Joe Ball

SURFACE WATER RESOURCES OF BUFFALO COUNTY

DEPARTMENT OF NATURAL RESOURCES
MADISON, WISCONSIN
1976

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SURFACE WATER RESOURCES

OF

BUFFALO COUNTY

By

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INTRODUCTION

In 1900, Wisconsin had a population of 2,069,042, or a density of 37.4 people per square mile. As of April 1, 1970, the official count was 4,417,993, or nearly 80 people per square mile. There seems little doubt that the population will continue to grow and the trend toward shorter work weeks and longer vacations will continue. Much of the new leisure time is being spent outdoors in swimming, fishing, motorboating, water-skiing, skin diving, hunting, and other water sports and activities. The expansion of these activities in addition to increased agricultural, industrial, and domestic demands on water has resulted in surface water use conflicts. Often one interest may dominate the use to the exclusion of others. To assure that the resource is equitably utilized, a method of apportioning water use must be found.

In 1959, the State Legislature requested the Conservation Department, now the Department of Natural Resources, to develop a program for classification of lakes by use and later this responsibility was enlarged to include streams. Before an actual classification system can be devised, it is necessary to first prepare a water resources inventory consisting of basic data such as number, size, physical and chemical characteristics of lakes and streams as well as present and potential uses of our water resources. Inventories are being prepared on a county by county basis. Collection of data for this summary of the surface water resources in Buffalo County was completed in 1970.

This inventory is intended to provide a summary of the quality, quantity, and character of the surface waters (lakes and streams) of Buffalo County. Use potential will be described and methods of protection discussed. The inventory will have served its purpose if it can be used as a base in planning for the wise use and good management of the waters.

Data for this inventory came from a number of origins. The principal sources were aerial photographs, U.S.G.S. maps, files of the Department of Natural Resources, and field investigations.

The maps reproduced in this publication are not intended for legal and regulatory use. They must, therefore, not be considered or used as factual or final authority because of natural or man-made changes which may have occurred.

That portion of the Chippewa River bordering Pepin County has been included in the Pepin County report. The part of the Trempealeau River between Buffalo and Trempealeau Counties was included in the Trempealeau County report.

SETTING OF THE SURFACE WATER

Early Settlement

Buffalo County was created in 1854, taking its name from its main river which French explorers apparently named for the buffalo that were found there. Fountain City was the original county seat, but it was moved to Alma in 1860, which had a majority of the voting population. Alma was named by W. H. Gates in 1855 when the village was surveyed and platted. He wanted a short name that was easy to spell and pronounce. Looking at an atlas, he chose the name "Alma" which he saw on a map of Russia (Andreas, 1881).

Indian trade was the major incentive for settlement of Buffalo County. In 1839 and perhaps as early as 1826, a Mr. Holmes located near the present site of Fountain City. He traded with the Indians and cut cord wood fuel for the Mississippi River boats. In 1842, a group of German men from Galena, Illinois, formed the nucleus of the first white settlement in the county and they also settled at Fountain City, then known as Holmes' Landing. This small community became a trading point for supplies and a stopping point for boats which were making monthly trips during the open-water season between Galena and Fort Snelling. For several years, Holmes' Landing was the only settlement with the rest of the county area remaining in the hands of the Indians.

J. P. Stein was reportedly the first settler to grow grain in Buffalo County when he harvested his first wheat crop in 1852. Homesteaders found the land easy to plant and crop because much of the area was prairie. There was some lumbering, but there was little pine and most of the timber was oak. Wheat was the main grain crop and it reached a peak in 1880. The move toward dairy farming took place about that time. Small cheese factories soon lost out in their competition with the creamery.

The population peak was reached in 1900. At this time, farms were relatively small and machinery had just begun to replace hand labor. Today farms are larger and only Oneida County in Wisconsin, with its commercial potato production, has larger farms (Wisconsin Department of Resource Development, 1962). German immigrants predominated; however, there were considerable numbers of Swiss and Swedes.

Geography

The county is located in the west central part of the state and has a natural western boundary formed by the Mississippi and Chippewa Rivers. A portion of its eastern boundary is the Trempealeau River. It lies within three of the major drainage areas in Wisconsin--the Chippewa River, the Buffalo (Beef) River, and the Trempealeau River. The locations of these watersheds are shown in Figure 1.

The county lies entirely in one geographical province, the Western Upland. Martin (1932) compares the Western Upland to the Allegheny and Cumberland Plateaus of the Appalachians. The Western Upland of Buffalo County is a plateau which is thoroughly dissected by a maze of high, narrow ridges, steep escarpments, and deep, steep-sided valleys. This system of ridges and valleys (coulees) has given Buffalo County's terrain the reputation of being some of the roughest in the state.

Dissection of the upland through stream erosion has been made possible by intrenchment of the master stream (the Mississippi River) and its tributaries in the weak Cambrian sandstone. Ridges lie 400 feet or more above the valley floors. East of Alma, the general altitude of the hilltop is 1,240 feet (Martin, 1932). The lowest part of the county is the Mississippi River floodplain in the southern part of the county with an elevation of about 650 feet. Figures 3 and 4 give an indication of the county's relief.

Terraces are found along the Mississippi River and its tributaries. The highest are in the Bear Creek valley in the northern part of the county, and they rise to an elevation of about 900 feet (Thomas, 1962).

Only a small portion of Buffalo County north and northwest of Alma has been glaciated. This area was glaciated during the first substages of the Wisconsin glacier; hence it is part of the region of older drift (Martin, 1932). After receding, the glacier left a few rounded pebbles on ridgetops attesting to its presence (Thomas, 1962).

The majority of the county lies in an unglaciated region. Evidence used to support this statement is the lack of natural lakes and undrained depressions, lack of glacial till, and the lack of moraines. Glacial abrasion farther north resulted in deep deposits of loess being blown into Buffalo County after the glacier retreated approximately 10,000 years ago (Martin, 1932). Figure 2 shows the glacial geology of Buffalo County.

Geology

Buffalo County's rocks and minerals have greatly influenced the county's soils and topography.

The oldest underlying rock formation is Pre-Cambrian granite. Proceeding upward from the granite, the deposits become younger and are sedimentary formations formed in a marine environment and consist of three Cambrian sandstones and of Prairie du Chien dolomite (Lower Magnesian limestone). These make up most of the bedrock underlying the county. In the northwestern part of the county, there are scattered remnants of St. Peter sandstone that overlie the dolomite on the highest hilltops. Because it is harder and more resistant to erosion than sandstone, the dolomite is the principal bedrock making up the ridges (Thomas, 1962). Erosion of the dolomite and sandstone bedrock has been carried on over a long period of time and as a result deep valleys were formed. The Franconia sandstone forms narrow, steep, intermediate ridges and is probably the single most important determiner of Buffalo County's topography. Prairie du Chien dolomite is the second most important.

Loess, alluvium, and colluvium are the uppermost deposits. They are the parent materials for many of the soils in Buffalo County (Thomas, 1962). Figure 3 shows a typical cross section of Buffalo County's geological formations.

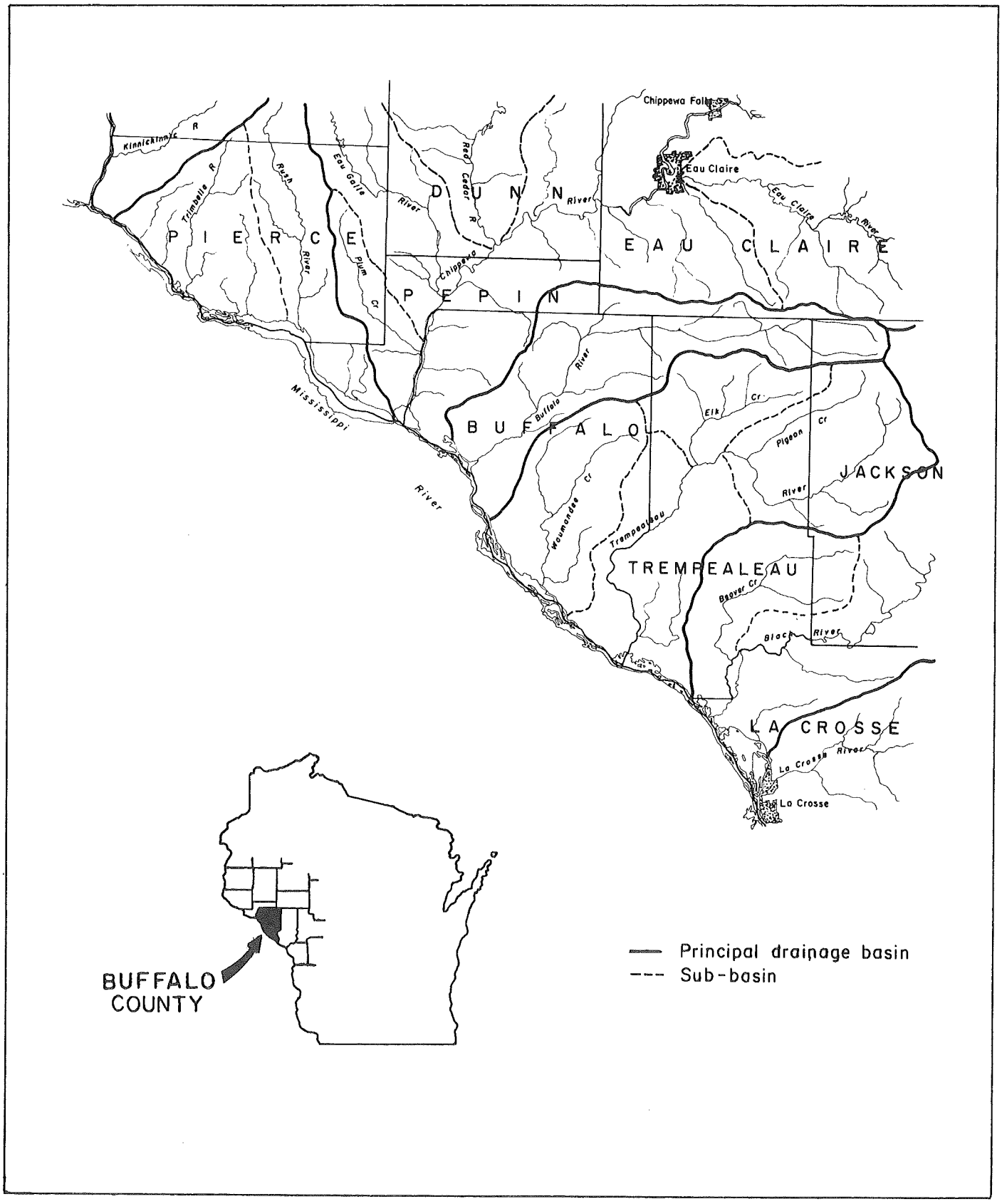


Figure 1. Location of Buffalo County within the state and within major watersheds.

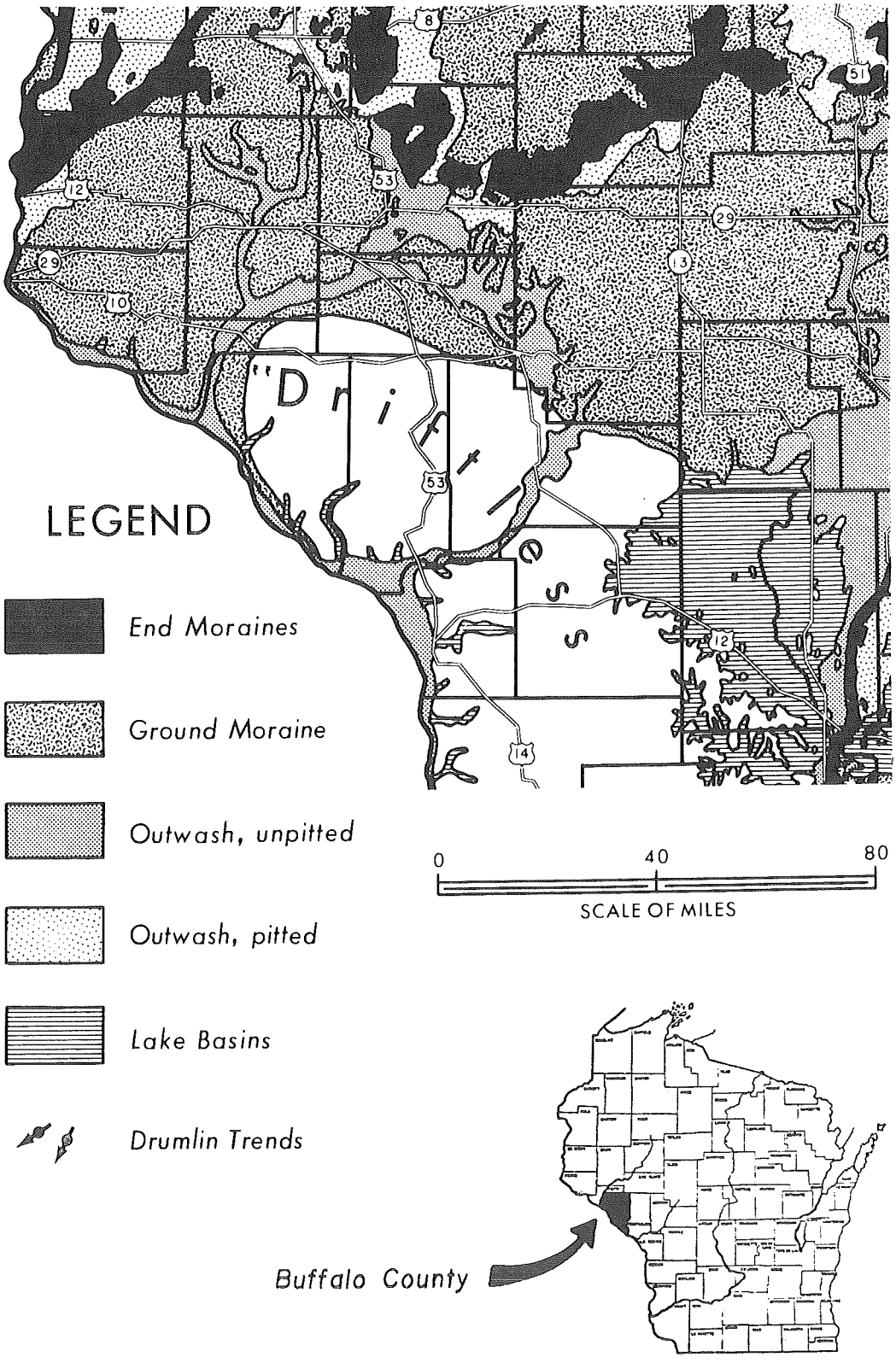


Figure 2. Glacial geology of Buffalo and surrounding counties (after Thwaites, 1956).

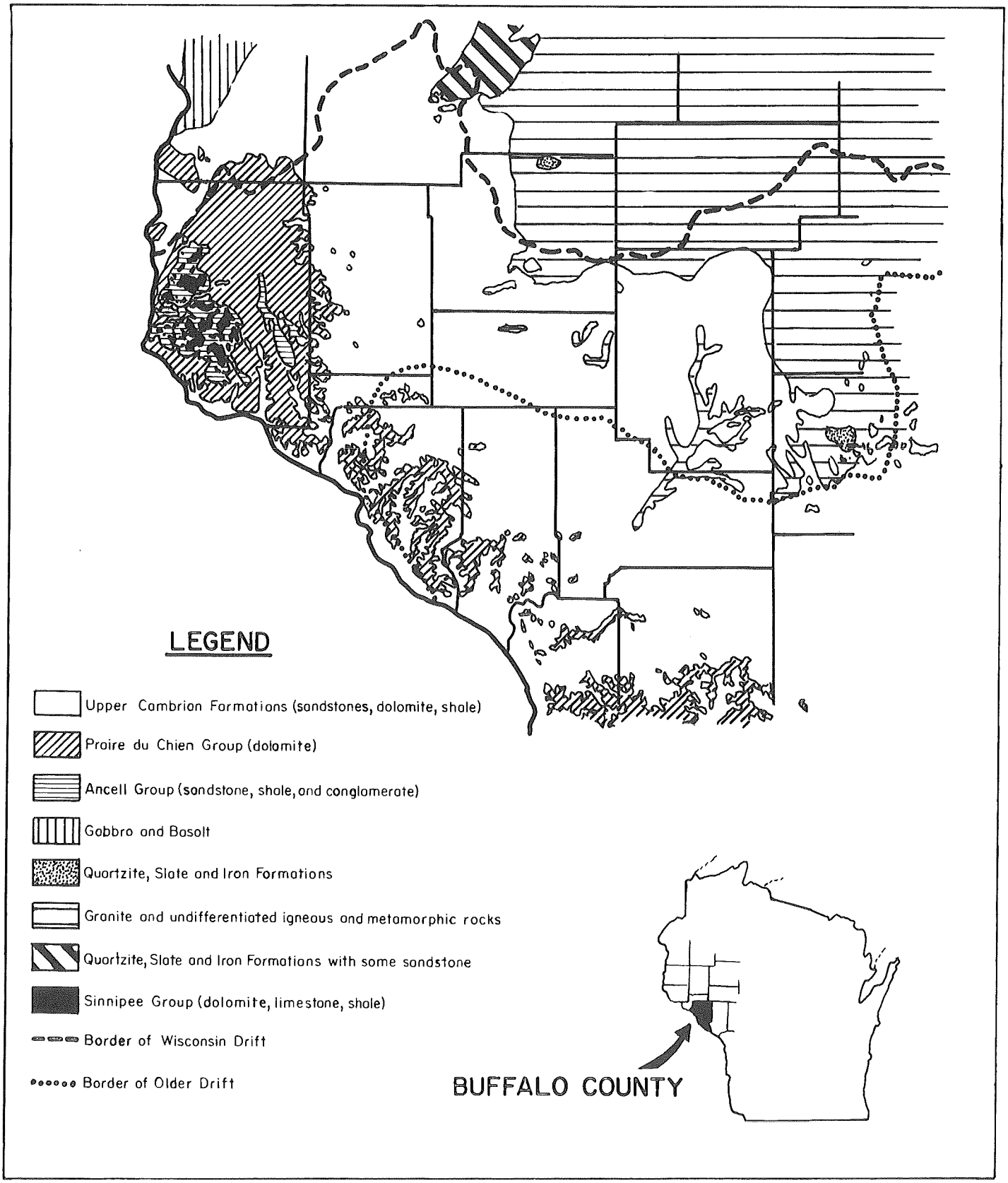
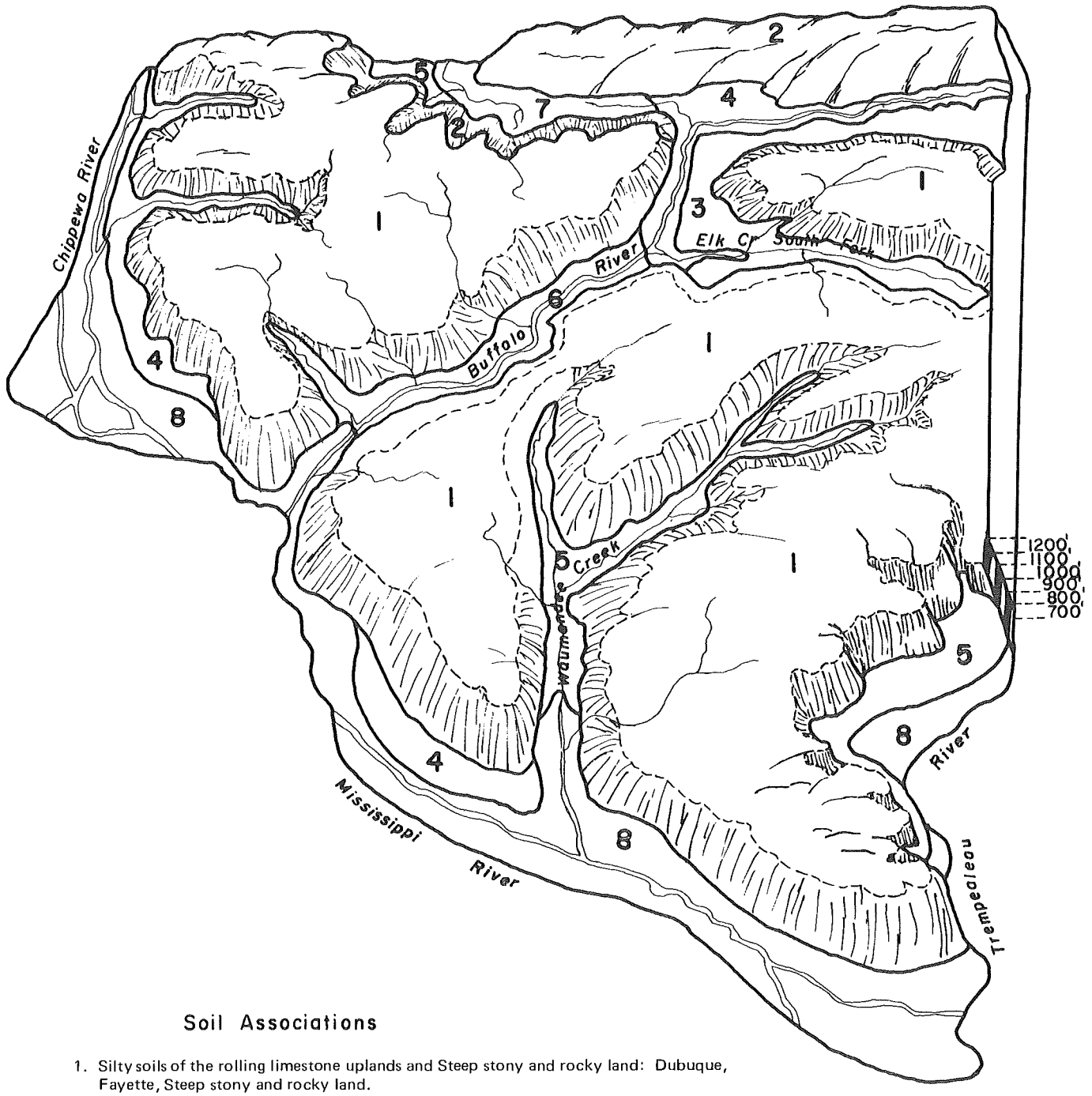


Figure 3. Cross sectional geology of Buffalo County (after Thomas, 1962).



Soil Associations

1. Silty soils of the rolling limestone uplands and Steep stony and rocky land: Dubuque, Fayette, Steep stony and rocky land.
2. Loamy soils of the rolling to hilly sandstone uplands: Gale, Hixton.
3. Sandy soils of the rolling to hilly sandstone uplands: Boone, Hixton.
4. Sandy soils of stream terraces: Sparta, Plainfield.
5. Silty soils of stream terraces: Bertrand, Richwood.
6. Loamy terrace soils underlain by sand on stream terraces: Meridian, Tell.
7. Wet organic and mineral soils of bottom lands: Peat and Muck, Ettrick, Wallkill.
8. Soils of overflow bottom lands: Loamy alluvial lands, Marsh.

Figure 4. Location and distribution of Buffalo County's soil associations (after Thomas, 1962).

Soils

Buffalo County has eight soil associations as shown in Figure 4. Each soil type owes its existence to several geomorphic processes. Probably the most important was glacial activity.

Nearly all of the county is covered by a layer of loess spread over the county by westerly winds following glaciation. This loess, or silt, ranges in depths from 10 feet on ridges near the Mississippi River to about one foot deep in the more distant areas away from the river (Thomas, 1962). It is the parent material for many of the soils in the county.

Several of the soils have developed from geological weathering of the sandstone and dolomite (limestone) bedrocks. In addition, alluvial sands and gravels are present in the valleys.

Most of the soils are of mineral origin, but a few are derived from organic materials. Figure 3 shows soil profiles of a few soil series. Table 1 provides additional information concerning the eight soil associations and dominant soil series.

Water

Groundwater reservoirs are recharged by direct precipitation. Low evaporation, melting snow, and rainfall make spring a prime time for recharging these reservoirs as water moves from the surface areas into the ground and percolates to the water table.

During the summer, groundwater levels tend to drop because precipitation is low and discharge to spring flow, evaporation, and transpiration are high. Groundwater is also lost by direct discharge to surface waters (Devaul, 1967).

Soil types combined with geology have an influence on the surface and groundwater conditions. As seen in Figure 4, most of Buffalo County's soils are classified as silt loams. These soils are not likely to provide as good circumstances for springs and good base flow of streams as do sandy soils that have high pore spaces, high specific yields of water, and good infiltration and percolation qualities.

The most important water-bearing horizons are the Upper Cambrian sandstone and the alluvial sands and gravels (Weidman and Schultz, 1915).

The Conservation Department's (now Department of Natural Resources) 1958 Springhead and Spring Pond Survey, using the springs located on land cover maps as a basis for its investigations, found 51 flowing springs in the county. Of these, 11 had flows of 50 to 100 gallons per minute, 9 had flows of 100 to 200 g.p.m., and 1 had a flow of 100 to 200 g.p.m. or more. The remaining 30 springs had flows of less than 50 gallons per minute. The survey included springs having at least a trickle of flow and which were separated from streams. It did not include spring seepage directly into streams.

Climate

Climatological data for the Buffalo County area is shown in Table 2. The county has an average annual precipitation of about 30 inches with the majority of it occurring during the growing season (May-September). Figure 5 shows the location of Buffalo County within mean annual precipitation isograms for the state. The average annual runoff on the Buffalo (Beef) River near Tell amounted to 8.5 inches during a water year period from October, 1932, through September, 1951. The runoff during the low and high water years is shown in Table 3. Since runoff is that part of precipitation which appears in surface streams, it may be assumed that the runoff for Buffalo County averages about eight inches per year.

The average growing season, defined as the number of days following the last 32-degree freeze in the spring to the first in the fall, is probably about 140 days. Figure 6 shows the location of Buffalo County within growing season isopleths for the state.

Freeze-up of shallow lakes normally takes place in late November and ice cover remains until late March or early April.

Land Use

In Buffalo County, like most of west central Wisconsin, early settlers grew wheat as their main crop. After 1880, wheat acreages declined and were supplanted by the dairy industry. Dairying and the cooperative creamery became a characteristic economic institution in the county (Wisconsin Department of Resource Development, 1962 or 1963).

Table 1. Description of Buffalo County's major soil series (Adapted from Thomas, 1962).

Soil Association	Dominant Soil Series	Parent Material	Physiographic Position	Natural Fertility	Drainage	Permeability of Subsoil	Droughtiness - Erosion
Dubuque, Fayette	Dubuque	Derived from loess and weathered from limestone	Gently sloping to steep sites on uplands	High	Well-drained	Moderately slow	
Steep, stony and rocky land	Fayette	Loess	Gently undulating to steep sites on uplands and concave valley slopes	High	Well-drained	Moderately slow	Subject to water erosion if not properly managed
	Downs	Loess	Gently undulating to gently rolling sites on uplands and high terraces along streams.	High	Well-drained	Moderately slow	
	Steep, stony and rocky land	Variable; silt or sand overly ing limestone or sandstone bedrock	Steep breaks below upland ridges	Variable	Somewhat excessively	Moderate	
Gale, Hixton	Gale	Loess	Sloping to steep sites on uplands	Moderate	Well-drained	Moderate	Moderate erosion
	Hixton	Material weathered from sandstone	Gently undulating to very steep sites on uplands	Low to moderate	Well-drained to excessively drained	Moderate to moderately rapid	Moderate to severe wind and water erosion
Boone, Hixton	Boone	Material weathered from sandstone	Gently sloping to very steep sites on uplands	Low	Excessively drained	Rapid	Droughty and easily eroded by wind and water
Sparta, Plainfield	Sparta	Sandstone, or well-sorted glacial outwash	Level to gently sloping outwash plains and stream terraces	Low	Excessively drained	Rapid	Droughty and subject
	Plainfield	Sandstone or from well-sorted glacial outwash	Level to gently sloping outwash plains and stream terraces	Low	Excessively drained	Rapid	to severe erosion
Bertrand, Richwood	Bertrand	Deep loess	Nearly level to sloping sites on terraces along streams	High	Well-drained	Moderate	Moderate erosion
	Richwood	Deep loess	Nearly level to sloping sites on stream terraces	High	Well-drained	Moderate	Moderate erosion; very droughty
	Jackson	Deep loess	Nearly level to sloping sites on stream terraces	High	Moderately well-drained	Moderate	Moderate erosion
	Curran	Deep loess	Nearly level to sloping sites on stream terraces	High	Somewhat poorly drained	Moderately slow	Subject to flooding; moderate erosion
	Toddville	Deep loess	Nearly level to sloping sites on stream terraces	High	Moderately well-drained	Moderate	Moderate erosion; droughty
	Rowley	Deep loess	Nearly level to sloping sites on stream terraces	High	Somewhat poorly drained	Moderate	Subject to flooding; moderate erosion
Meridian, Tell	Meridian	Old sand alluvium	Nearly level to gently undulating sites on terraces along streams	Low	Well-drained	Moderate to moderately rapid	Moderate to severe erosion; high water table
	Tell	Loess	Nearly level to gently sloping sites on stream terraces	Low	Well-drained	Moderate	Moderate erosion
Peat and Muck, Ettrick, Wallkill	Peat and Muck	Remains of grasses and sedges & some tamarack	Sites on flats or depressions on broad valley bottoms	High	Poorly drained	Moderate	Severe erosion Subject to flooding
	Ettrick	Silty alluvium washed from medium and fine-textured soils of nearby uplands and terraces	Level to concave sites along stream bottoms	High	Poorly drained	Moderately slow to slow	Subject to flooding and moderate erosion
	Wallkill	Silty, alluvium or colluvial material	Level to concave sites along stream bottoms	High	Poorly drained	Moderate	Moderate erosion Subject to flooding
Loamy alluvial lands, marsh	Loamy alluvial land	Mixed, medium-textured alluvial materials washed from uplands and terraces	Level to concave sites along over-flow bottoms	Fair to good	Poorly to moderately drained	Moderate	Subject to flooding Moderate erosion
	Marsh	Mixed organic and alluvial deposits	Level to concave sites along over-flow bottoms	Low	Poorly drained	Moderate	Very high water table

Table 2. Climatological data for Buffalo County area*

Station	Period Covered	Precipitation (inches) Mean Annual	Mean Monthly Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Percent Annual (May-Sept)	Length of Growing Season (days)	Avg. Dates of 32-Degree Freeze Last	First
Blair	1930-1959	31.11	1.20	1.05	1.85	2.56	3.65	4.64	3.84	3.82	3.58	2.02	1.91	0.99	65	128	May 19	Sept. 24
Eau Claire	1930-1959	30.20	0.96	1.03	1.78	2.77	3.65	4.52	3.34	3.93	3.39	2.03	1.77	1.03	65	151	May 5	Oct. 4
La Crosse†/	1951-1960	28.96	1.22	1.15	1.86	2.31	3.27	3.87	3.21	3.29	3.81	1.93	1.81	1.22	65	164	Apr. 29	Oct. 10
Menomonie	1938-1959	30.53	0.71	0.90	1.77	2.75	4.09	4.84	4.06	3.67	3.29	1.76	1.53	1.16	65	142	May 10	Sept. 29
Mondovi	1930-1959‡/	29.16	0.96	0.85	1.81	2.49	3.55	4.40	3.21	4.07	3.28	1.74	1.80	1.00	65	134	May 17	Sept. 28
River Falls	1930-1959	29.57	0.92	0.85	1.74	2.36	3.78	4.85	3.88	3.39	3.15	1.95	1.63	1.07	65	135	May 14	Sept. 26

* Data taken from Wisconsin Climatological Data, 1961, Wisconsin Crop Reporting Service.

†/ Precipitations shown are normal values which are based on the period 1921-1950 and are means adjusted to represent observations taken at the present standard location.

‡/ Numerous short periods with no records.

Table 3. Discharge and runoff for the Buffalo River near Tell, 1933-1951.*

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Mean and Totals
Discharge (cfs)													
High water year, 1942	270	291	266	163	172	433	242	529	703	354	237	525	349
Low water year, 1933	164	228	145	121	102	288	375	231	161	114	87.3	165	182
Runoff (inches)													
High water year, 1942	0.77	0.80	0.75	0.46	0.44	1.23	0.66	1.50	1.93	1.01	0.67	1.44	11.66
Low water year, 1933	0.47	0.63	0.41	0.34	0.26	0.82	1.03	0.66	0.44	0.32	0.25	0.45	6.08

* Data from Geological Survey Water Supply Papers 1308 and 1728.

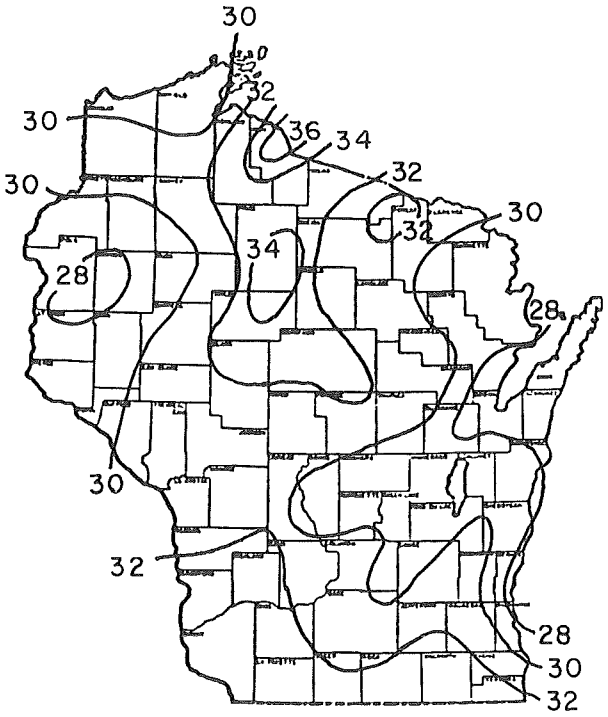


Figure 5. Location of Buffalo County within mean annual precipitation isograms.

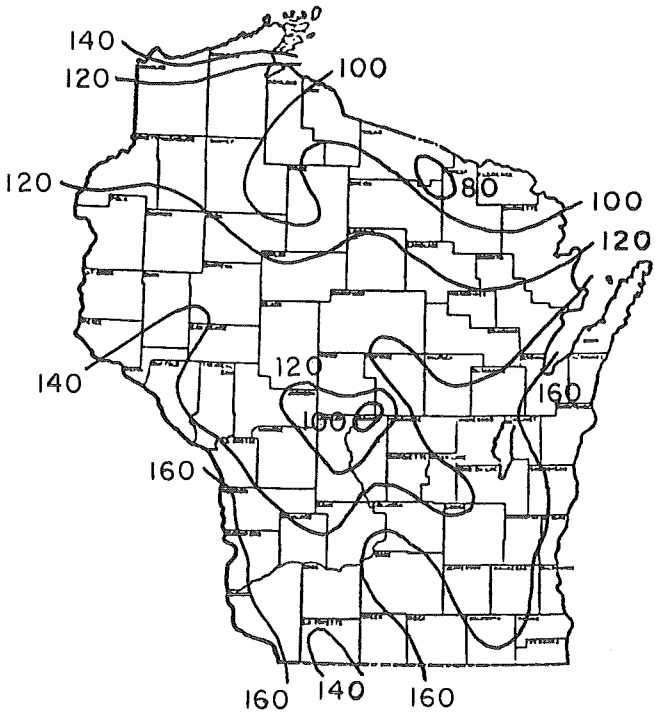


Figure 6. Location of Buffalo County within average growing season isopleths.

Hay, small grains, and corn provide an important base for the dairy and livestock industries (Thomas, 1962). In addition to dairying, swine, beef cattle, and poultry are raised. Soybean production is also starting to gain in importance (Wisconsin Department of Resource Development, 1962 or 1963).

Agricultural practices in Buffalo County, like in other areas of the country, have been experiencing a dynamic change brought on by increased farm technology. The individual farmer using machinery can farm more land more efficiently than ever before. During the 10-year period from 1950 to 1960, employment in agriculture dropped from 56.4 percent to 44.2 percent in Buffalo County. Other phenomena possibly associated with expanding farm technology are an increasing average farm size and decreasing numbers of farms. In 1954, there were 1,682 farms and their average size was 235.3 acres. By 1959, there were 1,524 farms, but they had an average size of 253.1 acres. Although the percentage of land in Buffalo County farms dropped from 86.9 to 84.6 percent from 1954 to 1959, farmers are farming more intensively and efficiently as shown by the increasing value of agricultural products since 1949 (Marshall, Serie, and Titus, 1964).

Land uses are illustrated in an inventory of the forest resources of eight counties in west central Wisconsin (Wis. Cons. Dept., 1959). Of the total land area in Buffalo County, 55.1 percent is classed as farm land, 43.7 percent as commercial forest, 2.0 percent as right-of-way, 1.1 percent as marsh, and 0.3 percent as rock outcrop.

Commercial forests, mainly in farm woodlots, and comprised primarily of maple, aspen, elm, red oak, white oak, birch, and basswood, cover about 188,500 acres. As of 1957, nearly 65 percent of the commercial forest area was being grazed by livestock. This practice has helped neither the cattle nor the forest. Wooded pasture provides four-fifths less forage than open pasture land, the forage is less palatable and nutritious, and there is a reduction in animal weight and milk production. In addition, grazing causes the degeneration of a forest resulting in trees of inferior quality and species. It also causes a compaction of the soil and reduction in organic material which results in reduction of water infiltration and retention. The increased runoff finally results in a lower water table and increased soil erosion.

The only important mineral quarried and processed in Buffalo County is limestone.

As our population increases, certain problems arise including water pollution, overcrowding, unwise development, and the destruction of fish and wildlife habitat and of natural beauty. In order to meet the problems and to preserve its water and shoreland for future generations, the State has required each county to pass a shoreland zoning ordinance. Buffalo County has such an ordinance and has a zoning administrator to administer it.

ALPHABETICAL LISTING AND DESCRIPTION OF LAKES AND STREAMS

Lakes and impoundments have been defined for inventory purposes. Lakes are all waters navigable, meandered, or public that are wet nine out of ten years. Impoundments are those bodies of water which owe half or more of their maximum depth to an artificial impounding structure.

Each named lake and impoundment is listed in alphabetical order. Unnamed lakes and impoundments are listed in alphabetical order according to political township. A numbering system has been devised for unnamed lakes based on township, range, section, and sixteenth section, etc., in which they are located. The system is described on the resource maps.

Data included in the description of each lake and impoundment are location, area, degree of shoreline irregularity (S.D.F.), and known maximum depth. The latter is the maximum depth found during investigations and it may vary with water levels or small deeps may have been missed. Characteristics of the waters presented include color, hardness, and transparency. Among resources, significant fish species present are listed and waterfowl and furbearer use is noted where known. Circumstances contributing to use of the waters are presented in terms of the degree of public access and amount of private development. If problems affecting the use of these waters were encountered, they are cited. A more detailed description of the named lakes and impoundments is provided than for the unnamed ones that follow them. The description of unnamed lakes and impoundments is presented in tabular form for quick reference. All of these waters are located on the resource maps. Physical and chemical data for all lakes and impoundments are provided in Appendix I and IA.

Not included in this report are many water areas located in wetlands and within flood plains of the major rivers and larger streams. U.S.G.S. quadrangle maps and aerial photos indicated there were approximately 1,133 such waters. A sampling was made of about 16 percent. Of these, 73 or about

40 percent of those sampled contained water. The remainder were either nonexistent or vernal. Many of the waters were used for cattle watering and many were considered shallow or deep marshes. It is likely that all are subject to winterkill conditions, but fish probably enter the ponds during flood periods. Muskrats are frequently present and several provide fair to good waterfowl hunting for a limited number of hunters.

Streams referred to in this inventory are natural waters that have permanent or continuous flow. Named streams are listed in alphabetical order. Because of its size, importance, and nature as a boundary water, the Mississippi River, including its adjoining sloughs, bays, and bayous, is described separately. Unnamed streams are listed in alphabetical order according to the political township in which they are located. The numbering system devised for unnamed lakes is also used for unnamed streams and is illustrated on the resource maps.

All streams are described by the location of their confluence with another body of water or by the point they exit the county, by surface acres, length, and gradient where it is known. The general direction of flow, basic fishery, amount of bank cover, and impoundments, if any, are given. Public access, including road crossings, and public lands bordering streams are noted. The description of unnamed streams is less detailed than for named streams and is presented in tabular form. The description of each stream is based on only that part of the stream found having continuous flow during the investigation. The physical and chemical characteristics of all streams are given in Appendix II.

Lake and stream names used in this report are those found on U.S.G.S. quadrangle maps and in the Department of Natural Resources publications "Wisconsin Lakes" and "Wisconsin Trout Streams". Where a local name for a particular water differs from that on quadrangle maps or in the above named Department publications, the local name is shown in parenthesis following the official name. For a water that has a local name, but is otherwise unnamed, the water is considered unnamed and is given a number with the local name following in parenthesis.

Named Lakes

Bensel Pond, T20N, R12W, S23

Surface acres = 43.7, S.D.F. = 2.53, Maximum depth = 5 feet

This is a natural drained lake that probably flows into Waumandee Creek during high water periods. Also, it is possible that water enters the pond from Waumandee Creek during high water periods. The water is hard, alkaline, has a light brown color, and a low transparency. Its depth indicates winterkill conditions; however, fish species found include northern pike, bluegill, pumpkinseed, and carp. There is no public access. Beaver are present and muskrat are significant. Migrant puddle and diving ducks and coot use the pond. Mallard and teal broods may be observed.

Duck Lake (Bennetts), T23N, R14W, S11

Surface acres = 14.8, S.D.F. = 2.22, Maximum depth = 3 feet

A seepage lake having slightly alkaline, soft, medium brown colored water of low transparency. It is located within the Tiffany Wildlife Area and is better suited to wildlife than to fish. The lake suffers from annual winterkill conditions, but fish, including northern pike, largemouth bass, bluegill, and pumpkinseed enter the lake during high water periods on the Chippewa River. There is wilderness access from the Chippewa River. Beaver are present and muskrats are significant. Migrating waterfowl use the water and mallard, teal and wood ducks nest at the lake.

Lizzie Paul Pond, T21N, R12W, S29

Surface acres = 44.0, S.D.F. = 1.08, Maximum depth = 4.0 feet

This is a backwater area of the Mississippi River. There is spring seepage and there is a continuous flow of water to the river from the pond. It has hard, alkaline, and clear water with a high transparency. Northern pike, perch, and bullhead dominate the fish species. The pond has a history of winterkill. There is access with parking. Beaver are present and muskrats are significant. Wood duck, mallard, and teal nesting takes place and migrant puddle ducks use the pond.

Mirror Lake, T24N, R11W, S12

Surface acres = 28.9, S.D.F. = 1.73, Maximum depth - 7.0 feet

A drainage impoundment having hard, alkaline, clear water of low transparency. The dam is privately owned and provides power. It has a height of 23 feet. The dam is located on Peeso Creek, but Brownlee Creek also enters the flowage from the north. Largemouth bass, bluegill, and black crappie are the primary sports fish. Brown trout, white crappie, bullhead, and green sunfish are also present. There are 2 public park areas and 35 dwellings. Muskrat numbers are significant in the biota. Mallard and teal nesting takes place and migrating waterfowl use the flowage.

Stump Lake, T24N, R14W, S13

Surface acres = 6.5, S.D.F. = 1.56, Maximum depth = 1.0 foot

A seepage lake subject to flooding by the Chippewa River. It has soft, alkaline, medium brown colored water of low transparency. It is freezeout water, but during high water periods fish enter the lake from the river. Species usually present include northern pike and largemouth bass and probably various panfish species. Wilderness access is possible from the Chippewa River. The lake is located within the Tiffany Wildlife Area. Beaver are present and muskrats are significant. Mallard and teal broods may be observed. Migrant waterfowl use the lake.

Unnamed Lakes

Belvidere Township, T20N, R12W

8-4 (Goose Lake)
Surface acres - 3.7
S.D.F. - 1.85
Maximum depth - 5 feet
Medium hard water, seepage lake
Light brown, alkaline water with a low transparency.
Fishery - Not managed, bullhead reportedly present
Access - City park
Wildlife - Nesting by mallard and teal and used by migrating puddle and diving ducks and coot
Note - A city park project completed in 1969. Two small natural ponds were joined to form one lake. A park area was developed.

Named Streams

Bear Creek, T24N, R12W, S4

Surface acres = 4.4, Length = 5.2 miles, Gradient = 14.6 feet per mile

A hard water stream having clear, alkaline water that flows in a general northwesterly direction and joins the Chippewa River in Pepin County. A portion of the stream is ditched. Sand is the dominant bottom type, but there is some silt and lesser amounts of peat, detritus, gravel, clay, and muck. Forage fish species are present. There are about 819 acres of adjoining wetland. Beaver are present. Mallard, teal, and wood duck nest along the stream and migrating puddle ducks use the water. A portion of the stream flows through the Big Swamp public hunting grounds area in Buffalo County and there are 4.8 miles of public frontage. Access is also possible from the several road crossings.

Brownlee Creek, T24N, R11W, S12

Surface acres = 1.3, Length = 1.5 miles, Gradient = 28.5 feet per mile

This hard water tributary of Peeso Creek flows in a southerly direction and joins the parent stream in Mirror Lake. The water is alkaline and clear. Sand and silt are the primary bottom types with small amounts of gravel, rubble, boulder, and detritus present. Forage fish species are present. Furbearers and waterfowl are insignificant. Several bridge crossings provide access.

Buffalo River, T22N, R13W, S26

Surface acres = 394, Length = 37.8 miles, Gradient = 4.5 feet per mile

A hard water, alkaline river that flows the width of the county in a general southwesterly direction and joins the Mississippi River at Alma. At the time of the survey, the water was turbid. Sand is the primary bottom type with relatively small amounts of silt, detritus, gravel, and clay present. While walleye are present, especially toward the lower end of the stream, northern pike and channel and flathead catfish are probably the most important species to sports fishermen. The catfish are especially important. There are approximately 2,714 acres of adjoining wetland. Muskrats and beaver are significant. Mallard, teal, and wood ducks nest along the stream and migrating waterfowl use the water. Access is possible from several road crossings as well as from a public park and a private campground. A quasi-public youth camp is located on the river. There are 1.8 miles of public frontage.

By Golly Creek, T23N, R14W, S36

Surface acres = 2.2, Length = 3.7 miles, Gradient = 60 feet per mile

A hard water, alkaline, clear stream that flows in a westerly direction and is a tributary of the Mississippi River via Shirely Slough. More than 95 percent of the bottom is sand. The rest is composed of gravel, rubble, and boulder. Forage fish species are present. Furbearers and waterfowl are insignificant. Access is possible from three road crossings.

Center Creek, T23N, R13W, S4

Surface acres = 1.4, Length = 3.4 miles, Gradient = 64 feet per mile

This hard water, alkaline, clear stream flows in a northerly direction and is a tributary of Little Bear Creek. Sand dominates the bottom types followed in order of abundance by small amounts of gravel, silt, rubble, and boulder. Forage fish species are present. Waterfowl and furbearers are insignificant. Access is possible from two road crossings.

Cook Creek, T23N, R10W, S27

Surface acres = 1.6, Length = 2.0 miles, Gradient = 75 feet per mile

A hard water, alkaline, clear tributary of Kilness Creek, this stream flows in a northerly direction. Sand dominates the bottom types followed in order of abundance by gravel, rubble, boulder, clay, and silt. It is class three trout water with brook and brown trout present. Furbearers and waterfowl numbers are insignificant. Two road crossings provide access.

Danuser Creek, T22N, R11W, S36

Surface acres = 7.7, Length = 5.8 miles, Gradient = 43.4 feet per mile

A hard water, alkaline, light brown colored stream that flows in a westerly direction and is a tributary of Waumandee Creek. A sand bottom is prevalent with small amounts of clay, gravel, rubble, silt, boulder, and detritus present in that order of abundance. This stream was formerly listed as class three trout water (brook and brown trout) but a 1970 shocker investigation found no trout, and upon recommendation by the area fish manager the stream was removed from the trout stream list. The winter aerial groundwater survey conducted during the early 1960's found two large open water areas in the lower two-thirds of its length. Furbearers and waterfowl are insignificant. There are about 38 acres of adjoining wetland. Access is possible from three road crossings.

Deer Creek, T22N, R13W, S17

Surface acres = 0.7, Length = 1.3 miles, Gradient = 44.4 feet per mile

This hard water, alkaline stream flows in a southerly direction and is a tributary of the Mississippi River. At the time of the investigation, the water was turbid. The primary bottom type is sand with very small amounts of gravel, rubble, and boulder. Forage fish species are present. Waterfowl and furbearers are insignificant. Access is possible from one road crossing. There is about one-half mile of public frontage.

Doelle Creek, T20N, R10W, S29

Surface acres = 1.1, Length = 2.3 miles, Gradient = 50.0 feet per mile

A hard water, alkaline, light brown colored stream that flows in a southeasterly direction and under normal flow conditions ends in a deep marsh and pot hole area located within the Trempealeau River flood plain. Sand is the dominant bottom type followed in order of abundance by peat, silt, muck, detritus, rubble, and gravel. The stream is considered class three trout water and brook and brown trout are present. An aerial ground water survey conducted during the winter in the early 1960's found most of the stream open. Waterfowl and furbearers are insignificant. There are about 38 acres of adjoining wetland. Access is possible from three road crossings.

Eagle Creek, T20N, R11W, S31

Surface acres = 11.5, Length = 13.5 miles, Gradient = 20.0 feet per mile

A hard water, alkaline, clear stream that flows in a general southwesterly direction and is a tributary of Waumandee Creek. Though sand is the dominant bottom type, there is considerable silt and very small amounts of rubble, clay, gravel, and boulder. That portion of the stream from C.T.H. "G" in the NE¼ S33 upstream is considered class three brown trout water. The ground water survey of the early 1960's found one small open area in the lower third of the stream. Other game and panfish present include northern pike, largemouth bass, bluegill, and pumpkinseed. As a group, forage fish species are common. Furbearers and waterfowl are insignificant. Access is possible from several road crossings.

Elk Creek (Bennett), T23N, R11W, S16

Surface acres = 25.8, Length = 11.9 miles, Gradient = 18.0 feet per mile

This stream flows in a westerly direction and joins the Buffalo (Beef) River west of Gilmanton. Upstream from the bridge crossing at Gilmanton, the stream is classified as class three brook and brown trout water and is known locally as Bennett Creek. The aerial ground water winter survey of the early 1960's found four small scattered open areas in the portion of the stream above the junction of the south fork. The water is hard, alkaline and clear. Sand dominates the bottom types. Some clay is also present. There are approximately 166 acres of adjoining wetland. Waterfowl and furbearers are insignificant. Several road crossings provide access.

Elk Creek, South Fork (Lookout Creek), T23N, R10W, S18

Surface acres = 17.7, Length = 6.0 miles, Gradient = 34.3 feet per mile

Known locally as Lookout Creek, this stream flows in a westerly direction and joins the main Elk Creek east of Gilmanton. It has clear, hard, alkaline water. While there are small amounts of peat, muck, and detritus in that order of abundance, sand is the principal bottom type. It is classed as class three brown trout water. The winter aerial ground water survey of the early 1960's found two small open areas in the lower third of its length. There are about 64 acres of adjoining wetland. There are no particular wildlife values. Several road crossings provide access.

Farrington Creek, T24N, R11W, S5

Surface acres = 2.7, Length = 5.5 miles, Gradient = 35.0 feet per mile

This extensively ditched stream flows in a general northeasterly direction and is a tributary of Harvey Creek. It has hard, clear, alkaline water and its primary bottom type is sand. Hardpan, silt, gravel, rubble, boulder, and detritus comprise a little over 25 percent of the bottom. Forage fish species are present. The aerial ground water survey conducted during the winter in the early 1960's found one small open water area in the lower third of the stream. Furbearers and waterfowl are insignificant. There are about 1,958 acres of adjoining wetland. Three road crossings provide access.

Fimian Creek, T22N, R12W, S31

Surface acres = 0.2, Length = 0.7 mile, Gradient = 44.4 feet per mile

This clear, hard, alkaline stream flows in a westerly direction and is a tributary of Mill Creek. Sand dominates the bottom types with very small amounts of gravel, rubble, silt, and boulder present in that order of abundance. Forage fish species are present. Wildlife values are insignificant. One road crossing provides access.

Hadley Creek, T23N, R11W, S14

Surface acres = 2.1, Length = 2.5 miles, Gradient = 44.4 feet per mile

A hard water, alkaline, clear creek that flows in a southerly direction and joins Elk Creek west of Gilmanton. Except for very small amounts of silt, gravel, and rubble, a sand bottom dominates. Forage fish species are present. Wildlife values are of no consequence. Access is possible from three road crossings.

Harvey Creek, T24N, R11W, S14

Surface acres = 5.4, Length = 5.6 miles, Gradient = 10.5 feet per mile

Following in a general southeasterly direction, this stream joins the Buffalo River at Mondovi. The water is clear, hard, and alkaline. Silt and sand are the two dominant bottom types with lesser amounts of hardpan and gravel present. The water is managed as a class three brown trout stream. A large open water area was found in the lower third of the stream during the winter aerial ground water survey of the early 1960's. There are about 371 acres of adjoining wetland. There is no particular wildlife value. Access is possible from four road crossings.

Holmes Creek, T24N, R11W, S10

Surface acres = 0.7, Length = 1.5 miles, Gradient = 22.2 feet per mile

This tributary of Harvey Creek flows in a southerly direction. It has hard, alkaline, clear water and nearly 95 percent of the bottom is sand. Other bottom types present include about equal amounts of gravel, clay, and silt. Forage fish species are present. Wildlife values are low. Access is from three road crossings.

Hutchinson Creek, T22N, R12W, S11

Surface acres = 5.7, Length = 3.9 miles, Gradient = 32.2 feet per mile

It is a tributary of Buffalo River and flows in a westerly direction. The water is hard, alkaline, and clear. Nearly 100 percent of the bottom is sand. There is a very little gravel, rubble, muck, and peat. Forage fish species are present. Migrating puddle ducks use the water. Access is possible from two road crossings.

Keller Creek, T20N, R10W, S9

Surface acres = 0.2, Length = 0.7 mile, Gradient = 66.7 feet per mile

This small tributary of the Trempealeau River flows in a southerly direction and has clear, hard, alkaline water. Most of the bottom is sand with silt and gravel making up no more than 2 percent of the bottom types. Forage fish species are present. There are no particular wildlife values. One road crossing provides access.

Kilness Creek, T23N, R10W, S22

Surface acres = 3.8, Length = 3.8 miles, Gradient = 28.6 feet per mile

A hard water, alkaline, clear stream that flows in a general northwesterly direction and is a tributary of the south fork of Elk Creek. Sand and silt are the dominant bottom types with sand being the most common. Other types present in their order of abundance include gravel, rubble, about equal amounts of clay and boulder and nearly equal amounts of detritus and peat. It is class three brown trout water. There are about 64 acres of adjoining wetland. Waterfowl and furbearers are of little importance. Access is possible from four road crossings.

Little Bear Creek, T23N, R14W, S1

Surface acres = 17.0, Length = 10.8 miles, Gradient = 25.4 feet per mile

This clear, hard, alkaline water stream flows in a westerly direction and is a tributary of the Mississippi River via Buffalo Slough. Sand dominates the bottom types with some silt and very little gravel, clay, rubble, and boulder present. Forage fish species are present. There are approximately 155 acres of adjoining wetland. Migrating puddle ducks use the water. Several road crossings provide access and there are 2.4 miles of public frontage.

Little Bear Creek, North Branch, T23N, R13W, S2

Surface acres = 3.9, Length = 5.4 miles, Gradient = 48.8 feet per mile

A tributary of Little Bear Creek, this stream flows in a southerly direction. The water is hard, alkaline, and clear. Sand dominates the bottom types. There is some silt and lesser amounts of gravel, rubble, and boulder. During the aerial ground water survey conducted during the winter in the early 1960's, much of the upper one-half of its length was open water. Forage fish species are present. There are about 26 acres of adjoining wetland. Beaver are present. Several road crossings provide access.

Little Tamarack Creek, T23N, R12W, S23

Surface acres = 0.5, Length = 1.5 miles, Gradient = 45.4 feet per mile

This hard water, alkaline, clear stream flows in an easterly direction and is a tributary of Tamarack Creek. The bottom is primarily sand with very small amounts of silt, gravel, rubble, and boulder. Forage fish are present. There is no particular wildlife value. Four road crossings provide access.

Little Waumandee Creek, T21N, R11W, S29

Surface acres = 18.8, Length = 15.5 miles, Gradient = 22.2 feet per mile

A hard water, alkaline, clear stream that flows in a southerly direction and is a tributary of Waumandee Creek. Sand dominates the bottom types with very small amounts of silt, gravel, rubble, and boulder present. The stream is managed for brown trout and is class three trout water upstream from the C.T.H. "E" crossing at Cream. Three small open water areas were found near the headwaters of the stream during the aerial ground water survey made during the winter in the early 1960's. There are about 230 acres of adjoining wetland. Migrating puddle ducks use the water. Several road crossings provide access.

Mill Creek, T22N, R13W, S26

Surface acres = 3.5, Length = 3.0 miles, Gradient = 43.5 feet per mile

This tributary of the Mississippi River flows in a westerly direction. It has hard, alkaline, clear water. More than 95 percent of the stream bottom is sand. The other bottom types include silt, gravel, and boulder. Forage fish species are present. There are about 32 acres of adjoining wetland. Muskrats are significant and beaver are present. Mallard, teal, and wood duck broods are raised along the stream and migrant puddle ducks use the water. Access is possible from three road crossings.

Peeso Creek (Hoyts), T24N, R11W, S13

Surface acres = 3.8, Length = 3.5 miles, Gradient = 20.0 feet per mile

This tributary of Buffalo River flows in a general southwesterly direction. It has hard, alkaline, clear water. Sand predominates as a bottom type, but there is considerable silt and little gravel and hardpan. It is a class three brown trout stream. Other game and panfish present include largemouth bass, bluegill, black crappie, and pumpkinseed. Developments include a dam forming Mirror Lake and a park located in Mondovi. There are no particular wildlife values. There is about 0.06 mile of public frontage and several road crossings.

Pine Creek, T22N, R12W, S16

Surface acres = 2.1, Length = 3.4 miles, Gradient = 71.4 feet per mile

A hard water, alkaline, clear stream that flows in a southerly direction and is a tributary of Buffalo River. About 93 percent of the bottom is sand with gravel, rubble, boulder, clay, and peat making up the rest. Forage fish are present. There are no particular wildlife values. Two road crossings provide access.

Pratt Creek, T23N, R11W, S16

Surface acres = 1.8, Length = 2.2 miles, Gradient = 38.1 feet per mile

Flowing in a northwesterly direction, this hard water, alkaline, clear stream joins Elk Creek near its confluence with Buffalo River. Except for very small and nearly like amounts of gravel, rubble, boulder, clay, and silt, the bottom is composed primarily of sand. Forage fish species are present. Furbearers and waterfowl are insignificant. One road crossing provides access.

Riesch Creek, T22N, R12W, S31

Surface acres = 0.2, Length = 0.8 mile, Gradient = 40.0 feet per mile

A hard water, alkaline, clear stream that flows in a northerly direction and is a tributary of Mill Creek. More than 95 percent of the stream bottom is sand with very small amounts of gravel and silt present. Forage fish species are present. There is no significant wildlife value. Access is possible from Mill Creek.

Rossman Creek, T24N, R10W, S11

Surface acres = 3.3, Length = 3.0 miles, Gradient = 16.0 feet per mile

Flowing in a northwesterly direction, this tributary of the Buffalo River has hard, alkaline, clear water. Sand is the predominant bottom type followed in order of abundance by silt and small amounts of gravel and detritus. The stream is class three trout water and brook and brown trout are present. The aerial ground water survey conducted during the winter in the early 1960's found two small open water areas near the upper portion of stream in Buffalo County. Waterfowl and furbearers are insignificant. There is access from four road crossings.

Spring Creek, T22N, R13W, S27

Surface acres = 0.2, Length = 0.9 mile, Gradient = 80.0 feet per mile

A tributary of the Mississippi River, this stream flows in a southerly direction. It has hard, alkaline, clear water. Ninety-eight percent of the bottom is sand and the remainder is silt. Forage fish species are present. Migrant puddle ducks use the water. One road crossing provides access.

Spring Creek, T24N, R14W, S13

Surface acres = 3.6, Length = 4.9 miles, Gradient = 32.6 feet per mile

This medium hard water, alkaline, clear stream flows in a westerly direction and is a tributary of the Mississippi River via Buffalo Slough. Sand dominates the bottom types followed in order of abundance by considerably lesser amounts of silt, gravel, and clay. Forage fish are present. There are about six acres of adjoining wetland. Migrant puddle ducks use the water. Several road crossings provide access.

Tamarack Creek (Modena), T23N, R12W, S25

Surface acres = 6.7, Length = 6.5 miles, Gradient = 26.9 feet per mile

A tributary of Buffalo River, this hard water, alkaline, clear stream flows in a southeasterly direction. Locally, it is known as Modena Creek. Sand and silt are the primary bottom types in that order of abundance. There is also a little gravel. Upstream from C.T.H. "J" road crossing in the SE¼ NE¼ S23, this stream is class three brown trout water. In addition to forage species, other fish species present include green sunfish and northern pike. The aerial ground water survey conducted during the winter in the early 1960's found several open water areas throughout most of its length. There are approximately 122 acres of adjoining wetland. Wildlife values are insignificant. Several road crossings provide access.

Threemile Creek, T23N, R10W, S17

Surface acres = 1.7, Length = 2.8 miles, Gradient = 58.4 feet per mile

Sometimes called Davis Creek, this stream flows in a northerly direction and is a tributary of south fork of Elk Creek. It has hard, alkaline, clear water. Sand is the primary bottom type with very small amounts of silt, detritus, clay, and gravel. Forage fish species are present. There are no particular wildlife values. Four road crossings provide access.

Traverse Valley Creek, T22N, R10W, S13

Surface acres = 1.4, Length = 1.8 miles, Gradient = 73.7 feet per mile

This clear, hard water, alkaline stream flows in a southeasterly direction and joins the Trempealeau River in Trempealeau County. Sand is the dominant bottom type, with some gravel and rubble in about equal amounts and little boulder, clay, and silt. Forage fish species are present. Furbearers and waterfowl values are low. Access is provided by three road crossings.

Trout Creek, T22N, R12W, S18

Surface acres = 7.5, Length = 5.6 miles, Gradient = 46.1 feet per mile

A hard water, alkaline, light brown colored stream that flows in a southeasterly direction and is a tributary of Buffalo River. The bottom is primarily sand with very small amounts of gravel, rubble, boulder, and silt. Forage fish species are present. An aerial ground water survey conducted in the early 1960's during the winter found three open water areas in the lower two-thirds of the stream. Wildlife values are low. One road crossing provides access.

Waumandee Creek, T19N, R11W, S6

Surface acres = 48.9, Length = 28.8 miles, Gradient = 15.4 feet per mile

This is a hard water, alkaline, clear stream that flows in a southerly direction and is a tributary of the Mississippi River. Sand and silt are the principal bottom types with very small quantities of clay, gravel, rubble, and boulder. The stream is class three brown and brook trout water upstream from C.T.H. "U" in S25, T22N, R11W. When an aerial ground water survey was conducted during the winter in the early 1960's, several open water areas were observed from Montana upstream. There are about 352 acres of adjoining wetland. Beaver are present and muskrats are significant. Mallard, teal, and wood ducks nest along the stream and migrant puddle ducks use the water. There is approximately one-half mile of public frontage. Many road crossings provide access.

Mississippi River

The Mississippi River flows in a southeasterly direction and forms the boundary with Minnesota along the south side of Buffalo County. Following the thread of the main channel, which serves as the boundary between Wisconsin and Minnesota, the length of the stream along Buffalo County is nearly 42.3 miles.

Within the political boundary of Wisconsin outlying Buffalo County and including adjoining sloughs, bays, and cuts, the river has an average width of about 2,508 feet and the water area covers approximately 12,607 acres. Including islands, the shoreline for this portion of river and its connecting backwaters amounts to about 415 miles.

All of Buffalo County lies within the Mississippi River drainage and most of the drainage water finds its way directly to the river. The Chippewa River, which forms the west boundary of the county, drains the northwest portion; the Buffalo River and Waumandee Creek drain the central part; and the Trempealeau River drains a portion of the southeastern part of the county.

The Mississippi River gorge, extending from the bluffs of Minnesota to the Wisconsin bluffs, provides some of the most rugged topography and picturesque scenery found in Wisconsin. It is one of the most attractive areas in the United States. This gorge is over 200 miles long in Wisconsin and extends from Prescott in Pierce County southward to Grant County, opposite Dubuque, Iowa. At Buffalo City, the gorge has a width of 4.3 miles and the height of the bluffs above the flood plain is about 500 feet.

Lock and Dam Numbers 4, 5, and 5B as well as the upper portion of Pool 6 outlie Buffalo County. In addition to these federal navigational dams, dredging has been necessary in order to maintain a nine-foot navigational channel. Sand and gravel are the primary bottom types in the littoral bottom zone of the main part of the river while silt, muck, and detritus are dominant in the quiet backwater areas.

For tourists and others, the Mississippi River with its backwater areas provides places to fish and hunt and to enjoy other types of water-oriented activities and recreation.

Almost any warm-water sports fish, with the exception of muskellunge, is quite common with walleye, sauger, northern pike, largemouth and smallmouth bass, catfish, and panfish (primarily bluegill, crappie, white bass, yellow bass, yellow perch, and bullhead) perhaps being the most sought after species. Fish species more commonly harvested by commercial fishermen include carp, freshwater drum (sheepshead), buffalo, and quillback.

Various waterfowl nest along the Mississippi in Buffalo County. The more common species are the mallard, blue-winged teal, wood duck, hooded merganser, and coot. During periods of migration, several other species may also be found in the area.

User facilities are quite numerous along the river in Buffalo County. Fernholz, Van Dyck, and Threinen (1970) indicate there are 17 federal, state, county, and local areas, having a total river frontage of 4.72 miles, that are available for public use. Three of these areas have picnic facilities, two have camping facilities, three have swimming beaches, and 15 have facilities for car-trailer parking and boat launching. In addition, there are 16 private enterprises that offer various facilities and services.

Sandbars provide additional swimming areas and picnic sites for boaters. Including islands, the federal government owns and controls approximately 299 miles of shoreline not included above. A considerable amount of this frontage lies within the Upper Mississippi Refuge where public use is restricted.

Unnamed Streams

Alma Township, T22N, R12W

15-2
Surface acres - 0.3
Length - 1.0 miles
Gradient - 57.1 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Northwesterly
Tributary of - Buffalo River
Bottom types - Primarily sand with very small amounts of gravel and rubble.
Fishery - Forage species
Access - One road crossing

16-7
Surface acres - 0.4
Length - 1.3 miles
Gradient - 57.1 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Northwesterly
Tributary of - Buffalo River
Bottom types - Primarily sand, some gravel, small amounts of muck, rubble, and peat
Fishery - Forage species
Access - Two road crossings

19-3
Surface acres - 1.8
Length - 2.1 miles
Gradient - 75.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Northwesterly
Tributary of - Buffalo River
Bottom types - Sand dominates with small amounts of gravel, rubble, and boulder
Fishery - Forage species
Acres of adjoining wetland - Approximately 44.8
Access - One road crossing

Buffalo Township, T19N, R10W

26-12
Surface acres - 1.2
Length - 3.4 miles
Gradient - 53.8 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Easterly
Tributary of - Trempealeau River
Bottom types - Primarily sand with small amounts of gravel, rubble, boulder, and silt
Fishery - Forage species
Access - One road crossing

Canton Township, T24N, R12W

3-6 (Tiffany Creek)
Surface acres - 2.2
Length - 4.6 miles
Gradient - 21.0 feet per mile
Water - Alkaline, hard, clear
Direction of flow - Northerly
Tributary of - Bear Creek
Bottom types - Silt dominates, some sand, little detritus, rubble, and gravel
Fishery - Forage species
Acres of adjoining wetland - About 365
Wildlife - Beaver present; nesting by mallard, teal, and wood duck; used by migrant puddle ducks
Access - Two road crossings

5-2
Surface acres - 1.1
Length - 2.0 miles
Gradient - 20.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Northerly
Tributary of - Bear Creek (Pepin Co.)
Bottom types - Sand dominates with little silt, detritus, and gravel
Fishery - Forage species
Access - Two road crossings

5-9
Surface acres - 1.0
Length - 2.0 miles
Gradient - 37.5 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Easterly
Tributary of - Creek 5-2 (T24N, R12W)
Bottom types - Primarily sand, little gravel, silt, and rubble
Fishery - Forage species
Access - Four road crossings

13-14
Surface acres - 1.5
Length - 2.0 miles
Gradient - 50.0 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Northerly
Tributary of - Farrington Creek
Bottom types - Sand, gravel, clay, rubble, boulder, and silt in that order of abundance
Fishery - Forage species
Acres of adjoining wetland - About 51
Access - Farrington Creek

16-13
Surface acres - 0.2
Length - 1.0 miles
Gradient - 40.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Northerly
Tributary of - Creek 3-6 (Tiffany Creek)
Bottom types - Primarily sand, little gravel and silt
Fishery - Forage species
Acres of adjoining wetland - Approximately 19
Access - One road crossing

31-10
Surface acres - 0.4
Length - 1.5 miles
Gradient - 44.4 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Westerly
Tributary of - Little Bear Creek, North Branch
Bottom types - Primarily sand, little gravel, detritus, silt
Fishery - Forage species
Acres of adjoining wetland - About 32
Access - Two road crossings

Cross Township, T19, 20N, R10, 11W

T19N, R10W

4-6
Surface acres - 3.8
Length - 2.4 miles
Gradient - 27.3 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Northeasterly
Tributary of Trempealeau River
Bottom types - Primarily sand, little gravel, rubble, boulder, and silt
Fishery - Forage species
Wildlife - Use by migrant puddle ducks
Access - Two road crossings

T20N, R10W

32-12
Surface acres - 0.4
Length - 1.2 miles
Water - Hard, alkaline, light brown color
Direction of flow - Easterly
Tributary of - Ends in marsh within Trempealeau River flood plain
Bottom types - Primarily sand, little gravel, rubble, silt, and boulder
Fishery - Forage species
Acres of adjoining wetland - About 77
Access - Two road crossings

T20N, R11W

15-1
Surface acres - 1.8
Length - 3.8 miles
Gradient - 46.1 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southwesterly
Tributary of - Eagle Creek
Bottom types - Sand dominates, some silt and rubble, little clay
Fishery - Forage species
Access - One road crossing

Dover Township, T23N, R10W

14-13
Surface acres - 0.1
Length - 0.5 mile
Gradient - 82.5 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Westerly
Tributary of - Elk Creek, South Fork
Bottom types - Sand dominates with considerable detritus and gravel, some peat
Fishery - Forage species
Acres of adjoining wetland - About 26
Access - Two road crossings

21-2
Surface acres - 1.0
Length - 1.8 miles
Gradient - 35.3 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southwesterly
Tributary of - Elk Creek, South Fork
Bottom types - Primarily sand, little gravel, rubble, clay, detritus, and silt
Fishery - Forage species
Access - Three road crossings

26-7
Surface acres - 0.2
Length - 1.0 miles
Gradient - 44.4 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Northwesterly
Tributary of - Kilness Creek
Bottom types - Sand dominant with little silt, gravel, clay, and detritus
Fishery - Forage species
Acres of adjoining wetland - About 32
Access - None

29-9
Surface acres - 0.3
Length - 0.6 mile
Gradient - 100.0 feet per mile
Water - Alkaline, hard, clear
Direction of flow - Northwesterly
Tributary of - Threemile Creek
Bottom types - Mostly sand, some gravel, little rubble, clay, and silt
Fishery - Forage species
Access - One road crossing

Gilmanton Township, T23N, R11W

13-8
Surface acres - 1.2
Length - 2.0 miles
Gradient - 82.5 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southerly
Tributary of - Elk Creek
Bottom types - Primarily sand, little gravel, clay, detritus, and silt
Fishery - Forage species
Access - Five road crossings

19-5
Surface acres - 0.4
Length - 0.6 mile
Gradient - 50.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southerly
Tributary of - Buffalo River
Bottom types - Sand
Fishery - Forage species
Access - One road crossing

20-5
Surface acres - 1.1
Length - 2.0 miles
Gradient - 32.0 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Southerly
Tributary of - Buffalo River
Bottom types - Primarily sand, little silt, clay, and gravel
Fishery - Forage species
Access - Two road crossings

Glencoe Township, T20, 21N, R10W

T20N

2-2
Surface acres - 10.9
Length - 7.5 miles
Gradient - 29.8 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southerly
Tributary of - Trempealeau River
Bottom types - Mostly sand, little gravel, rubble, boulder, clay, and silt
Fishery - Forage species
Acres of adjoining wetland - About 32
Wildlife - Used by migrant waterfowl, wood duck nesting
Access - Five road crossings

2-9
Surface acres - 5.1
Length - 5.2 miles
Gradient - 32.5 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southeasterly
Tributary of - Trempealeau River
Bottom types - Primarily sand, little gravel, rubble, silt, and clay
Fishery - Forage species
Wildlife - Used by migrant puddle ducks
Access - Five road crossings

T21N

10-4
Surface acres - 0.3
Length - 0.7 mile
Gradient - 85.7 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Southerly
Tributary of - Creek 11-15 (T21N, R10W)
Bottom types - Sand dominant, some gravel, little rubble, boulder, and silt
Fishery - Forage species
Access - One road crossing

11-15
Surface acres - 0.8
Length - 1.8 miles
Gradient - 47.3 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southeasterly
Tributary of - Creek 2-2 (T20N, R10W)
Bottom types - Primarily sand, little gravel, rubble, silt, boulder, and clay
Fishery - Forage species
Acres of adjoining wetland - Approximately 38
Access - One road crossing

14-4
Surface acres - 0.3
Length - 1.4 miles
Gradient - 100.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Easterly
Tributary of - Creek 2-2 (T20N, R10W)
Bottom types - Primarily sand, little gravel, silt, and rubble
Fishery - Forage species
Access - One road crossing

34-4
Surface acres - 0.2
Length - 1.2 miles
Gradient - 76.9 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Easterly
Tributary of - Creek 35-7 (T21N, R10W)
Bottom types - Mostly sand, some silt, little clay, gravel, and rubble
Fishery - Forage species
Access - Two road crossings

35-7
Surface acres - 0.2
Length - 2.4 miles
Gradient - 70.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southeasterly
Tributary of - Creek 2-9 (T20N, R10W)
Bottom types - Peat dominant, considerable sand, little muck
Fishery - Forage species
Acres of adjoining wetland - About 26
Access - Three road crossings

Lincoln Township, T21, 22N, R11, 12W

T21N, R11W

6-7
Surface acres - 3.2
Length - 5.3 miles
Gradient - 44.9 feet per mile
Water - Alkaline, hard, clear
Direction of flow - Southwesterly
Tributary of - Little Waumandee Creek
Bottom types - Primarily sand, some silt, little rubble, gravel, boulder, and clay
Fishery - Forage species
Access - Six road crossings

T21N, R12W

12-1
Surface acres - 0.7
Length - 2.0 miles
Gradient - 100.0 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Easterly
Tributary of - Little Waumandee Creek
Bottom types - Primarily sand, little gravel, Silt, and rubble
Fishery - Forage species
Access - Little Waumandee Creek

12-13
Surface acres - 0.5
Length - 1.1 miles
Gradient - 33.3 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Easterly
Tributary of - Little Waumandee Creek
Bottom types - Primarily sand, little gravel, silt, rubble, and boulder
Fishery - Forage species
Access - Little Waumandee Creek

T22N, R11W

18-16
Surface acres - 1.5
Length - 2.1 miles
Gradient - 93.3 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Westerly
Tributary of - Little Waumandee Creek
Bottom types - Primarily sand, some rubble, little gravel, boulder, and silt
Fishery - Forage species
Access - Two road crossings

T22N, R12W

36-3
Surface acres - 0.3
Length - 1.3 miles
Gradient - 166.7 feet per mile
Water - Clear, hard, alkaline
Tributary of - Little Waumandee Creek
Bottom types - Primarily sand, little silt, clay, and gravel
Fishery - Forage species
Access - Little Waumandee Creek

Milton Township, T20N, R11W

18-9
Surface acres - 0.2
Length - 1.6 miles
Gradient - 100.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Westerly
Tributary of - Waumandee Creek
Bottom types - Mostly sand, some silt, little gravel and rubble
Fishery - Forage species
Access - One road crossing

28-14
Surface acres - 0.3
Length - 0.7 mile
Gradient - 44.4 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Westerly
Tributary - Eagle Creek
Bottom types - Mostly sand, some rubble, little boulder, gravel, silt, and clay
Fishery - Forage species
Access - One road crossing

Modena Township, T23N, R12W

3-12
Surface acres - 0.3
Length - 1.8 miles
Gradient - 62.5 feet per mile
Water - Alkaline, hard, clear
Direction of flow - Southwesterly
Tributary of - Tamarack Creek
Bottom types - Peat predominates, considerable sand, some muck, little detritus
Fishery - Forage species
Access - One road crossing

14-15
Surface acres - 0.7
Length - 1.8 miles
Gradient - 37.5 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southwesterly
Tributary of - Tamarack Creek
Bottom types - Mostly sand, considerable silt, little gravel, rubble, and clay
Fishery - Forage species
Access - Four road crossings

18-15
Surface acres - 0.2
Length - 0.9 mile
Gradient - 120.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Westerly
Tributary of - Little Bear Creek
Bottom types - Primarily sand, little gravel and silt
Fishery - Forage species
Access - None

35-12
Surface acres - 1.9
Length - 2.9 miles
Gradient - 62.5 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Southeasterly
Tributary of - Buffalo River
Bottom types - Mostly sand, some gravel, little rubble, silt, and clay
Fishery - Forage species
Access - Three road crossings

Mondovi Township, T24N, R11W

3-8
Surface acres - 0.2
Length - 0.5 mile
Gradient - 33.3 feet per mile
Water - Turbid, hard, alkaline
Direction of flow - Southwesterly
Tributary of - Holmes Creek
Bottom types - Primarily sand, some silt, little clay and detritus
Fishery - Forage species
Access - One road crossing

13-1 (Armour Creek)
Surface acres - 2.4
Length - 2.6 miles
Gradient - 21.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Northerly
Tributary of - Buffalo River
Bottom types - Primarily sand, little gravel, detritus, silt, and rubble
Fishery - Forage species
Access - Three road crossings

Montana Township, T22N, R10, 11W

R10W

8-16
Surface acres - 0.4
Length - 0.8 mile
Gradient - 150.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southeasterly
Tributary of - Creek 17-1 (T22N, R10W)
Bottom types - Sand predominates, some gravel and rubble, little boulder, silt, and clay
Fishery - Forage species
Access - One road crossing

13-3
Surface acres - 0.1
Length - 0.6 mile
Gradient - 100.0 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Northeasterly
Tributary of - Traverse Valley Creek
Bottom types - Sand predominates, some gravel and rubble in about equal amounts, little boulder
Fishery - Forage species
Access - Traverse Valley Creek

13-4
Surface acres - 1.8
Length - 2.2 miles
Gradient - 100.0 feet per mile
Water - Alkaline, hard, clear
Direction of flow - Southerly
Tributary of - Traverse Valley Creek
Bottom types - Sand dominates, some gravel and rubble in near equal amounts, little boulder, silt, and clay
Fishery - Forage species
Access - One road crossing

17-1
Surface acres - 2.2
Length - 2.3 miles
Gradient - 80.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southerly
Tributary of - Waumandee Creek
Bottom types - Primarily sand, little silt, gravel, rubble, boulder, and clay
Fishery - Forage species
Access - One road crossing
Note - Lower quarter of stream open during aerial ground water survey conducted during winter in early 1960's.

18-13
Surface acres - 0.2
Length - 0.7 mile
Gradient - 80.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southerly
Tributary of - Waumandee Creek
Bottom types - Sand dominates, some silt, little detritus
Fishery - Forage species
Access - Two road crossings

19-7
Surface acres - 0.7
Length - 1.8 miles
Gradient - 72.7 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southeasterly
Tributary of - Waumandee Creek
Bottom types - Primarily sand, little gravel, clay, and silt in about equal amounts
Fishery - Forage species
Access - Three road crossings

24-4
Surface acres - 0.5
Length - 1.4 miles
Gradient - 71.4 feet per mile
Water - Hard, clear, alkaline
Direction of flow - Easterly
Tributary of - Traverse Valley Creek (Trempealeau Co.)
Bottom types - Sand dominates, but there is considerable peat, and little clay, gravel, rubble, boulder, and muck in about equal amounts
Fishery - Forage species
Access - Three road crossings

28-13
Surface acres - 0.2
Length - 0.8 mile
Gradient - 80.0 feet per mile
Water - Hard and alkaline; turbid at time of investigation
Direction of flow - Westerly
Tributary of - Danuser Creek
Bottom types - Primarily sand, little peat, gravel, rubble, and muck
Fishery - Forage species
Acres of adjoining wetland - About 6
Access - One road crossing

31-4
Surface acres - 0.4
Length - 0.9 mile
Gradient - 100.0 feet per mile
Water - Light brown colored, hard, alkaline
Direction of flow - Northwesterly
Tributary of - Danuser Creek
Bottom types - Primarily sand, little gravel, clay, rubble, boulder, and peat
Fishery - Forage species
Acres of adjoining wetland - About 13
Access - Two road crossings

32-1
Surface acres - 0.2
Length - 1.0 miles
Gradient - 85.7 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Northwesterly
Tributary of - Danuser Creek
Bottom types - Sand dominates, some peat, gravel, and rubble in about equal amounts, little boulder and muck
Fishery - Forage species
Acres of adjoining wetland - About 6
Access - One road crossing

32-5
Surface acres - 0.3
Length - 1.0 miles
Gradient - 57.1 feet per mile
Water - Hard and alkaline, water turbid at time of investigation
Direction of flow - Southerly
Tributary of - Danuser Creek
Bottom types - Primarily sand, little clay, gravel, and rubble
Fishery - Forage species
Acres of adjoining wetland - About 26
Access - One road crossing

R11W

13-3
Surface acres - 0.1
Length - 0.6 mile
Gradient - 100.0 feet per mile
Water - Light brown colored, hard, alkaline
Direction of flow - Southerly
Tributary of - Creek 19-7 (T22N, R10W)
Bottom types - Primarily sand, little silt
Fishery - Forage species
Access - Creek 19-7 (T22N, R10W)

25-10
Surface acres - 0.2
Length - 0.8 mile
Gradient - 66.7 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southeasterly
Tributary of - Waumandee Creek
Bottom types - Mostly sand, some silt, little gravel and clay
Fishery - Forage species
Access - Waumandee Creek

25-11
Surface acres - 0.2
Length - 1.0 miles
Gradient - 66.7 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Southeasterly
Tributary of - Waumandee Creek
Bottom types - Primarily sand, little gravel, silt, and rubble
Fishery - Forage species
Access - One road crossing

Naples Township, T24N, R10W

6-3
Surface acres - 0.9
Length - 2.1 miles
Gradient - 33.4 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Westerly
Tributary of - Peeso Creek
Bottom types - Sand dominant, some silt, little detritus, clay, and gravel
Fishery - Forage species
Access - Two road crossings

10-11
Surface acres - 2.4
Length - 3.9 miles
Gradient - 24.2 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Northwesterly
Tributary of - Buffalo River
Bottom types - Predominantly sand, some silt, little detritus, gravel, and clay
Fishery - Forage species
Access - Six road crossings

11-4
Surface acres - 1.5
Length - 1.8 miles
Gradient - 30.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southerly
Tributary of - Buffalo River
Bottom types - Sand dominant, some silt, little gravel, clay, detritus, and rubble
Fishery - Forage species
Access - Five road crossings

17-1
Surface acres - 2.1
Length - 3.2 miles
Gradient - 28.3 feet per mile
Water - Light brown colored, hard, alkaline
Direction of flow - Northwesterly
Tributary of - Buffalo River
Bottom types - Primarily sand, some silt, little detritus, gravel, and boulder
Fishery - Forage species
Access - Four road crossings

Nelson Township, T22, 23N, R13W

T22N

12-4
Surface acres - 0.1
Length - 0.6 mile
Gradient - 80.0 feet per mile
Water - Light brown colored, alkaline, hard
Direction of flow - Southerly
Tributary of - Trout Creek
Bottom types - Sand dominates, little gravel, rubble, clay, and boulder
Fishery - Forage species
Access - One road crossing

T23N

2-3
Surface acres - 1.6
Length - 3.0 miles
Gradient - 40.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southerly
Tributary of - Little Bear Creek, North Branch
Bottom types - Sand dominant, considerable silt, some clay, little gravel
Fishery - Forage species
Access - Eight road crossings

2-14
Surface acres - 3.9
Length - 4.7 miles
Gradient - 38.1 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Northerly
Tributary of - Little Bear Creek
Bottom types - Primarily sand, little silt and gravel
Fishery - Forage species
Access - Two road crossings

4-7
Surface acres - 0.2
Length - 0.7 mile
Gradient - 120.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southerly
Tributary of - Little Bear Creek
Bottom types - Primarily sand, little gravel and rubble
Fishery - Forage species
Access - One road crossing

23-4
Surface acres - 0.3
Length - 1.5 miles
Gradient - 76.9 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Northerly
Tributary of - Creek 2-14 (T23N, R13W)
Bottom types - Primarily sand, some silt, little detritus and gravel
Fishery - Forage species
Access - One road crossing

Waumandee Township, T20, 21N, R11W

T20N

6-5
Surface acres - 3.8
Length - 5.2 miles
Gradient - 41.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southwesterly
Tributary of - Waumandee Creek
Bottom types - Primarily sand, little silt, gravel, and clay
Fishery - Forage species
Acres of adjoining wetland - Approximately 6
Access - Three road crossings

7-11
Surface acres - 0.5
Length - 1.5 miles
Gradient - 44.4 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southwesterly
Tributary of - Waumandee Creek
Bottom types - Sand dominant, some gravel, little rubble, clay, boulder, and silt
Fishery - Forage species
Acres of adjoining wetland - About 19
Access - One road crossing

T21N

2-5bb
Surface acres - 0.2
Length - 0.7 mile
Gradient - 66.7 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Southeasterly
Tributary of - Waumandee Creek
Bottom types - Primarily sand, little gravel, silt, rubble, and clay
Fishery - Forage fish
Access - Two road crossings

2-5bc
Surface acres - 1.4
Length - 2.9 miles
Gradient - 46.1 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Northwesterly
Tributary of - Waumandee Creek
Bottom types - Except for traces of gravel and silt, the bottom is sand
Fishery - Forage species
Access - Three road crossings

14-8
Surface acres - 0.6
Length - 1.9 miles
Gradient - 50.0 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Southwesterly
Tributary of - Creek 15-8 (T21N, R11W)
Bottom types - Primarily sand, little silt, gravel, clay, detritus, and rubble
Fishery - Forage species
Access - Creek 15-8 (T21N, R11W)

15-8
Surface acres - 6.2
Length - 5.1 miles
Gradient - 37.2 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Westerly
Tributary of - Waumandee Creek
Bottom types - Primarily sand, little gravel, silt, clay, and rubble
Fishery - Forage species
Acres of adjoining wetland - About 6
Access - Four road crossings

27-16
Surface acres - 0.2
Length - 0.5 mile
Gradient - 150.0 feet per mile
Water - Clear, hard, alkaline
Direction of flow - Southwesterly
Tributary of - Creek 6-5 (T20N, R11W)
Bottom types - Sand dominates, some silt, little gravel, rubble, and clay
Fishery - Forage species
Access - None

29-2
Surface acres - 0.8
Length - 3.3 miles
Gradient - 55.2 feet per mile
Water - Hard, alkaline, clear
Direction of flow - Southerly
Tributary of - Little Waumandee Creek
Bottom types - Primarily sand, little silt, gravel, rubble, boulder, and detritus
Fishery - Forage species
Access - Three road crossings

31-7
Surface acres - 2.4
Length - 3.3 miles
Gradient - 93.7 feet per mile
Water - Light brown colored, hard, alkaline
Direction of flow - Southeasterly
Tributary of - Waumandee Creek
Bottom types - Primarily sand, little rubble, gravel, boulder, and silt
Fishery - Forage species
Access - Two road crossings

ANALYSIS OF INVENTORY DATA

The following information, comments, tables, and maps have been compiled from all data presently available for waters of Buffalo County. Supplemental information was obtained from publications listed in the bibliography.

A tabular summary of the physical and chemical characteristics of each body of water is provided in Appendix I, IA, and II. The comments that follow have reference to some of the items and data presented in the appendices.

Quantitative Aspects

The total water surface in the county (excluding the Mississippi River and its bays, sloughs, and bayous) is 843.9 acres. Of this total, 141.6 acres are included in 6 lakes and 702.3 acres are found in 109 streams. The Chippewa River, which forms a part of the boundary with Pepin County, and the Trempealeau River, which forms a part of the boundary with Trempealeau County, are not included in the above stream data as these two streams are included in the reports for Pepin and Trempealeau Counties respectively.

Information concerning lakes by size classes is given in Table 4. Of the few lakes present in the county, 3 are in the 20 to 50 acre size class and there is none larger. There is one having an area of less than five acres. One-half of the lakes have maximum depths of less than 5 feet and there is no lake having a depth exceeding 7 feet (Table 6). Sand and muck are the bottom types in the littoral zone with the latter predominating (Table 7). The shoreline development factor (S.D.F.) for all lakes ranges from 1.08 to 2.53 and averages 1.83.

The total stream length amounts to 361.6 linear miles of which 77.2 miles are considered class three trout water, about 21 percent of the total mileage. Of all the streams, 98, or nearly 90 percent of the total number, have average widths of less than 10 feet. Streams with average widths of 10 feet or greater are usually more desirable for recreational purposes. There are 11 such streams in the county. They have 38 percent of the total stream frontage and almost 80 percent of the total stream area. Buffalo River is the longest stream within the county and it has the greatest surface acreage. It is thought that at one time the Buffalo River flowed west into the Chippewa River, but due to glacial action, or some other activity, its course was changed. Table 5 illustrates stream length, acreage, and public frontage according to average stream width classes.

Table 4. Size classes of Buffalo County lakes.

Size Class (acres)	No.	% Total No.	Area (acres)	% Total Area	Shore-line (miles)	% Total Shore-line	Public*/ Frontage (miles)	% Total Public Frontage	Parking Without Boat Launch	Unim-proved Access	Wilder-ness Access	Without Public Access
Less than 5	1	17	3.7	3	0.50	6	0.50	11	1			
5 to 10	1	17	6.5	5	0.56	7	0.19	4			1	
10 to 20	1	17	14.8	10	1.20	15	1.20	27			1	
20 to 50	3	50	116.6	82	5.89	72	2.60	58	2	1	—	1
Totals	6		141.6		8.15		4.49		3	1	2	1

* Does not include road crossings.

Table 5. Size classes of Buffalo County streams.

Average width (feet)	No.	% Total No.	Length (miles)	% Total Length	Area (acres)	% Total Area	Public*/ Frontage (miles)	% Total Public Frontage
Less than 10	98	90	222.9	62	142.1	20	5.36	53
10 to 20	10	9	100.9	28	166.2	24	2.9	29
20 to 40	0	0	-	-	-	-	-	-
40 and wider	1	1	37.8	10	394.0	56	1.80	18
Totals	109		361.6		702.3		10.06	
Mississippi R.†/ (Avg. width 2,508 ft.)			42.3		12,607.0		4.72	
Grand Totals			403.9		13,309.3		14.78	

*/ Does not include road crossings.

†/ Mississippi River width, area, and public frontage data refer only to Wisconsin portion of river and its adjoining cuts, bays, and sloughs.

Table 6. Depth classes of Buffalo County lakes.

Maximum Depth Class (feet)	No. Lakes	Percent of Total	Area (acres)	Percent of Total	Shoreline (miles)	Percent of Total
Less than 5	3	50	65.3	46	4.01	49
5 to 10	3	50	76.3	54	4.14	51
10 to 20	0	0	-		-	
20 to 50	0	0	-		-	
Totals	6		141.6		8.15	

Table 7. Shoal composition of Buffalo County lakes according to size classes.

Size Class (acres)	No. Lakes	Area (acres)	Shoreline (miles)	Percent Bottom Types*/ in Shoal Area	
				Sand	Muck
Less than 5	1	3.7	0.50	45	55
5 to 10	1	6.5	0.56	-	100
10 to 20	1	14.8	1.20	30	70
20 to 50	3	116.6	5.89	1	99
Totals	6	141.6	8.15		

*/ Percent of shoal area bottom soil types based on field observations and estimates rather than actual measurements. Muck includes muck, silt, and clay.

Water Quality

During the gathering of information for the inventory, total alkalinity, pH, specific conductance, water color, and transparency data were collected for each lake and stream so that interpretations of water quality could be made.

Total alkalinity is commonly used as an index of fertility. Based on Moyle's classification values, the streams, in general, have a much higher index of fertility than do the lakes. Actually, except for the three lakes lying within the Chippewa River flood plain, lake fertility is also relatively high. Figure 7 shows the water fertility in the county and Tables 8 and 9 illustrate the classification, productivity, and fertility of Buffalo County lakes and streams according to size classes. Table 10 provides detailed chemical analysis of Buffalo River near Alma. The fertility of the soils is reflected in the fertility of the waters as indicated by high water fertility in an area where silt loam soils predominate. Sandy soils are found along the Chippewa River terrace which may account, at least in part, for the lower fertility of the lakes found within the river's flood plain.

The pH (hydrogen ion concentration) ranges from 7.3 to 9.5 for lakes and from 7.2 to 8.6 for streams.

Specific conductance measures the total concentration of dissolved electrolytes in water. The higher the conductance, the greater the fertility and productivity of the water. Mean conductance for Buffalo County lakes, measured in micromhos at 77 degrees Fahrenheit, was 233 and ranged from 23 to 501. For streams, the mean was considerably greater, 548. It ranged from 180 to 810.

Water color ranged from colorless (clear) to medium brown for Buffalo County lakes. As may be suspected, the less productive water comprised three of the four lakes having a brown color. This color is due to organic colloids in the water. Of 103 streams, 94 were colorless and 9 had light brown colored water. Six streams were turbid during the investigation. Even though the maximum depths of lakes did not exceed 7 feet, secchi disk readings were low for all but one lake. Colored water, surface water movement, and cloudy skies were the primary reasons for low readings. Water color of Buffalo County lakes and streams by size classes is shown in Table 11.

Table 8. Classification, productivity, and fertility of Buffalo County lakes according to size classes.*

Size Class (acres)	No.	Total Alkalinity (ppm $CaCO_3$) Range	Mean	pH Range	Mean	Specific Conductance (mmhos @ 77°F.) Range	Mean	Hardness Classif. Range	Mean	Productivity Classif. Range	Mean	Fertility Classif. Range	Mean
Less than 5	1		59		7.3		172		Med. Hard		Med. High		Med. Fertile
5 to 10	1		11		7.5		82		Very Soft		Low		Infer-tile
10 to 20	1		6		7.3		23		Very Soft		Low		Infer-tile
20 to 50	3	112-268	175	8.3-9.5	9.0	283-501	373	Hard	Hard		High		Very Fertile
Mean			100		8.2		233		Hard		High		Very Fertile

* See Appendix III for definitions of hardness, productivity, and fertility.

Table 9. Classification, productivity, and fertility of Buffalo County streams according to size classes.*

Avg. Width (feet)	No.	Total Alkalinity (ppm $CaCO_3$) Range	Mean	pH Range	Mean	Specific Conductance (mmhos at 77°F.) Range	Mean	Hardness Classification Range	Mean	Productivity Classification Range	Mean	Fertility Classification Range	Mean
Less than 10	98	80-316	258	7.2-8.6	7.9	180-810	557	Med.-Hard Hard	Hard	Med.-High High	High	Med.-Very Fer.	Very Fer.
10 to 20	10	174-286	254	7.9-8.6	8.2	250-682	448	Hard	Hard	High	High	Very Fer.	Very Fer.
20 to 40	0		-		-		-		-		-		
40 & wider	1		170		7.7		235		Hard		High		Very Fer.
Mean			257		7.9		548		Hard		High		Very Fer.

*See Appendix III for definitions of hardness, productivity and fertility.

Table 10. Surface water quality, Buffalo River near Alma: 1965 through 1968.
(Drainage area approximately 481 square miles)

	Laboratory Analyses																		Field Data			
Year	Alkalinity Phth ($CaCO_3$)	Alkalinity Total ($CaCO_3$)	Bacteriological per 0.1 ml.	Biochemical Oxygen Demand (5-day)	Chlorides (Mohr Method)	Color (True)	Hardness	Nitrogen: Total Organic	Free Ammonia	Nitrates	pH (s.u.)	Phosphorus Total	Phosphorus Sol.	Solids: Total	Volatile	Solids: Suspended	Volatile	MBAS (Synthetic Detergent)	Dissolved Oxygen	pH (s.u.)	Temperature °C	Fecal Coliform Count (per 0.1 ml.)
1965																						
Mean	0	107		5.5	3		128	1.12	0.62	0.89		0.33	0.19						7.5			0.5*
Max.	0	128	11.0	15.4	6	140	156	2.74	2.04	1.20	7.70	0.56	0.38	308	80	156	34	0.16	13.3	7.5	24	1.2
Min.	0	52	<0.1	<0.5	1	5	68	0.35	0.01	0.55	6.95	0.12	0.08	150	54	1	1	<0.03	3.2	7.0	0	0.1
1966																						
Mean	0	109		1.6	2.8		136	0.51	0.16	1.32		0.269	0.114						9.9			0.38
Max.	10†	134	70.0	5.4	5	74	156	0.72	0.20	1.78	8.90	0.38	0.128	248	82	80	22	<0.03	13.9	8.6	27	1.20
Min.	9†	58	0.9	0.6	2	5	84	0.16	0.13	1.08	6.85	0.168	0.100	180	58	3	1	<0.03	6.7	7.0	0	0.01
1967																						
Mean	0	107		2.0	3.4		135	0.75	0.43	0.93		0.328	0.158						10.0			0.364
Max.	0	138	80.0	4.3	4	50	160	1.21	0.97	1.24	7.75	0.480	0.28	286	74	97	13	<0.04	16.2	8.2	26	1.000
Min.	0	36	1.9	0.5	0	3	44	0.40	0.14	0.68	6.95	0.204	0.084	116	40	4	1	<0.04	5.7	7.0	0.5	0.035
1968																						
Mean	0	122		2.6	3.5		149	0.67	0.17	1.16		0.285	0.118						8.7			2.766
Max.	0	140	100.0	5.6	7	60	168	0.89	0.27	1.56	8.2	0.38	0.17	280	90	100	12	<0.04	12.7	8.0	24.5	22.00
Min.	0	100	1.5	0.6	2	5	132	0.42	0.11	0.92	7.3	0.13	0.072	190	22	5	1	<0.04	6.1	7.2	0	0.300

Source of Data: State of Wisconsin Surface Water Quality Monitoring Data, 1965-68, Wisconsin Department of Natural Resources, Division of Environmental Protection.

Note: Water samples gathered at monthly intervals, but nitrogen and phosphorus determinations were usually made every third month.

* Fecal coliform count was initiated at this monitoring station, July, 1965.

† Phth ($CaCO_3$) alkalinity present in only two water samples.

Table 11. Water color of Buffalo County lakes and streams by size classes.

Lake Size Class (Acres)	No.	Clear	Light Brown	Medium Brown	Turbid
Less than 5	1		1		
5 to 10	1			1	
10 to 20	1			1	
20 to 50	3	2	1	—	—
Totals	6	2	2	2	0
Stream Width Class (Feet)					
Less than 10	98	86	7		5
10 to 20	10	8	2		
20 to 40	0				
40 and wider	1	—	—	—	1
Totals	109	94	9	0	6

Fishery Resources

The fishery resources have been classified on the basis of predominant species and present management. In Figure 8, a code has been used to indicate the classification of individual waters.

All or part of 15 streams are classified as trout water. All contain brown trout and four also have brook trout. The trout habitat in Buffalo County is marginal and stocking legal-sized fish is necessary to provide trout fishing. While some of the larger, warm-water streams tributary to the Mississippi River contain walleye, northern pike, and possibly other sport fish species (especially toward their lower ends and on a seasonal basis), most of the streams are dominated by forage species. Channel and flathead catfish provide fishing pleasure to anglers along the Buffalo River.

Because of their shallow depths, all but one of the lakes in the county are subject to winter-kill conditions. The one lake that isn't is managed for bass-panfish. The remaining lakes, though subject to freeze-outs, lie within flood plains of large streams and may contain seasonal populations of various sport fish species, especially northern pike, bass, and panfish.

During 1974, there were 1,585 resident, 362 resident husband and wife, 1,045 nonresident fishing, and 121 nonresident combination licenses sold in Buffalo County. In addition, there were 1,088 voluntary sportsmen's licenses sold.

Commercial fishing in the county includes the taking and selling of bait minnows by licensed minnow dealers and harvesting rough fish species from the Buffalo and Mississippi Rivers. Commercial fishing in the Buffalo River has been limited to the area at the mouth of the stream. Carp and buffalo are the species most generally harvested from this area, but freshwater drum (sheepshead) and sucker are also taken. As mentioned previously in this report, carp, buffalo, freshwater drum, and quillback are the species that comprise most of the catch from the Mississippi River.

Aquatic Game Resources

Based on the total of important inland acreages for wetlands and waters within the state (a total of 1,127,246 acres), Buffalo County has 0.2 percent of the inland aquatic habitat of importance to ducks and coots (Jahn and Hunt, 1964). Using 1952-54 data, there was 0.5 acre of wetland that was classed as most important duck and coot breeding habitat for each square mile of land area. Breeding species most commonly found in Buffalo County include mallard, blue-winged teal, wood duck, hooded merganser and coot. All of the above species more commonly nest along the Mississippi River rather than in the interior of the county; however, according to Jahn and Hunt (1964), aquatic habitat resources of important value to ducks and coots in Buffalo County are Buffalo River, Chippewa River, Trempealeau River, and Waumandee Creek. Important waterfowl management areas in the county are Tiffany and Upper Mississippi Refuge. The Delta Fish and Fur Farm, located in Buffalo and Trempealeau Counties, is a major private wildlife area in the state.

There were 630 migratory waterfowl stamps sold in Buffalo County from June 29, 1957 through April 4, 1958. This ranked it 52nd among all the counties of the state.

Muskrat, fox, mink, coon, beaver, and otter are the furbearers appearing in the annual harvest in about the order of abundance.

Fox trapping is county-wide, but most trapping for other furbearers is confined to the area along the Mississippi River. Though most of the trapping is done by middle-aged or older individuals, young trappers are present in significant numbers and they try their hand at least one season.

Farm Ponds and Private Fish Hatcheries

Information concerning farm ponds in Buffalo County is incomplete and is limited to data gathered during the 1969-70 survey. Excluding those licensed as private fish hatcheries, a total of 96 ponds was found. It is suspected that if Soil Conservation Service data could have been included, the total number may have been nearer 200 as there has been an increased interest in farm ponds over the past several years and it hasn't been uncommon to have 10 or more water retention ponds constructed in a year with SCS technical assistance and federal government cost-sharing. Of the ponds investigated, 10 were dry, or nearly so, and the remainder ranged from 0.01 to 3.5 acres in size and had a total surface area of about 29.4 acres. Their depths ranged from 1 to 20 feet and the average depth was about 6 feet. Because of their generally shallow depths, few support a year-around fishery. Flood and erosion control and stock watering were the primary purposes of the majority of the ponds; however, in many instances stock watering was a secondary use.

As of December 31, 1970, there were 22 ponds and 2 raceways included in 12 private fish hatchery licenses. Their total surface water area was approximately 2.5 acres. The ponds ranged in size from less than 0.01 to nearly 0.7 acre. The Delta Fish and Fur Farm is also licensed as a private fish hatchery and 5,440 acres are included in its license in Buffalo and Trempealeau Counties. The locations of the private hatcheries are shown in Figure 8.

Boating and Swimming

According to Department of Natural Resource records of December 31, 1975, there were 1,207 boats registered in Buffalo County. This total included 1,092 outboard motors, 17 inboard motors, 16 sail, 1 inboard fleet, and 81 outboard fleet registrations. Boat traffic on waters is governed by several factors including degree of access, size of water and its depth, purpose of traffic, and obstructions to navigation. Due to several of these factors, boating on inland waters of Buffalo County has been minimal. The majority of the boats registered are no doubt used on the boundary waters and in other counties. There are limited boating opportunities on some of the larger streams within the county such as Buffalo River and Waumandee Creek.

There are few, if any, supervised swimming beaches in the county. Swimming opportunities are mostly limited to areas along the Mississippi River. Of all lake shores, 87 percent are muck and silt. These bottom types are undesirable for swimming.

Aesthetics

As referred to in this report, aesthetics is the appreciation of the beauties of nature. In addition to the beauty of the coulee area lying east of the Mississippi River, there are about 13.7 miles of scenic bluffs along the river and they rise abruptly 500 feet above the flood plain. A boat trip or a drive along the river will provide picturesque views never to be forgotten. An autumn trip through the coulee area or along the Mississippi when there's "color" in the trees is especially beautiful.

Throughout the state are several scientific areas. These are tracts of land or water in their native state set aside and permanently protected or managed to preserve native plant and animal communities or rare or valuable individual members of such communities or archaeological sites. Such a site, known as the "Tiffany Public Hunting Grounds", is located along the west edge of the county next to the Chippewa River. This area consists of low-lying river bottomland and it has a good stand of virgin swamp hardwoods.

AVAILABILITY OF THE WATER RESOURCES

Area and Population

Buffalo County covers a land area of 712 square miles and it represents approximately 1.3 percent of the total area of the state. The county has a rural population. Table 12 lists the population and location of incorporated cities and villages in Buffalo County.

The county reached its population peak in 1900. Since then there has been a steady decline which appears typical for many counties in this part of the state. There was a 3.5 percent decline in the population from 1950 to 1960 and a 3.2 percent decline has been indicated for the period of 1960 to 1970. In 1960, the census figure of 14,202 represents approximately 0.36 percent of the state's population (approximately 0.31 percent of the 1970 state's population). There are 19.9 people per square mile as compared to the state average of 72.2.

Wisconsin population projections suggest that by July 1, 1980, Buffalo County will have a population of 12,000, or a decrease of 2,202 inhabitants from the 1960 census figure and 1,743 below the official census figure as of April 1, 1970. This projected census figure will amount to about 0.25 percent of the projected state total (State of Wisconsin, 1969).

The county has a zoning ordinance and it is rather unique in that it was geared to the soil survey. It established minimum lot size according to soil type.

Public Access and Use

Lakes are classified by degree of access following the 1969-70 investigations. Information obtained appears in Figure 9, a public lands and access map of Buffalo County. Data concerning access to lakes and streams according to size classes are provided in Tables 4 and 5.

One of the lakes surveyed had more than one type of access. Of the six lakes included in this report, three had parking, one had unimproved access, two had wilderness access, and one was without public access.

Excluding road rights-of-way, there are 10.06 miles of public frontage along streams within Buffalo County and nearly 4.5 miles around lakes.

Public use areas as obtained from various Department of Natural Resources data and information appear as follows:

United States Government

Upper Mississippi National Wildlife Refuge - 7,102 acres

State of Wisconsin

Owned lands
- Merrick State Park - 320.67 acres
- Dept. of Natural Resources (Fish and Game)* - 11,035.05 acres
- Other - 322.04 acres

Leased or easement land
- Dept. of Natural Resources (Fish and Game)* - 1,487.28 acres

Village and City Park and Access Areas

- Alma Beach - 5 acres
- Buena Vista Park - 5 acres
- Buffalo Park - 14 acres
- Goose Lake Memorial Park - 5 acres
- Memorial Recreation Park - 9.33 acres
- Mirror Lake Park - 3 acres
- Mondovi Tourist Park - 20 acres
- Rieck's Lake Park - 7 acres
- Waumandee Park (county-owned land; park administered, developed, and managed by Waumandee Rod and Gun Club) - 2 acres

School Forests†

- Alma - 20 acres
- Cochrane - 7 acres

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* Figure for Fish and Game owned lands as of 6-30-70 and is subject to change. Figure for Fish and Game leased and easement lands as of 12-31-70 and is subject to change.

† Not included is about 5 acres of school forest in Mondovi. Land is church owned and may be used for expansion of cemetery.

Table 12. Incorporated cities and villages in Buffalo County.

Cities	Population (1970 census)[1/]	Location in County
Alma	956	West Central
Buffalo	671	Southwest
Fountain City	1,017	South Central
Mondovi	2,338	Northeast
Villages		
Cochrane	506	Southwest

[1/] Population figures taken from the Advance Report on 1970 Census of Population in Wisconsin prepared by State of Wisconsin, January, 1971.

Private Development

There is little private development around the lakes and along streams lying within the county. A quasi-public youth camp is located on the Buffalo River. Except for Mirror Lake in Mondovi where there are 35 dwellings, private development is absent around four lakes, and one dwelling and a church are located near one. The general lack of development around most lakes in the county is probably due to the fact that most lie in flood plains and they lack recreation potential.

SURFACE WATER PROBLEMS

Resource-Based Problems

Like most counties in the west central part of the state, Buffalo County has no natural lakes of any significance and has limited water area. The natural lakes present lie within flood plains of streams and rivers and were probably formed as a result of these waters.

The lakes are subject to seasonal water level fluctuations, since evaporation from Wisconsin lakes and wetlands nearly equals the annual rainfall, and as all Buffalo County lakes have maximum depths of less than 10 feet and most are located in areas where there are wetlands surrounding them. Unstable water levels have pronounced effects. Fish winterkills are more likely and more bottom areas are exposed, thus increasing the possiblity of vegetation growth.

A less obvious problem is the gradual filling of lakes and flowages. Natural filling results in the accumulation of layers of plant and animal bodies mixed with layers of silt. Soil and detritus washed off the surrounding land by rains have accelerated the filling of lakes and flowages. Streams drop their silt loads upon entering flowages and over flood plain areas during high water periods. This results in a buildup of bottom materials especially at the upper end of flowages where the current slackens and in the pothole type lakes located within flood plains. All but one of the Buffalo County lakes are either known to have or suspected to have winterkill conditions. The fault lies in the shallow depth of these waters. Where fertility is high, it adds to the problem. The natural aging process is one cause and is especially noticeable in small lakes where undecomposed aquatic vegetation and other detritus build up on the bottom and where the encroaching shoreline reduces the surface water area and depth. These lakes become smaller each year and will eventually become devoid of open water.

Streams respond closely to the amount of runoff from rains. Buffalo County's geography affects the rate of runoff. Steep slopes of the coulees shed rain quickly, often creating flash flood conditions which can cause streams to change courses, destroy habitat, and alter animal life.

Fishery Problems

Winterkill remains a problem at five of the six lakes in the county. As four of these waters lie within flood plains of major streams, there is an exchange of several fish species during high water periods. While this more or less solves the winterkill problem, it does not permit management of these waters by fish species and numbers.

Use Conflicts

Use conflicts include several types of habitat destruction as well as conflict among users of a resource. Some use conflicts cause a deterioration or even a reduction in the quality and quantity of water resources.

Bank cover removed too close to the stream's edge by cultivation or overgrazing causes unstable bank conditions. Bank erosion is the usual result and it often results in fish habitat destruction. Principles and practices of wise land use could reduce the habitat destruction and improve water quality. This not only includes wise practices along the streams, but also on their watersheds. An example would be to take out of cultivation areas of the county where the soil is thin and where the slopes are steep, especially those that are eroded.

Recreational demands on inland waters of the county are not intensive at this time and none is expected on most of the lakes in the future because of the relatively low recreational potential.

Pollution

Possible pollution sources are listed in Table 13. Equipment failures and overloading of sewage treatment facilities often cause pollution. Overloading may be caused by excessive rainfall or by abnormally large amounts of industrial wastes. In some instances, present treatment facilities are unsatisfactory, resulting in the discharge of inadequately treated sewage. Biologists continually check water quality and stream sites suspected of pollution and inform the agencies concerned of their responsibilities.

Water pollution is a serious problem wherever it is found. Communities are growing faster than the capacity of sewage treatment plants can be increased. Also, greater volume of wastes require higher degrees of treatment to protect the waters into which the treated effluent is discharged. Clean water is not only in the interests of sport fishermen and outdoor recreationists; it is in the interests of everyone. Directly, or indirectly, each person benefits from improved water quality.

Projected sewage treatment needs in Buffalo County include improved treatment at Alma, Cochrane, and Fountain City.

Public Access

Recreational sites are generally suited to present needs; however, the continued expansion of the established wildlife areas is desirable and additional access site development along the larger rivers will be needed as use of these waters increases.

Table 13. Possible pollution sources in Buffalo County.

Waste Source	Type of Waste	Receiving Water	Remarks
Alma, City of	Sewage	Mississippi R.	Primary Treatment
Alma, City of, Water Treatment Plant	Iron Removal Backwash	Mississippi R.	
Cochrane, Village of	Sewage	Cochrane Creek	Primary Treatment
Dairyland Power Coop, Alma	Cooling Water	Mississippi R.	
	Ash Pond Wastes	Land Disposal	No Discharge
Durand Canning Co., Mondovi	Canning Wastes	Land Disposal	No Discharge
Fountain City, City of	Sewage	Mississippi R.	Primary Treatment
Land O' Lakes, Inc., Mondovi	Cooling Water	Buffalo River	
Mondovi, City of	Sewage	Buffalo River	Secondary Treatment
Mondovi, City of, Water Treatment Plant	Iron Removal Backwash	Mirror Creek	
Nelson, Town of, Sanitary District	Sewage	Mississippi R.	Lagoon Treatment No Discharge
Wisconsin Dairies Co-op, Waumandee	Cooling Water	Waumandee Cr.	No Discharge
	Dairy Wastes	Land Disposal	

Data Source: Bureau of Environmental Impact, Department of Natural Resources.

THE FUTURE

Lacking natural lakes of any consequence, Buffalo County is dependent upon a relatively few poor trout streams, warm water rivers and streams, and one impoundment for its recreational opportunities. Any further increase in its recreational waters within the county is dependent upon construction of impoundments and upon improving (in many cases rebuilding) habitat of the trout streams. The latter is most difficult and expensive to accomplish in coulee streams that are subject to flash flood conditions and erosion problems. Unless a given stream is protected from floods and there is a good soil and water conservation program for the entire watershed, there is little chance that a stream's habitat and trout fishery can be improved. Any kind of boating activity on lakes is very limited and future impoundment development should give this activity consideration. Additional swimming facilities are also needed.

Due to the relatively limited inland water resources, especially for aquatic recreational oriented activities in Buffalo County, water quality is extremely important. Pollution control becomes a necessity and proper land use is a major concern. Public land acquisition and lake and stream shoreline zoning are essential. In order to meet future demands on the waters, there must be intensive management of all the land and water resources through the use of all available management tools.

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Appendix I. Physical and chemical characteristics of Buffalo County lakes and impoundments.

Named Waters	Location T-N	R-W	Sec.	Drainage System	Surface Acres	Max. Known Depth (ft.)	Surface Acres Under 3 Feet %	Surface Acres Over 20 Feet %	Length (miles)	Width (miles)	Shore-line (miles)	Shore-line Dev. Factor	Methyl Purple Alka-linity (ppm)	pH	Specific Conductance (umhos-77°F)	Water Color	Date of Sampling
Bensel Pond	20	12	23	Waumandee Cr.	43.7	5.0	55	0	0.66	0.15	2.34	2.53	268	8.3	501	Lt. Brn.	7-8-70
Duck (Bennetts) Lake	23	14	11	Landlocked	14.8	3.0	99	0	0.40	0.10	1.20	2.22	6	7.3	23	Med. Brn.	10-9-69
Lizzie Paul Pond	21	12	29	Mississippi R.	44.0	4.0	55	0	1.01	0.13	2.25	1.08	146	9.2	334	Clear	10-7-69
Mirror Lake	24	11	12	Peeso Creek	28.9	7.0	65	0	0.33	0.12	1.30	1.73	112	9.5	283	Clear	5-25-67
Stump Lake	24	14	13	Landlocked	6.5	1.0	100	0	0.20	0.08	0.56	1.56	11	7.5	82	Med. Brn.	10-10-69
Unnamed Waters																	
Belvidere Tn. Lake 8-4 (Goose L.)	20	12	8	Landlocked	3.7	5.0	5	0	0.11	0.07	0.5	1.85	59	7.3	172	Lt. Brn.	10-15-69
Totals and Averages - Named Lakes - 5					137.9	4.0					7.65	1.82	109	8.4	245		
Unnamed Lakes - 1					3.7	5.0					0.50	1.85	59	7.3	172		
Grand Totals and Averages: 6					141.6	4.2					8.15	1.83	100	8.2	233		

Appendix IA. Physical characteristics of Buffalo County lakes.

Named Waters	Watershed Area (Sq. Miles)	Percent Muck Shore	Adjoining Wetlands*/ Acres	Percent Woody	Percent Nonwoody	Public Frontage†/ (Miles)	No. of Dwellings
Bensel Pond	1.0	95	2.0	30	70	0.00	0
Duck (Bennetts) Lake	0.2	70	10.5	0	100	1.20	0
Lizzie Paul Pond	0.3	100	0.1	0	100	2.25	0
Mirror Lake	20.0	99	0	0	0	0.35	35
Stump Lake	0.1	100	74.2	0	100	0.19	0
Unnamed Waters							
Lake 8-4 (Goose Lake)	0.1	35	0	0	0	0.50	1
Totals and Averages							
Named Waters		92.8	86.8			3.99	35
Unnamed Waters		35	0			0.50	1
Grand Totals and Averages		83.2	86.8			4.49	36

*/ Includes only wetlands surrounding lakes or impoundments. Does not include wetlands along stream that flows into lake or impoundment.

†/ Does not include road rights-of-way.

Appendix II. Physical and chemical characteristics of Buffalo County streams.

Named Streams	Outlet Location T-N	R-W	Sec.	Watershed	Surface Acres	Length (miles)	Avg. Width (feet)	Flow*/ (c.f.s.)	Approx. Watershed Area Within County (sq. mi.)	Gradient (ft./mi.)	Miles of Public Frontage †/	Fishery (See Code)	Methyl Purple Alkalinity (ppm)	pH	Specific Conductance (umhos-77°F)	Water Color	Date of Sampling
Bear Creek	24	12	4	Chippewa River	4.4	5.2	7.0	4.61	23.7	14.6	4.80	6	230	7.8	610	Clear	7-23-69
Brownlee Creek	24	11	11	Peeso Creek	1.3	1.5	7.0	2.21	1.4	28.5	-	6	237	7.6	592	Clear	7-17-69
Buffalo River	22	13	26	Mississippi R.	394.0	37.8	86.0	254 ±/	222.4	4.5	1.80	2,5	170	7.7	235	Turbid	8-8-69
By Golly Creek	23	14	36	Mississippi R.	2.2	3.7	5.0	0.25	5.0	60.0	-	6	250	8.2	514	Clear	8-5-69
Center Creek	23	13	4	Little Bear Cr.	1.4	3.4	3.5	3.15	3.8	64.0	-	6	282	8.0	530	Clear	8-6-69
Chippewa River	-	-	-	SEE PEPIN COUNTY REPORT													
Cook Creek	23	10	27	Kilness Creek	1.6	2.0	6.5	2.25	3.2	75.0	-	1	247	7.8	598	Clear	7-24-69
Danuser Creek	22	11	36	Waumandee Creek	7.7	5.8	11.0	8.05	14.5	43.4	-	1	268	8.3	566	Lt. Brn.	8-19-69
Deer Creek	22	13	17	Mississippi R.	0.7	1.3	4.5	1.83	4.0	44.4	0.50	6	316	8.0	575	Turbid	8-5-69
Doelle Creek	20	10	29	Trempealeau River	1.1	2.3	4.0	2.95	5.4	50.0	-	1	289	7.9	614	Lt. Brn.	8-28-69
Eagle Creek	20	11	31	Waumandee Creek	11.5	13.5	7.0	19.50	31.5	20.0	-	1,2,3,4	262	8.0	572	Clear	8-27-69
Elk Creek (Bennett)	23	11	16	Buffalo River	25.8	11.9	17.9	8.00	51.8	18.0	-	1	230	8.4	320	Clear	7-30-69
Elk Cr., So. Fk. (Lookout Creek)	23	10	18	Elk Creek	17.7	6.0	12.2	4.50	23.5	34.3	-	1	174	8.6	250	Clear	7-24-69
Farrington Creek	24	11	5	Harvey Creek	2.7	5.5	4.0	3.41	18.4	35.0	-	6	271	7.3	623	Clear	7-17-69
Fimian Creek	22	12	31	Mill Creek	0.2	0.7	2.5	1.13	3.7	44.4	-	6	315	8.0	524	Clear	8-7-69
Hadley Creek	23	11	14	Elk Creek	2.1	2.5	7.0	3.75	3.9	44.4	-	6	201	7.8	442	Clear	7-25-69
Harvey Creek	24	11	14	Buffalo River	5.4	5.6	8.0	7.50	24.9	10.5	-	1	196	7.2	525	Clear	7-17-69
Holmes Creek	24	11	10	Harvey Creek	0.7	1.5	4.0	2.25	1.5	22.2	-	6	246	7.5	597	Clear	7-16-69
Hutchinson Creek	22	12	11	Buffalo River	5.7	3.9	12.0	2.70	7.9	32.2	-	6	260	8.0	532	Clear	8-6-69
Keller Creek	20	10	9	Trempealeau River	0.2	0.7	2.5	1.12	1.3	66.7	-	6	306	8.0	676	Clear	8-21-69
Kilness Creek	23	10	22	So. Fk. Elk Creek (Lookout Creek)	3.8	3.8	8.0	10.00	7.8	28.6	-	1	207	7.7	510	Clear	7-24-69
Little Bear Creek	23	14	1	Mississippi R.	17.0	10.8	13.0	17.09	48.8	25.4	2.40	6	149	8.4	260	Clear	8-5-69
Little Bear Cr., No. Br.	23	13	2	Little Bear Creek	3.9	5.4	6.0	6.75	16.7	48.8	-	6	259	7.9	518	Clear	8-1-69
Little Tamarack Cr.	23	12	23	Tamarack Cr. (Modena)	0.5	1.5	2.5	0.50	2.7	45.4	-	6	316	7.6	642	Turbid	7-30-69
Little Waumandee Cr.	21	11	29	Waumandee Creek	18.8	15.5	10.0	25.20	49.5	22.2	-	1	271	8.2	582	Clear	8-26-69
Mill Creek	22	13	26	Mississippi R.	3.5	3.0	9.5	7.20	12.2	43.5	-	6	274	8.0	526	Clear	8-7-69
Peeso Cr. (Ford)	24	11	14	Buffalo River	3.8	3.5	9.0	2.80	5.9	20.0	0.06	1,3,4	134	8.6	380	Clear	7-17-69
Pine Creek	22	12	16	Buffalo River	2.1	3.4	5.0	3.43	5.5	71.4	-	6	309	7.9	526	Clear	8-6-69
Pratt Creek	23	11	16	Elk Creek	1.8	2.2	7.0	0.92	4.6	38.1	-	6	263	8.1	618	Clear	7-29-69
Riesch Creek	22	12	31	Mill Creek	0.2	0.8	2.5	1.88	4.2	40.0	-	6	294	8.1	556	Clear	8-8-69
Rossman Creek	24	10	11	Buffalo River	3.3	3.0	9.0	4.50	4.2	16.0	-	1	125	8.0	293	Clear	7-19-69
Spring Creek	22	13	27	Mississippi R.	0.2	0.9	2.0	0.64	2.6	80.0	-	6	284	7.7	546	Clear	8-12-69
Spring Creek	24	14	13	Mississippi R.	3.6	4.9	6.0	2.16	13.2	32.6	-	6	80	7.8	180	Clear	4-14-65
Tamarack Cr. (Modena)	23	12	25	Buffalo River	6.7	6.5	8.5	6.19	17.4	26.9	-	1,2,4	273	7.8	547	Clear	7-30-69
Threemile Cr. (Davis)	23	10	17	So. Fk. Elk Cr. (Lookout Cr.)	1.7	2.8	5.0	2.81	4.0	58.4	-	6	226	7.8	560	Clear	7-25-69
Traverse Valley Cr.	22	10	13	Trempealeau R.	1.4	1.8	6.5	2.92	5.4	73.7	-	6	268	7.9	530	Clear	8-13-69
Trempealeau River				SEE TREMPEALEAU COUNTY REPORT													
Trout Creek	22	12	18	Buffalo River	7.5	5.6	11.0	7.50	10.6	46.1	-	6	286	7.9	505	Lt. Brn.	8-8-69
Waumandee Cr. (Big Waumandee)	19	11	6	Mississippi R.	48.9	28.8	14.0	46.1	169.2	15.4	0.50	1	269	8.1	604	Clear	8-29-69

Appendix II. (Continued)

Unnamed Streams	Outlet Location T-N	R-W	Sec.	Watershed	Surface Acres	Length (miles)	Avg. Width (feet)	Flow ± / (c.f.s.)	Approx. Watershed Area Within County (sq. mi.)	Gradient (ft./mi.)	Miles of Public Frontage ± /	Fishery (See Code)	Methyl Purple Alkalinity (ppm)	pH	Specific Conductance (umhos-77°F)	Water Color	Date of Sampling
Alma Tn.																	
Creek 15-2	22	12	15	Buffalo River	0.3	1.0	2.5	2.25	2.3	57.1	-	6	275	7.8	520	Clear	8-6-69
Creek 16-7	22	12	16	Buffalo River	0.4	1.3	2.5	1.50	2.8	57.1	-	6	271	7.8	510	Clear	8-6-69
Creek 19-3	22	12	19	Buffalo River	1.8	2.1	7.0	1.75	3.5	75.0	-	6	278	8.2	526	Clear	8-6-69
Buffalo Tn.																	
Creek 26-12	19	10	26	Trempealeau River	1.2	3.4	4.5	1.12	5.4	53.8	-	6	269	8.2	542	Clear	8-28-69
Canton Tn.																	
Creek 3-6 (Tiffany Cr.)	24	12	3	Bear Creek	2.2	4.6	4.0	4.50	8.6	21.0	-	6	280	7.4	607	Clear	7-18-69
Creek 5-2	24	12	5	Bear Creek	1.1	2.0	4.5	3.75	5.8	20.0	-	6	280	7.4	700	Clear	7-23-69
Creek 5-9	24	12	5	Creek 5-2	1.0	2.0	4.0	1.11	2.7	37.5	-	6	278	7.7	665	Clear	7-23-69
Creek 13-14	24	12	13	Farrington Creek	1.5	2.0	6.0	1.72	4.2	50.0	-	6	245	8.2	608	Clear	7-23-69
Creek 16-13	24	12	16	Creek 3-6	0.2	1.0	2.0	0.75	1.5	40.0	-	6	273	8.1	645	Clear	7-23-69
Creek 31-10	24	12	31	No. Br. Little Bear Creek	0.4	1.5	2.0	1.12	2.5	44.4	-	6	286	7.8	810	Clear	7-24-69
Cross Tn.																	
Creek 4-6	19	10	4	Trempealeau River	3.8	2.4	13.0	3.00	10.3	27.3	-	6	268	8.0	572	Clear	8-28-69
Creek 32-12	20	10	32		0.4	1.2	2.5	0.86	4.5	-	-	6	306	7.9	630	Clear	8-27-69
Creek 15-1 (Wiemer Cr.)	20	11	15	Eagle Creek	1.8	3.8	4.0	3.25	6.4	46.1	-	6	252	7.9	520	Clear	8-27-69
Dover Tn.																	
Creek 14-13	23	10	14	So. Fk. Elk Cr. (Lookout Creek)	0.1	0.5	2.0	0.42	0.7	82.5	-	1	225	7.3	588	Clear	7-24-69
Creek 21-2	23	10	21	So. Fk. Elk Cr. (Lookout Creek)	1.0	1.8	4.5	0.83	2.5	35.3	-	6	230	7.6	666	Clear	7-25-69
Creek 26-7	23	10	26	Kilness Creek	0.2	1.0	2.0	0.62	1.4	44.4	-	1	246	7.6	615	Clear	7-25-69
Creek 29-9	23	10	29	Threemile (Davis) Cr.	0.3	0.6	3.5	0.75	1.0	100.0	-	6	275	8.0	666	Clear	7-25-69
Gilmanton Tn.																	
Creek 13-8	23	11	13	Elk Cr. (Bennett)	1.2	2.0	5.0	1.17	2.1	82.5	-	6	269	8.0	656	Clear	7-29-69
Creek 19-5	23	11	19	Buffalo River	0.4	0.6	6.0	1.09	0.7	50.0	-	6	316	8.2	576	Clear	7-30-69
Creek 20-5	23	11	20	Buffalo River	1.1	2.0	4.5	0.90	4.6	32.0	-	6	314	7.8	6.8	Clear	7-30-69
Glencoe Tn.																	
Creek 2-2	20	10	2	Trempealeau River	10.9	7.5	12.0	8.44	14.3	29.8	-	6	271	8.1	682	Clear	8-21-69
Creek 2-9	20	10	2	Trempealeau River	5.1	5.2	8.0	5.00	7.8	32.5	-	6	285	8.1	628	Clear	8-21-69
Creek 10-4	21	10	10	Creek 11-15	0.3	0.7	3.0	0.67	0.9	85.7	-	6	271	8.0	650	Clear	8-20-69
Creek 11-15	21	10	11	Creek 2-2	0.8	1.8	3.5	2.25	3.6	47.3	-	6	281	8.0	644	Clear	8-20-69
Creek 14-4	21	10	14	Creek 2-2	0.3	1.4	2.0	0.56	1.4	100.0	-	6	249	8.1	578	Clear	8-20-69
Creek 34-4	21	10	34	Creek 35-7	0.2	1.2	1.5	0.20	1.1	76.9	-	6	240	8.4	555	Clear	8-20-69
Creek 35-7	21	10	35	Creek 2-9	0.2	2.4	4.3	2.50	3.5	70.0	-	6	272	7.9	554	Clear	8-20-69
Lincoln Tn.																	
Creek 6-7 (Jahns Cr.)	21	11	6	Little Waumandee Cr.	3.2	5.3	5.0	4.30	10.1	44.9	-	6	272	7.8	620	Clear	8-20-69
Creek 12-1	21	12	12	Little Waumandee Cr.	0.7	2.0	2.5	1.61	2.4	100.0	-	6	245	7.9	475	Clear	8-12-69
Creek 12-13	21	12	12	Little Waumandee Cr.	0.5	1.1	4.0	1.50	4.0	33.3	-	6	242	8.1	465	Clear	8-12-69
Creek 18-16	22	11	18	Little Waumandee Cr.	1.5	2.1	6.0	1.12	2.3	93.3	-	6	288	8.1	550	Clear	8-15-69
Creek 36-3	22	12	36	Little Waumandee Cr.	0.3	1.3	2.0	0.84	1.9	166.7	-	6	258	7.9	566	Clear	8-20-69
Milton Tn.																	
Creek 18-9	20	11	18	Waumandee Creek	0.2	0.8	2.0	1.00	2.3	100.0	-	6	265	8.0	562	Clear	8-28-69
Creek 28-14	20	11	28	Eagle Creek	0.3	0.7	3.0	1.50	2.8	44.4	-	6	264	7.7	562	Clear	8-28-69

Appendix II. (Continued)

Unnamed Streams	Outlet Location T-N	R-W	Sec.	Watershed	Surface Acres	Length (miles)	Avg. Width (feet)	Flow */ (c.f.s.)	Approx. Watershed Area Within County (sq. mi.)	Gradient (ft./mi.)	Miles of Public Frontage †/	Fishery (See Code)	Methyl Purple Alkalinity (ppm)	pH	Specific Conductance (umhos-77°F)	Water Color	Date of Sampling
Modena Tn.																	
Creek 3-12	23	12	3	Tamarack Cr. (Modena)	0.3	1.8	1.5	1.00	2.3	62.5	-	6	284	7.7	560	Clear	7-31-69
Creek 14-15	23	12	14	Tamarack Cr. (Modena)	0.7	1.8	3.3	1.12	2.7	37.5	-	6	292	7.8	605	Clear	7-31-69
Creek 18-15	23	12	18	Little Bear Cr.	0.2	0.9	1.5	0.84	1.4	120.0	-	6	288	7.7	540	Clear	7-31-69
Creek 35-12	23	12	35	Buffalo River	1.9	2.9	5.5	3.15	4.2	62.5	-	6	292	7.8	595	Clear	7-31-69
Mondovi Tn.																	
Creek 3-8	24	11	3	Holmes Creek	0.2	0.5	4.0	0.83	0.4	33.3	-	6	243	7.3	644	Turbid	7-16-69
Creek 13-1 (Armour Cr.)	24	11	13	Buffalo River	2.4	2.6	7.5	2.72	5.9	21.0	-	6	148	7.5	392	Clear	7-16-69
Montana Tn.																	
Creek 8-16	22	10	8	Creek 17-1	0.4	0.8	4.5	0.88	1.6	150.0	-	6	261	7.9	510	Clear	8-14-69
Creek 13-3	22	10	13	Creek 13-4ad	0.1	0.6	2.0	1.23	1.4	100.0	-	6	263	7.8	520	Clear	8-13-69
Creek 13-4	22	10	13	Creek 13-4ad	1.8	2.2	6.8	2.00	2.0	100.0	-	6	262	7.6	508	Clear	8-13-69
Creek 17-1	22	10	17	Waumandee Creek	2.2	2.3	8.0	3.46	4.1	80.0	-	6	263	8.0	534	Clear	8-14-69
Creek 18-13	22	10	18	Waumandee Creek	0.2	0.7	2.0	0.45	1.1	80.0	-	6	279	7.9	580	Clear	8-14-69
Creek 19-7	22	10	19	Waumandee Creek	0.7	1.8	3.0	2.57	2.4	72.7	-	6	263	7.7	545	Clear	8-14-69
Creek 24-4	22	10	24	Traverse Valley Cr.	0.5	1.4	2.7	1.00	2.6	71.4	-	6	269	7.9	498	Clear	8-13-69
Creek 28-13	22	10	28	Danuser Creek	0.2	0.8	2.2	0.64	2.1	80.0	-	6	278	7.6	523	Turbid	8-13-69
Creek 31-4	22	10	31	Danuser Creek	0.4	0.9	3.5	1.44	2.7	100	-	6	276	7.9	562	Lt. Brn.	8-14-69
Creek 32-1	22	10	32	Danuser Creek	0.2	1.0	2.0	0.41	1.3	85.7	-	6	292	7.8	575	Clear	8-13-69
Creek 32-5	22	10	32	Danuser Creek	0.3	1.0	2.3	0.75	1.9	57.1	-	6	272	7.7	598	Turbid	8-14-69
Creek 13-3	22	11	13	Creek 19-7	0.1	0.6	1.5	0.33	0.6	100.0	-	6	265	8.2	666	Lt. Brn.	8-19-69
Creek 25-10	22	11	25	Waumandee Creek	0.2	0.8	2.0	0.50	1.0	66.7	-	6	315	7.8	715	Clear	8-19-69
Creek 25-11	22	11	25	Waumandee Creek	0.2	1.0	2.0	0.48	0.9	66.7	-	6	314	8.2	720	Clear	8-19-69
Naples Tn.																	
Creek 6-3	24	10	6	Peeso Cr. (Ford)	0.9	2.1	3.5	1.2	1.6	33.4	-	6	161	7.7	461	Clear	7-9-69
Creek 10-11	24	10	10	Buffalo River	2.4	3.9	5.0	2.5	3.6	24.2	-	6	93	7.8	240	Clear	7-10-69
Creek 11-4	24	10	11	Buffalo River	1.5	1.8	7.0	3.4	1.3	30.0	-	6	133	7.6	302	Clear	7-9-69
Creek 17-1	24	10	17	Buffalo River	2.1	3.2	5.5	2.9	3.5	28.3	-	6	141	8.0	355	Lt. Brn.	7-10-69
Nelson Tn.																	
Creek 12-4	22	13	12	Trout Creek	0.1	0.6	1.8	0.46	2.0	80.0	-	6	275	7.8	525	Lt. Brn.	8-5-69
Creek 2-3	23	13	2	No. Br. Little Bear Creek	1.6	3.0	4.0	2.25	5.4	40.0	-	6	298	7.9	675	Clear	8-1-69
Creek 2-14	23	13	2	Little Bear Cr.	3.9	4.7	7.0	3.71	6.7	38.1	-	6	282	7.8	580	Clear	8-1-69
Creek 4-7	23	13	4	Little Bear Cr.	0.2	0.7	2.0	0.25	1.2	120.0	-	6	292	8.1	526	Clear	8-4-69
Creek 23-4	23	13	23	Creek 2-14	0.3	1.5	1.5	0.20	1.6	76.9	-	6	280	8.3	452	Clear	7-31-69
Waumandee Tn.																	
Creek 6-5	20	11	6	Waumandee Creek	3.8	5.2	6.0	4.72	7.8	41.0	-	6	267	8.0	562	Clear	8-26-69
Creek 7-11	20	11	7	Waumandee Creek	0.5	1.5	3.0	3.38	4.3	44.4	-	6	284	8.1	572	Clear	8-27-69
Creek 2-5bb	21	11	2	Waumandee Creek	0.2	0.7	2.0	0.48	0.8	66.7	-	6	270	7.9	566	Clear	8-22-69
Creek 2-5bc	21	11	2	Waumandee Creek	1.4	2.9	4.0	2.92	3.9	46.1	-	6	222	8.0	534	Clear	8-22-69
Creek 14-8	21	11	14	Creek 15-8	0.6	1.9	2.5	0.75	2.4	50.0	-	6	268	7.9	616	Clear	8-22-69
Creek 15-8 (Irish Cr.)	21	11	15	Waumandee Creek	6.2	5.1	10.0	6.38	11.6	37.2	-	6	266	8.0	582	Clear	8-22-69
Creek 27-16	21	11	27	Creek 6-5	0.2	0.5	2.5	0.83	1.0	150.0	-	6	265	7.8	562	Clear	8-26-69
Creek 29-2	21	11	29	Little Waumandee Cr.	0.8	3.3	2.0	0.38	2.7	55.2	-	6	263	8.1	562	Clear	8-26-69
Creek 31-7	21	11	31	Waumandee Creek	2.4	3.3	6.0	2.25	3.9	93.7	-	6	269	8.1	572	Lt. Brn.	8-26-69
Totals and Averages - Named Streams - 37					615.1	219.0					10.06		244.3	7.9	507.5		
Unnamed Streams - 72					87.2	142.6					0.00		258.5	7.8	562.6		
Grand Totals and Averages 109					702.3	361.6					10.06		253.6	7.8	543.9		

Appendix II. (Continued)

Fishery code: 1. Trout 3. Largemouth Bass 5. Catfish
2. Northern Pike 4. Panfish 6. Forage Species

*/ Where possible, flow data were gathered from the lower third of the streams investigated. The floating chip method of flow determination was used.

†/ Does not include road crossings.

‡/ U.S.G.S. seasonal continuous-record gaging station data from Oct., 1932 to Sept., 1951 at C.T.H. "F" crossing in NW¼ S16, T22N, R12W. Above discharge of 254 c.f.s. is average for 19 yrs. Maximum discharge of 8,650 c.f.s. recorded 4-4-34 and minimum observed, 59 c.f.s., 8-16-33. Data source was U.S.G.S. Waters Supply Paper 1728.

NOTE: Miscellaneous U.S.G.S. records of low flow and crest stage discharges at partial record stations as taken from Surface Water Records of Wisconsin 1961-1964 and from Water Resources Data for Wisconsin 1965-1968. Discharges follow dates and have been recorded in cubic feet per second (c.f.s.).

Buffalo River - Station at C.T.H. "F" crossing in NW¼ S16, T22N, R12W

8-19-64	72.8	9-7-67	149	8-14-68	230

By Golly Creek - Station at C.T.H. "D" crossing in SW¼ S28, T23N, R13W

8-31-62	12.00	3-4-66	11.00	7-26-68	64.00
4-7-65	20.00	3-27-67	12.00		

Eagle Creek - Station at C.T.H. "G" road crossing in SW¼ S33, T20N, R11W

3-25-61	930.00	7-1-64	730.00	3-26-67	390.00
8-24-61	4.13	10-21-64	5.00	9-7-67	7.01
3-28-62	790.00	4-7-65	1,060.00	9-11-67	7.49
11-30-62	6.54	5-12-65	8.02	10-17-67	8.66
3-26-63	360.00	10-27-65	7.45	3-27-68	8.64
7-10-63	5.29	2-8-66	870.00	6-6-68	9.40
8-14-63	5.71	10-27-66	7.41	8-14-68	12.00
9-25-63	6.97	11-29-66	6.96	8-20-68	2,460.00

Little Waumandee Creek - Station at S.T.H. 88 road crossing in SE¼ S19, T21N, R11W

8-19-64	6.58	7-11-67	24.9	8-14-68	27.9
9-7-66	12.00	9-7-67	16.3		

Spring Creek at bridge crossing on country road in S½ S9, T24N, R13W

3-28-62	250.00	11-11-64	0.84	9-8-66	1.26
8-24-62	1.55	4-7-65	370.00	9-13-66	0.99
9-24-62	1.55	6-18-65	0.84	10-26-66	1.37
11-1-62	1.53	10-20-65	1.20	3-29-67	240.00
7-17-63	430.00	2-8-66	310.00	9-7-67	2.05
10-25-63	50.00	4-22-66	1.11	6-21-68	340.00
10-1-64	0.90	8-10-66	1.23	8-14-68	2.31

APPENDIX III

DEFINITIONS

To facilitate data collection and reporting, several technical terms are employed with which some readers may not be familiar. The following definitions should serve to clarify the meaning of these terms.

access - Refers to public right to approach water over public lands.

unimproved or difficult - Exists when a road of any type which permits vehicular traffic lies within 200 feet of the shoreline but does not afford a direct access to the lake, impoundment, or stream. The road must be public or pass over public land in its entirety and the land from the road to the water must be in public ownership.

wilderness - Exists where public lands adjoin the water from a public road or a navigable stream that is over 200 feet from the water. In other respects, it is similar to an unimproved or difficult access.

with parking but without boat launch - Must provide a specific area or facility for legal parking of automobiles on public land (does not include shoulder of a road) but does not provide a ramp or other facility for launching a boat.

acidity - Is the preponderance of hydrogen (H) ions, which are acid, over the base (OH) ions that are alkaline. It is ordinarily expressed as a pH less than seven.

alkalinity - A measure of the carbonates, bicarbonates, and hydroxides present in a sample of water, expressed as parts per million calcium carbonate (ppm $CaCO_3$). In this report, alkalinity, determined with the acid-base indicator methyl purple, is assumed to represent total alkalinity.

aquatic plant types

floating - Plants whose leaves normally float on the water surface such as duckweed, white water lily, and yellow pond lily.

emergent - Plants whose leaves mostly emerge from the water such as cattail, pickerel weed, and arrowhead.

submergent - Plants whose leaves are mostly beneath the water surface such as coontail, bladderwort, and water milfoil.

direct drainage area - The land area where runoff flows directly into a particular lake or stream, as differentiated from watershed area. The direct drainage for streams is only the area drained within the county; for lakes (not impoundments), the drainage area includes the total area that may also drain into lakes from other counties.

duck types

dabbler or puddle ducks - Ducks characteristic of small streams, ponds, and marshes and who obtain their food at or near the surface of the water by dabbling or tipping rather than diving. Examples include mallard, wood duck, black duck, pintail, and teal.

diving ducks - Ducks more commonly found on the more open bodies of water, such as large rivers and lakes, who dive for their food. When leaving the water, they run along the surface before taking wing instead of springing up. Examples include bluebill (scaup), redhead, canvasback, bufflehead, goldeneye, and ringnecked ducks.

fertility classification - Used in the Buffalo County report and in part from Moyle, 1946.

Total Alkalinity	Classification	Productivity	Fertility
0.0 - 20.0	very soft	low	infertile
21.0 - 40.0	soft	low - medium	fairly fertile
41.0 - 90.0	medium hard	medium - high	moderately fertile
91.0 and higher	hard	high	very fertile

fish types

forage fish - Includes dace, stonerollers, chubs, shiners, and other species found in the family Cyprinidae and sucker and redhorse in the family Catostomidae.

game fish - Includes walleye, largemouth bass, smallmouth bass, northern pike, muskellunge, and panfish as the predominating members of this group.

panfish - Includes bluegill, pumpkinseed, green sunfish, warmouth, rock bass, crappie, perch, and bullhead.

rough fish - Includes carp, dogfish, gar, buffalo, drum, and quillback carpsuckers.

lake types

drainage - Lake or impoundment having an inlet and outlet.

drained - Lake or impoundment that has no inlet but has an outlet of no substantial flow.

seepage - Lake that is landlocked, or nearly so. It is dependent upon groundwater seepage to maintain its level.

spring - Lake that has no inlet but has an outlet of substantial flow.

pH - The negative logarithm of the hydrogen ion concentration expressed in gram equivalents. A pH of less than 7.0 is acid, a pH of 7.0 is neutral, and one more than 7.0 is alkaline. Usually swamp drainage contributes to a low pH.

shoal area - In this report, it refers to the shoreward part of the basin visible to the naked eye but not exceeding the five foot depth.

shoreline development factor (S.D.F.) - A method of expressing the degree of irregularity of the shoreline of a lake. It is the ratio of the length of the shoreline to the circumference of a circle having the same area as the lake. The number is therefore never less than 1.00.

soil bottom types

sand - Particles having diameters of 0.125 inch or less, but excludes muck, silt, clay, and marl.

gravel - Has a diameter of 0.125 to 3.0 inches.

rock - Includes rubble (3.0 to 12.0 inches in diameter), rock 12.0 inches and larger in diameter, and bedrock.

muck - Includes detritus, silt, muck, and marl.

specific conductance - A measure of the ability of water to conduct an electric current. It is therefore a measure of the total dissolved electrolytes in water and has use in determining relative purity of waters. The unit of measurement is reciprocal megohms or microhms, as measured at $77^{o}F$ ($25^{o}C$).

transparency - It is a measure of vertical distance that can be seen into water using an instrument known as a secchi disk. The distance a secchi disk can be seen is influenced by a number of factors including amount of sunlight, turbidity, and water color to mention a few. Where secchi disks can be seen at depths not exceeding 5.5 feet, the transparency is low; 6.0 to 12.0 feet, moderate; 12.5 to 20.0 feet, high; and 20.5 feet and deeper, very high.

trout stream types

Class I - Good water conditions and with high natural reproduction and suitable density of wild trout; no stocking of hatchery fish.

Class II - Good water conditions and may have some natural reproduction, but where natural reproduction is not sufficient to maintain a completely wild fishery. Moderate to heavy stocking of hatchery fish is necessary to assure satisfactory fishing.

Class III - Marginal water conditions for sustaining trout populations on a year-round basis. Continual trout stocking at specific time intervals is necessary to provide fishing throughout the season.

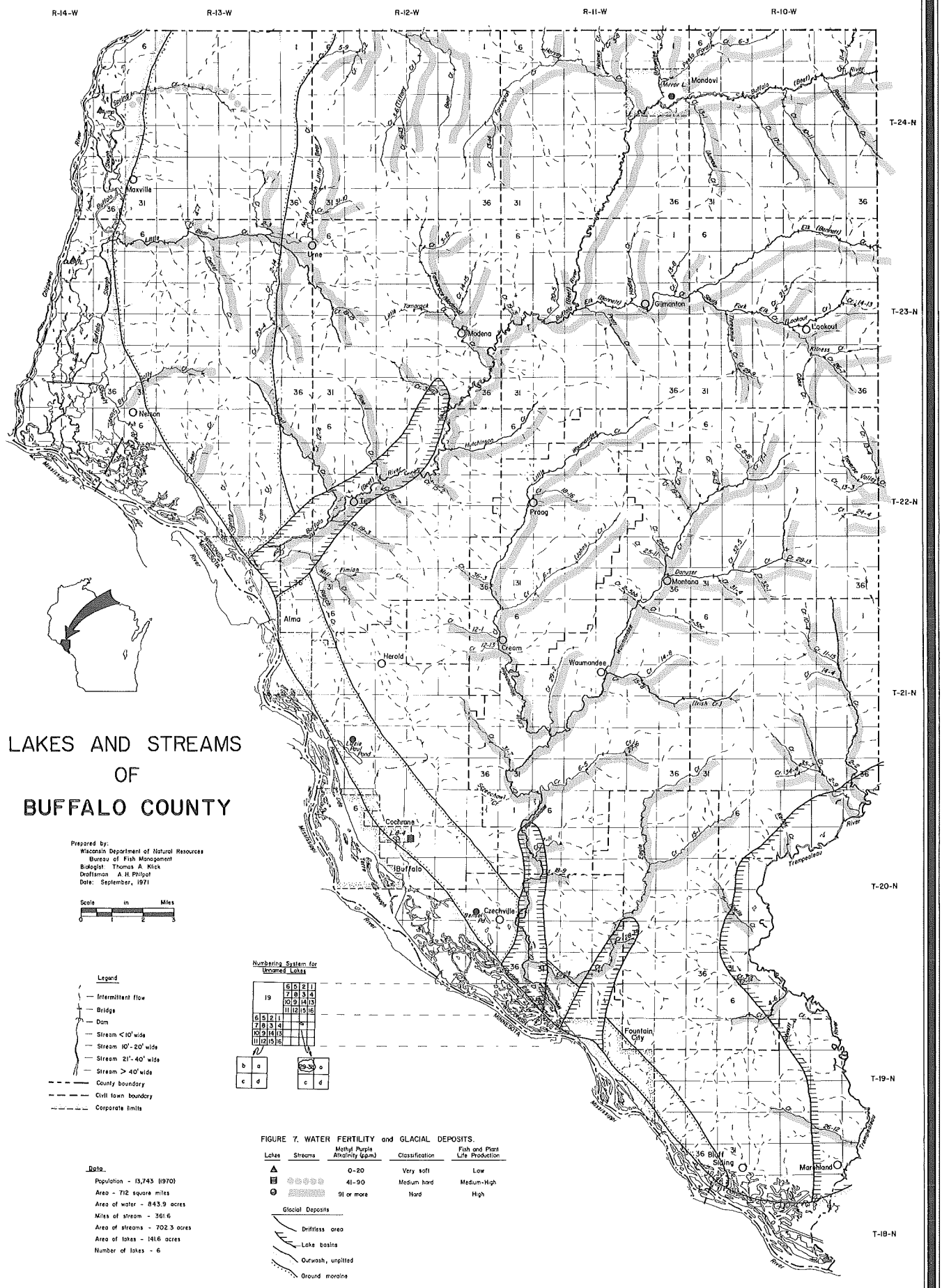
water color - As used in this report, water was either clear, light brown, or medium brown. The color was determined of samples taken directly from the water; therefore, apparent color rather than true color was measured as it included not only that color produced by materials in solution but also any color produced by substances in suspension. According to the American Public Health Association (1949), true and apparent color of clear water having a low turbidity is nearly alike.

watershed area - The whole water-gathering land surface of a lake or stream basin and includes the runoff surfaces of other lakes and streams above the one in question. Stream watershed areas, however, include only the runoff surfaces above the county line, while lake (not impoundment) watershed areas include the entire basin system within and out of the county.

wetlands - Any area where the water table is at such a level that raising of a cultivated crop, other than cranberries, is usually not possible. Wetland classifications include bogs, fresh meadow, shallow marsh, deep marsh, shrub swamp, and timber swamp.

winterkill - A fish mortality in ice and snow covered lakes resulting from the depletion of dissolved oxygen in the water to a level where it is no longer capable of supporting fish life. The high oxygen demand of, and the formation of, carbon dioxide, hydrogen sulfide and other gases by the decay of organic material contribute to the kill. Winterkills usually occur in shallow or very fertile lakes, or in shallow bay areas of deeper lakes.

8-4-76
afs



LAKES AND STREAMS OF BUFFALO COUNTY

Prepared by:
Wisconsin Department of Natural Resources
Bureau of Fish Management
Biologist: Thomas A. Klick
Draftsman: A. H. Philpot
Date: September, 1971

Scale in Miles
0 1 2 3

Legend
- Intermittent flow
- Bridge
- Dam
- Stream < 10' wide
- Stream 10' - 20' wide
- Stream 21' - 40' wide
- Stream > 40' wide
- County boundary
- Civil town boundary
- Corporate limits

Numbering System for Unnamed Lakes

		6	5	4	3	2	1
		7	8	9	10	11	12
19		18	17	16	15	14	13
		19	20	21	22	23	24
		30	29	28	27	26	25
		31	32	33	34	35	36

b a
c d

29-30 a
c d

Data
- Population - 13,743 (1970)
- Area - 712 square miles
- Area of water - 843.9 acres
- Miles of stream - 361.6
- Area of streams - 702.3 acres
- Area of lakes - 141.6 acres
- Number of lakes - 6

FIGURE 7. WATER FERTILITY and GLACIAL DEPOSITS.

Lakes	Streams	Methyl Purple Alkalinity (ppm)	Classification	Fish and Plant Life Production
△		0-20	Very soft	Low
▣		41-90	Medium hard	Medium-High
●		91 or more	Hard	High

Glacial Deposits
- Driftless area
- Lake basins
- Outwash, unpitted
- Ground moraine

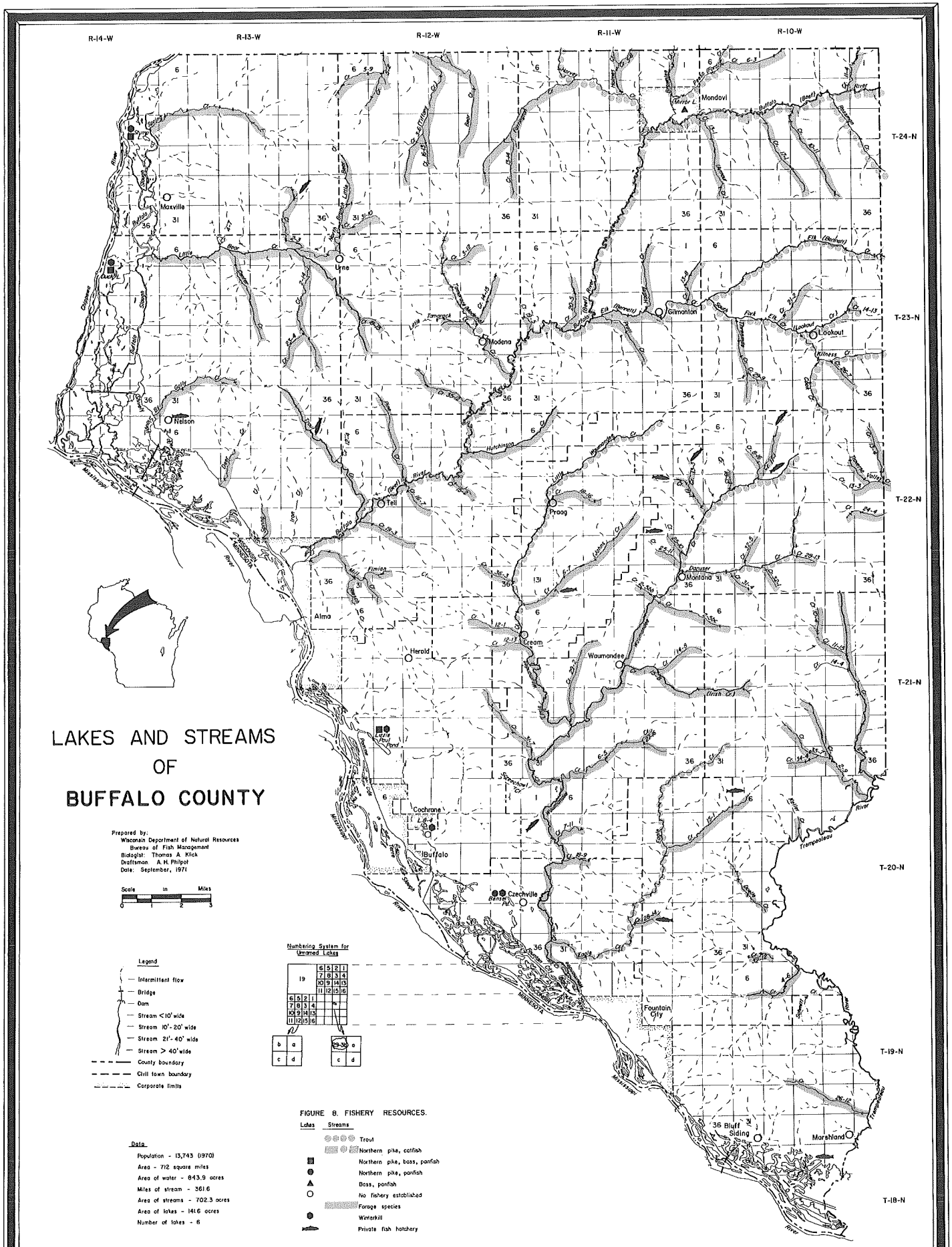


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FIGURE 8. FISHERY RESOURCES.

Lakes / Streams

- Trout
- Northern pike, catfish
- Northern pike, bass, panfish
- Northern pike, panfish
- Bass, panfish
- No fishery established
- Forage species
- Winterkill
- Private fish hatchery

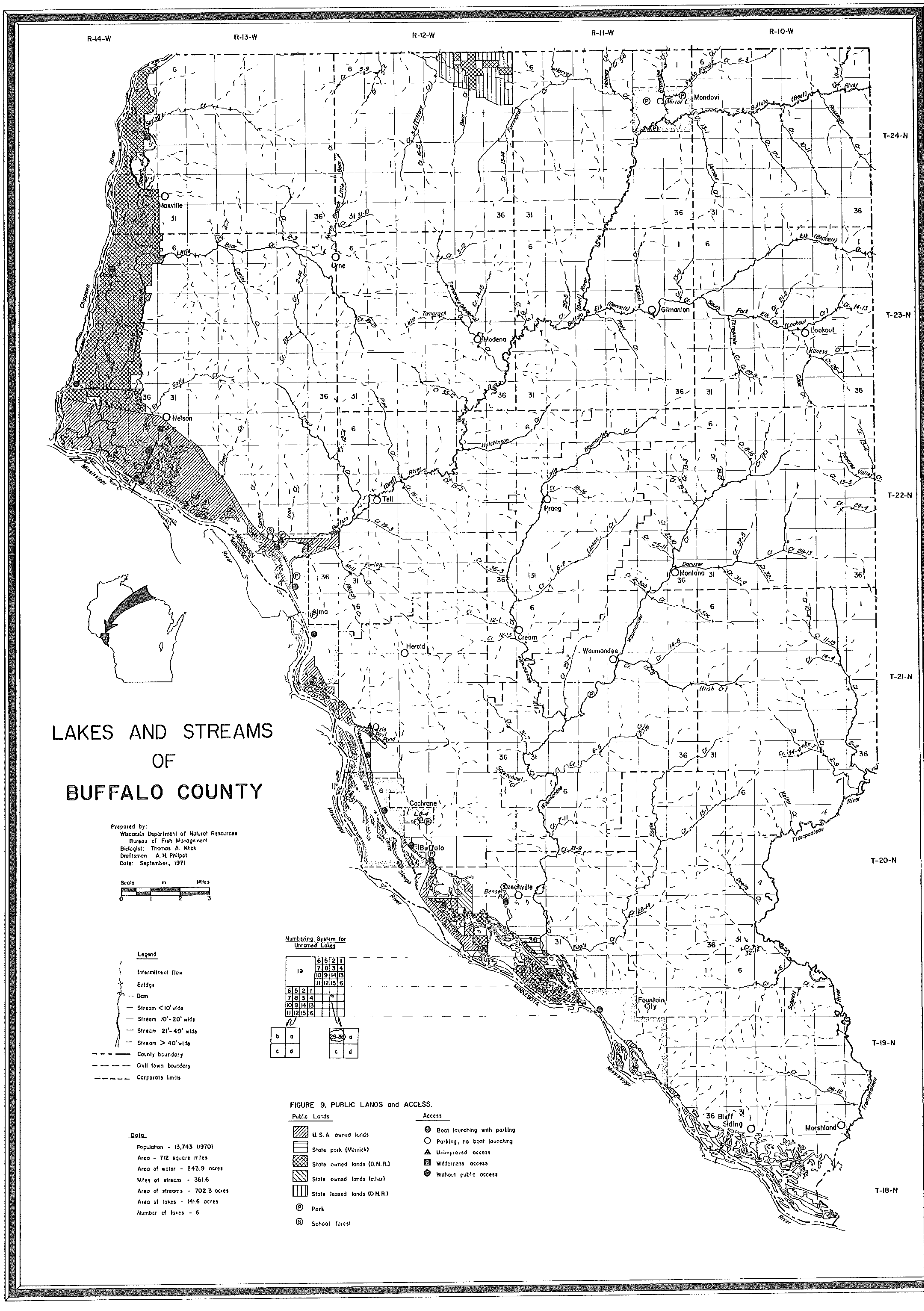

FIGURE 9. PUBLIC LANDS and ACCESS.

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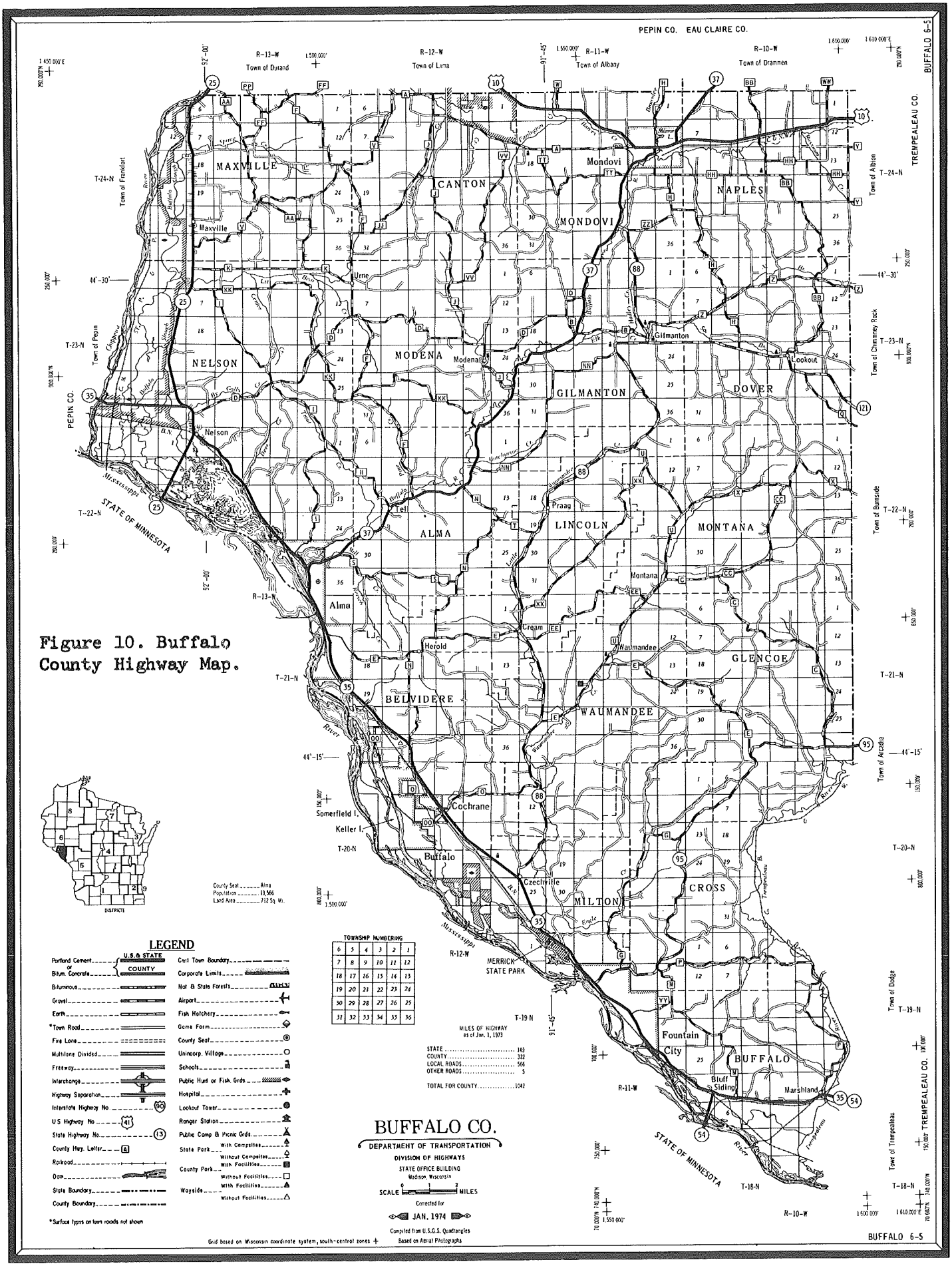
PEPIN CO.
EAU CLAIRE CO.
BUFFALO 6-5
TREMPEALEAU CO.
R-13-W
Town of Durand
R-12-W
Town of Lima
R-11-W
Town of Albany
R-10-W
Town of Drammen
T-24-N
T-23-N
T-22-N
T-21-N
T-20-N
T-19 N
T-18-N
MAXVILLE
CANTON
MONDOVI
NARLES
NELSON
MODENA
GILMANTON
DOVER
ALMA
LINCOLN
MONTANA
BELVIDERE
WAUMANDEE
GLENCOE
MILTON
CROSS
BUFFALO
Mondovi
Maxville
Urne
Gilmanton
Lookout
Modena
Nelson
Praag
Alma
Montana
Cream
Herold
Waumandee
Cochrane
Somerfield I.
Keller I.
Buffalo
Czechville
Fountain City
Bluff Siding
Marshland
MERRICK STATE PARK
STATE OF MINNESOTA
Mississippi River
Trempealeau R.
Town of Frankfort
Town of Pepin
Town of Chimney Rock
Town of Albion
Town of Burnside
Town of Arcadia
Town of Dodge
Town of Trempealeau
Figure 10. Buffalo County Highway Map.
DISTRICTS
County Seat ..... Alma
Population 13,566
Land Area ..... 712 Sq. Mi.
TOWNSHIP NUMBERING
6 5 4 3 2 1
7 8 9 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36
MILES OF HIGHWAY as of Jan. 1, 1973
STATE 143
COUNTY 322
LOCAL ROADS 566
OTHER ROADS 5
TOTAL FOR COUNTY 1042
LEGEND
U.S. & STATE
COUNTY
Portland Cement or Bitum. Concrete
Bituminous
Gravel
Earth
*Town Road
Fire Lane
Multilane Divided
Freeway
Interchange
Highway Separation
Interstate Highway No. 90
U.S. Highway No. 41
State Highway No. 13
County Hwy. Letter A
Railroad
Dam
State Boundary
County Boundary
Civil Town Boundary
Corporate Limits
Nat. & State Forests
Airport
Fish Hatchery
Game Farm
County Seat
Unincorp. Village
Schools
Public Hunt. or Fish. Grds.
Hospital
Lookout Tower
Ranger Station
Public Camp & Picnic Grds.
State Park With Campsites
Without Campsites
County Park With Facilities
Without Facilities
Wayside With Facilities
Without Facilities
*Surface types on town roads not shown
BUFFALO CO.
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OFFICE BUILDING
Madison, Wisconsin
SCALE 0 1 2 MILES
Corrected for
JAN. 1974
Compiled from U.S.G.S. Quadrangles
Based on Aerial Photographs
Grid based on Wisconsin coordinate system, south-central zones +
BUFFALO 6-5