

# **RESEARCH SUB-PROGRAM**

## **MAINTENANCE PROGRAM FOR THREE SOUTHWESTERN ONTARIO WATERSHEDS, 1993 - 94**

**April 1994**

**COESA Report No.: LMAP - 016a/94**

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# FORWARD

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This report summarizes the continuation of agronomic and water quality/quantity monitoring activities from three Southwestern Ontario watersheds which were initiated in the mid-eighties under previous environmental programs, such as SWEEP (Soil and Water Environmental Enhancement Program). These activities have been continued in support of research projects sited on these watersheds under the **COESA** (Canada-Ontario Environmental Sustainability Accord) Research Sub-Program of the Canada-Ontario Green Plan. The **GREEN PLAN** agreement, signed Sept. 21, 1992, is an equally-shared Canada-Ontario program totalling \$64.2 M, to be delivered over a five-year period starting April 1, 1992 and ending March 31, 1997. It is designed to encourage and assist farmers with the implementation of appropriate farm management practices within the framework of environmentally sustainable agriculture. The Federal component will be delivered by Agriculture and Agri-Food Canada and the Ontario component will be delivered by the Ontario Ministry of Agriculture and Food and Rural Assistance.

From the 30 recommendations crafted at the Kempenfelt Stakeholders conference (Barrie, October 1991), the Agreement Management Committee (AMC) identified nine program areas for Green Plan activities of which the three comprising research activities are (with Team Leaders):

1. **Manure/Nutrient Management and Utilization of Biodegradable Organic Wastes** through land application, with emphasis on water quality implications
  - A. Animal Manure Management (nutrients and bacteria)
  - B. Biodegradable organic urban waste application on agricultural lands (closed loop recycling) (Dr. Bruce T. Bowman, Pest Management Research Centre, London, ONT)
2. **On-Farm Research:** Tillage and crop management in a sustainable agriculture system. (Dr. Al Hamill, Harrow Research Station, Harrow, ONT)
3. **Development of an integrated monitoring capability** to track and diagnose aspects of resource quality and sustainability. (Dr. Bruce MacDonald, Centre for Land and Biological Resource Research, Guelph, ONT)

The original level of funding for the research component was \$9,700,000 through Mar. 31, 1997. Projects will be carried out by Agriculture and Agri-Food Canada, universities, colleges or private sector agencies including farm groups.

This Research Sub-Program is being managed by the Pest Management Research Centre, Agriculture and Agri-Food Canada, 1391 Sandford St., London, ONT. N5V 4T3.

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## Maintenance Program for Three Southwestern Ontario Watersheds

August 1, 1993 - May 31, 1994

### 1. BACKGROUND

The Soil and Water Environmental Enhancement Program (SWEEP), was initiated in 1986 with an overall mandate to:

- reduce Ontario's Non-Point Source (NSP) loadings of phosphorus to Lake Erie from agricultural sources by 200 tonnes; and
- maintain or improve the productivity of the primary agricultural sector in Southwestern Ontario by reducing or correcting soil erosion and degradation.

The Pilot Watershed Study (PWS) was a major SWEEP sub-program aimed at evaluating and demonstrating the benefits of established conservation farming systems at the watershed and smaller scales. The cooperating agencies in SWEEP were; Environment Canada (EC) Agriculture Canada (AC) and the Ontario Ministry of the Environment (OMOE). Beak Consultants Limited was the prime contractor responsible to AC and OMOE. Ecologistics Limited was a sub-contractor to BEAK responsible for site selection and the agronomic program of the PWS.

The PWS started in 1987 with detailed study design, staffing, training, cooperatore enlistment, and watershed selection. Farm plans were initiated in August, 1988 and environmental monitoring began the same year.

Monitoring and evaluation were conducted from late 1988 until mid 1992.

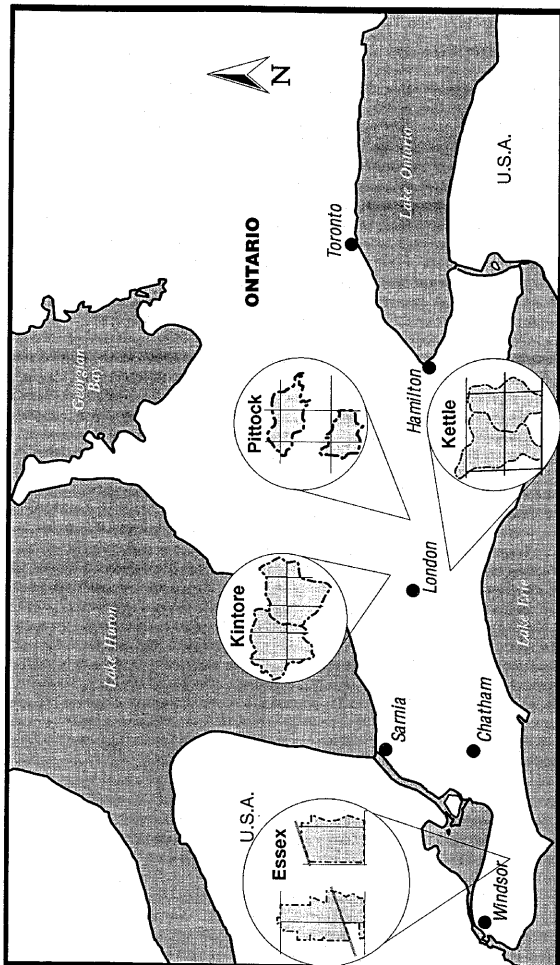
Initially, three paired watersheds were selected for study. Figure 1 shows the locations of the three study watersheds within the Lake Erie Basin. The fourth watershed, Kintore Creek, has since replaced the Pittock watershed. Kintore was not included in the initial project because work that mirrored the objectives of the PWS was previously initiated by OMOE, EC, and the Upper Thames River Conservation Authority (U.T.R.C.A.) in 1984.



**A Montadoro-Whitney velocity meter is used to determine stream discharge at a paired watershed station.**

Figure 1

# PAIRED WATERSHEDS STUDY



## 2. PURPOSE

Following the completion of the overall SWEEP program, there was no longer a framework in place to continue activities in the Pilot watersheds. such as encouragement for the landowners to adopt conservation tillage/cropping practices, and monitoring of the water quality as a result of these land activities. The intent of the 'maintenance program' was to provide funding for short-term maintenance activities in three of the watersheds (Kintore, Essex, and Kettle), to sustain the levels of landowner adoption of conservation tillage practices attained at the end of the SWEEP program, and to continue to monitor the outflowing water quality.

## 3. OBJECTIVES

Encourage continued adoption of conservation tillage/ cropping practices in three watersheds, (Kintore, Essex and Kettle) through dialogue with the landowners

- b. Monitor the water quality of the streams in the

## 4- PROJECT SUMMERY

### 4.1 Kintore Watershed

*4.1.1 location:* The Kintore creek watershed is formed by the headwaters of the Arther-Vannatter (Western subbasin) and Logan (Eastern sub-basin) Municipal Drains. The two branches join together to form Kintore Creek, which flows south and outlets into the middle branch of the Thames River at the village of Thamesford in Oxford County (Figure 1).

Each sub-watershed drains approximately 600 hectares of rolling cropland consisting of well drained silt loam soils and pockets of poorly drained soil. Both branches of the creek originate in swampy headlands with strong spring sources that help provide continuous year around base flow in the range of .05 to .07 cubic metres per second in midsummer.

Thirty landowners carry out a range of agricultural activities including; dairy, beef swine and cash crop. The main crops grown in the watershed are corn, soybeans, alfalfa, winter wheat and spring grains.

Individual field slopes range from 1 to 6% and are classified by Environment Canada's sediment delivery mapping system as having high potential for both soil erosion (> 5 tons/acre/yr) and delivery of sediment to the watercourse (> 5 tons/acre/yr).

*4.1.2 observations:* The unseasonably wet fall in 1992, (Environment Canada, London Weather Office) resulted in very little fall tillage activity. Consequently, the tillable land was protected over the winter with a high percentage of crop residue. Water samples collected during the spring runoff events, indicate the residue cover had a significant impact on stopping soil erosion during this period. Considering approximately 75% of the annual losses occur during this period (Wall et al. 1982), coupled with the general lack of rainfall in 1993, yearly soil loss numbers should be significantly less than in previous years.

Construction on the Union Gas pipeline during the summer and fall months left an exposed corridor across the watershed. Dry weather conditions and vastly improved construction techniques appeared to minimize any potential impacts on the water quality.

**4.1.3 water quality data:** The routine grab and storm event sample data from the Kintore watershed is presented in Appendix A. The tables include data collected from January 1993 to May 31, 1994.

Routine water samples were collected from the two outlet monitoring stations (stations 1 and 5) and the five stations upstream of the outlets (stations 2,3,6,7,8). All samples were collected using a hand held USDH-48 depth integrated sampler. The map in Appendix A, identifies the seven sampling stations in the watershed.

Storm event data were collected for 10 events in 1993. Equipment failure prevented data collection at station 1 for the January 4th event. Spring melt event was sampled from March 27 to 29. There was no rainfall during the melt.

From January 1994 to the end of May 1994, seven runoff events were sampled. Spring melt occurred between March 21 to 23. ISCO automatic samplers were used to collect the runoff event samples. The ISCO samplers were emptied the day after the storm event. Samples were refrigerated then transported to the Ministry of the Environment and Energy Regional laboratory in London for analysis.

A 1993 statistical summary has been included for suspended solids and total phosphorus data collected at the two sub-basin outlets (Appendix A)- The data summary includes median, maximum, minimum and 75th and 25th quartiles (inter-quartile range). Data is presented in a boxplot format (Bodo, (no date)), with the central point of each bar representing the median, the solid bar the interquartile range and the top and bottom of each vertical line the station's maximum and minimum concentrations.

Not enough data points were available from the other two paired watersheds for data presentation in this format.

**4.1.4 water quantity data:** Rating curves were established at the two sub-watershed outlets as well as the 5 sampling stations upstream. A Montedoro-Whitney current meter was used to take stage discharge measurements at these stations during high and low flow conditions.

Leopold-Stevens chart recorders collected water level data at the two outlet stations. Charts were digitized by the Science and Technology Branch, Ontario Ministry of Environment and Energy.

Average daily discharge data from these two stations is presented in Appendix B. Due to the remote location of these two outlet stations, hydro electric heat is not available to keep the stilling well ice free during winter. Continuous water level data is therefore unavailable. The Tables in Appendix B are incomplete for this reason.

**4.1.5 agricultural practices data:** The 1993 field activities of landowners in the western and eastern sub-basins, are summarized in Appendix C. Individual farm and field locations can be referred to with the map in Appendix C

As previously mentioned, the unusually wet fall of 1992 had a significant impact on the field activities in 1993. In the Western sub-basin only 10% of the 1221 total tillable acreage was worked in the fall. Even less acreage was fall worked in the Eastern sub-watershed.

As the below tillage summary indicates, 11 % of the West and 30% of the East was protected with a cover crop, leaving 79% and 84% of the remaining tillable acres to be worked in the spring.

**Table 1: 1993 PRIMARY TILLAGE PRACTICES KINTORE WATERSHED**

Field Activity	Western Sub-basin	Eastern Sub-basin
	in acres	in acres
fall mouldboard	66 (5%)	7 (1%)
Spring mouldboard*	816 (67%)	562 (67%)
fall chisel*	59 (5%)	0 (0%)
Spring chisel*	87 (7%)	15 (2%)
No-Till*	58 (5%)	0 (0%)
Cover Crop*	135 (11%)	255 (30%)
Total	1221 (100%)	839 (100%)

\* conservation practice

In previous SWEEP update reports, the term 'conservation practice' has been defined as the field activities marked with an asterisk in the above table. By this definition, 95% of the Western sub-basin and 99% of the Eastern Subbasin were treated with some form of conservation practice in the 1993 cropping season.

Since this weather related phenomena was Province wide, it is unrealistic to treat the 1993 data as an indication of permanent adoption rates.



**4.1.6 other projects:** Due to the excellent landowner cooperation and interest, coupled with the historical water quality data base, Kintore has long been a favourite location for multi-agencies research and demonstration projects. Some of these projects include:

- University of Guelph: GAMES Model development
- Environment Canada: sediment/transport studies
- Environment Canada: atrazine monitoring
- Environment Canada: invertebrate monitoring techniques
- Agriculture Canada: GLAP manure application studies
- University of Waterloo: groundwater investigations
- Agriculture Canada: National Soils Program demonstration
- University of Waterloo: denitrification project
- U.T.R.C.A.: solar power watering demonstration

These projects are all in addition to the ongoing soil conservation work initiated by the Ontario Ministry of Environment and Energy and the Upper Thames River Conservation Authority.

The watershed has also been selected as the location for two agricultural research project funded under Canada's Green Plan.

Dr. Gregory Wall with Agriculture and Agri-Food Canada, is investigating the impact of manure application methods on water quality, focusing of nitrogen and bacteria transport in soil. The field scale study of liquid manure application is being undertaken to identify the pathways and process in nutrient and bacteria transport to tile drains and ground water with emphasis on preferential flow.

Dr. Dave Rudolph, Waterloo Centre for Groundwater Research and Dr. Gary Kachanoski, University of Guelph, are conducting research into partitioning of solutes from agricultural fields within the hydrologic cycle. The combination of water balance and nitrogen balance measurements will provide a fairly detailed view of contaminant flux partitioning between soil water, shallow groundwater, tile drainage, deep groundwater and surface water.

## 4.2 Essex Watershed

**4.2.1 location:** The two sub-watersheds are located in Essex County, Maidstone Township Southwestern Ontario (Figure 1). Both the West (Fifth Concession Drain) and East (Second Concession Drain) watersheds are predominantly cash crop farming operations producing mainly grain corn, soybeans and winter wheat. The areas are comprised of 435 hectares (West) and 218 hectares (East) of poorly drained, extensively sub-surface tiled Brookston clay soils. The landscape in the region is gently undulating, with less than 1 % slope.

Various field management practices range from no-tillage, to reduced tillage to conventional tillage (Table 2).

**4.2.2 observations:** During the fall of 1993, the Fifth Concession Drain (Western sub-watershed), was cleaned out. This clean out lowered the drainage profile, significantly altering the hydrology of the Western sub-watershed. The Water Survey Canada construction unit re-established a low-flow weir at the outlet late in 1993. Water quality data was not collected during the fall season due to the weir construction.

The winter of 1994 was extremely cold. The colder than normal temperatures (Environment Canada, London Weather Office) greatly affected the flow of water at both the West and East monitoring stations. The entire drainage profile was frozen solid. When the water finally did start to flow, the flow patterns were influenced by ice jams and build ups, therefore not representing the true nature of storm event or baseflow runoff.

The spring and summer periods were extremely dry. Any rain that did fall, was held as soil storage due to the low moisture levels in the fields. Only two storm events yielded enough flow to monitor water quality within the watersheds. Base flow samples were taken on a bi-weekly basis.

**4.2.3 water quality data:** Water samples were collected on a bi-weekly basis from January 4, 1994 to May 31, 1994. Samples were not collected prior to this date due to weir reconstruction. Two storm events were monitored during the same time period. Water sampling equipment was maintained on a regular basis to ensure proper working condition. Routine grab and storm event sample data is presented in Appendix D.

**4.2.4 water quantity data:** Due to the re-construction of the stream flow gauge, this data is unavailable for the fall 1993. Dataloggers at each of the stations were monitored and downloaded on a regular basis. Water quantity data for 1993 and part of 1994 is presented in Appendix E. The data was collected and prepared by Water Survey of Canada.

**4.2.5 agricultural practices data:** Landowner surveys were conducted to determine the 1993 field activities in the two sub-basins. The information collected included; fall and spring tillage, 1993 crop, field location and size. The survey data and map of field boundary locations, are presented in Appendix F.

Field activities were affected by weather. The unusually wet weather in the fall of 1992, stopped corn harvest until the ground froze with mid-December frost. As the below tillage summary indicates, some bean ground was worked prior to the wet weather, but most acreage was not worked until the spring of 1993. In most other regions of the Province, conditions were unsuitable for any fall tillage.

**Table 2: 1993 Primary Tillage Practices  
Essex Watershed**

Field Activity	Western Sub-basin (acres)	Eastern Sub-basin (acres)
Fall Mouldboard	43 (6%)	208 (28%)
Fall Cultivator	270 (36%)	0
Spring mouldboard	0	62 (8%)
Spring cultivator	79 (11%)	408.5 (59%)
No-Till	252 (34%)	40 (5%)
Cover Crop	95.5 (13%)	0
Total	739.5 (100%)	730.5 (100%)

Approximately 25% of the acreage spring tilled in the Eastern sub-basin, was due to change in ownership. The new owner has indicated he will switch to no-till after the newly acquired land has been re-levelled with plough and cultivator.

Indications are that no-till practices will increase in the Eastern sub-basin in future years. Landowners in this the former 'control' sub-basin, were financially 'discouraged' from adopting no-till practices under the SWEEP program. Now they are ready to try the conservation practices they have been observing for the past few years.

**4.2.6 other projects:** In addition to the ongoing maintenance program, the watershed is currently being utilized by two other research projects. The first is an Agriculture and Agri Food Canada project funded by Canada's Green Plan. Dr. C.S. Tan with the Harrow Research Station, is heading a controlled drainage study. The study objective is to assess the effects of controlled drainage on nitrate levels in tile drains and ground water, and crop yields. This project is scheduled for completion March 31, 1997.

The second project is funded through the Rural Conservation Clubs Program, and is aimed at studying populations of earthworms present in different tillage systems, while educating the farming community on the benefits of good soil management practices. This project runs until March 1, 1997.

### 4.3 Kettle Watershed

**4.3.1 location:** The Kettle Creek Paired watersheds are located within the southern boundaries of the City of London (former Town of Westminster). Soils are a combination of Brant and Muriel soils with slopes of 2 to 5% throughout. Soils can generally be considered as a series of moraine deposits of silt loams to silty clay loams.

Both the East and West sub-watersheds are drained by open municipal drains which flow in a southerly direction to Kettle Creek which outlets into Lake Erie. The West sub-watershed is drained by the Madter drain and is approximately 380 hectares in size. The East sub-watershed is drained by the Holtby drain and is about 340 hectares.

The headwaters of these sub-watersheds, form the Lake Erie boundary of the Lake Erie - Lake St. Clair divide. Surface flows run across open fields and grassed waterways to the open drains. Drainage is generally considered fair to good. Tile drainage exists only as random tile drainage in depression areas and broad swales.

Typical farm systems in the watershed consist of row crop farming (predominately grain corn, soybeans and winter wheat) and some mixed system with dairy, beef and hogs. There are no other land uses other than agricultural lands within either sub-watershed.

**4.3.2 observations:** Although the outlet monitoring stations were maintained during the fall of 1993, no stream

flow was recorded until December 1, 1993. There were no other occurrences of any unusual activities in the watersheds that would have affected monitoring and data collection.

**4.3.3 water quality data:** The routine grab and storm event sample data is presented in Appendix G. Below average rainfall in the Kettle watershed had an impact on the water quality monitoring program in 1993. A dry stream bed throughout the summer and fall months, limited the number of water samples that could be collected.

**4.3.4 water quantity data:** Water quantity data for the year 1993 and part of the year 1994 in presented in Appendix H.

**4.3.5 agricultural practices data:** The 1993 field activities are summarized in Appendix 1, for each of the subwatersheds. Field locations can be referenced by using the map in Appendix 1.

Again the weather conditions influenced primary tillage practices in the Kettle watershed compared to other years. As the below table indicates, the fall mouldboard plough was used on a large number of acres. The survey may be somewhat misleading, most of the fall ploughing was actually done during mid-December 1992 and through the winter months of 1993.

The local corn crop was of high enough quality and low enough moisture to warrant harvest even under poor fall field conditions. Many fields was damaged by heavy wheel traffic on the wet soils during harvest. As a result, the plough was used to help re-level the damaged fields.

**Table 3: 1993 Primary Tillage Practices Kettle Watershed**

Field Activity	Western Sub-basin (acres)	Eastern Sub-basin (acres)
Fall Mouldboard	191.7(24%)	607.3(72%)
Fall chisel	9.9(1%)	0
Fall Cultivator	21.1(3%)	11.2(1%)
Spring Cultivator	28.8(3%)	66.9 (8%)
No-Till	479.4(60%)	47.9 (6%)
Cover Crop	75.1 (9%)	109.5 (13%)
Total	805.3 (100%)	842.8 (100%)

A landowner survey was conducted in the Western (formerly referred to in the SWEEP Project as the Test watershed). The 17 farmers were surveyed to find out their general comments on no-till cropping practices versus conventional tillage practices.

Generally, most participating landowners have been satisfied with the results of no-till cropping practices when used in cropping rotations. Overall, no-till offers more benefits than costs, especially in soybeans and wheat. Remarks on no-till soybeans have been favourable with reduced inputs yet comparable yields. Results on no-till wheat have been generally good. Reduced yields have been noted yet overall profit margins remain comparable to conventional practices. No-till corn has had variable results with good to poor results as far as profit margin.

Drawbacks have been later planting dates, high cost of purchasing equipment, some increased weed problems and limited use of incorporated fertilizers and pesticides. They feel no-till is not very practical in continuous wheat or continuous corn situations.

Of the 17 farmers:

- 11 have suggested that no-till farming will be permanent components of their cropping plans; however this will be to varying degrees. Two farmers have gone completely no-till, with two other farmers considering the same option. The rest will probably carry out some level of primary tillage in the fall (chisel, mouldboard, soil saving) and secondary tillage (discs, cultivators) in the spring of corn ground.
- 2 farmers are in the canned vegetable business and will continue to use conventional tillage to ensure warm spring soils and broader planting dates. These farmers may consider no-till when they rotate wheat.
- 4 farmers are not yet interested in no-till for their corn and wheat but will use no-till to varying degrees in their soybean rotation.

The most popular rotations have been a three year rotation of corn, soybeans, wheat or a five year rotation of corn, soybeans corn, soybeans and wheat. Except for the farmers who have gone completely no-till, most of the farmers prefer a fall plough or soil saver pass in the fall prior to seeding corn with some level of cultivation in the spring.

## 5. SUMMARY

Water quality, quantity and agricultural practices data have been collected and summarized for the periods between August 1, 1993 and May 31, 1994. Additional water quality data has been included for the entire 1993 year from Kintore watershed.

The 1993/94 data will add to the previously collected data and enhance the overall historical record. As the data base grows, agricultural research in Ontario will benefit from the existence of historical agronomic and environmental watershed data for reference.

As outlined in this report, the preservation of these watershed sites has already proving extremely useful to assisting agricultural field research and demonstration. With maintenance support, they will continue to pay dividends

## 6. REFERENCES

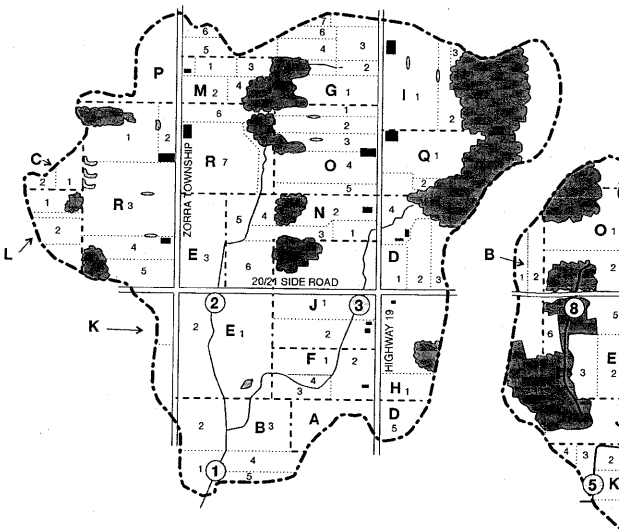
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# KINTORE PAIRED WATERSHEDS

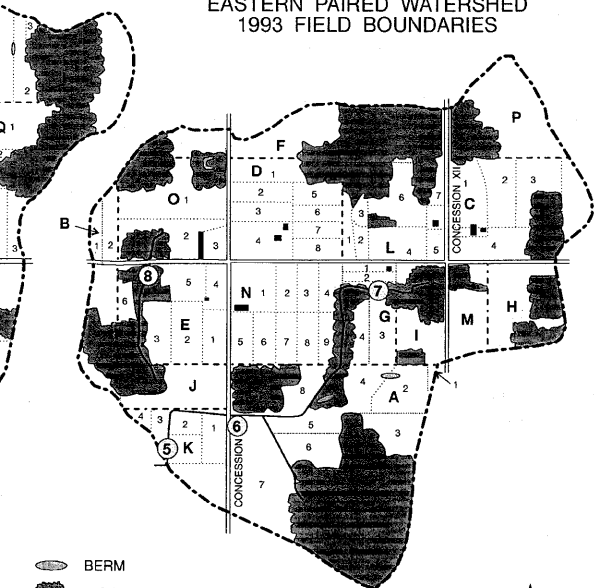
## WESTERN PAIRED WATERSHED 1993 FIELD BOUNDARIES









-  BERM
-  WOODLOT
-  WATER COURSE
-  FIELD BOUNDARY
-  FARM BOUNDARY LINE
-  WATER SAMPLING STATION

# KINTORE PAIRED WATERSHEDS

## EASTERN PAIRED WATERSHED 1993 FIELD BOUNDARIES



-  BERM
-  WOODLOT
-  WATER COURSE
-  FIELD BOUNDARY
-  FARM BOUNDARY LINE
-  WATER SAMPLING STATION



SCALE 1 : 15,000

Paired Watershed Study - Kintore Creek Water Sampling Data; Station: Station 1, (West) Routine Grab Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp (C)	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (µmho/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)					
04-Jan-93	4	09:45	1.570	6.0	470.0	0.001	3.95	0.010	2.0	0.930	0.079	8.02	260	na	na	
25-Jan-93	25	10:50	0.610	na	8.7	0.402	98.00	0.010	6.4	0.102	0.047	8.03	623	na	na	
23-Feb-93	54	12:05	0.000	na	5.0	1.000	1.67	0.020	6.5	0.124	na	8.14	632	na	na	
29-Mar-93	88	10:14	1.010	na	33.3	0.305	1.26	0.010	3.0	0.170	0.078	7.66	320	na	na	
30-Mar-93	89	15:45	0.943	na	62.7	0.247	1.48	0.020	3.2	0.178	na	7.62	384	na	na	
26-Apr-93	116	11:05	0.615	7	7.8	0.225	0.76	0.01	5.6	0.061	0.027	7.99	616	na	na	
31-May-93	151	09:36	0.532	12.0	11.5	0.012	0.67	0.020	3.5	0.028	na	8.12	558	na	na	
07-Jun-93	158	11:00	0.500	17.0	6.4	0.014	0.47	0.020	6.0	0.016	0.001	8.17	617	na	na	
09-Jun-93	160	10:08	0.609	14.0	31.6	0.090	1.20	0.060	8.5	0.104	0.023	8.01	643	na	na	
18-Jun-93	169	09:45	0.485	16.0	6.0	0.015	0.44	0.020	6.5	0.015	na	7.91	625	na	na	
21-Jun-93	172	12:30	0.505	18.0	5.0	0.006	0.59	0.010	4.4	0.032	0.004	8.28	623	na	na	
07-Jul-93	188	11:40	0.472	21.0	5.0	0.050	0.43	0.020	5.2	0.025	0.001	8.33	598	na	na	
12-Jul-93	192	09:10	0.506	18.0	5.0	0.111	0.94	0.030	5.0	0.098	0.050	8.12	626	na	na	
20-Jul-93	201	11:30	0.494	18	5	0.019	0.46	0.01	2.4	0.03	0.013	8.28	637	na	na	
26-Jul-93	207	13:50	0.475	21.0	5.0	0.017	0.37	0.010	4.9	0.015	0.001	8.16	581	na	na	
08-Aug-93	219		na	na	5.0	0.011	0.47	0.010	4.2	0.023	0.006	8.27	611	na	na	
09-Aug-93	221	11:45	na	na	5.0	0.021	0.39	0.010	4.4	0.021	0.001	8.20	606	na	na	
23-Aug-93	235	17:15	0.450	na	5.0	0.005	0.43	0.010	5.3	0.015	0.001	8.15	613	na	na	
07-Sep-93	250	10:10	0.480	na	5.0	0.019	0.46	0.010	4.0	0.024	0.013	8.17	630	na	na	
13-Sep-93	256	09:30	0.490	15.0	6.5	0.016	0.48	0.010	3.6	0.028	0.008	8.38	642	na	na	
04-Oct-93	277	13:20	0.485	na	5.0	0.172	0.56	0.010	4.1	0.043	0.009	8.13	656	na	na	
13-Oct-93	286	08:30	0.487	na	14.2	0.018	0.44	0.010	0.1	0.025	0.001	8.13	662	22.4	1.6	
19-Oct-93	292	10:00	0.540	na	7.2	0.005	0.59	0.010	6.6	0.033	0.001	8.08	717	31	2.2	
26-Oct-93	299	14:00	0.488	na	9.5	0.005	0.38	0.010	4.4	0.014	0.003	8.37	661	28.8	1.5	
02-Nov-93	306	09:50	0.485	na	21.9	0.007	0.38	0.010	4.4	0.018	na	8.12	668	23	1.7	
09-Nov-93	313	13:30	0.490	na	25.4	0.007	0.43	0.010	4.6	0.025	0.001	8.23	649	41.7	1.8	
23-Nov-93	327	10:30	0.490	na	18.3	0.005	0.45	0.010	4.8	0.024	0.004	8.23	670	23.6	1.5	
06-Dec-93	340	14:00	0.570	na	24.0	0.028	1.46	0.030	3.4	0.132	na	8.36	685	27.7	3	
Feb-20-94	51				249.0		4.00			0.570						
Feb-21-94	52	1100			40.7	0.275	1.40	0.020	6.0	0.181	0.066	7.79	528	31.4	3.4	12.7
Mar-22-94	81				574.0	0.500	5.70	0.010	3.5	1.050	0.129	7.71	312	15.4	3.1	7.1
Mar-24-94	83				292.0	0.078	3.10	0.300	3.7	0.585	0.087	7.62	305	12	3.9	5.3
Apr-18-94	108	1530	0.285	9.0	5.1	0.012	0.51	0.020	6.4	0.022	0.004					
Apr-26-94	116	1020	0.312	12.0	79.9	0.020	0.92	0.030	3.4	0.084	0.013	8.16	589	33.6	2.2	10.4
May-02-94	122	1200	0.284	11.0	3.9	0.011	0.51	0.020	5.3	0.020	0.003	8.31	624	25.4	1.7	8.9
May-11-94	131	810	0.26		19.6	0.015	0.42	0.02	6.6	0.011	0.005	8.27	631	23.7	1.6	8.8
May-24-94	144	1222			6.8	0.041	0.55	0.040	5.9	0.022	0.008	8.21	627	19.5	1.3	6.6
May-26-94	146	1405	0.545		165.0	0.334	2.20	0.060	6.3	0.510	0.085	7.83	508	26.7		8.7

Paired Watershed Study - Kintore Creek Water Sampling Data - Station: Station 2, (West) Routine Grab Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp (C)	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)					
04-Jan-93	4	10:55	2.9	6	210	0.001	2.35	0.01	1.5	0.59	0.088	8.04	217	na	na	
25-Jan-93	25	12:25	0.340	na	5.2	0.018	0.48	0.010	5.5	0.022	0.005	8.17	581	na	na	
23-Feb-93	54	12:00	0.0()0	na	20.4	0.004	0.40	0.010	4.7	0.020	na	8.24	591	na	na	
29-Mar-93	88	10:50	1.920	na	38.4	0.164	1.22	0.010	2.9	0.136	0.031	7.68	322	na	na	
30-Mar-93	89	15:25	1 -700	na	78.8	0.087	1.58	0.020	3.3	0.176	na	7.74	392	na	na	
26-Apr-93	116	14:10	1.25	9.5	5	0.042	0.45	0.01	4.5	0.022	0.001	8.1	576	na	na	
31 -May-93	151	13:05	0.175	na	6.5	0.005	0.50	0.010	2.8	0.015	na	8.29	555	na	na	
07-Jun-93	158	14:40	1.100	17.0	5.0	0.005	0.41	0.010	4.4	0.013	0.003	8.21	582	na	na	
09-Jun-93	160	13:52	1.260	17.0	5.0	0.002	0.67	0.040	8.6	0.036	0.008	8.14	613	na	na	
1 B-Jun-93	169	11-.50	0.090	na	5.2	0.007	0.43	0.010	4.4	0.011	na	8.20	573	na	na	
21-Jun-93	172	15:00	0.149	18.0	5.0	0.018	0.67	0.010	3.4	0.026	0.001	8.33	603	na	na	
07-Jul-93	188	13:45	1.090	20.0	5.0	0.014	0.44	0.010	3.2	0.024	0.013	8,33	573	na	na	
12-Jul-93	193	11:30	1.095	19.0	11.2	0.005	0.61	0.020	3.7	0.041	0.001	8.24	591	na	na	
20-Jul-93	201	13:00	1.05	19	na	0.026	na	0.01	1.7	na	0.012	na	na	na	na	
26-Jul-93	207	16:00	1.070	19.0	5.0	0.011	0.47	0.010	3.2	0.012	0.001	8.30	577	na	na	
09-Aug-93	221	13:30	na	na	13.1	0.010	0.39	0.010	2.6	0.016	0.001	8.16	552	na	na	
23-Aug-93	235	14-.50	1.070	na	5.0	0.007	0.39	0.010	3.0	0.013	0.001	8.25	579	na	na	
30-Aug-93	242	11:10	1.070	na	5.0	0.005	0.41	0.010	2.4	0.018	0.001	8.29	574	na	na	
07-Sel3.93	250	12:05	1.020	na	5.0	0.025	0.37	0.010	2.6	0.022	0.005	8.27	592	na	na	
13-Sep-93	256	11:40	1.000	14.0	5.8	0.009	0.47	0.010	2.9	0.025	0.010	8.43	598	na	na	
04-Oct-93	277	13:20	1.100	na	7.3	0.007	0.49	0.010	2.9	0.031	0.022	8.14	592	na	na	
13-Oct-93	286	09:20	na	na	5.0	0.005	0.43	0.010	3.4	0.017	0.001	8.26	610	17.8	1.4	
1 9-Oct-93	292	10:20	1.100	na	41.2	0.005	0.55	0.010	6.1	0.023	0.001	8.08	652	21.9	1.9	
26-Oct-93	299	15:35	1.000	na	8.2	0.005	0.39	0.010	3.4	0.013	0.001	8.36	611	76.5	1.5	
02-Nov-93	306	10:40	0.900	na	25.2	0.004	0.35	0.010	3.6	0.014	na	8.20	601	17.4	1.3	
09-Nov-93	313	15:20	1.000	na	5.0	0.013	0.38	0.010	3.6	0.014	0.001	8.15	620	17.5	1.4	
23-Nov-93	327	12:00	0.160	na	5.0	0.007	0.39	0.010	4.3	0.014	0.003	8.24	485	19.1	1.3	
06-Dec-93	340	15:15	0.240	na	59.7	0.043	1.48	0.020	0.1	0.174	na	8.40	576	20.7	2.5	
Feb-20-94	51				424.0		4.60			0.730						
Feb-21-94	52	1040			52.3	0.325	1.92	0.020	5.1	0.335	0.058	7.92	449	22.9	4.5	8.9
Mar-22-94	81				483	0.447	4.7	0.01	2.8	0.82	0.152	7.4	273 81		3.4	3.5
Mar-24-94	83				413	0.209	4.1	0.36	3.1	0.89	0.085	7.5	266	8.1	4.7	2.9
Apr-18-94	108	1450	0.265	9	2.7	0.01	0.4	0.01	5.5	0.017	0.005					
Apr-26-94	116	950	0.185	11	17	0.038	0.87	0.05	2.8	0.059	0.011	8.25	535	18.5	2.7	6
May-02-94	122	1315	0.27	10	5.3	0.005	0.44	0.01	4.9	0.015	0.003	8.4	565	20.4	1.9	7.4
May-24-94	144	1347	0.14		7.8	0.027	0.47	0.02	4.2	0.017	0.001	8.29	597	17.8	1.3	6.2
May-26-94	146	1220	0.305		81.5	0.154	1.92	0.11	8	0.268	0.059	7.82	314	9.3	4.2	1.7



Paired Watershed Study - Kintore Creek Water Sampling Data - Station: Station 3, (West) - Routine Grab Samples

Date of Sample	Julian Date	Time	Staff Guage (ft.)	Temp (C)	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)					
04-Jan-93	4	10:50	1.700	6.0	76.1	0.017	1.36	0.010	0.8	0.228	0.038	8.24	256	na	na	
25-Jan-93	25	12:20	0.940	na	23.2	0.027	0.90	0.010	5.3	0.052	0.002	8.19	551	na	na	
23-Feb-93	54	11:47	snow	na	10.4	0.008	0.39	0.010	6.7	0.020	na	8.18	604	na	na	
29-Mar-93	88	11:15	1.140	na	55.6	0.154	1.74	0.010	1.9	0.128	0.020	7.90	364	na	na	
30-Mar-93	89	15:15	1.250	na	91.4	0.076	1.70	0.010	1.2	0.185	na	7.84	278	na	na	
26-Apr-93	116	14:03	0.78	11	10.7	0.055	0.74	0.01	3.6	0.034	0.005	8.21	517	na	na	
31-May-93	151	12:55	0.710	12.0	19.8	0.006	0.85	0.010	4.7	0.051	na	8.25	582	na	na	
07-Jun-93	158	14:30	0.050	16.0	10.0	0.005	0.51	0.010	6.3	0.027	0.003	8.16	596	na	na	
09-Jun-93	160	13:45	0.750	17.0	20.5	0.006	0.89	0.010	4.1	0.061	0.013	8.22	610	na	na	
18-Jun-93	169	11:45	0.640	16.0	31.6	0.007	0.68	0.010	6.5	0.046	na	8.32	602	na	na	
21-Jun-93	172	14:45	0.645	18.0	35.0	0.014	0.83	0.010	4.4	0.066	0.001	8.36	602	na	na	
07-Jul-93	188	13:35	0.800	19.0	121.0	0.005	1.52	0.010	5.9	0.168	0.007	8.37	573	na	na	
12-Jul-93	193	11:20	0.650	18.0	15.4	0.005	0.74	0.020	4.5	0.052	0.009	8.28	632	na	na	
20-Jul-93	201	12:50	0.62	18	10.3	0.023	0.43	0.01	2.8	0.019	0.007	8.3	604	na	na	
26-Jul-93	207	15:55	0.600	20.0	5.0	0.005	0.31	0.010	6.1	0.012	0.001	8.22	616	na	na	
09-Aug-93	221	13:15	0.640	na	5.0	0.015	0.33	0.010	1.2	0.014	0.001	8.25	607	na	na	
23-Aug-93	235	14:40	0.640	na	5.0	0.006	0.36	0.010	6.6	0.010	0.001	8.21	621	na	na	
30-Aug-93	242	11:05	0.630	na	19.0	0.005	1.67	0.010	5.5	0.156	0.001	8.28	618	na	na	
07-Sep-93	250	11:55	0.650	na	5.0	0.009	0.44	0.010	5.6	0.020	0.005	8.25	634	na	na	
13-Sep-93	256	11:25	0.650	na	48.9	0.010	0.94	0.010	5.1	0.086	0.001	8.41	619	na	na	
04-Oct-93	277	13:10	0.650	na	8.7	0.009	0.47	0.010	4.8	0.031	0.001	8.15	660	na	na	
13-Oct-93	286	09:15	0.650	15.0	5.0	0.005	0.35	0.010	6.1	0.008	0.001	8.23	637	19.4	1.7	
19-Oct-93	292	10:10	0.670	na	10.2	0.005	0.48	0.010	5.6	0.019	0.001	8.20	660	28.3	2.3	
26-Oct-93	299	15:27	0.650	na	31.5	0.005	0.37	0.010	5.5	0.011	0.001	8.39	607	17.7	1.8	
02-Nov-93	306	10:35	0.680	na	32.1	0.001	0.31	0.010	5.8	0.011	na	8.26	637	19	1.7	
09-Nov-93	313	15:15	0.650	na	25.8	0.028	0.40	0.010	5.7	0.018	0.001	8.17	631	17.4	1.7	
23-Nov-93	327	11:55	0.640	na	13.3	0.005	0.36	0.010	6.3	0.013	0.002	8.23	500	20.6	1.6	
06-Dec-93	340	15:40	0.820	na	64.1	0.017	1.50	0.010	5.5	0.188	na	8.44	664	48.9	3.1	
Feb-21-94	51	1100			325.0	0.062	0.81	0.010	4.4	0.105	0.028	8.28	687	69.7	2.7	35.6
Mar-22-94	52				617.0	0.153	6.50	0.010	1.7	0.900	0.040	7.75	398	41	3.3	25.1
Mar-24-94	81				416	0.038	4.8	0.06	2.5	0.92	0.138	7.58	284	15.9	4.9	9.4
Apr-18-94	83	1440	0.6	12	5.7	0.018	0.55	0.01	5.3	0.019	0.002					
Apr-26-94	108	947	0.74	12	175	0.04	2.9	0.03	3.2	0.3	0.01	8.13	679	72.2	3.1	36.3
May-02-94	116	1310	0.62	12	6.3	0.008	0.58	0.01	4.4	0.016	0.003	8.45	585	24.5	1.3	10.8
May-11-94	131	905	0.59		10.4	0.007	0.52	0.01	5.3	0.012	0.001	8.34	598	23.1	1.4	10.5
May-24-94	144	1344	0.58		13	0.016	0.55	0.01	6.4	0.016	0.001	8.36	605	12.3		5.8
May-26-94	146	1215	0.98		27.9	0.017	1.11	0.01	1.9	0.132	0.04	8.03	514	42.3	2.1	21.5

**Paired Watershed Study - Kintore Creek Water Sampling Data - Station: Station 1, (West) - ISCO Samples**

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Date	Julian	Time	Suspended	Total	Date	Julian	Time	Suspended	Total	TKN
27-MAR-93	86	1000	406.0	0.790	25-APR-	115	1200	213	0.52	
27-MAR-93	86	1100	33.4	0.248	25-APR-	115	1400	116	0.36	
27-MAR-93	86	1200	78.5	0.334	25-APR-	115	1600	60.9	0.236	
27-MAR-93	86	1300	231.0	0.640	25-APR-	115	1800	35.2	0.181	
27-MAR-93	86	1400	381.0	0.850	25-APR-	115	2000	24.2	0.142	
27-MAR-93	86	1500	523.0	0.910	25-APR-	115	2200	21.2	0.125	
27-MAR-93	86	1600	480.0	0.880	19-JUN-93	170	1700	17.2	0.300	
27-MAR-93	86	1700	424.0	0.790	19-JUN-93	170	1900	5.0	0.018	
27-MAR-93	86	1800	317.0	0.650	19-JUN-93	170	2300	5.0	0.021	
27-MAR-93	86	1900	286.0	0.610	20-JUN-93	171	100	5.0	0.022	
27-MAR-93	86	2000	233.0	0.485	20-JUN-93	171	500	21.4	0.043	
27-MAR-93	86	2100	169.0	0.500	20-JUN-93	171	700	16.4	0.035	
28-MAR-93	87	1000	57.3	0.256	16-Oct-93	289	1800	126.0	0.114	
28-MAR-93	87	1100	47.5	0.304	16-Oct-93	289	2000	117.0	0.264	
28-MAR-93	87	1200	153.0	0.348	16-Oct-93	289	2200	60.8	0.322	
28-MAR-93	87	1300	240.0	0.510	17-Oct-93	290	0	33.5	0.155	
28-MAR-93	87	1400	406.0	0.660	17-Oct-93	290	200	44.8	0.111	
28-MAR-93	87	1500	321.0	0.635	17-Oct-93	290	400	32.9	0.108	
28-MAR-93	87	1600	303.0	0.635	17-Oct-93	290	600	69.6	0.120	
28-MAR-93	87	1700	239.0	0.470	17-Oct-93	290	800	39.1	0.168	
28-MAR-93	87	1800	185.0	0.364	17-Oct-93	290	1000	55.6	0.179	
28-MAR-93	87	1900	125.0	0.328	17-Oct-93	290	1200	248.0	0.550	
28-MAR-93	87	2000	86.2	0.280	17-Oct-93	290	1400	274.0	0.650	
28-MAR-93	87	2100	61.1	0.266	17-Oct-93	290	1600	106.0	0.435	
29-MAR-93	88	1100	33.0	0.164	17-Oct-93	290	1800	72.6	0.290	
29-MAR-93	88	1200	34.7	0.164	17-Oct-93	290	2000	49.4	0.199	
29-MAR-93	88	1300	35.6	0.172	17-Oct-93	290	2200	34.3	0.135	
29-MAR-93	88	1400	50.8	0.168	18-Oct-93	291	0	26.2	0.107	
29-MAR-93	88	1500	57.3	0.184	18-Oct-93	291	200	23.8	0.090	
29-MAR-93	88	1600	56.9	0.178	18-Oct-93	291	400	24.7	0.090	
29-MAR-93	88	1700	39.7	0.174	06-Dec-93	340	1400	31.3	0.140	
29-MAR-93	88	1800	40.8	0.164	06-Dec-93	340	1500	51.5	0.161	
29-MAR-93	88	1900	34.1	0.175	06-Dec-93	340	1700	78.2	0.220	
29-MAR-93	88	2000	36.2	0.176	06-Dec-93	340	1800	83.4	0.382	
29-MAR-93	88	2100	31.3	0.161	06-Dec-93	340	1900	85.0	0.296	
29-MAR-93	88	2200	29.9	0.167	06-Dec-93	340	2000	69.6	0.246	
09-APR-93	99	2200	30.9	0.094	06-Dec-93	340	2100	59.2	0.220	
10-APR-93	100	0	175.0	0.375	21-Mar-94	80	10:00	9.6	0.03	0.6
10-APR-93	100	200	188.0	0.345	21-Mar-94	80	12:00	34.3	0.1	1.2
10-APR-93	100	400	104.0	0.255	21-Mar-94	80	14:00	264	0.98	5.2
10-APR-93	100	600	58.1	0.190	21-Mar-94	80	16:00	257	0.82	3.3
10-APR-93	100	800	39.6	0.166	21-Mar-94	80	18:00	181	0.64	3.7
10-APR-93	100	1000	25.6	0.137	21-Mar-94	80	20:00	110	0.5	2.9
10-APR-93	100	1200	21.4	0.125	21-Mar-94	80	22:00	68.6	0.4	2.9
20-APR-93	110	1450	22.1	0.055	22-Mar-94	81	00:00	47.3	0.262	2.18
20-APR-93	110	1550	24.6	0.08	22-Mar-94	81	02:00	41.4	0.218	1.78
20-APR-93	110	1650	17.9	0.067	22-Mar-94	81	12:30	45.1	0.18	1.3
20-APR-93	110	1750	18.7	0.067	22-Mar-94	81	14:30	288	0.66	3.2
20-APR-93	110	1850	80.0	0.190	22-Mar-94	81	16:30	361	0.75	4

2G-APR-93	110	1950	154.0	0.295	22-Mar-94	81	18:30	275	0.96	5.25
20-APR-93	110	2050	112.0	0.240	22-Mar-94	81	20:30	202	0.62	3.3
20-APR-93	110	2150	64.4	0.165	22-Mar-94	81	22:30	138	0.415	2.3
20-APR-93	110	2250	42.9	0.138	23-Mar-94	82	12:30	65.8	0.33	2.56
20-APR-93	110	2350	33.1	0.106	23-Mar-94	82	14:30	220	0.65	3.7
21-APR-93	111	50	27.2	0.105	23-Mar-94	82	16:30	255	0.79	4.3
21-APR-93	111	150	24.3	0.095	23-Mar-94	82	18:30	205	0.59	3.3
25-APR-93	115	800	6.4	0.105	23-Mar-94	82	20:30	103	0.37	2.3
25-APR-93	115	100	382	0.885						

Paired Watershed Study - Kintore Creek Water Sampling Data - Station: Station 5, (East) - Routine Grab Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp (°C)	Suspended Solids (mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)					
04-Jan-93	4	10:15	over	6.0	1120.0	0.001	6.20	0.010	1.2	2.040	0.113	8.10	210	na	na	
25-Jan-93	25	11:30	0.310	na	13.7	0.040	0.61	0.010	3.6	0.036	0.010	8.10	508	na	na	
23-Feb-93	54	11:07	snow	na	5.0	0.027	0.45	0.010	3.7	0.028	na	8.14	549	na	na	
29-Mar-93	88	11:28	0.850	na	96.8	0.200	1.56	0.010	2.3	0.254	0.063	7.62	257	na	na	
30-Mar-93	89	14:40	0.830	na	158.0	0.171	1.62	0.020	2.1	0.272	na	7.77	296	na	na	
26-Apr-93	116	11:40	0.318	7	9.8	0.053	0.61	0.01	3.1	0.036	0.011	8.04	479	na	na	
31 -Apr-93	151	10:45	0.228	12.0	17.3	0.015	0.77	0.010	1.6	0.046	na	8.16	474	na	na	
07-Jun-93	158	12:20	0.196	17.0	5.0	0.015	0.64	0.010	2.8	0.028	0.006	8.13	539	na	na	
09-Jun-93	160	11:04	0.390	16.0	36.7	0.024	1.20	0.040	3.8	0.104	0.021	8.02	496	na	na	
18-Jun-93	169	10:45	0.140	17.0	5.2	0.025	0.47	0.020	4.6	0.030	na	8.06	594	na	na	
21-Jun-93	172	13:45	0.190	18.0	5.0	0.005	0.71	0.010	2.2	0.041	0.013	8.22	569	na	na	
07-Jul-93	188	12:40	0.128	20.0	5.0	0.043	0.39	0.030	3.7	0.046	0.044	8.26	575	na	na	
12-Jul-93	193	09:50	0.190	19.0	18.4	0.013	1.06	0.010	2.7	0.090	0.037	8.11	551	na	na	
20-Jul-93	201	12:15	0.17	21	20	0.018	0.73	0.01	1.7	0.067	0.019	8.26	568	na	na	
26-Jul-93	207	14:25	0.130	23.0	5.0	0.005	0.37	0.010	3.2	0.044	0.016	8.30	555	na	na	
09-Aug-93	221	12:15	na	na	5.0	0.019	0.38	0.010	2.2	0.037	0.012	8.28	578	na	na	
23-Aug-93	235	13:40	0.100	na	5.0	0.005	0.48	0.010	3.1	0.048	0.010	8.13	565	na	na	
30-Aug-93	242	10:05	0.120	na	5.0	0.005	0.40	0.010	2.4	0.031	0.003	8.30	575	na	na	
07-Sep-93	250	10:40	0.190	na	36.0	0.010	0.69	0.010	3.0	0.082	0.008	8.15	488	na	na	
13-Sep-93	256	10:10	0.190	na	6.1	0.019	0.57	0.010	2.1	0.052	(3.015	na	na	na	na	
04-Oct-93	277	11:30	0.178	na	5.0	0.042	0.38	0.010	2.0	0.041	0.013	8.05	611	na	na	
13-Oct-93	286	08:44	0.198	na	32.2	0.023	0.77	0.010	2.0	0.079	0.001	8.05	613	10.6	1.5	
19-Oct-93	292	08:00	0.270	na	16.0	0.005	0.61	0.010	3.3	0.037	0.001	7.99	602	13.6	2.3	
26-Oct-93	299	14:40	0.220	na	10.8	0.005	0.56	0.010	2.1	0.026	0.003	8.26	595	15.2	1.5	
02-Nov-93	306	10:10	0.239	na	4.5	0.014	0.42	0.010	1.9	0.019	na	8.00	581	11.2	1.5	
09-Nov-93	313	14:30	0.228	na	6.6	0.008	0.41	0.010	2.2	0.023	0.005	8.11	587	10.9	1.4	
23-Nov-93	327	11:21	0.233	na	3.8	0.007	0.51	0.010	2.5	0.021	0.009	7.92	650	12.2	1.4	
06-Dec-93	340	14:38	0.380	na	67.0	0.078	1.30	0.020	2.7	0.170	na	8.20	546	13.7	2.7	
Feb-20-94	51				404.0		6.60			1.540						
Feb-21-94	52	940			31.4	0.118	1.08	0.010	3.5	0.115	0.147	7.77	423	9.8	3.1	2.4
Mar-22-94	81				739.0	0.187	3.90	0.010	2.7	1.150	0.042	7.67	32.9	7	2.8	1.9
Mar-24-94	83				203.0	0.335	1.85	0.300	3.3	0.425	0.128	7.53	306	5.7	3.4	1.9
Apr-18-94	108	1400	0.250	9.0	3.6	0.021	0.48	0.010	2.9	0.016	0.003					
Apr-26-94	116	835	0.278	11	10	0.007	0.61	0.01	1.3	0.026	0.004	8.23	470	12.2	1.6	2.4
May-02-94	122	1230	0.247	12.0	3.3	0.027	0.63	0.010	2.6	0.027	0.010	8.28	511	10.5	1.5	3.1
May-11-94	131	845	0.225		6.0	0.013	0.53	0.010	2.9	0.015	0.005	8.29	530	10.2	1.5	3.1
May-24-94	144	1245	0.185		2.8	0.030	0.39	0.020	3.8	0.030	0.021	8.22	557	9.7	1.3	4
May-26-94	146	1345	0.658		186.0	0.263	2.70	0.050	2.2	0.590	0.050	7.84	359	10.1	2.5	1.5

Paired Watershed Study - Kintore Creek Water Sampling Data - Station: Station 6, (East) - Routine Grab Samples

Date of Sample	Julian Date	Time	Staff Guage (metres)	Temp (C)	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L) (M)	Sodium
						F ree Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)					
04-Jan-93	4	10:25	0.850	6.0	1088.0	0.021	5.50	0.010	1.2	1.740	0.144	8.20	208	na	na	
25-Jan-93	25	11:45	0.285	na	8.6	0.035	0.64	0.010	3.3	0.025	0.006	8.04	476	na	na	
23-Feb-93	54	11:19	snow	na	5.0	0.012	0.36	0.010	3.2	0.018		8.10	532	na	na	
29-Mar-93	88	14:05	0.635	na	623.0	0.160	3.25	0.010	2.0	0.760	0.048	7.84	233	na	na	
30-Mar-93	89	14:30	0.550	na	232.0	0.117	2.15	0.020	2.0	0.375	na	7.81	282	na	na	
26-Apr-93	116	13:00	0.3	9	6.4	0.04	0.63	0.01	2.7	0.023	0.001	8.18	444	na	na	
31-May-93	151	11:15	0.270	12.0	7.9	0.007	0.66	0.010	1.2	0.029	na	8.16	474	na	na	
07-Jun-93	158	13:40	0.226	18.0	5.0	0.011	0.53	0.010	2.1	0.025	0.008	8.27	520	na	na	
09-Jun-93	160	11:52	0.330	16.5	20.7	0.003	1.10	0.040	3.4	0.072	0.017	8.08	487	na	na	
18-Jun-93	169	11:00	0.199	18.0	5.0	0.019	0.45	0.010	4.1	0.019	na	8.28	576	na	na	
21-Jun-93	172	14:05	0.240	19.0	5.0	0.010	0.70	0.010	1.5	0.030	0.009	8.27	550	na	na	
07-Jul-93	188	12:50	0.190	23.0	5.0	0.018	0.33	0.010	3.3	0.023	0.002	8.41	564	na	na	
12-Jul-93	193	10:40	0.265	20.0	11.9	0.008	0.88	0.010	2.0	0.071	0.028	8.17	534	na	na	
20-Jul-93	201	12:30	0.23	21	78.1	0.019	1	0.01	0.2	0.245	0.018	8.25	449	na	na	
26-Jul-93	207	14:45	0~200	23.0	12.9	0.013	0.36	0.010	3.0	0.020	0.001	8.23	534	na	na	
08-Aug-93	219			na	5.0	0.005	0.37	0.010	2.4	0.021	0.001	8.23	554	na	na	
09-Aug-93	221	12:35	na	na	8.8	0.021	0.34	0.010	1.0	0.019	0.001	8.16	547	na	na	
23-Aug-93	235	14:00	0.150	na	5.0	0.005	0.33	0.010	3.1	0.012	0.001	8.27	559	na	na	
30-Aug-93	242	10:25	na	na	5.0	0.005	0.37	0.010	2.4	0.021	0.001	8.23	554	na	na	
07-Sep-93	250	11:15	0.150	na	5.0	0.005	0.44	0.010	2.1	0.027	0.006	8.26	604	na	na	
13-Sep-93	256	10:30	0.150	na	4.4	0.008	0.53	0.010	1.9	0.024	0.007	8.34	596	na	na	
04-Oct-93	277	11:00	0.200	na	5.0	0.027	0.41	0.010	2.1	0.031	0.003	8.12	606	na	na	
13-Oct-93	286	08:50	0.210	na	5.0	0.005	0.39	0.010	2.0	0.011	0.001	8.12	606	10.4	1.3	
19-Oct-93	292	09:10	0.285	na	3.2	0.005	0.58	0.010	2.5	0.018	0.001	8.03	578	12.7	1.8	
26-Oct-93	299	14:50	0.230	na	3.0	0.005	0.48	0.010	2.1	0.011	0.001	8.31	583	11.8	1.3	
02-Nov-93	306	10:00	0.240	na	2.5	0.008	0.43	0.010	1.8	0.011	na	8.04	571	11.7	1.3	
09-Nov-93	313	14:45	0.240	na	5.0	0.005	0.48	0.010	2.2	0.018	0.001	8.19	569	11.8	1.2	
23-Nov-93	327	11-.40	0.250	na	5.0	0.005	0.46	0.010	2A	0.013	0.005	8.38	459	13	1.1	
06-Dec-93	340	15:15	0.350	na	71.8	0.028	1.10	0.010	0.8	0.176	na	8.41	509	12.2	1.9	
Feb-20-94	51				206.0		2.40			0.340						
Feb-21-94	52	917			42.3	0.167	1.27	0.010	4.0	0.126	0.030	7.85	438	10.8	3.5	2.6
Mar-22-94	81				1310	0.098	5.7	0.01	2.8	1.95	0.05	7.73	321	6.4	2	1.9
Mar-24-94	83				364	0.378	2.4	0.34	3.7	0.605	0.165	7.55	309	6.8	3.3	2.1
Apr-18-94	108	1328	0.26	9	1.9	0.007	0.38	0.01	2.5	0.009	0.002					
Apr-26-94	116	905	0.297	12	38.5	0.016	0.72	0.01	1.2	0.053	0.011	8.24	439	9.6	1.4	2.3
May-02-94	122	1255	0.25	12	3.5	0.005	0.58	0.01	2.3	0.009	0.003	8.35	477	9	1.2	3.2
May-11-94	131	840	0.25		2.2	0.008	0.56	0.01	2.5	0.01	0.003	8.33	502	9.5	1.1	2.9
May-24-94	144	1315	0.228		7	0.021	0.46	0.01	3.8	0.015	0.006	8.29	545	8.1	1	3.2
May-26-94	146	1135	0.49		138	0.442	2.82	0.07	2.4	0.376	0.071	7.88	372	10.2	3	1.8

Date of Sample	Julian Date	Time	Staff Guage (metres)	Temp (C)	Suspend ed Solids (Mg/L)	Nitrogen					Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L) (M)	Sodium
						F ree Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)						
25-Jan-93	25	11:55	0.300	na	10.4	0.068	0.54	0.010	2.1	0.042	0.010	8.14	524	na	na		
23-Feb-93	54	11:29	snow	na	24.2	0.016	0.48	0.010	0.8	0.054	na	8.03	561	na	na		
29-Mar-93	88	13:31	1.050	na	104.0	0.231	1.94	0.010	0.6	0.266	0.032	7.58	155	na	na		
30-Mar-93	89	15:00	0.800	na	37.4	0.151	0.94	0.010	0.5	0.102	na	7.75	237	na	na		
26-Apr-93	116	13:30	0.16	9	4.4	0.033	0.35	0.01	0.2	0.02	0.003	8.09	480	na	na		
31 -May-93	151	11:35	0.115	11.0	19.3	0.011	0.58	0.010	0.2	0.052	na	8.04	529	na	na		
07-Jun-93	158	14:00	0.030	16.2	16.2	0.005	0.40	0.010	0.3	0.043	0.009	8.07	598	na	na		
09-Jun-93	160	13:22	0.100	16.0	13.3	0.012	0.83	0.120	4.6	0.061	0.018	8.05	583	na	na		
18-Jun-93	169	11:20	0.000	15.0	21.4	0.005	0.37	0.010	0.4	0.043	na	8.15	594	na	na		
21-Jun-93	172	14:25	0.500	17.0	5.0	0.009	0.39	0.010	0.1	0.029	0.005	8.22	609	na	na		
07-Jul-93	188	13:15	0.020	19.0	5.0	0.019	0.23	0.010	0.3	0.030	0.019	8.26	583	na	na		
12,Jul-93	193	10:50	0.030	18.0	5.0	0.007	0.53	0.010	0.6	0.043	0.020	8.11	600	na	na		
20,Jul-93	201	12:40	0.01	18	5.7	0.019	0.31	0.01	2.9	0.028	0.005	8.14	597	na	na		
26-Jul-93	207	15:30	0.020	19.0	5.0	0.005	0.20	0.010	0.3	0.021	0.002	8.16	594	na	na		
09-Aug-93	221	13:00	na	na	5.7	0.022	0.23	0.010	0.2	0.031	0.003	8.14	596	na	na		
23-Aug-93	235	14:15	0.020	na	19.8	0.008	0.31	0.010	0.5	0.045	0.005	8.06	588	na	na		
30-Aug-93	242	10:40	0.050	na	8.6	0.005	0.28	0.010	0.3	0.034	0.001	8.16	597	na	na		
07-Sep--93	250	11:40	0.020	na	28.9	0.011	0.58	0.010	0.4	0.078	0.006	8.05	641	na	na		
13-Sep--93	256	10:50	0.020	na	14.2	0.015	0.47	0.010	0.8	0.047	0.007	8.36	633	na	na		
04-Oct-93	277	12:00	0.060	na	10.7	0.013	0.37	0.010	0.4	0.039	0.004	7.94	625	na	na		
13-Oct-93	286	09:00	0.050	12.0	11.7	0.005	0.31	0.010	0.6	0.032	0.001	8.00	630	17.8	2		
19-Oct-93	292	09:30	0.080	na	8.3	0.026	0.37	0.010	1.2	0.021	0.003	7.99	630	25.4	2.8		
26-Oct-93	299	15:00	0.070	na	5.5	0.005	0.28	0.010	0.6	0.020	0.001	8.17	615	18.6	2		
02-Nov-93	306	10~15	0.070	na	7.8	0.001	0.23	0.010	0.7	0.015	na	8.07	616	18.4	1.8		
09-Nov-93	313	15:00	0.070	na	6.9	0.045	0.29	0.010	0.6	0.020	0.001	8.12	609	18.5	1.8		
23-Nov-93	327	11:45	0.050	na	14.5	0.007	0.43	0.010	0.9	0.044	0.005	8.31	544	18.3	1.8		
06-Dec-93	340	15:30	0.240	na	84.3	0.019	1.40	0.010	2.0	0.188	na	8.42	554	22.4	2.5		
Feb-20-94	51				144.0		2.60			0.300							
Feb-21-94	52				32.0	0.464	2.24	0.020	1.7	0.152	0.009	8.02	410	16	7	3	
Mar-22-94	81				186	0.136	2.9	0.01	1.2	0.43	0.014	7.83	385	11.4	3.1	2.5	
Mar-24-94	83				177	0.234	2	0.15	1.6	0.345	0.047	7.76	169	4.8	4.7	0.9	
Apr-18-94	108	1425	0.1	8.5	16.8	0.011	0.52	0.01	1	0.034	0.002						
Apr-26-94	116	935	0.35	11	164	0.033	2.8	0.01	0.6	0.3	0.013	8.06	453	13.3	2.2	2.7	
May-02-94	122	1300	0.12	9	3.4	0.011	0.35	0.01	1	0.014	0.007	8.2	522	15	1.7	2.7	
May- 11-94	131	855	0.1		9.2	0.005	0.33	0.01	0.9	0.014	0.005	8.26	535	16.1	1.6	3	
May-24-94	144	1332	0.07		6	0.027	0.33	0.01	0.9	0.027	0.009	8.02	560	9.2	1.4	3.1	
May-26-94	146	1200	0.85		35.8	0.111	1.42	0.07	1.7	0.184	0.046	7.9.	340	13.6	3.9	1.6	

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp (C)	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L) (M)	Sodium
						F ree Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)					
25-Jan-93	25	12:05	0.260	na	39.0	0.023	1.00	0.010	5.3	0.068	0.001	8.19	555	na	na	
23-Feb-93	54	11:36	0.180	na	42.2	0.014	1.00	0.010	5.0	0.090	na	8.12	574	na	na	
29-Mar-93	88	14:25	0.940	na	115.0	0.194	2.00	0.010	1.1	0.208	0.009	7.75	198	na	na	
30-Mar-93	89	15:10	0.710	na	54.5	0.136	1.18	0.010	1.5	0.098	na	7.88	285	na	na	
26-Apr-93	116	13:55	0.335	9	11.3	0.027	0.48	0.01	3.5	0.025	0.001	8.16	547	na	na	
31-May-93	151	11:50	0.200	11.0	40.3	0.005	1.06	0.010	2.9	0.064	na	8.09	536	na	na	
07-Jun-93	158	14:20	0.145	13.0	10.3	0.005	0.40	0.010	4.8	0.020	0.003	8.02	582	na	na	
09-Jun-93	160	13:35	0.240	14.0	12.6	0.012	0.51	0.010	4.4	0.032	0.011	8.12	556	na	na	
18-Jun-93	169	11:35	0.140	15.0	4.6	0.005	0.34	0.010	4.1	0.012	na	8.15	586	na	na	
21-Jun-93	172	14:30	0.135	15.0	5.0	0.005	0.44	0.010	2.9	0.019	0.001	8.21	580	na	na	
07-Jul-93	188	13:25	0.100	19.0	15.9	0.006	0.49	0.010	3.0	0.029	0.017	8.26	590	na	na	
12-Jul-93	193	11:05	0.150	17.0	5.0	0.005	0.48	0.050	2.7	0.022	0.004	8.11	575	na	na	
20-Jul-93	201	12:45	0.15	17	5	0.011	0.38	0.01	5.4	0.018	0.006	8.11	571	na	na	
26-Jul-93	207	15:40	0.110	19.0	5.0	0.008	0.31	0.010	3.5	0.017	0.001	8.17	590	na	na	
09-Aug-93	221	13:10	na	na	6.1	0.004	0.33	0.010	3.1	0.020	0.002	8.14	596	na	na	
23-Aug-93	235	14:30	0.140	na	15.1	0.005	0.55	0.010	3.4	0.026	0.001	8.12	602	na	na	
30-Aug-93	242	10:55	0.100	na	29.0	0.005	0.87	0.010	2.9	0.053	0.001	8.14	604	na	na	
07-Sep-93	250	11:45	0.120	na	9.0	0.009	0.54	0.010	2.6	0.024	0.003	8.09	601	na	na	
13-Sep-93	256	11:10	0.150	na	19.5	0.009	0.60	0.010	2.9	0.042	0.005	8.40	583	na	na	
04-Oct-93	277	13:00	0.260	na	112.0	0.005	2.60	0.010	2.0	0.215	0.001	7.92	590	na	na	
13-Oct-93	286	09:10	0.230	13.0	6.2	0.005	0.31	0.010	2.8	0.012	0.001	8.03	626	7.1	0.6	
19-Oct-93	292	09:35	na	na	9.5	0.018	0.43	0.010	3.4	0.010	0.003	8.06	596	9.3	0.8	
26-Oct-93	299	15:25	0.230	na	7.1	0.005	0.41	0.010	2.7	0.016	0.001	8.18	581	8.2	0.8	
09-Nov-93	313	15:10	0.240	na	10.6	0.028	0.52	0.010	2.9	0.022	0.018	8.01	597	7.4	0.6	
02-Nov-93	306	10:30	0.240	na	26.7	0.001	0.57	0.010	3.0	0.041	na	8.00	597	7.9	0.7	
23-Nov-93	327	11:50	0.200	na	25.0	0.005	0.82	0.010	3.5	0.049	0.003	8.13	497	8	0.6	
06-Dec-93	340	15:35	0.400	na	103.0	0.017	2.04	0.010	3.8	0.202	na	8.38	530	11.2	1	
Feb-20-94	51				455.0		8.00			0.880						
Feb-21-94	52				124.0	0.071	2.50	0.010	3.8	0.270	0.004	8.22	465	9	1.2	2.5
Mar-22-94	81				658	0.99	10.2	0.04	2.5	1.7	0.27	7.47	369	6.2	4.2	3.1
Mar-24-94	83				323	0.226	3.3	0.18	1.7	0.57	0.053	7.57	171	3.7	2.7	0.9
Apr-18-94	108	1435	0.26	8	29.4	0.012	0.81	0.01	3.6	0.049	0.004					
Apr-26-94	116	940	0.48	10	147	0.056	2.8	0.04	1.7	0.23	0.013	8.08	480	16.6	1.2	3.3
May-02-94	122	1305	0.25	8	18.1	0.021	0.38	0.01	3.2	0.016	0.014	8.19	568	8.6	0.6	2.8
May-11-94	131	900	0.22		45.3	0.005	0.42	0.01	3.4	0.02	0.005	8.23	577	8.3	0.8	2.7
May-24-94	144	1330	0.18		32.6	0.022	0.85	0.01	3.1	0.059	0.007	8.04	578	7.1	0.5	2.8
May-26-94	146	1210	0.54			0.109	1.7	0.06	3.1	0.138	0.012	8.25	417	9.5	1.6	2

**Paired Watershed Study Kintore Creek Water**

**Sampling Data**

**Station: Station 5,  
(East)**

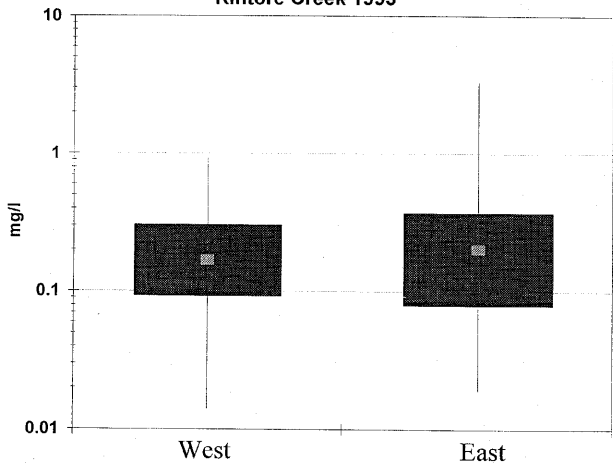
**ISCO Samples**

Date	Julian Date	Time	Suspended Solids (Mg/L)	Total Phosphorus (Mg/L)	Date	Julian Date	Time	Suspended Solids (Mg/L)	Total Phosphorus (Mg/L)	TKN (Mg/L)	19
					17-Oct-93		290	800	60.4	0.134	
					17-Oct-93		290	1000		0.151	
					17-Oct-93		290	1200	215.0	0.435	
					17-Oct-93		290	1400	349.0	0.715	
04-JAN-93	4	1030	1984.0	3.300	17-Oct-93		290	1600	179.0	0.370	
04-JAN-93	4	1230	671.0	1.450	17-Oct-93		290	1800	72.5	0.202	
04-JAN-93	4	1430	237.0	0.920	17-Oct-93		290	2000	52.2	0.110	
04-JAN-93	4	1630	123.0	0.314	17-Oct-93		290	2200	37.8	0.084	
04-JAN-93	4	1830	83.0	0.242	18-Oct-93		291	0	27.3	0.079	
04-JAN-93	4	2030	69.1	0.206	18-Oct-93		291	200	29.4	0.073	
04-JAN-93	4	2230	224.0	0.470	18-Oct-93		291	400	34.3	0.074	
05-JAN-93	5	30	196.0	0.410	06-Dec-93		340	1500	78.6	0.268	
05-JAN-93	5	230	142.0	0.352	06-Dec-93		340	1600	71.7	0.230	
05-JAN-93	5	430	83.8	0.256	06-Dec-93		340	1700	68.2	0.230	
05-JAN-93	5	630	64.5	0.224	06-Dec-93		340	1800	62.3	0.174	
05-JAN-93	6	830	71.7	0.212	06-Dec-93		340	1900	43.8	0.140	
27-MAR-93	86	1000	43.3	0.140	06-Dec-93		340	2000	34.0	0.119	
27-MAR-93	86	1100	34.7	0.145	06-Dec-93		340	2100	27.7	0.101	
27-MAR-93	86	1200	42.2	0.194	06-Dec-93		340	2200	26.8	0.078	
27-MAR-93	86	1300	72.2	0.274	06-Dec-93		340	2300	22.6	0.077	
27-MAR-93	86	1400	123.0	0.365	07-Dec-93		341	0	20.4	0.063	
27-MAR-93	86	1500	282.0	0.625	21-Mar-94		80	10:00	6	0.039	0.61
27-MAR-93	86	1600	372.0	0.880	21-Mar-94		so	12:00	59.5	0.14	1.35
27-MAR-93	86	1700	415.0	0.680	21-Mar-94		80	14:00	286	0.54	3.1
27-MAR-93	86	18DO	323.0	0.630	21-Mar-94		80	16:00	256	0.59	3.1
27-MAR-93	86	1900	245.0	0.445	21-Mar-94		80	18:00	164	0.51	2.8
27-MAR-93	86	2000	188.0	0.450	21-Mar-94		80	20:00	89.5	0.255	1.85
27-MAR-93	86	21GO	154.0	0.405	21-Mar-94		80	22:00	64.6	0.225	1.6
28-MAR-93	87	1000	68.7	0.226	22-Mar-94		81	00:00			1.7
28-MAR-93	87	1100	95.7	0.250	22-Mar-94		81	02:00	31.2	0.166	1.56
28-MAR-93	87	1200	123.0	0.358	22-Mar-94		81	12:00	58.2	0.13	1.32
28-MAR-93	87	1300	173.0	0.430	22-Mar-94		81	14:00	259	0.435	2.35
28-MAR-93	87	1400	311.0	0.655	22-Mar-94		81	16:00	690	1.01	3.8
28-MAR-93	87	ism	237.0	0.720	22-Mar-94		81	18:00	570	0.91	3.3
28-MAR-93	87	1600	270.0	0.695	22-Mar-94		81	20:00	276	0.44	2.15
28-MAR-93	87	1800	200.0	0.460	22-Mar-94		81	22:00	154	0.335	1.7
28-MAR-93	87	1900	164.0	0.395	23-Mar-94		82	12:00	125	0.345	1.9
28-MAR-93	87	2000	137.0	0.332	23-Mar-94		82	14:00	386	0.85	2.3
28-MAR-93	87	2100	135.0	0.320	23-Mar-94		82	16:00	610	0.91	3.3
28-MAR-93	87	2200	97.1	0.372	23-Mar-94		82	18:00	605	0.74	3.2
29-MAR-93	88	1100	161.0	0.304	23-Mar-94		82	20:00	286	0.68	2.85
29-MAR-93	88	1200	148.0	0.290	23-Mar-94		82	22:00	190	0.605	2.45
29-MAR-93	88	1300	221.0	0.320	24-Mar-94		82	12:00	289	0.55	1.91
29-MAR-93	88	1400	350.0	0.475	24-Mar-94		82	14:00	1124	1.64	5.8
29-MAR-93	88	1500	397.0	0.545	24-Mar-94		82	16:00	924	1.43	4.9
29-MAR-93	88	1600	300.0	0.390	12-Apr-94		102	18:00	12.9	0.044	0.81

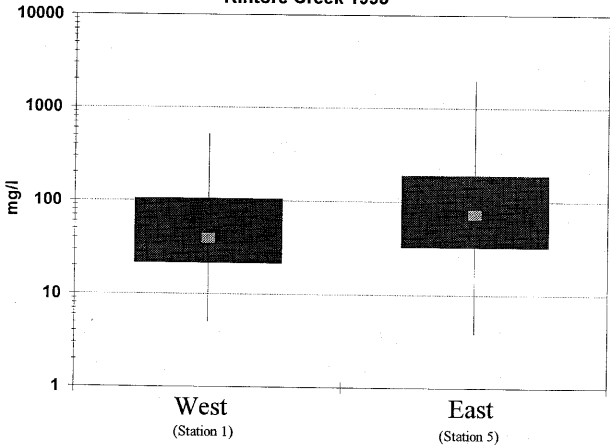


20-MAR-93	88	1700	201.0	0.235	12-Apr-94	102	20:00	48	0.18	1.05
29-MAR-93	88	1800	139.0	0.240	12-Apr-94	102	22:00	108	0.285	1,45
29-MAR-93	88	1900	97.2	0.196	13-Apr-94	103	00:00	30.1	0.106	0.94
29-MAR-93	88	2000	78.5	0.176	13-Apr-94	103	02:00	15	O.D68	0.74
29-MAR-93	88	2100	62.6	0.1132	13-Apr-94	103	04:00	31.4	0.08	U41
29-MAR-93	88	2200	58	0.134	26-Apr-94	116	09:00	20.4	0.038	0.78
09-APR-93	99	2000	22.2	0.043	26-Apr-94	116	11:00	361	0.595	2.45
09-APR-93	99	2200	44.7	0.101	26-Apr-94	116	13:00	35.4	0.074	0.87
10-APR-93	100	0	222.0	0.420	26-Apr-94	116	15:00	13.3	0.035	0.56
10-APR-93	100	200	159.0	0.335	27-Apr-94	117	03:00	9	0.028	0.7
10-APR-93	100	400	159.0	3.260	27-Apr-94	117	05:00	25.7	0.061	0.77
10-APR-93	100	600	69.8	0.198	27-Apr-94	117	07:00	537	0.92	4
10-APR-93	1DO	800	50.6	0.106	27-Apr-94	117	09:00	295	0.515	2.75
10-APR-93	100	1000	34.0	0.114	27-Apr-94	117	11:00	62.3	0.131	1.25
10-APR-93	100	1200	25.4	0.073	27-Apr-94	117	13:00	114	0.175	1.16
2D-APR-93	110	1530	39.3	0.110	27-Apr-94	117	15:00	168	0.22	1.45
20-APR-93	110	1630	98.5	0.226	27-Apr-94	117	21:00	28.1	0.059	0.9
20-APR-93	110	1730	78.2	0.174	11-May-94	131	22:00	5.4	0.019	0.6
20-APR-93	110	la3O	586.0	1.210	12-May-94	132	00:00	301	0.62	2.4
20-APR-93	110	1930	397.0	1.030	12-May-94	132	02:00	81.6	0.164	1.22
20-APR-93	110	2030	527.0	0.700	12-May-94	132	04:00	30.7	0.064	0.76
20-APR-93	110	2130	375.0	0.905	12-May-94	132	06:00	21.2	0.052	0.6
2D-APR-93	110	2230	185.0	0.280	12-May-94	132	08:00	11.4	0.033	0.67
21-APR-93	111	330	88.8	0.248	26-May-94	146	06:50	1171	1.55	7.15
21-APR-93	111	430	47.8	0.072	26-May-94	146	08:50	926	1.68	7.45
21 -APR-93	111	530	24.1	0.068	26-May-94	146	10:20	316	0.665	3.25
21-APR-93	111	630	21.7	0.053	26-May-94	146	10:35	179	0.47	2.62
25-APR-93	116	800	17.9	0.035	26-May-94	146	11:35	167	0.37	2.54
25-APR-93	116	1000	21.0	0.035	26-May-94	146	12:35	101	0.28	1.8
25-APR-93	116	1200	763.0	1.670	26-May-94	146	13:35	80.9	0.182	1.63
25-APR-93	116	1400	354.0	0.840	26-May-94	146	14:35	103	0.258	1.86
25-APR-93	116	1600	219.0	0.350	26-May-94	146	15:35	63.9	0.194	1.62
25-APR-93	116	1800	258.0	0.224	26-May-94	146	16:35	56.7	0.15	1.54
25-APR-93	116	2000	113.0	0.128	26-May-94	146	17:35	61.3	0.146	1.46
25-APR-93	116	2200	52.1	0.106	26-May-94	146	18:35	54	0.136	1.42
25-APR-93	116				26-May-94	146	19:35	47.9	0.114	1.56
19-JUN-93	170	2100	500.0	0.170	26-May-94	146	20:35	41.6	0.138	1.28
19-JUN-93	170	2300	214.0	0.230	26-May-94	146	21:35	55.5	0.112	1,46
16-Oct-93	289	1800	191.0	0.380	31 -May-94	151	17:00	561	0.83	3.35
16-Oct-93	289	2000	115.0	0.234	31 -May-94	151	18:00	1708	3.3	8.9
16-Oct-93	289	2200	64.6	0.122	31 -May-94	151	19:00	364	0.7	2.75
17-Oct-93	290	0	38.9	0.092	31 -May-94	151	20:00	163	0.294	1.74
17-Od-93	290	200	32.5	0.058	31 -May-94	151	21:00	112	0.192	1.42
17-Oct-93	290	400	313.2	0.080	31 -May-94	151	22:00	75.9	0.166	1.26
117-Oct-93	290	600	91.8	0.190	31 -May-94	151	23:00	91.9	0.16	1,26
					31 -May-94	151	16:00	212	0.36	4.75

# Total Phosphorus Kintore Creek 1993



# Suspended Solids Kintore Creek 1993



PRELIMINARY COMPUTATION SHEET

STATION NO. 02GD120

MAR 1993			APR 1993			MAY 1993			JUN 1993		
DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S
1	-9999.999	-9999.999	1	0.742	0.363	1	0.551	0.079	1	0.503	0.03S
2	-9999.999	-9999.999	2	0.679	0.241	2	0.544	0.072	2	0.492	0.026
3	-9999.999	-9999.999	3	0.635	0.179	3	0.540	0.06B	3	0.491	0.025
4	-9999.999	-9999.999	4	0.612	0.148	4	0.538	0.066	4	0.487	0.022
5	-9999.999	-9999.y99	5	0.605	0.139	5	0.561	0.091	5	0.520	0.050
6	-9999.999	-9999.999	6	0.597	0.130	6	0.545	0.073	6	0.499	0.031
7	-9999.999	-9999.999	7	0.581	0.112	7	0.532	0.060	7	0.498	0.031
8	-9999.999	-9999.999	8	0.573	0.104	8	0.324	0.052	8	0.499	0.031
9	-9999.999	-9999.999	9	0.581	0.112	9	0.519	0.048	9	0.614	0.161
10	-9999.999	-9999.999	10	0.717	0.321	10	0.514	0.044	10	0.563	0.093
11	-9999.999	-9999.999	11	0.612	0.148	11	0.511	0.041	11	0.520	0.049
12	-9799.999	-9999.999	12	0.584	0.116	12	0.507	0.038	12	0.504	0.035
13	-9999.999	-9999.999	13	0.569	0.079	13	0.50S	0.036	13	0.496	0.029
14	-9999.999	-9999.999	14	0.557	0.086	14	0.505	0.036	14	0.490	0.024
15	-9999.999	-9999.999	15	0.551	0.079	15	0.528	0.057	15	0.495	0.028
16	-9999.999	-9999.999	16	0.565	0.095	16	0.508	0.039	16	0.484	0.018
17	-9999.999	-9999.999	17	0.551	.0.079.	17	0.5D4	0.037	17	0.482.	0.016
18	-9999.999	-9999.999	18	0.550	0.078	18	0.506	0.036	18	0.483	0.017
19	-9999.999	-9999.999	19	0.562	0.091	19	0.504	0.035	19	0.495	0.028
20	-9999.979	-9999.999	20	0.746	0.367	20	0.501	0.033	20	0.509	0.039
21	-9999.999	-9999.999	21	0.663	0.221	21	0.506	0.037	21	0.503	0.034
22	-9999.999	-9999.999	22	0.597	0.130	22	0.504	0.035	22	0.491	0.025
23	-9999.999	-9999.999	23	0.569.	0.099	23	0.503	0.034	23	0.485	0.019
24	-9999.999	-9999.999	24	0.560	0.089	24	0.515	0.045	24	0.480	0.015
25	-9999.999	-9999.999	25	0.675	0.265	25	0.507	0.038	25	0.483	0.017
26	-9999.999	-9999.999	26	0.616	0.154	26	0.501	0.033	26	0.493	0.026
27	-9999.999	-9999.999	27	0.582	0.113	27	0.498	0.031	27	0.482	0.017
28	1.042	-9999.999	28	0.565	0.09S	28	0.500	0.032	28	0.480	0.015
29	1.041	-9999.999	29	0.559	0.088	29	0.494	0.027	29	0.478	0.013

30	0.878	0.659	.30	0.570-	0.100	30	0.491	0.025	30	0.474	0.009
31	0.746	0.364	31	-1111.111	-1111.111	31	0.512	0.042	31	-1111.111	-1111.111
	TOTAL =	-9999.999		TOTAL =	4.441		TOTAL =	1.420		TOTAL =	0.978
	MEAN =	-9999.999		MEAN =	0.148		MEAN =	0.046		MEAN =	0.033
	DAM3 =	-9999.999		DAM3 =	384.000		DAM3 =	23.000		DAM3 =	84.500

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY
1.336	METRES	1637 28	0.863	METRES	1253 25	0.581	METRES	1435 5	0.803	METRES	3 6 9
0.836	M3/S	17 8 30	0.622	M3/S	1253 25	0.113	M3/S	1435 5	0.489	M3/S	3 6 9
0.689	METRES	24 0 31	0.544	METRES	1118 18	0.487	METRES	1747 30	0.473	METRES	24 0 30
0.258	M3/S	24 0 31	0.072	M3/S	1118 18	0.021	M3/S	1747 30	0.008	M3/S	24 0 30

NOTE THAT -1111.111 = NOT APPLICABLE, -9999.999 = MISSING DATA

**PRELIMINARY COMPUTATION SHEET**

**STATION NO. 02GD120**

JUL 1993			AUG1993			SEP 1993			OCT 1993		
DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S
1	0.472	0.007	1	0 470	0.005	1	0.474	0.008	1	0.486	0.020
2	0.473	0.007	2	0 470	0.005	2	0.492	0.026	2	0.505	0.036
3	0.474	0.009	3	0 469	0.005	3	0.538	0.069	3	0. 409	0.023
4	0.471	0.006	4	0470	0.005	4	0.516	0.047	4	0.495	0.028
5	0.469	0.00S	5	0.465	0.004	5	0.479	0.014	5	0. 489	0.023
6	0.473	0.009	6	0.464	0.004	6	0.480	0.014	6	0. 482	0.017
7	0.515	0.048	7	0.468	0. 005	7	0.478	0.013	7	0.481	0.015
8	0.485	0.019	8	0.464	0. 004	8	0.474	0.009	8	0.479	0.014
9	0.482	0.016	9	0.460	0. 003	9	0.470	0.00,1	9	0.537	0.071
10	0.476	0.011	10	0.459	0.003	10	0.486	0.019	10	0.513	0.042
11	0.483	0.018	11	0.461	0.003	11	0.541	0.072	11	0.494	0.027
12	0.514	0.046	12	0.454	0. 002	12	0.491	0.025	12	0.490	0.024
13	0.481	0.016	13	0.454	0.002	13	0.484	0.018	13	0.488	0.022
14	0.480	.0.0is	14	0.447	-9999.999	14	0.476	0.011	14	0.496	0.021
15	0.477	0.012	15	0.448	-9999.999	15	0.491	0.024	15	0.482	0.017
16	0.474	0.009	16	0.465	0.004	16	0.481	0.016	16	0.514	0.047
17	0 473	.0,009	17	0.452	0.-001	17	0. 474	0. 008.	17	0,673	0.266
18	0.473	0.008	18	0.446	-9999.999	18	0.473	0.00e	. 18	0.502	0.114
19	0.549	0.086	19	0.440	-9999.999	19	0.472	0.007	19	0.533	0.061
20	0.491	0.025	20	0.457	-9999.999	20	0.467	0.004	20	0.518	0.047
21	0.481	0.015	21	0.458	0.003	21	0.466	0.004	21	0.528	0.056
22	0.480	0.015	22	0.449	.-9999.999	22	0.468	0.005	22	0.507	0.037
23	0.482	0.016	23	0.450	-9999.999	23	0.470	0.005	23	0.500	0.032
24	0.476	0.010	24	0.4-48	-9999.999	24	0.465	0.004	24	0.495	0.029
25	0.474	0.009	25	0.442	-9999.999	25	0.466	0.004	25	0.490	0.024
26	0.476	0,011	26	.0.445	-9999.999	26	0.474	0.009	26	0.488	0.022
27	0.472	0.006	27	0.450	0.001	27	0.475	0.009	27	0.497	0.021
28	0. 484	0.017	28	0.462	0.003	128	0.504	0.036	28	0.491	0.025
29	0.485	0.019	29	0.466	0.004	29	0.496	0.029	29	0.495	0.019

30	0.486	0.020	.30	0.473	0.008	30	0.486	0.021	30	0.483	0.018
31	0.474	0.009	31	0.479	0.013	31			31	0.493	0.026
	TOTAL =	0.525		TOTAL =	-9999.999		TOTAL =	0.543		TOTAL =	1.243
	MEAN =	0.017		MEAN =	-.9999.999		MEAN =	0.018		MEAN =	0.040
	DAM3 =	45.400		DAM3 =	-9999.999		DAM3 =	46.900		DAM3 =	107.000

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE-

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY
0.728	METRES	4 1 19	0.496	METRES	959 23	0.641	METRES	341 11	0.906	METRES	1517 17
0.323	M3/S	4 1 19	0.024	M3/S	027 16	0.187	M3/S	341 11	0.718	M3/S	1517 17
0.466	METRES	1616 5	0.426	METRES	910 23	0.463	METRES	2 6 21	0.475	METRES	2255 8
0.004	M3/S	1616 5	-283.0	M3/S	0 0 27	0.004	M3/S	2 6 21	0.010	M3/S	2255 8

NOTE THAT -1111.111 = NOT APPLICABLE, -9999.999 = MISSING DATA

ENVIRONMENT ONTARIO STATION NO. 02GD120  
 VANNATTER DRAIN NEAR KINTORE - APR 11 1994 PAGE 12 TORONTO

## PRELIMINARY COMPUTATION SHEET

NOV 1993			DEC 1993		
DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S
1	0.494	0.027	1	0.527	0.055
2	0.488	0.022	2	0.553	0.086
3	0.502	0.034	3	0.584	0.116
4	0.497	0.029	4	0.567	0.096
5	0.537	0.066	5	0.565	0.094
6	0.512	0.042	6	0.577	0.109
7	0.500	0.032	7	0.589	0.121
8	0.494	0.027	8	0.552	0.081
9	0.491	0.025	9	0.535	0.063
10	0.490	0.024	10	0.558	0.087
11	0.491	0.025	11	0.536	0.066
12	0.487	0.021	12	0.511	0.041
13	0.494	0.027	13	0.502	0.033
14	0.493	0.026	14	0.501	0.033
15	0.508	0.038	15	0.498	0.030
16	0.498	0.030	16	0.494	0.027
17	0.504	0.035	17	0.413.7	0.022
18	0.500	0.032	18	0.492	0.026
19	0.505	0.037	19	0.4175	0.028
20	0.509	0.040	20	0.494	0.028
21	0.500	0.032	21	0.498	0.031
22	0.495	0.028	22	0.492	0.026
23	0.492	0.025	23	0.487	0.021
24	0.492	0.026	24	0.486	0.021
25	0.484	0.018	25	0.486	0.020
26	0.484	0.018	26	0.485	0.019
27	0.674	0.251	27	0.486	0.020
28	0.602	0.137	28	0.487	0.021
29	0.554	0.083	29	0.488	0.022
30	0.534	0.062	30	0.489	0.023
31	-1111.111	-1111.111	31	0.490	0.024
	TOTAL =	1.319		TOTAL =	1.490
	MEAN =	0.044		MEAN =	0.048
	DAM3 =	114.000		DAM3 =	129.000

MAX. AND MIN. INST.  
GAUGE HT. AND

MAX. AND MIN. INST.  
GAUGE HT. AND

VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY
0.769	METRES	1054 27	0.663	METRES	2043 2
0.426	M3/S	1054 27	0.216	M3/S	2043 2
0.482	METRES	1110 25	.0484	METRES	1349 25
0.016	M3/S	1110 25	0.019	M3/S	1349 25



**PRELIMINARY COMPUTATION SHEET**

**STATION NO. 02GD121**

MAR 1993			APR 1993			MAY 1993			JUN 1993		
DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S
1	-9999.999	-9999.999	1	0.476	0.352	1	0.227	0.040	1	0.191	0.019
2	-9999.999	-9999.999	2	0.390	0.216	2	0.211	0.030	2	0.176	0.012
3	-9999.999	-9999.999	3	0.382	0.205	3	0.203	0.026	3	0.170	0.009
4	-9999.999	-9999.999	4	0.358	0.176	4	0.202	0.025	4	0.165	0.007
5	-9999.999	-9999.999	5	0.322	0.130	5	0.244	0.053	5	0.223	0.041
6	-9999.999	-9999.999	6	0.301	0.107	6	0.224	0.038	6	0.205	0.027
7	-9999.999	-9999.999	7	0.285	0.090	7	0.200	0.024	7	0.191	0.019
8	-9999.999	-9999.999	8	0.273	0.076	8	0.189	0.019	8	0.179	0.013
9	-9999.999	-9999.999	9	0.282	0.087	9	0.194	0.016	9	0.375	0.216
10	-9999.999	-9999.999	10	0.4S4	0.322	10	0.179	0.013	10	0.271	0.081
11	-9999.999	-9999.999	11	0.305	0.111	11	0.175	0.012	11	0.196	0.022
12	-9999.999	-9999.999	12	0.267	0.071	12	0.169	0.009	12	0.174	0.011
13	-9999.999	-9999.999	13	0.248	0.054	13	0.168	0.008	13	0.162	0.006
14	-9999.999	-9999.999	14	0.235	0.045	14	0.16B	0.008	14	0.156	0.004
15	-9999.999	-9999.999	15	0.229	0.041	15	0.212	0.032	15	0.160	0.005
16	-9999.999	-9999.999	16	0.261	0.065	16	0.182	0.015	16	0.147	-9999.999
17	-9999.999	-9999.999	17	0.238	0.047	17	0.173	0.011	17	0.141	-9999.999
18	-9991.999	-9999.999	18	0.232	0.044	18	0.171	0.009	18	0.139	-9999.999
19	-9999.999	-9999.999	19	0.257	0.063	19	0.175	0.011	19	0.161	-9999.999
20	-9999.999	-9999.999	20	0.5S7	0.516	20	0.173	0.010	20	0.190	0.019
21	-9999.999	-9999.999	21	0.385	0.222	21	0.175	0.011	21	0.189	0.019
22	-9999.999	-9999.999	22	0.266	0.069	22	0.174	0.011	22	0.169	0.009
23	-9999.999	-9999.999	23	0.244	0.051	23	0.172	0.010	23	0.155	0.003
24	-9999.999	-9999.999	24	0.235	0.045	24	0.193	0.021	24	0.148	-9999.999
25	-9999.999	-9999.999	25	0.429	0.325	25	0.196	0.022	25	0.148	-9999.999
26	-9999.999	-9999.999	26	0.325	0.135	26	0.180	0.014	26	0.171	0.010
27	-9999.999	-9999.999	27	0.260	0.064	27	0.176	0.012	27	0.150	-9999.999
28	0.781	-9999.999	28	0.237	0.046	28	0.173	0.010	28	0.143	-9999.999
29	0.880	-9999.999	29	0.231	0.043	29	0.166	0.007	29	0.141	-9999.999

<b>30</b>	0:695	0.877	.30	0.256	0.061	30	0.157	0.004	30	0.138	-9999.999
<b>31</b>	0.505	0.402	31	-1111.111	-1111.111	31	0.199	0.025	31	-1111.111	-1111.111
	TOTAL =	-9999.999		TOTAL =	3.879		TOTAL =	0.556		TOTAL =	-9999.999
	MEAN =	-9999.999		MEAN =	0.129		MEAN =	0.018		MEAN =	-9999.999
	DAM3 =	-9999.999		DAM3 =	335.000		DAM3 =	48.000		DAM3 =	-9999.999

MAX. AND MIN. INST.  
GAUGE HT. AND

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY
1.120	METRES	1616 28	0.700	METRES	2020 20	0.277	METRES	16 0 5	0.568	METRES	5 1 9
1.450	M3/S	1650 30	0.855	M3/S	2020 20	0.081	M3/S	16 0 5	0.527	M3/S	5 1 9
0.445	METRES	24 0 31	0.223	METRES	1855 18	0.152	METRES	2331 30	0.136	METRES	24 0 30
0.292	M3/S	24 0 31	0.037	M3/S	1855 18	0.002	M3/S	2331 30	-283.00	M3/S	0 0 27

NOTE THAT -1111.111 = NOT APPLICABLE, -9999.999 = MISSING DATA

PRELIMINARY COMPUTATION SHEET

STATION NO. 02GD121

JUL 1993			AUG 1993			SEP 1993			OCT 1993		
DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S
1	0.134	-9999.999	1	0.135	-9999.999	1	0.130	-9999.999	1	0.173	0.010
2	0.134	-9999.999	2	0.130	-9999.999	2	0.160	-9999.999	2	0.205	0.027
3	0.130	-9999.999	3	0.127	-9999.999	3	0.226	0.046	3	0.185	0.016
4	0.127	-9999.999	4	0.126	-9999.999	4	0.211i	0.034	4	0.191	0.020
5	0.125	-9999.999	5	0.123	-9999.999	5	0.169	0.009	5	0.195	0.021
6	0.127	-9999.999	6	0.119	-9999.999	6	0.170	0.009	6	0.184	0.016
7	0.139	-9999.999	7	0.124	-9999.999	7	0.170	0.009	7	0.181	0.014
8	0.151	-9999.999	8	0.119	-9999.999	8	0.155	0.003	8	0.178	0.013
9	0.139	-9999.999	9	0.117	-9999.999	9	0.153	0.002	9	0.282	0.106
10	0.136	-9999.999	10	0.113	-9999.999	10	0.169	0.009	10	0.251	0.059
11	0.141	-9999.999	11	0.121	-9999.999	11	0.259	0.071	11	0.212	0.031
12	0.212	0.043	12	0.117	-9999.999	12	0.191	0.019	12	0.202	0.025
13	0.146	-9999.999	13	0.111	-9999.999	13	0.181	0.015	13	0.199	0.023
14	0.139	-9999.999	14	0.104	-9999.999	14	0.166	0.007	14	0.194	0.021
15	0.140	-9999.999	15	0.103	-9999.999	15	0.183	0.016	15	0.194	0.021
16	0.135	-9999.999	16	0.120	-9999.999	16	0.175	0.012	16	0.233	0.052
17	0.133	-9999.999	17	0.125	-9999.999	17	0.167	0.008	17	0.465	0.372
18	0:133	-9999.999	18	0.110	-9999.999	18	0.161	0.005	18	0.350	0.167
19	0 234	-9999.999	19	0.106	-9999.999	19	0.156	0.004	19	0.267	0.071
20	0.165	0.007	20	0.105	-9999.999	20	0.155	0.003	20	0.246	0.053
21	0.148	-9999.999	21	0.101	-9999.999	21	0.158	0.004	21	0.282	0.086
22	0.140	-9999.999	22	0.100	-9999.999	22	0.159	0.005	22	0.249	0.055
23	0.134	-9999.999	23	0.099	-9999.999	23	0.155	0.003	23	0.236	0.046
24	0.131	-9999.999	24	0.104	-9999.999	24	0.153	0.002	24	0.230	0.042
25	0.129	-9999.999	25	0.102	-9999.999	25	0.152	0.002	25	0.255	0.039
26	0.131	-9999.999	26	0.101	-9999.999	26	0.165	0.007	26	0.220	0.036
27	0.125	-9999.999	27	0.104	-9999.999	27	0.165	0.007	27	0.220	0.036
28	0.141	-9999.999	28	0.118	-9999.999	28	0.205	0.027	28	0.229	0.041
29	0.161	-9999.999	29	0.118	-9999.999	29	0.196	0.022	29	0.226	0.040
30	0.163	0.006	.30	0.125	-9999.999	30	0.181	0.014	30	0.224	0.038

31	0.144	-9999.999	31	0 133	-9999.999	31	-1111.111	-1111.111	31	0.244	0.052
	TOTAL =	-9999.999		TOTAL =	-9999.999		TOTAL =	-9999.999		TOTAL =	1.649
	MEAN =	-9999.999		MEAN =	-9999.999		MEAN =	-9999.999		MEAN =	0.053
	DAM3 =	-9999.999		DAM3 =	-9999.999		DAM3 =	-9999.999		DAM3 =	142.00

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE-

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

MAX. AND MIN. INST.  
GAUGE HT. AND DISCHARGE

VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY
0.139	METRES	317 19	0.183	METRES	1142 17	0.364	METRES	234 11	0.698	METRES	1545 17
0.277	M3/S	116 12	-9999.999	M3/S	0 0 0	0.184	M3/S	234 11	0.850	M3/S	1545 17
0.123	METRES	130 6	0.095	METRES	2 8 23	0.126	METRES	18 8 1	0.170	METRES	1345 1
0.001	M3/S	0 0 31	-9999.999	M3/S	0 0 0	-283.000	M3/S	2237 9	0.009	M3/S	1345 1

NOTE THAT -1111.111 = NOT APPLICABLE, -9999.999 = MISSING DATA

ENVIRONMENT ONTARIO STATION NO. 02GD120  
 LOGAN DRAIN NEAR KINTORE - APR 11 1994 PAGE 14 TORONTO

PRELIMINARY COMPUTATION SHEET

NOV 1993			DEC 1993		
DAY	GAUGE HT. METRES	DISCHARGE M3/S	DAY	GAUGE HT. METRES	DISCHARGE M3/S
1	0.253	0.057	1	0.290	0.095
2	0.241	0.049	2	0.334	0.152
3	0.257	0.061	3	0.371	0.192
4	0.254	0.059	4	0.350	0.165
5	0.291	0.096	5	0.351	0.166
6	0.264	0.068	6	0.371	0.194
7	0.246	0.053	7	0.383	0.207
8	0.235	0.045	8	0.332	0.142
9	0.230	0.042	9	0.319	0.126
10	0.227	0.040	10	0.351	0.166
11	0.228	0.040	11	0.325	0.134
12	0.224	0.030	12	0.288	0.093
13	0.235	0.045	13	0.290	0.084
14	0.237	0.046	14	0.283	0.087
15	0.259	0.063	15	0.291	0.096
16	0.247	0.053	16	0.294	0.099
17	0.251	0.055	17	0.283	0.088
18	0.250	0.051	18	0.286	0.091
19	0.254	0.060	19	0.293	0.090
20	0.262	0.066	20	0.296	0.101
21	0.247	0.053	21	0.307	0.112
22	0.241	0.049	22	0.300	0.105
23	0.234	0.045	23	0.284	0.089
24	0.237	0.047	24	0.276	0.080
25	0.233	0.044	25	0.276	0.079
26	0.233	0.044	26	0.273	0.076
27	0.522	0.474	27	0.270	0.073
28	0.381	0.207	28	0.268	0.071
29	0.315	0.122	29	0.266	0.069
30	0.294	0.099	30	0.264	0.069
31	-1111.111	-1111.111	31	0.262	0.066
TOTAL =		2.275	TOTAL =		3.463
MEAN =		0.076	MEAN =		0.112
DAM3 =		197.000	DAM3 =		299.000

MAX. AND MIN. INST.  
GAUGE HT. AND

MAX. AND MIN. INST.  
GAUGE HT. AND

VALUE	UNITS	TIME DAY	VALUE	UNITS	TIME DAY
0.667	METRES	14 2 27	0.484	METRES	21 1 2
0.763	M3/S	14 2 27	0.361	M3/S	21 1 2
0.222	METRES	1855 12	0.261	METRES	24 0 31
0.037	M3/S	1855 12	0.065	M3/S	24 0 31

## KINTORE - 1993 Field Activities -Western Sub-basin

Landowners	Field #	Acres	Primary Tillage	1993 Crop
Farm A		24	spring mouldboard	corn
Farm B	1,2,3,5	98	spring mouldboard	corn
	4	15	-----*	alfalfa
Farm C	1	10	-----	alfafa
	2	7	spring mouldboard	corn
Farm D	1,2	56	spring mouldboard	corn
	3	10	spring mouldboard	spr gr**
	4	21	spring mouldboard	corn
Farm E	1	49	fall chisel	Corn
	2,3	87	spring chisel	Corn
Farm F	1,2,3	20		alfalfa
Farm G	1	20	spring mouldboard	corn.
	2	6	spring mouldboard	beans
	3	16	-----	alfalfa
	4	13	-----	alfalfa
	5	13	fall mouldboard	corn
	6	23	spring mouldboard	beans
Farm H	1	10	fall chisel	winter wheat
Farm I	1,2	70	spring mouldboard	corn
	3	7		alfalfa
Farm J	1	20	spring niouldboard	sp gr
	2	22	fall mouldboard	sp gr
Farm K		12	spring mouldboard	corn
Farm L	1	15	spring mouldboard	alfalfa
	2	15		corn

Landowners	Field #	Acres	1992/93 Primary Tillage	1993 Crop
Farm M	1	10	---	alfalfa
	2	13	spring mouldboard	sp gr
	3	10	spring mouldboard	corn
	4	7	spring mouldboard	corn
Farm N	1,2	30	---	alfalfa
	3,6	40	no-till	corn
	4	6	no-till	sp gr
	5	12	no-till	corn
Farm O	1	11	spring mouldboard	corn
	2	14	---	alfalfa
	3	18	spring mouldboard	sp gr
	4	31	fall mouldboard	corn
	5	14	spring mouldboard	spring gr to alfalfa
Farm P		47	spring mouldboard	corn
Farm Q	1	42	spring mouldboard	corn
	2		---	alfalfa
Farm R	1,2,3,4,	156	spring mouldboard	corn
	6			
	5	42.7	spring mouldboard	beans
	7	59	spring mouldboard	beans

\* ---- no tillage practiced due to forage crop

\*\* sp gr represents spring grain

## KINTORE - 1993 Field Activities- Eastern Sub-basin

Landowners	Field #	Acres	1992/93 Tillage	1993 Crop
Farm A	1	8	---	alfalfa
	2	22	spring mouldboard	wheat
	3	24.7	spring mouldboard	corn
	4	15	spring mouldboard	corn
	5	18	spring mouldboard	s beans
	6	20	spring mouldboard	sp grain
	7	18	spring mouldboard	corn
	8	14	spring mouldboard	corn
Farm B	1	8	spring mouldboard	corn
	2	10	spring mouldboard	sp gr to alfalfa
Farm C	1	26	---	wheat
	2	15	---	corn
	3	20	spring chisel	wheat
	4	21	---	alfalfa
Farm D	1	14	---	sp grain
	2	13	spring mouldboard	corn
	3	12	spring mouldboard	alfalfa
	4	20	---	alfalfa
	5	12	---	corn
	6	7	spring mouldboard	corn
	7	7	spring mouldboard	alfalfa
	8	13	---	alfalfa
Farm E	1	14	spring mouldboard	beans
	2	24	spring mouldboard	beans
	3	11	spring mouldboard	beans
	4	2	spring mouldboard	beans
	5	14	spring mouldboard	beans
	6	4	spring mouldboard	beans
Farm F	1	23	spring mouldboard	beans



## KINTORE - 1993 Field Activities- Eastern Sub-basin

Landowners	Field #	Acres	1992/93 Tillage	1993 Crop
Farm G	1	3	spring mouldboard	corn
	2	7	-----	wheat
	3	18	spring mouldboard	corn
	4	7	-----	wheat
Farm H		25	spring mouldboard	corn
Farm I	----	17	---	alfalfa
Farm J		42	spring mouldboard	corn
Farm K	1,3	7	-----	alfalfa
	2	5	fall mouldboard	sp grain
	4	2	fall mouldboard	wheat
Farm L	1	9	spring mouldboard	beans
	2	3	spring mouldboard	beans
	3	3	spring mouldboard	beans
	4	20	spring mouldboard	beans
	5	4	spring mouldboard	corn
	6	20	spring mouldboard	corn
	7	4	spring mouldboard	corn
Farm M	-----	28	spring mouldboard	corn
Farm N	1,3,8	35	spring mouldboard	corn
	2	11	-----	alfalfa
	4	10	spring mouldboard	sp grain
	5	11	-----	alfalfa
	6	11	-----	alfalfa
	7	8	-----	alfalfa
	9	9	spring mouldboard	sp grain
Farm O	1	49	-----	alfalfa
	2,3	23	spring mouldboard	sp grain
Farm P	-----	18	spring mouldboard	corn

Paired Watershed Study - Essex Region Water Sampling Data - Station: Second Concession, (East) - Routine Grab Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp Celsius	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)	Calcium (Mg/L)	Magnesium (Mg/L)	Calcd Hardness (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)								
Jan-4-94	4	1320	No	0.035	19.1	0.341	1.31	0.01	0.8	0.047	0.01	7.58	1560	195	6.4	65.1			
Feb-2-94	33	1120	Readings		42.2	0.143	2.1	0.04	2.2	0.34	0.054	7.62	334	42.7	3.7	19.5	28.5	6.3	97
Mar-9-94	68	930	Taken;	0.286	10.3	0.072	1.45	0.03	3.9	0.17	0.037	7.6	334	29.7	3	10.4			
Mar-17-94	76	910	Assume	0.846	33.9	0.116	1.95	0.05	6	0.16	0.019	7.36	440	29.1	3.4	9.8			
Apr-14-94	104		Water	8.15	7.7	0.106	0.026	0.02	4.8	0.8	0.003	8.61	580	33	2.5	11.2	80	24.8	302
Apr-28-94	118	1053	Temp is	9.62							0.024								
May-10-94	130	1515	Same	12.46	3.7	0.005	0.86	0.02	1.3	0.023	0.001	8.61	705	52.8	2.3	14.5	78.4	27.8	311

Paired Watershed Study - Essex Region Water Sampling Data - Station: Fifth Concession, (West) - Routine Grab Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp Celsius	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)	Calcium (Mg/L)	Magnesium (Mg/L)	Calcd Hardness (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)								
Jan-4-94	4	1330	2.064	0.035	25.6	0.1	2.04	1.2	27	0.43	0.181	7.46	3240	420	10.1	167			
Feb-2-94	33	1120			48.7	0.102	2	0.04	2.1	0.31	0.041	7.51	310	28.5	3.5	12.2	31.7	7.2	109
Mar-9-94	68	910	2.198	0.286	34.1	0.127	1.7	0.02	4.3	0.19	0.046	7.94	429	37.1	2.7	15.9			
Mar-17-94	76	1005	2.193	0.846	74	0.06	1.7	0.02	7.2	0.17	0.01	7.85	566	33.2	2.2	13			
Apr-11-94	101	1900	2.159	5.487	21.4	0.008	0.83	0.02	7.7	0.045	0.001	8.58	632	45.8	1.9	18.6			
Apr-28-94	118	1040	2.112	9.62	35.8	0.021	1.3	0.05	0.1	0.084	0.034	8.21	789	65.3	2.7	26.6			
May- 10-94	130	1640	2.061	12.46	25.2	0.005	1.73	0.05	4.4	0.136	0.032	7.91	678	56.3	2.2	21.2	64.6	27.3	274

Paired Watershed Study - Essex Region Water Sampling Data - Station: Second Concession, (East) - ISCO Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp Celsius	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)	Calcium (Mg/L)	Magnesium (Mg/L)	Calcd Hardness (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)								
Apr-11-94	101	2300	No	5.487	13.7	0.037	1.04	0.01	5.9	0.042	0.005	8.02	637	34	2	11.3	77.4	23.4	290
Apr-12-94	102	100	Readings	5.63	9.4	0.033	0.78	0.01	5.7	0.029	0.004	8.08	636	35.6	1.9	10.8	77.5	23	289
Apr-12-94	102	300	Taken;	5.63	12	0.029	0.76	0.01	6.1	0.033	0.001	8.09	627	34.5	2.1	11.9	84	24.6	311
Apr-12-94	102	500	Assume	5.63	22	0.065	0.92	0.01	5.9	0.054	0.001	8.06	631	35.1	2.1	12.1	82.8	23.6	304
Apr-12-94	102	700	Water	5.63	26.3	0.029	1.15	0.01	5.6	0.103	0.002	8	599	34	1.8	11.2	74.7	21.2	274
Apr-12-94	102	900	Temperatu	5.63	35.1	0.026	1.21	0.01	5.9	0.131	0.001	7.86	540	28.4	2.3	11	72	20.3	264
Apr-12-94	102	1100	Similar	5.63	625	0.01	4.55	0.03	4.4	1.17	0.003	7.41	391	21.9	2.1	7.4	44.9	11.8	161
Apr-14-94	104	400	to 5th	8.15	28.6	0.032	1.8	0.02	8.1	0.22	0.008	7.75	456	23.9	2.8	7.7	60.6	16.5	219
Apr-30-94	120	1200	concession	8.56	5.7	0.011	0.87	0.02	1.8	0.026	0.006	7.37	1770	70.8	2.8	29	Not		
Apr-30-94	120	1500		8.56	7.9	0.01	0.81	0.02	1.6	0.027	0.005	7.38	1750	67.9	2.7	26.5			
Apr-30-94	120	1800		8.56	32.5	0.006	0.74	0.01	2.1	0.064	0.005	7.72	959	64.9	2.9	25.5			
Apr-30-94	120	2100		8.56	191	0.012	2.3	0.03	6.2	0.215	0.015	7.81	760	67.2	4.2	14.1			
May-01-94	121	0		8.06	181	0.013	2.55	0.03	8.6	0.36	0.007	8.64	601	47.9	4.1	9			
May-01-94	121	300		8.06	119	0.076	2.25	0.03	10	0.275	0.155	7.7	1002	43.1	4.5	9.6			
May-01-94	121	1200		8.06	53.6	0.006	2	0.05	7.5	0.17	0.01	7.4	1000	39.5	3.4	9			
May-03-94	123	1300		9	24.1	0.005	0.93	0.03	6.7	0.027	0.006	7.19	1038	37.2	2.3	12.7			

Paired Watershed Study - Essex Region Water Sampling Data - Station: Fifth Concession, (West) - ISCO Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp Celsius	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (uhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)	Calcium (Mg/L)	Magnesium (Mg/L)	Calcd Hardness (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)								
Apr-11-94	101	2300	2.159	5.487	63.9	0.017	1.1	0.02	7.2	0.072	0.002	7.99	687	50.5	1.7	21	76.6	25.3	296
Apr-12-94	102	100	2.397	5.63	67.8	0.017	1.4	0.02	6.4	0.105	0.001	7.94	754	72.3	2	28.8	80.2	24.5	301
Apr-12-94	102	300	2.397	5.63	68.6	0.496	2.05	0.08	2.7	0.435	0.124	7.64	1191	199	3.6	92.2	96.6	25.6	347
Apr-12-94	102	500	2.397	5.63	65	0.89	2.35	0.22	2.9	0.395	0.148	7.49	1340	231	3.9	112	100	25.3	355
Apr-12-94	102	700	2.397	5.63	54.4	1.21	3.2	0.09	3.2	0.36	0.154	7.55	1226	204	3.9	98.3	98.7	25.1	350
Apr-12-94	102	900	2.397	5.63	253	0.56	2.5	0.43	2.7	0.65	0.084	7.49	1128	182	3.4	97	83.2	19.8	290
Apr-12-94	102	1100	2.397	5.63	1112	0.204	5.2	0.14	5.6	1.37	0.194	7.68	526	57.3	2.6	28.3	53.2	12.9	186
Apr-14-94	104	400	2.217	8.15	47.3	0.08	1.64	0.04	6.5	0.27	0.018	7.89	806	103	2.9	39.7	81.9	21.5	293
Apr-3G-94	120	1500	2.141	8.56	59.9	0.055	1.48	0.08	8.3	0.118	0.005	7.24	1420	51.3	2	24.4	Not		
Apr-30-94	120	1800	2.141	8.56	50.8	0.01	6	0.29	6	1.35	0.007	7.1	1380	44.4	5.3	20.3			
Apr-30-94	120	2100	2.141	8.56	974	0.199	5.8	0.61	9.7	1.51	0.07	7.21	1400	40.2	7.2	9.4			
May-01-94	121	0	2.212	8.06	469	0.28	5	0.43	9.7	1.06	0.169	7.53	904	39	5.7	22.2			
May-01-94	121	600	2.212	8.06	105	0.473	3.25	0.8	9.4	0.545	0.177	7.55	1530	126	4	43.1			
May-01-94	121	1200	2.212	8.06	45.2	0.407	2.55	0.05	6.5	0.385	0.134	7.87	2220	81.4	3.8	40.2			
May-03-94	123	1400	2.132	9	19.4	0.016	0.84	0.04	9.5	0.037	0.009	7.56	2360	41.7	1.5	13.5			

## Second Concession Drain Near Essex (East, Control)

(Preliminary) Daily Discharge in Cubic Metres per Second for 1993 - Station 02GH014

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	0.096	0.005	0.001	0.437	0.004E	0.001	0.002A	OE	OE	OE	0.001E	0.002	1
2	0.019	0.003	0.001	0.141	0.003E	0	0.001E	OE	OE	OE	0.001E	0.002	2
3	0.024	0.002	0.01 B	0.066	0.003E	0	0.002E	OE	OE	OE	0.001E	0.002	3
4	1.07	0.002	0.077 B	0.042	0.017E	0	0.002E	OE	OE	OE	0.001E	0.028	4
5	0.796	0.002	0.138 B	0.03	0.166E	0.001	0.002E	OE	OE	OE	0.001E	0.025	5
6	0.138	0.002 B	0.13 B	0.02	0.039E	0.001	0.001E	OE	OE	OE	0.001E	0.009	6
7	0.061	0.002 B	0.115 B	0.013	0.014E	0.152	0.001A	OE	OE	OE	OE	0.005	7
8	0.039	0.002 B	0.16 B	0.01	0.009E	0.613	0.001E	OE	OE	OE	OE	0.004	8
9	0.017	0.001 B	0.21 B	0.021	0.006E	0.089	0.001E	OE	OE	0.003E	OE	0.003	9
10	0.008	0.001	0.14 B	0.091	0.004E	0.016	0.001E	OE	OE	0.001E	OE	0.003	10
11	0.008	0.001	0.1 B	0.028	0.003E	0.006	OE	OE	OE	OE	OE	0.002	11
12	0.006	0.001	0.07 B	0.031	0.004E	0.003	OE	OE	OE	OE	OE	0.001	12
13	0.04	0.001	0.042 B	0.013	0.003E	0.002	OE	OE	OE	OE	OE	0.001	13
14	0.036	0.001	0.035 B	0.009	0.002E	0.002	0.001E	OE	OE	OE	0.001E	0.001	14
15	0.025	0.001	0.03 B	0.007	0.002E	0.001	0.001E	OE	OE	OE	0.002E	0.001	15
16	0.018	0.001	0.04 B	0.009	0.001E	0.001	OE	OE	OE	OE	.001E	0.001	16
17	0.012	0.001	0.046 B	0.008	0.001E	0.001	OE	OE	OE	0.002E	0.004E	0.001	17
18	0.007	0.001	0.031 B	0.006	OE	0.001	OE	OA	OE	0.002E	0.005E	0.001	18
19	0.004	0.001	0.025 B	0.011	0.001A	0.002	OE	OE	OE	0.001E	0.003E	0.001	19
20	0.003	0.001	0.07 B	0.068	0	0.002	OE	OE	OE	OE	0.002E	0.001	20
21	0.029	0.001	0.0788	0.036	0	0.006	OE	OE	OE	0.001E	0.002E	0.001	21
22	0.17	0.001	0.15 B	0.012	0	0.003	OE	OE	OE	0.001E	0.002E	0.002	22
23	0.112	0.001	0.299	0.008	0	0.001	OE	OE	OE	OE	0.001A	0.001	23
24	0.156	0.001	0.206	0.007	0	0.001	OE	OE	OE	OE	0.002	0.001	24
25	0.078	0.001	0.169	0.036	0.001	0.001	OE	OE	0.001	OE	0.002	0.001	25
26	0.03 B	0.001	0.143	0.023	0	0.001	OE	OE	0.003	OE	0.002	0.001	26
27	0.012	0.001	0.119	0.009	0	0.001	OE	OE	0.002	OE	0.028	0	27
28	0.011	0.001	0.128	0.007 E	0	0.04	OE	OE	0.004	OE	0.009	0	28
29	0.009 B		0.123	0.006E	0	0.008	OE	OE	0.001	OE	0.004	0	29
30	0.004 B		0.094	0.005E	0	0.003	OE	OE	0	OE	0.003	0	30
31	0.006		0.053		0.001		OE	OE		0.001E		0	31
TOTAL	3.044	0.04	3.033	1.21	0.284	0.959	0.016	0	0.011	0.012	0.079	0.101	TOTAL
MEAN	0.098	0.001	0.098	0.04	0.009	0.032	0.001	0	0	0	0.003	0.003	MEAN
DAM3	263	3.46	262	105	24.5	82.9	1.38	0	0.95	1.04	6.83	8.73	DAM3
MAX	1.07	0.005	0.299	0.437	0.166	0.613	0.002	0	0.004	0.003	0.028	0.028	MAX
MIN	0.003	0.001	0.001	0.005	0		0	0	0	0	0	0	MIN

Summary for the year 1993  
 Mean Discharge 0.024 M3/S  
 Total Discharge, 760 DAM3

Maximum Daily Discharge, 1.07 M3/S on Jan 4  
 Minimum Daily Discharge, 0 M3/S on May 18  
 Data Source: Water Survey Canada

A - Manual Gauge  
 B-Ice Conditions  
 C-Estimated

**Fifth Concession Drain Near Essex (West, Test)**

(Preliminary) Daily Discharge in Cubic Metres per Second for 1993

Station 02GH013

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	0.091	0.006B	0.002	0.808								0.003	1
2	0.022	0.002B	0.003	0.191								0.003	2
3	0.033	0.003B	0.012B	0.057								0.004	3
4	1.94	0.003	0.126B	0.038								0.109	4
5	0.999	0.004	0.359B	0.029								0.03	5
6	0.115	0.002B	0.337B	0.019								0.008	6
7	0.036	0.002B	0.313	0.012								0.006	7
8	0.025	0.002	0.39B	0.012								0.005	8
9	0.016	0.002	0.48B	0.041								0.004	9
10	0.006	0.002	0.35B	0.197								0.004	10
11	0.007	0.002	0.265B	0.043								0.003	11
12	0.007	0.002	0.15B	0.048								0.003	12
13	0.025	0.002	0.09B	0.024								0.002	13
14	0.036	0.002	0.07B	0.016								0.002	14
15	0.025	0.002	0.056B	0.013								0.003	15
16	0.019	0.001	0.075B	0.021								0.002	16
17	0.014	0.002B	0.084B	0.015								0.002	17
18	0.007	0.001B	0.05B	0.009								0.002	18
19	0.004	0.001B	0.04B	0.029								0.002	19
20	0.004	0.001	0.12B	0.137								0.002	20
21	0.135	0.002	0.13B	0.044								0.002	21
22	0.806	0.002	0.2B	0.022								0.002	22
23	0.176	0.002	0.66B	0.013								0.002B	23
24	0.323	0.002	0.43B	0.009								0.002B	24
25	0.083	0.001	0.3B	0.085								0.002B	25
26	0.025	0.002	0.2038	0.033								0.001 B	26
27	0.017	0.002	0.147	0.016								0.001B	27
28	0.017	0.002	0.15	0.011								0.001B	28
29	0.006B		0.133	0.009A								0.001 B	29
30	0.005B		0.078							0.003A		0.001 B	0
31	0.011		0.045									0.001B	31
TOTAL	5.035	0.059	5.835									0.215	TOTAL
MEAN	0.162	0.002	0.188									0.007	MEAN
DAM3	435	5.1	504									18.6	DAM3
MAX	1.94	0.006	0.66									0.109	MAX
MIN	0.004	0.001	0.002									0.001	MIN

Data Source: Water Survey Canada

A - Manual Gauge

B-1ce Conditions

**Second Concession Drain Near Essex (East, Control)**

(Preliminary) Daily Discharge in Cubic Metres per Second for 1994

Station 02GH014

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	0 B	0 B	0.003	0.031	0.087	0.001							1
2	0 B	0 B	0.003	0.024	0.041	0							2
3	0 B	0 B	0.004	0.027	0.023	0							3
4	0 B	0 B	0.005	0.034	0.016	0							4
5	0 B	0 8	0.02 B	0.033	0.011	0							5
6	0 B	0 B	1.26 B	0.064	0.008	0							6
7	0 B	0 B	0.257 B	0.119	0.007	0							7
8	0	0 B	0.084 B	0.13	0.006	0							8
9	0	0 B	0.039 B	0.108	0.005	0							9
10	0	0 B	0.021	0.067	0.004	0							10
11	0	0 B	0.014	0.04	0.003	0							11
12	0	0 B	0.02	0.424	0.003	0							12
13	0	0 B	0.112	0.208	0.002	0.156							13
14	0	0 B	0.079	0.12	0.001	0.38							14
15	0	0 B	0.104	0.071	0.002	0.014							15
16	0	0 B	0.051 B	0.051	0.002	0.005							16
17	0 B	0.001 B	0.02 B	0.03	0.001	0.002							17
18	0 B	0.192 B	0.017	0.018	0.001	0.001							18
19	0 B	1.24 B	0.01	0.015	0.001	0.001							19
20	0 B	1.17 B	0.017	0.009	0.001	0							20
21	0 B	0.62 B	0.204	0.007	0.001	0							21
22	0 B	0.133 B	0.147	0.006	0	0							22
23	0 B	0.201 B	0.096	0.005	0	0							23
24	0 8	0.315	0.069	0.005	0.001	0.001							24
25	0 B	0.048	0.042	0.005	0.001	0.003							25
26	0 B	0.015	0.026	0.004	0.003	0.003							26
27	0.002 B	0.006	0.058	0.006	0.002	0.001							27
28	0.3 B	0.005	0.056	0.005	0.001	0.001							28
29	1.01 B		0.1	0.01	0.001	0							29
30	0.008 B		0.058	0.038	0.001	0.001 A							0
31	0B		0.042		0.001								31
TOTAL	1.32	3.946	3.038	1.714	0.237	0.57							TOTAL
MEAN	0.043	0.141	0.098	0.057	0.008	0.019							MEAN
DAM3	114	341	262	148	20.5	49.2							DAM3
MAX	1.01	1.24	1.26	0.424	0.087	0.38							MAX
MIN	0	0	0.003	0.004	0	0							MIN

Data Source: Water Survey Canada

A - Manual Gauge

B-1ce Conditions

**Fifth Concession Drain Near Essex (West, Test)**

(Preliminary) Daily Discharge in Cubic Metres per Second for 1994 Station 02GH013

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	0.001 B	0 B	0 B	0.009	0.078	0.004							1
2	0.001 B	0 B	0 B	0.007	0.024	0.004							2
3	0 B	0 B	0 B	0.01	0.013	0.003							3
4	0 B	0 a	0 B	0.011	0.009	0.003							4
5	0 B	0 B	0.235 B	0.014	0.008	0.003							5
6	0 B	0 B	1.6 B	0.138	0.007	0.002							6
7	0 B	0 B	0.48 B	0.24	0.007	0.002							7
8	0 B	0 B	0.085 B	0.156	0.007	0.002							8
9	0 B	0 8	0.008 B	0.063	0.006	0.002							9
10	0 B	0 8	0.004 B	0.022	0.006	0.002							10
11	0 B	0 B	0.002 B	0.012	0.006	0.001							11
12	0 B	0 B	0.015 B	0.391	0.006	0.001							12
13	0 B	0 B	0.28 B	0.272	0.005	0.101							13
14	0 B	0 8	0.046 B	0.089	0.005	0.199							14
15	0 B	0 B	0.073 B	0.029	0.005	0.013							15
16	0 B	0 B	0.027 B	0.016	0.006	0.007							16
17	0 B	0.435 8	0.011 B	0.011	0.006	0.006							17
18	0 B	0.948 B	0.007	0.009	0.005	0.005							18
19	0 B	1.8 B	0.008	0.007	0.004	0.005							19
20	0 B	2.77	0.01	0.005	0.004	0.005							20
21	0 B	1.46	0.429	0.005	0.004	0.004							21
22	0 B	0.602	0.138	0.005	0.003	0.003							22
23	0 B	0.117	0.044	0.004	0.003	0.002							23
24	0.001 B	0.158	0.023	0.005	0.003	0.262							24
25	0.001 B	0.022	0.012	0.004	0.003	0.176							25
26	0	0 B	0.01	0.005	0.004	0.088							26
27	0.1 B	0 B	0.033	0.008	0.004	0.019							27
28	2 B	0 B	0.025	0.007	0.004	0.009							28
29	0.95 B	0 B	0.059	0.013	0.004	0.008							29
30	0.2 B	0 B	0.02	0.022	0.004	0.006 A							0
31	0.01 B		0.014		0.004								31
TOTAL	3.264	8.312	3.698	1,589	0.257	0.947							TOTAL
MEAN	0.105	0.297	0.119	0.053	0.008	0.032							MEAN
DAM3	282	718	320	137	22.2	81.8							DAM3
MAX		2.77	1.6	0.391	0.078	0.262							MAX
MIN		0	0	0.004	0.003	0.001							MIN

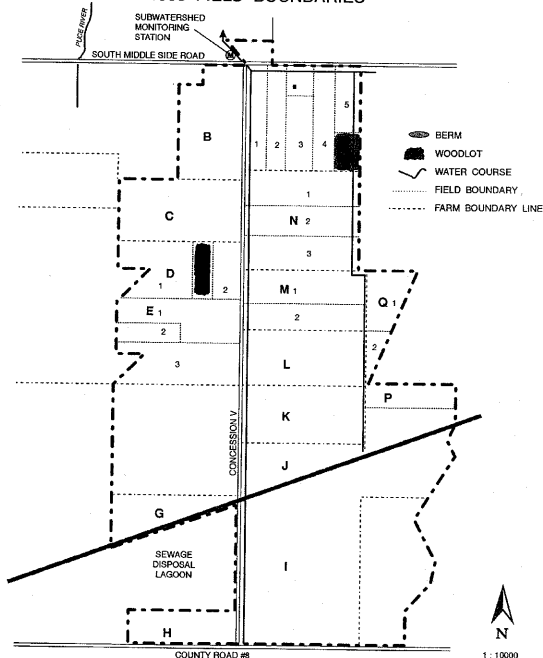
Data Source: Water Survey Canada

A - Manual Gauge

B-1ce Conditions

# ESSEX PAIRED WATERSHEDS

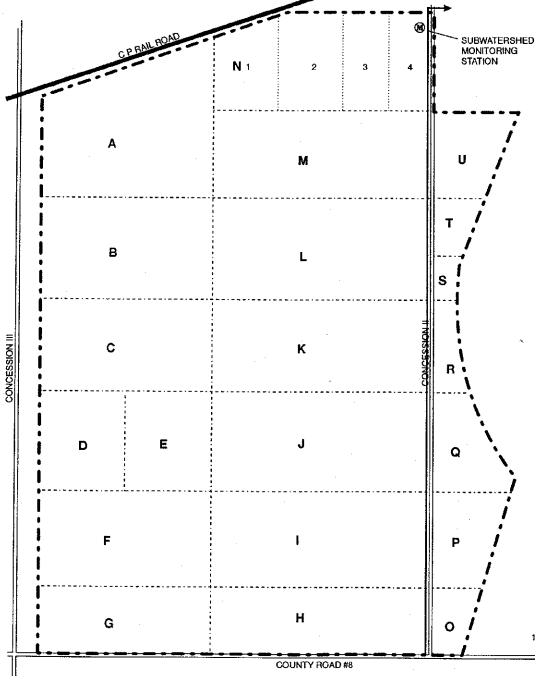
## ESSEX WEST PAIRED WATERSHED 1993 FIELD BOUNDARIES





# ESSEX PAIRED WATERSHEDS

## ESSEX EAST PAIRED WATERSHED 1993 FIELD BOUNDARIES



Landowner	Field #	Acres	1992/93 Tillage	1993 Crop
Farm A	1	4	fall mouldboard, spring 1x-3x	wheat
Farm B	1	50	no-till	corn
Farm C			not available	
Farm D	1	16.5	summer fallow disc (3) cult (1)	wheat
	2	10	disc (2), cultivator (1)	soybeans
Farm E	1	24	fall cultivator (2) spring cultivator (2)	soybeans
	2	10	spring cultivator (2)	soybeans
	3	37	spring cultivator (2)	soybeans
Farm F	1	82	disc (2)	soybeans
	2	15		wheat
Farm G	1	18	cultivator (2)	soybeans
Farm H	1	23	cultivator (3)	soybeans
Farm I	1	45	no-till	corn
	2	60	disc (1)	wheat
Farm J	1	23	fall mouldboard, spring cultivator (1) disc (2)	soybeans
Farm K	1	42	fall disc (1), spring cultivator (3)	soybeans
Farm L	1	47	triple K, (2)	soybeans
Farm M	1	24	no-till	soybeans
	2	24	disc (1)	soybeans
Farm N	1	25	no-till	soybeans
	2	16	fall mouldboard	soybeans
	3	32	spring disc (2), cultivator +packer (1)	soybeans
Farm O	1	10	no-till	corn
	2	16	no-till	corn
	3	15	no-till	soybeans
	4	20	no-till	wheat
	5	9	no-till	corn
Farm P	1		10	no-till
	2		20	no-till
Farm Q	1		8	no-till
	2		4	fall mouldboard

\* () represents the number of passes over the field

Landowner	Field #	Acres	1992/93 Tillage	1993 Crop
Farm A	1	68	spring s-tine + packers (2)*	soybeans
Farm B	1	50	fall mouldboard, spring s-tine +packers (2)	soybeans
Farm C	1	50	spring s-tine + packers (2)	soybeans
Farm D	1	23	fall mouldboard, spring double disc (3)	soybeans
Farm E	1	40	spring triple k with packers, (3)	corn
Farm F	1	50	fall mouldboard	red clover
Farm G	1	28	spring triple k (3)	soybeans
Farm H	1		not available	
Farm I	1	49	spring cultivator (2)	soybeans
Farm J	1	40	no-till	soybeans
Farm K	1	46	spring cultivator (2) levelled (1)	soybeans
Farm L	1	35	fall mouldboard, spring s-tine + packers (3)	soybeans
Farm M	1	47.5	spring cultivator (2)	soybeans
Farm N	1	12	spring mouldboard, spring cultivator (2)	soybeans
	2	12	disc (2)	soybeans
	3	10	disc (2)	corn
	4	11	disc (2)	soybeans
Farm O	1	12	fall mouldboard, spring cultivator (3)	sweet corn
Farm P	1	68	spring cultivator (2)	corn
Farm Q	1	7	fall mouldboard, spring cultivator (2)	corn
Farm R			not available	
Farm S	1	10	fall mouldboard, spring cultivator (2)	soybeans
Farm T	1	12	spring disc (2), cultivator (1)	corn
Farm U	1	50	fall mouldboard, spring cultivator (2)	

\* () represents the number of passes over the field

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp (C)	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (µhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)					
Dec 15,1993	349	1430	NA	NA	6.8	0.032	0.61	<0.05	12.5	0.049	0.031	7.75	4240	35.3	3.6	NA
Dec 29,1993	363	1400	NA	NA	23.3	0.035	0.64	<0.01	13	0.037	0.015	7.85	958	45.1	3.3	14.5
Jan 14,1994	14	1400	0.923	0.35	22.9	0.164	0.88	0.06	6	0.092	0.035	7.9	773	34.3	3.1	12.7
Feb01,1994	32	1430	1.117	0.19	6.1	0.066	0.65	<0.1	8	0.099	0.056	8.05	619	62.9	4.1	31.3
Feb 18,1994	49	1400	0.955	0.086	9.3	0.154	0.69	0.02	6.5	0.07	0.037	7.86	669	35.9	2.9	15.8
Mar 03,1994	62	1500	0.992	0.07	6.1	0.152	0.58	0.01	6.6	0.057	0.038	7.83	648	38.8	2.6	16
Mar 17,1994	76	1400	1.06	0.16	9.8	0.022	0.75	0.02	5.5	0.089	0.035	7.87	508	30.2	3.4	12.4
Apr05,1994	95	1200	1.071	4.38	4.8	0.043	0.66	0.06	13.1	0.05	0.025	8.07	608	31.1	2.7	10.6
Apr14,1994	104	1400	1.17	7.07	10	0.074	0.81	0.1	9.1	0.06	0.029	8.13	601	34.2	3.2	11.7
May 04,1994	124	1800	1.025	11.59	5.2	0.041	0.73	<0.05	9.4	0.019	0.007	8.47	566	31.2	2.5	10.7
May 18,1994	138	1300	1.048	9.7	5.4	<0.005	0.6	<0.01	10	0.026	0.004	8.36	630	29.5	2.2	8.6
Jun 08,1994	159	1200	0.92	17.56	25.2	0.038	1	0.02	1.5	0.074	0.003	8.53	464	31.7	0.6	8.3
Jun 25,1994	NO SAMPLE TAKEN, NO FLOW															
Jul 11, 1994	192	1200	0.966	17.21	2.5	0.005	0.76	0.05	12.4	0.044	0.02	NA	NA	NA	NA	NA
Aug 02,1994	214	1300	0.933	19.47	8.2	<0.005	0.69	0.005	3.6	0.025	0.005	8.07	749	46.5	3.7	17.5
Aug 16,1994	NO SAMPLE TAKEN, NO FLOW															
Aug 30,1994	NO SAMPLE TAKEN, NO FLOW															
Sep 15,1994	NO SAMPLE TAKEN, NO FLOW															

**Paired Watershed Study - Kettle Creek C.A. Water Sampling Data** - Station: Holtby Drain, (East) - Routine Grab Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp (C)	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (µhmo/mL)	Chloride (Mg/L)	Potassium (Mg/L)	Sodium (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)					
Dec 15,1993	349	1430	NA	NA	3.2	0.084	0.85	0.01	10	0.054	0.035	7.23	755	47.3	5.4	NA
Dec 29,1993	363	1400	NA	NA	15.8	0.031	0.69	0.01	4.7	0.05	0.007	7.85	886	82.8	5.2	12.8
Jan 14,1994	NO SAMPLE TAKEN DUE TO COMPLETE ICE FREEZE UP OF DRAIN															
Feb 01, 1994	32	1430	NA	NA	16	0.058	0.93	0.03	9.4	0.153	0.108	7.75	565	47	6.8	13.5
Feb18,1994	49	1400	NA	NA	5.9	0.098	0.78	0.02	4.1	0.065	0.041	7.76	638	46.3	4	13.8
Mar 03,1994	62	1500	NA	NA	2.6	0.139	0.68	0.02	5.5	0.06	0.038	7.75	624	41	3.9	8.1
Mar 17,1994	76	1400	NA	NA	4.1	0.145	0.94	0.05	5.4	0.118	0.064	7.67	464	25.5	4.6	6.3
Apr05,1994	95	1200	NA	NA	4.1	0.385	1.15	0.02	10	0.086	0.051	7.81	592	37.8	4.6	6.9
Apr14,1994	104	1400	NA	NA	3.5	0.145	0.81	0.03	7.7	0.055	0.031	8.31	567	37.9	4.6	7.6
May 04,1994	124	1800	NA	NA	4.3	0.173	1.06	0.04	6	0.115	0.071	8.39	533	34.9	4.3	7.5
May 18,1994	138	1300	NA	NA	3.2	0.046	0.67	0.02	5.3	0.045	0.001	8.2	612	34.4	3	6.6
Jun 08,1994	159	1200	NA	NA	30	0.019	1.38	0.02	0.2	1.68	0.009	8.03	629	65.4	4.5	8.4
Jun 25,1994	STORM EVENT, SEE BELOW															
Jul 11, 1994	192	1200	NA	NA	5.6	0.012	0.85	0.07	4.2	0.052	0.009	NA	NA	NA	NA	NA
Aug 02,1994	214	1300	NA	NA	11.2	0.017	0.72	0.02	0.5	0.063	0.011	7.73	710	45.3	4.4	9.7
Aug 16,1994	NO SAMPLE TAKEN. NO FLOW															
Aug 30,1994	NO SAMPLE TAKEN, NO FLOW															
Sep 15,1994	NO SAMPLE TAKEN, NO FLOW															

Date of Sample	Julian Date	Time	Staff Gauge	Temp (C)	Suspended Solids	Nitrogen				Phosphorus		pH	Conductivity (µhmo/mL)	Chloride (Mg/L)
						Free Ammonia	Total Kjeldahl	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive			
Dec 04, 1993	338	0500	8.9	0.21	1.11	<0.01	20	0.1	0.01	8.11	698	41	4	NA
Dec 04, 1993	338	1700	82.9	0.08	1.33	<0.01	14	0.31	0.14	7.81	521	29.1	4.5	NA
Dec 04, 1993	338	2300	83.3	0.05	2.18	<0.01	14	0.5	0.17	7.68	471	27.8	5.8	NA
Dec 05, 1993	339	0500	33.2	0.07	2.12	<0.01	18	0.26	0.15	8.19	565	34.1	5.5	NA
Dec 05, 1993	339	1100	11.9	<0.05	1.42	<0.01	19	0.18	0.12	8.22	617	36.5	4.6	NA
Dec 06, 1993	340	0500	10.4	<0.05	1.11	<0.01	19	0.1	<0.01	8.23	668	36.4	4	NA
Mar 21, 1994	80	0000	33.6	0.015	1.84	0.02	2.1	0.268	0.067	7.29	294	21.4	4.6	9.2
Mar 21, 1994	80	0900	12.7	0.122	1.04	0.02	2.8	0.123	0.039	7.77	471	60	4.4	31.5
Mar 21, 1994	80	1200	116	0.163	1.7	0.02	2	0.35	0.011	7.21	193	15.5	3.8	7.8
Mar 21, 1994	80	1500	276	0.165	2.5	0.02	1.1	0.85	0.025	7.1	103	6.9	3.2	3.3
Mar 21, 1994	80	2100	184	0.15	2	0.03	1.4	0.74	0.1	7.22	122	8.9	3.5	4.3
Mar 22, 1994	81	0600	65.9	0.136	1.5	0.02	2.9	0.405	0.061	7.44	244	21.6	3.8	11.2
Apr 05, 1994	95	1500	3.8	0.181	0.92	0.1	13.4	0.09	0.055	8.31	612	28.2	2.7	10.5
Apr 05, 1994	95	2100	4.3	0.87	3.1	0.25	12.8	0.181	0.13	8.24	621	28.2	4.5	11.1
Apr 06, 1994	96	0000	10	0.58	1.63	0.65	11.8	0.113	0.066	8.24	562	26.2	4.5	9.6
Apr 06, 1994	96	D600	10.6	0.272	1.25	0.25	13.8	0.103	0.047	8.17	594	42.3	4.4	16.2
Apr 06, 1994	96	1200	5.5	0.193	0.91	0.2	15.8	0.065	0.033	8.25	601	38.4	3.7	15.6
Apr 06, 1994	96	1500	5.6	0.149	0.95	0.15	14.8	0.06	0.031	8.27	581	35.2	3.5	13.9
Jun 24, 1994	175	0600	58.4	<0.005	1.25	0.05	0.6	0.125	0.01	7.63	455	19.6	3.7	8.3
Jun 24, 1994	175	1200	67.5	0.36	3.5	0.55	42.2	0.34	0.116	7.46	722	51.1	8.2	10.8
Jun 24, 1994	175	1800	21.7	0.162	1.74	0.31	46.7	0.162	0.076	7.81	809	42.7	5.8	11.2
Jun 24, 1994	176	0000	20.5	0.383	2.24	0.32	46.7	0.218	0.119	7.74	778	50.8	7.3	11.3
Jun 24, 1994	176	0600	12.2	0.132	0.92	0.19	41.4	0.131	0.084	7.94	827	47.9	5.5	10.6
Jun 24, 1994	176	1200	6.3	0.037	0.93	0.18	37.9	0.099	0.063	8	829	47.1	4.8	10.5
Jun 24, 1994	176	1800	11.7	0.124	1.05	0.16	34.9	0.109	0.057	8.05	820	47.9	4.7	10.6
Jun 24, 1994	177	0900	9.9	0.025	0.82	0.12	31.9	0.085	0.037	8.04	831	47.2	3.8	11.3

Paired Watershed Study - Kettle Creek C.A. - Water Sampling Data - Station: Holtby Drain, (East) - ISCO Samples

Date of Sample	Julian Date	Time	Staff Gauge (metres)	Temp (C)	Suspended Solids (Mg/L)	Nitrogen				Phosphorus		pH	Conductivity (µhmo/mL)	Chloride (Mg/L)
						Free Ammonia (Mg/L)	Total Kjeldahl (Mg/L)	Nitrite (Mg/L)	Nitrate (Mg/L)	Total (Mg/L)	Dissolved Reactive (Mg/L)			
Dec 04, 1993	338	0500	63.7	6.84	24.4	0.02	<0.1	3	0.8	7.66	1440	131	89.4	NA
Dec 04,1993	338	1700	50.1	6.42	20.4	0.01	0.1	2.5	0.95	7.68	1390	128	78.5	NA
Dec 04, 1993	338	2300	17.3	0.48	2.38	<0.01	10	0.3	0.19	8	648	54.4	12	NA
Dec 05,1993	339	0500	11.7	0.23	1.77	<0.01	10	0.23	0.15	8.09	644	53.3	8.9	NA
Dec 05, 1993	339	1100	10.2	0.18	1.55	<0.01	11	0.2	0.13	8.13	652	51.1	7.8	NA
Dec 06,1993	340	0500	4.8	0.15	1.52	<0.01	12	0.13	0.11	8.21	693	53.2	7	NA
Mar 21, 1994	80	0000	20.8	0.75	1.8	0.03	3.1	0.22	0.081	7.48	358	21.1	6.7	5.2
Mar 21, 1994	80	0900	10.3	0.386	1.29	0.03	3.1	0.188	0.096	7.74	344	21.9	5.2	6.3
Mar 21. 1994	80	1200	124	0.75	3.25	0.02	1.4	0.51	0.07	7.06	160	8.8	4.5	2.9
Mar 21.1994	80	1500	531	0.297	5.25	0.03	1.2	1.55	0.107	7.01	106	5.9	3.8	2.2
Mar 21.1994	80	2100	249	0.278	2.47	0.04	1.7	1.17	0.153	7.09	122	8.2	3.8	2.3
Mar 22. 1994	81	0600	56.7	0.225	1.9	0.05	2.5	0.56	0.153	7.36	189	10	4.1	3.1
Apr 05, 1994	95	1500	2.1	0.17	1.02	0.22	8.6	0.089	0.056	8.36	602	38.2	5.1	7.2
Apr 05,1994	95	2100	4.3	0.085	1.04	0.38	8.5	0.104	0.063	8.29	589	37	5.9	7.6
Apr 06. 1994	96	0000	6	0.445	1.6	0.19	7.6	0.119	0.057	8.19	583	36.1	6.5	7.2
Apr 06. 1994	96	0600	7.5	0.258	1.3	0.1	6.9	0.095	0.035	8.22	584	50.8	6.2	9.4
Apr 06.1994	96	1200	4.9	0.133	0.94	0.11	9.1	0.075	0.04	8.28	569	46.8	5.4	9.6
Apr 06,1994	96	1500	4.1	0.132	0.88	0.07	8.7	0.073	0.035	8.55	545	44.4	4.9	8.8
Jun 24. 1994	175	0600	107	<0.005	1.85	0.35	0.2	0.295	0.022	7.77	647	NA	7.9	12.3
Jun 24, 1994	175	1200	67.1	0.008	4.3	1.2.5	9.3	0.7	0.208	7.45	509	58	34.1	7
Jun 24, 1994	175	1800	13.9	<0.005	1.49	0.46	15.8	0.173	0.106	7.88	571	39.9	7.2	6.7
Jun 25. 1994	176	0000	33.2	0.005	1.9	0.33	12.3	0.238	0.077	7.74	520	36.9	7.9	6.1
Jun 25. 1994	176	0600	8.3	<0.005	1.39	0.39	17.9	0.139	0.071	7.87	613	42.8	6.2	6.9
Jun 25. 1994	176	1200	5.2	<0.005	1.27	0.38	18.9	0.109	0.059	7.99	661	43.9	5.8	7.4
Jun 25, 1994	176	1800	4.7	0.01	1.09	0.35	17.9	0.091	0.054	8.04	672	44.5	5.2	7.7
Jun 26, 1994	177	0900	4.2	<0.005	1.17	0.35	16.9	0.076	0.043	8.06	695	40.9	4.7	7.8

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	0.099	0.021	0	0.188	0.022	0.007	OE	0	0	0	0	0.001	1
2	0.041	0.019B	0	0.1	0.018	0.004	OE	0	0	0	0	0.003	2
3	0.119	0.016B	0.007	0.053	0.013	0.002	OE	0	0	0	0	0.02	3
4	2.11	0.013B	0.024B	0.035	0.013	0.001	OE	0	0	0	0	0.032	4
5	0.57	0.0128	0.016	0.035	0.089	0.016	OA	0	0	0	0	0.047	5
6	0.092	0.018	0.01	0.031	0.038	0.015	0	0	0	0	0	0.04	6
7	0.045	0.009B	0.021	0.028	0.02	0.011	0	0	0	0	0	0.055	7
8	0.032	0.007B	0.104B	0.027	0.018	0.009A	0	0	0	0	0	0.025	8
9	0.023	0.0068	0.132B	0.045	0.02	0.013E	0	0	0	0	0	0.017	9
10	0.02	0.005B	0.092B	0.338	0.018	0.011 E	0	0	0	0	0	0.03	10
11	0.0186	0.005B	0.044B	0.067	0.013	0.007E	0	0	0	0	0	0.031	11
12	0.017B	0.004B	0.036B	0.035	0.009	0.005E	0	0	0	0	0	0.017	12
13	0.023B	0.0048	0.032B	0.027	0.006	0.003E	0	0	0	0	0	0.011	13
14	0.022B	0.003B	0.037	0.023	0.0134	0.002E	0	0	0	0	0	0.01	14
15	0.019B	0.003B	0.022B	0.02	0.009	0.001 E	0	0	0	0	0	0.01	15
16	0.0148	0.002B	0.01 9B	0.026	0.005	0.001 E	0	0	0	0	0	0.009	16
17	0.011 B	0.002B	0.056B	0.025	0.OD4	OE	0	0	0	0	0	0.005	17
18	0.008B	0.002B	0.044B	0.022	0.004	OE	0	0	0	0	0	0.006	18
19	0.007B	0.001B	0.0358	0.026	0.005	0.007E	0	0	0	0	0	0.008	19
20	0.012B	0.001B	0.031 B	0.317	0.004	0.004E	0	0	0	0	0	0.009	20
21	0.024B	0.001B	0.029B	0.121	0.003	0.01 5E	0	0	0	0	0	0.015	21
22	0.173 B	0.001B	0. 1 78B	0.035	0.002	O.OD4E	0	0	0	0	0	0.013	22
23	0.117B	0	0.202B	0.023	0.001	0.001A	0	0	0	0	0	0.007	23
24	0.181B	0	0.497	0.018	0.005	0	0	0	0	0	0	0.004	24
25	0.109B	0	0.318	0.126	0.005	0	0	0	0	0	0	0.0038	25
26	0.046B	0	0.307	0.046	0.004	0	0	0	0	0	0	0.002B	26
27	0.0418	0	0.378	0.025	0.002	0	0	0	0	0	0.001	0.0018	27
28	0.034B0	0	0.262	0.021	0.001	0	0	0	0	0	0.001	OB	28
29	0.029B		0.204	0.022	0.002	OE	0	0	0	0	0.001	OB	29
30	0.0268		0.16	0.031	0.001	OE	0	0	0	0	0.001	OB	0
31	0.023B		0.113		0.009		0	0		0		OB	31
TOTAL	4.105	0.147	3.41	1.936	0.367	0.139	0		0	0	0.004	0.431	TOTAL
MEAN	0.132	0.005	0.11	0.065	0.012	0.005	0	0	0	0	0	0.014	MEAN
DAM3	355	12.7	295	167	31.7	12	0	0	0	0	0.346	37.2	DAM3
MAX	2.11	0.021	0.497	0.338	0.089	0.016	0	0	0	0	0.001	0.055	MAX
MIN	0.007	0	0	0.018	0.001	0	0	0	0	0	0	0	MIN

Data Source: Water Survey A - Manual Gauge B-1ce Conditions E - Estimated

Mean discharge 0.029 M3/S  
 Total discharge. 911 DAM3

Minimum daily discharge, 0 M3/S on Feb 23  
 Data Source: Water Survey Canada



**Madter Drain at Concession 7 (Kettle, Test)**

(Preliminary) Daily Discharge in Cubic Metres per Second for 1993

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	0.101	0.012B	0.001B	0.21	0.017	0.003	OE	0	0	0	0	0.003	1
2	0.039	0.008B	0.001B	0.085	0.01	0.002	OE	0	0	0	0	0.014	2
3	0.141	0.007B	0.006B	0.031	0.008	0.002	OE	0	0	0	0	0.021	3
4	1.37E	0.006B	0.014B	0.015	0.005	0.001	OE	0	0	0	0	0.032	4
5	0.544E	0.005B	0.021B	0.016	0.198	0.011	OE	0	0	0	0.003	0.009	5
6	0.133E	0.004B	0.005B	0.017	0.046	0.009	0	0	0	0	0.001	0.03	6
7	0.057B	0.004B	0.011B	0.018	0.01	0.006	0	0	0	0	0.001	0.008	7
8	0.046B	0.003B	0.051B	0.022	0.011	0.005	0	0	0	0	0	0	8
9	0.033B	0.003B	0.137B	0.037	0.01	0.008	0	0	0	0	0	0.002	9
10	0.026B	0.003B	0.085B	0.369	0.01	0.007	0	0	0	0	0	0.027	10
11	0.022B	0.002B	0.039B	0.042	0.008	0.004	0	0	0	0	0	0.007	11
12	0.019B	0.002B	0.013B	0.015	0.006	0.003	0	0	0	0	0	0.004	12
13	0.014B	0.002B	0.01B	0.011	0.004	0.001	0	0	0	0	0	0.003	13
14	0.015B	0.002B	0.007B	0.011	0.003	0.001	0	0	0	0	0	0.002	14
15	0.012B	0.002B	0.0058	0.013	0.004	0.001	0	0	0	0	0	0.002	15
16	0.01B	0.002B	0.003B	0.034	0.003	0.001	0	0	0	0	0.001	0.002	16
17	0.008B	0.002B	0.095B	0.023	0.002	0	0	0	0	0.001	0.001	0.001	17
18	0.006B	0.001B	0.054B	0.015	0.002	0	0	0	0	0.002	0.003	0.001	18
19	0.006B	0.001B	0.031B	0.024	0.002	0.009	0	0	0	0	0.001	0.002	19
20	0.005B	0.001B	0.01B	0.409	0.001	0.005	0	0	0	0	0.002	0.003	20
21	0.032B	0.001B	0.012B	0.155	0.001	0.021	0	0	0	0	0.001	0.004	21
22	0.409B	0.001B	0.072B	0.039	0.001	0.007	0	0	0	0	0.001	0.003	22
23	0.209B	0.001B	0.145B	0.017	0.001	0.003	0	0	0	0	0.001	0.002	23
24	0.345B	0.001B	0.491B	0.013	0.002	0.002	0	0	0	0	0.001	0.0018	24
25	0.142B	0.001B	0.469B	0.196	0.002	0.001	0	0	0	0	0.001	0.0018	25
26	0.061B	0.001B	0.448	0.05	0.001	0.003	0	0	0	0	0.001	0.001B	26
27	0.039B	0.001B	0.518	0.024	0.001	0.003	0	0	0	0	0.061	06	27
28	0.028B	0.001B	0.369	0.014	0.001	0.003E	0	0	0	0	0.01	OB	28
29	0.021B		0.252	0.018	0.001	0.002E	0	0	0	0	0.003	OB	29
30	0.02B		0.162	0.051	0.001	0.001E	0	0	0	0	0.004	OB	0
31	0.017B		0.092		0.005		0	0	0	0		OB	31
TOTAL	3.93	0.08	3.629	1.994	0.377	0.125				0.003	0.097	0.185	TOTAL
MEAN	0.127	0.003	0.117	0.066	0.012	0.004				0	0.003	0.006	MEAN
DAM3	340	6.91	314	172	32.6	10.8				0.259	8.38	16	DAM3
MAX	1.37	0.012	0.518	0.409	0.198	0.021				0.002	0.061	0.032	MAX
MIN	0.005	0.001	0.001	0.011	0.001	0				0	0	0	MIN

Data Source: Water Survey A - Manual Gauge B-1ce Conditions E - Estimated

Summary for the year 1993  
 Mean discharge, 0.029 M3/S  
 Total discharge, 901 DAM3

Maximum daily discharge, 1.37 M3/S on Jan 4  
 Minimum daily discharge, 0 M3/S on Jun 17

**Holtby Drain at Concession 7 (Kettle Control)**

(Preliminary) Daily Discharge in Cubic Metres per Second for 1994 - Station 02GCO32

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	0 B	.030 B	.007 B	0.055	0.071	0.009	0.068						1
2	0 B	.014 B	.005 B	0.056	0.041	0.004	0.034						2
3	0 a	.0068	.004 B	0.071	0.032	0.002	0.025						3
4	0 B	.004 B	.006 B	0.044	0.027	0.001	0.017						4
5	0 B	.003 B	.012 B	0.054	0.025	0.001	0.015						5
6	0 B	.002 B	.080 B	0.119	0.029	0.001	0.01						6
7	0 B	.002 B	.237 B	0.123	0.027	0.001	0.15						7
8	0 B	.001 B	.110B	0.143	0.056	0.001	0.031						8
9	0 B	.001 B	.060 B	0.124	0.034	0	0.02						9
10	0 B	.001 B	.030 B	0.066	0.028	0	0.016						10
11	0 B	0 B	.021 B	0.045	0.023	0	0.01						11
12	0 B	0 B	.019 B	0.077	0.025	0	0.404						12
13	0 B	0 B	.060 B	0.144	0.021	0	0.375						13
14	0 B	0 B	.150 B	0.096	0.016	0.002	0.05						14
15	0 B	0 B	.379 B	0.056	0.09	0	0.028						15
16	0 a	0 8	.110B	0.043	0.081	0.001	0.022						16
17	0 B	0 B	.040 B	0.035	0.043	0E	0.017						17
18	0 B	.004 B	.030 B	0.03	0.034	0	0.012						18
19	0 B	.100 B	024 B	0.027	0.029	0	0.008						19
20	0 B	1.26 B	.019 B	0.024	0.027	0	0.004						20
21	0 B	.300 B	.377 B	0.021	0.022	0	0.004						21
22	0 B	.100 B	.360 B	0.019	0.016	0	0.012						22
23	0 B	.050 B	.180 B	0.017	0.011	0	0.008						23
24	0 8	.035 B	.100 B	0.015	0.008	0.125	0.003						24
25	0 B	.023 B	.085 B	0.017	0.008	0.103	0.001						25
26	0 B	.020 B	.054 B	0.042	0.013	0.048	0.001						26
27	0 B	.015 B	0.111	0.2	0.011	0.091	0 A						27
28	.130 B	.011 B	0.095	0.053	0.()06	0.034							28
29	.500 B		0.109	0.062	0.003	0.588							29
30	.170 B		0.073	0.05	0.002	0.199							30
31	.070 B		0.057		0.005								31
TOTAL	0.87	1.982	3.004	1.928	0.864	1.212							TOTAL
MEAN	0.028	0.071	0.097	0.064	0.028	0.04							MEAN
DAM3	75.1	171	260	167	74.6	105							DAM3
MAX	0.5	1.26	0.379	0.2	0.09	0.588							MAX
MIN	0	0	0.004	0.015	0.002	0							MIN

Data Source: Water Survey Canada

A - Manual Gauge

B-1ce Conditions

E - Estimated

**Madter Drain at Concession 7 (Kettle Test)**

(Preliminary) Daily Discharge in Cubic Metres per Second for 1994

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	0 B	0.038 B	0.004 B	0.053	0.073	0.005	0.045						1
2	0 B	0.024 B	0.003 B	0.052	0.027	0.003	0.02						2
3	0 B	0.011 B	0.002 B	0.064	0.015	0.001	0.014						3
4	0 B	0.008 B	0.018 B	0.042	0.013	0.001	0.011						4
5	0 B	0.006 B	0.05 B	0.044	0.011	0.001	0.01						5
6	0 B	0.005 B	0.11 B	0.134	0.016	0.001	0.008						6
7	0 B	0.004 B	0.239 B	0.201	0.014	0.001	0.302						7
8	0 B	0.003 B	0.1 B	0.202	0.05	0	0.022						8
9	0 B	0.0028	0.026 B	0.135	0.017	0	0.014						9
10	0 B	0.001 B	0.015 B	0.06	0.014	0	0.01						10
11	0 B	0 B	0.013 B	0.034	0.011	0	0.006						11
12	0 B	0 B	0.026 B	0.073	0.013	0	0.658						12
13	0 B	0 B	0.07 B	0.163	0.01	0.008	0.563						13
14	0 B	0 B	0.18 B	0.106	0.008	0.013	0.044						14
15	0 B	0 B	0.348 B	0.049	0.152	0.005	0.018						15
16	0 B	0 B	0.07 B	0.035	0.124	0.002	0.011						16
17	0 B	0 B	0.0228	0.026	0.036	0.001	0.007						17
18	0 B	0.001 B	0.016 B	0.019	0.019	0.001	0.005						18
19	0 B	0.07 B	0.013 B	0.016	0.014	0	0.004						19
20	0 B	1.26 B	0.012 B	0.013	0.011	0	0.003						20
21	0 B	0.3 B	0.461 B	0.01	0.009	0	0.002						21
22	0 B	0.1 B	0.316 B	0.008	0.007	0	0.017						22
23	0 B	0.03 B	0.309	0.006	0.005	0	0.004						23
24	0 B	0.02 B	0.357	0.006	0.004	0.349	0.005						24
25	0 B	0.01 B	0.104	0.007	0.004	0.133	0.003						25
26	0 B	0.008 B	0.056	0.036	0.005	0.046	0.001						26
27	0 B	0.006 B	0.169	0.226	0.005	0.103	0.001						27
28	.396 B	.005 B	0.118	0.045	0.003	0.024							28
29	.210 B		0.142	0.057	0.002	1.05							29
30	.120 B		0.084	0.038	0.001	0.249							30
31	.070 B		0.064		0.003								31
TOTAL	0.796	1.912	3.517	1.96	0.696	1.997							TOTAL
MEAN	0.026	0.068	0.113	0.065	0.022	0.067							MEAN
DAM3	68.8	165	304	169	60.1	173							DAM3
MAX	0.396	1.26	0.461	0.226	0.152	1.05							MAX
MIN	0	0	0.002	0.006	0.001	0							MIN

Data Source: Water Survey Canada

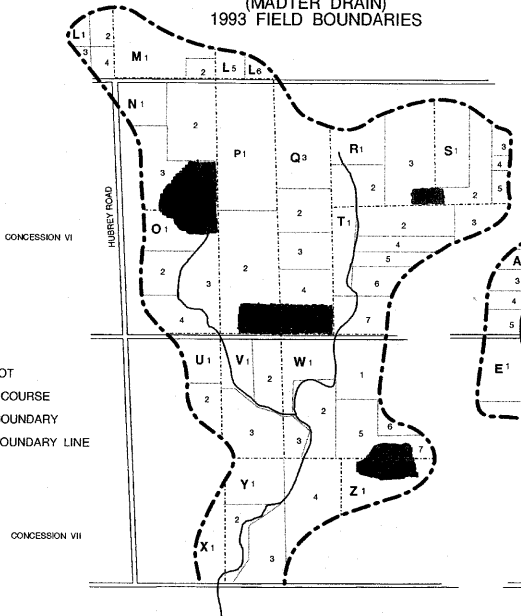
A - Manual Gauge

B-1ce Conditions

E - Estimated

# KETTLE CREEK PAIRED WATERSHEDS

## WEST PAIRED WATERSHED (MADTER DRAIN) 1993 FIELD BOUNDARIES



# KETTLE CREEK PAIRED WATERSHEDS

EAST PAIRED WATERSHED  
(HOLTBY DRAIN)  
1993 FIELD BOUNDARIES



SCALE 1: 15,500

**KETTLE**

1993 Field Activities

Western Sub-basin (Matter Drain)

Landowner	Field #	Acres	1992/93 Tillage	1993 Crop
Farm L	1	3.7	---	alfalfa
	2	10.4	---	pasture
	3	1.8	fall cultivator (2)**	alfalfa
	4	5.2	---	alfalfa
	5	5.2	no-till	corn
	6	4.9	no-till	soybeans
Farm M	1	36.5	no-till	soybeans
	2	4.2	---	pasture
Farm N	1	12.3	no-till	corn
	2	30.8	no-till	corn
	3	19	spr cultivator (2)	soybeans
Farm O	1	15.3	no-till	soybeans
	2	10.1	---	fallow
	3	27.2	no-till	soybeans
	4	8.4	---	fallow
Farm P	1	50.9	fall mouldboard, spring cultivator (2)	green-beans
	2	44.7	no-till	wheat
Farm Q	1	28.4	fall mouldboard,	corn
	2	17.5	spring cultivator (3)	corn
	3	14.3	no-till	soybeans
	4	18.5	no-till	corn
Farm R	1	16.1	no-till	soybeans
	2	23.2	---	alfalfa
	3	29.7	fall mouldboard, spring cultivator (2)	peas
Farm S	1	26.7	no-till	corn
	2	15.2	no-till	soybeans
	3	3.2	spring cultivator (3)	soybeans
	4	1.5	spring cultivator (3)	soybeans
	5	4.4	spring cultivator (3)	soybeans
Farm T	1	16.3	no-till	soybeans
	2	18	no-till	soybeans
	3	3	fall mouldboard, spring cultivator (2)	corn
	4	7.9	no-till	soybeans
	5	7.2	no-till	corn
	6	10.9	no-till	corn
	7	14.1	no-till	soybeans

Farm U	1	10.4	fall mouldboard, spring cultivator (2)	corn
	2	4.9	fall mouldboard, spring cultivator (2)	corn
Farm V	1	6.7	fall cultivator (2)	alfalfa
	2	12.6	fall cultivator (2)	alfalfa
	3	15.8	no-till	soybeans
Farm W	1	8	no-till	corn
	2	26.2	no-till	soybeans
	3	8	no-till	corn
	4	17.6	no-till	soybeans
	5	21	fall mouldboard, spring cultivator (2)	corn
	6	7.9	no-till	soybeans
	7	12.6	no-till	soybeans
Farm X	1	20	fall mouldboard, spring cultivator (3)	corn
Farm Y	1	12.4	no-till	soybeans
	2	9.9	---	alfalfa
	3	11.3	no-till	soybeans
	4	23.4	fall mouldboard, spring cultivator (2)	corn
Farm Z	1	9.9	fall chisel, spring cultivator (3)	soybeans

\* --- no tillage practiced due to forage crop

\*\* () represents number of passes over field

**KETTLE 1993 Field Boundaries**

Eastern Sub-basin - (Holtby Drain)

Landowner	Field #	Acres	1992/93 Tillage	1993 Crop
Farm A	1	2.7	no-till	soybeans
	2	3.7	no-till	corn
	3	10.8	no-till	corn
	4	5.2	no-till	soybeans
	5	9.6	no-till	corn
	6	32.9	fall mouldboard, spring cultivator (2)*	corn
	7	27.4	fall mould board, spring cultivator (2)	soybeans
	8	29.2	fall mouldboard, spring cultivator (2)	soybeans
	9	7	fall cultivator (2)	alfalfa
Farm B	1	10.4	no-till	barley
	2	20.2	fall mouldboard, spring cultivator (2)	corn
	3	36.1	fall mouldboard, spring cultivator (2)	corn
	4	32.6	spring cultivator (3)	soybeans
Farm C	1	139	fall mouldboard, spring cultivator (3)	corn
Farm D	1	43	fall mouldboard, spring cultivator (2)	corn
	2	34.3	spring cultivator (2)	soybeans
Farm E	1	25.4	fall mouldboard, spring cultivator (2)	corn
	2	5.5	no-till	soybeans
Farm F	1	88.2	fall mouldboard, spring cultivator (2)	corn
Farm G	1	54	fall mouldboard, spring cultivator (2)	corn
	2	32.4	fall mouldboard, spring cultivator (2)	corn
Farm H	1	48.1	fall mouldboard, spring cultivator (2)	corn
	2	21.5	fall mouldboard, spring cultivator (2)	corn
Farm J	1	4.5	-----**	pasture
	2	11.6	---	alfalfa
	3	9.9	fall mouldboard, spring cultivator (2)	corn
	4	11.9	---	pasture
	5	19.9	---	alfalfa
	6	16.6	---	alfalfa
	7	16.3	---	pasture
	8	28.7	---	alfalfa
	9	4.2	fall cultivator (2)	wheat

\* ( ) represents the number of passes over the field

\*\* --- no tillage practiced due to forage crop