

Water Quality Study

Van Wert County

Results from samples collected January – December 2009

Town Creek Nutrient Data

Nitrogen and Phosphorus concentrations at four locations in Town Creek

Town Creek Pesticide Data

Pesticide concentrations for samples collected in June and November at three locations in Town Creek.

Municipal and Township Well Pesticide Samples

Pesticide concentrations for June samples of six area municipalities and twelve rural wells.

Van Wert County Ecoli Results

Ecoli Levels from streams leaving Van Wert County and Township wells.

Rainfall Data

Amount of rainfall recorded prior to sampling day, and monthly totals for each year.

A Grant from The Van Wert County Foundation

Municipal Pesticide Samples – 2009

| Location | Atrazine | Alachlor | Metolachlor | Metribuzin | Propachlor | Propazine | Simazine | Nitrates (ppm) |
|--------------|----------|----------|-------------|------------|------------|-----------|----------|----------------|
| Convoy | * | * | * | N/T | * | * | * | * |
| Delphos | 0.4 | * | * | N/T | * | * | * | 3.7 |
| Middle Point | * | * | * | N/T | * | * | * | * |
| Ohio City | * | * | * | N/T | * | * | * | * |
| Van Wert | * | * | * | N/T | * | * | * | 1.43 |
| Willshire | * | * | * | N/T | * | * | * | * |

Results in ppm

The 2009 samples had detectable levels of nitrates in the Delphos and Van Wert sample. However, this is the first time Delphos has had detectable levels of pesticides. Van Wert has always had detectable nitrates in it, and Delphos will probably start having them on a regular basis due to their source water now coming from the surface water and not deep wells. The concentration of nitrates present did not exceed the EPA's HAL of 10ppm.

Township Wells Pesticide Samples – 2009

| Location | Alachlor | Atrazine | Metolachlor | Metribuzin | Propachlor | Propazine | Simazine | Nitrates (ppm) |
|------------|----------|----------|-------------|------------|------------|-----------|----------|----------------|
| Union | * | * | * | N/T | * | * | * | .22 |
| Pleasant | * | * | * | N/T | 7.6 | * | * | * |
| Tully | * | * | * | N/T | * | * | * | * |
| Harrison | * | * | * | N/T | * | * | * | * |
| Willshire | * | * | * | N/T | * | * | * | * |
| Liberty | * | * | * | N/T | * | * | * | * |
| York | * | * | * | N/T | * | * | * | * |
| Jennings | * | * | * | N/T | * | * | * | .2 |
| Ridge | * | * | * | N/T | * | * | * | * |
| Washington | * | * | * | N/T | * | * | * | * |
| Jackson | * | * | * | N/T | * | * | * | * |
| Hoaglin | * | * | * | N/T | * | * | * | * |

Results in ppm

The samples collected in June 2009, contained no detectable levels of pesticides in the water.

Town Creek Pesticide Data 2009

| Location | Date | Alachlor | Acetochlor | Atrazine | Carbofuran | Cyanazine | Fluchloralin | Metolachlor | Metribuzin | Pendimethalin | Propachlor | Simazine | Trifluralin |
|----------|--------|----------|------------|----------|------------|-----------|--------------|-------------|------------|---------------|------------|----------|-------------|
| TC-1 | Jun-08 | * | * | * | * | * | * | * | * | * | * | * | * |
| TC-2 | Jun-08 | * | * | * | * | * | * | * | * | * | * | * | * |
| TC-3 | Jun-08 | * | * | * | * | * | * | * | * | * | * | * | * |
| TC-1 | Nov-08 | * | * | * | * | * | * | * | * | * | * | * | * |
| TC-2 | Nov-08 | * | * | * | * | * | * | * | * | * | * | * | * |
| TC-3 | Nov-08 | * | * | * | * | * | * | * | * | * | * | * | * |

Only pesticides detected throughout the study are included

- = Sample was below the detection limit
Sample results are in parts per million (ppm)

Comments:

2009 was the first year the Town Creek Pesticide samples in both June and November didn't have any detectable levels of pesticide in them.

Total Nitrogen and Phosphorus 2009

| | Nitrate (ppm) | | | | | Phosphate (ppm) | | | | |
|-----------|---------------|------|------|------|------|-----------------|------|------|------|------|
| Month | TC-1 | TC-2 | TC-3 | TC-4 | AVG. | TC-1 | TC-2 | TC-3 | TC-4 | AVG. |
| January | N/S | 8.83 | 6.58 | 6.79 | 7.40 | N/S | 0.18 | 0.20 | 0.19 | 0.19 |
| February | N/S | 3.59 | 7.77 | 6.27 | 5.88 | N/S | 0.1 | 0.46 | 0.33 | 0.30 |
| March | N/S | 9.01 | 7.06 | 6.6 | 7.56 | N/S | 0.12 | 0.16 | 0.15 | 0.14 |
| April | N/S | 3.73 | 6.28 | 3.68 | 4.56 | N/S | 0 | 0.20 | 0.00 | 0.07 |
| May | N/S | 8.7 | 7.16 | 6.78 | 7.55 | N/S | 0.27 | 0.21 | 0.26 | 0.25 |
| June | 2.89 | 3.02 | 6.55 | 2.69 | 3.79 | 0.10 | 0 | 0.24 | 0.30 | 0.18 |
| July | N/S | 6.54 | 6.63 | 0.05 | 4.41 | N/S | 0.1 | 0.30 | 0.15 | 0.18 |
| August | N/S | 0.05 | 7.26 | 0.22 | 2.51 | N/S | 0.15 | 0.27 | 0.31 | 0.24 |
| September | N/S | 0.21 | 8.09 | 2.44 | 3.58 | N/S | 0.1 | 0.15 | 0.10 | 0.12 |
| October | N/S | 0.05 | 9.87 | 3.04 | 4.3 | N/S | 0.94 | 0.45 | 1.22 | 0.87 |
| November | 11.1 | 3.78 | 4.28 | 3.07 | 1.8 | 0.36 | 0.24 | 0.25 | 3.07 | 0.89 |
| December | N/S | 0.2 | 3.41 | 2.83 | 2.15 | N/S | 0.1 | 0.50 | 0.26 | 0.29 |

Nitrogen = nitrates + nitrites

Phosphorus=Total Phosphorus

N/S=Not sampled

Shaded boxes indicate values that exceed EPA's HAL of 10ppm Nitrogen.

Comments:

Nitrogen concentrations were below average comparing to other years of the study. This might be the result of less rain in the later ½ of the 2009 crop year. In 2009 we didn't have any samples above the 10ppm.

Phosphorus concentrations throughout 2009 were about average compared to the last couple of years.

Town Creek E. Coli Test col/100ml

| | 1-Jun-02 | -Nov-02 | 3-Jun-03 | 3-Nov-03 | 1-Jun-04 | 1-Nov-04 | 1-Jun-05 | 1-Nov-05 | 1-Jun-06 | 1-Nov-06 | 1-Jun-07 | 1-Nov-07 | 1-Jun-08 | 1-Nov-08 | 1-Jun-09 | 1-Nov-09 | Average |
|-----------------|-------------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Location | E.Coli/col/100ml | | | | | | | | | | | | | | | | |
| TC1 | 390 | 630 | * | 300 | 2000 | 1920 | 4400 | 500 | 500 | 790 | 3800 | 0 | 1600 | 40 | 1200 | 940 | 1578.889 |
| TC2 | 290 | 0 | 400 | 140 | 2000 | 1760 | 3800 | 500 | 200 | 1110 | 1400 | 6 | 3240 | 6 | 980 | 740 | 937.5714 |
| TC3 | 660 | 2390 | 1000 | 308 | 6000 | 2840 | 5200 | 14000 | 1800 | 2040 | 1600 | 1 | 3140 | 40 | 600 | 230 | 2742.786 |
| TC4 | 230 | 20 | 200 | 90 | 4000 | 3000 | 5600 | 300 | 600 | 1080 | 1700 | 28 | 2080 | 40 | 320 | 232 | 1265.571 |

E.coli levels are hard to predict. The only factor that appears is that the E. coli levels are slightly higher downstream of Van Wert

Streams leaving Van Wert County (E.Coli Test)col/100ml

| | 1-Mar-06 | 3-Jun-06 | 3-Sep-06 | 1-Dec-06 | 1-Mar-07 | 3-Jun-07 | 3-Sep-07 | 1-Dec-07 | 3-Mar-08 | 3-Jun-08 | 3-Sep-08 | 1-Dec-08 | 1-Mar-09 | 3-Jun-09 | 3-Sep-09 | 1-Dec-09 |
|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Town Creek | 0 | 600 | 13300 | 2600 | 15700 | 1700 | 100 | 5600 | 5400 | 2080 | 282 | 250 | 1120 | 1200 | 30 | 102 |
| Maddox Creek | 200 | 400 | 13900 | 3300 | 6200 | 400 | 800 | 3560 | 1700 | 1800 | 46 | 354 | 346 | 220 | 72 | 1240 |
| Hoaglin Creek | 0 | 200 | 42400 | 800 | 2700 | 400 | 850 | 2400 | 960 | 1440 | 102 | 352 | 242 | 80 | 78 | 280 |
| Hagerman Creek | 400 | 200 | 39200 | 1500 | 1700 | 400 | 1500 | 1840 | 500 | 1520 | 48 | 334 | 362 | 5440 | no water | 2220 |
| Upper Prairie Creek | 400 | 600 | 8000 | 1300 | 2200 | 400 | 1900 | 1660 | 280 | 1680 | | 198 | 200 | 640 | 40 | 2460 |
| Middle Creek | 800 | 500 | 20600 | 1200 | 1600 | 500 | 1350 | 1300 | 1240 | 1560 | 260 | 516 | 282 | 300 | 126 | 700 |
| Blue Creek | 0 | 200 | 19400 | 1100 | 1500 | 1100 | 2000 | 4360 | 660 | 1140 | 1380 | 28 | 940 | 540 | 50 | 1260 |

The levels of E.coli are sporadic and somewhat inconsistent. They don't follow any weather related events.

| Location | Coliform 02 | Ecoli 02 | Coliform03 | Ecoli 03 | Coliform04 | Ecoli 04 | Coliform05 | Ecoli 05 | Coliform06 | Ecoli 06 | Coliform07 | Ecoli 07 | Coliform08 | Ecoli 08 | Coliform09 | Ecoli 09 | Year Dug | Depth | Casing |
|----------|-------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|----------|-------|------------|
| Harrison | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Present | Absent | Absent | Absent | N/A | N/A | N/A |
| Hoaglin | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Present | Absent | Absent | Absent | 1970's | 40' | Metal |
| Jackson | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 1987 | 52' | PVC |
| Jennings | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Present | Absent | Absent | Absent | 1979 | 38' | Metal |
| Liberty | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Present | Absent | Absent | Absent | 1974 | 108' | Metal |
| Pleasant | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 1975 | 140' | Metal |
| Ridge | Present | Absent | Absent | Absent | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Present | Absent | Absent | Absent | 1939 | 85' | Galvanized |

| Location | Coliform 02 | Ecoli 02 | Coliform03 | Ecoli 03 | Coliform04 | Ecoli 04 | Coliform05 | Ecoli 05 | Coliform06 | Ecoli 06 | Coliform07 | Ecoli 07 | Coliform08 | Ecoli 08 | Coliform 09 | Ecoli 09 | Year Dug | Depth | Casing |
|------------|-------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|-------------|----------|----------|-------|--------|
| Tully | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Present | Absent | Present | Absent | 1978 | 105' | Iron |
| Union | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Present | Absent | Absent | Absent | N/A | N/A | N/A |
| Washington | Present | Absent | Absent | Absent | Present | Absent | Absent | Absent | Present | Absent | Absent | Absent | Present | Absent | Absent | Absent | 1952 | 35' | Steel |
| Willshire | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 1979 | 88' | Steel |
| York | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Present | Absent | Absent | Absent | N/A | N/A | Steel |

Shaded boxes indicate values that Coliform was present.

The 2009 sample shows that no E.coli Bacteria were present in the wells during the June sample.

Total Rain Fall in inches

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Average |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| Jan. | 3.82 | 1.81 | 1.89 | 2.75 | 1.98 | 2.97 | 2.70 | 2.29 | 1.71 | 3.82 | 1.65 | 0.65 | 1.63 | 1.45 | 2.54 | 6.01 | 2.53 | 8.47 | 1.87 | 3.4 | 2.80 |
| Feb. | 6.40 | 0.94 | 1.20 | 1.60 | 0.70 | 0.75 | 0.36 | 3.70 | 1.53 | 1.94 | 1.45 | 2.18 | 2.51 | 2.42 | 0.41 | 1.07 | 2.24 | 0.8 | 3.57 | 2.95 | 1.94 |
| Mar. | 1.87 | 2.38 | 2.24 | 1.34 | 0.72 | 1.86 | 1.97 | 2.50 | 3.15 | 1.26 | 1.53 | 0.61 | 3.42 | 1.76 | 1.95 | 1.14 | 1.22 | 3.67 | 4.51 | 3.49 | 2.13 |
| Apr. | 1.89 | 3.87 | 4.09 | 5.21 | 4.43 | 4.70 | 4.37 | 0.78 | 5.03 | 5.11 | 1.51 | 3.43 | 3.71 | 2.07 | 0.64 | 3.26 | 2.62 | 4.36 | 3.41 | 5.56 | 3.50 |
| May | 5.28 | 3.94 | 2.53 | 3.04 | 1.77 | 4.24 | 5.21 | 4.58 | 3.23 | 2.13 | 4.98 | 5.78 | 5.56 | 8.18 | 5.69 | 1.31 | 4.2 | 1.18 | 5.1 | 3.15 | 4.05 |
| June | 3.47 | 0.12 | 2.09 | 8.68 | 5.27 | 4.95 | 4.65 | 3.79 | 7.56 | 3.64 | 9.23 | 2.61 | 2.4 | 4.55 | 5.54 | 2.91 | 2.81 | 0.85 | 6.66 | 3.14 | 4.25 |
| July | 8.95 | 2.87 | 6.79 | 5.65 | 4.39 | 2.19 | 8.30 | 8.33 | 4.28 | 3.19 | 1.86 | 3.65 | 3.03 | 8.81 | 9.45 | 3.04 | 5.95 | 1.14 | 3.33 | 2.24 | 4.87 |
| Aug. | 5.21 | 3.89 | 2.22 | 1.25 | 2.31 | 3.50 | 1.77 | 3.01 | 4.31 | 2.71 | 3.04 | 1.71 | 2.23 | 6.51 | 5.85 | 3.21 | 2.79 | 11.86 | 2.31 | 3.08 | 3.64 |
| Sept. | 3.28 | 1.66 | 1.66 | 4.11 | 0.62 | 0.43 | 2.42 | 5.53 | 0.80 | 1.59 | 5.32 | 6.29 | 2.77 | 4.79 | 2.31 | 5.06 | 2.46 | 2.75 | 2.35 | 1.58 | 2.89 |
| Oct. | 3.37 | 2.21 | 2.61 | 1.82 | 0.80 | 4.08 | 2.40 | 1.61 | 2.70 | 2.08 | 2.3 | 7.79 | 1.45 | 1.73 | 3.25 | 1.28 | 5.19 | 2.67 | 3.26 | 6.36 | 2.95 |
| Nov. | 2.31 | 1.05 | 5.51 | 4.13 | 3.56 | 2.63 | 5.56 | 2.74 | 1.89 | 1.25 | 1.9 | 7.76 | 2.91 | 2.99 | 3.66 | 3.19 | 1.65 | 3.85 | 2.44 | 1.37 | 3.12 |
| Dec. | 7.10 | 1.10 | 1.33 | 1.56 | 2.59 | 1.10 | 0.00 | 1.73 | 0.93 | 2.51 | 3.2 | 0.37 | 2.198 | 2.86 | 2.16 | 2.99 | 4.71 | 4.41 | 3.54 | 2.77 | 2.46 |
| Total | 52.95 | 25.84 | 34.16 | 41.14 | 29.14 | 33.40 | 39.71 | 40.59 | 37.12 | 31.23 | 37.97 | 42.83 | 33.82 | 48.12 | 43.45 | 34.47 | 38.37 | 46.01 | 42.35 | 29.21 | 38.59 |

Comments:

Rainfall data is reported because it may help explain pesticide and nutrient levels in town creek. High levels of precipitation can increase run-off and the amount of nitrogen, phosphorus and pesticides entering the stream.

Rainfall (inches) Recorded prior to Sampling

| 2009 | January | February | March | April | May | June | July | August | September | October | November | December |
|-----------------|----------------|-----------------|--------------|--------------|------------|-------------|-------------|---------------|------------------|----------------|-----------------|-----------------|
| 24 Hours | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.26 |
| 48 Hours | 0.00 | 0.00 | 0.00 | 0.04 | 0.38 | 0.10 | 0.00 | 0.00 | 0.00 | 0.28 | 0.84 | 0.00 |
| 72 Hours | 0.61 | 0.00 | 0.24 | 0.27 | 0.15 | 0.15 | 0.00 | 0.00 | 0.90 | 0.00 | 0.02 | 0.00 |
| 96 Hours | 0.18 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.02 | 0.04 | 0.16 |
| Totals | 0.79 | 0.15 | 0.24 | 0.31 | 0.71 | 0.25 | 0.00 | 0.11 | 0.90 | 0.30 | 0.90 | 0.42 |

Comments:

Rainfall data is reported because it may help explain pesticide and nutrient levels in town creek. High levels of precipitation can increase run-off and the amount of nitrogen, phosphorus and pesticides entering the stream.