

Plant and Animal Populations of the Missouri River Valley in North Dakota

By
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The Missouri River Basin Comprehensive Plan authorized by the 78th Congress (Public Law 534, Chapter 665—2nd session) would flood approximately three-fourths of the valley² of the river in North Dakota. This would destroy most of the existing vegetation and presumably cause considerable changes in the marginal portions. Practically no ecological studies and few botanical collections had been made in this area, so that we had no inventory of earlier conditions. In June, 1945, at the suggestion of Mr. Roy N. Bach, biologist and coordinator with the State Game and Fish Department, the writer spent two weeks with Mr. Bach in making some studies on vegetation composition in the area.

Mr. Bach and his assistants³ made estimates of the areas from aerial maps and other sources with the following results:

Table 1. Amount of land in North Dakota to be flooded by Oahe and Garrison dams.

	Oahe		Garrison	
	Acres	Percent	Acres	Percent
Cultivated	11,000	14.2	150,000	39.3
Timber and brush	27,000	34.8	71,500	18.7
Meadow, pasture, waste land, and the area of the river	36,625	51.0	160,500	42.0
Totals	77,625	100.0	383,000	100.0

The Game and Fish Department was especially interested in the number of game and fur-bearing animals. They estimated the total number in the two areas in 1945 as follows: pheasant 800,000; deer 1,200; rabbit 60,000; skunk 10,000; muskrat 4,500; weasel 4,000; mink 2,050; raccoon 1,750; beaver 1,000; bobcat 425.

General Topography

The Missouri River enters North Dakota just above the mouth of the Yellowstone River at approximately longitude 104° west, latitude 48° north, runs nearly east to about 102° 40', irregularly southeast to longitude 101°, latitude 47° 15', thence south. It forms a natural divid-

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²The term "valley" as used in this article, refers to the flood plain or valley floor and immediately adjacent areas.

³Miller, Wilford and Nels Struwing, Missouri Basin Studies made by (State Game and Fish) Department. North Dakota Outdoors. March, 1945, p. 11.

ing point between "east" and "west" more nearly than any other place in the region.

The famous Bad Lands are found along the Little Missouri River, chiefly on its eastern side and especially along its lower portion in McKenzie County. Along the Missouri River there are many places where the bluffs are similar to the Bad Lands, especially the first section between Williams and McKenzie Counties. Below this portion, such bluffs are occasional, but usually quite limited in extent, and rare south of Washburn (latitude 47° 20'). On these isolated buttes are found a number of species of plants which are not found farther east or only on similar isolated buttes, notably near Valley City and Walhalla. The writer² has published a brief account of a local butte and river bottom flora along the Little Missouri River, which is much like that found along the larger river.

Trees

Cottonwood is the conspicuous tree along the river, but the individual trees have wide, spreading tops and usually do not grow as closely together as they appear. Green ash and box elder are commonly interspersed with the cottonwoods. The composition of various timbered areas varies greatly and is not always easily explained. The method of counting finally used was a strip 1,000 feet long and 11¾ feet wide, equivalent to approximately one-fourth acre. These were taken on a line more or less at right angles to the river. Since the timbered areas occupy

bends which have been formed by river deposit, they commonly have low ridges and alternating depressions more or less parallel to the river. The cottonwoods tend to occupy the ridges while the depressions contain shrubs or open areas with sparse grasses and sedges.

The flora of the river valley varies considerably according to the origin of the soil material. One interesting feature is the occasional appearance of dwarf sagebrush and associated plants. This sagebrush is one of the most characteristic plants of the Plains region. It is first seen as one crosses the river and is frequent or common from there westward. It grows on bare clay buttes or more especially on the clay washed down from them. In many places, one can trace this wash for some rods, and occasionally for as much as a quarter of a mile, quite to the river bank, by the growth of sagebrush.

Differences between the various timbered areas is illustrated in Table 2. Elm is absent in some places, common in others. Fairly large specimens of it seemed more characteristic of the deep, narrow coulees above the flood plain. Young ash trees, 1-5 years old were abundant in most areas and in some places young box elders were common. Bur oak is frequent at various elevations on the hills, not on the flood plain.

Shrubs

Woods' rose, wolfberry, poison ivy, dogwood, willows and buffaloberry, are the common shrubs. Sandbar willow, which forms large patches on the low

²Stevens, O. A. North Roosevelt Park in North Dakota. *American Botanist*, 49:104-110. 1943.

Table 2. Number per acre and size of trees along the Missouri River in North Dakota

Location of areas sampled	Kinds of trees								diameter and number per acre		
	Cottonwood			Ash			Elm	Box Elder			
	1 ft. or less	1-2 ft.	over 2 ft.	1-3 in.	3-6 in.	over 6 in.					
1. Linton	12	12	4	164	4	0	0	40			
2. Bismarck	4	44	4	20	?	0	0	28			
3. Garrison (dam site)	24	4	0	174	79	4	0	174			
4. Emmet	0	0	0	131	10	0	118	43			
5. Elbowoods											
No. 1	40	20	4	4	0	0	4	30			
6. Elbowoods											
No. 2	20	32	0	16	0	0	0	4			
7. Sanish	52	24	4	16	0	0	0	16			
8. Williston No. 1	8	32	6	390	24	2	48	26			
9. Williston No. 2	164	8	0	0	0	0	0	0			
10-18. Williston	2	tr	3	402	41	0	74	170			
19-21. Banks	121	13	56	346	0	0	12	352			

1. Also oak only at foot of bank; 4 peach-leaved willow.

2. Sizes of ash not separated.

3. 1100 ft. sample. Peach-leaved willow 16.

4. 3700 ft. in two parallel strips. Approximately 14% of elm over 1 ft. in diameter.

5. One of the lower areas. Peach-leaved willow 16; sandbar willow 16.

6. Rather typical, very brushy area.

7. Quite typical cottonwood flat.

8. 2000 ft. in two parallel strips. Heavy timber, some cutting.

9. Near old ferry; dry and brush sparse.

10-21. Counts made later by Bach and assistants. Peach-leaved willow 30 and 66, sandbar willow 169 and 135 respectively, in two areas east of Williston. Cottonwoods over 2 ft. diameter, 168 in one area 6 miles northeast of Banks.

river bars, was rare in most areas examined. Poison ivy was common and especially abundant at Linton where it was beginning to bloom on June 27.

Rose and wolfberry form a large part of the undergrowth in the woods and no counts were made on these since they are small and occur in dense patches or scattered throughout. Counts of dogwood, diamond willow and buffalo berry show that dogwood was present in every sample except one and averaged 241 clumps per acre in 21 counts. Very few were present at Bismarck and Emmet.

Diamond willow was present in 8 of the 21 areas, Garrison,

Elbowoods (both areas), Williston (No. 8), and 4 others averaging 100 clumps per acre in these places. Buffaloberry was found in 9 areas and averaged 64 plants per acre. The willows usually grew in large clumps of 20-40 stems, usually not over one to two inches in diameter and with many dead stems. Dogwood clumps contained from one to 25 stems.

Buffaloberry is found more commonly as dense patches, 2-10 rods wide, on higher, grass covered areas. No attempt was made to estimate its abundance in such places. It also grows on the hillsides and frequently at

certain elevations so that it forms pronounced lines.

Juneberry was frequent but not abundant. Black haw, wild grape, black currant and wild plum were occasionally found.

Herbaceous plants in the woods

Very few notes on these plants were made during the short time available. Native grasses are not abundant. In some of the more open places Kentucky bluegrass has become common. Fringed loosestrife is one of the most common weedy plants. Dogbane, yellow avens, anemone, tall meadow-rue, hog peanut and large bindweed are common.

Grasslands

Probably the greater part of the better grassland has been broken up for cultivation and thus good sample areas are not common. Western wheatgrass seems to be easily the predominant grass. Where the ground has been somewhat disturbed, as by plowing, close cutting or grazing, this grass may be the chief or almost the only one present. In undisturbed areas, it is mixed with other grasses or is the chief one where the soil is heavy.

Feather bunchgrass is perhaps second in abundance where the soil is fairly well supplied with moisture. Blue grama and needle-and-thread prevail on slight ridges or where the soil is dry. On the tops of the adjacent hills blue grama and thread-leaved sedge, or the latter alone, become the chief plants.

A few counts were made by running 300 to 1000 ft. lines across selected areas, to deter-

mine the proportion of ground over which the different grasses were dominant and the frequency of other plants. On one area of the flood plain near Williston, western wheatgrass was found to occupy approximately 80 percent of the area, with feather bunchgrass 8 percent, brome-grass (introduced) 8 percent, bluegrasses 3 percent. The chief weeds here were blue lettuce, anemone, Frenchweed, flixweed, white sage, long-rooted smartweed, prairie rose, prairie thistle and white prairie aster.

A flood plain area near Bismarck, sampled only briefly, showed feather bunchgrass about 45 percent, porcupine grass and western wheatgrass 25 percent each, plains reedgrass 4 percent and prairie Junegrass 1 percent. This is based on number of stalks because the plants were quite thoroughly mixed. White prairie aster and prairie rose were the chief weeds.

A flood plain area near Elbowoods and a creek flat at Shell Creek had nearly equal amounts of western wheatgrass and blue grama with small amounts of feather bunchgrass and occasional weeds of various species.

Fluctuation in water level will destroy present vegetation in places which will later be exposed for development of new cover. This offers interesting problems in vegetation changes. Definite areas for study could not be selected at this time but were considered. Steep slopes are sparsely vegetated and will be subject to severe erosion, slipping, etc. Gentle slopes will not be so readily eroded and larger areas of them will be affected by

water level changes. At the upper end of the lake, some timber and brush land may be flooded and later exposed for even a period of years.

A steep and a gentle slope near Bismarck were selected to compare the vegetation under such conditions and especially to compare the grasses occurring at different elevations. The gentle slope was estimated at 10 percent slope and the cover was largely the blue grama-thread leaved sedge combination which was calculated to cover 66 percent (on a line 1532 ft. long) of the hillside. Western wheatgrass was mixed with it over the remaining 34 percent, especially on the lower two-thirds. Needle-and-thread was present throughout, averaging 40 tufts per 100 feet on the upper and 16 on the lower halves of the slope. The cover was good here but occasional plants of 18 non-grass species were listed.

The steep slope was estimated at 45° slope and a line of 300 feet was studied. Needle-and-thread and side-oats grama were the chief grasses. Thread-leaved sedge was the main plant on the ridge at the top of the hill, and occasional tufts of it occurred at various levels. Plains muhly was common, plains reedgrass frequent, and little bluestem rather infrequent. Blue grama was rare, feather bunchgrass occurred only in the first 10 feet where it was the chief grass. Western wheatgrass was mixed with feather bunchgrass in the second 10 feet. Of non-grass plants, 20 species were listed, of which aromatic aster, false mallow and prickly pear were most abundant.

Birds

Birds were conspicuous during the period spent in the field but no notes were taken on them. In the woods the songs of ovenbird, chat and redstart were heard continually. Black-headed grosbeaks and vireos were common but not as obviously so. Blue jays, as usual, seemed associated with oak trees.

Around the edges of the woods or in brushy places, arctic towhees, lazuli buntings, field sparrows, clay-colored sparrows and lark sparrows were common. Magpies were seen in various places. On the prairie, lark buntings and lark sparrows are especially characteristic. Meadow larks, mourning doves, horned larks, chesnut-colored longspurs, vesper sparrows, savannah sparrows, eastern and Arkansas kingbirds, are of course common. Baird sparrows were noted in many places and were especially numerous in a sand dune area between Linton and the river.

Practical Considerations

The chief land loss in flooded areas is probably that of the agricultural land. Cottonwood and ash comprise the chief timber loss. Cottonwood can supply considerable rough lumber and soft firewood. Ash is used mainly for fence posts. We had thought that diamond willow might be of some importance, but apparently trunks large enough for posts are too rare in most localities. In fences along the river valley, ash posts predominated, diamond willow running from perhaps one to five percent. How much of this timber can be taken out before it is destroyed, depends upon labor available and

relatively local use for the material.

Hay and grazing lands represent other land losses. Native fruits include buffaloberry and choke cherry. The loss in wild life habitat is a large one which is difficult to evaluate. To some extent it will be compensated by improvement at some of the higher levels. Plans should be made for further development in this direction.

Scientific Names of Plants Mentioned

- Anemone Canada—*Anemone canadensis*
 Ash, Green—*Fraxinus lanceolata*
 Aster, Aromatic—*Aster oblongifolius*
 Aster, White Prairie—*Aster ericoides*
 Avens, Yellow—*Geum strictum*
 Bindweed, Large—*Convolvulus sepium*
 Black Haw—*Viburnum lentago*
 Bluegrass, Kentucky—*Poa pratensis*
 Bluegrasses—*Poa* spp.
 Bluestem, Little—*Andropogon scoparius*
 Box Elder—*Acer negundo*
 Bromegrass, Smooth—*Bromus inermis*
 Buffaloberry—*Shepherdia argentea*
 Bunchgrass, feather—*Stipa viridula*
 Chokecherry—*Prunus virginiana*
 Cottonwood—*Populus deltoides*
 Currant, Black—*Ribes americanum*
 Dogbane—*Apocynum hypericifolium*
 Dogwood—*Cornus stolonifera*
 Elm, American—*Ulmus americana*
 Flixweed—*Descurainia sophia*
 Frenchweed—*Thlaspi arvense*
 Grama, Blue—*Bouteloua gracilis*
 Grama, Side-oats—*Bouteloua curtipendula*
 Grape, Wild—*Vitis vulpina*
 Hog Peanut—*Amphicarpa bracteata*
 Juneberry—*Amelanchier alnifolia*
 Junegrass, Prairie—*Koeleria cristata*
 Lettuce, Blue Wild—*Lactuca pulchella*
 Loosestrife, Fringed — *Lysimachia ciliata*
 Mallow, False—*Malvastrum coccineum*
 Meadowrue, Tall—*Thalictrum dasycarpum*
 Muhly, Plains—*Muhlenbergia cuspidata*
 Needle-and-thread—*Stipa comata*
 Oak, Bur—*Quercus macrocarpa*
 Plum, Wild—*Prunus americana*
 Poison Ivy—*Rhus radicans*
 Porcupine Grass—*Stipa spartea*
 Prickly Pear—*Opuntia polyacantha*
 Reedgrass, Plains — *Calamagrostis montanensis*
 Rose, Prairie—*Rosa arkansana*
 Rose, Wood's—*Rosa woodsii*
 Sage, White—*Artemisia ludoviciana*
 Sagebrush, Dwarf—*Artemisia cana*
 Sedge, Thread-leaved—*Carex filifolia*
 Smartweed, Long-rooted—*Polygonum coccineum*
 Thistle, Prairie—*Cirsium undulatum*
 Wheatgrass, Western — *Agropyron smithii*
 Willow, Diamond—*Salix mackenziana*
 Willow, Peach-leaved—*Salix amygdaloides*
 Willow, Sandbar—*Salix interior*
 Wolfberry — *Symphoricarpos occidentalis*