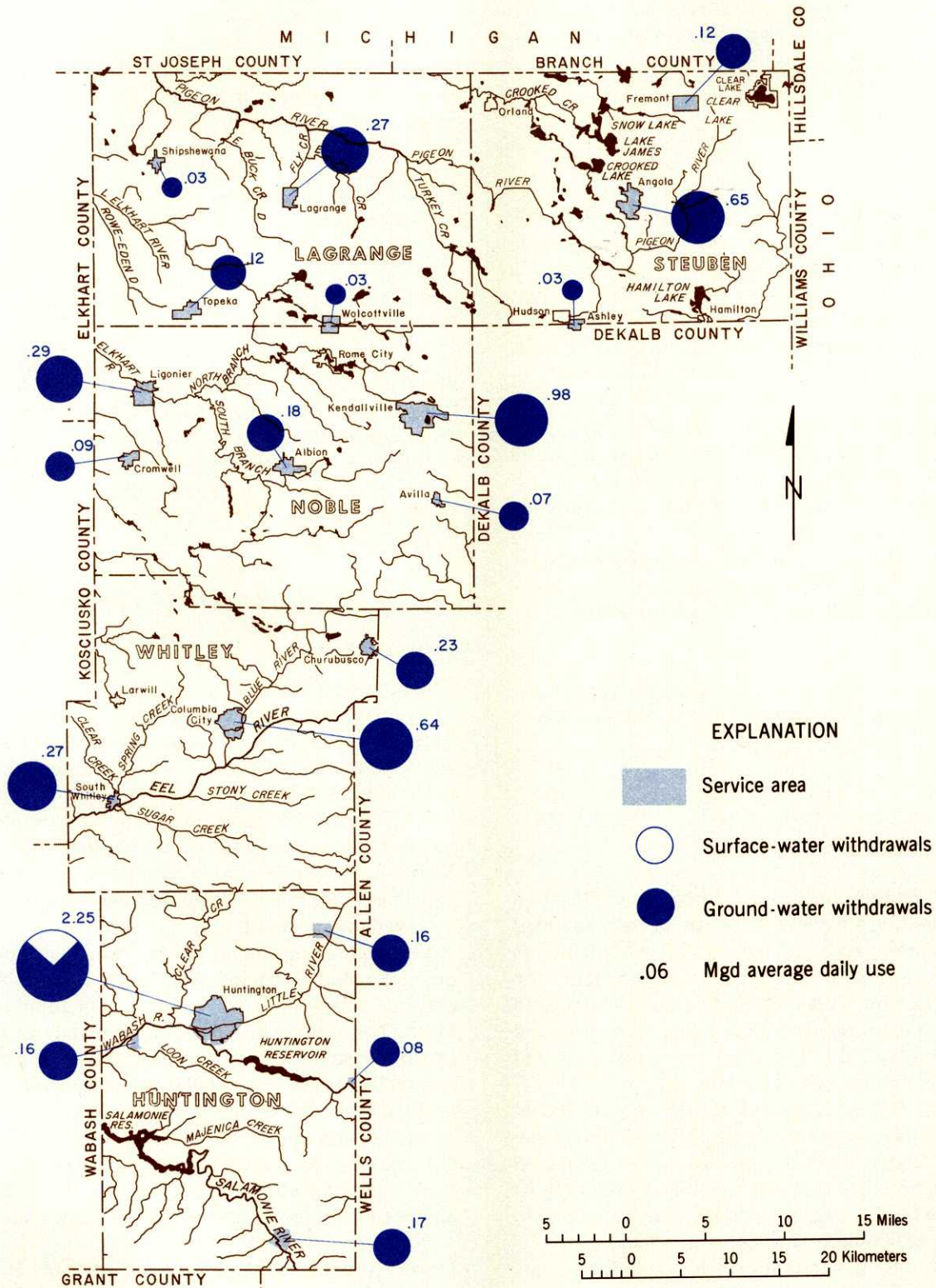


**Figure 91**  
Map of Region Three-A showing the quality of the riparian habitat.



**Figure 92**  
Map of Region Three-A showing the service areas of the public water utilities and average daily use in million-gallons-per-day.



**Table 64**

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

| <i>Industrial Self-Supplied</i> | 1977 | 1980 | 1990 | 2000 |
|---------------------------------|------|------|------|------|
| Withdrawal                      | 2.8  | 2.9  | 3.0  | 3.2  |
| Consumption                     | 0.3  | 0.4  | 0.5  | 0.6  |

**Rural Self-Supplied Water** An estimated 88,000 persons lived in homes supplied by individual wells in 1975. Approximately 5.2 mgd of this rural self-supplied water was used for residential purposes. By the year 2000, the population may increase by 61,800. An estimated 52,600 additional persons may depend on their own wells for household water. The withdrawal of rural self-supplied residential water may increase to approximately 10.6 mgd by the year 2000.

In 1975, an estimated 386,100 head of livestock and 1,070,000 chickens were located within the region. Collectively, these animals will consume approximately 3.2 mgd by the year 2000.

The total withdrawal for rural self-supplied water may increase from the current 8.8 mgd to approximately 13.9 mgd by the year 2000, as presented here.

**Table 65**

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               | 8.8  | 9.4  | 11.7 | 13.9 |
| Consumption              | 8.8  | 9.4  | 11.7 | 13.9 |

**Irrigation Water** LaGrange, Noble, and Steuben Counties are the most favorable areas for expanded irrigation of croplands in Region Three-A. Figure 93 shows the soil associations with potential for profitable irrigation. Based upon the survey of irrigated croplands, approximately 14,850 acres were irrigated in the region in 1977. The principal crops irrigated were corn, potatoes, and soybeans.

Assuming 1977 as a normal growing year, these crops would have required about 39.0 mgd during the peak July–August irrigation season. It was estimated that approximately 80,000 acres could be profitably irrigated. The 1977 irrigated average was expected to increase to 23,800 acres by the year 2000.

In addition to the irrigation for agricultural use, fairways and greens on the region's golf courses were irrigated. About 0.9 mgd was applied to these areas during the peak July-August irrigation season.

The expansion of irrigation acreage, and the irrigation of golf courses, is expected to raise the peak July-August irrigation demand in an "average" season

to about 63.8 mgd as indicated in Table 66. In wetter growing years, less water will be required while during drier seasons, more water will be applied. The average season withdrawal of ground water for croplands is expected to increase from the current rate of 26.8 mgd to 46.0 mgd by the year 2000.

**Table 66**

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        | 40.0 | 43.1 | 53.4 | 63.8 |
| Consumption       | 40.0 | 43.1 | 53.4 | 63.8 |

**Electrical Energy** Rinkel Dam is the only hydroelectric power facility in the region. Hydroelectric power is discussed in the section "Instream Uses." At the present time no electrical generating stations, other than the Rinkel hydroelectric plant, occur in Region Three-A nor are any anticipated within the next twenty-five years.

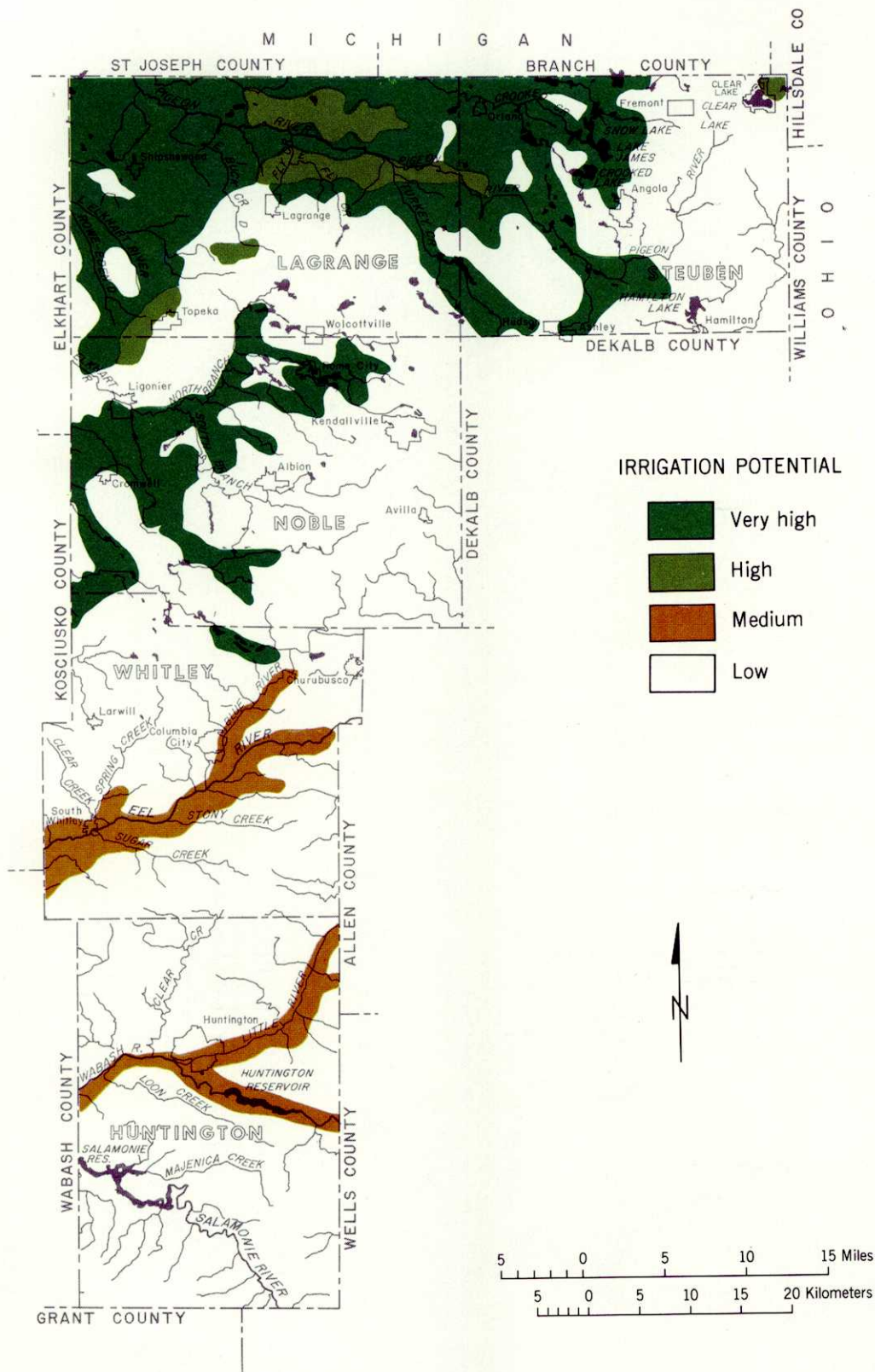
## EXCESS WATER

### Flooding

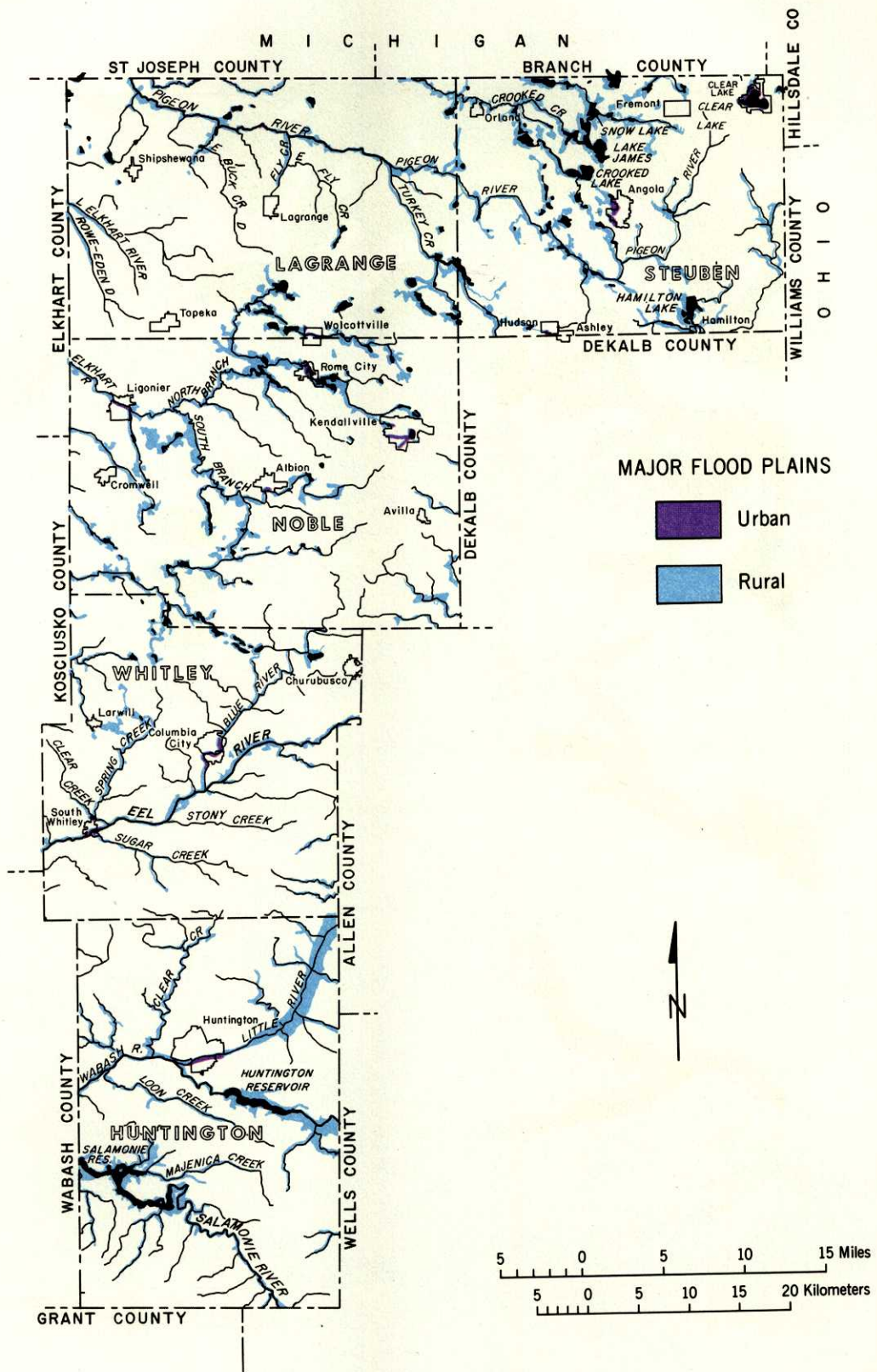
Approximately 40,200 acres of the region are subject to flooding. The major flood plains are shown in Figure 94. Figure 95 delineates the average annual flood damages along selected streams within the region. The average annual damages due to flooding were estimated in 1977 to be \$900,000, of which some eighty-eight percent occurs in rural areas. A portion of the St. Joseph River basin is also located in the region, but information on flood damage and flood plain acreage is not available at this time.

Minor flood problems of the nuisance type occur once or twice a year on the Pigeon, Elkhart, and Tippecanoe Rivers. Severe flooding is a relatively rare event. The numerous lakes and wetlands in the area retain excess water and thereby help to reduce flooding on the rivers. Some lakes, however, have flooding problems due to the fluctuating water stages caused by inadequate outlet conditions. The Little, Salamonie, Eel, and Wabash Rivers are prone to frequent and severe flooding, which is primarily due to the large amount of precipitation during the winter and spring.

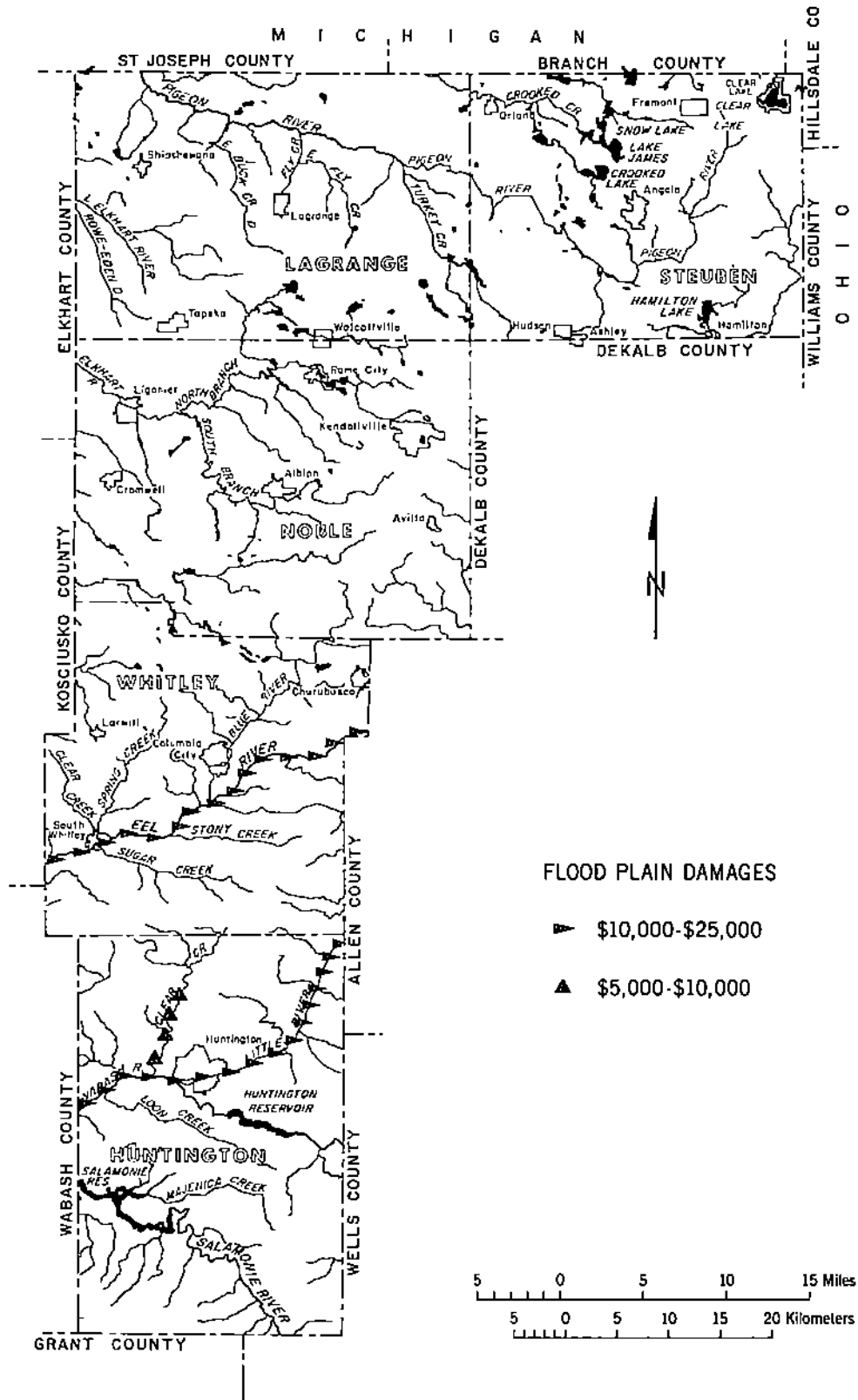
**Flood Control** Huntington Lake, the only flood control project in the region, was completed in 1969 by the United States Army Corps of Engineers in cooperation with the State of Indiana. The control structure and dam for Huntington Lake is located in Huntington County about two miles south of the city of Huntington. The lake receives runoff from a drainage area of



**Figure 93**  
 Map of Region Three-A showing the general location of the soil associations that appear to possess an economic potential for the irrigation of croplands.



**Figure 94**  
Map of Region Three-A showing the major floodplains.



**Figure 95**  
 Map of Region Three-A showing the estimated average annual flood damages per mile along selected streams.



approximately 707 square miles, including parts of Wells and Adams Counties and the State of Ohio.

The Rock Creek Small Watershed Project is the only small watershed project within the region. The major works of improvement include 24.1 miles of debris removal on Mossberg Drain. Supplemental additions to reduce the adverse environmental effects include 14.7 miles of one-sided channel construction, fish pools throughout most of the length of the Rock Creek main channel, and replanting of approximately fifty-one acres of trees and shrubs adjacent to the berm. This project is designed to reduce flood water damages on Rock Creek by sixty-four percent.

**Flood Plain Management** Several communities are participating in the emergency phase of the National Flood Insurance Program as listed in the following table. Unincorporated Noble County and Churubusco are participating in the regular phase of the National Flood Insurance Program.

**Table 67**  
Communities participating in the emergency phase of the National Flood Insurance Program.

|               |                 |
|---------------|-----------------|
| Angola        | South Whitley   |
| Cedar Lake    | Steuben County, |
| Columbia City | unincorporated  |
| Hamilton      | Whitley County, |
| Hudson        | unincorporated  |
| Huntington    | Warren          |

### Agricultural Drainage

Approximately nineteen percent of soil associations in Region Three-A have "severe" wetness characteristics, fifty-eight percent have "moderate" wetness characteristics, while twenty-three percent have "slight" wetness characteristics. The general location of soil associations with these wetness characteristics are shown in Figure 96. Those areas with "slight" wetness are located along the basins of the Fawn and Pigeon Rivers in northern Steuben and LaGrange Counties, along the Eel River in Whitley County, and along Little River in Huntington County.

Approximately 3,600 miles of legal drains occur 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, of conservancy districts.

### Soil Erosion

The erosion potential of soil associations within Region Three-A are shown in Figure 97. Fifty-seven

percent of the 1,167,900 acres in the region are rated as having a "medium" soil erosion hazard. Such land has a moderate potential for soil loss when not adequately protected by vegetation or when conservation techniques are not practiced. These areas are located primarily in the eastern half of Steuben and Noble Counties, the southeastern corner of LaGrange County, the northern half of Whitley County, and along the Wabash, Little, and Salamonie Rivers in Huntington County. The remaining forty-three percent of the land is predominately level and ranks as having a "low" erosion potential for land in a fallow state.

## WATER QUALITY

The surface streams within Region Three-A routinely surveyed for water quality by the Indiana State Board of Health are the Wabash, Salamonie, Pigeon, and the North and South Branches of the Elkhart 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.

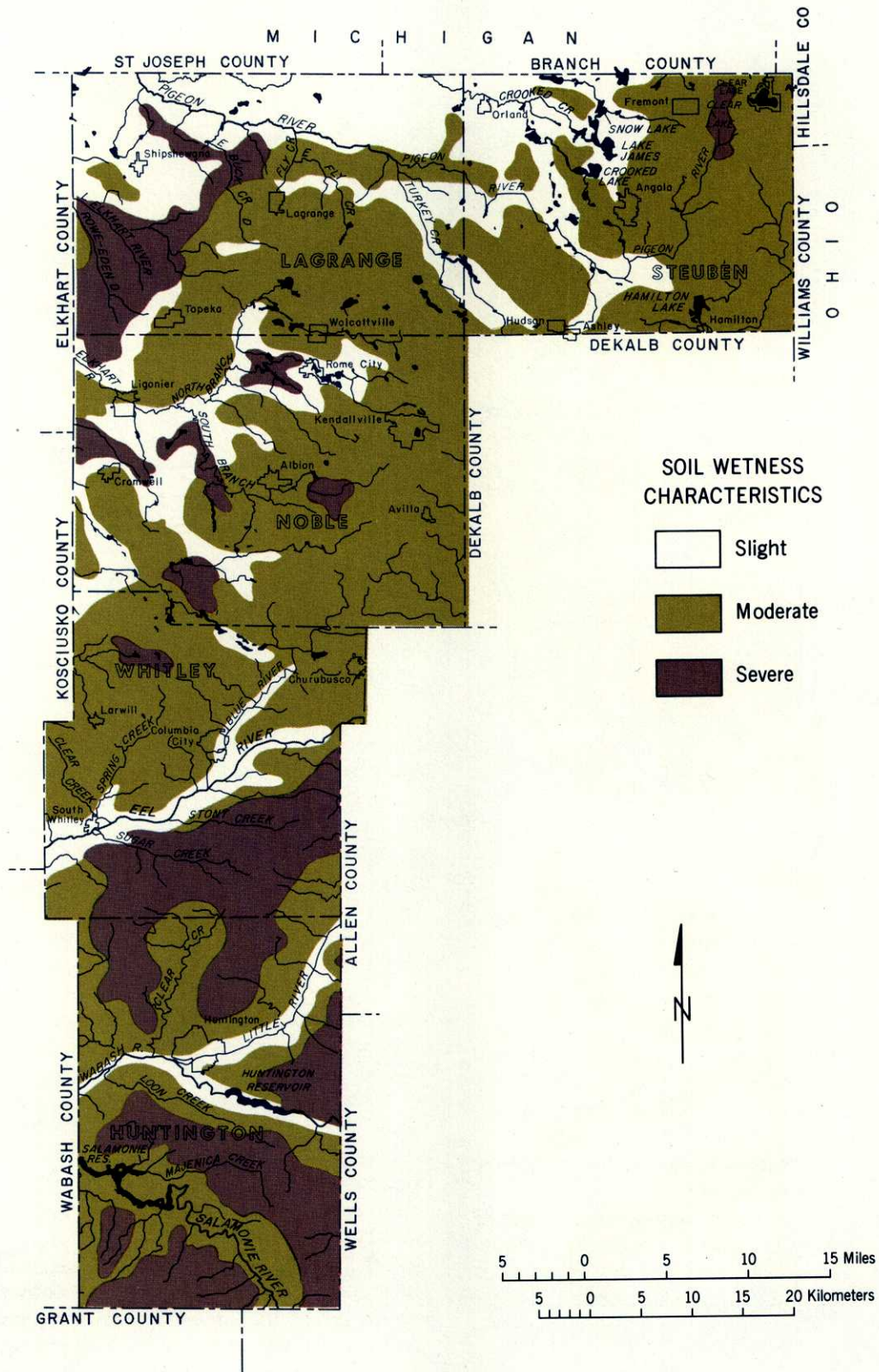
Water quality for the Salamonie River at Lancaster was within the recommended standards for temperature and dissolved oxygen. The biochemical oxygen demand, a measure of the amount of oxygen consumed in the biological processes that breakdown organic matter in water, was at an acceptable level. The only parameter which occasionally reached unacceptable levels was nitrate, a potential nutrient source for algae. Also, concentrations of fecal coliform bacteria often violated the state's partial body contact standard.

Nitrate levels in the Wabash River near Huntington exceeded recommended levels for raw drinking water in June and July. Although the concentrations of fecal coliform bacteria met the criterion for partial body contact, total coliform bacteria levels have at times been in violation of the raw drinking water criterion.

The North and South Branches of the Elkhart River were found to have good water quality as related to various parameters examined. Only minor violations of National Pollution Discharge Elimination System limits were found within the stream's basin during intensive surveys.

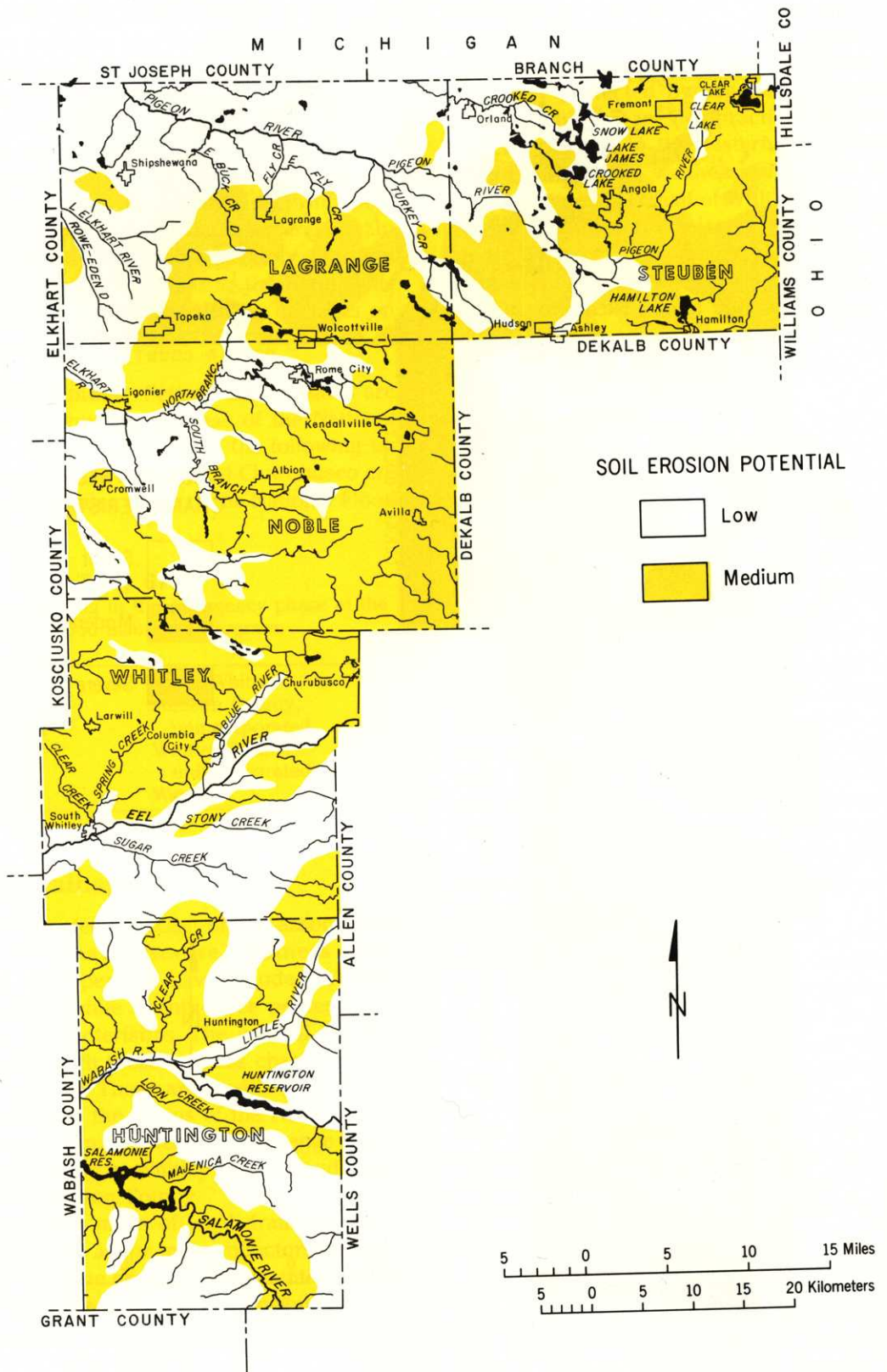
The Pigeon River, Crooked Creek, and Fawn River have had problems that relate primarily to inadequate treatment at the municipal sewage treatment plants and semi-public dischargers. The municipalities have various projects under way to alleviate these problems.

The trophic or age classification of those lakes surveyed by the Stream Pollution Control Board in Region Three-A are presented in Table 68.



**Figure 96**  
 Map of Region Three-A showing the general location of the wetness characteristics of soil associations.





**Figure 97**  
 Map of Region Three-A showing the erosion potential of the soil associations.

**Table 68**  
Trophic classification of lakes surveyed.

**Table 68 (continued)**

| <i>Lake</i> | <i>County</i> | <i>Age Classification</i> |
|-------------|---------------|---------------------------|
| Adams       | LaGrange      | II                        |
| Anne        | Steuben       | II                        |
| Appleman    | LaGrange      | II                        |
| Atwood      | LaGrange      | I                         |
| Ball        | Steuben       | II                        |
| Bartley     | Noble         | II                        |
| Bass        | Steuben       | II                        |
| Baughner    | Noble         | III                       |
| Bear        | Noble         | II                        |
| Bell        | Steuben       | I                         |
| Big         | Noble         | II                        |
| Big Bar Bee | Noble         | II                        |
| Big Bower   | Steuben       | III                       |
| Big Center  | Steuben       | III                       |
| Big Long    | LaGrange      | II                        |
| Big Otter   | Steuben       | III                       |
| Big Pigeon  | Steuben       | III                       |
| Big Turkey  | Steuben       | II                        |
| Bixler      | Noble         | II                        |
| Black       | Steuben       | II                        |
| Blackman    | Steuben       | I                         |
| Blue        | Whitley       | II                        |
| Bowen       | Noble         | II                        |
| Bristol     | Noble         | II                        |
| Brokeshaw   | LaGrange      | I                         |
| Buck        | Steuben       | II                        |
| Cass        | LaGrange      | II                        |
| Cedar       | LaGrange      | I                         |
| Cedar       | Whitley       | I                         |
| Cheeseboro  | Steuben       | II                        |
| Clear       | Steuben       | I                         |
| Cotton      | LaGrange      | III                       |
| Crane       | Noble         | II                        |
| Cree        | Noble         | II                        |
| Crooked     | Noble-Whitley | I                         |
| Crooked     | Steuben       | I                         |
| Dallas      | LaGrange      | II                        |
| Deep        | Noble         | II                        |
| Diamond     | Noble         | I                         |
| Dock        | Noble         | II                        |
| Emma        | LaGrange      | II                        |
| Engles      | Noble         | II                        |
| Eve         | LaGrange      | I                         |
| Failing     | Steuben       | I                         |
| Femmel      | LaGrange      | II                        |
| Fish        | LaGrange      | II                        |
| Fish        | Steuben       | III                       |
| Fox         | Steuben       | II                        |
| Gage        | Steuben       | I                         |
| George      | Steuben       | I                         |
| Gillbert    | Noble         | II                        |
| Golden      | Steuben       | III                       |
| Goose       | Whitley       | III                       |
| Gooseneck   | Steuben       | I                         |
| Gordy       | Noble         | II                        |
| Grass       | Steuben       | I                         |
| Gravel      | Steuben       | I                         |
| Green       | Steuben       | I                         |
| Greene      | LaGrange      | III                       |
| Hackenburg  | LaGrange      | II                        |

| <i>Lake</i>       | <i>County</i> | <i>Age Classification</i> |
|-------------------|---------------|---------------------------|
| Hall              | Noble         | I                         |
| Hamilton          | Steuben       | II                        |
| Harper            | Noble         | III                       |
| Hayward           | LaGrange      | II                        |
| Henderson         | Noble         | III                       |
| Henry             | Steuben       | II                        |
| High              | Noble         | III                       |
| Hogback           | Steuben       | III                       |
| Horseshoe         | Noble         | II                        |
| Howard            | Steuben       | III                       |
| Jimmerson         | Steuben       | I                         |
| Jones             | Noble         | II                        |
| Knapp             | Noble         | II                        |
| Lake James        | Steuben       | I                         |
| Lake Pleasant     | Steuben       | II                        |
| Lake of the Woods | LaGrange      | I                         |
| Larwill           | Whitley       | II                        |
| Latta             | Noble         | II                        |
| Lindsey           | Noble         | II                        |
| Lime              | Steuben       | I                         |
| Little Bower      | Steuben       | III                       |
| Little Center     | Steuben       | III                       |
| Little Crooked    | Whitley       | II                        |
| Little Long       | Noble         | II                        |
| Little Otter      | Steuben       | III                       |
| Little Pigeon     | Steuben       | III                       |
| Little Turkey     | LaGrange      | II                        |
| Loon              | Whitley       | II                        |
| Loon              | Steuben       | III                       |
| Long              | Steuben       | I                         |
| Long              | Steuben       | III                       |
| Long              | Noble         | II                        |
| Marsh             | Steuben       | III                       |
| Martin            | LaGrange      | II                        |
| McLish            | Steuben       | I                         |
| Meserve           | Steuben       | I                         |
| Messick           | LaGrange      | II                        |
| Meteer            | Steuben       | I                         |
| Middle Center     | Steuben       | III                       |
| Millers           | Noble         | II                        |
| Mirror            | Steuben       | I                         |
| Muncie            | Noble         | II                        |
| Navoo             | LaGrange      | II                        |
| New               | Whitley       | I                         |
| Norman            | Noble         | II                        |
| North Twin        | LaGrange      | I                         |
| Old               | Whitley       | II                        |
| Olin              | LaGrange      | I                         |
| Oliver            | LaGrange      | I                         |
| Otter             | Steuben       | II                        |
| Pigeon            | LaGrange      | II                        |
| Pleasant          | Noble         | II                        |
| Pleasant          | Steuben       | I                         |
| Port Mitchell     | Noble         | II                        |
| Pretty            | LaGrange      | I                         |
| Rainbow           | LaGrange      | II                        |
| Pine              | Whitley       | II                        |
| Rivir             | Noble         | II                        |
| Round             | Steuben       | I                         |
| Round             | Steuben       | II                        |

**Table 68 (continued)**

| <i>Lake</i> | <i>County</i> | <i>Age<br/>Classification</i> |
|-------------|---------------|-------------------------------|
| Round       | Steuben       | I                             |
| Round       | Steuben       | I                             |
| Round       | Whitley       | II                            |
| Royer       | LaGrange      | II                            |
| Sacanider   | Noble         | II                            |
| Sand        | Noble         | I                             |
| Scott       | Whitley       | I                             |
| Shipshewana | LaGrange      | III                           |
| Shockopee   | Noble         | II                            |
| Shriner     | Whitley       | I                             |
| Silver      | Noble         | II                            |
| Silver      | Steuben       | II                            |
| Skinner     | Noble         | II                            |
| Smalley     | Noble         | II                            |
| Snow        | Steuben       | I                             |
| South Twin  | LaGrange      | I                             |
| Sparta      | Noble         | II                            |
| Stayner     | Steuben       | III                           |

**Table 68 (continued)**

| <i>Lake</i> | <i>County</i> | <i>Age<br/>Classification</i> |
|-------------|---------------|-------------------------------|
| Still       | LaGrange      | I                             |
| Stone       | LaGrange      | I                             |
| Strenbarger | Noble         | II                            |
| Sweet       | Noble         | II                            |
| Sylvan      | Noble         | III                           |
| Tamarack    | Noble         | II                            |
| Tamarack    | Noble         | III                           |
| Taylor      | LaGrange      | II                            |
| Troy-Cedar  | Whitley       | III                           |
| Upper Long  | Noble         | II                            |
| Village     | Noble         | III                           |
| Waldron     | Noble         | II                            |
| Wall        | LaGrange      | I                             |
| Warner      | Steuben       | II                            |
| Westler     | LaGrange      | I                             |
| Wible       | Noble         | III                           |
| Williams    | Noble         | II                            |
| Witmer      | Steuben       | II                            |