although the water is muddy and odoriferous, it does not seem to be very alkaline; (2) the shore plants are nearly all of the fresh-water type and the only alkali indicators found were rare; and (3) the water apparently is almost full of small, threadlike particles, which appear to be portions of a light-green, filamentous alga. Sago pondweed, common bladderwort, and algae are fairly common in the west bay, which was almost separated from the lake by a narrow peninsula about a mile long. The lake proper is devoid of vegetation, with the possible exception of the alga noted.

BIG SLOUGH, DUNN COUNTY

This large slough with an area of 2 sections, is the only one of any size west of the Missouri River in North Dakota that does not dry up in summer. Partly for this reason it is quite different in vegetation from the others. River bulrush is very abundant, occupying the center of the slough. Outside of this is a band of open water, and beyond it and reaching to the shore is a great abundance of water smartweed and occasional large patches of whitetop. Mixed with these two dominant species the following totally submerged plants are abundant: Coontail, leafy pondweed, and common bladderwort. Common white water buttercup is frequent. Among the floating plants, both small and star duckweeds and algae are common. The shore plants are of the usual barren hillside kinds, with the addition of hoary sagebrush. This is a western species of sage, rarely extending east of the Missouri River.

Gunbo Slough is a marshy dried-out hay slough somewhat similar; here also river bulrush and water smartweed are abundant.

ROCK LAKE (LAC DES ROCHES), TOWNER COUNTY

This large, shallow lake, with an area of about 4 sections, is in reality a large whitetop slough. Originally it was an important lake, but later it went completely dry and whitetop took possession. A sedge (*Carex riparia*) is the only other marsh plant in abundance; the following, however, are less commonly present: Soft bulrush, bulrush, common cattail, giant reed grass, bog rush, and slough grass. Among the aquatics only common bladderwort is common; small quantities of floating water smartweed, clasping-leaf pondweed, sago pondweed, water milfoil, and coontail are present. Algae, the two duckweeds, and butterflywort are fairly common. There were no striking differences noted in the shore vegetation.

RUSH LAKE, CAVALIER COUNTY

This large, shallow lake, including the bordering marshes, has an area of about 15 square miles. The submerged aquatic vegetation is confined to large patches of sago pondweed in the center of the lake with occasional colonies of clasping-leaf pondweed. Extending shoreward from the open water, bulrush is abundant in rather dense, scattered clumps. Along the shore and bordering the two wooded islands, giant reed grass is abundant, and in many places common cattail, soft bulrush, and whitetop are common, while locally river bulrush and bur-reed are found. In the slough at the south end, water milfoil and common bladderwort are abundant, small and star duckweeds are fairly common, and coontail is rare. The shore vegetation is composed mostly of willows, currants, hawthorns, and roses.

ALICE, IRVIN, AND CHAIN LAKES, RAMSEY COUNTY

These large, shallow lakes, with a combined total area of about 16 square miles, were at one time connected, but in late years they have been entirely separate. Lake Irvin has been completely dry in some years and at one time was partly seeded over with barley. A fourth lake south of Chain Lake has for many years been a wild meadow. Lake Alice (Lac aux Morts) the largest of the group, is entirely surrounded by a dense border of giant reed grass; bulrush is rather common, and the following marsh plants occur locally in small patches: Whitetop, sedge (*Carex riparia*), river bulrush, common cattail, bur-reed, western wapato, and soft bulrush; sago pondweed is present in small quantities. In the other two lakes sago pondweed is more abundant, but the marsh vegetation is rather scanty, probably on account of cultivation and extensive pasturage.

ISLAND LAKE, ROLETTE COUNTY

This 1,100-acre, sloughlike lake was the only one listed from the northeastern and eastern counties that could be considered as belonging to the whitetop sloughs (Group 4, B), but even this lake has an aquatic vegetation in common with the fresh-water lakes (Group 3, A), since clasping-leaf pondweed, water milfoil, and sago pondweed are abundant. A few years ago a large portion of the lake bed was seeded to barley, but when visited during the present investigation only part of the lake was dry, so that it still furnished an excellent feeding ground for thousands of ducks. The whole lake is covered with an abundant growth of whitetop and a few scattered patches of bulrush. The most interesting feature in regard to the shore vegetation and that of the two small islands is the frequency of three poplars—southern cottonwood, quaking aspen, and balsam poplar—glaucous and slender willows, and red-osier dogwood. Otherwise, the shore vegetation is of the usual type.

BENSON COUNTY GROUP

The majority of the lakes of this county were surveyed from October 18 to 21. Beginning on the 16th of the month a severe storm made field work exceedingly difficult. At the time of the survey all the lakes were covered with 2 to 4 inches of ice. Even with the vigorous use of spade and ax, only a general and possibly inaccurate idea could be obtained of the vegetation of these lakes;

therefore, they have been placed in a separate group and the information about them, admittedly incomplete, is offered for whatever it is worth.

Horseshoe and Broken Bone Lakes, just south of the town of Pleasant Lake, are very similar and are separated by only a narrow strip of land. In Broken Bone Lake sago pondweed is abundant; the whole lake is bordered by a broad band of giant reed grass and bulrush. Horseshoe Lake, on the other hand, is not so deep; three-square and bulrush are frequent and giant reed grass is rare. A little vegetation was noticed in the center of the lake, but its nature could not be determined. The only striking fact about the shore vegetation of these two lakes is the abundance of balsam poplar, mossycup oak, and southern cottonwood.

Stink Lake, southeast of Leeds, is an extremely alkaline lake, shallow and devoid of aquatic or marsh vegetation. The floor of the lake is a mass of soft, black, puttylike quicksand or mud, which gives off a penetrating, offensive odor. On the shore samphire and salt grass are common.

Shinbone, Elbow, and Spring Lakes in the vicinity of Warwick and Tokio were found somewhat similar. Sago pondweed is present in various quantities in all of them. The shore vegetation in general is also of the usual type.

ANNOTATED LIST OF PLANTS COLLECTED ABOUT LAKES AND SLOUGHS

ALGAE: POND SCUMS

- Synechococcus Naegeli.** One of the unicellular, nongelatinous, blue-green algae (Cyanophyceae), giving a dark olive-green color to saline waters; rare, occurring only in Mercer Lakes Nos. 1 and 2, northeast of Turtle Lake, McLean County.
- Clathrocystis Henfrey.** One of the small, unicellular, colonial blue-green algae, usually of a pinkish color and found in alkaline waters; rather rare, occurring in Gooley Slough, near Hankinson, Richland County; only occasional elsewhere.
- Anabaena Bory.** One of the heterocystic blue-green algae, giving a greenish tinge to fresh water; rare; definitely determined only from Upsilon Lake in the Turtle Mountains, Rolette County. Plants, possibly the same, were found in Wanitala Lake, Foster County, and Cherry Lake, north of Dawson, Kidder County.
- Enteromorpha Link.** One of the filamentous green algae (Chlorophyceae); light green in color, rather common in Stump Lake, Nelson County; occasionally found elsewhere.
- Chaetomorpha Kutz.** One of the filamentous green algae; dark green in color, exceedingly tough and wiry; common in Section 11E Lake, Cordelia Township, Bottineau County; frequent in many other Turtle Mountain Lakes, and occasional elsewhere.
- Cladophora Kutz.** One of the branching green algae; usually yellow brown in color, very abundant in stagnant water, especially in Richland County in the southeastern, and Burke, Ward, and Mountrail Counties in the northwestern, part of the State.
- Spirogyra Link.** One of the filamentous green algae; green in color, fairly common.

CHARACEAE: STONEWORTS

- Chara Vaillant:** Stonewort. Common throughout the State; at least three distinct species present, which, however, remain unidentified.

HEPATICA: LIVERWORTS

- Riccia Linnaeus:** Liverwort. Rare; reported only from Rock Lake, Towner County.
- Ricciella fluitans (Linnaeus) Bisch:** Butterflywort. Rare; reported only from Deer Lake, Kidder County.
- Marchantia polymorpha Linnaeus:** Liverwort. Rare; reported only from Eli Lake, Sections 15-16, Diamond Township, Burke County; confined to springy places.

MUSCI: MOSSES

- Amblystegium riparium Bruch and Schimper.** Common throughout the State in quiet bays and lakes.
- Sphagnum Linnaeus.** Occasionally found in springy places and bogs.

EQUISETACEAE: HORSETAILS; SCOURING-RUSHES

- Equisetum arvense Linnaeus:** Common horsetail. Rare; in sandy soil near Mud Lake, Richland County; also at Sweetwater Lake, Barnes County, and Upsilon Lake, Rolette County.
- Equisetum hyemale Linnaeus:** Scouring-rush. Frequent on sandy slopes bordering lakes throughout the State.

TYPHACEAE: CATTAILS

- Typha latifolia Linnaeus:** Common cattail. Common throughout the State in springy places and in the vicinity of fresh-water lakes.

SPARGANIACEAE: BUR-REEDS

- Sparganium eurycarpum* Engelm.: Bur-reed. Frequent throughout the State along the border of fresh-water sloughs and lakes; fairly common in the Turtle Mountain lakes.
- Sparganium americanum* Nutt.: Bur-reed. Rare; reported only from River-side Marsh along the Missouri River, south of Mandan, Morton County, where it was fairly common.

NALADACEAE: PONDWEEDS

- Potamogeton natans* Linnaeus: Floating pondweed. Rather rare fresh-water plant, being found in eight Turtle Mountain lakes but in only one case common (Metigoshe Lake). The only other locality where it was noted was in a lake in sections 20 to 29, Foothill Township, Burke County, where a few plants were seen.
- Potamogeton heterophyllus* Schreber: Variable pondweed. Rare fresh-water plant, being found only in four sloughs: Bismarek and King Sloughs, east of Bismarek, Burleigh County, and Big Slough south of Underwood, and slough south of Max, McLean County.
- Potamogeton praelongus* Wulfen: White-stemmed pondweed. Rare; reported only from Pelican Lake, Turtle Mountains, Bottineau County.
- Potamogeton perfoliatus* Linnaeus: Claspingleaf pondweed. Abundant in the northern, less abundant in the southern counties; prefers shallow, slightly alkaline, or fresh water. This species was represented by two forms, one of which was characterized by sessile, lanceolate to narrow ovate-lanceolate leaves with acuminate apex agreeing with *Potamogeton richardsonii* (Bennett) Rydberg (*P. perfoliatus richardsonii* Bennett); the other with clasping-perfoliate, ovate-lanceolate to ovate leaves with acute apex representing *P. perfoliatus* Linnaeus. Every possible intermediate intergradation between these two forms was found, indicating that all these forms should be treated as a single species.
- Potamogeton zosterifolius* Schumacher: Eelgrass pondweed. Rare; occurring in three fresh-water lakes: Jim Lake, Stutsman County, where it was fairly common; King Slough, Burleigh County; and Painted Woods Lake, McLean County, where it was abundant.
- Potamogeton friesii* Ruprecht: Fries's pondweed. Rare, being reported from the two fresh-water lakes Upsilon and Jarves in the Turtle Mountains, Rolette County.
- Potamogeton foliosus* Rafinesque-Schmaltz: Leafy pondweed. Frequent throughout the State in quiet, shallow bays or lakes.
- Potamogeton pectinatus* Linnaeus: Sago pondweed. Abundant throughout the State in fresh, alkaline, or saline water. Extremely variable.
- Ruppia maritima* Linnaeus: Widgeon grass. Abundant throughout the State in slightly alkaline-saline or saline water. A few plants were noted that approached very closely to *Ruppia occidentalis* Watson of Britton and Brown's Manual (2) (sheaths $1\frac{1}{2}$ to 2 inches and achenes $1\frac{1}{4}$ to 2 lines); others were less vigorous (sheaths 3 to 4 lines, and achenes 1 line) resembling *R. maritima*, and one, very much stunted, was identical with *R. maritima rostrata* Agardh (3). However, the large forms that approached *R. occidentalis* are always found in the least alkaline lakes under the most favorable conditions, as in Brush Lake, McLean County, whereas the less vigorous forms are found under adverse conditions in the strongly alkaline-saline lakes, and the most stunted of all, *R. maritima rostrata*, in the very salty Kellys Slough, Grand Forks County. Unfortunately, fruit in many cases could not be found, but after the summer's investigation of numerous lakes of extremely different types, evidence seems to indicate that the so-called species and varieties of *Ruppia* are due in North Dakota to environmental factors primarily connected with the concentration of various salts in the water.
- Zannichellia palustris* Linnaeus: Horned pondweed. Rare throughout the State; found in small springs and on sandy bottoms in shallow water along the border of fresh-water lakes.
- Najas marina* Linnaeus: Naiad. Rare; reported from Mud Lake and Lake Elsie, near Hankinson, Richland County.

JUNCAGINACEAE: ARROWGRASS

- Triglochin maritima* Linnaeus: Seaside arrowgrass. Common on marshy flats and sandy meadows of strongly alkaline-saline lakes throughout the State.
Triglochin palustris Linnaeus: Arrowgrass. Frequent throughout the State in springy places or bordering fresh-water lakes.

ALISMACEAE: WATERPLANTAIN; WAPATO

- Sagittaria latifolia* Willdenow: Wapato. Rare; reported from Mud Lake, Richland County, and Dawson Slough and Horseshoe Lake, Kidder County.
Sagittaria arifolia Nuttall: Western wapato. Common throughout the State along the borders of fresh-water lakes and sloughs.
Alisma plantago-aquatica Linnaeus: Waterplantain. Frequent throughout the State along the border of fresh-water sloughs and lakes.
Alisma geyeri Torrey: Geyer's waterplantain. Rather rare; reported from six or seven fresh-water lakes; usually growing completely submerged in 1 to 2 feet of water; in one case found on dried-out mud flats where the water had receded (p. 29).

HYDROCHARITACEAE: WATERWEED; EELGRASS

- Elodea canadensis* Michaux: Waterweed. Rather rare; reported from eight fresh-water sloughs or lakes, usually growing in shallow water and abundant only in Bismarek Slough, Burleigh County, and Jim Lake, Stutsman County.

GRAMINEAE: GRASSES

- Andropogon scoparius* Michaux: Little bluestem. Common throughout the State on the prairies or dry barren hillsides.
Andropogon furcatus Muhlenberg: Beardgrass. Not so common as little bluestem but rather common throughout the State on sandy hillsides and in moist meadows.
Panicum capillare Linnaeus: Old witch grass. Frequent throughout the State in small quantities, along the sandy borders of fresh-water or slightly alkaline-saline lakes.
Panicum virgatum Linnaeus: Switch grass. Frequent throughout the State in low meadows in the vicinity of lakes.
Echinochloa crusgalli (Linnaeus) Beauvois: Barnyard grass. Frequent throughout the State, usually found in sandy meadows. A number of the plants approached very closely to the var. *frumentacea* (Roxburgh) Link.
Setaria viridis (Linnaeus) Beauvois: Green foxtail. Only reported once in the vicinity of lakes, namely at Swan Lake, Richland County; frequent elsewhere.
Cenchrus carolinianus Walter: Sandbur. Very rare; reported only from sandy bank along Missouri River, near Bismarek, Burleigh County.
Phalaris arundinacea Linnaeus: Reed canary grass. Common throughout the State in sandy flats, meadows, and marshes.
Stipa comata Trinius and Ruprecht: Feathergrass. Reported only once in the vicinity of any lake (Buffalo Lake, Kidder County); common elsewhere.
Stipa spartea Trinius: Porcupine grass. Reported only once in the vicinity of any lake (Elsie Lake, Richland County); frequent elsewhere.
Muhlenbergia foliosa Trinius. Very rare; found only at Crooked Lake, McLean County.
Muhlenbergia racemosa (Michaux) Britton, Sterns, and Poggenberg: Wild timothy. Reported only once in the vicinity of any lake (Bismarek Slough, Burleigh County); frequent elsewhere.
Phleum pratense Linnaeus: Timothy. Rare; found only in meadow along the border of Mud Lake, Richland County.
Sporobolus cryptandrus (Torrey) Gray: Sand dropseed. Rare; found only once — Williams Lake, Kidder County, on sandy beach.
Sporobolus richardsoni (Trinius) Merrill: Dropseed. Rare; found along sandy borders of five lakes: Isabel Lake, Kidder County; Johnson and North Lakes, Divide County; Clear Lake and Lostwood Section 21-28 Lake, Burke County.
Sporobolus asperifolius (Nees and Meyen) Thurber: Rough-leaf dropseed. Common throughout the State; a plant of sandy beaches and meadows.
Agrostis alba Linnaeus: Redtop. Rather rare; reported from Round and Elsie Lakes, Richland County, and Sweetwater Lake, Barnes County. One specimen approached var. *vulgaris* (Withering) Thurber.

- Agrostis hyemalis* (Walter) Britton, Sterns, and Poggenberg: Hair grass. Frequent throughout the State on dry, sandy hillsides and grasslands.
- Calamagrostis canadensis* (Michaux) Beauvois: Bluejoint. Very rare; reported only from the marsh at the south end of Elsie Lake, Richland County.
- Calamagrostis inexpectans* Gray: Bog reed grass. Very rare; definitely reported only from one locality, namely, marshy ground at Kellys Slough, Grand Forks County.
- Sphenopholis obtusata* (Michaux) Scribn. var. *lobata* (Trinius) Scribn.: Early bunch grass. Fairly common throughout the State in low meadows and on dry hillsides and prairies.
- Koeleria cristata* (Linnaeus) Persoon: June grass. Rare; found only once at Miller Lake, Divide County; probably frequent early in the season.
- Spartina michauxiana* Hitchcock: Cord grass. Common to abundant throughout the State in marshes, moist meadows, sandy beaches, and sloughs.
- Spartina gracilis* Trinius: Inland cord grass. Common throughout the State on sandy beaches and meadows of the saline lakes; an excellent indicator of saline soils.
- Beckmannia erucaeformis* (Linnaeus) Host: Slough grass. Rather common throughout the State in fresh-water marshes and sloughs.
- Bouteloua oligostachya* (Nuttall) Torrey: Mesquite grass. Seen only once or twice on dry, sandy hillsides in the vicinity of lakes; common on the prairies.
- Munroa squarrosa* (Nuttall) Torrey: False buffalo grass. Very rare; reported only from dry, sandy hillsides near Lake Wanitah, Foster County.
- Phragmites communis* Trinius: Giant reed grass. Common to very abundant throughout the State in marshes, sloughs, and along the borders of lakes.
- Eragrostis megastachya* (Koeler) Link: Stink grass. Rare; reported from sandy soil bordering Lake Wanitah, Foster County, and near Bismarck, along the Missouri River, Burleigh County.
- Distichlis spicata* (Linnaeus) Greene: Salt grass. Abundant throughout the State about alkali lakes and sloughs.
- Poa triflora* Gilibert: Bluegrass. Rather common throughout the State in low places, moist meadows, and sloughs.
- Poa buckleyana* Nash: Spear grass. Rare, reported only from dry meadows near Holmes Lake, McLean County, and Miller Lake, Divide County.
- Fluminea festuacea* (Willdenow) Link (*Scotolchloa festuacea* Willdenow): Whitetop. Abundant throughout the State, growing in shallow water, marshes, and sloughs.
- Panicularia nervata* (Willdenow) Trinius: Meadow grass. Very rare; reported only from a moist meadow, at Mud Lake, Richland County.
- Panicularia grandis* Watson: Reed meadow grass. Locally common in the marshes bordering the Turtle Mountain lakes; otherwise rare, being found at two other fresh-water lakes or marshes in the State: Painted Woods Lake and Riverside Marsh along the Missouri River.
- Puccinellia nuttalliana* (Nuttall) Watson and Coulter: Slender meadow grass. Common throughout the State on alkaline flats and meadows.
- Bromus ciliatus* Linnaeus: Fringed bromegrass. Rare; reported from the woods of the Turtle Mountains, Bottineau County (Dalen Township, sections 9-10), and woods bordering Riverside Marsh, Morton County.
- Bromus purgans* Linnaeus: Hairy wood grass. Rare; reported from the bordering woods of Riverside Marsh, Morton County, and Painted Woods Lake, McLean County.
- Bromus inermis* Leysser: Common bromegrass. Rare; reported only from meadow bordering Middle Des Lacs Lake, Ward County.
- Agropyron repens* (Linnaeus) Beauvois: Quack grass. Common throughout the State on dry hillsides and meadows.
- Agropyron tenerum* Vasey: Slender wheatgrass. Apparently rare, at least in the vicinity of lakes, being reported from dry hillsides near Buckhouse Slough, Richland County, and Lostwood Section 9 Lake, Burke County.
- Hordeum jubatum* Linnaeus: Squirreltail grass. Very abundant throughout the State in meadows, in borders of marshes, on ponds, and on alkali flats; a pest in grazing lands.
- Elymus virginicus* Linnaeus, var. *submuticus* Hooker (*Elymus curvatus* Piper): Short-awned wild-rye. Very rare; reported only from woody border of Riverside Marsh, Morton County.
- Elymus canadensis* Linnaeus: Nodding wild-rye. Common throughout the State in sandy meadows and open woods; very variable, some forms approaching the so-called species *E. robustus* Scribn. and J. G. Smith.

CYPERACEAE: SEDGES; NUT-GRASS; SPIKE RUSH; BULRUSH

- Cyperus diandrus* Torrey. Low nut-grass. Very rare; reported only from sandy shore of Moran Lake, Richland County.
- Cyperus schweinitzii* Torrey: Flat-sedge. Very rare; reported only from sandy beach of Isabel Lake, Kidder County.
- Cyperus erythrorhizos* Muhlenberg: Flat-sedge. Very rare; reported only from sandy beach of Mud Lake, Richland County.
- Eleocharis palustris* (Linnaeus) Roemer and Schultes: Bog rush. Common throughout the State, in borders of marshes and moist meadows; one specimen from Rush Lake, Cavalier County, appeared to agree with var. *vicens* Bailey.
- Eleocharis acicularis* (Linnaeus) Roemer and Schultes: Needle rush. Common throughout the State on mud flats along lake borders.
- Scirpus americanus* Persoon: Three-square. Abundant throughout the State, growing in the water or in sandy meadows along the border of lakes.
- Scirpus nevadensis* Watson: Nevada bulrush. Common throughout the State on sandy beaches and meadows of saline lakes; an excellent indicator of saline soils.
- Scirpus occidentalis* (Watson) Chase: Bulrush. Abundant throughout the State in marshes and sloughs.
- Scirpus validus* Vahl: Soft bulrush. Frequent throughout the State in marshes and sloughs but not clearly distinguishable from *S. occidentalis*; these two intergrade so completely that it is very doubtful whether *S. occidentalis* should be recognized as a separate species. Under favorable conditions when the form *S. validus* was found in springy places, the soft, light-green, thickened culm was apparent and distinguishable from the much harder, olive-green culm of *S. occidentalis*, but usually this character was too variable to be used for diagnosis. Again, the broader achene and longer spikelet of *S. occidentalis* are considered valuable characters for distinguishing this form from *S. validus*, but numerous measurements and comparisons were made in the field, with the result that all normal or extreme variations of both these characteristics were found in the achenes of plants of a single patch, all having the hard, olive-green type of culm. The character of the setae, whether flexuous or stiff, also was subject to intergradation. In the Eastern States such extensive variation has not been observed. In North Dakota, however, until definite work has been done in growing these two species under different conditions of alkalinity, it is still a question whether *S. occidentalis* is a valid species. Present evidence points to the opposite conclusion.
- Scirpus fluviatilis* (Torrey) Gray: River bulrush. Frequent throughout the State in fresh-water marshes; common in only one or two of the larger sloughs.
- Scirpus paludosus* A. Nelson: Bayonet grass. Very abundant throughout the State, usually growing in the water or along the borders of alkaline lakes and sloughs.
- Scirpus atrovirens* Muhlenberg: Green bulrush. Rather rare to frequent, found in meadows and woody borders only once in each of the following counties: Richland, McLean, Bottineau, Stutsman, Griggs, and Rolette.
- Carex cristata* Schweinitz: Sedge. Rare; reported from grassy borders of two lakes—Elsie Lake, Richland County, and Dion Lake, Rolette County.
- Carex sychnocephala* Carey: Sedge. Rare; reported from grassy borders of Dion and Jarves Lakes, Rolette County.
- Carex scirpoides* Schkuhr: Sedge. Rare; reported only from boggy border of Elsie Lake, Richland County.
- Carex vulpinoidea* Michaux: Sedge. Rare; reported from moist meadows along the border of Moon Lake, Barnes County, and Dion Lake, Rolette County.
- Carex diandra* Schrank, var. *ramosa* (Boott) Fernald: Sedge. Rather rare; reported only from grassy borders of lakes once in each of the following counties: Richland, Logan, McLean, Ward, and Pierce.
- Carex stipata* Muhlenberg: Sedge. Very rare; reported only from the border of Elsie Lake, Richland County.
- Carex aquatilis* Wahlenberg: Sedge. Rather common throughout the State in fresh-water marshes and sloughs.
- Carex aurea* Nuttall: Sedge. Rare; reported only from grassy border of Mud Lake, Richland County.
- Carex laxiflora* Lamarek: Sedge. Rare; reported only from grassy border of Elsie Lake, Richland County. *C. laxiflora* var. *gracillima* Boott also was found only here.
- Carex lanuginosa* Michaux: Sedge. Frequent throughout the southeastern and central portions of the State in fresh-water marshes and sloughs.

- Carex trichocarpa* Muhlenberg, var. *aristata* (R. Brown) Bailey: Sedge. Rare; reported from the fresh-water marshes of Riverside Marsh, Morton County, and Painted Woods Lake, McLean County.
- Carex riparia* W. Curtis: Sedge. Frequent throughout the State in fresh-water marshes and sloughs.
- Carex hystericina* Muhlenberg: Sedge. Rare; reported from grassy meadows of Elsie and Mud Lakes, Richland County, and Sweetwater Lake, Barnes County.
- Carex rostrata* Stokes, var. *utriculata* (Boott) Bailey: Sedge. Frequent throughout the State in fresh-water marshes.
- Carex rostrata* Stokes, var. *ambigens* Fernald: Sedge. Rare; reported only from marshy borders of Deer Lake, Kidder County.

LEMNACEAE: DUCKWEEDS

- Lemna trisulca* Linnaeus: Star duckweed. Common throughout the State along the borders of fresh-water sloughs and marshes.
- Lemna minor* Linnaeus: Small duckweed. Common throughout the State in springy places and borders of fresh-water sloughs and marshes.

JUNCACEAE: RUSHES

- Juncus bufonius* Linnaeus, var. *halophilus* Buchenau and Fernald: Toad rush. Frequent in moist, open ground throughout the south-central and southeastern counties of the State.
- Juncus dudleyi* Wiegand: Rush. Frequent throughout the State in grassy meadows bordering lakes and sloughs.
- Juncus balticus* Willdenow, var. *littoralis* Engelmann: Battle rush. Common throughout the State on sandy meadows of saline and strongly alkaline lakes.
- Juncus longistylis* Torrey: Rush. Rather rare; reported from the grassy borders of Upsilon Lake, Rolette County; Lostwood, sections 20-29, Burke County; and two or three lakes in the vicinity of Round Lake, McHenry County.
- Juncus nodosus* Linnaeus: Knotted rush. Frequent, but in no case common, throughout the State in grassy meadows bordering lakes.
- Juncus torreyi* Coville: Torrey's rush. Common throughout the State in low places, moist meadows, and borders of lakes and sloughs.
- Juncus alpinus* Villars: Rush. Rather rare, being found in wet, springy places bordering lakes; reported only once from each of the following counties: Richland, Kidder, Bottineau, Burke, Barnes, McHenry, and Rolette.

LILIACEAE: ONION; SOLOMONSEAL; ETC.

- Allium stellatum* Ker: Prairie wild onion. Frequent throughout the State in moist meadows bordering lakes and sloughs.
- Vagnera stellata* (Linnaeus) Morong: Starry false solomonseal. Rare; a single plant reported from Brush Lake, McLean County.
- Disporum trachycarpum* (S. Watson) Benthams and Hooker: Rough-fruited disporum. Rare; reported only from woody border of Upsilon Lake, Turtle Mountains, Rolette County.
- Smilax herbacea* Linnaeus: Carrion-flower. Rare; reported from the borders of Moon and St. Marys Lakes, Barnes County, and Spiritwood and Jim Lakes, Stutsman County.

ORCHIDACEAE: ORCHIDS; LADY-SLIPPERS; LADIES-TRESSES

- Ibidium romanzoffianum* (Chamisso) House: Ladies-tresses. Rare; reported only from springy border of Lake George, McHenry County.

SALICACEAE: WILLOWS; POPLARS

- Salix amygdaloides* Andersson: Peachleaf willow. Rather common throughout the State along the borders of the larger lakes.
- Salix serissima* (Bailey) Fernald: Autumn willow. Rare; reported only from Upsilon Lake, Rolette County.
- Salix interior* Rowlee: Sand-bar willow. Abundant throughout the State in low places, moist meadows, and bordering lakes and sloughs.
- Salix petiolaris* Smith: Slender willow. Rather rare; definitely reported only from border of Camp Lake, McLean County; Rock Lake, Towner County; and Rush Lake, Cavalier County.
- Salix cordata* Muhlenberg: Heartleaf willow. Frequent along the borders of lakes in Richland, Morton, Barnes, and McHenry Counties.

- Salix discolor* Muhlenberg: Pussy willow. Fairly common along the border of Elsie Lake, Richland County, and throughout the Turtle Mountains in Bottineau County; not reported elsewhere.
- Salix bebbiana* Sargent: Beak willow. Fairly common in woody border along Lake George, McHenry County, and bordering the lakes in the Turtle Mountains in Bottineau County. Otherwise reported only from Camp Lake, McLean County, and Lostwood, sections 28-29, Burke County, in both of which places it was rare.
- Salix prinoides* Pursh: Glaucous willow. Rather rare; common only in the vicinity of Red Willow Lake, Griggs County; otherwise reported from Rush Lake, Cavalier County; Denbigh Lake, McHenry County; Upsilon Lake, Rolette County; and Sweetwater Lake, Ramsey County.
- Salix candida* Flügge: Hoary willow. Rare; reported from boggy shores of Elsie Lake, Richland County; Camp Lake, McLean County; Coville Township, sections 1-2, Burke County.
- Salix tristis* Aiton: Dwarf pussy willow. Rare; reported only from sandy hills near Lake George, McHenry County.
- Populus tremuloides* Michaux: Quaking aspen. Frequent along streams and shores of lakes throughout the southern part of the State; abundant, however, near Devils Lake, along the Missouri River, and throughout the northern tier of counties, especially Rolette and Bottineau.
- Populus tacamahacca* Miller: Balsam poplar. Very abundant throughout the Turtle Mountains in Rolette and Bottineau Counties; common in the vicinity of Pleasant Lake, Beuson County, but rare at Antelope and Round Lake, McHenry County, and Red Willow Lake, Griggs County, the latter being the farthest south.
- Populus deltoides* Marshall: Southern cottonwood. Common throughout the State along streams and borders of lakes and ponds.

BETULACEAE: HAZELNUTS; BIRCHES

- Corylus americana* Walker: American hazelnut. Common throughout the woods bordering lakes in the Turtle Mountains, Bottineau and Rolette Counties. Elsewhere it was reported only from Red Willow Lake, Griggs County, where it was fairly common.
- Corylus rostrata* Aiton: Beaked hazelnut. Reported only from the vicinity of Upsilon Lake in the Turtle Mountains, Rolette County, where it was rather common.
- Betula papyrifera* Marshall: Canoe birch. Common throughout the woody borders of almost all the lakes in the Turtle Mountains, Bottineau and Rolette Counties.

FAGACEAE: OAKS

- Quercus macrocarpa* Michaux: Mossy oak. Common in the vicinity of almost all the large fresh-water lakes throughout the State; abundant in the Turtle Mountains.

URTICACEAE: ELMS; HACKBERRY; NETTLES

- Ulmus americana* Linnaeus: American elm. Frequent to common throughout the State in low places, along streams and lake borders.
- Celtis occidentalis* Linnaeus: Hackberry. Rare; reported from border of Elsie Lake, Richland County, and Jim and Spiritwood Lakes, Stutsman County.
- Urtica gracilis* Aiton: Nettle. Frequent throughout the State; never present in large numbers, and usually found in low ground or in open woods bordering lakes.
- Urtica lyallii* Watson: Nettle. Apparently more common than *U. gracilis* throughout the State, in about the same situations; in some cases confusingly similar in appearance.

POLYGONACEAE: DOCKS; KNOTWEEDS; SMARTWEEDS

- Rumex occidentalis* Watson: Western dock. Rather rare throughout the State; observed only in marshy areas along the borders of the following lakes: Coville Township, sections 1-2, Burke County; Spiritwood Lake, Stutsman County; Red Willow Lake, Griggs County; and two or three lakes in the vicinity of Girard Lake, McHenry County.
- Rumex britannica* Linnaeus: Great water dock. Rare; reported only from marshy ground bordering Camp Lake, McLean County.

- Rumex mexicanus* Meisner: Willow-leaf dock. Rare; reported from moist meadows bordering Swan Lake Slough, Richland County; at Sweetwater Lake; Barnes County; and Long Lake, Griggs County.
- Rumex persicarioides* Linnaeus: Golden dock. Common throughout the State; usually confined to alkali flats.
- Polygonum aviculare* Linnaeus: Knotgrass. Rather rare; being found on sandy beaches and waste ground, bordering Elsie Lake, Richland County; Minto and Salt Lakes, Walsh County; and Sweetwater and Devils Lakes, Ramsey County.
- Polygonum erectum* Linnaeus: Knotgrass. Rare; reported only from waste ground bordering Florence Lake, Burleigh County.
- Polygonum ramosissimum* Michaux: Bushy knotgrass. Fairly common throughout the State in sandy meadows and low places bordering lakes and sloughs.
- Polygonum lapathifolium* Linnaeus: Pale smartweed. Fairly common throughout the State on sandy shores and flats bordering slightly alkaline or fresh-water lakes.
- Polygonum amphibium* Linnaeus: Water smartweed. Rather rare, reported, with the exception of Emmons County, only from one lake in each of the northern counties of Ward, Ramsey, Rolette, Towner, and Burke. Another form of this species masquerading under the name *P. hartwegii* Gray was rare, reported only from partly dried-out mud flats of Frettin Lake, sections 13-14, Kidder County, and at Upsilon Lake, Rolette County. Still another form of this same species, known as *P. muhlenbergii* (Meisner) Watson, was common throughout the State, growing in water and in moist meadows bordering fresh-water lakes. These so-called species can only be considered forms of *P. amphibium*. This species is very variable, all its forms intergrading, depending upon ecological conditions. Poole's statement (8, p. 287) that—"The development of the hydro-mesophytic mode of life by these species is a fact of everyday observation. In the marshy areas of the sandhills one can trace a perfect series of changes from the typical form called *P. amphibium* through *P. hartwegii* and finally to *P. emersum*. The first two forms, though often very different appearing plants, may commonly be collected from the same rhizome. The latter 'species' is almost as variable and it seems a plain case that these three 'species' are merely extreme variations that may be found arising from same rootstock"—which was verified by the author in North Dakota—shows clearly that the continued treatment of these forms as species is a mistake.
- Polygonum persicaria* Linnaeus: Lady's-thumb. Rare throughout the State, being reported only from sandy meadows bordering Swan Lake Slough, Richland County, and Long Lake, Griggs County.
- Polygonum convolvulus* Linnaeus: Black bindweed. Rare; reported only from sandy shores of Crooked Lake, McLean County.
- CHENOPODIACEAE: GOOSEFOOT; PIGWEED; ORACH; SAMPHIRE; SEA BLITE; ETC.**
- Cycloloma atriplicifolium* (Sprengel) Coulter: Winged pigweed. Rare; found only in sandy waste ground along the Missouri River, near Bismarck, Burleigh County.
- Chenopodium rubrum* Linnaeus: Coast blite; red goosefoot. Common to abundant throughout the State on alkali flats. On the shores of Middle Des Lacs Lake were a few plants that were clearly *C. humile* Hooker, but along with these were a number of forms that represent intermediate steps between the two species, showing that *C. humile* was probably only a form growing under unfavorable food conditions.
- Chenopodium glaucum* Linnaeus: Oak-leaf goosefoot. Common throughout the State on sandy flats and meadows of alkaline or saline lakes. Apparently native and not naturalized from Europe.
- Chenopodium album* Linnaeus: Lamb's-quarters. Frequent in waste ground bordering lakes and sloughs throughout the State.
- Chenopodium leptophyllum* Nuttall: Narrow-leaf goosefoot. Rare; reported only from border of Salt Lakes, Ward County.
- Atriplex patula* Linnaeus, var. *hastata* (Linnaeus) Gray: Orach. Common throughout the State on alkali flats. The typical form, *A. patula*, apparently was also present but only occasional.
- Atriplex argentea* Nuttall: Silvery orach. Rare; reported from alkali flats bordering Myers Slough, Dunn County, and Falkirk Lake, McLean County.
- Atriplex nuttallii* S. Watson: Saltbush. Rather rare; reported from dry, barren hillsides in the vicinity of the following lakes: Douglass and Mud Lakes,

McLean County; Shealy Township, Sections 34-35 Lake, Ward County; Beauvert and Keller Lakes, Burke County.

Salicornia rubra Nelson: Samphire. Fairly common throughout the State on strongly alkaline or saline flats bordering lakes and sloughs, being more abundant on the latter.

Dondia depressa (Pursh) Britton: Sea blite. Common throughout the State on dried alkali flats and meadows. There were two distinct forms of this plant (p. 17) probably correlated with moisture content and degree of concentration of salts in the upper strata of soil. One was a low-spreading or prostrate depauperate form, the other high and erect, with an elongate inflorescence (possibly *Suaeda depressa* var. *erecta* S. Watson).

Dondia sp.: Sea blite. Rare; reported only from the alkaline-saline flats of Holmes Lake, McLean County, and Minto Lake, Walsh County.

Salsola kali Linnaeus: Common saltwort. Frequent throughout the State on sandy flats and shores of lakes and sloughs.

AMARANTHACEAE: AMARANTH PIGWEED

Amaranthus graecizans Linnaeus: Tumbleweed. Rather rare; reported from waste places and sandy shores of the following lakes: Mud, Richland County; Sibley, Kidder County; and Crooked, Farkirk, and Margaret, McLean County.

Amaranthus blitoides Watson: Prostrate amaranth. Rare; reported from the sandy shores of Mud Lake, Richland County, and King Slough, Burleigh County.

NYCTAGINACEAE: FOUR-O'CLOCKS

Oxybaphus nyctagineus (Michaux) Sweet: Four-o'clock. Rare; reported from border of Cherry Lake, Kidder County; and Crooked Lake, McLean County.

CARYOPHYLLACEAE: PINKS; SAND SPURRY; ETC.

Tissa marina (Linnaeus) Britton: Sand spurry. Rather rare; being reported from alkaline-saline flats bordering Cushion Slough, Burke County; Eckelson and Moon Lakes, Barnes County; Addie Lake, Griggs County; Stump Lake, Nelson County; Kellys Slough, Grand Forks County; and Minto and Salt Lakes, Walsh County.

PORTULACACEAE: PURSLANE

Portulaca oleracea Linnaeus: Common purslane. Rare; reported from sandy shores and waste ground bordering Swan Lake, Richland County, and Lake Wanitah, Foster County.

CERATOPHYLLACEAE: COONTAIL

Ceratophyllum demersum Linnaeus: Coontail. Fairly common throughout the State in fresh-water sloughs and lakes.

NYMPHAEACEAE: WATERLILIES

Nymphaea advena Aiton: Yellow waterlily. Found only in the Turtle Mountains; reported twice from Rolette County (Gravel and Crowell Lakes), and abundant throughout the lakes in Bottineau County.

RANUNCULACEAE: BUTTERCUPS; ANEMONES

Ranunculus aquatilis Linnaeus, var. *capillaceus* De Candolle: Common white water buttercup. Frequent throughout the State on dried-out mud flats and in shallow water of fresh-water sloughs and lakes.

Ranunculus cymbalaria Pursh: Seaside buttercup. Common throughout the State in moist meadows and on alkaline-saline flats bordering lakes and sloughs.

Ranunculus purshii Richardson: Buttercup. Rather rare; growing in shallow water or on mud flats of the following lakes: Red Willow Lake, Griggs County; Upsilon Lake, Rolette County; Sweetwater Lake, Ramsey County; and George, Riga, and Denbigh Lakes, McHenry County.

Ranunculus sceleratus Linnaeus: Cursed buttercup. Frequent throughout the State on mud flats of fresh-water lakes.

Thalictrum dasycarpum Fischer and Ave-Lallemant: Purple meadowrue. Rare; reported only from woody border of Mud Lake, Richland County; Crooked Lake, McLean County; and Jim Lake, Stutsman County.

Anemone canadensis Linnaeus: Meadow anemone. Rather rare; reported only from grassy meadows bordering Mud Lake, Richland County; Eckelson and Sweetwater Lakes, Barnes County; Hester Lake, McHenry County; and Upsilon Lake, Rolette County.

Clematis virginiana Linnaeus: Virgins-bower. Rare; found in woods bordering Painted Woods Lake, McLean County; and Riverside Marsh, Morton County; both situated along the Missouri River.

Actaea rubra (Aiton) Willdenow forma *neglecta* (Gillman) Robinson: Red baneberry. Rare; reported only from woody border of Upsilon Lake, Rolette County, in the Turtle Mountains.

CRUCIFERAE: MUSTARDS; PEPPERGRASS; WATERCRESS

Thlaspi arvense Linnaeus: Penny-cress. Rare; reported only from the sandy border of Rush Lake, Cavalier County.

Lepidium apetalum Willdenow: Peppergrass. Rare; reported from waste places and sandy borders of Swan Lake, Richland County, and Round Lake, McHenry County.

Brassica juncea (Linnaeus) Cosson: Mustard. Rare; reported from meadows bordering Waterloo Lake, Ward County; and Brush Lake, McHenry County.

Norda altissima (Linnaeus) Britton: Tumblemustard. Frequent throughout the State in waste places bordering lakes and sloughs.

Radicula palustris (Linnaeus) Moench: Watercress. Rare; found in marshy ground along the borders of Swan Lake Slough, Richland County; Hiddenwood Lake, McLean County; and Arrowood Lake, Stutsman County.

Stanleya pinnata (Pursh) Britton: Mustard. Rather rare; reported from sandy meadows bordering Jim Lake, Stutsman County; Jessie Lake, Griggs County; and Round, Brush, Doctor, Hester, and Girard Lakes, McHenry County.

Thelypodium integrifolium (Nuttall) Endlicher: Mustard. Rare; reported from alkaline meadows of Big Alkali and Sink Lakes, Kidder County.

CAPPARIDACEAE: CLAMMY-WEED; STINKING-CLOVER

Polanisia trachysperma Torrey and Gray: Clammy-weed. Rather rare; reported from sandy beaches of Isabel and Williams Lakes, Kidder County; Turtle Lake, McLean County; Round, McHenry, and Wanitah Lakes, Foster County.

Cleome serrulata Pursh: Stinking-clover. Frequent in grassy meadows bordering lakes in McLean, McHenry, and Kidder Counties.

SAXIFRAGACEAE: SAXIFRAGE; PARNASSIA; GOOSEBERRY

Parnassia palustris Linnaeus: Parnassia. Probably frequent throughout the State; reported from moist meadows bordering three or four lakes in the following counties: Richland, Kidder, Barnes, Griggs, McHenry, and Rolette.

Ribes americanum Miller: American black currant. Fairly common throughout the State along the borders of lakes, and especially common in open woods.

Ribes missouriense Nuttall: Missouri gooseberry. Rare; found only in open woods of Brush Lake, McLean County.

ROSACEAE: ROSES; SHADBLOW; HAWTHORN; CINQUEFOILS; BRAMBLES; CHERRIES

Amelanchier florida Lindley: Shadblow. Fairly common throughout the State on wooded slopes in vicinity of lakes and sloughs; very common along the Missouri River and in the northern counties.

Crataegus chrysocarpa Ashe: Hawthorn. Fairly common throughout the State on wooded slopes in the vicinity of lakes and sloughs.

Crataegus succulenta Schrader: Fleshy hawthorn. Rather rare; reported from woody slopes in the vicinity of Red Willow Lake, Griggs County; Brush Lake, McHenry County; and Sweetwater Lake, Ramsey County.

Potentilla paradoxa Nuttall: Bushy cinquefoil. Frequent throughout the State on sandy beaches and flats of fresh-water lakes.

Potentilla anserina Linnaeus: Silverweed. Common throughout the State in sandy meadows and beaches of lakes and sloughs.

Potentilla bipinnatifida Douglas: Prairie cinquefoil. Rare; reported only from edge of prairie bordering Isabel Lake, Kidder County.

Geum strictum Aiton: Avens. Rare; reported only from grassy meadow bordering Sweetwater Lake, Barnes County.

Rubus strigosus Michx: Common red raspberry. Rare; found along the border of Spiritwood and Jim Lakes, Stutsman County, and Sweetwater Lake, Barnes County.

- Agrimonia gryposepala* Wallroth: Agrimony. Rare; reported only from grassy border of Mud Lake, Richland County.
- Rosa blanda* Aiton: Meadow rose. Found only in Bottineau County, Turtle Mountains, where it was frequent.
- Rosa woodsii* Lindley: Woods's rose. Abundant throughout the State on barren hillsides and wooded slopes in the vicinity of lakes and sloughs.
- Prunus virginiana* Linnaeus: Chokecherry. Abundant throughout the State on open and wooded slopes in the vicinity of lakes and sloughs.
- Prunus pennsylvanica* Linnaeus filius. Pin cherry. Frequent throughout Bottineau County, Turtle Mountains; not reported elsewhere.
- Prunus americana* Marshall: American plum. Rare; reported only from woodland border of Red Willow Lake, Griggs County.
- Prunus besseyi* Bailey: Bessey cherry. Rare; reported from only one locality, a dry hillside along the Missouri River in Emmons County.

LEGUMINOSAE: CLOVERS; FALSE INDIGO; MILKVETCH

- Trifolium pratense* Linnaeus: Red clover. Rather rare; seen only in the vicinity of Elsie, Mud, and Swan Lakes, Richland County.
- Melilotus alba* Desrousseaux: White sweetclover. Rare; reported only from grassy meadow bordering Spiritwood Lake, Stutsman County.
- Lotus americanus* (Nuttall) Bischoff: Birdsfoot trefoil. Frequent throughout the State; confined mostly to sandy grassy meadows bordering lakes; abundant in some localities.
- Psoralea argophylla* Pursh: Scurf-pea. Frequent throughout the State in sandy meadows bordering lakes and sloughs; common on the prairie.
- Amorpha canescens* Pursh: Leadplant. Rather rare; reported from dry hillside slopes bordering Buckhouse Slough and Elsie Lake, Richland County; Buffalo Lake and salt-alkaline lakes, Kidder County; Long Lake, Griggs County; and McDonough Lake, McHenry County.
- Amorpha fruticosa* Linnaeus: Indigobush. Rare; reported from dry hillsides bordering Sweetwater Lake, Barnes County; Jim Lake, Stutsman County; and Lake Wanitah, Foster County.
- Parosela dalea* (Linnaeus) Britton. Rare; reported from grassy borders of Mud Lake, Richland County; Deer Lake, Kidder County; and Hobart Lake, Barnes County.
- Petalostemum purpureum* (Ventenat) Rydberg: Prairieclover. Frequent throughout the State in moist meadows bordering lakes and sloughs.
- Petalostemum candidum* Michaux: White prairieclover. Rare; reported only from meadows bordering Buckhouse and Gooleys Sloughs, Richland County.
- Astragalus canadensis* Linnaeus: Milkvetch. Rather rare; reported from grassy meadows bordering Mud Lake, Richland County; Eckelson Lake, Barnes County; Long Lake, Griggs County; Upsilon Lake, Rolette County; and Girard and McDonough Lakes, McHenry County.
- Glycyrrhiza lepidota* (Nuttall) Pursh: Licorice. Frequent throughout the State in meadows and slopes bordering lakes and sloughs.
- Meibomia canadensis* (Linnaeus) Kuntze: Hoary tickclover. Rare; reported from meadows and hillsides bordering Mud Lake, Richland County; Sweetwater Lake, Barnes County; and Upsilon Lake, Rolette County.
- Falcata pitcheri* (Torrey and Gray) Kuntze: Hog peanut. Rare; reported only from meadow of Mud Lake, Richland County.

LINACEAE: FLAX

- Linum lewisii* Pursh: Prairie flax. Rare; reported only from hillside bordering Anna Township, Sections 17-20 Lake, Ward County.

EUPHORBIACEAE: SPURGES

- Euphorbia serpyllifolia* Persoon: Spurge. Rather rare; found on sandy beaches of Mud and Swan Lakes, Richland County; Williams and Cherry Lakes, Kidder County; and Crooked Lake, McLean County.

ANACARDIACEAE: POISON IVY; ETC.

- Rhus rydbergii* Small: Small poison ivy. Frequent throughout the State in moist meadows and on wooded slopes bordering lakes.

CELASTRACEAE: BITTERSWEET; ETC.

Celastrus scandens Linnaeus: American bittersweet. Fairly common in Bottineau County, Turtle Mountains, twining upon shrubs near the lakes; not reported elsewhere in the vicinity of lakes.

ACERACEAE: MAPLES

Acer negundo Linnaeus: Boxelder. Fairly common throughout the State on wooded slopes in the vicinity of the larger lakes; very common in the Turtle Mountains.

BALSAMINACEAE: TOUCH-ME-NOT; SNAPWEED

Impatiens biflora Walter: Spotted snapweed. Rare; reported only from wooded slopes bordering Red Willow Lake, Griggs County; and Upsilon Lake, Rolette County.

VITACEAE: WOODBINE; GRAPE

Parthenocissus quinquefolia (Linnaeus) Planchon: Virginia creeper. Frequent on wooded slopes of fresh-water lakes in Barnes, Stutsman, and Foster Counties; also reported from Girard Lake, McHenry County.

Vitis vulpina Linnaeus: Riverbank grape. Rare; found in woods bordering Elsie Lake, Richland County; Riverside Marsh, Morton County; and Painted Woods Lake, McLean County.

TILIACEAE: LINDEN; BASSWOOD

Tilia americana Linnaeus: American linden. Rather rare; reported from Moran Lake, Richland County; Girard Lake, McHenry County; and Red Willow Lake, Griggs County.

VIOLACEAE: VIOLETS

Viola papilionacea Pursh: Butterfly violet. Rare; reported only from grassy border of Waterloo-Roaches Lakes, Ward County.

CACTACEAE: CACTUS; PRICKLYPEAR

Coryphantha vivipara (Nuttall) Britton and Rose: Purple cactus. Rare; reported only from sandy hills near Lake George, McHenry County.

Opuntia polyacantha Haworth: Pricklypear. Rare; reported only from dry hillsides along the Missouri River, near Bismarck, Burleigh County.

Opuntia fragilis (Nuttall) Haworth: Pricklypear. Rare; found only on sandy hills near Lake George, McHenry County.

ELAEOGNACEAE: BUFFALOBERRY; SILVERBERRY

Elaeagnus commutata Bernhardt: Silverberry. Common to abundant throughout the State on dry slopes and hillsides in the vicinity of lakes and elsewhere.

Lepargyrea canadensis (Linnaeus) Greene: Russet buffaloberry. Fairly common in the vicinity of lakes of Bottineau County, in the Turtle Mountains; otherwise reported only from Mulberry Lake, Kidder County, where it was rare.

Lepargyrea argentea (Pursh) Greene: Silver buffaloberry. Rather rare; reported from borders of Antelope Lake, McHenry County; Hiddenwood Lake, McLean County; and the following river lakes: John Wilde, Emmons County; and Painted Woods, McLean County.

ONAGRACEAE: EVENING-PRIMROSE; WILLOW-WEED

Epilobium angustifolium Linnaeus: Fireweed. Rare; reported in the vicinity of two or three lakes in Cordelia, Homen, and Dalen Townships, Bottineau County, in the Turtle Mountains.

Epilobium densum Rafinesque-Schmaltz: Willow-weed. Rare; reported from moist meadows along the border of Williams Lake, McLean County; and Smoky Lake, McHenry County.

Epilobium adenocaulon Haussknecht: Willow-weed. Frequent throughout the State in springy places and moist meadows bordering lakes and sloughs.

Oenothera biennis Linnaeus: Common evening-primrose. Rare; reported only from Gooleys Slough, Richland County. Another form approaching *O. muricata* var. *canescens* was reported from Crooked Lake, McLean County; and McDonough Lake, McHenry County.

- Oenothera serrulata* Nuttall: Evening-primrose. Rare; reported only from vicinity of Elsie Lake, Richland County.
Gaura coccinea Pursh: Scarlet gaura. Rare; reported only from the vicinity of Elsie Lake, Richland County; frequent on the prairie.

HALORAGIDACEAE: WATER MILFOIL; MARE'S-TAIL

- Myriophyllum spicatum* Linnaeus: Water milfoil. Abundant throughout the State in shallow, slightly alkaline lakes.
Hippuris vulgaris Linnaeus: Mare's-tail. Frequent throughout the State, occurring in small patches in shallow water or on mud flats of fresh-water lakes; never common.

ARALIACEAE: SARSAPARILLA; GINSENG

- Aralia nudicaulis* Linnaeus: Wild-sarsaparilla. Rare; reported only from woody borders of Upsilon Lake, Bottineau County, in the Turtle Mountains.

UMBELLIFERAE: PARSLEY; WATERHEMLOCK; WATER PARSNIP; ETC.

- Cicuta maculata* Linnaeus: Spotted waterhemlock. Frequent throughout the State in marshy meadows on the edge of fresh-water or slightly alkaline-saline lakes; only a few plants in a place.
Cicuta bulbifera Linnaeus: Waterhemlock. Rare; reported only from the marshy, boggy border of Camp Lake, McLean County.
Sium suave Walter: Water parsnip. Frequent throughout the central and western parts of the State in marshy ground bordering lakes and sloughs; otherwise reported only from Richland County.
Zizia aurea (Linnaeus) Koch: Golden Alexanders. Rare; found only in marshy meadows of Mud and Round Lakes, Richland County.
Zizia cordata (Walter) De Candolle: Golden Alexanders. Rare; found only in marshy meadows of Sink Lake, Kidder County.

CORNACEAE: DOGWOODS

- Cornus canadensis* Linnaeus: Bunchberry. Rare; reported only from woods bordering Metigoshe Lake, Bottineau County, in the Turtle Mountains.
Cornus amomum Miller: Silky dogwood. Rather rare; reported from the wooded border of Strawberry Lake, McLean County; and Riverside Marsh, Morton County.
Cornus stolonifera Michaux: Red-osier dogwood. Frequent throughout the State on wooded slopes in vicinity of the larger lakes; very common in the Turtle Mountains.

ERICACEAE: PYROLA; BEARBERRY; ETC.

- Pyrola secunda* Linnaeus: Sidebells pyrola. Rare; reported only from woods bordering lakes in Dalen Township, Bottineau County, in the Turtle Mountains.
Pyrola asarifolia Michaux: Pyrola. Rare; reported from woods bordering lakes in Dalen, Homen, and Roland Townships, Bottineau County, in the Turtle Mountains.
Arctostaphylos uva-ursi (Linnaeus) Sprengel: Bearberry. Rare; found only on sandy hillsides near Lake George, McHenry County.

PRIMULACEAE: PRIMROSES; SEA MILKWORT

- Steironema ciliatum* (Linnaeus) Rafinesque-Schmaltz: Fringed loosestrife. Rare; reported only from marshy meadows along the Missouri River south of Riverside Marsh near Rice Creek, Morton County.
Glaux maritima Linnaeus: Sea milkwort. Rare; reported from saline meadows and flats of Miller and North Lakes, Divide County; Riga Lake, McHenry County; and Salt Lake, Walsh County.

OLEACEAE: ASHES

- Fraxinus lanceolata* Borkhausen: Green ash. Fairly common throughout the State on wooded slopes and borders of lakes and streams; very common in the Turtle Mountains.

GENTIANACEAE: GENTIANS

Gentiana amarella Linnaeus, var. *acuta* (Michaux) Herder: Gentian. Rare; reported from grassy meadow along the border of Gravel Lake, Rolette County; and at Johnson Lake, Divide County.

APOCYNACEAE: HEMP DOGBANE

Apocynum cannabinum Linnaeus, var. *hypericifolium* (Aiton) Gray: Hemp dogbane. Frequent throughout the State in grassy meadows and on hillsides bordering lakes and sloughs.

ASCLEPIADACEAE: MILKWEEDS

Asclepias incarnata Linnaeus: Swamp milkweed. Rare; reported from marshy meadows of Mud and Moran Lakes, Richland County; and Isabel Slough, F Kidder County.

Asclepias speciosa Torrey: Showy milkweed. Common in grassy meadows bordering Big Alkali, Isabel, and Sink Lakes, Kidder County; not reported elsewhere.

Asclepias syriaca Linnaeus: Common milkweed. Frequent throughout the State in moist meadows in the vicinity of lakes and sloughs.

Asclepias verticillata Linnaeus: Whorled milkweed. Rare; found in grassy meadows along the border of Robinson Lake, Emmons County, and Addie Lake, Griggs County.

Acerates viridiflora Elliott: Green milkweed. Rare; found only in meadow along the border of Robinson Lake, Emmons County. *A. viridiflora* var. *linearis* Gray also found in small quantities near this lake.

CONVOLVULACEAE: MORNING-GLORY; BINDWEED; DODDER

Convolvulus sepium Linnaeus: Hedge bindweed. Rather rare; reported from grassy meadows and hillside slopes of Mud Lake, Richland County; Rock Lake, Towner County; and the three Jim River Lakes, Stutsman County.

Cuscuta cephalanthi Engelm.: Dodder. Rare; reported growing on herbs and shrubs along the border of Arrowood Lake, Stutsman County.

BORAGINACEAE: BORAGE; HELIOTROPE; FALSE GROMWELL

Heliotropium curassavicum Linnaeus: Seaside heliotrope. Frequent on alkali or mud flats along the borders of lakes in Logan, Kidder, Burleigh, Dunn, and McLean Counties.

Lappula echinata Gilibert: Beggar-lice. Rare; reported only from sandy, waste ground along the border of Waterloo-Roaches Lakes, Ward County.

Onosmodium occidentale Mackenzie: False gromwell. Rare; reported from barren hillsides bordering Crooked Lake, McLean County; and Moon, Hobart, Eckelson, and Sweetwater Lakes, Barnes County.

VERBENACEAE: Vervain

Verbena urticaefolia Linnaeus: White vervain. Uncommon; reported from grassy meadow and open woods along the borders of Mud, Gooleys, and Moran Lakes, Richland County; Moon Lake, Barnes County; and Jim Lake, Stutsman County.

Verbena hastata Linnaeus: Blue vervain. Frequent throughout the State in grassy meadows and open woods bordering lakes and sloughs.

Verbena bracteosa Michaux: Vervain. Rare; found on waste ground in the vicinity of John Wilde Lake, Emmons County, and along the Missouri River near Bismarck, Burleigh County.

LABIATAE: MINTS; GERMANDER; SKULLCAP; BUGLEWEED

Teucrium occidentale Gray: Germander. Frequent throughout the State in marshy ground along the borders of lakes and sloughs.

Scutellaria galericulata Linnaeus: Skullcap. Rare; reported from springy borders of Hobart Lake, Barnes County; and Red Willow Lake, Griggs County.

Dracopcephalum nuttallii Britton: False-dragonhead. Rare; found only on sandy alluvial bottoms along the Missouri River, south of Riverside Marsh, Morton County.

Monarda fistulosa Linnaeus: Wildbergamot. Rare; found in grassy meadows and open woods along the border of Lake Wapitah, Foster County; and Spiritwood, Jim, and Arrowood Lakes, Stutsman County.

- Lycopus lucidulus** Turczaninow, var. **americanus** Gray: Bugleweed. Frequent on moist meadows, mud and alkali flats, and low places bordering lakes and sloughs in Richland, McLean, Barnes, and Stutsman Counties; reported also from Metigoshe Lake, Bottineau County, in the Turtle Mountains.
- Lycopus americanus** Muhlenberg: Bugleweed. Frequent throughout the State in about the same situations as the preceding species.
- Mentha arvensis** Linnaeus, var. **canadensis** (Linnaeus) Briquet: Field mint. Fairly common throughout the State along sandy shores, alkali flats, and moist meadows of fresh-water or slightly alkaline lakes.

SOLANACEAE: NIGHTSHADE; GROUNDCHERRY

- Solanum nigrum** Linnaeus: Black nightshade. Rare; reported only from sandy shores of Jim Lake, Stutsman County.
- Physalis lanceolata** Michaux: Groundcherry. Rare; reported only from waste places along the Missouri River, near Bismarek, Burleigh County.

SCROPHULARIACEAE: FIGWORT; GERARDIA; LOUSEWORT

- Agalinis tenuifolia** (Vahl) Rafinesque-Schmaltz: Slender gerardia. Frequent in moist sandy meadows along the border of lakes in Kidder, McLean, Barnes, Griggs, and McHenry Counties.
- Orthocarpus luteus** Nuttall. Rare; reported from grassy meadow along the border of Anna Township, Sections 8-9 Lake, Ward County, and at Eckelson Lake, Barnes County.
- Pedicularis lanceolata** Michaux: Swamp woodbetony. Rare; reported only from meadow along the border of Elsie Lake, Richland County.

LENTIBULARIACEAE: BLADDERWORT

- Utricularia vulgaris** Linnaeus, var. **americana** Gray: Common bladderwort. Common to abundant throughout the State in quiet bays and stagnant sloughs.
- Utricularia minor** Linnaeus: Smaller bladderwort. Rare; reported only from Dawson Slough, Kidder County.

PLANTAGINACEAE: PLANTAIN

- Plantago major** Linnaeus: Common plantain. Rare; reported from grassy borders and waste ground near Elsie and Swan Lakes, Richland County; and Brush Lake, McLean County.
- Plantago rugelii** Decaisne: Plantain. Frequent on waste ground in the vicinity of lakes in Stutsman and Barnes Counties; otherwise reported only from Long Lake, Griggs County; and Upsilon Lake, Rolette County.
- Plantago elongata** Pursh: Plantain. Rare; found only on sandy beaches of Swan Lake, Nelson County.

RUBIACEAE: MADDER; BEDSTRAW

- Galium boreale** Linnaeus: Northern bedstraw. Rare; found only in grassy meadow along the border of Anna Township, Sections 17-20 Lake, Ward County.
- Galium trifidum** Linnaeus: Bedstraw. Rather rare; reported from springy grassy meadows bordering Elsie Lake, Richland County; at Louise Lake, Stutsman County; Hobart Lake, Barnes County; and Mill and Upsilon Lakes, Rolette County.

CAPRIFOLIACEAE: HONEYSUCKLE; SNOWBERRY; NANNYBERRY

- Symphoricarpos occidentalis** Hooker: Western snowberry. Abundant throughout the State on dry barren hillsides, wooded slopes, and prairies in the vicinity of lakes and sloughs.
- Symphoricarpos albus** (Robbins) Blake: Dwarf snowberry. Fairly common around Upsilon Lake, Rolette County, in the Turtle Mountains; not found elsewhere.
- Viburnum trilobum** Marshall: American cranberrybush. Rare; found on wooded slopes of Red Willow Lake, Griggs County; and Upsilon Lake, Rolette County.
- Viburnum lentago** Linnaeus: Nannyberry. Frequent throughout the State on wooded slopes of the larger lakes.

CUCURBITACEAE: GOURDS; MOCK-CUCUMBER

Micrampelis lobata (Michaux) Greene: Mock-cucumber. Rare; reported from the borders of Spiritwood and Arrowood Lakes, Stutsman County.

CAMPANULACEAE: BLUEBELLS

Campanula rotundifolia Linnaeus: Harebell. Rare; found in the vicinity of Ranch Lake, Kidder County; and Blue Lake, McLean County.

LOBELIACEAE: LOBELIAS

Lobelia spicata Lamarek: Lobelia. Rare; reported from grassy meadows along the borders of Mud Lake and Buckhouse Slough, Richland County; and Sibley Lake, Kidder County.

Lobelia kalmii Linnaeus: Ontario lobelia. Rare; reported only from boggy meadow along the southwest end of Elsie Lake, Richland County.

COMPOSITAE: ASTERS; GOLDENRODS; SUNFLOWERS; THISTLES

Vernonia fasciculata Michaux: Western ironweed. Rare; reported only from marshy meadow and low ground along the Missouri River, near Bismarck, Burleigh County.

Eupatorium purpureum Linnaeus: Joe-pye-weed. Rare; reported only from meadow bordering Upsilon Lake, Rolette County.

Eupatorium perfoliatum Linnaeus: Boneset. Rare; found only in moist meadow along the border of Mud Lake, Richland County.

Lacinaria punctata (Hooker) Kuntze: Dotted gayfeather. Rather rare in the vicinity of lakes, frequent elsewhere; reported from Turtle and Williams Lakes, McLean County; and Rice Lake, Ward County.

Lacinaria scariosa (Linnaeus) Hill: Gayfeather. Rare in the vicinity of lakes, frequent to common elsewhere; reported from Bird and Deer Lakes, Kidder County.

Lacinaria pycnostachya (Michaux) Kuntze: Cattail gayfeather. Rare; reported only from meadow bordering Buckhouse Slough, Richland County.

Grindelia squarrosa (Pursh) Dunal: Gum plant. Common throughout the State on dry sandy or gravelly slopes and prairies in the vicinity of lakes and sloughs.

Gutierrezia sarothrae (Pursh) Britton and Rusby: Broomweed. Fairly common throughout the State on dry barren hillsides in the vicinity of lakes and sloughs; common on the prairie.

Chrysopsis villosa (Pursh) Nuttall: Hairy golden-aster. Fairly common throughout the State on dry, barren hillsides in the vicinity of lakes and sloughs; common on the prairie.

Chrysothamnus graveolens (Nuttall) Greene: Fetid rayless goldenrod. Rare; reported only from a high dry butte along the Missouri River, south of Riverside Marsh, Morton County.

Solidago nemoralis Aiton: Oldfield goldenrod. Rare; found on dry meadows along the border of Holmes Lake, McLean County, and Anna Township, section 33, Ward County.

Solidago canadensis Linnaeus: Canada goldenrod. Common throughout the State on sandy, gravelly meadows, and dry hillsides bordering lakes and sloughs.

Solidago serotina Aiton: November goldenrod. Rare; found in open woods along the border of Cherry Lake, Kidder County; John Wilde Lake, Emmons County; and Rock Lake, Towner County.

Solidago rigida Linnaeus: Stiff goldenrod. Fairly common throughout the State on dry hillsides in the vicinity of lakes and sloughs.

Solidago graminifolia (Linnaeus) Salisbury: Goldenrod. Frequent throughout the State in grassy meadows and open woods bordering lakes; fairly common in Bottineau and Rolette Counties.

Aplopappus spinulosus (Pursh) De Candolle. Fairly common throughout the State on dry barren hillsides in the vicinity of lakes and sloughs; common on the prairie.

Aster novae-angliae Linnaeus: New England aster. Rare; found only along the border of Camp Lake, McLean County.

Aster laevis Linnaeus: Smooth aster. Common in the open woods bordering lakes throughout the Turtle Mountains, Rolette and Bottineau Counties; not reported elsewhere. Some specimens were very variable and dissimilar to the typical *A. laevis*, one approaching var. *amplifolius* Porter.

- Aster multiflorus* Aiton: Wreath aster. Fairly common throughout the State in moist meadows and on alkali flats bordering fresh-water and slightly alkaline-saline lakes.
- Aster commutatus* (Torrey and Gray) Gray: Aster. Rare, a low prostrate, few-flowered form being found in small quantities on dry, barren hillsides along the Middle Des Laes Lake, Ward County, and also in a grassy meadow near Anna Township, Sections 8-9 Lake, Ward County.
- Aster paniculatus* Lamarek: Panicle aster. Frequent throughout the State on sandy meadows, mud flats, and dry hillsides bordering fresh-water lakes.
- Aster salicifolius* Aiton: Aster. Rare; reported from the borders of Jones Lake, Sheridan County; and Waterloo-Roaches Lakes, Ward County.
- Aster paucifolius* Nuttall: Aster. Rare; reported from dry flats along the border of Cherry Lake, McLean County, and Johnson Lake, Divide County.
- Aster brachyactis* Blake: Rayless aster. Common throughout the State on sandy meadows and alkaline flats bordering lakes and sloughs.
- Erigeron annuus* (Linnaeus) Persoon: Fleabane. Rare; reported only from meadow along border of Elsie Lake, Richland County.
- Erigeron canadensis* Linnaeus: Horseweed. Fairly common throughout the State in waste ground and sandy soil along the border of lakes and sloughs.
- Antennaria microphylla* Rydberg: Pussytoes. Rare; reported from dry meadow along the border of Lostwood, Sections 21-28 Lake, Burke County; and Johnson Lake, Divide County.
- Iva xanthifolia* Nuttall: Marsh-elder. Rather rare; reported from dry, barren hillsides and sandy meadows bordering Buffalo Lake, Kidder County; Camp and Max Lakes, McLean County; Red Willow Lake, Griggs County; Lake Wanitah, Foster County; and Rush Lake, Cavalier County.
- Iva axillaris* Pursh: Marsh-elder. Rare; found only on dry alkaline flats bordering McKensies Slough, Burleigh County.
- Ambrosia trifida* Linnaeus: Great ragweed. Rare; reported only from marshy border of Elsie Lake, Richland County.
- Ambrosia psilostachya* De Candolle: Ragweed. Frequent throughout the State in sandy meadows, waste places, and dry flats bordering lakes and sloughs.
- Xanthium italicum* Moretti: Cocklebur. Common throughout the State on sandy meadows, waste ground and flats along the borders of lakes and sloughs.
- Xanthium echinatum* Murray (*X. glanduliferum* Greene): Cocklebur. Rare; reported only from sandy, low ground along the Missouri River, near Bismarek, Burleigh County.
- Xanthium speciosum* Kearney: Cocklebur. Rare; found only in sandy low places along the Missouri River, near Bismarek, Burleigh County.
- Heliopsis scabra* Dunal: Rough heliopsis. Rare; found along border of Mud Lake and Buckhouse Slough, Richland County.
- Rudbeckia hirta* Linnaeus: Black-eyed-susan. Frequent throughout the State on sandy meadows and dry hillsides in the vicinity of lakes and sloughs.
- Ratibida columnaris* (Sims) D. Don: Prairie-coneflower. Frequent throughout the State in meadows and along the edge of the prairie in the vicinity of lakes and sloughs.
- Helianthus maximiliani* Sebrader: Maximilian sunflower. Rare in the vicinity of lakes and sloughs, frequent on the prairie; reported from Turtle Lake, McLean County; Long Lake, Griggs County; and Lake Wanitah, Foster County.
- Helianthus tuberosus* Linnaeus: Jerusalem-artichoke. Fairly common throughout the State in meadows along the borders of lakes.
- Bidens frondosa* Linnaeus: Beggar-ticks. Frequent throughout the State in meadows and low places along the borders of fresh-water lakes.
- Bidens vulgata* Greene: Sticktight. Rare; reported from meadow borders of Coal Lake, McLean County; and Nelson-Cameron Lakes, Ward County.
- Bidens comosa* (Gray) Wiegand: Beggar-ticks. Frequent along the borders of lakes throughout Rolette, Ramsey, Towner, and Cavalier Counties.
- Bidens cernua* Linnaeus: Bur-marigold. Rare; reported from moist rich soil along the border of Florence Lake, Burleigh County; and Waterloo-Roaches Lakes, Ward County.
- Gaillardia aristata* Pursh: Common perennial gaillardia. Rare; only a few plants being seen along the border of Moon Lake, Barnes County.
- Achillea millefolium* Linnaeus: Common yarrow. Frequent throughout the State in grassy meadows, near lakes and sloughs; apparently never common.
- Artemisia caudata* Michaux: Wormwood. Rare; reported from dry hillsides and sandy meadows along the border of Isabel Lake, Kidder County; Eckelson Lake, Barnes County; and Addie Lake, Griggs County.

- Artemisia dracunculoides* Pursh: Wormwood. Frequent throughout the State on dry hillsides and meadows along the borders of lakes and sloughs.
- Artemisia ludoviciana* Nuttall: White sage. Fairly common throughout the State on dry hillsides in the vicinity of lakes and sloughs.
- Artemisia biennis* Willdenow: Wormwood. Rare; reported only from Jones Lake, Sheridan County.
- Artemisia frigida* Willdenow: Fringed wormwood. Abundant throughout the State on dry hillsides along the borders of lakes and sloughs.
- Artemisia cana* Pursh: Hoary sagebrush. Rare; found on dry hillsides in the vicinity of Big Slough, Dunn County; and along the Missouri River.
- Arctium minus* Bernhardt: Common burdock. Rare; reported only from Jim Lake, Stutsman County.
- Cirsium undulatum* (Nuttall) Sprengel: Prairie thistle. Fairly common throughout the State in sandy meadows and on the prairie in the vicinity of lakes and sloughs. Very variable, a number of forms and possibly species, as *C. flodmanni* Rydberg, have been here placed under this single name since insufficient material was collected to justify a discussion of the relative importance and distribution of these forms or species.
- Cirsium arvense* (Linnaeus) Scopoli: Canada thistle. Frequent throughout the southeastern and northeastern parts of the State; not found west of Bottineau, McHenry, and Ramsey Counties.
- Sonchus arvensis* Linnaeus: Corn sowthistle. Rare; reported from waste ground along the borders of Long Lake, Griggs County; Kellys Slough, Grand Forks County; Brush Lake, McHenry County; and Salt Lake, Walsh County.
- Lactuca ludoviciana* (Nuttall) Riddell: Lettuce. Rare; reported only from McDonough Lake, McHenry County.
- Lactuca pulchella* (Pursh) De Candolle: Blue lettuce. Frequent in grassy meadows along the borders of lakes in Kidder, McLean, Barnes, and Griggs Counties.
- Lygodesmia juncea* (Pursh) D. Don: Skeletonflower. Rare; found only in dry ground along the border of Middle Des Lacs Lake, Ward County; frequent on the prairie.
- Crepis runcinata* (James) Torrey and Gray: Hawks-beard. Rare; reported only from Waterloo-Roaches Lakes, Ward County.
- Hieracium scabriusculum* Schweinitz: Narrow-leaf hawkweed. Rare; reported only from border of Addie Lake, Griggs County.

COMMON AND SCIENTIFIC NAMES OF PLANTS OF NORTH DAKOTA MENTIONED IN THIS REPORT

Common name	Scientific name
Agrimony	<i>Agrimonia gryposepala</i> .
Alexanders, golden	<i>Zizia aurea</i> .
Do	<i>Zizia cordata</i> .
Algae	<i>Anabaena</i> .
Do	<i>Chaetomorpha</i> .
Do	<i>Cladophora</i> .
Do	<i>Clathrocystis</i> .
Do	<i>Enteromorpha</i> .
Do	<i>Spirogyra</i> .
Do	<i>Synechococcus</i> .
Amaranth, prostrate	<i>Amaranthus blitoides</i> .
Anemone, meadow	<i>Anemone canadensis</i> .
Aplopappus	<i>Aplopappus spinulosus</i> .
Arrowgrass	<i>Triglochin pulustris</i> .
Seaside	<i>Triglochin maritima</i> .
Ash, green	<i>Fraxinus lanceolata</i> .
Aspen, quaking	<i>Populus tremuloides</i> .
Aster	<i>Aster commutatus</i> .
Do	<i>Aster paucifolius</i> .
Do	<i>Aster salicifolius</i> .
Aster, New England	<i>Aster novae-angliae</i> .
Panicle	<i>Aster paniculatus</i> .
Rayless	<i>Aster brachyactis</i> .
Smooth	<i>Aster laevis</i> .
Wreath	<i>Aster multiflorus</i> .
Avens	<i>Geum strictum</i> .
Banberry, red	<i>Actaea rubra</i> var. <i>neglecta</i> .
Bearberry	<i>Arctostaphylos uva-ursi</i> .
Beardgrass	<i>Andropogon furcatus</i> .
Bedstraw	<i>Galium trifidum</i> .
Northern	<i>Galium boreale</i> .
Beggar-lice	<i>Lappula echinata</i> .
Beggar-ticks	<i>Bidens comosa</i> .
Do	<i>Bidens frondosa</i> .
Bindweed, black	<i>Polygonum convolvulus</i> .
Hedge	<i>Convolvulus sepium</i> .
Birch, canoe	<i>Betula papyrifera</i> .
Bittersweet, American	<i>Celastrus scandens</i> .
Black-eyed-susan	<i>Rudbeckia hirta</i> .
Bladderwort, common	<i>Utricularia vulgaris</i> var. <i>americana</i> .
Smaller	<i>Utricularia minor</i> .
Blite, sea	<i>Dondia depressa</i> .
Do	<i>Dondia</i> sp.
Bluegrass	<i>Poa triflora</i> .
Bluejoint	<i>Calamagrostis canadensis</i> .
Boneset	<i>Eupatorium perfoliatum</i> .
Boxelder	<i>Acer negundo</i> .
Bromegrass, common	<i>Bromus inermis</i> .
Fringed	<i>Bromus ciliatus</i> .
Broomweed	<i>Gutierrezia sarothrae</i> .
Buffaloberry, russet	<i>Lepargyrea canadensis</i> .
Silver	<i>Lepargyrea argentea</i> .
Bugleweed	<i>Lycopus lucidus</i> var. <i>americanus</i> .
American	<i>Lycopus americanus</i> .
Bulrush	<i>Scirpus occidentalis</i> .
Green	<i>Scirpus atrovirens</i> .
Nevada	<i>Scirpus nevadensis</i> .
River	<i>Scirpus fluviatilis</i> .
Soft	<i>Scirpus validus</i> .

Common name	Scientific name
Bunchberry	<i>Cornus canadensis</i> .
Burdock, common	<i>Arcium minus</i> .
Bur-marigold	<i>Bidens cernua</i> .
Bur-reed	<i>Sparganium americanum</i> .
Do	<i>Sparganium eurycarpum</i> .
Buttercup	<i>Ranunculus purshii</i> .
Common white water	<i>Ranunculus aquatilis</i> var. <i>capillaceus</i> .
Cursed	<i>Ranunculus sceleratus</i> .
Seaside	<i>Ranunculus cymbalaria</i> .
Butterflywort	<i>Ricciella fluitans</i> .
Cactus, purple	<i>Coryphantha vivipara</i> .
Carrión-flower	<i>Smilax herbacea</i> .
Cattail, common	<i>Typha latifolia</i> .
Cherry, Bessey	<i>Prunus besseyi</i> .
Pin	<i>Prunus pennsylvanica</i> .
Chokecherry	<i>Prunus virginiana</i> .
Cinquefoil, bushy	<i>Potentilla paradoxa</i> .
Prairie	<i>Potentilla bipinnatifida</i> .
Clammy-weed	<i>Polanisia trachysperma</i> .
Clover, red	<i>Trifolium pratense</i> .
Cocklebur	<i>Xanthium echinatum</i> .
Do	<i>Xanthium italicum</i> .
Do	<i>Xanthium speciosum</i> .
Coontail	<i>Ceratophyllum demersum</i> .
Cottonwood, southern	<i>Populus deltoides</i> .
Cranberrybush, American	<i>Viburnum trilobum</i> .
Creeper, Virginia	<i>Parthenocissus quinquefolia</i> .
Currant, American black	<i>Ribes americanum</i> .
Disporum, rough-fruited	<i>Disporum trachycarpum</i> .
Dock, golden	<i>Rumex persicarioides</i> .
Great water	<i>Rumex britannica</i> .
Western	<i>Rumex occidentalis</i> .
Willow-leaf	<i>Rumex mexicanus</i> .
Dodder	<i>Cuscuta cephalanthi</i> .
Dogbane, hemp	<i>Apocynum cannabinum</i> var. <i>hypericifolium</i> .
Dogwood, red-osier	<i>Cornus stolonifera</i> .
Silky	<i>Cornus amomum</i> .
Dropseed	<i>Sporobolus richardsoni</i> .
Rough-leaf	<i>Sporobolus asperifolius</i> .
Sand	<i>Sporobolus cryptandrus</i> .
Duckweed, small	<i>Lemna minor</i> .
Star	<i>Lemna trisulca</i> .
Eelgrass	<i>Vallisneria spiralis</i> .
Elm, American	<i>Ulmus americana</i> .
Evening-primrose	<i>Oenothera serrulata</i> .
Common	<i>Oenothera biennis</i> .
False-dragonhead	<i>Dracocephalum nuttallii</i> .
Feathergrass	<i>Stipa comata</i> .
Fireweed	<i>Epilobium angustifolium</i> .
Flat-sedge	<i>Cyperus erythrorhizos</i> .
Do	<i>Cyperus schweinitzii</i> .
Flax, prairie	<i>Linum lewisii</i> .
Fleabane	<i>Erigeron annuus</i> .
Four-o'clock	<i>Oxybaphus nyctagineus</i> .
Foxtail, green	<i>Setaria viridis</i> .
Gaillardia, common perennial	<i>Gaillardia aristata</i> .
Gaura, scarlet	<i>Gaura coccinea</i> .
Gayfeather	<i>Lacinaria scariosa</i> .
Cattail	<i>Lacinaria pycnostachya</i> .
Dotted	<i>Lacinaria punctata</i> .
Gentian	<i>Gentiana amarella</i> var. <i>acuta</i> .
Gerardia, slender	<i>Agalinis tenuifolia</i> .
Germander	<i>Teucrium occidentale</i> .
Golden-aster, hairy	<i>Chrysopsis villosa</i> .

Common name	Scientific name
Goldenrod.....	<i>Solidago graminifolia</i> .
Canada.....	<i>Solidago canadensis</i> .
Fetid rayless.....	<i>Chrysanthamnus graveolens</i> .
November.....	<i>Solidago serotina</i> .
Oldfield.....	<i>Solidago nemoralis</i> .
Stiff.....	<i>Solidago rigida</i> .
Gooseberry, Missouri.....	<i>Ribes missouriense</i> .
Smooth.....	<i>Ribes oxycanthoides</i> .
Goosefoot, narrow-leaf.....	<i>Chenopodium leptophyllum</i> .
Oak-leaf.....	<i>Chenopodium glaucum</i> .
Red.....	<i>Chenopodium rubrum</i> .
Grape, riverbank.....	<i>Vitis vulpina</i> .
Grass, barnyard.....	<i>Echinochloa crusgalli</i> .
Bayonet.....	<i>Scirpus paludosus</i> .
Bog reed.....	<i>Calamagrostis inexpectata</i> .
Cord.....	<i>Spartina michauxiana</i> .
Early bunch.....	<i>Sphenopholis obtusata</i> var. <i>lobata</i> .
False buffalo.....	<i>Munroa squarrosa</i> .
Giant reed.....	<i>Phragmites communis</i> .
Hair.....	<i>Agrostis hyemalis</i> .
Hairy wood.....	<i>Bromus purgans</i> .
Inland cord.....	<i>Spartina gracilis</i> .
June.....	<i>Koeleria cristata</i> .
Little bluestem.....	<i>Andropogon scoparius</i> .
Meadow.....	<i>Panicum nervata</i> .
Mesquite.....	<i>Bouteloua oligostachya</i> .
Old witch.....	<i>Panicum capillare</i> .
Porcupine.....	<i>Stipa spartea</i> .
Quack.....	<i>Agropyron repens</i> .
Reed canary.....	<i>Phalaris arundinacea</i> .
Reed meadow.....	<i>Panicum grandis</i> .
Salt.....	<i>Distichlis spicata</i> .
Slender meadow.....	<i>Puccinellia nuttalliana</i> .
Slough.....	<i>Beckmannia erucaeformis</i> .
Spear.....	<i>Poa buckleyana</i> .
Squirreltail.....	<i>Hordeum jubatum</i> .
Stink.....	<i>Eragrostis megastachya</i> .
Switch.....	<i>Panicum virgatum</i> .
Widgeon.....	<i>Ruppia maritima</i> .
Gromwell, false.....	<i>Onosmodium occidentale</i> .
Groundcherry.....	<i>Physalis lanceolata</i> .
Gum plant.....	<i>Grindelia squarrosa</i> .
Hackberry.....	<i>Celtis occidentalis</i> .
Harebell.....	<i>Campanula rotundifolia</i> .
Hawk's-beard.....	<i>Crepis runcinata</i> .
Hawkweed, narrow-leaf.....	<i>Hieracium scabrisculum</i> .
Hawthorn.....	<i>Crataegus chrysocarpa</i> .
Fleshy.....	<i>Crataegus succulenta</i> .
Hazelnut, American.....	<i>Corylus americana</i> .
Beaked.....	<i>Corylus rostrata</i> .
Heliopsis, rough.....	<i>Heliopsis scabra</i> .
Heliotrope, seaside.....	<i>Heliotropium curassavicum</i> .
Horsetail, common.....	<i>Equisetum arvense</i> .
Horseweed.....	<i>Erigeron canadensis</i> .
Indigobush.....	<i>Amorpha fruticosa</i> .
Ironweed, western.....	<i>Vernonia fasciculata</i> .
Jerusalem-artichoke.....	<i>Helianthus tuberosus</i> .
Joe-pye-weed.....	<i>Eupatorium purpureum</i> .
Knotgrass.....	<i>Polygonum aviculare</i> .
Do.....	<i>Polygonum erectum</i> .
Knotgrass, bushy.....	<i>Polygonum ramosissimum</i> .
Ladies-tresses.....	<i>Idium romanzoffianum</i> .
Lady's-thumb.....	<i>Polygonum persicaria</i> .
Lamb's-quarters.....	<i>Chenopodium album</i> .
Leadplant.....	<i>Amorpha canescens</i> .

Common name	Scientific name
Lettuce.....	<i>Lactuca ludoviciana</i> .
Blue.....	<i>Lactuca pulchella</i> .
Licorice.....	<i>Glycyrrhiza lepidota</i> .
Linden, American.....	<i>Tilia americana</i> .
Liverwort.....	<i>Marchantia polymorpha</i> .
Do.....	<i>Riccia</i> .
Lobelia.....	<i>Lobelia spicata</i> .
Ontario.....	<i>Lobelia kalmii</i> .
Loosestrife, fringed.....	<i>Steironema ciliatum</i> .
Mare's-tail.....	<i>Hippuris vulgaris</i> .
Marsh-elder.....	<i>Iva axillaris</i> .
Do.....	<i>Iva xanthifolia</i> .
Meadowruc, purple.....	<i>Thalictrum dasycarpum</i> .
Milfoil, water.....	<i>Myriophyllum spicatum</i> .
Milkvetch.....	<i>Astragalus canadensis</i> .
Milkweed, common.....	<i>Asclepias syriaca</i> .
Green.....	<i>Acerules viridiflora</i> .
Showy.....	<i>Asclepias speciosa</i> .
Swamp.....	<i>Asclepias incarnata</i> .
Whorled.....	<i>Asclepias verticillata</i> .
Milkwort, sea.....	<i>Glauz maritima</i> .
Mint, field.....	<i>Mentha arvensis</i> var. <i>canadensis</i> .
Mock-cucumber.....	<i>Micrampelis lobata</i> .
Moss.....	<i>Amblystegium riparium</i> .
Do.....	<i>Sphagnum</i> .
Muhlenbergia.....	<i>Muhlenbergia foliosa</i> .
Mustard.....	<i>Brassica juncea</i> .
Do.....	<i>Stanleya pinnata</i> .
Do.....	<i>Thelypodium integrifolium</i> .
Naiad.....	<i>Najas marina</i> .
Nannyberry.....	<i>Viburnum lentago</i> .
Nettle.....	<i>Urtica gracilis</i> .
Do.....	<i>Urtica lyallii</i> .
Nightshade, black.....	<i>Solanum nigrum</i> .
Nut-grass, low.....	<i>Cyperus diandrus</i> .
Oak, mossycup.....	<i>Quercus macrocarpa</i> .
Onion, prairie wild.....	<i>Allium stellatum</i> .
Orach.....	<i>Atriplex patula</i> var. <i>hastula</i> .
Silvery.....	<i>Atriplex argentea</i> .
Orthocarpus.....	<i>Orthocarpus luteus</i> .
Parnassia.....	<i>Parnassia palustris</i> .
Parosela.....	<i>Parosela dalea</i> .
Parsnip, water.....	<i>Sium suave</i> .
Peanut, hog.....	<i>Falcata pitcheri</i> .
Penny-cress.....	<i>Thlaspi arvense</i> .
Peppergrass.....	<i>Lepidium apetalum</i> .
Pigweed, winged.....	<i>Cycloloma atriplicifolium</i> .
Plantain.....	<i>Plantago elongata</i> .
Do.....	<i>Plantago rugelii</i> .
Plantain, common.....	<i>Plantago major</i> .
Plum, American.....	<i>Prunus americana</i> .
Poison ivy.....	<i>Rhus radicans</i> .
Small.....	<i>Rhus rydbergii</i> .
Pondweed, clasping-leaf.....	<i>Potamogeton perfoliatus</i> .
Eelgrass.....	<i>Potamogeton zosterifolius</i> .
Floating.....	<i>Potamogeton natans</i> .
Fries's.....	<i>Potamogeton friesii</i> .
Horned.....	<i>Zannichellia palustris</i> .
Leafy.....	<i>Potamogeton foliosus</i> .
Sago.....	<i>Potamogeton pectinatus</i> .
Variable.....	<i>Potamogeton heterophyllus</i> .
White-stemmed.....	<i>Potamogeton praelongus</i> .
Poplar, balsam.....	<i>Populus tacamahacca</i> .
Prairieclover.....	<i>Petalostemum purpureum</i> .
White.....	<i>Petalostemum candidum</i> .

Common name	Scientific name
Prairie-coneflower	<i>Ratibida columnaris</i> .
Pricklypear	<i>Opuntia fragilis</i> .
Do	<i>Opuntia polyacantha</i> .
Purslane, common	<i>Portulaca oleracea</i> .
Pussytoes	<i>Antennaria microphylla</i> .
Pyrola	<i>Pyrola asarifolia</i> .
Sidebells	<i>Pyrola secunda</i> .
Ragweed	<i>Ambrosia psilostachya</i> .
Great	<i>Ambrosia trifida</i> .
Raspberry, common red	<i>Rubus strigosus</i> .
Redtop	<i>Agrostis alba</i> .
Rose, meadow	<i>Rosa blanda</i> .
Woods's	<i>Rosa woodsii</i> .
Rush	<i>Juncus alpinus</i> .
Do	<i>Juncus dudleyi</i> .
Do	<i>Juncus longistylis</i> .
Rush, Baltic	<i>Juncus balticus</i> var. <i>littoralis</i> .
Bog	<i>Eleocharis palustris</i> .
Knotted	<i>Juncus nodosus</i> .
Needle	<i>Eleocharis acicularis</i> .
Toad	<i>Juncus bufonius</i> var. <i>halophilus</i> .
Torrey's	<i>Juncus torreyi</i> .
Sagebrush, hoary	<i>Artemisia cana</i> .
Sage, white	<i>Artemisia ludoviciana</i> .
Saltbush	<i>Atriplex nuttallii</i> .
Saltwort, common	<i>Salsola kali</i> .
Samphire	<i>Salicornia rubra</i> .
Sandbar	<i>Cenchrus carolinianus</i> .
Scouring-rush	<i>Equisetum hyemale</i> .
Scurf-pea	<i>Psoralea argophylla</i> .
Sedge	<i>Carex aquatilis</i> .
Do	<i>Carex aurea</i> .
Do	<i>Carex cristata</i> .
Do	<i>Carex diandra</i> var. <i>ramosa</i> .
Do	<i>Carex hystericina</i> .
Do	<i>Carex lanuginosa</i> .
Do	<i>Carex laxiflora</i> .
Do	<i>Carex riparia</i> .
Do	<i>Carex rostrata</i> var. <i>ambigens</i> .
Do	<i>Carex rostrata</i> var. <i>utriculata</i> .
Do	<i>Carex scirpoides</i> .
Do	<i>Carex stipata</i> .
Do	<i>Carex sychnocephala</i> .
Do	<i>Carex trichocarpa</i> var. <i>aristata</i> .
Do	<i>Carex vulpinoidea</i> .
Shadblow	<i>Amelanchier florida</i> .
Silverberry	<i>Elaeagnus commutata</i> .
Silverweed	<i>Potentilla anserina</i> .
Skeletonflower	<i>Lygodesmia juncea</i> .
Skullcap	<i>Scutellaria galericulata</i> .
Smartweed, pale	<i>Polygonum lapathifolium</i> .
Water	<i>Polygonum amphibium</i> .
Snapweed, spotted	<i>Impatiens biflora</i> .
Snowberry, dwarf	<i>Symphoricarpos albus</i> .
Western	<i>Symphoricarpos occidentalis</i> .
Solomonseal, starry false	<i>Vagnera stellata</i> .
Sowthistle, corn	<i>Sonchus arvensis</i> .
Spurge	<i>Euphorbia serpyllifolia</i> .
Spurry, sand	<i>Tissa marina</i> .
Sticktight	<i>Bidens vulgata</i> .
Stinking-clover	<i>Cleome serrulata</i> .
Stonewort	<i>Chara</i> .
Sunflower, Maximilian	<i>Helianthus maximiliani</i> .
Sweetclover, white	<i>Melilotus alba</i> .

Common name	Scientific name
Thistle, Canada	<i>Cirsium arvense.</i>
Prairie	<i>Cirsium undulatum.</i>
Three-square	<i>Scirpus americanus.</i>
Tickclover, hoary	<i>Meibomia canadensis.</i>
Timothy	<i>Phleum pratense.</i>
Wild	<i>Muhlenbergia racemosa.</i>
Trefoil, birdsfoot	<i>Lotus americanus.</i>
Tumblemustard	<i>Norda altissima.</i>
Tumbleweed	<i>Amaranthus graecizans.</i>
Vervain	<i>Verbena bracteosa.</i>
Blue	<i>Verbena hastata.</i>
White	<i>Verbena urticaefolia.</i>
Violet, butterfly	<i>Viola papilionacea.</i>
Virgins-bower	<i>Clematis virginiana.</i>
Wapato	<i>Sagittaria latifolia.</i>
Western	<i>Sagittaria arifolia.</i>
Watercress	<i>Radicula palustris.</i>
Waterhemlock	<i>Cicuta bulbifera.</i>
Spotted	<i>Cicuta maculata.</i>
Waterlily, yellow	<i>Nymphaea advena.</i>
Waterplantain	<i>Alisma plantago-aquatica.</i>
Geyer's	<i>Alisma geyeri.</i>
Waterweed	<i>Elodea canadensis.</i>
Wheatgrass, slender	<i>Agropyron tenerum.</i>
Whitetop	<i>Fluminea festucacea.</i>
Wildbergamot	<i>Monarda fistulosa.</i>
Wildcelery	<i>Vallisneria spiralis.</i>
Wildrice, northern	<i>Zizania aquatica.</i>
Wild-rye, nodding	<i>Elymus canadensis.</i>
Short-awned	<i>Elymus virginicus</i> var. <i>submuticus.</i>
Wild-sarsaparilla	<i>Aralia nudicaulis.</i>
Willow, autumn	<i>Salix serissima.</i>
Beak	<i>Salix bebbiana.</i>
Dwarf pussy	<i>Salix tristis.</i>
Glaucous	<i>Salix prinoides.</i>
Heartleaf	<i>Salix cordata.</i>
Hoary	<i>Salix candida.</i>
Peachleaf	<i>Salix amygdaloides.</i>
Pussy	<i>Salix discolor.</i>
Sand-bar	<i>Salix interior.</i>
Slender	<i>Salix petiolaris.</i>
Willow-weed	<i>Epilobium adenocaulon.</i>
Do	<i>Epilobium densum.</i>
Woodbetony, swamp	<i>Pedicularis lanceolata.</i>
Wormwood	<i>Artemisia biennis.</i>
Do	<i>Artemisia caudata.</i>
Do	<i>Artemisia dracunculoides.</i>
Wormwood, fringed	<i>Artemisia frigida.</i>
Yarrow, common	<i>Achillea millefolium.</i>

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TABLE 9.—The prairie lakes: The fresh-water lakes of No

County and lake	Location	Date visited	Myrio- phyll- um spicu- m	Cera- tophyll- um demers- um	Pota- mogeton perfoli- atus	Pota- mogeton hetero- phyllus	Pota- mogeton zosteri- folius	Pota- mogeton folius	Pota- mogeton frasil	Ruppia maritima	Zan- nichel- lia palu- stris	Flodea cama- densis	Chara sp.	Algae	R
Logan County:															
Doyle	Napoleon (18 mi. S.E.)	Aug. 2	F		A	F								C	
Red (3)	Napoleon (10 mi. S.E.)	do			R	R								F	
Rudolph	Napoleon (13 mi. E.)	do		A											
Kidder County:															
Driscoll	Driscoll (5½ mi. E.)	Aug. 4			F									A	
Fresh	Napoleon (17½ mi. N.E.)	Aug. 6			F									A	
Dawson Slough (2)¹	Dawson (1½ mi. S.)	Aug. 9	F		A								A	A	
Ranch	Pettibone (1 mi. N.W.)	Aug. 15	F		C			R					A	F	
Swan (1)	Robinson (11 mi. N.)	Aug. 16	A		C									A	
Wallace, sections 35-36	Lake Williams (9 mi. N.)	do	A		C									A	
Fretton, sections 13-14	Pettibone (13 mi. NNW.)	do	A	A		F		A		F	C			A	
Wallace, sections 37-38	Lake Williams (9½ mi. NNW.)	do	A	A										A	
Mulberry (1)¹	Tuttle (2½ mi. N.)	Aug. 17	A	A	A									A	
Woodhouse (1)	Tuttle (10 mi. N.)	do	A	A	A									A	
Merkel, South, section 29	Robinson (N.W.)	do			A										
Harriet (1)	Arena (½ mi. S.W.)	Aug. 18			A										
Clear	Lake Horseshoe (2 mi. S.E.)	do	F	C	A								C	C	
Horseshoe (1)¹	Wing (3½ mi. N.E.)	do	A	A	R	A	F								
Crystal Springs	Crystal Springs	Aug. 20	A		A										
Pumilus Slough (1)	Dawson (2½ mi. NNW.)	Aug. 22	A	A											
Barnes County:															
St. Marys	Moon Lake (½ mi. S.)	Aug. 6	A		A	A				A	C			A	
Sweetwater	Sauborn (4 mi. S.)	Aug. 6			A					A				A	
Stutsman County:															
Louise	Chase Lake (1½ mi. N.)	Aug. 10			C			R		A	F		A	A	
Spiritwood (1)¹	Jamestown (18 mi. NE.)	Aug. 12	C	F	C					A			A	A	
Griggs County:															
Long	Bimford (2½ mi. E.)	Aug. 18	A		A	C	F		R	F	R		C	C	
Red Willow	Bimford (3 mi. NW.)	Aug. 20	C	R	A					F			A	F	
Burleigh County:															
Bismarck	Bismarck (7 mi. E.)	Aug. 21	A	A	A			F				A			
Kling (1)	Mouken (3 mi. S.)	do		A		R	A	C	F						
Florence	Alta (E.S.E.)	Sept. 3	A		A										
McHenry County:															
Brush (Bentley)	Drake (3 mi. W.)	Aug. 27	A	R	A	R									
Doctor	Lake George (1½ mi. NW.)	Aug. 28	A		C		F								
Hester	Valva (8 mi. E.)	Sept. 4		R	A										
McLean County:															
Camp	Strawberry Lake (N.E.)	Sept. 1	F	A	A						F		A	R	
Strawberry	Turtle Lake (17 mi. N.)	do	R	A	A										
Long	Crooked Lake (N.)	do	A		A	A				C					
Crooked	Turtle Lake (8 mi. N.)	do			A	A									
Buffalo, North and South	Felkirk (N.E. and E.)	Sept. 3	C		A	A									
Coal	Underwood (3½ mi. S.E.)	do	A	A	R	A			C						
Blue Lake Slough	East of Blue Lake	Sept. 5	A	A											
Dugden Slough	Russ (6 mi. E.)	do	A	A	R	A									
Max	Max (3 mi. S.W.)	Sept. 8	A	A	R	A									
Max Slough	Ryder (10 mi. N.)	Sept. 11	A	A		F	A								
Waterloo Ranches	Ryder (7 mi. N.)	do													
Waite Ranch	Ryder (9 mi. S.W.)	Sept. 12	A		A	A									
Hiddenwood	do	do	A		A	A									
Hiddenwood Slough	do	do	A		A	A									
Doughlass (2)	Doughlass (S.W. and E.)	do	A		A	A									
Sheridan County:															
Jones	Denhoff (5 mi. N.E.)	Sept. 3			A	A									
Mercer No. 6	Mercer (8 mi. N.)	Sept. 5			A							R	F		
Towner County:															
Snyder (1)	Cando (N.E.)	Sept. 28	A		A	A					F				
Rolette County:															
Gurr	Rolette (3 mi. NW.)	Sept. 29			C										
Gurr Slough	Rolette (3 mi. N.)	do	A		A										
Burke County:															
Arvidson	Kenmare (15 mi. W.)	Oct. 2		R						R					
Vanville, section 9	Kenmare (25 mi. SW.)	do			A										
Martin Sloughs	Kenmare (12 mi. WSW. & W.)	do	F		C									A	
Kandogoh, section 5	do	do	F		F									A	
Parsons	Kenmare (13 mi. WSW.)	do	C		A	F								A	
Vanville, sections 3-10	Kenmare (17 mi. WSW.)	do	A		A									A	
Ell	Kenmare (16 mi. W.)	do	A		A										
Stagg (1)¹	Kenmare (17 mi. W.)	do	A		A										
Fresh	Kenmare (9 mi. SW.)	Oct. 3	R		R									R	
Ward	Kenmare (19 mi. WNW.)	Oct. 2		R	R										
Kandogoh, section 1	Kenmare (8 mi. SW.)	Oct. 3			F										
Footfalls, section 28	Kenmare (26 mi. WNW.)	Oct. 5	R		C	F								F	
Coville, sections 1-2	Kenmare (26 mi. WSW.)	do		R	C	R			C				A	F	
Clayton, sections 29-32 [10]	Kenmare (21 mi. WNW.)	do			C	C								A	
Footfalls, sections 29-32 [2]	Kenmare (26 mi. WNW.)	do			C	C								A	
Footfalls, sections 18-19	Kenmare (28 mi. WNW.)	do			C	C								A	
Leaf Mountain, sections 35-36 [2]	Kenmare (29 mi. WNW.)	do			A										
Clear, sections 4 and 6 [2]	Kenmare (30 mi. W.)	do			A										
Clear and Leaf Mountain [100]	Kenmare (25-35 mi. W.)	do			A	A									
Rainy Slough	Columbus (3½ mi. S.E.)	Oct. 12	F												
Mountain County:															
Powers (3)	Powers Lake	Oct. 3			A										
T. 158 N., R. 89 W., section 29	Piermo (11 mi. N.)	Oct. 9	C			F								A	
T. 159 N., R. 89 W., section 29	Piermo (10 mi. N.)	do	A												
Nelson County:															
Swan Lake	Stump Lake (N.)	Oct. 5	C		A	A								A	
Slough	Tag (E.)	Oct. 16	A		A	A									
Ramsey County:															
Sweetwater (1)¹	Devils Lake (N.)	Oct. 10	C	R	A	A					C			C	
Williams County:															
Alamo Slough	Alamo	Oct. 15	A												
Zahl Slough (2)	Zahl	do	A												
Pierce County:															
Pleasant	Pleasant Lake (3 mi. N.)	Oct. 18	R		A					C				R	
Denson County:															
Pelican (2)¹	Devils Lake (W.)	Oct. 13	A		A	C									
Ideen	Leeds (E.)	Oct. 20	C												
Long	Minnewauken (S.W.)	Oct. 23	A		A										
Stony	do	do			A										
Round	do	do	A		A										

¹ A, abundant; C, common; F, fairly common; R, rare.

² Numbers in parentheses represent approximate area in square miles.

³ Also *Hippuris vulgaris*, rare; *Utricularia minor*, very rare; *Sagittaria latifolia*, rare, 1 patch near road on highway.

⁴ *Scirpus paludosus* was fairly abundant.

⁵ In addition, *Scirpus paludosus* was very rare to rare.

⁶ Also *Sagittaria latifolia*, rare.

⁷ Numbers in brackets indicate number of smaller lakes.

⁸ Lunell, of Leeds, N. Dak., has also reported *Ceratophyllum demersum*, *Potamogeton zosterifolius*, and *Ranunculus purshii* from this lake. When visited by the writer the lake was covered with

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was covered with 3 inches of ice and much snow, so that complete data were unobtainable.

END