RETURN TO S. YOUNG

DRAFT

STUDY REPORT
ON THE
WOLF RIVER, WISCONSIN

Prepared by the Lake Central Regional Task Group
For Consideration of the Wild Rivers Study Team
September 1964

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WOLF RIVER

Wisconsin

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September 1964

Task Group Members

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NOTE

This draft report was prepared by the Lake Central Regional Office of the Bureau of Outdoor Recreation in accordance with a letter of June 3, 1964, from Associate Director Stevens to Senator Gaylord Nelson of Wisconsin. The recommendations made herein are concurred in generally by the regional Wild Rivers study team, which discussed the Wolf River situation at a recent meeting. To save time, the team has not reviewed the report itself. This report was prepared as a working paper for the review and consideration of the Washington Wild Rivers Study Team, which may or may not accept the recommendations made herein. The findings made in this report are not necessarily those of the State of Wisconsin or of the Federal agencies represented on the regional task group or of the Washington Wild Rivers Study Team.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
LAKE CENTRAL REGION
15 RESEARCH DRIVE
ANN ARBOR, MICHIGAN 48103

September 16, 1964

Memorandum

To: The Director

From: Regional Director, Lake Central Region

Subject: Wild Rivers: Wolf River, Wisconsin

Enclosed is material received from the Wisconsin Conservation Department and Casper Buettner of White Lake, Wisconsin regarding the Wolf River. These two sources and the Wolf River Basin Regional Planning Commission were contacted during the week of July 20 by team members Eichstedt, Uppgren and Miller. Additional contacts were made during the week of August 24.

The study team in its report of September 13, 1963 found that the stretch of the Wolf River, from the confluence of the Hunting River near Lily, Wisconsin to Keshena, Wisconsin, meets the five criteria to be satisfied for a river to be included within a Wild Rivers System. The team affirms this finding. The team further recommends a Federal-state cost sharing arrangement for furtherance of a Wild Rivers program on the Wolf River, in accordance with the Land and Water Conservation Fund Act. The 48 mile study stretch of the Wolf River remains as in the original report.

The study stretch of the Wolf River lies within two counties: Langlade upstream and Menominee below. This relationship is shown on Enclosure (1), a vicinity map. The forest bordering the river is second growth hardwood with some pine. The river is interesting from a canoeing standpoint and scenic. The stream is widely known for its trout fishing and is clean and unpolluted. As shown in Enclosure (2), ownership consists of assorted private holdings, some in fairly sizeable blocks, and limited public holdings. Most of the land in Menominee County is under a single corporate owner, Menominee Enterprises, Incorporated.

A great deal of local and state interest centers around the Wolf River. The Wisconsin Conservation Department consistently has listed the Wolf at the top of its Wild Rivers list. By an Act of August 23, 1963 (Chapter 253, Laws of 1963), the Wisconsin Legislature has prohibited navigation improvements or dams on the Wolf River north of the southern boundary of Shawano County, beginning below the study stretch and extending upstream. A copy of the law is enclosed at the end of the report.

Some evidence of the degree of interest in the stream is shown by the existence of 64 conservation clubs within the eight county area adjacent to the Wolf River. In addition to these sportsmens clubs, the following organizations are involved with the Wolf River:

Wolf River Basin Regional Planning Commission (under auspices of the Wisconsin Department of Resource Development)

Menominee Enterprises, Incorporated (representing Menominee interests in the former Menominee Indian Reservation)

Trout Unlimited

Trees for Tomorrow

Wisconsin Trout Fishermen's Association

Wolf River Country, Incorporated

Sierra Club (John Muir Chapter)

Wolf River Improvement Committee

The situations within Langlade and Menominee Counties are so different that the Wolf River can be considered as two separate study stretches. Plans for the Langlade County portion of the Wolf River can proceed immediately. It is recommended that the State of Wisconsin, in concert with the Wolf River Basin Regional Planning Commission and Langlade County, develop a master plan for that portion of the Wolf River lying in Langlade County and proceed with its execution. The plan should be comprehensive, including land use plans, proposed zoning ordinances, management programs and proposed acquisition of fee or easements to perpetuate and improve the outstanding recreation qualities of the stream.

The situation in Menominee County is much more complex and is explained in a special report, Enclosure (4). Solutions to the problems in Menominee County are neither simple nor close, and are much wider in scope than mere resource problems. Menominee County can draw up a land use plan for the Wolf River and enact zoning ordinances. This is a simple measure which can be taken to help preserve the outstanding qualities of the Wolf River, and it is recommended that such action be taken. A total program would consist of many more facets, however, some of which are discussed in the appended report.

This submission includes, among others, copies of six documents:

Encl. 5 The Wolf River by Arthur Oehmcke and Wayne C. Truax, Wisconsin Academy of Sciences, Arts and Letters at the 94th Annual Meeting, May 2, 1964. This presentation is a good SUMMARY of the Wolf River.

Encl. 6 Wolf River Watershed. A report of the Wolf River Study Committee, Wisconsin Conservation Department, 1962. This report is more detailed than the above and emphasizes the recreational aspects of the Wolf River Watershed.

Encl. 7 The Wolf River Basin. A report to the Water Resources Committee of the Wisconsin Legislative Council, August, 1960. Prepared by Ann C. Williams and others under the supervision of Professor J. H. Beuscher, University of Wisconsin Law School. A comprehensive treatment of the river basin including an analysis of alternatives.

Encl. 8 Project MAP (Menominee Action Program) as proposed by Governor John Reynolds on July 27, 1964.

Encl. 9 Work and Conservation Program for Help to Menominee County, special advisory committee report to the Wisconsin Attorney General, August 20, 1964.

Encl. 10 Federal Register excerpt, April 29, 1961.

These sources, plus the other enclosures, present a concise picture of the Wolf River and problems related to it.

Roman H. Koenings
Regional Director

Enclosures: (1) Vicinity map
(2) Ownership map
(3) Study stretch map
(4) Special Report on Menominee County
(5) Paper on The Wolf River by Oehmcke and Truax
(6) Wisconsin Conservation Department report on the Wolf River Watershed
(7) Report to Water Resources Committee on The Wolf River Basin
(8) PROJECT MAP, as proposed by Governor Reynolds July 27, 1964
(9) Work and Conservation Program for Help to Menominee County, special advisory committee to Attorney General, August 20, 1964
(10) Federal Register excerpt, April 29, 1961
(11) Wisconsin Laws of 1963, Chapter 253

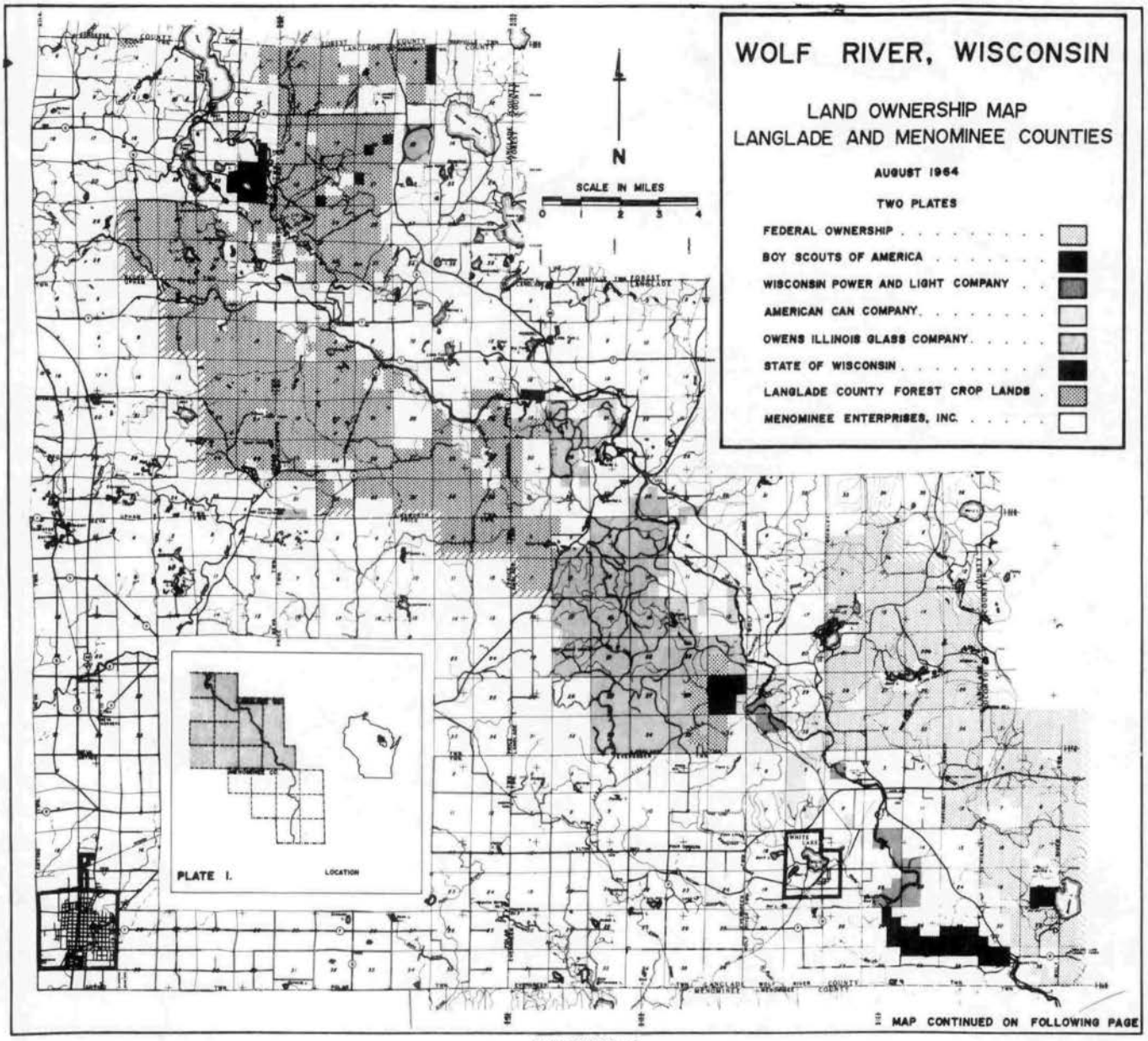
VICINITY MAP

WOLF RIVER DRAINAGE BASIN

SCALE IN MILES

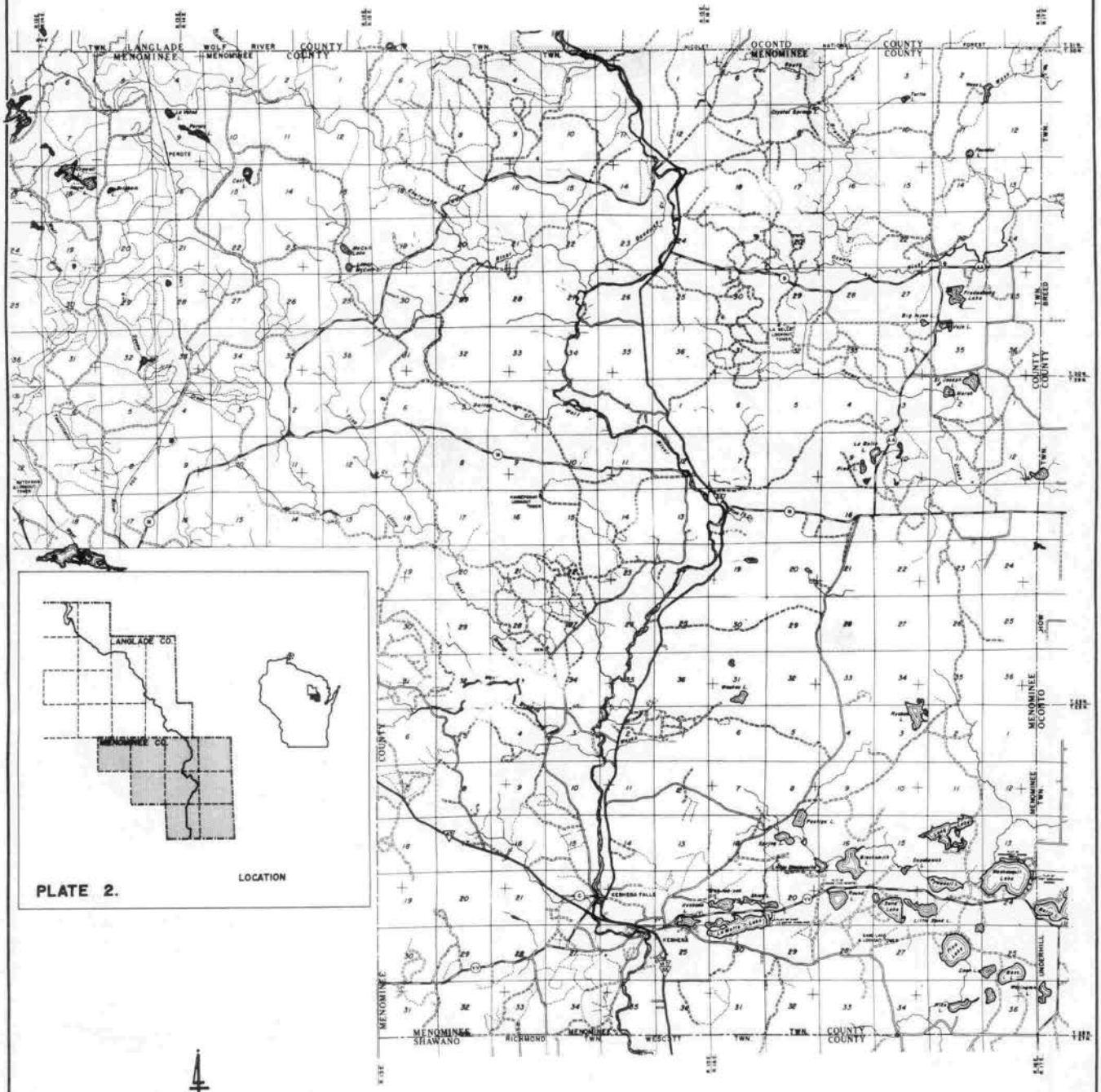
25 0 25 50

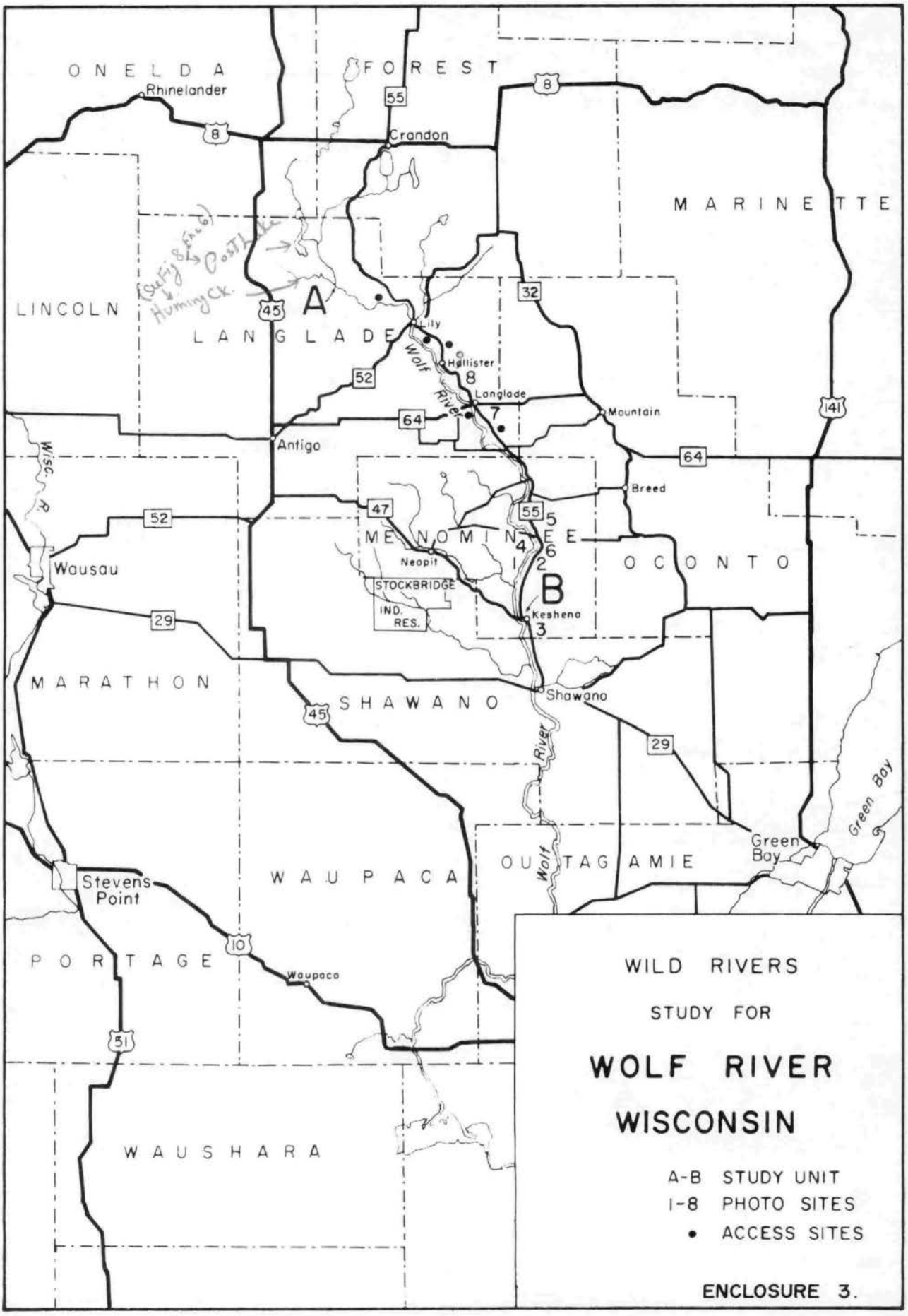
ENCLOSURE I.


WOLF RIVER, WISCONSIN
LAND OWNERSHIP MAP
LANGLADE AND MENOMINEE COUNTIES
AUGUST 1964
TWO PLATES
FEDERAL OWNERSHIP
BOY SCOUTS OF AMERICA
WISCONSIN POWER AND LIGHT COMPANY
AMERICAN CAN COMPANY
OWENS ILLINOIS GLASS COMPANY
STATE OF WISCONSIN
LANGLADE COUNTY FOREST CROP LANDS
MENOMINEE ENTERPRISES, INC.
N
SCALE IN MILES
0 1 2 3 4
PLATE I.
LOCATION
MAP CONTINUED ON FOLLOWING PAGE

ENCLOSURE 2.

MAP CONTINUED FROM PRECEDING PAGE




ONELDA
FOREST
Rhinelander
Crandon
MARINETTE
LINCOLN
LANGLADE
A
Lily
Hollister
Wolf River
Langlade
Mountain
Antigo
Wisc. R.
Breed
MENOMINEE
OCONTO
Wausau
Neopit
STOCKBRIDGE
IND. RES.
B
Keshena
MARATHON
SHAWANO
Shawano
Wolf River
Green Bay
Green Bay
OUTAGAMIE
WAUPACA
Stevens Point
PORTAGE
Waupaca
WAUSHARA
WILD RIVERS
STUDY FOR
WOLF RIVER
WISCONSIN
A-B STUDY UNIT
1-8 PHOTO SITES
• ACCESS SITES
ENCLOSURE 3.

R.M.H. 630903

Enclosure (4)

Special Report on Menominee County

September 1964

Menominee County was created in April, 1961, from the former Menominee Indian Reservation, as evidenced in enclosure 8. The plight of the Menominee Indians is desperate. Any proposal for Wild River status is a social as well as a resource issue. A great deal of state activity centers on Menominee County.

Much interest in Federal action on the Wolf River seems to stem from an uncertainty over the future of Menominee Enterprises, Incorporated. This corporation was established in April 1961 when the Menominee Indian Reservation was terminated (25 U.S.C. 891) and Menominee County created in its place (Chapters 258, 259, and 260, Laws of Wisconsin, 1959). Menominee Enterprises, as a corporate body, represents Indian interests in Menominee County. Nearly the entire county is owned by the corporation. Principal apprehension seems to center around the possibility of outsiders gaining control of the corporation and exploiting the outstanding timber resource, to the detriment of the river. Menominee County contains a magnificent forest including a stand of virgin white pine of over 400 acres.

The possibility of takeover of Menominee Enterprises appears remote, provided the State takes appropriate action. Stockholders consist of tribal members whose voting interests are assigned to

a seven member voting trust, four of which are tribal members. The board of directors consists of nine members, four of which are tribal members. Income bonds have been issued to tribal members in an aggregate principal amount of $10 million. The bylaws of the corporation and the indenture between Menominee Enterprises, Incorporated and the Wisconsin Trust Company (which presently controls 36 percent of the votes as trustee for minors and persons non compos mentis) provide Menominee Enterprises and the State of Wisconsin with first and second options, respectively, to purchase both the stocks and the bonds, should they become available for sale.

The voting trust arrangement, together with the role of the Wisconsin Trust Company as trustee for a large body of Indians, overcome gaps in training and experience among the over 3,000 Menominee members, and insure stability in management of the corporation, particularly during critical early years. Tribal voting interests are recognized by trust certificates issued to enrolled tribal members. The trust certificates become salable in January of 1966 and can be acquired by outside interests, provided the corporation or the State do not exercise options to acquire them. The new owner is bound by the voting trust agreement. All significant interests can be acquired by either the corporation or the State of Wisconsin.

The legal documents prohibit the corporation from selling land unless approved by holders of not less than two-thirds of the

outstanding shares of stock entitled to vote. Whether the corporation, with the concurrence of five members of the voting trust, would sell land is open to speculation. Indian interests have rebuffed at least two attempts by the Department of Conservation to buy land.

From the standpoint of immediate threat to the Wolf River in Menominee County several possibilities stand out. One is that an owner may withdraw from the sustained yield forest management plan required by law any parcel of land not exceeding ten acres in size in each calendar year, to a total of 250 acres cumulatively. This provision could or could not result in damage or defacement to the most outstanding parts of the Wolf River, depending on the use to which the lands were put. Even without withdrawal, unsightly developments could spring up. Some methods should be developed to prevent this happening. Zoning ordinances, acquisition of easements, or purchase of the outstanding sites are possibilities.

Trust certificates have been issued to stockholders in lieu of stock certificates. These trust certificates carry a voting privilege and will be available for sale in January of 1966. It is expected that through assignment or outright purchase an unknown number of certificates will change hands. Through acquisition of these certificates, outside control of the corporation is possible. Before sales to outside individuals can be made, the corporation

and the State both have options to acquire the certificates. Since the corporation probably will not be in a financial position to pick up the certificates, the State must have available sufficient funds to acquire them. These funds will have to be made available during the next legislative session beginning in January of 1965. It is recommended that the State seek these funds, the amount to be determined by more detailed study.

Another threat exists: Menominee Enterprises is so desperately in need of income it is proceeding with a plan for developing, under lease, large frontages on lakes and streams. The plan is to increase the tax base through construction of summer homes, thereby reducing the tax load carried by the corporation and also providing an income to Menominee Enterprises. An ambitious master plan was drawn by Neilan Corporation, a firm of engineers in Pennsylvania. Although the corporation is using the plan generally, it is not seeking professional assistance in the laying out of lots or site development and may even grant other corporations, such as home builders, leases for colony developments. Without professional planning guidance and effective controls, the potential for low grade development with consequent destruction of the landscape is great. It is recommended that the corporation seek immediate and qualified professional assistance in planning and developing its recreation lands, and follow the advice of those planners.

Within a month of each other two reports have been issued by State agencies recommending courses of action in Menominee County.

The earlier proposal was made by the Conservation Commission to the Board of Directors of Menominee Enterprises, proposing a 4,340 acre state park along the most scenic portion of the Wolf River and a 480 acre native white pine area away from the river. The second report, more comprehensive in nature, was made by a special advisory committee to the Wisconsin Attorney General. The report is entitled "A Work and Conservation Program for Help to Menominee County" and, among other things, recommends acquisition of most corporation holdings for a state forest or state forest recreation area. The Attorney General's report is included as enclosure 8.

It appears that communications between the Indians and other interests could be improved. With increased communicative effort on the part of those studying the problem, and increased receptivity on the part of the Indians, plus a bit of salesmanship on both sides, perhaps those interested in accomplishing something will be able to arrive at a course of action jointly.

It appears that, from a legal standpoint, all safeguards have been taken which can be taken to assure operation of Menominee Enterprises in the best interests of the stockholders and of the general public. With timely State action through provision of funds for acquisition of voting trust certificates, outside interests will not gain control of the corporation. The emphasis must be on timely action. If the corporation receives an option to purchase trust

certificates which it fails to exercise, the option must be assigned to the State within 45 days after receipt of the option. The State has until 90 days after the corporation receives the first offer to purchase the certificate. Much delay can be avoided by prior agreement between the corporation and the State and the provision of funds by the State. This is a stopgap measure only, and does not answer the question of whether or not, in the long run, it would be desirable for the State of Wisconsin to acquire a controlling interest in Menominee Enterprises.

Considerable legal involvement can be expected due to the wide distribution of both trust certificates and bonds. We believe there will be a great amount of misunderstanding between owners and buyers regarding the value and rights involved in the two documents. The options held by the company and the State will not be generally known. It is recommended that these options be widely publicized, particularly if either group intends to exercise its option. If not, the procedures for selling and buying should be widely publicized. A vigorous educational campaign will not eliminate complications but might reduce them in number.

In summary, the Wolf River is a recreation resource of outstanding quality and merits use of Federal funds for land acquisition and other uses in accordance with the Land and Water Conservation Fund Act. Though not specifically elements of recreation land planning,

consideration should be given to the following interrelated and allied subjects:

(1) Funds should be appropriated at the State level, during the 1965 legislative session, for the purchase of Menominee Enterprises trust certificates as they become available, and advance agreement should be reached with the corporation regarding exercise of options to purchase the certificates.

(2) An education program should inform buyers and sellers of corporation documents on necessary procedures.

(3) Further studies and proposals by the State of Wisconsin should be conducted with free and open communications between Menominee County residents and thosemaking studies, and, so far as possible, proposals should be arrived at jointly.

(4) Planning and zoning should proceed within Menominee County to assure perpetuation of the high recreation values therein.

(5) Before it proceeds further with leasing of recreation sites, the corporation should seek and follow the advice of qualified professional site planners.

Enclosure (5)

Wisconsin Conservation Department
Madison 53701

THE WOLF RIVER

Arthur A. Oehmcke
NE Area Supervisor, Fish Management

Wayne C. Truax
EC Area Supervisor, Game Management

(Paper presented to Wisconsin Academy of Sciences, Arts and Letters
at 94th annual meeting (Wausau) May 2, 1964)

INTRODUCTION

The early picture of northern Wisconsin so aptly portrayed by our state historians largely reflects the beginning of the development of the entire Wolf River Basin. This river system was an integral part of the mass resource exploitation (otherwise categorized as "progress") for which men labored in the pineries of Forest, Langlade and Shawano Counties, and then in the fields and factories after the wood was gone.

As a major tributary to the Fox-Winnebago waterway, the Wolf River Basin was first traversed by French explorers, fur traders and missionaries, all compatriots of Jean Nicolet who came to the Green Bay area in 1634. After the French (1763) and then the English (1815) relinquished control of the region, the first Wisconsin settlers moved into the upper Wolf River Basin.

The first permanent white settlement appeared at the outlet of Shawano Lake in 1843. Here, Charles D. Wescott constructed a sawmill for Samuel Farnsworth. The sawmill was adjacent to the site of "Shawanaw", then an Indian village on the Wolf River. This point in upper Wolf River history was important to the economic expansion of the Fox-Winnebago area which is importantly linked to the lower Wolf.

Steamboats and other river navigation on the lower Wolf during 1849 to 1854 were instrumental in spearheading settlement and, subsequently, the fabulous logging operations on the central and upper Wolf River Basin.

Wolf River log drives reached their destination at Lake Poygan where timber companies made up rafts of logs which were floated to Oshkosh. In 1873, at the peak of logging, 217,000,000 board feet of lumber were sawed in mills in Oshkosh, which was properly named the "Sawdust City".

The entire length of the Wolf River was utilized for the transportation of saw logs. Remnants of small impounding structures and rafting dams, constructed in the mid-19th century at fifteen different sites on the main stream to flush logs over shallow stretches, are witness to the extent of the early log drives.

Not all saw timber was driven downstream to Lake Poygan. Railroad and wagon road penetration into the upper watershed by 1870 and 1880 aided in the development of local mills at Hiles, Lily, White Lake, Red River, Langlade, Pearson and many other sites on the main stream and tributaries.

The reputation of the upper Wolf River system as prime trout water is well established. Before the turn of the century this region was the destination for anglers from many midwestern states. Trout fishing on the West Branch of the Wolf River is described in an article in the magazine, "Forest and Stream", by Dr. Alfred Hinde of Chicago in 1894. Dr. Hinde reported his

railroad trip to Matoon, via Oshkosh and Aniwa, where he

> "Drove by team to Phlox (a distance of four miles). Went half way toward W. Branch of Wolf. Two miles through virgin woods to an Indian sugar camp on the Menominee Indian Reservation . . . . Found fishing rough, fighting brush, mosquitoes, etc. Stream had to be waded, too deep at some places. Had to use worms, fly fishing impractical. First day 95 trout . . . 334 trout in 3½ days (3 men) - largest 1½ pounds. Found the trout small, the river difficult to fish and too inaccessible for comfort."

Thus, even virgin fishing had its critics. But its supporters frequented the inns, fishing camps and small hotels in nearby sawmill towns and the City of Antigo.

Although initially dependent on the upper watershed, the later economy of the Lower Wolf-Fox-Winnebago area experienced a different trend in growth resulting, in the main, from its geographic position. The proximity to the fertile bottom lands of Wisconsin's Central Plain, to low cost transportation and, consequently, necessary raw materials, were among more important factors of opportunity which were eagerly seized by the early citizens of this locality. Their initiative is well documented and presently in evidence by the great complex of paper mills in the adjacent Fox River Valley and the prospering urban areas between Oshkosh and Green Bay.

The economy of the upper Wolf River Basin transformed directly from pioneer land clearing and lumbering to dairying. There was no intermediate wheat growing era prior to implementation of dairying as in the more southern counties of the state. The watershed of the upper Wolf has not prospered at the same rate and to the same extent as the larger area of its lower basin. But, the lack of natural resource "development" in the upper watershed might possibly be considered a blessing to the state as a whole. Many of the original natural endowments on the upper Wolf have not been obliterated or despoiled although some have been considerably altered. Thus, many features and resources remain for our wise use and/or enjoyment; some by chance, others by deliberation.

THE RIVER

Several characteristics of the Wolf River are common to other classic Wisconsin streams. The precipitous drop of the central Wolf is duplicated on the Menominee, Popple, Pine and Peshtigo Rivers. The Wolf River has a total vertical drop from source to mouth of 903 feet, contrasted with the 1,018-foot fall of the Peshtigo River.

The Northern Highland ground moraine gives birth to the Chippewa-Flambeau, Brule-Menominee and the Wolf River systems. From this gravel-covered granite perch, all four streams flow down to lowland areas of the Mississippi River and Lake Michigan.

The Wolf tumbles, riffles and meanders through 220 miles of terrain of eight counties from its source in Little Pine Creek north of Hiles, less than 25 miles from the Wisconsin-Michigan boundary, to Lake Poygan. The forested headwaters of the Wolf are distinctly slow-moving. Not until the Wolf has coursed through about 12 miles of northern Langlade county does it

begin its spectacular lurch to Keshena Falls. In this stretch alone the Wolf descends nearly 700 feet.

After leaving the granitic-crystalline upland, the pace of the Wolf slows down considerably, falling only about 50 feet in its 100-mile course from Shawano to Lake Winneconne.

Gauging stations on the Wolf River operated by the United States Geological Survey for nearly 50 years indicate an erratic flow from seasonal high water levels caused by prolonged periods of precipitation and heavy runoff. During drought years (viz. 1961-64), the level of the lower Wolf drops to such an extent that walleye and northern pike are prevented from reaching their natural spawning marshes. The average volume of flow in the Wolf River is 1,734 cubic feet per second. Annual precipitation in the watershed varies from an annual high average of 43 inches to a low of 23 inches.

Fish populations in the lower warm water sections include game fish, panfish and rough fish. The more important species of these groups are lake sturgeon, walleye, largemouth bass, northern pike, white bass, catfish, perch, bullheads, crappies, bluegill, carp, sucker, sheepshead, eelpout, and garfish.

The fishing in the Wolf above Keshena Falls for a distance of 60 miles consists predominantly of brown trout, but rainbow and brook trout are taken early and late in the season.

Another warm water fishery exists at the headwaters and is made up of species similar to those found in the lower Wolf with the exception of the sturgeon, white bass, catfish, sheepshead and carp. While muskellunge are present in the lower Wolf, they are much more abundant in the headwaters, particularly in the Post Lake area.

The flat, expansive flood plain of the Wolf River below Shawano and the characteristic heterogeneous habitats in the subwatersheds provides a variety of wildlife species for hunting and observation. Deer and grouse are abundant while farm game occupies the habitat along the forest edges. About 27 per cent of the 1,169,720 acres in the lower basin is forested, amounting to 316,650 acres. The remainder is made up of extensive open wetlands, largely incapable of being drained, and farmland. Thousands of acres are in fur farms for the production and harvest of muskrats, mink and otter. The degrees of management vary greatly, depending on the resources of the private owner, the natural attributes of the land and the fur market.

Waterfowl traditionally use the lower Wolf in their spring and fall migrations. Summer residents are largely teal and mallards and other species occasionally nest along the sloughs, in the muskrat ditches and on the shores of the adjacent lakes.

A discussion of the scenic and aesthetic values of the Wolf River generates another encore to that splendid central portion with its white water, foaming cascades and the beautiful gorges in Menominee County called the Dalles. Hardly any other Wisconsin canoe route offers a trip on one of the more important trout steams which, in Langlade and Menominee Counties, is considered to be one of the state's most scenic, exciting, rugged and dangerous. The precaution that it is not recommended for inexperienced

canoemen is sufficient commendation for this stream. To comfort present day "voyageurs", numerous unimproved campsites are found on the river along with adequate put-in and take-out spots. Since no rapids or dams are found in the lower stretch of the Wolf, a trip in this section is ideal for novice canoeists.

One must indulge in fishing, canoeing, boating or hiking to appreciate to its fullest extent the beauty of the Wolf River. The northern hardwood stands and age-old conifers lining its banks, have already disappeared from most Wisconsin streams.

An erroneous reputation of being the least "dammed" stream in the state has been awarded the Wolf. Actually, there are five dams upstream from the city of Shawano. The Shawano, Upper Shawano, and Keshena dams are used for electric power generation and have a capacity of 1,590 kilowatts. The Post Lake and Little Rice Flowage dams in Langlade and Forest counties are primarily recreational and water storage reservoirs.

Existing Dams

THE FEEDERS

Six major tributaries drain the 3,750 square miles of the Wolf River Basin. The post-glacial drainage pattern displayed by the Evergreen, Red, West Branch, Little Wolf, and Embarrass Rivers on the west and northwest portions of the basin account for most of the runoff from this large area. Only the small sub-watershed of the Shioc River is of any consequence east of the main stream. The contribution of the Lily River and Nine Mile Creek in the upper Wolf River of Langlade county is significant to the trout management program of the upper river system.

All of the Wolf's feeder streams have their origin in springs, spring seeps and naturally exposed aquifers in the glacial sands and gravels. The fact that nearly every stream in the feeder system sustains a trout population confirms the quality of the water.

With several exceptions, almost all branches of the Wolf have moderate to high gradients. However, spruce-cedar shelves on the Nine Mile, Evergreen and Lily have provided excellent locations for beaver to impound water.

Thus, problems in management programs develop since the feeder streams, with very few exceptions, are high-grade trout waters. An increasing trend in beaver populations is occurring on the headwaters of the sand country streams of Waupaca and Shawano Counties. Beaver numbers in the forested portions of the upper watershed are gradually being controlled through special regulatory management.

Among the best producers of trout, the Wolf's tentacles in Waupaca and Waushara Counties are heavily fished for trout and are noted for their high capacity for natural reproduction. The reputation of the Tomorrow, Little Wolf, White and Waupaca Rivers for their ability to maintain themselves without stocking are a few examples.

Northern feeder streams of some repute include the Evergreen River, Nine Mile Creek, Spring Creek, and the Hunting River. Because of past extensive beaver damage, these streams are not as productive as they were in previous years. They are nonetheless meeting present fishermen demands by a heavy "put and take" trout stocking and stream habitat improvement program.

Many miles of scenic tributary waterways can still be found on the Wolf watershed but farming, logging and general habitat changes have transferred the present feeder stream scene from one of continuous stream cover to a broken pattern of farm-woods-field. Exceptions, of course, appear on the main stem and branches of the West Branch of the Wolf, the Red and Evergreen Rivers in Menominee County. Here, the preservation of wilderness and attendant values to a stream are demonstrated in Wisconsin's last big timber stand.

Even though the main Wolf can boast of fewer dams than other state streams of similar size and importance, not as much can be said of its feeders. This fact is particularly true of the Embarrass River where five dams have been built and still operate. Ponds in back of these barriers support, for the most part, warm water fish populations. Constructed originally for sawing lumber and grinding feed, they no longer serve such purposes. Most sites have been used as hydro-electric plants but several have been abandoned in the past 15 years.

In their entirety, the 1,352 miles of feeder streams, making up the sub-watersheds of the upper Wolf River, drain 790,041 acres, or 32.3 per cent of the 2,438,900 acres in the watershed as a whole and offer varying characteristics. Those in the upper portion of the watershed originate in forested subwatersheds which provide habitat for typical forest game species including deer, ruffed grouse and snowshoe hares.

Watersheds which the feeders drain, and which are west of the main stem of the Wolf River below Menominee County also have typical forest game species. Marginal farming and other factors produce a bioecological complex conducive to forming habitats occupied by a greater variety of game species including farm game along with forest species.

East of the main stem the subwatersheds are fewer and larger, draining better soils. Forest cover is lacking and farming is more predominant than elsewhere in the Wolf River basin. This gives rise to farm game habitats with forest species in the more or less isolated forest coverts. Wildlife is less abundant in this region than elsewhere in the basin, but the area has considerable potential as will be discussed later.

THE LAKES

Three significant inland lake areas appear in the Langlade, Menominee, Shawano and Waupaca County portions of the Wolf River basin. There are over 400 lakes of glacial origin which vary in size from several acres to over 10,000 acres, but most contain less than 100 acres of surface area. Lakes Poygan and Shawano are the largest and the most prominent natural lakes in the Wolf watershed. They are also classified among the twenty largest lakes in the state.

The nature of the substrate from the northern to the southern extremes of the basin influences the fertility of the lakes. Those lakes formed in or adjacent to glacial drift containing limestone and dolomite, or near sedimentary rocks of a calcareous nature, have a high proportion of nutrients. The crystalline-granite sands and gravel of the northern section of the watershed contribute hardly any material of a soluble nature and as a result the lakes in this region are not very fertile and consequently less productive. Generally speaking, the clarity and lower temperatures of the water in the northern lakes make them highly desirable for water recreation activities, whereas the lower watershed lakes warm up considerably and, due

to their higher fertility, lack the clarity desired for general water-centered activity except fishing. All fish species listed for the north and south sections of the main Wolf River are also common to lakes of these sectors of the river basin.

Thus, the factor of fertility points up the productivity of the lakes in the basin, and although there is danger in any generalization, one can safely say that good fish-producing areas generally are found in the better farming areas.

FORESTS AND LANDS

Almost all of the original forest is gone from the Wolf watershed, but a remarkable recovery has taken place in the present woodland area which covers about 46 per cent of the entire Wolf River basin. Agriculture, urban areas, water and highways absorb the remaining surface area.

Our foresters tell us that this region contains over 1,000,000 acres of commercial forest land, 61 per cent of which is privately owned by small landowners.

The only remaining choice pine is found in Menominee County, but these species have been replaced in other counties predominantly by dense hardwoods and aspens. Mixed hardwoods and lowland hardwoods in the lower portion of the basin and oak in the sandy, well-drained soils of the western section is typical. Farming is the major land use in the southern half of the watershed with livestock and livestock products the more important source of farm cash income.

The use of lake and stream frontage for rest and recreation has grown considerably. Much river frontage on the main Wolf north and south of Shawano has been platted and is being sold and developed. Many small land parcels have been acquired by trout fishermen and hunters on this extensive water system. Riparian lands in public ownership on this river show a much more healthy ratio to private holdings in Forest, Oneida and northern Langlade Counties. South of the village of Hollister, however, the picture changes drastically, and private ownership of downstream river frontage runs higher progressively.

Highways to all portions of the river basin are not only adequate but of excellent quality. General public access facilities to the Wolf ranges from fair to good except for Menominee Enterprises, Inc., lands in Menominee County. Access to major lakes is fair, but poor to nonexistent on many lakes under 100 acres.

THE PEOPLE

Census figures from 1960 show that the human population of the Wolf watershed has decreased by nearly 3,000 people since 1950. This decrease appears to parallel similar rural area population trends in Wisconsin and the United States.

The various sectors of the river basin have very low population densities. Only 2,600 people, mostly Menominee Indians, inhabit Menominee County, one of the less populated vicinities in this river system.

PROBLEMS AND POTENTIAL

During periods of abnormal rainfall, high water has created an incessant problem in the lower Wolf River and damaging floods, particularly in the New London area. The Corps of Engineers of the United States Army contends that most lower Wolf River lands will flood because of the nearly flat slopes of the river's natural cross section and that the high flow during flood stages cannot help but spread out over the lowlands below Leeman. While this may be considered a problem, it perhaps is not greater in scope than any other lowland river area. The frequency of flooding leaves one to speculate that possibly changes in land use and land-use patterns, and less emphasis on river channel improvement effective and economical. It is noted that only 39,000 acres of the total watershed area are subject to floods. It would appear that local planning could devise some system of eliminating areas of this type without creating additional problems throughout the watershed.

Paradoxically, drought influence on trout habitat and the effect of irrigation during periods of low rainfall present as much of a dilemma to administrators as the flood situation in the lower watershed. Low flows and excessive irrigation on feeder streams have caused warming of water and destruction of trout habitat.

The anxiety of the people in the more economically distressed areas of Forest and northern Langlade County to broaden their tax base and "develop" generally has led to problems in "over-development" and destruction of fish habitat along lake and stream banks. The cover in many instances has been ruined in the so-called "cleanup" of stream banks and lake shores, and has resulted in a look of artificiality. When one considers that there are over a thousand spring seeps and spring ponds on the Wolf River from the County "A" bridge to the Menominee County line, it is understandable that the problem must be acted upon at once.

The development of the upper watershed has also been challenged by well-meaning individuals who feel that the construction of a dam will provide greater water recreation opportunity regardless of the general nature of the impoundment. It is understandable from the planner's viewpoint and the governmental officials' outlook that extremely heavy use and increased public traffic will be the picture in the future. The recent controversy over the proposal to establish a dam on a slow-moving portion of the upper Wolf River and more recently the proposal to establish a dam in the Leeman area has aroused the ire of many sportsmen and other individuals who believe the quality of the remaining stretches of the Wolf River, which now run unimpeded, will be injured. The proponents contend that the deleterious effects on the other portions of the Wolf River will be minimal and the benefits from new impoundments will far outweigh any damaging effects. The Wisconsin Conservation Commission has opposed the construction of such dams on the basis that trout values would be ruined on the upper Wolf and spawning migrations of sturgeon and other species of game fish on the lower Wolf would be lost and the effects would be felt on the Winnebago-Fox area as well.

It is obvious that increased boat traffic will create additional demands on the river. It is hoped that unnecessary speed and excessive horsepower can be held to a minimum so that there will be no menace to future canoeing, on the lower Wolf particularly.

Feeders to the Wolf River generally are the problem areas and will continue to be plagued with problems of pollution, destruction of land

cover and irrigation. Although the main stem of the Wolf provides the name and the glamor, trouble usually centers on the feeder streams. The pollution from creameries, cheese factories, and in some instances municipalities has made it necessary for the State Board of Health to issue orders for cleanup. This was accomplished in 1951, and it appears that good compliance is being made. On the brighter side, it has been mentioned already that the future of trout fishing, particularly in the sand country area, is improving. This outlook is enhanced by the land acquisition program on the feeder streams in these areas. If the construction of dams can be prevented and cover can be restored and protected, it is quite evident that stabilized flows and improved quality of water would be a reality.

What the future might offer for lake areas in the upper watershed is demonstrated by the intensive development around Shawano Lake and the more southerly lakes of the basin. Future demands on water recreation will be just as intense in this watershed in the future as it is in the more populous localities of the state today. Fewer people appear to be in pursuit of fishing opportunities and the quest for swimming, sight-seeing, and relaxation is being substituted.

While the lakes furnish about 8 times more water area in the basin, the larger streams offer much more available frontage and hence will require zoning or some other control measures to provide for protection as well as orderly development. Natural inland lakes cannot be replaced by artificial impoundments. The creation of artificial water areas generates additional problems of warming and siltation. This should be avoided.

Present forest inventory information on the watershed shows a real potential for increasing tree growth rates to ½-cord per acre per year. Foresters claim a step-up of this nature could provide most of the wood for Fox River Valley mills. In order to realize the full potential of the forest lands, woodland grazing (presently a No. 1 offender) must be curtailed drastically. The well-forested watershed will retard runoff, promote infiltration, and generally contribute to improvement of the economy.

Wildlife management is conducted as a 2-pronged attack using both public and private funds. The long-range objective is public ownership of some 10,000 acres consisting of the larger wetland areas offering choice development possibilities. These are to serve for demonstration as well as public hunting grounds and resting areas. Waterfowl and fur-bearers will be given top priority along with other resident species which occupy the edges. Water control and manipulation by gravity or pumping is planned.

Private wildlife management is a vast untapped potential in the watershed. The key to exploiting this tremendous resource is--technical advice! Game management planning and supervision is under way on more than a dozen private projects.

In summary, we envision a network of strategically located public areas surrounded by numerous satellite management projects, privately owned. All of the game habitats mentioned are within an hour's drive of the populous lower Fox River Valley. Accessibility, along with the excellent wildlife potential of the basin, will make the Wolf River Basin an increasingly important hunting area.

Pressures from increased population in and near urban centers outside the Wolf watershed are being felt. The cry is for more recreational

"lebensraum" and for more freedom in achieving it. Such forces are met with counterpressure from within the river basin to "broaden the tax base" by subdividing private lands and platting. Interior forces in the watershed also are active in coercing town and county boards to release desirable watershed frontage land for private acquisition.

Much ready capital is needed to stimulate and carry out long-range programs for forest plantations, woodland management, resort and service business development and general recreation--vacation-centered business. A great deal of local talent and knowledge is lost annually from migrants out of the upper watershed to the cities because of lack of opportunities and inadequate financing possibilities at home.

Public administrators at all levels of government within the Wolf Basin are required to analyze divergent public opinion on perplexing issues. For instance, the land developers and real estate people want to create lakes by building dams while trout fishermen, sports clubs and conservation groups want to retain the original status of the river. A fly-fishing only area is accepted by only half the residents of the area since it "discriminates" against the worm fishermen.

Many citizens are clamoring for more long-range planning while others maintain that we must develop lands now to increase the tax base. A fine project in stream habitat improvement work on the Evergreen River is criticized on the grounds that the "state should get out of the land business". Thus, the official in the watershed responsible for planning reaches an impasse trying to determine how to improve any of the basin area without adequate control of the land.

The attitudes must change or no improvement will grace the Wolf watershed. Future demands of the river basin, particularly those of recreation, must be met with an unselfish outlook. Local sacrifices must be made and state aids will perhaps be necessary. But outside help will never replace the "bootstraps" of local patience and initiative.

Where the Wolf River was an important factor in the economy of northern Wisconsin in the past, a reversal appears imminent if its future role in Wisconsin's development follows a planned course. The opportunities offered by the northern portion of the Wolf Watershed are so great that little time should be wasted in getting on with a program.

Many ideal waterfront sites are available for youth camps in the Langlade, Forest and Menominee County sections of the basin. New groups are becoming interested in canoeing and by 1975 this sport will have many more supporters. Historical sites offer splendid opportunities for entertaining and/or educating the tourist. Such locations should be marked by signs and the historical value of the logging era should be stressed. Wherever possible old log flumes and other noninterfering structures should be resurrected in the streams as they applied originally to the lumber industry.

Finally, a sincere effort by all citizens and government officials in the Wolf Watershed should be made to bring about an agreeable and equitable zoning system for river and lake frontage lands. Such zoning should include adequate building set-back provisions and assure protection of cover along stream banks and shorelines to perpetuate wilderness aspects.

Planning is essential in the over-all development of the resources of the Wolf River Watershed. The Wolf River Basin Regional Planning Commission was authorized and began functioning less than two years ago. It can and must serve as a catalyst for the many government resource agencies, the people living in the watershed and those who will benefit from the development of its resources. Coordinating this monumental task are three commissioners from each of the eight counties comprising the Planning Commission. Their leadership must be bold, yet diplomatic; courageous, but compromising; farsighted, but practical. They are the foundation of the resource planning and development structure. Failure in the foundation or any of the agencies forming the superstructure will topple the whole.

Success is essential to the orderly, logical development of all the resources of the basin. The alternative is chaos! Mismanagement to date is apparent to anyone who wishes to view it. Witness the shacks along the banks, the house trailers on the subdivisions, the draining, the filling and a host of other helter-skelter cultural atrocities.

On the other hand, picture if you will the clean, clear water, the managed woodlands, abundant wildlife, scenic drives, zoned land uses, attractive cottages, a flourishing recreation industry, overlooks, parks, historical sites, white water, and lastly--a happy people!

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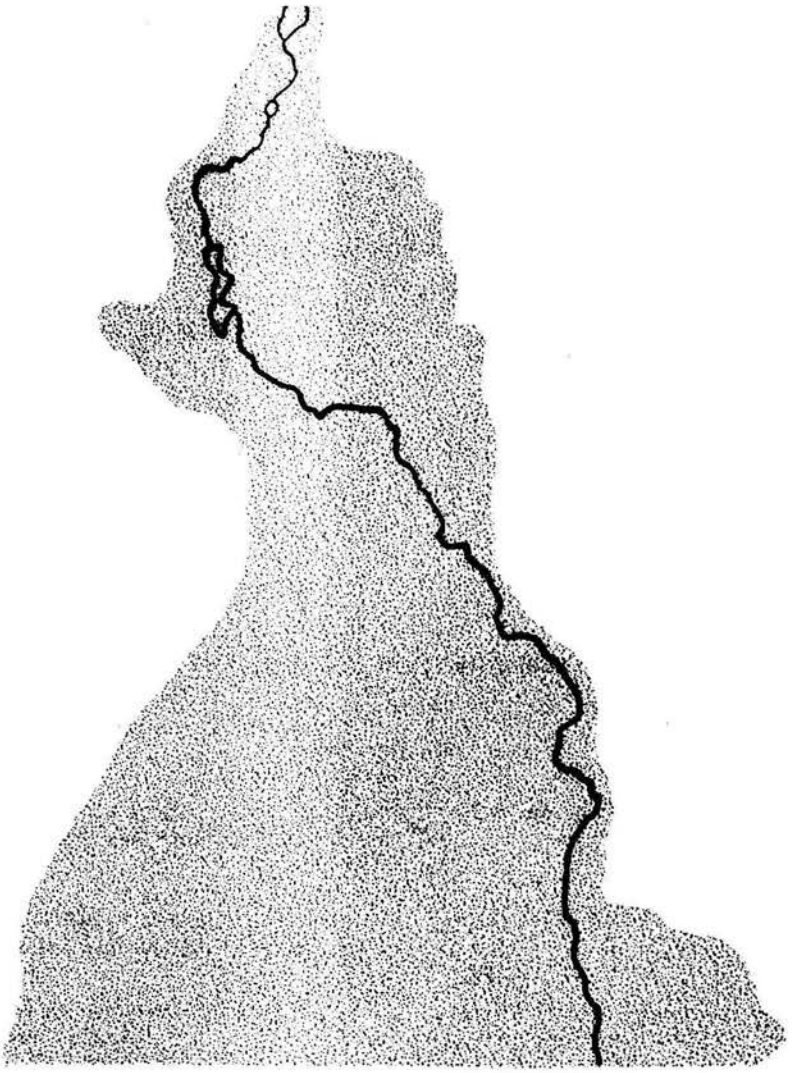
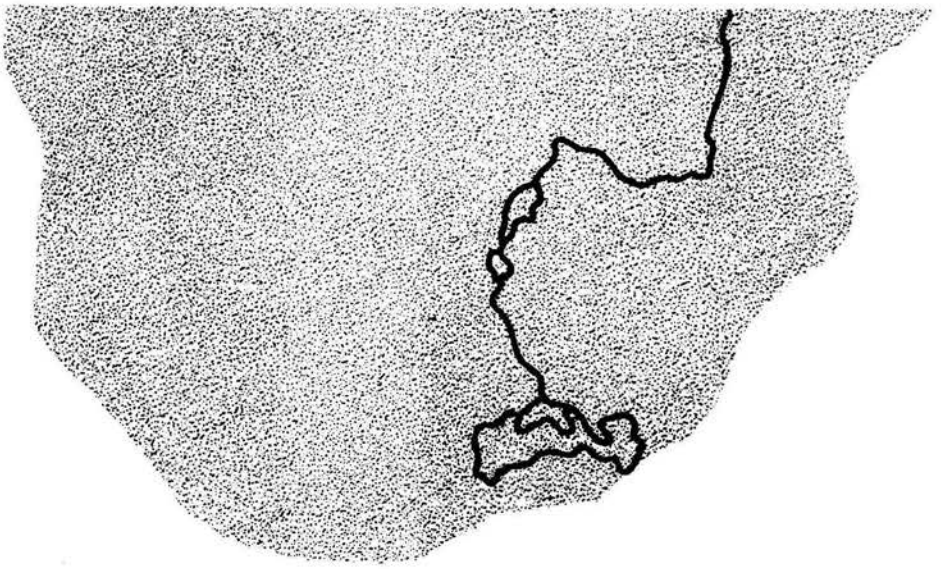
Enclosure (6)



WOLF RIVER WATERSHED

A REPORT OF THE WOLF RIVER STUDY COMMITTEE

Wisconsin Conservation Department • 1962



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W O L F R I V E R W A T E R S H E D

A Report on the Improvement and Protection of the Wolf River Basin for Fish, Wildlife, Recreation and Forestry Purposes

by

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November, 1962

CONTENTS

INTRODUCTION

The Wolf River Basin always has been highly valued for its fishing, hunting, forests and scenic attractions. Public interest in protection and improvement of its resources has, therefore, always been keen. Sensitive to this interest, the Conservation Commission and Department have frequently been called upon to formulate opinions as to the value of suggested development plans. The growing demands on the river basin by an expanding population suggested the need for more concentrated long-range planning.

The Conservation Department first organized a planning committee in 1959 to collect and analyze data on the Wolf River to determine in what ways the recreational advantages of the river might be protected and improved. The first action of the committee was to provide basic outdoor recreation data and preliminary reactions to proposals for development for a Legislative Council study of the water problems in the Wolf River Basin. This initial analysis edited by Harold Jordahl was combined with the Legislative Council's report completed in 1960.

Since this initial effort, the committee has been at work gathering additional basic data on the watershed and developing and analyzing more specific suggestions for development and improvement. The present report (1962) includes these supplementary basic data and a review of proposals for development and improvement emanating within Department ranks and from others.

Members of the present committee are Messrs. John O'Donnell, John Ockerman, Lewis Posekany, John Keener, Donald Mackie, Thomas Rausch, and Robert Espeseth. The chairmanship of the committee was held by Walter Scott in the early stages of the development of this report and by C. W. Threinen in later stages. The committee is indebted to the U. S. Corps of Engineers, Wisconsin's Committee on Water Pollution, Public Service Commission, U. S. Soil Conservation Service, U. S. Fish and Wildlife Service and others for some of the data presented. The report could not have been compiled without the able assistance of field men from all divisions of the Department and consultants from other agencies.

WATER RESOURCES

In this section an inventory of the quantity and types of water available within the Wolf River watershed has been provided. Waters may be divided into two classes, lakes and streams. The wider streams offer many of the same recreational opportunities as do the lakes. Since size of a body of water whether lake or stream is important in its recreational value, the amount of water has been summarized in terms of size classes.

The number and area of lakes of various size classes are summarized in Table 1. Shoreline length, on frontage, although not available for all of them, was estimated by using the circumference of a circle and multiplying it by 1.4, the average shoreline development factor for a large number of lakes in other parts of the state. The 424 lakes in the watershed provide approximately 49,665 acres of water and 520 miles of frontage. Most of the lakes (86 per cent) have less than 100 acres of water surface.

Streams more than 35 feet wide provide 781 miles of frontage and 3,441 acres (Tables 2 and 3). Streams less than 35 feet wide provide about 1,936 miles of frontage and 2,546 acres. The watershed has about 1,355 miles of streams of all sizes. The widths of streams are drawn approximately to scale on the watershed map (Fig. 1). This map also shows watershed areas delineated as planning units of the Soil Conservation Service.

It is quite evident that lakes provide much more water area (about 8 times more) from which to enjoy aquatic recreation and that large streams have more frontage than the lakes.

The land area of the Wolf River watershed measures 2,438,900 acres. The total water area is about 55,500 acres, or 2.3 per cent of the land area. With a population in this watershed of about 107,600[1], there are 0.51 acres of water per capita. If the population within 50 miles of the Wolf River is included (200,000 more people), the per capita area of water is reduced considerably (0.18 acres) because the added area includes the bigger cities of the Fox Valley - Lake Winnebago region. By comparison, Kenosha County in southeastern Wisconsin has an inland water area of 0.04 acres per capita.

These waters and the terrain they drain were amply described in the Wisconsin Legislative Council report (1960). A detailed set of maps of the Wolf River itself and a profile of the river from a Corps of Engineers survey are part of that report. By way of supplementary information, a map showing bed rock geology, glacial geology and soils (Fig. 2) and a contour map (Fig. 2a) have been prepared for the basin as a whole because of the influence of these features on water characteristics. Waters of the streams can all be classified as hard water capable of growing large crops of rooted vegetation. Lakes range from small infertile basins with small drainage areas in the granitic areas to the highly fertile drainage lakes underlain by sedimentary rock.

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[1]Obtained by adding the populations from the 1960 census of political subdivisions in the Wolf.

Table 1. Number and area of lakes of various size classes that lie within the Wolf River watershed.[1]

Size Classes:	1,000 Acres		500-999 Acres		100-499 Acres		20-99 Acres		1-19 Acres	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Forest	4	7,519	-	-	14	2,873	17	831	1	18
Langlade	1	1,120	1	688	4	624	29	1,115	41	499
Marathon	-	-	-	-	2	310	4	145	2	27
Menominee[2]	-	-	-	-	-	-	-	-	-	-
Oneida	-	-	-	-	-	-	1	59	-	-
Outagamie	-	-	-	-	-	-	1	62	4	27
Portage	-	-	-	-	2	228	20	854	10	142
Shawano	1	6,178	-	-	10	2,310	32	1,486	28	347
Waupaca	1	1,120	1	990	9	1,387	46	1,847	83	683
Waushara	-	-	-	-	5	829	14	825	33	266
Winnebago	2	14,256	-	-	-	-	-	-	-	-
Total	9	30,193	2	1,678	46	8,561	164	7,224	202	2,009
Grand Total				Number 424				Area 49,665		

[1]Data summarized from "Wisconsin Lakes", Publ. 218, Wis. Conservation Dept., 1958. Data on the lakes of Menominee County are least reliable.

[2]Total for Menominee County is included with Shawano and Oconto Counties.

Table 2. Approximate lengths and estimated water area of streams in the Wolf River watershed

County	Streams more than 35 feet wide		Streams less than 35 feet wide	
	Length	Est. Area[1] (Acres)	Length	Est. Area (Acres)
Winnebago	7	175	26	80
Waushara	16	80	37	90
Waupaca	135	927	214	649
Portage	15	137	52	94
Outagamie	53	236	116	283
Marathon	-	-	36	64
Shawano	82	825	180	438
Menominee	34	436	179	543
Langlade	36	528	101	246
Oconto	-	-	-	-
Oneida	8	97	1	1
Forest	-	-	24	58
Total	386	3,441	966	2,546
Grand Total		1,352 miles (approximate)		5,987 acres (approximate)

[1]Obtained by multiplying average width by the length of the stream as measured on the watershed map. It does not exactly agree with the sum of the water area inhabited by various fish associations summarized in Table 6 nor the sum in Table 3. It should be regarded as an approximation. The difference arises from the imprecision of the measuring instrument.

Table 3. Approximate length, area and frontage of streams or portions of streams in the Wolf River watershed which are more than 35 feet wide.

Stream	County	Length (Miles)	Assumed Width (Ft.)	Est. Area (Acres)	Shoreline Length (Miles)
Willow	Waushara	5	50	32	10
Pine	Waushara	9	40	45	18
Walle	Waupaca	1	35	2	2
Waupaca	Waupaca, Portage	42	50	254	84
So. Br. Little Wolf	Waupaca	17	40	83	34
Little Wolf	Waupaca	38	50	232	77
Embarrass	Outagamie, Waupaca Shawano	82	60	593	164
Red	Shawano	16	35	66	32
W. Br. Wolf	Shawano, Menominee	10	40	48	20
Hunting	Langlade	3	35	13	6
Swamp	Langlade, Forest	3	35	14	6
Lily	Langlade	3	35	14	6
Shawano	Shawano	2	100	24	4
Shioc	Outagamie, Shawano	14	50	85	28
Wolf	Winnebago, Waupaca Outagamie, Shawano Menominee, Langlade Oneida	145	150	2,640	290
Total		390		4,145	781

Table 4. Discharge and drainage data for gauging stations.[1]

Site	Years of Record	Drainage Area (Sq. Mi.)	Discharge Range (cfs)	Discharge Mean (cfs)	Approx. Discharge at Mean Low Flow (cfs)
Wolf River near White Lake	1935-38	482	165-1,530	401	250
Wolf River above West Branch (4 miles north of Keshena)	1927-50	633	199-2,640	574	340
West Branch of Wolf River (Neopit)	1911-17	108	17-999	130	85
West Branch of Wolf River (Near Keshena)	1928-32	170	36-1,320	150	100
Wolf River (Keshena Falls)	1907-50	826	91-4,390	775	400
Embarrass (Embarrass)	1919-50	395	23-6,920	295	130
Wolf River (New London)	1896-50	2,240	150-15,500	1,734	850
Little Wolf River (Royalton)	1896-50	485	57-6,950	423	200
Waupaca River (Waupaca)	1916-50	305	50-2,520	250	200

[1]Source of data: U. S. Geol. Survey (1958).

In addition, a flow diagram of the Wolf and some of its tributaries is presented to show growth of the stream from its point of origin (Fig. 3). As the watershed map (Fig. 1) and discharge data (Table 4) also show, the Wolf grows slowly and bulges into a big stream when it picks up the larger tributaries beginning at Keshena in Menominee County.

The Wolf is a stream of moderate gradient with alternating flats and riffles in its uppermost portion above Post Lake, a narrow fast stream from Shawano to Post Lake and a low-gradient stream with a very wide flood plain below Shawano. This is illustrated by the profile (Wis. Leg. Council Report, 1960) and by cross sections of the flood plain at selected points (Fig. 4). Tributaries all begin with high gradients and flatten out, much like the parent stream, when they reach the bed of glacial Lake Oshkosh.

FISH RESOURCES

Basic fishery resources in the Wolf River basin have been color-coded on Figure 5; their value was described in the 1960 Legislative Council report. The smaller lakes provide suitable habitat for bass-panfish associations. The medium-sized lakes with marsh frontage usually furnish suitable habitat for northern pike-bass-panfish associations and the larger lakes with wind-swept shorelines and rocky bars or inlets furnish habitat for walleyes as well. Some lakes have been converted to trout lakes. Those considered to be panfish or minnow lakes may have a winter-kill problem.

A tabular summary of these classes of water is presented in Table 5. Although numerically we have many more small "bass" lakes than other types, the total area of larger lakes with more varied fish populations is greater.

Stream habitat may be classed as forage fish water, trout water, smallmouth bass water and catfish water (Table 6). In addition, streams may be the spawning grounds for lake-run species. These have also been designated by color code. About 64 per cent of the stream mileage, or about 3,400 acres, is classed as trout water where trout are the dominant game fish. About 9 per cent, or about 800 acres is recognized as smallmouth bass water, where smallmouth are dominant. The largest river in the system, the Wolf River and the flooded lower portions of other rivers, from Lake Poygan to the dam at Shawano, are unobstructed and serve as a major spawning area for walleye, white bass and sturgeon coming from Lake Winnebago and associated lakes. Other tributaries or portions of tributaries are especially valuable as spawning grounds for lake-run fish in low-water years, and frequently furnish northern pike spawning habitat.

Limiting factors for fish vary with the species. For trout it is cold water maintained by ground water springs of continuous flow. Geography of the uplands of this watershed generally favors trout in the streams. Influences detracting from the trout fishery are impoundment of water, which warms it; low water; irrigation during low-water periods, causing competition for water; and stream and watershed erosion arising from pastured streambanks and cultivated fields. The growing trend toward construction of ponds on trout stream feeders, often for private fish hatcheries, is a serious threat to trout streams.

Northern pike are most abundant in lakes with good weed beds. They usually require marshy spawning grounds, generally flooded marsh vegetation. As cottage development and shoreline improvement proceed, this type of habitat will decline. The walleye is fundamentally a fish of the open water and larger lakes. It spawns on rocky shores in most lakes where it is present. An exception to this is the run of walleyes from Winnebago which spawns on the flooded marsh vegetation in the river bottoms over which a current is passing. As this habitat shrinks the spawning grounds are reduced accordingly. The sturgeon spawns in the current among the rocks in the rivers. A reduction or cutting off of this type of habitat can be a serious blow to this species. Because of late maturation and long life this species requires conservative management. White bass spawn in situations where there is a current of water such as rivers or off head lands in lakes. They too are fundamentally a fish of the open water and larger lakes. The perch lays its ribbon of eggs on any type of firm substrate, and has no special known limiting factors outside of food, space, and predation. The young do, however, usually frequent weed beds for nursery areas.

Nesting species such as largemouth bass, bluegill, crappie, and bullhead require only a place to build a nest -- a sand, gravel or rubble bottom. Few waters lack this habitat. The nesters usually grow and develop in association with vegetation. Lakes blanketed with weeds, however, sometimes provide excessive protection for panfish resulting in stunted populations. Shallow impoundments on the Wolf have this difficulty. At the other extreme, infertile lakes, such as some of the deep clear lakes with small drainage areas in the sandy uplands, often have poor panfish growth.

Smallmouth bass have a strong affinity for rocky habitat where crayfish, a staple in its diet, are abundant. Impounding habitat of this type would reduce the numbers of smallmouth.

One of the greatest limiting factors in fish production is winter-kill. It occurs because waters which are shallow do not have enough of a reserve of oxygen. Such big waters as White Lake, Cincoe, Partridge, and Partridge Crop have this problem. There appears to be, however, sufficient incoming fresh water in the latter three to permit considerable survival and good growth under conditions of reduced competition. Lakes without moderate incoming sources of fresh water have to be 20 or more feet deep to avoid this problem. If material volumes of incoming fresh water are provided they can be much shallower, or repopulation can occur if partial kills are experienced.

A number of private fish hatcheries are located in the watershed, although they are not as common within this watershed as they are in some parts of the state. Of the 56 hatcheries within the watershed, 11 have fish for sale (Table 7). Most raise trout.

Table 5. Number and area of lakes producing various types of fish.[1]

Size Classes:	1-49 Acres		50-99 Acres		100-499 Acres		500-999 Acres		1000+ Acres	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Panfish	66	1,407	10	677	2	302	-	-	-	-
Bass-panfish	49	1,170	9	600	9	1,311	-	-	-	-
Northern pike-bass-panfish	73	1,837	39	2,758	24	3,948	-	-	1	1,120
Walleye-northern pike-bass-panfish	4	94	5	338	17	3,560	2	1,678	8	29,073

[1] Data from "Wisconsin Lakes", Wis. Conservation Dept. Bull. No. 218 (1958), with supplementary data from Menominee County.

Table 6. Estimated miles and approximate area[1] of streams with various basic fish associations.

	Lenth (Miles)	Area (Acres)
Forage Fish	250	600
Trout	870	3,400
Smallmouth Bass	130	800
Mixed Species	180	2,300
Total	1,430	7,100

[1]Area has been measured on the watershed map. It is necessarily a crude estimate because of inability to measure all bends in the streams. When measured more precisely, it will prove to be larger.

Table 7. Number of private fish hatcheries located in the Wolf River watershed.

County	Total Number	Number With Fish For Sale
Oneida	-	-
Forest	1	-
Langlade	6	2
Marathon	2	-
Shawano	7	1
Oconto	-	-
Portage	4	1
Waupaca	17	6
Outagamie	4	1
Waushara	14	-
Winnebago	1	-
Total	56	11

Table 8. Summary of fishing license sales for 1960 in counties within the Wolf River basin and adjoining counties making heavy use of the basin.

County	Resident Fishing License	Sportsman's License	Per cent Total Population	Non-resident License	Nonresident Combination
Wolf River Basin Cos.					
Winnebago	20,759	2,275	21.5	4,506	389
Waupaca	9,203	1,314	29.7	4,123	431
Outagamie	14,302	1,931	16.0	324	61
Shawano	9,980	1,106	32.3	1,661	409
Langlade	6,724	1,351	40.5	2,067	643
Adjoining Cos.					
Brown	9,594	1,499	8.9	242	35
Portage	7,042	643	20.8	634	99
Wisconsin Total	612,913	65,371	17.0	259,792	53,022

Fishing intensity, annual yield of fish and demand for fishing have not been accurately assessed for this region. However, the yields of waters with similar characteristics are a matter of record. For a lake of modest fertility, such as most of those in the region underlain by the Canadian Shield, a yield of 10-25 pounds per acre can be anticipated. Fertile lakes will have annual yields from 50-100 pounds per acre. Streams appear to have parallel harvests. The gross harvest of fish from the 55,652 acres of water would be a minimum of 556,500 pounds.

Surveys of fishing have shown that one in four persons fish (U. S. Fish and Wildlife Service, 1961). Resident license sales amount to 17 per cent of the population, and there are about half this number of nonresident sales. Actual license sales do not measure the number of fishermen less than 16 years of age nor those over 65 because they are not required to have a license.

A summary of license sales for counties lying mostly within the watershed and for important adjoining counties is shown in Table 8. The large number of nonresident license sales suggests high use of this region by nonresidents.

On the basis of 30 per cent of the population participating in fishing activities, each fisherman has 1.7 acres of public water for fishing of all types, and 1.5 acres of trout water. Using 30 per cent of a regional population of 300,000 (watershed and adjoining area), each fisherman would have 0.6 acres of water for fishing.

GAME RESOURCES

Game resources and harvest in the watershed were comprehensively summarized in the Legislative Council report (1960). There was, however, little habitat described and amplification of the description of habitat is deemed advisable. The eastern part of the south half of the basin, fundamentally the bed of old glacial Lake Oshkosh, is a rich clay soil with "A" agricultural rating supporting a mixture of farmlands and marshes. It is excellent habitat for pheasants and waterfowl because of good winter and cover and abundant aquatic weeds. Furthermore, the Wolf River valley is a waterfowl subflyway in the Mississippi Flyway. Winnebago County has some of the highest pheasant density in the state with these cover conditions. The western part of the south half of the basin is highland and tends to have sandy loam soils with a "C" agricultural rating and few marshes. It supports mixed farmlands and woodlands growing on the light sandy soils of this region and there are several pit-type lakes, circumstances productive of deer, grouse, squirrels and rabbits. The young topography and hilly landscape of the northern half of the basin provide numerous lakes and marshes. This area furnishes good grouse and deer habitat and moderately good waterfowl areas although the marshes are less fertile than farther south. A generalized picture of these areas is presented in Figure 6.

Limiting habitat and antagonistic economic factors for major game species are as follows:

Pheasant	Limiting: nesting cover, winter cover Antagonistic: heavy grazing and intensive land cultivation
Deer	Limiting: winter browse Antagonistic: closed forest canopy, complete cultivation
Squirrel	Limiting: tree dens, sufficient oak woods Antagonistic: conversion of oak woods to farm land or soft wood timber
Ducks and geese	Limiting: undisturbed nesting area, resting and feeding areas Antagonistic: draining marshes, converting lake and stream shores to sandy beaches or cement bulkheads.
Rabbit	Limiting: winter cover Antagonistic: complete cultivation and grazing

The habitat requirements for pheasants are met by the marshes and corn fields of the southeastern part of the basin; for deer by continuous forest cropping to keep browse available; for grouse by the broken woodlands and cropping of forest land; and for waterfowl by wetlands. It is the areas of marsh and water edge that are most subject to reduction. Water edge is desired by city dwellers for cottage sites and inroads on waterfowl habitat for this purpose are being made throughout the basin. Where water edge adjoins lowlands, it is desired also by farmers for fields. This is creating a difficulty in the heavy soil area of the southeastern part of the basin. To counteract this habitat destruction, the game management division is carrying out an active wetland habitat acquisition program. These areas not only preserve vital habitat but also furnish hunting opportunities.

Also in the northern part of the basin deer and grouse habitat improvement is practiced on public lands. Since forest lands are subject to continuous cropping, the game productivity of managed forest lands is being continually renewed. Also the Department has cooperative game management arrangements on some U. S. Forest Service lands and Langlade County lands to give maximum game production. Lands within public hunting grounds are subject to more intensive management than surrounding lands.

Demand for hunting opportunities is best expressed by license sales (Table 9). Between 9 and 17 per cent of the population within these counties hunt small game and between 8 and 22 per cent hunt big game. A national survey indicated about one if five men hunt (U. S. Fish and Wildlife Service, 1960). Assuming 10 per cent hunt in the watershed

Table 9. Game license sales for 1960 in counties lying largely within the Wolf River basin, and some adjoining counties.

	Resident Big Game	Per cent of Population[1]	Resident Small Game	Per cent of Population[1]	Sportsman's License	Trapping	Per cent of Population
Counties in Watershed							
Winnebago	6,669	8.4	8,069	9.5	2,275	29	1
Waupaca	4,301	15.8	3,549	13.6	1,314	74	1
Outagamie	8,050	9.8	8,193	9.9	1,931	44	1
Shawano	4,617	16.6	3,629	13.8	1,106	47	1
Langlade	3,291	22.2	1,971	16.6	1,351	87	1
Counties outside Watershed							
Brown	8,881	8.3	9,592	9.5	1,499	48	
Portage	3,580	11.4	1,824	7.0	643	46	
Total for state	269,867	8.5	278,334	8.7	65,371	4,401	

[1]Includes sportsman's license

area, this is a density of one hunter per 218 acres. The density of deer hunters per acre of forest land is one hunter to 102 acres using 1960 figures. However, outside of indicating how many hunters there are in relation to land area, this figure has little meaning because of the wide dispersion and mobility of hunters.

Other economic activity associated with game resources includes trapping, fur farms and shooting preserves, some licensed and some not. The counties lying wholely within the region had 4,401 licensed trappers (1960), 59 licensed fur farms (1959) and 3 licensed shooting preserves (1959). The acreage of licensed fur farms and some shooting preserves contributes to total wetland habitat, thus directly or indirectly aiding waterfowl. Fur farms contained 9,677 acres, and they were located mainly in the flood plain of the lower Wolf.

FOREST RESOURCES

This region has a large stake in forest management for there are 123 wood-using industries in the watershed (Table 14) plus a large wild game population dependent on the forest. In addition there are major wood-using industries in the Wisconsin and Fox River Valleys which draw raw materials from the basin. For the most part industrial and public forest lands are well managed; small private holdings, however, are generally poorly managed. This is of particular significance since 61 per cent of the 1,095,643 acres of commercial forest land in the basin is in small private ownership. Industrial forest holdings account for 28 per cent* of the commercial forest land and public forests, 11 per cent.

The commercial forest land in the basin is composed of the following timber types:

Northern Hardwoods	- 34%
Oak	- 13%
Aspen	- 19%
Upland Conifers	- 12%
Grass and brush	- 5%
Other	- 17%

The rich clay soils of the bed of glacial Lake Oshkosh in the southern portion of the basin tend to support mixed hardwoods and lowland hardwoods. The sandy, draughty soils of the western half of the basin now support principally oak. Looking ahead, it is expected that there will be a small

* Over 60 per cent of the industrial commercial forest land is owned by Menominee Enterprises, Inc.

(See Tables 10-14 also)

increase in total forest acreage in the basin due primarily to heavy pine planting. There will, however, probably be a decrease in forest acreage in those areas devoted primarily to agriculture.

From the standpoint of public policy, a steady adequate supply of timber is essential to the continued prosperity of the numerous wood-using industries of the basin. These industries presently import more wood than is produced in the basin. Thus increasing growth and thereby the available timber supply seems more important at this time than increasing the number of primary wood-using industries. It therefore appears necessary to increase technical and educational forestry services to bring the small private forest holdings to an acceptable level of management.

Commercial forest now covers approximately 46 per cent of the basin. The Wisconsin forest inventory indicates that Wisconsin commercial forest land on the average grows approximately $\frac{1}{4}$ cord of wood per acre per year. It is entirely feasible that this growth rate can be doubled in the basin in the foreseeable future if the proper emphasis is placed on improved management. A doubling of the present growth rate to $\frac{1}{2}$ cord per acre per year would make the area capable of producing well over $\frac{1}{2}$ million cords of wood per year or the equivalent of the wood consumption of about five paper mills of the size of some Fox River Valley mills. The potential benefits of an improved level of growth is obvious. Fox River Valley paper mills now draw only about half their wood from Wisconsin sources. With an improved level of management they could draw most of it except spruce from Wisconsin.

Watersheds covered with forest land make an indirect contribution to industry by providing good infiltration beds, delayed runoff, and clear water. They also tend to protect the shallow downstream lakes from siltation. It is recognized that a water supply is an important adjunct of raw material use for paper manufacture. The Wolf River basin furnishes 58 per cent of the drainage area for the entire Wolf-Fox system supplying the many paper mills on the Lower Fox with a dependable water supply. Paper production requires from 2,000 to 100,000 gallons of water per ton of paper produced, depending upon the process used. Most require between 10,000 and 20,000 gallons per ton. Since the 11 mills in the Fox-Wolf watershed produce about 1,500 tons of paper per day, the magnitude of the water needs can be realized.

There is at present little use of the Wolf River itself for a paper mill water supply. The only mill in operation is a small one in Shawano. Although the water supply is sufficient from Keshena downstream, the necessary head of water is not always sufficient. The necessary head of water is available now at Shawano, and Keshena. Water flow above Keshena is probably too small to provide sufficient water for a paper-processing industry and below Leeman it has insufficient gradient to provide a head of water. Unfortunately, summer flows, at times, have become very low at all points on the river. Perhaps the most important contribution of the Wolf will be to furnish good water for downstream industries.

Table 10. Acreage of forest land in the Wolf River basin.

Counties	Area in Basin	Area of Commercial Forest Land		Area of Noncommercial Forest Land	
		1961	1975	1961	1975
Portage	184,000	57,200	60,000	0	0
Winnebago	47,360	5,400	5,200	320	400
Waupaca	487,040	147,600	163,945	220	220
Waushara	184,320	56,000	65,720	0	0
Outagamie	267,000	50,450	47,450	48,000	40,000
Shawano	506,773	245,000	244,000	1,585	1,585
Menominee	181,777	181,777	181,777	0	0
Marathon	75,000	35,000	37,000	1,500	1,200
Langlade	286,680	200,676	175,930	0	0
Oconto	660	660	660	75	80
Oneida	83,680	19,280	21,000	3,280	3,300
Forest	109,762	96,600	100,000	2,000	2,000
TOTAL	2,354,052	1,095,643	1,102,682	56,980	48,785

Table 11. Acreage of commercial forest land by forest type.

County	Northern Hardwoods	Oak	Aspen	Upland Conifers	Grass and Upland Brush	Other
Portage	1,480	23,280	5,720	15,440	5,205	6,120
Winnebago	400	1,000	700	900	900	1,500
Waupaca	12,140	33,770	18,290	8,060	7,870	67,470
Waushara	560	24,610	2,000	13,500	5,830	9,500
Outagamie	6,000	2,000	16,000	2,000	9,000	15,450
Shaweno	150,000	34,000	30,000	25,000	4,000	2,000
Menominee	53,638	23,360	36,043	46,872	3,530	18,334
Marathon	13,000	2,000	10,000	2,000	4,000	4,000
Langlade	100,270	-	43,212	13,646	11,440	32,108
Oconto	-	170	240	250	-	-
Oneida	1,530	230	8,321	1,540	1,710	5,050
Forest	35,360	-	31,550	4,720	5,270	19,700
TOTAL	374,378	144,420	202,076	133,928	58,755	181,232

Table 12. Acreage of commercial timber based on growth stage.

County	Plantable 1961	Sawtimber 1961	Pole timber 1961	Seedling and Sapling 1961
Portage	11,500	11,440	19,448	17,732
Winnebago	200	1,500	1,500	1,300
Waupaca	33,400	28,680	59,420	35,070
Waushara	8,500	5,300	13,100	19,100
Outagamie	4,000	11,000	20,000	10,450
Shawano	15,000	35,000	150,000	60,000
Menominee	19,800	115,632	18,028	23,783
Marathon	2,500	6,000	14,000	10,000
Langlade	12,000	6,422	49,077	117,800
Oconto	-	20	290	350
Oneida	860	709	6,165	8,966
Forest	2,600	11,600	28,790	45,930
TOTAL	110,360	233,303	379,818	350,481

County	Sawtimber Volume 1961 (Board Feet)	Total Volume (Sawtimber and Poles) 1961 (Cords)	Per Cent under Satisfactory Management 1961	1975
Portage	100,672,000	304,923	25	50
Winnebago	10,000,000	55,000	15	35
Waupaca	254,540,000	1,186,630	13	20
Waushara	45,309,000	225,600	40	60
Outagamie	62,000,000	310,000	10	15-17
Shawano	140,000,000	1,350,000	100	100
Menominee	960,000,000	2,100,000	25	50
Marathon	35,000	250,000	35	45
Langlade	166,322,000	1,120,210	65	85
Oconto	60,000	6,300	65	75
Oneida	10,708,000	99,757	50	70
Forest	93,740,000	658,832	10	30
TOTAL	1,843,386,000	7,667,252		

Table 13. Ownership of Commercial Forest Land

County	Federal	State	County Forest Crop	County Not Forest Crop	Forest Industry	Farm Woodlands	Other Private
Portage	-	200	-	-	200	54,800	2,000
Winnebago	-	-	-	-	-	4,200	1,200
Waupaca	-	288	-	286	6,857	120,740	19,430
Waushara	-	1,550	-	-	-	35,780	18,670
Outagamie	-	1,000	-	-	1,000	39,000	9,450
Shawano	-	5,100	-	400	35,000	175,000	34,000
Menominee	-	-	-	-	181,777	-	-
Marathon	-	-	-	1,000	5,000	20,000	4,000
Langlade	18,000	2,000	57,000	2,000	36,000	39,430	21,500
Oconto	440	20	-	-	-	-	200
Oneida	-	1,020	-	200	10,720	3,190	4,150
Forest	18,820	2,620	3,120	280	19,070	7,730	44,960
TOTAL	37,260	13,798	60,120	4,166	295,624	499,870	159,560

Table 14. Number of primary wood-using industries in the Wolf River Basin.

County	Sawmills			Pulp and Paper Mills	Veneer Mills	Other
	Large	Medium	Small			
Winnebago			3			
Waupaca		3	35		2	1
Waushara		1	10			2
Outagamie			11		1	1
Shawano	5	4	27	1	3	
Menominee	1					
Marathon			7			
Langlade	1		1			
Oconto						
Oneida						
Forest	—	—	3	—	—	—
TOTAL	7	8	97	1	6	4

PARKS AND AESTHETIC OPPORTUNITIES

Major recreational desires aside from hunting, fishing and boating are swimming and the enjoyment of water scenery and landscape. Scenery is best enjoyed by some in pure wilderness and by others in developed areas with attendant services such as scenic roads, trails, picnic areas and camping areas. Since extensive landscape scenery is provided by the abundant public and private forest land in the watershed, it is not a commodity in short supply or lacking in availability.

Water frontage, on the other hand, is a basic requirement for the enjoyment of water scenery and swimming opportunities. The abundant frontage on lakes and wide streams (a total of some 1,300 miles) could furnish 100-foot lots to about 67,000 families, more than would be required by the total number of families living in the watershed but not enough to supply those living in nearby areas. Everyone, then, could have the privilege of owning his own frontage and satisfying his water recreational and aesthetic desires. Such development could only be done of course at great scenic and fish and wildlife loss.

However, bright as this may appear perhaps only half or less of the frontage might be called "desirable" without substantial improvement because of bottom types or water conditions. Except in Menominee County most good frontage on lakes has already been appropriated and is in short supply. Stream frontage is now being acquired.

Public frontage on the Wolf River and its tributaries and lakes for scenery enjoyment or swimming, however, is scarce. Further provision of good recreational frontage for widespread use of the general public will require public investment in prime lake shore.

The Wolf River watershed has several unique features. The river and several of its tributaries originate on the Canadian Shield, a mass of impervious granite with a layer of glacial till on top. As they flow down from this highland, they tumble over falls and rapids at the edge of this formation. In most river systems of the state originating on and flowing off the Canadian shield, such falls have been impounded, but on the Wolf and on parts of the Little Wolf, the West Branch of the Wolf and the Red, they remain undisturbed. These are today among the major scenic features in Menominee and Waupaca Counties and are unique to the state. The locations of some of these areas on these rivers have been noted in Figure 7. These are not now in public ownership except for a small county park on the lower rips of the Little Wolf owned by Waupaca County.

Present park areas are summarized in Table 15, Figure 7, and in the Legislative Council's 1960 report. There are not more than about 500 acres of park belonging to counties and communities, and there is only the Hartmans Creek recreation area managed by the state. In the Nicolet National Forest the U. S. Forest Service has a moderately improved

facility on Pine Lake (Forest County) and on a small lake near White Lake (Langlade County). Within the forest as a whole, the U. S. Forest Service owns about 10 per cent of the lake frontage. On Pine Lake it has two forties which touch the lake and it has frontage on Hiles Mill Pond. County, state or federal facilities are offered on about 20 bodies of water.

Potential sites for parks of local or regional significance are located on the fall line of the Waupaca River (Portage County), Little Wolf River (Waupaca County), Red (Shawano), West Branch of Little Wolf and Wolf River (Menominee County). Potential sites on the latter especially have state-wide significance. The space and opportunity for a significant state recreation area exists in the undeveloped Sand Lakes area and Bass Lakes area of Menominee County. Just what Menominee County does with these areas will be watched with interest. Present plans call for platting the Sand Lakes area. Some specific sites for potential development are listed in Table 16.

State investment in recreation areas may seem out of place in a lightly populated area but it is justified and warranted because of service to the densely populated areas to the southeast. Substantial public use facilities which offer camping and swimming are lacking on 5 of the 9 large lakes (over 500 acres). County park facilities can best meet public use needs in these situations. There are also several interesting and significant hills such as Mt. Morris in Waushara County and striking hills along the Wolf above New London which should be of interest at the county level.

Although the U. S. Forest Service has only two recreation areas within the basin, it has 20 more in close proximity. These in effect compete with and at the same time complement facilities in the basin. The Forest Service has tapped the major recreational area within the basin, but it is limited by the small amount of lake frontage it controls.

Subsidiary recreational areas are available for travel convenience in the form of highway waysides and historic markers. There are 19 now in existence and one more is planned according to the 1960 report. There are also 7 private campgrounds in operation. The only state area providing camping will be located at Hartmans Creek in Waupaca County when development is completed.

Population

Population trends indicate that counties in the watershed having major cities gained population during the last decade while those without major cities underwent significant losses (Fuguitt, 1961). Outagamie County, for example, gained 24.6 per cent and Winnebago gained 18.5 per cent, while Forest County dropped 20.1 per cent and Langlade 9.4 per cent. These latter areas, however, are the playgrounds for areas where the population has increased.

The National Recreation Association in its standards calls for 10 acres of metropolitan parks per 1,000 persons, 10 acres of large parks and beaches designed for the entire community per 1,000 persons, and 20 acres of hunting, fishing and hiking reservations within 75 miles per 1,000 persons.

Table 15. Number of park areas under different types of ownership within the Wolf River watershed.

	County Parks	County Recreation Areas	Community Parks	National Forest Recreation Areas	State Recreation Areas
Winnebago	1		1		
Waushara			5		
Waupaca	9		10		1
Portage	4		1		
Outagamie	2		1		
Shawano	2		1		
Menominee					
Marathon	2		1		
Langlade	3	1	2	1	
Forest	1		1	1	
Oneida	-	-	-	-	-
Total	24	1	23	2	1

Table 16. Potential state parks and regional recreation areas within the Wolf River basin.

Site	County	Area
Sand Lakes	Menominee	11,500
Bass Lakes	Menominee	3,650
Smokey Falls and Rapids	Menominee	2,600
Wolf River Dells	Menominee	3,700
Native White Pine	Menominee	500
Riemers Rips - Little Wolf	Waupaca	Undetermined
Waupaca River	Portage	Undetermined
Nelson Landing - Wolf River	Waupaca	Undetermined

The Wolf River basin, area with 11,256 acres of public hunting and fishing grounds, 340 acres of state parks, about 23,000 acres of national forest and about 46,000 acres of county forest, meets this standard for all the cities within the watershed and adjoining areas. The National Park Service offered the opinion that 15 per cent of the Great Lakes shoreline ought to be in public ownership. Similarly, it would seem that a portion of frontage on inland lakes should be in public ownership also. Most lakes do not have nearly this amount of public frontage if any.

Demand for outdoor recreation has been increasing rapidly as the population concentrates in urban centers. Camping growth has been especially rapid and public agencies have not been able to keep up with it. The increase was more than 300 per cent for state parks and forests in the last 10 years. The Nicolet National Forest has inadequate campgrounds which become filled to the point of overflowing now. The best potential for expansion lies in such places as the Langlade County forests and in the lands held by Menominee Enterprises, Inc. Significantly, the Langlade County Board has requested the park planning services of the Conservation Department to improve its offerings.

Plans of the Conservation Department call for expansion of Hartmans Creek from its present 340 acres to 750 acres which would provide a 75-unit campground, 2 picnic areas, a group camp for 50 people and a beach bathhouse facility for swimming.

Making contributions to aesthetic opportunities on waters are the wild public lands held by all agencies or by private ownership. The extent of the public areas may be seen in the map of public lands (Fig. 10) in the section on public use opportunities. This map shows a portion of the Nicolet Forest crossing the Wolf River. The Forest Service does not, however, own any frontage.

WATER POLLUTION AND IRRIGATION

Water uses have a dual character, consumptive and nonconsumptive. Nonconsumptive uses result in a return of the water used to the surface water system undiminished in quantity but often diminished in quality by addition of pollutants. Since pollutants can damage water for recreational use, their impact on surface waters is a concern in this analysis.

Consumptive uses diminish the quantity of water, and therefore are also a concern here. The principle consumptive use is for irrigation, which is carried on during the growing season generally at periods of low rainfall. Seasonal distribution of rainfall (Table 18) indicates that rains in the growing season are least frequent during the month of August, so it is at this time that competition for water could be most critical. Withdrawal of water is carried out from either shallow wells, swamps or surface streams. Direct withdrawal from a stream, if significant, can

reduce the water perimeter, hence water area, and thereby reduce the fish carrying capacity. Since good year classes of trout have been consistently correlated with ample ground water flow, lowering of stream levels can be antagonistic to trout production or other fish production. Ordinarily permits granted by the Public Service Commission permit withdrawal of a portion of the flow of a surface water stream. Irrigators have often found it more practical to make use of open pits or shallow wells. Irrigable lands lying near the edge of the Canadian Shield have ground water close to the surface because of the hydraulic gradient. The gradient is also responsible for the springs that contribute to the birth of trout streams.

In 1960 there were 37 permits for irrigation from streams in the basin, giving authority to withdraw 57 cubic feet per second (Wis. Leg. Council, 1960). This total is about one-third of the ordinary low flow of the Wolf River at New London or the equivalent of the low flow of the Little Wolf at Royalton. Use of streams for irrigation would be competitive with recreational uses.

Other water uses cannot be described as significantly consumptive. Nonconsumptive users, the communities and industries, pump waters from the ground and contribute them to the surface waters. This pumpage usually amounts to 80 gallons per person per day and, including industry, will average about 115 gallons per person per day. With a low population of only 107,600, demands for either the ground water pumpage or the reciprocal contribution of sewage will not be large. The total sewage contribution to surface water of this number of people at 80 gallons per day equals 8,600,000 gallons per day or about 13 second feet of flow. It is concentrated at cities.

The largest city, Shawano, with a population of 6,000, discharges an estimated 1,110,000 gallons per day or 1.6 feet per second. In addition, the paper mill when in operation will discharge 1,700,000 gallons per day. This is probably 1 per cent of the mean low flow of the Wolf River at this point. There would thus be a dilution of 100 to 1, far exceeding a desirable dilution standard of 8 to 1 for a sewage effluent.

The Committee on Water Pollution made extensive surveys of the pollution in the Wolf River in 1951 and found 59 sources of pollution, 32 with no treatment whatsoever. At the present time there are only two remaining sources of untreated wastes. A tabulation of sources of pollution and type of treatment is presented in Table 17. These sources are also shown in Figure 8. The Committee on Water Pollution reported on June 28, 1961, that there were no critical conditions on the major streams in the watershed. On some smaller streams and certain headwater areas there is a measurable drop in dissolved oxygen especially at Seymour, Birnamwood and Wittenberg.

Table 17. Sources of pollution in the Wolf River drainage basin, type of treatment and discharge.

No.	Source	Miles Above Mouth	Type of Waste	Treatment	Discharge Per Day Gallons	Discharge Per Day Lbs. 5-Day B.O.D.
Wolf River - Main Stem						
1	Keshena	111.6	Sewage	Secondary	52,000	26
2	Badger Breeders Coop., Shawano	104.4	Sewage & Barn Waste	Secondary	1,200	0.2
3	Shawano Paper Mills	103.3	Paper	Fiber Removal	1,700,000	480
4	Shawano	103.1	Sewage	Secondary	1,110,000	900
	a. Cons. Badger Coop.		Milk	With City		
	b. Shawano Canning Co.		Canning	With City		
	c. Howard & Gilbert Prod. Co.		Poultry	With City		
	d. Western Condensing		Milk	With City		
5	Shiocton Dairy Prod. Assn.	61.8	Milk	Hauling		
6	Shiocton Kraut Co.	61.7	Canning	None	6,000	320 Fall & Winter
7	Shiocton	61.5+	Sewage	None	15,000?	25?
8	New London	37.8	Sewage	Secondary	1,217,000	750
	a. Borden Co.		Milk	With City		
	b. Hamilton & Sons		Canning	With City		
	c. Knapstein Brewing Co.		Brewing	With City		
9	Winneconne Corp.	2.1	Canning	Land Disposal	-	-
10	Winneconne	1.8	Sewage	Primary	150,000	350
	a. Whitehouse Milk Co.		Milk	With City		
West Branch Wolf						
11	Neopit	13.7	Sewage	Secondary	120,000	50
Shioc River						
12	Bonduel	33.5	Sewage	Secondary	120,000	20
13	Nichols	15.6	Sewage	None	10,000	10
Black Creek						
14	Seymour Canning Co.	12.5	Canning	Land Disposal		
15	Seymour	12.3	Sewage	Secondary	370,000	170
	a. Cons. Badger Coop.		Milk	With City		
	b. Seymour Canning Co.		Canning	Part With City		
16	Black Creek	4.4	Sewage	Secondary	99,500	20
	a. Outagamie Prod. Coop.		Milk	With City		
17	Frank Pure Food Co., Black Creek	4.1	Canning	Lagoon	70,000	10 In Spring

Bear Creek						
18	Stephensville Cheese Factory, Hortonville	1.0	Milk	Hauling		
Black Otter Creek						
19	Fox Valley Canning Co.	2.3	Canning	Land Disposal		
20	Hortonville	1.7	Sewage	Secondary	121,000	28
Embarrass River						
21	Matteson Cheese & Butter Co., R. 2, Clintonville	33.5	Milk	Septic Tank	5,400	180
South Branch Embarrass River						
22	Birnamwood	34.5	Sewage	Secondary	60,000	21
23	Tigerton	10.2	Sewage	Primary	90,000	100
Tiger Creek						
24	Wittenberg	9.6	Sewage	Secondary	238,000	90
	a. Cons. Badger Coop.		Milk	With City		
	b. Kraft Foods		Milk	With City		
Pigeon River						
25	Shawano Canning Co., Clintonville	3.6	Canning	Land Disposal		
26	Clintonville	3.1	Sewage	Secondary	967,000	485
	a. Wright Broiler Co.		Poultry	With City		
Bear Creek						
27	Flanagan Bros., Bear Ck.	6.2	Canning	Lagoon	70,000	30 In Spring
North Branch Pigeon River						
28	Marion	3.5	Sewage	Primary	200,000	168
	a.Marion Cheese Factory		Milk	With Village		
Little Wolf River						
29	Cons. Badger Coop., Iola	46.5	Milk	Hauling		
30	Iola	46.3	Sewage	Primary	100,000	110
31	Scandinavia Creamery Co.	32.3	Milk	Land Disposal		
North Branch Little Wolf River						
32	Symco Cheese Co., Rt. 1 Manawa	10.0	Milk	Land Disposal		
33	Manawa	5.0	Sewage	Secondary	120,000	80
	a. Manawa Creamery		Milk	With City		
34	Waupaca County Home	0.6	Sewage	Absorption		

Flume Creek						
35	Rosholt Cheese Factory	13.5	Milk	Land Disposal		
Waupaca River						
36	Sherman Cheese & Butter Co., Rt. 4, Waupaca	27.7	Milk	Land Disposal		
37	Waupaca	16.2	Sewage	Primary	927,000	670
	a. Filter Materials, Inc.		Paper	With City		
38	Weyauwega	4.6	Sewage	Secondary	140,000	300
	a. Waupaca County Hosp.		Sewage	With City		
	b. Stoppenbach Sausage		Meat	With City		
	c. Star Cheese Factory		Milk	With City		
	d. Weyauwega Milk Prod.		Milk	With City		
Tomorrow River						
39	Farmers Coop. Dairy Assn., Nelsonville	9.9	Milk	Land Disposal		
40	Borden Co.	5.9	Milk	Secondary	20,000	16
41	Amherst	5.7	Sewage	Secondary	72,000	20
South Branch Waupaca River						
42	Wis. Veterans Home, King	13.4	Sewage	Land Disposal		
Medina Creek						
43	North Medina Cheese Factory, Medina	10.3	Milk	Septic Tank	5,400	90
Pine River						
44	Wild Rose Coop. Creamery	22.7	Milk	Land Disposal		
45	Wild Rose Hospital	22.6	Sewage	Secondary	4,200	6
46	Daisy Dairy Co., Poy Sippi	4.5	Milk	Septic Tank	5,400	85
Brushville Creek						
47	Brushville Cheese Factory, Pine River	5.6	Milk	Absorption		
Willow Creek						
48	Chicago Pickle Co., Red Granite	15.5	Canning	Land Disposal		
	TOTAL				8,186,100	

Table 18. Monthly precipitation at stations within and near the Wolf River Valley.*

	Length Of Record	Average Precipitation												
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Crandon	18	.91	1.07	1.73	2.23	2.81	3.17	4.22	3.80	3.70	2.60	1.80	.92	28.96
Antigo	40	1.01	1.02	1.38	2.35	3.26	4.26	3.93	3.30	4.06	2.53	1.57	1.00	29.67
Appleton	32	1.39	1.29	1.81	2.23	3.68	3.43	3.47	2.77	3.78	2.35	2.00	1.35	29.55
Amherst	10	1.13	1.15	1.81	2.31	4.27	4.12	4.71	3.86	3.52	2.89	1.48	1.64	32.89
Shawano	35	1.36	1.26	1.63	2.50	3.16	3.73	3.48	3.10	3.56	2.64	1.99	1.32	29.33
New London	40	1.36	1.39	2.16	2.68	3.95	4.18	3.77	3.48	3.68	2.48	2.16	1.42	32.71
Waupaca	40	1.24	1.29	1.85	2.70	3.89	4.15	3.33	3.52	4.05	2.44	2.01	1.26	31.73
Pine River	40	1.26	1.38	1.89	2.73	3.87	4.02	2.69	3.25	3.89	2.43	2.00	1.37	31.78

* USDA (1941).

PUBLIC HUNTING AND FISHING

The public use of Wisconsin's lakes and streams rests on a sound legal foundation. Waters and bottoms of natural lakes are owned by the state and held in trust for public use. For streams large enough to float a canoe, the right of navigation and its incidents are also held by the state in trust for the people. Stream bottoms are not owned outright.

Ownership of land, however, is an absolute right and through exercise of this right when banks of lakes and streams are privately owned, the public can be excluded from public waters. The ability to use waters other than through outright ownership of the shore land is, therefore, dependent on access over land. Access to streams can occur at crossroads which are numerous, but optimum use will be through shore ownership. Access to lakes requires the presence of an access way leading to the waters.

The status of public use opportunities for lakes in this watershed has been indicated by color code on the accompanying map (Fig. 9). This map does not show all lakes, especially the small ones, and therefore should be regarded as a partial picture based on the judgment of field men. Public use opportunities on streams may be observed on the map showing public lands (Fig. 10). Public fishing grounds purchased by the Conservation Department have frontage on 17 streams (Table 19) and furnish many miles of frontage for fishing access. Also some trout streams lie within the Nicolet Forest and county forest boundaries and provide public use opportunities. The Indian Reservation lands, now Menominee County, are held by a corporation and might just as well be classed as private. A fee is levied for use of them for fishing access. Present public lands and fish and game acquisition boundaries are shown on the accompanying map (Fig. 10). Public lake frontage is more limited than access to streams.

Lake access has been classed as multiple use (a park-type facility), road access, and walk-in access only (e.g. to wilderness lakes). Access of some sort is generally present on larger lakes and lacking on numerous small lakes. Lake access and access to large rivers serves fisherman, boater and hunter alike.

There are 424 lakes with an area of 49,665 acres which offer water recreation opportunities. These lake situations are in effect competitive with stream recreational opportunities, where about 6,000 acres of water are available. Landowners will generally exclude people from lakes but will allow access to streams. There is, however, a growing tendency to bar trespass for access to streams also. Lakes will often have privately managed access through resorts or boat liveries, something on which we have no data.

The Wolf River basin has a low population density, and consequently a high water area per person (Table 20). This relationship holds true because there are no large cities within the watershed. The largest city is Shawano with only 6,078 inhabitants. Therefore, within the basin itself there is little justification for sizable public use areas. However, the

bigger cities of the Fox River Valley - Lake Winnebago region and elsewhere in Wisconsin enter into a consideration of public use opportunities. There are eight cities within 50 miles, a one-hour drive of the Wolf River, which have over 10,000 inhabitants each (Table 21). The largest, Green Bay, has 62,688 and two more have over 40,000. The Madison and Milwaukee metropolitan areas are within 100 miles, or a two-hour drive.

Hunting is not completely dependent upon public lands, but public lands do make a contribution to the required habitat for game birds and animals and hunting opportunities. Forest lands, both county and federal, provide habitat, with hunting opportunities for grouse and deer especially. Where there is frontage on wetlands, forest areas furnish duck nesting habitat and hunting. The many acres of private forest land furnish equal opportunities because few are posted against use by the public.

Where population pressures are greater and land use more intense, as for example in the southern part of the basin, wild public lands make a much more vital contribution to both the habitat and hunting. The wild public lands in the mixed woodland and farmland of the western part of the basin consist of stream banks with strips of wild vegetation. This is additional edge and cover where protection is offered for nesting birds and deer. The fenced-in stream banks supply a maximum amount of edge proportional to area because of great length of streams compared to width. There were on June 30, 1961, 3,575 acres of this type of public land.

In the area of intensive farming and incidently greater human population, wild lands in public ownership may be the only hunting grounds open to the general public without direct charge and may comprise a significant amount of scarce habitat, especially if wetlands. These furnish nesting cover for waterfowl and winter cover for upland game birds. On September 30, 1962, there were 13,010 acres of public hunting lands in this region.

Present public forest land boundaries are practically static with no significant additions being made. The U. S. Forest Service does, however, have some funds for improving recreational opportunities, namely, by providing water frontage. State-owned fish and game lands, on the other hand, are being expanded rapidly. Purchases of fish and game lands to date have given public ownership to 16,585 acres, and plans in effect on September 30, 1962, called for acquisition of a total of 42,436 acres. One of the principal objectives of game land acquisition is to provide wetland habitat. Fish management acquisition is intended to provide access for fishing and habitat protection. Specifically, the fish management division now has plans to acquire frontage on major trout streams in the watershed and spawning grounds for Lake Winnebago fishes on the Wolf River. A list of approved fish and game acquisition projects with acreage goals appears in Table 19.

Table 19. List of Conservation Department fish and game acquisition and state park projects in the Wolf River watershed as of September 30, 1962.

Project	County	Acreage Purchased	Acreage Goal
Game Areas			
Deer Creek	Outagamie-Waupaca	1,410	1,410
Little Rice Lake	Forest	1,568	2,633
Mack	Outagamie	1,357	1,957
Navarino	Shawano	6,982	9,457
Outagamie	Outagamie	549	877
Poygan Marsh	Waushara	1,144	2,022
Fish Areas			
Cedar Springs	Waushara	209	314
Dalton Creek	Langlade	80	80
Demlow Lake	Langlade	59	59
Embarrass River	Outagamie-Waupaca	-	325
Emmons Creek	Portage-Waupaca	259	2,269
Evergreen River	Langlade	362	1,808
Little Wolf River	Waupaca	19	449
Nace Creek	Waupaca	-	1,552
Pine River	Waushara	-	2,270
Radley Creek	Portage-Waupaca	11	2,780
Soules Creek	Waushara	161	1,404
Trout Creek	Waupaca	-	1,552.0
Upper Tomorrow River	Portage	634	2,952
Waupaca River	Waupaca	-	120
White River	Waushara	107	2,106
Woods Flowage	Langlade	478	802
Willow Creek	Waushara	1,196	3,238
TOTAL		16,585[1]	42,436
State Park			
Hartmans Creek	Waupaca	340	750

[1]Since this date, 293.87 acres have been acquired on the Wolf River above New London for the purpose of fish spawning grounds.

Table 20. Relationship of water area and frontage to population within the Wolf River drainage basin.

County[1]	Land Area (Acres)	Water Area (Acres)	Frontage[2] (Miles)	Population	Acres of Water Per Person
Winnebago	47,360	14,511	45	5,779	2.5
Waushara	184,320	2,010	93	6,378	0.3
Outagamie	267,000	608	109.0	16,025	0.04
Waupaca	487,040	7,630	377.0	34,980	0.2
Portage	184,000	1,456	64	3,663	0.4
Shawano	506,773	12,584	266	28,068	0.4
Marathon	75,000	546	10	2,130	0.3
Menominee	181,777	979[4]	68[3]	2,352	0.4[3]
Oconto	660	-	-	-	-
Langlade	286,680	4,820	142	4,823	1.0
Forest	109,762	11,299	98	3,082	3.7
Oneida	23,680	157	24	327	0.4
TOTAL	2,354,052	56,680 (approx.)	1,296 (approx.)	107,607	0.5

[1]Includes only towns for which 50 per cent or more of the area lies within the drainage area.

[2]Frontage includes total for lakes and total for streams more than 35 feet wide.

[3]Frontage for Menominee County includes only stream frontage. Lake frontage is incorporated in Shawano County total.

[4]Lakes tabulated under Shawano County. For ratio of population to water, lakes are included.

Table 21. Distance of major cities from New London, and population of these cities.

Miles	Major Cities
20	Appleton, Neenah, Menasha (46,758) (18,057) (14,647)
40	Oshkosh, Green Bay (45,110) (62,888)
60	Wausau, Wisconsin Rapids, Stevens Point (31,943) (15,042) (17,837)
	Fond du Lac, Manitowoc (32,719) (32,275)
80	Marshfield, Marinette, Sheboygan (14,153) (13,329) (45,747)
	Beaver Dam (13,118)
100	Milwaukee,[1] Waukesha, Watertown (1,036,047) (30,004) (13,943)
	Madison, Racine, Kenosha, Janesville, Beloit (126,706)(89,144)(67,899) (35,164) (32,846
200	Chicago metropolitan area[2] (5,129,725)

[1]Milwaukee County

[2]Cook County

ANALYSIS OF PROPOSALS FOR WOLF RIVER BASIN IMPROVEMENTS

This analysis will be pursued by posing a series of questions to which answers have been prepared using basic data presented. Some of the questions have been raised by others, abstracted from previous reports or originated by the Department. Background governing factors include a population drift to the larger cities and a population growth rate of 1.5 per cent per year for the state as a whole. The questions presented do not exhaust those that might be raised. Should there be others, the basic data are available to provide information contributing to an answer.

In raising or selecting these questions, we have attempted to cover the primary aquatic activities and development situations and consider them in the light of present and future demand. Out of this treatment a number of recommendations have been formulated. General objectives of a watershed plan will be to provide water of good quality in the quantity desired, to provide the necessary procedures for the management of renewable resources in the watershed and to provide for the use of these renewable resources consistent with the capacity of the resource.

1. Are more fish habitat and more fishing opportunities needed within this basin?

A primary consideration for fish is water quality. A clear body of water with adequate oxygen will provide a better environment for all biological activity. The generally good watersheds of the Wolf provide these conditions except that considerable erosion originates in clay soils in the bed of glacial lake Oshkosh and there is bank erosion on the river itself. If left unchecked shrinking water resources and fish production can be anticipated and a wide, flat, shallow river and shallow lakes will result.

There is good fishing in this watershed now. There are also at present large amounts of surface water area of good quality within this basin and good distribution of waters. No section is impoverished. Furthermore, there is a light population density within the basin which allows for 0.52 acres of water per person.

If this amount is not enough, many large water areas lie nearby which offer substitutes or alternatives. Additional water space, therefore, to provide more fish habitat or fishing opportunities is not needed or justified for the basin alone. There is even abundant frontage. But to view the amount of water and frontage in terms of the basin boundaries alone is inadequate because of the many urban areas nearby with a much larger population which make recreational demands on the water. Because of this situation, it is possible that more water space might be desirable. One way in which to provide additional waters is to build impoundments. However, there are advantages and disadvantages, and these are discussed later in this report.

Fishing opportunities depend also upon the degree of public access to existing waters. This could be improved on some of the larger lakes and on many of the smaller ones. Park planning recommendations suggest establishment of county park facilities on the larger lakes, some of which lack them now. Access to smaller waters would also make additional water space available for public use.

Opportunities for some use of streams and rivers are available at roadsides and bridges. In the southern part of the basin these occur at every section line except on the larger rivers. In the north bridges are less frequent and may be lacking altogether in forested regions. For best use of bridge access there should be parking available at or near the bridge at used sites. The tendency for both state and county highway administration is to bar parking and fishing at bridge sites. If this practice is followed universally, much fishing access will be lost. Certainly all new roads crossing all water in the valley should provide access, parking and space for bank and bridge fishing. Access for fishing of small streams where it is not practical to use a boat is best provided from the bank. If public fishing is to be provided, it may be necessary to have an access right to the stream banks. The Conservation Department's long-range program of trout stream acquisition fits this need very well and the plans for acquisition of scenic areas would also make a contribution to bank fishing. Seventeen streams plus portions of others have acquisition projects on them as of September 30, 1961.

The protection of fish habitat on lakes, aside from maintaining water quality, requires preservation of a number of the bordering marshes and the inflowing streams. On streams it also requires preservation of the spring water sources and spawning riffles. If stream trout populations are to be maintained, warming of the water must be avoided. Since this occurs with impoundment, such development should not be undertaken on trout streams. Beaver can be a threat to a trout stream by their damming activities, and control of beaver has been favored on important trout-inhabited streams tributary to the Wolf.

Marsh frontage on lakes and incoming streams is important for spawning of northern pike and muskellunge. This frontage is also valuable for human habitation and consequently tends to become improved for man's use. If populations of these fishes are to be maintained, this marsh habitat must be protected and preserved. At the present time there is no habitat protection in operation on lakes in this basin over and above existing laws enforced by state agencies. With the trend toward complete shoreline improvement, a portion of the shoreline on every lake should be reserved for fish, game, aesthetic and public use purposes.

The Wolf River proper deserves special consideration because the main river and associated marshes from Lake Poygan to Shawano is a spawning grounds for fish in the Lake Winnebago system. The walleye spawn in the

flooded marshy flats of the flood plain and the fry after hatching drift downstream. The success of the hatch is dependent upon water levels. The white bass spawn in the river proper over a firm bottom with a current, and the sturgeon spawn among the rocks in the river channel. The amount of sturgeon spawning habitat in the lower river is very limited and the sites fairly well known. Obliteration of these sites should be avoided and acquisition of key spawning grounds in the lower Wolf bottoms would be desirable.

In conclusion, the protection of existing resources and adequate provision for use loom as the most important considerations for fish conservation in the watershed.

Recommendations:

(1) Protect spawning habitat for migratory fish in the lower Wolf River through public acquisition and zoning of flood plain bottom lands below Shawano. A small start in this endeavor has been made already.

(2) Protect marshy habitat on all lakes by reserving a portion of the shoreline as spawning grounds and nursery area. This will require acquisition of some frontage on all lakes, and especially on those waters which have fish populations spawning in marshes. To have a moderate portion of the shoreline in public ownership is desirable. The National Park Service, for example, prescribed 15 per cent for Great Lakes shoreline. Another means of protecting marshy frontage would be to zone it as a conservancy district. This would be less costly than acquisition.

(3) Seek correction of watershed and bank erosion problems originating in the lower part of the Wolf River basin.

(4) Purchase frontage on trout streams of known good quality which do not now have significant amounts of public frontage. Such streams are located principally in Waushara, Waupaca, Portage, and Shawano Counties. North of these counties there are already substantial amounts of public lands, except along the banks of the Wolf River itself. Here there should also be public acquisition because of the uniqueness of the banks for fishing and aesthetics.

(5) Seek to establish substantial public use areas on the large lakes (over 1,000 acres) which now lack them. Lakes in this category are Metonga, Lucerne, Poygan, and Winneconne.[1]

(6) Investigate potential for impoundment construction for recreational purposes in the future at sites above Post Lake where there is little competition with other uses and low cost land is available.

(7) Keep beaver under control on important trout streams in accordance with the Conservation Commission's beaver-trout-forestry policy.

2. What measures would enhance wildlife production and cropping?

The history of the Lower Wolf River vividly reveals its past and present ability to provide habitat for the production, maintenance and harvest of fish and game. Highs and lows have been experienced depending on all the factors which affect habitat such as water levels, food and cover conditions, weather and a number of lesser influences. One of the objectives of management is to control these limiting factors to accomplish a sustained yield of fish and game over the years. Integrated efforts must now be directed toward preserving present desirable land and water habitat with subsequent efforts toward the improvement of both.

Acquisition of key areas along the flood plain of the Lower Wolf is ot utmost importance to retain and preserve the best available habitat. High priority should be given this activity with improvement through development a little later objective.

Public acquisition and development of large, key blocks will assure a nucleus of optimum habitat for public benefit and use. Private wildlife development as "satellite" areas interspersed between public areas would result in habitat preservation and improvement in the public interest at minimal cost to public agencies and without disturbing the local tax base. Technical services of fish and game managers is essential in this endeavor.

The most rewarding form of management in the entire bed of glacial Lake Oshkosh is the acquisition of wetlands which furnish winter cover, nesting areas and hunting opportunities where population pressures are high and the quantity of public lands low. These areas are being drained and need the protection of zoning or acquisition if they are to remain. An expanded acquisition program within the marshy bottoms of the flood plain of the Wolf River and tributary streams can also provide fish spawning grounds, aesthetic opportunities and public use opportunities for the boating public or camping public.

An excellent focal point for acquisition are the deltas of major streams as they enter Lake Poygan and other lakes in the river bottom. Since these lands are low and subject to flooding, they will always be difficult to drain. The bottom lands also provide an unusual piece of woodland ecology with extensive stands of bottom land hardwoods. This is the largest block of such hardwood anywhere in the state. The preliminary thoughts of the Conservation Department call for acquisition of about 10,000 acres for hunting lands and 2-3,000 acres for fish habitat purposes. This would still leave substantial area for private investment since there are about 40,000 acres in these bottoms.

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[1] Such an area is under construction on Metonga at the time this report was completed.

With effective flood plain zoning, actual acquisition would not be immediately pressing. Zoning of wetlands is not now practiced by any of the counties on the river. An objective of planning should, therefore, be to stimulate effective use of this tool to accomplish wetlands preservation where desired. Unfortunately, zoning now is all too often an ineffectual stop-gap measure.

Forest game values are almost as great as timber values, so in some cases substitution of game production for poor quality forest assets may be warranted. This is the rationale that applies in the development of food patches and waterfowl impoundments at Navarino and on some county and national forest lands. Game managers are alert to measures which can be applied and have a number of agreements in force now with the counties and the U. S. Forest Service. This approach could perhaps be extended to some poorer quality lands of Menominee Enterprises, Inc., owners of the former Indian lands, and many private landowners may find that vegetation management for game production would be to their advantage. Continuous cropping of forested areas -- keeping a forest young -- will enhance game production on all lands. Cropping at a rate equal to growth still is not done on the Menominee but plans call for improving the cut. The strong market for forest products by the many wood-using industries within the watershed and nearby suggests that intensive cropping will take place to the benefit of game populations.

Added water areas particularly if shallow have waterfowl production and hunting opportunities. Impoundments usually with deltas at the upper ends, offer this habitat. It may be to the advantage of waterfowl and furbearer management to provide additional shallow impoundments on tributaries of the Wolf River. The abundant marshland in the Navarino Public Hunting Grounds, for example, offers the opportunity for small shallow impoundments and to provide them is part of the planning for development of that area. The water supply probably would be sought from the Shioc River.

There is the potential for private organizations to furnish either wetland or upland game habitat and there are many which do so now, particularly hunting clubs and fur farms. To furnish a stable climate for private investment greater use of zoning will be necessary in the bottom lands.

3. Are park and recreation lands needed in the Wolf River basin?

Since the basin has major scenic features of state-wide significance and the basin lies close to rapidly growing, major population centers, the answer is in the affirmative. State parks or their equivalent should be established at major scenic attractions -- the falls of the Wolf (Smokey Falls) and the Dalles of the Wolf River, the rips on the Little Wolf, portions of the Red, and the Virgin Pine stand in Menominee County. Lands within Menominee County, the county having Smokey Falls and the Dalles, are owned by a corporation which may be able to provide the degree of public use and protection desired for a scenic feature. If the corporation is unable to do this, the Conservation Department should be ready to step in.

There is now one state recreation area, Hartmans Creek, which will be able to supply diverse types of recreation close to population centers. The potential for others exist in the Sand Lake and Bass Lakes regions of Menominee County. Recreational opportunities are best provided in conjunction with prime water frontage, a commodity less available in the southern part of the basin because of poor quality frontage or completely developed frontage. Some opportunity does remain in the northern part of the basin on the larger lakes, but with numerous alternative situations not far away in national forests, such investment is not called for. Rather, county investment in recreational facilities on all big lakes is suggested. These lakes include Metonga, Lucerne, Poygan, and Butte des Morts.

Under present plans in the Outdoor Recreation Act, scenic easements are to be acquired along the Wolf where it comes close to State Highway 55. These acquisition areas along the river are located mainly in Langlade County and will be highly compatible with the wilderness -- canoe stream concept for this portion. Such easement acquisition could profitably be extended to Menominee County also.

4. Is the forest resource base adequate to supply wood-using demands?

The forest resource base of this region is not adequate to support existing paper mills, and the mills in Wisconsin are net importers of forest products. Therefore, it would be desirable to raise the productivity of forest lands from their present low level of about one-fourth cord per acre to the full potential of one cord per acre. This is especially applicable because foresters do not visualize any substantial increase in the amount of forest lands during the next 15 years. Vertical expansion from increased productivity will be necessary. Concentration on the educational and management work necessary to achieve this objective would be desirable. There is no need for direct use of waters in the Wolf River for additional paper manufacturing facilities when the forest-using industries in the Fox Valley are now net importers of wood products.

Improvement of the resource base will only come through research and education since so much forest land is privately owned. Just exactly what this requires in the form of manpower and effort should be investigated further. If the investment horizon of the individual landowner is too short to envision forest management advantages, there should perhaps be more public or commercial investment in forest lands.

5. What about boating in the Wolf River system?

Boating popularity has increased immensely in recent years. This growth is accompanied by interest in and demand for navigable water and boating accommodations. At the same time boating creates problems through interference with other activities and damage to habitat. Summer use of the river has undergone complete change in recent years -- a shift from fishing

to recreational boating. An appraisal of improvement potential and the position of recreational boating follows.

The Wolf River is wide, measuring about 400 feet at its lower end. It is also unobstructed as far as the dam at Shawano. In the portion from New London to a point below the dam at Shawano widths average about 200 feet. Since the entire lower river has relatively slow water, it can be readily traveled by boats, up to the size of inboard cruisers as far as New London and with smaller boats above. The river has been declared navigable by the U. S. Corps of Engineers to New London, but care must be taken in cruising with larger boats during midsummer low flow as the channel is poorly marked and shallow above Gills Landing. The Corps of Engineers maintains a channel capable of accommodating boats with drafts as much as four feet to New London.

There are many complaints of boating interference with fishing, and much evidence of bank erosion all summer from motorboat waves in the portion having heavy traffic. The lower river, of course, cuts through the alluvial plain of the bed of glacial Lake Oshkosh so it fortunately has many low banks of sedimentary materials. Erosion of these materials is not serious but the high clay banks exposed here and there are in critical condition from repeated motorboat wave action. Bank stabilization is considered necessary to protect the water quality of this great river.

Motorboats cause a disturbance to the fishing enjoyment by speed, noise, and waves. This disturbance is serious wherever anglers congregate. Inbetween Lake Poygan and New London boating has become so intense between June 1 and Labor Day that anglers claim they cannot enjoy river fishing at any time. This is not as serious from New London upstream because there is more bank fishing and less boating.

Unrestricted motorboating has probably extended about as far as it can go on the Lower Wolf, unless there is a dam and lockage system to raise water levels to permit more extensive travel -- possibly 72 additional miles. Because of the great expense of locks, danger to a valuable fishery and lack of other benefits, providing this additional navigable water has not been deemed practical enough to warrant further investigation. Other rivers in the system are not big enough for motorboating but the large lakes in the watershed offer this opportunity. Interference with other activities is a subject needing further intensive and immediate study for possible resolution.

The enjoyment of motorboating and any other type of boating will be enhanced by opportunities for shore stops, camping and picnics, and possibly for emergency communication. Acquisition of frontage for fish and game purposes in the lower river could provide this opportunity incidentally to other uses. The navigable portion of the river now has no navigational aids maintained by a public agency. However, if boating intensity continues it is probable that aids as used on the Mississippi River might be needed for safety.

Boating on the upper river, from Post Lake downstream to Keshena will be largely canoeing. This is slow travel and best appreciated where there are opportunities for camping. The numerous rapids and several falls on the Upper Wolf make it especially attractive and exciting but are at the same time dangerous. There are 72 miles of river between the lower Post Lake dam and the Keshena dam which offer exciting canoeing opportunities because of the high gradient. Traveling at a speed of 20 miles per day it would take three days to complete a canoe trip on the river. This suggests the need for several camping areas. Acquisition of frontage for fishing and aesthetic purposes and establishment of parks at major scenic attractions would contribute to meeting the need for camping areas. The concept of a wilderness-like canoeing area for this portion of the river is warranted. Parts of the Little Wolf and Waupaca Rivers offer this opportunity also. There are now no canoeing outfitters for this river as there are for the Flambeau, Brule and other rivers in western Wisconsin. With advertising and provision for public use opportunities this business could be built up.

6. Is it desirable and feasible to build water areas for recreational purposes on the Upper Wolf River?

As we have seen there is abundant surface water in this watershed now, so the need for more is not pressing. But impoundments do have value for the additional recreation provided in the form of swimming, fishing, boating, water scenery and aesthetics and some hunting. Consequently, there is always a great deal of public interest in creation of additional impoundments.

In recognition of that interest, the Department has reviewed at some length the potential for impoundment construction for the Upper Wolf basin. Impoundments all have certain characteristics in common which are listed below.

1. They require a dam, the cost of which will be proportional to height, the span to be blocked and the amount of water to be passed; and dams are always expensive, especially downstream dams.

2. Impoundments create a free water surface from which evaporation rates may be high -- an important factor when water supplies are limited.

3. They usually provide a limited amount of deep water and the proportion of shallow water is high. Consequently, they usually have a high proportion of second and third class frontage.

4. With large drainage areas high fertility can be expected, resulting in abundant weed and algae growths, but at the same time good fish production, if winterkill and increase of undesirable species are not a problem.

A sketch of the value of the Upper Wolf for impoundments follows. The river in its upper reaches from Shawano upstream to the Hunting River Bottoms above Pearson in Langlade County occupies a narrow valley and has a high gradient. Utilizing this gradient, dams were constructed at Shawano and Keshena. These sites create small impoundments because of the narrow valley. Between Keshena and Post Lake there are no dams. Impoundments in the portion between Keshena and the hunting bottoms would not provide much more water area than the present river bed itself. Since impoundments here would seriously detract from highly valuable scenic and trout fishing resources, they should be discouraged.

The picture changes abruptly above Post Lake, where a gradient of less than one foot per mile takes the place of a gradient of 10 feet per mile. There is much marsh or swamp associated with the river in what were probably depressions in the ground surface that have gradually filled. Creation of impoundments above Post Lake will flood substantial land areas and create good-sized lakes of several hundred acres each. Upper and Lower Post Lakes themselves are examples of this kind of development in the past.

Langlade County proposes to take advantage of the potential for impoundment by building a dam at Pearson above county Trunk Highway "A" which would have a 12-foot head and create a 1,400-acre lake (Public Service Commission, 1958). The proposal had previously been advanced by the State Planning Division in 1938. It has been opposed by the Conservation Department because, beginning at the Hunting River and proceeding downstream, the Wolf River is a trout stream and would be damaged by impoundment[1]. Furthermore, this impoundment would have much more shallow water at its upper end than it would have deeper water at its lower end. The utility of very shallow water would be limited to game resources and some fishing and it would not provide prime building or recreational frontage or optimum fishing. The Post Lakes are examples of shallow impoundments, and they have proved to possess more than the normal share of management difficulties. Weeds are a chronic problem throughout most of the basin and the dense weed beds have contributed to a stunted panfish problem. The shallowness of the Post Lakes has not, however, inhibited cottage building and resort development -- the shores are about two-thirds occupied now.

An impoundment, to have the most desirable qualifications for fishing purposes, should have at least a 20-foot head and a third of the basin with 15- to 20-foot water depths. The Pearson Dam will not meet this standard, nor do the Post Lakes. A higher dam, as proposed by the State Planning Division, would be more desirable if a dam must be built. Langlade County would build the dam and flood mostly low-value county lands. Higher-value lake frontage would be substituted for low-value swamplands. Little high-quality, private river frontage is involved.

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[1]The Public Service Commission and the Supreme Court approved its construction but the decision is now under appeal to the Federal Power Commission by the Conservation Commission.

The Post Lakes are shallow, too shallow for optimum recreation. They are reported to have lost more than a foot in depth in recent years from siltation or accumulation of organic matter within the basin. Raising the height of this dam might be considered but it could only be done with loss of private property and existing improvements.

In summary, it appears that new impoundments on the main stem of the Wolf River generally would be detrimental to the existing fishery. On selected lateral branches, they could have specific recreational values. However, any proposals for new impoundments, such as above the Post Lakes, must be evaluated on the merits of each individual case.

7. What is the feasibility of water level control on the Lower Wolf River to enhance fishing and hunting opportunities?

Water control is a key factor frequently utilized by fish and game managers in the production of fish and aquatic game. Lateral dikes with control structures, sometimes supplemented by pumping, offer vast opportunities to restore and maintain continuous suitable habitat. A pilot project is in operation on the Outagamie Wildlife Area which will provide guidelines for future development on both public and private lands.

Stream bank stabilization is necessary to reduce siltation. Other methods for controlling erosion may also be helpful. Water level stabilization may be a factor in controlling undercutting of timber, thus keeping channel maintenance costs low.

The dam at the outlet of Lake Winnebago at Neenah-Menasha apparently furnishes the key to maintaining water levels as far upstream as Gills Landing. The dam operation allows low-flow augmentation for power dams on the Lower Fox and winter drawdowns for spring flood storage and avoidance of winter ice damage in the Lake Winnebago pool. A thorough definition of fish and wildlife management goals as affected by water levels is desirable to determine how water levels might be better managed to accommodate fish and wildlife and other uses on the Lake Butte des Mortes-Poygan Pool and the marshes and winterkill lakes above Fremont. As a result of high waters, the marsh which largely surrounded Lake Butte des Morts and Poygan has retreated and Poygan is said to be 30 per cent larger than it was. Resolution of the Winnebago pool problem and an idea of maintaining where stable levels in the marshes is required.

In summary, water level control is feasible and desirable on the lower Wolf River and will result in enhancement of fishing and hunting opportunities. Both public and private initiative can be encouraged to attain a high sustained yield of fish and game resources.

8. What measures can be taken in the watershed to prevent flooding and stabilize stream flow which would be beneficial to fish and game as well as to man?

Seasonal peaks in runoff and temporal variations in snow accumulation, melt and rainfall suggest we will always have flooding at times. Some flooding may be desirable in the spring to provide water for marshes and conditions for spawning but excessive floods are generally undesirable to both man and beast. The problem is to reduce the flooding of property as much as possible and distribute this runoff over a longer period of time to keep stable stream flows.

Reduction of flooding depends upon water retention in the uplands and stabilization of stream flow is dependent upon the gentle release of either surface or ground waters to the water courses below. Flooding on the Wolf River occurs principally in the spring although high water can occur at other times also. An especially critical period, and combination of circumstances, is the time at which snow melt is occurring, the ground is still frozen and heavy rains occur. This is usually in late March or early April. The highest flood on record for the Wolf was in April of 1922.

Forest cover, particularly in the uplands, is advantageous for the watershed in that it provides a better infiltration bed for precipitation and generally slows the melt of the snow particularly under coniferous cover. If a watershed was entirely in tree cover, better infiltration capabilities could be expected because of the organic uncompacted character of the soil and lesser freezing of the ground under insulation of the forest litter. The upper part of the Wolf watershed is in this condition now. The fact that the Wolf is generally a clear-water stream is good evidence of the value of forest cover.

Ground infiltration and subsequent expression as springs is the best natural insurance for a sustained flow. Much of the western and the northern parts of this basin -- essentially all of it except the bed of glacial Lake Oshkosh -- is a sandy type of soil ranging from Vilas sands to sandy loam. Such soils have good infiltration qualities and water transmission qualities, thus contributing to springs and sustained flow. This is not true of the clay soils of the old lake bed. However, infiltration will be limited on all soil types during the period when the ground is frozen especially when forest cover is lacking.

Water retention on the surface would require construction and maintenance of impoundments. These could be in the upland in the form of small impoundments and/or on the main stream as large impoundments. For an impoundment to contribute to sustained flow of a stream, its stored water must be released in periods of low flow. The release of water is, however, generally contrary to fish and game values in the impoundment although it may contribute to

fish and game values in the stream below. The management of impoundments, large or small, should best preserve their water recreational values rather than contribute them to the streams below which have a much smaller water area. However, it might be possible to dedicate a little storage to flood control and low-flow augmentation and retain the rest for recreation without seriously hurting recreational values. High-water periods occur especially in the spring and often in the fall. High water or full impoundments for fish spawning in the spring and for duck hunting in the fall is a good combination and compatible with peak runoff periods and flood management.

Impoundments on trout streams which comprise most of the headwater streams in the western part of the basin are not desirable because of their effect on the fishery. Actually a usual characteristic of a good trout stream is stable flow the year around, a product of good ground-water supplies. The sandy lands of the western and northern parts of the basin already have good water-storage features without impoundment.

The most significant type of flood-water storage in the entire Wolf River region would be large, main stream valley storage whether as flood plain behind constrictions, artificial impoundments or lakes. The unoccupied flood plain and natural lakes such as Butte des Morts, Poygan, Partridge, Partridge Crop, and Cincoe do provide for abundant water storage now and help to take some of the load off Winnebago. It is doubtful that this could be improved upon. Small impoundments appear to be practical in the higher parts of the bed of glacial Lake Oshkosh. The clay soils provide good water-holding qualities. A program of farm pond construction should be encouraged here. Stimulation of such a program rests with the County Extension Agent and technical services would be provided by the S.C.S.

9. What measures are practical to avoid erosion and siltation of lakes and streams?

The north part of the watershed is as good now as can be expected because most of the land is in forest cover. The western part of the basin is mixed farm land and woodland, hence with farm land quality ranging from good to poor. Parts of the region are being converted to more farm land while other parts are being converted to woodland. Those who live in the watershed say that the heaviest silt load comes down the Embarrass River, a fact which is keenly evident in times of high runoff where the Embarrass joins the clear Wolf at New London. The Embarrass probably drains the area with the highest concentration of farms and farm land and of course drains part of the bed of glacial Lake Oshkosh with its clay soils.

On hilly lands, there is the strongest need and desire for the institution of erosion control practices on farms, while on relatively flat lowlands the demand or incentive is not great. In the flat bed of glacial Old Lake Oshkosh where row crops are more common, there is little incentive.

It is understandable that much of the turbidity and erosion would originate from this area, and that turbidity from the clay soil would be evident. The whole watershed of the Wolf has 10,458 farms of which 2,460 have been provided basic plans meeting erosion problems, according to the 1960 report (Wis. Leg. Council, 1960). This is only one-fifth. It therefore seems appropriate to seek improvement in this activity especially around the rolling fringes of the bed of glacial Lake Oshkosh if the marshes and lakes of the Wolf River bottoms are to be protected. Deltation continuously subtracts from the storage capacity of Lake Poygan, and siltation can be cited as a factor contributing to the extinction of Partridge, Partridge Crop and Cincoe Lakes. It is necessary to occasionally dredge the mouth of the Wolf at Lake Poygan for navigation purposes because of erosion and silt. In order to locate major erosion sources, a survey by soils technicians will be required.

Erosion

Bank erosion is an entirely different matter. It can be caused by cattle trampling the banks or it can be caused by wave erosion or natural stream action. Good bank cover -- in other words, protection from cattle -- is one measure to avoid erosion. The Conservation Department's trout stream acquisition program is helpful in this regard as are forest enterprises which front on streams from which cattle are excluded. Natural bank erosion caused by the meanderings of the stream cannot be avoided although in some cases it can be alleviated by guiding the course of the stream with deflectors. Situations descriptive of natural erosion are the "red banks" of the Wolf.

Boat-caused

A newer form of erosion is bank erosion caused by the wake waves of boats. Vegetative cover does not heal over sites of normal bank erosion. Consequently, the eroded bank enlarges and tumbles into the waters. This contributes to the turbidity of the water and may cause it to become shallower, especially during periods of little flushing and high boat waves. It can be reduced by restricting boat speed in eroding areas, riprapping of banks or conversion of vegetation to a tougher vegetative material such as heavy grass cover. Avoidance of wake waves requires a speed reduction to less than 5 miles per hour or having all boats traveling fast enough to plane, a speed of 15 or more miles per hour. Neither appears to be a very likely innovation because of the varying characteristics of boats and the length of the river. Riprapping with rock or other nonerodable materials appears to be best. This would logically be done under the guidance of the Corps of Engineers by individual property owners or road crews from the county. Riprapping has the interesting potential for providing additional spawning grounds for sturgeon. If measures are not adopted and utilized, employment of boat speed control measures is suggested.

Focusing attention on the bank erosion problem and prescribing improvement measures should be a joint function of the Army Engineers. Actual riprapping may be a Corps, county or individual function.

THE WOLF RIVER:
A CONCEPT AND RECOMMENDATIONS

The Wolf River basin is a great outdoor recreational area. Variety, abundance and size give it all the essential ingredients for appeal to the entire spectrum of outdoor recreation activities. These features include a cluster of headwater lakes and impoundments for water recreation of all types, wild, scenic canoeing and fishing water, spectacular falls and rock formations, a fascinating flood plain wetland for fish and wildlife, big water for boating and fishing, a patch of productive trout streams -- the petcocks for ground water storage -- and scattered clear lakes. These major features have been lifted from the many maps in this report and are shown in Figure 12.

The river and its basin actually offer abundant recreational opportunities now and many people are quite satisfied with these waters in their present state. But like all waters, the waters of this basin are being subjected to more use. Public agencies therefore face a problem in accommodating these uses without damage to the resource. To help lead the way for future maintenance or betterment, many specific measures are recommended for action by the Wisconsin Conservation Department and suggested for action by several other agencies. Protection and improvement of the Wolf River requires the combined cooperative efforts of several governmental agencies.

Action by the Wisconsin Conservation Department

1. Preserve areas of scenic significance for enjoyment by the state's citizens.

   a. Work out the protection of and public use opportunities for major scenic features on the Wolf River -- especially Smokey Falls and the Dalles with Menominee County. These features have state park significance.

   b. Survey potential for park sites on other waters such as the rips of the Red River, West Branch of Little Wolf and Waupaca River.

   c. Assist counties in planning recreational developments on scenic and recreational lands on sites of significance to the counties.

2. Protect fish habitat primarily and game habitat secondarily on major trout streams.

   a. Complete planning for acquisition and continue acquisition of frontage on major trout streams in western part of the basin.

   b. Outline boundaries for wilderness canoe and trout fishing waters on part of the Wolf and develop acquisition plans in cooperation with counties concerned to enhance this concept.

3. Seek preservation of the flood plain wetlands of the Lower Wolf for fish and wildlife habitat and recreational use.

a. Outline plans for acquisition and/or complete plans for acquisition and development of parts of the flood plain wetlands of the lower river.

b. Assist counties with delineation of the flood plain.

c. Provide research on how Wolf River water regimen meets requirements of fish and game resources.

4. Conduct specific surveys to uncover some of the unknown potential for development of the Upper Wolf.

a. Survey potential for improving existing waters in the recreational lake area of the Upper Wolf above the Post Lakes.

b. Acquire fish and game habitat lands owned by the Land Commission that lie in the bottoms of the Wolf in Forest and Oneida Counties.

5. Recognize the fact that bank erosion on the Lower Wolf is becoming exaggerated. There would be no conflict of interest among agencies here, so plans for all to participate could be drawn immediately.

a. The Conservation Department will assist other agencies, counties and individuals with the planning necessary for improvement work.

6. Determine how water level management in the Winnebago pool affects fish, wildlife and other recreation in waters above.

a. To accomplish this objective it will be necessary to define fish and wildlife management and other water recreation objectives for the Lake Poygan -- Butte des Morts pool and the marshes above Fremont, and determine how these objectives are affected by water level control at the outlet of Lake Winnebago.

7. Protect essential fish and game habitat and seek satisfactory public use opportunities on lakes within the watershed.

a. Acquire key fish and game and aesthetic habitat on the shores of lakes.

b. Assist counties and towns with establishment of access to lakes and rivers under the state aid law.

8. Improve the quality of the forest resource in the basin.

a. The Department will assist counties and individuals with planning and management phases of forestry practices beneficial to the over-all Wolf River watershed. These include protection, reforestation, management and harvesting, all stressing water and soil retention and control.

As firmer, more comprehensive plans for improvements of individual areas are completed, they will become appendices for this report. The expected more detailed plans include plans for acquisition and development of the Upper Wolf, Lower Wolf, trout streams and lake habitat.

Action by Other Agencies

Other agencies besides the Conservation Department have a key role to play in the Wolf River basin. Especially important as a coordinating group and source of leadership is the Wolf River Basin Planning Commission, formed since this report was first drafted. In an effort to pinpoint some of the problems to be solved and questions to be answered, the Department has listed areas of activity which could be considered by other agencies. Sound management of the Wolf River requires the combined work of all. Problems to be tackled which lie outside Conservation Department responsibility follow.

1. Complete a profile of the Wolf River from the headwaters to the mouth and run contours in the flood plain to elevations 30 feet above the river level.

2. Complete a profile of the lower Embarrass River and Shioc River and run contours in the flood plain to elevations 30 feet above the river level.

3. Outline the flood plain in the lower Wolf, lower Embarrass River and the Rat River for purposes of flood plain zoning, and provide a model zoning ordinance.

4. Provide an engineering opinion on the feasibility of low-cost, low-head wing dams on the Wolf and Embarrass that would tend to hold water levels yet not block fish migration or navigation above New London.

5. Provide advice and assistance on bank stabilization at sites of serious erosion along the main lower Wolf River.

6. Provide soil surveys and interpretation for guidance in land use planning and location of major sources of sedimentation.

7. Provide technical assistance in planning and applying soil conservation practices on farm lands to keep erosion and siltation minimal. Practices such as water retention structures, contour strip cropping, terraces and driveways, waterways, farm ponds and erosion control structures are envisioned, especially in the clay soil regions of high runoff and serious erosion.

8. Provide research on evaporation and transpiration as it relates to the low-flow water supply of the Wolf.

9. Furnish information and education for development of sound flood plain zoning.

10. Furnish information and education for development of erosion control practices, farm ponds and silt detention basins where feasible.

11. Explore potential for recreational improvement of the Hiles Millpond.

12. Provide larger multi-purpose facilities for recreation on Pine Lake, which would accommodate camping, picnicking, swimming and boating. Provide some public frontage for fish, wildlife and aesthetic uses on lakes within Forest Service boundaries, to help absorb the recreational demands of the region.

13. Provide frontage on the Wolf River within U. S. Forest Service boundaries in support of the wilderness -- canoe concept.

14. On the Lower Wolf, provide flood plain and wetlands zoning, to avoid damages and extra services and to protect fish, wildlife and recreation resources.

15. Enhance fish and wildlife recreational opportunities on flood plains by acquisition of recreational lands and/or making available tax titles to agencies attempting to fulfill this concept.

16. Provide regional and local recreation areas on major lakes and clusters of lakes.

17. Reserve county-owned lands or sell county-owned lands to designated agencies in support of the wilderness -- canoe stream concept.

18. Provide adequate access sites to lakes under the state aid program and provide parking opportunities and access at bridge sites.

19. Reserve county-owned lands or sell county-owned lands to designated agencies in the recreational lake area of the Upper Wolf, at least until surveys can reveal future management trends.

20. Conduct an economic and activity survey of the water-oriented recreation activities in the Wolf River basin.

21. Seek stabilized flow of Wolf River through coordinated water management of water storage facilities.

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Figures 1, 5, 7 and 9 are
omitted from this version
of the report.

GENERALIZED SOILS, GLACIAL AND BEDROCK GEOLOGY OF THE WOLF RIVER BASIN

Clay Soils
"A" Rating

Sandy Soils
"C" Rating

Granite (Precambrian)

Sandstone (Cambrian)

Dolomite (Ordovician)

End Moraines

Outwash, Ground Moraines

FIGURE 2.

GENERALIZED ELEVATIONS IN THE WOLF RIVER BASIN

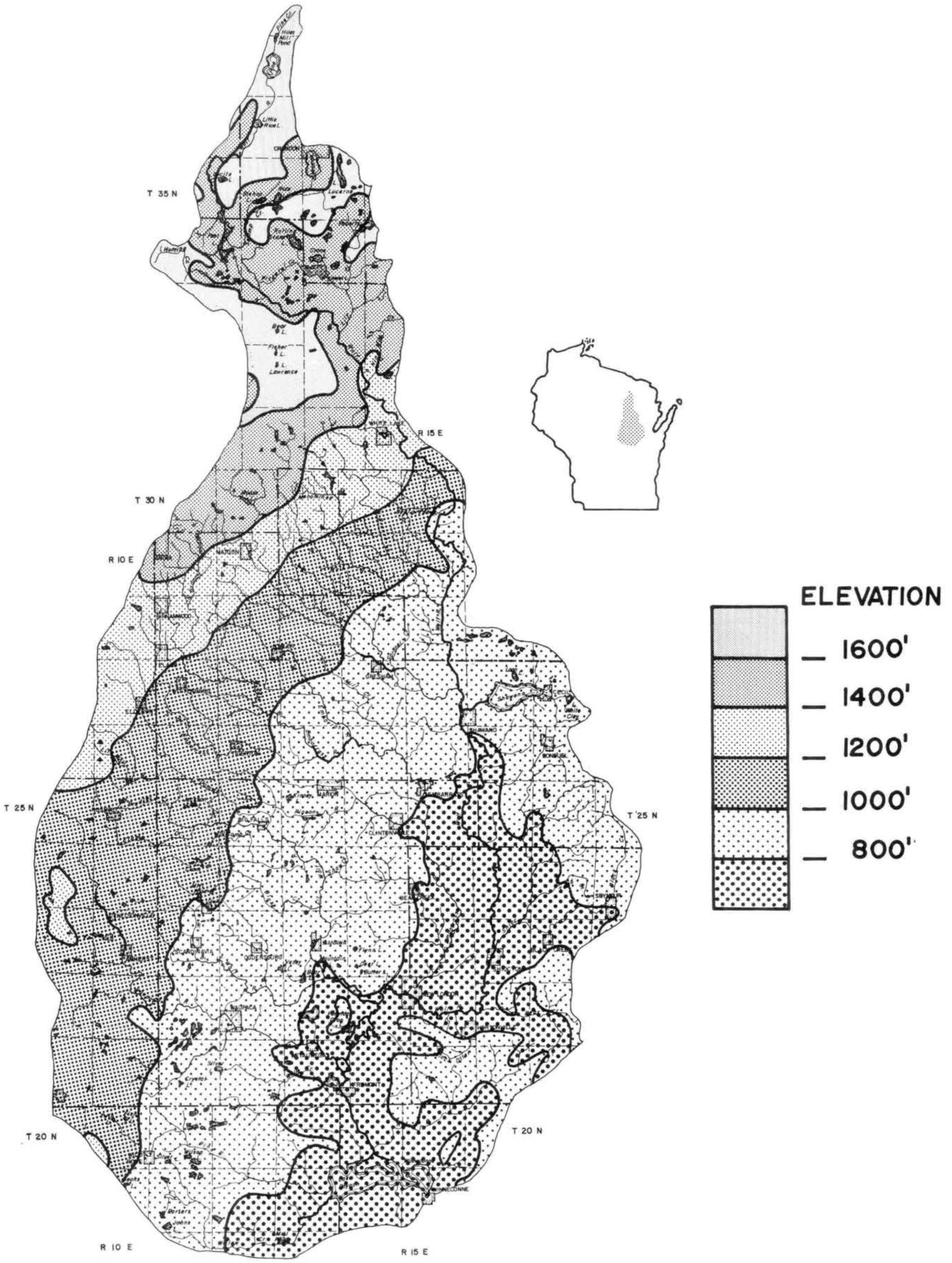
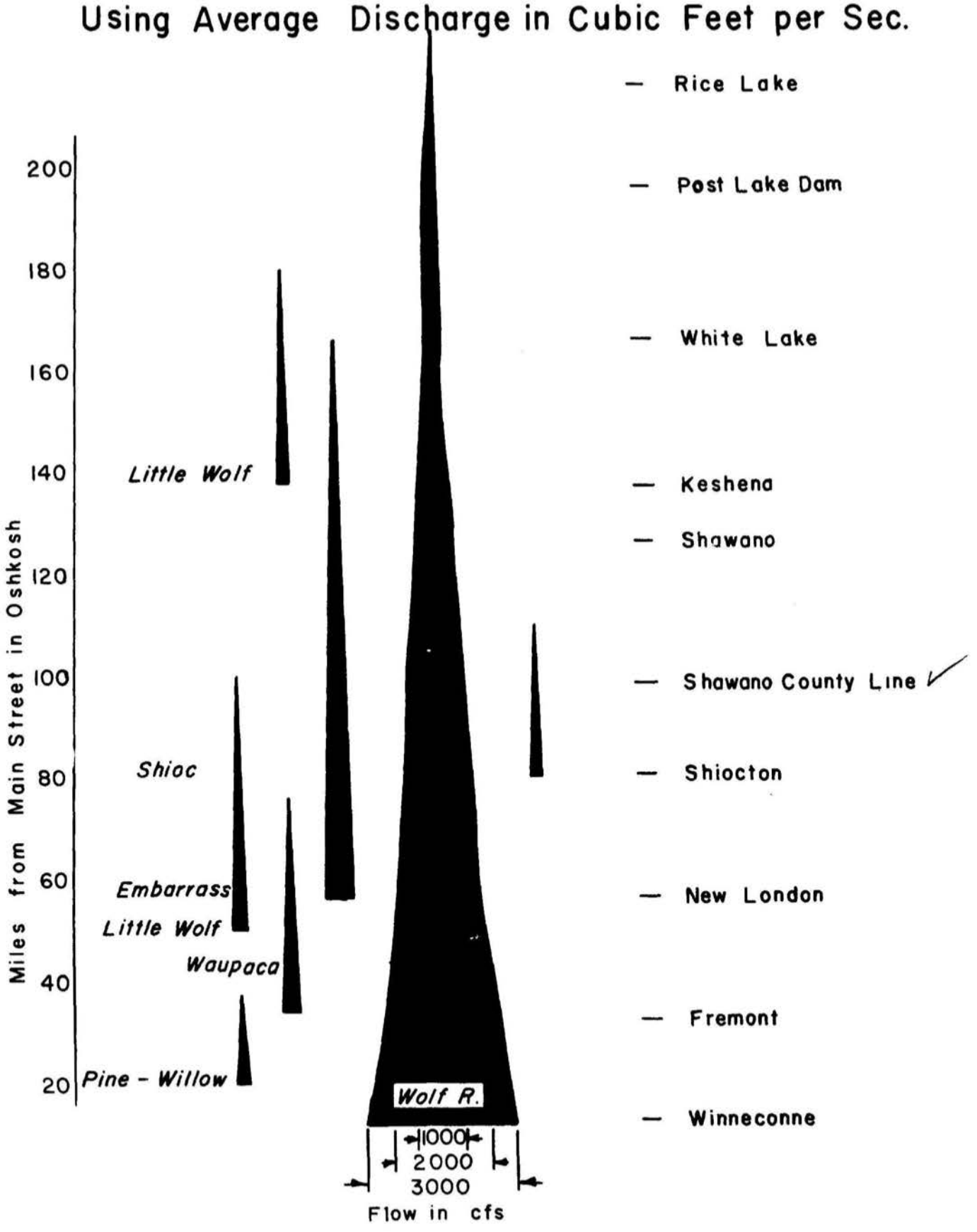


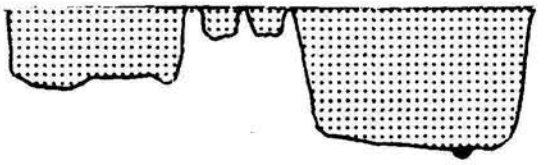
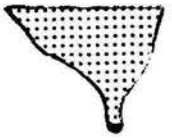
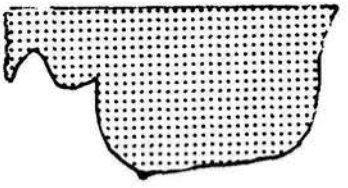
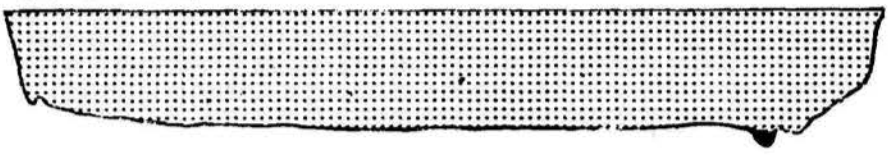
FIGURE 2a.

Fig. 3 Flow Diagram of the Wolf River

Using Average Discharge in Cubic Feet per Sec.

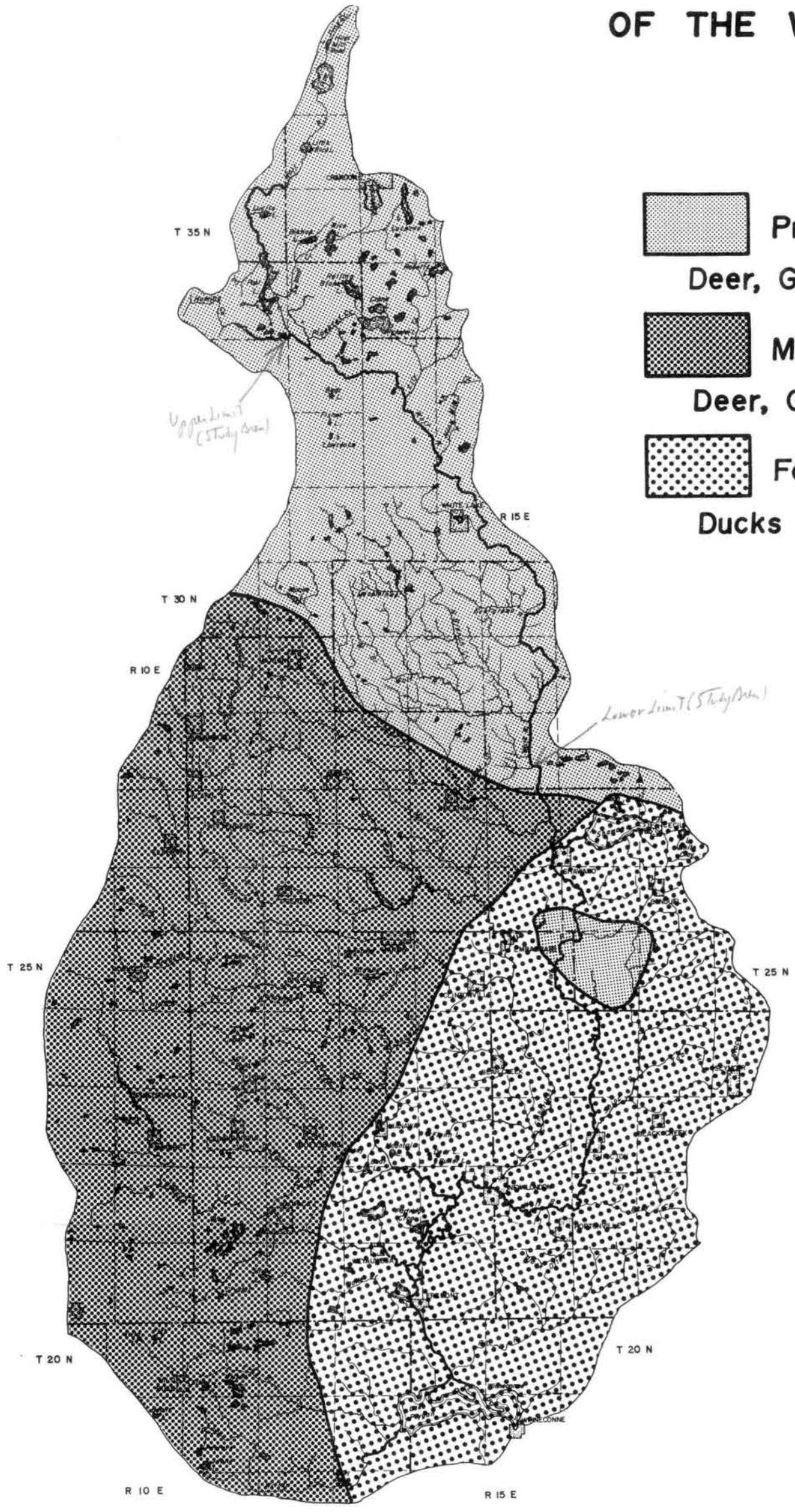


Width of the Flood Plain at Selected Points on the Wolf River

LOCATION	WIDTH	ELEVATION
	← 1000 ft. →	
202 - Pearson (E-W axis)		1540 1530 1520 1510
165 - Coule Rapids (E-W axis)		1260 1250 1240 1230
145 - Above Big Eddy (E-W axis)		915 900 895 885
99 - Above Leeman (NE-SW axis)		805 795 785 775
35 - Partridge Lake (E-W axis)		775 765 755 745

1. Source of data: Corps of Engineers 1931 Survey

GENERALIZED PICTURE OF LAND USE AND GAME RESOURCES OF THE WOLF RIVER BASIN



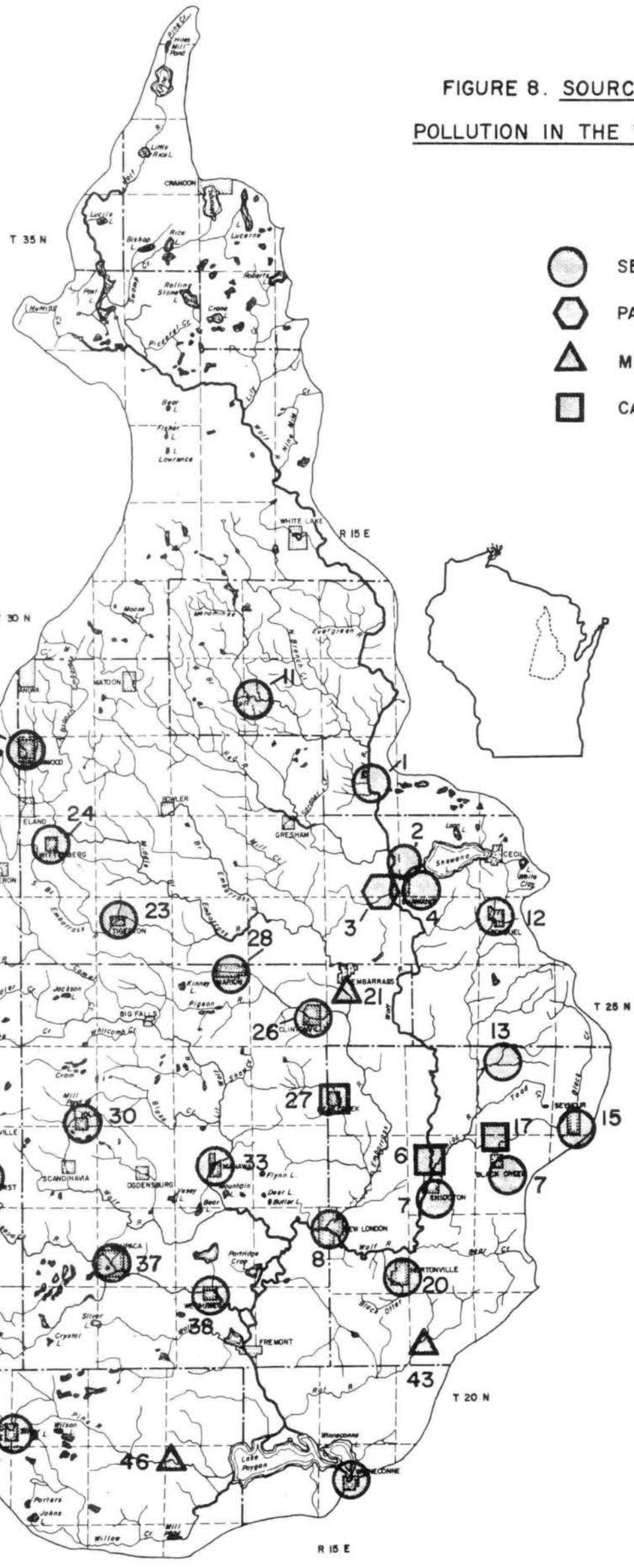
Predominantly Forest
Deer, Grouse, Snowshoe, Rabbit

Mixed Farm and Woodlot
Deer, Grouse, Squirrel, Rabbit

Farm Lands and Marshes
Ducks and Pheasants

FIGURE 6.

FIGURE 8. SOURCES AND TYPES OF POLLUTION IN THE WOLF RIVER SYSTEM



SEWAGE

PAPER

MILK

CANNING

WIDTH OF RIVERS AND STREAMS IN THE WOLF RIVER DRAINAGE AREA

35'

35'-100'

100'

Prepared by W.C.D. Lake Classification
R. Lehmann, Draftsman

PUBLIC LANDS IN THE
WOLF RIVER BASIN

U. S. FOREST SERVICE

COUNTY

CONSERVATION DEPARTMENT

INDIAN

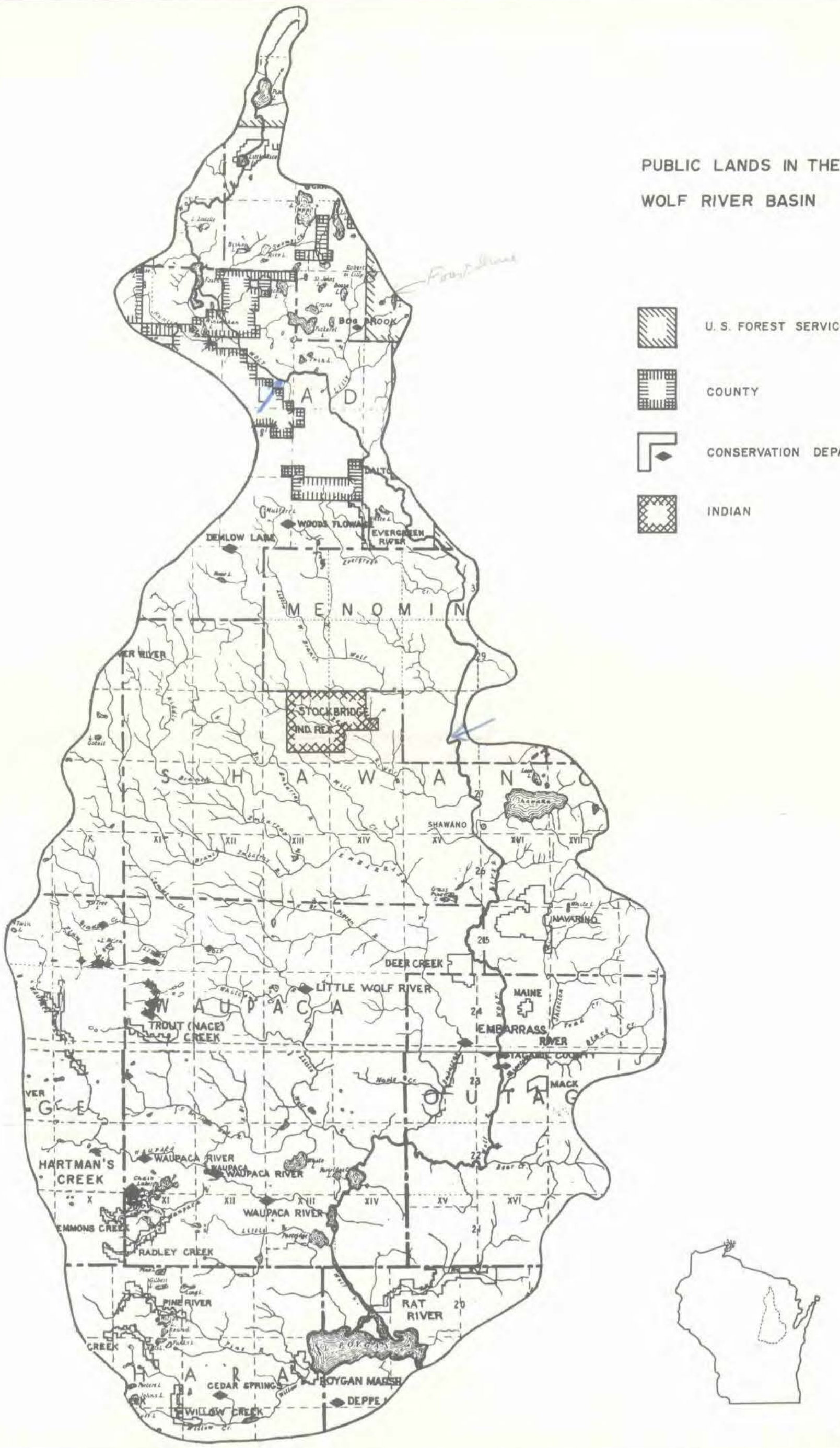


FIGURE 10.

RECREATION RESOURCES IN THE WOLF RIVER BASIN

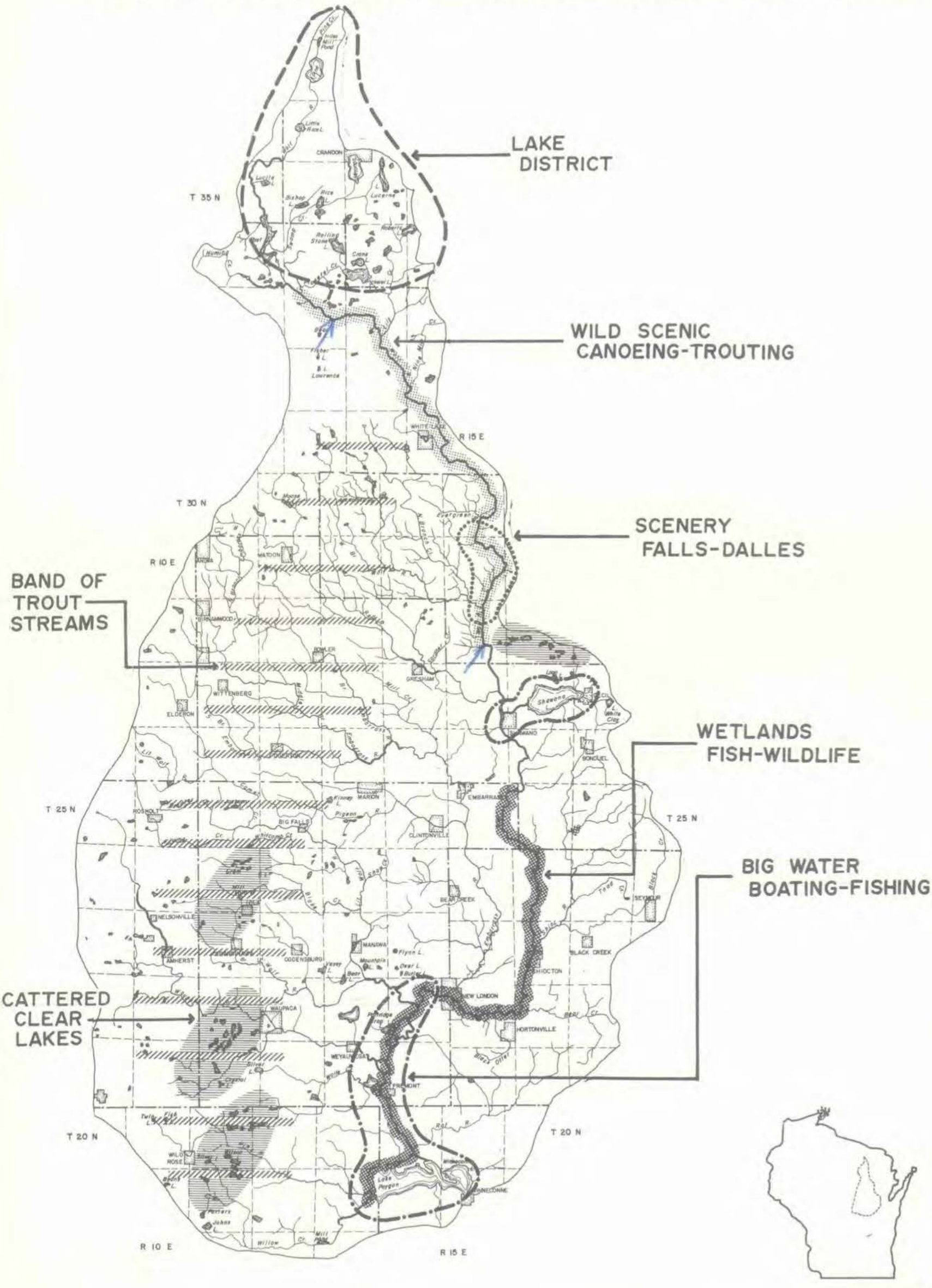


FIGURE 12.

Enclosure (7)

A REPORT

TO THE

WATER RESOURCES COMMITTEE

OF THE

WISCONSIN LEGISLATIVE COUNCIL

ON

THE WOLF RIVER BASIN

SR-61-6

AUGUST, 1960

A REPORT

to the

WATER RESOURCES COMMITTEE

of the

WISCONSIN LEGISLATIVE COUNCIL

on

THE WOLF RIVER BASIN

August, 1960

(Prepared by Ann C. Williams and others under the supervision of
Professor J. H. Beuscher, University of Wisconsin Law School)

Legislative Council
Room 202 South

SR-61-6

State Capitol
Madison, Wis.

Fishing for walleyes - Wolf River
near Shiocton
April 1958

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1959-61 Biennium

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PREFACE

The 1959 Wisconsin legislature directed the legislative council, through its water resources committee, to study the water problems of the Wolf River Basin (Jt. Res. No. 51, S. and 94, S.). A great deal of information on the Wolf River watershed is available even without further field studies. This report summarizes much of that information for the committee.

A comprehensive river basin study cuts across many of the principal fields of learning, including among others, economics, law, political science, engineering and geology. The cooperation of the university of Wisconsin therefore was enlisted in this study. The Wolf River Basin was made the subject of study in a seminar on river basin planning in which students in law, engineering, economics and planning participated. Each student studied and reported on a particular phase of the Wolf River Basin. Some of the information summarized in the present report was obtained as a result of this seminar. Other important sources of information were a 1938 report by the state planning board on the Fox-Wolf River Basin and a 1960 report by the state conservation department on recreational values of the Wolf River Basin, reproduced as Appendix B of the present report. Population and economic data were obtained from the census and other sources.

The present report was written largely by Ann C. Williams under the supervision of Professor J. H. Beuscher of the University of Wisconsin Law School. Professor Beuscher, along with Professors Arno Lenz, Fred A. Clarenbach and Lionel Thatcher, directed the seminar on the Wolf River Basin.

The present report describes (1) the physical setting of the Wolf River Basin, (2) the population characteristics of the basin, (3) the economic setting of the basin, (4) the various agencies of government involved, (5) the present land and water uses in the basin and related problems, and (6) past proposals for solution of various problems of the basin. It is hoped that the report will be of material assistance to the committee in making recommendations for the future.

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SYNOPSIS

I. The Physical Setting

The Wolf River Basin, in northeast Wisconsin, drains about 3,750 square miles of forests, farms, swamp land, and lakes. The northern part of the basin is mostly rugged, steeply sloping land, and the southern part is relatively flat and therefore more subject to flooding. This difference in topography explains why the Wolf in its northern reaches is a fast-moving white-water river and in its southern parts is sluggish, sprawling, and marshy.

II. The Demographic and Economic Setting

The basin has a sparse population compared with the population of the whole state. About half of the people are farmers, or about 50,000 out of a total population of about 100,000. In March of 1959, 6,133 people were employed in the eight cities of the basin in industries subject to unemployment compensation.

The equalized full value of taxable property in the basin is about $356,000,000, or a little more than half of the value of property in Oshkosh, Appleton, Neenah, and Menasha in the neighboring Lower Fox River Basin. Bank resources are also relatively low. Retail sales in the four largest cities of the basin total about $45,000,000 a year.

III. The Governmental Setting

The key governmental agencies and their principal roles are as follows:

A. Federal Agencies

1. The Corps of Engineers operates Menasha Dam, which controls lake levels in the Winnebago Pool (i.e., Lakes Winnebago, Butte des Morts, Winneconne, Poygan, Partridge, Cincoe, and Partridge Crop and connecting streams). The Corps also dredges a 47-mile-long, 4-foot-deep channel for navigation from the mouth of the Wolf to New London.

2. The Coast Guard claims jursidiction to enforce Great Lakes Pilot and Navigation Rules on the lakes of the Winnebago Pool and on the Wolf as far north as New London.

3. The United States Department of Agriculture carries out the Soil Bank program and gives technical assistance in soil conservation programs.

4. The United States Fish and Wildlife Service advises state and local groups about measures to encourage fish and wildlife and to maintain fair distribution among the states.

5. The Federal Power Commission can give or withhold consent to applicants for permits to develop hydro-electric power.

B. State Agencies

1. The Public Service Commission administers the dam, lake level, and stream irrigation permit systems.

2. The Conservation Commission represents the interests of conservation in Public Service Commission hearings and carries out various programs, among them, the protection of fish and wildlife, the purchase of wetlands, the purchase and lease of public hunting lands, and the enforcement of hunting and fishing laws.

3. The Board of Health is responsible for maintaining pure water supplies, for administering the high capacity well law, and, with the State Committee on Water Pollution, for protecting streams and lakes from pollution.

4. The Department of Resource Development is responsible for preparing long-range plans for the wise use of Wisconsin's natural and industrial resources.

C. Local Agencies

1. Soil Conservation Districts cooperate with the State Soil Conservation Committee in carrying out soil conservation measures.

2. Ten counties, ninety-one unincorporated civil towns, twenty-nine villages, and eight cities are the local units of government.

3. There is no governmental unit of a regional character to view the problems of the region and to plan and develop solutions. The powers for land use planning and zoning are distributed among the many local units in the basin.

IV. Some Present Land and Water Uses and Problems

About 66% of the land is in farms. Dairy products, potatoes, corn, oats, and garden vegetables are the main crops. Some farm land, mostly in Langlade and Waupaca counties is irrigated from streams, wells, and pits. The chief irrigated crops are potatoes and garden vegetables. About 57,189 acres are in the Soil Bank; 12,404 of them are in flood plain towns.

Hydro-electric power is produced in small quantity in the basin. It

amounts to about one tenth of the hydro-electric power in the Wolf-Fox Basin and one one-hundredth of all Wisconsin hydro-electric power.

Parts of the basin are popular recreational areas, particularly the area from New London south, the forests, and the Menominee Indian Reservation. The American Automobile Associations lists only seven motels and one resort. No one has ever studied the quantity or quality of recreational accommodations in the basin. Recreational boating rather than commercial boating is important, as is fishing for sturgeon, pike, white bass, pan fish, and trout. Family camping and hunting for wildfowl are also popular recreational activities.

The forests of the basin provide resources for recreation and also for industry. Logging in the nineteenth century stripped large parts of the basin, but second-growth timber has replaced much of the virgin forest. The Menominee Indian Reservation has a 174,000-acre stand of sustained-yield forest used for logging and recreation. About 23,830 acres of Nicolet National Forest, a popular camping region, are in the basin. Langlade county owns 46,000 acres of forest land, part of which is in the basin. In the northern part of the basin, 80,000 acres of industrial forests provide timber for lumber, paper, and other wood products.

Some of these uses of land and water are competitive, and together with floods they present important problems. Flooding is a problem principally in the southern part of the basin, where the land is flat and people have built on the flood plain. Most of the land flooded is either unused or is farm land. The only city with a flood problem is New London. The Corps in 1949 estimated an average annual damage of $3,000 to New London and about $78,000 to agricultural lands and crops.

No watershed districts have been set up under Public Law 566, but prospects exist for such activity.

V. Proposals for the Wolf, 1922-1960

Many groups have studied the Wolf, but all have done so in patchwork fashion. The most comprehensive report has been that of the Corps of Engineers in 1949. The Corps, reporting primarily on hydro-electric power and flood control, stated that further development of hydro-electric power in the basin would be uneconomic and that the most sensible proposed systems of dams would be of very little help in lessening major floods. For example, the disastrous 1922 flood could have been lessened by only about six inches with the help of these dams. Until now, no study of the basin has been made in the perspective of the basin's total resources and economic and social needs. The Conservation Department's 1960 study of the basin indicates the benefits of a basin-wide approach to planning for recreational development. A 1960 university joint seminar was particularly helpful in its analysis of flood control, hydro-electric development, and irrigation in the basin.

VI. Possible Kinds of Regional Organization for the Wolf Basin

A Regional Planning Commission under Wis. Stat. 1959, §66.945, is a possible form of regional organization. The Governor would create it on petition from one or more local governmental units. It would have advisory planning and promotional powers only. It could charge back the costs of its activities to local units but not to exceed .003 per cent of the equalized value of land and buildings for property tax purposes.

Ohio and Minnesota have established locally controlled organizations for comprehensive control and development of water resources. Problems in these states are different from those in the Wolf Basin, but the experience of these states can serve as guides (and perhaps in some ways as warnings) for a basin-wide approach to Wisconsin's water problems.

WOLF RIVER BASIN STUDY (1960)

I. THE PHYSICAL SETTING

The Wolf River Basin can be studied as a unit, but such a study has limitations: the basin and other areas are interdependent in several important ways. One of these areas is the Lower Fox River. The amount of water flowing down the Wolf into the Fox affects the amount of water available for industrial, municipal, and other uses in the Winnebago Pool and in the Lower Fox. The dam at Menasha controls the level of water in Lake Winnebago and therefore has some control of levels upstream into the Wolf. A second area is the Wisconsin River Basin. The canal at Portage joining the Wisconsin and the Upper Fox is a potentially important link between the Fox-Wolf Basin and the Wisconsin River Basin. Therefore, even though this report focuses principally on the Wolf Basin, as such, references must be made to the Fox-Wolf Basin and to the Wisconsin-Fox-Wolf complex.

A. Location

Pine Lake, about 25 miles south of the Michigan line in west-central Forest County, gives rise to the Wolf River. This river flows 223 miles to the south, through Langlade County, the Menominee Indian Reservation, Shawano and Outagamie Counties, New London, and Waupaca and Winnebago Counties. It joins the Fox River ten miles upstream from and west of Lake Winnebago, near Oshkosh. The Fox then flows to Green Bay, and the Fox-Wolf thus connects with the Great Lakes-St. Lawrence Seaway System. (See Map 1, Wolf River Drainage Basin, p. 3.)

The main tributaries of the Wolf flow into it from the northwest. They are the West Branch, the Red, Embarrass, Little Wolf, and Waupaca Rivers. The Shioc, a rather small tributary, enters from the northeast. The Embarrass is particularly important, for it joins the Wolf at New London and helps create rather large floods in and near that city. (See Table 1, Tributaries of the Wolf River, p. 2.)

The Wolf and its tributaries drain 3,750 square miles covering part or all of 10 counties--the six noted above and Oneida, Marathon, Portage, and Waushara. This is more than half the drainage area of the Fox-Wolf system, which is 6,520 square miles. Together the Fox and Wolf drain more than half as much area as does the Wisconsin River, which drains 11,715 square miles. The second largest basin in Wisconsin is the Chippewa-Flambeau, draining 9,519 square miles. The Rock and Pecatonica drain 5,569 square miles and the St. Croix drains 4,206 square miles. The Black, draining 2,439 square miles, is the only major Wisconsin River draining less land than does the Wolf. (See Appendix A, Drainage Area, Fox-Wolf River System).

B. Geology and Topography

The northern part of the Wolf travels through rugged country. Ancient Pre-Cambrian bedrock juts out through a relatively thin layer of glacial drift and

Table 1

TRIBUTARIES OF THE WOLF RIVER

Name	Place of Entry		Drainage Area - sq. mi.	
	Side	Miles above Lake Winnebago (1)	Tributary	Wolf River Including Tributary
Evergreen Creek	West	152.6	100	632
West Branch of Wolf River	West	139.5	160	812
Red River	West	128.8	200	1050
Shioc River	East	81.3	200	1450
Embarass River	West	56.5	660	2240
Little Wolf River	West	50.1	510	2770
Waupaca River	West	37.7	330	3140
Little River	West	34.0	80	3240
Rat River	East	25.7	90	3350
Pine River	West (2)	(2)	110	3500
Willow Creek	West (2)	(2)	160	3670

(1) Mouth of Wolf River is 10 miles upstream from Lake Winnebago.

(2) Enters west end of Lake Poygan about 24.7 miles upstream from Lake Winnebago.

Map 1

WOLF RIVER DRAINAGE BASIN

creates rapids, waterfalls, gorges, unusual rock formations, and other natural beauty spots attractive to visitors. The river in most of its northern reaches flows within high banks. Heavy rain and the spring thaw do not generally bring about a spillover there. The generally steep slope of the land allows the Wolf to rush along rapidly for 109 miles to Shawano Dam, falling 775 feet. The only sizeable stretch of slow water is in Langlade County where the river falls only about 10 feet in about 20 miles. Much of the scenic area is in the Menominee Indian Reservation.

In the lower part of the river a great change in the lay of the land creates a great change in the nature of the Wolf. Sandstone covers the Pre-Cambrian rock, and glacial drift covers the sandstone. Plains replace gorges and lakes replace waterfalls. The high banks recede gradually from about the Shawano-Outagamie County line to the nearly flat land of the New London and Winnebago Pool areas. The Winnebago Pool includes 263.3 square miles of water in lakes Winnebago, Butte des Morts, Winneconne, Poygan, Partridge, Cincoe, and Partridge Crop. Three of these lakes (Winnebago, Poygan and Butte des Morts) are included among the 20 largest lakes in Wisconsin. The Wolf, flowing through low-lying marshlands and some of the lakes of the Pool, falls only about 56 feet from Shawano Dam to the river's mouth at Lake Butte des Morts, a distance of 114 miles. The water rushing along the upper 109 miles slows down and spreads over the river bottoms, which become great reservoirs. Periodically floods interfere with use of land along this lower end of the Wolf. (See Appendix A, Profile of the Wolf River and Appendix J, Topography of the Wolf River.)

The waters themselves are in a comparatively late stage in their life span. In geologic terms, lakes have a rather short life. Wisconsin's many bogs are remnants of lakes that were once like those in the Wolf Basin. Young lakes are relatively algae-free, but eroded land and organic debris enrich the water and encourage massive development of algae. Fertilizers and drainage of land nearby hasten the old age of a lake. The process is not necessarily inevitable: a bog lake can be limed to make it suitable for rainbow trout. In general, man knows too little and acts too little to restore lakes to a much more pleasant condition.

C. Soils and Rainfall

The kind of soil along the various parts of the river and particularly the amount and distribution of rainfall throughout the year (here "rainfall" signifies all kinds of precipitation) are important to understand why the Wolf is a problem.

The soil in the northern part of the basin is predominantly silt loam with subsoils of gravel and loam. It is rocky land, most of which is more suited to its covering of second growth timber than to cultivation. In the central section, below Shawano, silt loams and sandy loams are a little better suited to agriculture. Marshy peat soils in the lowlands and red clay predominate in the southernmost part.

Average yearly rainfall for the Wolf Basin is about 30 inches. This figure is typical of rainfall in Wisconsin as a whole. From 1930 to 1959 the maximum

annual precipitation was about 43 inches and the minimum about 23 inches. Approximately 60% of the rain comes from April to September, June having the highest average. Uneven distribution during the spring and summer can produce floods. In April of 1922, 3.36 inches fell on frozen ground and created the worst storm on record for the basin. In the summer, heavier rains, such as the 6.35 inches that fell in June of 1905, create less run-off. For example, run-off from the April, 1922, storm was 2.13 inches, but from the heavier summer rain in June, 1905, the run-off was only 1 inch and thus the flood situation was much less severe. The total average annual run-off is about 1/3 of the rainfall. Two thirds of the rainfall is absorbed by the soil, transpired, or evaporated. Much of the water absorbed by the soil finds its way to the water table.

The character of the soil determines in large part the ability of the soil to absorb and retain water. Sand absorbs much, clay less, and rocky ground still less. Humus and vegetable matter increase the power to absorb. Frozen soil of course sheds water. In general, then, in the highlands the rocky soil sheds water and in the lowlands the soil, when not frozen, can retain or absorb a great deal.

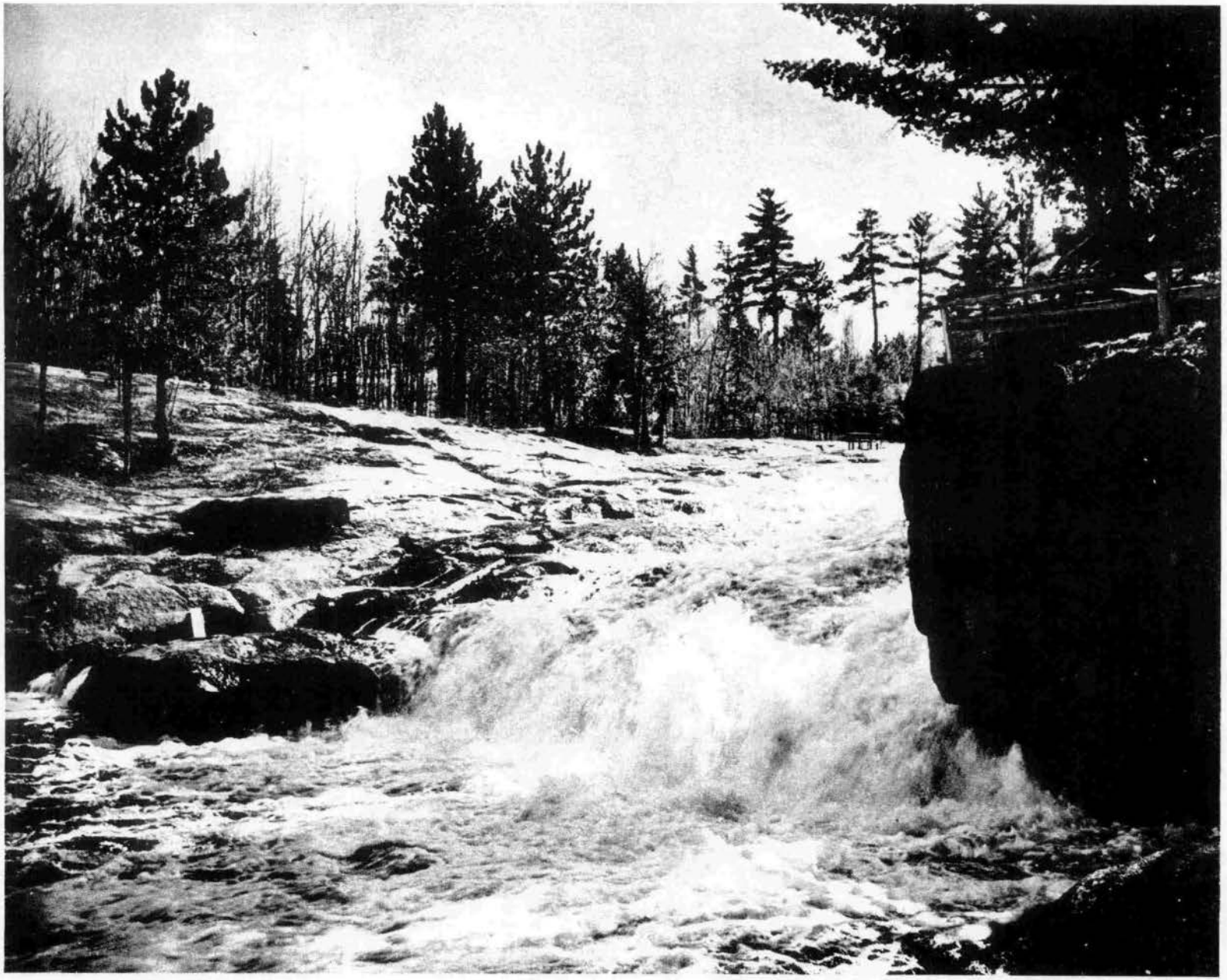
D. Ground Water

In the northern half of the river basin, the underlying bedrock of the Pre-Cambrian age contains little or no water. Such ground water as exists in this area is found in glacial outwash and sand and gravel deposits above this bedrock. An intensive ground water survey in 1948 in northwestern Langlade County estimated an annual recharge for a 90-square-mile area of 30,000 acre-feet a year. Pumpage in this area was 1,100 acre-feet. Of this pumpage, 69% was for a municipal supply, 26% for rural supply, and 5% for irrigation. Known depths to water ranged from 25 to 117 feet. The quantity of ground water in particular areas of the northern half of the basin varies according to the thickness of the water-holding material above bedrock.

In the southern part of the basin, water is available either from glacial deposit or from underlying Cambrian or St. Peter sandstone.

Throughout the basin the water in the glacial drift flows southward and responds to changes in rainfall much more than does water in the sandstone in the southern part of the basin. Water in the sandstone generally flows under artesian pressure conditions.

In general, ground water in the glacial drift supplies the Wolf and its tributaries, and accordingly long-term deficiencies in rainfall will not only affect the ground water supply but also the flow of the Wolf and its tributaries. Over the basin as a whole there seems to be little danger that present and immediately prospective uses of ground water, including irrigation, will seriously endanger ground water supply. However, local overpumpage, particularly from relatively thin glacial deposits, may cause local "cones of depression" in the aquifer so as, at least temporarily, to deprive the shallower wells located within the local zone of water.



Smokey Falls
Menominee Indian Reservation
May 8, 1956

II. THE DEMOGRAPHIC AND ECONOMIC SETTING

A. Population Data

The 1950 U. S. Census, a 1954 Wisconsin State Crop Reporting Service survey, and preliminary U. S. Census figures for all counties and for some cities are the chief sources for the following data. Detailed and exact information on the 1960 population will not be available until the fall of 1960.

Compared with the rest of Wisconsin, the basin has been relatively sparsely populated. In 1950, the basin held 3.2% of Wisconsin's population in an area about 6.7% the size of the state. It is predominately a rural area: in its 91 towns, there are only 8 small cities and 29 villages.

The cities, villages and unincorporated civil towns, the areas of which are at least 50% within the basin, are listed in Table 2, p. 8. In 1950, the population of this basin area was 110,096.

From 1950 to 1960, the ten basin counties increased in population from 424,305 to about 463,430, or about 9%. In 1950, the basin itself held 1/4 the population of the ten basin counties.

However, it is clear that this ratio is no longer accurate. The population of the three counties in the heart of the basin has decreased: Langlade by 10.1%, Shawano by 3.1% and Waupaca by .2%. The seven basin cities for which preliminary 1960 census figures are available (excluding Weyauwega) have increased a little more than 1%. Cities outside the basin but within the basin counties--Neenah, Menasha, Appleton and Oshkosh--have increased 26.1%. It appears that, within the ten basin counties, fewer people live in the basin itself and more live in the urban areas outside the basin than in 1950. It is therefore most likely that the population of the basin has decreased since 1950. This trend is in keeping with the statewide and nationwide decrease of population in rural areas.

B. Occupational Data

Of the total basin population, 50,165 or 49.8% were engaged in farming in 1950. Estimates indicate a decrease in the farm population since then. However, in spite of a decrease in farm population, there seems to be a surplus farm population in the ten basin counties (an area greater than just the drainage area). Youngsters coming of age to farm are numerically more than replacing their elders, and many must leave to seek employment elsewhere. For example, in Outagamie county 164 farm boys will come of age to farm during the 1950-60 decade for every 100 men who leave farming, according to estimates made in 1957 by the department of rural sociology of the University of Wisconsin. The average farm population replacement ratio for the state as a whole is 127 to 100. (See Chart 1, Wisconsin Farm Population Replacement Ratio, 1950-1960, p. 11).

Chart 2, p. 13 shows the percent of total farm operators working off the farm 100 days or more in 1954 in the state. In the ten counties of the basin about 24.3% of the farm operators worked off the farm 100 days or more in 1954. This compares with 22.4% for the state as a whole and with 22.4% for the 17 Wolf-Fox counties. The fact that so many work off the farm is perhaps a reflection of the

Table 2

TOWNS, VILLAGES, AND CITIES WITHIN THE WOLF RIVER BASIN
(Includes only those whose area is 50% or more within the basin)

County	Towns		Villages	Cities
Forest	Crandon	Lincoln	-	Crandon
	Hiles	Nashville		
Langlade	Ainsworth	Polar	White Lake	-
	Evergreen	Price		
	Langlade	Rolling		
	Norwood	Wolf River		
Marathon	Elderon		Elderon	-
	Franzen		Hatley	
	Norrie			
Oneida	Schoepke		-	-
Outagamie	Black Creek	Ellington	Bear Creek	New London
	Bovina	Greenville	Black Creek	
	Center	Hortonia	Hortonville	
	Cicero	Liberty	Shiocton	
	Dale	Maine		
	Deer Creek	Maple Creek		
Portage	Alban		Amherst	-
	Amherst		Amherst Junction	
	Belmont		Nelsonville	
	Lanark			
	New Hope			
Shawano	Almon	Menominee	Aniwa	Shawano
	Aniwa	Indian Res.	Birnamwood	
	Bartelme	Morris	Bonduel	
	Belle Plaine	Navarino	Bowler	
	Birnamwood	Pella	Cecil	
	Fairbanks	Red Springs	Eland	
	Germania	Richmond	Gresham	
	Grant	Seneca	Mattoon	
	Hartland	Washington	Tigerton	
	Herman	Waukechon	Wittenberg	
	Hutchins	Wescott		
	Lessor	Wittenberg		

(Table 2 continued)

County	Towns		Villages	Cities
Waupaca	Bear Creek	Lind	Big Falls	Clintonville
	Caledonia	Little Wolf	Embarrass	Marion
	Dayton	Matteson	Fremont	New London
	Dupont	Mukwa	Iola	Waupaca
	Farmington	Rayalton	Manawa	Weyauwega
	Fremont	St. Lawrence	Ogdensburg	
	Harrison	Scandinavia	Scandinavia	
	Helvetia	Union		
	Iola	Waupaca		
	Larrabee	Weyauwega		
	Lebanon	Wyoming		
Waushara	Bloomfield		Wild Rose	Wautoma
	Leon			
	Mount Morris			
	Poysippi			
	Rose			
	Saxeville			
	Springwater			
	Wautoma			
Winnebago	Clayton		Winneconne	
	Poygan			
	Winchester			
	Winneconne			
	Wolf River			

nation-wide surplus of farm products and of farm population. The farm operator replacement ratios of Chart 2 do not take into consideration this nation-wide surplus of farm operators, so the effect of the surplus of young people is really greater than the chart indicates.

We were able to find March, 1959, figures for the number of people working in firms large enough to be subject to unemployment compensation. (These figures with possible slight exception do not include workers in establishments with fewer than four employees.) The total number working in subject firms in and near the eight cities of the basin was about 6,133 or about 5.6% of the total 1950 population. Only 402 were working in service industries. (See Table 3, p. 15.)

C. Other Economic Data (See Table 4, p. 16.)

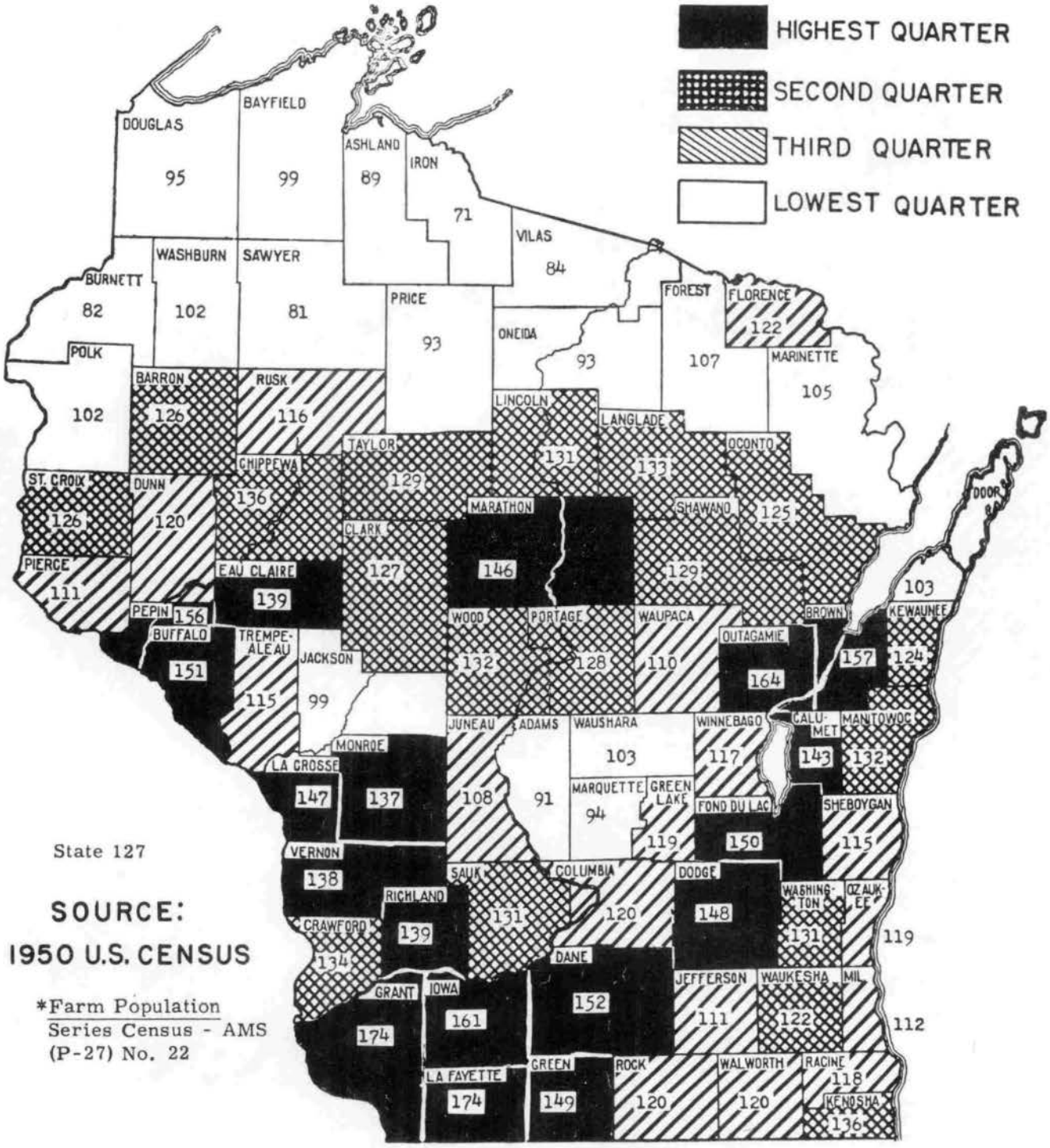
The full value of assessed property in the Wolf Basin compares rather poorly with the value of property of cities along the Fox River. For example, the 1957-8 full value of all assessed property in the basin was only 59% of the combined full value of only Appleton, Neenah, Menasha, and Oshkosh. The increase of value of all assessed property in the basin from 1947 to 1957-8 was 54.8% and of the Fox cities 117%. Much of the increase is, of course, simply an inflationary increase and not a real one. The full value of all assessed property in all of the Wolf Basin cities increased by 91.4%, but that of the four Fox Basin cities increased by 117%. Within the basin itself, farming areas increased in value by 35.7% and villages by 79%.

Bank resources are another measure of the economy of the basin. The total footings (i.e., assets and liabilities) of all National and commercial State banks in the Wolf Basin are $86,515,469, or about 1.8% of the total footing of all Wisconsin banks, and 42% of the total footings of the Fox Basin cities of Appleton, Neenah, Menasha, and Oshkosh.

Several informed people have suggested that potential development of the basin not for agriculture, but for vacationers, may represent the most fruitful way of increasing the area's economic base. It was noted above that in 1959 relatively few people in the basin were engaged in service industries, and present investment for recreational facilities seems slight. The American Automobile Association's Great Lakes Tour Book lists only eight approved motels or hotels in the basin and these have a total of only 92 units and rooms. Harold C. Jordahl's 1960 report for the Conservation department, "Recreational Values of the Wolf River Basin, Wisconsin", Appendix B of this report, gives several pages of important information on recreational facilities. (See pp. 16-21 of Appendix B.)

CHART I

Wisconsin Farm Population
Replacement Ratio - 1950-60*



State 127

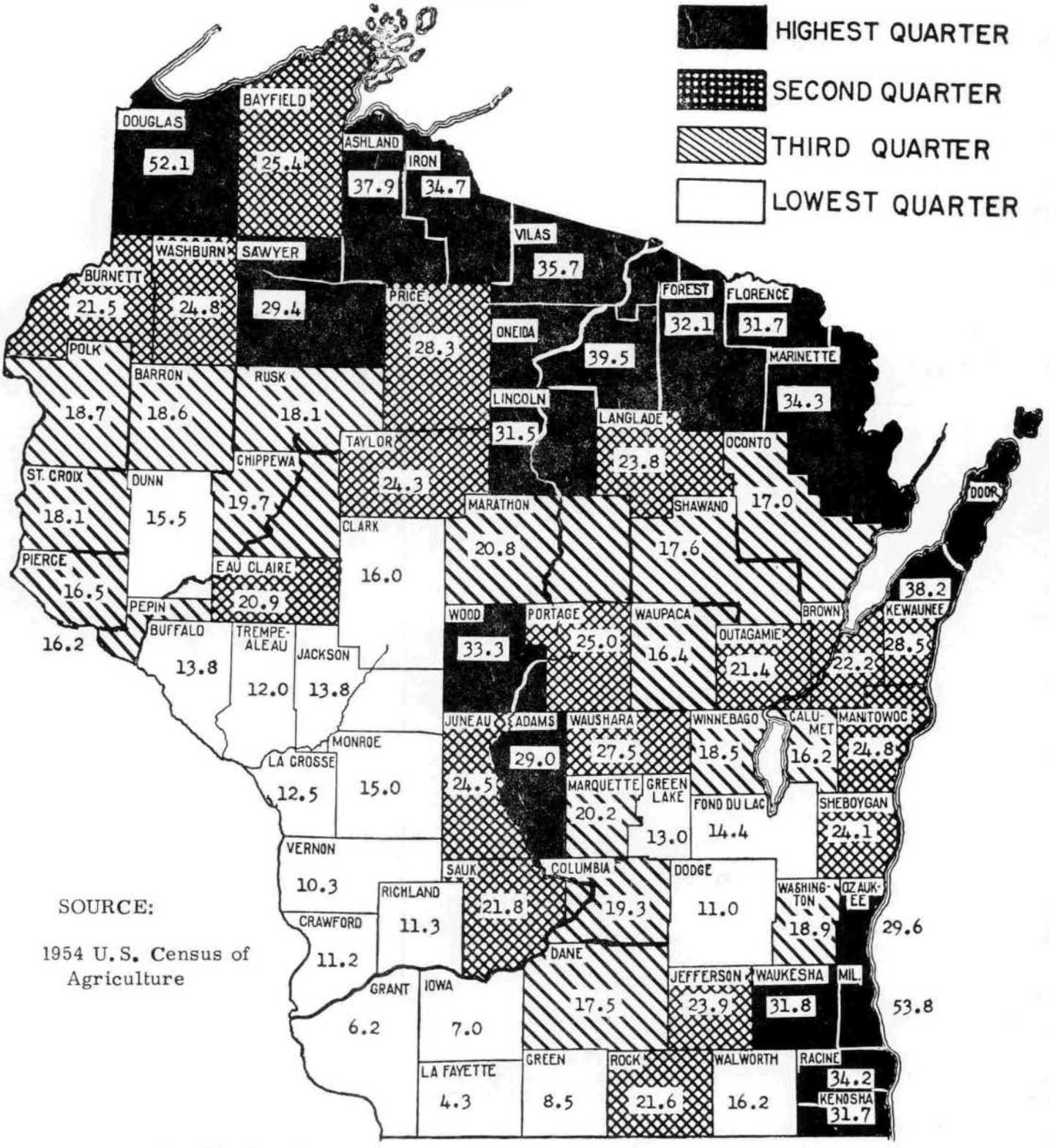
SOURCE:

1950 U.S. CENSUS

*Farm Population
Series Census - AMS
(P-27) No. 22

Chart 2

Percent of Total Farm Operators Working Off the Farm
100 Days or More
Wisconsin 1954



SOURCE:

1954 U.S. Census of Agriculture

As with 1950 the cut-over counties plus those counties in the Milwaukee-Racine-Kenosha area and the central sand plains have the greatest proportion of farm operators working off the farm 100 days or more.

Table 3

WORKERS IN FIRMS SUBJECT TO UNEMPLOYMENT COMPENSATION IN WOLF RIVER BASIN (Mid-March 1959)

Industry	Crandon	Clintonville	Marion	New London	Waupaca	Weyauwega	Shawano	Wautoma	Total
Mining	0	0	0	0	0	0	0	0	0
Construction*	4	7	0	15	57	9	47	10	149
Manufacturing - Total									
Foods	0	28	10	123	28	109	299	7	604
Textiles & Apparel	0	214	0	0	0	0	0	0	214
Lumber & Furniture	89	0	77	710	0	34	314	0	1224
Paper	0	0	0	0	25	0	(some)**	0	25
Stone, clay, glass	0	0	0	0	24	0	12	0	36
Metal products	0	0	0	84	75	12	0	0	171
Machinery	0	57	0	0	7	0	0	(c. 100)	64
Transp. equipment	0	981	51	0	0	0	0	0	1032
Miscellaneous	4	17	4	11	17	2	45	5	105
Total	93	1297	142	928	176	157	670**	N.A.**	3475**
Transp. & Commun.	8	103	0	32	67	17	20	27	274
Wholesale & retail trade	58	289	61	220	296	99	484	87	1594
Finance, Ins. & Real E.	9	25	12	29	24	7	84	28	218
Services	21	91	12	43	61	55	126	14	423
Total	193	1812	227	1267	681	344	1431	178	6133**

* Seasonal industry (mid-March low)

** Information not given by separate operation in these areas

Table 4

ECONOMIC DATA ON THE WOLF RIVER BASIN

I. Total land area in Wisconsin — c. 56,000 sq. miles

II. Total land area in the Wolf River basin — 3,750 sq. miles

3,566 of the 3,750 square miles cited by the Corps of Engineers are located in the towns listed in Appendix A. The 184 square miles not included are located in towns whose area is less than 50% within the basin.

III. Land in agricultural use in the Wolf River basin

Square miles	2,438
Acres	1,560,320
% of Total land	about 66%
Number of farms, 1954	10,458
Average size of farms, 1954, acres	149

IV. Full value of all assessed property

	1949	1957-8	% Increase
Wolf River basin:			
Towns	$146,422,935	$198,678,665	35.7%
Villages	23,024,815	41,355,675	79.0%
Cities	60,389,400	115,636,245	91.4%
Total	$229,837,150	$355,660,585	54.8%
Fox Basin Cities: (Appleton, Neenah, Menasha, Oshkosh)	$275,837,070	$600,174,800	117.0%

V. Retail sales in the four largest cities of the Wolf River basin in 1958

Shawano	$14,226,000
Clintonville	11,517,000
Waupaca	9,433,000
New London	8,609,000
Total	$43,785,000

VI. Bank resources: total footings (assets and liabilities), 1959

Wolf River basin		Fox River basin cities	Wisconsin
Villages	$27,015,702	(Appleton, Neenah, Menasha	
Cities	59,499,767	Oshkosh)	
Total	$86,515,469	$205,732,137	$4,835,049,110

III. THE GOVERNMENTAL SETTING

The planning and carrying out of action programs for the development of the Wolf River Basin have been and will largely continue to be the responsibility of public bodies. Therefore it helps to survey quickly the governmental agencies and units which have authority for planning or action in the basin, emphasizing the salient aspects of this authority.

A. Federal Agencies

1. General Powers

The powers of the federal government to develop water and other resources are limited to those expressly granted by the Constitution and those which can reasonably be implied from these express powers. Among the powers expressly granted are powers to (1) regulate commerce among the states, (2) provide for the common defense, (3) make war, (4) make treaties, (5) control compacts between states, (6) manage federal property, and (7) provide for the general welfare. The most important of these for our purposes is the power to regulate commerce among the several states. Commerce includes transportation, and navigation comes within this meaning. Power over navigation requires control over navigable water.

2. The U. S. Army, Corps of Engineers

This power to regulate interstate commerce is the constitutional basis for the activities of the Corps of Engineers on the Wolf. Technically the Corps "exercises jurisdiction" from the mouth of the Wolf to the highway bridge at Leeman, a distance of 86.2 miles. Actually the head of navigation is at New London, some 39 miles south of Leeman. Congress in 1896 instructed the Corps to dredge, snag and otherwise improve a channel 4-feet deep and 100 feet wide from the mouth of the Wolf to New London. The corps also has vital control power over the Winnebago Pool by regulating its level through operation of the Menasha Dam. In addition the Corps, in response to Congressional directives, has several times studied and reported on the Wolf, once on the Wolf alone and twice on the Fox-Wolf. Undoubtedly the Corps, if properly authorized by Congress, could make a new and comprehensive study of the basin. (See 16 U.S.C. §§701.1, 701a; 541 and 542 for statutory powers of the Corps generally. See Appendix C, for 1958 report by the Corps.)

3. U. S. Coast Guard

The Coast Guard enforces the Great Lakes Rules of the Road on the Wolf as far north as New London and maintains two lights and various navigational aids on this segment of the river. (See 33 U.S.C. §§241-245 and C. G. 172, "Rules of the Road, Great Lakes" (May 1, 1959). It does not undertake to enforce state or local boating rules. (See Appendix D, for 1959 Coast Guard projects in the Winnebago Pool and Wolf River.) The problem of possible conflict and confusion in federal and state-local boating rules on water such as the Wolf was recognized by the Congress in the Federal Boating Act of 1958 (46 U.S.C. §527f). This act encourages cooperative enforcement exemplified by action taken by the 1959 legislature (ch. 505, Laws of 1959) to provide a state-administered boat numbering system complying with federal requirements. Having set up such a system, Wisconsin may enforce state

boating regulations on the Wolf and comparable navigable waters of the United States. (See 46 U. S. C. §527h.)

4. U. S. Fish and Wildlife Service of the Department of Interior

This agency is authorized to and does cooperate with the state conservation department in fish restoration and management and other conservation projects and with the Corps in connection with river basin studies and multi-purpose river projects. It has been relatively inactive in the Wolf Basin because of the absence of a specific program for which its cooperation by way of study and recommendation has been requested. It has direct interest in migratory bird conservation and hence in the annual kill of migratory waterfowl and other migratory birds in the Wolf Basin, as in other areas of the state. (See 16 U. S. C. §§661-669i for the general powers of this agency.)

5. Federal Power Commission

If dams or reservoirs are to be built on the Wolf or its tributaries, the Federal Power Commission might come into the picture. It is given the power to license construction of dams or reservoirs on any streams over which Congress has jurisdiction under the commerce clause. Congress has frequently and expressly declared particular rivers or portions of them non-navigable in order to free them for exclusive control by the states. This could conceivably happen for part or all of the Wolf. But until it happens, an applicant for a permit to build a dam anywhere in the Wolf Basin would probably give serious consideration to the question of whether or not to apply to the Federal Power Commission as well as to our state Public Service Commission. This would be true even if the dam was to be located in the white water section of the Wolf or one of its tributaries. Some years ago, for example, the state P. S. C. argued unsuccessfully to a U. S. Court of Appeals that the F. P. C. had no jurisdiction over a proposed dam at Snap Tail Rapids on the Chippewa because these rocky rapids were not navigable. The court said they were navigable enough to give the F. P. C. jurisdiction. Wisconsin v. Federal Power Commission, 214 F. (2d) 334 (CCA 7th, 1954). On the other hand, there is no requirement that P. S. C. advise F. P. C. of an application, so it is possible that a dam might be built with state permission only. If this did happen and if the dam was a relatively small one, the F. P. C. would probably as a matter of administrative discretion take no action. (See 16 U. S. C. §797 for the general powers of the F. P. C.)

6. U. S. Soil Conservation Service and U. S. Forestry Service of the Department of Agriculture

The Soil Conservation Service of the U. S. Department of Agriculture cooperates with local soil conservation districts in the basin by giving technical assistance in planning and carrying out individual farm plans for soil and water conservation. (See 16 U. S. C. §§590a - 590h.) Table 5, p. 20, summarizes these activities for those counties, a part or all of which is in the basin. To fill the gap between these individual farm measures and major dams constructed by the Corps, Congress in 1954 (and by amendments in 1956) enacted so-called Public Law 566 providing for financial and technical assistance (through S. C. S.) to state and local agencies in the construction of small multi-purpose projects for flood control, conservation and utilization and disposal of water for watersheds

up to 250,000 acres. The federal government assumes up to $250,000 of the cost, but matching local contributions, the size of which depends on the purposes of the project, are required. Dams may be constructed that will impound up to 25,000 acre-feet of water, including up to 500 acre-feet of flood water detentions. (See 16 U.S.C. §§1001-1008.) In some states, two or more individual Public Law 566 projects have been coordinated and planned together so that the total watershed areas affected exceed the 250,000 acre minimum. Typically these projects are in headwater areas. None has yet been established in the Wolf Basin. To have measurable effect in leveling out the flow of the Wolf, many thousands of acres would have to be brought into carefully planned and executed projects. It is well to recall that we are concerned here with a drainage area of almost 2-1/2 million acres, --3,750 square miles.

Forest Service

The Forestry Service of the U. S. Department of Agriculture operates the Nicolet National Forest, two small portions of which (totaling about ~~1,100~~ 23,830 acres) are in the basin. However, the camping facilities and scenic attractions of the forest as a whole are so close to the basin that they should be thought of when considering the basin's potential.

B. State Agencies

1. General Focus

Thirteen state agencies play some role in the implementation of state water policies in Wisconsin:

(a) Public Service Commission
(b) Conservation Commission
(c) Board of Health
(d) Department of Resource Development
(e) Committee on Water Pollution
(f) Natural Resources Committee of State Agencies
(g) State Soil Conservation Committee
(h) State Geologist
(i) Water Regulatory Board
(j) Great Lakes Compact Commission
(k) Portage Levee Commission
(l) Agricultural Extension Service
(m) Laboratory of Hygiene

We consider in detail only the first seven named, although the others listed are of great importance. For example, certainly the records of work of the State geologist and the educational work of the agricultural extension service through its county agricultural agents could become outstandingly important to the future development of the Wolf Basin. Or again, the planning and construction of state trunk highways by the highway commission may be of major importance in terms of scenic drives, access to recreational areas, wayside parks, drainage, and dual purpose highway fill and water impoundment structures.

Table 5

SOIL CONSERVATION SERVICE REPORT FOR THE 10 COUNTIES OF THE WOLF RIVER BASIN

1. Summary of Soil Conservation Plans

County Soil Conservation District	District Cooperators	Basic Plans	Woodland Protected
Forest	26	7	--
Langlade	348	187	5,416 acres
Marathon	1,499	788	6,057 acres
Oneida	12	4	--
Outagamie	509	256	1,923 acres
Portage	384	190	1,882 acres
Shawano	391	140	6,649 acres
Waupaca	751	507	7,169 acres
Waushara	342	224	2,557 acres
Winnebago	334	157	340 acres

2. Summary of Acres of Applied Practices, Lineal Feet of Terraces, Square Feet of Waterways and Number of Structures

County	No. of Farms	Acres of Applied Practices	Lineal feet of Terraces & Diversions	Square feet of Waterways	Number of Structures
Forest	86	1,371	None	None	None
Winnebago	129	1,316	6,421	1,503,000	1
Waushara	367	5,587	7,622	390,000	1
Waupaca	567	13,528	25,878	663,000	2
Shawano	594	10,611	8,350	225,000	1
Marathon	1,329	29,562	141,575	487,000	17
Portage	537	9,757	None	53,000	None
Outagamie	174	2,461	19,395	462,000	4
Oneida	50	744	None	2,000	None
Langlade	275	4,057	3,400	142,000	None
Totals	4,108	78,995	244,641	3,957,000	26

2. Public Service Commission

The state Public Service Commission is our chief water regulatory agency. Its permission is required for (1) constructing dams on navigable streams, (2) withdrawing water from streams or lakes for supplemental irrigation, (3) establishing lake or stream levels, and (4) other important actions affecting navigable lakes and streams. (See Wis. Stats. 1959 §§30.18, 31.02 and 31.04.) Presumably its power to establish lake levels does not apply to the lakes of the Winnebago Pool because of the longstanding assumption of this authority by the Corps as described above. Probably under Wisconsin Supreme Court decisions, the consent of the Public Service Commission or comparable state agency would be required before major water development actions could be taken by a basin-wide water conservancy district, assuming one were established for the Wolf. (See Muench v. Public Service Commission, 261, Wis. 492, 53 NW (2d) 514 (1952).)

3. Conservation Commission

The State Conservation Commission and its department have the responsibility to provide "an adequate and favorable system for the protection, development and use of the forests, fish and game, lakes, streams, plant life, flowers and other outdoor resources in the State of Wisconsin." In carrying out this broad responsibility, the department (1) administers the fish and game laws, (2) establishes forest, water and wet land policies, (3) protects the forests from fire, (4) promotes and aids watershed management programs, (5) represents the outdoor recreationist's point of view in proceedings for irrigation or dam permits, (6) aids in the enforcement of water pollution orders and irrigation permits, and (7) surveys and acquires lands for public access to navigable streams and lakes. Exercise of the latter power to survey for and provide public access to Wolf Basin waters might well be used in connection with an overall basin development program. With respect to irrigation permits, the irrigator must get the written consent of the Conservation Commission before a permit to take water from a trout stream can be issued. Annually the Commission reviews all of the irrigation permits with the Public Service Commission. Obviously this agency is of major importance in a river basin development program. (See generally Wis. Stats. 1959, ch. 23 and §30.18.)

4. Board of Health

The State Board of Health has primary responsibility for the purity of the public water supply. It also sets specifications for drilling and constructing wells and administers the so-called high capacity well law. Under this law, an irrigator, municipality, industry or other person must obtain a Board of Health permit before drilling a well with a capacity of more than 100,000 gallons a day. It can deny the permit only if the proposed well "will adversely affect or reduce the availability of water to any public utility in furnishing water to or for the public." (See Wis. Stats. 1959, §144.03 (6) to (8).) It also has important responsibilities to inspect restaurants, hotels, motels, boys' and girls' camps and other recreational establishments. It cooperates intimately with the State Committee on Water Pollution in carrying out the state's program for pollution control. (Wis. Stats. 1959, chs. 143 and 144).

5. Department of Resource Development

This new department created by the 1959 legislature has broad powers to promote development and maximum wise use of natural and human resources. It is authorized to prepare coordinated plans for resource development within watersheds, and river valleys. It is directed to cooperate with federal, state, regional and local, public and private agencies in the making of plans for control, use, conservation, allocation and use of the water supply and the development of new water resources. It also has important responsibility for the promotion of industrial and recreational development. When fully staffed, it could play a major role in the planning and development of the Wolf River Basin. (See Wis. Stats. 1959 §§109.01 - 109.09.)

6. Committee on Water Pollution

This inter-agency committee, on the basis of basin-wide surveys of industrial, municipal, and household pollution of surface waters, issues pollution prevention orders directing pollutors to take specified steps to reduce and eliminate the dumping of waste and other polluting materials into surface waters. Such a basin-wide study of the Wolf Basin was completed in 1949. Orders were issued, many of which now have been complied with. The orders have been particularly successful in inducing the construction of municipal sewage disposal plants in the basin area. Further work by the committee is vital to the elimination of pollution in the basin. (See Wis Stats. 1959 §§144.51 - 144.57.)

7. Natural Resources Committee of State Agencies

This interdepartmental committee was set up by the legislature in 1951 to coordinate the activities of several state agencies concerning natural resources. The committee has no staff as such and no budget. It meets four times a year and is divided into subcommittees, one of which is concerned with water. Its general recommendations with respect to water have been largely restricted to four unsuccessful attempts to get the legislature to amend the high capacity well law so as to make it apply to bulldozed irrigation pits and permit the board to deny a permit where the proposed new high capacity well would seriously and adversely affect neighboring private wells, not just municipal supply wells. It is now an advisory arm of the new Department of Resource Development. It could be an important help in coordinating the efforts of the State agencies in a development program for the Wolf River Basin. (See Wis. Stats. 1959 § 23.26.)

8. State Soil Conservation Committee

This committee is primarily a service agency charged with the duties of encouraging the creation of soil conservation districts, assisting soil conservation districts in carrying out soil conservation programs, and approving and supervising Public Law 566 on small watershed programs. It is closely tied to the Agricultural Extension Service and has intimate working relations with the Conservation Commission. It could play a major role in promoting and assisting in the establishment of coordinated small watershed programs throughout the Wolf Basin. (See Wis. Stats. 1959 § 92.04.) Individual farm soil conservation measures

being sponsored by the soil conservation districts in basin counties under the state committee's guidance are listed in Table 5, p. 20.

C. Local Governmental Units

1. General Focus

This is not the place to review the many powers of local units which could be brought to bear upon problems of planning and development in the Wolf Basin. For example, local powers over roads, streets and bridges are obviously important in this regard but are so well understood as not to require special attention. Instead, we have emphasized less well-known but important powers of local units.

2. The Ten Counties and Their Soil Conservation Districts

Parts or all of Forest, Oneida, Langlade, Marathon, Portage, Outagamie, Winnebago, Waushara, Shawano, and Waupaca Counties are in the Wolf Basin. The ten counties could join in petitioning the Governor to create a Regional Planning Commission under §66.945, Wis. Stats. 1959. Such an agency would have only powers to advise in planning. To be effective, its recommendations would need to be implemented by the counties and other local units. For example, if a basin-wide zoning program were recommended, the counties would have to enact the ordinances, and even then to be effective in any town, the town board must also approve the ordinance. (See Wis. Stats., 1959 §59.97.) Perhaps federal matching planning funds would be available to such an agency.

Counties, under §66.30 of the statutes, can contract to do jointly whatever they could do separately. This offers some prospect for use in fostering a basin-wide program.

Even though town approval is required for zoning, counties can, without consent of towns, establish set-backs along county highways. (See Wis. Stats. 1959 §80.64.)

Counties operating marine developments could be of help in setting up boating regulations for adjacent waters. This authority now exists under the recently enacted boating code, Wis. Stats. 1959 §30.77 (3).

In addition under Wis. Stats. §236.46 each of these basin counties can set up a planning agency and adopt a county-wide regional plan which presumably could be meshed with a basin-wide plan. If it sets up a planning agency, the county, under Wis. Stats. §236.10, can exercise important control over land use patterns being laid down by subdividers, including those dividing water front lands.

In Wisconsin, soil conservation districts are county-wide in their jurisdiction and the agricultural committee of the county board is ex officio the board of supervisors of the district. This close tie between the district and the county board means that active support of both must be obtained for any small watershed program that may be undertaken. (See Wis. Stats. 1959 ch. 92.)

3. The Ninety-one Towns

There are 91 civil towns, all or more than half of which are located within the Wolf Basin. Cooperation of these towns must be sought if a basin-wide development program is to succeed. But, in general, this cooperation will be reflected through town representatives on county boards.

Towns have authority to approve planning and subdividing but, in general, they must get county board approval before they can zone. (See Wis. Stats. 1959 §§60.183, 236.10 and 60.74) They may, under Wis. Stats. 1959 § 60.29 (41) and (43), act jointly with other local units for regional planning and cooperate with the county in rural planning. Under Wis. Stats. 1959 §§ 60.18 (21) and (22), towns through the annual town meeting may vote to raise money to assist in creating and developing watershed protection areas and to assist in the development of a soil conservation district.

4. The Twenty-nine Villages and Eight Cities

These incorporated units of government have zoning powers for their areas under Wis. Stats. 1959 § 62.23 (7). They also have authority under appropriate circumstances to adopt boating regulations. (Wis. Stats. 1959 § 30.77.) Their planning powers can be used for areas outside the municipality which in the opinion of the plan commission, bear a relation to the development of the municipality. (See Wis. Stats. 1959 § 62.23 (2).) The powers of cities and villages of the Wolf Basin to approve subdividing extend 1-1/2 miles beyond the municipal limits as do also their official mapping powers. (See Wis. Stats. 1959 §§236.02 (2) and 62.23 (6).) Under section 66.30 they have broad powers to enter into cooperative contracts with other units of local government.

5. Flood Control Boards, Drainage and Other Special Purpose Districts

Chapter 87 of the Wisconsin Statutes authorizes the creation, with the approval of the Public Service Commission, of local Flood Control Boards. No such board has ever been created even though this legislation has been on the books since 1931. The probable reasons lie in the quite involved procedures and in the fact that the only mechanism provided for the financing of flood control works is the assessment of benefits to benefited lands.

Drainage Districts as such may no longer legally be created in Wisconsin but it is possible to bring into existence so-called "farm drainages" under chapter 88 of the statutes. This is a mechanism for group drainage of land under a county-wide board subject to approval of all major decisions by the county court.

Likelihood of group activity under the Flood Control Board Act or under the Farm Drainage Act in the Wolf Basin is not great. There is no legislative authority for the creation in Wisconsin of multiple-purpose watershed conservancy districts like the famous Muskingum District in Ohio or like some of the Watershed Districts which have recently been set up in our neighboring state of Minnesota. See Appendix E for a summary of the Ohio and Minnesota multiple-purpose districts.

Site of Proposed Dam on Wolf River at County Trunk "A" in Langlade County. Upper photograph shows the area which would be flooded while lower photograph shows the area immediately below the dam site.

IV. SOME PRESENT LAND AND WATER USES AND PROBLEMS

A. General Uses and Problems

The Wolf is Wisconsin's least harnessed major river. What should be its future? Should it be left in its relatively natural state? Should it be harnessed for hydro-electric power? Should flood control dams and reservoirs be established? Should water be impounded to stabilize summer flow? How much of its water should be taken for agricultural irrigation? How much for industrial use?

To find answers to these questions it is well to look first to present land and water uses and problems of the basin as a whole.

B. Present Hydro-electric Power

There are 29 dams in the Wolf River Basin, four on the Wolf itself, (Post Lake, Keshena Falls, Upper Shawano, and Shawano); the remainder are on its tributaries. The total water wheel capacity of all these dams is small, only 6,720 horsepower, and their total generating capacity is a meager 4,164 kilowatts. Their total water wheel capacity is only about 1/10 that of plants in the joint Fox-Wolf basin and only about 1/100 that of all hydro-electric plants in Wisconsin. (See Tables 6 and 7, pp. 26 and 27.) Most of the plants supply power to private industry, primarily to utility companies and paper mills. Some are small grist and saw mills. The Public Service Commission does not yet know the number of plants in the basin that have gone out of operation, but the presumption is that some have. Only 3 out of 4 dams on the Wolf have power plants: Keshena Falls, Upper Shawano and Shawano. They have a total installed capacity of 1,950 horsepower and 1,515 kilowatts. The major dams are on the tributaries: Gresham on the Red, Hayman Falls on the Embarrass, Big Falls on the Little Wolf, and Manawa and Weyauwega on the Waupaca. They have a total installed capacity of 2,459 horsepower and 1,735 kilowatts.

Obviously to pass judgment on proposals for additional hydro-electric development on the Wolf, one should know of other present sources of electric power in the basin and within the economic radius. We attempt no such listing here but note the recent substantial expansion of steam generation by the Wisconsin Public Service Company, principal supplier of electricity in northeastern Wisconsin.

C. Present Flood Problems and Control Measures

1. Average Annual Damage

The average annual damages by flooding in the Wolf River Basin, according to the 1949 Corps of Engineers' report, was then about $81,000, exclusive of damage to fish and wildlife. Of this amount, the Corps estimated about $78,000 to be damage to agricultural lands and crops because of overflow of bottom lands, and $3,000 to be damage to the city of New London. Estimates for damage to crops are difficult to establish and may well be higher or lower than actual damage. (See Table 8, pp. 28 and 29.) Interruption of business accounts for about half of the damages in urban areas. There is very little danger to human life: few people live in the lowlands, the current is usually sluggish, and no epidemics have resulted.

Table 6

EXISTING HYDRO POWER IN THE WOLF RIVER BASIN AS COMPARED TO THE STATE AS A WHOLE

Stream	No. of Plants	Total Head in feet	Installed Generating Capacity K. W.	Water Wheel Horse Power Installed
The Wolf, Main Stream	3	40	1,590	2,053
The Wolf, tributaries				
The Pine	5	58	100	435
The Waupaca	5	68	710	1,450
The Little Wolf	3	49	584	830
The Embarass	5	94	548	1,031
Other Minor tributaries	6	106	533	723
Total, Wolf System	27	415	4,585	6,522
Total, Fox-Wolf System	58	807	24,070	63,387
The Wisconsin River System	62	1,071	147,749	236,000
The Chippewa River System	30	809	159,552	223,090
The St. Croix River System	29	827	33,183	53,834
The Black River System	9	270	5,734	10,663
The Rock River System	28	273	3,392	6,887
The Mississippi minor streams	14	172	535	1,297
The Illinois Fox	2	16		98
The Fox-Wolf System	58	807	24,070	63,387
The Lake Superior drainage	9	269	5,091	8,479
The Lake Michigan drainage	46	1,032	79,794	133,272
Grand Total (All Wisconsin Installations)	287	5,846	459,092	737,007

Data from Natural Resources of Wisconsin, The Natural Resources Committee of State Agencies, December 1956.

Since this time, the Waupaca River has lost one plant, and other tributaries of the Wolf have gained three. Changes in other basins have probably taken place, but these 1956 figures are still helpful for making general comparisons.

Table 7

EXISTING DAMS IN THE WOLF RIVER BASIN

Dam No.	P. S. C. No.	Name of Dam	Owner*	Head	Drainage area	No. units	Q H/8.8 THP 50% time	Installed Gen. KW Capacity	Installed Water Wheel HP
1	58.10	Neopit Dam on W. Br. Wolf R.	(1)	14	108	1		108	150
2	58.6	Keshena on Wolf R.	(1)	16	790	1	1,130	340	455
3	58.23	Upper Shawano on Wolf R.	(2)	14	825	1	1,040	700	900
4	34.9	Phlox on Red R.	(2)	22	30	1		80	115
5	58.3	Gresham on Red R.	(7)	36	147	1		303	424
6	58.14	Shawano on Wolf R.	(3)	10	1,139	4	1,020	475	595
7	58.18	Tilleda on N. Br. of Embarass R.	(8)	14	53	1		-	60
8	58.21	Wittenberg on Middle Br. Embarass R.	(2)	24	75	1		100	151
9	58.1	Caroline Dam on Embarass R.	(8)	9	247	1		-	80
10	58.22	Hayman Falls on Embarass R.	(2)	34	260	1		448	640
11	58.12	Pella on Embarass R.	(8)	13	334	1		-	120
12	68.6	Marion on N. Br. Pigeon R.	(8)	16	30	1		-	82
13	68.1	Big Falls on Little Wolf R.	(2)	30	160	1		320	405
14	68.4	Manawa on Little Wolf R.	(2)	12	275	2		264	390
15	68.3	Iola on S. Br. Little Wolf R.	(8)	7	30	3		-	42
16	68.9	Ogdensberg Dam on St. Lawrence R.	(8)	13	12	1		-	30
17	68.14	Lighting Plant on Waupaca R.	(4)	21	176	1		250	400
18	68.15	Waupaca Dam on Waupaca R.	(6)	14	178	1		60	109
19	68.17	Fisher on Waupaca R.	(8)	13	180	2		-	240
20	68.13	Felt Mill On Crystal R.	(8)	9	114	1		150	80
21	68.19	Weyauwega Dam on Waupaca R.	(5)	11	314	1		400	600
22	69.10	Clarke on Walla Walla Cr.	(8)	7	25			-	75
23	69.9	Wild Rose on Pine R.	(8)	17	53	2		-	40
24	69.3	Idlewild on Pine R.	(8)	8	70	2		-	85
25	69.7	Saxeville on Pine R.	(8)	9	89	2		-	75
26	69.5	Pine River Dam on Pine R.	(8)	14	100	1		100	125
27	69.6	Poysippi on Pine R.	(8)	10	131	2		-	130
28	69.4	Mount Morris on Rattlesnake Cr.	(8)	15	8	1		66	65
29	69.1	Aurorahville on Willow Cr.	(8)	7	80	1		-	57
								4,164	6,720

*OWNERSHIP:

(1) U. S. Government-Indian Agency
(2) Wis. Power & Light Co.
(3) Shawano Paper Mills
(4) Wis. Public Service Corp.
(5) Wis.-Michigan Power Co.
(6) City of Waupaca
(7) Village of Gresham
(8) Private

Data obtained from list prepared by Wis. Public Service Comm. Jan. 1, 1960, except for the No. units, which was obtained from House Document No. 276, 72nd Congress, 1st Session

Table 8

AVERAGE ANNUAL FLOOD DAMAGES TO AGRICULTURAL PROPERTY IN WOLF-FOX BASIN

Item of Damage	Upper Fox River	Wolf River	Lake Winnebago Below upper limit of regulation	Lake Winnebago Above upper limit of regulation
Marsh land suitable for cutting hay that is not accessible in average year due to floods or high water - Acres	17,000	25,000	600	
Value of lost production, estimating one ton of marsh hay per acre and value at $6.00 per ton (1)	$102,000	$150,000	$3,600	
Less value of labor not expended for harvesting hay, at $4.00 per acre	68,000	100,000	2,400	
Net Loss due to loss of hay harvest	$34,000	$50,000	$1,200	
Marginal land suitable for cultivated crops not accessible in average year due to flood or high water - Acres	1,500	4,000	100	225
Value of lost production, assuming equal acreages of corn, oats and tame hay, at $22.00 (2)	$33,000	$88,000	$2,200	$4,950
Less value of labor, seed and fertilizer not expended for production and harvesting crop, at $19.00 per acre (3)	28,500	76,000	1,900	1,800 (6)
Net Loss due to loss of crops other than marsh hay	$4,500	$12,000	$300	$3,150
Garden land not accessible in average year due to floods or high water - Acres	- -	400	- -	- -
Value of lost garden production at $140 per acre (4)		$56,000	- -	
Less value of labor, seed, and fertilizer not expended in production and harvesting of crop at $100 per acre		40,000	- -	
Net loss due to loss of garden crops		$16,000		
Total Net Loss in Area	$38,500	$78,000	$1,500 (5)	$3,150

(Table 8 continued)

(1) Based on approximate average yield of wild hay in Wis. 1933-44 at 70 percent of 1944 average price received by farmers for loose prairie hay.

(2) Based on 75 percent of average 1933-44 yield of corn, oats and tame hay in Wisconsin and 1944 average price received by farmers which is approximately the price now prevailing assuming equal acreages of the three crops. Usually it is not feasible to reduce loss by planting a later crop, as season is too far advanced before land dries to workable condition.

(3) Based on average cost of production in 1942 in Wisconsin and other States in same production group, less land rent and 25 percent of cost of fertilizer and miscellaneous costs, plus 33 percent of cost of preparation, planting, cultivating, and harvesting to allow for approximately 50 percent wage increase.

(4) Based on 1944 average production and price received by farmers for 9 common Wisconsin garden crops. (cabbage, beets, sweet corn, onions, green peas, green lima beans, snap beans, tomatoes, potatoes)

(5) Loss on lands below upper limit of regulation to which United States has acquired perpetual rights by payment of flowage damages. Not to be included in justification of additional work.

(6) At $8.00 per acre covering cost of cultivating and harvesting only, as loss normally occurs after crop has been planted.

Most of the Wolf Basin's flooding is between the Winnebago Pool and Leeman. (The previous discussion of topography explains the reason for this concentration.) About 39,000 acres next to the river between Leeman and New London are subject to frequent overflow. Most of this is low, marshy river bottom not used for agricultural purposes. About half of the flooding is in Outagamie County. Below New London, about 35,000 rural acres are subject to frequent flooding. This land is primarily marshland.

The only major urban area flooded by the Wolf is New London, part of which was built on the river bottom and is flooded by both the Wolf and its tributary the Embarrass. The Lower Fox, into which the Wolf flows, floods other urban areas, but the Corps of Engineers uses the Winnebago Pool as a great series of storage reservoirs to lessen such floods. Early each spring, the Corps manipulates the Menasha Dam to lower the level of Lake Winnebago by 18 or 24 inches. If its estimate of probable spring flood waters proves to have been too high, low water may result. If its estimate is too low, flooding at Oshkosh and Fond du Lac may result because of the high lake level.

2. Unusual Damages

In 1922, a spectacular flood covering about 73,000 acres caused damages of about $52,000 in New London. In the fifty-three years after 1896, four lesser floods in New London caused about $10,000 damage each. During about two of five summers, a crop-damaging flood occurs along the Wolf and its tributaries. In Outagamie County, which gets the brunt of the floods, 25% of such crop-damaging flooding covers cultivated land and 75% covers marsh and pasture.

3. Tables of Flow

Table 9, p. 31, gives figures for average, high, and low flows at six gauging stations in the basin. Appendix F gives hydrographs of floods to be expected every 10, 25 and 40 years, and Appendix G, stages of the Pool.

4. Flood Control Measures

None of the existing 29 dams in the basin is a flood control structure as such, and the total effect of these dams on floods is negligible. As noted above, the Menasha Dam is a key dam for the joint Fox-Wolf Basin. This dam has three primary functions: (1) to maintain the level of the Winnebago Pool, (2) to help prevent floods on the Lower Fox, and (3) to stabilize the flow of the Lower Fox for navigation, power and industry. The Corps of Engineers has operated the Menasha Dam since the beginning of its construction in 1850. The lower level of the Pool during periods of navigation is fixed at 746.7 feet above sea level. As already stated, the Corps lowers the level 18 or 24 inches in anticipation of a large spring flow from melting snow and ice. In 1886 the War Department set an upper limit of 21-1/4 inches above the crest of Menasha Dam, a limit which is still in effect. This level was the average of annual high water stages of the lake for 1859-1886 (excluding the unusual high in 1881 and low in 1860). The United States paid $592,375.09 for flowage damages, including future damages, resulting from the new water level.

Table 9

STREAM GAUGING STATIONS ON WOLF RIVER SYSTEM

Station	Year established	Location		Drainage Area (sq. mi.)		Extreme Records						Average Discharge	
						High water			Low water				
		River	Miles above mouth	Above station	Above mouth river	Date	Gauge (ft.)	Daily disch. (c.f.s.)	Date	Gauge (ft.)	Daily disch. (c.f.s.)	cfs	Yrs.
4 mi. north of Keshena (about West branch of Wolf river)	1928	Wolf	129	633	3750	4/8/29	6.10	2580	2/20/36	--	199	584	17
Keshena &	1907	Wolf	124.7	840	3750	4/10/22	7.30	4390	12/22/32	4.67	91[a]	798	35
Keshena Falls	1928	Wolf	126.2	812									
New London	1888[b]	Wolf	46.4	2240	3750	4/13/22	11.4	15500	9/6/33	-0.4	261	1842	32
Embarrass (4 mi. above village)	1919	Embarrass	39.3	395	650	4/10/22	c.11	6280	8/3,6,7/31	2.32	23	305	26
Royalton	1914	Little Wolf	4	485	505	3/30/43	c.7-8	6950	2/10/34	--	57	439	31
Waupaca (4 mi. below city)	1917	Waup.	10	305	335	3/17/19	5.6	2600	1/22,28/26	--	35	253	29

-- Indicates information not available.

a. Result of low temperature.

b. Exact date unknown; records available since 1 March 1896.

c. Maximum stage reported was 11.6 feet on 16 April 1888. Discharge not known but flood volume was less than that of 1922.

When water reaches the limit at the dam, some land near the Winnebago Pool is flooded. At the time of the 1949 report by the Corps of Engineers, most of that land was uncultivated marsh and pasture.

Occasionally water rises above the 21-1/4 inch limit and floods agricultural lands and summer homes along Lake Winnebago causing sewers in parts of Fond du Lac and Oshkosh to back up. This is understandable when one realizes that flood waters may be entering Lake Winnebago at a rate of 40,000 c.f.s., whereas the maximum safe discharge rate at Menasha Dam is 15,000 c.f.s.. Menasha Dam and other structures on the Lower Fox would be endangered by faster flow. The Wolf typically provides more than 60% of the high water entering Lake Winnebago.

The Corps of Engineers is often blamed for high water conditions in the Winnebago Pool and in turn for floods on the lower Wolf, which some people assume are caused by water backing up from the Pool. The Corps contends that much of the land along the lower Wolf would be flooded regardless of the level of Lake Winnebago since the nearly flat slopes of the rivers' natural cross section are "entirely inadequate to pass the large volume of flood waters without expansion into the adjacent lowlands." (House Document 276, 72nd Congress, 1932, p. 26.) The Corps claims that the Menasha Dam at no time backs up flood waters farther than Fremont. Above Fremont the entire depth of the flood waters is due, says the Corps, to the volume of water, the condition of the natural channel, and the nearly flat slope of the river. Flooding of the lakes below Fremont begins almost as soon as Lake Winnebago rises one-half foot above the crest of Menasha Dam and becomes extensive at the stage of 1.25 feet above the crest.

5. Bridges

Some bridges in the past have helped to increase the danger of flooding by constricting the flow of various streams in the Wolf Basin. According to the District Engineer of the Corps of Engineers, in a report submitted in compliance with the Flood Control Act of June 22, 1936, three bridges on the Wolf and five on the Embarrass in New London were then constricting flow enough to cause one to two feet of flood backwater in that city. It should be noted that the system of nine flood control reservoirs proposed at various times in the past would reduce the stage of a major flood by only about six inches, whereas the local bridges were said to have backed up two to four times that many inches. Appendix H, from Highway Commission records, lists the locations, number, and dimensions of existing bridges on the Wolf, the Little Wolf, and the Embarrass. A few bridges located on city or village streets not on the state or county trunk system may not be included in this list. Information about them may be secured through local municipalities.

6. Navigation

By about 1918 logs were no longer floated down the Wolf to mills on Lake Winnebago and on the Lower Fox. In the era thus ended, millions of logs had been brought each year to the mills on the Wolf and the Fox. Argicultural crops and small amounts of freight are no longer shipped on the Wolf, nor is there any passenger-boat traffic. The scheduled excursions between Oshkosh and Justin on Lake Poygan, or Lake Winneconne, Fremont, or New London are only memories.

To replace commercial navigation, pleasure boating has come by hundreds of motor boats, canoes, and other pleasure craft. Here on the Wolf is a dramatic illustration of a shift that has occurred on many public waters away from commercial navigation to recreational boating. This boating has implications for the economy of the lower Wolf and of the basin, implications at least as great as those of former commercial uses, including logging. The need to maintain a reliable 4-foot navigable channel from the mouth of the Wolf to the head of navigation at New London is as great as ever.

In 1896 Congress decided to maintain a 4-foot-deep, 100-foot-wide navigable channel from the mouth of the Wolf 47 miles north to New London. In that year it amended earlier legislation under which the Corps had been attempting, at considerable expense, to maintain a navigable channel on the Upper Fox as far south as Portage. The 1896 amendment directed the Corps to dredge, snag and otherwise improve the Wolf to New London. Initial work was done between 1911 and 1921 at a cost of only $15,400, of which $10,500 was for the improvement of the channel and the rest for maintenance. About 3/4 of the money spent for improvement was spent on mile 23 above Fremont. The natural depth of the river below New London exceeds 4 feet, except for Boom Cut at the head of Lake Poygan. In 1932 the Corps estimated that an annual expenditure of $500 for dredging would be required if full depth was to be maintained at all times in Boom Cut.

Based on the latest available soundings taken in the mid-30's the natural depth of the river at times of standard low water is also 4 feet or more for 10 miles above Fremont, but in the next 14 miles a number of large shoals and bars lower the controlling depth at standard low water to only about 2.5 feet. There are no funds presently available to complete the dredging of this channel. From information available to the District Engineer of the Corps at Chicago, the following amounts have been spent for dredging and snagging on the Wolf river:

Year	Amount	Work
1897 to 1921	$10,500	Improvement Dredging
1921	4,900	Dredging
1922	3,030	Dredging & Snagging
1926	175	Snagging
1934	1,845	Dredging & Snagging
1936	9,555	Dredging & Snagging
1937	3,575	Dredging & Snagging
1938	14,115	Dredging & Snagging
1942	12,220	Dredging & Snagging
1950	12,500	Dredging & Snagging
1956	10,000	Snagging
1957	12,670	Dredging & Snagging
1959	19,300	Dredging & Snagging
Total	$114,385	

As will be seen in the next section of this report, the Corps in 1949 reported that a system of nine dams and reservoirs as proposed at various times on the Wolf above New London would produce relatively minor benefits to navigation below New London. In view of the increasing use of this 47 miles, one of the key problems of the Wolf is to maintain adequate depth in this channel for motor boats of moderate size.

This 47-mile channel is treated as a tributary of the Great Lakes and the Great Lakes Pilot Rules apply to it. The U. S. Coast Guard claims jurisdiction for the enforcement of these rules in this section of the river and also maintains at least two lights and various channel buoys and markers. So far there seems to have been no conflict between the Coast Guard, charged with enforcing federal rules of navigation, and agencies attempting to enforce state or local boating rules. Typically present in summer in this stretch of the river are many small anchored boats occupied by fishermen. Power boats often distrub these fishermen. Here, as wherever fishermen and motor boat operators use the same waters, is a source of increasing conflict between competing public users.

7. Recreation

Mr. Harold C. Jordahl's report for the State Conservation Department "Recreational Values of the Wolf River Basin, Wisconsin," (Appendix B of this report) contains much valuable detail. Pages 2-4 give information of fishery resources, pages 5-9 on game resources, and pages 16-21 on other recreational aspects such as camping and skiing.

Fishing, as well as the boating mentioned above, is a popular pastime in the Wolf Basin: trout fishing in the northern stretches of white water, and sturgeon, white bass, walleye, and pan fishing to the south and in the Winnebago Pool. Camp grounds and summer cottages ring some of the lakes and border some streams. A number of summer resorts exist, but the American Automobile Association lists but one, with only eight units, in its Great Lakes Tour Book. Many hundreds of people annually visit the basin because of scenic attractions, particularly those in the Menominee Indian Reservation. Abundant wildlife provides much hunting, particularly of waterfowl and deer.

Mr. Jordahl points out that there are no state parks in the basin and that the only non-urban parks or public recreation areas in the whole of this 3,750 square-mile basin are the following:

Upper Basin

Two recreation areas in the Nicolet National Forest about ~~1,100~~ 23,830 acres of which lies within the basin. (20 more adjacent areas are in this forest but not in the basin.)

Two Langlade County Parks

Lower Basin

Six county parks totaling 118 acres:

Shawano County

Shawano County Park - 36 acres; located on Shawano Lake; swimming beach, bathhouse, boathouse, dock and pier, picnicking, camping, group camping, fishing, playground, toilets.

Wilson Lake - 9 acres; located on Wilson Lake; swimming.

Portage County

Collins Park - 23 acres; located on Collins Lake; swimming beach, bathhouse, fishing, boat rental, picnic area, playground equipment.
Elderon Park - 12 acres; located on Lily Lake; picnic area, camping, playground equipment.

Waupaca County

Gills Landing - 11 acres; located on the Wolf River; provides public access, two boat landings, docks, toilets.
Keller Park - 37 acres; located on Little Lake; swimming beach, fishing, picnic area, playground.

8. Forests

Of tremendous value to the recreational potential of the Wolf Basin is the superb 174,000 acre sustained-yield forest of the Menominee Reservation. Here is perhaps the best example in the northern lake states of how forest of quality looked in this part of the country before the white man came.

All the other forests of the basin are second growth: the trees have grown again to hide the ugly scars of clean-cutting and of the devastating fires that followed the butchery of our forests. Most of this second-growth land is privately owned. There is no state forest and only small parts (about 23,830 acres) of the Nicolet National Forest lap over into the basin area. The only county forest lands are the 46,000 acres owned by Langlade. In many places the second growth is of substantial size and the northern reaches of the basin have many large and relatively remote forests. About 80,000 acres of this is in industrial forests.

9. Soil Conservation

Soil erosion on the Wolf itself is relatively slight. Spring floods sometimes break up or move floating bogs from one place to another, but agricultural land is not affected in this way. Potential regulation by reservoirs would probably not appreciably affect such action, according to the Corps of Engineers, although it might increase erosion by increasing the speed of run-off in some areas. See "State Soil Conservation Committee", at page 22, and Table 5, p. 20 for a further consideration of soil conservation.

10. Agriculture

a. Land. About 66% of the land in the Wolf River Basin, or 1,560,320 acres, is used for agricultural purposes. The central part of the basin contains much of this acreage. Rocky timber land in the north and marshland to the south are less suitable for agriculture. See Appendix I. for information about agricultural land of the basin which currently is in the Soil Bank.

b. People. About 50,000 people or about half of the people of the basin were engaged in farming in 1950. Apparently the farming population has decreased during the past ten years, and it also appears that farms are getting larger. (See "Occupational Data," at page 7 of this report, for a fuller consideration of the farming population of the basin.)

c. Crops. The main crops are dairy products, potatoes, corn, oats and garden vegetables. Langlade County, about half of which is in the basin, derives about half of its farm income from dairying and one-fourth from potatoes. The Antigo Flats, in Langlade County but outside the basin, is a particularly productive potato area. Langlade produced one-fourth of the state crop of potatoes in 1959 from 11,700 acres. In 1959 about 400 Mexicans and southern Negroes were hired in Langlade, but harvesting machinery is replacing manual labor.

Other agricultural products in the basin are wood products, livestock, poultry, eggs, alfalfa, hay, furs, and maple syrup. The Menominee Indian Reservation produces high-quality timber for various wood products. Muskrat farms in the marshy areas of the basin produce valuable furs. Maple syrup is produced in Langlade County and presumably elsewhere in the basin.

11. Irrigation.

The variety of soils in the basin, their varying ability to absorb and retain water, and the variation in rainfall present conflicts between agricultural uses of water for irrigation and other uses, particularly recreational ones. It should be remembered that irrigation is not a completely consumptive use of water: much of the water used for irrigation returns to ground water. For example, only about 40% of 10 inches of irrigation is actually used by plants in evapotranspiration.

a. Irrigation from Streams (See Table 10, pp. 38-9.). Because land in Langlade and Waupaca Counties is generally not prime agricultural land and because rainfall is often uneven on soils that dry out quickly, some farmers in these two counties have turned to supplemental irrigation. In Langlade the irrigated crop is potatoes; in Waupaca potatoes are the main crop but the longer, warmer growing season there permits some diversification to truck crops and hay. Most of the irrigable soil in Langlade County is now being irrigated. All 37 of the holders of permits for stream irrigation in the basin are in these two counties. They are authorized to withdraw a total maximum of 57 cubic feet per second. This is 23% of the record low flow of the river, but pumping is not continuous, the irrigators are spread over a large area, and they draw water mostly from tributaries, which may possibly be recharged from ground supplies before entering the Wolf.

Irrigation in the Wolf Basin involves the interests of recreation. Some plans for irrigation could result in serious damage to fish and other aquatic life. Irrigation also involves the interests of industry, particularly of mills below the point from which the water is taken. The demands upon water for irrigation and power are not completely compatible: irrigation uses up some water that hydro-plants might want to feed through their turbines.

Sometimes, and in some places, however, the quantity of water available and the quantity of water to be taken for irrigation causes more imaginary than real damage. Nine objectors, mostly representing sportsmen's groups, appeared at a hearing against one application for withdrawal of water from the Wolf, even though the applicant proposed to withdraw a maximum of only two cubic feet per second from a point where the low flow was 200 cubic feet per second.

b. Irrigation From Wells. One of the chief difficulties with stream irrigation is that water for crops is often needed most when streams are lowest. One possible help would be more irrigation from wells and less from streams. Such in fact seems to be the present tendency. Conflicts over the use of water and the comparative high costs of stream irrigation also tend to encourage irrigation from wells instead of from streams. Potato production in Portage and Waushara counties is rapidly expanding, and, since the sandy soil there dries out rapidly, irrigation is essential about every five days during the critical growing season. This irrigation is primarily from wells, not from streams. Langlade and Waupaca have large numbers of well irrigators and stream irrigators, too. Figures for the number of permits granted to well irrigators in the basin were not available for this report, but by counties the numbers for January, 1960, are:

Central counties in the basin (Some of these permits may be for wells outside the basin.)		Fringe counties (Many of these permits are probably for wells outside the basin.)	
Langlade	30	Oneida	2
Waupaca	19	Forest	0
Shawano	0	Marathon	10
Outagamie	0	Portage	86
Winnebago	0	Waushara	60

Irrigation from wells involves serious problems, too, however. Ground water supply is inadequate in some areas, and in some, underlying soil structure, particularly the presence of quicksand and glacial boulders, seriously interferes with drilling. One farmer in Langlade County was successful in establishing only two wells in seven attempts. When water becomes low in a functioning well, farmers need water from streams, but streams can quite likely be low at such times. The problem of securing water in sandy areas where irrigation is necessary for efficient agricultural use, and not merely helpful, is therefore a serious one involving many interests.

c. Irrigators and the Law. Stream irrigators and well irrigators both are required to have permits but under quite different laws from different state agencies.

Stream irrigators apply to the Public Service Commission, which holds formal hearings after appropriate notice. From 1950 to 1959 the Commission evolved a permit system that paid great attention to public rights in streams and lakes and also gave consideration to interests of private coriparians who might be substantially affected. Consent of riparians who would not be substantially affected was not required. In late 1959 the state Supreme Court held that such consent of lower riparians was required before a permit for non-surplus water could be issued.

Table 10

STREAM IRRIGATION PERMITS AND STREAM FLOW
IN THE WOLF RIVER BASIN, Jan. 1, 1960

Permit Number	Stream	County	Crop Use	Measured Flow (c. f. s.)	Request	Diversion Granted (c. f. s.)
848	Little Wolf R.	Marathon	Potatoes	6-7	1. 5	1 when flow less than 7; no more than 1-1/2 when over 7
852	Wolf R.	Shawano				
973	Emmons Cr.	Waupaca	Potatoes	25-30	1. 5	1. 5
974	Whitcomb Cr.	Waupaca	Cucumbers,corn	58/20	1. 0	1. 0
979	Waupaca R.	Waupaca	Potatoes	78	1. 7-2. 0	2. 0
980	Trout Cr.	Waupaca	Hay crops	10	0. 9	0. 9
1075	Hunting R.	Langlade	Potatoes	21	2. 2	2. 2
1076	Lily R.	Langlade	Potatoes	20	2. 2	2. 2
1078	Evergreen R.	Langlade	Potatoes	19. 1	2. 0	2. 0
1078	Wolf R.	Langlade	Potatoes	220	2. 0	2. 0
1082	Hunting R.	Langlade	Potatoes	20	1. 35	1. 35
1083	Nine Mile Cr.	Langlade	Potatoes	10	2. 0	2. 0 when over 11; 1. 0 when 10 or below
1084	Elton Cr.	Langlade	Potatoes	15. 35	1. 78	1. 78 when over 11; 1. 0 when 11 or below
1092	Wolf R.	Langlade	Potatoes	106/35	2. 0	2. 0
1104	SB Little Wolf R.	Waupaca	Potatoes	57. 67	1. 11	1. 11
1120	Pollock Cr.	Langlade	Potatoes	5. 8	1. 78	1. 5 when 5 or more; 1. 0 when less than 5
1151	Crystal R.	Waupaca	Potatoes, corn cucumbers	52	1. 34	1. 34
1173	Swamp Cr.	Forest	Potatoes, strawberries	20	1. 33	1. 33
1175	Waupaca R.	Portage	Potatoes	43	4. 01	4. 01 - 10 am to 9 pm
1176	Crystal R.	Waupaca	Potatoes	52	1. 78	1. 78
1178	Crystal R.	Waupaca		52	1. 78	1. 78
1213	Radley Cr.	Waupaca	Potatoes, corn truck crops	18/15	1. 34	1. 0 - none when divided by 1214

Permit Number	Stream	County	Crop Use	Measured Flow (c. f. s.)	Request	Diversion Granted (c. f. s.)
1214	Radley Cr.	Waupaca	Potatoes, corn truck crops	18/15	1.34	1.0 - none when divided by 1213
1224	Little Wolf R.	Waupaca		16	1.34	1.34
1231	Waupaca R.	Waupaca	Potatoes	78	1.77	1.0
1258	Hunting R.	Langlade	Potatoes	38		2.0 - 108 hr. annual maximum
1259	Red R.	Langlade	Potatoes	17.5	2.0	2.0 - 150 hr. annual maximum
1260	Hunting & Wolf	Langlade	Potatoes	38.2	2.0	2.0 when flow in Wolf R. above Minimum to be specified; 117 hr. annual maximum 2.0 from Hunting; 360 annual max.
1267	Blake Cr.	Waupaca	Garden crops	15.7		.22
1291	SB Embarrass R.	Shawano	Potatoes			1.0
1307	SB Little Wolf	Waupaca		31.1		1.11
1366	Schioc R.	Outagamie				1.77 - 150 hr. annual maximum
1369	Black Cr.	Outagamie				1.77 - 150 hr. annual maximum
1373	Spring Cr.	Portage	Potatoes			1.11 - 40 hr. annual maximum
1386	SB Little Wolf	Waupaca	Strawberries, vegetables			1.34 - 125 hr. annual maximum
1390	Pigeon R.	Waupaca		12.5		1.74 - 125 hr. annual maximum
1401	Waupaca R.	Waupaca	Cash crops			1.11 - 100 hr. annual maximum

From Clayton K. Yeutter, "Economic Aspects of Irrigation in the Wolf River Basing, 1960" unpublished seminar report, University of Wisconsin, June, 1960.

Now it may be necessary, for example, for an irrigator to purchase water rights from a downstream dam owner before his permit is granted. For trout streams, listed in a publication by the Conservation Commission, (a major part of the Wolf and its tributaries is included), written consent of that Commission is also required. The expected result is that 1960 permits for stream irrigation will be fewer than those of the past several years.

Well irrigators have a much easier time securing a permit. If the well is to yield more than 100,000 gallons per day, the irrigator must apply for a permit to the State Board of Health. No hearing and no notice to others are required. If the Board determines that the well will not interfere with a public utility well for municipal supply, it issues the permit. Obviously in the irrigated areas of the Wolf Basin there is little likelihood of such interference, and accordingly the Board issues permits almost as a matter of course. Permits cannot be denied even though the new well would interfere with another private well. An irrigator needs no permit to bulldoze a pit and use it as a source of water.

12. Sanitation and Pollution Control

The Committee on Water Pollution, created in 1927 by the Legislature, coordinates the state's efforts to control the pollution of water (§§144.51 - 144.57 of the Statutes). The Committee created drainage basin sanitation programs in Wisconsin's 28 major drainage basins. During World War II, shortages of labor and materials interrupted the program.

In 1949, work for pollution control was intensified. The Legislature provided for a full-time Director of the Committee on Water Pollution and the State Board of Health established the Division of Water Pollution Control. Increased funds and more attentive enforcement gave greater power and potential effectiveness to the Director and the Division.

At present, sanitation and pollution control involve many problems and many interests. Surveys and research on pollution and methods of control are being carried out. Of 57 sources of pollution located on the Wolf, 46 now have been abated. Follow-up is expected to eliminate the remaining sources. Pulp and paper mills, milk processing plants, and canneries were the largest single groups of pollutors. Dairy plants at that time were still in need of an inexpensive method of disposal of waste. All Communities on the Wolf and its tributaries except Shiocton have sewage treatment plants: Shiocton has plans for a plant but is having trouble financing them.

A further problem is the effect of pollution on fish and wildlife, but we have little information about this. Fish are occasionally deprived of enough oxygen, but such was the case even before man polluted the water. The decomposition of algae depletes the supply of oxygen and therefore can kill fish. Before the day of the white man, some of the lakes and rivers of the Fox-Wolf Basin had reached the point in their geologic life span that encouraged plentiful growth of algae. Man has helped to hasten progress toward the old age of the river system by increasing pollution.

Research on the treatment of natural pollution by algae and weeds needs to be done. The Subcommittee on Aquatic Nuisance Control of the Committee on Water Pollution studies this problem and supervises treatment. Professor Folke Skoog and others of the University of Wisconsin have developed a chemical, 2-3 dichloronaphthoquinone, that kills blue-green algae and is apparently harmless to other organisms. This chemical is quite expensive but may be less expensive than other methods of control of natural pollution.

Some people have claimed that reservoirs on the Wolf would help prevent or get rid of pollution in Lake Winnebago and on the Lower Fox by providing water to flush contaminated areas. However, the Corps of Engineers reported in 1949 that the area stank even when there was plenty of water, that the area was called "stinking waters" in Indian days before the days of pollution by industry and municipalities, and that the flow provided by reservoirs would be very little in dry years when it is presumably most needed. The Corps further stated that "actual discharge records show that there has been no instance in more than 50 years when the flow on the lower [Fox] river has not been several times the amount required for municipal water supply and for all paper mill and other industrial processing requirements," (p. 83).

However, esthetic values, as well as values of commerce and public health, are important. Developing the basin as a vacationland would require creating a more pleasant environment, not the least of which is all possible removal of causes of the pervading stench.

13. Coordinated Land and Water Planning and Zoning

There is no basin-wide agency to coordinate land and water planning. Nor is there any basin-wide agency to implement such plans by zoning, lake management, watershed programs, wetland restoration or protection and the like. To accomplish an overall basin-wide zoning program, for example, coordinated ordinances would need to be approved by 29 villages, 8 cities, 10 counties and 91 towns. At present some of the villages and cities have their own localized zoning ordinances. Only two counties, Langlade and Oneida have adopted zoning ordinances. Langlade's ordinance, of the forestry-recreation type, tends to protect forest lands from agricultural or other undesirable development and is in force in several Langlade County towns. A similar ordinance protects lands in a forestry zone in the town of Schoepke, the only Oneida County town in the basin. No zoning is in force in any of the other towns or counties of the basin and even in Langlade County no attempt has been made through zoning to protect flood plains, stream banks, lake shores and highways.

V. PROPOSALS FOR THE WOLF, 1922-1960

For several decades people in Wisconsin have been interested in problems of further developing the Wolf and its tributaries. We outline here first some proposals that have not been intensively studied and then turn to those which have been.

A. Proposals Not Commented on in Detail

Proposals which have not been studied in detail by any group are listed below and are not commented on in detail in this report. These are proposals to:

1. Push for intensive small watershed programs in the upper reaches of the tributaries. In each of the counties in the basin a soil conservation district is in existence to carry out small watershed programs under Public Law 566, should any be proposed--something which has not yet happened. If proposals are forthcoming in the future it would be well to mesh them into a coordinated basin-wide development program.

2. Be more active about dredging and maintaining a 4-foot channel from New London south. As was indicated in the previous section under the heading "Navigation," the natural low-water level in the 14-mile section of the channel immediately south of New London is on the average considerably below 4 feet. The Corps reports that it has no money with which to carry on future dredging operations. This proposal contemplates a request to Congress that funds be made available to dredge in this and other sections of the channel.

3. Restore the level of White Lake. White Lake covers about 1,100 acres and its level rises and falls with that of the ground water table. Because of deficiencies of rainfall over a period of years, the level by the summer of 1959 had declined about 2 feet. Since last fall heavy replenishment of the ground supply has brought the lake back to an acceptable level, but undoubtedly low levels will recur from time to time in the future after extended periods of deficient rainfall. The proposal is to build a dam across the South Branch of the Wolf and to bring water in from the west through a ditch about a mile long. Estimates of the cost of the project vary greatly. The local association believes it can be done for about $27,500; the Conservation Department estimates a cost of at least $100,000.

4. Raise the level of upstream lakes not in the Winnebago Pool and use them as storage reservoirs to help even out the flow of the Wolf. It is doubtful that these lakes would provide sufficient storage to affect noticeably the flow of the river. The mid-summer draw-down of these lakes to increase the river flow would probably bring protests from persons who own summer cottage properties on them. No estimate of the cost or of the engineering feasibility of such a project has been made.

5. Establish lateral reservoirs in the lower basin to store flood waters

and to level the mid-summer flow. Water would be taken into the reservoirs in spring without erection of dams and would be released in mid-summer. The feasibility of this suggestion has not been investigated. Topographical conditions may not permit reservoirs of adequate depth and size and there are important implications for fish and wildlife that need full and careful study, for example the growth of rough fish in such shallow reservoirs and the maintenance of sufficient current in the reservoirs to permit pike spawn to hatch.

6. Engage in a comprehensive overall basin-wide study with a view toward evolving affirmative proposals for the improvement of the basin as opposed to studying and evaluating single proposals. This proposal has substantial value, but will involve basin-wide, local organization and leadership and substantial financing. The Corps has repeatedly, in its reports, pointed to local unwillingness to help finance development.

B. Proposals Considered in Detail

Proposals for the development along the Wolf and its tributaries that have been intensively studied relate mostly to hydro-electric power, flood control and stabilization of the flow of the river. They have been of the following six types, which will be commented on in relation to the findings of the various agencies and individuals who have investigated the proposals:

1. Develop dams for hydro-electric power;

2. Build dams and other impoundment structures for flood control purposes, and take certain other steps for flood control purposes;

3. Build dams for water storage purposes to stabilize the flow of the river, the depth of the navigable channel below New London, the level of the Winnebago Pool and the release of water into the Lower Fox;

4. Build multiple purpose dams for two or more of the above purposes;

5. Use water for supplemental agricultural irrigation (considered in "Some Present Land and Water Uses and Problems," at page 25 of this report);

6. Leave the river system alone and protect it as a wildlife and fishing resource and for other recreational purposes.

More specifically, the above six proposals considered in past surveys involve nine possible sites for hydro-electric power dams--five in the Menominee Indian Reservation, three at and above Lily, and one at Leeman. They also involve proposed flood control dams at the same sites and more recent flood control proposals for water diversion and for erection of impoundments at various possible locations above New London to spread the river over substantial areas of low flat land there. The most frequently talked of multiple-purpose sites are at Lily and Leeman. (Usually flowage control and flood control are inconsistent with the most efficient use of water for hydro-electric generation,

but as pointed out later this is thought by the Corps not to be a serious problem on the Wolf and its tributaries.)

C. Specific Surveys and Interests

There have been a number of studies of most of these proposals, some involving both the Fox and the Wolf. Among formal surveys are those of the Corps of Engineers in 1922, 1926, 1932, 1939, and 1949, the United States Department of Agriculture in 1926 and 1929, the Wisconsin State Planning Board in 1938, private firms and public utilities, the Conservation Commission in 1960 (attached as Appendix B to this report), and those of graduate students in a 1960 University of Wisconsin interdepartmental seminar in River Basin Planning. It should be noted that most of these conclusions have been based on reviews of a specific project or projects. To date there has been little or no attempt to study the basin as a whole with a view toward affirmatively proposing programs of action for the overall development of the basin. It is the difference between reviewing relatively isolated suggestions and making coordinated proposals founded upon a comprehensive study of the land and water uses and economic and social problems of the basin.

1. Corps of Engineers, 1922, 1926 and 1932

In 1922 the Corps recommended: (a) abandoning the improvement of the Wolf River above Fremont, (b) lowering the Winnebago Pool to two feet below the crest of Menasha Dam and deepening all channels if power interests furnished a bond as a guarantee to lease at a specified annual rental the power resulting from the improvement, and (c) cooperation of the United States in plans for reclamation of land along the Wolf by making necessary changes in Government dams on the Lower Fox. Congress took no action on these proposals. In 1926, the Corps reported unfavorably on a proposal for controlling floods by means of a cut-off canal at Shiocton from the Wolf near Leeman's Bridge into Duck Creek Valley. It reported favorably on conducting a survey on the Wolf above New London provided that local interests contributed $33,000 of the estimated $50,000 cost. Congress took no action on this recommendation. In 1932, the Corps reported unfavorably on additional improvement on the Wolf for navigation, flood control, water power, and irrigation. In 1939, a preliminary examination was unfavorable to a survey for improvement of the Wolf for flood control because the potential reservoir capacity would not be effective for controlling floods.

The Corps carried out a further preliminary examination of the Fox and its tributaries in 1949. This report is considered at length below.

2. Department of Agriculture

U. S. Department of Agriculture reports of 1926 and 1929 stated that the costs of various flood control measures along the Wolf would be greater than the probable benefits. The Associate Drainage Engineer, in a 1926 report on "The Possibility of Diminishing Floods in the Wolf River Valley, Wisconsin," considered plans for diverting flood waters but found costs and legal complications

too great to justify putting the plans into effect. In 1929, the Chief of the Division of Agricultural Engineering found that diversion, reservoirs, and channel improvement would be impracticable, and that protection by levees was possible but probably more expensive than the benefits were worth.

3. Wisconsin State Planning Board

The Wisconsin State Planning Board report of 1938, "The Fox River Valley," Bulletin No. 5, was prepared at the request of city officials from the cities of Fond du Lac, Oshkosh, Menasha, Appleton, and New London, who represented the Fox River Improvement and Conservation Committee, a group interested in regulating stream flow to minimize flood damage. The Planning Board's findings were not encouraging about methods of control except for changes in New London. Specifically, its findings were:

a. The cost of diversion of water from the Wolf above New London would exceed benefits.

b. Any reservoirs built on the Wolf at North Lily and Leeman, the two most practicable sites, would not help diminish floods in New London very much.

c. More rapid sluicing at the Menasha Dam would cut down on the amount of water accumulated in the Winnebago Pool, but consequent readjustments would involve perhaps prohibitive costs.

d. Raising levees around New London's low area, or raising the grades of streets and buildings, or abandoning or removing to higher ground certain streets and buildings, would have to be brought about to protect New London. (Levees are still being proposed in 1960).

e. Storage reservoirs at North Lily and Leeman could increase flow in dry periods, although initial costs would be about $1,000,000 in 1938 money.

In a second report in 1938, "The Proposed Wisconsin-Fox Rivers Development Plan," Bulletin No. 6, the Wisconsin State Planning Board considered the control of floods on the Wisconsin, the development of power on the Wisconsin and the Fox, the expansion of employment and industry, and the improvement of sanitation, navigation, and recreation. It proposed construction of a reservoir of very great capacity on the Little Eau Pleine River, construction of three new hydro-electric power plants on the Wisconsin below the reservoir, and provision for diversion of some stored water to the Fox River by way of the canal at Portage. Expected benefits were:

a. Flood control on the Wisconsin River.

b. Increased hydro-electric power.

c. Facilitation of treatment of sewage effluent in cities on the Wisconsin below the proposed reservoir and on the Fox, and disposal of industrial wastes, because of increased flow during the season of normal low flow.

d. Improvement of navigation and recreation because of increased low flow.

e. Expansion of employment during construction of the project and expansion of employment and industry as a result of its completion.

The Board claimed ample evidence to justify every conclusion and strongly urged such use of surplus water on the Wisconsin which was at that time going to waste. The reservoir and canal have not been constructed.

4. Private and Local Groups

The engineers' reports for private firms and municipalities include quite a number of investigations carried out from 1913 to 1944. Most of them concluded that construction for power and flood control at specific sites would not be economically justified.

The Wolf River Improvement Company, representing power companies operating on the lower Fox River, was authorized by a State Act of July 21, 1913, "to construct, acquire, maintain, and operate a system of water reservoirs on the Wolf River and its tributaries north of township 32 (Lower Post Lake) . . . for the purpose of producing a uniform flow of water in the Wolf and Lower Fox Rivers, and thereby improving navigation and other uses of said streams and diminishing the injury to property, both public and private." Plans were made for a large reservoir in the vicinity of Lower Post Lake, but the project was later abandoned because the engineers' report showed that costs would be great in comparison with benefits.

In 1926-28 a public utility company made a detailed investigation of the Menominee Indian Reservation with the idea of constructing five hydro-electric plants on the Wolf. None of the dams has been built. Scenic areas would have been endangered and the economic benefits of such reservoirs were doubtful.

In 1936 the Wolf River Hydro-Electric Company, a group organized to own and lease lands for dams and reservoirs and to go into the power business, prepared a report on flooding on the Wolf for a 1936 Corps of Engineers' public hearing in connection with the preliminary examination of the Fox River and its tributaries for flood control required by the Flood Control Act of June, 1926. The report specially emphasized the area near Lily, also known as Strauss Rapids, Squaw Creek, and Olk site, as a location for a reservoir. The Corps report was unfavorable. A rehearing in 1938 resulted in the report

that the limited potential reservoir capacity in the Wolf River Basin would not be effective for controlling floods and that construction of reservoirs for water power could not be economically justified.

In 1937 and 1938 the Fox River Water Power Users Association, a private group, commissioned a report on the Lily site to determine the size and capacity of the reservoir, the stream flow, storage effects, advantages to be expected, and to provide a basis for further study. A complex problem of costs and jurisdiction arose. In 1939 the Wisconsin legislature authorized the Wolf River Reservoir Company (formerly the Wolf River Hydro-Electric Company) to build the Lily dam and assess tolls from the users of the water power (Chapter 441, Laws of 1939). Much of the land for the site was owned by an officer of the Wolf River Reservoir Company and was being offered at what the Fox River Water Power Users Association considered an excessive price. The water power users, who would be the ones to pay the tolls, appeared against the Reservoir Company's plans at a Public Service Commission hearing. The P. S. C. did not approve the plans and the specifications of the Wolf River Reservoir Company, stating that the plans were not sufficiently detailed.

In 1937, the Fox and Wolf River Control Association presented a brief at a public hearing conducted by the District Engineer of the Corps of Engineers in Oshkosh. The aims of the Association, according to their brief as summarized by the Corps, were to improve sanitation, prevent floods, reduce soil erosion and restore the water table, provide a more uniform river water supply, improve navigation, and improve recreational facilities on the Fox and Wolf River System.

The Corps reported that the president of the Association believed that a "complete field survey of the upper Wolf River and its tributaries would disclose reservoir sites whose costs would be justified by all of the resulting benefits." However, the Corps further reported that "No local cooperation was offered for or on behalf of the water power, industrial, agricultural, or municipal interests informally represented by the Association which requested the multiple purpose improvement of the river."* A definite plan for improvement and a finding of its economic justification would have been necessary for a detailed discussion of the kind of local cooperation required for participation in a federal program under the provisions of the 1936 and 1944 Flood Control Act. (See Corps report, pp. 36-7, for a detailed listing of local responsibilities according to these Acts.) At this hearing, the secretary of the Wisconsin State Planning Board suggested that the United States outline such a plan for complete development of the Wolf and Fox River Basin. It will be noted that the Planning Board itself had prepared a plan for the Wisconsin-Fox-Wolf complex in 1938 and that the plan had not been put into effect.

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* Corps of Engineers, U. S. Army, "Preliminary Examination Report on Fox River and its Tributaries, Wisconsin, for Flood Control and Other Purposes," Milwaukee, 1949, p. 56.

5. Corps of Engineers, 1949

The Oshkosh hearing of 1947 was part of the preliminary investigation of the Fox and its tributaries undertaken by the Corps of Engineers and authorized by the Federal Flood Control Act of 1946.

Part of the work of the Corps was an evaluation of the proposals of the Fox and Wolf River Control Association, whose representatives appeared at the hearing with a request for investigation of multiple use projects. The District Engineer concluded that "benefits to be derived from the most favorable comprehensive project for flood control and improved water usage probably would justify such improvements" and that such a survey of economic benefits should be made (p. iv). Congress has not provided money for such a survey, nor has one been commissioned locally. It must be remembered that the Corps report and its conclusions dealt with both the Wolf and the Fox. The Corps' conclusion concerning power, flood control, and regulation of flow on the Wolf alone are given below.

The Corps found in connection with water power and flood control that all practicable reservoirs would hold only a minor fraction of floods such as that of 1922 and that consequently such reservoirs would primarily benefit water power. They found in detail that:

a. Five sites in the Menominee Indian Reservation were not suitable for flood control because of excessive cost. However, the Indians were interested in developing a power site in the Menominee Reservation if one could be found that would not flood too much land or timber or cover scenic attractions.

b. Three sites at and above Lily had a total capacity of about 120,000 acre-feet and would be adequate for maximum practicable power benefits and would provide all practicable storage capacity for flow of the river system down through the Reservation. (A permit for construction of a dam above Lily for recreational purposes has just been granted to Langlade County.)

c. South of the Reservation, the Leeman site, with a capacity of about 70,000 acre-feet, would provide all further practicable storage and power on the main river to a point about 10 miles south of Leeman (i.e., with the power and storage of three existing dams at and above Shawano).

d. Sites farther down the main stream were not suitable.

e. Additional sites for storage reservoirs on tributaries did not seem likely to be of much practical benefit.

f. Capacity for storage of 725,000 acre-feet would be necessary

for practical control of floods like that of 1922. Only about 200,000 acre-feet could be stored in the above sites. Such storage would probably have lowered the 1922 flood by only six inches. Therefore, such reservoirs would be primarily for the benefit of water power, not for control of major floods.

The Fox and Wolf River Control Association was also interested in the use of reservoirs to even out the flow of water during the year. The Corps reported that reservoirs could provide incidental benefits, such as some control of summer floods, but its findings were not at all specific. At present, the Wolf River Improvement Association is interested in regulating the flow for recreational boating purposes.

The Corps also reported on various proposals to reduce flood damage at New London. They found that about equal costs and benefits would result from the creation of a by-pass for the Embarrass around New London. The Embarrass is responsible for much of New London's flood damage, and if some of its water could be diverted around New London to join the Wolf two miles downstream, the peak flood level in the city could be reduced by about two feet near the northerly city limits. Low levees around the city would still be needed. The Wolf usually reaches a peak flood stage after the Embarrass does, and could usually take some water from it without endangering land to the south.

The Corps found, too, that costs of reducing floods on crop lands on the Wolf would probably exceed the value of the land. About 11,700 acres of good farm land in two possible levee districts on the lower part of the Embarrass and on the Shioc River could probably be economically protected from floods. A combination of the cut-off of the Embarrass around New London, levees to confine the flow, and pumping facilities could probably protect an additional 1,000 acres economically. (See Section 7 below)

6. Conservation Commission

The Conservation Commission report of 1960 by Harold C. Jordahl, entitled "Recreational Values of the Wolf River Basin, Wisconsin", attached as Appendix B, considers fishery and wildlife resources, existing water management, effects of flowages and dams on fish and game, and park needs, boating, canoeing, skiing, camping and motoring. Appendix 1 of that report gives a summary of action taken during the past thirty years by the Commission and Department regarding protection of recreational values.

The discussion of effects of proposed dams and flood control is particularly interesting. The four major proposed dams outside the Reservation would evidently bring disaster to fish and wildlife. The Commission states that a dam at Lily "would destroy the downstream trout fishing of the Wolf as well as portions of the Lily River." A dam at Leeman would eliminate or adversely affect sturgeon in the Winnebago Pool. Summer drawdowns could strand broods of ducks nesting along the edge of the water. A dam at Upper Post Lake would destroy smallmouth bass fishing and one at Lower Post Lake, would cause game losses and "would jeopardize the trout habitat of the entire Wolf River as well as portions of the Hunting River trout fishery."

As previously noted, the Public Service Commission has recently granted Langlade County permission to construct a dam between Lily and Lower Post Lake. The Conservation Commission is, however, seeking a court review of this action. The commission claims that the reservoir would, by warming the water, destroy about 35 miles of Wisconsin's finest trout water below the dam on the Wolf and possibly on other streams. Langlade County wants to back up water for about 9 miles to the outlet of Post Lake to develop shore properties and increase recreational use for fishing, hunting and boating. Congressman Reuss recently requested the Secretary of the Interior to investigate possible harmful effects in the Menominee Indian Reservation.

7. University of Wisconsin Seminar in River Basin Planning

Members of a 1960 interdepartmental seminar on River Basin Planning at the University of Wisconsin in Madison prepared a number of reports on problems of the Wolf River. These reports were studies of present conditions and current proposals for flood control, power and irrigation, considered principally from the points of view of engineering, economics and law. The following is a summary of findings on flood control and power by members of the seminar. See "Some Present Land and Water Uses and Problems", at page 25 of this report for a consideration of irrigation, and "The Governmental Setting" at page 17 of this report for legal aspects.

a. Rural Area Protection with Levees and Pumping. Robert Kohnke, a graduate engineer, reported that a proposal for reclamation of wet lands along the Wolf by means of levees and pumping would have serious unwanted consequences:

> Such a plan would probably increase the stages and damages somewhat upstream from where the levees would start at Portage and New London. Also, the marshlands in their present condition act as a vast storage basin and retard the movement of floodwaters on these streams. The construction of levees would probably increase the flood discharges into the Winnebago Pool, due to the loss of the flood storage area in the marshlands along the rivers. This would require increased outflow from the Winnebago Pool into the Lower Fox River in order to prevent excessive stages in the Winnebago Pool. In 1922 the Corps of Engineers estimated that enlarging the spillways along the Lower Fox River to handle the increased flows would cost about $250,000. It is possible that, at present prices, the cost of such changes would be a million dollars or more.

> This plan to protect the wetlands would convert vast marshland areas, which are now producing wildlife of various sorts, to agricultural lands. No doubt this would have an effect on the wildlife population of the area. Possibly the net returns from such a project would exceed the costs but the cost of development and operation of the lands involved would be much greater than the cost of comparable lands in that vicinity.*

*Robert Kohnke, "Engineering Aspects of Flood Control in the Wolf-Fox River Basin", Unpublished Univ. of Wisconsin seminar report (June, 1960), pp. 8-9.

The Corps of Engineers, in its 1949 report, stated that only a small area of land in the basin, 11,700 acres of rich land on the Lower Embarrass and on the Shioc near Shiocton, could probably be economically protected by levees and pumping.

b. Embarrass River Diversion at New London. Mr. R. M. Dave, a graduate engineer, brought up to date analysis of the proposal for constructing a by-pass for the Embarrass River around New London to help prevent floods. Mr. Dave calculated the benefits over a 40-year period to be far less than the costs. The total cost of the construction, including the cost of necessary levees, movement of earth, purchase of land, construction of a bridge, engineering, overhead, and 10% for contingencies would be about $690,607. Mr. Dave listed probable benefits of this project as:

1. Improvement of drainage of land along the Embarrass.
2. Reduction of flow on the Wolf at New London by 3,500 c.f.s.
3. Reduction of water level on the Embarrass by as much as 2.0 feet and on the Wolf at New London by as much as 0.6 feet.

c. Levee Protection for New London. Mr. Kohnke reported on the long-standing proposal to protect New London from floods by constructing low levees. His conclusion was that a properly planned and constructed levee system "would give good, positive protection against all except very extreme floods" at probably the lowest cost of all plans for flood control at New London. His conclusion agrees with that of the Wisconsin State Planning Board in 1938.

Mr. Dave's report presented figures on some costs and benefits of this project. He calculated costs, excluding the unknown cost of twelve blocks of river-front property, to be $58,987; and benefits over a forty-year period, excluding enhancement of property values and other intangible benefits to be $144,200. If the cost of purchasing river-front property is not prohibitive, it appears that benefits would justify costs of constructing a levee system for control of floods at New London.*

Mr. Kohnke stated that if this levee plan and the plan for a by-pass of the Embarrass around New London were combined, New London could fill in and use the part of the channel of the Embarrass that meanders through the city and thereby increase property values.

d. Multiple-purpose Projects Involving Storage of Upstream Water. Mr. Kohnke provided information concerning the repeated hope that storing the run-off from spring floods and releasing it when the flow is low would work to the advantage of people in the Wolf Basin. Some people have expected

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*R. M. Dave, "Economic Aspects of Flood Damage Prevention for Wolf River Basin," Unpublished University of Wisconsin Seminar report, June, 1960.

benefits for flood control, navigation, power, and other purposes if a system of storage reservoirs were constructed.

Proposed dams at Lily and Leeman would be much more effective in controlling small summer floods that damage agricultural and other land than in controlling large spring floods, Mr. Kohnke said. These proposed dams would reduce the flood stage of a flow like that of 1922 by less than a foot at New London.

The Lily dam could hold enough spring flow to release 580 c.f.s. for 120 days during the summer when flow is normally low. The dam at Leeman could provide 290 c.f.s. for 120 days. This increased flow would make little difference in the navigability of the Wolf during the summer.

Mr. Kohnke said that there are no other practical sites for storage reservoirs on the main stream of the Wolf.

He stated that it did not seem that the proposal for a five or six mile dam across the Embarrass and the Wolf above New London would be practical for flood control. Two proposed dams above New London, one on the Wolf and one on the Embarrass, would permanently flood areas that the proposed Lily and Leeman dams would be supposed to protect. They would also flood the village of Shiocton if their reservoirs were more than a few feet deep.

He stated that benefits from reservoirs on the Wolf therefore would probably not equal costs. Mr. Dave figured benefits of all four reservoirs to be about one-fourth their cost.

e. Diversion Plans for the Winnebago Pool and the Shioc River. Occasionally high water in the Winnebago Pool causes damages. Three proposals for alleviating the problem have been made. For a consideration of the reasons for such high water conditions, see pages 30 and 31.

One proposal, the Manitowoc Diversion Plan, would require the diversion of water from Lake Winnebago (747 feet above mean sea level) to the east over or through the Niagara Escarpment (834 feet above mean sea level) to the Manitowoc River. Eight miles to the east of the lowest convenient part of the escarpment, the elevation is still 58 feet higher than Lake Winnebago. Therefore excavating costs would be exceedingly high. Mr. Dave claims that costs and legal problems would not justify the project. He also says that such a diversion would not lower the stage at New London appreciably and the Lower Fox could handle any normal flood without damage if there were a more rapid draw-down through the Menasha Dam.

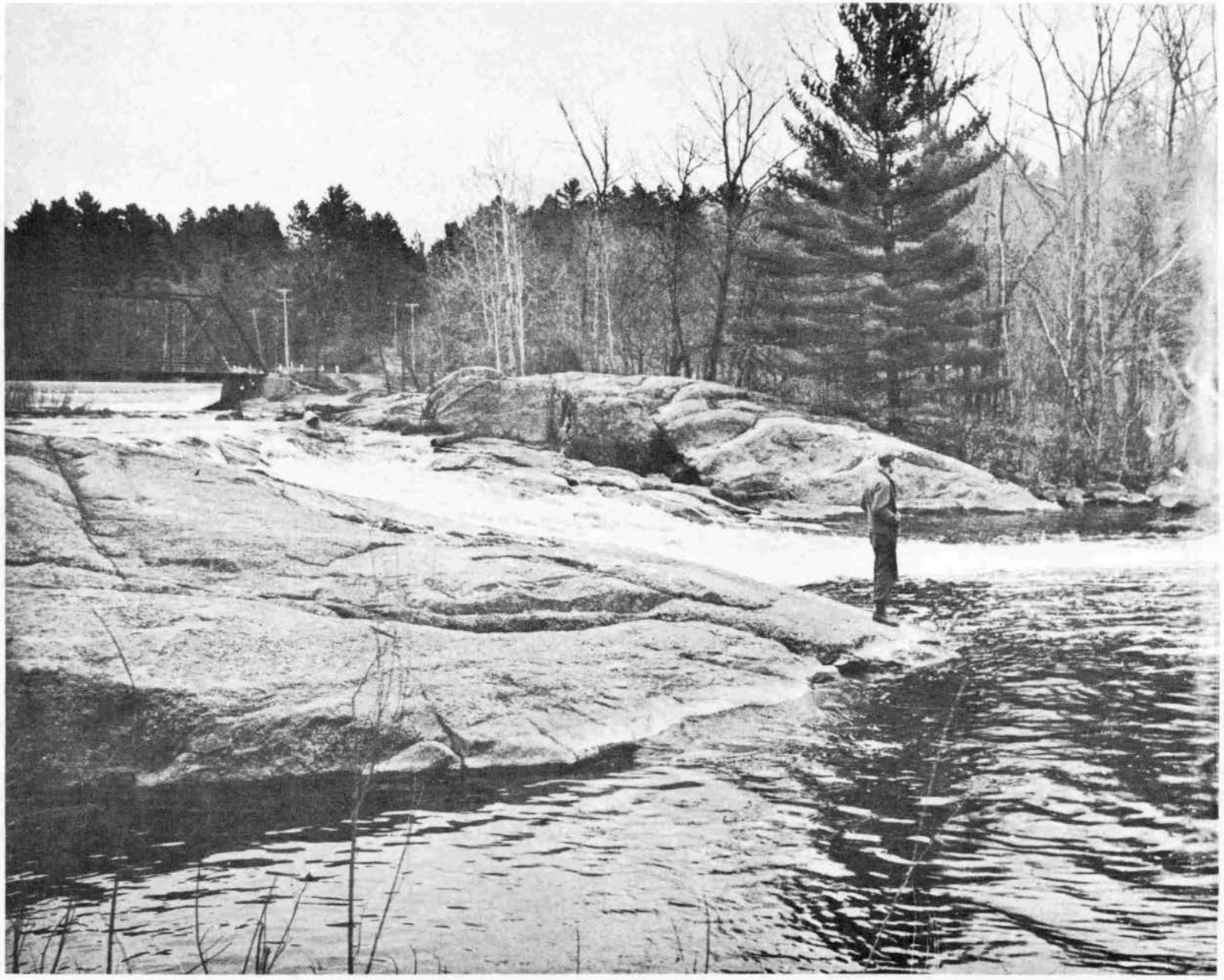
A second proposal, the Shiocton Cut-off, calls for the diversion of water from the Wolf near Leeman eastward to Green Bay. Mr. Kohnke says that such a project would still not prevent floods in New London about every other year, although it would reduce stages somewhat. The cost of excavating about 23,000,000 cubic yards would be about $57,500,000, according to Mr. Dave. Other costs would bring the total to about $71,000,000. The project therefore does not seem economically justifiable.

A third proposal is for more rapid draw-down through the Winnebago Pool to the Lower Fox River. Such a plan, according to Mr. Kohnke, would be much less costly in preventing flood damages in the Winnebago Pool than would the two plans considered above, but would have the same disadvantage as those plans. They would all waste water that is now stored for later release for hydro-electric power and navigation. The chief problem in analyzing costs and benefits of preventing flood damages in the Pool is that no study of such damages has been made. Mr. Kohnke's guess is that the third plan would be most economical, but even it would cost about $1,000,000.

f. Hydro-electric Power. C. K. Sarkar, a graduate civil engineer, analyzed two proposed hydro-electric projects and found that neither was economically justifiable. He concluded that other less desirable sites would also be uneconomical. One site is at the Dalles of the Wolf, where an existing plant has an installed water wheel capacity of 7,000 horsepower. The other is Keshena Falls, where an existing plant has an installed water wheel capacity of 4,500 horsepower. Stream flow could at times produce more power if bigger wheels were installed. Keshena Dam, on the Wolf, has water wheels for 340 kilowatts, and if larger wheels were installed, 660 kilowatts could probably be produced 50% of the time and 428 kilowatts 90% of the time. However, Mr. Sarkar says that construction costs far outweigh potential benefits. It would perhaps be less expensive to build and operate steam power plants.

The graduate students' conclusions concerning development of hydro-electric power agreed with those of engineers commissioned by local firms to investigate sites for power plants.

APPENDICES



Keshena Falls
Menominee Indian Reservation
May 10, 1956

APPENDIX A

PROFILE OF THE WOLF RIVER

AND

MAP OF THE FOX-WOLF RIVER DRAINAGE AREA

WOLF RIVER

WISCONSIN

IN 16 SHEETS — SHEET NO. 1 — SCALES AS NOTED

SCALE, MAIN MAP, IN FEET: 1000 0 1000 2000

U. S. ENGINEER OFFICE, MILWAUKEE, WIS. OCTOBER 30, 1931.

SUBMITTED: E. M. Nixon, SENIOR ENGINEER

SUBMITTED: MAJOR, CORPS OF ENGINEERS, U.S.A.

TRACED BY: R.D.S. FILE NO. 52-E-1

TO ACCOMPANY REPORT TO C. OF E. DATED NOV. 3, 1931.

ELECTRIC POWER PRODUCTION AND DISTRIBUTION

SCALE OF MILES: 0 5 10 15 20

LEGEND

Wis. Public Service Co.	Wis. Mich. Power Co.	Wis. Power & Light Co.	Wis. Valley Electric Co.	Private
■	■	■	■	○
▲	▲	▲	▲	△

Hydro-Electric Plant
Fuel Power Plant
Substation
Transmission Line

DRAINAGE AREA

SCALE OF MILES: 10 0 10 20 30

Drainage Areas in Square Miles

Wolf River	3750
Upper Fox River	1850
Lake Winnebago	600
Total above Menasha	6030
Total above mouth of Lower Fox River	6430

PROFILE

WOLF RIVER

HOR. SCALE OF MILES: 0 5 10 15 20

VERT. SCALE OF FEET: 0 50 100

Elevation above sea level in feet

Miles above Main Street in Oshkosh

Miles above mouth

Note: Elevations upstream from this line are based on sea level datum as determined from U.S.C.&G.S. bench marks, which is 2.03 feet lower than datum used for Fox River survey, U.S. Dept. 144/1915, and for Wolf River from its mouth to this line

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NOTES

Wolf River from mouth to New London surveyed July 17-Dec 20, 1916, Earl M. Nixon, Asst'l Engr., in charge of field and office work.

Wolf River from New London to Keshena, Embarrass River, Shiocton Creek and Black Creek surveyed Dec. 8, 1929, to April 12, 1930, and Nov. 4, 1930, to April 1, 1931, by P. R. Lundstrom, Jr. Engr. Shawano Lake, Post Lake and river from Keshena to mile 216.0, except 3.9 miles above Keshena Falls, surveyed Aug. 1, 1930, to May 2, 1931, by James E. Bambery, Jr. Engr. to Sept. 21, 1930, and Chas. A. Jonkerman, Jr. Engr. after that date. Survey above New London and preparation of map under supervision of A. F. Striegl, Civil Engr.

Wolf River from Keshena Falls to south line of Langlade Co., mile 137 to 160, taken from maps by Mead and Seastone, Consulting Engrs., prepared for Wis. Power and Light Co. in 1928.

Soundings below New London are referred to standard low water and those above new London are referred to the ordinary low water surface of the river except as otherwise indicated. Elevations for points in Shawano and above are referred to mean sea level as determined from U.S. Coast and Geodetic Survey bench marks and elevations below Shawano are referred to the datum used for the 1918 survey of the Fox River and Wolf River below New London which at the ice just below Shawano was found to be 2.03 feet above the U.S.C.&G.S. sea level datum. HW=high water; LW=low water; SL W= standard low water; M W= mean water.

Enclosure (8)

July 27, 1964

PROJECT: MAP
(Menominee Action Program)

Governor Reynolds today launched Project MAP (Menominee Action Program) and asked the people of Wisconsin for an all out donation of time and talent to relieve the many problems of Menominee County. Menominee County was the reservation for the Menominee Indians until the termination act of 1961 made it Wisconsin's 72nd county. The Governor emphasized that the county was having some difficulties which are not insolvable if available resources and talents are applied. The Governor restated his faith and confidence in the Menominee people. He said he was convinced that they could become self sustaining and achieve a comfortable standard of living if enough effort was exerted to put the economic wheel of progress into motion. Governor Reynolds declared that he was calling upon the people of Wisconsin to apply that effort. He said he was setting the example for that effort by using his executive powers to initiate a basic action program and directed state agencies to take specific action on some of the problem areas by applying their available resources. The Governor also stated that he was creating an interagency committee for Menominee County for the purpose of preparing and implementing a comprehensive action plan of development for the county.

The Governor stated that the future for Menominee County lies in increasing its tax base and getting more money into the area. In 1963 the assessed valuation of the property was about $17 million, on which there is a taxable limit of 1.5% or $255,000. Adding the $34,000 obtained from the 2 mill road and bridge fund results in a total revenue base of $289,000 to operate the county. In 1964 this amount was $29,000 less than what was needed. The county depends upon the Menominee Enterprises corporation for over 90% of its revenues.

Governor Reynolds pointed out that the present overall situation in Menominee County is very distressing. There are few skilled workers; there are about 550 employable males and about 200 more workers than jobs; 54% of the population is below 18 years of age; the housing is inadequate; there are no health or medical facilities in the county, and the income level does not lend itself to medical insurance; the water and sewage lines are inadequate; business opportunities and establishments are practically non-existent; there is no financing available locally; the land is of marginal value for agriculture; there is almost no way of holding tourists in the county because the food, lodging, and service facilities are minimal.

However, the Governor stressed that, bleak as the situation appears at the present time, there is substantial hope for development if an extensive pump-priming program is undertaken. The overall long-range objectives would have to involve the combined talents of the state agencies, private industry, the federal government and the Menominees. Some techniques which could be considered include a state-sponsored adult peace corps; a war on poverty; and a governor's "idea factory." The Menominee Action Program intent is to involve as many people as possible, get them interested, and appeal to their humanitarian instincts to donate a little of themselves to help solve the problem. It might even be possible to view the program as a pilot project for possible application elsewhere in the distressed areas of the state. There are a few things which can be done immediately to relieve the situation, and they are outlined in the "Immediate Action Plan" in subsequent paragraphs. However, he briefly discussed the overall potential development of the area to explain his feeling of confidence that the problems of Menominee County can be overcome.

Overall Development Plan

1. Recreational development would appear to offer the best potential for concentrated effort to achieve financial stability and local employment. Menominee County is located near the center of the U. S. Census North Central Region. The 1960 census showed that this area has over 7 million families with an income of over $5,000 per year. If 1/2% (35,000) of these families visited the county annually, stayed 7 days, and spent $50 per day the income to the county would be $12,250,000 per year. (35,000 x 7 = 245,000 x $50). Additional funds would depend upon how many families outside the general area could be attracted. The population in the county could be used in the development, operation, and maintenance of hotels, motels, camps, lease sites, sports, etc. plus being employed as gardeners, guides, camp counsellors, maids, etc. Municipal obligations would have to expand with the trade, and personnel would be needed for fire, police, sanitation, roads, utilities, shopping centers, etc. Training exercises would have to be provided for the various trades, but these can be developed through the area redevelopment act, manpower retraining, vocational and adult education, employment relations, etc.

A preliminary report on land use development for Menominee County conducted by Nielan Enterprises Inc. appears promising with some refinements. That report proposes leasing lots for building sites for 20 years with an option to buy. Ultimate development costs would be about $25 million with $6 million included in the first phase. The first phase would include leasing 600 one-half acre lots for a down payment of $800 and an annual lease rental of $315 for the first 10 years - $250 for the second 10 years. These 600 lots would bring in $3,870,000 in development funds ($800 + $3,150 + $2,500 = $6,450 X 600 lots). About half of the down payment would be needed to pay for the cost of developing the lots, and the annual rentals would be pledged against loans for construction of revenue producing facilities such as hotels, motels, golf courses, etc. The revenues from these facilities plus pledging annual amortization and depreciation accounts could be used to obtain the balance of the $6 million needed for the first phase. Of course the entire success of the plan depends upon the successful leasing of the 600 lots. Conservation, Highway, Resource Development and private firms could assist in the advertising, platting, developing, construction and operations.

2. The forest is the present main source of income. Unfortunately the lumber industry is very competitive and some procession operation is necessary for expanded economic development. Greater expansion toward the use of the total forest product offers a number of possibilities which include:

a. A remanufacturing plant in conjunction with the mill to make use of edgings, slabs, culls, etc. for furniture, parts, cut stock, mouldings, etc.

b. A veneer plant for low cost use of hardwood logs.

c. Pulp and paper production for use of logging residue, thinnings, sub-standard trees, etc.

d. Post and pole processing to make use of 2,000 cords of cedar in the 15,526 acres of coniferous swamp.

The Conservation Department, Resource Development, the Forest Products Lab, technicians from lumber companies, paper companies, wood products companies, etc. could advise on possibilities and be approached for development and investment interests.

3. Commercial development could be developed to include machinery repair, garages, drug stores, barber shops, etc. Funds for long-term, low interest loans are available through the area redevelopment act since this county has been declared eligible for such funds. There are several canning factories in the area, but the potential for a food freezing plant should be explored.

Immediate Action Plan

The Governor pointed out that the immediate measures he was putting into effect were obviously going to be largely stop-gap in nature, but would be geared to mesh with the various aspects of a total plan as much as possible. However, he stated it was his intention to have the state apply its resources in a concerted manner to direct some specific actions which include the following:

1. Financial Assistance

a. The Banking Commission is instructed to study the operation of the Menominee Loan Fund Authority and advise on what reorganization measures are necessary to provide some banking services, methodsof financing, and means of making some venture and investment capital available to the area.

b. The Department of Public Welfare has the authority to make loans for relief and welfare purposes to the people holding bonds of the Menominee Enterprises using the bonds as collateral. The Welfare Department investigates the possibility of developing the market for loans to be used for remodeling, adding to, and modernizing homes. The deteriorated, over-crowded houses occupied by people with active cases of T.B. is definitely a welfare concern.

2. Health and Medical and Welfare Assistance

a. The Industrial Commission, State Board of Health and State Department of Public Welfare are instructed to examine the hospital buildings which have been closed down to determine possible utilization as a hospital, outpatient clinic, nursing home for the aged, hotel, or whatever.

b. The State Board of Health is instructed to concentrate more of its district staff's time in Menominee County to give consultation, instruction, and direct medical assistance in a full fledged attack on eliminating, and preventing diseases and changing the attitude of the people toward receiving medical and dental assistance. The state medical society is studying the problem, and its continued help is requested to assist in developing a plan and providing some services.

c. The State Insurance Department is directed to determine if some form of health insurance could be provided to the people on a group rate basis. The object would be to accustom the people to seek medical and dental services prior to the time an illness reaches a critical or terminal stage.

d. The cost of boarding prisoners in the Shawano County jail amounts to about $20,000 per year because Menominee has no facility. The Welfare Department is instructed to provide the necessary assistance for the county to develop a correctional camp "county jail" in connection with the saw mill so that county prisoners could be sent to the camp rather than the Shawano jail, thus cutting jail boarding costs and utilizing prison labor.

3. Recreational Facilities

a. Recreation funds provide money to the Welfare Department to create youth conservation camps. The Welfare Department is instructed to investigate the feasibility of establishing such a camp in the county. The work force of the camp could be used to develop swimming beaches, clear trails, erect historic markers, etc. An ultimate use of the camp might be as a private or youth agency summer camp, at which time the money could be repaid to the Recreation Committee.

b. Recreation funds are also available to the Soil and Water Conservation Committee for lake creation. Ultimate development of the area for recreation will require damming of some water to create additional lakes for site development. The Soil and Water Conservation Committee is instructed to investigate this possible application of state recreation and available federal funds.

c. The Department of Public Welfare and State Board of Health have been asked to concentrate the efforts of their district community services consultants to stimulate a more comprehensive program of recreation for the residents of the county.

d. The Free Library Commission is instructed to develop a program to provide a library or library services to the county.

e. The Conservation Department is instructed to examine the possibility of establishing a state park in the county. A state park would serve as a Memorial to the Menominee Tribe; establish a standard for future development of facilities; provide jobs and the possibility of small tourist businesses; and bring the much needed tourist trade into the area.

f. The State Historical Society is instructed to investigate the feasibility of establishing an historical site in the area.

g. The Highway Commission is instructed to give primary attention to improving Highways 47 and 55 to modern standards to improve transportation in the county. If the area is to be developed for recreation and tourist attraction, it must be made more accessible.

4. Housing

a. The Department of Resource Development is instructed to investigate the possibility of obtaining long-term low interest federal funds for building, remodeling and modernizing the homes.

b. The Department of Resource Development is also instructed to assist the county in establishing and implementing an urban redevelopment authority and plan, explain various federal programs available for development, and determine what action the county must take to qualify.

5. Forestry

a. The Conservation Department is instructed to seek the assistance of the Forest Products Laboratory and private industry in reviewing the overall forestry program in an attempt to improve procedures, and in developing a program of full scale utilization of the forest products.


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6. Menominee County

The people of Menominee County are asked to cooperate with the people assigned to help them with their problems. This program is an effort to help the Menominees to help themselves.

Enclosure (9)

August 20, 1964

Mr. George Thompson
Attorney General
State Capitol
Madison, Wisconsin

Dear Mr. Thompson:

SUBJECT: Special Advisory Committee
to Attorney General
Menominee County

Herewith is a Work and Conservation Program for Help to Menominee County by the special advisory committee to the Attorney General as appointed by your letter of July 10, 1964.

Your committee studied in detail a number of aspects and from a considerable body of material presents its findings and recommendations in seven concise pages. In summary we propose:

1. That the federal government be asked to assist in aiding the Menominee people.

2. That a State Forest and State Forest Recreation Area be established in the county.

3. That a resident forestry work camp be established on a permanent basis.

4. That the Menominee people be given opportunity for basic personal counseling.

The supplementary reports, estimates, maps, correspondence, and notes by which these recommendations were developed are available and are retained in the files of the committee chairman.

The recommendations will require intense application and follow through to transform any of the suggestions into reality. Your committee believes that its suggestions go hand-in-hand with one another and that the entire program be put to action rather than any one aspect be singled out.

The dire needs of the Menominee people have impressed your committee deeply. We urge that this report be accepted and that means to undertake the actions recommended be immediately arranged.

Respectfully submitted

V. L. Fiedler

V. L. Fiedler
Chairman, Special Advisory Committee

VLF:MVW
CC: Committee Members

A WORK AND CONSERVATION

PROGRAM FOR HELP TO

MENOMINEE COUNTY

Suggested by the

Special Advisory Committee to the

Attorney General
of Wisconsin

August 21, 1964

Mr. George Keith
Department of Public Welfare
State Office Building
Madison, Wisconsin

Mr. Theodore Abrahamson
Assemblyman
Tigerton, Wisconsin

Mr. G. E. Sprecher
Conservation Department
Hill Farms State Office Building
Madison, Wisconsin

Mr. James Dick
County Highway Commissioner
of Menominee County
Keshena, Wisconsin

Mr. Robert Fey
Carl C. Crane, Inc.
2702 Monroe Street
Madison, Wisconsin

Mr. V. L. Fiedler (Chairman)
Secretary of the
State Highway Commission
Madison, Wisconsin

INTRODUCTION

With Menominee County predominantly Indian, a basic problem is the historic difference between its culture and that of the rest of the state. Centuries as a woodland people have given the Menominees a distinctive set of values with little need for formalized economics, education, or hygiene. In early days as a free people, the severity of nature kept their population in balance with their environment.

As wards of the federal government from 1854 to 1961, living conditions were eased, education was made available, a sustained yield from the forest provided an economic cushion, and their health was looked after. Under these conditions, their population grew to today's average of more than five persons per family and a total tribal population of more than 3,200 persons, not all of whom live in the county.

Termination of the reservation on April 30, 1961, ceased all federal sponsorships of the Menominees as Indians. At once they became full United States and Wisconsin citizens, but except for a few outstanding individuals, without the background, or development of the attitudes, expected of a citizen. They are on their own with little preparation to make a living, maintain a home, or take ordinary health precautions. They stand in a twilight zone, the old Indian cultures slowly fading, the ways of modern western culture appealing only in the material sense. They are not ready by themselves, as the last few years have shown, to make a go of operating Menominee County. They urgently need help.

It will be the purpose of this report to list the most pressing needs, to suggest ways of extending help, and to recognize responsibilities for making the needed help available.

INVENTORY OF MENOMINEE COUNTY

Land Area

There are some 2,600 inhabitants of the county. There are two communities of some size in the county, and the major industry is Menominee Enterprises, Inc., which is almost completely involved in the harvest, processing, and sale of lumber.

Approximately 218,000 acres are classified at present as forest lands. This is the acreage accepted as entered by Menominee Enterprises under Section 70.335, of the Wisconsin Statutes, the sustained yield tax law. The total acreage of Menominee County is roughly 234,000 acres. Therefore, the sustained yield lands comprise about 93 per cent of the county. The remaining area is made up of meandered water; private lands sold to Menominees for farms and homesites; public roads; schools; cemeteries; churches; a railroad; and nonsustained yield lands of Menominee Enterprises.

Of the sustained yield forest lands only about 113,000 acres are at present in sawtimber stands capable of being managed under selective

cutting. This is the area which must be considered as the present land base for the sawmill. At present, 18,000 additional acres of aspen sawtimber are available but this area is scheduled for cutting by 1967. Since aspen is clear-cut, this acreage will go out of sawlog production for 45 to 50 years. To increase the sawtimber base significantly then, a relatively large acreage of nonsawtimber forest land would have to grow into sawtimber size. The remaining nonsawtimber acreage consists of immature pole-timber and reproduction stands, coniferous swamps, and nonstocked lands.

The present sawtimber cut as allowed in the forest management plan is approximately 30 million board feet annually. This cut is above the estimated growth for the remainder of the 15-year-cutting cycle in an attempt to cover all the sawtimber area by 1967.

In addition, there is a cut of about 20,000 cords of pulpwood and other by-products such as cedar poles and posts. This figure is conservative.

Studies of the area in the forest in need of planting have been made. Roughly, it is estimated that about 25,000 acres could be reforested. This area is not all open land; much of it is land which was heavily cut over in the past, then burned, and is presently occupied by brush or scrub aspen and oak. Planting of this area would have to be done by several methods. Some could be planted by conventional machines; some could be furrowed and hand planted; some could be planted with hand scalping. However, a large portion would have to be planted by brushland planting machines using herbicides or controlled burning to prepare the area and to restrict brush competition after planting.

Industry and Employment

On April 30, 1961, the Menominee Indian Reservation became Wisconsin's 72nd county. All former assets of the tribe were transferred to Menominee Enterprises, a corporation founded to conduct the business affairs of the Menominee people. Industrial employment is limited almost entirely to the production plant of Menominee Enterprises, the sole business corporation of the county. It employs about 275 people throughout the year in its forestry, logging, mill, yard and shipping operations. About 125 to 130 jobs are available in the woods with or as private contractors during the logging season. Municipal offices and public roads provide 50 jobs. Limited small business as filling stations, stores, concessions, taverns, and farms provide another 50 jobs. The facts that 50 per cent of the population receives surplus commodities and that average annual income per family of five is about $2,300 are an indication of the low economic level.

Development funds and venture capital are in short supply. There are no banks. Working capital is almost unavailable from local sources because of the distressed condition of the majority of the residents, lack of land ownership, and lack of proof of business management ability. Small business places are few, incomplete, and face many hazards. Inadequate water, sewer, phones, and parking add to their plight.

Health and Medical Facilities

Except for a public health nurse on a generalized program, there are no medical facilities in the county. A 40-bed hospital in Keshena had to be discontinued, when the reservation was terminated in 1961, because of lack of funds to remodel to meet State Board of Health standards and because of lack of funds to operate it. Low incomes, limited health insurance coverage, distance and unfamiliarity result in few people seeking a doctor until they are critically ill and when they do, they may not return for continued care. Of 62 known diabetics, for example, some do not receive routine blood tests and follow-ups. There is a high rate of tuberculosis. Few expectant mothers make more than one visit to a doctor before delivery.

Housing

Less than 1/3 of the 600 houses are in sound condition. Half are seriously deteriorated and 1/3 are dilapidated. The average house has 3.8 rooms against the state average of 5.2 rooms. Twelve per cent of the units have only one room. Only ten of the 600 units have an assessed valuation of $6,000 or over. Forty per cent, or 245 units, are valued below $1,000 each. Water and sewer reach only 50 per cent of the occupied homes and only 106 units have adequate plumbing. Electricity, however, is in 95 per cent of the homes. Keshena and Neopit are served by telephone in approximately 215 homes.

Schools

There are four grade schools, one public and one parochial each, in Neopit and Keshena. High school students go to Shawano. Dropouts average about 50 per cent. Four years ago, 59 were in the freshman class. Twenty-five graduated and three went on to college. Reasons for dropout include low economic condition of families, lack of desire by the student, lack of understanding by the parents, and attitude of the surrounding community.

Transportation

There are no airports in the county. One railroad, the Soo, runs north and south through the county connecting Neopit with Crandon to the north and Shawano to the south. State Trunk Highway 55 runs north and south through Keshena and State Trunk Highway 47 runs northwesterly through Keshena and Neopit. Highway mileage in the county consists of 41 miles of state trunk highways, 54 miles of county trunk highways, and 80 miles of town roads for a total of 175 miles of public road. Another 72 or more miles are in private logging roads through the forest. The village streets in the unincorporated villages of Keshena and Neopit are largely unimproved. There are about 600 motor vehicles owned in the county.

Recreation

The forest is famous as the largest block of old growth timber in the lake states. There are 82 lakes, 40 of which are over ten acres in size. There are 300 miles of trout streams. Waterfalls, dalles, white water, rushing chasms, rocky gorges, giant trees, colorful foliage make it a wilderness

paradise of grandeur and awe for hiking, sightseeing, photography, nature studies, quiet contemplation. This is the unique resource of Menominee County that few places in the entire nation can equal.

NEEDS AND ESTIMATES

	Capital	Annual
Employment		
To bring the Menominee people to self sufficiency would require that in addition to those already earning a livelihood, new jobs for about 300 remaining families need to be found that could bring in about $4,000 per family. Needed is for a work potential that would bring economic stability to each family.		$1,200,000
Health and Medical Facilities		
Hospital		
Remodel patient rooms to meet State Board of Health standards	$200,000	
Remodel laundry and dietary kitchens	25,000	
Remodel for fire and electrical codes	100,000	
Operational Costs		150,000
Alternate		
Use of Shawano and other Hospitals by Menominee County		*150,000
Public Health Clinic in Menominee County		30,000
Water - Extend system in Keshena	120,000	
Sanitary Sewers - Extend system in Keshena	250,000	
Extend system in Neopit	100,000	
Housing		
Replace 250 substandard and dilapidated houses @ $10,000	2,500,000	
Schools		
Federal share, five-year phase-out after termination (1961-1966)	*560,000	115,000
Present Tax Yield		*115,000

* Starred items are programs in effect and these expenditures or payments being made.

Transportation

	Capital	Annual
Bring potential town roads and county trunks to maintainable condition	$990,000	$25,000
STH 55 three-year stage construction	*378,000)	*61,500
STH 47 current betterment	* 55,000)	
Ultimate resurfacing	275,000	
Present Town Roads, County Trunks		*54,700
Keshena streets, walks, storm sewers	655,000	
Neopit streets, walks, storm sewers	640,000	

*Starred items are programs in effect and these expenditures or payments being made.

These rudimentary and fundamental needs of Menominee County show 6-1/2 to 7 million dollars desirable in capital for personal and public needs of the Menominees and 1.8 to 2 million dollars as annual requirements in addition to the present level of the economy. With the present assessed valuation of about 17 million dollars returning only $450,000 in taxes to the county, it is obvious that state and federal aids must be prepared to furnish at least 1.5 million annually until the Menominees can be prepared to be self-supporting citizens in the competitive American economy.

RECOGNIZING THE RESPONSIBILITIES

Federal

It is obvious now, three and one-half years after termination, that an unprepared people were given a set of inadequate and largely uninhabitable dwellings and minimum community facilities with the expectation that they could develop an economy capable of providing them a respectable livelihood as American citizens. It did not so work out. It is generally felt by all who give serious thought to the plight of the Menominees that termination was too abrupt and that federal responsibility and financial aid for rehabilitation in basic human needs and community facilities should be reconsidered and re-established, not for wards of the government but on the basis that the Menominees are distressed American citizens.

State

Acceptance of Menominee County as a part of the state makes Wisconsin fully responsible to render every available state service to the county. Each state agency is cooperating to its utmost and the recommendations to follow are being made through consultation with the pertinent agency.

Local

In this reference, the local interest includes Menominee County, Town of Menominee, the Menominee Enterprises, the Menominee Tribal Council, and the Menominees individually. Menominee Enterprises should be responsible

for full and complete reporting to its stockholders, the Menominee people, and to the state. The Menominee Tribal Council should be responsible for leading its people in the proper attitudes toward education, hygiene, individual development, thrift and industry, citizenship, and personal satisfaction.

Citizens at Large

The Menominee's troubles will take a great deal of thought for a long time. The press can be very helpful in bringing their plight before the general citizenry for information, contemplation, and suggestions what individual citizens can do, such as visiting the area, offering professional guidance, counseling and skills, training and teaching, writing, public speaking, enlisting support, initiating and carrying through programs to help them help themselves.

RECOMMENDATIONS

Federal Grants

Urge Wisconsin senators and representatives in Washington to obtain authorization for:

		Capital	Annual
Housing rehabilitation	Up to	$2,500,000	
Water and sanitary sewers	" "	470,000	
Street improvements, Keshena and Neopit	" "	1,295,000	
Fish, game, and forestry aids	" "	100,000	$1,500,000
School aid renewal	" "		120,000
Forest roads omitted at termination	" "	990,000	

Some of these needs may be met through programs available through existing legislation, others would require new legislation. Careful study of available federal grants in aid must be undertaken to obtain the greatest possible help for the Menominees.

State Program

The state must be prepared to match or meet all available federal aids.

Conservation

Appraise and purchase the 218,000-acre total commercial forest land as the Menominee State Forest as shown on the exhibit map. Set aside and develop the native white pine area and Wolf River area north of Highway "M" and west of Highway 55 as State Forest Recreational Areas.

In this way, the Conservation Department could limit the sale of stumpage at market value to Menominee Enterprises, could regulate the sale and occupancy of land, and develop the area for recreational uses. Land

management and reforestation camps could give much needed employment to the Menominees. With the land state-owned, grant in aid programs could be undertaken that would not be available to private lands under the ownership of the Menominee Enterprises, a private corporate body.

Highways

The improvement projects already underway or programmed on Highways 47 and 55 and annual maintenance expenditures bring nominal employment, but modern highway construction is largely materials and machines rather than a very effective work program. In the long run, the 75 miles or so of private logging roads that could be made public roads would bring to the town and county about $25,000 annually as road mileage aid. It is strongly recommended that these roads be made public to earn this aid even though the federal government accepts no responsibility to rehabilitate them.

Health and Welfare

It appears that even though the hospital were to be remodeled and reactivated, the community could not support it. The alternate is more practical--to continue sending hospital patients to Shawano and elsewhere and meeting the costs from welfare funds. This should be supplemented, however, with a local public health clinic staffed by a nurse who could provide emergency treatment, vaccinations, routine clinical treatments, and counsel in hygienic problems. An annual outlay of about $30,000 would probably be involved.

The recommended fish, wildlife, and forestry work program is one of the most pressing needs and is strongly recommended.

It is also strongly recommended that a program of personal fitness be immediately undertaken through a staff of field counselors who can work with the Indians at their own level to help them in cleanliness, hygiene, domestic science, diet, basic economics, family counseling, responsibility. While this would appear to be a state responsibility, it could also be undertaken as missionary work by a church or as voluntary activity by the same class of devoted persons who enter the Peace Corps.

SUMMARY

This concise report is supplemented by correspondence with the members of the special committee, maps, reports, and estimates retained by the Chairman.

The principal recommendations are:

1. That the federal government be asked to assist in aiding the Menominee people.
2. That a State Forest and State Forest Recreational Area be established in the county.
3. That a resident forestry work camp be established on a permanent basis.
4. That the Menominee people be given opportunity for basic personal counseling.

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

PLAN FOR THE FUTURE CONTROL OF MENOMINEE INDIAN TRIBAL PROPERTY AND FUTURE SERVICE FUNCTIONS

The Plan consists of the following documents:

1. Statement of the Plan and Description of its Objectives and Goals (revised December 1, 1960).
2. Articles of Incorporation of Menominee Enterprises, Inc. (revised November 30, 1959).
3. By-Laws of Menominee Enterprises, Inc. (revised November 30, 1959).
4. Menominee Common Stock and Voting Trust (revised November 30, 1959).
5. Menominee Assistance Trust (revised November 30, 1959).
6. Menominee Enterprises, Inc., Bond Indenture (form of bond included) (revised November 30, 1959).
7. Menominee Indian Tribe, Certificate of Beneficial Interest.

In addition the following documents are included by reference: [1]

1. Resolution of General Council, Menominee Indian Tribe, January 17, 1959.
2. Resolution of General Council, Menominee Indian Tribe, July 27, 1959.
3. Resolution of Advisory Council, Menominee Indian Tribe, July 28, 1959.
4. Letter of Glen A. Wilkinson, Attorney for Tribe, to Secretary of Interior, July 31, 1959.
5. Letter from Acting Secretary of Interior to James G. Frechette, Chairman, Menominee Advisory Council, July 31, 1959.
6. Letter from Acting Secretary of Interior to James G. Frechette, Chairman, Menominee Advisory Council, October 30, 1959.

6a. Letter from George W. Abbott, Assistant Secretary of Interior to Jerome Grignon, Chairman, Menominee Advisory Council, January 9, 1961.

7. Copies of Chapters 258, 259, and 260, Laws of Wisconsin, 1959.

Coordinating and Negotiating Committee:
George W. Kenote, Chairman.
Jerome Grignon, Chairman, Advisory Council.
Gordon Dickie.
Mitchell A. Dodge.

Tribal Attorneys:
Wilkinson, Cragun & Barker, Washington, D.C.
Foley, Sammond & Lardner, Milwaukee, Wis.
Lloyd G. Andrews, Shawano, Wis.

Statement of the Plan and Description of its Objectives and Goals

Pursuant to section 896 Title 25, U.S.C. (sec. 7, Public Law 399, 83d Cong., as amended) a Plan such as this was submitted by the Menominee Indian Tribe (herein sometimes called "the Tribe") on January 26, 1959, to the Secretary of the Interior (herein sometimes called "the Secretary"). Under date of April 30, 1959, he wrote the Tribe stating that in view of the contingencies still attaching to our Plan, especially the unfinished legislation, he resubmitted the Plan conditionally as his Plan for a period of three months for negotiation purposes with the understanding that if the Plan should not by August 1 meet the approval of the Secretary for reasonable equity and legal conformity, he would have to take action as if there were no Plan.

On July 30, 1959, the said legislation was finished by signature of the Governor of Wisconsin on three bills on which the legislature completed action on July 24. These bills and the remainder of the Plan as revised after numerous conferences with State officials were submitted to the Secretary on July 30, 1959, which is included hereinafter. This was accepted for the Secretary by letter of the same date which is included hereinafter.

After extensive study by the staff of the Secretary, including those in the Bureau of Indian Affairs, a conference was held by such staff with representatives of the Tribe and of the State of Wisconsin on October 26 through 29, 1959, inclusive, at which agreement was reached for changes in the detail but not the principles of the Plan, and the Secretary so stated by letter of October 30, 1959, as hereinafter included. The Plan as herein presented (and defined in the Table of Contents) includes the changes as agreed upon.

Objectives and Goals

To better insure the welfare of the Menominee people, their heirs and descendants, the Menominee Indian Study Committee and representatives of the Tribe during the course of their meetings agreed upon several objectives, which we believe it is desirable to record.

1. To promote the most beneficial use of the Menominee property, consisting substantially of forest land, State law and deed covenants were agreed upon which will enforce the maintenance of sustained yield principles in the care and preservation of the forest. It is believed that within thirty years sustained yield will have served the ultimate benefit of the Menominee people as a tribe, at the end of which time the owners can reassess their condition. If deemed advisable, the forest could be sold to or acquired in part by the State for the benefit of all its citizens, and particularly for those of Menominee extraction who wish to remain on the land.

2. To overcome gaps in essential training and experience among the 3,270 Menominee members and to lessen the influence of non-essential politics in the management of business affairs the voting trust principle was adopted as a device to better insure stability in the Menominee corporation to be.

3. Basic rights of Menominee members, their heirs and descendants, to hold residence and employment on the Menominee land are tied into the articles and by-laws as a safeguard against possible abuse of ownership or other unfair exploitation, recognizing a preferential right in such persons.

4. A merit system in government is desirable and the Menominee county board will be requested to seek its establishment. Buildings owned by the tribe and needed in governmental operations will be transferred to the best municipal use without cost to the new county or town.

5. Hospital and medical services and the continued operation of public utilities are important elements in the welfare and progress of the Menominee community and should be continued in operation. Alternatives are in question and can hardly be resolved or bound until the corporation and municipal officers can study the practical effects of the termination of Federal supervision and the commencement of State licensing and regulation.

Section 896, Title 25, U.S.C. provides as follows:

> The [Menominee] tribe shall • • • formulate and submit to the Secretary a plan for the future control of the tribal property and service functions now conducted by or under the supervision of the United States, including but not limited to services in the fields of health, education, welfare, credit, roads, and law and order, and for all other matters involved in the withdrawal of Federal supervision.

The Plan formulated and submitted by the Tribe is designed to meet the requirements of the law by (1) providing machinery for municipal activities heretofore supervised by the Department of the Interior, including health, education, welfare, credit, roads, and law and order, and (2) providing a sound economic base through realization and use of communal tribal property and operation of the Menominee Forest on a sustained yield basis.

Description of legislation. The first objective has been achieved, to a large extent, by three laws which became a part of the Wisconsin Statutes on July 30, 1959. Chapter 259, Wisconsin Statutes, one of those laws, creates Menominee County as Wisconsin's seventy-second county. It becomes effective on the date of publication of the Termination Plan in the FEDERAL REGISTER by the Secretary under section 896, Title 25 U.S.C. This is intended to be and should be the same date as the proclamation in the FEDERAL REGISTER of transfer of property under section 899, Title 25 U.S.C. This law:

1. Creates Menominee County from all reservation areas as described therein, now included in Shawano and Oconto Counties.

2. Provides appropriate machinery for requiring and preserving necessary county records.

3. Attaches Menominee County to Shawano County for necessary judicial functions and provides that the District Attorney for Shawano County shall serve Menominee County.

4. Establisnes one political town to consist of area of entire Menominee County (which will contain ten surveyor townships).

5. Attaches Menominee County to Shawano County for the purpose of the office and functions of the County Superintendent of Schools.

6. Attaches Menominee County to Shawano County for functions of the juvenile court and the judge of juvenile court.

7. Provides for the election of a Town Board by precincts and at large whose

[1] Filed as part of the original document.

members ex-officio constitute the County Board.

8. Provides for handling of some town and county offices as part-time and combined assignments.

9. Provides machinery for assessment and collection of taxes in transition years.

10. Permits restraint on securities of any corporation or organization created by the Menominee Tribe.

11. Includes Menominee County in area of Tenth Circuit Court.

12. Creates a Shawano-Menominee County Court, and extends the jurisdiction of the Shawano City and County municipal court to the County of Menominee.

Chapter 260, Wisconsin Statutes, is a minor technical enactment required to distribute to Menominee County moneys held in escrow by the State's Treasurer. These moneys have been accumulated by the State of Wisconsin from taxes from income, intoxicating liquors and utilities. According to Wisconsin law, these funds must be distributed to the county.

The Tribal Lending Agency has already received a transfer from the Secretary of the Interior of $368,196.96 in tribal funds under section 897, Title 25 U.S.C.

This Agency is operated under section 224.10, Wisconsin Statutes, and now has most of these funds out on loan to tribal members. This law needs amendment by the Wisconsin Legislature in order to provide for the appointment of Trustees by another agency than the "governing body of the Tribe" and to define the eligible borrowers otherwise than as "tribal members." It is proposed to ask the Legislature of 1961 to provide for appointment of trustees by the stockholders of Menominee Enterprises, Inc., or any successor thereof, and for loans to enrolled tribal members (as of June 17, 1954, as proclaimed) and their spouses and descendants and such additional classes as may be recommended by the Trustees. If such legislation fails of passage the Commissioner of Banking of Wisconsin will be asked to approve such changes by regulations adopted by the Trustees. Until termination date no change is required, and thereafter the existing Trustees will serve out their original terms, which will permit continuity pending action proposed above.

It is unnecessary, aside from amendment of Wisconsin laws to accord with existing judicial machinery, to provide specific plans for future handling of law and order, federal jurisdiction over the Menominee Reservation having been surrendered by the United States by Public Law 280, 83d Congress, as amended (18 U.S.C. 1162). Welfare problems will be handled within the framework of state law, particularly pursuant to specific provisions of chapter 259, Wisconsin Statutes. Agreement has been reached between the United States and the State of Wisconsin with respect to improvement and transfer of roads within the Menominee Reservation.

Chapter 258, Wisconsin Statutes, provides "a new method of taxation of forest lands required by federal law to be operated on a sustained-yield basis and the regulation of such land." This act accepts the principle that a forest required by law to be operated on sustained-yield has a fair market value equivalent to 40 percent of the fair market value of a forest owned and operated without such restriction. To be eligible for tax benefits under this chapter, the owner must apply to the Commissioner of Taxation for Wisconsin and file a forest management plan with the Conservation Commission of that State. The Conservation Commission must find that the plan provides for sustained-yield management of the forest lands consistent with sound forestry practices. (These are defined, and specific provision is made for catastrophic changes such as fire, flood, storm, and epidemic.) The Conservation Commission must inform the Commissioner of Taxation of its findings. The Commissioner of Taxation must then determine whether the forest lands involved are eligible for and qualified for taxation under chapter 258. If so, the Commissioner of Taxation orders the lands entered on a special property tax roll. The lands are then assessed as having a full value equal to 40 percent of fair market value of unrestricted forest lands. An application for taxation under chapter 258 may be denied only after hearing

Each year, the owner of sustained-yield forest lands is required to submit a sworn statement giving data which will enable the Conservation Department and the Commissioner of Taxation to determine whether the land involved shall continue to be taxed under this special law. Chapter 258 allows revision of the forest management plan upon submission of a revised plan not later than six months prior to the end of each cutting cycle. If the Conservation Commission finds that the revised plan is adequate to ensure continued sustained-yield management, it must enter such an order. Approval of a revised plan may not be denied without a hearing.

An owner may withdraw from sustained-yield operation any parcel of land not exceeding ten acres in size and 250 acres cumulatively in each calendar year. Larger parcels may be withdrawn only if the Commissioner of Taxation, after consultation with the Conservation Commission, finds that the lands involved may be dedicated to a higher beneficial use. Such lands may later be reinstated under chapter 258 upon appropriate application. The Commissioner of Taxation and the Conservation Commission are given the right to conduct hearings and examine all records to determine that the requirements of the law are being followed. Criminal penalties are provided for violations, such as excess cutting or failure to follow the management plan. Equitable jurisdiction is granted to the Circuit Court to compel "management and classification of lands" according to the articles of incorporation of a Wisconsin corporation.

Description of economic plan. The economic plan, designed to promote the highest beneficial use of the communal property, is set forth in six basic documents: (1) Articles of Incorporation of Menominee Enterprises, Inc., (2) By-Laws of Menominee Enterprises, Inc., (3) a common stock and voting trust, (4) a bond indenture, (5) a Menominee Assistance trust, (6) a Certificate of Beneficial Interest.

One Certificate of Beneficial Interest in form attached will be issued pursuant to section 893 Title 25 U.S.C., with list attached thereto of the tribal roll of 3,270 members as of June 17, 1954 (as finally proclaimed). The Certificate will be issued as of June 17, 1954, in advance of termination date, and will be held by the Coordinating and Negotiating Committee until that date. At that time, the Committee will mark it "cancelled" and file it with its records.

It is a part of this Plan that (1) the issue of stock to the said Coordinating and Negotiating Committee, (2) the issue of voting trust certificates to tribal members and lawful distributees of deceased members upon deposit of the stock in the Common Stock and Voting Trust, (3) the issue of income bonds, (4) the transfer of real and personal property to the said Coordinating and Negotiating Committee and/or to Menominee Enterprises, Inc., or any subsidiary, (5) the transfer of real and personal property to any public body; shall all be in substitution for and consideration of cancellation of the Certificate of Beneficial Interest and no one shall thereafter have any rights or interest in such Certificate.

Such issuance of voting trust certificate, and income bonds to individuals shall be to or for those members so proclaimed who are alive at date of termination, and to the personal representatives, heirs or next of kin under the laws of the State of Wisconsin of those members who predecease the date of termination, as personal property shall be distributable.

The plan as to the Certificate of Beneficial Interest provided herein shall constitute the regulations of the Tribe governing alienability of interests under said section 893.

A copy of the cancelled Certificate shall be delivered to each recipient of voting trust certificates and income bonds at the time of distribution thereof.

The Board of Directors of Menominee Enterprises, Inc. will be elected by the holders of the common stock. While the voting trust is in existence (it may be terminated by the tribal members who become holders of the voting trust certificates in ten, twenty, or thirty years), the voting trustees will elect the board. It is contemplated that four of the nine members of the board will be persons listed on the final Menominee roll, and the remaining five will be men of experience in industry, the professions, and government.

The interests of minor members, persons non compos mentis and those otherwise deemed in need of assistance will be entrusted to the First Wisconsin Trust Company under the terms of the Menominee Assistance Trust. The selection of this trust company was recommended by the Coordinating and Negotiating Committee of the Menominee Tribe and confirmed by the General Council in 1958. Top officials of the First

Wisconsin Trust Company have long evinced keen interest in Menominee affairs, responded promptly to requests by the tribal officials, and have contributed considerable time and assistance in formulation of the Plan. Utilization of one trust company will effect considerable savings for the beneficiaries when the alternative of a multitude of guardianships is considered. It is believed that the experience and advice of First Wisconsin Trust Company will be of considerable assistance during the formative years of Menominee Enterprises, Inc. First Wisconsin Trust Company has agreed to assume the fiduciary responsibility for the beneficiaries at rates comparable to going rates for similar activities. Any U.S. bonds held by the Federal Government for any of such beneficiaries at termination date will be released to the Menominee Assistance Trust.

Procedure on establishment of Menominee Enterprises, Inc. The selection of voting trustees will occur well in advance of termination date and before any trust in fact exists. The initial voting trustees will consist of four enrolled members of the Tribe elected by the General Council and three non-tribal members selected jointly by the Advisory Council and the Coordinating and Negotiating Committee, subject to confirmation by the General Council. In case any should not be confirmed, he will be replaced by another selection by the same bodies for confirmation. It is expected that these three voting trustees will be outstanding Wisconsin citizens who have shown an interest in and understanding of the problem.

Contemporaneously with the selection of initial trustees, the members of the Coordinating and Negotiating Committee, as individuals, will incorporate Menominee Enterprises, Inc., will subscribe to all the stock as representatives of the persons entitled thereto, and hold the organizational meeting of the corporation. Before the organizational meeting of the corporation is held, the initial voting trustees will informally name the individual directors of the corporation, and those persons will be named in the articles of incorporation and will be formally elected by the subscribers to stock (the Coordinating and Negotiating Committee) at the organizational meeting of the corporation.

After being elected, the directors will hold their first meeting and will accept the stock subscription for 327,000 shares of common stock, $1.00 par value, for a consideration of $327,000. The Secretary of the Interior will advance cash for this purpose from the tribal 4 percent funds. Upon paying in the $327,000 consideration, the corporation will issue a single stock certificate to the Coordinating and Negotiating Committee for 327,000 shares of stock. That Committee will then create the voting trust, naming as trustees the persons previously selected by the General Council of the Tribe, will deposit the common stock and instruct (on direction from the Secretary) the trustees to issue voting trust certificates evidencing such stock to the enrolled members of the Tribe and their heirs or next of kin on termination date or to First Wisconsin Trust Company, in the case of persons covered by the Menominee Assistance Trust. On termination date, or shortly before, the Secretary will transfer to Menominee Enterprises, Inc., as a capital contribution all of the remaining tribal assets which are to constitute corporate property, and the corporation will issue the income bonds to enrolled members or heirs, and to First Wisconsin Trust Company for persons covered by the Menominee Assistance Trust. Such persons will be determined by the Secretary prior to such transactions by a finding under section 900, Title 25 U.S.C.

Although income bonds of $10,000,000 will be authorized, it is proposed to issue bonds at a par value of $3,000 to each of the 3,270 enrolled members at an aggregate of $9 810,000 par value.

Immediately after the transfers to it, the corporation, through its Board of Directors, will make a capital contribution of all the remaining tribal assets estimated to have a value of about $7,500,000 which will be received as a capital contribution to "paid in surplus" and later transferred by the Board and added to "stated capital."

Each Voting Trust Certificate will contain the following language:

> This Certificate represents 100 shares of stock of Menominee Enterprises, Inc. The stated capital which is the net book value on January 1, 1961, was $------ per share of stock, or $------ for the stock represented by this certificate. This price is the cost basis to a member of the Menominee Indian Tribe for federal and state income tax purposes under section 898, Title 25 U.S.C. and section 71.015, Wisconsin Statutes, for computing gain or loss in case of sale. The corporate assets represented by the capital of the corporation consist principally of forest lands and other physical property which have a per share value at least equal to that stated above, but which will not be realized or become income producing for some time to come.

The Secretary will issue separate deeds for lands presently classified as forest lands and other lands to Menominee Enterprises, Inc. He will also issue a deed or deeds to appropriate body or bodies for designated public lands, buildings and roads for school district, county and town, and a deed and bill of sale to the organization operating the hospital. The deed for the forest lands will contain the following language:

> The parties hereto mutually covenant and agree for the benefit of the State of Wisconsin that the lands conveyed hereby shall be operated on a sustained-yield basis until released therefrom under the laws of Wisconsin or by act of Congress.
>
> The parties further mutually covenant and agree for the benefit of the State of Wisconsin that for a period of 30 years commencing with the date of this deed the ownership of lands conveyed hereby shall not be transferred, nor shall such lands be encumbered without the prior consent of the State Conservation Commission of Wisconsin and approval of the Governor of Wisconsin unless released from sustained-yield basis under the laws of Wisconsin.
>
> A lawful order removing land from sustained-yield taxation pursuant to the Wisconsin Statutes as they now exist or as they may be amended shall constitute a method of release.
>
> These covenants shall be enforceable only by an action for an injunction brought in its own name by the State of Wisconsin.

An appraisal of the tangible property made by tax appraisers of the State of Wisconsin shows that the Menominee Forest is worth about $30,000,000 based on stumpage prices. Other Menominee property is valued at approximately $4,000,000. Based on the 40 percent formula adopted by the Wisconsin Legislature, this means that the Menominee Forest is worth, under the requirement of sustained yield operation, approximately $12,000,000. This leaves a valuation on Menominee property of approximately $16,000,000. By increasing the annual cut on the Menominee Forest, within agreed limits of sound sustained-yield practice, it is estimated that Menominee Enterprises, Inc. will be able to realize net earnings of $400,000 to $450,000 per year after taxes and before payments to stockholders. This is approximately the amount of payments made to tribal members over the past several years as so-called "stumpage payments." It is contemplated that most of this amount will be paid to holders of the income bonds to be issued by the corporation. As stated, income bonds of $10,000,000 will be authorized bearing 4 percent interest if earned, and an aggregate of $9,810,000 par value issued to the 3,270 enrolled members or their heirs. These bonds may be utilized for purchase of homestead or farm property from the corporation at par value under article XI of the By-Laws. They may not be sold for a period of three years, but, in the meantime, may be pledged for loans. The corporation will reserve an option to meet bona fide offers after the three year period. During the first three years, pledgees will be required to refund to the pledgors any amounts in excess of the amount pledged plus lawful charges.

The Menominee Tribe now operates a conventional sawmill. This is done pursuant to the act of March 28, 1908 (35 Stat. 51), an Act which constituted an early model for sustained-yield forestry practices. The Menominee Indian Mills have not advanced perceptibly into specialized branches of the highly competitive lumber industry. In order to survive and to improve its present economic situation, such expansion is deemed essential. Tribal leaders, the Department of the Interior, and other advisors are currently considering expansion possibilities. Promising possibilities are a veneer plant and a dimensions plant. The latter would require a relatively small financial outlay, but would utilize materials which are now largely wasted. A comprehensive memorandum on these and other possibilities has been prepared by Mr. Arlie Toole of the Great Lakes Experiment Station and will be considered carefully by Menominee Tribal leaders and executives and directors chosen to operate Menominee Enterprises, Inc.

In addition, the Tribe and its successor corporation have available some of the most natural commercial recreational possibilities in the United States. Development of these resources is being

considered, and such study will continue. Assistant Secretary Ernst has volunteered to make available the knowledge and advice of the National Parks Service and Bureau of Fish and Wildlife in this effort. What will develop along this line is uncertain, but this is one field which will have high priority on the part of tribal leaders and the executives and Board of Directors of Menominee Enterprises, Inc.

MENOMINEE COORDINATING AND NEGOTIATING COMMITTEE,
GEORGE W. KENOTE,
Chairman.
GORDON DICKIE,
MITCHELL A. DODGE,
JEROME GRIGNON.

Approved:

GEORGE W ABBOTT,
Assistant Secretary of the Interior.

Articles of Incorporation of Menominee Enterprises, Inc.

The undersigned individuals, who are the members of the Coordinating and Negotiating Committee of the Menominee Indian Tribe, for the purpose of forming a Wisconsin corporation under Chapter 180 of the Wisconsin Statutes, do hereby adopt the following Articles of Incorporation:

ARTICLE I—NAME

The name of the corporation is Menominee Enterprises, Inc.

ARTICLE II—PURPOSE

The purpose for which this corporation is organized is to engage in any lawful activity within the purposes for which corporations may be organized under the Wisconsin Business Corporation Law. Without limiting in any way the generality of the foregoing, the corporation shall manage and operate all of the businesses and property, real and personal, transferred to the corporation by the United States of America, pursuant to section 897, Title 25, U.S.C.

ARTICLE III—AUTHORIZED CAPITAL

The total number of shares which the corporation shall have authority to issue is 330,000, consisting of one class only, designated as common stock of the par value of One Dollar ($1.00) per share. The corporation and/or its shareholders shall have the right by amendment to these Articles by affirmative vote of the holders of not less than two-thirds of its outstanding shares entitled to vote, to prohibit or restrict, subject to such terms and conditions it or they may see fit, the right of any holder of common stock to sell or otherwise dispose of his shares of common stock without first offering the same to the corporation or its nominees, or giving the corporation or its nominees an option to reacquire the stock from a transferee.

ARTICLE IV—AUTHORITY TO PURCHASE SHARES

Subject to the provisions of section 180.385(1) (a) and (b), the corporation is authorized to purchase shares of its own stock or voting trust certificates issued in exchange for such shares, without vote of the shareholders and without regard to the availability of unreserved and unrestricted earned surplus equal to the cost of such shares. Preemptive rights shall attach to the sale of treasury shares, except that an amount of treasury shares not in excess of 5 percent of issued and outstanding shares may be set aside by the board of directors for issuance under an employee stock ownership plan.

ARTICLE V—DIRECTORS

The business and affairs of the corporation shall be managed by its board of directors, which shall consist of nine (9) directors. At the first annual meeting of shareholders, the nine directors elected shall be divided into three classes, to consist of three directors in each class, the term of office of directors of the first class to expire at the first annual meeting of shareholders after their election, that of the second class to expire at the second annual meeting after their election, and that of the third class to expire at the third annual meeting after their election. A total of four directors, including at least one member of each class, shall be members of the Menominee Indian Tribe of Wisconsin, whose names appear on "Final Roll—Menominee Indian Tribe of Wisconsin" as proclaimed by the Secretary of Interior on November 26, 1957 and published at pages 9951–9972, FEDERAL REGISTER, December 12, 1957, or blood descendants of such members, and such directors shall be designated "Tribal Directors". At each annual meeting subsequent to the first annual meeting three directors shall be elected to hold office for three years, except when elected by the shareholders to fill the unexpired term of their predecessors. No person shall be eligible to serve as a director of the corporation at the same time he is a trustee under any voting trust entered into by shareholders of the corporation, pursuant to article VII of these Articles of Incorporation. Directors need not be residents of the State of Wisconsin. Any vacancy occurring in the Board of Directors shall be filled until the next succeeding annual election of directors by the affirmative vote of a majority of the directors then in office although less than a quorum.

The initial directors, who shall serve until the first annual meeting of shareholders, shall be as follows:

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No person who is a member of the county board of Menominee County or of the town board of any town or supervisor of any village in such county shall be eligible to be a director.

ARTICLE VI—QUORUM OF SHAREHOLDERS

One-third of the outstanding shares of the corporation entitled to vote, represented in person or by proxy, shall constitute a quorum at any meeting of shareholders.

ARTICLE VII—VOTING TRUST

The shareholders of the corporation may, as provided by law, create a voting trust for the purpose of conferring upon trustees the right to vote or otherwise represent their shares, by entering into a written voting trust agreement specifying the terms and conditions of the voting trust, and it is contemplated that all of the shares initially issued by the corporation shall be placed in a voting trust.

ARTICLE VIII—OPERATION OF FOREST ON SUSTAINED-YIELD BASIS

In accordance with the requirements of section 896, Title 25, U.S.C., the forest lands classified as such by the United States pursuant to § 143.50 of Title 25, CFR, when transferred by the United States of America to the corporation, shall be operated by the corporation and any assignee or successor in interest on a sustained-yield basis, consistent with sound forestry practice; provided, however, that the Board of Directors may from time to time determine by resolution what lands shall be designated forest land, or removed from such designation not inconsistent with law, and shall record such resolution or resolutions with the register of deeds for the county or counties in which such lands are located. Notwithstanding the provisions of article X or any other article dealing with amendments to these articles, or any other provisions of law, this article may not be amended by the shareholders to delete the requirement that forest lands shall be operated on a sustained-yield basis consistent with sound forestry practice unless expressly permitted by the Congress of the United States of America.

ARTICLE IX—REGISTERED OFFICE AND AGENT

The address of the initial registered office of the corporation is Neopit, Wisconsin, and the name of the initial registered agent at such address is ----------.

ARTICLE X—AMENDMENT

These articles may be amended by an affirmative vote of the holders of at least two-thirds of the shares entitled to vote thereon at any regular meeting of shareholders, or special meeting of shareholders called for that purpose.

ARTICLE XI—INCORPORATORS

The names and addresses of the incorporators are:

George W. Kenote, Keshena, Wis.
Gordon Dickie, Keshena, Wis.
Mitchell A. Dodge, Keshena, Wis.
Jerome Grignon, Keshena, Wis.

ARTICLE XII—SALE OF LAND

Unless otherwise authorized by the affirmative vote of the holders of not less than two-thirds of the outstanding shares of stock entitled to vote thereon, the corporation shall have no authority to sell, exchange, assign, convey or otherwise transfer all or any portion of the real property owned by the corporation; provided, however, that the board of directors, or the appropriate officers at the direction of the board of directors, may mortgage or pledge corporation assets, for such borrowing purposes as it shall deem necessary and advisable, in an amount not exceeding $250,000; and, provided, further, that the board of directors or the appropriate officers at the direction of the board of directors shall have authority to lease real property other than lands designated as forest lands; and, provided, further, that the board of directors, or the appropriate officers at the direction of the board of directors, shall have authority to sell or to convey to individuals, who were enrolled tribal members under section 893, Title 25, U.S.C. (final roll) or their heirs-at-law, individual parcels which in the aggregate will not exceed 14,500 acres for home sites, agricultural use or other development, which lands shall be zoned for that purpose and shall not include lands designated as forest lands.

Executed in duplicate this ------ day of ----------, 196--.

GEORGE W. KENOTE,
GORDON DICKIE,
MITCHELL A. DODGE,
JEROME GRIGNON.

By-Laws of Menominee Enterprises, Inc.

ARTICLE I—OFFICES

SECTION 1. *Principal office.* The principal office of the corporation in the State of Wisconsin shall be located in Neopit, Menominee County, Wisconsin. The corporation may have such other offices, either within or without the State of Wisconsin, as the board of directors may designate or as the business of the corporation may require from time to time.

SEC. 2. *Registered office.* The registered office of the corporation required by the Wisconsin Business Corporation Law to be maintained in the State of Wisconsin shall be the same as the principal office except as the board of directors may change the address of the registered office from time to time.

STATE OF WISCONSIN AUG 23 1963

No. 361, S. Published

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CHAPTER———————, LAWS OF 1963

AN ACT

AN ACT to create 30.25 of the statutes, relating to the prohibition of any developments affecting the natural status of the Wolf river.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

30.25 of the statutes is created to read:

30.25 WOLF RIVER PROTECTION. No effort to improve the navigation on the Wolf river north of the southern boundary of Shawano county shall be made nor shall any dam be authorized in that portion of the Wolf river. Any permit issued or in effect by virtue of or under authority of any order or law authorizing the construction of any dam in the Wolf river in Langlade county is hereby set aside and declared void. This declaration shall not affect the operation or maintenance of any existing dam.

PRESIDENT OF THE SENATE.

SPEAKER OF THE ASSEMBLY.

This act originated in the Senate.

CHIEF CLERK.

Approved———————, 1963.

GOVERNOR.

Enclosure (11)