3.2.6 Heidelberg University Sampling

Heidelburg University in Tiffin, Ohio has been studying the transport of nutrients from Northwest Ohio cropland to Lake Erie for the past several years. Heidelberg has a set of water sampling sites they test on a regular basis within the WLEB, with one site located within the UMRW at a site known as "The Bend". This is the same site used by the OH TMDL staff; site 76. However, only data collected during the recreational season in 2010 was available at the time of writing this document. Parameters analyzed by Heidelburg at Site 76 include Chlorophyll-a, ammonia, nitrite, nitrate, DRP, and total phosphorus.

3.3 Water Quality Data per Sub-watershed

This Section discusses historic and current water quality data that has been collected within each HUC 12 sub-watershed in the Upper Maumee River Watershed to help provide a picture of the overall health of each of the sub-watersheds.

3.3.1 Trier Ditch Sub-watershed Water Quality Analysis

Water quality in the Trier Ditch sub-watershed was only analyzed by the Allen County SWCD as part of this project, so water quality data is limited within this sub-watershed. Samples were collected at one site on Trier Ditch in New Haven, IN during 2012 during the recreational season. The location of the sample site is shown in Figure 3.3. As can be seen in Table 3.5, *E. coli* exceeded the state standard of 235CFU/100ml in 59% of the samples analyzed and had an average measurement of 446 CFU/100ml. However, the geometric mean was well below the standard at 86 CFU/100ml. The geomean excludes any outliers giving a more accurate representation of the *E. coli* counts that will typically be found in the waterway. Phosphorus exceeded the target of 0.08mg/L in 46% of the samples and D.O. exceeded the target level of 9mg/L in 13% of the samples. Of significant note is that turbidity levels exceeded the target level of 10.4 NTU in 75% of the samples with an average reading twice that of the target level.

Figure 3.3: Trier Ditch Sub-watershed Water Quality Sample Sites

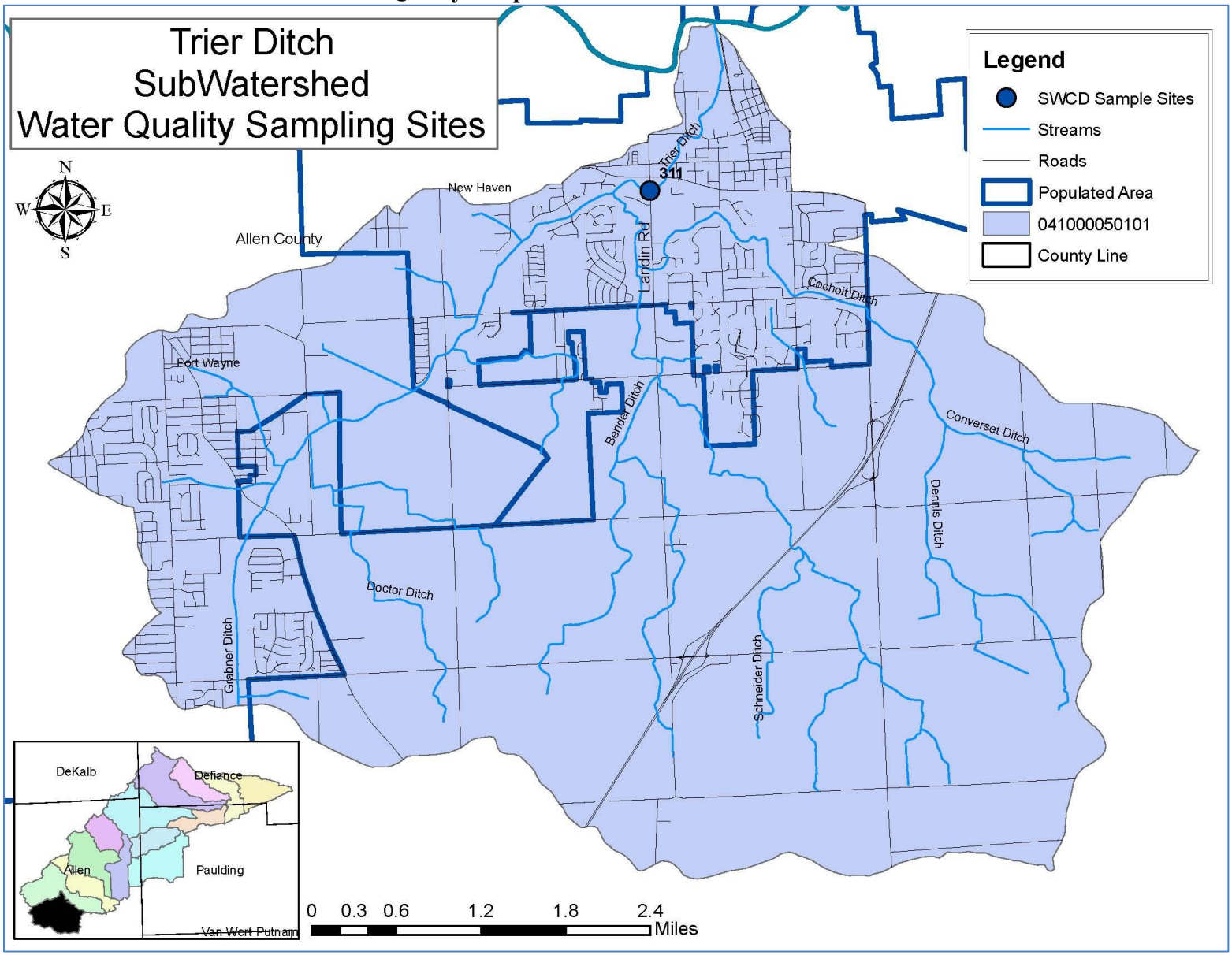


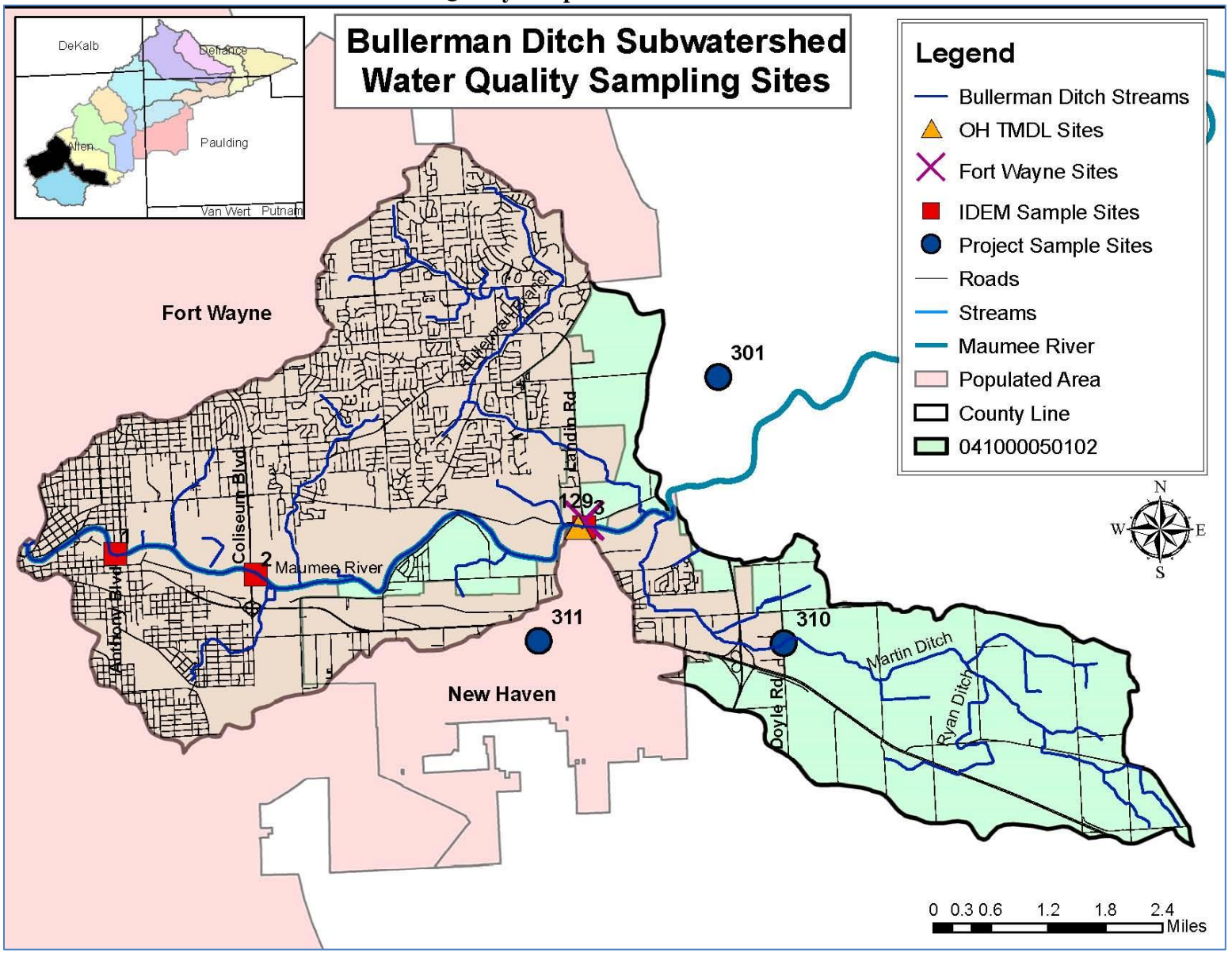
Table 3.5: 2012-Allen County SWCD Water Quality Analysis-Trier Ditch (311)

Trier Ditch (Allen County SWCD - Site 311)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	7.18	mg/L	3/24 > 9mg/L	13%
E. coli	446 (Mean) 86 (Geomean)	CFU/100 ml	13/22 (235 CFU/100ml)	59%
Nitrate+Nitrite	0.149	mg/L	0/24	0%
pH	8.052	SU	0/24	0%
Phosphorus	0.088	mg/L	11/24	46%
Temperature	20.767	Celsius	1/24 > 29.44 ºC	4%
TDS	453.792	mg/L	0/24	0%
Turbidity	23.225	NTU	18/24	75%
Alachlor	0.061	ppb	0/23	0%
Atrazine	0.24	ppb	0/23	0%
Metolachlor	0.125	ppb	0/23	0%
Macroinvertebrates	22	points	Good	
Habitat	81	points	Good	

3.3.2: Bullerman Ditch Sub-watershed Water Quality Analysis

Bullerman Ditch sub-watershed has been sampled by IDEM, OH EPA, the City of Fort Wayne, and the Allen County SWCD. There is a sample site in Bullerman Ditch located on Landin Road which is a fixed sample site managed by IDEM which has over 100 samples and the City of Fort Wayne has over 300 samples taken from that location over the past decade. Therefore, there is ample historical data available in the Bullerman Ditch sub-watershed. Figure 3.3 shows the location of each of the sample sites from each of the entities within the Bullerman Ditch sub-watershed. Tables 3.6 through 3.11 shows the analysis of the water quality samples from each of the sites.

Figure 3.4: Bullerman Ditch Sub-watershed Water Quality Sample Sites



IDEM sampled water from the Maumee River at the Anthony Blvd bridge in Fort Wayne, IN randomly from 2003 through 2010. The results of that sampling show that D.O., nitrate+nitrites, TKN, TSS, and turbidity are all issues that can be found from the urban setting surrounding this water sample site. Table 3.6 shows the results of the analysis for IDEM sample site 1.

Table 3.6 IDEM, Site 1 Water Quality Analysis-Bullerman Ditch sub-watershed

Bullerman Ditch (IDEM-1; Lat. 41.078402, Long. -85.086747)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0.202	mg/L	2/85	2%
D.O.	10.39	mg/L	57/90 >9mg/L	63%
E. coli				
Nitrate+Nitrite	2.85	mg/L	54/85	64%
TKN	1.37	mg/L	85/85	100%
pH	7.48	SU	1/90 <6 SU	1%
Phosphorus	0.20	mg/L	15/85	18%
Temperature	12.16	Celsius	27/90	30%
TDS	394	mg/L	0/85	0%
TSS	22.33	mg/L	61/85	72%
Turbidity	71.69	NTU	78/90	87%

IDEM sampled water from the Maumee River at the Coliseum Blvd bridge in Fort Wayne, IN randomly from 2003 through 2010. The results of that sampling showed that ammonia, nitrate+nitrite, E.coli, TKN, Phosphorus, TSS and turbidity are all issues in the Maumee River at that location. Table 3.7 shows the results of the analysis for the IDEM sample site 2.

Table 3.7: IDEM, Site 2 Water Quality Analysis-Bullerman Ditch sub-watershed

Bullerman Ditch (IDEM-2; Lat. 41.0761973, Long. -85.08176649)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0.3	mg/L	2/3	67%
D.O.	7.63	mg/L	0/10	0%
E. coli	2890.96 (mean) 478.62 (geomean)	CFU/100ml	3/5 (235 CFU/100ml)	60%
Nitrate+Nitrite	3.37	mg/L	3/3	100%
TKN	1.85	mg/L	2/3	67%
pH	7.38	SU	0/10	0%
Phosphorus	0.31	mg/L	1/3	33%
Temperature	20.556	Celcius	0/10	0%
TDS	490	mg/L	0/3	0%
TSS	22.33	mg/L	1/3	33%
Turbidity	27.49	NTU	10/10	100%

IDEM collected water quality samples at the fixed station on the Maumee River at the Landin Rd bridge on an almost monthly basis between 2003 and 2010. As can be seen in Table 3.8, parameters of concern at this sample site are D.O. nitrate+nitrite, TKN, Phosphorus, TSS and turbidity, as all of those parameters exceeded their target levels in over 60% of the samples. Temperature exceeded the target level in 29% of the samples analyzed. Nearly all D.O. samples that exceeded 9mg/L were taken between October and March of each year.

Table 3.8: IDEM, Site 3 Water Quality Analysis-Bullerman Ditch Sub-watershed

Bullerman Ditch (IDEM Lat. 41.0819444, Long. -85.11472222)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0.03	mg/L	3/121	2%
D.O.	10.23	mg/L	77/122 >9 mg/L	63%
Nitrate+Nitrite	2.69	mg/L	78/120	65%
Total Kjeldahl Nitrogen (TKN)	1.32	mg/L	119/120	99%
pH	7.78	SU	0/234	0%
Phosphorus	0.2	mg/L	83/120	69%
Temperature	12.4	Celsius	35/122 < 4.44 ºC	29%
TDS	394.79	mg/L	0/121	0%
TSS	50.34	mg/L	82/120	68%
Turbidity	77.81	NTU	111/121	93%

In preparation to write the TMDL for the Western Lake Erie Basin watersheds, the OH EPA collected samples throughout the UMRW and included the Landin Rd fixed station site to help form a baseline, since there was over a decade of other samples taken from that site. The OH EPA sampled water from the Landin Rd sample location six times between June and September 2012. As can be seen in Table 3.9, OH EPA found similar results as IDEM in that nitrate+nitrite, and TKN all exceeded target levels significantly. TSS, Phosphorus, and D.O. also exceeded target levels but to a lesser degree than the other parameters. D. O. fell below 4 mg/L once during the sample cycle, and TSS exceeded the target level of 25 mg/L in one sample.

Table 3.9: OH EPA Water Quality Analysis-Bullerman Ditch Sub-watershed

Bullerman Ditch (OH EPA - Maumee River @ New Haven IN Gage)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Dissolved Oxygen	5.235	mg/L	1/6 under 4 mg/L	17%
Ammonia	0.145	mg/L	0/6	0%
pH	7.64	SU	0/6	0%
Phosphorus	0.193	mg/L	1/6	17%
TDS	467.667	mg/L	0/6	0%
Temperature	24.258	Celsius	0/6	0%
TSS	19.8	mg/L	1/6	17%
Nitrate + nitrite	3.72	mg/L	5/6	83%
Nitrite	0.067	mg/L	0/6	0%
TKN	1.68	mg/L	6/6	100%

The City of Fort Wayne has been collecting water quality data from the Landin Rd sample site for over a decade. They collect samples once a month during the winter, and weekly from April through October. Data the city has collected since 2002 through 2012 was analyzed for the purposes of this project. As can be seen in Table 3.10, E. coli exceeded the state standard in nearly 48% of the samples, with the geometric mean exceeding the state standard as well. Ammonia exceeded the target in 11% of the samples, temperature in 9%, phosphorus in 18%, and TSS in 68% of the samples. D.O. fell below the state standard 7/389 times and exceeded the target of 9mg/L in 156 samples, making it not meet the target level in nearly 42% of the samples. The City of Fort Wayne provided dates in which CSO events occurred for 2012. Two of the highest *E. coli* readings for the Landin Road sample site, 1553 CFU and 2420 CFU, occurred on days that there was a CSO event. There were six other dates in 2012 where E. coli levels at this sample site exceeded state standards for a single sample, and CSO events occurred within the week prior to the reading taking place during all but one sampling event, indicating that the CSOs may have a significant impact on *E. coli* levels at this sample site.

Table 3.10: City of Fort Wayne Water Quality Analysis-Bullerman Ditch Sub-watershed

Bullerman Ditch (City of Fort Wayne - Landin Rd)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Dissolved Oxygen	8.6	mg/L	7/389 < 4 and 156/389 > 9	41.90%
E. coli	792.8 (mean) 246.4 (geomean)	CFU/100ml	187/390 (235 CFU/100ml)	47.90%
Ammonia	0.15	mg/L	46/393	11.70%
pH	7.7	SU	1/390 < 6 and 2/390 > 9	0.80%
Phosphorus	0.33	mg/L	71/392	18%
TDS	415.3	mg/L	0/393	0
Temperature	17	Celsius	18/205 < 4.4 and 1/205 > 29.44	9.3
TSS	55.1	mg/L	270/393	68.70%

The Allen County SWCD has one sample site located in the Bullerman Ditch sub-watershed on the A. Martin Drain on Doyle Rd. As can be seen in Table 3.11, phosphorus, nitrate+nitrite, turbidity, D.O. and *E. coli* are all issues at this sample site, which is predominately surrounded by agriculture, where the other sample sites within Bullerman Ditch sub-watershed are located within heavily populated areas. It should be noted that the geometric mean for *E. coli* does fall below the state standard and the macroinvertebrate score is on the low end of the "good" scale.

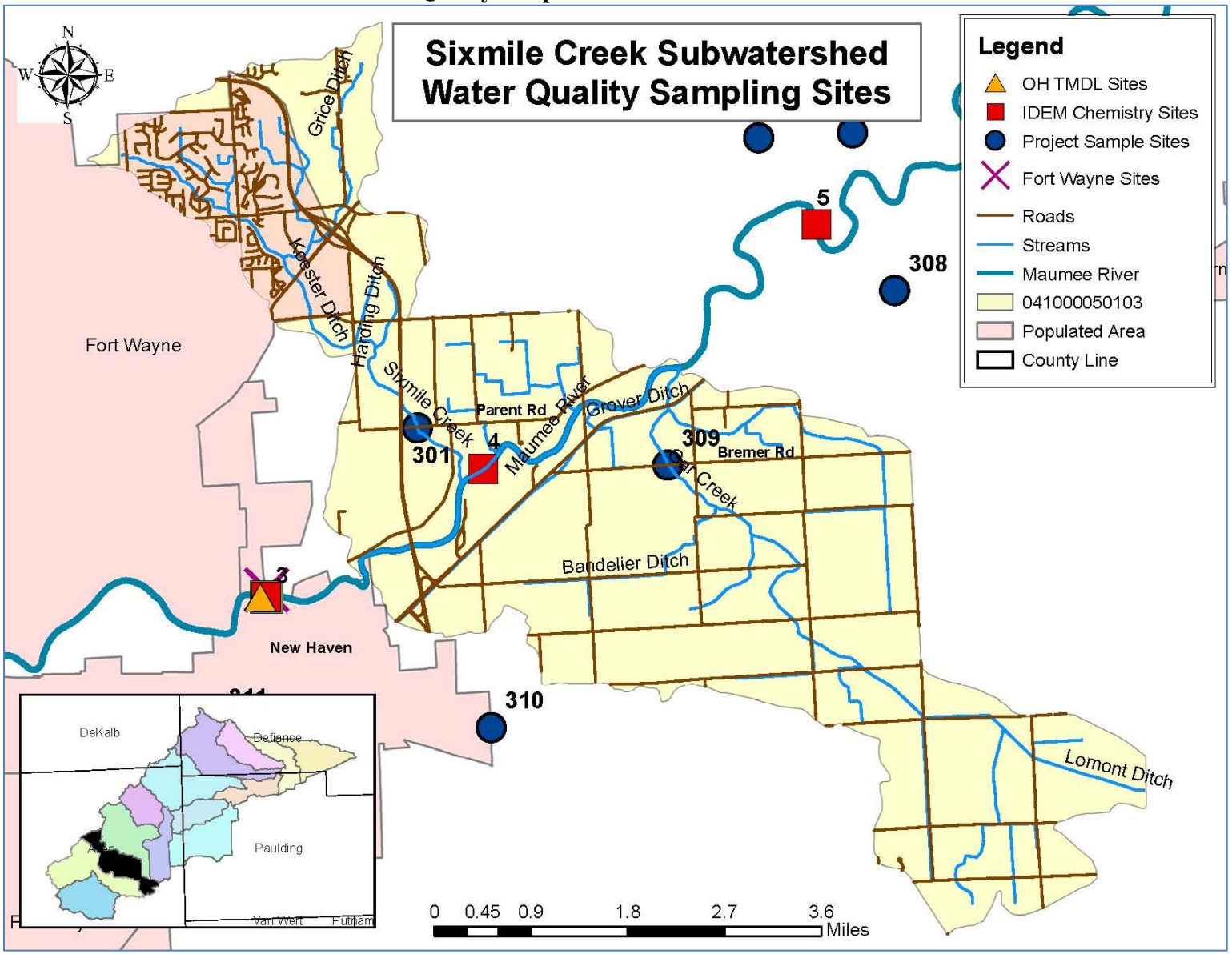
Table 3.11: 2012-Allen County SWCD Water Quality Analysis-Bullerman Ditch (310)

Bullerman Ditch (Allen County SWCD - Site 310)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	6.923	mg/L	1/18 < 4mg/L and 3/18 > 9mg/L	22%
E. coli	313.559 (Mean) 31 (Geomean)	CFU/100 ml	7/17 (235 CFU/100ml)	41%
Nitrate+Nitrite	1.523	mg/L	4/18	22%
pH	7.813	SU	0/18	0%
Phosphorus	0.125	mg/L	11/18	61%
Temperature	18.987	Celsius	0/18	0%
TDS	488.261	mg/L	0/18	0%
Turbidity	36.106	NTU	15/18	83%
Alachlor	0.165	ppb	0/18	0%
Atrazine	0.278	ppb	0/18	0%
Metolachlor	0.347	ppb	0/18	0%
Macroinvertebrates	17	Points	Good	
Habitat	77	Points	Good	

3.3.3 Sixmile Creek Sub-watershed Water Quality Analysis

Water quality samples were taken in the Sixmile Creek sub-watershed by IDEM in 2010 at one site and by the Allen County SWCD in 2012 at two sites. It should be noted that due to the 2012 drought, samples were not able to be taken at both sites weekly due to low water levels. Due to the fact that historic samples were only taken three times during 2010, there is not a significant amount of historical data to note specific changes in water quality over the past several years. Figure 3.4 shows the location of each of the sample sites and Tables 3.12 through 3.14 show the water quality analysis of each sample site.

Figure 3.5: Sixmile Creek Sub-watershed Water Quality Sample Sites



IDEM sampled water quality at one site on the Maumee River in 2010 three times for chemistry, 10 times using the hydrolab, and five equally spaced samples were taken over a 30 day period for *E. coli*. As can be seen in Table 3.12 Phosphorus, TSS, and Turbidity exceeded the target levels in 100% of the samples. Nitrate+Nitrite and TKN readings exceeded target levels in 67% of the samples and D.O. exceeded the target level in 30% of the samples. E. coli, which was measured to determine if it met the geometric mean state standard of 125 CFU/100ml did not meet the standard and exceeded the state standard of a single sample (235 CFU/100ml) in 60% of the samples.

Table 3.12: IDEM – Site 4 Water Quality Analysis-Sixmile Creek Sub-watershed

Sixmile Creek (IDEM-4; Lat. 41.1010727, Long. -84.98127925)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0.13	mg/L	0/3	0%
D.O.	7.79	mg/L	3/10 > 9 mg/L	30%
E. coli	219.54 (Mean) 175.15 (Geomean)	CFU/100 ml	3/5 (235 CFU/100ml)	60%
Nitrate+Nitrite	2.4	mg/L	2/3	67%
Total Kjeldahl Nitrogen (TKN)	0.73	mg/L	2/3	67%
pH	7.98	SU	0/10	0%
Phosphorus	0.54	mg/L	3/3	100%
Temperature	20.44	Celsius	0/10	0%
TDS	400	mg/L	0/3	0%
TSS	78.67	mg/L	3/3	100%
Turbidity	67.12	NTU	10/10	100%

The Allen County SWCD sampled water quality from the Sixmile Creek located on Parent Rd at Site 301 weekly throughout the recreational season during 2012. As can be seen in Table 3.13, D.O. did not meet the target level in 43% of the samples, with 7 samples falling below the 4 mg/L target and 2 samples falling above the 9 mg/L target. Phosphorus and turbidity exceeded target levels in more than 50% of the samples analyzed and E. coli exceeded the state standard in 30% of the samples analyzed, however the geometric mean fell well below the state standard. The macroinvertebrate score of 17 is on the low end of the "good" range.

Table 3.13: Allen County SWCD Water Quality Analysis-Sixmile Creek (301)

Sixmile Creek (Allen County SWCD - Site 301)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	5.836	mg/L	7/21 < 4 mg/L 2/21 > 9 mg/L	43%
E. coli	149.04 (Mean) 10.133 (Geomean)	CFU/100 ml	6/20 (235 CFU/100ml)	30%
Nitrate+Nitrite	0.141	mg/L	0/21	0%
pH	7.92	SU	0/21	0%
Phosphorus	0.092	mg/L	11/21	52%
Temperature	18.83	Celsius	0/21	0%
TDS	570.35	mg/L	1/21	5%
Turbidity	26.457	NTU	16/21	67%
Alachlor	0.03	ppb	0/20	0%
Atrazine	0.109	ppb	0/20	0%
Metolachlor	0.042	ppb	0/20	0%
Macroinvertebrates	17	Points	Good	
Habitat	75	Points	Good	

The Allen County SWCD also sampled water quality weekly through the recreational season from Gar Creek at Bremer Rd at Site 309. It should be noted that due to the severe drought of 2012, only six samples were taken during the recreational season. As can be seen in Table 3.14, nitrate+nitrite and phosphorus samples exceeded the target levels 50% of the time. Turbidity exceeded the target levels in one sample and E. coli exceeded the state standard of 235 CFU/100ml in 60% of the samples (the five samples taken were not equally spaced over a 30 day period so the 235 CFU/100ml standard still holds). Finally, of significant note is that atrazine exceeded the target level in 33% of the samples. Atrazine levels measured 4.603 ppb on May 25 and 3.125 ppb on June 4, 2012.

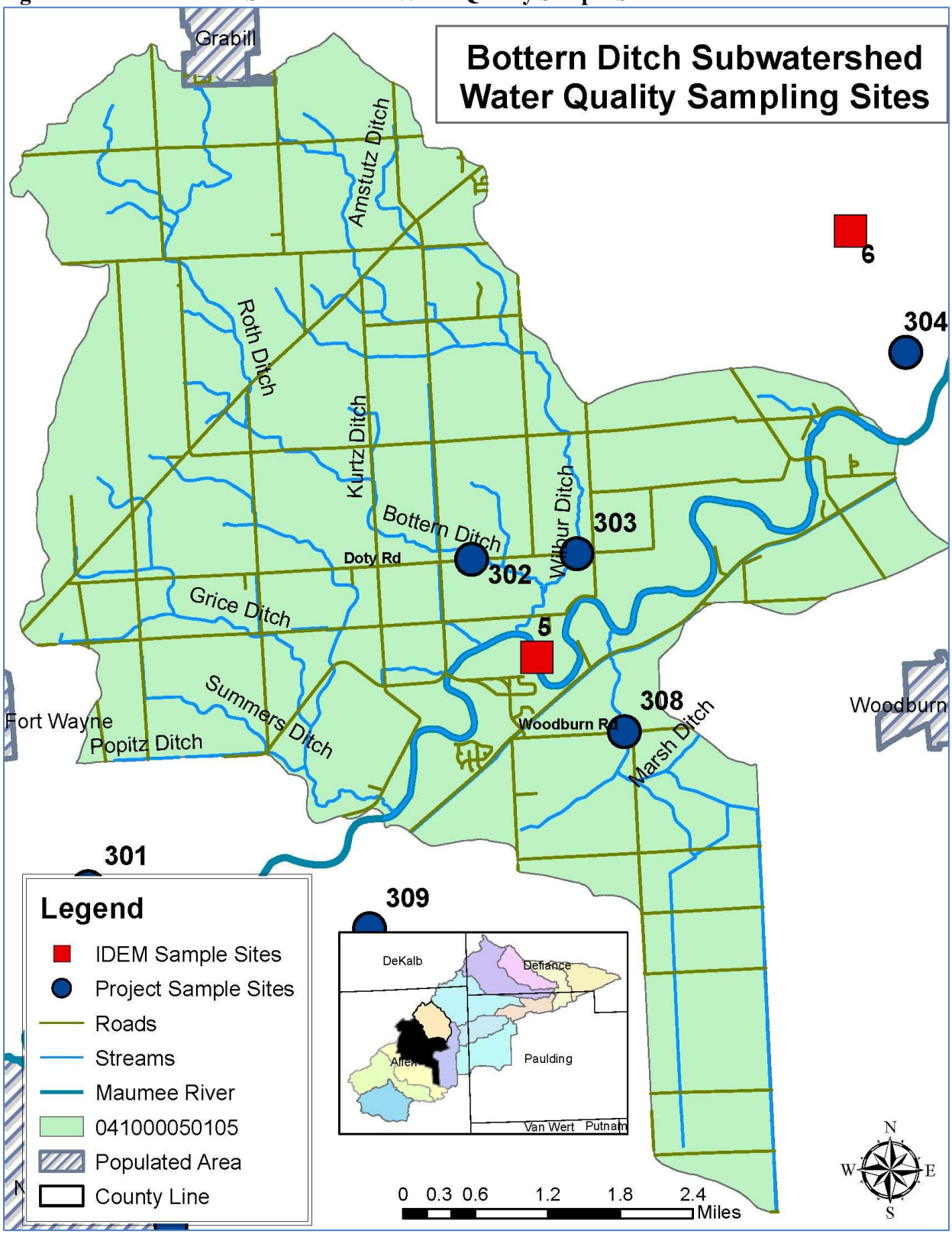
Table 3.14: Allen County SWCD Water Quality Analysis-Sixmile Creek (309)

Sixmile Creek (Allen County SWCD - Site 309)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	6.767	mg/L	0/6	0%
E. coli	906.02(Mean)	CFU/100 ml	3/5 (235 CFU/100ml)	60%
Nitrate+Nitrite	4.173	mg/L	3/6	50%
pH	7.938	SU	0/6	0%
Phosphorus	0.174	mg/L	3/6	50%
Temperature	19.648	Celsius	0/6	0%
TDS	410.2	mg/L	0/6	0%
Turbidity	8.017	NTU	1/6	17%
Alachlor	0.11	ppb	0/6	0%
Atrazine	1.619	ppb	2/6	33%
Metolachlor	0.285	ppb	0/6	0%
Macroinvertebrates	36	Points	Excellent	
Habitat	92	Points	Good	

3.3.4 Bottern Ditch Sub-watershed Water Quality Analysis

Water quality samples were collected in the Bottern Ditch sub-watershed at one IDEM site in 2010 and at three sites by the Allen County SWCD in 2012. It should be noted that due to the drought samples were not able to be taken at both sites weekly due to low water levels. Due to the fact that historic samples were only taken three times during 2010, there is not a significant amount of historical data to note specific changes in water quality over the past several years. Figure 3.5 shows the location of each of the sample sites and Tables 3.15 through 3.18 show the water quality analysis of each sample site in the Bottern Ditch sub-watershed.

Figure 3.6: Bottern Ditch Sub-watershed Water Quality Sample Sites



IDEM sampled water quality at one site on the Maumee River in 2010 three times for chemistry, 10 times using the hydrolab, and five equally spaced samples were taken over a 30 day period for *E. coli*. As can be seen in Table 3.15 turbidity exceeded the target levels in 100% of the samples analyzed, phosphorus, TKN and TSS exceeded the target levels in two of the samples analyzed, and nitrate+nitrite exceeded the target level in one of the samples analyzed. E. coli, which was measured to determine if it met the geometric mean state standard of 125 CFU/100ml did not meet the standard and exceeded the state standard of a single sample (235 CFU/100ml) in 40% of the samples.

Table 3.15: IDEM-Site 5 Water Quality Analysis –Bottern Ditch Sub-watershed

Maumee River (IDEM-5; Lat. 41.13298835, Long. -84.92092362)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0	mg/L	0/3	0%
D.O.	7.654	mg/L	4/10 > 9 mg/L	40%
E. coli	234.84 (Mean) 170.538 (Geomean)	CFU/100 ml	2/5 (235 CFU/100 ml)	40%
Nitrate+Nitrite	2.367	mg/L	1/3	33%
Total Kjeldahl Nitrogen (TKN)	0.8	mg/L	2/3	67%
pH	8.07	SU	0/10	0%
Phosphorus	0.487	mg/L	2/3	67%
Temperature	20.132	Celsius	0/10	0%
TDS	390	mg/L	0/3	0%
TSS	49.667	mg/L	2/3	67%
Turbidity	37.03	NTU	10/10	100%

The Allen County SWCD attempted to sample water quality weekly through the recreational season from Bottern Ditch at Doty Rd at Site 302. It should be noted that due to the severe drought of 2012, only four samples were taken during the recreational season. As can be seen in Table 3.16, phosphorus exceeded the target level in three of the samples analyzed and turbidity exceeded the target level in one of the samples analyzed. E. coli exceeded the state standard of 235 CFU/100ml in two samples. It should be noted that macroinvertebrates and habitat were assessed in October, 2012 and that an excellent variety of macroinvertbrates were found; representing a relatively healthy ecosystem.

Table 3.16: Allen County SWCD Water Quality Analysis – Bottern Ditch Sub-watershed – Site 302

Bottern Ditch (Allen County SWCD - Site 302)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	5.268	mg/L	0/4	0%
E. coli	437.10 (Mean)	CFU/100 ml	2/4 (235 CFU/100ml)	50%
Nitrate+Nitrite	0.44	mg/L	0/4	0%
pH	7.92	SU	0/4	0%
Phosphorus	0.18	mg/L	3/4	75%
Temperature	20.53	Celsius	0/4	0%
TDS	532.6	mg/L	0/4	0%
Turbidity	14.65	NTU	1/4	25%
Alachlor	0.053	ppb	0/4	0%
Atrazine	0.361	ppb	0/4	0%
Metolachlor	0.149	ppb	0/4	0%
Macroinvertebrates	24	Points	Excellent	
Habitat	83	Points	Good	

The Allen County SWCD also sampled water quality in the Bottern Ditch sub-watershed from Wilbur Ditch at Doty Rd, Site 303. The Wilbur Ditch did not dry up as did Bottern Ditch so water samples were able to be collected 24 times during the recreational season of 2012. As can be seen in Table 3.17, phosphorus exceeded the target level in 96% of the samples analyzed, turbidity exceeded the target level in 79% of the samples, and D.O. did not meet the target level in 42% of the samples analyzed with 10 samples falling below the 4mg/L limit. *E. coli* exceeded the state standard of 235 CFU/100ml in 64% of the samples analyzed with the average sample measuring over 2720 CFU/100ml. Of significance is that atrazine exceeded the target level once during a drought period. However, it is also important to note that macroinvertebrate populations, as measured in October 2012, were in excellent condition and the aquatic habitat is in good condition.

Table 3.17: Allen Co. SWCD Water Quality Analysis –Bottern Ditch Sub-watershed – Site 303

Wilbur Ditch (Allen County SWCD - Site 303)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	4.454	mg/L	10/24 < 4 mg/L	42%
E. coli	2720.059 (Mean) 226 (Geomean)	CFU/100 ml	14/22 (235 CFU/100ml)	64%
Nitrate+Nitrite	0.392	mg/L	1/24	4%
pH	7.88	SU	0/24	0%
Phosphorus	0.399	mg/L	23/24	96%
Temperature	18.768	Celsius	0/24	0%
TDS	542.29	mg/L	1/24	4%
Turbidity	29.813	NTU	19/24	79%
Alachlor	0.102	ppb	0/24	0%
Atrazine	0.54	ppb	1/24	4%
Metolachlor	0.154	ppb	0/24	0%
Macroinvertebrates	25	Points	Excellent	
Habitat	83	Points	Good	

The Allen County SWCD also sampled water quality in the Bottern Ditch sub-watershed from Grover Ditch at Woodburn Rd, Site 308. The Grover Ditch also did not dry up as did Bottern Ditch so water samples were able to be collected 24 times during the recreational season of 2012. As can be seen in Table 3.18, phosphorus exceeded the target level in 58% of the samples analyzed, turbidity exceeded the target level in 88% of the samples, and D.O. did not meet the target level in 29% of the samples analyzed with four samples falling below the 4mg/L limit and three measuring above the 9mg/L limit. E. coli exceeded the state standard of 235 CFU/100ml in 83% of the samples analyzed with the average sample measuring at 2379 CFU/100 ml. Of significance is that atrazine exceeded the target level three times during a drought period. On July 23 and 30th, and August 6 atrazine measured above the target level at 3.385 ppb, 3.086 ppb, and 3.235 ppb, respectively.

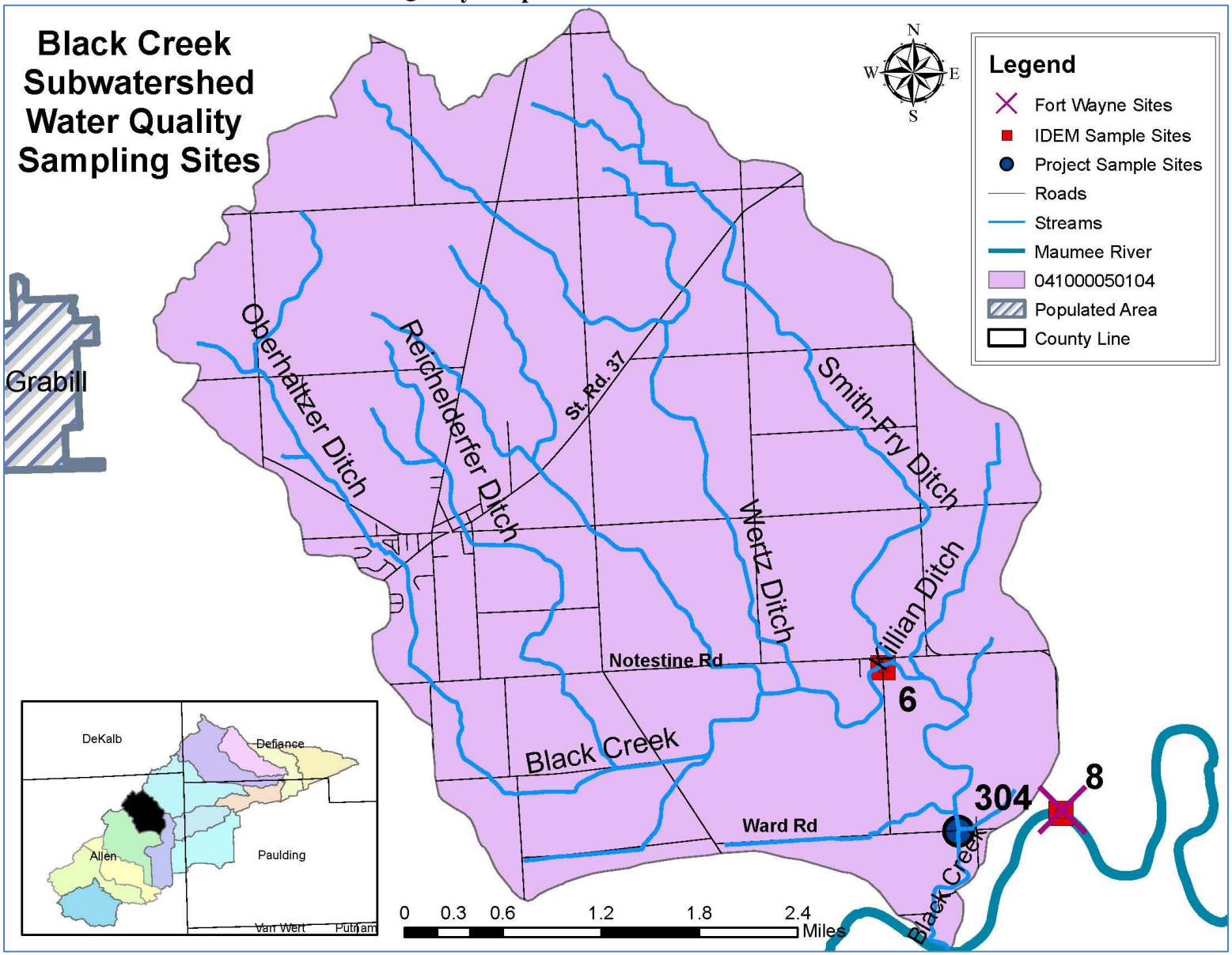
Table 3.18: Allen County SWCD Water Quality Analysis – Bottern Ditch Sub-watershed –Site 308

Grover Ditch B (Allen County SWCD - Site 308)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	6.021	mg/L	4/24 < 4mg/L and 3/24 > 9mg/L	29%
E. coli	2379 (Mean) 514 (Geomean)	CFU/100 ml	19/23 (235 CFU/100ml)	83%
Nitrate+Nitrite	2.289	mg/L	8/24	33%
pH	7.907	SU	0/24	0%
Phosphorus	0.299	mg/L	14/24	58%
Temperature	19.078	Celsius	0/24	0%
TDS	670.654	mg/L	5/24	21%
Turbidity	28.296	NTU	21/24	88%
Alachlor	0.175	ppb	0/23	0%
Atrazine	0.91	ppb	3/23	13%
Metolachlor	0.372	ppb	0/23	0%
Macroinvertebrates	21	Points	Good	
Habitat	81	Points	Good	

3.3.5 Black Creek Sub-watershed Water Quality Analysis

Water quality samples were collected in the Black Creek sub-watershed at one site by IDEM in 2010 and at one site by the Allen County SWCD in 2012. Due to the fact that historic samples were only taken three times during 2010, there is not a significant amount of historical data to note specific changes in water quality over the past several years. Figure 3.6 shows the location of each of the sample sites and Tables 3.19 and 3.20 show the water quality analysis of each sample site in the Black Creek sub-watershed.

Figure 3.7: Black Creek Sub-watershed Water Quality Sample Sites



IDEM sampled water quality at one site on Black Creek in 2010 three times for chemistry, 10 times using the hydrolab, and five equally spaced samples were taken over a 30 day period for *E. coli*. As can be seen in Table 3.19 phosphorus exceeded the target level in one of the samples analyzed, TKN exceeded the target level in 50% of the samples, Nitrate+nitrite exceeded the target level in 67% of the samples analyzed, Ammonia exceeded the target level in one of the samples, TSS exceeded the target level in one of the samples analyzed, and turbidity exceeded the target level in 40% of the samples analyzed. *E. coli*, which was measured to determine if it met the geometric mean state standard of 125 CFU/100ml did not meet the standard as the geomean was well above the standard at 349 CFU/100ml and it exceeded the state standard of a single sample (235 CFU/100ml) in 40% of the samples.

Table 3.19 IDEM-Site 6, Water Quality Analysis -Black Creek Sub-watershed

Black Creek (IDEM Lat. 41.183025, Long. -84.869582)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0.08	mg/L	1/3	33%
D.O.	5.84	mg/L	0/10	0%
E. coli	749.98 (mean) 349.62 (geomean)	CFU/100ml	2/5 (235 CFU/100ml)	40%
Nitrate+nitrite	2.7	mg/L	2/3	67%
Total Kjeldahl Nitrogen (TKN)	0.35	mg/L	1/2	50%
pH	7.82	SU	0/10	0%
Phosphorus	0.36	mg/L	1/3	33%
Temperature	19.53	Celsius	0/10	0%
TDS	405	mg/L	0/3	0%
TSS	18.33	mg/L	1/3	33%
Turbidity	27.3	NTU	4/10	40%

The Allen County SWCD sampled water quality weekly through the recreational season from Black Creek at Ward Rd at Site 304. As can be seen in Table 3.20, phosphorus exceeded the target level in 79% of the samples analyzed and turbidity exceeded the target level in 63% of the samples analyzed. D.O. did not meet the target levels in 38% of the samples analyzed with eight samples falling below the 4mg/L threshold and one sample measuring greater than the 9mg/L target. *E. coli* exceeded the state standard of 235 CFU/100ml in 74% of samples with an average measurement of 1380 CFU/100ml and the geometric mean measured at 285 CFU/100ml. It should be noted that macroinvertebrates and habitat were assessed in October, 2012 and that an excellent variety of macroinvertbrates were found, as well as a high habitat score; representing a relatively healthy ecosystem.

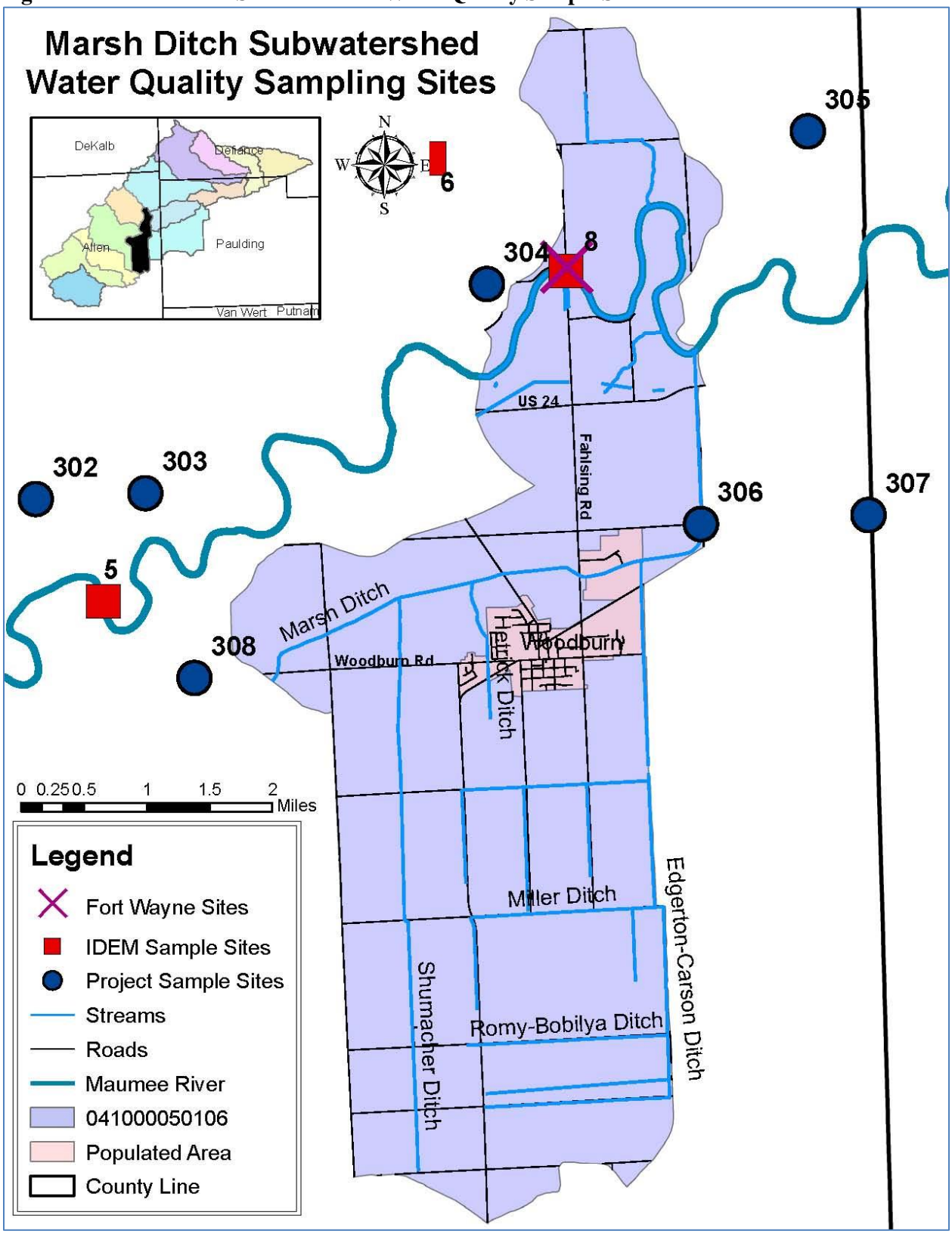
Table 3.20: Allen County SWCD Water Quality Analysis – Black Creek Sub-watershed - Site 304

Black Creek (Allen County SWCD - Site 304)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	5.204	mg/L	8/24 < 4mg/L and 1/24 > 9mg/L	38%
E. coli	1380 (Mean) 285(Geomean)	CFU/100 ml	17/23 (235 CFU/100ml)	74%
Nitrate+Nitrite	0.419	mg/L	1/24	4%
pH	8.015	SU	0/24	0%
Phosphorus	0.24	mg/L	19/24	79%
Temperature	18.313	Celsius	0/24	0%
TDS	445.229	mg/L	0/24	0%
Turbidity	37.913	NTU	15/24	63%
Alachlor	0.152	ppb	0/24	0%
Atrazine	0.816	ppb	0/24	0%
Metolachlor	0.334	ppb	0/24	0%
Macroinvertebrates	31	Points	Excellent	
Habitat	91	Points	Good	

3.3.6 Marsh Ditch Sub-watershed Water Quality Analysis

Water quality samples were collected in the Marsh Ditch sub-watershed at one site by IDEM from 2003 through 2010, the City of Fort Wayne samples water quality at that same site and has provided to this project water quality data that has been collected from 2002 through 2012, and the Allen County SWCD collected water samples at one site in Marsh Ditch in 2012. Figure 3.7 shows the location of each of the sample sites and Tables 3.21 through 3.23 show the water quality analysis of each sample site in Marsh Ditch sub-watershed.

Figure 3.8: Marsh Ditch Sub-watershed Water Quality Sample Sites



IDEM sampled water quality at one site on the Maumee River at S.R. 101 and has supplied this project with data from 2003 through 2010. As can be seen in Table 3.21 phosphorus exceeded the target level in 18% of the samples analyzed, TKN exceeded the target level in 100% of the samples, Nitrate+nitrite exceeded the target level in 81% of the samples analyzed, TSS exceeded the target level in 64% of the samples analyzed, turbidity exceeded the target level in 91% of the samples analyzed and temperature did not meet the target level in 27% of the samples analyzed with 29 samples falling below the 4.44 degrees C threshold and 1 sample measuring above the 29.44 degrees C target. D.O. did not meet the target level in 70% of the samples analyzed with 1 sample falling below the 4 mg/L target and 77 measuring above the 9 mg/L target. It should be noted that 44% of the samples that measured above the 9mg/L target did so during the recreational season. This indicates that the majority of the exceedances were a result of the natural tendencies of D.O. in water when the temperature of the water drops. *E. coli* was not measured at this fixed station.

Table 3.21: IDEM-Site 8, Water Quality Analysis-Marsh Creek Sub-watershed

Maumee River (IDEM-8; Lat. 41.16972222, Long. -84.84916667)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0.029	mg/L	3/111	3%
D.O.	10.54	mg/L	1/112 < 4 mg/l and 77/112 > 9 mg/l	70%
Nitrate+Nitrite	3.41	mg/L	89/110	81%
Total Kjeldahl Nitrogen (TKN)	1.4	mg/L	110/110	100%
pH	7.89	SU	0/216	0%
Phosphorus	0.24	mg/L	20/110	18%
Temperature	12.94	Celcius	29/112 < 4.44 ºC and 1/112 > 29.44 ºC	27%
TDS	398.6	mg/L	0/112	0%
TSS	52.13	mg/L	71/111	64%
Turbidity	102.01	NTU	99/109	91%

The City of Fort Wayne has been collecting water quality from the S.R. 101 sample site for over a decade. They collect samples once a month during the winter, and weekly from April through October. Data the city has collected since 2002 through 2012 was analyzed for the purposes of this project. As can be seen in Table 3.22, *E. coli* exceeded the state standard in nearly 40% of the samples, with the geometric mean exceeding the state standard as well. Phosphorus exceeded the target in 17% of the samples, temperature in 25%, and TSS in nearly 60% of the samples. D.O. fell below the state standard 1/120 times and exceeded the target level of 9mg/L in 80 samples, making it not meet the target in nearly 67.5% of the samples. It should be noted that of those samples that exceeded the target of 9 mg/L, 41% of the samples exceeded the target during the recreational season, indicating that the majority of the samples that exceeded did so due to the natural progression of D.O. during the colder winter months.

Table 3.22: City of Fort Wayne Water Quality Analysis-Marsh Ditch S.R. 101

Maumee River (City of Fort Wayne - State Rd 101)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Dissolved Oxygen	10.5	mg/L	1/120 < 4 and 80/120 > 9	67.5%
E. coli	843.9 (mean) 191.5 (geomean)	CFU/100ml	47/120 (235 CFU/100ml)	39.2%
Ammonia	0.14	mg/L	3/120	2.5%
pH	7.9	SU	1/119 < 6 and 2/119 > 9	2.5%
Phosphorus	0.22	mg/L	20/120	17%
TDS	403.19	mg/L	0/121	0%
Temperature	13	Celsius	16/64 < 4.4 and 0/64 > 29.44	25%
TSS	54.1	mg/L	72/121	59.5%

The Allen County SWCD sampled water quality weekly through the recreational season from Marsh Ditch at Maumee Center Rd at Site 306. As can be seen in Table 3.23, phosphorus exceeded the target level in 67% of the samples analyzed, nitrate+nitrite exceeded the target level in 25% of the samples analyzed, and turbidity exceeded the target level in 92% of the samples analyzed. D.O. exceeded the target level of 9mg/L in 13% of the samples analyzed. *E. coli* exceeded the state standard of 235 CFU/100ml in 74% of samples with the average measurement at 580 CFU/100ml and the geometric mean measured at 346 CFU/100ml. Atrazine measured greater than the target level twice, both in May, 2012 measuring at 11.97 ppb and 25.85 ppb, respectively. It should be noted that macroinvertebrates and habitat were assessed in October, 2012 and that an excellent variety of macroinvertbrates were found, as well as a high habitat score; representing a relatively healthy ecosystem.

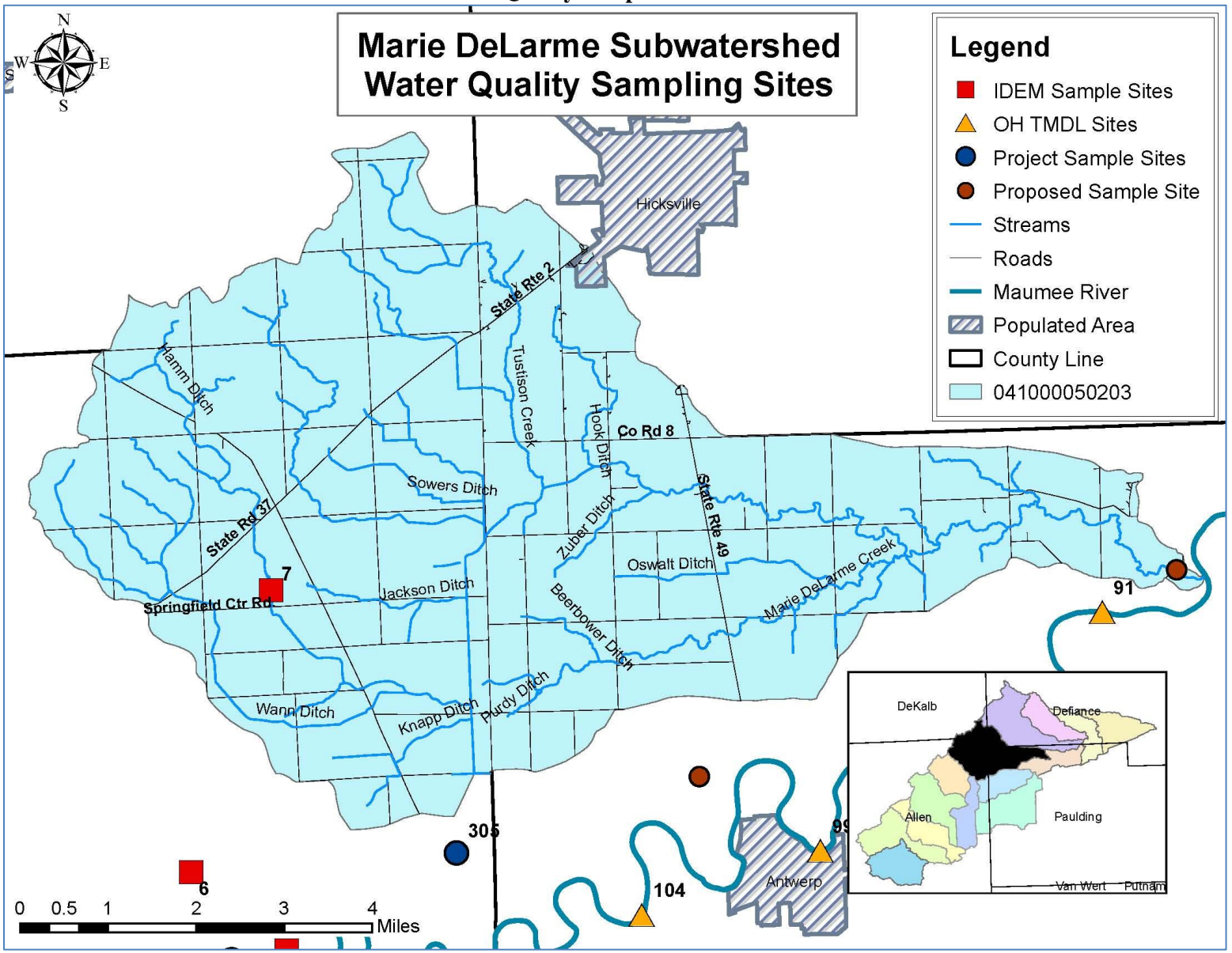
Table 3.23: Allen County SWCD Water Quality Analysis-Marsh Ditch Sub-watershed - Site 306

Marsh Ditch (Allen County SWCD - Site 306)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	6.494	mg/L	3/24 > 9mg/L	13%
E. coli	580 (Mean) 346 (Geomean)	CFU/100 ml	17/23 (235 CFU/100ml)	74%
Nitrate+Nitrite	1.91	mg/L	6/24	25%
pH	7.948	SU	0/24	0%
Phosphorus	0.31	mg/L	16/24	67%
Temperature	19.106	Celsius	0/24	0%
TDS	614.442	mg/L	0/24	0%
Turbidity	29.704	NTU	22/24	92%
Alachlor	0.096	ppb	0/23	0%
Atrazine	2.053	ppb	2/23	9%
Metolachlor	0.307	ppb	0/23	0%
Macroinvertebrates	28	Points	Excellent	
Habitat	88	Points	Good	

3.3.7 Marie DeLarme Creek Sub-watershed Water Quality Analysis

Water quality in the Marie DeLarme Creek sub-watershed has only been analyzed by IDEM at one site in 2010. Therefore, there is limited data available to determine current water quality conditions, and later, pollutant loadings. The Defiance County SWCD is currently in the process of acquiring funding to implement a water quality testing program which will aid in determining current conditions of the water in the Marie DeLarme Creek sub-watershed. Figure 3.8 shows the location of IDEM's sample site, as well as Defiance County SWCD's proposed sample site and Table 3.24 shows the results of IDEM's sampling efforts.

Figure 3.9: Marie DeLarme Creek Sub-watershed Water Quality Sample Sites



IDEM sampled water quality at one site on the Hamm Ditch in 2010 three times for chemistry, 10 times using the hydrolab, and five equally spaced samples were taken over a 30 day period for *E. coli*. As can be seen in Table 3.24 phosphorus exceeded the target level in 67% of the samples analyzed, nitrate+nitrite exceeded the target level in one sample, and turbidity exceeded the target level in 70% of the samples analyzed. D.O. exceeded the target level of 9 mg/L in 30% of the samples analyzed and *E. coli*, which was measured to determine if it met the geometric mean state standard of 125 CFU/100ml did not meet the standard as the geomean was well above the standard at 616 CFU/100ml and it exceeded the state standard of a single sample (235 CFU/100ml) in 100% of the samples.

Table 3.24: IDEM-Site 7, Water Quality Analysis-Marie DeLarme Creek Sub-watershed

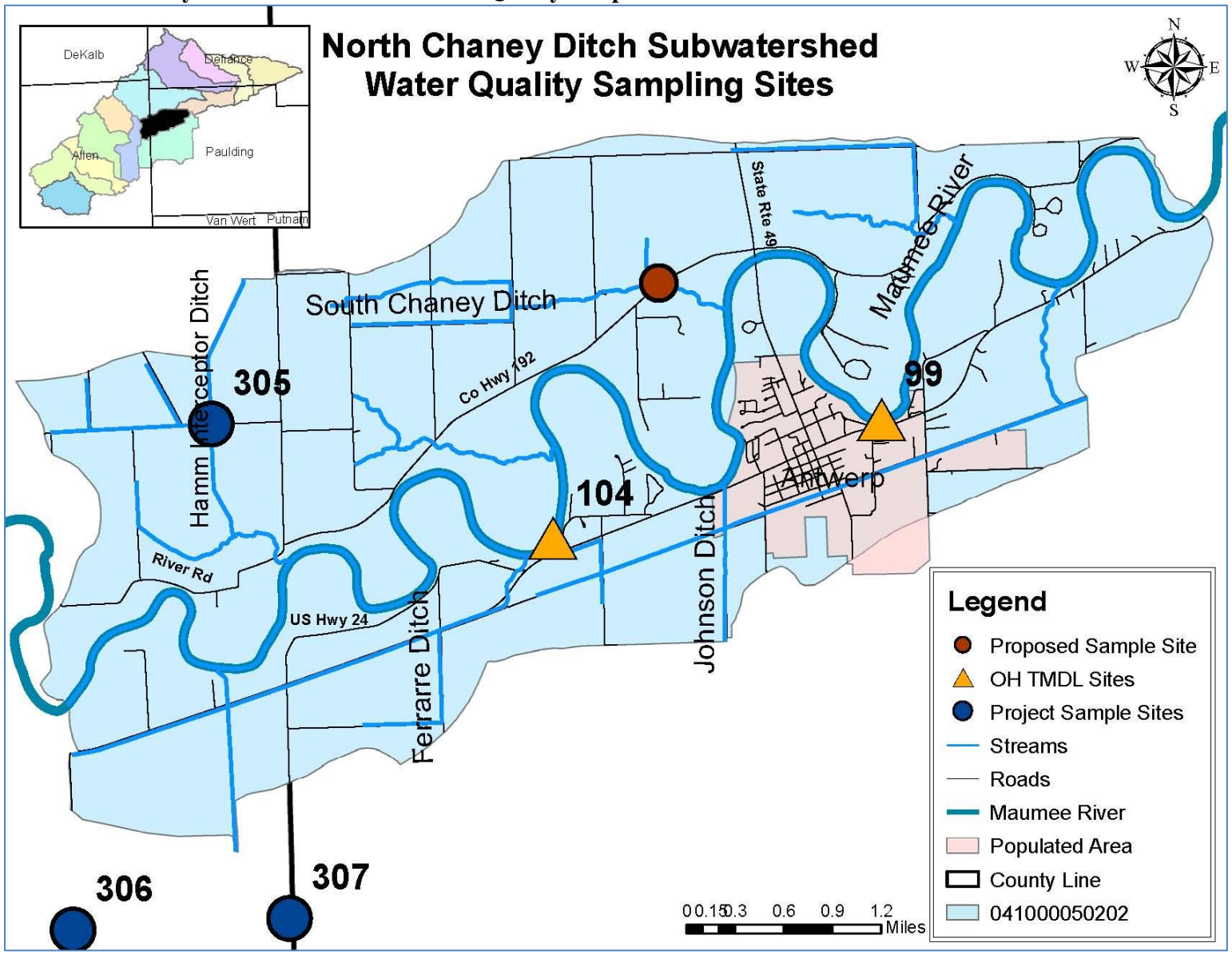
Hamm Ditch (IDEM - 7; Lat. 41.22916608, Long. -84.85066921)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0	mg/L	0/3	0%
D.O.	8.031	mg/L	3/10 > 9 mg/L	30%
E. coli	853.1 (Mean) 616.17 (Geomean)	CFU/100 ml	5/5 (235 CFU/100ml)	100%
Nitrate+Nitrite	0.767	mg/L	1/3	33%
Total Kjeldahl Nitrogen (TKN)	0	mg/L	0/3	0%
pH	8.083	SU	0/10	0%
Phosphorus	0.087	mg/L	2/3	67%
Temperature	17.653	Celsius	0/10	0%
TDS	593.33	mg/L	0/3	0%
TSS	9	mg/L	0/3	0%
Turbidity	15.52	NTU	7/10	70%

The IDEM sample site only accounts for the input from a small portion of the land use in the sub-watershed. Most of the Marie DeLarme watershed that drains into Sixmile Cutoff sub-watershed will be accounted for at the OEPA TMDL sample site 85. The results at Site 85 are discussed below in Section 3.3.11.

3.3.8 North Chaney Ditch Sub-watershed Water Quality Analysis

Water quality samples were collected in the North Chaney Ditch sub-watershed at two sites by the OEPA in 2012 as part of the TMDL development process. The Allen County SWCD collected samples at one site in the North Chaney Ditch sub-watershed in 2012 as part of this project. Due to the fact that the only available data in North Chaney Ditch is from 2012, during an extreme drought period, there is limited historical data to give an entirely accurate picture of water quality in the watershed. The Defiance County SWCD has one site they propose to conduct water quality sampling efforts located in the North Chaney Ditch sub-watershed. The Defiance SWCD is in the process of acquiring funds to conduct that sampling. Figure 3.9 shows the location of each of the sample sites and Tables 3.25 through 3.27 show the water quality analysis of each sample site in the North Chaney Ditch sub-watershed.

Figure 3.10: North Chaney Ditch Sub-watershed Water Quality Sample Sites



The OEPA conducted water quality monitoring in the Upper Maumee Watershed as part of their Western Lake Erie Basin, TMDL process. They had two sample sites located on the Maumee River in the North Chaney Ditch sub-watershed that were sampled bi-weekly between June and September in 2012; Site 104 west of Antwerp and Site 99 on the east side of Antwerp. Table 3.25 shows the results of the analysis of samples taken at Site 104. As can be seen in the table TKN exceeded target levels in 100% of the samples analyzed, nitrate+nitrite exceeded the target level in 67% of the samples analyzed and TSS exceeded target levels in one of the six samples analyzed.

Table 3.25: OEPA-Site 104 Water Quality Analysis-North Chaney Ditch Sub-watershed

Maumee River (OH EPA - 104; Maumee River 1.0 Mi. W. of Antwerp @Road C-250a)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	6.34	mg/L	0/6	0%
E. coli	104.8 (Mean)	CFU/100ml	0/5 (235 CFU/100ml)	0%
Ammonia	0.059	mg/L	0/6	0%
pH	7.963	SU	0/6	0%
Phosphorus	0.173	mg/L	0/6	0%
TDS	485	mg/L	0/6	0%
Temperature	24.087	Celsius	0/6	0%
TSS	19.667	mg/L	1/6	17%
Nitrate+Nitrite	2.392	mg/L	4/6	67%
Nitrite	0.033	mg/L	0/6	0%
TKN	1.105	mg/L	6/6	100%

Table 3.26 shows the water quality analysis from the OEPA efforts taken at Site 99. As can be seen in the Table TKN exceeded the target level in 100% of the samples, nitrate+nitrite exceeded the target level in 70% of the samples, TSS exceeded the target level in 30% of the samples, and ammonia exceeded the target level in one sample. D.O. measured greater than the target level in 25% of the samples. *E. coli* did not exceed the state standard in any of the samples taken averaging only 120 CFU/100ml, however this can be expected as the samples are taken with the larger Maumee River where the *E. coli* count can be diluted by the volume of water running through the sample site.

Table 3.26: OEPA-Site 99 Water Quality Analysis-North Chaney Ditch Sub-watershed

Maumee River (OH EPA - 99; Maumee River @ Antwerp City Park)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	8.411	mg/L	2/8 > 9 mg/l	25%
E. coli	120.6 (Mean)	CFU/100ml	0/5 (235 CFU/100ml)	0%
Ammonia	0.149	mg/L	1/10	10%
pH	8.046	SU	0/8	0%
Phosphorus	0.14	mg/L	0/10	0%
TDS	445.8	mg/L	0/10	0%
Temperature	22.221	Celsius	0/8	0%
TSS	27.1	mg/L	3/10	30%
Nitrate+Nitrite	2.601	mg/L	7/10	70%
Nitrite	0.046	mg/L	0/10	0%
TKN	1.012	mg/L	10/10	100%

The Allen County SWCD sampled one site (Site 305) in the North Chaney Ditch sub-watershed from the Hamm Interceptor Ditch at Notestine Rd in 2012. Samples were taken weekly during the recreational season. As can be seen in Table 3.27 phosphorus exceeded the target level in 39% of the samples, turbidity exceeded target levels in 61% of the samples, and D.O. fell below the state standard of 4 mg/L in four samples. *E. coli* exceeded the state standard of 235 CFU/100ml in 21% of the samples, however the geometric mean was only 17 CFU/100ml and the average measurement of *E. coli* was 177 CFU/100ml. It should be noted that macroinvertebrate sampling showed an excellent variety of pollution sensitive species, indicating a good ecosystem.

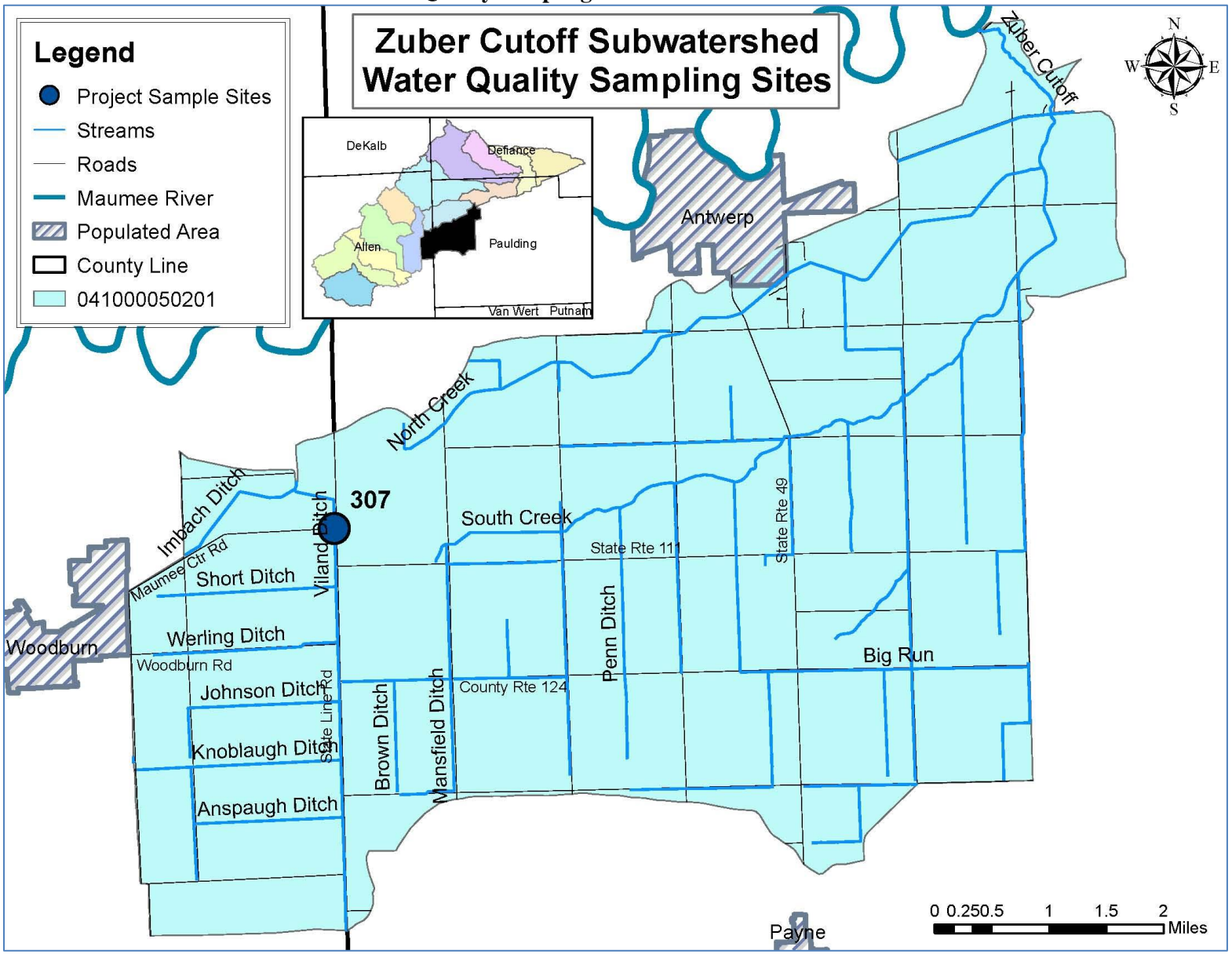
Table 3.27: Allen County SWCD Water Quality Analysis-North Chaney Ditch - Site 305

North Chaney Ditch (Allen County SWCD - Site 305)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	5.156	mg/L	4/23 < 4mg/L	17%
E. coli	177.176(Mean) 17(Geomean)	CFU/100 ml	5/24 (235 CFU/100ml)	21%
Nitrate+Nitrite	0.33	mg/L	1/23	4%
pH	7.953	SU	0/23	0%
Phosphorus	0.092	mg/L	9/23	39%
Temperature	19.004	Celsius	0/23	0%
TDS	411.996	mg/L	0/23	0%
Turbidity	36.409	NTU	14/23	61%
Alachlor	0.068	ppb	0/22	0%
Atrazine	0.224	ppb	0/22	0%
Metolachlor	0.088	ppb	0/22	0%
Macroinvertebrates	25	Points	Excellent	
Habitat	85	Points	Good	

3.3.9 Zuber Cutoff Sub-watershed Water Quality Analysis

Water quality in the Zuber Cutoff sub-watershed was analyzed by the Allen County SWCD at one site in 2012. Due to extreme drought conditions samples were not able to be collected weekly throughout the recreational season and only seven samples total were taken. Since the only available water quality data available for the Zuber Cutoff sub-watershed was taken during drought conditions, there is little information available to determine pollution problems and accurate pollution loads to the watershed. Figure 3.10 shows the location of the water sample site in Zuber Cutoff sub-watershed.

Figure 3.11: Zuber Cutoff Sub-watershed Water Quality Sampling Sites



As mentioned earlier, there is little available water quality data in the Zuber Cutoff sub-watershed. However, the Allen SWCD did get some samples pulled from Viland Ditch at State Line Rd seven times throughout the recreational season in 2012. As can be seen in Table 3.28 turbidity exceeded target levels in 100% of the samples, phosphorus exceeded the target level in 43% of the samples, and nitrate+nitrite exceeded the target level in 29% of the samples. D.O. measured greater than 9mg/L in one sample and *E. coli* measured greater than the 235 CFU/100ml state standard in five of the six samples taken, this could be due to low water levels and a higher concentration of pollutants due to the low water levels. It is important to note that atrazine exceeded the target level once in August 2012 where it measured 4.295 ppb. Also of significance is that a low representation of pollution intolerant macroinvertebrates was found during the October 2012 inventory, indicating a less than optimal aquatic habitat. This corresponds with the habitat score within the "acceptable" range, where it would be preferred to have a habitat score in the "good" to "excellent" range.

Table 3.28: Allen County SWCD Water Quality Analysis-Zuber Cutoff Sub-watershed (Site 307)

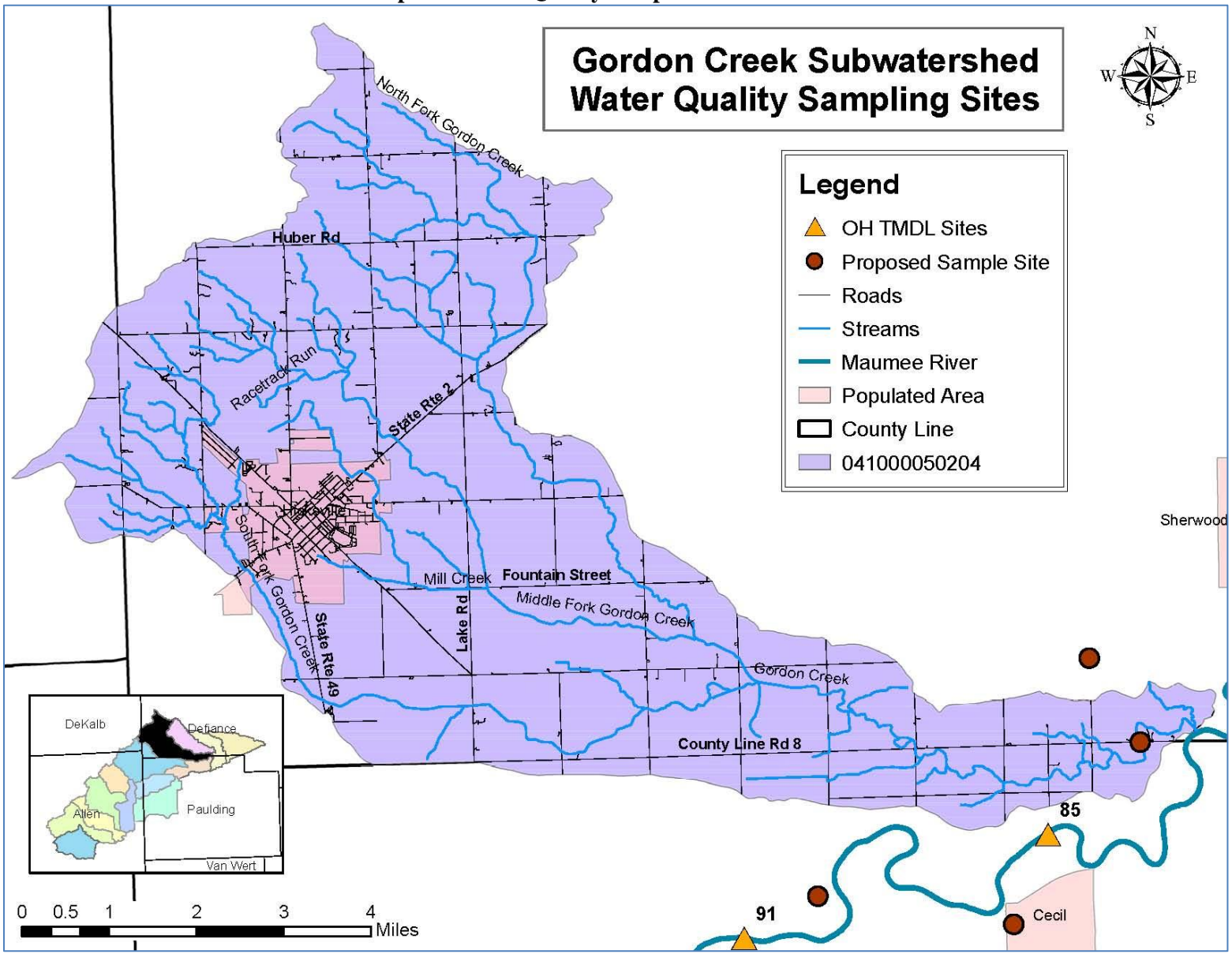
Viland Ditch (Allen County SWCD - Site 307)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	7.337	mg/L	1/7 > 9mg/L	14%
E. coli	815 (Mean) 564.17 (Geomean)	CFU/100 ml	5/6 (235 CFU/100ml)	83%
Nitrate+Nitrite	2.807	mg/L	2/7	29%
pH	7.997	SU	0/7	0%
Phosphorus	0.089	mg/L	3/7	43%
Temperature	17.237	Celsius	0/7	0%
TDS	329.357	mg/L	0/7	0%
Turbidity	29.971	NTU	7/7	100%
Alachlor	0.357	ppb	0/7	0%
Atrazine	1.318	ppb	1/7	14%
Metolachlor	0.804	ppb	0/7	0%
Macroinvertebrates	15	Points	Fair	
Habitat	72	Points	Acceptable	

The project sample site only accounts for the input from the Indiana side of the sub-watershed. The rest of the Zuber Cutoff watershed drains into Sixmile Cutoff sub-watershed. Therefore, polluted runoff from the majority of Zuber will be accounted for at the OEPA TMDL sample site 91. The results at Site 91 are discussed below in Section 3.3.11.

3.3.10 Gordon Creek Sub-watershed Water Quality Analysis

There are no current or historic sampling efforts in the Gordon Creek sub-watershed. The Defiance County SWCD has a proposed site they would like to sample once funding is acquired. If sampling is able to be conducted in Gordon Creek it will help to identify pollutant loads into the Gordon Creek sub-watershed and validate findings of this watershed management plan. Figure 3.11 is a map showing the proposed location of the Defiance County SWCD sample site.

Figure 3.12: Gordon Creek Sub-watershed Proposed Water Quality Sample Site



While Gordon Creek does not have any sample sites located within its boundaries, sample site 79, located within Sulphur Creek sub-watershed can help provide information regarding what type of polluted runoff may be coming from Gordon Creek. Sample site 79 will be discussed in Section 3.3.13.

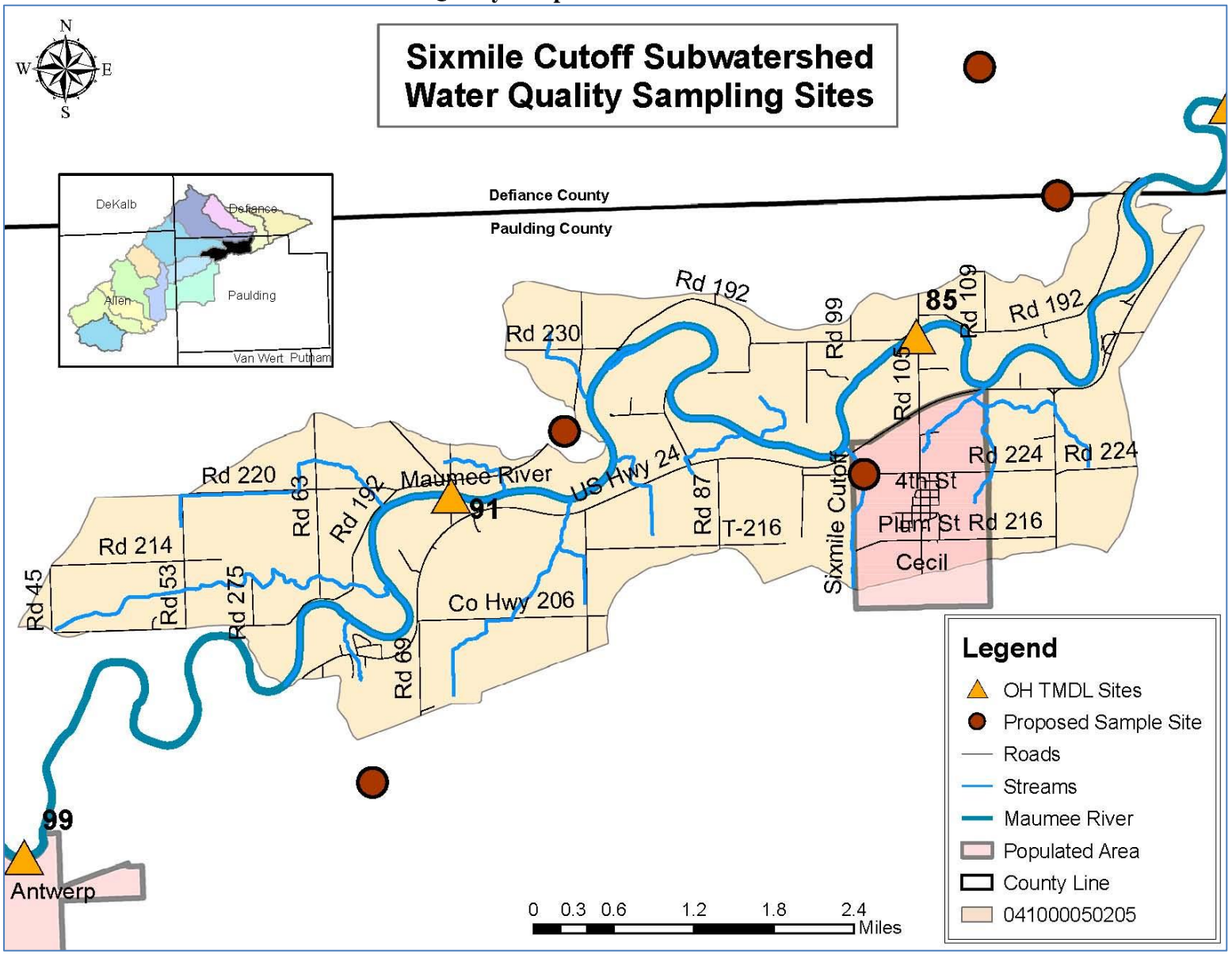
3.3.11 Sixmile Cutoff Sub-watershed Water Quality Analysis

Water quality was analyzed in 2012 by the OEPA in their efforts to acquire information for a TMDL for the WLEB at two sites; site 91 and site 85, both on the Maumee River mainstem. The Defiance County SWCD has one site chosen to conduct water quality sampling should they acquire funds to do so. Due to the lack of historic water quality data, and samples being taken during an extreme drought season, a representative sample of water quality in the Sixmile Cutoff sub-watershed cannot be presented. However, an analysis of available data was performed and will be used as a baseline of water quality in the sub-watershed at this time. Figure 3.12 shows the location of the sample sites in the Sixmile Cutoff sub-watershed and Tables 3.29 and 3.30 show the analysis of the OEPA water quality data.

The OEPA site 91 is located approximately one river mile downstream from the confluence of Zuber Cutoff and the Maumee River in Sixmile Cutoff. Site 91 will provide information to help us extrapolate the amount and type of polluted runoff that is entering the Maumee River from Zuber Cutoff sub-watershed, as well as the east portion of Gordon Creek sub-watershed.

The OEPA site 85 is located approximately three river miles downstream from the confluence of Marie DeLarme and the Maumee River in Sixmile Cutoff sub-watershed. Site 85 will provide information to help us extrapolate the amount and type of polluted runoff that is entering the Maumee River from Marie DeLarme sub-watershed.

Figure 3.13: Sixmile Cutoff Sub-watershed Water Quality Sample Sites



The OEPA conducted water quality monitoring in the Upper Maumee Watershed as part of their WLEB TMDL process. They had two sample sites located on the Maumee River in the Sixmile Cutoff sub-watershed that were sampled bi-weekly between June and September in 2012; Site 91 west of Cecil and Site 85 directly north of Cecil. Table 3.29 shows the results of the analysis of samples taken at Site 91. As can be seen in the table TKN exceeded target levels in 100% of the samples analyzed, and nitrate+nitrite exceeded the target level in 67% of the samples analyzed.

Table 3.29: OEPA-Site 91 Water Quality Analysis Sixmile Cutoff Sub-watershed

Sixmile Cutoff (OH EPA - 91; Maumee River @ Eater Rd. / County Road 73)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Dissolved Oxygen	6.648	mg/L	0/6	0%
E. coli	89.4 (Mean)	CFU/100ml	0/5	0%
Ammonia	0.097	mg/L	0/6	0%
pH	8.065	SU	0/6	0%
Phosphorus	0.153	mg/L	06	0%
TDS	458.5	mg/L	0/6	0%
Temperature	24.48	Celsius	0/6	0%
TSS	14.667	mg/L	0/6	0%
Nitrate+Nitrite	2.83	mg/L	4/6	67%
Nitrite	0.027	mg/L	0/6	0%
TKN	0.99	mg/L	6/6	100%

The results from samples taken by OEPA from Site 85, north of Cecil are shown in Table 3.30. As can be seen below, TKN exceeded the target levels in 100% of the samples, nitrate+nitrite exceeded the target level in 83% of the samples, and *E. coli* exceeded the state standard of 235 CFU/100ml in 40% of the samples. It should be noted that *E. coli* was measured monthly during the recreational season.

Table 3.30: OEPA-Site 85 Water Quality Analysis Sixmile Cutoff Sub-watershed

Sixmile Cutoff (OH EPA - 85; Maumee River @ County Road 105)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Dissolved Oxygen	6.108	mg/L	0/6	0%
E. coli	186.6 (Mean)	CFU/100ml	2/5 (235CFU/100ml)	40%
Ammonia	0.129	mg/L	0/6	0%
pH	8.022	SU	0/6	0%
Phosphorus	0.137	mg/L	0/6	0%
TDS	467	mg/L	0/6	0%
Temperature	24.428	Celsius	0/6	0%
TSS	12.667	mg/L	0/6	0%
Nitrate+Nitrite	2.992	mg/L	5/6	83%
Nitrite	0.031	mg/L	0/6	0%
TKN	1.078	mg/L	6/6	100%

3.3.12 Platter Creek Sub-watershed Water Quality Analysis

There are no current or historic sampling efforts in the Platter Creek sub-watershed. The Defiance County SWCD has a proposed site they would like to sample once funding is acquired. While there are no sampling efforts that have taken place within Platter Creek to date, OEPA's TMDL sample site 79, located in the Sulphur Creek sub-watershed, is located just downstream from the confluence of Platter Creek and the Maumee River. Therefore, site 79 provides a more representative sample for Platter Creek than for Sulphur Creek.

If the Defiance SWCD's sampling is able to be conducted in Gordon Creek it will help to identify pollutant loads into the Gordon Creek sub-watershed and further validate findings of this watershed management plan. Figure 3.11 is a map showing the proposed location of the Defiance County SWCD sample site.

While Platter Creek does not have any sample sites located within its boundaries, sample site 79, located within Sulphur Creek sub-watershed can help provide information regarding what type of polluted runoff may be coming from Platter Creek. It should be noted that Sample site 79 will provide a measurement of polluted runoff from the east side of North Chaney Ditch, Gordon Creek and Platter Creek. Sample site 79 will be discussed in Section 3.3.13.

Figure 3.14: Platter Creek Sub-watershed Water Quality Sample Sites