

industrial self-supplied withdrawals and rates of consumption are presented in Table 187.

Table 187

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

<i>Industrial Self-Supply</i>	1977	1980	1990	2000
Withdrawal	12.0	11.7	12.8	14.6
Consumption	1.5	1.5	2.1	2.9

Rural Self-Supplied Water Most rural, self-supplied water is withdrawn from ground-water sources, farm ponds, cisterns, and water haulers.

An estimated 79,100 persons lived in homes supplied by individual water sources in 1975. It is estimated that these people used about 4.7 mgd for residential purposes in that year. An estimated 15,600 additional residents of the region may depend on their own wells for household water by the year 2000. These people, along with the anticipated general rise in the standard of living, are expected to increase rural, residential water use to approximately 7.1 mgd by the year 2000.

In 1975, rural, self-supplied water for livestock approached 1.2 mgd. By the year 2000, this withdrawal may increase to about 1.5 mgd. Water for livestock frequently is supplied from farm ponds.

The total withdrawal of rural, self-supplied water may increase from the current 6.1 mgd to approximately 8.7 mgd by the year 2000, as presented in the following table.

Table 188

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

<i>Rural Self-Supply</i>	1977	1980	1990	2000
Withdrawal	6.1	6.4	7.6	8.7
Consumption	6.1	6.4	7.6	8.7

Irrigation Water Soil associations with irrigation potential are located in loess deposits along the eastern edge of the Wabash River flood plain in western Gibson and Posey Counties. Figure 234 shows the potential irrigation areas within the region. Based upon the survey of irrigated lands, approximately six acres were irrigated in the region.

Assuming 1977 as a normal growing year, agricultural land would have required about 0.02 mgd during the peak irrigation period of July and August. All the water used for irrigation was derived from surface water sources.

It is estimated that about 4,500 acres in the region could be profitably irrigated. Irrigation of cropland is expected to increase to 600 acres by the year 2000. This may increase the peak July–August irrigation demand in an “average” year to about 1.6 mgd. The average year increase in ground-water withdrawal may reach 0.9 mgd by the year 2000.

In addition to irrigation for agricultural use, fairways and greens on the region’s golf courses are irrigated. About 1.0 mgd is applied to these areas during the peak July–August irrigation period.

The total withdrawal of irrigation water may increase from the current 1.0 mgd to approximately 3.0 mgd by the year 2000, as shown below.

Table 189

The current and projected withdrawals of irrigation water for croplands and golf courses, during an average growing season, in million-gallons-per-day.

<i>Irrigation</i>	1977	1980	1990	2000
Withdrawal	1.0	1.6	2.2	3.0
Consumption	1.0	1.6	2.2	3.0

Expansion of irrigated areas will depend in part on proximity to water sources. Ground water is limited in some areas which contain soils that could be profitably irrigated. The availability to irrigation water may be a major constraint to any appreciable irrigation practices in the region.

Electric Energy Six major electric generating plants are located in the region. The Petersburg and Hoosier Energy plants are located along the White River in Pike County. The Gibson facility is located along the Wabash River in Gibson County. The Warrick and Culley plants are sited along the Ohio River in Warrick County, and the Ohio River plant is located in Vanderburgh County along the Ohio River. These plants employ once-through cooling systems with the exception of the Gibson plant, which employs a closed-cycle cooling system.

The Petersburg plant has a generating capacity of 754 megawatts (mw), the Hoosier Energy station is rated at 255 mw, and the Gibson plant is rated at 1,370 mw. The Warrick plant is rated at 732 mw and the Culley plant has a generating capacity of 412 mw. The Ohio River facility is rated at 128 mw. Intake requirements from the White River for Petersburg and Hoosier Energy amount to 611 million-gallons-per-day. The Gibson plant withdraws an average of 16 mgd from the Wabash River. The Warrick, Culley, and Ohio River plants withdraw approximately 921 mgd from the Ohio River.

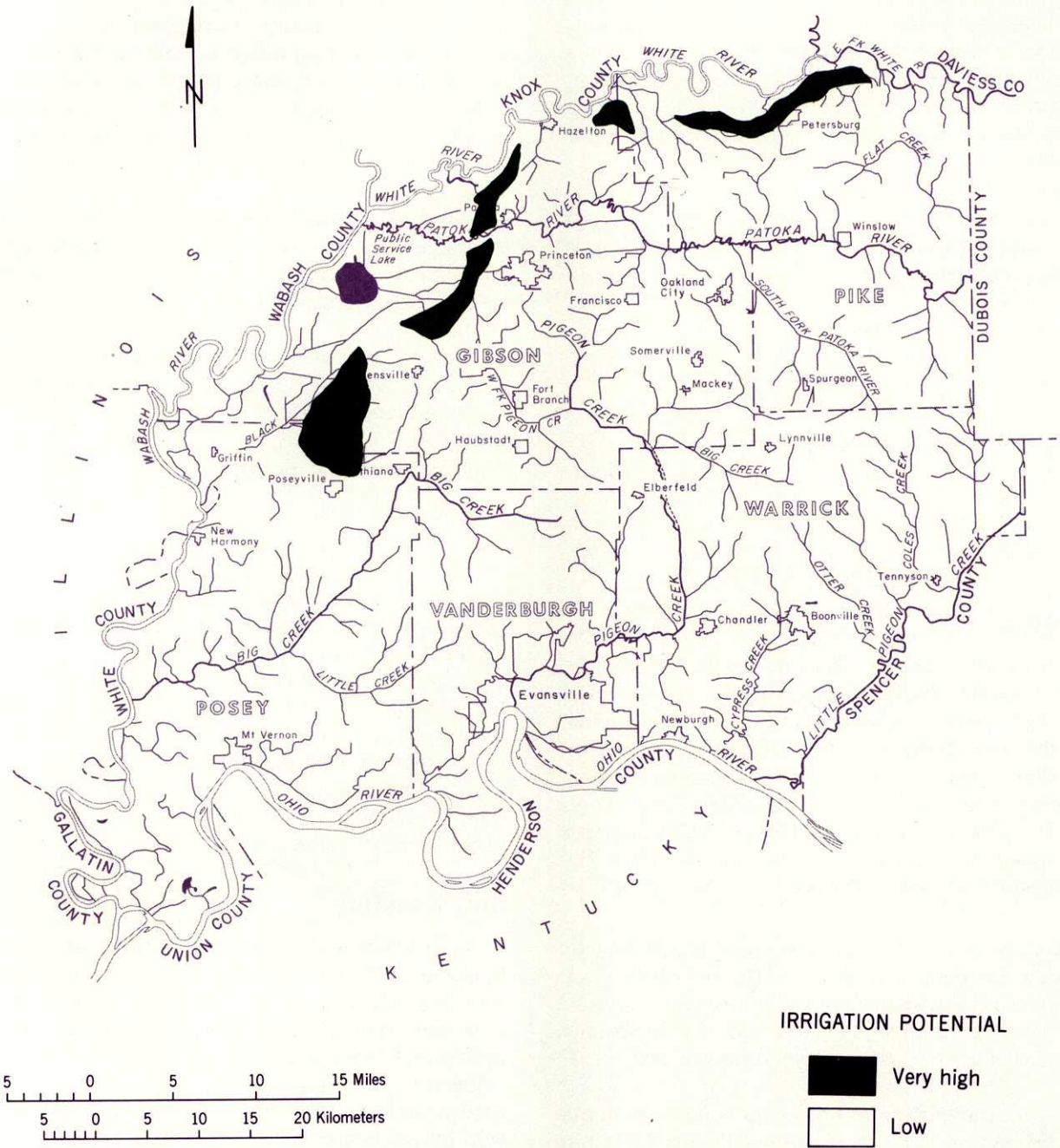


Figure 234
 Map of Region Thirteen-B showing the general location of the soil association that appear to possess an economic potential for the irrigation of croplands.

Plans have been announced to expand generating facilities in the region. Additions to the Petersburg plant will increase its consumption requirements to 6.2 mgd of water from the White River by the year 2000. Additions at the Gibson plant will increase consumption of Wabash River water by 25.3 mgd. A new power plant, the Brown facility, will be located along the Ohio River in Posey County, and consumption requirements will reach approximately 3.6 mgd by the year 2000.

Water withdrawals for the generation of energy in the region during 1977 was approximately 1,560 mgd but is expected to decrease to 1,485 mgd by the year 2000 as presented below.

Table 190

The 1977 and projected water withdrawals 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	1,560.8	1,580.1	1,586.1	1,485.1
Consumption	17.9	39.0	5.3	73.3

EXCESS WATER

Flooding

Approximately 242,073 acres of the region are subject to flooding. The major flood plains are shown in Figure 235. Figure 236 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 \$963,000 for urban areas and \$5,674,000 for rural areas. Most of these damages occur along the Patoka, White, Wabash, and Ohio Rivers, and Big and Pigeon Creeks.

Flood Control There are a number of existing or ongoing flood control projects in the region. A small watershed project, sponsored by Prides Creek Conservancy District, is under construction in Pike County and is designed for flood control, drainage, and recreation.

The U.S. Army Corps of Engineers is constructing a local protection project at Evansville on the Ohio River and Pigeon Creek. The system consists of earth levees, concrete walls, pumping facilities, and provisions for traffic during nonflood periods. When completed, the project will afford protection to the city of Evansville encompassing about 6,740 acres. It has been estimated that completed portions of the project have prevented flood damages amounting to approximately \$11,620,000 to date.

The U.S. Army Corps of Engineers has also completed in agricultural levee protection project, Levee Unit 5, in

Gibson and Posey Counties along the Wabash River. This project consists of an earth levee which protects a 43,200 acre agricultural area and the communities of Griffin, Skelton, and Lyles against a flood which could be expected to occur on an average of seven times in a one hundred-year period. It is estimated that the project has prevented flood damages amounting to \$5,231,000. The U.S. Army Corps of Engineers has also carried out emergency bank protection projects at Mount Vernon, Newburgh, and New Harmony.

Flood Plain Management Participants in the emergency phase of the National Flood Insurance Program include Princeton, Petersburg, Winslow, Mount Vernon, New Harmony, unincorporated Posey County, Evansville, unincorporated Vanderburgh County, Chandler, Newburgh, and unincorporated Warrick County. Griffin participates in the regular phase of the National Flood Insurance Program.

Agricultural Drainage

Approximately seven percent of the soil associations have "severe," thirty-eight percent have "moderate," while fifty-five percent have "slight" wetness characteristics. The general location of the soil associations with these wetness characteristics are shown in Figure 237.

There are approximately 854 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. There is no legal entity that is responsible for maintaining drainage for the other streams in the region.

Soil Erosion

The erosion potential of soil associations is shown in Figure 238. Approximately fifty-two percent of the soil associations are classified as having a "high" potential erosion hazard. These lands are fairly well distributed throughout the region, but generally exclude the river and stream valleys. Another eighteen percent of the region have a "medium" potential erosion hazard, while thirty percent are classified as having a "low" erosion hazard 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 Patoka, East Fork White, White, Wabash, and Ohio Rivers. Water quality standards for the region are established by the Stream Pollution Control Board

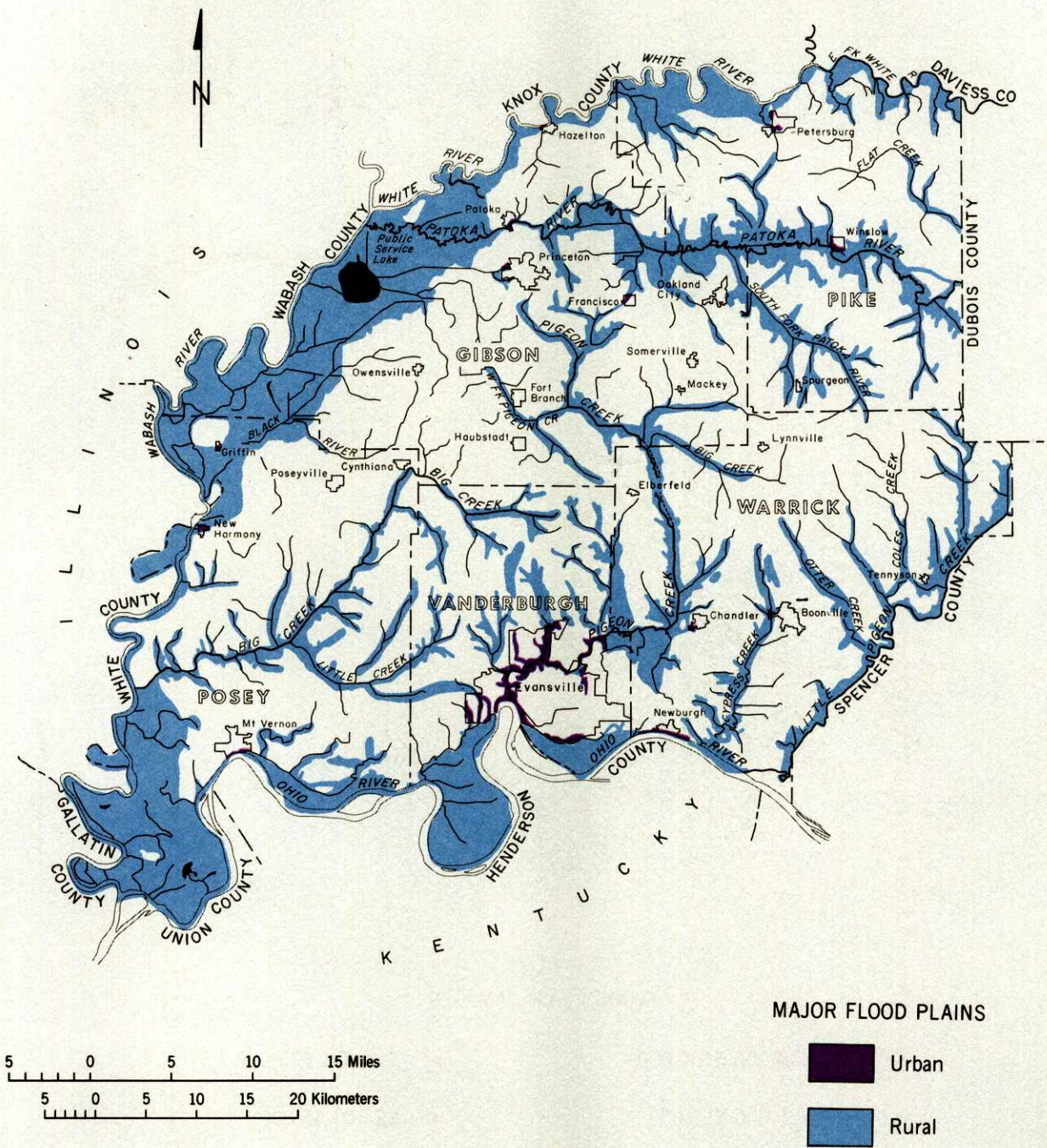
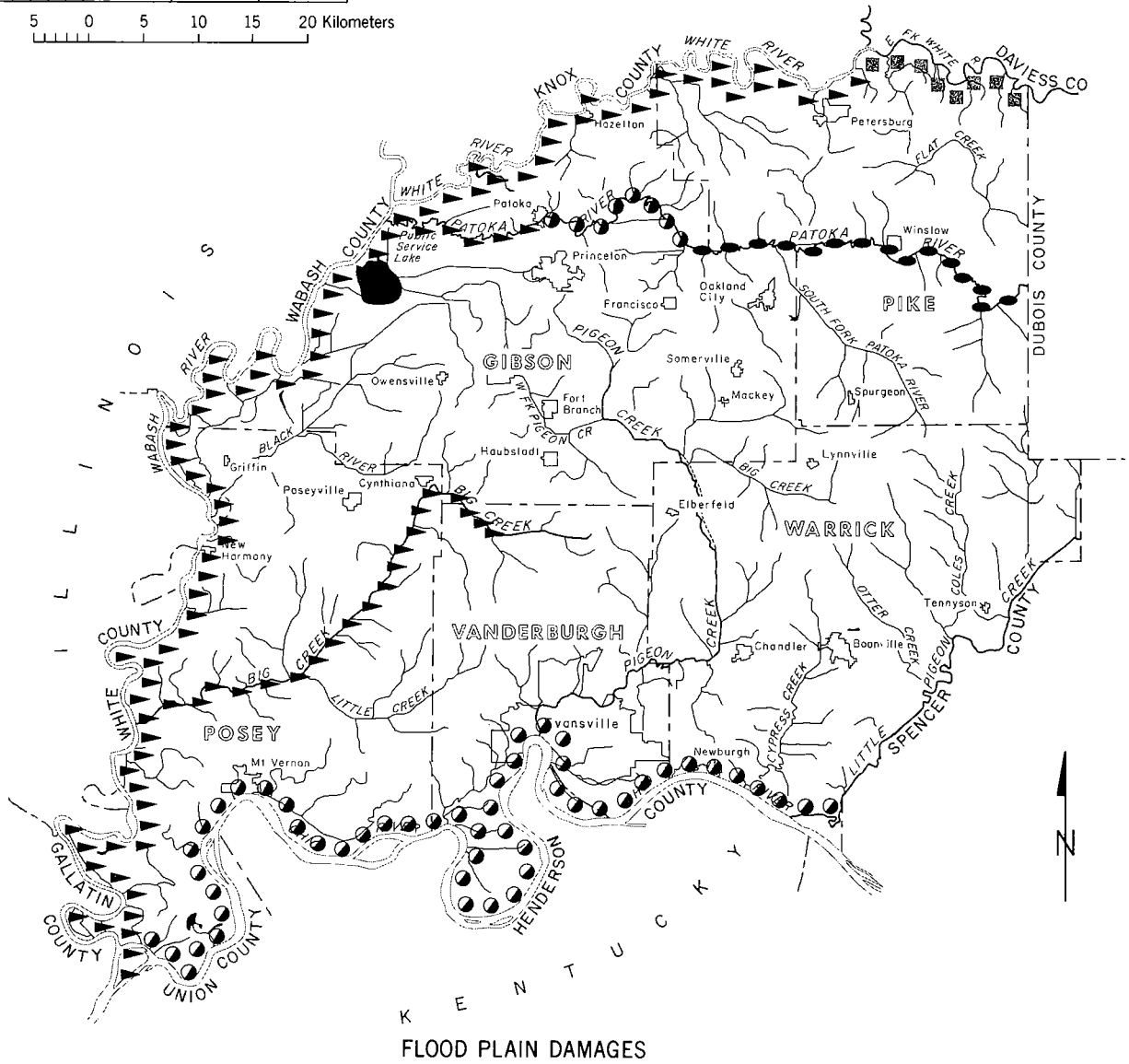
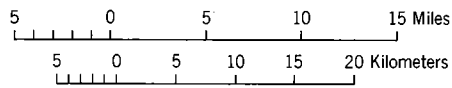


Figure 235
 Map of Region Thirteen-B showing the major flood plains.



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|----------------------|----------------------------|
| ● \$50,000-\$100,000 | ▶ \$10,000-\$25,000 |
| ■ \$25,000-\$50,000 | ■ (with X) \$2,500-\$5,000 |

Figure 236
Map of Region Thirteen-B showing the estimated average annual flood damages per mile along selected streams.

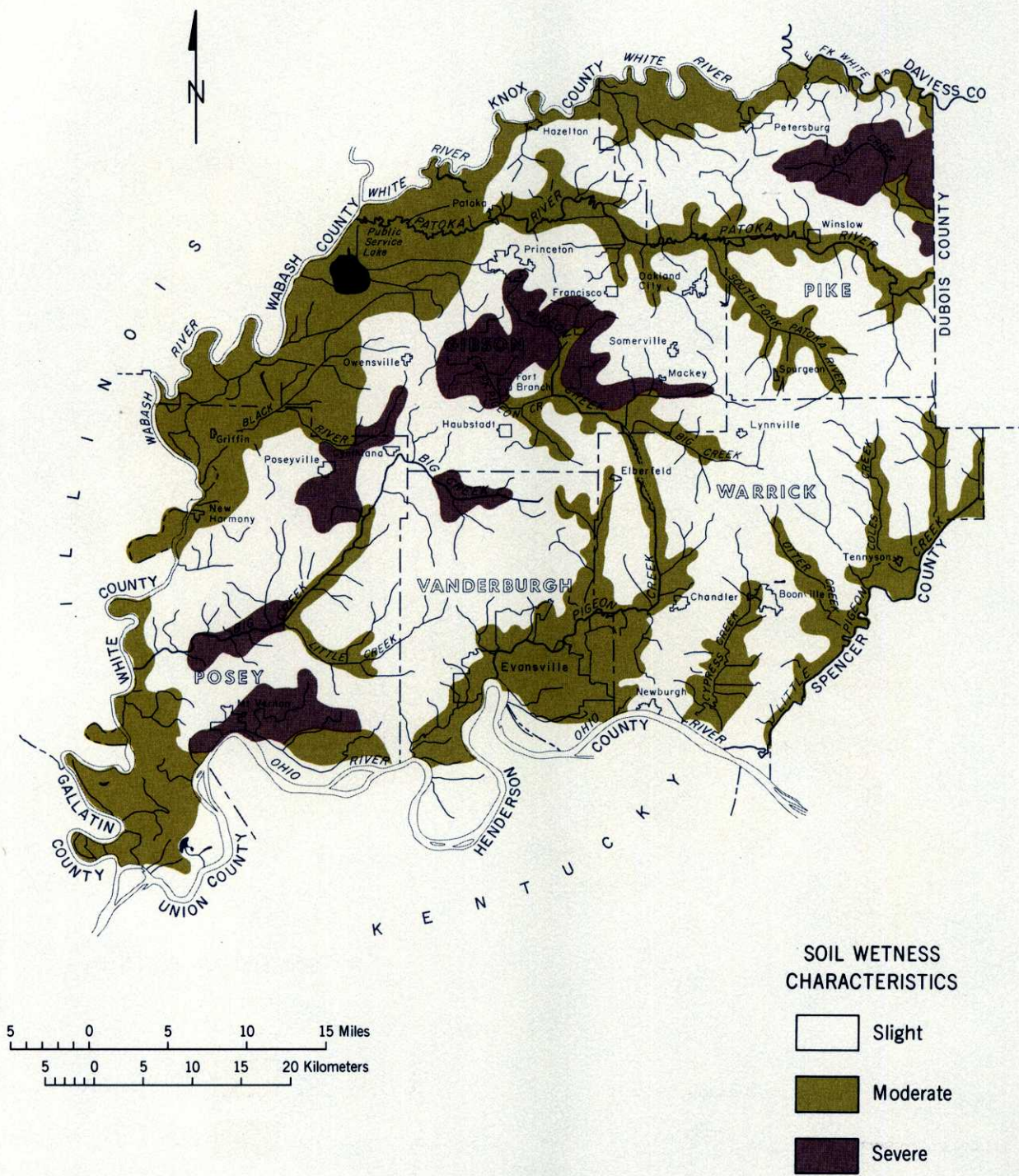


Figure 237
 Map of Region Thirteen-B showing the general location of the wetness characteristics of soil associations.

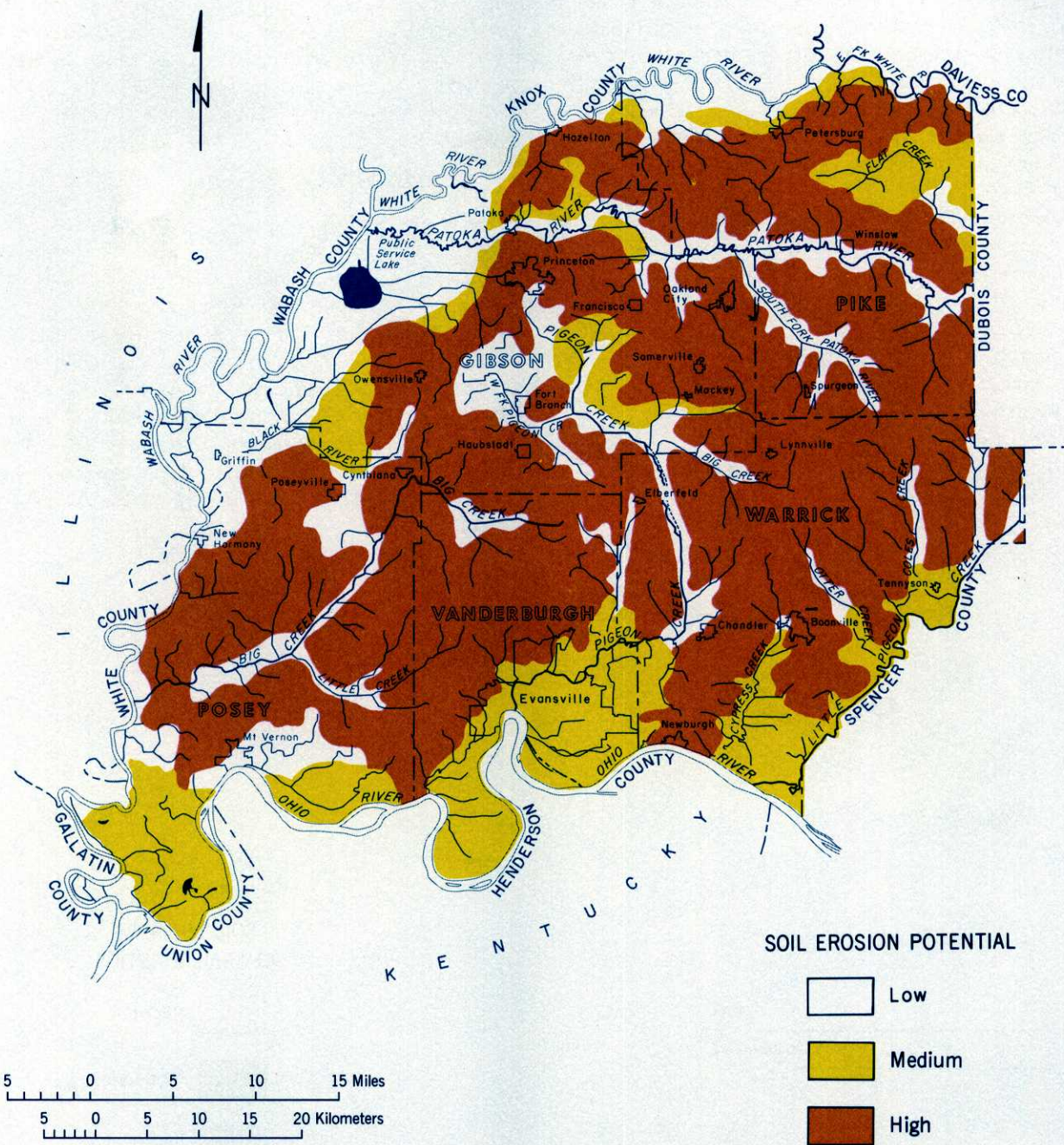


Figure 238
 Map of Region Thirteen-B showing the erosion potential of the soil associations.

regulation SPC IR-4, the Water Quality Standards for the State of Indiana, and SPC-3 the coal mine waste and drainage regulations.

Samples of the Patoka River near Princeton and Oakland City indicated that the temperature and pH complied with state standards, and the biochemical oxygen demand was at a satisfactory level. The concentrations of dissolved oxygen occasionally violated the standards. The fecal coliform levels sometimes violated partial body contact standards.

Data from the East Fork of the White River indicated that temperature, dissolved oxygen, nitrate, and pH values were within desirable limits. The values for fecal coliform occasionally were in violation of the standards.

The water quality of the White River near Petersburg met temperature, dissolved oxygen, and pH standards. The only standard violated was the fecal coliform bacteria standard for partial body contact recreation.

Assessment of water quality on the Ohio River near Evansville showed that temperature, the biochemical oxygen demand, nitrate, and pH values all fell within acceptable levels. However, dissolved oxygen levels occasionally violated the standards. Total coliform

bacteria levels for drinking water were met at Evansville and Mount Vernon water intakes.

The Wabash River near New Harmony exhibited temperature, nitrate, and pH values within state standards in 1977. The levels of biochemical oxygen demand and dissolved oxygen occasionally were not satisfactory in this part of the Wabash. Fecal coliform bacteria counts were in violation of standards used to designate streams for whole and partial body contact recreation at some times.

Four fish kills have been reported to the Indiana State Board of Health from the region in the period 1974 to 1977. One occurred in Pond Flat Ditch near Haubstadt in Gibson County when a hog waste discharge killed approximately fifty fish. Another, in Posey County near Mount Vernon, resulted in an undetermined number of fish killed from an industrial spill in McFadden Creek. There have been two fish kills reported during this time from the Evansville area in Pigeon Creek. One resulted from a sewer bypass and killed approximately fifty fish, and the other was from an industrial spill which killed an undetermined number of fish.