SANDUSKY RIVER BASIN

Draining 1420 square miles, the Sandusky River forms at the confluence of Paramour Creek and Allen Run and extends about 115 stream miles to its mouth in Sandusky Bay. Paramour Creek gathers in morainal hills near Crestline. The Sandusky River is joined by Broken Sword Creek southwest of Nevada. The Broken Sword has drainage area of 95 square miles. Not far downstream, the Little Sandusky contributes 38 square miles of drainage area. Tymochtee Creek drains 302 square miles in the western part of the upper basin and joins the Sandusky about midway between Upper Sandusky and Tiffin. Sycamore Creek, Honey Creek, and Rock Creek flow into the Sandusky from the east contributing 64, 179, and 35 square miles, respectively. Most of the western half of the lower basin is drained by Wolf Creek with a drainage area of 158 square miles. Muskellunge Creek drains 47 square miles of the lower western basin joining the Sandusky north of Fremont. Green Creek drains 81 square miles of the lower eastern part of the basin and joins the Sandusky at its mouth in Sandusky Bay.

Physiography

The Sandusky River Basin is about equally divided between the Till Plains and the Lake Plains. The upper portion of the basin is in the Central Ohio Clayey Till Plain while the lower portion is in the Maumee Lake Plains. Paramour Creek, at the head of the Sandusky River, gathers in the Galion Glaciated Low Plateau. From the confluence of Paramour Creek and Allen Run, the Sandusky flows southwestward along the outer margin of the Wabash End Moraine. At the Crawford-Wyandot county line, the river crosses the moraine and flows northwest toward Upper Sandusky crossing the Fort Wayne Moraine along the way. About midway between Upper Sandusky and Tiffin the river crosses the Defiance End Moraine. At Tiffin, it leaves the till plain and flows onto the lake plain.

The gradient of the Sandusky River is extremely variable. In some places the fall is 2 feet per mile and in other places, such as north of Tiffin, it is 25 feet per mile. The stream gradient reflects underlying substrates. Just north of Tiffin the substrate is thick erodible deltaic silt; near Fremont the stream flows directly on Silurian dolomite. In many places the river and its tributaries have cut through thin till to bedrock. Cobble and gravel substrate along its reaches consist of rounded granite and carbonate rock fragments. Upper reaches in the Galion Glaciated Low Plateaus contain sandstone and shale bed material. The Sandusky is a mildly entrenched river that meanders considerably along its course.

Geology

Nearly all the Sandusky River Basin consists of limestone, dolomite, and shale of Silurian and Devonian age. Headwater streams of the Sandusky are underlain with sandstone, limestone, and shale of Late Mississippian age. The bedrock is relatively dense and ground water storage is not great. The water table in the rock generally lies at or below drainage. The overburden of glacial drift and lacustrine deposits is generally thin and for the most part consists of materials with relatively low permeability. Sandy

lacustrine deposits are generally shallow and underlain by material of low permeability. Fractures in till afford some passages for ground water recharge.

Headwater areas of the Sandusky River gather where drift thickens in end moraines with relatively greater amounts of permeable sand and gravel deposits. The portion of the Defiance End Moraine where the Sandusky crosses contains significant amounts of sand and gravel deposits, and there are buried valleys with permeable deposits in the area. Flowing springs near the river are indicative of a ground water discharge area. East of Fremont, a shallow buried valley exists along Green Creek. The buried valley contains sand and gravel deposits that yield considerable amounts of ground water.

Soils

Soils in the Sandusky River Basin are more varied than in the Portage River Basin. Soil Regions 1, 3, and 5 are represented. Hoytville silty clay loam dominates the lower Lake Plain portion of the basin with less extensive areas of Ottokee and Tedrow sandy loam. Blount-Pewamo-Glynwood soils of Region 3 dominant the upper western portion of the basin while Bennington-Cardington soils of Region 5 dominate the eastern part of the upper basin. Blount-Pewamo-Glynwood soils of the upper western basin have slow permeability similar to Hoytville soils of the lower basin. Bennington-Cardington soils are moderately to slowly permeable.

Land Use

The Sandusky River Basin is divided between two land resource areas. The lower basin lies in the Erie-Huron Lake Plain Resource Area while the upper basin is in the Ohio-Indiana Till Plain Resource Area. Land use in the lower portion of the basin is dominated by farmland used for cash grain crops, specialty crops, and fruit crops. The upper portion of the basin is dominated by farmland used for grain crops and livestock production. Pasture and woodland account for about 10 percent of land use. A number of rock quarries discharge ground water to tributaries of the Sandusky River.

Water Development

The Sandusky River serves as source of water supply for Bucyrus, Upper Sandusky, Tiffin and Fremont. Bucyrus and Upper Sandusky pump water into off-stream storage while Tiffin and Fremont withdraw water directly from behind low-head dams. The Ballville low-head dam at Fremont has about 180 million gallons of storage. Attica and New Washington obtain source of supply from Honey Creek utilizing off-stream impoundments. An off-stream reservoir near Marseilles in Wyandot County is filled from Tymochtee Creek and supplies water for wetland management on the Killdeer Plains Wildlife Area. A number of communities obtain source of supply from ground water, the largest systems being at Crestline and Carey. Green Springs obtains water supply from wells. Wastewater return flows generated by water supply systems in the basin affect low-flow characteristics of streams to varying degrees.

Flow Characteristics

Mean annual flow of the Sandusky River at Fremont equates to 11.2 inches, typical runoff for most streams in the basin. Areas east of Bucyrus receive greater amounts of

annual precipitation, and this is reflected in the higher mean annual flow of 13.2 inches at Bucyrus. The relatively low mean annual flow of 10.3 inches given in Table 2 for Sandusky River at Mexico is mainly due to differences in period of record rather than basin hydrology. Base flow in the Sandusky River generally accounts for about one-third of mean annual runoff. This amount of base flow is in the lower range for streams in Ohio. Fifty percent duration flows at gaging stations along the Sandusky average about 0.2 cfs per square mile, a relatively low value indicating that ground-water storage in the basin is not great.

The 90-percent duration flows at various stations along the Sandusky are uniformly low averaging about 0.03 cfs per square mile. The uniformity of low flows is somewhat contrary to what the physiology of the basin suggests as the till plain of the upper basin yields only modest ground-water accretions to streams and even less to the lake plain of the lower basin.. Low-flow augmentation from municipal wastewater discharges and dewatering flows from quarries contribute to the uniformity of low flows, but the basin geology remains the most important factor determining the low-flow regimen of streams. Paramour Creek at Leesville and the Sandusky River near North Robinson exhibit relatively high base-flow characteristics compared to those for the Sandusky River at downstream stations. Wastewater discharge at Crestline could account for the higher base flows, as might ground-water discharge from permeable materials in the morainal drift. Low flows of the Sandusky River at Bucyrus are affected by wastewater discharge that enters immediately upstream of the gage, but marked declines in effluent discharge during dry spells has historically lessened the direct impact on low flows.

Between Bucyrus and Upper Sandusky, the river may receive modest contributions of ground water from the end moraine and alluvial deposits bordering the channel. Baseflow characteristics of Broken Sword Creek and Tymochtee Creek are very low with 90-percent duration flow of 0.006 to 0.007 cfs per square mile. The Broken Sword receives little ground-water contribution from the Fort Wayne End Moraine that it flows along. Tymochtee Creek gathers in a lacustrine plain and flows across till plain neither yielding much ground water to sustain flows.

About half of the drainage area of the Sandusky River at Mexico is contained in the Broken Sword and Tymochtee drainages. That by itself should cause less favorable base flow at Mexico than observations reveal. Wastewater discharge at Upper Sandusky and Carey combined with dewatering flows from the rock quarry at Carey provide some augmentation flows but not of sufficient amount to explain the magnitude of base flows at Mexico. The Sandusky River apparently receives significant ground-water contribution as it crosses through the Defiance End Moraine in vicinity of McCutchenville.

Honey Creek at Melmore has base-flow characteristics slightly more favorable than Broken Sword Creek or Tymochtee Creek, but it receives little ground water to sustain flows from the Defiance Moraine that borders it. Rock Creek, that traverses the Defiance Moraine, has relatively high sustained flows, but the drainage area is too small to make much contribution to sustaining flows in the Sandusky.

Streams in the western portion of the lower basin contribute little base flow to sustain flows in the Sandusky River. The 90-percent duration flows of Wolf Creek and East Branch of Wolf Creek reported in Bulletin 40 are zero or near zero flow. Ground-water discharge to sustain flows in lower reaches of the Sandusky below Tiffin may originate with tributaries draining from the east and from rock exposures along the river.
Base flows of Green Creek near Fremont appear as an anomaly in the Sandusky River Basin. The 90-percent duration flow for Green Creek near Fremont reported in Bulletin 40 equates to 0.18 cfs per square mile, an exceptionally high value for the Sandusky Basin. Base flow of Green Creek is sustained by ground-water discharge from artesian springs originating in the limestone bedrock in the Green Springs area.

The 10-percent duration flows for streams in the Sandusky River Basin are comparatively low averaging 2.2 cfs per square mile. The 2-year recurrence interval flood-peak discharges are also relatively low, ranging from about 40 cfs per square mile for smaller gaged streams to about 12 cfs per square mile for the largest streams. Flat to moderately rolling topography of the basin and the relatively mild gradient of streams allows floodwaters to rise at moderate rates and recede gradually. Violent flash floods are not common in the basin. Channel forming flows, being relatively low, tend to favor channels with comparatively narrow bankfull widths. Accelerated runoff is common in headwater areas where streams have been channelized for drainage and flood control purposes.

Figure 71: Sandusky River Watershed

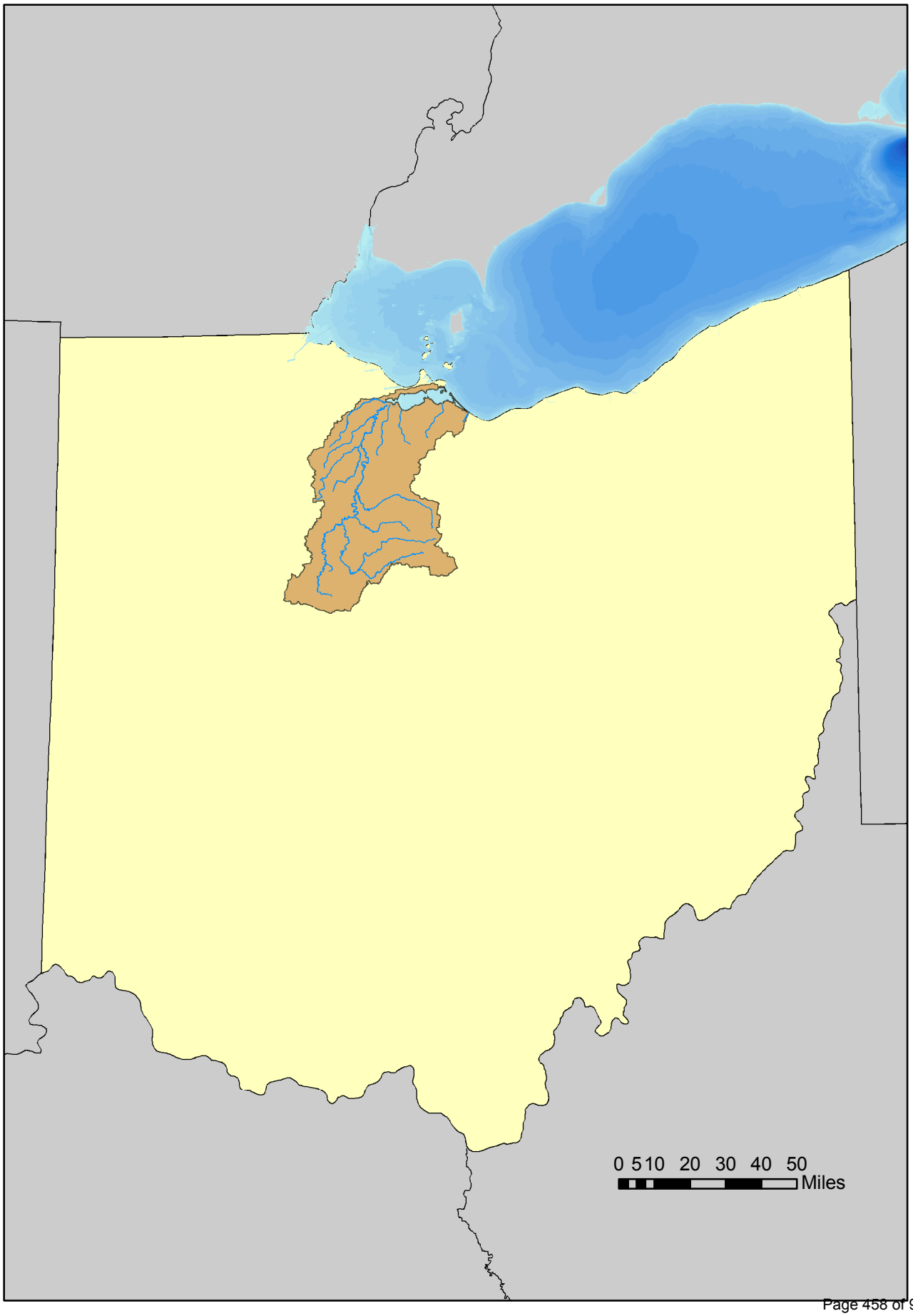

Figure 72: Sandusky River Watershed Land Cover

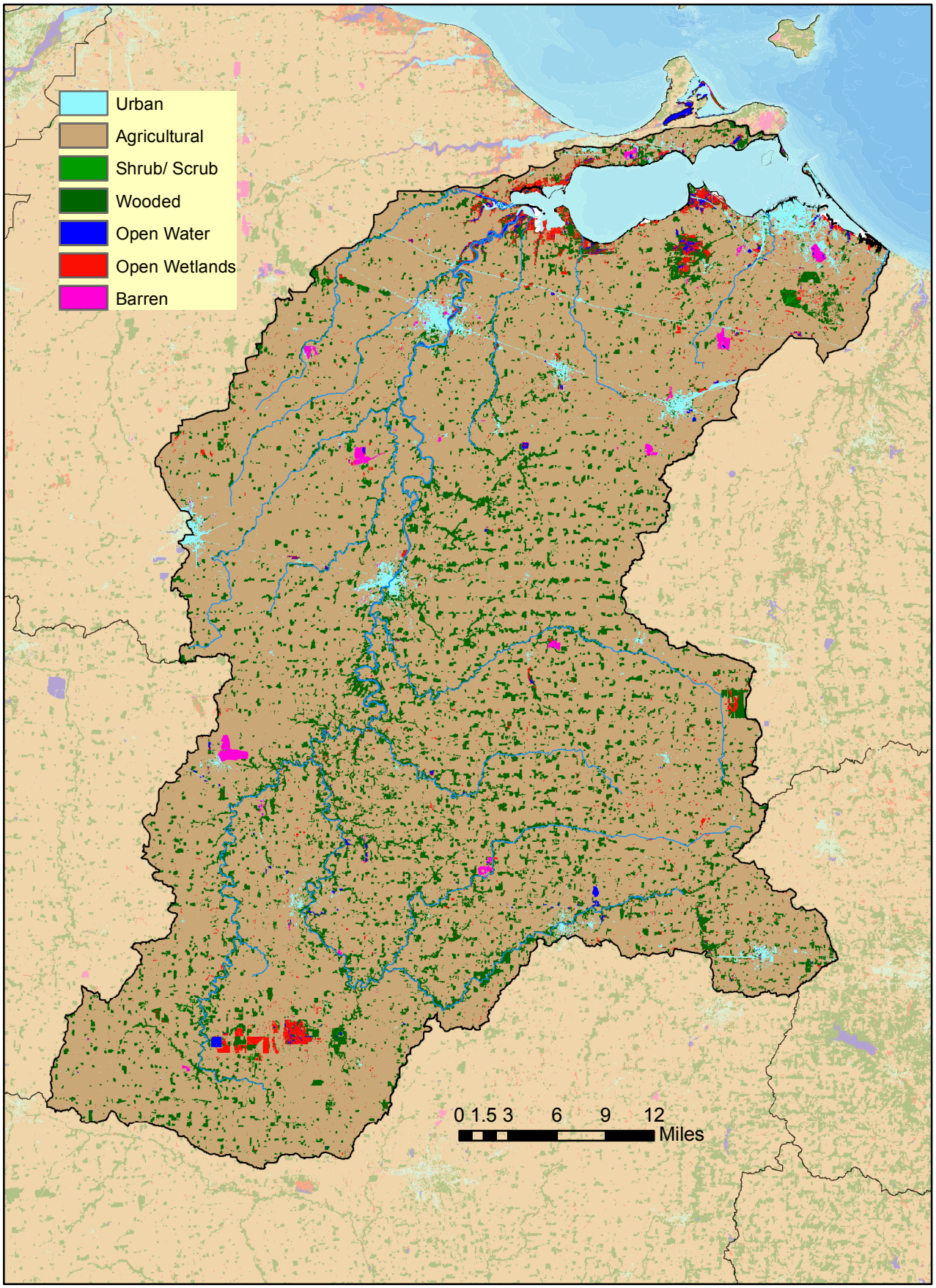
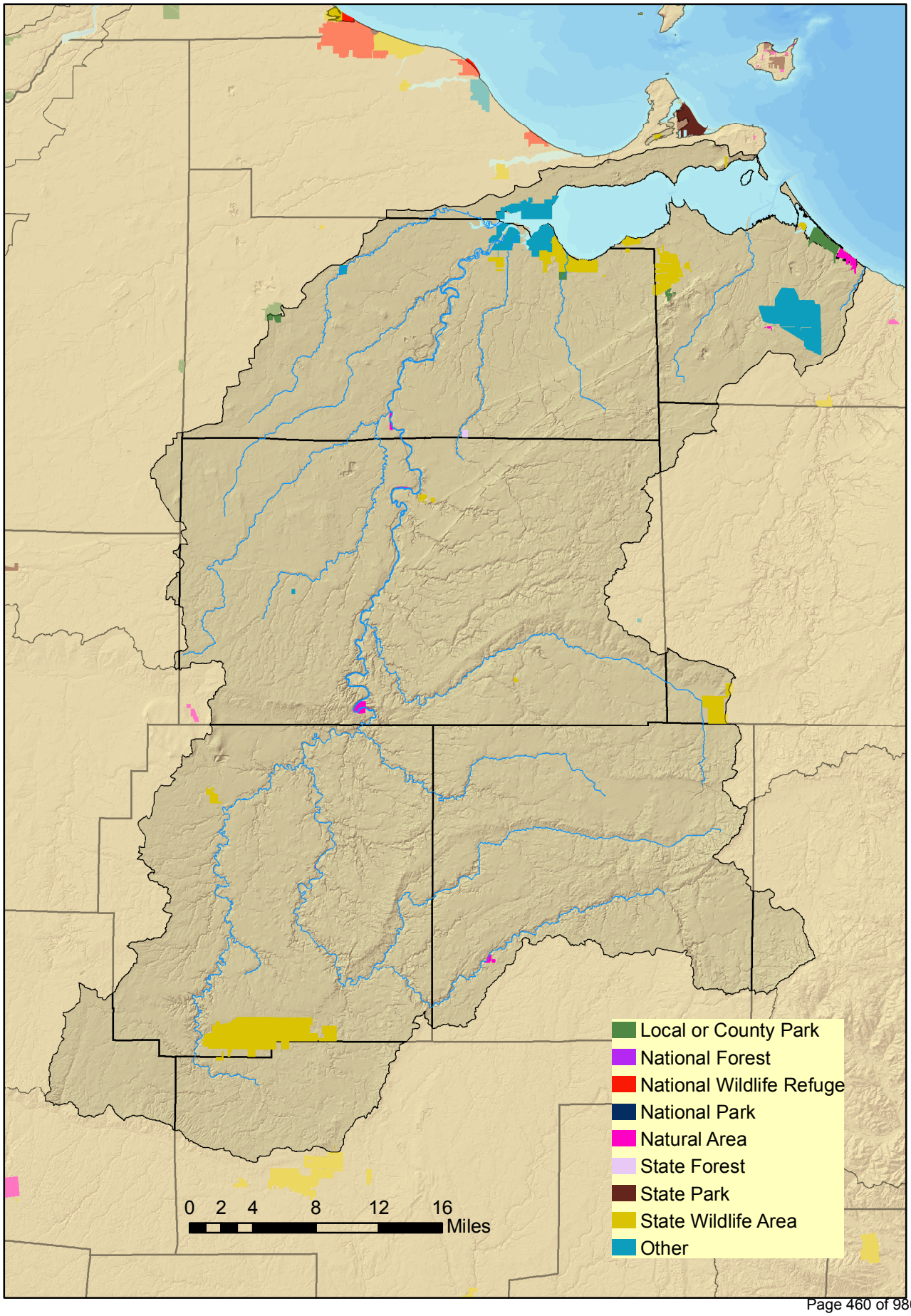
Figure 73: Sandusky River Watershed Protected Lands