

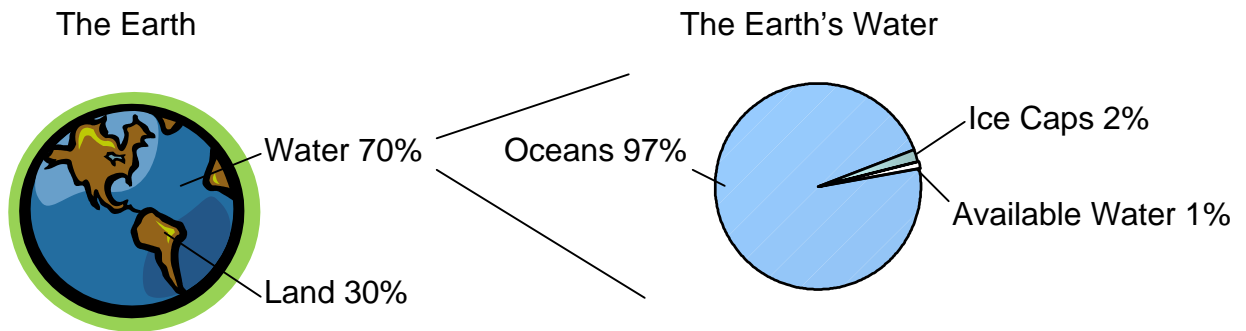
Did you know?

Your body is almost 70% water?

The earth we live on is over 70% water?

Less than 1% of the Earth's water is available for humans to drink?

It's true! Our bodies are mostly water, and we need 64 ounces of fresh water everyday. We would die without water. The same is true for most living things. That is why clean water is so important. Although the Earth has lots of water, most of it (97%) is in the oceans, which is not safe for humans to drink. Another 2% is frozen in the polar icecaps. That means only 1% of the Earth's water is available for humans, and cows, and dogs, and trees, and all living things.



New water is never created, it just gets recycled – a process known as the water cycle. The water you drink today will be used again and again for years to come. That is why it is important to keep the water clean and free of pollution.

There are many things you and your family can do to help protect the water. Here are just a few ideas:

- Properly dispose of household wastes
- Reduce consumption of water
- Recycle to reduce the volume of trash that ends up in landfills - a source of contamination
- Reduce fertilizer and pesticide use on lawns
- Limit the use of toxic products. Keep them away from storm sewers, lakes and streams, and never dump them onto the ground
- Homeowners should have their septic systems checked regularly to be sure it is functioning properly, since this can be a source of harmful nutrients and bacteria.

This booklet talks about a water quality study in Van Wert County, Ohio. Read on for more information!

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QUESTIONS AND ANSWERS ABOUT THE WATER QUALITY STUDY – INTRODUCTION

Who is responsible for the water quality study?

This study was initiated by the County Foundation following some concerns about pesticides in drinking water. The Foundation approached the Soil and Water Conservation District (SWCD) and a partnership was formed, where the Foundation provides funds for the study and the SWCD is responsible for collection, data summary, reporting and presenting the information.

When did the study begin?

The study was initiated in June of 1989. It has been a learning process for all involved and some things were changed following the initial sampling rounds. In January of 1990 nutrient monitoring was added to the study and the sampling procedure has remained the same since that time. This booklet focuses on the data collected from 1990 to 1999. Information from 1989 is included in the Appendix, but not included in the tables and charts throughout the book.

What is Van Wert County like?

Van Wert County is located in northwest Ohio, extending 21 miles in a north-south direction and 24 miles in an east-west direction, encompassing 409 square miles (261,760 acres). Van Wert County is home to 30,278 people, of which about 11,000 reside within the city of Van Wert.

The residents and industries in the city of Van Wert use 1.4-2.0 million gallons of water of which originates from Town Creek. The water is pumped from Town Creek into two embankment reservoirs. The reservoirs are located at the south edge of the city, just east 127. The north reservoir was constructed in 1949 and has a capacity of 380 million gallons, south reservoir was constructed in 1964 and has a capacity of 400 million gallons.



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Town Creek has a watershed of approximately 52.6 square miles within Van Wert County. It starts in the southwest part of Van Wert County and flows into Paulding County where it soon joins Maddox Creek to form Middle Branch Creek -- a tributary to the Little Auglaize River. Eventually this water flows into Lake Erie.

Land use in Van Wert County is primarily agriculture. Ninety five percent of the land is in agriculture and other open areas, 3% is in forest, and 1% is in urban developments. Typical agriculture management is cash grain farming with a corn-soybean rotation. Little livestock is found in the county.

The soils in Van Wert County originate from Wisconsin Age glacial material. The area north of Lincoln Highway is part of a glacial lakebed. These soils are high in clay, poorly drained and nearly level to depressional. A narrow beach ridge with sandier soils runs along the south edge of the lake deposits, coinciding with the location of Lincoln Highway. Areas south of Lincoln Highway are a bit more sloping, high in clay, and like the rest of the county require artificial drainage to increase crop yields.

In 1949 a project was undertaken to reduce flooding potential in Van Wert County. The streams within the Little Auglaize River Watershed were reconstructed (widened, deepened, and straightened) to increase capacity and flow of water. Mitigation efforts included placing rock dams at ¼ mile intervals and preserving a few oxbows. Town Creek was part of this project, with construction of the entire Little Auglaize River Watershed completed in 1998.

What is being tested for? Why?



This study focuses on nitrogen (nitrates), phosphorus and pesticides. Nitrogen and phosphorus occur naturally in the environment, but human activities (fertilization of crops and lawns, disposal of human and animal waste) can cause elevated levels. High nitrate levels can interfere with the body's use of oxygen, a condition known as blue baby syndrome. Young children and pregnant women are especially sensitive to high nitrate levels. Phosphorus is required for plant growth and is usually in short supply in lakes and streams in the Midwestern United States. Addition of phosphorus to water can cause excess algae growth or blooms. Although algae is not a serious problem, the decomposition of algae consumes the oxygen essential for fish. If too much phosphorus is added to a stream or lake it may result in a fish kill.

There are many different kinds of pesticides that may be used to control weeds or insects. Pesticides are used in both rural and urban areas. Farmers may use these chemicals to control weeds or insects in their crops, while people living in the city use similar chemicals in their gardens and lawns. Every chemical is tested for potential health effects prior to its sale, and some pesticides have been associated with cancer or birth defects in laboratory studies. From this information the Environmental Protection Agency (EPA) may establish a health advisory level (HAL). The HAL is a concentration that does not pose a direct threat to human health, and includes a margin of safety. Not all chemicals have a HAL, and many of the current levels are under review. The EPA may also establish a maximum contaminant level (MCL). This is the maximum permissible level of a contaminant in water that is delivered to the public. Contaminant levels found in the County's drinking water supplies (municipalities and wells) are compared to the MCL.

Where do these pollutants come from?

Today most of the pollution entering water sources is non-point, or from an indefinable source. For example, nitrogen is widely used in agriculture and may be present in runoff and tile leachate. A specific source of nitrogen loading may be impossible to locate, therefore it is called a non-point source pollutant (NPSP). Phosphorus is another nutrient that enters the water via runoff and classified as a NPSP. Pesticides may enter the water via runoff and leaching, or by improper application and disposal.

Urban areas can also be a significant source of nutrient and pesticide enrichment. Homeowners in these areas can reduce the potential for water quality impairment by decreasing the amount of fertilizers and pesticides applied to lawns. Proper disposal methods for hazardous materials should always be used to avoid contamination of local water resources.

Pollutants also come from human and animal waste. Most cities have a wastewater treatment plant to treat the water before it goes back into a stream. If this is not designed correctly or not working properly it can be a source of harmful pollution. Rural homeowners often have a septic system to treat their waste. Unfortunately, the soils in Van Wert County are not suited for septic systems and most do not function correctly. Agencies and government in Van Wert County are currently addressing this issue.

Are nutrients and pesticides the primary polluters of surface water?

Although this study focuses on nutrient and pesticides in water, the biggest threat to water quality in this nation is sediment. Erosion from agricultural fields and urban construction sites sends soil particles into local rivers and streams. The particles make the water cloudy, can suffocate fish, and carry other pollutants like nutrients and pesticides with them. Other threats to water quality in Ohio include pathogens, organic enrichment, metals, salinity, and habitat and flow alteration.



What is the objective of this study?

The first objective is to obtain information on the quality of surface water in Van Wert County. This is done by monitoring nitrogen and phosphorus levels in Town Creek each month. Town Creek is also tested twice yearly (June and November) for approximately 27 pesticides.

The second objective is to obtain information on the quality of drinking (ground) water in Van Wert County. Once each year (June), one well in each township is tested for nitrates and five pesticides. Samples from six municipalities (Convoy, Delphos, Middle Point, Ohio City, Van Wert and Willshire) are also tested for nitrates and five pesticides at this time.

How the study is conducted:

- See the map on the next page for sampling locations.
- Samples are collected by District personnel and analyzed by A&L Great Lakes Laboratories in Fort Wayne, Indiana.
- Nitrate and phosphorus analyses are conducted on three samples from Town Creek (at locations TC2, TC3, TC4) every month.
- Pesticide screening (MR1)* is performed on three sites of Town Creek (TC1, TC2, TC3) in June and November.
- Pesticide (HS1)** and nitrate screening of township wells and municipalities are done in June.

*MR1 pesticides: (brand names are given in parentheses)

Alachlor (Lasso)	Metribuzin (Lexone/Sencore)	Carbofuran (Furadan)
Acetochlor (Harness)	Pebulate	Ethyl Chlorpyrifos
Atrazine	Pebulate	Diazinon
Butylate (Sutan)	Pendimethalin (Prowl)	Ethyl Parathion
Clomazone (Command)	Prometon (Pramitol)	Fonofos (Dyfonate)
Cyanazine (Bladex)	Propachlor	Isofenphos
EPTC (Eptam)	Propazine	Malathion
Ethalfuralin (Sonolan)	Simazine (Princep)	Methyl Parathion
Fluchloralin	Trifluralin (Treflan)	Terbufos (Counter)
Metolachlor (Dual)	Vernolate	

**HS1 herbicides

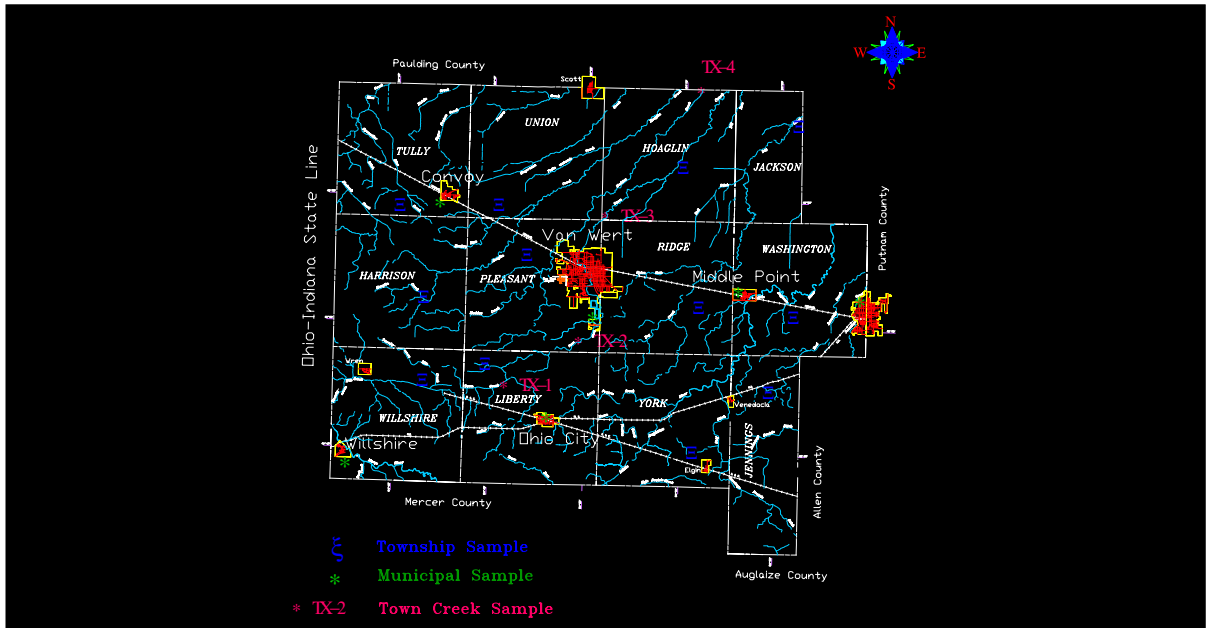
Alachlor (Lasso)	Metolachlor (Dual)	Propazine
Atrazine	Propachlor	Simazine (Princep)

More information on these chemicals can be found in the Appendix.

A note about the sampling procedure

Chemical analysis on grab samples defines the water quality at the instant the water sample is taken. Because water systems are very dynamic, grab samples do not provide a good indication of overall water quality. Composite or flow weighted samples could overcome this problem, however equipment and analysis costs would increase beyond the scope of this study. This shortcoming may be compensated for by the extended period of the study – the longer monitoring continues, the more validity the data will have.

Another way to check the data is to correlate the chemical information to a stream’s biological indicators. Macroinvertebrate and fish assessments can provide a better picture of overall stream quality. Biological monitoring began in the fall of 1999 and information describing this process is found in the educational outreach section of this booklet.





QUESTIONS AND ANSWERS ABOUT THE WATER QUALITY STUDY – DATA PRESENTATION AND WAYS TO HELP

How is the information presented?

The data are presented in tables and graphs on the following pages. The numbers represent a concentration. Some common ways to express concentration include units like parts per million (ppm) and parts per billion (ppb). These values are hard to imagine, so to illustrate consider a bag of 1 million marbles. If there were 10 red marbles in this bag, then that would equal 10 ppm red marbles. One ppm is also equal to 1 minute in 2 years. Parts per billion is similar except the quantity reported is out of 1 billion total units. Eleven square feet (about the size of a bathtub) in Van Wert County is equal to 1 ppb since there is approximately 11 billion square feet in the county. There is even a parts per trillion – this equals 1 square foot in the state of Indiana.

How is this information being used?

The information is sort of an insurance policy so the people of Van Wert County know the water is safe. It may also be used as background data should any problems be detected in the future. Quarterly reports are submitted to local newspapers, and regular updates have been given on the radio. This booklet is another way to distribute the information gathered. Local schools have each received a copy, as well as many local government offices. Additional copies may be obtained from the Soil and Water Conservation District. It is hoped that the residents of Van Wert are made aware of the water quality issue and the work being done to ensure clean water into the future.

What can be done to reduce pollution of local waters?

Conservation tillage, waterways, cover crops and filter strips can be used in the field to reduce pollution potential. Implementing a filter strip between the edge of the field and the stream will catch most of the sediment and decrease the potential for nutrients and pesticides entering the water. Sediment barriers near construction sites will function the same way.

****In 1999 approximately 24% of the corn and 77% of the soybeans were planted using conservation tillage (having >30% residue cover). Over 53 miles of waterways have been constructed in Van Wert County, and filter strips continue to be implemented along streams and ditches.**

Another way the agriculture industry has changed to protect the water is the development of low volume pesticides. Many of the new chemicals have directions to use a couple ounces per acre (compare this with a quart per acre some older chemicals). This means that less chemical is being applied to the with less likelihood to end up in the water. Many of these chemicals break down very quickly, further decreasing the potential for contamination.



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Homeowners need to be aware of potential septic system failures. Due to local soil conditions, the majority of systems fail within the first two years of operation. This results in harmful nutrients and bacteria entering local waters. A properly designed system, regular pumping and periodic inspections to ensure functioning are ways to prevent contamination.

Where can I learn more information about water quality?

If you have any questions about the water quality study, you can contact the Soil and Water Conservation District. They can help explain the information in this book and assist you in your efforts to protect your water.



Dollars and Cents

ANNUAL MATERIAL AND LAB COSTS

TOWN CREEK

Monthly Nitrate analyses	36 @ \$13.50 each	\$ 486.00
Monthly Phosphorus analyses	36 @ \$13.50 each	\$ 486.00
Biannual MRI	6 @ \$200.00 each	\$1200.00
Biannual Nitrate at TC1	2 @ \$13.50 each	\$ 27.00
Biannual Phosphorus at TC1	2 @ \$13.50 each	\$ 27.00
Town Creek Subtotal		\$2226.00

TOWNSHIP WELLS

Annual HS1	12 @ \$75.00 each	\$ 900.00
Annual Nitrate analyses	12 @ \$13.50 each	\$ 162.00
Township Wells subtotal		\$1062.00

MUNICIPALITIES

Annual HS1	6 @ \$200.00 each	\$1200.00
Annual Nitrate analyses	6 @ \$13.50 each	\$ 81.00
Municipalities subtotal		\$1281.00

SUPPLIES

Glass bottles for pesticide screens	24 @ \$2.00 each	\$ 48.00
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TOTAL ANNUAL MATERIALS AND LAB FEES **\$4617.00**

ANNUAL ADMINISTRATIVE COSTS

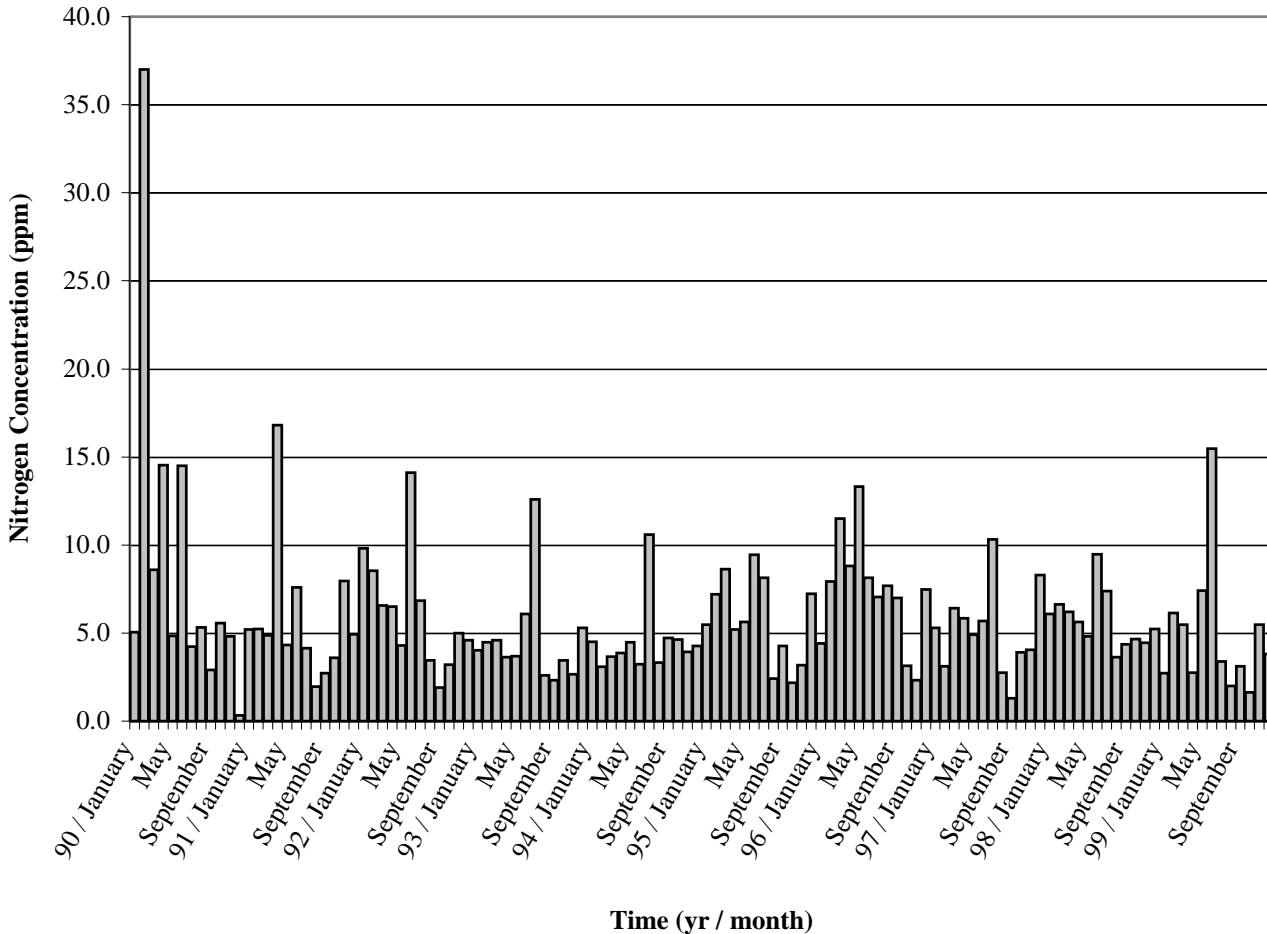
Sample collection and transport	\$ 830.00
Data Compilation	\$ 400.00
TOTAL ANNUAL ADMINISTRATIVE COST	\$1230.00

OVERALL ANNUAL COST OF THE STUDY **\$5847.00**

County Foundation funding	\$4000.00
Cost incurred by the SWCD	\$1847.00

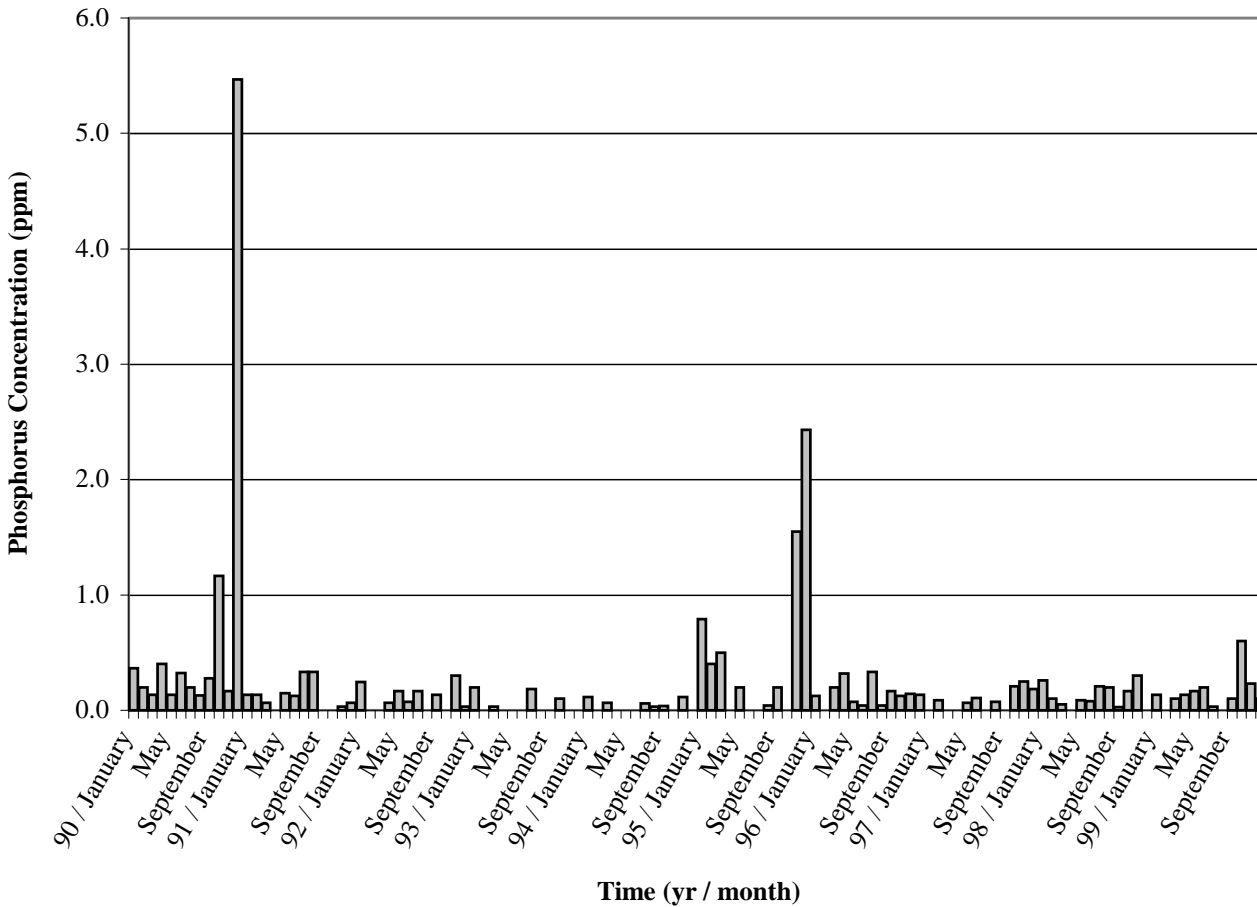
TOWN CREEK - NUTRIENT DATA

This graph shows the average nitrogen (nitrate plus nitrite) concentration for each sampling period. (Raw data for this graph is presented in the Appendix.) The values for nitrogen vary from near zero to greater than 35. It is unclear why the 1990 February value is so high relative to the other readings. This value could be considered an outlier, and not a good indication of overall water quality. The EPA HAL for nitrates is 10ppm. Occasionally the concentration of nitrates in Town Creek exceeds this value, most often in June or July.



When analyzing the nitrogen data at the three sites sampled monthly, the highest concentrations occurred at TC3 – the site located downstream from the city of Van Wert. Urban areas can be significant contributors of pollution, with Waste Water Treatment Plants being a source of excess nutrients. Problems with poorly designed / maintained treatment plants often exacerbate pollution problems. See the Nutrient Data Table in the Appendix for specific nutrient concentrations.

This graph shows the average phosphorus (ortho-phosphorus) concentration for each sampling period. (Raw data for this graph is presented in the Appendix.) Phosphorus concentrations remain relatively low, with the exception of a few readings exceeding 1.0ppm. Although there is no HAL for phosphorus, excess algae growth is likely to occur at concentrations greater than 1.0ppm. The December 1990 value is not consistent with the other data, and may not be a good indication of water quality.



When analyzing the phosphorus data at the three sites sampled monthly, the highest concentrations occurred at TC3 – the site located downstream from the city of Van Wert. Urban areas can be significant contributors of pollution, with Waste Water Treatment Plants being a source of excess nutrients. Problems with poorly designed / maintained treatment plants often exacerbate pollution problems. See the Nutrient Data Table in the Appendix for specific nutrient concentrations.

This table shows the overall average nitrogen (nitrate plus nitrite) and phosphorus (ortho-phosphorus) concentration by month. The values were obtained by averaging all sample results acquired from 1990 to 1999. When the concentration was below the detection limit, a value of zero was used.

Month	Average Nitrogen Concentration (ppm)	Average Phosphorus Concentration (ppm)
January	5.3	0.3
February	8.9 *	0.1
March	6.7	0.1
April	7.4	0.1
May	5.8	0.1
June	9.4	0.1
July	7.5	0.2
August	3.5	0.1
September	3.5	0.1
October	3.6	0.2
November	4.4	0.3
December	5.1	0.9 *

* See discussion of values below.

The average nitrogen value for the month of February is significantly influenced by a 1990 concentration of 37ppm. When this value is removed, the average nitrogen concentration in February is 5.8ppm. Of the remaining months, nitrogen concentrations were greatest in Spring and early Summer (March – July). This may be explained by crop management and rainfall patterns at this time of year. Fertilization of agricultural crops is done mostly in the spring (April and May). These fertilizers may enter the water through surface runoff or tile leachate. Additionally, intense rainstorms tend to occur early in the growing season when crop cover is limited, increasing the chance of surface runoff and erosion

The average phosphorus value for the month of December is influenced by a 1990 concentration of 5.5ppm. When this value is removed, the average phosphorus concentration in December is 0.4ppm. The winter months (November – January) exhibit the highest phosphorus concentrations. The biggest limitation to the nutrient monitoring portion of this study is the testing for ortho-phosphorus rather than total phosphorus. Ortho-phosphorus is only a portion of the total phosphorus, and is influenced by biotic activity. Less biotic activity during the Winter months may explain the higher values. During the last 6 months of 1999 a comparative study was done between ortho-phosphorus and total phosphorus values at TC2 and TC3. We found that total phosphorus concentration was approximately two times greater than ortho-phosphorus concentration, indicating that something (algae or bacteria) was influencing the phosphorus concentrations between sampling and analysis. To avoid this problem in the future, all samples will be tested for total phosphorus.

To determine the effect rainfall had on nutrient concentration, the amount of rain received 96 hours before sampling was recorded (see the Appendix for rainfall amounts). This value was compared to the nutrient concentrations. High amounts of rain did not always correlate to higher nitrogen and phosphorus concentrations. This may be due to the sampling technique, as grab samples determine the condition of the stream *only* at the instant the sample is collected. Rainfall received more than 96 hours before collecting the sample, soil moisture and soil conditions could all influence nutrient concentrations.

TOWN CREEK – PESTICIDE DATA

Twice a year Town Creek is analyzed for nearly 30 different pesticides. Samples taken in June consistently have one or more pesticides present, while the November samples generally do not have pesticides above detectable levels. Like the nutrient concentrations, this may be explained by the management and rainfall patterns at this time of year.

The table below shows the years and locations that each pesticide was detected (note that 17 of the 28 pesticides have not been detected throughout this study). The graph on the following page displays the June concentrations for the eleven pesticides detected. For ease of reading the graph, November data and the pesticides never detected have been omitted. See the table in the Appendix for specific concentrations.

Pesticide	June Sampling			November Sampling		
	TC1	TC2	TC3	TC1	TC2	TC3
Alachlor	90-92, 94, 97	90, 91, 93, 97	90-92, 97, 98			
Atrazine	90-99	90-99	90-99	91	91, 95	91, 95-97
Carbofuran			98			
Chlorpyrifos		90	91	91	91	91
Cyanazine	90-99	90-99	90-99	95		93, 97
Metolachlor	90-94, 97-99	90-99	90, 91, 94-99	93		
Metribuzin	90, 97, 99	90, 91, 97-99	90-92, 97-99			96
Pendimethalin		90				
Simazine	97-99	97, 99	97, 99			
Terbufos	99					
Acetochlor	99		98, 99			

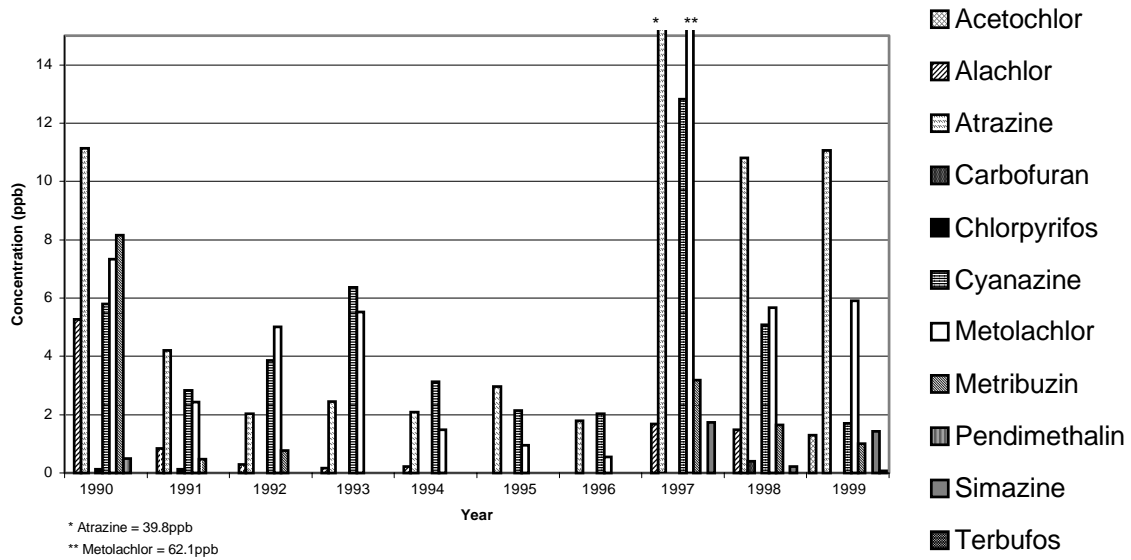
Note: Butylate, Clomazone, Diazinon, EPTC, Ethalfluralin, Ethyl Parathion, Fluchloralin, Fonofos, Isofenphos, Malathion, Methyl Parathion, Pebulate, Propachlor, Propazine, Prometon, Trifluralin and Vernolate have not been detected through this study.

As shown in the table Atrazine, Alachlor, Cyanazine, Metolachlor and Metribuzin are the most commonly detected pesticides. Atrazine, Cyanazine and Metolachlor have been present in at least one of the June samples every year.

The samples collected in 1997 exhibited higher than usual concentrations. Unlike the nutrient concentrations, a correlation did exist between rainfall 96 hours before sampling and the pesticide concentrations detected in the samples. Over two inches of rain was received before sampling in 1997. The large amount of rain may have increased runoff, carrying pesticides to Town Creek.

Although pesticides have commonly been detected in Town Creek, levels have not exceeded the HALs in the samples analyzed. Perhaps this is a good time to point out that although Town Creek serves as the source of water for Van Wert, no one is (or should be) drinking the water directly from Town Creek. The water goes through a mixing and processing period before it is sent to residential areas. This study also tests the processed water in Van Wert and other municipalities in the county. Continue reading for more details.

**Pesticide Concentrations in Town Creek (ave.)
1990-1999**



MUNICIPAL WATER SUPPLIES

As stated earlier, Town Creek serves as the source of drinking water for Van Wert. The drinking water sources for Convoy, Delphos, Middle Point, and Ohio City are wells. The village of Willshire relied on surface water until 1998 when they switched to groundwater through wells. Every year in June, samples are collected from these municipalities and tested for Nitrates, Atrazine, Alachlor, Metolachlor, Propachlor, Propazine and Simazine.

The tables that follow are arranged by municipality. The value given for pesticide concentrations is in parts per billion and nitrate concentration is in parts per million. N/T indicates that the sample was not analyzed for the compound. A * means that pesticides and nitrates were not present at detectable levels.

Convoy	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	0.5	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	1.17	1.24	*	*	*	*	*	0.44
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations in Convoy's water supply from 1990 to 1999. Samples were collected in June. 1996 displayed higher concentrations, with nitrates, Atrazine and Alachlor detected.

Delphos	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	0.8	*	*	*	*	*	0.5
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations in Delphos' water supply from 1990 to 1999. Samples were collected in June. Concentrations have exceeded detectable levels only in 1996, with small amounts of nitrates and Alachlor present.

Middle Point	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.5
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations in Middle Point's water supply from 1990 to 1999. Samples were collected in June. Concentrations exceeded detectable levels only in 1996, with a small amount of nitrates detected.

Ohio City	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	4.5
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	0.38	*	*	*	*	*	*	5.32
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations in Ohio City's water supply from 1990 to 1999. Samples were collected in June. Nitrates were found in 1992 and 1996, but not at levels exceeding the HAL. A small amount of Atrazine was also detected in 1996.

Van Wert	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	0.6	*	*	*	N/T	N/T	*	4.8
1991	0.2	*	*	*	N/T	N/T	*	1.2
1992	*	N/T	N/T	*	N/T	N/T	*	4.2
1993	1.21	N/T	N/T	*	N/T	N/T	*	1.0
1994	1.43	N/T	N/T	*	N/T	N/T	*	2.1
1995	0.43	*	*	*	*	*	*	5.0
1996	*	*	*	*	*	*	*	0.5
1997	1.9	*	1.46	N/T	*	*	*	3.2
1998	0.58	*	*	N/T	*	*	*	2.4
1999	0.73	*	*	N/T	*	*	*	3.9

This table includes pesticide and nitrate concentrations in Van Wert's water supply from 1990 to 1999. Samples were collected in June. Atrazine and nitrate levels regularly exceeded the detectable levels, but have not exceeded the MCL (3.0ppb for Atrazine and 10.0ppm for Nitrates). The increased levels of Atrazine and nitrates in Van Wert's water may be explained by the source of the water, as surface waters tend to be more susceptible to contamination when compared to groundwater sources.

Willshire	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	1.3	*	*	*	N/T	N/T	*	0.7
1991	0.4	*	*	*	N/T	N/T	*	0.2
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	1.03	N/T	N/T	*	N/T	N/T	*	0.3
1994	0.71	N/T	N/T	*	N/T	N/T	*	*
1995	1.54	*	0.86	*	*	*	*	*
1996	0.39	*	*	*	*	*	*	0.49
1997	1.63	0.68	1.41	N/T	*	*	*	1.3
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations in Willshire's water supply from 1990 to 1999. Samples were collected in June. Atrazine and nitrate levels regularly exceeded the detectable levels from 1990 to 1997. Alachlor and Metolachlor have also been detected. None of the pesticides present exceeded the MCL. Detectable levels were not found in 1998 and 1999, reflecting the switch from surface water to groundwater.

Municipality Summary

Each municipality tested in 1996 had some level of nitrates present. 0.85 inches of rain was received 96 hours before sampling, perhaps introducing nitrates into municipal water supplies. Additionally, the spring of 1996 was relatively wet, with April and May receiving 4.37 and 5.21 inches respectively. Nitrates are subject to leaching, with large amounts of rainfall increasing the leaching potential.

It is also possible that the small nitrate concentrations detected in 1996 are due to laboratory or sampling error. With the exception of Ohio city (concentration of 5.32ppm), all samples had a nitrate concentration between 0.44 and 0.50ppm. Whether these concentrations are true or due to an error, the values are small and not a real

concern.

The drinking water made available to county residents through the municipalities tested is safe for consumption by all people. Levels have not exceeded the MCL. Water treatment plants throughout the country take considerable measures to ensure the safety of drinking waters, complying with all EPA regulations.

TOWNSHIP WELLS

In rural areas across the country, wells often serve as the source of drinking water. Wells pump ground water from beneath the surface, making it available to people and livestock. Groundwater usually originates as rainfall that has flowed through the soil into an underground aquifer. Most soils have an inherent ability to filter out any contaminants that may be in the water. However, groundwater is vulnerable to contamination through improper management (handling, application and disposal) of pesticides and nutrients. To assess the quality of groundwater in Van Wert County, one well in each of the twelve townships was tested for nitrates and five pesticides each June.

The following charts are organized by township. The value given for pesticide concentrations is in parts per billion and nitrate concentration is parts per million. N/T indicates that the sample was not analyzed for the compound. A * means that pesticides and nitrates were not present at detectable levels. Italicized values indicate concentrations exceeding the MCL - the maximum permissible level of a contaminant in water that is delivered to any user of a public water system (established by the EPA). Township wells exceeding the MCL should be more of a safety concern than a regulatory concern, as none of the wells tested in this portion of the study are for a public water supply.

Harrison	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.51
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Harrison Township. Samples were collected in June of each year from 1990 to 1999. The only detectable level occurred in 1996, with a small amount of nitrates present. The MCL for nitrates is 10ppm.

Hoaglin	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	0.6
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.5
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Hoaglin Township. Samples were collected in June of each year from 1990 to 1999. The only detectable levels occurred in 1991 and 1996, with small amounts of nitrates present. The MCL for nitrates is 10ppm.

Jackson	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.5
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Jackson Township. Samples were collected in June of each year from 1990 to 1999. The only detectable level occurred in 1996, with a small amount of nitrates present. The MCL for nitrates is 10ppm.

Jennings	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	0.3
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.51
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Jennings Township. Samples were collected in June of each year from 1990 to 1999. The only detectable levels occurred in 1993 and 1996, with small amounts of nitrates present. The MCL for nitrates is 10ppm.

Liberty	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	0.2
1993	*	N/T	N/T	*	N/T	N/T	*	0.3
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.52
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Liberty Township. Samples were collected in June of each year from 1990 to 1999. The only detectable levels occurred in 1992, 1993 and 1996, with small amounts of nitrates present. The MCL for nitrates is 10ppm.

Pleasant	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.52
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Pleasant Township. Samples were collected in June of each year from 1990 to 1999. The only detectable level occurred in 1996, with a small amount of nitrates present. The MCL for nitrates is 10ppm.

Ridge	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.51
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	0.21

This table includes pesticide and nitrate concentrations for a well located in Ridge Township. Samples were collected in June of each year from 1990 to 1999. The only detectable levels occurred in 1996 and 1999, with small amounts of nitrates present. The MCL for nitrates is 10ppm.

Tully	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	1.3	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.52
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Tully Township. Samples were collected in June of each year from 1990 to 1999. Alachlor was detected in 1990 and nitrates were detected in 1996. The MCL for Alachlor is 2ppb and the MCL for nitrates is 10ppm.

Union	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.73
1997	*	*	*	N/T	*	*	*	3.0
1998	*	*	*	N/T	*	*	*	*
1999	3.11	*	*	N/T	*	*	1.85	*

This table includes pesticide and nitrate concentrations for a well located in Union Township. Samples were collected in June of each year from 1990 to 1999. Nitrates were detected in 1996 and 1997. The MCL for nitrates is 10ppm. The 1999 sample had detectable levels of Atrazine and Simazine. The Atrazine concentration of 3.11ppb exceeds the MCL (3.0ppb), but does not exceed the HAL of 200ppb. The MCL for Simazine is 4ppb, while the HAL for Simazine is 70ppb.

Washington	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	0.4	N/T	N/T	*	0.1
1991	*	*	*	*	N/T	N/T	*	0.3
1992	*	N/T	N/T	*	N/T	N/T	*	*

1993	*	N/T	N/T	*	N/T	N/T	*	0.5
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	0.45	7.35	*	*	*	*	*	0.49
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Washington Township. Samples were collected in June of each year from 1990 to 1999. Nitrates were detected in 1990, 1991, 1993 and 1996. The MCL for nitrates is 10ppm. The 1996 sample also had detectable levels of Atrazine and Alachlor. The Atrazine concentration at 0.45ppb does not exceed the MCL of 3ppb. The Alachlor concentration of 7.35ppb exceeds the MCL of 2ppb, but does not exceed the HAL of 10ppb.

Willshire	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	0.1
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	*
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.51
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in Willshire Township. Samples were collected in June of each year from 1990 to 1999. The only detectable levels occurred in 1990 and 1996, with small amounts of nitrates present. The MCL for nitrates is 10ppm.

York	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
1990	*	*	*	*	N/T	N/T	*	*
1991	*	*	*	*	N/T	N/T	*	*
1992	*	N/T	N/T	*	N/T	N/T	*	0.1
1993	*	N/T	N/T	*	N/T	N/T	*	*
1994	*	N/T	N/T	*	N/T	N/T	*	*
1995	*	*	*	*	*	*	*	*
1996	*	*	*	*	*	*	*	0.51
1997	*	*	*	N/T	*	*	*	*
1998	*	*	*	N/T	*	*	*	*
1999	*	*	*	N/T	*	*	*	*

This table includes pesticide and nitrate concentrations for a well located in York Township. Samples were collected in June of each year from 1990 to 1999. The only detectable levels occurred in 1992 and 1996, with small amounts of nitrates present. The MCL for nitrates is 10ppm.

Township Well Summary

Overall, the water coming from the wells tested is safe for consumption. A few samples tested had levels that may be of concern, but levels exceeding the HALs were not present. Additionally, problems did not persist from one sampling year to the next.

Each township well tested in 1996 had some level of nitrates present. 0.85 inches of rain was received 96 hours before sampling, perhaps causing nitrate movement to local wells. Additionally, the spring of 1996 was relatively wet, with April and May receiving 4.37 and 5.21 inches respectively. Nitrates are subject to leaching, with large amounts of rainfall increasing the leaching potential.

It is also possible that the small nitrate concentrations detected in 1996 are due to laboratory or sampling error. With the exception of Union Township (concentration of 0.73ppm), all samples had a nitrate concentration between 0.49 and 0.52ppm. Whether these concentrations are true or due to an error, the values are small and not a real concern.

As mentioned earlier the soils in Van Wert County have a large capacity to filter out contaminants like pesticides, contributing to the low number of detectable levels in most wells. However, heavy use and improper storage, application and disposal can contribute to groundwater contamination. Care should always be used when working with these chemicals.

EDUCATIONAL OUTREACH

In April of 1999, a grant was received from the Ohio Department of Natural Resources – Division of Soil and Water Conservation. The money was used to expand the current water quality study to include some educational activities with local school groups. Chemical and biological monitoring activities began in the fall.

Presentations on non-point source pollution and watershed basics were given to local schools. Hands-on exercises related to watersheds were included in this preliminary training. Later the students got their feet wet as they learned first-hand about water quality.



Lincolnview High School students identify macroinvertebrates collected from Town Creek with the help of science teacher Dave Mathew.

Sampling was conducted approximately once a month throughout the fall semester on Town Creek in the Willow Bend Golf Course. The students tested the water for pH, dissolved oxygen, nitrates, phosphates, and turbidity using a simple test kit from LaMotte. Macroinvertebrates (mostly aquatic insects and worms) were sampled using the kick-seine method.

Following identification, the macroinvertebrates were grouped according to their sensitivity to pollution. A general statement about the quality of Town Creek was made using this information.

The data collected by the students are presented on the following tables. Note that the macroinvertebrates are divided into three taxa according to their pollution tolerance. Group 1 is least tolerant and Group 3 is most tolerant. The number of different species in each taxa is multiplied by a weighting factor because the presence of Group 1 is more favorable than the presence of Group 3 species.

in the county are abundant, but also susceptible to contamination. Steps should be taken to reduce levels of pesticides and nutrients entering local water resources.

Both rural and urban people have the opportunity to improve water quality. Here are a few things everyone can do:

- Properly dispose of household wastes – keep them away from storm sewers, lakes and streams, and never dump them onto the ground.
- Sweep (do not wash) fertilizer and soil off driveways and sidewalks. Any debris remaining on paved areas will quickly be washed into the nearest storm sewer during the next rainfall.
- Minimize the use of de-icing materials on sidewalks and driveways, and encourage your city and county to practice responsible use of salt on roads.
- Recycle – this reduces the volume of trash, which ends up in landfills - a source of contamination.
- Test your soil in your garden or lawn, then apply only the needed amount of fertilizer. This will save you money and reduce the risk of nutrients entering streams.
- Limit the use of toxic products around your house. Did you know that vinegar, baking soda, lemon juice and salt can take the place of many expensive and dangerous cleaners?
- Think about your waste! Most (~80%) septic systems stop working within the first year of operation. Septic systems can be a source of harmful nutrients and bacteria, so if you own one, check it regularly to be sure it is functioning properly.

Perhaps education is the most important step to reach current water quality goals. Incorporating more water related activities into classroom curriculum will lead to more educated and environmentally aware adults. Efforts by the Soil and Water Conservation District will continue to focus on water quality, through education, and technical assistance for local landowners to implement conservation practices.

Because there will always be the need for safe water, monitoring efforts will continue across the country. Plans are for this study to continue monitoring the water quality in Van Wert County. Perhaps expanded efforts to include more in-depth monitoring are on the horizon.

The next big challenge related to Water Quality in Van Wert County is improving the treatment of household sewage. For although the soils of Van Wert County are excellent for growing crops and filtering out contaminants before they reach the groundwater, the soils are not suited for treating sewage with a traditional septic system – soil absorption field. Current designs often fail within the first year of operation, sending untreated sewage into our streams. This is one area that will require more attention in the future.

Appendices

Chemical (Product Name)	MCL *	EPA/HAL ** (ppb unless noted)	Detecti on Limit	Category / Use
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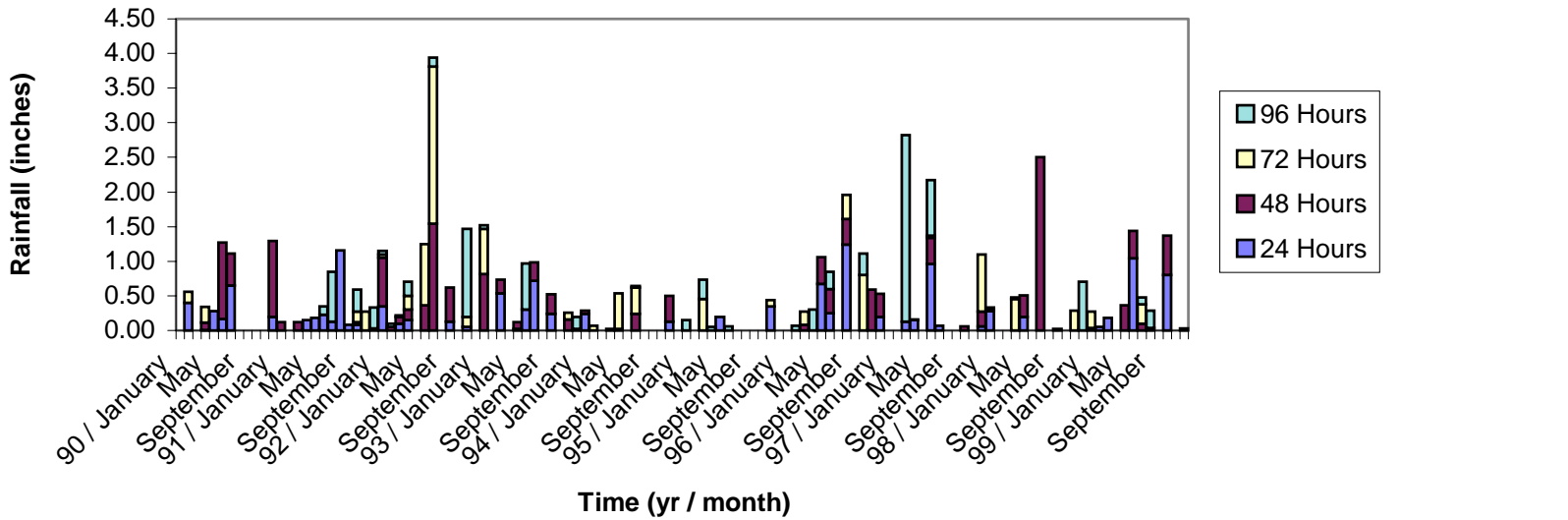
	ppb unless noted	14 day 10kg child	long term, 70kg adult	ppb unless noted			
Nitrate + Nitrite (as N)	10.00 (ppm)	10.00 (ppm)	N/A	0.24 (ppm)	Fertilizer, essential for plant growth		
Phosphorus (as Ortho P)	N/A	N/A	N/A	0.10 (ppm)	Fertilizer, essential for plant growth		
Alachlor (Lasso)	2.00	100.00	N/A	0.50		Herbicide	
Atrazine	3.00	100.00	200.00	0.50		Herbicide	
Butylate (Sutan)	N/A	2000.00	4000.00	0.50		Herbicide	
Carbofuran (Furadan)	40	50.00	200.00	0.50		Insecticide/nematocide	
Clomazone (Command)	N/A	N/A	N/A	0.50		Herbicide	
Cyanazine (Bladex)	N/A	100.00	70.00	0.50		Herbicide	
Diazinon	N/A	20.00	20.00	0.10		Insecticide/nematocide	
EPTC (Eradicane)	N/A	N/A	N/A	0.50		Herbicide	
Ethalfuralin (Basalin)	N/A	N/A	N/A	0.50		Herbicide	
Ethyl Chlorpyrifos/Chlorpyrifos (Lorsban)	N/A	30.00	100.00	0.10		Insecticide	
Ethyl Parathion	N/A	N/A	N/A	0.10		Insecticide	
Fluchloralin	N/A	N/A	N/A	0.50		Herbicide	
Fonofos (Dyfonate)	N/A	20.00	70.00	0.10		Insecticide	
Isofenphos (Amaze)	N/A	N/A	N/A	0.10		Insecticide	
Malathion	N/A	200.00	800.00	0.10		Insecticide	
Methyl Parathion	N/A	300.00	100.00	0.10		Insecticide	
Metolachlor (Dual)	N/A	1000.00	3500.00	0.50		Herbicide	
Metribuzin (Lexone-Sencore)	N/A	5000.00	500.00	0.50		Herbicide	
Pebulate (Tillam)	N/A	N/A	N/A	0.50		Herbicide	
Pendimethalin (Prowl)	N/A	2.00	N/A	0.50		Herbicide	
Propachlor (Ramrod)	N/A	500.00	500.00	0.50		Herbicide	
Prometon (Pramitol)	N/A	200.00	500.00	0.50		Herbicide	
Propazine (Milogard)	N/A	1000.00	2000.00	0.50		Herbicide	
Simazine (Princep)	4.00	70.00	70.00	0.50		Herbicide	
Trifluralin (Treflan)	N/A	80.00	300.00	0.50		Herbicide	
Terbufos (Counter)	N/A	5.00	5.00	0.10		Insecticide/nematocide	
Vernolate (Vernam)	N/A	N/A	N/A	0.50		Herbicide	

N/A = no MCL or HAL established.

*MCL = Maximum Contaminant Level - Maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

**HAL's based on the concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects with up to 14 consecutive days of exposure in a 10kg child, or up to ~7 yrs (10% of lifetime) in a 70kg adult. Both values have a margin of safety.

Rainfall Recorded Prior to Sampling: 1990-1999



Water Quality Study

Van Wert County

Results from samples collected January – December 2000

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.

Rainfall Data

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

Municipal Pesticide Samples – 2000

Location	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrates (ppm)
Convoy	*	*	*	N/T	*	*	*	*
Delphos	*	*	*	N/T	*	*	*	*
Middle Point	*	*	*	N/T	*	*	*	*
Ohio City	*	*	*	N/T	*	*	*	*
Van Wert	*	*	*	N/T	*	*	*	5.9
Willshire	*	*	*	N/T	*	*	*	*

Similar to other years, the 2000 samples were void of any detectable levels with the exception of nitrates in the Van Wert sample. However the concentration of nitrates present did not exceed the EPA's HAL of 10ppm.

Township Wells Pesticide Samples – 2000

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

The samples collected in June 2000, contained no detectable levels of pesticides. This information coincides with previous years, confirming the high quality of well water.

Date	Location	Alachlor	Acetochlor	Atrazine	Carbofuran	Chlorpyrifos	Clomazone	Cyanazine	Ethyl Chlorpyrifos	Metolachlor	Metribuzin	Pendimethalin	Simazine	Terbufos
Jun-00	TC-1	*	*	1.4	*	N/T	*	*	*	*	*	*	*	*
	TC-2	*	*	3.2	*	N/T	0.9	*	*	*	*	*	*	*
	TC-3	*	*	3.2	*	N/T	1.6	*	*	*	*	*	*	*
Nov-00	TC-1	*	*	*	*	N/T	*	*	*	*	*	*	*	*
	TC-2	*	*	*	*	N/T	*	*	*	*	*	*	*	*
	TC-3	*	*	*	*	N/T	*	*	*	*	*	*	*	*

* = sample concentration was below the detection limit.

N/T = Sample was not tested for this pesticide (reflects changes in tests available throughout the study).

Comments:

Town Creek Pesticide samples for 2000 followed a similar pattern as previous years, with some pesticides present in the June samples, and no detectable levels in November. The concentrations found in the June 2000 samples are the lowest since the beginning of this study. Only small amounts of Atrazine and Clomazone were present. This was the first year Clomazone was detected.

Nitrogen (ppm)⁺					Phosphorus (ppm)⁺⁺				
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		TC-1	TC-2	TC-3	TC-4	AVG.	TC-1	TC-2	TC-3	TC-4	AVG.
2000	January	N/S	0.65	9.70	4.60	4.98	N/S	0.11	0.14	0.10	0.12
	February	N/S	1.90	8.80	6.30	5.67	N/S	0.11	0.20	0.17	0.16
	March	N/S	13.40	6.00	9.60	9.67	N/S	0.10	0.28	0.11	0.16
	April	N/S	11.40	8.00	9.90	9.77	N/S	0.66	*	*	0.22
	May	N/S	11.60	9.40	9.50	10.17	N/S	*	0.43	0.14	0.19
	June	13.50	20.00	12.80	16.20	15.63	0.26	0.40	0.40	0.33	0.35
	July	N/S	*	11.40	9.80	10.60	N/S	*	0.38	*	0.13
	August	N/S	0.37	9.80	2.40	4.19	N/S	0.13	0.53	0.34	0.33
	September	N/S	0.53	6.11	1.53	2.72	N/S	0.20	0.44	0.28	0.31
	October	N/S	*	8.82	4.20	4.34	N/S	*	*	*	0.00
	November	*	1.05	10.70	3.61	3.58	*	0.10	0.10	0.19	0.10
	December	N/S	7.80	9.00	6.60	7.80	N/S	2.50	0.68	1.70	1.63

+ Nitrogen = nitrates + nitrites

++ Phosphorus = total phosphorus

* = Below detection limit of 0.2ppm for nitrates and 0.1ppm for total phosphorus

N/S = Not sampled

Shaded boxes indicate values exceeding EPA's HAL of 10ppm Nitrogen, or the eutrophication guideline of 1.0ppm Phosphorus.

Comments:

Nitrogen concentrations saw an increase in the 2000 samples. Levels exceeded the EPA's HAL in at least one site for six of the twelve months. This may be due to the dry year in 1999. During very dry years nitrogen tends to accumulate in the soil, and then leach at higher concentrations when wet periods return.

Phosphorus concentrations throughout 2000 were higher than previous years. However samples were analyzed for total P instead of ortho-P as in 1990-1999. Total P is a better indicator of water quality, as it accounts for all phosphorus in the water.

2000	January	February	March	April	May	June	July	August	September	October	November	December
24 Hours	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.10

48 Hours	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72 Hours	0.00	0.00	0.00	0.13	0.00	0.42	0.27	0.00	0.00	0.00	0.00	0.00
96 Hours	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.05
Totals	0.00	0.60	0.00	0.13	0.00	0.70	0.31	0.00	0.00	0.00	0.00	0.15

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.

Water Quality Study Van Wert County

Results from samples collected January- December 2001

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 tree 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

	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	9	8.5	8.1	8.53	N/S	0.22	*	2.40	0.873333
February	N/S	9.44	6.24	6.34	7.34	N/S	0.11	0.19	0.16	0.153333
March	N/S	12.12	9.66	9.23	10.34	N/S	*	*	*	0
April	N/S	2.07	2.64	1.82	2.18	N/S	*	*	*	0
May	N/S	13.84	8.94	9.68	10.82	N/S	*	0.61	0.27	0.293333
June	13.13	13.11	10.74	10.78	11.94	*	0.16	0.21	0.10	0.1175

July	N/S	3.81	7.36	2.29	4.49	N/S	0.11	0.23	0.25	0.196667
August	N/S	*	6.9	*	2.30	N/S	*	0.34	0.30	0.213333
September	N/S	*	11.6	*	3.87	N/S	*	0.21	0.25	0.153333
October	N/S	12.32	42	19.7	20.6	N/S	0.11	0.28	0.18	0.19
November	7.83	7.98	7.22	6.39	3.4	*	*	0.18	0.11	0.0725
December	N/S	9.22	8.06	7.69	8.32	N/S	*	0.11	0.12	0.076667

+Nitrogen = nitrates + nitrites

++ Phosphorus = total phosphorus

* = Below detection limit of 0.2ppm for nitrates and 0.1ppm for total phosphorus

N/S = Not sampled

Shaded boxes indicate values exceeding EPA's HAL of 10ppm Nitrogen, or the eutrophication guideline of 1.0ppm Phosphorus.

Comments:

Nitrogen concentrations on average were very similar to levels in the 2000 samples. Levels exceeded the EPA's HAL in at least one site for six of the twelve months. We experienced the third highest nitrogen reading the study has ever indicated. It came from TC3 just down stream from the city of Van Wert. I believe this high level is due to lawn fertilizer making it's way into the storm sewers. We had high levels of rain all through September (6.29 inches). Most of the precipitation was just before the sample was taken.

Phosphorus concentrations throughout 2001 were lower than previous years. We only had one sample site go above the HAL and that was at TC4 in January. In the past years our highest phosphorus reading always seem to occur in the winter months. One possible theory of this is that a growing percentage of water in Town Creek is coming from households. We get less agricultural runoff when the ground is frozen and most of the precipitation we get this time of year is in a frozen form (snow, sleet and freezing rain).

Town Creek Pesticide Data 2001

Only those pesticides detected throughout the study are included

Location	Date	Alachlor	Acetochlor	Atrazine	Carbofuran	Cyanazine	Fluchloralin	Metolachlor	Metribuzin	Pendimethalin	Propachlor	Simazine	Trifluralin
TC-1	Jun-01	*	*	2.1	*	*	0.5	0.8	*	*	*	0.5	*
TC-2	Jun-01	*	*	3.6	*	*	0.8	1.7	*	*	*	0.8	*
TC-3	Jun-01	*	*	2.4	*	*	*	1.1	*	*	*	*	*
TC-1	Nov-01	*	*	*	*	*	*	*	*	*	*	*	*
TC-2	Nov-01	*	*	*	*	*	*	*	*	*	*	*	*
TC-3	Nov-01	*	*	*	*	*	*	*	*	*	*	*	*

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

Comments:

Town Creek Pesticide samples for 2001 followed a similar pattern as previous years, with some pesticides present in the June samples, and no detectable levels in November. June 2001 samples are about average levels except for the type of chemicals that are used. This year Boundry and Bicept II Magnum (Metolachlor and Atrazine) were present. This was the first year Fluchloralin was detected. Fluchloralin is found in Squadron and Steel herbicide all of which were discontinued in 1999.

Over the course of the study, chemical levels in the water have been decreasing. This is a possible result of the chemical industry starting to make more attractive post products. Post products are a contact pesticide that has to be absorbed through the green vegetation. Post products often have lower use rates.

Location	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrate+Nitrite (ppm)
01 / Convoy	*	*	*	N/T	*	*	*	*
Delphos	*	*	*	N/T	*	*	*	*
Middle Point	*	*	*	N/T	*	*	*	*
Ohio City	*	*	*	N/T	*	*	*	*
Van Wert	0.94	*	0.6	N/T	*	*	*	3.61
Willshire	*	*	*	N/T	*	*	*	*
EPA-MCL	2.5	0.5	10	N/T	N/A	10	35	10

Similar to other years, the 2001 samples were void of any detectible chemical levels with the exception of nitrates in the Van Wert sample. The concentration of chemicals and nitrates present did not exceed EPA's HAL level. The similarity of the Van Wert sample to the town creek sample might be due to the use of water in Town Creek.

Township Wells Pesticide Samples- 2001

Location 2001	Alachlor	Atrazine	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrate+Nitrite (as N) (ppm)
Union	*	0.26	*	*	*	*	*	*
Pleasant	*	*	*	*	*	*	*	*
Tully	*	*	*	*	*	*	*	*
Harrison	*	*	*	*	*	*	*	*
Willshire	*	*	*	*	*	*	*	*
Liberty	*	*	*	*	*	*	*	*
York	*	*	*	*	*	*	*	*
Jennings	*	*	*	*	*	*	*	*
Ridge	*	*	*	*	*	*	*	*
Washington	*	*	*	*	*	*	*	*
Jackson	*	*	*	*	*	*	*	*
Hoaglin	*	1.79	*	*	*	*	*	0.53

The samples collected in June 2001, contained some detectable levels of Atrazine and nitrates. The wells that had detectable levels were less than 50' depth. May 2001 set a record for rainfall since the project began. In May we had 5.78 inches of rain possibly causing the atrazine and nitrates to get into the ground water

E.coli Test

Township Wells E.coli and Coliform Bacteria

Location	Coliform	Ecoli	Year Dug	Depth	Casing
Harrison	Present	Absent	N/A	N/A	N/A
Hoaglin	Present	Absent	1970's	40'	Metal
Jackson	Absent	Absent	1987	52'	PVC
Jennings	Present	Absent	1979	38'	Metal
Liberty	Absent	Absent	1974	108'	Metal
Pleasant	Absent	Absent	1975	140'	Metal
Ridge	Present	Absent	1939	85'	Galvanized
Tully	Absent	Absent	1978	105'	Iron
Union	Present	Absent	N/A	N/A	N/A
Washington	Present	Absent	1952	35'	Steel
Willshire	Present	Absent	1979	88'	Steel
York	Absent	Absent	N/A	N/A	Steel

It appears that all old wells before 1980 that are less than one hundred feet have some Coliform bacteria in them. Lab personnel indicated that this is normal and most of the bacteria that were found are a natural bacterium that feeds on the metal casing of the well. However, lab personnel did recommend shocking the wells with bleach if the household has very young children.

Town Creek E.coli Test

	1-Jun-01	1-Nov-01
Location	E.Coli/col/100ml	
TC1	160	740
TC2	600	920
TC3	260	300
TC4	680	190

E.coli Levels are hard to predict. They don't rise or fall following different environmental fluctuations such as precipitation and temperature. It does appear that the E.coli Levels just downstream of the city of Van Wert are lower. This maybe due to the city wastewater treatment plant ridding the waste of E.coli before it is discharged back into town creek. The E.coli Levels out in the rural areas may be higher due to substandard septic systems.

Streams Leaving Van Wert County (E.coli Test)

E. Coli tests for seven creeks at county line - 2001			
* Values given in colonies/ 100ml			
	Sample date		
	1-Mar-01	2-Apr-01	1-May-01
Town Creek	400	1400	200
Maddox Creek	600	1200	200
Hoaglin Creek	1400	200	800
Hagerman Creek	800	700	200
Upper Prairie Creek	1800	600	1800
Middle Creek	5600	1200	200
Blue Creek	400	600	200

The levels of E. Coli are sporadic and inconsistent. They don't follow any pattern and will require more years of data to establish a baseline level.

Rainfall (inches) Recorded Prior to Sampling

2001	January	February	March	April	May	June	July	August	September	October	November	December
24 Hours	0.02	0.00	0.00	0.09	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00
48 Hours	0.00	0.07	0.00	0.00	0.00	0.04	0.00	0.03	0.00	0.00	0.00	0.00
72 Hours	0.02	0.40	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
96 Hours	0.17	0.07	0.48	0.02	0.00	0.04	0.00	0.00	0.02	0.00	0.00	0.00
Totals	0.21	0.54	0.48	0.11	0.00	0.08	0.13	0.06	0.02	0.00	0.00	0.00

Comments:

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

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Average
January	3.82	1.81	1.89	2.75	1.98	2.97	2.70	2.29	1.71	3.82	1.65	0.65	2.34

February	6.40	0.94	1.20	1.60	0.70	0.75	0.36	3.70	1.53	1.94	1.45	2.18	1.90
March	1.87	2.38	2.24	1.34	0.72	1.86	1.97	2.50	3.15	1.26	1.53	0.61	1.79
April	1.89	3.87	4.09	5.21	4.43	4.70	4.37	0.78	5.03	5.11	1.51	3.43	3.70
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	3.89
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	4.67
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	5.04
August	5.21	3.89	2.22	1.25	2.31	3.50	1.77	3.01	4.31	2.71	3.04	1.71	2.91
September	3.28	1.66	1.66	4.11	0.62	0.43	2.42	5.53	0.80	1.59	5.32	6.29	2.81
October	3.37	2.21	2.61	1.82	0.80	4.08	2.40	1.61	2.70	2.08	2.3	7.79	2.81
November	2.31	1.05	5.51	4.13	3.56	2.63	5.56	2.74	1.89	1.25	1.9	7.76	3.36
December	7.10	1.10	1.33	1.56	2.59	1.10	0.00	1.73	0.93	2.51	3.2	0.37	1.96
total for year	52.95	25.84	34.16	41.14	29.14	33.40	39.71	40.59	37.12	31.23	37.97	42.83	36.53

Results from samples collected January- December 2002

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 tree 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

	Nitrate (ppm)					Phosphate (ppm)					Height	Clarity
Month	TC-1	TC-2	TC-3	TC-4	AVG.	TC-1	TC-2	TC-3	TC-4	AVG.		
January	N/S	9.49	10.01	8.75	9.42	N/S	*	*	*	0.00		
February	N/S	7.76	7.82	7.03	7.54	N/S	0.56	0.49	0.43	0.49		
March	N/S	9.13	6.71	6.35	7.40	N/S	*	*	*	0.00	0.75	4
April	N/S	9	7.64	7.31	7.98	N/S	0.19	0.21	0.26	0.22	1.70	5

May	N/S	11.4	9.27	9.1	9.92	N/S	0	0.15	0.00	0.05	0.80	4
June	7.42	8.34	7.57	5.14	7.12	0.18	0.12	0.13	0.13	0.14	0.20	3
July	N/S	2.84	6.37	1.56	3.59	N/S	*	0.12	0.12	0.08	0.10	4
August	N/S	*	5.17	0.73	2.95	N/S	0.1	0.18	0.27	0.18	0.10	4
September	N/S	2.01	8.89	1.69	4.20	N/S	*	0.68	0.20	0.29	0.10	4
October	N/S	1.43	7.8	3.14	3.6	N/S	*	0.21	0.21	0.14	0.10	4
November	0.22	3.25	10.93	3.8	3.7	0.13	*	0.11	0.28	0.10	0.10	3
December	N/S	16.15	11.54	6.75	11.48	N/S	*	0.12	0.11	0.08	0.20	4

Nitrogen=nitrates + nitrites

Phosphorus= total phosphorus

*= Below detection limit of 0.2ppm for nitrates and 0.1ppm for total phosphorus

N/S = Not sampled

Shaded boxes indicate values exceeding EPA's HAL of 10ppm Nitrogen, or the eutrophication guideline of 1.0ppm Phosphorus.

Height= inches. Reading is taken across from the Van Wert County engineer's office

Clarity= 0=clear – 10=very cloudy

Comments:

Nitrogen concentrations on average were very similar to the levels of the past five years.

Levels exceeded the EPA's HAL in at least one site for four out of the twelve months.

Phosphorus concentrations throughout 2002 were about average compared to the last couple of years. This year however we didn't have any site experience a level higher than the EPA's HAL of 1.0ppm

Town Creek Pesticide Data 2002
Only those pesticides detected throughout the study are included

Location	Date	Alachlor	Acetochlor	Atrazine	Carbofuran	Cyanazine	Fluchloralin	Metolachlor	Metribuzin	Pendimethalin	Propachlor	Simazine	Trifluralin
TC-1	Jun-02	*	*	1.5	*	*	*	0.6	0.5	*	*	*	*
TC-2	Jun-02	*	*	3.8	*	*	*	1.3	*	*	*	*	*
TC-3	Jun-02	*	*	2.9	*	*	*	1.5	*	*	*	*	*
TC-1	Nov-02	*	*	*	*	*	*	*	*	*	*	*	*
TC-2	Nov-02	*	*	0.8	*	*	*	*	*	*	*	*	*
TC-3	Nov-02	*	*	*	*	*	*	*	*	*	*	*	*

- * = Sample was below the detection limit
Sample results are in parts per million

Comments:

Town Creek Pesticide samples for 2002 followed a similar pattern as previous years, with some pesticides present in the June samples, and one site having a detectable level of atrazine in November. June 2002 samples are about average levels including the type of chemicals that are used. This year Boundry and Bicept II Magnum (Metolachlor and Atrazine), Harness Extra were present.

Over the course of the study, chemical levels in the water have been decreasing. This is a possible result of the chemical industry starting to make more attractive post products. Most modern post products are a contact pesticide that has to be absorbed through the green vegetation. Post products often have lower use rates.

Municipal Pesticide Samples – 2002

Location	Atrazine	Alachlor	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrate+Nitrite (ppm)
02 / Convoy	*	*	*	N/T	*	*	*	*
Delphos	*	*	*	N/T	*	*	*	*
Middle Point	*	*	*	N/T	*	*	*	*
Ohio City	*	*	*	N/T	*	*	*	*
Van Wert	0.5	*	*	N/T	*	*	*	1.86
Willshire	*	*	*	N/T	*	*	*	*
EPA-MCL	2.5	0.5	10	N/T	N/A	10	35	10

Similar to other years, the 2002 samples were void of any detectible chemical levels with the exception of nitrates in the Van Wert sample. The concentration of chemicals and nitrates present did not exceed EPA's HAL level. The similarity of the Van Wert sample to the town creek sample might be due to the use of water in Town Creek.

Township Wells Pesticide Samples- 2002

Location 2002	Alachlor	Atrazine	Metolachlor	Metribuzin	Propachlor	Propazine	Simazine	Nitrate+Nitrite (as N) (ppm)
Union	*	*	*	*	*	*	*	.22
Pleasant	*	*	*	*	*	*	*	*
Tully	*	*	*	*	*	*	*	*
Harrison	*	*	*	*	*	*	*	*
Willshire	*	*	*	*	*	*	*	*
Liberty	*	*	*	*	*	*	*	*
York	*	0.9	12	*	*	*	*	*
Jennings	*	*	*	*	*	*	*	*
Ridge	*	*	*	*	*	*	*	*
Washington	*	*	*	*	*	*	*	0.24
Jackson	*	*	*	*	*	*	*	*
Hoaglin	*	*	*	*	*	*	*	*

The samples collected in June 2002, contained some detectable levels of Atrazine and nitrates. The wells that had detectable levels were less than 50' depth.

Township Wells E.coli and Coliform Bacteria

Location	Coliform	Ecoli	Year Dug	Depth	Casing
Harrison	Absent	Absent	N/A	N/A	N/A
Hoaglin	Absent	Absent	1970's	40'	Steel
Jackson	Absent	Absent	1987	52'	PVC
Jennings	Present	Absent	1979	38'	Steel
Liberty	Absent	Absent	1974	108'	Steel
Pleasant	Absent	Absent	1975	140'	Steel
Ridge	Present	Absent	1939	85'	Galvanized
Tully	Present	Absent	1978	105'	Iron
Union	Present	Absent	N/A	N/A	N/A
Washington	Present	Absent	1952	35'	Steel
Willshire	Absent	Absent	1979	88'	Steel
York	Absent	Absent	N/A	N/A	Steel

It appears that all old wells before 1980 that are less than one hundred and five feet have some Coliform bacteria in them. Lab personnel indicated that this is normal and most of the bacteria that were found are a natural bacterium that feeds on the metal casing of the well. However, lab personnel did recommend shocking the wells with bleach if the household has very young children.

Town Creek E.coli Test

Location	1-Jun-02	1-Nov-02
	E.Coli/col/100ml	
TC1	390	630
TC2	290	0
TC3	660	2390
TC4	230	20

E.coli Levels are hard to predict. They don't rise or fall following different environmental fluctuations such as precipitation and temperature. In 2002 E. coli readings are reversed compared to last years readings. This year readings were the highest downstream of Van Wert vs. upstream of Van Wert. The highest reading this year occurred directly down stream of Van Wert. A possible cause of this is that the treatment plant stops disinfecting waste after October.

Streams Leaving Van Wert County (E.coli Test)

E. Coli tests for seven creeks at county line - 2002	Sample date			
	1-Mar-02	3-June-02	3-Sept-02	1-Dec-02
* Values given in colonies/ 100ml				
Town Creek	140	230	200	470
Maddox Creek	40	160	20	2010
Hoaglin Creek	260	160	200	310
Hagerman Creek	110	530	3580	1240
Upper Prairie Creek	50	190	260	750
Middle Creek	40	160	200	130
Blue Creek	660	400	800	120

The levels of E. Coli are sporadic and inconsistent. They don't follow any pattern and will require more years of data to establish a baseline level.

Rainfall (inches) Recorded Prior to Sampling

2002	January	February	March	April	May	June	July	August	September	October	November	December
24 Hours	0.00	0.62	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
48 Hours	0.00	0.75	0.42	0.45	0.02	0.00	0.00	1.12	0.00	0.00	0.00	0.00
72 Hours	0.00	0.00	0.00	0.00	1.45	0.00	0.00	0.00	0.00	0.20	0.00	0.00
96 Hours	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00
Totals	0.00	1.37	0.52	0.45	1.47	0.00	0.00	1.12	0.00	1.15	0.00	0.22

Comments:

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