

the self-supplied water was derived from wells located on the individual plant properties.

The largest water-using industry group was comprised of small industries which withdrew 14.8 mgd. The manufacture of transportation equipment required 14.2 mgd, while the primary metals group used 6.5 mgd during 1977.

Although industrial output is expected to increase, total industrial water intake is expected to decrease initially due to plant efficiency and then slowly rise as output increases. In Region Six, industrial water usage is projected to decline to approximately 47.0 mgd by the year 2000. Self-supplied withdrawals may be reduced to 31.3 mgd. Data for industrial self-supplied withdrawals is given below.

Table 109

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

<i>Industrial Self-Supplied</i>	<i>1977</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>
Withdrawal	33.4	32.3	31.4	31.3
Consumption	4.7	5.0	.1	7.3

Rural Self-Supplied Water An estimated 168,300 residents of Region Six lived in homes supplied by individual wells in 1975, with estimated water withdrawals of approximately 9.9 mgd. By the year 2000, additional residents, along with the anticipated general rise in the standard of living, are expected to increase this rural residential water use to approximately 14.1 mgd.

In 1975 there were an estimated 492,700 head of livestock and about 440,400 chickens and turkeys. Collectively, these animals consumed approximately 2.9 mgd. By the year 2000, these animals may require 3.8 mgd. This water is usually supplied from wells on individual farms.

Total rural self-supplied water use for 1977 and the year 2000 is presented in the following table.

Table 110

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

<i>Rural Self-Supplied</i>	<i>1977</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>
Withdrawal	13.2	13.8	15.9	18.0
Consumption	13.2	13.8	15.9	18.0

Irrigation Water Based upon the survey of irrigated lands, approximately 400 acres were irrigated in 1977. Figure 141 shows the potential irrigation areas. Assuming 1977 as a normal growing year, the irrigation of agricultural cropland would have required about 1.1 mgd during the peak irrigation period of July and

August. Only 0.3 mgd of ground water is currently contributed to this irrigation demand.

It is estimated that 3,600 acres may be irrigated by the year 2000. The peak July–August irrigation demand in an "average" year is expected to increase to about 9.5 mgd. The "average" year ground-water use for agricultural demands is expected to increase to 5.11 mgd in the year 2000.

In addition to the irrigation for agricultural use, there are fairways and greens on the region's golf courses that require irrigation. About 2.58 mgd is applied to these areas during the peak July–August irrigation period.

The total withdrawal for irrigation of croplands and golf courses during the "average" irrigation season of 1977 was approximately 3.6 mgd. These withdrawals may increase to 12.1 mgd by the year 2000, as presented here.

Table 111

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

<i>Irrigation</i>	<i>1977</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>
Withdrawal	3.6	4.7	8.4	12.1
Consumption	3.6	4.7	8.4	12.1

Electric Energy Region Six does not contain any active electric power generating stations and none are anticipated.

EXCESS WATER

Flooding

Approximately 73,000 acres of the region are subject to flooding. The major flood plains are shown in Figure 142. Figure 143 delineates the average annual flood damages along selected streams. The average annual damages due to flooding were estimated in 1977 to be \$2,264,000, of which some fifty-three percent occurred in urban areas.

Flood Control The primary flood control project in the region is the levee system on the West Fork of White River in Muncie. This levee system was designed to improve the floodway channel between walls and levees. The project is comprised of 3.6 miles of earth levee, 0.9 mile of earth levee enlargement, 0.7 mile of concrete wall, 3.8 miles of channel improvement, pumping facilities to dispose of sewage and drainage from the protected areas during floods, and other associated structures. The protected area encompasses approximately 580 acres.

The Upper Big Blue River Small Watershed Project, authorized for construction in 1966, is the only small

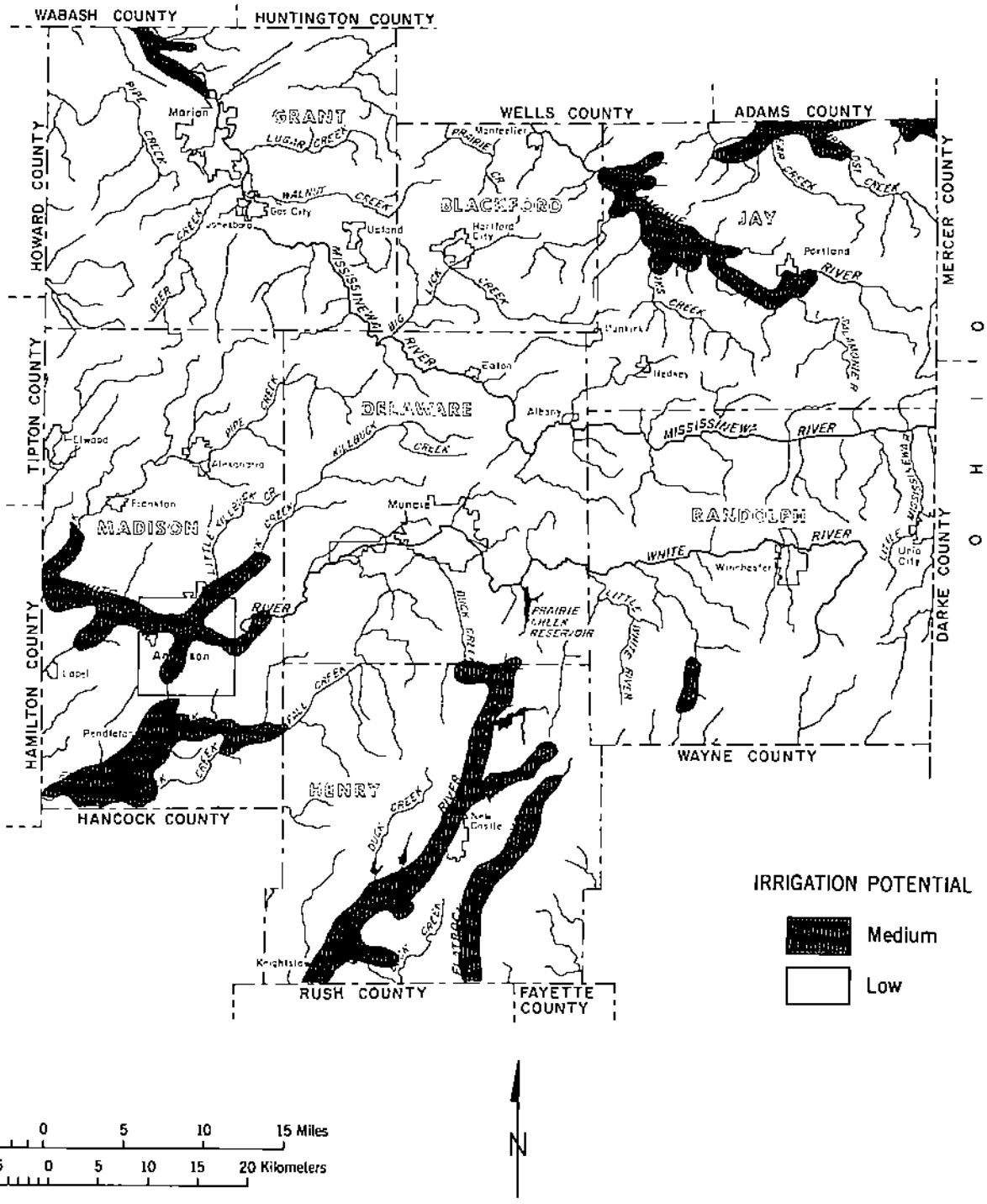


Figure 141
 Map of Region Six showing the general location of the soil associations that appear to possess an economic potential for the irrigation of croplands.

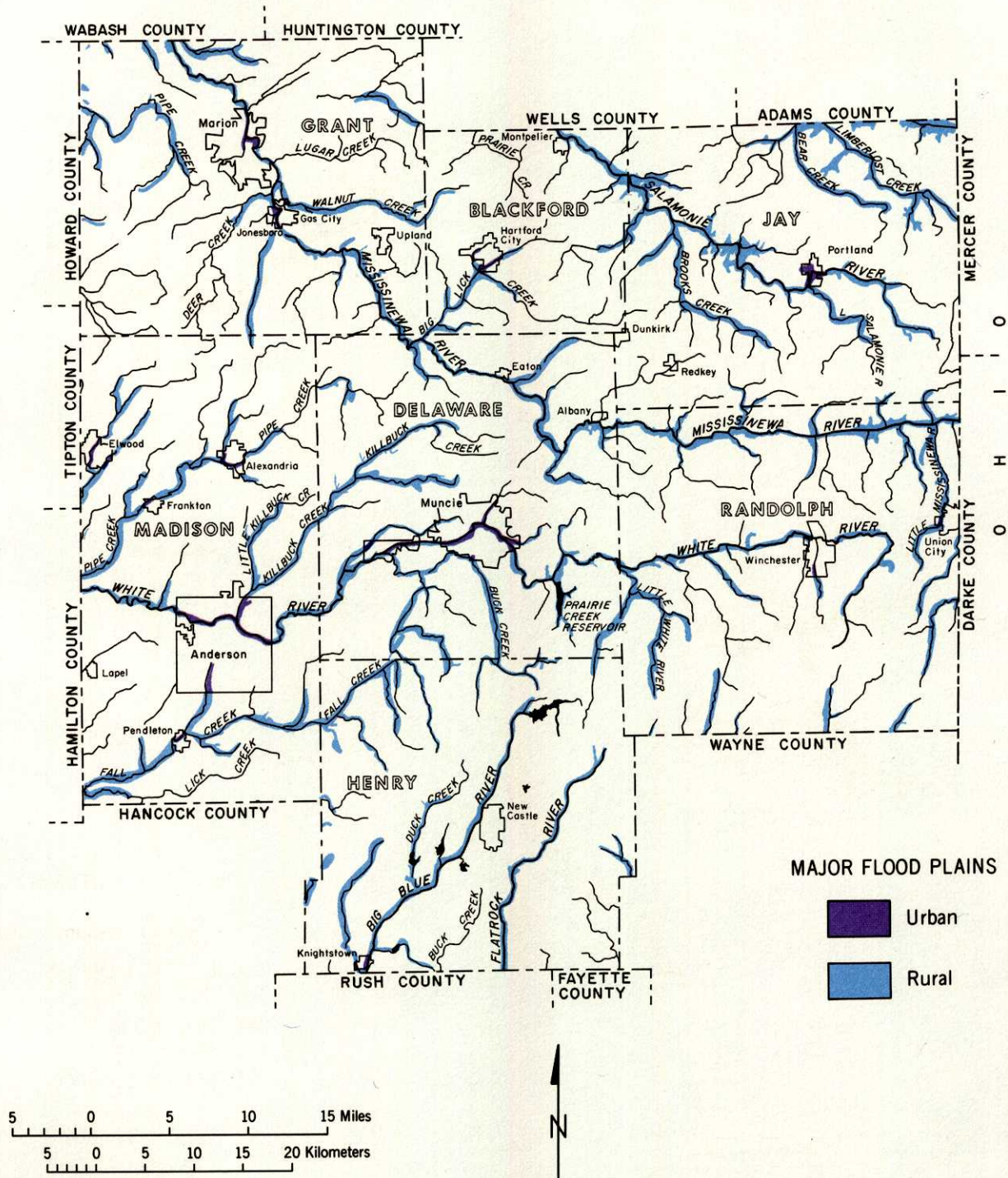


Figure 142
Map of Region Six showing the major floodplains.

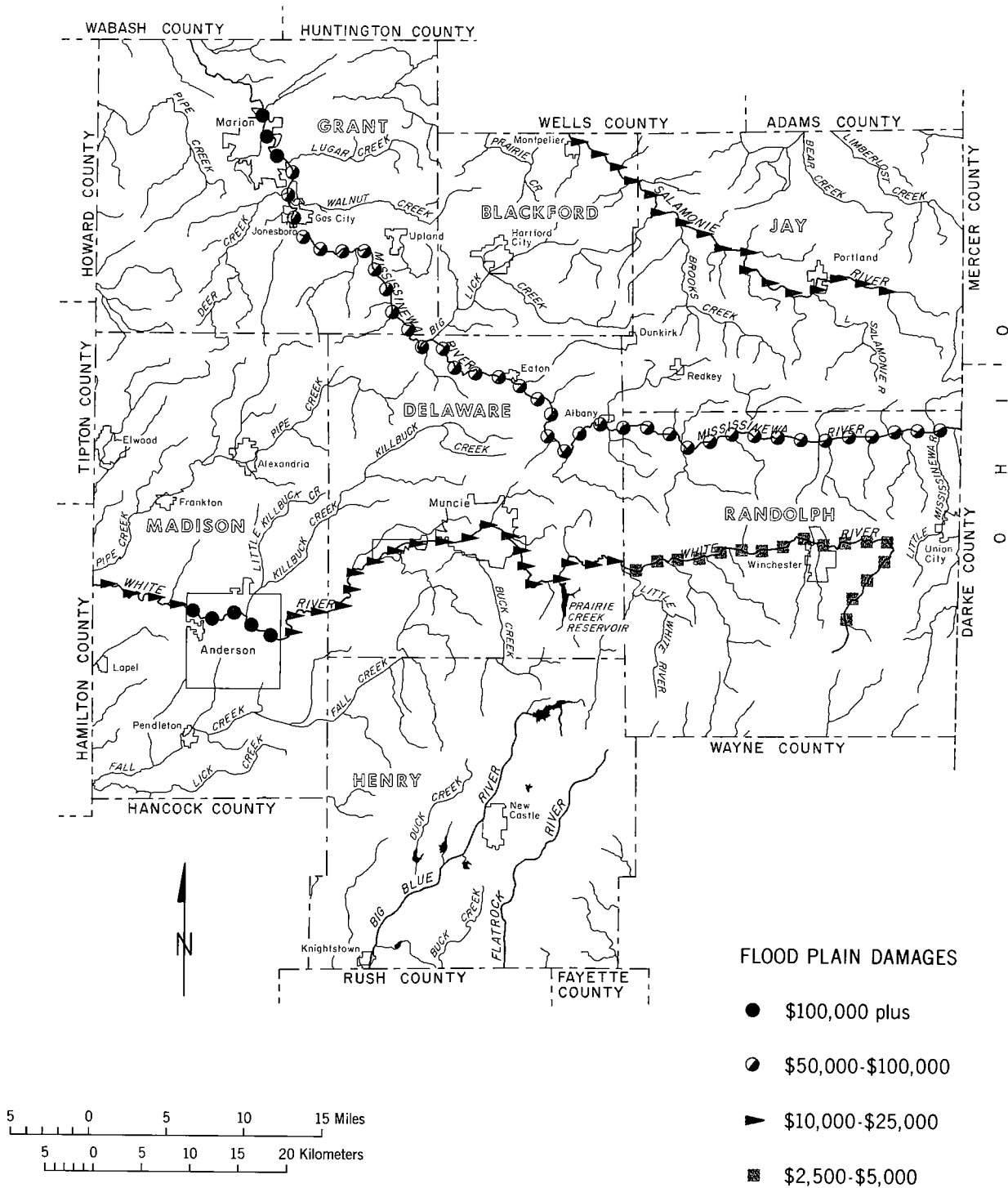


Figure 143
Map of Region Six showing the estimated average annual flood damages per mile along selected streams.

watershed project within the region. The structural measures included in this project are seven single-purpose flood water retarding structures, two multiple-purpose structures for flood prevention and low flow augmentation, two multiple-purpose structures for flood prevention water supply and recreational development, and 32.8 miles of channel improvement.

Of the region's several dams, four are used as water supplies while the remainder are utilized for recreation and flood control.

Flood Plain Management The communities that are participating in the emergency phase of the National Flood Insurance Program are listed below. Summitville in Madison County and Portland in Jay County are participating in the regular phase of the National Flood Insurance Program.

Table 112

Communities participating in the emergency phase of the National Flood Insurance Program.

Albany	Marion
Alexandria	Matthews
Anderson	Middletown
Chesterfield	Muncie
Delaware County, unincorporated	New Castle
Eaton	Parker City
Elwood	Pendleton
Fairmont	Portland
Farmland	Randolph County, unincorporated
Frankton	Ridgeville
Gas City	Springport
Hartford City	Summitville
Ingalls	Union City
Jonesboro	Winchester
Lewisville	Yorktown

Agricultural Drainage

Approximately sixty-six percent of the soil associations in Region Six have "severe" wetness characteristics, twenty-five percent have "moderate," while nine percent have "slight" wetness characteristics. The general location of the soil associations with these characteristics are shown in Figure 144.

Those areas that do not have a severe potential for soil wetness are located in Jay County in the north-west corner along the Salamonie River and in the north-central portion of the county along Limberlost Creek, in Madison County in the southwest corner along Fall Creek and west-central portion along Killbuck Creek and the West Fork White River, and in Henry County along the Big Blue and Flatrock Rivers.

There are approximately 4,500 miles of legal drains in the region, which serve as the main collector 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, conservancy districts. No legal entity exists to maintain drainage systems for the other streams in the region.

Soil Erosion

The erosion potential of soil associations within the region are shown in Figure 145. Twenty-four percent of the 1,715,200 acres are rated as having a "medium" soil erosion hazard. Such land has a moderate potential for soil loss when not protected by vegetation, or when appropriate conservation techniques are not practiced. These areas are usually located adjacent to major streams in the region. The remaining seventy-six percent of the land is predominantly level and ranks as having a "low" erosion potential for land left in a fallow state.

WATER QUALITY

The surface streams within Region Six routinely surveyed for water quality by the Indiana State Board of Health are the Mississinewa and West Fork of the White River. Water quality standards for the region are established by the Stream Pollution Control Board Regulation SPC IR-4, the Water Quality Standard for the State of Indiana.

Samples from the Mississinewa River at Marion indicated that the dissolved oxygen, temperature, and pH were in compliance with water quality standards. The level of the biochemical oxygen demand sometimes exceeded acceptable levels in July and August. On one occasion nitrate values exceeded desirable levels in June. Furthermore, levels of fecal coliform bacteria indicated that the stream did not meet standards for partial body contact recreation at the sampling location near Marion.

Dissolved oxygen levels in the White River frequently fell below the required concentration to support a diversified aquatic community. High levels of fecal coliform bacteria frequently violated standards for partial body contact recreation. No values which violate nitrate or pH standards were observed.

Nine fish kills in the region have been reported to the Indiana State Board of Health during the period 1974 to 1977. Five fish kills have been investigated in Delaware County and resulted from a sewer bypass into the White River, a chemical spill into the White River, a sewage treatment package plant malfunction into Thurston Ditch, and two spills of undetermined cause. The highest fish mortality was approximately 8,800 during the sewer bypass incident in the Muncie

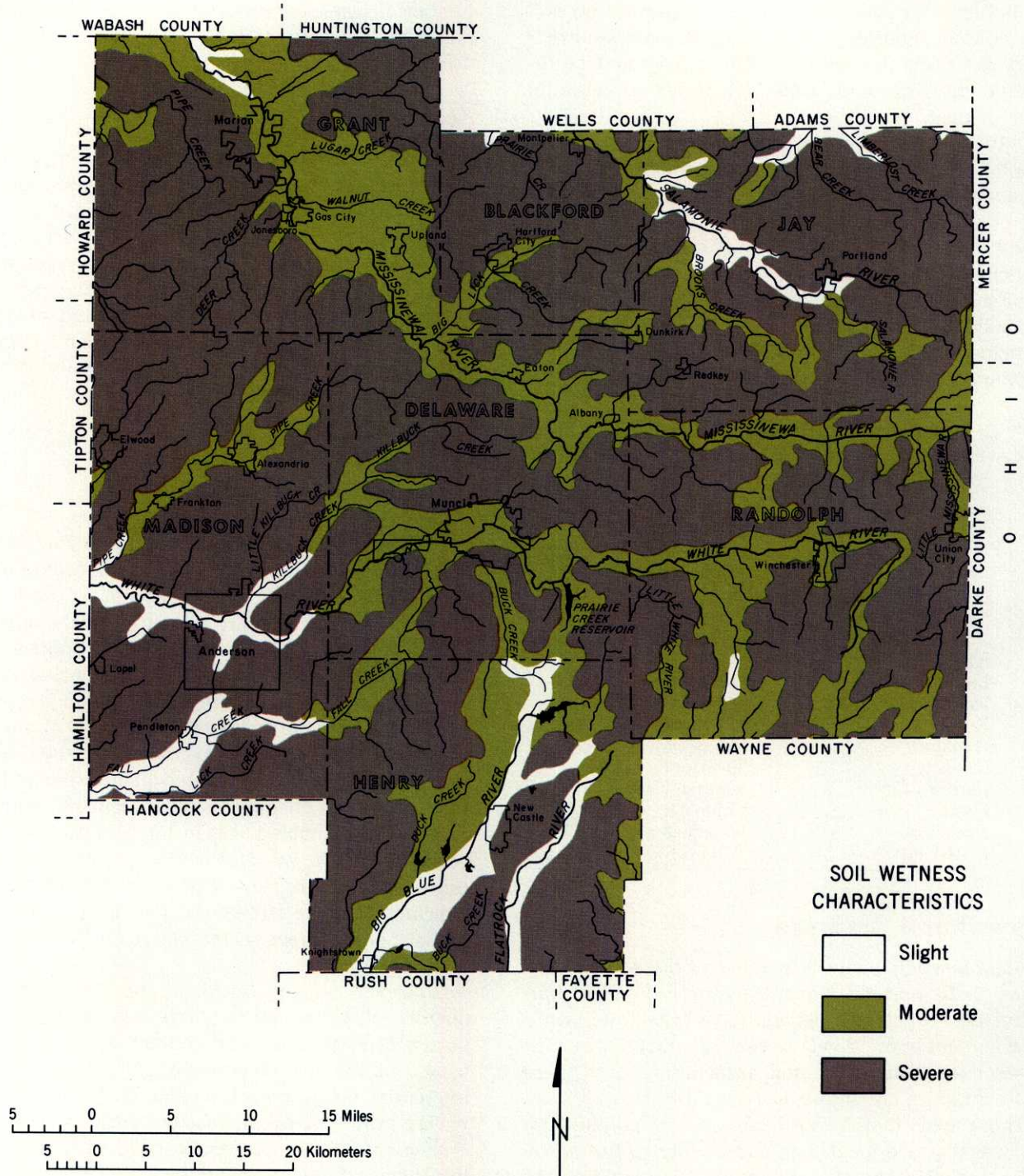


Figure 144
 Map of Region Six showing the general location of the wetness characteristics of soil associations.

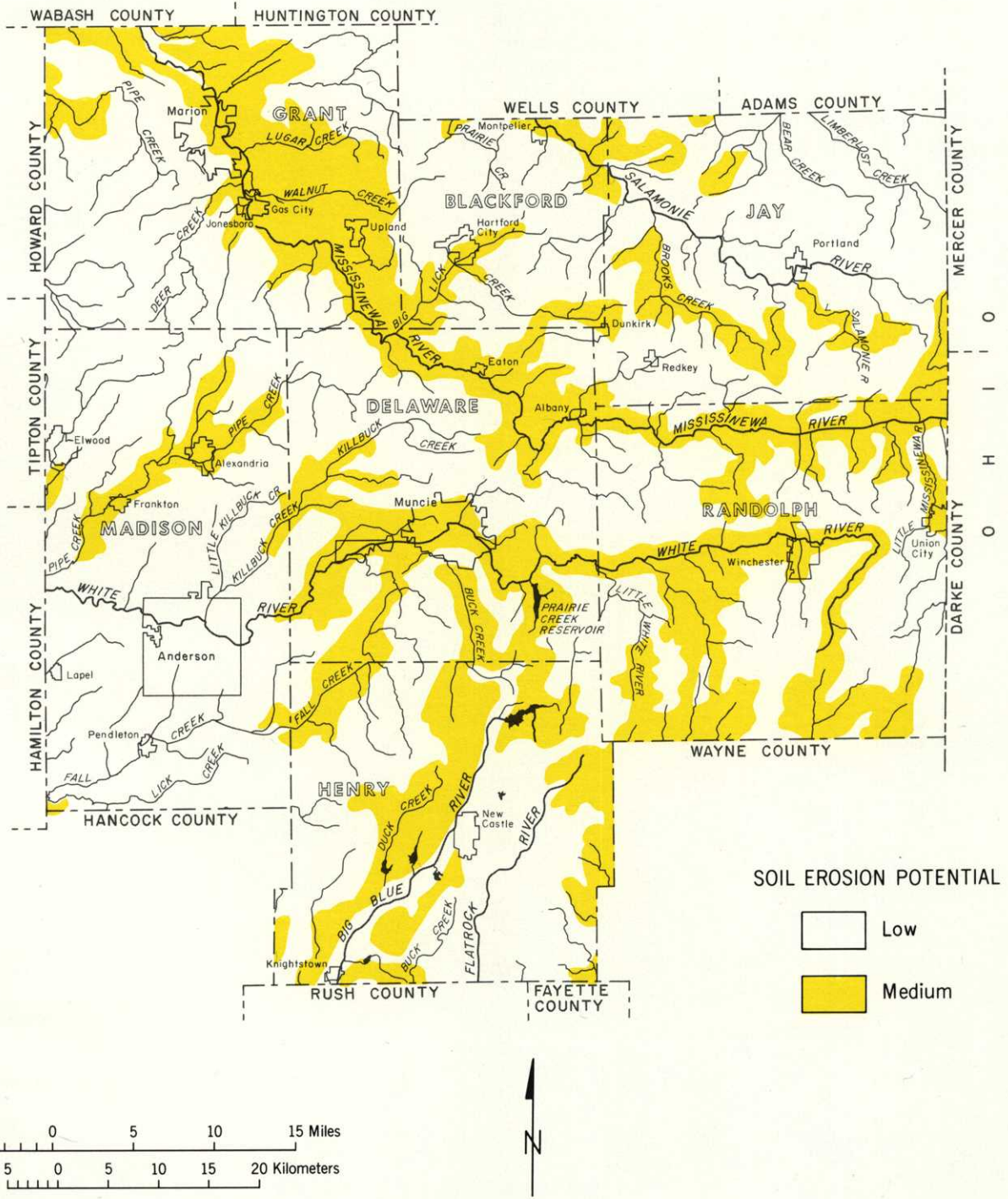


Figure 145
 Map of Region Six showing the erosion potential of the soil associations.

area. Three fish kills have been reported in Grant County with two resulting from industrial discharge to Little Pipe Creek near Swayzee. Only one fish kill (680 fish) was reported from Jay County and resulted from a discharge of inadequately treated sewage to the Salamonie River. Reported fish kills have not been frequent and were confined primarily to urban areas.

The trophic classification of those lakes surveyed by the Stream Pollution Control Board in Region Six is presented in Table 113.

Table 113
Trophic classification of lakes surveyed.

<i>Lake</i>	<i>County</i>	<i>Age Classification</i>
Galacia	Grant	III
Kilgore	Grant	III