

**Rural Self-Supplied Water** In 1975 an estimated 222,600 persons lived in homes supplied by individual wells. Approximately 13.1 mgd of water was used for residential purposes in 1975. Approximately 111,100 additional residents may depend on their own wells for household water by the year 2000. The withdrawal of rural, self-supplied, residential water may increase to 25.1 mgd by the year 2000.

Approximately 3.4 mgd was withdrawn for 453,500 head of livestock and 2,100,100 chickens in 1975. By the year 2000 these withdrawals may increase to 4.1 mgd. Ground water is generally the source for these rural, self-supplied uses of water.

The total withdrawal of rural, self-supplied water may increase from the current 18.0 mgd to approximately 29.2 mgd by the year 2000, as indicated in the following table.

**Table 55**

The 1977 and projected withdrawal and consumption rates for rural self-supplied water, in million-gallons-per-day.

<i>Rural Self-Supply</i>	1977	1980	1990	2000
Withdrawal	18.0	19.4	24.3	29.2
Consumption	18.0	19.4	24.3	29.2

**Irrigation Water** Soil associations with irrigation potential are located in all but a small corner of LaPorte County; all but the southwestern third of St. Joseph County; in a wide band up the St. Joseph and Elkhart Rivers in Elkhart County; and in broad areas across the Yellow and Tippecanoe Rivers in Marshall and Kosciusko Counties. Figure 82 shows the potential irrigation areas.

Based upon the survey of irrigated lands, approximately 21,100 acres of cropland were irrigated in 1977. This represents the largest irrigated acreage of any of the eighteen Indiana regions. The principal crops irrigated were corn, soybeans, hay, and pasture. Other irrigated crops were mint and vegetables including potatoes. Assuming 1977 as a normal growing year, these crops would have required about 55.4 mgd during the peak irrigation season of July–August.

Approximately 205,000 acres of croplands could be profitably irrigated in Region Two. Approximately 45,100 acres of croplands may be irrigated by the year 2000. This expansion of irrigation acreage is expected to raise the peak July–August irrigation demand in an “average” year to about 118.3 mgd. The ground water withdrawal during the “average” season of precipitation is expected to increase from the current 34.6 mgd to 88.0 mgd by the year 2000.

In addition to the irrigation for agricultural use,

there are about 1,520 acres of irrigated fairways and greens on the region’s golf courses. About 4.7 mgd is applied to these areas during the peak July–August irrigation period.

The total withdrawal for the irrigation of crops and golf courses during the “average” irrigation year of 1977 was approximately 60.1 mgd. These withdrawals may increase to 123.6 mgd by the year 2000 as indicated here.

**Table 56**

The 1977 and projected withdrawals of irrigation water for croplands and golf courses, in million-gallons-per-day.

<i>Irrigation</i>	1977	1980	1990	2000
Withdrawal	60.1	68.3	95.9	123.6
Consumption	60.1	68.3	95.9	123.6

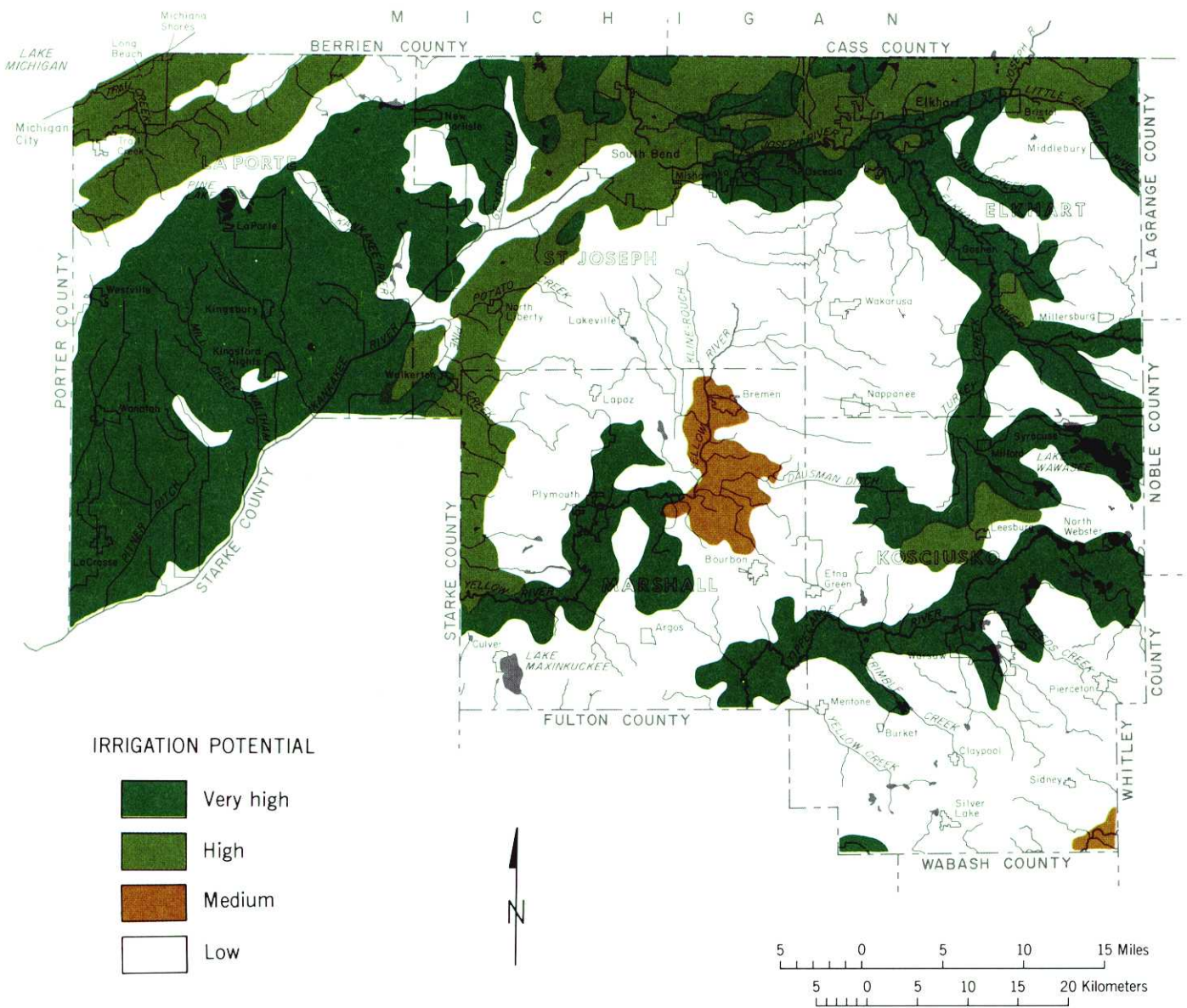
**Electrical Energy** Region Two contains four electric generating stations, two of which are hydroelectric stations and two are fossil-fuel fired steam turbines. The two hydroelectric plants owned and operated by the Indiana and Michigan Electric Company are discussed as an “instream use.”

The two fossil-fueled plants are the Michigan City Generating Station and the Twin Branch Generating Division. The Michigan City plant is owned by Northern Indiana Public Service Company, and Twin Branch is owned by Indiana and Michigan Electric Company. The Michigan City plant is rated at 736 megawatts, and the Twin Branch station is rated at 250 mw. Intake requirements are 275 mgd from the St. Joseph River for Twin Branch and 158 mgd from Lake Michigan for Michigan City. Neither utility has announced plans to expand its existing plant nor have any plans been announced for construction of new generating facilities in this region.

The Michigan City Generating Station consists of four active generating units. Three of the four units, representing 215 mw capacity, are cooled by a once-through process. The remaining unit, representing 521 mw capacity, is cooled by a closed system cooling tower.

Because of its excellent sustained flow characteristics, the St. Joseph River is a potential candidate for siting of additional power plants. Due to severe restraints on site development, Lake Michigan with its virtually unlimited water, is not considered to be available for additional electric power development.

Water withdrawals for the production of energy in Region Two were approximately 433 mgd in 1977, but this is expected to decrease to 158 mgd by the year 2000 as shown in Table 57.



**Figure 82**  
 Map of Region Two showing the general location of soil associations that appear to possess an economic potential for the irrigation of croplands.

**Table 57**

The 1977 and projected water withdrawal and consumption rates for the production of energy, in million-gallons-per-day.

<i>Energy</i>	<i>1977</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>
Withdrawal	433.0	433.0	433.0	158.0
Consumption	13.0	13.0	13.0	13.0

## EXCESS WATER

### Flooding

An estimated 38,000 acres are subject to flooding. The major flood plains within the region are shown in Figure 83. Figure 84 delineates the average annual flood damages along selected streams within the region. The average annual damages due to flooding were estimated in 1977 to be 1.5 million dollars.

Virtually all of the streams in Region Two are subject to flooding. Flash flooding on streams in the area is uncommon due to the flatness of the topography and prevailing geologic conditions. The Kankakee, St. Joseph, and Tippecanoe Rivers are the three major streams in the region. These streams are subject to long flood durations. There are no major flood control projects planned.

**Flood Plain Management** The unincorporated parts of Elkhart, Kosciusko, LaPorte, and St. Joseph Counties — along with the incorporated areas of Bremen, Bristol, Culver, Elkhart, Goshen, LaCrosse, Michigan City, Mishawaka, Nappanee, North Liberty, South Bend, Syracuse, Walkerton, Warsaw, and Winona Lake — are participating in the emergency phase of the National Flood Insurance Program. Lakeville, Long Beach, Plymouth, and Roseland are participating in the regular phase of the National Flood Insurance Program. Residents in these areas can purchase insurance against property losses due to flooding.

### Agricultural Drainage

Approximately twenty-four percent of the soil associations in Region Two have “severe” wetness characteristics, forty-seven percent have “moderate” wetness characteristics, while twenty-nine percent have “slight” wetness characteristics. The general location of the soil associations with these wetness characteristics is shown in Figure 85. There are at least 3,764 miles of legal drains in the five-county area. Maintenance of this system is the responsibility of the individual county drainage boards.

## Soil Erosion

The soils of the region were evaluated as to their potential for erosion and classified as to high, medium, and low erosion hazards as shown in Figure 86. Nearly thirty-eight percent of the 1,615,900 acres are rated as having a “medium” erosion hazard. Approximately sixty-two percent of the region has a “low” soil erosion hazard for those lands in a fallow condition.

## WATER QUALITY

The surface streams routinely surveyed for water quality by the Indiana State Board of Health were the St. Joseph River, Elkhart, and Trail Creek. In addition, Lake Michigan was surveyed.

Water quality standards for the region were established by the Stream Pollution Control Board regulation SPC IR-4 (the Water Quality Standards for the State of Indiana), SPC 4R-2 (Water Quality Standards for Lake Michigan and Contiguous Harbor Areas) and SPC 12-R (Natural Spawning, Rearing, and Imprinting Areas).

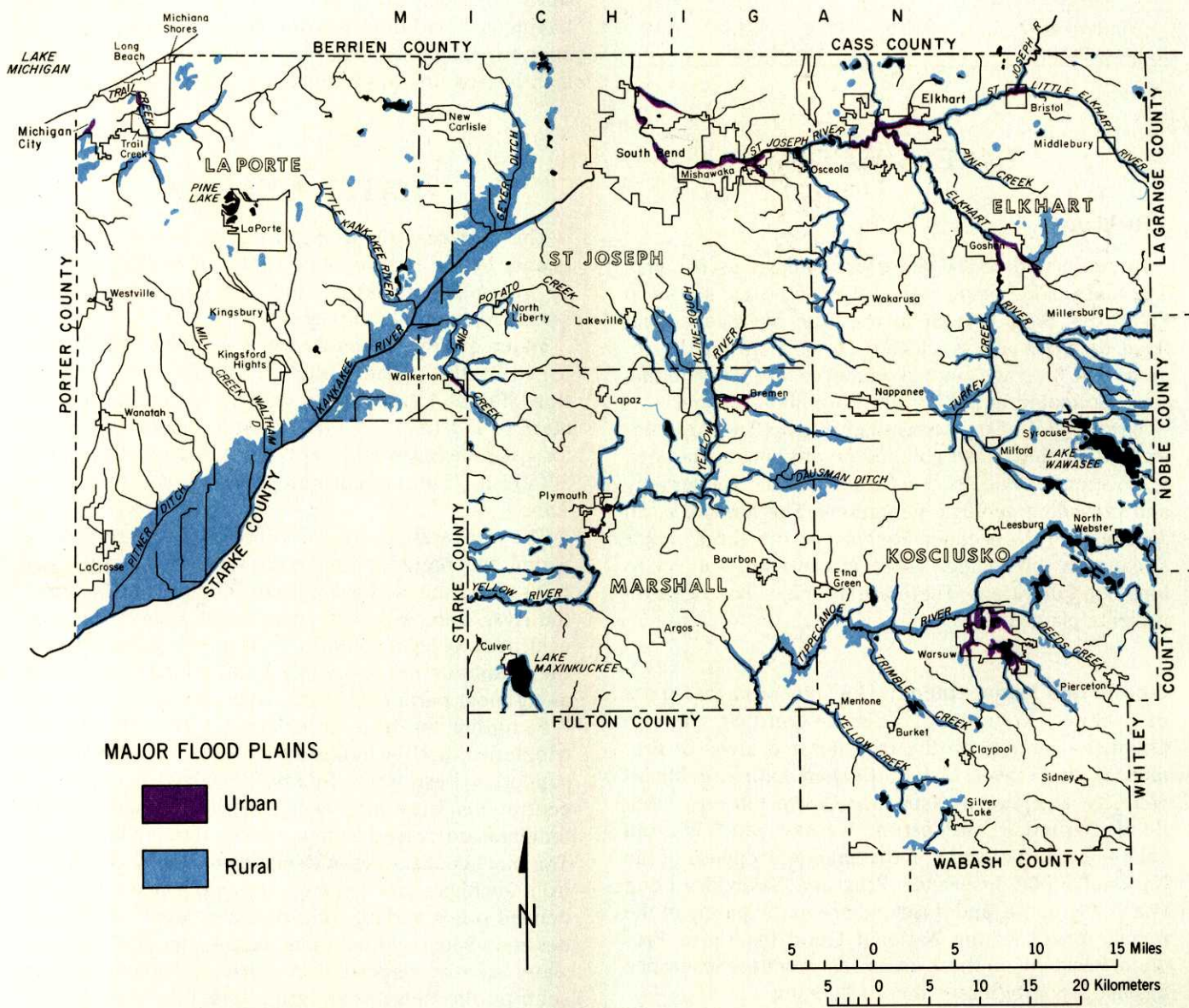
The temperature and dissolved oxygen values were within the required ranges at various sampling stations along the St. Joseph River. The pH values within the river were within the acceptable range. The concentration of fecal coliform bacteria was in violation of the standards set for whole body contact recreation along most parts of the St. Joseph River.

Sampling on Trail Creek’s main channel and its tributaries in 1974 indicated that water quality would support a fresh-water fishery. Dissolved oxygen concentrations were also well above the standard, and temperature stayed within the recommended range. The biochemical oxygen demand was low downstream from Michigan City’s sewage treatment plant, but suspended solids and oil concentrations were higher than desired. Some contributing factors to Trail Creek’s water quality degradation were the effluents from semi-public sewage treatment facilities along the tributaries of Trail Creek.

Water quality for Lake Michigan at Michigan City exhibited temperature values well within standards established by the Stream Pollution Control Board. Dissolved oxygen concentrations were above the water quality standards. Although pH values occasionally fell below minimum standards, they generally fell within the recommended range. The raw water met the total coliform bacteria standard set for drinking water supply and the fecal coliform bacteria standard for whole body contact.

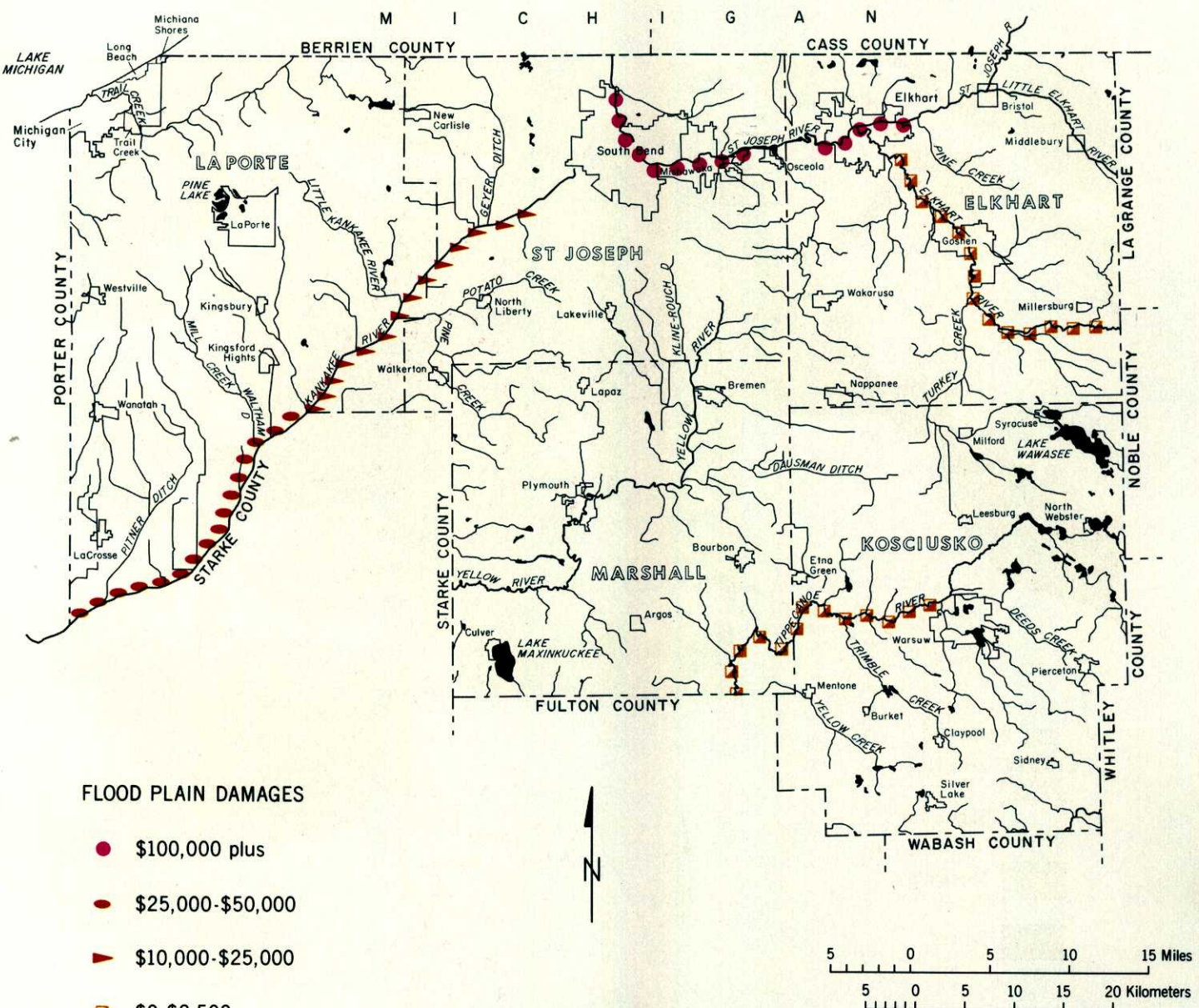
Satisfactory water quality conditions occurred in the mainstem of the Elkhart River. Data indicated that





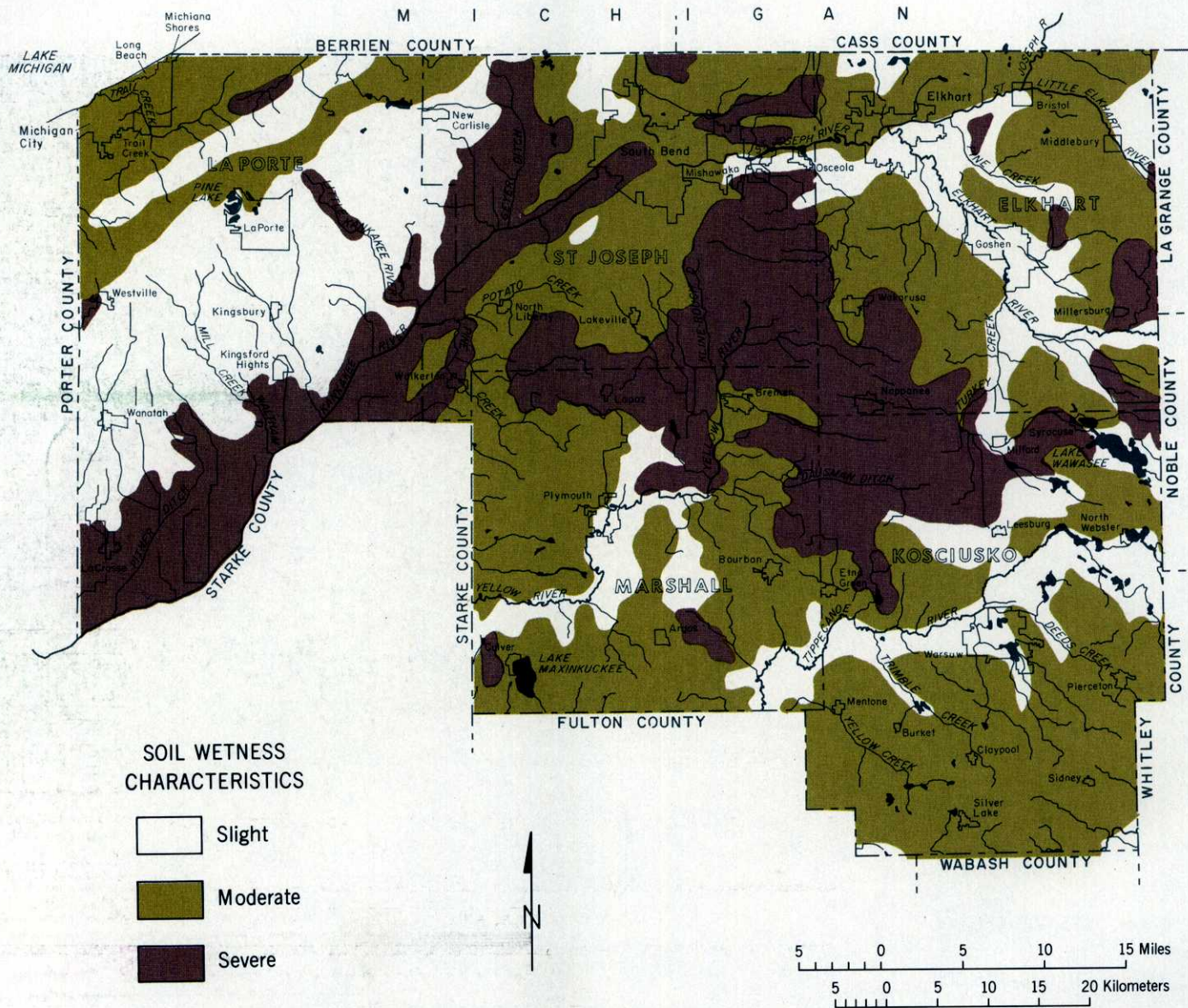
**Figure 83**  
Map of Region Two showing the major floodplains.





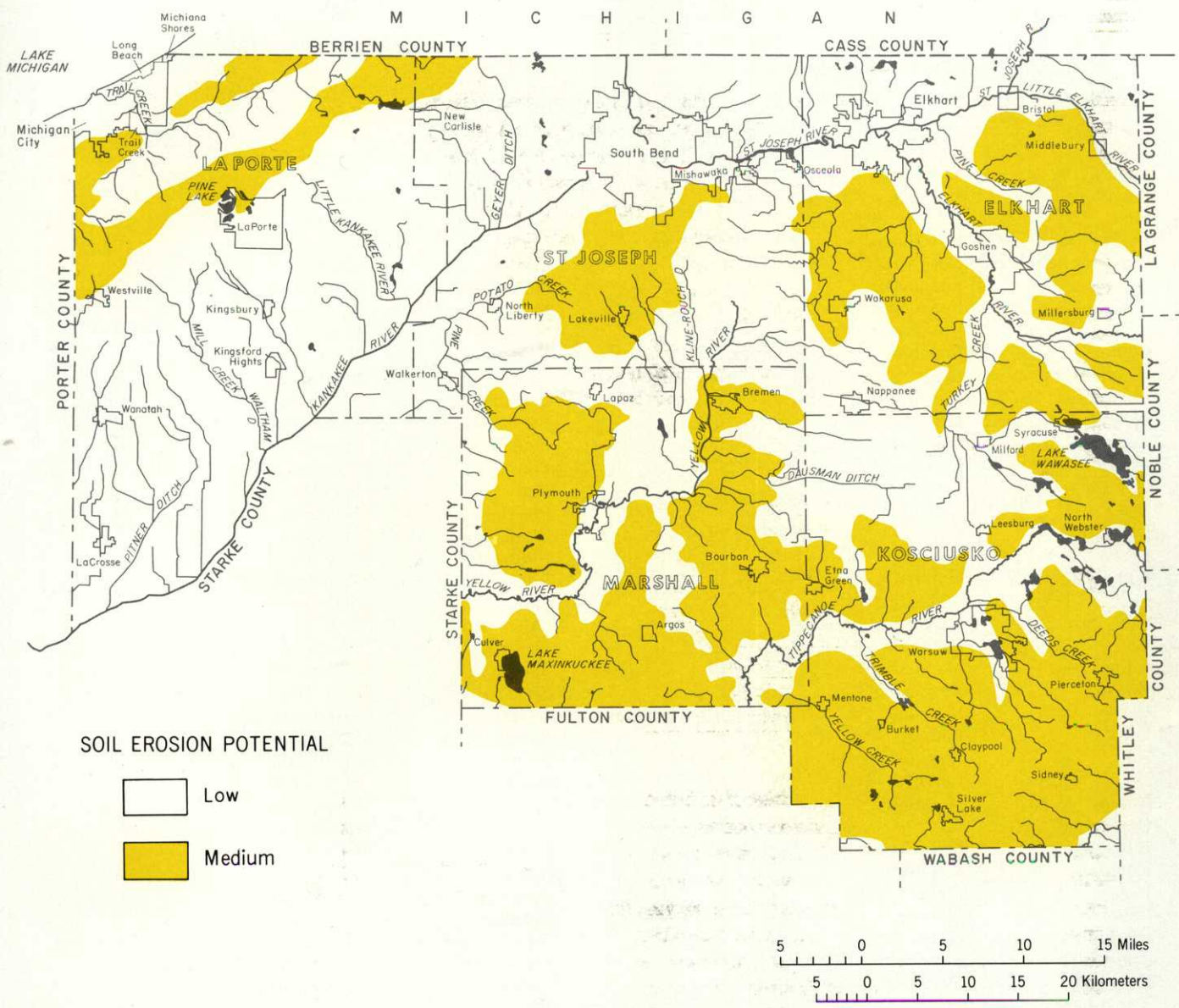
**Figure 84**  
 Map of Region Two showing the estimated average annual flood damages per mile along selected streams.





**Figure 85**  
Map of Region Two showing the general location of the wetness characteristics of soil associations.





**Figure 86**  
Map of Region Two showing the erosion potential of the soil associations.

potential problems related to bacterial contamination occurred in Pine Creek, a tributary of the Kankakee River. Water quality problems in the mainstem of the Yellow River were related to high fecal coliform, ammonia nitrogen, and phosphorus concentrations in the Plymouth area.

**Table 58**  
Trophic classification of lakes surveyed.

Lake	County	Age Classification
Banning	Kosciusko	II
Barrel	Kosciusko	II
Bass	St. Joseph	I
Beaver Dam	Kosciusko	III
Big Chapman	Kosciusko	I
Boner	Kosciusko	II
Caldwell	Kosciusko	II
Carr	Kosciusko	II
Center	Kosciusko	II
Chamberlain	St. Joseph	III
Chrystal	Kosciusko	I
Clear	LaPorte	II
Cook	Marshall	II
Crane	LaPorte	II
Czmanda	St. Joseph	III
Dewart	Kosciusko	II
Diamond	Kosciusko	III
Dixon	Marshall	II
Eddy	Marshall	II
Fish	Elkhart	II
Fish Trap	LaPorte	I
Flat	Marshall	II
Gilbert	Marshall	III
Goose	Kosciusko	I
Hawks	Marshall	III
Heaton	Elkhart	I
Hill	Kosciusko	II
Hog	LaPorte	I
Holem	Marshall	I
Horseshoe	LaPorte	III
Hudson	LaPorte	I
Huffman	Kosciusko	I
Hunter	Elkhart	I
Indiana	Elkhart	I
Irish	Kosciusko	II
James	Kosciusko	II
Koonty	Marshall	II
Kreighbaum	Marshall	II
Kuhn	Kosciusko	I
Lake of the Woods	Marshall	II
Lawrence	Marshall	I
Little Bar Bee	Kosciusko	III
Little Chapman	Kosciusko	I

The trophic classification of those lakes surveyed by the Stream Pollution Control Board in Region Two are indicated in the following table.

**Table 58 (continued)**

Lake	County	Age Classification
Little Pike	Kosciusko	II
Little Winona	Kosciusko	III
Lower Fish	LaPorte	I
Loon	Kosciusko	III
Maxinkuckee	Marshall	I
McLures	Kosciusko	II
Mud	St. Joseph	III
Muskellonge	Kosciusko	II
Myers	Marshall	I
Oswego	Kosciusko	II
Palestine	Kosciusko	III
Papkeetchie	Kosciusko	III
Peterson	St. Joseph	II
Pike	Kosciusko	II
Pine	LaPorte	I
Pretty	Marshall	II
Riddles	St. Joseph	II
Ridinger	Kosciusko	III
Rock	Kosciusko-Fulton	III
Saugany	LaPorte	I
Sawmill	Kosciusko	II
Sechrist	Kosciusko	I
Shock	Kosciusko	II
Shoe	Kosciusko	I
Silvers	Kosciusko	III
Simonton	Elkhart	I
Sously	St. Joseph	III
South Clear	St. Joseph	III
Spear	Kosciusko	II
Stanton	Kosciusko	I
Stone	LaPorte	I
Swede	LaPorte	II
Syracuse	Kosciusko	I
Thomas	Marshall	III
Tippecanoe	Kosciusko	I
Upper Fish	LaPorte	I
Wabee	Kosciusko	III
Walton	LaPorte	II
Wawasee	Kosciusko	I
Webster	Kosciusko	II
Winona	Kosciusko	III
Yellow Creek Lake	Kosciusko	III