

Projections of public water supplies indicate that withdrawals by the region's public water utilities may increase to approximately 33.8 mgd by the year 2000, as presented in the following table.

Table 84

The 1975 and projected withdrawal and consumption rates of public water supplies by the year 2000, in million-gallons-per-day.

<i>Public Water Supply</i>	1975	1980	1990	2000
Withdrawal	25.2	27.3	30.9	33.8
Consumption	2.5	2.7	3.1	3.4

Industrial Water Industrial establishments had a water intake averaging 35.9 mgd in 1977. Of the total industrial intake, approximately 30.0 mgd was developed by the industries themselves while 5.9 mgd was purchased from the region's public water utilities. Approximately 3.6 mgd of the self-supplied water was consumed in 1977. The chemical industry is the largest water-using group, followed by food processing, primary metals, and electrical industries.

Industrial water use may increase to approximately 44.6 mgd by the year 2000. Industrial self-supplied withdrawals from ground water may increase to 38.5 mgd. Industrial use of water supplied by public utilities is expected to increase to 6.1 mgd by the year 2000. Data for industrial self-supplied withdrawals is presented in the following table.

Table 85

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

<i>Industrial Self-Supplied</i>	1977	1980	1990	2000
Withdrawal	30.0	31.6	34.9	38.5
Consumption	3.6	4.1	5.8	7.7

Rural Self-Supplied Water The majority of rural self-supplied water in Region Four is withdrawn from ground-water sources. In 1975, rural self-supplied water withdrawals averaged 5.7 mgd. Ground-water withdrawals for household water are expected to increase to 8.3 mgd by the year 2000. Livestock in the region required an estimated 3.6 mgd in 1976. This withdrawal of ground water is expected to increase to 5.4 mgd by the year 2000.

The total withdrawal of rural self-supplied water may increase from the current 9.7 mgd to approximately 13.7 mgd by the year 2000, as presented here.

Table 86

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	9.7	10.2	12.0	13.7
Consumption	9.7	10.2	12.0	13.7

Irrigation Water Soil associations with irrigation potential are located in northern White County, adjacent to the Wabash and Tippecanoe Rivers, and in the Deer, Wea, Coal, and Upper Sugar Creek watersheds. Figure 117 shows the potential irrigation areas within the region.

Based upon the survey of irrigated lands, approximately 960 acres were irrigated in the region in 1977. Six hundred acres of croplands were irrigated in Tippecanoe County, and approximately 360 acres were irrigated in Carroll and Clinton Counties.

Assuming 1977 as a normal growing year, agricultural irrigation would have required about 2.5 mgd during the peak irrigation period of July to August.

It is estimated that approximately 87,000 acres in the region could be profitably irrigated: 35,000 acres in White County, 15,000 in Tippecanoe County, 10,000 in Fountain County, 9,000 in Montgomery County, 6,000 in Carroll and Warren Counties, and 6,000 in Benton and Clinton Counties. The 1977 irrigated average is expected to increase to 11,000 by the year 2000. This expansion of irrigation acreage is expected to increase the peak July–August irrigation demand in an “average” year to about 29.1 mgd. During wetter growing seasons less water will be required, while during drier seasons more irrigation water will be applied.

In addition to the irrigation for agricultural use, fairways and greens on the region's golf courses are irrigated. About 1.5 mgd was applied to these areas during the peak July–August irrigation period of 1977.

The total withdrawal for irrigation of croplands and golf courses during the average season of 1977 was approximately 4.1 mgd. These withdrawals may increase to 30.6 mgd during the average growing season by the year 2000, as presented below.

Table 87

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

<i>Irrigation</i>	1977	1980	1990	2000
Withdrawal	4.1	7.5	19.1	30.6
Consumption	4.1	7.5	19.1	30.6

Energy There are three electric generating plants located in Region Four. Two of the plants, at Norway and Oakdale, are hydroelectric powered, and are discussed

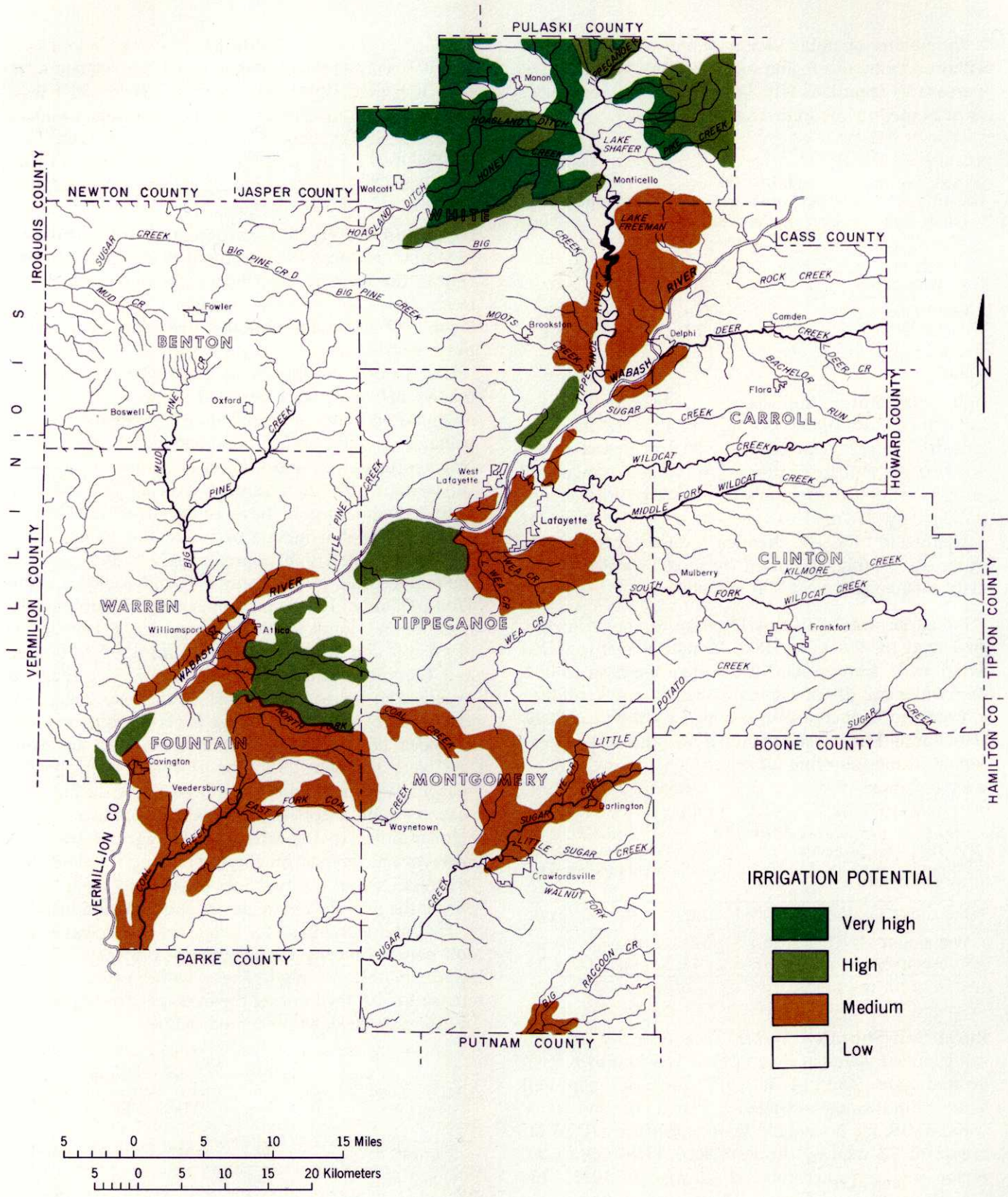


Figure 117
 Map of Region Four showing the general location of the soil associations that appear to possess an economic potential for the irrigation of croplands.

as an "Instream Use." The Crawfordsville plant is a coal-fired municipal facility with a generating capacity of 24.1 mw. This plant withdraws and consumes an average of 0.7 mgd of ground water.

Water withdrawals for energy during 1977 were approximately 0.7 mgd but are expected to decrease to 0.4 mgd by the year 2000 as shown below.

Table 88

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

Energy	1977	1980	1990	2000
Withdrawal	0.7	0.7	0.7	0.4
Consumption	0.7	0.7	0.7	0.4

While no plans for any new electrical generating facilities were announced in 1978, the region's water resource is capable of supporting additional power facilities. Both the Wabash and Tippecanoe Rivers possess flows which could support a power plant, although withdrawals of the magnitude required by electrical generation facilities would affect the low flows of these streams.

EXCESS WATER

Flooding

Approximately 95,000 acres of the region are subject to flooding. The major flood plains are shown in Figure 118. Figure 119 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 \$3.94 million, of which some ninety-four percent occurred in rural areas. Most of the urban damages occurred along the Wabash River in the Lafayette—West Lafayette area and along Sugar Creek at Crawfordsville.

Flood Control A number of small watershed projects are either completed or under construction, as presented in the following table. Rutan Farms Dam in Tippecanoe County is the only privately owned flood control structure in Region Four.

Table 89

The name and status of small watershed projects.

Project	Status
Little Wea Creek	complete
Kickapoo Creek	complete
Little Raccoon Creek	complete
Jordon Creek	under construction
Lye Creek Drain	under construction
Bachelor Run Creek	under construction
Rock Creek	under construction
Fall Creek	not started

The Delphi Levee on the Wabash River at Delphi was constructed by the U.S. Army Corps of Engineers in 1962. It protects approximately 310 acres, and was constructed to be effective against floodwaters equaling the maximum flood of record, which occurred in March 1913. The operation of the Salamonie, Mississinewa, and Huntington reservoirs, located upstream of Region Four, enhances the degree of protection afforded by the Delphi Levee project. These reservoirs also reduce flood stages on the main stem of the Wabash River.

Flood Plain Management Participants in the National Flood Insurance Program are listed below.

Table 90

Communities participating in the National Flood Insurance Program.

Community	Phase Status
Attica	emergency
Battle Ground	emergency
Burlington	emergency
Carroll County, unincorporated	emergency
Chalmers	regular
Clinton County, unincorporated	emergency
Covington	emergency
Crawfordsville	emergency
Darlington	emergency
Delphi	emergency
Flora	emergency
Fowler	emergency
Frankfort	regular
Hillsboro	emergency
Lafayette	emergency
Monon	regular
Monticello	regular
Mulberry	emergency
Tippecanoe County, unincorporated	emergency
Veedersburg	emergency
Waveland	emergency
West Lafayette	emergency
WilliamSPORT	emergency
Wolcott	regular

Agricultural Drainage

Approximately forty-seven percent of the soil associations in Region Four have "severe" wetness characteristics, twenty-five percent have "moderate" wetness characteristics, while twenty-eight percent have "slight" wetness characteristics. The general location of the soil associations with these wetness characteristics is shown in Figure 120. There are approximately 4,151 miles of legal drains in the region, which serve as the main collectors and outlets for on-farm drainage systems. The maintenance of this system of legal drains is the responsibility of the local county drainage boards or, in a limited number of cases,

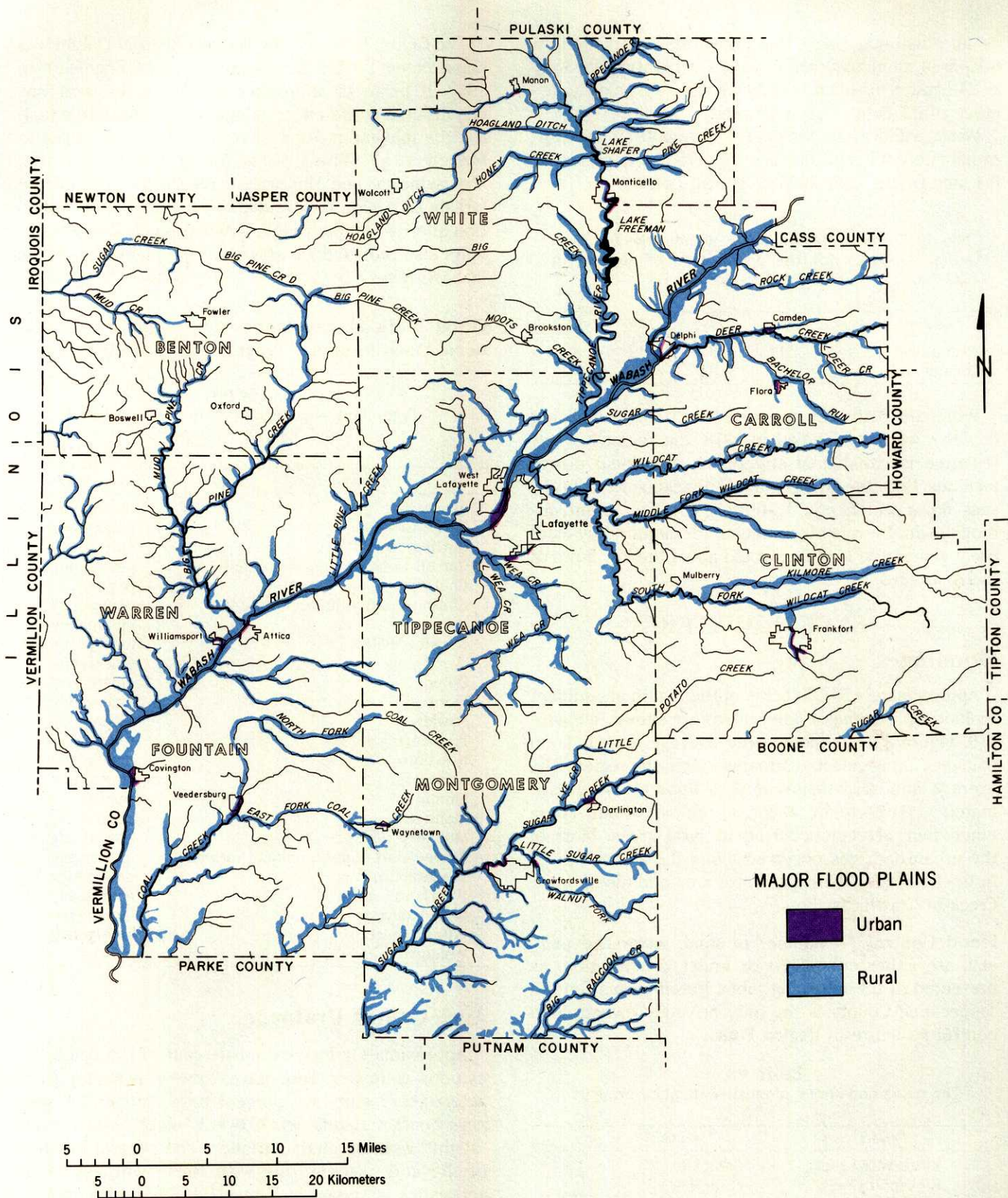


Figure 118
 Map of Region Four showing the major floodplains.

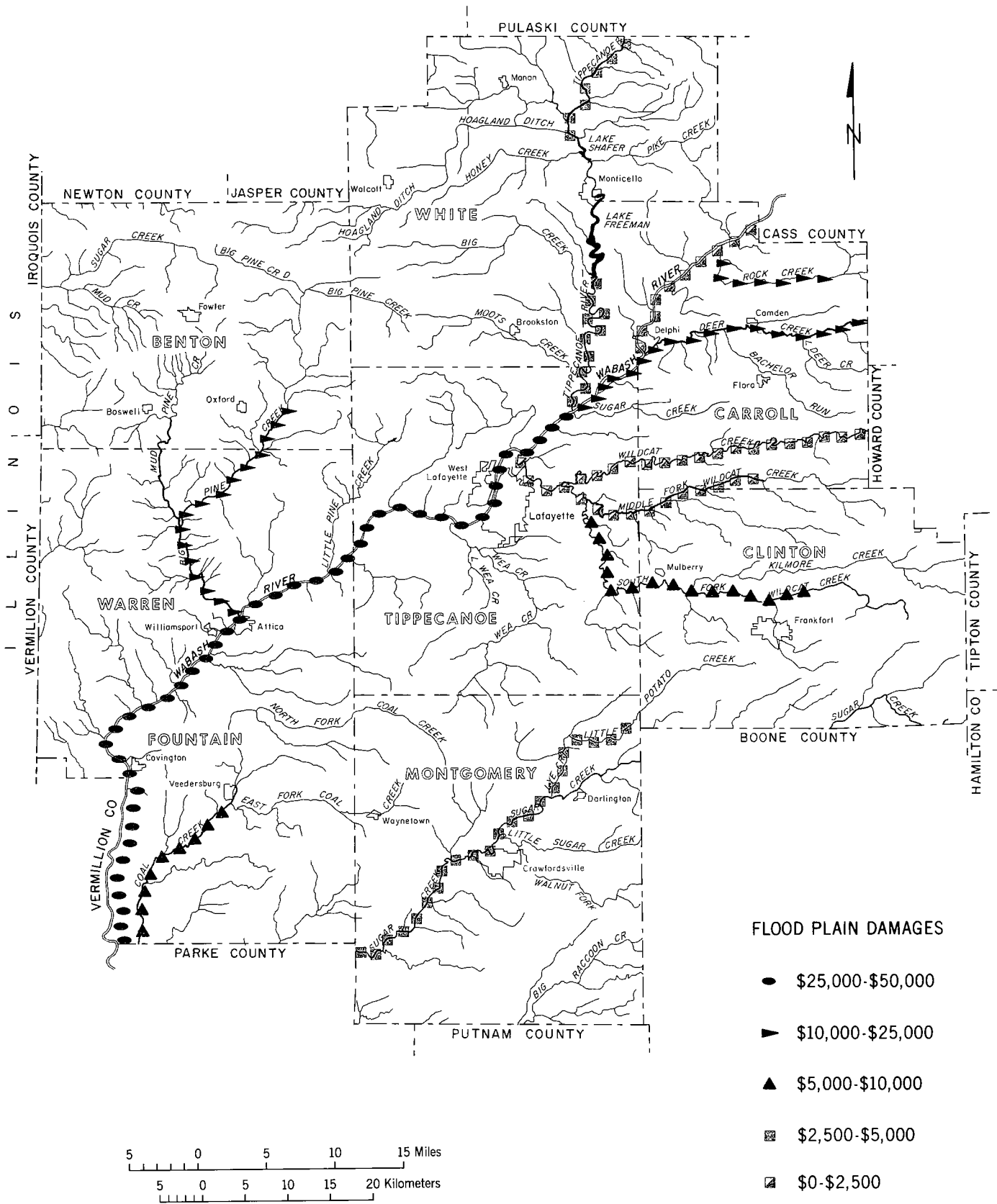


Figure 119
Map of Region Four showing the estimated average annual flood damages per mile along selected streams.

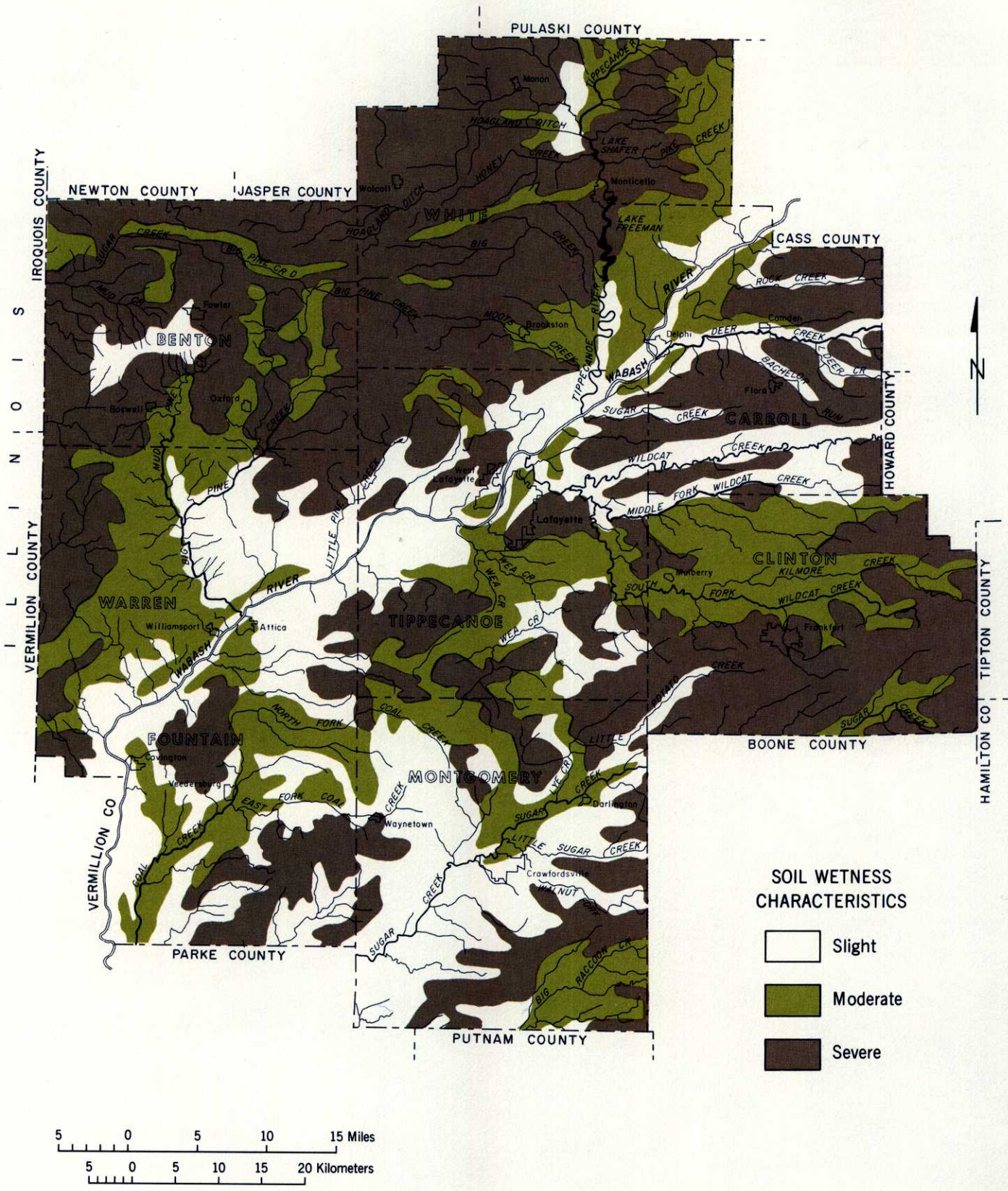


Figure 120
Map of Region Four showing the general location of the wetness characteristics of soil associations.

conservancy districts. No legal entity exists to maintain drainage along the other streams in the region.

Soil Erosion

The soils of the region have been examined as to their potential for erosion and are classified as "high," "medium," or "low" hazards as shown in Figure 121. Twenty-one percent of the 2,214,000 acres are rated as having a high soil erosion hazard potential while fifteen percent are classified in the medium potential erosion hazard category. These areas are located in the northeastern part of Carroll County, the northwestern part of Warren County, the eastern parts of Tippecanoe and Warren Counties, and most of Fountain and Montgomery Counties. The remaining sixty-four percent of land in Region Four have a low erosion potential for land left in a fallow state.

WATER QUALITY

The surface streams routinely surveyed for water quality by the Indiana State Board of Health are the Wabash and Tippecanoe Rivers as well as Wildcat and Sugar Creeks. Water quality standards for the region are established by the Stream Pollution Control Board regulation SPC IR-4, the Water Quality Standards for the State of Indiana.

Data collected along the main stem of the Wabash River indicated that both temperature and dissolved oxygen concentration met the standards. Values for pH fell below the minimum allowable value. The fecal col-

iform bacteria levels were well within the standards for partial body contact recreation.

The Tippecanoe River, a tributary to the Wabash River, also exhibited temperature and dissolved oxygen values within acceptable limits. The biochemical oxygen demand, a measure of the amount of oxygen consumed in the biological processes that break down organic matter in water, was well within the recommended level. Both maximum and minimum pH levels were in compliance with state standards. A temporary source of water quality degradation in the Tippecanoe River was the City of Monticello's sewage treatment plant, but the city was in the process of correcting the problem.

In the lower reaches of Wildcat Creek, water quality standards for temperature and dissolved oxygen were not being violated. In addition, the level of the biochemical oxygen demand and pH values were within acceptable limits.

No temperature violations were recorded for Sugar Creek near Shades State Park. The dissolved oxygen concentrations were adequate to support a diverse biological community. Biochemical oxygen demand levels have remained relatively low for the past four-year period of record. Generally, pH values and fecal coliform bacterial levels were within the recommended standards. Severe localized problems existed in the Crawfordsville area due to conditions at the municipal wastewater treatment plant. These conditions were, however, in the process of being corrected.

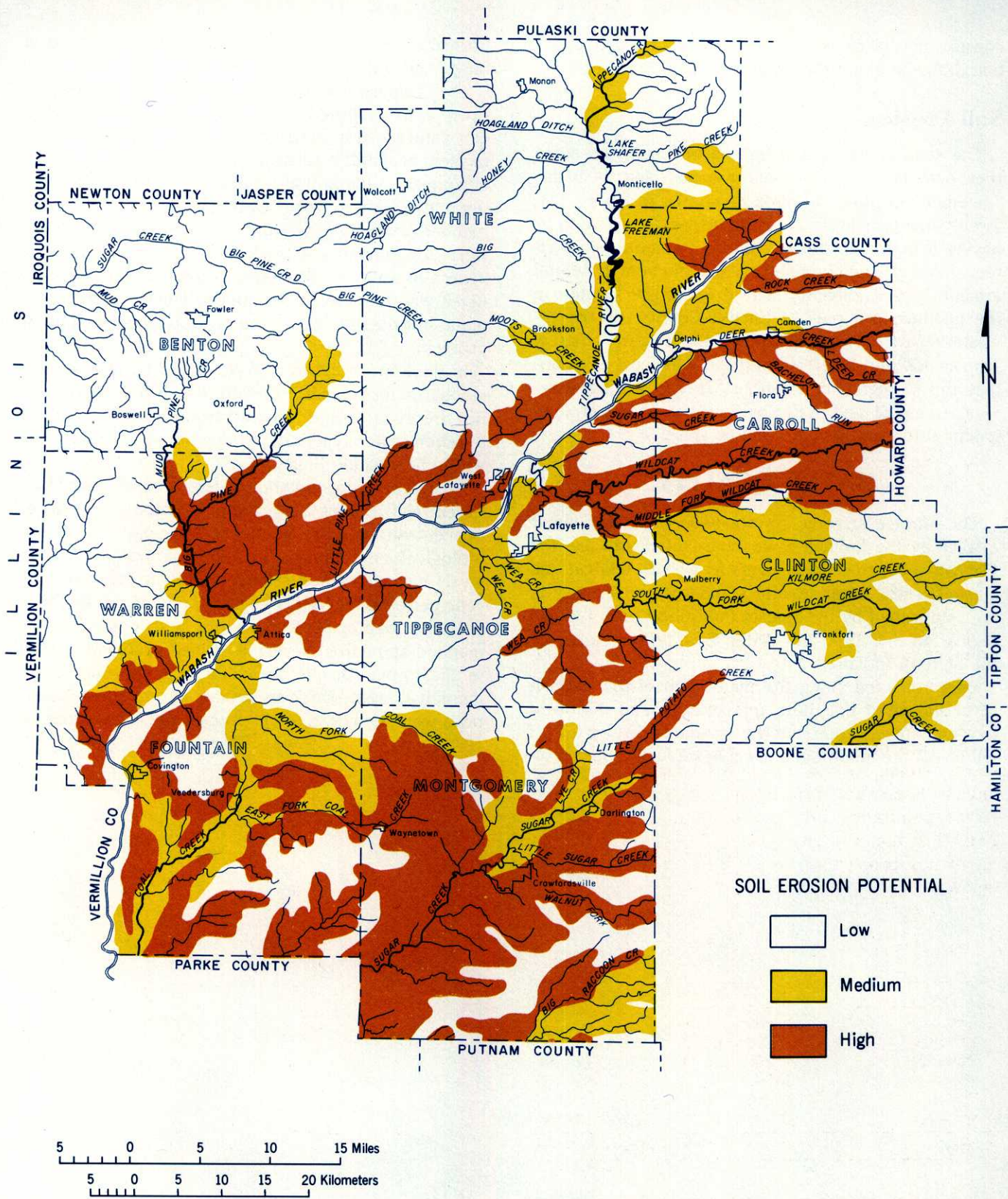


Figure 121
Map of Region Four showing the erosion potential of the soil associations.