Table 175
The 1977 and projected water withdrawal and consumption rates of public water supplies, in million-gallons-per-day.

Public Water Supply	*1977*	*1980*	*1990*	*2000*
Withdrawal	15.8	16.7	19.0	21.1
Consumption	3.3	3.5	4.0	4.1

Industrial Water Industrial establishments had a water intake averaging 21.2 mgd in 1977. Of the total industrial intake, 12.5 mgd was self-supplied by the industries while 8.6 mgd was purchased from the region's public utilities. Ground-water is the source for most of the self-supplied industrial water.

The largest water-using industry group is the stone, clay, and glass group. Most of the water used by these establishments is withdrawn from strip mine lakes and abandoned quarries on company property. Other industries using significant quantities of water include the primary metals group and manufacturers of electrical machinery.

Although industrial output is expected to increase, total industrial water intake is expected to decrease initially, due to plant efficiency, and to rise slowly as ouput increases.

Industrial production by the year 2000 is expected to increase one hundred and eighteen percent above the 1977 value (U.S. Water Resources Council). By the year 2000, total industrial intake is expected to be 24.6 mgd. Of this projected usage, approximately 15.1 mgd may be self-supplied. The current and projected industrial self-supplied withdrawals and rates of consumption are now presented.

Table 176
The 1977 and projected self-supplied withdrawals and consumption rates for industries, in million-gallons-per-day.

Industrial Self-Supply	*1977*	*1980*	*1990*	*2000*
Withdrawal	12.5	12.4	13.7	15.1
Consumption	1.7	1.9	2.6	3.5

Rural Self-Supplied Water Most rural self-supplied water is withdrawn from ground-water sources. In 1975 an estimated 50,000 persons lived in homes supplied by individual sources of water. It is estimated that these people used about 2.8 mgd for residential purposes in that year. By the year 2000, the number using their own water supply is expected to decrease to 47,300 persons. This decrease is a reflection of expansion in the region's public water supplies and, in particular, the expansion of the rural systems. Although fewer will be using self-supplied water, the anticipated general use in the standard of living is expected to increase their withdrawal demands to 3.6 mgd by the year 2000.

In 1975 there were an estimated 386,600 head of livestock, 313,000 chickens, and 128,300 turkeys. Collectively, these animals used about 3.2 mgd. By the year 2000, these animals may require 3.5 mgd. This water is withdrawn from wells, farm ponds, and springs.

The total withdrawal of rural self-supplied water may increase from the current 6.1 mgd to approximately 7.0 mgd by the year 2000, as shown here.

Table 177
The 1977 and projected water withdrawal and consumption rates for rural self-supplied water, in million-gallons-per-day.

Rural Self-Supply	*1977*	*1980*	*1990*	*2000*
Withdrawal	6.1	6.2	6.6	7.0
Consumption	6.1	6.2	6.6	7.0

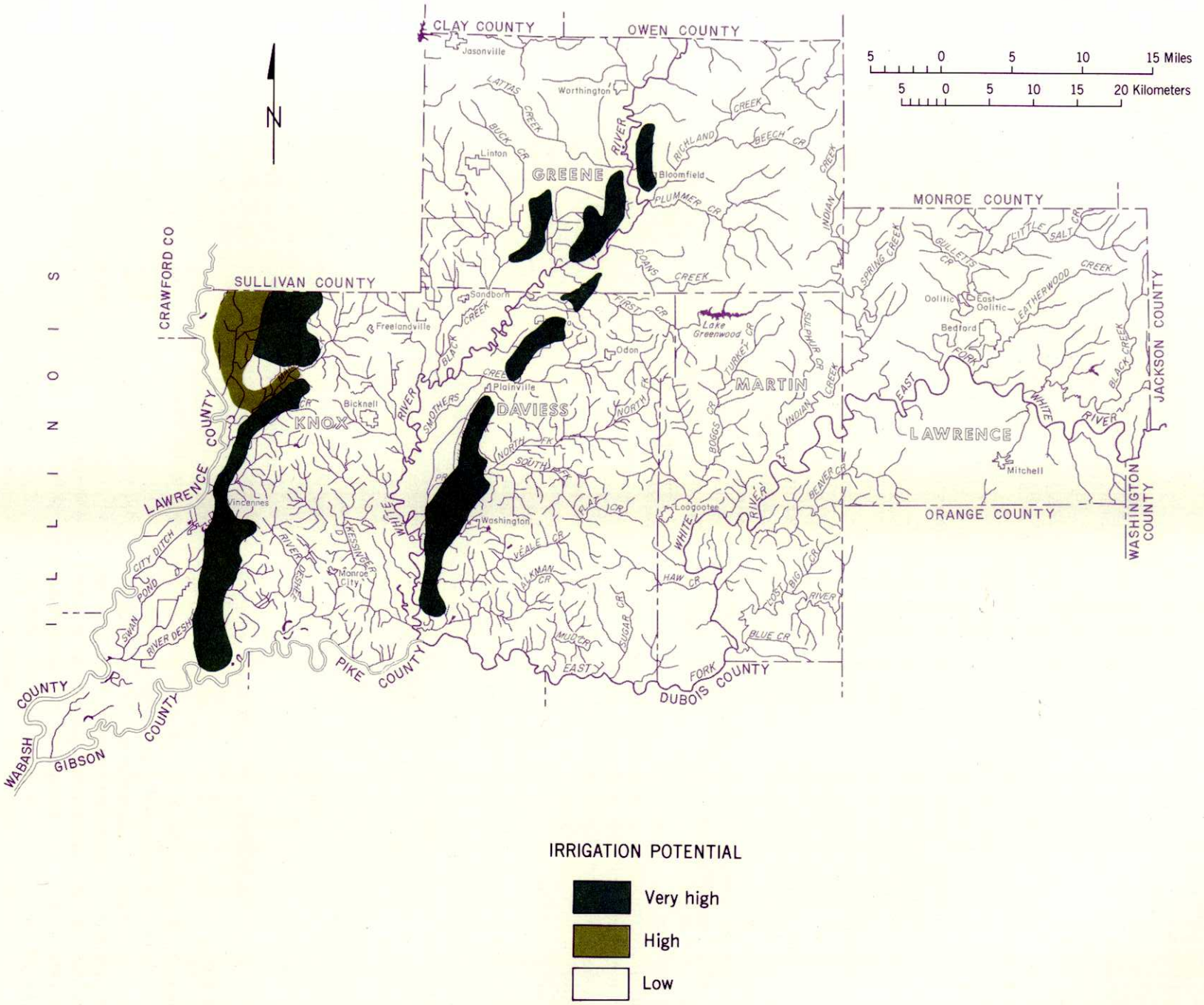
Irrigation Water Soil associations with irrigation potential are located on the Wabash River terraces in Knox County and on windblown sands in Knox, Daviess, and Greene Counties. Figure 222 shows the potential irrigation areas within the region.

Based upon the survey of irrigated croplands, approximately 6,190 acres were irrigated in the region: 6,000 in Knox County and 190 in Daviess County. Corn, soybeans, and other vegetables were the principle crops irrigated in 1977. Other crops irrigated were potatoes, hay, and pasture. Assuming 1977 as a normal growing season, these crops would have required about 16.3 mgd during the peak irrigation season of July and August.

It is estimated that about 15,500 acres of croplands may be profitably irrigated. Today's 6,190 acres may increase to 9,200 acres by the year 2000. Almost all of this additional acreage will be located in Knox County. This expansion of irrigation is expected to increase the peak July and August irrigation demand in an "average" season to about 24.1 mgd to 32.2 mgd by the year 2000.

In addition to the irrigation for agricultural use, there are approximately 124 acres of irrigated fairways and greens on the region's golf courses. About 0.4 mgd was applied to these areas during the peak July to August irrigation period of 1977.

The total withdrawal for irrigation of croplands and golf courses during the "average" irrigation season of 1977 was approximately 16.7 mgd. These withdrawals may increase to 24.5 mgd during the "average" growing season by the year 2000 as presented in Table 178.



IRRIGATION POTENTIAL

- Very high
- High
- Low

Figure 222
Map of Region Thirteen-A showing the general location of the soil association that appear to possess an economic potential for the irrigation of croplands.

Table 178
The current and projected withdrawal of irrigation water for croplands and golf courses, during an average growing season, in million-gallons-per-day.

Irrigation	*1977*	*1980*	*1990*	*2000*
Withdrawal	16.7	17.6	21.1	24.5
Consumption	16.7	17.6	21.1	24.5

Electric Energy The region contains one electric generating station, located at Edwardsport on the West Fork of the White River. It is owned and operated by Public Service Indiana. A once-through cooling system is utilized at this plant. Edwardsport is rated at 175 megawatts for the three units currently in operation. Intake requirements are 202 mgd. This is an older station, and at least one of the operating units was installed during World War II. Public Service Indiana expects to retire this station during the next decade.

Water withdrawals for energy during 1977 were approximately 202 mgd. No water is expected to be withdrawn for the generation of electricity by the year 1990, as presented below.

Table 179
The 1977 and projected water withdrawals and consumption rates for the production of energy, in million-gallons-per-day.

Energy	*1977*	*1980*	*1990*	*2000*
Withdrawal	202	202	0	0
Consumption	0	0	0	0

Coal Conversion: Coal conversion is a process whereby coal is converted to a gaseous or liquid hydrocarbon. Withdrawal demands for coal conversion range from 17 to 32 mgd. If coal conversion should economically be feasible by the end of the century, Region Thirteen-A would be a prime candidate for siting because it contains available water supplies in close proximity to abundant supplies of coal.

EXCESS WATER

Flooding

Approximately 365,000 acres of the region are subject to flooding. The major flood plains are shown in Figure 223. Figure 224 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 $7.6 million of which some eighty-three percent would occur in rural areas.

Flood Control There are three completed flood control projects in the region which are sponsored by a local conservancy district in cooperation with the U.S. Soil Conservation Service. Boggs Creek watershed includes two floodwater-retarding structures and 8.2 miles of channel improvements. The project is designed to reduce floodwater damages on 1,565 acres in the watershed.

Lattas Creek watershed includes 4.1 miles of flood prevention channels and 18.3 miles of multipurpose flood prevention and drainage channels. The project is designated to reduce floodwater damage to crops and pastures by ninety percent.

Prairie Creek watershed includes thirteen floodwater retention dams, 33.5 miles of channel improvements, 15.4 miles of levees, and twelve major stabilization structures for flood protection. The project is designed to reduce floodwater damages in the watershed by sixty-eight percent.

The West Boggs Creek small watershed project is authorized for construction. The structural measures of this project consist of one multi-purpose flood prevention and recreation structure which has been completed, and 4.6 miles of flood prevention channel improvement. The project as planned will reduce floodwater damages by eighty-six percent.

An application was made for the Snapp-Kelso Creek watershed.

The U.S. Army Corps of Engineers has constructed five, major, flood protection projects within the region. One of these is the Niblack Levee, which is located on the Wabash River in Knox and Sullivan Counties. It was approved by the Flood Control Act of 1946 and was completed in April 1965. The project consists of eighteen miles of earth levees which have prevented flood damages amounting to more than $2.5 million since their completion.

The Vincennes local protection project is located on the Wabash River at Vincennes in Knox County. The project was authorized by the Flood Control Act of 1946, and construction was completed in June 1962. It consists of concrete walls, including new construction, and enlargement of some existing works, alteration of three railroad bridges, and facilities necessary to the project. Ramps and openings are provided in the levee to permit unobstructed traffic movement during nonflood periods. Work on a section of levee across the south side of Vincennes is currently suspended. Railroad bridge alterations, however, are complete. The degree of protection currently afforded is limited to that provided by the Brevoort Levee. Flood damages prevented by the project amount to more than $23 million.

The Brevoort Levee project is located in Knox County, between the Wabash and White Rivers at their confluence. The project includes a system of earth levees extending from Vincennes downstream along the east bank of the Wabash River and upstream along

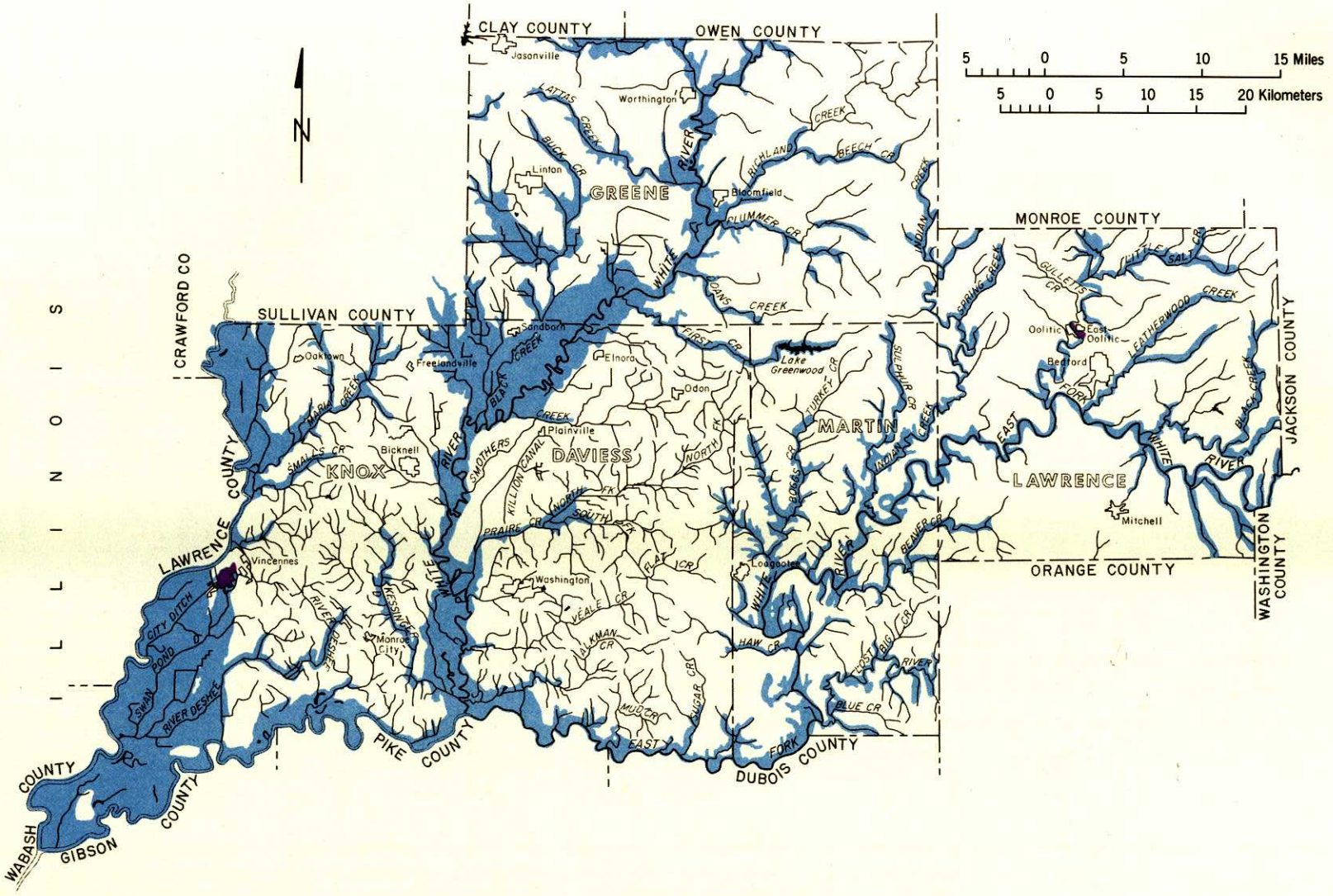


Figure 223
Map of Region Thirteen-A showing the major floodplains.

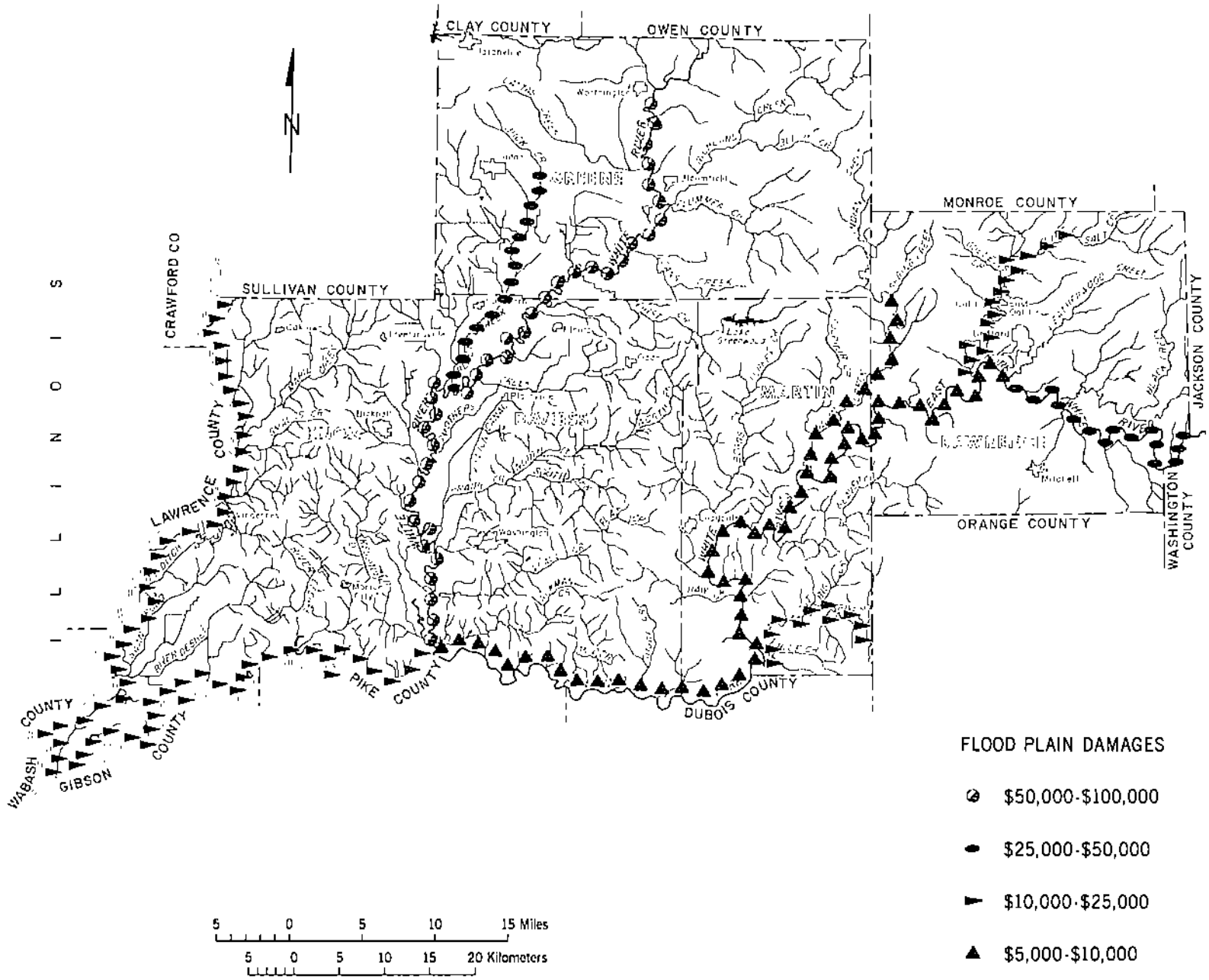


Figure 224
Map of Region Thirteen-A showing the estimated average annual flood damages per mile along selected streams.

the west bank of the White River. Pumping facilities are provided to dispose of drainage from the protected area. The project was authorized by the Flood Control Act of June 1936 and completed in 1947. It is estimated that the project has prevented over $27 million in flood damages since completion.

Levee Unit Eight is located on the left bank of the West Fork of the White River near Plainville in Daviess County. The project consists of a system of earth levees and pumping facilities to dispose of drainage from the protected area. It was completed in 1942 and provides agricultural protection for 13,400 acres.

The Edwardsport project consists of the construction of a pilot channel through a narrow neck in the West Fork of the White River to eliminate caving of river banks.

Flood Plain Management Participants in the emergency phase of the National Flood Insurance Program include Elnora and Washington in Daviess County; Worthington in Greene County; Decker, unincorporated, and Vincennes in Knox County; Bedford and Mitchell in Lawrence County; and Loogootee and Shoals in Martin County. Participants in the regular phase of the National Flood Insurance Program include Plainville in Daviess County and Edwardsport in Knox County.

Agricultural Drainage

Approximately fourteen percent of the soil associations have "severe," twenty-five percent have "moderate," while sixty-one percent have "slight" wetness characteristics. The location of soil associations with these wetness characteristics are shown in Figure 225.

There are approximately 411 miles of legal drains in the region, which serve as the main collectors and outlets for on-farm drainage systems. The maintenance of these systems is the responsibility of the local county drainage boards, or, in a limited number of cases, of conservancy districts. There is no legal entity responsible for maintaining drainage of the other streams in the region.

Soil Erosion

The erosion potential of soil associations within the region is shown in Figure 226. Thirty-four percent of the 1,473,900 acres in the region are rated as having a "high" potential erosion hazard. These areas need the protective covers of grassland and trees in order to prevent severe erosion. Seven percent are classified as having a "medium" erosion hazard potential, while the remaining thirty-two percent are ranked as having 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 West and East Forks of the White River, the White River, and the Wabash River. 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, and SPC-3, the standard for coal mine wastes and drainage.

Water samples for the East Fork of the White River indicated that temperature, dissolved oxygen, and pH values were in compliance with the state standards. The fecal coliform levels exceeded the water quality standards for streams designated for partial body contact.

Water quality samples from the West Fork of the White River indicated that the temperature and dissolved oxygen levels were in compliance with the state standards. Maximum pH values have been recorded in November which exceeded the state standard. The fecal coliform levels sometimes violated the standard for partial body contact recreation.

The West and East Forks join to form the mainstem of the White River. Generally, the water quality of the White River met temperature, dissolved oxygen, and pH standards of the state. Fecal coliform levels sometimes exceeded maximum standards for partial body contact recreation.

Recently, there has been some concern over the PCB levels found in the water and fish in the East Fork of the White River near Bedford. These types of pollutants are quite persistent in the environment and they may continue to be detected for some time at this location.

Only three fish kills have been reported to the Indiana State Board of Health from Region Thirteen-A in the period 1974 to 1977. One was a fish kill of undetermined size and origin in the Wabash River in Knox County near Vincennes. Another was in Latta's Creek near Switz City in Greene County, which resulted from a misapplication of a pesticide. The third fish kill occurred in Lawrence County, near Williams, in Sulfur Creek and resulted from an industrial discharge.

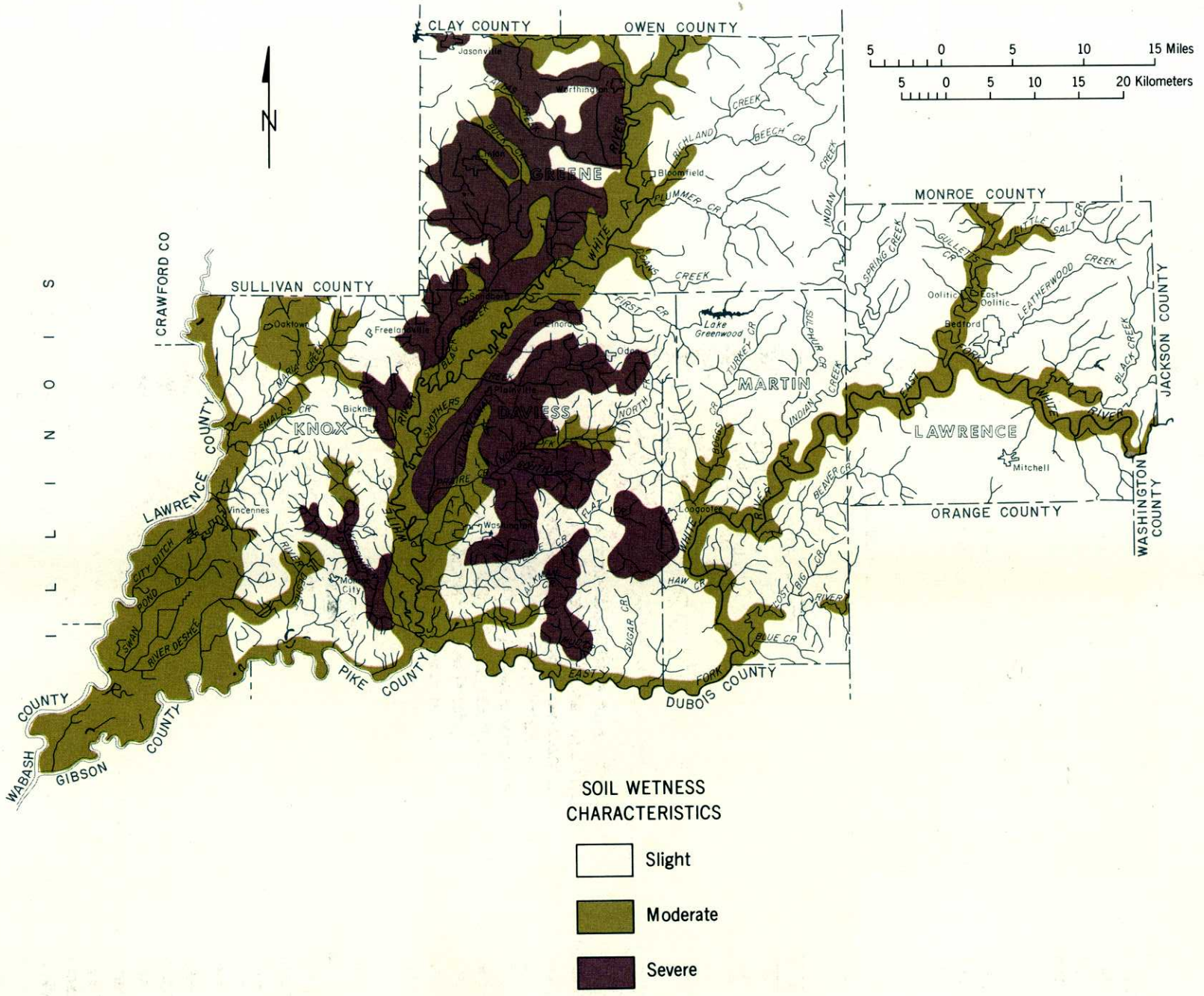


Figure 225
Map of Region Thirteen-A showing the general location of the wetness characteristics of soil associations.

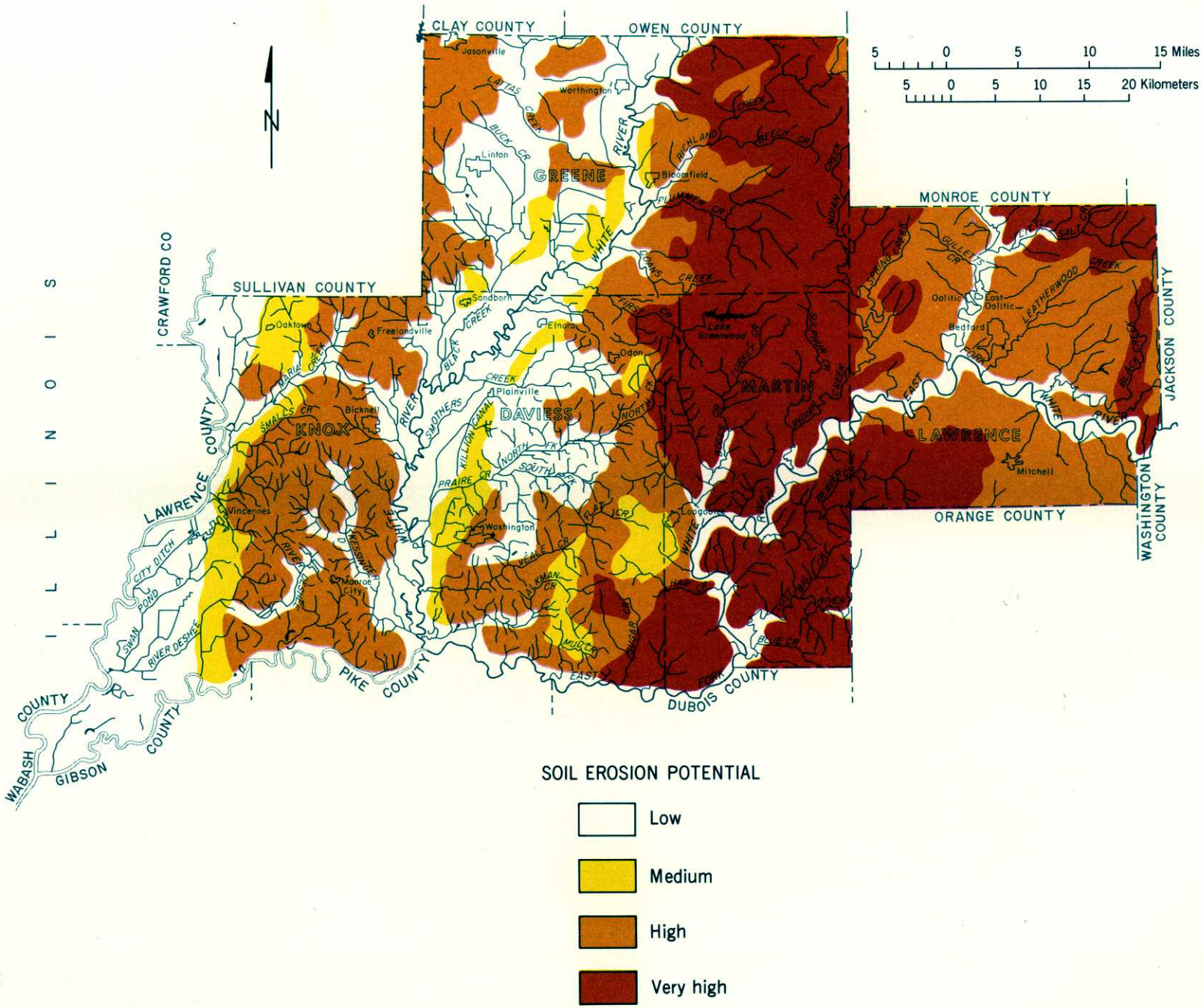


Figure 226
Map of Region Thirteen-A showing the erosion potential of the soil associations.