

### 3.5.4 Cline Lake-Pigeon River Land Use

The Cline Lake subwatershed is located west of the Mongo Millpond subwatershed but also shares watershed boundaries with East Fly Creek, Fly Creek, and VanNatta Ditch subwatersheds (Figure 38). It is approximately 17,303 acres (7002.28 hectares) in size. This subwatershed contains the Nasby Dam and Ontario Millpond. The major waterway running through the subwatershed is the Pigeon River. The predominant land use in the subwatershed is agriculture taking up nearly 59% of the total land use and with traditional tillage techniques being utilized there is potential for some erosion issues in the subwatershed. However, as with the previous subwatersheds discussed, a very large portion of the drainage area (27%) is designated as open water due to the fact that over half of the PRFWA is located within the Cline Lake drainage. The 124 acre Cline Lake Fen, managed by The Nature Conservancy, is also located in the subwatershed, as well as the 100 acre Ontario Millpond and 40 acre Nasby Millpond. The Cline Lake Fen is restricted and not open for public recreational use. Table 69 shows the distribution of land use in the Cline Lake subwatershed.

**Table 69: Cline Lake Land Use**

	Water	Developed - HD	Developed - LD	Industrial	Cultivated Crops	Grass/ Pasture	Forest	Other	Total
Acres	4705.8	303.5	722.7	0.9	8992.8	1158.7	1412.4	6.2	17303
%	27.2	1.8	4.1	<1	52.0	6.7	8.2	<1	17303

Pigeon River, located downstream of the Ontario Millpond in Cline Lake subwatershed, is listed on Indiana’s 2008 303(d) list of impaired waters *E. coli*. The Pigeon River, and many of its tributaries, are listed on the Indiana 2010 fish consumption advisory for Carp. Figure 39 displays those waterways that are designated as impaired by the state of Indiana.

# Cline Lake Sub-Watershed

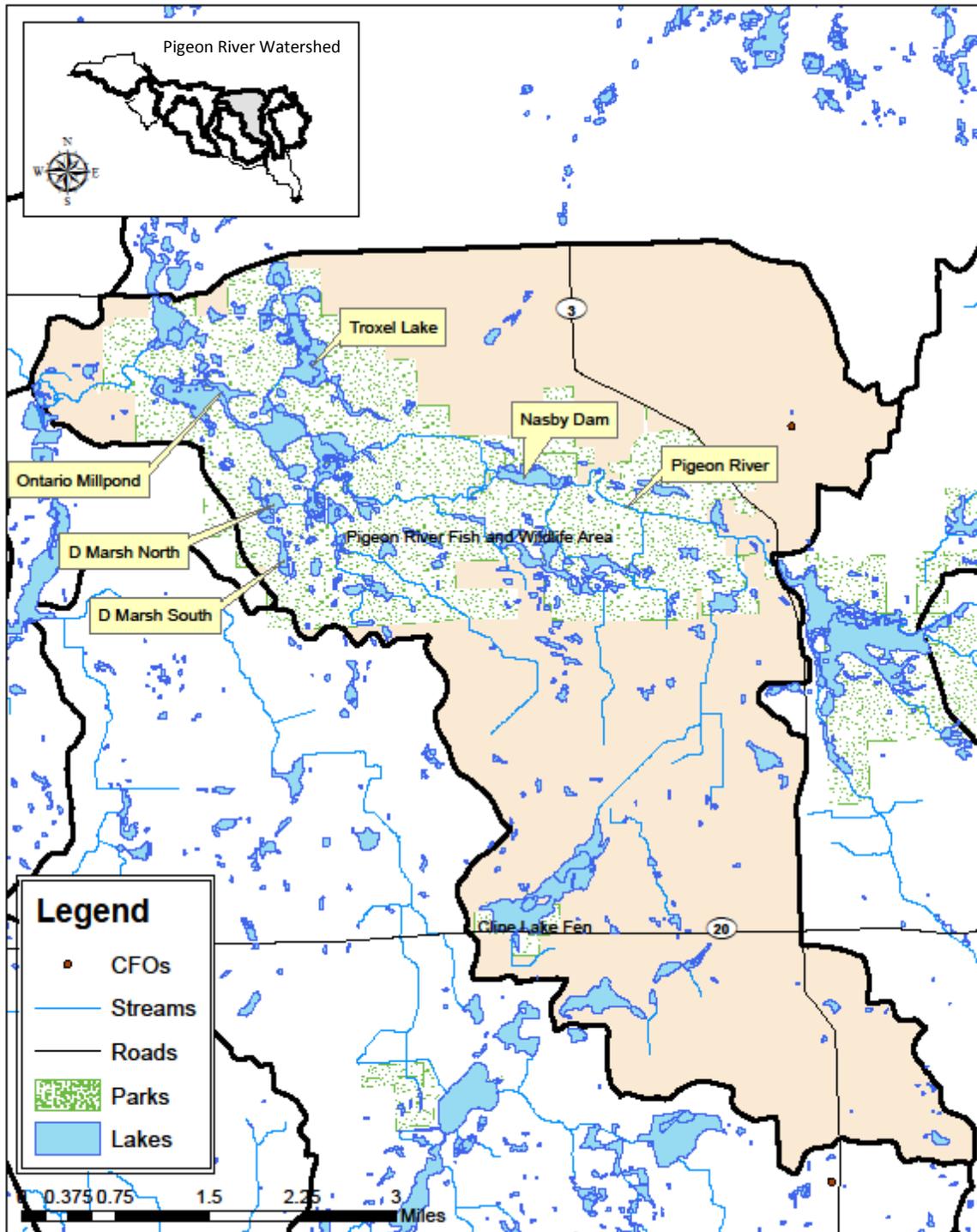


Figure 38: Cline Lake Subwatershed

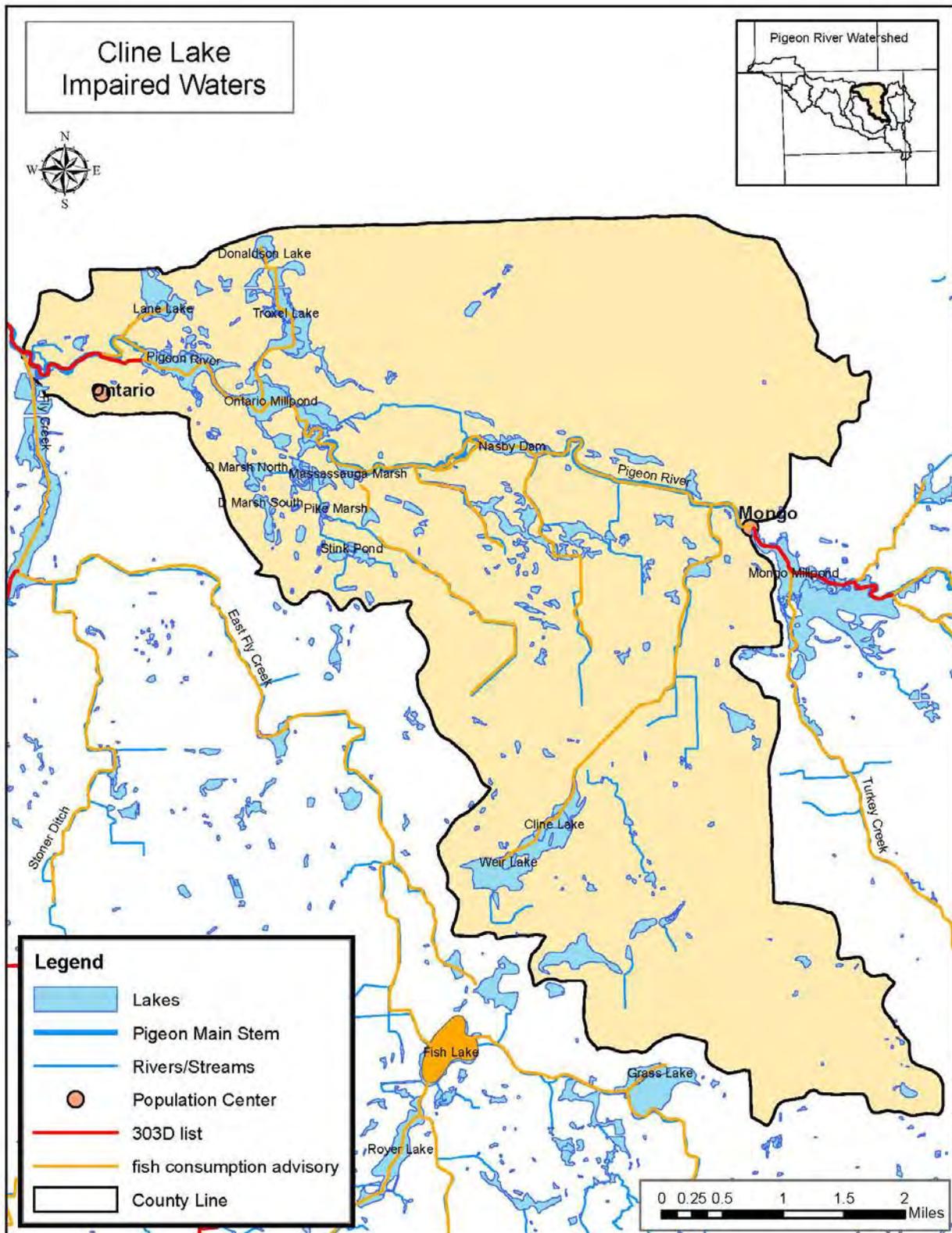


Figure 39: Cline Lake Impaired Waters

There are no NPDES permitted facilities located within the Cline Lake subwatershed. There are two LUSTs located in the Cline Lake drainage area; the Curtis Creek Trout Rearing Facility which is managed by the IN DNR, just west of the Ontario Millpond, and Weiss Trucking Co. which has been closed and remediated. The Curtis Creek Trout Rearing Facility LUST is still active and is designated as a medium level priority for the UST program to remediate. There is one UST located wholly within the Cline Lake subwatershed and one located on the border of Cline Lake and East Fly Creek subwatersheds. While these USTs are currently safe, there is the potential for them to leak and cause a pollution concern.

One CFO is located within the Cline Lake subwatershed. The CFO houses over 1000 swine on site and is located in the northeastern portion of the subwatershed. Windshield and desktop surveys do not provide evidence that NPS is a concern from this facility. Table 70 and Figure 40 display the potential pollution risks in the Cline Lake subwatershed and their location, respectively.

**Table 70: Potential Water Quality Pollution Threats in Cline Lake**

Type of Threat	Potential Contaminant	Number in Watershed
Leaking Underground Storage Tank	Oil/Gas	2
Confined Feeding Operations	Manure runoff/sedimentation	1

The Pigeon River itself runs through the PRFWA, Nasby Dam, Cline Lake Fen, and the Ontario and Nasby Millponds, all of which act as sediment traps and can lessen the impact of soil erosion on surface water quality. Therefore, traditional row cropped fields have only a slight impact on streams, however the impact on the ponds and lakes is great as they may be filling in more quickly than nature would do alone. The lateral ditch system flows through a series of wetlands and areas that have established riparian zones. One area of concern was noted during the windshield survey where the landowner was planting up to the edge of the stream. Therefore, a filter strip is needed at the site. Table 71 and Figure 41 display the results of the windshield/desktop survey. The desktop survey revealed the large amount of soil designated as PHEL. Special precaution will need to be taken by landowners farming the PHEL and HEL land.

**Table 71: Cline Lake Windshield Survey Observations**

Type of Threat	Potential Contaminant	Number in Watershed
Lack of Riparian Buffer	Sediment, nutrient runoff	1 mile

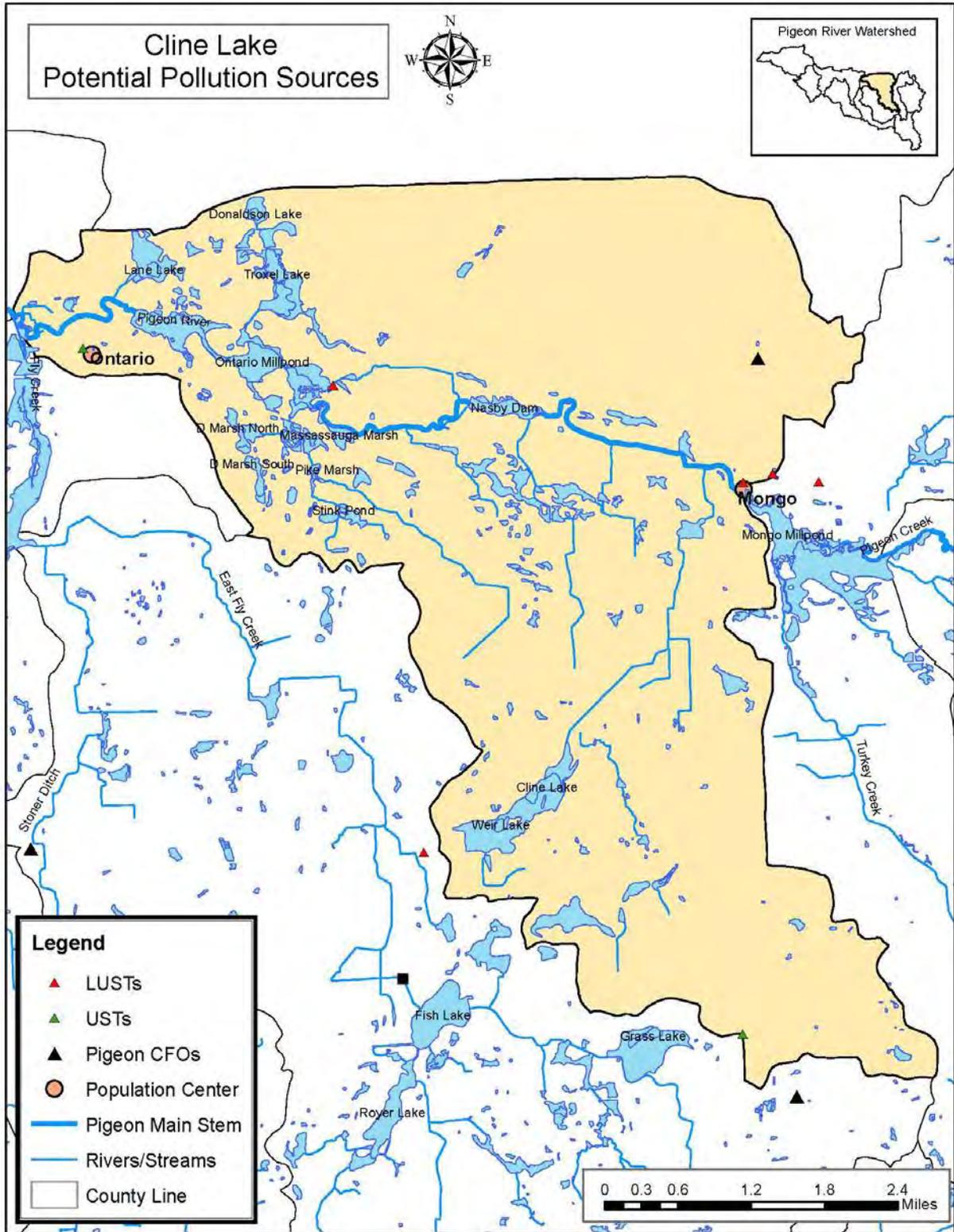
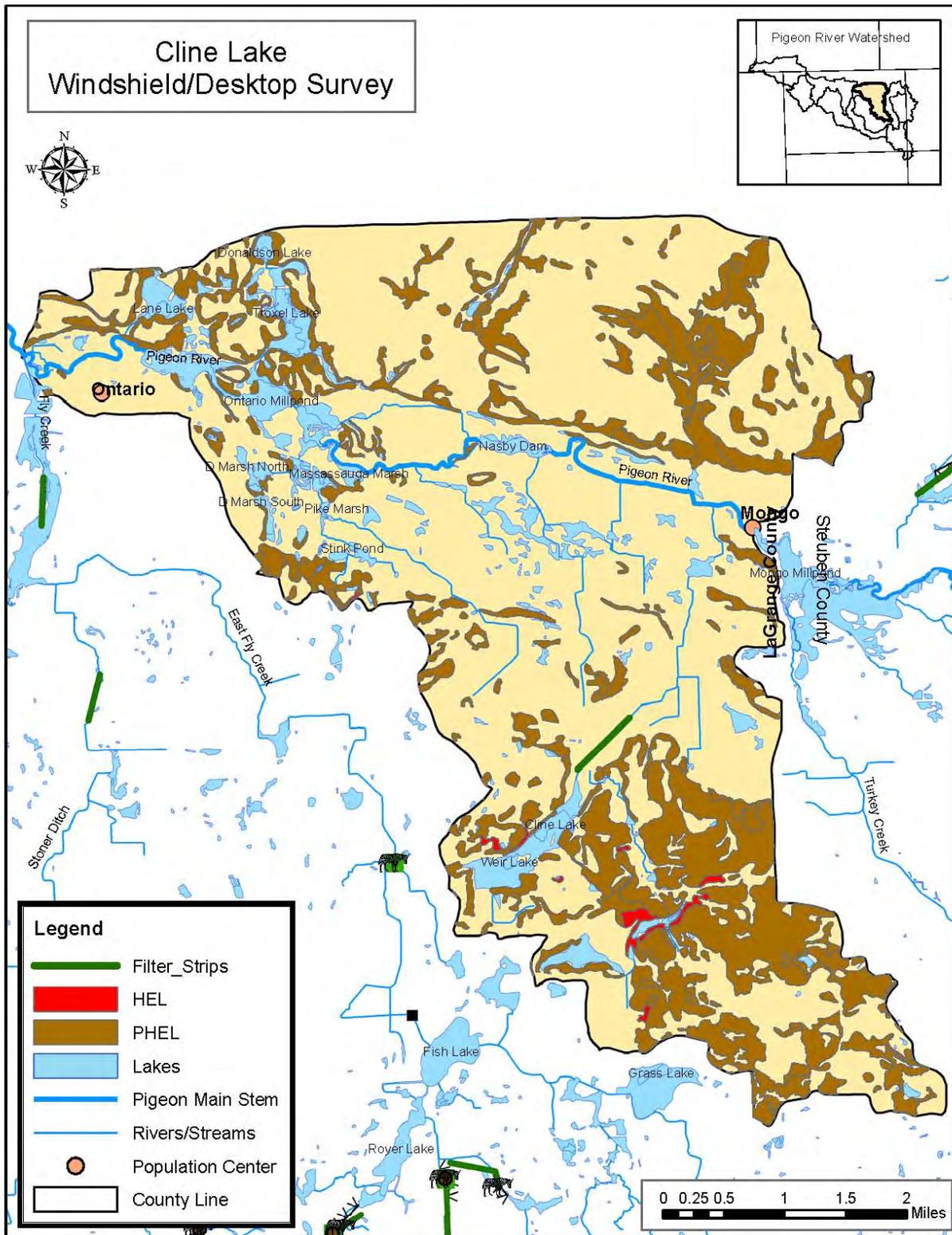


Figure 40: Cline Lake Potential Pollution Issues



**Figure 41: Cline Lake Windshield/Desktop Survey Results**

### 3.5.5 East Fly Creek Land Use

The East Fly Creek subwatershed is located east of the Fly Creek and west of the Cline Lake subwatersheds (Figure 42). It is approximately 16,722 acres (6787.39 hectares) and contains the major waterbodies East Fly Creek, Stoner Ditch, Fish Lake, and Royer Lake. The predominant land use in the subwatershed is agriculture which encompasses 65% of the total land use. The 30 acre Maplewood Natural Area, maintained by the LaGrange County Parks and Recreation Department, is located within the East Fly Creek subwatershed. The only built-up areas in the drainage area are Fish and Royer Lakes. Table 72 shows the distribution of land use within the East Fly Creek subwatershed.

**Table 72: East Fly Creek Land Use**

	<b>Water</b>	<b>Developed - HD</b>	<b>Developed - LD</b>	<b>Industrial</b>	<b>Cultivated Crops</b>	<b>Grass/ Pasture</b>	<b>Forest</b>	<b>Other</b>	<b>Total</b>
Acres	3378.6	353	909.8	17.9	7805.7	3137.9	1169.1	0	16772
%	20.1	2.1	5.4	<1	46.5	18.7	7.0	0	100

Fish and Royer Lake are both listed on the Indiana 2008, 303(d) list of impaired waters for IBC and Fish Lake is also listed for mercury in fish tissue. For this reason, Fish Lake is also listed on the Indiana fish consumption advisory. Also, Stoner Ditch, East Fly Creek, and several tributaries to East Fly Creek are listed on the fish consumption advisory for Carp. Figure 43 displays those waterways that are designated as impaired by the state of Indiana.

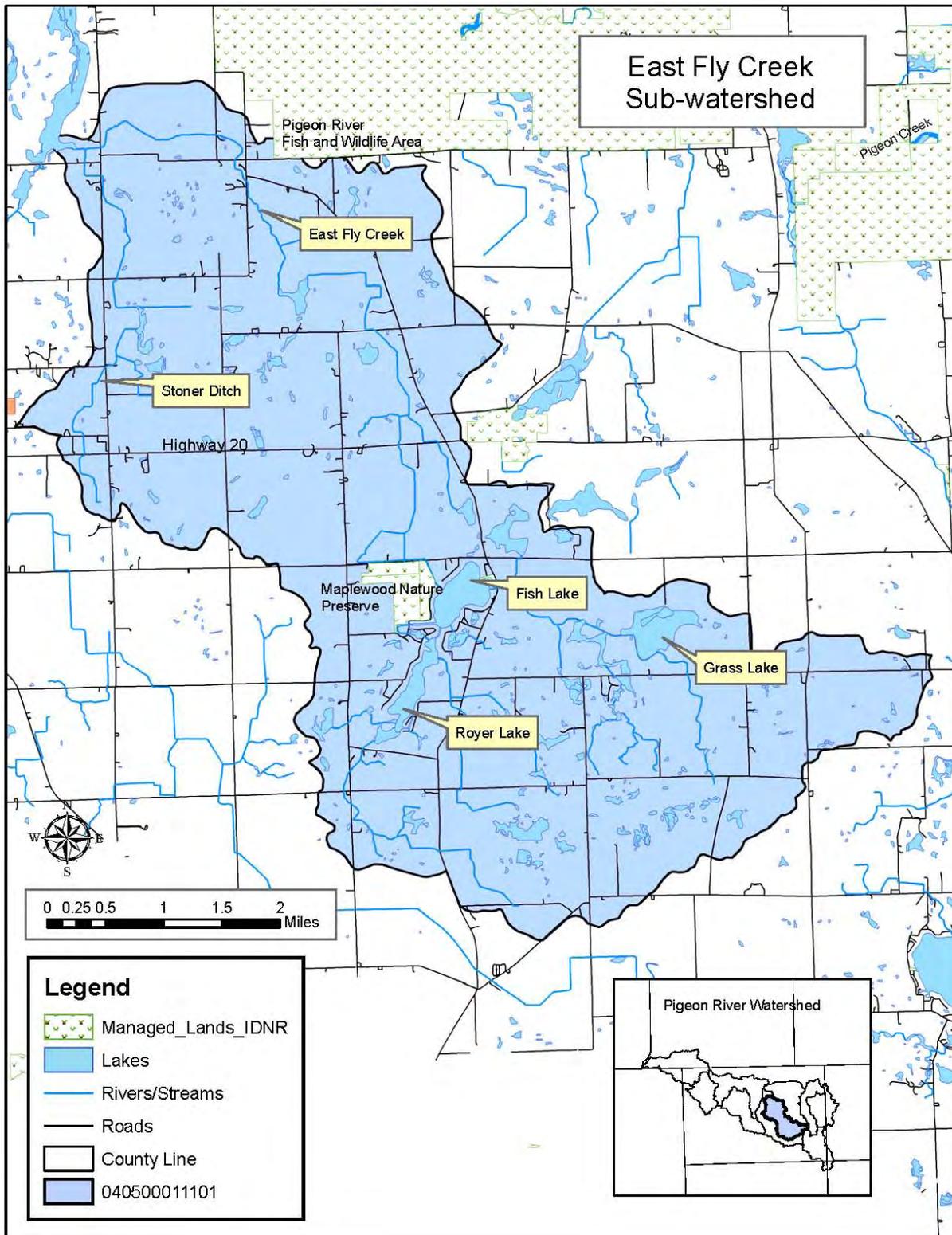


Figure 42: East Fly Creek Subwatershed

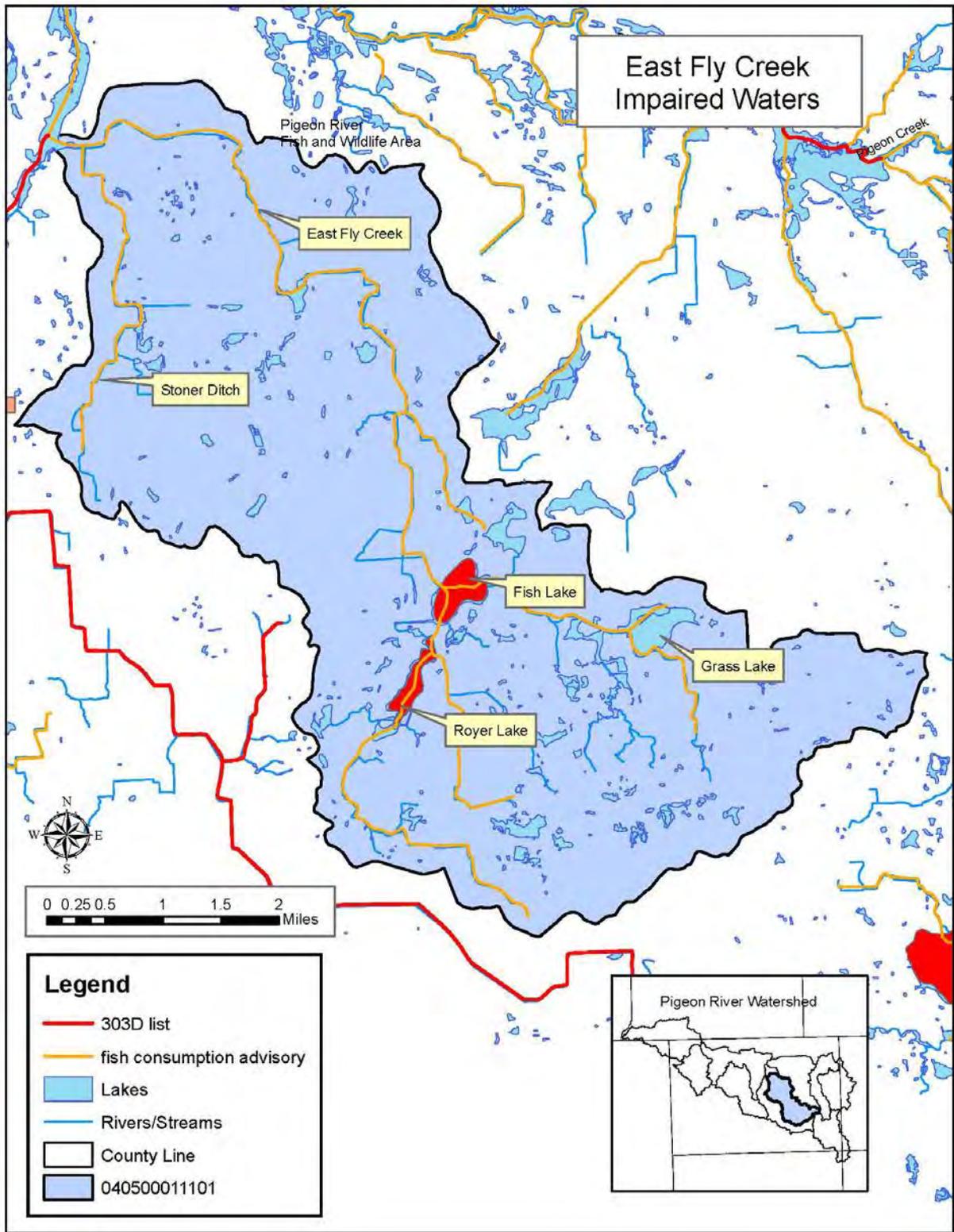


Figure 43: East Fly Creek Impaired Waters

The Fish and Royer Lake Waste Water Treatment Plant, serviced by the LaGrange County Regional Utility District-Region F, is the only NPDES permitted facility located within East Fly Creek subwatershed. They have an innovative way of waste water treatment by filtering it through a constructed wetland. The process is fairly new to them, but the Utility District feels that it is working very well. There is one SSO which discharges into the East Fly Creek. There have been no overflows reported in the past decade. However, the SSO should be carefully monitored and the residents of Fish and Royer Lakes should be educated on water conservation in their homes.

There is one LUST located in the East Fly Creek subwatershed. The LUST is owned by Don Meyer’s Property and is currently active and assigned a high priority level by the state of Indiana. There is also one UST located on the border of Cline Lake and East Fly Creek subwatershed. While the UST is currently safe, there is the potential for it to leak and cause a pollution concern.

There are two CFOs located within East Fly Creek. There is one current CFO and one recently closed. Although one is closed, it should be monitored to be sure there are no residual pollutants leaching from the property. There is a swine house in the southeastern portion of the subwatershed which houses nearly 200 hogs. From visual inspection, the CFO does not appear to be a current issue in regards to NPS. All potential pollution concerns are outlined in Table 73 and the location of each site is shown in Figure 44.

**Table 73: Potential Water Quality Pollution Threats in East Fly Creek**

Type of Threat	Potential Contaminant	Number in Watershed
Leaking Underground Storage Tank	Oil/Gas	1
Underground Storage Tank	Oil/Gas	1
Confined Feeding Operations	Manure runoff/sedimentation	2
NPDES Permitted Facility	Nutrients, Bacteria, Sediment	1

Windshield and desktop surveys revealed several small animal operations, many of which allowed livestock direct access to surface water and had improperly handled manure stacks. These practices promote increased sedimentation due to streambanks becoming denuded of vegetation from livestock trampling the vegetation and increased *E. coli* contamination and nutrient levels in the waterway. The surveys also revealed that there are row crop influences on water quality in the East Fly Creek subwatershed as there is an even mix of traditional English and Amish farming practices throughout the drainage area. The desktop survey revealed that there is a fair amount of soil which is ranked as either HEL or PHEL. Special precaution will need to be taken by landowners farming this soil. Table 74 and Figure 45 display the results of the windshield/desktop survey.

**Table 74: East Fly Creek Windshield Survey Observations**

<b>Type of Threat</b>	<b>Potential Contaminant</b>	<b>Number in Watershed</b>
Livestock Access to Ditch	Sediment, Bacteria, Nutrients	6
Need for Exclusion Fencing	Sediment, Bacteria, Nutrients	7000 feet
Lack of Riparian Buffer	Sediment, nutrient runoff	6 miles
Barnyard Remediation Needed	Sediment, Bacteria, Nutrients	3
Streambank Erosion	Sediment	240 feet

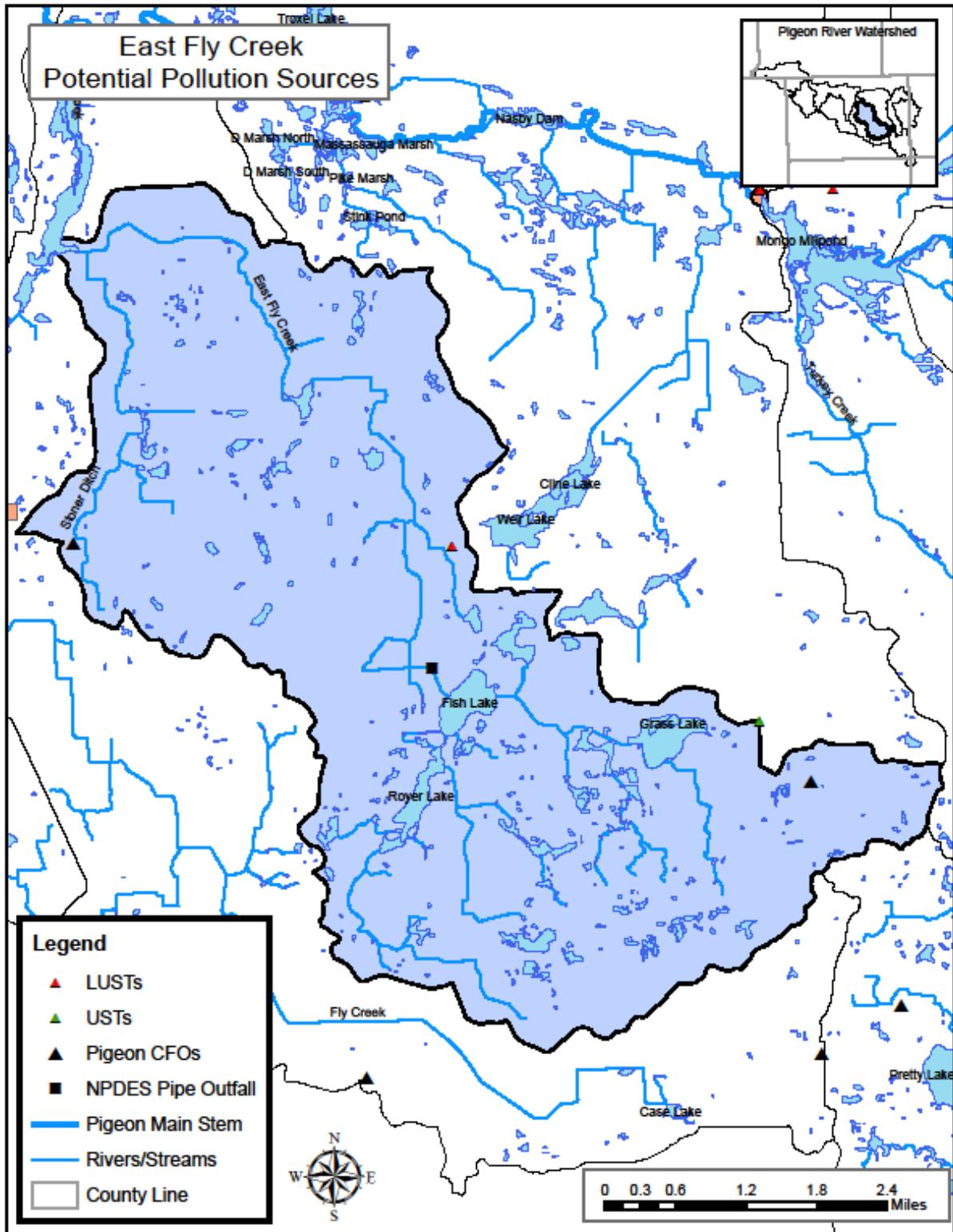


Figure 44: East Fly Creek Potential Pollution Issues

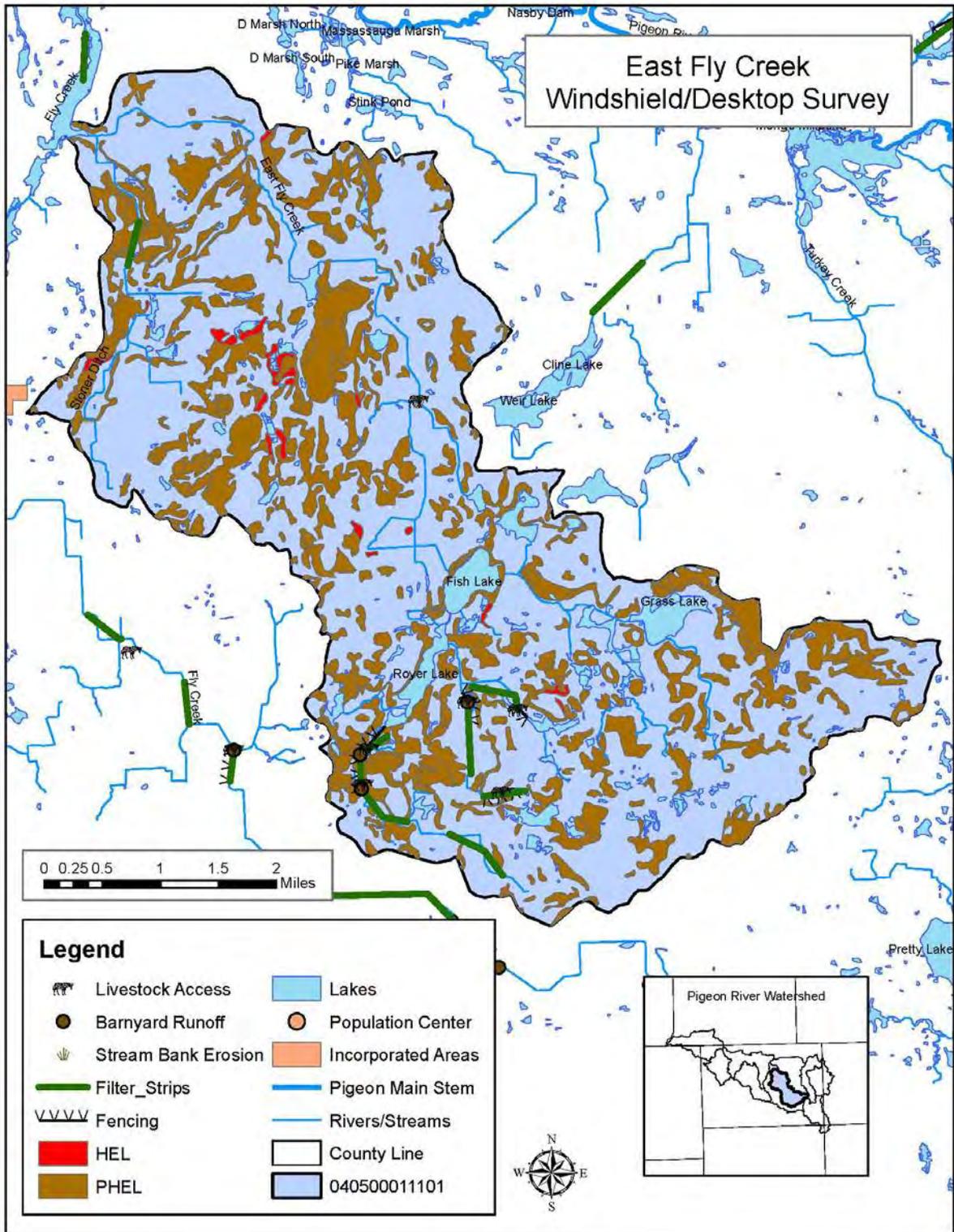


Figure 45: East Fly Creek Windshield/Desktop Survey Results

### 3.5.6 Fly Creek Land Use

The Fly Creek subwatershed is located west of East Fly Creek subwatershed and is also bordered by Buck Lake-Buck Creek, VanNatta Ditch, and Cline Lake subwatersheds (Figure 46). It is approximately 10,906 acres (4,414 hectares) and encompasses about 80% of the town of LaGrange. The major waterway located within the subwatershed is Fly Creek.

Fly Creek is the most heavily populated drainage area within the project area as it houses the majority of the county seat, LaGrange (P=2625). An analysis of land use in the project area revealed that 15% of the Fly Creek subwatershed is developed. While the urban influence on water quality is relatively small in comparison to the agricultural influence, it is important to begin urban BMP education and start implementing urban BMPs to promote lifestyle changes to help improve our water resources. Such pollutants that are common in urban areas are oil, salt, and pet waste. However, LaGrange is unique in that a large Amish population lives and/or frequents the town which results in horse manure being left on roadways to wash into roadside drains and surface waters. Even though 15% of the land use is deemed developed, agriculture is still the major influence on this subwatershed, as 70% of the land use is either in row crops or pasture and hayland (Table 75).

**Table 75: Fly Creek Land Use**

	Water	Developed - HD	Developed - LD	Industrial	Cultivated Crops	Grass/ Pasture	Forest	Other	Total
Acres	1138.9	774.3	845.7	53.8	5852	1796.2	443	2.1	10906
%	10.4	7.1	7.8	<1	53.7	16.5	4.1	<1	100

Fly Creek, located within the Fly Creek subwatershed, is listed in Indiana’s 2008 303(d) list of impaired waters for *E. coli*. Fly Creek is also listed on the 2010 fish consumption advisory for the consumption of Carp. Figure 47 shows the location of the water bodies that are designated as impaired by the state of Indiana.

# Fly Creek Sub-Watershed

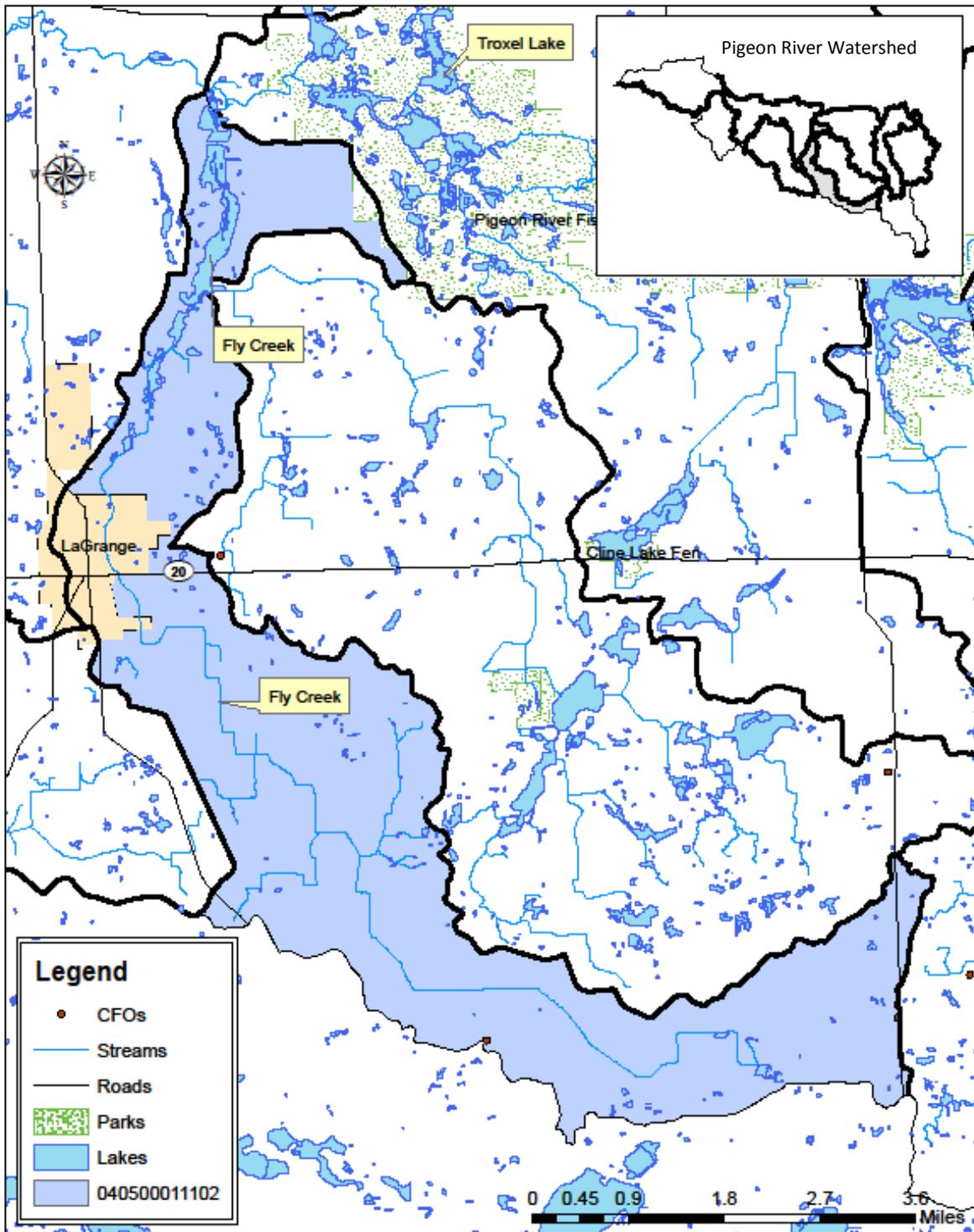


Figure 46: Fly Creek Subwatershed

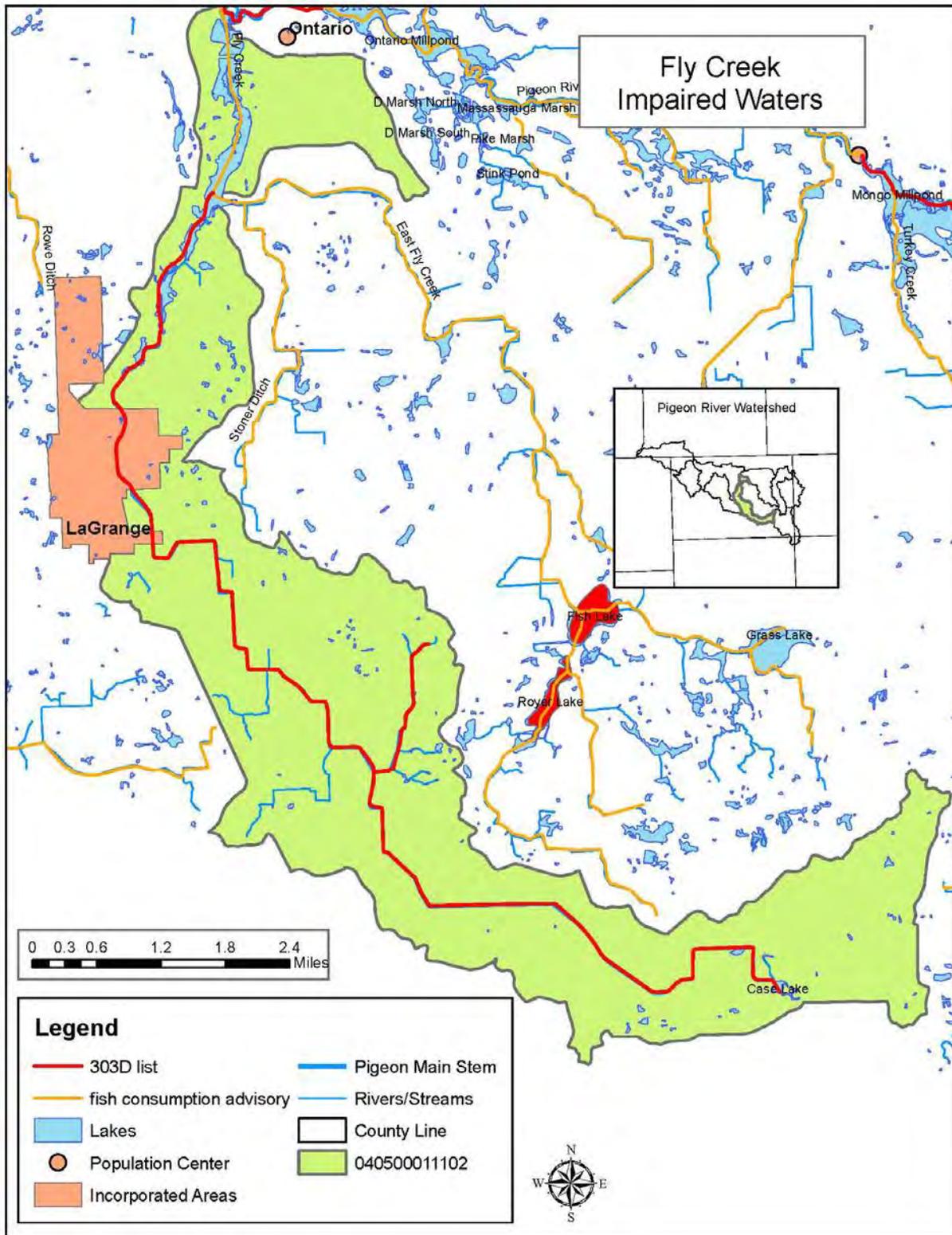


Figure 47: Fly Creek Impaired Waters

The LaGrange Sewer District (LSD) services LaGrange and the surrounding area. The LSD is the only NPDES permitted facility within Fly Creek subwatershed and has one SSO which discharges into Fly Creek, although there has not been a reported overflow within the past decade. The town of LaGrange had five CSOs prior to 2003. However, the town officials recognized the risk to human health and the environment from CSOs prior to the State requirement to develop a Long Term Control Plan and separated their municipal and residential sewers in 2003.

There are three industrial waste sites located in LaGrange, however only two are located within Fly Creek subwatershed. Industrial waste sites are those sites that are at risk of, or do, discharge hazardous wastes from the site and are therefore required to clean up the waste through the Resource Conservation and Recovery Act. All sites are currently following the RCRA for clean-up issues.

According to the IN UST program there are 10 LUSTs located within the Fly Creek subwatershed, all of which are located in or around the town of LaGrange (figure 35, section 2.6). Table 76 below provides the location, priority, and parameter posing the potential contamination for each of the LUSTs. As can be seen in the table the LUST facilities range from gas stations to schools to landfills. There are also three UST sites located in LaGrange in the Fly Creek subwatershed. While the USTs are currently safe, there is the potential for them to leak and cause a pollution concern in the future.

There are two CFOs located within the Fly Creek subwatershed. From visual inspection, the CFOs do not appear to be a current issue in regards to NPS. All potential pollution concerns are outlined in Table 77 and the location of each site is shown in Figure 48.

**Table 76: Potential Water Quality Pollution Threats in Fly Creek**

Type of Threat	Potential Contaminant	Number in Watershed
Leaking Underground Storage Tank	Oil/Gas	10
Underground Storage Tank	Oil/Gas	3
Confined Feeding Operations	Manure runoff/sedimentation	2
NPDES Permitted Facility	Nutrients, Bacteria, Sediment	1
Industrial Waste Site	A Variety of Toxic Chemicals	3

**Table 77: Fly Creek LUST Sites**

UST FACILITY ID	NAME	STREET ADDRESS	CITY	PRIORITY	AFFECTED AREA	DESCRIPTION
11527	Mid States	112 E Central	LaGrange	High	Wellhead Protection Area, Soil, Groundwater, Free product, C5H12O	Active
20318	Shipshewana Insure/Lincoln Bank	219 S Detroit	Lagrange	Low	Soil	Closed
22792	Lagrange Sheriff Office	101 N High St	Lagrange	Low	Soil	Closed
1511	Domestic Corp	509 South Poplar Street	Lagrange	Medium	Soil, Groundwater	Active
16418	Lagrange 9 & 20	103 E Central	Lagrange	High	Wellhead Protection Area, Soil, Groundwater, Free product	Active
24313	MMM Investments Inc. Property	104 E Central	Lagrange	Medium	Soil, Groundwater, C5H12O	Closed
5326	Lakeland High School	0805 E 075 N	Lagrange	Medium	Soil, Groundwater, C5H12O	Closed
16281	Walters Dimmick Shell Spee-D-mart #240	101 W Central	Lagrange	High	Wellhead Protection Area, Soil, Groundwater, Free product, C5H12O	Active
509	Martinrea Industries Inc	411 E Central Ave	Lagrange	High	Wellhead Protection Area, Vapors, Surface water, Soil, C5H12O, Groundwater	Active
17068	Lagrange County Hwy Dept	300 E Factory	Lagrange	High	Wellhead Protection Area, Soil, Groundwater, C5H12O, Ecologically Sensitive Area	Closed

Windshield and desktop surveys revealed that the Fly Creek subwatershed has one of the largest Amish populations of the project area. For this reason, several small animal operations were noted during the windshield and desktop survey and it was determined that Amish landowners are the primary influence in the Fly Creek drainage area. There were several sites where the livestock had direct access to the stream, indicating the need for exclusion fencing to be installed. There were also several sites found where there were no existing filter strips. The Desktop survey revealed that a large portion of the subwatershed was designated as having PHEL, including the majority of the town of LaGrange. Special precaution will need to be taken by landowners farming this soil. Table 78 and Figure 49 display the results of the windshield/desktop survey.

**Table 78: Fly Creek Windshield Survey Observations**

Type of Threat	Potential Contaminant	Number in Watershed
Livestock Access to Ditch	Sediment, Bacteria, Nutrients	3
Need for Exclusion Fencing	Sediment, Bacteria, Nutrients	7000 feet
Lack of Riparian Buffer	Sediment, nutrient runoff	5 miles
Barnyard Remediation Needed	Sediment, Bacteria, Nutrients	2
Streambank Erosion	Sediment	60 feet

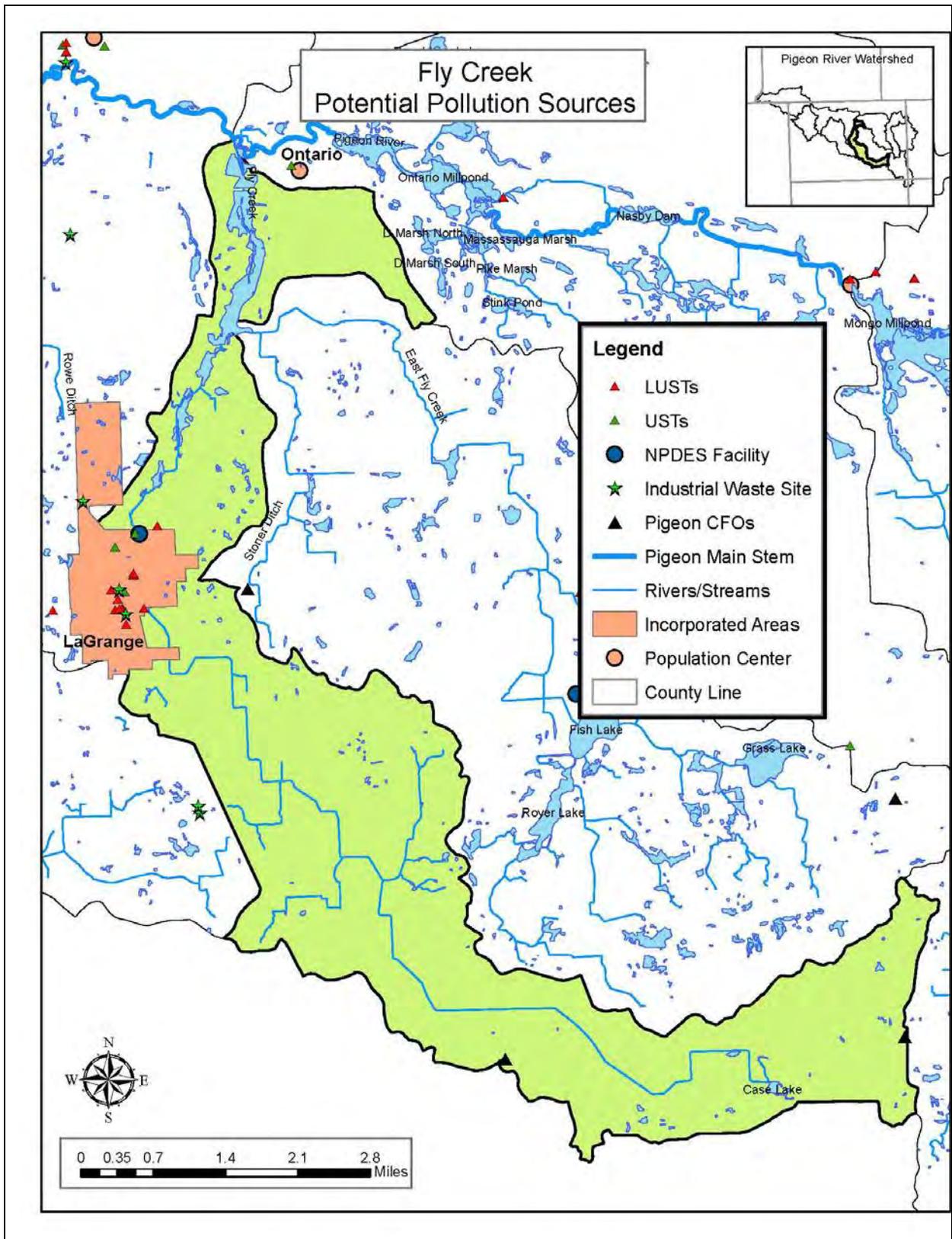
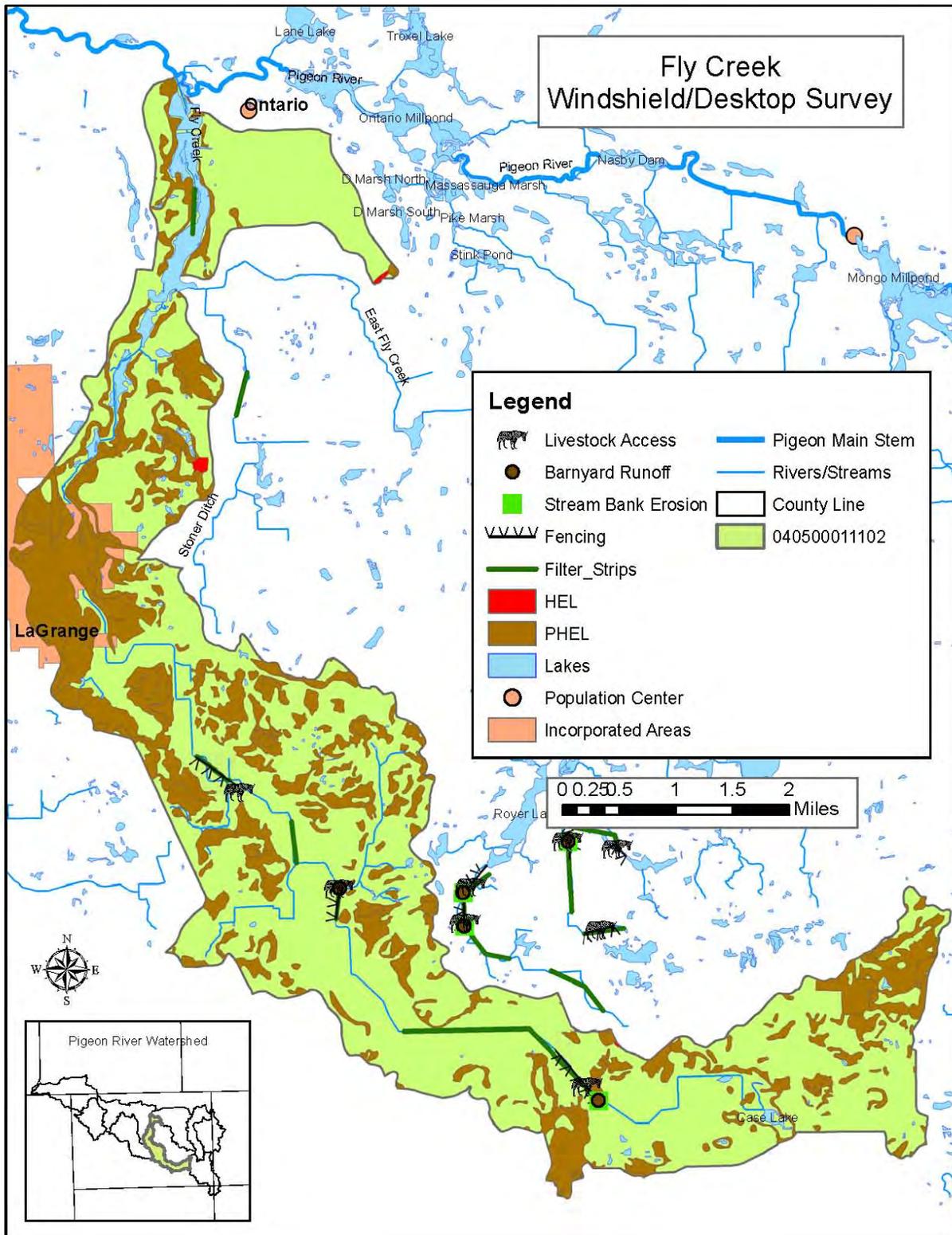


Figure 48: Fly Creek Potential Pollution Issues



**Figure 49: Fly Creek Windshield/Desktop Survey Results**

### 3.5.7 Buck Lake-Buck Creek Land Use

The Buck Lake-Buck Creek subwatershed is located south of VanNatta subwatershed (Figure 50). It is approximately 16,482 acres (6,670 hectares) and contains major waterways Buck Creek, East Buck Creek, McManus Ditch and Buck Lake. The predominant land use in the subwatershed is agriculture with nearly 80% of the land being in either row crops or pasture/grassland. Table 79 shows the distribution of land use in the Buck Lake – Buck Creek subwatershed.

**Table 79: Buck Lake-Buck Creek Landuse**

	<b>Water</b>	<b>Developed - HD</b>	<b>Developed - LD</b>	<b>Industrial</b>	<b>Cultivated Crops</b>	<b>Grass/ Pasture</b>	<b>Forest</b>	<b>Other</b>	<b>Total</b>
Acres	1761.9	471.5	569.6	5.5	7341.3	5618.1	709.4	4.7	16482
%	10.6	2.8	3.5	<1	44.5	34.1	4.3	<1	100

There are no waterbodies located in the Buck Lake – Buck Creek subwatershed that are listed on Indiana’s 303(d) list. However, East Buck Creek Ditch, Buck Creek, McManus Ditch, and all tributaries are listed on Indiana’s fish consumption advisory for Carp. Figure 51 shows the location of all water bodies listed on the fish consumption advisory.

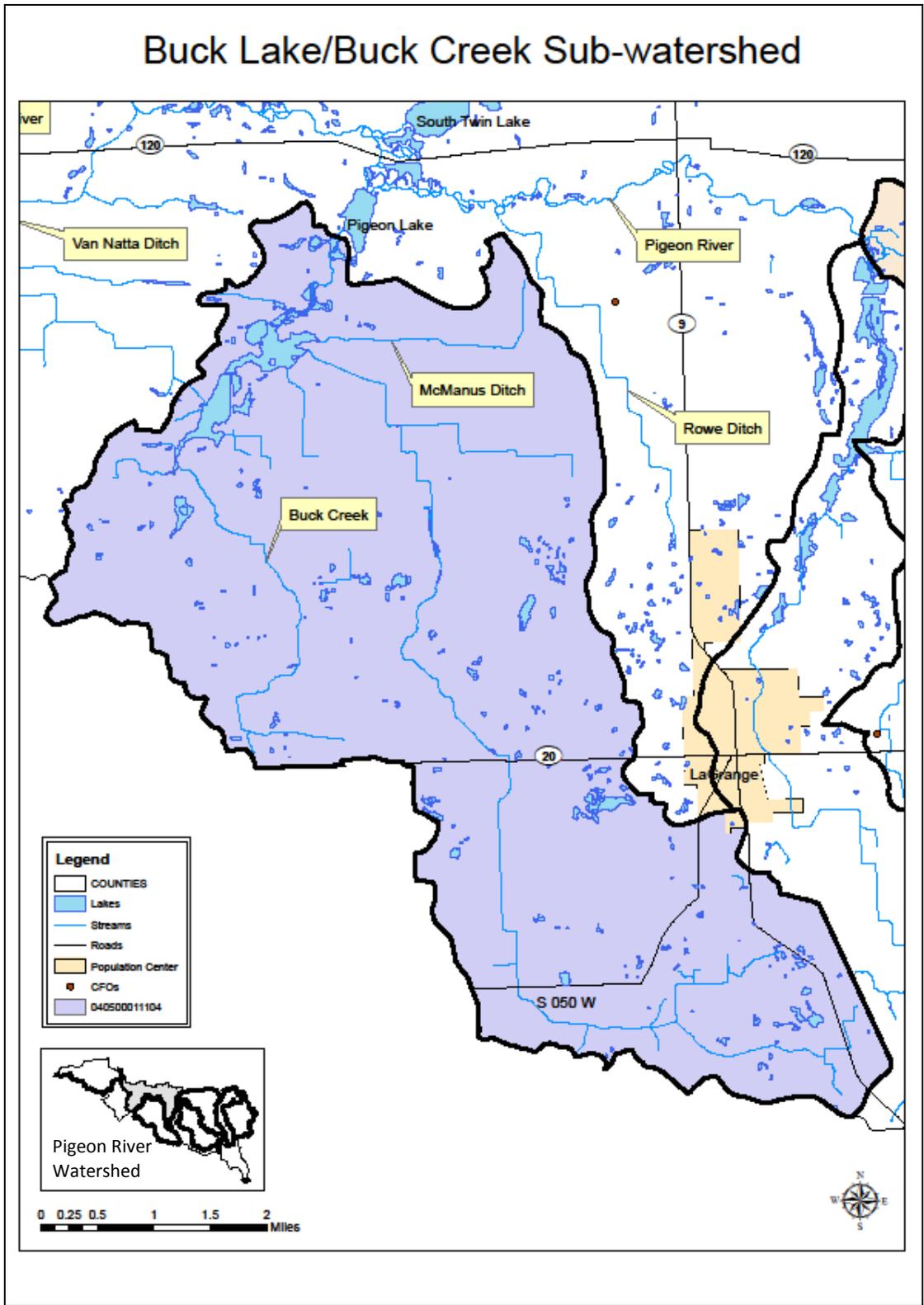


Figure 50: Buck Lake – Buck Creek Subwatershed

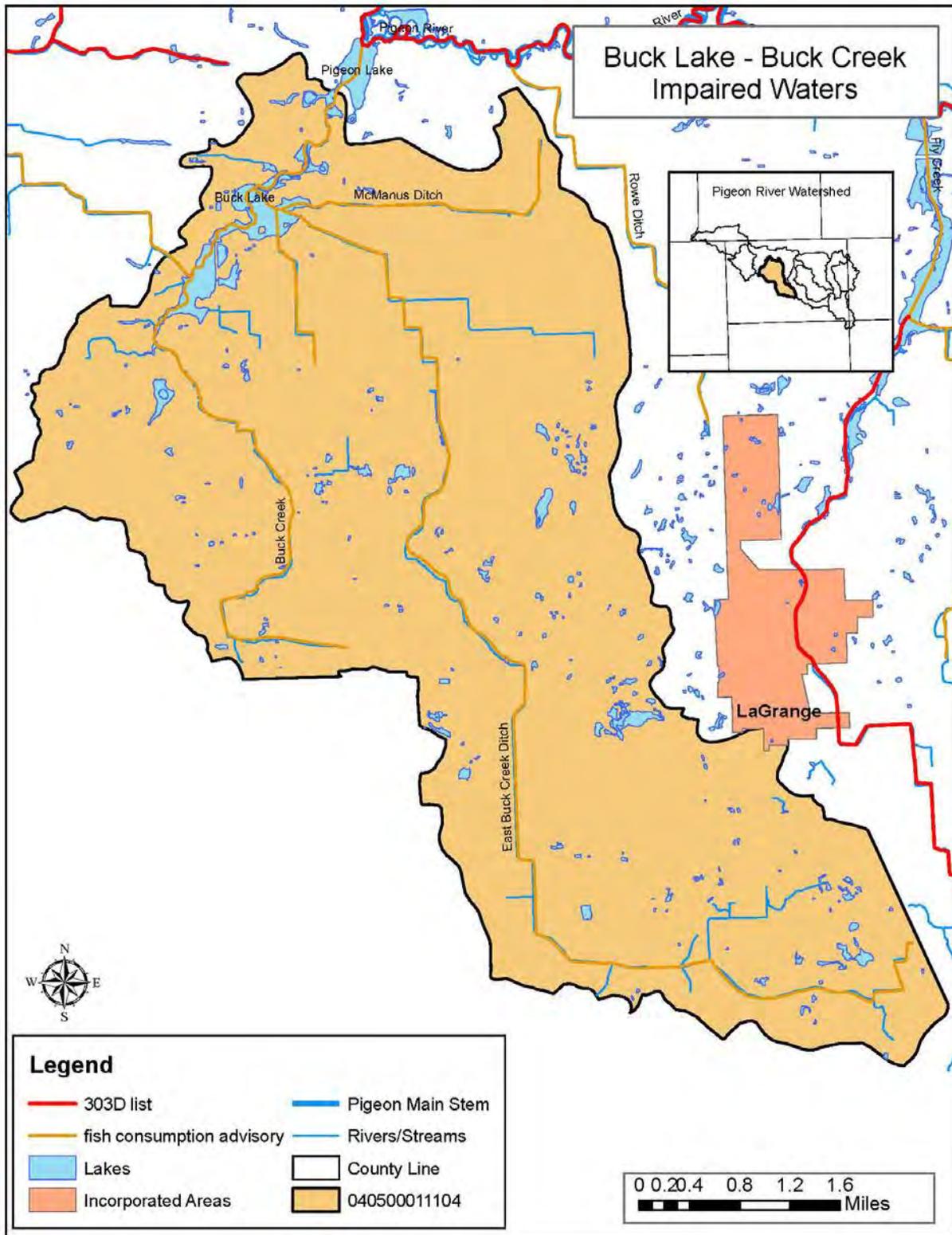


Figure 51: Buck Lake – Buck Creek Impaired Waters

There is one LUST site located within the Buck Lake-Buck Creek subwatershed located on US 20 as can be seen in Figure 52. The LUST is still active, needing remediated by either closing the UST or upgrading it. The IN UST program considers this site to be a medium priority for contamination of soil and groundwater.

There are three industrial waste sites located in the Buck Lake – Buck Creek subwatershed. Industrial waste sites are those sites that are at risk of, or do, discharge hazardous wastes from the site and are therefore required to clean up the waste through the Resource Conservation and Recovery Act. All sites are currently following the RCRA for clean-up issues. There are no CFOs located in Buck Lake – Buck Creek subwatershed. All potential pollution concerns are outlined in Table 80 and the location of each site is shown in Figure 52.

**Table 80: Potential Water Quality Pollution Threats in Buck Lake – Buck Creek**

Type of Threat	Potential Contaminant	Number in Watershed
Leaking Underground Storage Tank	Oil/Gas	1
Industrial Waste Site	A Variety of Toxic Chemicals	3

The windshield and desktop survey revealed several small, unregulated livestock operations in the drainage area, due to the high Amish population. There are also many ditches that drain the agricultural land, which feed into Pigeon Lake on the west edge of the subwatershed. However, it is important to note that the main channel of Buck Creek is well protected by riparian buffer. There were several sites where the livestock had direct access to the stream, indicating the need for exclusion fencing to be installed and several barnyards that do not have adequate manure runoff control measures. There were also several sites found where there were no existing filter strips. The Desktop survey revealed that a large portion of the subwatershed was designated as having PHEL, mostly on the west edge of the subwatershed. Special precaution will need to be taken by landowners farming this soil. Table 81 and Figure 53 display the results of the windshield/desktop survey.

**Table 81: Buck Lake – Buck Creek Windshield Survey Observations**

<b>Type of Threat</b>	<b>Potential Contaminant</b>	<b>Number in Watershed</b>
Livestock Access to Ditch	Sediment, Bacteria, Nutrients	4
Need for Exclusion Fencing	Sediment, Bacteria, Nutrients	7000 feet
Lack of Riparian Buffer	Sediment, nutrient runoff	2 miles
Barnyard Remediation Needed	Sediment, Bacteria, Nutrients	4
Streambank Erosion	Sediment	120 feet

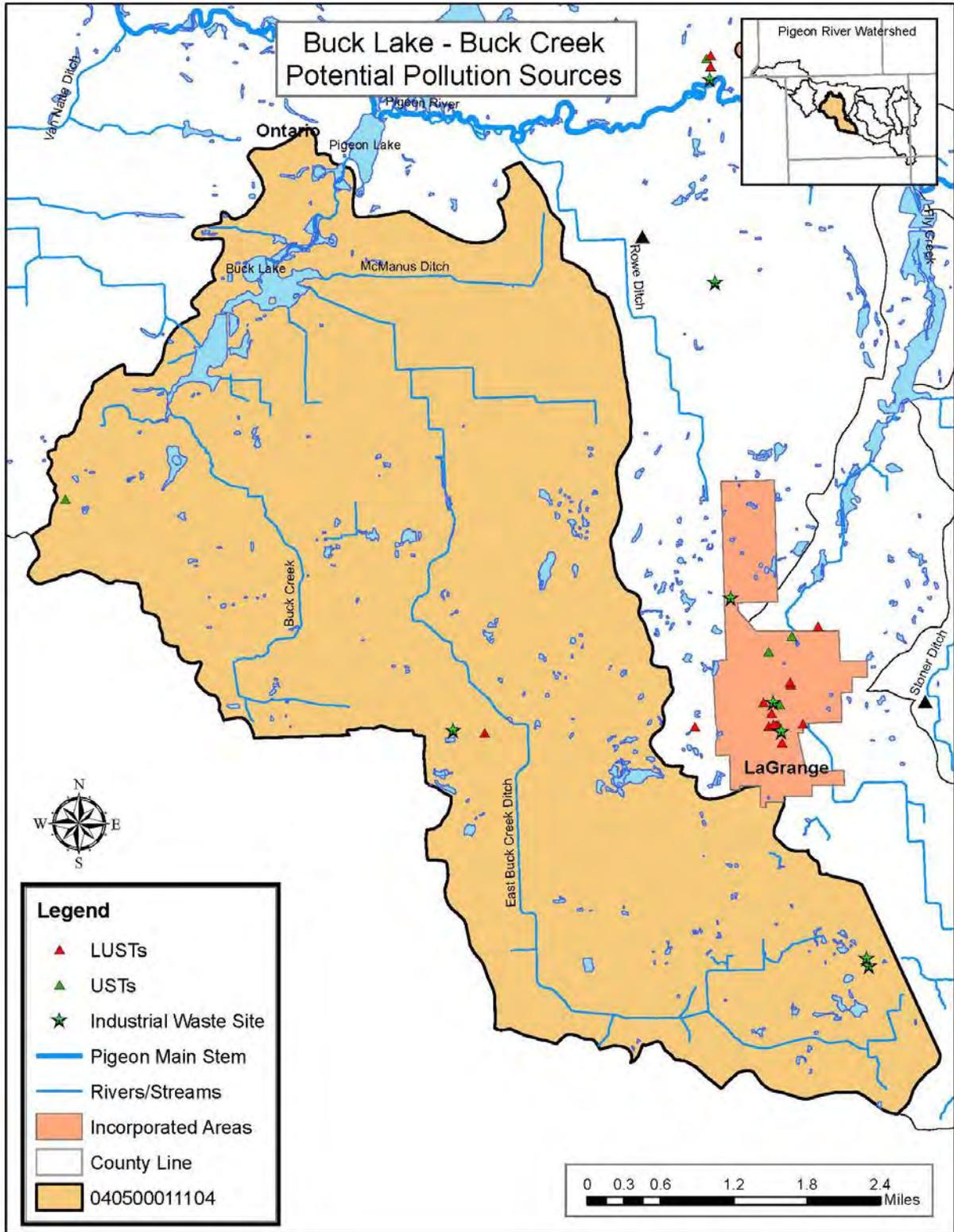
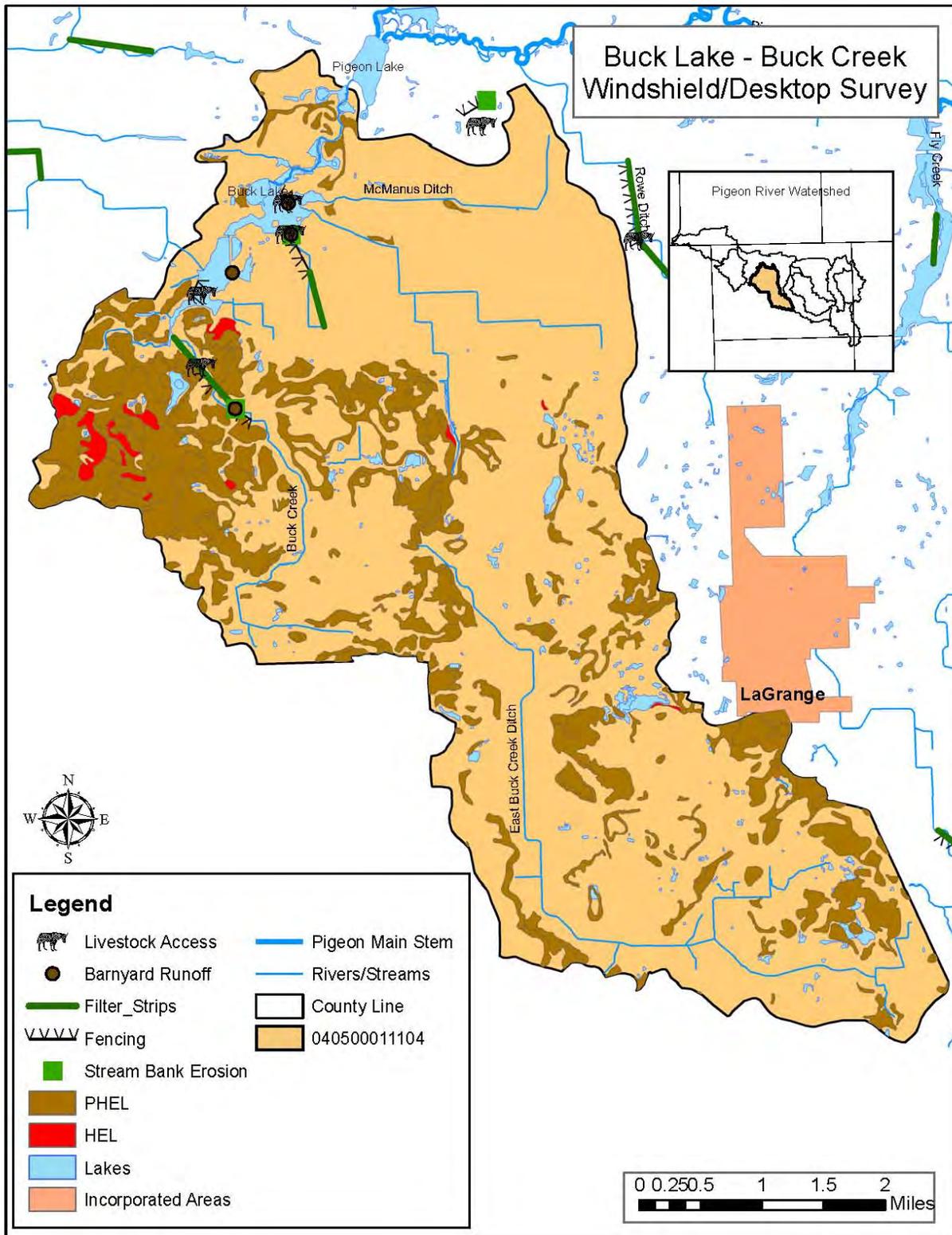


Figure 52: Buck Lake – Buck Creek Potential Pollution Issues



**Figure 53: Buck Lake – Buck Creek Windshield/Desktop Survey**

### 3.5.8 VanNatta Ditch Land Use

The VanNatta Ditch subwatershed is located northwest of Fly Creek subwatershed, north of Buck Lake-Buck Creek subwatershed and east of Page Ditch subwatershed (Figure 54). It is approximately 20,316 acres (8221.6 hectares) in size and encompasses the rest of the town of LaGrange that is not located within the Fly Creek subwatershed. The major waterbodies located within this subwatershed are North and South Twin Lakes and Pigeon Lake, as well as, the Pigeon River, Rowe Ditch and VanNatta Ditch. VanNatta Ditch also contains the Scott Mill Pond Park which is managed by the LaGrange County Parks Department.

The predominant land use in the VanNatta subwatershed is agriculture taking up nearly 70% of the total land (Table 82). The 127 acre Scott Mill Pond Public Fishing Area is located within the western portion of the VanNatta Ditch subwatershed. This recreational area is maintained by the Fish and Wildlife Department of the IN DNR. The small towns of Howe, IN (P=550), and Scott, IN (P=200) are located within the VanNatta Ditch subwatershed, which would account for the 10% of land that is currently developed.

**Table 82: VanNatta Ditch Land Use**

	Water	Developed - HD	Developed - LD	Industrial	Cultivated Crops	Grass/ Pasture	Forest	Other	Total
Acres	3234.9	1064.7	1005.6	94.4	10485.8	3527	903.6	0	20316
%	15.9	5.2	4.9	<1	51.6	17.4	4.4	0	100

The Pigeon River is listed on Indiana’s 2008, 303(d) list of impaired waters for PCBs in fish tissue and downstream of Scott, IN the Pigeon River is listed as impaired for *E. coli*. North Twin Lake, located in North central VanNatta Ditch, is listed as impaired for impaired biotic communities. All streams located in VanNatta Ditch subwatershed are listed on Indiana’s fish consumption advisory for Carp. Figure 55 displays the location of the impaired waterways found in VanNatta Ditch subwatershed.

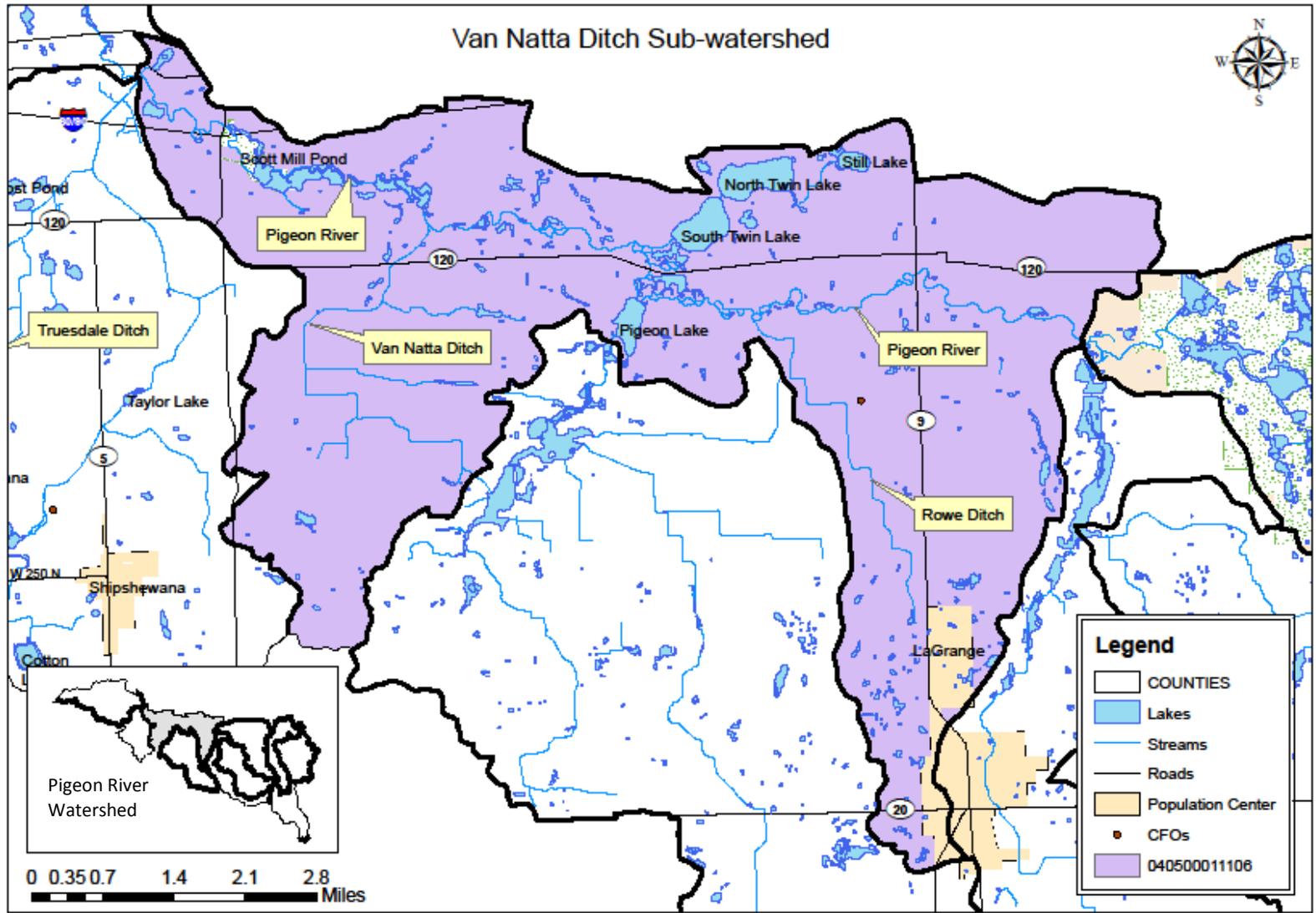
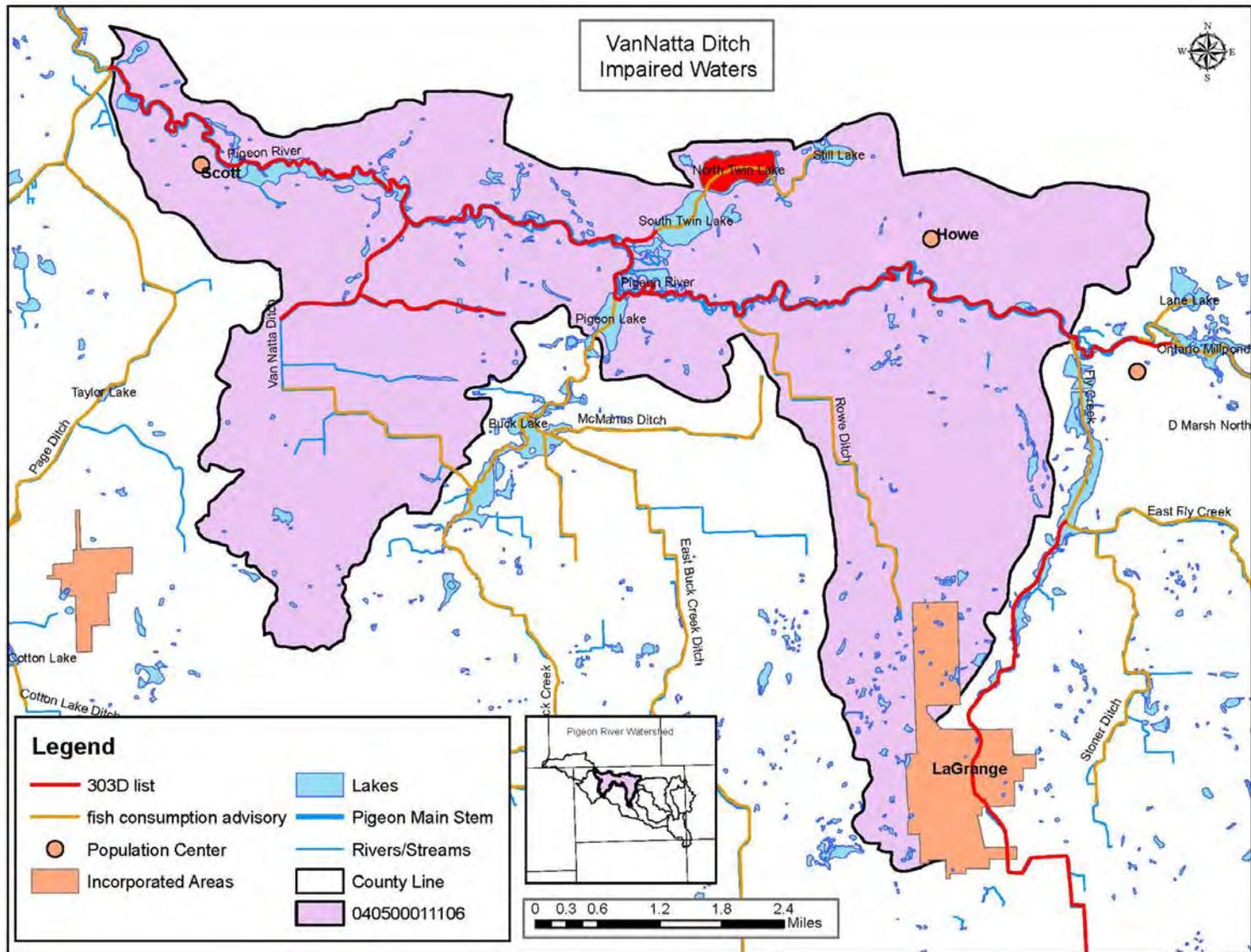


Figure 54: VanNatta Ditch Subwatershed



**Figure 55: VanNatta Ditch Impaired Waters**

There are no NPDES permitted facilities located within VanNatta Ditch subwatershed. The Howe-LaGrange Waste Water Treatment Plant services LaGrange, Howe, and the surrounding area, but it is located north of VanNatta Ditch subwatershed, and discharges outside of the project area.

There are three LUSTs located within the drainage area. One of the LUSTs has been remediated and is closed, however there are still two LUSTs that must either be closed or upgraded to stop contamination from entering the soil or ground water. A list of the LUSTs located within the VanNatta Ditch drainage area is presented in Table 83. There are also three UST sites located in the VanNatta Ditch subwatershed. While the USTs are currently safe, there is the potential for them to leak and cause a pollution concern in the future.

**Table 83: VanNatta Ditch LUST Sites**

UST FACILITY ID	NAME	STREET ADDRESS	CITY	PRIORITY	AFFECTED AREA	DESCRIPTION
9297	Howe Amoco	5445 N Sr 9	Howe	Low	Soil	Active
22199	Howe Marathon Express	5355 N Sr 9	Howe	Low	Soil	Closed
3837	Travel Plaza 7 South	CR 350 E Milepost 12538	Howe	High	Soil, Groundwater, C5H12O, Free Product	Active

There are three industrial waste sites located in VanNatta Ditch subwatershed. Industrial waste sites are those sites that are at risk of, or do, discharge hazardous wastes from the site and are therefore required to clean up the waste through the Resource Conservation and Recovery Act. All sites are currently following the RCRA for clean-up issues.

One CFO is located within the VanNatta Ditch drainage area. The CFO is located just east of Rowe Ditch and the facility houses over 1200 finishers. Since the CFO being located so close to surface water, the CFO may pose a threat to water quality if manure is not properly maintained on the property. All potential pollution concerns are outlined in Table 84 and the location of each site is shown in Figure 56.

**Table 84: Potential Water Quality Pollution Threats in VanNatta Ditch**

Type of Threat	Potential Contaminant	Number in Watershed
Leaking Underground Storage Tank	Oil/Gas	3
Underground Storage Tank	Oil/Gas	3
Confined Feeding Operations	Manure runoff/sedimentation	1
Industrial Waste Site	A Variety of Toxic Chemicals	3

During the windshield and desktop surveys it was revealed the predominant landowners in the VanNatta Ditch subwatershed are Amish. With that, several small animal operations were viewed during the survey, posing a potential threat of elevated sediment, bacteria, and nutrient levels in the water column. However, row crops take up the majority of agricultural land within the drainage area. It is important to note that the main channel of the Pigeon River running through this subwatershed is well protected by riparian buffer. Several sites were noted during the windshield survey where livestock had direct access to surface water and exclusion fencing will need to be installed to prevent the livestock from entering the stream. There were also several sites where there was a lack of riparian buffer and where severe bank erosion was present, as can be seen in Table 84.

The desktop survey revealed the large amount of soil designated as PHEL, especially on the west side of the subwatershed, which is where there is heavy row cropping. Landowners farming soil designated as PHEL will need to take special precautions to prevent erosion of the crop fields. The majority of the drainage has heavy riparian buffer that is filtering sediment loading. However during high water events sediment loading from fields will increase into the main channel without increased field buffering. Table 85 and Figure 57 show the results of the windshield and desktop surveys.

**Table 85: VanNatta Ditch Windshield Survey Observations**

Type of Threat	Potential Contaminant	Number in Watershed
Livestock Access to Ditch	Sediment, Bacteria, Nutrients	3
Need for Exclusion Fencing	Sediment, Bacteria, Nutrients	5000 feet
Lack of Riparian Buffer	Sediment, nutrient runoff	3 miles
Streambank Erosion	Sediment	120 feet

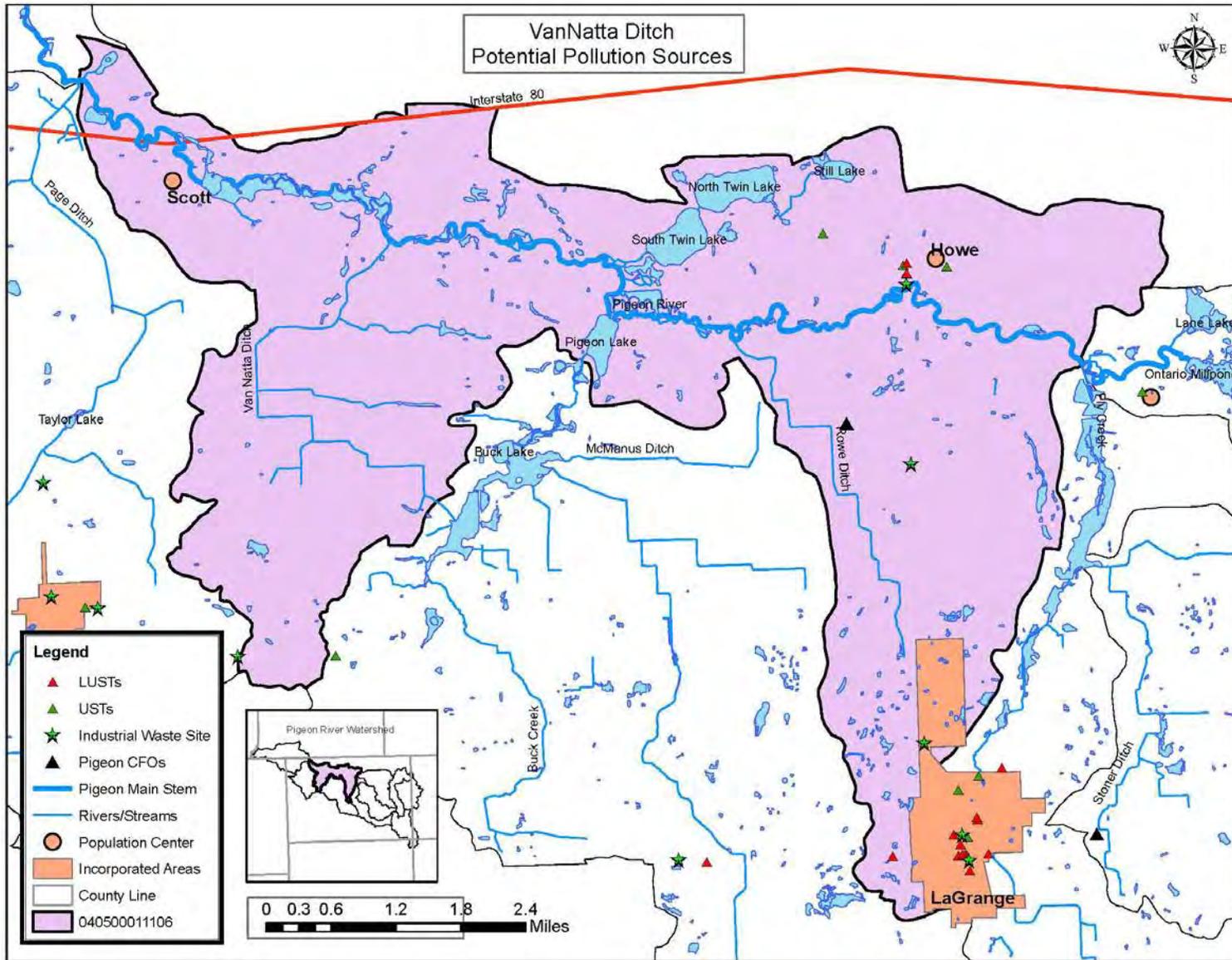


Figure 56: VanNatta Ditch Potential Pollution Issues

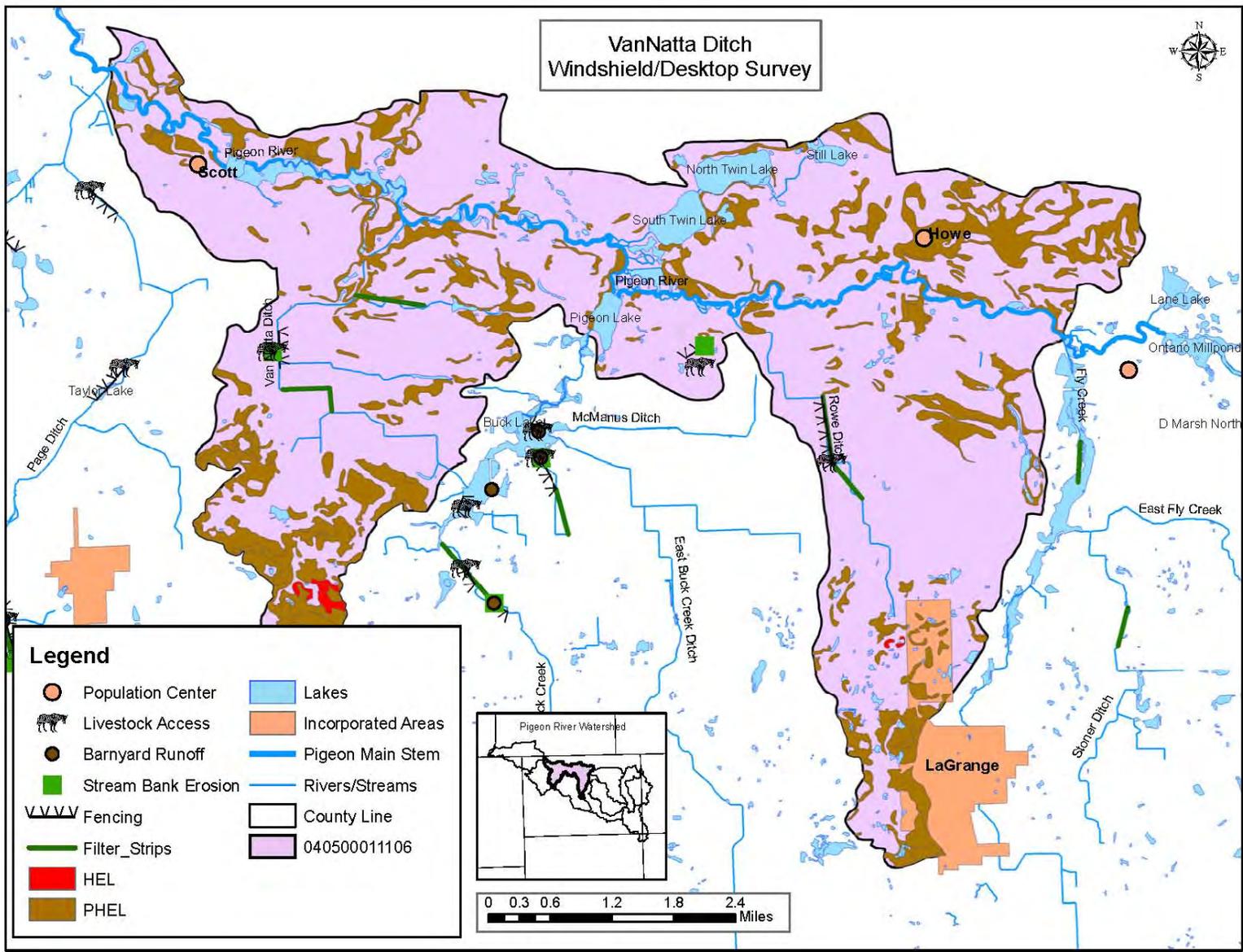


Figure 57: VanNatta Ditch Windshield/Desktop Survey Results

### 3.5.9 Page Ditch Land Use

The Page Ditch subwatershed is located west of the VanNatta Ditch subwatershed and southeast of the Pigeon River subwatershed (Figure 58). It is approximately 12,663 acres (5,124.5 hectares) in size and encompasses the town of Shipshewana (P=529). The major waterbodies located within this subwatershed include Shipshewana Lake, Truesdale Ditch and Page Ditch. The Page Ditch subwatershed contains the Yost Pond Nature Preserve. This 35 acre nature preserve is restricted to the public and is managed by the Department of Nature Preserves of the IN DNR. Page Ditch subwatershed is also home to the Shipshewana Lake Beach which is managed by the LaGrange County Parks Department.

The predominate land use in the Page Ditch subwatershed is agriculture which takes up approximately 70% of the total land use in the subwatershed as can be seen in Table 86.

**Table 86: Page Ditch Land Use**

	Water	Developed - HD	Developed - LD	Industrial	Cultivated Crops	Grass/ Pasture	Forest	Other	Total
Acres	1948.8	677.5	471.8	108.8	4116.8	4659.8	676.2	3.3	12663
%	15.4	5.4	3.7	<1	32.5	36.8	5.3	<1	100

There are no waterbodies in the Page Ditch subwatershed listed on Indiana’s 2008 303(d) list of impaired waters. However, Cotton Lake Ditch, Truesdale Ditch, Page Ditch and Shipshewana Lake are all listed on Indiana’s fish consumption advisory. A map showing the location of all impaired waterbodies can be seen in Figure 59.

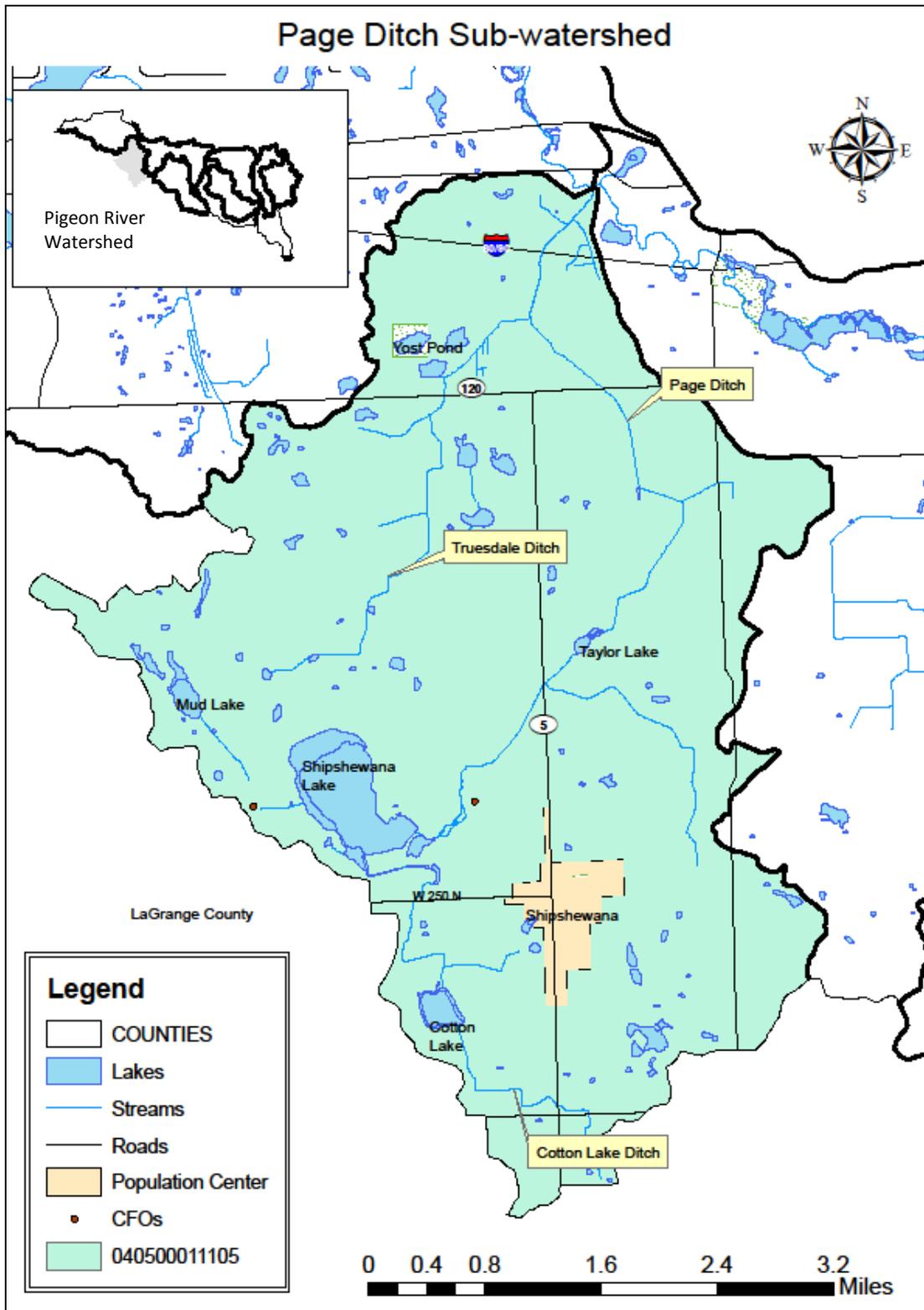


Figure 58: Page Ditch Subwatershed

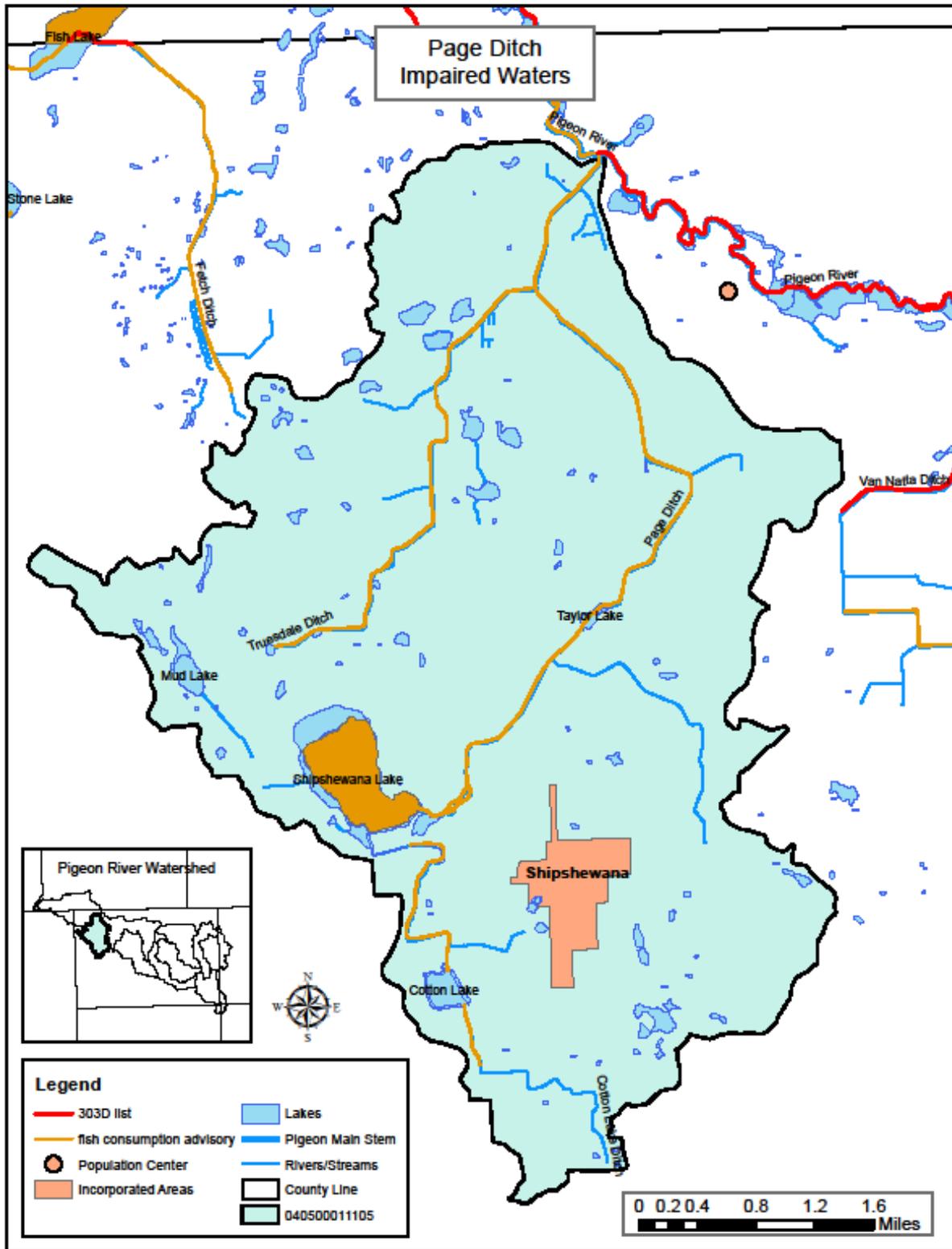


Figure 59: Page Ditch Impaired Waters

The Shipshewana Sewage Treatment Plant (STP) is the only NPDES permitted facility located within the Page Ditch subwatershed. There is one SSO that leads from the oxidation ditch used by the STP to the Page Ditch and they experienced one overflow in February, 2009 due to flooding of the facility. The issues allowing the plant to become flooded have been addressed and the superintendent does not foresee future SSO issues. The Shipshewana STP also had a leakage from the lift station several years ago, but the problem has been resolved. There are two CFOs located within the Page Ditch drainage area. One is located at the headwaters of a small ditch draining into the Shipshewana Lake (580 swine), and the other is directly adjacent to Page Ditch (1100 dairy cows). Although during visual observations, no apparent issues were noted at these properties, their proximity to surface water may be an issue if there is ever a leak of their manure storage facilities or if the manure is improperly handled.

Three USTs are located in the Page Ditch subwatershed. While the USTs are currently safe, there is the potential for them to leak and cause a pollution concern in the future. There are four industrial waste sites located in the Page Ditch subwatershed. Industrial waste sites are those sites that are at risk of, or do, discharge hazardous wastes from the site and are therefore required to clean up the waste through the Resource Conservation and Recovery Act. All sites are currently following the RCRA for clean-up issues. All potential pollution concerns are outlined in Table 87 and the location of each site is shown in Figure 60.

**Table 87: Potential Water Quality Pollution Threats in Page Ditch**

Type of Threat	Potential Contaminant	Number in Watershed
Underground Storage Tank	Oil/Gas	3
Confined Feeding Operations	Manure runoff/sedimentation	2
NPDES Permitted Facility	Nutrients, Bacteria, Sediment	1
Industrial Waste Site	A Variety of Toxic Chemicals	4

Shipshewana is a fast growing community. While the population is increasing only very little, it is the most industrialized subwatershed in the project area with nearly 100 acres in or around the town of Shipshewana designated as “industrial”. The main industry found in the area is the recreational vehicle industry. There is little concern for runoff from this type of industry. Also, Shipshewana is a huge tourist attraction in the region due to the monthly flea markets, weekly sales, and the “Amish Country” tourist attractions. These activities also increase Amish transportation which leads to a large amount of manure being left on the roadways to be washed off into roadside ditches and sewers. For this reason, urban BMPs must be introduced within the town of Shipshewana to minimize NPS runoff from roads, parking lots, and residential lots.

There are several nature preserves located within the Page ditch drainage including the 35 acres Yost Pond Nature Preserve and the 100 acre Scott Mill County Park. The Shipshewana Lake Beach is also open for public recreational use. Shipshewana Lake has received a lot of attention over the past ten years as it was once considered a “dead” lake due to heavy sedimentation and nutrients discharging into the lake. The lake was dredged and other measures, including installing a centralized sewer system have been proposed to insure the lake thrives: though little improvement has been seen in the lake to date. The residents located on the lake use on-site waste water treatment and it is expected that many of the septic systems are leaking directly into the Shipshewana Lake. The town of Shipshewana is currently constructing a waste water treatment plant that will address the problem of faulty septic systems around the lake. Once the facility is built, improvements will likely be seen in the Shipshewana Lake water quality.

The windshield and desktop survey indicated that Page Ditch is primarily influenced by the Amish community due to many small and unregulated livestock operations, and conventional tillage practices. However, it is important to mention that the main channel of Page Ditch is well protected by riparian buffer. Five sites were identified during the windshield survey where livestock had direct access to an open stream which indicates the need for exclusion fencing. There were also two site identified where an adequate riparian buffer was lacking, two sites where severe streambank erosion could be observed, and three sites where barnyards did not have adequate manure runoff control. It should also be noted that the desktop survey revealed a lot of land designated as PHEL, especially around Shipshewana Lake. Landowners farming this land will need to take special precautions to prevent soil erosion from their crop fields. In addition heavy construction has increased dramatically around the town of Shipshewana. Table 88 and Figure 61 show the results of the windshield and desktop surveys.

**Table 88: Page Ditch Windshield Survey Observations**

Type of Threat	Potential Contaminant	Number in Watershed
Livestock Access to Ditch	Sediment, Bacteria, Nutrients	5
Need for Exclusion Fencing	Sediment, Bacteria, Nutrients	8000 feet
Lack of Riparian Buffer	Sediment, nutrient runoff	2 miles
Streambank Erosion	Sediment	120 feet
Barnyard Runoff	Sediment, nutrient runoff	3

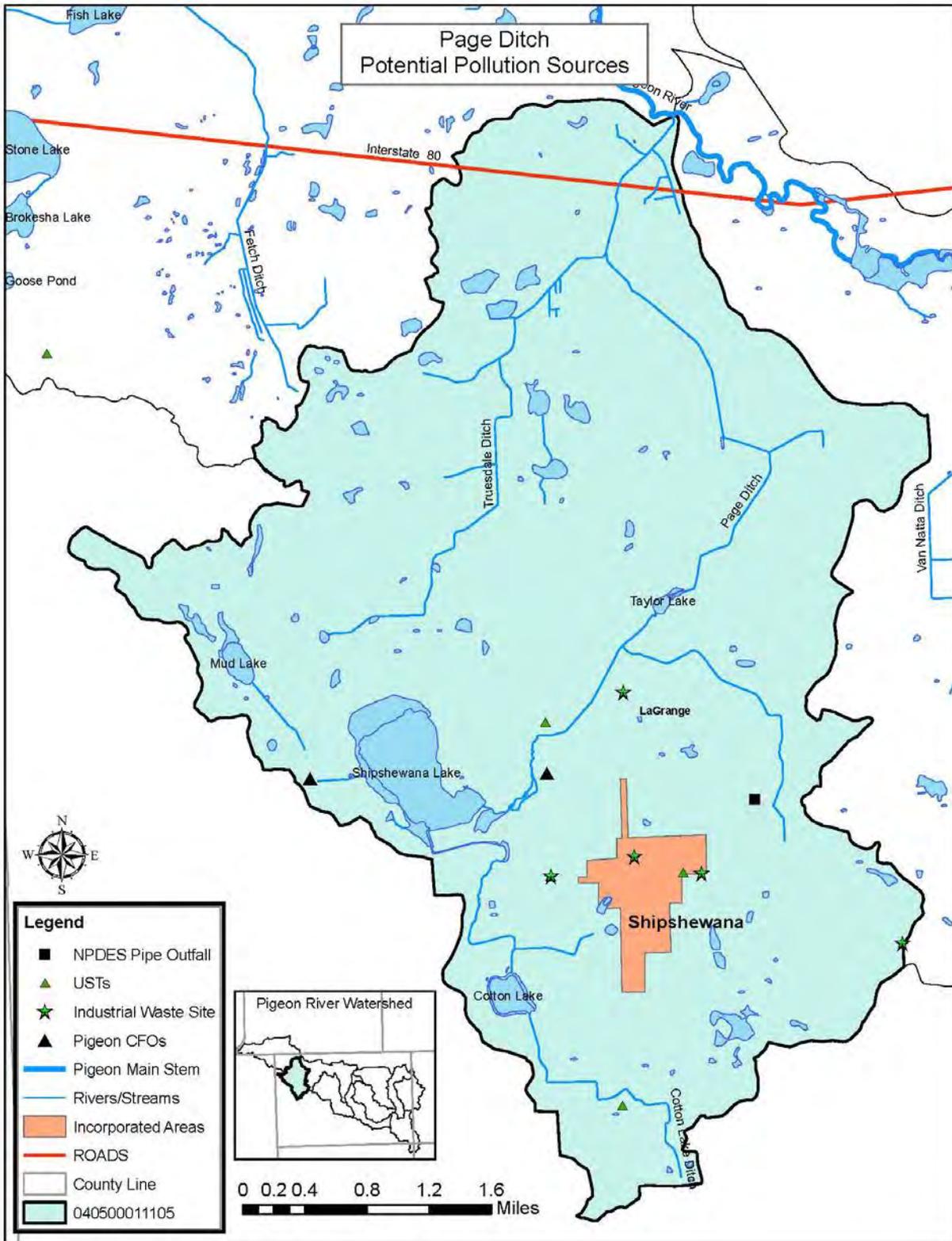
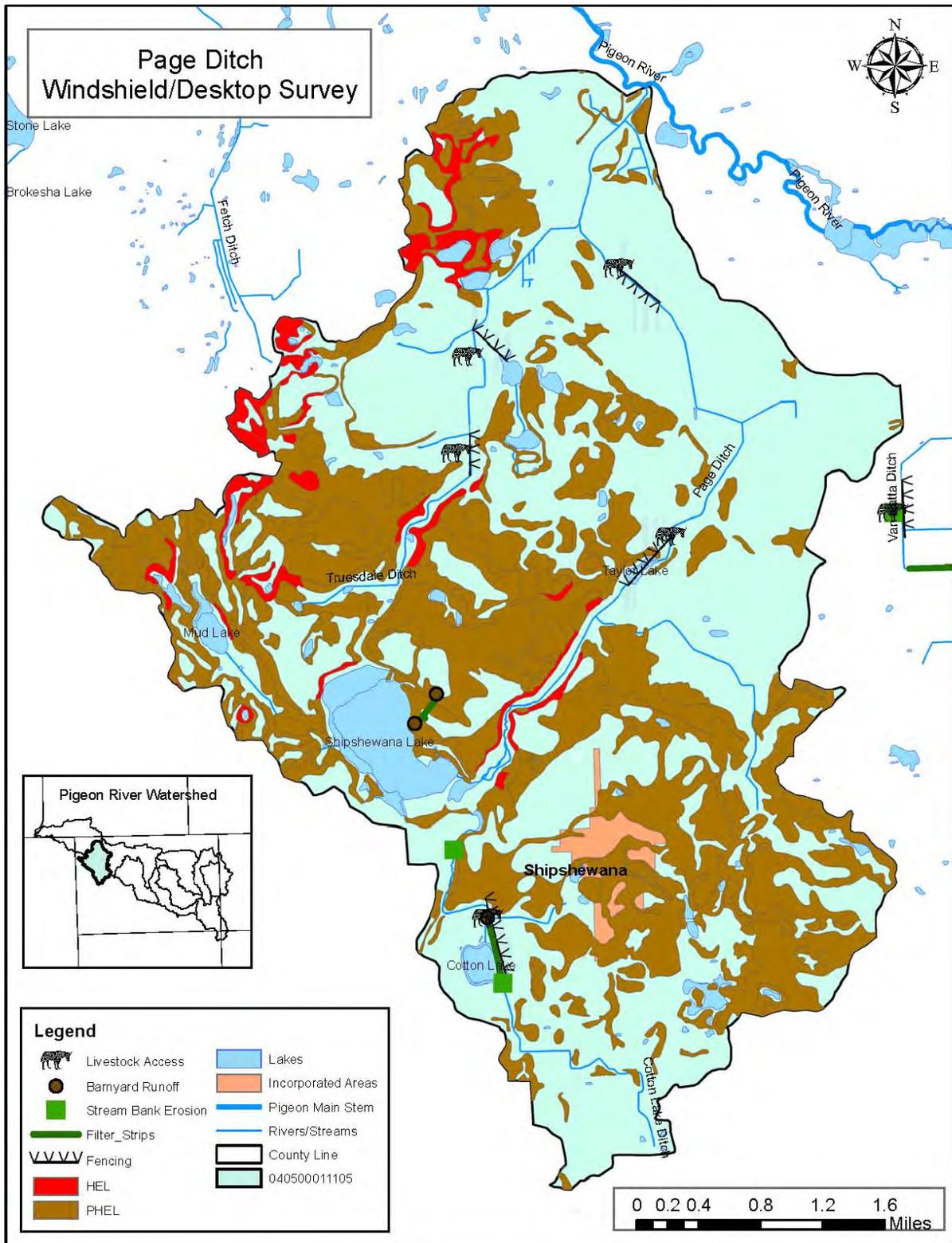


Figure 60: Page Ditch Potential Pollution Issues



**Figure 61: Page Ditch Windshield/Desktop Survey Results**

### 3.5.10 Pigeon River Land Use

The Pigeon River subwatershed is located northwest of the Page Ditch subwatershed and is split in half by the Indiana – Michigan border (Figure 62). It is approximately 23,764 acres (9,617 hectares) in size and contains about 85% of the city of White Pigeon, MI. Major waterbodies located within this subwatershed include Fish and Marl Lake, and the Pigeon River. The Pigeon River subwatershed is primarily influenced by agricultural practices with 48% of the land use being cultivated crops and 11% of the land use being pasture and hayland (most of which is located in the Indiana portion of the subwatershed). 8% of the subwatershed is considered to be developed due to the majority of the Village of White Pigeon being located within this drainage area. The total percentage of each type of land use is listed in Table 89.

**Table 89: Pigeon River Subwatershed Land Use**

	Water	Developed - HD	Developed - LD	Industrial	Cultivated Crops	Grass/ Pasture	Forest	Other	Total
Acres	671.7	678.2	1372.13	N/A	11471	2639.7	5600.7	1330.57	<b>23764</b>
%	2.8	2.8	5.8	N/A	48.3	11.1	23.6	5.6	<b>100</b>

The Pigeon River, and all its tributaries (Figure 63), is listed on the Michigan 2010, 303(d) list of impaired waters for mercury and PCBs in the water table. All lakes in the Michigan portion of Pigeon River subwatershed are listed on the Michigan fish consumption advisory for mercury and PCBs found in fish tissue. Love Joy Ditch and Fetch Ditch are listed on the 2010 Indiana fish consumption advisory for Carp.

### Pigeon River Sub-watershed

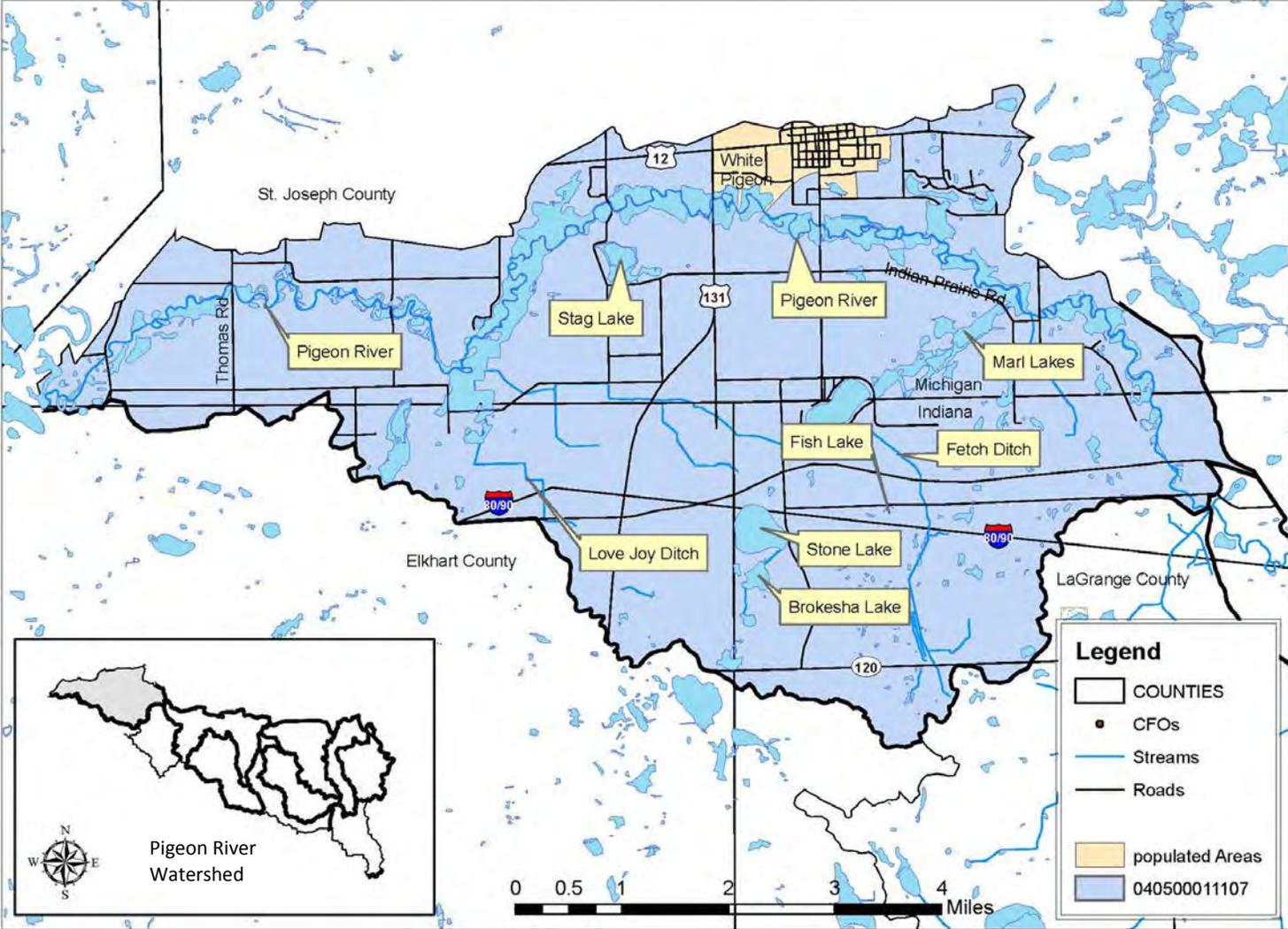
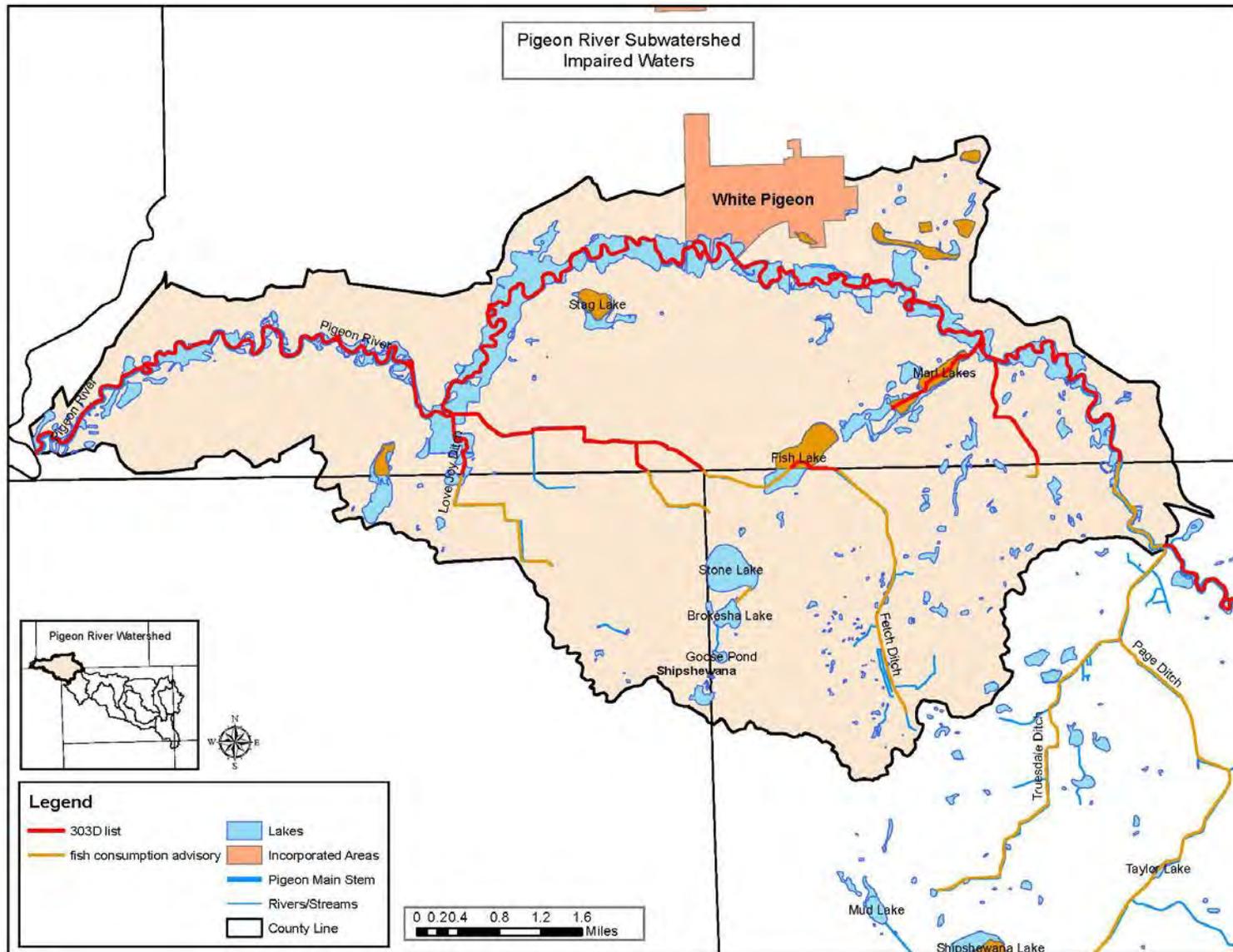


Figure 62: Pigeon River Sub-watershed



**Figure 63: Pigeon River Subwatershed Impaired Waters**

There are several NPDES permitted facilities located in this subwatershed (Table 90), which are regulated by the Michigan Department of Environmental Quality (DEQ). The permitted facilities include the White Pigeon Sanitary Systems, Gray Brothers, Dexter Chassis Group, Michigan Southern Railroad, Southern Michigan Canine, Universal Consumer Products Incorporated, and the White Pigeon Paper Company.

The White Pigeon Sanitary System has two SSOs. They have experienced three overflows in the past decade; one in 2003, 2008, and 2009. It was discovered through discussions with a MI DEQ representative that the discharges were due to a break in the conveyance line, rather than from the treatment plant not being able to handle the amount of waste water being processed. The problem is not expected to occur again.

There are thirteen industrial waste sites located in Pigeon River subwatershed. Industrial waste sites are those sites that are at risk of, or do, discharge hazardous wastes from the site and are therefore required to clean up the waste through the Resource Conservation and Recovery Act. All three sites are currently following the RCRA for clean-up issues.

Nine LUST sites are located in the Pigeon River subwatershed; two in Elkhart County which have been closed, and seven in St Joseph County, MI. The table below is a list of the LUST sites located within the Pigeon River subwatershed in St. Joseph County. Note that one LUST is not a registered tank UST with the MI DEQ, and all but one LUST has been remediated through closure of the UST.

There are no other USTs or CFOs located in the Pigeon River subwatershed.

**Table 90: Pigeon River Subwatershed LUST sites**

UST FACILITY ID	NAME	STREET ADDRESS	CITY	COUNTY NAME	Contaminant	DESCRIPTION
13154	Libby Atherton	16578 E Chicago Rd Rt-1	White Pigeon	St. Joseph	gasoline	Removed from Ground
50005733	Grant's Auto Clinic	400 W Chicago Rd	White Pigeon	St. Joseph	unknown	Non-registered Tank
8270	Mottville Stop & Go	10269 US-12	White Pigeon	St. Joseph	gasoline	Removed from Ground
39526	Platz Excavating	69025 US-131	White Pigeon	St. Joseph	diesel	Removed from Ground
9960	Shell-spee-D-Mart	215 E Chicago Rd	White Pigeon	St. Joseph	gasoline, kerosene	Currently in Use, Removed from Ground, or Closed in Ground
9637	Emro #7428	14973 US 12	White Pigeon	St. Joseph	gasoline	Removed from Ground
38890	White Pigeon Fruit Market	15093 US-12 and US-131	White Pigeon	St. Joseph	diesel	Removed from Ground

Over half of the Village of White Pigeon (P=1544) is located within the Pigeon River subwatershed. White Pigeon is a growing community. Therefore, it is important to introduce urban BMPs to the community and village officials to help reduce the risk of urban NPS from reaching the Pigeon River, which runs just south of the Village. As mentioned above, there are a total of seven NPDES permitted facilities located within the Pigeon River subwatershed. Those NPDES facilities are listed in Table 91 and can be seen on Figure 64.

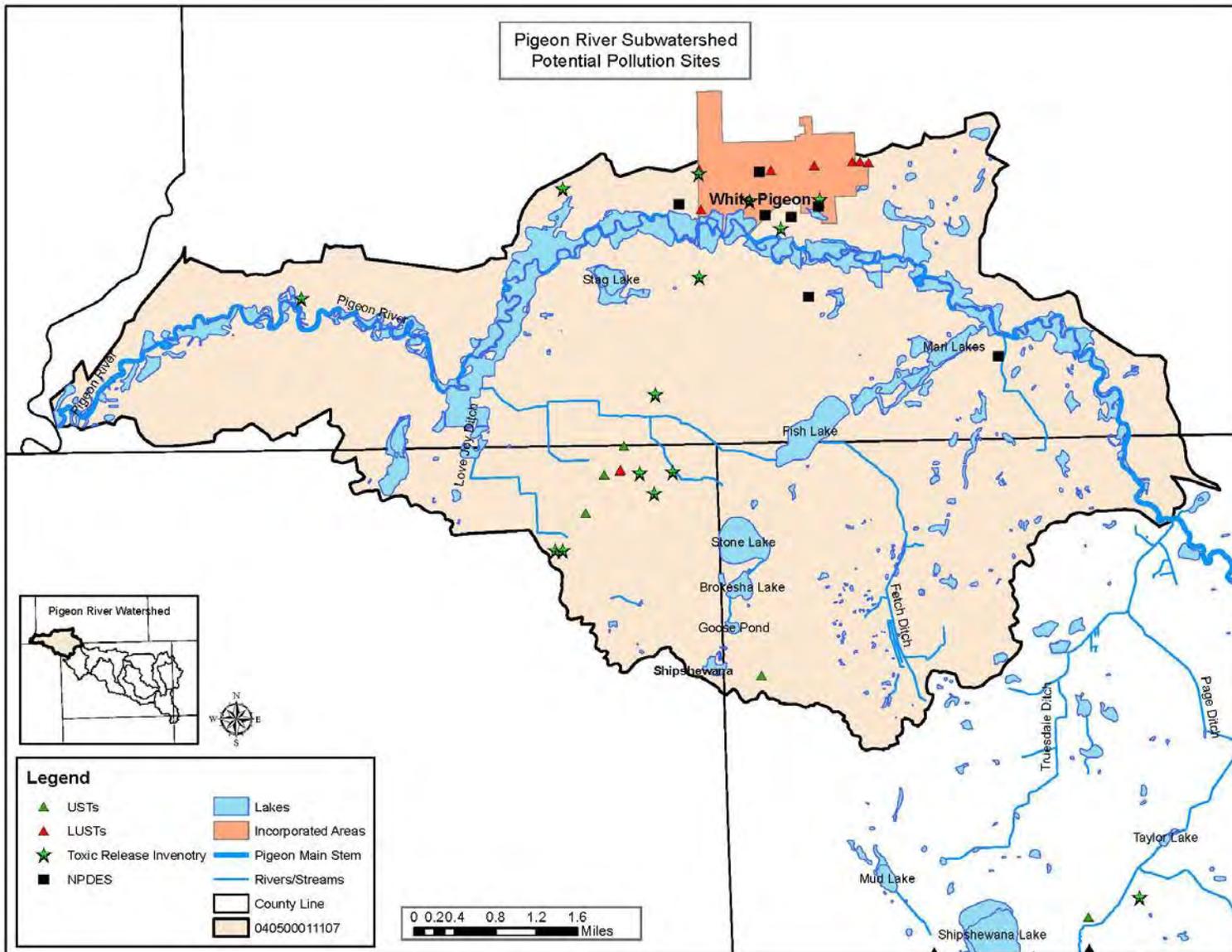
**Table 91: Pigeon River Subwatershed NPDES Permits (White Pigeon, MI)**

Facility Location Name	Address	City	Permit Type	Issue Date
Dexter Chassis Group Plant 55	501 South Miller Drive	White Pigeon	NEC	7/19/2010
Gray Brothers	424 West Chicago Road	White Pigeon	COC	1/24/2007
Michigan Southern Railroad	69065 South Kalamazoo Street	White Pigeon	COC	3/28/2007
Southern Michigan Canine	17844 Indian Prairie Road	White Pigeon	2211	1/3/2011
Universal Consumer Products Incorporated	68956 US 131	White Pigeon	COC	1/24/2007
White Pigeon Paper Company	15781 River Street	White Pigeon	COC	2/8/2007
White Pigeon Sanitary System	16220 Indian Prairie Road	White Pigeon	COC	11/17/2009

The windshield and desktop surveys revealed that several small and unregulated livestock operations, south of the main channel in Indiana, have a large influence on the Pigeon River and its tributaries. The surveys also revealed three sites where traditional farming techniques have led to the removal of any riparian buffer. One site in particular was noted as lacking a riparian buffer and adequate barnyard manure runoff control measures, and that livestock had direct access to the stream. However, it should be noted that the main channel of the Pigeon River is well protected by riparian buffers. The desktop survey revealed that the majority of the PHEL and HEL are located in LaGrange County. Landowners farming land designated as PHEL or HEL will need to take special precautions to prevent severe soil erosion from their crop fields. Table 92 and Figure 65 show the results of the windshield and desktop surveys.

**Table 92: Pigeon River Subwatershed Windshield Survey Observations**

Type of Threat	Potential Contaminant	Number in Watershed
Livestock Access to Ditch	Sediment, Bacteria, Nutrients	1
Need for Exclusion Fencing	Sediment, Bacteria, Nutrients	3000 feet
Lack of Riparian Buffer	Sediment, nutrient runoff	4 miles
Barnyard Runoff	Sediment, nutrient runoff	1



**Figure 64: Pigeon River Subwatershed Potential Pollution Issues**

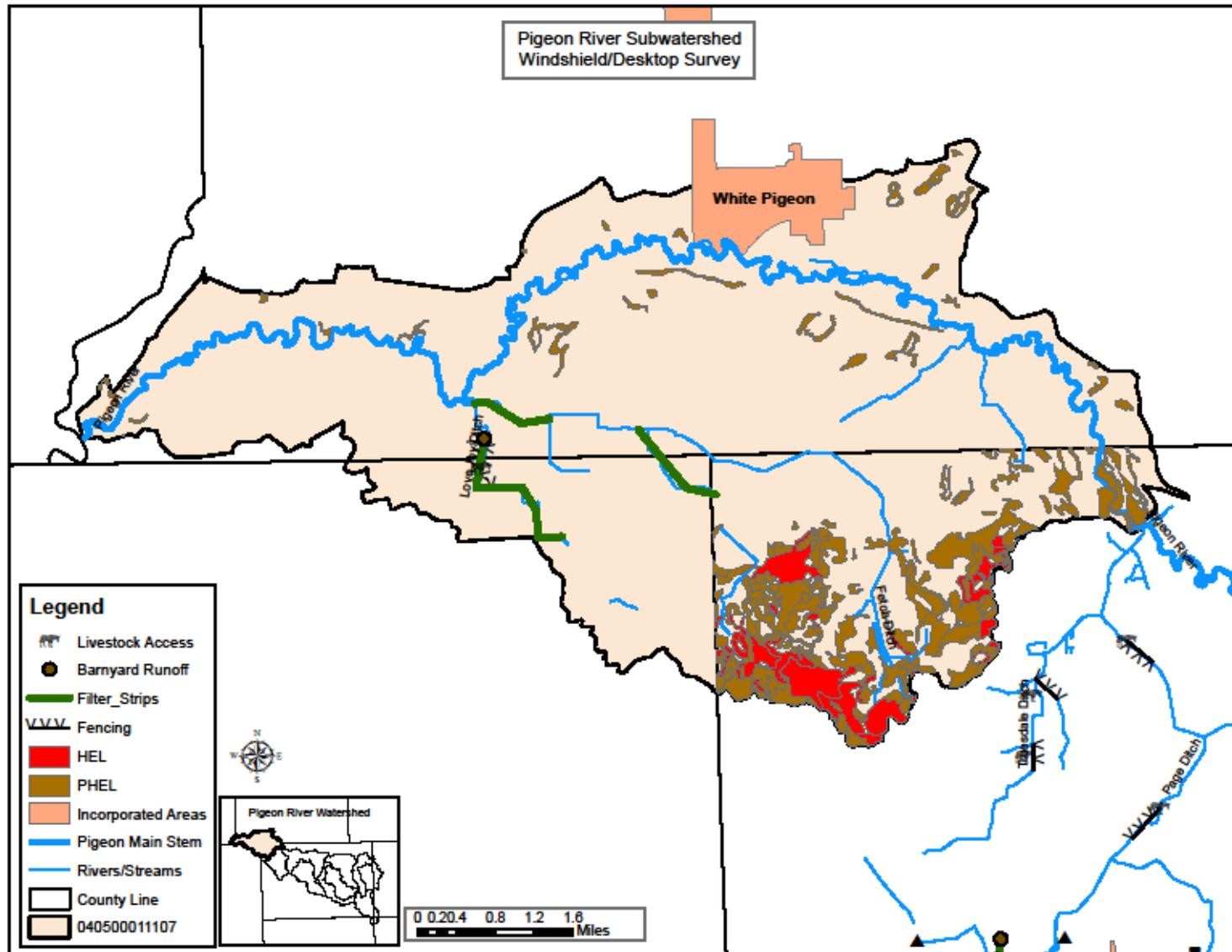


Figure 65: Pigeon River Subwatershed Windshield/Desktop Survey Results

### 3.6 Watershed Inventory Summary

To better understand the water quality problems in the Pigeon River project area and what influences may be contributing to those problems, a map was developed outlining the water quality issues in each subwatershed as well as showing the results of the windshield survey (Figure 66). As can be seen in the figure, nitrogen levels were elevated in every subwatershed located within the project area, except for Little Turkey Lake, and phosphorus levels averaged to be greater than the target level in East Fly Creek, Buck Lake-Buck Creek, and Page Ditch. When comparing the water quality results to the windshield survey, there is no apparent reason that nitrogen levels were so high, it could be a result of faulty septic systems combined with livestock access to open water and over application of fertilizer on crop fields. However, the high levels of phosphorus in the three subwatersheds coincide with the large number of livestock that have direct access to open water in East Fly Creek, Buck Lake – Buck Creek, and Page Ditch.

D.O. levels averaged to be > 9mg/L in all subwatersheds in the project area which may be a result of the high nutrient content in the water column contributing to overgrowth of aquatic plants, including cyanobacteria (a.k.a. blue green algae). *E. coli* is a current issue in Green Lake-Green Creek, Little Turkey Lake, East Fly Creek, Fly Creek, Buck Lake-Buck Creek, and Page Ditch subwatersheds. Elevated *E. coli* levels may be a result of livestock access to open water (Figure 66), faulty septic systems, inadequate barnyard runoff control (especially in Little Turkey Lake, East Fly Creek, Fly Creek, Buck Lake-Buck Creek, and Page Ditch), and manure runoff from horse and buggy use on roadways.

Historic water quality data shows similar results to what was found during the 2011 water quality testing performed by the LaGrange County SWCD except that sediment was an issue in Fly Creek and Page Ditch. This is likely a result of heavy agriculture production on PHEL and HEL, though much of the area population is beginning to produce more livestock than row crops which may be why sediment has not been a major problem in recent years.

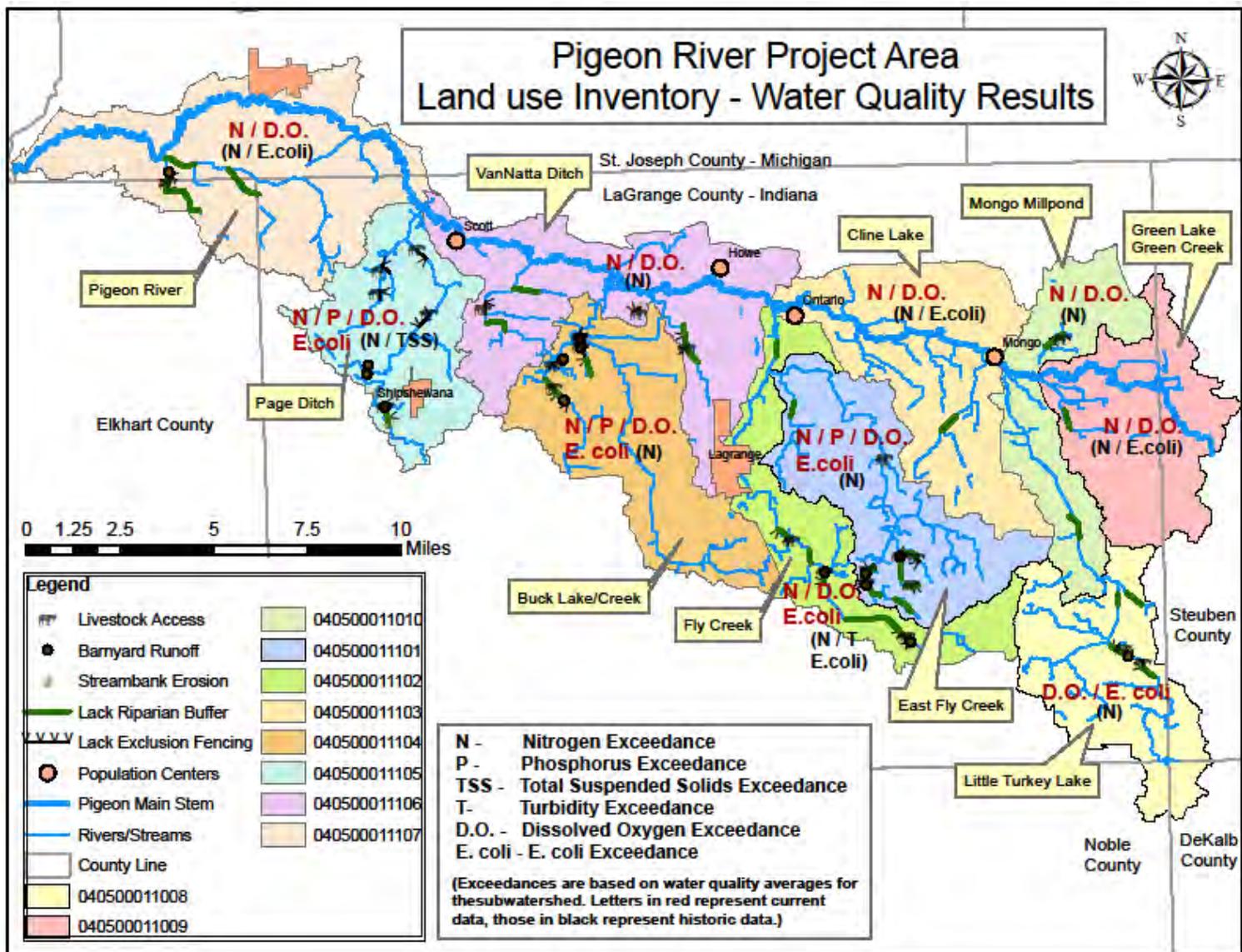


Figure 66: Land use and Water Quality Summary

### 3.7 Analysis of Stakeholder Concerns

Stakeholders in the Pigeon River project area expressed concerns regarding water quality and land uses during the public meeting held in late 2010 and additional concerns were raised while performing the watershed inventory. These concerns are outline in Table 92 as well as whether or not the concerns are supported by the collected data, quantifiable, outside the scope of this project, and whether or not the steering committee would like to focus on the concerns. The steering committee does not feel that most of the concerns listed in Table 93 are outside the scope of the project and wants to focus on those concerns. Some concerns will be addressed through education alone, while others will be addressed by implementing best management practices as well as an education and outreach program. The concern related to the fish consumption advisory is outside the scope of this project as most fish are listed due to mercury and PCBs in fish tissue which is mostly due to particles from the air containing mercury and PCBs depositing in the water table. The Steering Committee also decided that updating the Shipshewana Master Plan is outside the scope of this project; however, water quality informational support will be provided to the Town of Shipshewana when needed.

**Table 93: Analysis of Watershed Concerns**

Concerns	Supported by Data?	Evidence	Able to Quantify?	Outside Scope?	Group Wants to Focus On?
Livestock Access to Open Water	Yes	25 locations were found during the windshield survey where livestock had direct access to open water.	Yes	No	Yes
Stormwater Runoff From Barnyards	Yes	14 locations found during the windshield survey where inadequate, or no, barnyard runoff control measures were in place.	Yes	No	Yes
Increase in Impervious Surfaces	Yes	Shipshewana's population is on the rise and more tourist attractions are being built. White Pigeon is designated as an "industrial" town, indicating an increase in impervious surfaces.	No	No	Yes
Fertilizer Used on Urban Lawns	No	No particular evidence was collected, however it is common knowledge that as lakes become more developed, more fertilizer is being spread on urban lawns.	No	No	Yes

Concerns	Supported by Data?	Evidence	Able to Quantify?	Outside Scope?	Group Wants to Focus On?
Lakes in the Area Becoming More Developed	No	No particular evidence was collected, however it is known by local stakeholders that more residences are being constructed around the lakes in the area.	No	No	Yes
Septic System Discharge	Yes	The LaGrange County Health Department did a study which indicated nearly 75% of all septic systems in the county are faulty. The majority of soil found within the project area is designated as either somewhat or very limited for septic system usage. Most of the project area is rural and not connected to a centralized sewer system, meaning that most of the population uses on-site sewage treatment.	Yes	No	Yes
Horse Manure on Public Roads	Yes	While performing the windshield survey manure was regularly seen on public roads. There is a large Amish population, who uses horse and buggy as a means of transportation, residing within the project area.	No	No	Yes
Stream Bank Erosion	Yes	Six locations were found during the windshield survey where extreme stream bank erosion had taken place.	Yes	No	Yes
Lack of Riparian Buffer	Yes	31 locations were found during the windshield survey where an adequate filter strip or riparian buffer was not in place.	Yes	No	Yes
Landowners Farming PHEL or HEL	Yes	The desktop survey revealed a large portion of the project area is comprised of soil on PHEL or HEL and the majority of the land use in the project area is agriculture.	No	No	Yes
Water Contact is Unhealthy	Yes	E. coli exceeded the state standard in East Fly Creek, Buck CLake-Buck Creek, and Page Ditch Subwatersheds.	Yes	No	Yes

Concerns	Supported by Data?	Evidence	Able to Quantify?	Outside Scope?	Group Wants to Focus On?
Fish Consumption from Local Waterways is Unhealthy	Yes	There are several lakes and streams listed on Michigan's and Indiana's fish consumption advisory.	Yes	Yes	No
The Shipshewana Master Plan Needs Updated	Yes	The Master Plan was written in 1993 and the town office does not have a copy of the entire document. The town is currently under new management.	Yes	Yes	No
Endangered and Threatened Plants and Animals That Rely on Water Resources as Their Habitat	Yes	There are 15 species of plants and animals federally listed as endangered or threatened.	Yes	No	Yes

#### 4.0 Water Quality Problems, Causes, and Sources

In this section concerns identified by stakeholders in the watershed and through the watershed inventory will be linked to problems found through the watershed investigation. Additionally, potential causes for the problems identified will be expressed. Finally, potential sources will be identified. Table 94 shows the connection between stakeholder concerns, problems found in the watershed, and the potential causes of those problems. Table 95 takes it a step further by identifying potential sources to the problems found in the watershed.