

# IRRIGATION

Although rainfall is plentiful in the basin, irrigation allows timely application of moisture for optimum crop production. Water is applied through sprinkler systems or to furrows, and application per season averages about 3 inches. The area irrigated, up to 9,000 acres each year, varies considerably depending on weather conditions and crop type and rotation. Potatoes comprise almost all of the irrigated crop in the basin, but small amounts of corn, peas, beans, and alfalfa are irrigated.

Of the approximately 9,000 acres of land with water withdrawal available, only about 2,700 acres were irrigated in 1967. In 1966 about 1,800 acres were irrigated with an estimated 140 million gallons of ground water. Acreage with high-capacity wells increased about

25 percent from 1966 to 1967, but heavy rainfall in 1968 reduced the need for irrigation and only about 120 million gallons were used on about 2,300 acres. Pumpage of 11.2 million gallons of surface water for 1,011 acres was reported in 1966. In 1966, pumpage of only 48.8 million gallons for 505 acres was reported, a further reflection of the heavy rainfall that summer.

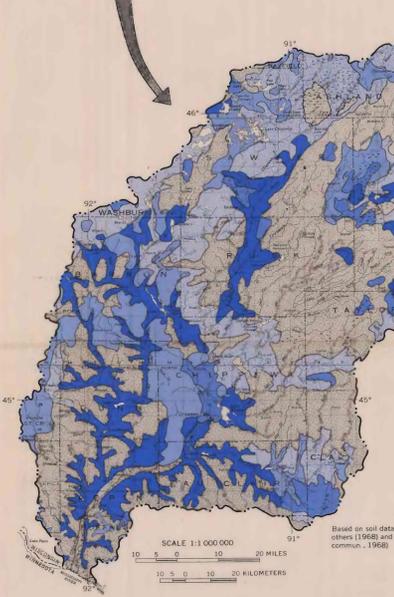
Irrigation developed rapidly after its beginning in the mid-1950's, reached a plateau in the early 1960's, and increased again in 1966. The largest development occurred on the outwash plains of Barron, Chippewa, and Dunn Counties because of level land, permeable soils, and abundant ground and surface water. A report by Olcott, Hoke, and Hanson (1967) gives a description of the geology, ground-water availability, and irrigation potential of soils in Dunn County.

WATER SOURCE FOR IRRIGATION ACREAGE WITH PERMITS FOR WATER WITHDRAWAL

County	Surface water 1967		Ground water 1968		Total acres
	Acres	Withdrawal permits	Acres	High-capacity wells	
Barron	1,200	25	2,140	23	3,400
Buffalo	0	0	120	1	120
Chippewa	410	6	670	15	1,080
Dunn	880	8	1,460	12	2,350
Eau Claire	250	3	370	4	630
Pequin	230	2	0	0	230
Sawyer	300	4	0	0	300
Washburn	40	1	150	1	190
Total	3,470	53	5,600	51	9,120

Water and soils are suitable for irrigation over about one-third of the basin, however, they are not always coincident. Many soils derived from outwash or other sandy deposits have good potential for irrigation in the basin. The suitability of soil for irrigation depends upon the flatness of the land, the permeability of the soil, and the depth to the water table. The best conditions are 1) level land, which allows use of sprinkler equipment and reduces surface runoff; 2) permeable soil, which allows water to infiltrate, and 3) depth to the water table of 4 feet or more, which allows plant roots to remain in the zone of aeration for good assimilation of oxygen and nutrients.

Based on topography, soil type, and depth to water, soils in the basin are arranged in 4 irrigation suitability groups according to a classification by F. D. Hoke (written communication, 1966). Water availability, soil fertility, and air temperature were not included in this classification. In the southwestern part of the basin ground water is available to the suitable areas from sandstone or glacial outwash, and in the northern part of the basin most of these areas are related to outwash sand and gravel that will yield good supplies of ground water (see Ground-Water Availability, sheet 3). Soil fertility and air temperature must be evaluated on a local basis.



**EXPLANATION**

Suitability	Qualifications	Parent material
Good	Soil is level and permeable; water table is more than 4 feet below land surface.	Silty and sandy materials.
Good to fair	Mixed soil types with wetlands that must be drained.	Sandy organic and acid glacial materials.
Good to poor	Good only on level uplands, limited in extent; poor on the narrow, poorly drained depressions.	Acid glacial sandy outwash and loess over clay and limestone.
Good to poor	Good on level areas; poor on wetlands unless artificially drained.	Acid sandy loam glacial till, gravel outwash, loess, and organic material.
Poor	Soil permeability is low, terrain is irregular or hilly, water table is less than 1 foot below land surface.	Loess, loamy sand, and glacial till, sandstones and siltstones, and organic material.

SOIL SUITABILITY FOR IRRIGATION

## AGENCIES HAVING ADDITIONAL INFORMATION

Agency	Geology	Soils	Topography and drainage	Land use	Water budget	Ground and surface-water characteristics	Surface-water quality	Pollution	Ground-water quality	Water use
University Extension—The University of Wisconsin Geological and Natural History Survey 1515 University Avenue, Madison, Wisconsin 53706 U.S. Department of the Interior, Geological Survey, Water Resources Division 1815 University Avenue, Madison, Wisconsin 53706 U.S. Department of Agriculture, Soil Conservation Service 4601 Hammenway Road, P. O. Box 426, Madison, Wis. 53711 Wisconsin Department of Natural Resources P. O. Box 400, Madison, Wis. 53701 U.S. Department of Defense, Army Corps of Engineers 1217 U.S. Post Office and Custom House, St. Paul, Minn. 55101 U.S. Department of the Interior, Federal Water Pollution Control Administration, Environmental Protection Agency, Water Quality Office 563 Street and 40th Avenue, South, Minneapolis, Minn. 55450 Public Service Commission of Wisconsin 432 Hill Farms State Office Building, Madison, Wis. 53702	x	x	x	x	x	x	x	x	x	x

## SUMMARY

**SUMMARY OF WATER RESOURCES**

Water resources	SURFACE WATER					GROUND WATER					
	Lower Chippewa River	Flambeau and upper Chippewa Rivers	Red Cedar River	Jump, Yellow, and Eau Claire Rivers	Eau Claire River	Lakes and reservoirs	Sand and gravel aquifer	Sandstone aquifer	Sandstone aquifer	Dolomite	
Quantity	Large and generally constant flow regulated by large reservoirs at Chippewa Falls and Durand. Average discharge at Durand, 7,222 cfs.	Moderately large and generally constant flow regulated by reservoirs in the headwaters. Average discharge at Chippewa River at Reese, 1,411 cfs. Flambeau River near Reese, 1,737 cfs.	Moderately large and generally constant flow regulated by reservoirs in the headwaters. Average discharge at Mesomoon, 1,100 cfs.	Moderately small and extremely variable flows. Very little regulation. Average discharge of Jump River at Sheldon, 564 cfs. Yellow River at Cadott, 273 cfs, and Eau Claire River near Fall Creek, 342 cfs.	Very small flow. Flashy high flow but constant low flow. Flood-control reservoir at Spring Valley and small reservoir at Eau Claire. Average discharge at Spring Valley, 253 cfs.	Large volume of storage in lakes, mainly in the north. Twenty-one reservoirs along major rivers provide more than 500,000 acre-feet of usable storage capacity.	Very large yields, as much as 2,000 gpm. Wells generally 70 to 100 feet in depth in extensive outwash plains. Specific capacity of high-capacity wells ranges generally from 15 to 60 gpm per foot of drawdown.	Small to moderate yields, generally not in excess of 200 gpm. Wells generally less than 100 feet in depth.	Large yields, as much as 1,000 gpm, with wells generally 100 to 400 feet in depth. Restricted to southern third of basin. Specific capacity of high-capacity wells ranges from 1 to 1.4 gpm per foot of drawdown.	Very small yields, generally less than 20 gpm. Restricted to southwestern part of basin.	Very hard water, commonly high in iron.
Quality	Moderately good quality. Soft to moderately hard, highly colored water. Very little pollution (Schnaafel and others, 1964). Summer water temperature generally above 21°C (70°F).	Generally good quality. Soft, highly colored water. Local pollution reported (Schnaafel and others, 1964). Summer water temperature generally above 21°C (70°F).	Good quality. Soft water in outwash areas. Moderately hard to hard in lower part of stream. Slightly colored water. Very little pollution (Schnaafel and others, 1964). Summer water temperature generally above 21°C (70°F).	Good quality. Soft to moderately hard, highly colored water. Very little pollution (Schnaafel and others, 1964). Summer water temperature generally above 18°C (65°F).	Good quality. Hard to very hard, slightly colored water. Very little pollution (Schnaafel and others, 1964). Summer water temperature generally above 18°C (65°F).	Good quality. Soft, clear water in seepage lakes. Moderately hard, colored water in drainage lakes and reservoirs.	Soft to moderately hard water, commonly high in iron.	Moderately hard to hard water, commonly high in iron.	Soft to very hard water, commonly high in iron.	Very hard water.	Very hard water.
Special concerns	Damaging floods at Eau Claire, Durand, and Chippewa Falls.	Flood damages very low.	Flood damages very low.	Minor flooding but damages are low.	Flash floods upstream from Spring Valley reservoir.	Shallow lakes subject to winterkill.	Water table generally shallow. Subject to pollution.	Water table generally shallow. Generally not subject to pollution.	Water table generally 50 to 100 feet deep. Generally not subject to pollution.	Water table generally 100 to 300 feet deep. Subject to pollution.	

## WATER AVAILABILITY AND SUITABILITY FOR VARIOUS USES

Source	SURFACE WATER					GROUND WATER					
	Lower Chippewa River	Flambeau and upper Chippewa Rivers	Red Cedar River	Jump, Yellow, and Eau Claire Rivers	Eau Claire River	Lakes and reservoirs	Sand and gravel aquifer	Sandstone aquifer	Sandstone aquifer	Dolomite	
Municipal and industrial	Adequate flow. Generally good chemical quality. Treatment necessary for municipal use. Color and temperature increases in summer. Pollution reported.	Adequate flow. Generally good chemical quality. Treatment necessary for municipal use. Color. Local pollution reported.	Adequate flow. Generally good chemical quality; soft water in headwaters. Only slightly colored. Very little pollution reported. Treatment necessary for municipal use. Hard water in lower reaches.	Adequate flow. Generally good chemical quality; soft to moderately hard water. Very little pollution reported. Treatment necessary for municipal use. Highly colored.	Generally adequate flow. Generally good chemical quality. Only slightly colored. Very little pollution reported. Treatment necessary for municipal use. Very hard water.	Adequate quantity in large lakes and reservoirs. Generally good chemical quality. Treatment necessary for municipal use. Easily polluted. Locally high in iron.	Adequate for large supplies. Generally good chemical quality; minimal treatment. Available to major cities in basin. Easily polluted. Locally high in iron.	Adequate for small supplies. Generally good chemical quality; minimal treatment. Only source in most of northeastern part of basin. Limited areal extent. Detailed exploration necessary. Locally high in iron.	Adequate for large supplies. Generally good chemical quality; minimal treatment. Only source in most of northeastern part of basin. Limited areal extent. Detailed exploration necessary. Locally high in iron.	Adequate for large supplies. Generally good chemical quality; minimal treatment. Only source in most of northeastern part of basin. Limited areal extent. Detailed exploration necessary. Locally high in iron.	Generally good chemical quality. Inadequate quantity. Very limited distribution, along southwestern part of basin.
Rural domestic and stock	Adequate flow. Generally good chemical quality. Low-cost stock watering. Limited to frontage on river. Treatment necessary for domestic use. Color. Local pollution reported.	Adequate flow. Generally good chemical quality. Low-cost stock watering. Limited to frontage on rivers. Treatment necessary for domestic use. Color. Local pollution reported.	Adequate flow. Generally good chemical quality. Low-cost stock watering. Very little pollution reported. Limited to frontage on river. Treatment necessary for domestic use. Easily polluted.	Adequate flow. Generally good chemical quality. Low-cost stock watering. Very little pollution reported. Limited to frontage on river. Treatment necessary for domestic use. Highly colored. Easily polluted.	Adequate flow. Generally good chemical quality. Low-cost stock watering. Very little pollution reported. Limited to frontage on river. Treatment necessary for domestic use. Color. Easily polluted.	Adequate quantity in large lakes and reservoirs. Generally good chemical quality. Low-cost stock watering. Limited to lake frontage. Very little pollution reported. Limited to frontage on river. Treatment necessary for domestic use. Color. Easily polluted.	Adequate well yields. Generally good chemical quality. Water table generally shallow. Limited areal distribution. Locally high in iron.	Adequate well yields. Generally good chemical quality. Only source in most of northeastern part of basin. Limited to southern one-third of basin. Water table generally deep beneath hills.	Adequate well yields. Generally good chemical quality. Only source in most of northeastern part of basin. Limited to southern one-third of basin. Water table generally deep beneath hills.	Locally adequate well yields. Generally good chemical quality. Very limited distribution, along southwestern part of basin. Water table generally deep.	
Irrigation	Adequate flow. Adequate quality. Limited to areas near the river.	Adequate flow. Adequate quality. Limited to areas near the river.	Adequate flow. Adequate quality. Limited to areas near the river.	Adequate flow. Adequate quality. Limited to areas near the river.	Generally adequate flow. Adequate quality. Limited to areas near the river.	Adequate quantity in large lakes and reservoirs. Adequate quality. Limited to areas near lakes and reservoirs.	Adequate for large supplies. Adequate quality. Limited areal extent.	Adequate for small supplies. Adequate quality. Limited areal extent.	Adequate for large supplies. Adequate quality. Deep wells necessary for large yields.	Adequate quality. Inadequate quantity.	
Recreation	Suitable for fishing, hunting and boating. Pollution limits body-contact activity.	Suitable for fishing, hunting, canoeing, and boating. Many lakes and reservoirs. Many rapids and a few falls. Streams flow through National and State forests. Many parks, campgrounds and resorts on streams. Local pollution reported.	Suitable for fishing, hunting, canoeing, and boating. Several lakes and reservoirs. Very little pollution reported. Easily polluted. Limited to upper basin.	Suitable for fishing, hunting, canoeing, and boating. Many rapids and a few falls. Streams flow through National and State forests. Many parks, campgrounds and resorts on streams. Local pollution reported.	Suitable for boating on reservoirs. Very little pollution reported. Easily polluted.	Suitable for fishing, hunting, and boating, and water skiing. Many campgrounds, resorts and cottages on lakes and reservoirs. Easily polluted.	Suitable for fishing, hunting, and boating, and water skiing. Many campgrounds, resorts and cottages on lakes and reservoirs. Easily polluted.	Suitable for fishing, hunting, and boating, and water skiing. Many campgrounds, resorts and cottages on lakes and reservoirs. Easily polluted.	Suitable for fishing, hunting, and boating, and water skiing. Many campgrounds, resorts and cottages on lakes and reservoirs. Easily polluted.	Suitable for fishing, hunting, and boating, and water skiing. Many campgrounds, resorts and cottages on lakes and reservoirs. Easily polluted.	Overall evaluation of suitability for use.
Fish and wildlife habitat	Walleye, northern pike, smallmouth bass, panfish, and muskellunge. Excellent wildlife habitat in marshes and sloughs of wide flood plain. Many tributaries are trout streams. Soft water reduces fish productivity. High summer water temperature. Pollution reported.	Muskellunge, bass, walleye, and panfish. Excellent wildlife habitat in associated swamps and wetlands. Many tributaries are trout streams.	Walleye, northern pike, and smallmouth bass. Excellent wildlife habitat in associated swamps and wetlands. Many tributaries are trout streams.	Muskellunge, walleye and smallmouth bass. Catfish in Jump and Yellow Rivers. Excellent wildlife habitat in wet swamps and wetlands. Many tributaries of Eau Claire River are trout streams.	Some tributaries in upper basin are trout streams. Mainly rough fish. Very few swamps or wetlands for wild-life habitat.	Excellent for fish. Suitable wildlife habitat in associated swamps and wetlands. Hard-water drainage lakes have high fish productivity.	Excellent for fish. Suitable wildlife habitat in associated swamps and wetlands. Hard-water drainage lakes have high fish productivity.	Excellent for fish. Suitable wildlife habitat in associated swamps and wetlands. Hard-water drainage lakes have high fish productivity.	Excellent for fish. Suitable wildlife habitat in associated swamps and wetlands. Hard-water drainage lakes have high fish productivity.	Excellent for fish. Suitable wildlife habitat in associated swamps and wetlands. Hard-water drainage lakes have high fish productivity.	Advantages for use: Good. Limitations for use: Fair. Poor.

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