APPENDIX F

WATERSHED SETTING

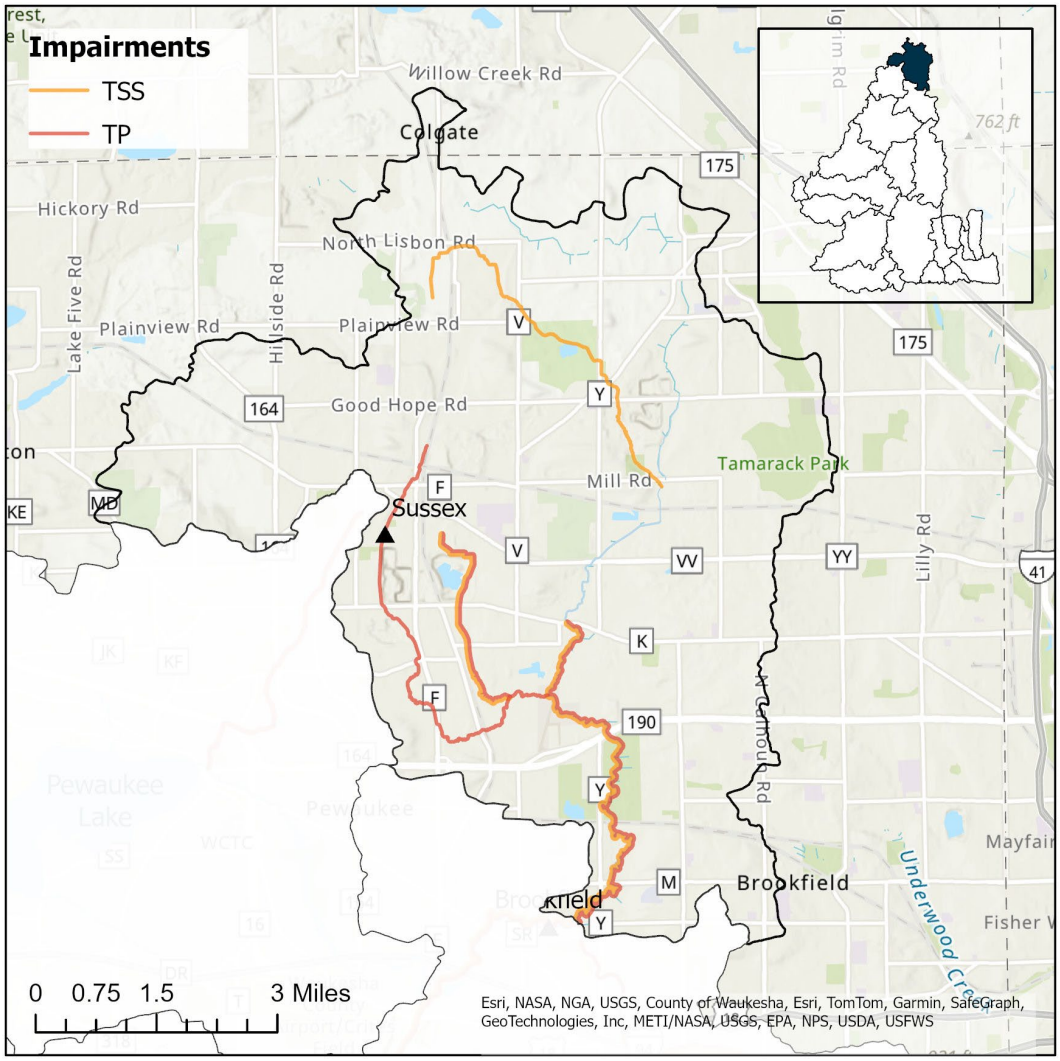
Supporting the Fox Illinois River Basin Total Maximum Daily Load (TMDL) for Phosphorus and Total Suspended Solids

1. FOX RIVER BASIN

1.1. Fox River Headwaters

Location Description: The headwaters of the Fox River are located in Waukesha County. The watershed is characterized by low-density development, though the basin also contains corn grain production. In the southern portion of the watershed, the areas adjacent to the Fox River are predominantly composed of wetlands.

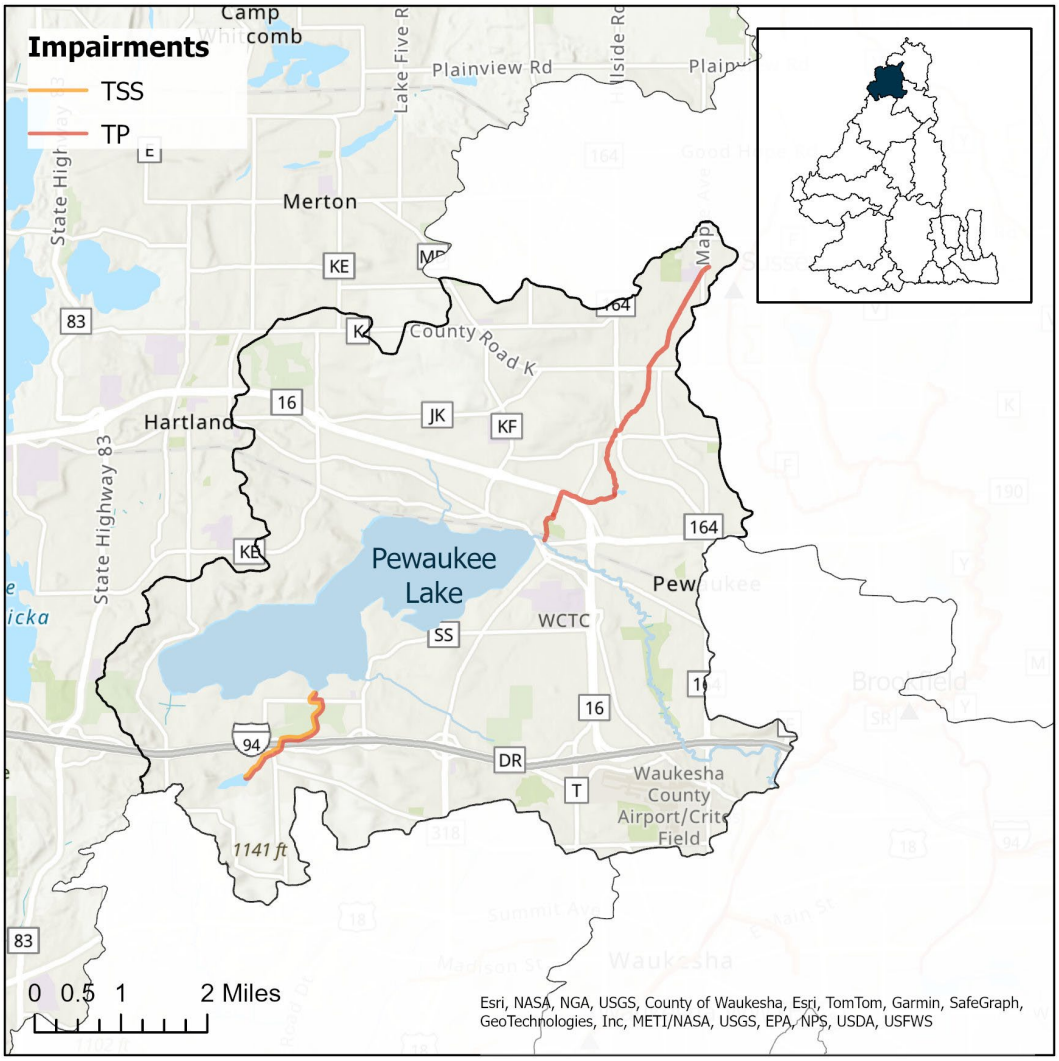
- Area: 48 square miles
- Land Use: 16% agriculture, 43% urban, 11% grassland/pasture, 8% forest, 21% wetland, 1% open water
- Large Lakes: None
- Municipalities: Sussex, Lisbon, Lannon, Menomonee Falls, Pewaukee, Brookfield
- Wastewater Dischargers: Sussex WWTF
- TP Impairments: Spring Creek, Perennial Stream C (3000121), Fox River
- TSS Impairments: Lannon Creek, Perennial Stream C (3000121), Fox River



1.2. Pewaukee Lake and Pewaukee River

Location Description: Pewaukee Lake and the Pewaukee River are located in Waukesha County. The sub-watershed draining to Pewaukee Lake is characterized by a mix of low-density urban development and forested land. In contrast, the western portions of the watershed—specifically within the Village of Pewaukee and the City of Pewaukee—feature high-density urban development. The lower portion of the Pewaukee River contains the Pewaukee River Greenway, which is an unimproved conservation corridor primarily composed of wetlands.

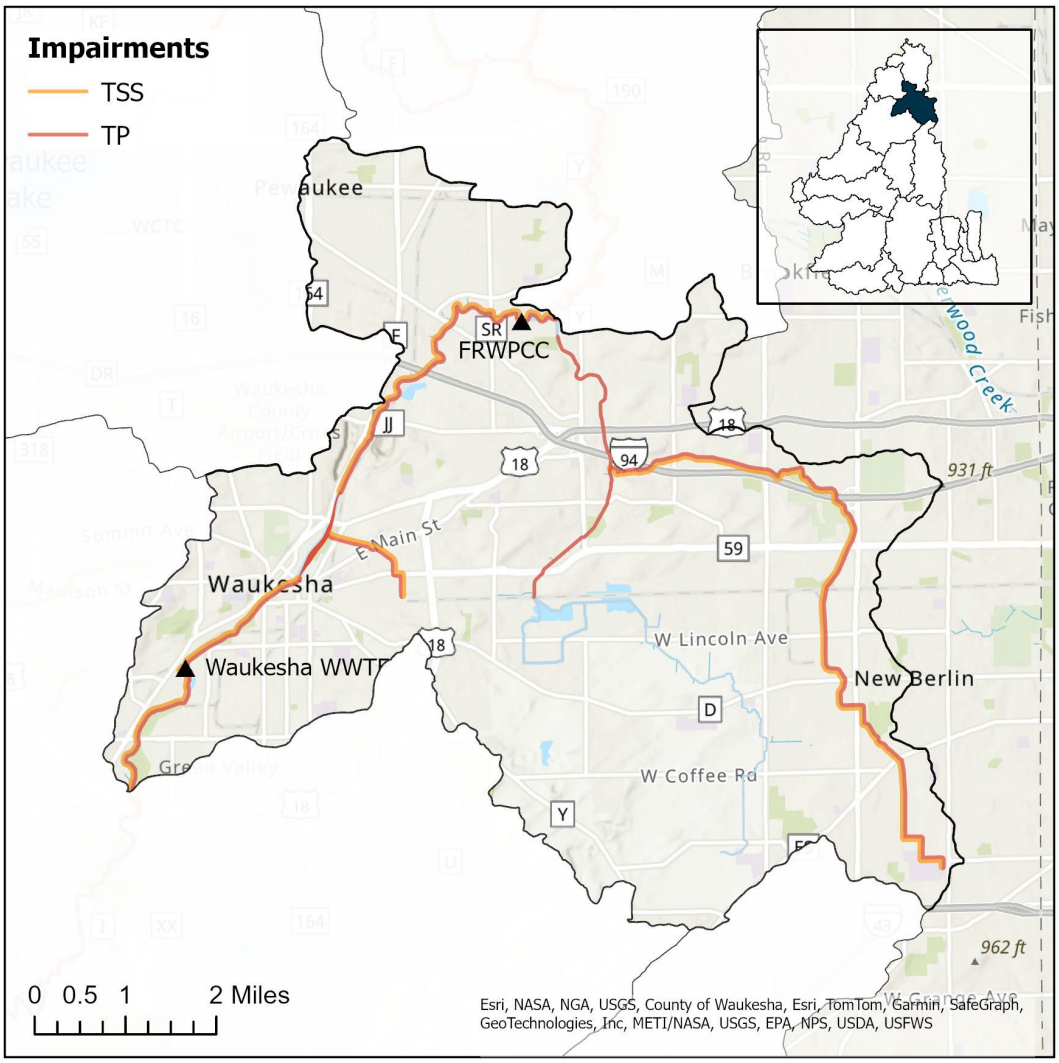
- Area: 38 square miles
- Land Use: 11% agriculture, 48% urban, 8% grassland/pasture, 10% forest, 18% wetland, 5% open water
- Large Lakes: Pewaukee Lake
- Municipalities: Sussex, Lisbon, Delafield, Pewaukee, Waukesha
- Wastewater Dischargers: None
- TP Impairments: Local Water (771800), Zion Creek
- TSS Impairments: Zion Creek



1.3. Fox River between Brookfield and Waukesha

Location Description: The Fox River watershed between Brookfield and Waukesha is heavily urbanized, characterized by a mix of low- and high-density development. A significant portion of flows and nutrients originates from wastewater treatment facilities in Brookfield and Waukesha.

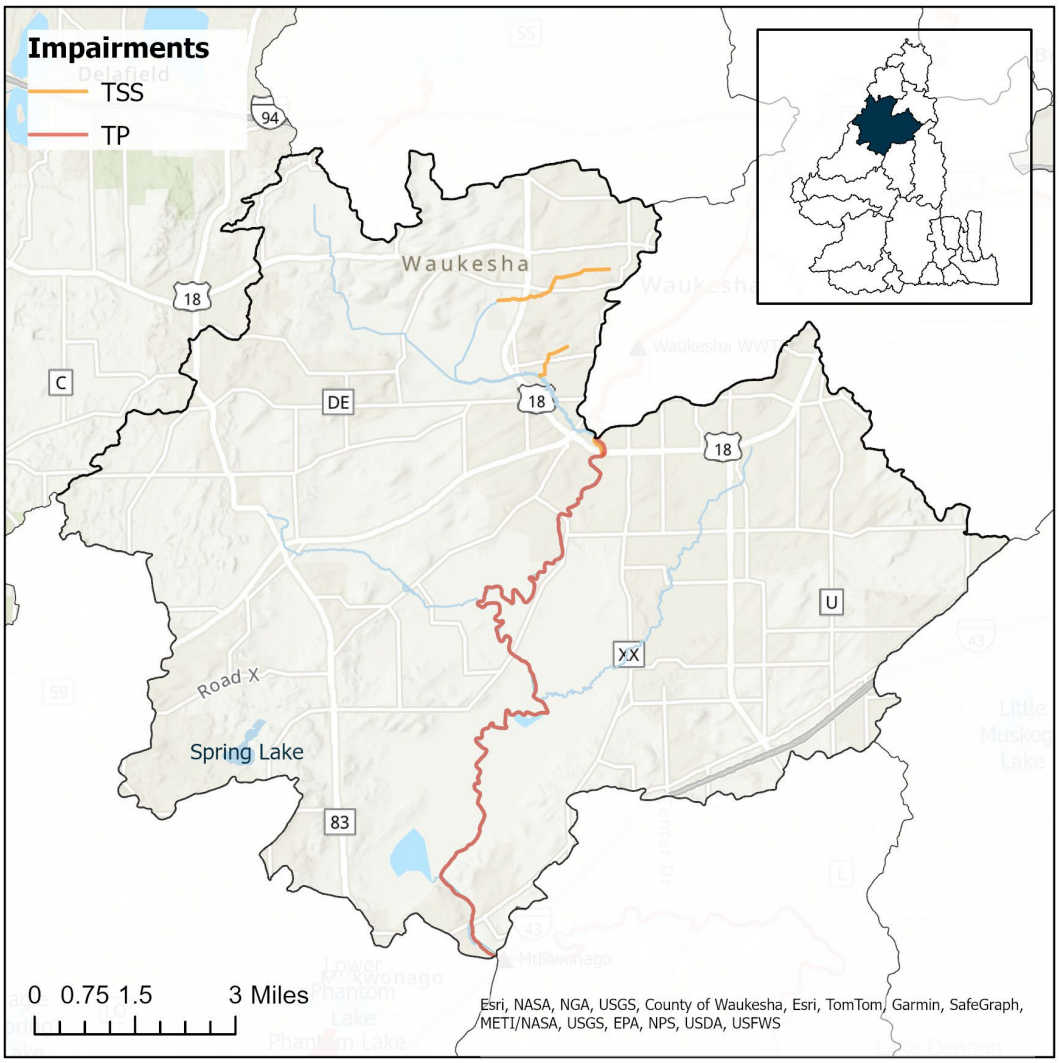
- Area: 43 square miles
- Land Use: 6% agriculture, 67% urban, 5% grassland/pasture, 8% forest, 14% wetland, 1% open water
- Large Lakes: None
- Municipalities: Pewaukee, Brookfield, Waukesha, New Berlin
- Wastewater Dischargers: Fox River Water Pollution Control Center, Waukesha Clean Water Plant
- TP Impairments: Deer Creek, Poplar Creek, Frame Park Creek, Fox River, Barstow Impoundment
- TSS Impairments: Deer Creek, Frame Park Creek, Fox River, Barstow Impoundment



1.4. Fox River between Waukesha and Mukwonago River

Location Description: This portion of the Fox River, located in Waukesha County downstream of the City of Waukesha, is notably less developed than the upstream areas. A defining feature of this area is Vernon Marsh, a 5,000 acre area comprising extensive wetlands, grasslands, and forests. The remaining land use consists of a mix of cash-grain agriculture and low-density urban development.

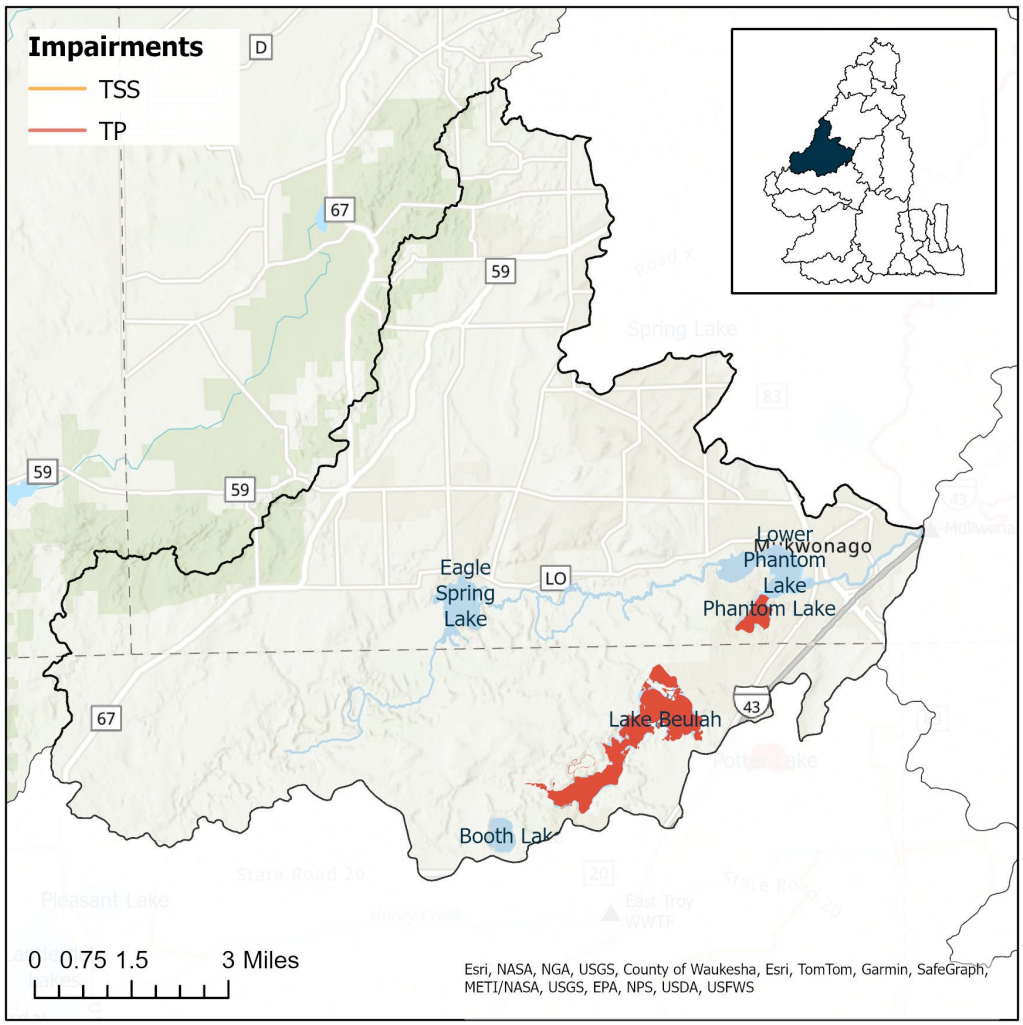
- Area: 95 square miles
- Land Use: 16% agriculture, 32% urban, 13% grassland/pasture, 17% forest, 21% wetland, 1% open water
- Large Lakes: None
- Municipalities: Waukesha, New Berlin, Muskego, Vernon, Big Bend, Genesee, Wales, North Prairie
- Wastewater Dischargers: None
- TP Impairments: Fox River
- TSS Impairments: Perennial Stream C (3000119), Perennial Stream D (3000120)



1.5. Mukwonago River

Location Description: The Mukwonago River watershed spans portions of Waukesha, Jefferson, and Walworth Counties. It is characterized by high-quality waterbodies that are unique within the project area. While the upland areas of the watershed contain low-density urban development and cash grain agriculture, the majority of riparian corridor adjacent to the Mukwonago River remains undeveloped, consisting of wetlands and forest. The watershed encompasses five lakes, including Eagle Spring Lake and Lower Phantom Lake, which are situated in-line with the Mukwonago River.

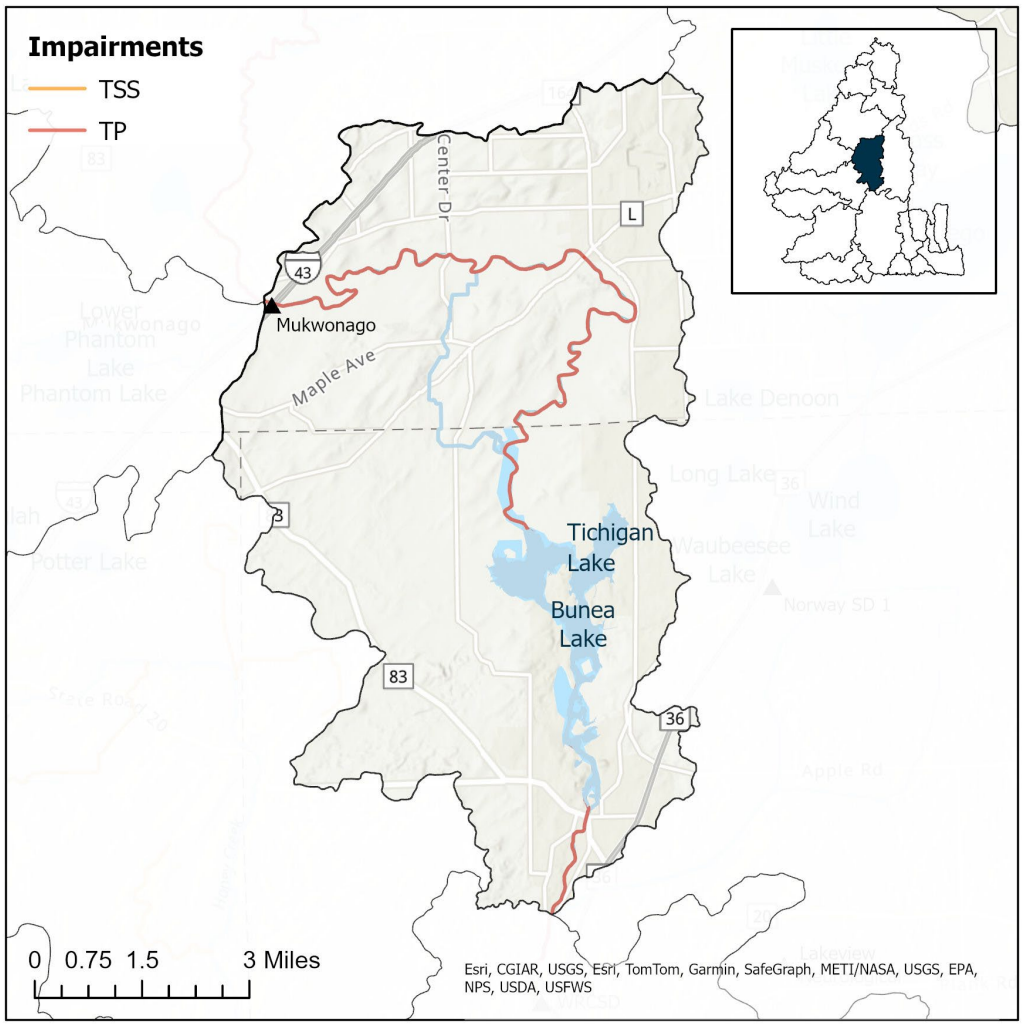
- Area: 80 square miles
- Land Use: 24% agriculture, 19% urban, 17% grassland/pasture, 26% forest, 12% wetland, 3% open water
- Large Lakes: Eagle Spring Lake, Booth Lake, Beulah Lake, Phantom Lake, Lower Phantom Lake
- Municipalities: Mukwonago
- Wastewater Dischargers: None
- TP Impairments: Phantom Lake, Beulah Lake
- TSS Impairments: None



1.6. Fox River between Mukwonago River and Wind Lake Canal

Location Description: This reach of the Fox River is situated within Waukesha and Racine Counties and extends from downstream of Mukwonago to the Wind Lake Canal. The Fox River in this section is impounded by two dams—the Waterford Dam and the Rochester Dam. The Waterford Dam creates Buena Lake, which is a shallow impoundment with a short residence time. Tichigan Lake is also located within this watershed. Land use comprises a mix of cash grain agriculture, low-density urban development, and wetlands. The Mukwonago Wastewater Treatment Facility discharges effluent just downstream of the confluence with the Mukwonago River.

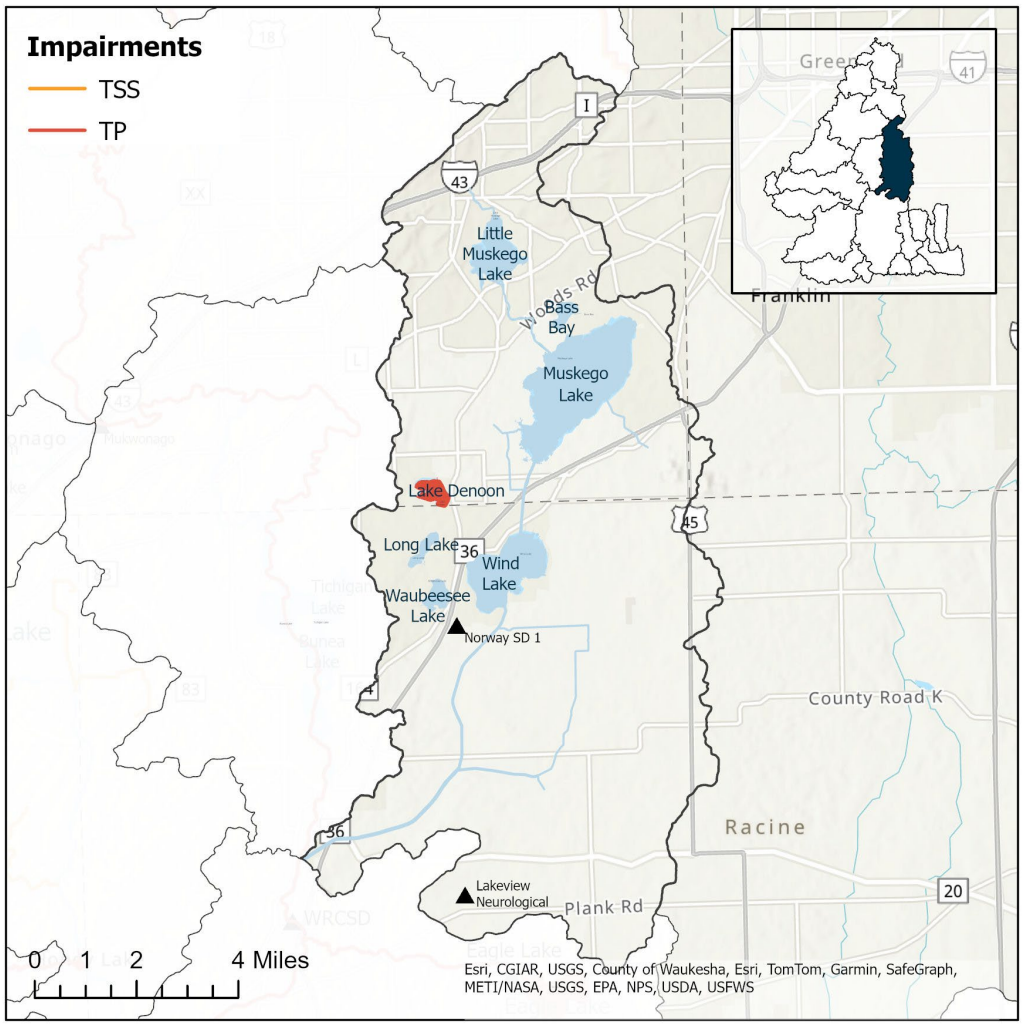
- Area: 54 square miles
- Land Use: 37% agriculture, 18% urban, 9% grassland/pasture, 13% forest, 17% wetland, 5% open water
- Large Lakes: Tichigan Lake
- Municipalities: Big Bend, Vernon, Waterford
- Wastewater Dischargers: Mukwonago WWTF
- TP Impairments: Fox River
- TSS Impairments: None



1.7. Wind Lake Canal

Location Description: The watershed for the Wind Lake Canal is situated within Waukesha and Racine counties. It contains the Wind Lake Canal, which is a manmade waterway that was created to drain the land. This area is unique to the Fox River watershed because it encompasses the Southern Lake Michigan Costal landscape unit. It is characterized by flat topography and contains seven lakes. Agriculture is composed of primarily of cash grain production, much of which contains subsurface tile drainage. This area includes sod farming, a practice unique to this portion of the project area.

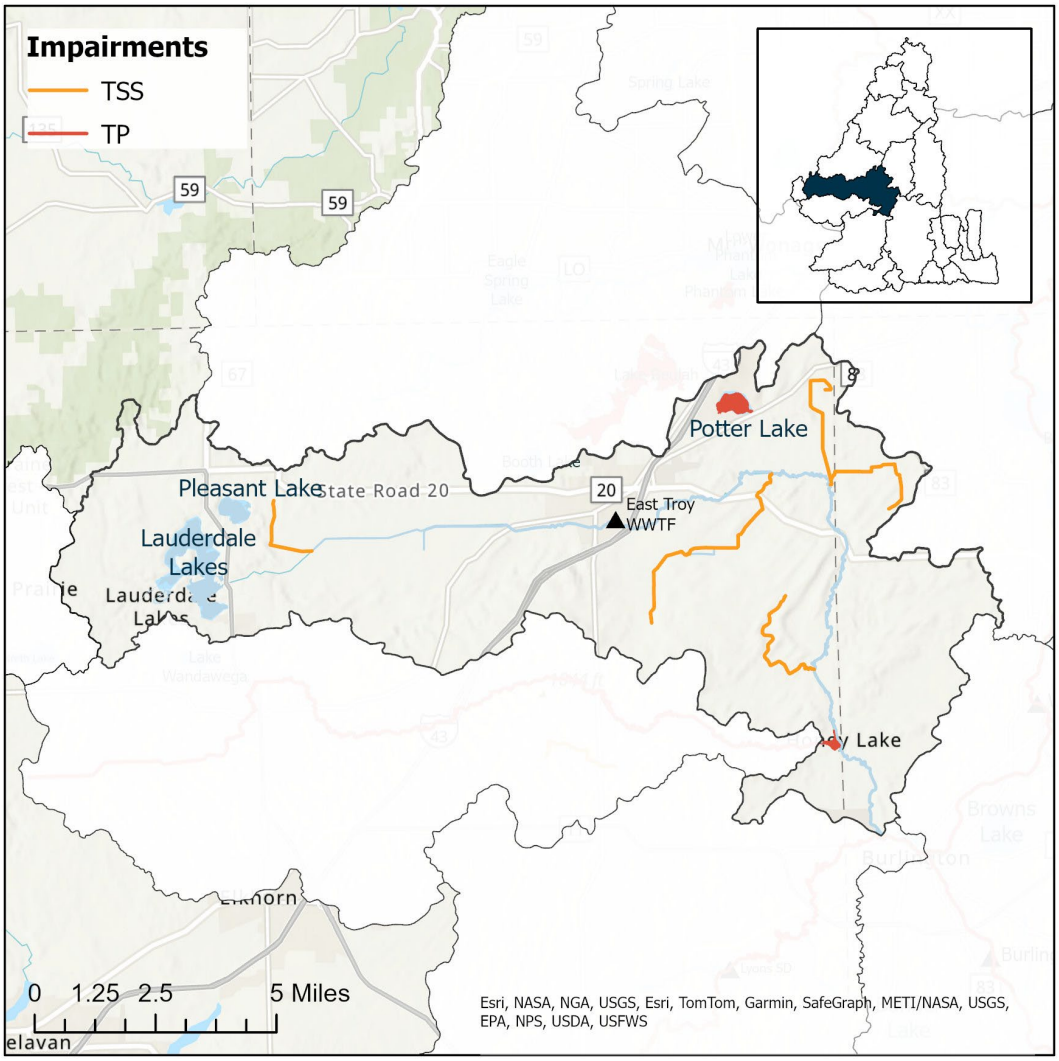
- Area: 89 square miles
- Land Use: 42% agriculture, 4% sod farming, 20% urban, 8% grassland/pasture, 8% forest, 12% wetland, 5% open water
- Large Lakes: Little Muskego Lake, Bass Bay, Big Muskego Lake, Wind Lake, Lake Denoon, Long Lake, Waubeesee Lake
- Municipalities: New Berlin, Muskego, Norway, Waterford
- Wastewater Dischargers: Norway Sewerage District, Lakeview Neurological Rehab Center
- TP Impairments: Lake Denoon
- TSS Impairments: None



1.8. Honey Creek

Location Description: The Honey Creek watershed is situated within Walworth and Racine counties. The watershed is primarily characterized by agricultural land use, most of which is cash grain production. The most significant urban development in the watershed is concentrated around the Village of East Troy, which has a wastewater treatment facility discharging to Honey Creek. The basin includes three predominant lakes: Lauderdale Lakes, Pleasant Lake, and Potter Lake.

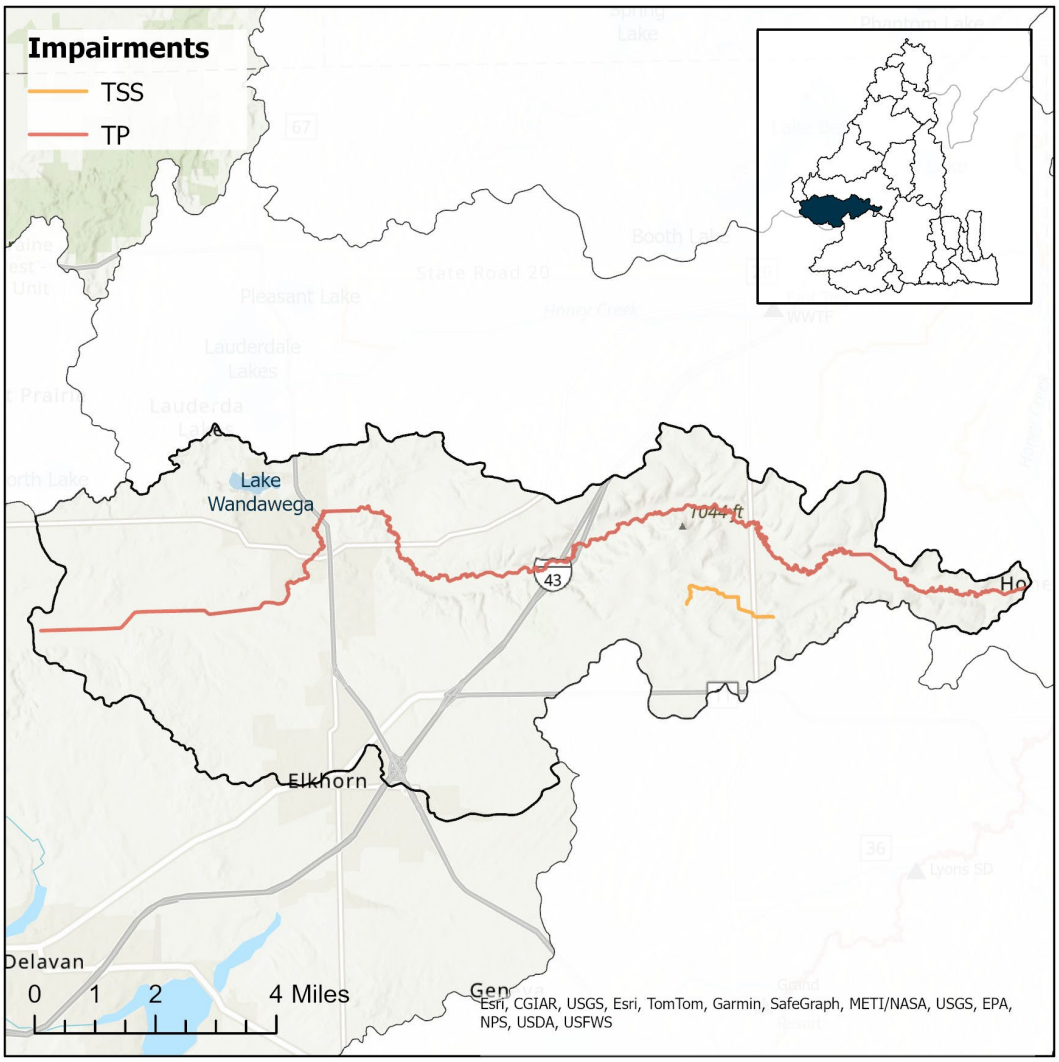
- Area: 89 square miles
- Land Use: 56% agriculture, 8% urban, 9% grassland/pasture, 13% forest, 12% wetland, 2% open water
- Large Lakes: Lauderdale Lakes, Pleasant Lake, Potter Lake.
- Municipalities: Village of Troy
- Wastewater Dischargers: East Troy WWTF
- TP Impairments: Potter Lake, Honey Lake
- TSS Impairments: Perennial Stream B (755100), Spring Creek, Perennial Stream D (753500), Perennial Stream E (753600), Perennial Stream A (753100)



1.9. Sugar Creek

Location Description: The Sugar Creek watershed is located within Walworth County. The predominant land use in the watershed is agriculture—most of which is cash grain. The only significant urban development in the watershed is Elkhorn, which is located in the southern upstream portion of the watershed.

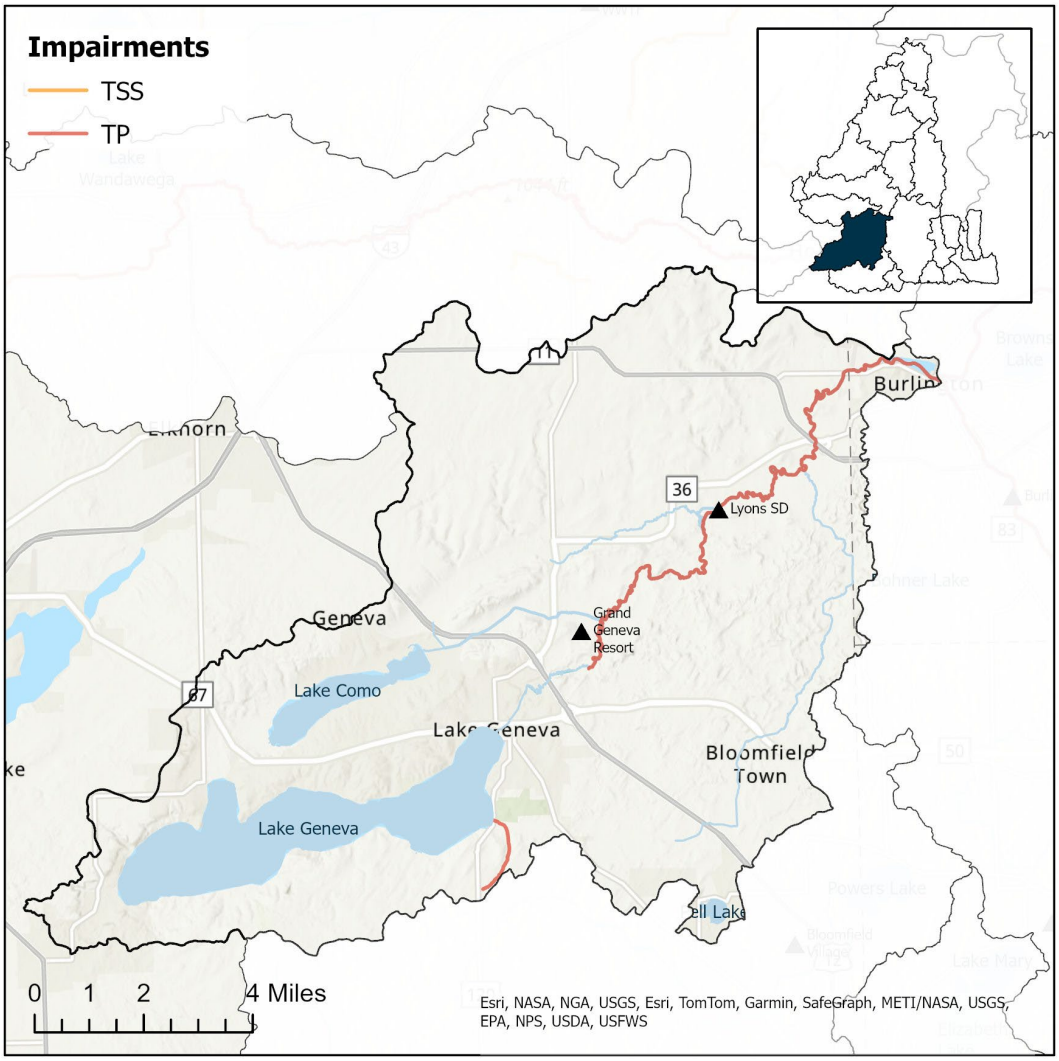
- Area: 89 square miles
- Land Use: 55% agriculture, 9% urban, 10% grassland/pasture, 14% forest, 11% wetland, 1% open water
- Large Lakes: Lake Wandawega
- Municipalities: Elkhorn
- Wastewater Dischargers: None
- TP Impairments: Sugar Creek
- TSS Impairments: Spring Brook (North Branch)



1.10. Geneva Lake and White River

Location Description: The Geneva Lake and White River watershed is situated within Walworth County. Geneva Lake is a large, deep, high-quality lake that discharges to the White River at the City of Lake Geneva. Lake Como also drains into the system via Como Creek, which joins the White River downstream of the City of Lake Geneva. The watershed contains two permitted point sources: Grand Geneva Resort and Lyons Sanitary District. Land use across the watershed consists of agriculture, low-density urban development, grassland, forests, and wetlands.

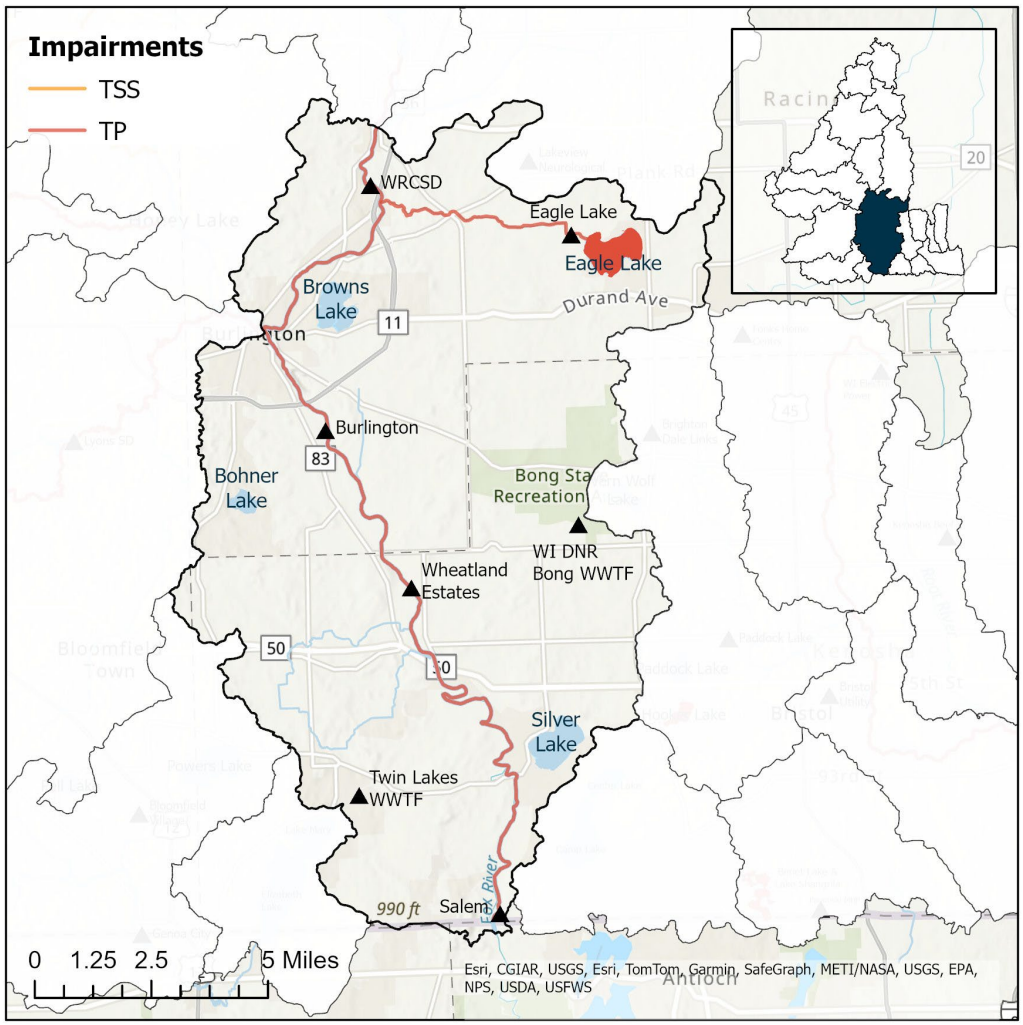
- Area: 114 square miles
- Land Use: 37% agriculture, 14% urban, 10% grassland, 18% forest, 12% wetland, 9% open water
- Large Lakes: Geneva Lake, Lake Como
- Municipalities: Lake Geneva, Elkhorn, Burlington
- Wastewater Dischargers: Grand Geneva Resort, Lyons Sanitary District
- TP Impairments: Button Creek, White River
- TSS Impairments: None



1.11. Fox River below Wind Lake Canal

Location Description: The section of the Fox River below Wind Lake Canal is situated within Racine and Kenosha counties. The predominant land use in the watershed is agriculture, primarily consisting of cash grain production with some dairy agriculture. The basin contains eight point source dischargers. The Fox River at the Wisconsin border is immediately upstream of the Chain O' Lakes system in Illinois, with Grass Lake serving as the immediate receiving waterbody.

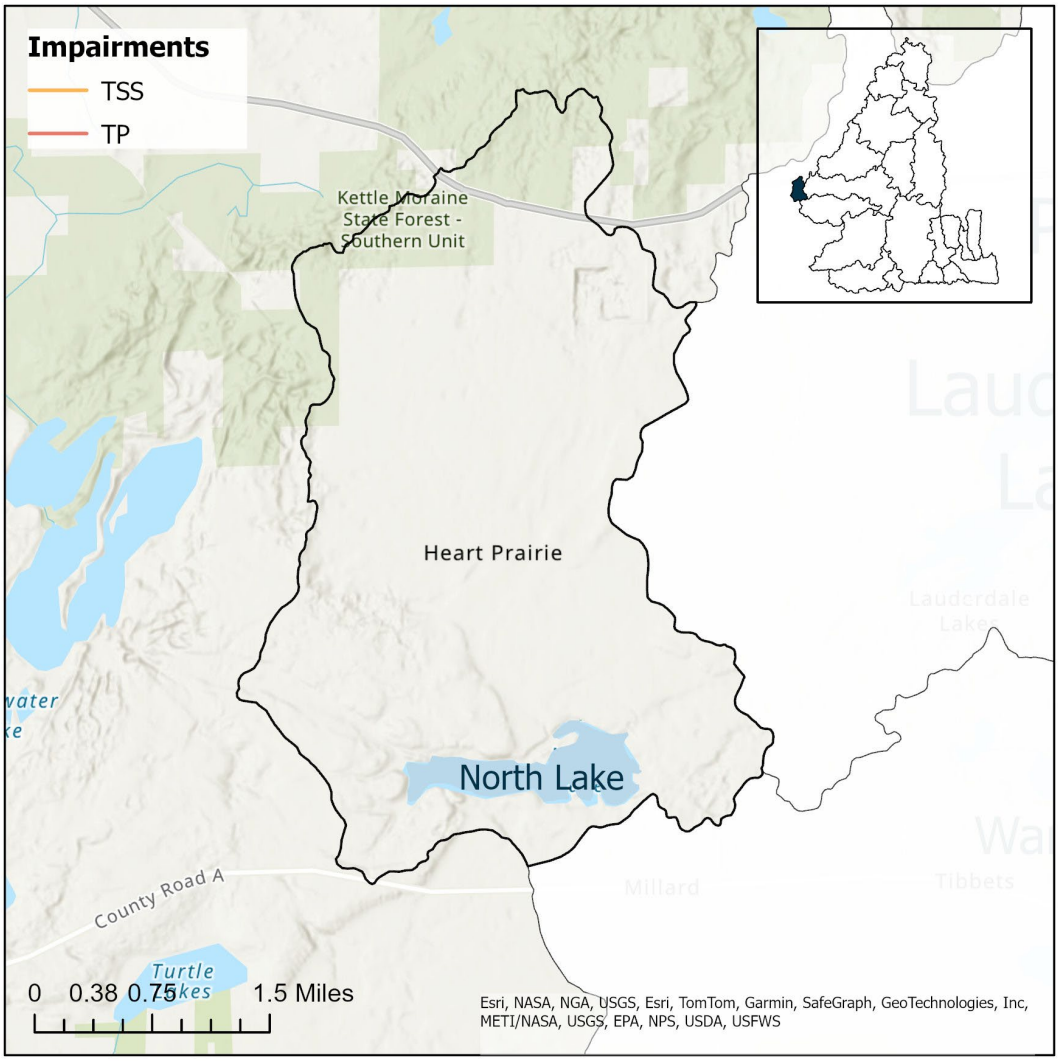
- Area: 132 square miles
- Land Use: 47% agriculture, 14% urban, 10% grassland/pasture, 13% forest, 13% wetland, 3% open water
- Large Lakes: Browns Lake, Bohner Lake, Eagle Lake, Silver Lake
- Municipalities: Burlington, Salem Lakes, Twin Lakes, Randall, Paddock Lake
- Wastewater Dischargers: Western Racine Sewerage District, Eagle Lake Sewer Utility, Burlington Water Pollution Control, Applied Material Solutions, Wheatland Estates MHP, WDNR Bong Recreation Area WWTF, Twin Lakes WWTF, Salem Utility District
- TP Impairments: Eagle Lake, Eagle Creek, Fox River
- TSS Impairments: None



1.12. North Lake

Location Description: North Lake is a seepage lake situated in Walworth County. As a seepage lake, it does not have a defined inlet or outlet and does not directly contribute flow to the Fox River. The predominant land use around the lake is agriculture, primarily cash grain and continuous corn.

- Area: 10 square miles
- Land Use: 63% agriculture, 3% urban, 16% grassland/pasture, 21% forest, 5% Wetland, 1% open water
- Large Lakes: North Lake
- Municipalities: None
- Wastewater Dischargers: None
- TP Impairments: None
- TSS Impairments: None

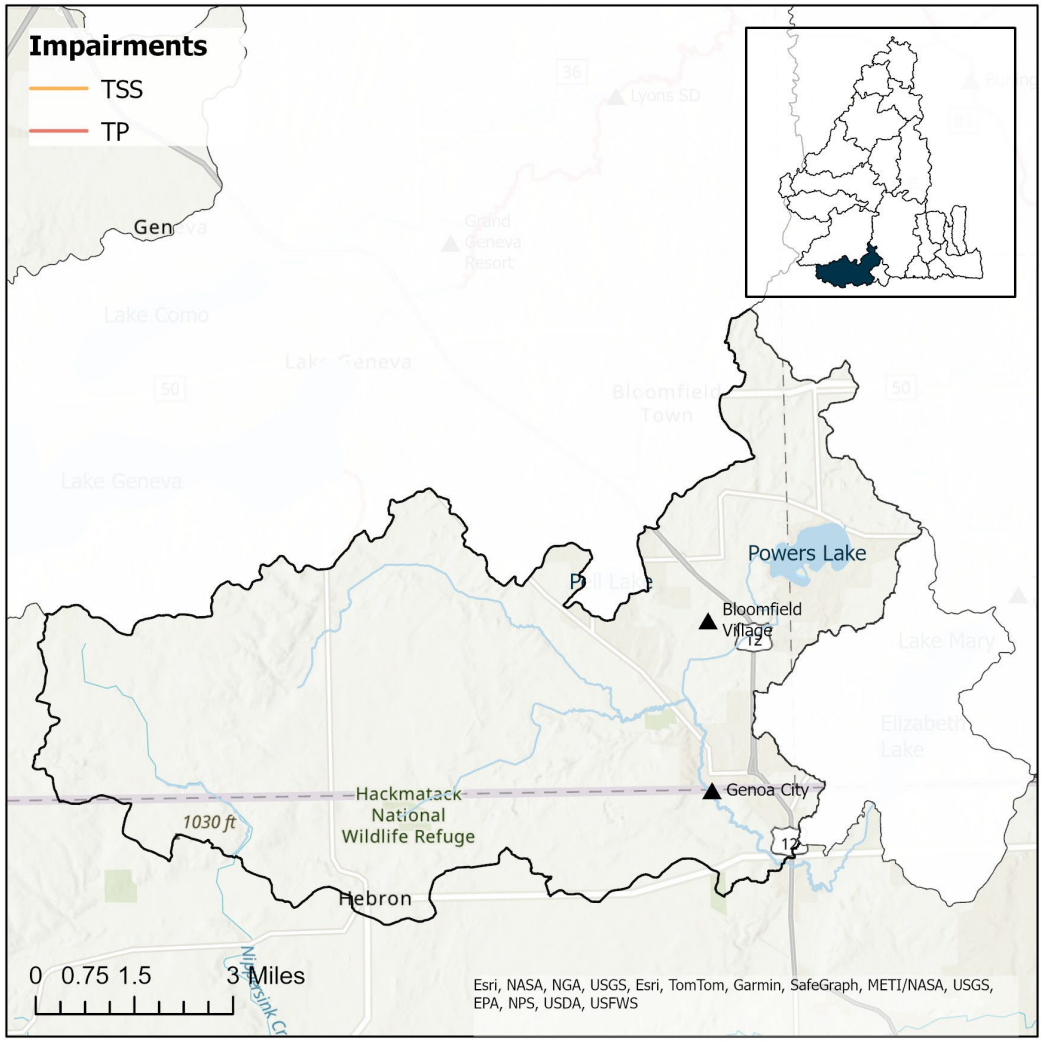


2. WATERSHEDS ALONG THE WISCONSIN BORDER

2.1. Nippersink Creek

Location Description: The upstream portions of Nippersink Creek in Wisconsin are situated within Walworth county. The watershed encompasses two main tributaries: the headwaters of Nippersink Creek and North Branch Nippersink Creek. Land use across these areas is predominantly agriculture, with a distribution between cash grain, continuous corn, and dairy rotations. Discharge from the reaches flow into Illinois, where they form the main stem of Nippersink Creek.

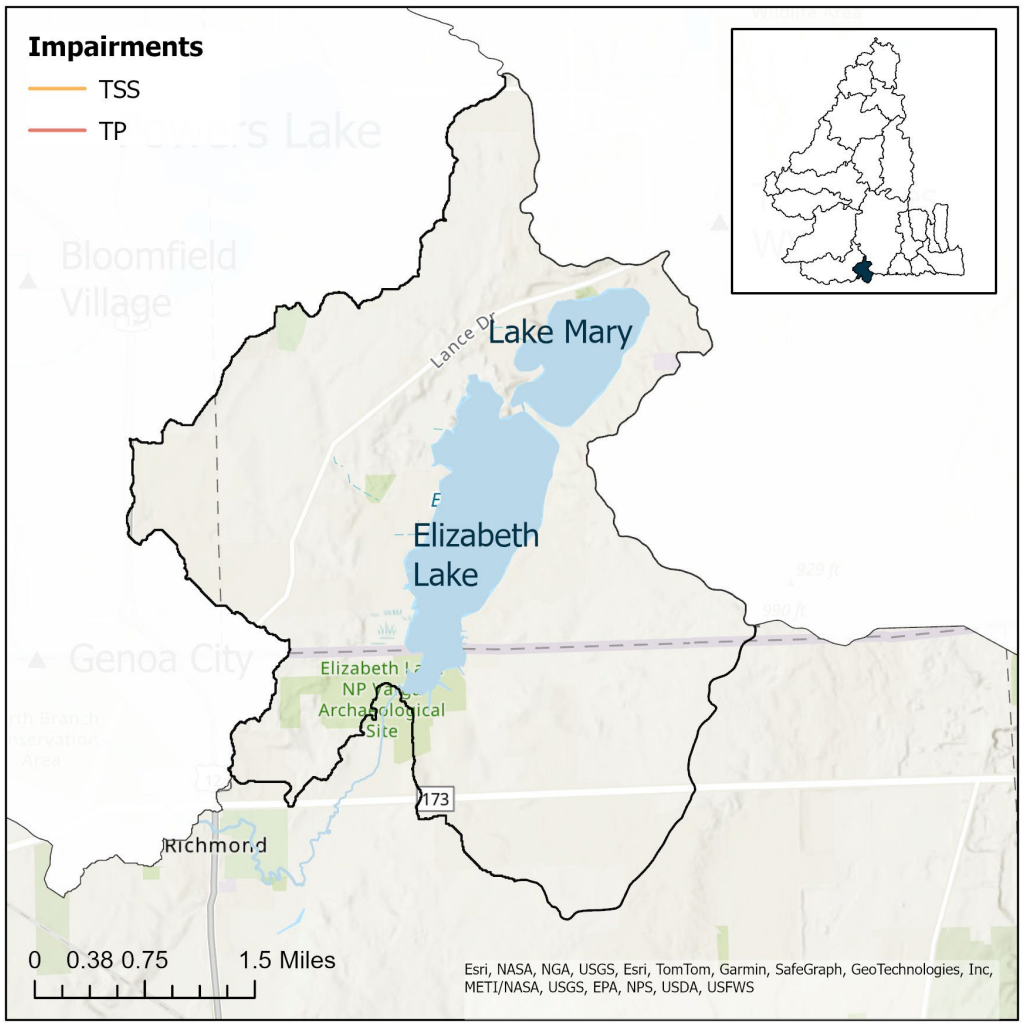
- Area: 61 square miles
- Land Use: 62% agriculture, 9% urban, 12% grassland/pasture, 7% forest, 9% wetland, 1% open water
- Large Lakes: Powers Lake
- Municipalities: Bloomfield, Genoa City, Randall
- Wastewater Dischargers: Bloomfield Village, Genoa City
- TP Impairments: None
- TSS Impairments: None



2.2. Lake Mary and Elizabeth Lake

Location Description: Lake Mary and Lake Elizabeth are situated within Walworth and Kenosha counties. The two lakes are collectively known as the "Twin Lakes." The lakes comprise approximately 12 percent of the total watershed area. The shoreline around Lake Mary is characterized by a mix of low-density and high-density urban development, while the shoreline around Elizabeth Lake is predominantly low-density urban development. Upland areas consist of mixed agriculture, with dairy rotation and cash grain being the most prominent uses. Outflow from Elizabeth Lake drains south, eventually reaching the North Branch of Nippersink Creek in Illinois.

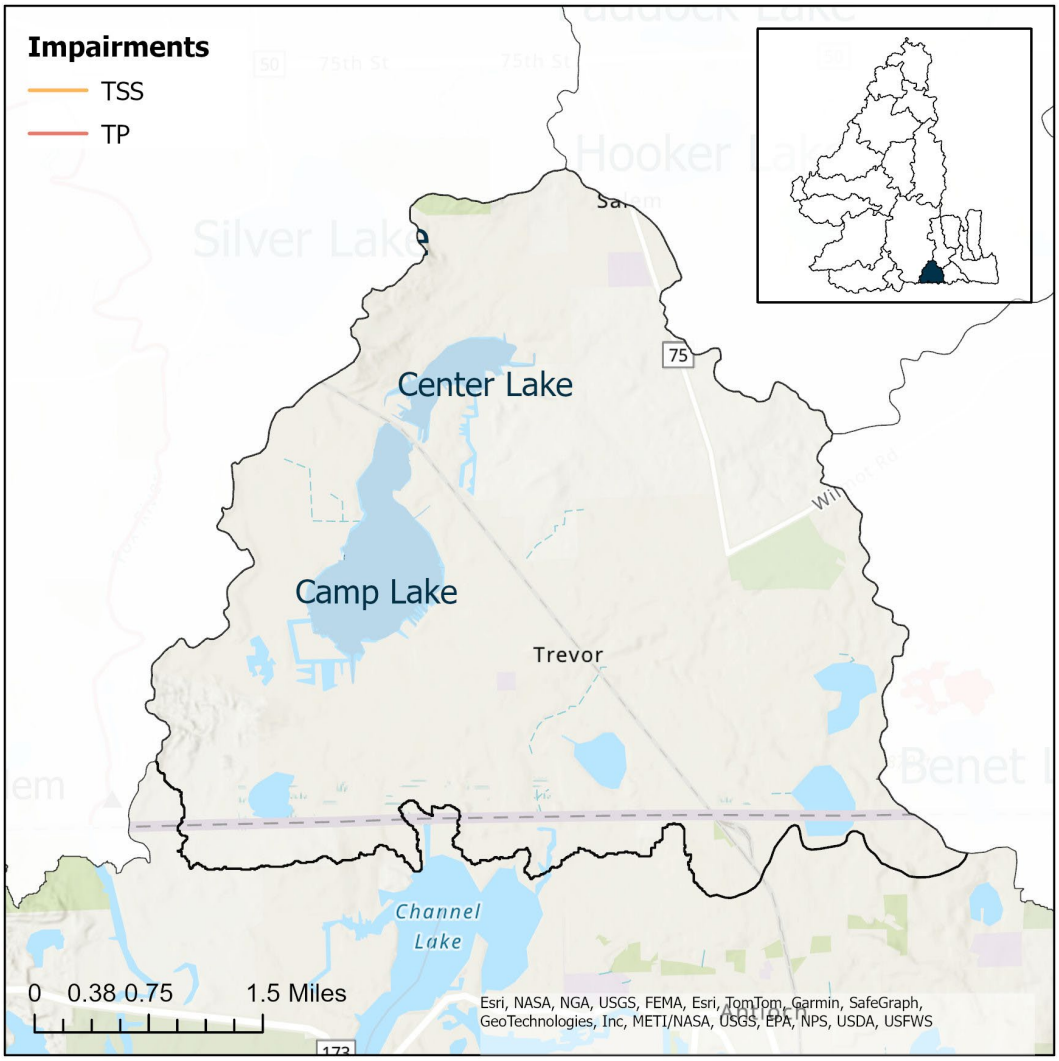
- Area: 12 square miles
- Land Use: 31% agriculture, 19% urban, 15% grassland/pasture, 15% forest, 8% wetland, 12% open water
- Large Lakes: Lake Mary, Elizabeth Lake
- Municipalities: Twin Lakes, Randall
- Wastewater Dischargers: None
- TP Impairments: None
- TSS Impairments: None



2.3. Center Lake, Camp Lake, and Trevor Creek

Location Description: Center Lake, Camp Lake, and Trevor Creek are situated within Kenosha County. The shoreline surrounding Center Lake and the eastern portion of Camp Lake is characterized by predominantly low-density urban development. The areas to the southwest of Camp Lake are predominantly wetlands. The upland areas of these watersheds are composed of agriculture land use, with cash grain being the dominant activity. Camp Lake drains to Channel Lake in Illinois, and Trevor Creek drains to Lake Catherine in Illinois.

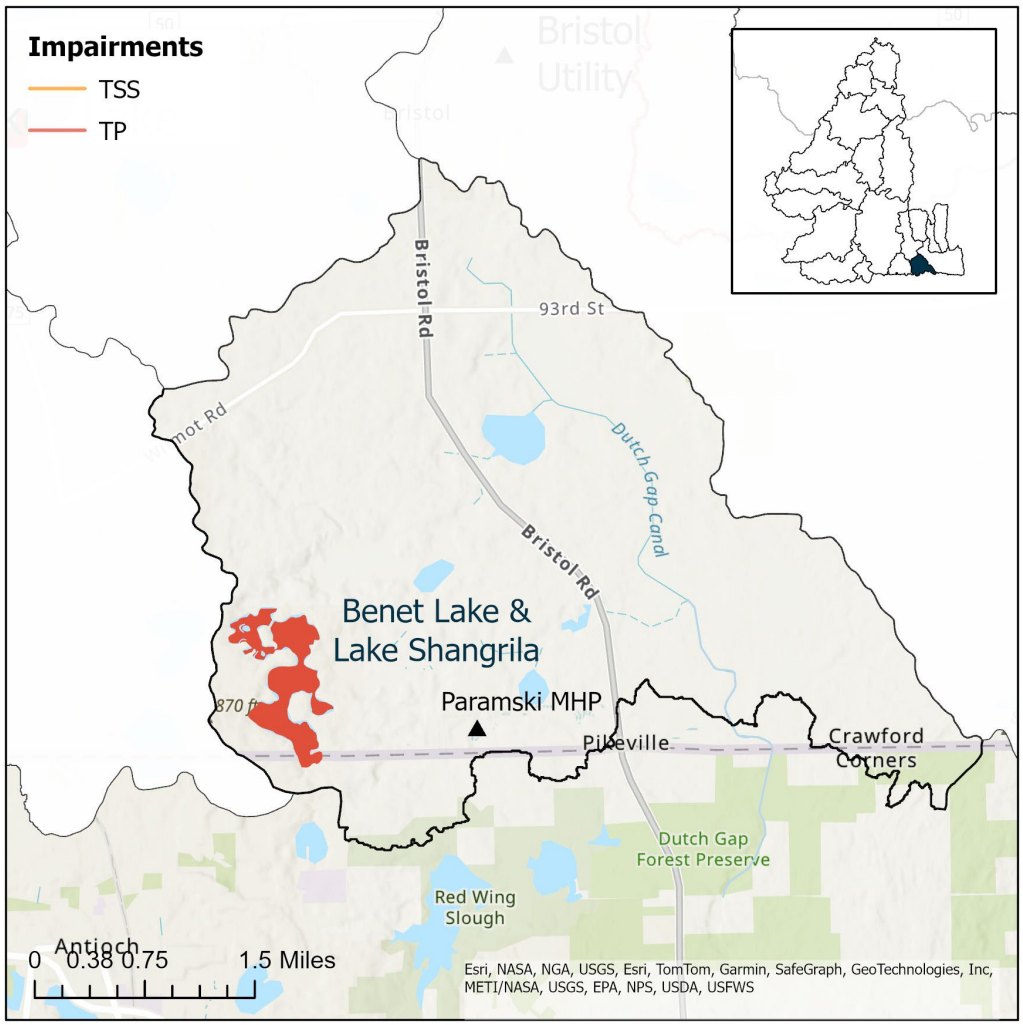
- Area: 16 square miles
- Land Use: 31% agriculture, 24% urban, 9% grassland/pasture, 12% forest, 19% wetland, 6% open water
- Large Lakes: Center Lake, Camp Lake
- Municipalities: Salem Lakes
- Wastewater Dischargers: None
- TP Impairments: None
- TSS Impairments: None



2.4. North Mill Creek

Location Description: The North Mill Creek watershed is situated within Kenosha County. The primary waterway in the watershed is also known as the Dutch Gap Canal. Land use in the watershed area is primarily agricultural, consisting of a mix of cash grain and dairy rotation. Lake Shangrila and Benet Lake, both of which are currently identified as impaired waterbodies, are located in the watershed. The discharge from the watershed eventually drains to North Mill Creek in Illinois. A comprehensive Nine-Key Element (9KE) Watershed Plan was developed for North Mill Creek/Dutch Gap Canal system to address water quality concerns.

- Area: 14 square miles
- Land Use: 56% agriculture, 10% urban, 9% grassland/pasture, 8% forest, 14% wetland, 3% open water
- Large Lakes: Lake Shangrila, Benet Lake
- Municipalities: Bristol, Salem Lakes
- Wastewater Dischargers: Paramski MHP Rainbow Lake Manor
- TP Impairments: Benet Lake, Lake Shangrila
- TSS Impairments: None

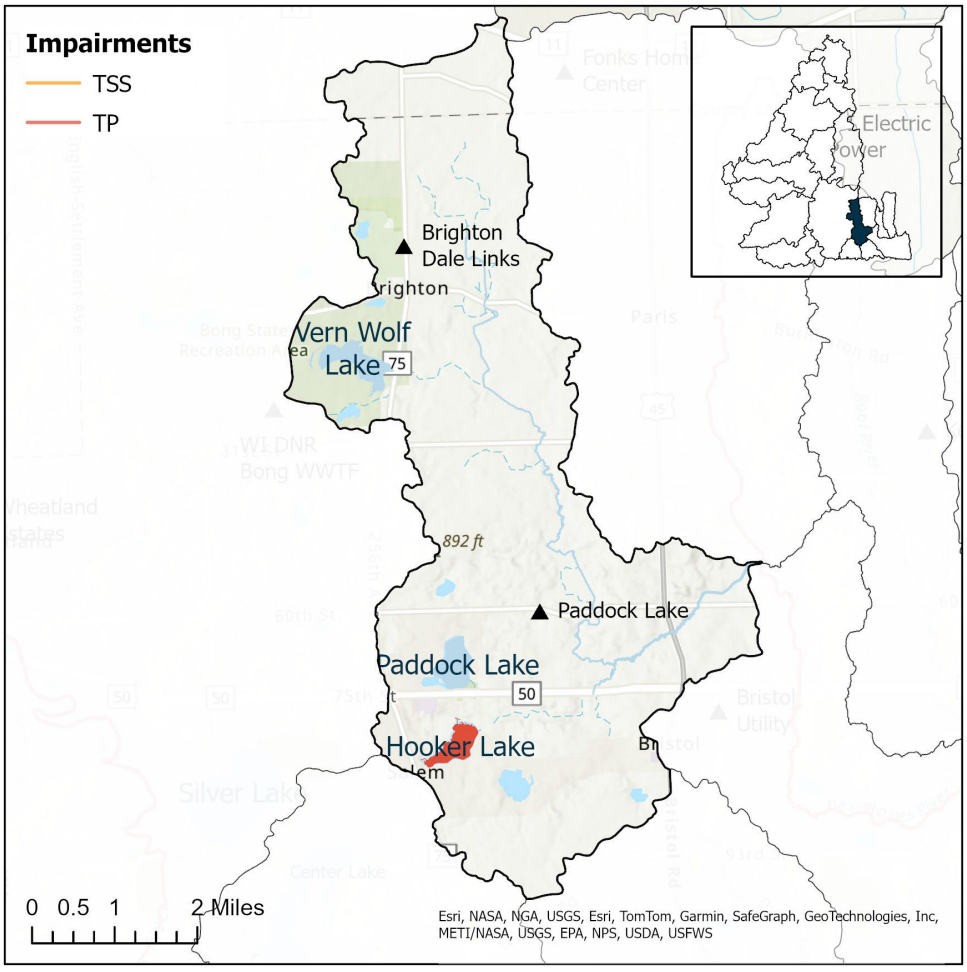


3. DES PLAINES RIVER BASIN

3.1. Brighton Creek

Location Description: The Brighton Creek watershed is situated in southern Racine County and western Kenosha County. Land use in the watershed is agriculture, consisting of mix of dairy rotation and cash grain. The landscape is relatively flat with poorly-drained soils, so subsurface tile drainage is common throughout the basin. Three large lakes—Vern Wolf Lake, Paddock Lake, and Hooker Lake—are located in the watershed. Hooker Lake is listed as impaired. The Paddock Lake WWTF is also located within the watershed, and the effluent from the facility discharges to Brighton Creek. Brighton Creek discharges to the Des Plaines River.

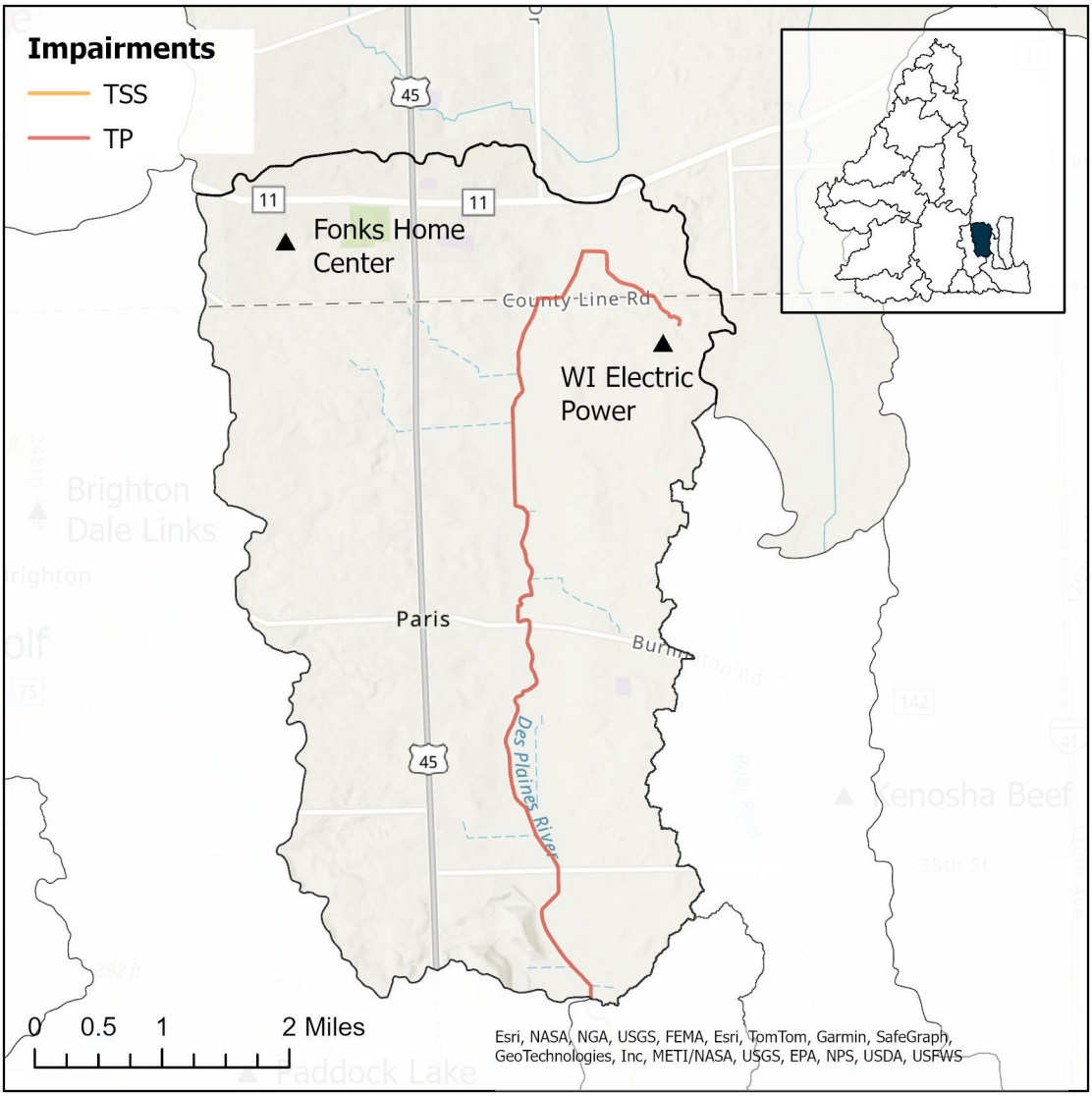
- Area: 27 square miles
- Land Use: 50% agriculture, 13% urban, 11% grassland/pasture, 12% forest, 11% wetland, 3% open water
- Large Lakes: Vern Wolf Lake, Paddock Lake, Hooker Lake
- Municipalities: Paddock Lake, Salem Lakes, Bristol
- Wastewater Dischargers: Brighton Dale Links WWTP, Paddock Lake WWTF
- TP Impairments: Hooker Lake
- TSS Impairments: None



3.2. Des Plaines River Headwaters

Location Description: The headwaters of the Des Plaines River are situated within southern Racine County and northern Kenosha County. The land use in the headwaters is predominantly agriculture, with almost 75% of all land devoted to cash grain and dairy rotations. The landscape is relatively flat with poorly-drained soils, so subsurface tile drainage is common throughout the basin.

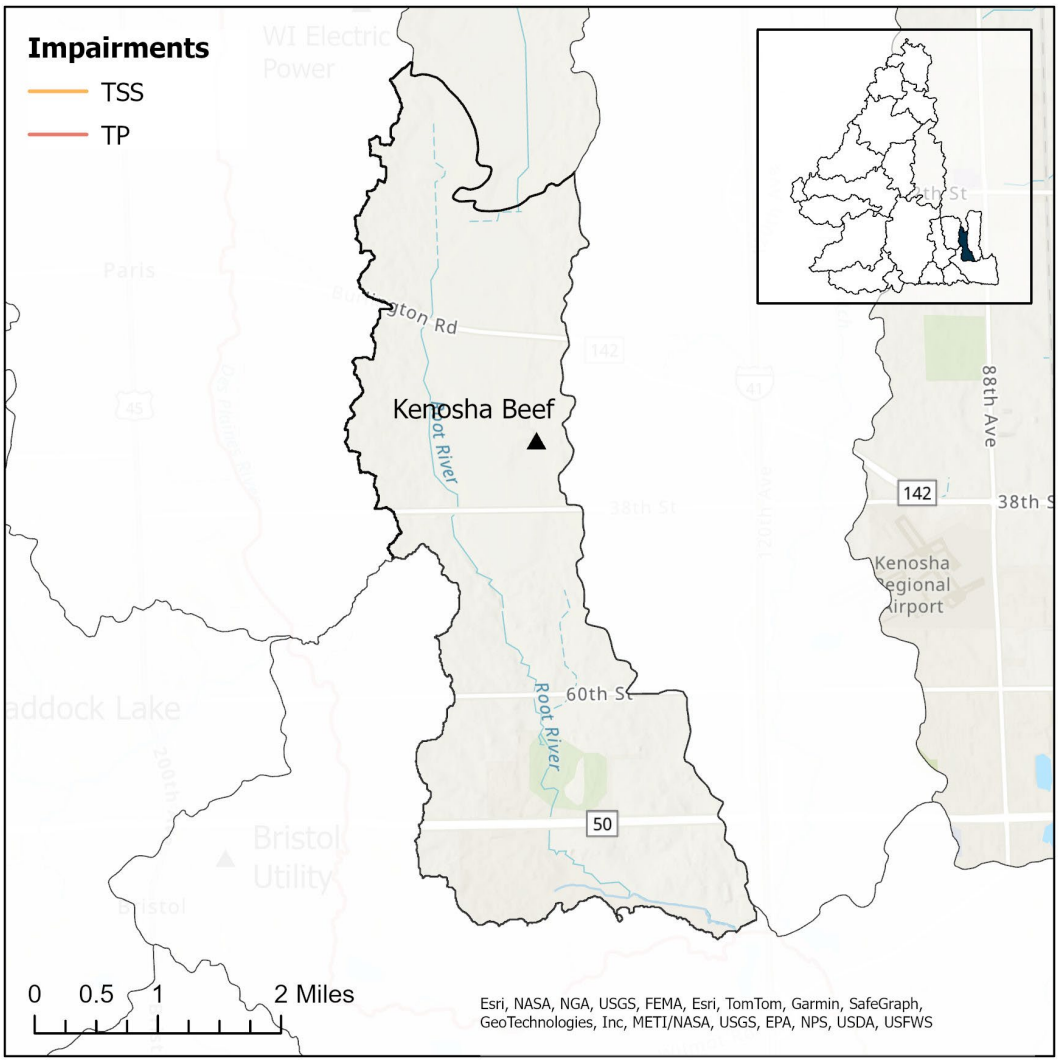
- Area: 21 square miles
- Land Use: 74% agriculture, 10% urban, 9% grassland/pasture, 5% forest, 3% wetland
- Large Lakes: None
- Municipalities: None
- Wastewater Dischargers: Fonks Home Center Hickory Haven, WI Electric Power Town of Paris
- TP Impairments: Des Plaines River
- TSS Impairments: None



3.3. Root River

Location Description: The Root River watershed is a narrow watershed situated within Kenosha County. The land use in the watershed is predominantly agriculture, with almost 75% of the total area devoted to primarily cash grain production. The landscape is relatively flat with poorly-drained soils, so subsurface tile drainage is common throughout the basin. The Root River discharges to the mainstem of the Des Plaines River just west of the Village of Pleasant Prairie.

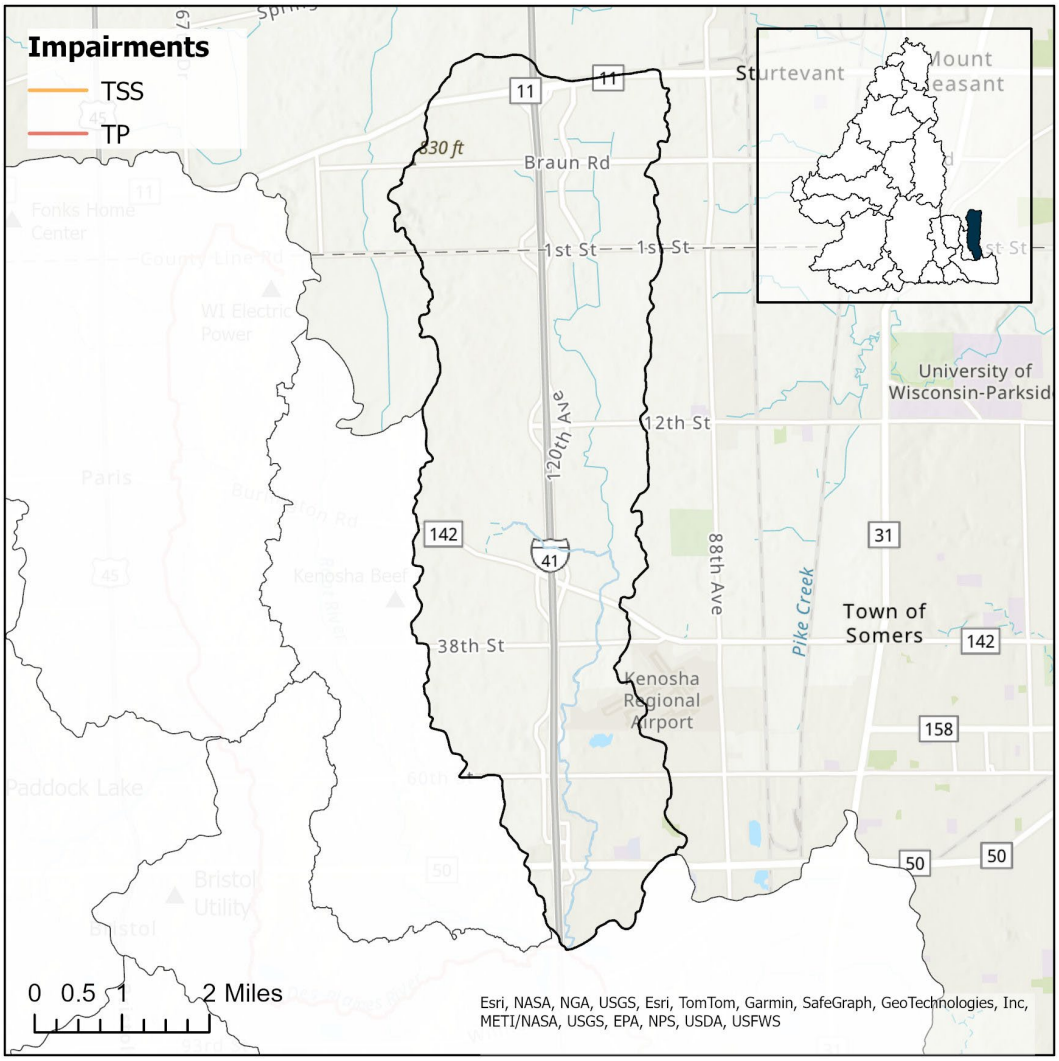
- Area: 11 square miles
- Land Use: 75% agriculture, 9% urban, 7% grassland, 6% forest, 3% wetland
- Large Lakes: None
- Municipalities: Kenosha
- Wastewater Dischargers: Kenosha Beef
- TP Impairments: None
- TSS Impairments: None



3.4. Kilbourn Road Ditch

Location Description: The Kilbourn Road Ditch is situated within southern Racine County and central Kenosha County. The upstream portions of the watershed are predominantly cash grain agriculture with tile drainage; however, the northern-most portion in Racine County is undergoing conversion to light industrial development. The southern portion of the watershed is heavily developed with a mix of light industrial and high-density urban development. The Kenosha Regional Airport is also located in the southern portion of the watershed. The Kilbourn Road Ditch discharges into the Des Plaines River just west of the Village of Pleasant Prairie.

- Area: 24 square miles
- Land Use: 68% agriculture, 18% urban, 5% grassland/pasture, 4% forest, 4% wetland
- Large Lakes: None
- Municipalities: Mount Pleasant, Somers, Kenosha, Pleasant Prairie
- Wastewater Dischargers: None
- TP Impairments: None
- TSS Impairments: None



3.5. Lower Des Plaines River

Location Description: The lower Des Plaines River watershed is situated within southern Kenosha County. The western portion of the watershed is primarily cash grain agriculture with subsurface tile drainage. The areas adjacent to the Des Plaines River are predominantly undeveloped wetlands. The eastern portion of the watershed is developed with primarily light industrial development within the Village of Pleasant Prairie. Lake Andrea is a former gravel pit that now serves as a spring-fed lake heavily used for recreation. The Des Plaines River watershed continues below the Wisconsin border into Illinois.

- Area: 40 square miles
- Land Use: 42% agriculture, 25% urban, 11% grassland, 7% forest, 14% wetland, 2% open water
- Large Lakes: Lake Andrea
- Municipalities: Pleasant Prairie
- Wastewater Dischargers: Bristol Utility District
- TP Impairments: Des Plaines River
- TSS Impairments: None