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**THE AQUATIC BIOTA AND GROUNDWATER QUALITY OF SPRINGS
IN THE LINCOLN HILLS, WISCONSIN DRIFTLESS,
AND NORTHERN TILL PLAINS SECTIONS OF ILLINOIS**

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S U M M A R Y

From 1 September 1995 through 1 July 1997, 125 springs in the Lincoln Hills Section of the Ozark Plateaus Province, the Wisconsin Driftless Section, and the Northern Till Plains Section of Illinois were visited. Aquatic macroinvertebrates and water samples were collected at 58 of these springs.

Two hundred and nine taxa of aquatic macroinvertebrates were collected during this present study (Appendix 1). Taxa richness ranged from 3 to 73 and averaged 16 taxa per spring. In comparison, the taxa richness recorded for seven springs in the Shawnee Hills Section of southern Illinois ranged from 11 to 46, averaging 27 taxa per spring (Webb *et al.* 1995). For 10 springs in the Salem Plateau Section of Monroe and St. Clair counties, the taxa richness ranged from 18 to 82, averaging 42 taxa per spring (Webb *et al.* 1996). Amphipods, isopods, and turbellarians were the most abundant organisms in most springs. Eleven species of amphipods were reported, five of which are troglobites. *Baettrurus brachycaudus* was reported from Madison Spring, a spring northeast of Schumann Spring, Weber Spring, Winegar Spring, and Unnamed Springs #33 and #45. *Baettrurus mucronatus* was reported from Wildcat and Mill Springs. *Crangonyx forbesi* was reported from Godar Spring, Long Spring, and Unnamed Spring #28. *Stygobromus iowae*, a species previously reported from a mine in northwestern Illinois, was reported from Well House Spring and Spring #1 [South Gate Spring] in Mississippi Palisades State Park. *Gammarus troglophilus*, a dominant species in Illinois caves, was reported from Madison, McNabb, and Dodson Springs. Six species of aquatic isopods were reported during this study, including three troglobitic species, and a species new to science from Bell Spring. *Caecidotea bicrenata* was reported from Bell Spring. *Caecidotea kendeighi* was reported from Dodson, Wildcat, and Mill Springs, and from a spring northeast of Schumann Spring. *Caecidotea packardi* was reported from Spring Lake Spring, Madison Spring, Potter Spring #1, and Weber Spring. Seven taxa of ostracods were reported during this study, including two species new to science.

Aquatic insects (133 taxa) comprised the most diverse group of aquatic macroinvertebrates, but generally were collected in low abundance. Forty-six taxa of aquatic Coleoptera were reported during this study; many of these taxa, however, were from springs which had been impounded to form ponds, particularly those which supported large areas of water cress. During this study, 42 taxa of Trichoptera were reported. Generally, they displayed a low diversity in most springs, but in certain springs in Pike and Carroll counties some extremely rare caddisflies were collected. *Lepidostoma libum*, a species reported by Ross (1944) from only three localities in Illinois, was reported from 27 additional springs during this study, thus becoming the most dominant caddisfly

in Illinois springs surveyed to date. *Glossosoma intermedium*, a species previously reported by Ross (1944) from springs in Trout Park, Elgin, was also reported from Nadig and Dewey Springs. *Ceratopsyche slossonae*, previously reported by Ross (1944) from three localities in Illinois, was reported from Dewey Spring #1. *Diplectrona modesta*, previously reported by Ross (1944) from only two localities in Illinois, was reported from Five Springs, Nadig Spring, Sorrel Horse Camp Spring, and North Spring (Trout Park). *Ochrotrichia riesi*, previously reported by Ross (1944) from only two localities in Illinois, was reported from Sand Boil Tributary Spring. *Triaenodes baris*, previously reported by Ross (1944) from only one locality in Illinois, was reported from Airhart Spring. *Hesperophylax designatus*, previously reported by Ross (1944) from Elgin, Illinois, was reported from Sand Boil Tributary Spring. *Pycnopsyche antica*, previously reported by Ross (1944) from southwestern Michigan, was reported from Nadig Spring — a new state record for this species. *Rhyacophila vibox*, previously reported by Ross (1944) from Elgin, was reported from Unnamed Spring #33. *Psychomyia flavida*, previously reported by Ross (1944) from only two localities in Illinois, was reported from Airhart Spring. Five species of stoneflies were reported during this study — *Allocaenia vivipara*, *Amphinemura delosa*, *Leuctra tenuis*, *Nemoura trispinosa*, and *Clioperla clio*. *Nemoura trispinosa*, previously reported by Ross (1944) from Elgin, was reported from Five Springs, Nadig Spring, Sorrel Horse Camp Spring, Sand Boil Spring, and Sand Boil Tributary Spring.

Oligochaetes (29 taxa) were the most diverse group of non-insectan aquatic macroinvertebrates collected during this study. *Rhyacodrilus* cf. *montana*, a rare species in Illinois, was reported from Wishing and Rhule Springs. *Varichaetadrilus angustipenis*, another rare species in Illinois, was reported from Two Springs, Madison, Twin, Bell, and Jennings Springs. *Allonais paraguayensis*, a rare species in the United States but recently reported from four other springs in Illinois (Webb *et al.* 1995, 1996), was reported from Ice Spring. Generally, oligochaetes were low in abundance but often high in diversity within a spring. Several other springs, particularly those in which the springhead and/or springbrook were heavily impacted by cattle, supported high densities of two or three species of oligochaetes tolerant of organic enrichment and siltation.

Water samples were collected in March, June, and August of 1996 and April and June of 1997. Nitrate nitrogen, above a background level of 1.4 mg/L, was detected in 73 of 123 water samples (59%). Concentrations ranged from below the analytical detection limit (<DL) to 33.9 mg/L. Ten samples exceeded the EPA Maximum Contaminant Level (EPAMCL) of 10 mg/L. Water samples were also analyzed for the presence of four herbicides — Alachlor, Atrazine, Cyanazine, and Metolachlor. Atrazine was detected in 48 of 110 water samples (44%); concentrations ranged from <DL to 1.98 µg/L. No samples exceeded the EPAMCL of 3 µg/L. Alachlor was detected in 4 of

110 water samples (4%); concentrations ranged from <DL to 0.03 µg/L. No samples exceeded the EPAMCL of 2 µg/L. Metolachlor was detected in 22 of 110 water samples (20%); concentrations ranged from <DL to 0.41 µg/L. No samples exceeded the EPA Health Advisory Level (EPAHAL) of 100 µg/L. Cyanazine was detected in 4 of 104 water samples (4%); concentrations ranged from <DL to 9.24 µg/L. Two samples from Calhoun County exceeded the EPAHAL of 1 µg/L.

Carex laxiculmis, a spreading sedge listed as State Threatened in Illinois (Herkert 1991), was located along the springbrook and on the adjacent mesic wooded slope around Madison Spring. This collection represents a new county record for this species, previously known from nine counties in Illinois (Herkert 1991). *Acalypha deamii* (Large-seeded Mercury), listed as State Threatened in Illinois (Herkert 1991), was found along the short springbrook of Payson Spring. *Juglans cinerea*, white walnut, was found at Dodson Spring. This tree is listed as a species of Special Concern by the Illinois Species Protection Board (IESPB 1994). Species of Special Concern are those not currently listed as endangered or threatened in the state, yet thought to be experiencing serious population declines such that they may become listed as either Threatened or Endangered in Illinois in the foreseeable future.

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Springs are a natural source of groundwater discharge at a rate high enough to form a channel on the earth's surface. They can be further described as the end point of a groundwater continuum and the initiation point for the base flow of many streams. Water quality data are not available for most springs in Illinois, although springs provide a point source for evaluating present and potential ground and surface water contamination. Systematic water quality sampling at springs provides information affecting the life cycle of aquatic organisms, including the loss or gain of species diversity. Although springs are an interface between groundwater (subsurface) and contribute to the base flow of streams (surface), they have not been a focal point of research by aquatic biologists or hydrogeologists interested in the elements or properties of lotic (flowing water) communities. The physical and chemical composition of spring water reflects not only the mineral composition of the various rock strata with which the water has been in contact, but also the various chemicals bound up in the surface waters which often move downward into the earth materials becoming groundwater.

Springs, along with their associated seeps and outflow brooks, provide a unique habitat for endemic and rare species of aquatic animals and plants because they usually exhibit a nearly constant physical and chemical environment (Butler 1984; Colbo 1991; Davidson and Wilding 1943; Elton 1966; Erman and Erman 1990; Forester 1991; Glazier 1991; Glazier and Gooch 1987; Gooch and Glazier 1991; Meffe and Marsh 1983; Minshall 1968; Pritchard 1991; Ring 1991; Roughley and Larson 1991; Williams N. E. 1991; Williams and Danks 1991; Williams *et al.* 1997). In the United States and Canada, little emphasis has been given to the study of springs, particularly from the holistic standpoint of examining the entire biota and then relating the diversity and endemism found in their hydrogeologic and water quality setting. Williams (1991) studied the Trichoptera of cold freshwater springs in Canada; Ring (1991) examined the insect fauna of natural salt springs on Saltspring Island, British Columbia; Barnby and Resh (1988) examined factors affecting the distribution of an endemic and a widespread species of brine fly in a northern California thermal saline spring; Brues (1924) observed the animal life in the thermal waters of

Yellowstone National Park, Wyoming; Roughley and Larson (1991) reviewed the aquatic Coleoptera of springs in Canada; Forester (1991) examined the assemblages of ostracods from springs in the western United States; and Smith (1991) reported on the water mites in springs in Canada. All of these studies focused on a selected group of species, but provided little water quality information beyond water temperature, dissolved oxygen, hydrogen ion concentration (as pH), and alkalinity. Glazier (1991) hypothesized that the aquatic macroinvertebrates of temperate, cold-water areas are dominated by either a non-insectan community (Turbellaria, Annelida, Amphipoda, Isopoda, Gastropoda) or an aquatic insect community (Odonata, Ephemeroptera, Plecoptera, Trichoptera, and aquatic Diptera and Coleoptera). The faunal dominance by non-insectan taxa appears in hard-water limestone springs [those with a pH >7.0 and alkalinity (as CaCO₃) >25 mg/L]. Aquatic insects appear to dominate in acidic soft-water springs [those with a pH <7.0 and alkalinity (as CaCO₃) <25 mg/L]. Both types of springs occur in Illinois and thus offer an opportunity to evaluate species diversity and endemism of aquatic organisms in relation to the hydrogeology of cultural and non-cultural drainage basins.

Due to the lack of baseline information on the fauna, water quality, and hydrogeology of Illinois springs, a cooperative program between the Illinois Natural History Survey and the Illinois State Geological Survey was initiated in 1991 to evaluate the current status of Illinois springs. The locations of Illinois springs were determined from historical data. Subsequently, a computerized database was developed to bring together all available information on spring location, hydrogeology, water quality, fauna, and flora, as well as any historical information available. At the turn of the century, 88 springs were reported in Illinois (Bartow *et al.* 1909). These springs were utilized as domestic drinking and bathing water sources or for the perceived health benefits derived from the minerals contained in the water. To date, over 300 springs have been entered into this database from historical, topographic, and personal data sources. The present focus is to verify precise spring locations, and to determine the hydrogeology, biota, and water quality of each spring listed in this database.

Springs in Illinois are principally found in the Mississippian and Devonian limestones of the four karst regions of Illinois: the Shawnee Hills, the Salem Plateau, the Lincoln Hills, and the Wisconsin Driftless Area. Several springs are also scattered in the northern Till Plains and Great Lake Sections of the state.

The objectives of this study are to: 1) determine the taxa richness and spatial diversity of the fauna and flora in springs with particular reference to endemic and rare species; 2) document the occurrence of animal and plant species in springs that are listed as threatened or endangered by the State of Illinois or the federal government (Herkert 1991, 1992, 1994; Illinois Endangered Species Protection Board 1994; U.S. Department of Interior, Fish and Wildlife Service 1996); 3) analyze the water quality of each spring with particular reference to concentrations of nitrate nitrogen and

the herbicides Alachlor, Atrazine, Cyanazine, and Metolachlor; and 4) compare the fauna, flora, and water quality of these springs with the results of recent surveys of springs occurring in the Shawnee Hills Section (Webb *et al.* 1992, 1995) and the Sinkhole Plain of the Salem Plateau Section (Webb *et al.* 1996) of Illinois.

Materials and Methods

Physical and Chemical Analyses

Water samples were collected and the following field quality parameters measured at each springhead: ambient and water temperature, dissolved oxygen, hydrogen ion concentration (as pH), field conductivity, and total alkalinity. Metals and other elements, including total phosphorus, were analyzed by inductively coupled argon plasma spectroscopy. Chlorides, bromides, fluorides, sulfates, orthophosphate, nitrate nitrogen, and nitrite nitrogen were analyzed by ion chromatography. Ammonia nitrogen was analyzed by a Technicon chemical analysis system.

Panno *et al.* (1996) were able to determine a background threshold of 1.4 mg/L for nitrate nitrogen in groundwater samples obtained from the karst terrain area of southwestern Illinois based on a probability technique developed by Sinclair (1974). As a point of reference, this background threshold was utilized in this report.

Spring water samples were analyzed for herbicide levels following United States Environmental Protection Agency (USEPA) National Pesticide Survey Method 508 (USEPA 1988), with the exception that 1,3-dimethyl-2-nitrobenzene was used as a surrogate standard. The 1,3-dimethyl-2-nitrobenzene is a more versatile standard because it can be detected and quantified using either an electron capture detector (ECD) or nitrogen-phosphorus detector (NPD). Each sample was spiked with 50 μ l of the surrogate solution (250 mg/L) before extraction. Water samples were buffered to pH 7 then extracted with 300 ml of methylene chloride. Trace amounts of water were removed from the methylene chloride phase with anhydrous sodium sulfate, and the solvent volume was decreased to about 2 ml by distillation. The remaining methylene chloride was exchanged with methyl tert-butyl ether. The internal standard, 4,6-dichloro-2-methylpyrimidine, was added to the sample prior to gas chromatography analysis. The sample extracts were analyzed as described in Chou and Roy (1993). Water samples were analyzed for the presence of four herbicides — Atrazine, Alachlor, Metolachlor, and Cyanazine. Concentration levels were compared with the Environmental Protection Agency Maximum Contaminant Level (EPAMCL) of 3 μ g/L for Atrazine and 2 μ g/L for Alachlor, and the Environmental Protection Agency Maximum Health Advisory Level (EPAHAL) of 100 μ g/L for Metolachlor and 1 μ g/L for Cyanazine.

Hardness (EDTA) was calculated following standard methods outlined in American Public Health Association *et al.* (1985).

Biological Studies

Specimens of aquatic vertebrates and macroinvertebrates were collected utilizing dip and kick nets, and sieves, and by hand-picking of rocks, submerged logs, and leaf packs. All specimens are deposited in the INHS collections in Champaign. A list of the aquatic macroinvertebrates collected in this study are listed in Appendix 1.

Descriptions of the vegetation at the springhead and along the springbrook were completed for a distance extending about 40 meters downstream of the springhead. In a few instances, a lesser distance was described because the springbrook sometimes entered another stream, pond, or went beneath a roadbed was described. The vegetation within one meter of the normally well-defined bank of the springbrook. Species of plants growing on gravel bars within the springbrook were also included, as well as any that were growing in the water itself [for example, *Nasturtium officinale* R.Br.]. During each census a species list was generated for each site, voucher specimens were taken, and a vegetation analysis was conducted for the purpose of determining dominance of the trees, shrubs, woody vines, and herbs around the springs and along the springbrooks. An attempt was made to voucher at least one specimen of each plant taxon found during this study. Vouchers are deposited at the Illinois Natural History Survey Herbarium (ILLS).

One meter square plots were positioned along the springbrook, and alternating down the springbrook at 4 meter intervals, beginning at 0 meter, then continuing to 38 meters. The area actually sampled at each site was 13% of the area along the springbrooks beginning at the springhead. The first one-meter square plot was always positioned at the left side of the spring source when facing away from the spring. Vascular herbaceous plant species (including non-woody vines) rooted within the plot and their percent cover for each species were recorded for each plot using the Daubenmire cover scale (Daubenmire 1959, 1968) with modifications following Bailey and Poulton (1968). For woody species, all taxa were recorded that covered the plot as well as their modified cover scale. The modified Daubenmire cover scale is as follows: class 1, 0-1%; class 2, 1-5%; class 3, 5-25%; class 4, 25-50%; class 5, 50-75%; class 6, 75-95%; and class 7, 95-100%. Frames representing 1% and 5% of the plot area were used as guides in cover estimation. With this data, percent frequency, percent relative frequency, average mean cover, and percent relative average mean cover were determined. Cover class midpoints were used to calculate average canopy cover. An importance value (IV) was determined for each species recorded within the plots. The IV is the average of the percent relative frequency and the percent relative average mean cover. The species were then grouped according to their IV. When two or

more species had equal IV's then they were listed alphabetically by species. Those species with the greatest IV's were considered the dominant species.

Species names primarily follow Gleason and Cronquist (1991) and Mohlenbrock (1986).

Stream Measurements

Velocity-area method was used where flow rate is determined by mean flow velocity (utilizing a Swofford flowmeter) across a representative cross-section of the stream and multiplying this by the flow rate and area (in cubic meters) at that point.

Spring Geology

Information on the geological setting for those springs examined for aquatic macroinvertebrates and water quality was extracted from a "Geologic map of Illinois" compiled by Willman and Others (1967) and "Stack-unit mapping of geologic materials in Illinois to a depth of 15 meters" by Berg and Kempton (1988).

S P R I N G S

Cole Spring: Adams County: 4.2 km N Marblehead. This spring resurges from a bedding plane of an east-facing slope of a Lower Valmeyeran limestone of Mississippian age. The springhead is located in a young second growth woods which shows evidence of heavy grazing in the recent past. Water resurges from a small opening (60 cm wide, 20 cm high) over a bottom substrate of limestone bedrock, then flows 3 m before falling over a limestone ledge into a small tributary of Mill Creek. **Springhead Fauna:** Amphipoda: *Gammarus minus*. Insecta: Diptera: Chironomidae. Tipulidae. **Springbrook:** Isopoda: *Caecidotea intermedia*, *C. minus*. **Flora:** The dominant tree in the area of the spring was *Ulmus americana*. Other trees included *Celtis occidentalis*, *Juglans nigra*, *Populus deltoides*, *Prunus serotina*, and *Quercus rubra*. The shrubs were *Cornus drummondii* and *Rosa multiflora*. The only vine present was *Toxicodendron radicans*. The dominant herbs were *Phalaris arundinacea* and *Cryptotaenia canadensis*. Other herbs included *Acalypha rhomboidea*, *Amphicarpa bracteata*, *Aster lateriflorus*, *Aster ontarionis*, *Aster simplex*, *Campanula americana*, *Carex blanda*, *Carex* sp., *Cinna arundinacea*, *Elymus villosus*, *Elymus virginicus*, *Eupatorium rugosum*, *Festuca obtusa*, *Glyceria striata*, *Impatiens* sp., *Lactuca floridana*, *Leersia virginica*, *Lobelia siphilitica*, *Osmorhiza longistylis*, *Phlox divaricata*, *Pilea pumila*, *Plantago rugelii*, *Polygonatum punctatum*, *Polygonum virginianum*, *Prunella vulgaris*, *Ranunculus abortivus*, *Rumex obtusifolius*, *Sanicula odorata*, *Taraxacum officinale*, *Trifolium repens*, and *Viola sororia*. Floral abundance, cover, and importance values are given in Appendix 2. **Reference:** Peck and Lewis (1978). **Summary:** Visited 15 May 1975: collections of isopods were made by L. M. Page and R. A. Evers. Visited 15 March 1996: water samples

were collected for analysis. Visited 22 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Visited 13 June 1997: water samples were collected for analysis. Five taxa of aquatic macroinvertebrates, dominated in abundance by amphipods and isopods, were collected. The fauna is somewhat depauperate because of the limestone bedrock substrate. Nitrate nitrogen levels determined in March and August (1996) and June (1997) were above the background level but below the EPAMCL. Samples for herbicides were collected in March (1996) and June (1997). Atrazine was detected in March and June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Cole Spring

Parameters *	3/15/96	8/22/96	6/13/97	Parameters *	3/15/96	8/22/96	6/13/97
Water Temperature (°C)		12	12.2	Dissolved Copper		<DL	<DL
Dissolved Oxygen		7.1	8.2	Dissolved Iron		<DL	0.21
pH			7.45	Dissolved Potassium		<DL	<DL
Total Alkalinity		233	352	Dissolved Lanthanum		<DL	<DL
Specific Conductivity		750.1	642.4	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		39.8	47.2	Dissolved Magnesium		16.7	14.8
Dissolved Organic C		27.6	17.5	Dissolved Manganese		<DL	0.03
Total Dissolved C		67.4	64.7	Dissolved Molybdenum		<DL	<DL
Sulfate Sulfur		31.6	29.8	Dissolved Sodium		15.8	16.3
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel		<DL	0.1
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	1.8	4.64	5.22	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.1	0.07	Dissolved Scandium		<DL	<DL
Hardness (EDTA)		295	261	Dissolved Selenium		<DL	<DL
Chlorides		26.8	29.8	Dissolved Silicon		9.89	9.12
Total Dissolved Solids		372	352	Dissolved Strontium		0.12	0.12
Turbidity (NTU)				Dissolved Titanium		<DL	<DL
Dissolved Aluminum		<DL	<DL	Dissolved Thallium		<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium		<DL	<DL
Dissolved Boron		<DL	<DL	Dissolved Zinc		0.01	0.03
Dissolved Barium		0.11	0.1	Dissolved Zirconium			
Dissolved Beryllium		<DL	<DL	Total Mercury (µg/L)		<DL	<DL
Dissolved Calcium		90.4	79.9	Atrazine (µg/L)	0.08		0.09
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL		<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL		0.15
Dissolved Chromium		<DL	0.06	Cyanazine (µg/L)	<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL = Value not determined because concentration below detection limit of analysis equipment.

Hummell Spring: Adams County: 6.6 km NNW Payson. This spring is used for the commercial bottling of spring water. The spring is situated at the base of a bluff aligned N40°E on the south side of the floodplain of Burton Creek. Water from the spring resurges through a stainless steel vertical casing (3 m high, 2.5 m diameter). The casing is positioned partially above an elongate crevice in Burlington limestone of Mississippian age, in the center of a circular man-

made pond (14 m diameter). The pond is approximately 1.5-2 m deep at the base of the casing. The pond water moves through a waterway (1-3 m wide, 15 m long) in alignment with the bluff into another larger man-made pond. The large pond discharges through a concrete weir notch (1.8 m wide). Water from the weir notch drops about 0.5 m onto a concrete spillway (2 m long) then is directed to a man-made ditch which surrounds the north side of the pond. Water from the ditch exits beneath a farm lane through a culvert pipe (0.5 m diameter) into a natural waterway. Spring discharge on 8 February 1993 was determined to be 82 L/sec. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Ostracoda: *Potamocypris* sp. Insecta: Chironomidae. **Flora:** No aquatic plants were observed in the springhead or springbrook. **Summary:** Visited 8 February 1993: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Nitrate nitrogen levels determined in February (1993) were 2.7 times above the EPAMCL. Analyses for herbicides were not conducted at this spring.

Hummel Spring

Parameters *	2/8/93	Parameters *	2/8/93
Water Temperature (°C)	11.5	Dissolved Copper	<DL
Dissolved Oxygen	8.6	Dissolved Iron	0.1
pH	7.2	Dissolved Potassium	2.11
Alkalinity	185	Dissolved Lanthanum	
Specific Conductivity	432.6	Dissolved Lithium	
Inorganic Dissolved C		Dissolved Magnesium	
Dissolved Organic C		Dissolved Manganese	0.06
Total Dissolved C		Dissolved Molybdenum	<DL
Sulfate Sulfur	28.3	Dissolved Sodium	11.1
Ammonia Nitrogen	27.3	Dissolved Nickel	<DL
Nitrite Nitrogen		Dissolved Lead	<DL
Nitrate Nitrogen	27.3	Dissolved Antimony	<DL
Total Phosphorus		Dissolved Scandium	
Hardness (EDTA)	219	Dissolved Selenium	<DL
Chlorides	14.9	Dissolved Silicon	6.75
Total Dissolved Solids	273	Dissolved Strontium	
Turbidity (NTU)	<DL	Dissolved Thallium	
Dissolved Aluminum	0.14	Dissolved Titanium	
Dissolved Arsenic	<DL	Dissolved Vanadium	<DL
Dissolved Boron	<DL	Dissolved Zinc	<DL
Dissolved Barium	0.072	Dissolved Zirconium	
Dissolved Beryllium	<DL	Total Mercury (µg/L)	
Dissolved Calcium		Atrazine (µg/L)	
Dissolved Cadmium	<DL	Alachlor (µg/L)	
Dissolved Cobalt	<DL	Metolachlor (µg/L)	
Dissolved Chromium	<DL	Cyanazine (µg/L)	

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides µg/L.
<DL = Value not determined because concentration below detection limit of analysis equipment.

Payson Spring: Adams County: 2.6 km E Payson. This spring is located at the base of an east-facing wooded slope; it has recently been disturbed by the construction of a gravel road just above the mouth of the spring. Water resurges from a small gravel opening which overlays Lower

Valmeyeran limestone of Mississippian age. The springbrook is in the floodplain of Pigeon Creek; from the springhead, it flows for 8 m within this floodplain, exiting by way of a PVC pipe (15 cm diameter) back into the wooded slope and below the gravel roadside, where it then enters Spring Creek, a tributary of Pigeon Creek. Spring discharge on 22 August 1996 was determined to be 0.90 L/sec. **Springbrook Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Ostracoda: *Potamocypris pallida*. Insecta: Trichoptera: Leptostomatidae: *Lepidostoma libum*. **Flora:** *Acalypha deamii* (Large-seeded Mercury), an Illinois State Threatened species (thirty individuals), was found along the short springbrook. The dominant tree was *Ulmus americana*. Other trees included *Acer negundo*, *Aesculus glabra*, *Celtis occidentalis*, *Fraxinus pennsylvanica*, *Gymnocladus dioicus*, and *Platanus occidentalis*. The dominant shrub was *Symphoricarpos orbiculatus*. Other shrubs observed included *Ribes missouriense* and *Rosa*

Payson Spring

Parameters *	3/15/96	8/22/96	6/13/97	Parameters *	3/15/96	8/22/96	6/13/97
Water Temperature (°C)		12	12	Dissolved Copper		0.02	<DL
Dissolved Oxygen		6.1	3.6	Dissolved Iron		<DL	<DL
pH			7.51	Dissolved Potassium		2	<DL
Total Alkalinity		307	178	Dissolved Lanthanum		<DL	<DL
Specific Conductivity		881.7	519.8	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		36.3	40.3	Dissolved Magnesium		11.5	10.8
Dissolved Organic C		23.8	17.8	Dissolved Manganese		<DL	0.02
Total Dissolved C		60.1	58.1	Dissolved Molybdenum		<DL	<DL
Sulfate Sulfur		16.2	19.5	Dissolved Sodium		10.3	10.1
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel		<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	3.1	4.72	7.51	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.05	0.03	Dissolved Scandium		<DL	<DL
Hardness (EDTA)		261	227	Dissolved Selenium		<DL	<DL
Chlorides		12.1	13.8	Dissolved Silicon		7.54	6.4
Total Dissolved Solids		324	320	Dissolved Strontium		0.11	0.11
Turbidity (NTU)				Dissolved Titanium		<DL	<DL
Dissolved Aluminum		0.02	<DL	Dissolved Thallium		<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium		<DL	<DL
Dissolved Boron		<DL	<DL	Dissolved Zinc		0.03	0.05
Dissolved Barium		0.07	0.07	Dissolved Zirconium			
Dissolved Beryllium		0	<DL	Total Mercury (µg/L)		<DL	<DL
Dissolved Calcium		85.4	73	Atrazine (µg/L)	<DL		1.98
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL		<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL		0.19
Dissolved Chromium		<DL	<DL	Cyanazine (µg/L)	<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL = Value not determined because concentration below detection limit of analysis equipment.

multiflora. The dominant vine was *Parthenocissus quinquefolia*. Other vines observed included *Smilax hispida* and *Toxicodendron radicans*. The dominant herb was *Pilea pumila*. Other herbs included *Acalypha deamii*, *Acalypha rhomboidea*, *Ambrosia trifida*, *Aster lateriflorus*, *Bidens frondosa*, *Campanula americana*, *Carex conjuncta*, *Carex granularis*, *Carex squarrosa*, *Commelina communis*, *Cryptotaenia canadensis*, *Erigeron annuus*, *Eupatorium rugosum*, *Geum canadensis*,

Glyceria striata, *Lactuca floridana*, *Mimulus alatus*, *Oxalis* sp., *Phalaris arundinacea*, *Pilea pumila*, *Plantago rugelii*, *Polygonum cespitosum*, *Polygonum punctatum*, *Solanum americanum*, *Taraxacum officinale*, *Trifolium repens*, *Verbena urticifolia*, and *Viola sororia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 15 March 1996: water samples were collected for analysis. Visited 22 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 13 June 1997: water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Three taxa of aquatic macroinvertebrates were collected. *Acalypha deamii* (Large-seeded Mercury), an Illinois State Threatened species, was found along the short springbrook of this spring. *Lepidostoma libum*, a rare caddisfly in Illinois, was collected at this spring. Nitrate nitrogen levels determined in March and August (1996) and June (1997) were above the background level but below the EPAMCL. Samples for herbicides were collected in March (1996) and June (1997). Atrazine was detected in June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Spring Lake Spring: Adams County: 7 km N Quincy. Spring Lake is situated at the base of a Burlington Limestone bluff of Mississippian age in the south floodplain of Homan Creek. Water from the spring discharges into a series of ponds from a rectangular opening (15 cm high, 50 cm wide) situated on the west side of an elliptical brick enclosure (1 m high, 7 m long, 4 m wide). The long axis of the elliptical brick enclosure is aligned N5°W. Water issuing from boils inside the brick enclosure averages 15 cm in depth. The pond segment nearest to the spring extends to an arched walk-over bridge about 35 m to the west; this area supports patches of water cress (*Nasturtium officinale*) which surround another boil about 6 m from the primary discharge opening. The pond is shallow (0.5 m in depth) within 9-12 m of the elliptical brick enclosure. Spring discharge on 8 February 1993 was determined to be 45 L/sec; on 22 August 1996 it was determined to be 93.4 L/sec. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Crangonyx minor*. Isopoda: Asellidae: *Caecidotea intermedia*, *C. packardi*. Insecta: Diptera: Ceratopogonidae: *Bezzia/Palpomyia* sp. Chironomidae: unidentified spp. Tipulidae: unidentified spp. **Springbrook Fauna:** Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Crangonyx minor*. Isopoda: Asellidae: *Caecidotea intermedia*. Ostracoda: *Cypridopsis vidua*, *Ilyocypris gibba*, *Potamocypris pallida*. Insecta: Coleoptera: Hydrophilidae: *Helophorus lineatus*. Diptera: Ceratopogonidae: *Bezzia/Palpomyia* sp. Chironomidae: *Chironomus* sp. Tipulidae: unidentified spp. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** An unidentified bryophyte formed a floating mat that covers about 1/6th of the surface of the first 30 m of an arm of the lake adjacent to the

spring. Two aquatic plants were observed, — a small floating leafed duck weed (*Lemna minor*) and an emergent water starwort (*Callitriche heterophylla*). The dominant trees were *Acer saccharinum* and *Tilia americana*. Other trees included *Acer saccharum*, *Carpinus caroliniana*, *Celtis occidentalis*, *Cercis canadensis*, *Fraxinus americana*, *Juniperus virginiana*, *Quercus alba*, *Quercus imbricaria*, and *Ulmus americana*. The dominant shrub was *Cornus drummondii*. Other shrubs observed included *Rosa multiflora*, *Rubus occidentalis*, and *Rubus* sp. The dominant vine

Spring Lake Spring

Parameters *	2/8/93	3/14/96	8/22/96	6/13/97	Parameters *	2/8/93	3/14/96	8/22/96	6/13/97
Water Temperature (°C)	12		12	12	Dissolved Copper	<DL		<DL	<DL
Dissolved Oxygen	8		6.4	7.4	Dissolved Iron	0.03		<DL	<DL
pH	7.3			7.6	Dissolved Potassium	<DL		<DL	<DL
Total Alkalinity	236		236	231	Dissolved Lanthanum			<DL	<DL
Specific Conductivity	296.1		658	684.3	Dissolved Lithium			<DL	<DL
Inorganic Dissolved C			40.5	49.8	Dissolved Magnesium	28.20		29	28.7
Dissolved Organic C			28.8	16.2	Dissolved Manganese			<DL	<DL
Total Dissolved C			69.4	66	Dissolved Molybdenum	<DL		<DL	<DL
Sulfate Sulfur	46.4		39.6	40.9	Dissolved Sodium	15.40		15.1	15
Ammonia Nitrogen	<DL		<DL	<DL	Dissolved Nickel	<DL		<DL	<DL
Nitrite Nitrogen			<DL	<DL	Dissolved Lead	<DL		<DL	<DL
Nitrate Nitrogen	33.9	2.8	6.91	7.19	Dissolved Antimony	<DL		<DL	<DL
Total Phosphorus			0.07	0.05	Dissolved Scandium			<DL	<DL
Hardness (EDTA)	322		334	315	Dissolved Selenium	<DL		<DL	<DL
Chlorides			32.1	37.9	Dissolved Silicon	11.00		11.9	10.8
Total Dissolved Solids			408	420	Dissolved Strontium			0.12	0.12
Turbidity (NTU)					Dissolved Titanium			<DL	<DL
Dissolved Aluminum			<DL	<DL	Dissolved Thallium			<DL	<DL
Dissolved Arsenic	33.7		<DL	<DL	Dissolved Vanadium	<DL		<DL	<DL
Dissolved Boron	<DL		<DL	<DL	Dissolved Zinc	<DL		0.02	0.02
Dissolved Barium	<DL		0.14	0.14	Dissolved Zirconium			<DL	<DL
Dissolved Beryllium	<DL		<DL	<DL	Total Mercury (µg/L)			<DL	<DL
Dissolved Calcium	82.6		86	79.4	Atrazine (µg/L)		<DL		0.57
Dissolved Cadmium	<DL		<DL	<DL	Alachlor (µg/L)		<DL		<DL
Dissolved Cobalt	<DL		<DL	<DL	Metolachlor (µg/L)		<DL		0.02
Dissolved Chromium	<DL		<DL	<DL	Cyanazine (µg/L)		<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm);

values for anions and cations expressed in mg/L; values for mercury and herbicides in µg/L.

<DL = Value not determined because concentration below detection limit of analysis equipment.

was *Parthenocissus quinquefolia*. Other vines observed included *Celastrus scandens*, *Euonymus fortunei*, *Toxicodendron radicans*, and *Vitis riparia*. The dominant herbs were *Eleocharis capillaris* and *Impatiens capensis*. Other herbs included *Acalypha rhomboidea*, *Agalinis tenuifolia*, *Agrostis perennans*, *Callitriche heterophylla*, *Carex blanda*, *Carex rosea*, *Carex* sp., *Cerastium nutans*, *Eupatorium rugosum*, *Galium circaeazans*, *Geum canadensis*, *Hackelia virginiana*, *Juncus tenuis*, *Lemna minor*, *Osmorhiza* sp., *Oxalis* sp., *Phlox divaricata*, *Pilea pumila*, *Plantago rugelii*, *Polygonum cespitosum*, *Rumex crispus*, *Rumex obtusifolius*, *Ranunculus abortivus*, *Sonchus* sp., *Taraxacum officinale*, and *Verbena urticifolia*. **Summary:** Visited 8 February 1993. Visited 14 March 1996: water samples were collected for analysis. Visited 22 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Visited 13 June

1997: water samples were collected for analysis. Twelve taxa of aquatic macroinvertebrates were collected. The fauna is somewhat depauperate although numerous specimens of *Chironomus* sp. were collected from the silt covered substrate of the springbrook. Nitrate nitrogen levels were determined in February (1993), March and August (1996), and June (1997). The February (1993) level was 3.4 times the EPAMCL; the more recent samples were above the background level but below the EPAMCL. Samples for herbicides were collected in March (1996) and June (1997). Atrazine was detected in June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Wand Spring: Adams County: 6.8 km NNE Marblehead. This spring is located below a wooded slope that has been heavily grazed. The wooded area covers the first 10 m of the spring. There are two openings to this spring resurging from a bedding plane of an east-facing slope of a Lower Valmeyeran limestone outcrop of Mississippi age. Both openings are small (less than 60 cm wide, 15-20 cm high). Water flows slowly into a heavily silted retention pond which extends east 45 m before entering an overflow culvert, then flowing under a local road. The bottom substrate is comprised of fine silt. Spring discharge on 22 August 1996 was determined to be 16.2 L/sec. **Springhead Fauna:** Annelida: Oligochaeta: Lumbriculidae: *Lumbriculus variegatus*, Lumbriculidae sp. C. Tubificidae: *Limnodrilus cervix*, *Limnodrilus* sp., Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Diptera: Stratiomyidae: unidentified spp. Tipulidae: *Pilaria* sp. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Springbrook Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Ostracoda: *Cypridopsis vidua*, *Potamocypris pallida*. **Flora:** One emergent aquatic plant, water cress (*Nasturtium officinale*) is associated with the springbrook. The dominant trees were *Acer saccharum* and *Quercus alba*. Other trees included *Acer saccharinum*, *Betula nigra*, *Celtis occidentalis*, *Juglans nigra*, *Ostrya virginiana*, and *Ulmus americana*. The only shrub observed was *Rosa multiflora*. The only vine observed was *Parthenocissus quinquefolia*. The dominant herbs were *Nasturtium officinale*, *Impatiens capensis*, and *Leersia oryzoides*. Other herbs included *Acalypha rhomboidea*, *Asclepias syriaca*, *Aster lateriflorus*, *Bidens cernua*, *Bidens frondosa*, *Carex* sp., *Cirsium vulgare*, *Cyperus rivularis*, *Cyperus strigosus*, *Digitaria* sp., *Echinochloa crusgalli*, *Eclipta prostrata*, *Oxalis* sp., *Panicum dichotomiflorum*, *Phalaris arundinacea*, *Pilea pumila*, *Plantago rugelii*, *Polygonum lapathifolium*, *Polygonum persicaria*, *Polygonum punctatum*, *Polygonum scandens*, *Ranunculus abortivus*, *Ranunculus sceleratus*, *Stellaria media*, *Trifolium repens*, *Typha latifolia*, and *Verbena urticifolia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 15 March 1996: water

samples were collected for analysis. Visited 22 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Visited 13 June 1997: water samples were collected for analysis. Eleven taxa of aquatic macroinvertebrates were collected. Nitrate nitrogen levels determined March and August (1996) and June (1997) were above the background level but below the EPAMCL. Samples for herbicides were collected in March (1996) and June (1997). Atrazine was detected in June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Wand Spring

Parameters *	3/15/96	8/22/96	6/13/97	Parameters *	3/15/96	8/22/96	6/13/97
Water Temperature (°C)		12	12	Dissolved Copper		<DL	<DL
Dissolved Oxygen		6.7	5.7	Dissolved Iron		0.01	<DL
pH			7.42	Dissolved Potassium		3	<DL
Total Alkalinity		139	262	Dissolved Lanthanum		<DL	<DL
Specific Conductivity		750.1	658	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		50.9	59.3	Dissolved Magnesium		15.4	13.9
Dissolved Organic C		35.7	19.9	Dissolved Manganese		<DL	<DL
Total Dissolved C		86.6	79.2	Dissolved Molybdenum		<DL	<DL
Sulfate Sulfur		22.1	18.7	Dissolved Sodium		17.6	17.9
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel		<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	2.48	5.2	6.26	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.12	0.16	Dissolved Scandium		<DL	<DL
Hardness (EDTA)		346	304	Dissolved Selenium		<DL	<DL
Chlorides		32.9	37.3	Dissolved Silicon		8.63	8.09
Total Dissolved Solids		432	400	Dissolved Strontium		0.13	0.13
Turbidity (NTU)				Dissolved Titanium		<DL	<DL
Dissolved Aluminum		<DL	0.04	Dissolved Thallium		<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium		<DL	<DL
Dissolved Boron		<DL	<DL	Dissolved Zinc		0.03	0.02
Dissolved Barium		0.1	0.01	Dissolved Zirconium			
Dissolved Beryllium		<DL	<DL	Total Mercury (µg/L)		<DL	<DL
Dissolved Calcium		113	98.6	Atrazine (µg/L)	<DL		0.75
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL		<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL		0.12
Dissolved Chromium		<DL	<DL	Cyanazine (µg/L)	<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL = Value not determined because concentration below detection limit of analysis equipment.

Unnamed Spring #50: Adams County: 1 km N Kingston. **Summary:** Visited 15 March 1996: no flowing water was observed; this is probably an ephemeral spring.

Unnamed Spring #51: Adams County: 1.8 km N Richfield. **Summary:** Visited 15 March 1996: no flowing water was observed; this is probably an ephemeral spring.

Unnamed Spring #52: Adams County: 1.9 km NE Payson. **Summary:** Visited 15 March 1996: this spring has been incorporated into a tributary of Pigeon Creek.

Unnamed Spring #60: Adams County: 5.4 km SW Camp Point. **Summary:** Visited 14 March 1996: only a small seep area was observed at the origin of this spring.

Unnamed Spring #61: Adams County: 5 km SW Camp Point. **Summary:** Visited 14 March 1996: only a small seep area was observed at the origin of this spring.

Unnamed Spring #62: Adams County: 3.9 km SW Camp Point. **Summary:** Visited 14 March 1996: only a small seep area was observed at the origin of this spring.

Unnamed Spring #63: Adams County: 8.8 km SW Mendon. **Summary:** Visited 14 March 1996: this spring is situated on a 5 m high bluff; water flows from the limestone outcropping into a capped circular cistern (50 cm diameter); a pipe (5 cm diameter) extends 4 m from the cistern and drains into Rock Creek.

Siloam Spring #1: Brown County: in Siloam Springs State Park. **Summary:** Visited 14 March 1996: no water was observed flowing; this probably is an ephemeral spring.

Siloam Springs #2: Brown County: in Siloam Springs State Park. **Summary:** Visited 14 March 1996: no water was observed flowing; the spring site is capped with a concrete covering on which sits a picnic pavilion.

Spring east of Siloam Springs #2: Brown County: in Siloam Springs State Park. This spring is situated on the south slope of a wooded hillside dominated by sugar maple and white oak that overlies Carbondale sandstone of Pennsylvanian age. The springbrook begins in an intermittent stream and flows through a second growth mesic woods for 15 m then enters a forb-dominated area near a public pavilion. Water flows from two small gravel openings in the hillside from beneath a large tree alongside a small tributary of Siloam Creek. The springbrook (0.5 m wide, 3 cm deep) has a bottom substrate of comprised of 70% gravel, 20% sand, and 10% silt with a distinctive covering of iron oxide. Spring discharge on 22 August 1996 was determined to be 1.19 L/sec. **Springhead Fauna:** Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). **Springbrook Fauna:** Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Ostracoda: *Potamocypris pallida*. Insecta: Coleoptera: Hydrophilidae: *Enochrus pygmaeus*

nebulosus. Mollusca: Gastropoda: Pleuroceridae: *Elimia* sp. **Flora:** The dominant trees were *Acer saccharum* and *Quercus alba*. Other trees included *Carpinus caroliniana*, *Carya ovata*, *Cercis canadensis*, *Fraxinus americana*, *Juniperus virginiana*, *Quercus velutina*, *Sassafras albidum*, and *Ulmus americana*. The dominant shrub was *Rubus allegheniensis*. The only other shrub present was *Rubus occidentalis*. The dominant vine was *Parthenocissus quinquefolia*. The only other vine present was *Toxicodendron radicans*. The dominant herbs were *Amphicarpa bracteata*, *Carex stricta*, *Equisetum arvense*, and *Aster lateriflorus*. Other herbs present were *Agrimonia pubescens*, *Anemone virginiana*, *Arisaema triphyllum*, *Aruncus dioicus*, *Aster lateriflorus*, *Carex granularis*, *Carex hirtifolia*, *Carex muhlenbergii*, *Carex pensylvanica*, *Circaea lutetiana*, *Cryptotaenia canadensis*, *Desmodium glutinosum*, *Desmodium paniculatum*, *Elymus villosus*, *Epilobium coloratum*, *Erigeron annuus*, *Eupatorium rugosum*, *Festuca obtusa*, *Fragaria virginiana*, *Galium aparine*, *Galium concinnum*, *Galium triflorum*, *Geum canadense*, *Glechoma hederacea*, *Glyceria striata*, *Impatiens capensis*, *Laportea canadensis*, *Leersia virginica*, *Lobelia siphilitica*, *Muhlenbergia tenuiflora*, *Oxalis* sp., *Panicum clandestinum*, *Phlox divaricata*, *Phryma leptostachya*, *Pilea pumila*, *Poa pratensis*, *Polemonium reptans*, *Polystichum acrostichoides*, *Prunella vulgaris*, *Ranunculus abortivus*, *Ranunculus recurvatus*, *Rudbeckia triloba*,

Spring E Siloam Spring #2

Parameters *	3/14/96	8/22/96	6/13/97	Parameters *	3/14/96	8/22/96	6/13/97
Water Temperature (°C)		13	11	Dissolved Copper		0.03	<DL
Dissolved Oxygen		4.2	1.4	Dissolved Iron		0.01	<DL
pH			7.37	Dissolved Potassium		<DL	<DL
Total Alkalinity		281	443	Dissolved Lanthanum		<DL	<DL
Specific Conductivity		835.9	970.6	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		83.2	96.3	Dissolved Magnesium		54.7	53
Dissolved Organic C		61.5	11.6	Dissolved Manganese		0.02	0.21
Total Dissolved C		144.7	107.9	Dissolved Molybdenum		<DL	<DL
Sulfate Sulfur		144	153	Dissolved Sodium		11.1	11.5
Ammonia Nitrogen		<DL	0.09	Dissolved Nickel		<DL	0.04
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	<DL	0.1	0.08	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.02	0.03	Dissolved Scandium		<DL	<DL
Hardness (EDTA)		595	566	Dissolved Selenium		<DL	<DL
Chlorides		5.63	6.56	Dissolved Silicon		9.45	9.12
Total Dissolved Solids		672	644	Dissolved Strontium		0.21	0.21
Turbidity (NTU)				Dissolved Titanium		<DL	<DL
Dissolved Aluminum		<DL	<DL	Dissolved Thallium		<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium		<DL	<DL
Dissolved Boron		<DL	<DL	Dissolved Zinc		0.03	<DL
Dissolved Barium		0.12	0.12	Dissolved Zirconium			
Dissolved Beryllium		<DL	<DL	Total Mercury (µg/L)		<DL	<DL
Dissolved Calcium		148	139	Atrazine (µg/L)	<DL		<DL
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL		<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL		<DL
Dissolved Chromium		<DL	0.02	Cyanazine (µg/L)	<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL = Value not determined because concentration below detection limit of analysis equipment.

Sanicula odorata, *Scirpus atrovirens*, *Solidago gigantea*, *Solidago rugosa*, *Solidago ulmifolia*, *Teucrium canadense*, *Thalictrum* sp., and *Viola* sp. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 14 March 1996: water samples were collected for analysis. Visited 22 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Visited 13 June 1997: water samples were collected for analysis. This is a small spring with a moderate flow. The bottom substrate appeared to be coated with iron oxide. Six taxa of aquatic macroinvertebrates were collected. Nitrate nitrogen levels determined in March and August (1996) and June (1997) were below the background level. Samples for herbicides were collected in March (1996) and June (1997). Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Ferguson Spring: Calhoun County: 8.9 km SW Pearl (center of town). This spring flows from a bedrock bluff of Lower Valmeyeran limestone of Mississippian age. The springhead is situated at the base of an east-facing bluff in a young, second growth, wooded fragment dominated by basswood and red oak. Water resurges from the limestone through an opening (1.5 m wide, 0.75 m high) into a narrow springbrook (1 m wide, 1 m long), which then widens to 2 m wide by 2.5 m long, and then into a springbrook (4 m wide, 5 m long) before emptying into a holding pond. The springbrook depth was 3 cm, with a bottom substrate comprised of 60% gravel, 20% sand and 20% small cobble. Flow was not measured because of the shallow nature of the springbrook. The sides of the springbrook have been built up with a brick wall (0.5 m high, 7 m long) on the north side of the springbrook and 2.5 m long along the south side of the springbrook. **Springhead Fauna:** Platyhelminthes: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbriculidae: Lumbriculidae sp. A. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypris pallida*. Insecta: Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Enchytraeidae: (unidentified sp.). Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Insecta: Diptera: Chironomidae: unidentified spp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Physidae. Pleuroceridae: *Elimia* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant trees were *Tilia americana* and *Ulmus rubra*. Other trees included *Acer saccharum*, *Prunus serotina*, and *Quercus rubra*. The dominant shrub was *Rosa multiflora*. The only other shrub present was *Hydrangea arborescens*. The dominant vine was *Parthenocissus quinquefolia*. Other vines present were *Toxicodendron radicans* and *Vitis cinerea*. The dominant herbs were *Eupatorium rugosum*, *Pentstemon sedoides*,

and *Campanula americana*. Other herbs present were *Acalypha virginica*, *Amphicarpa bracteata*, *Aquilegia canadensis*, *Aster drummondii*, *Aster lateriflorus*, *Botrychium virginianum*, *Circaea lutetiana*, *Festuca obtusa*, *Galium concinnum*, *Geum canadense*, *Hackelia virginiana*, *Lobelia siphilitica*, *Pilea pumila*, *Plantago rugelii*, *Polygonum punctatum*, *Sanicula odorata*, *Solidago flexicaulis*, and *Woodsia obtusa*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 13 October 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Visited 13 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Fourteen taxa of aquatic macroinvertebrates were collected. *Lepidostoma libum*, a rare caddisfly in Illinois, was collected at this spring. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level. Atrazine was detected in June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Ferguson Spring

Parameters *	10/13/95	3/12/96	6/13/96	Parameters *	3/12/96	6/13/96
Water Temperature (°C)	13		11.5	Dissolved Copper		0.04
Dissolved Oxygen	7.6		10.3	Dissolved Iron		<DL
pH	7.62			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	7.7.3		625.6	Dissolved Lithium		<DL
Inorganic Dissolved C			28.3	Dissolved Magnesium		7.37
Dissolved Organic C			17.4	Dissolved Manganese		<DL
Total Dissolved C			45.7	Dissolved Molybdenum		<DL
Sulfate Sulfur			14.8	Dissolved Sodium		4.5
Ammonia Nitrogen			0.04	Dissolved Nickel		<DL
Nitrite Nitrogen			<DL	Dissolved Lead		<DL
Nitrate Nitrogen		1.07	1.25	Dissolved Antimony		<DL
Total Phosphorus			0.02	Dissolved Scandium		<DL
Hardness (EDTA)			118	Dissolved Selenium		<DL
Chlorides			3.49	Dissolved Silicon		2.83
Total Dissolved Solids			208	Dissolved Strontium		0.04
Total Alkalinity			139	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.03
Dissolved Barium			0.02	Dissolved Zirconium		<DL
Dissolved Beryllium			<DL	Total Mercury (µg/L)		3.05
Dissolved Calcium			35.1	Atrazine (µg/L)	<DL	0.29
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	0.03
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

Godar Spring: Calhoun County: 7.5 km ESE Hamburg. This spring flows from Lower Valmeyeran limestone of Mississippian age. A small pipe (5 cm diameter) has been set into the springhead to provide water for cattle. A small amount of discharge from the base of this pipe flows into a springbrook which drains into an unnamed tributary of the Illinois River. The springbrook is narrow (15 cm wide, less than 3 cm deep) with a bottom substrate comprised of 60% gravel, 20% sand, and 20% silt. Flow was not measured because of the shallow nature of the springbrook. **Water Quality:** (11 October 1995): Water temperature 14.0°C, dissolved oxygen 5.4 mg/L, pH 7.53. **Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Crangonyx forbesi*. Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. **Summary:** Visited 11 October 1995: this spring is capped and currently used for watering cattle.

Howell Hollow Spring: Calhoun County: 5.2 km S Nebo. **Summary:** Visited 11 October 1995: this spring is covered with a cement springhouse; the water is pumped to a nearby farmhouse.

Long Spring: Calhoun County: 4.6 km SE Hamburg. This spring flows from a bedding plane in Lower Valmeyeran limestone of Mississippian age. The springhead is situated at the base of a heavily grazed, open, steep wooded slope. The springbrook flows along the north-facing heavily grazed woods; the north side of the springbrook is an open over-grazed pasture. The springhead opening is small (0.8 m 0.5 m high) situated part way up the bluff. Water flows into a shallow pool (0.8 m long 1 m wide, 5 cm deep) with a bottom substrate comprised of 40% gravel and 70% sand. This pool is dammed with cobble, allowing water to be diverted through a pipe into a water trough for cattle. Water from the pool flows down the side of the bluff in a cobble and gravel springbrook (1 m wide, 3.5 m long) before reaching a flattened area of pasture. Here the springbrook widens (2.5 m wide for 12 m, followed by a 0.8 m wide springbrook for 25 m) before emptying into an unnamed tributary of Indian Creek. Flow was not measured because of the shallow nature of the springbrook. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Enchytraeidae (unidentified sp.). Tubificidae: *Limnodrilus hoffmeisteri*. Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Crangonyx forbesi*. Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Springbrook Fauna:** Platyhelminthes: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, *Limnodrilus* sp., Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae:

Caecidotea brevicauda. Ostracoda: *Potamocypris pallida*, unidentified (possibly new) species. Diptera: Chironomidae: unidentified spp. Tabanidae: *Tabanus* sp. Tipulidae: unidentified spp. **Flora:** The dominant trees were *Ostrya virginiana* and *Acer saccharum*. Other trees included *Asimina triloba*, *Carya ovalis*, *Cornus florida*, *Fraxinus pennsylvanica*, *Quercus rubra*, and *Ulmus americana*. The dominant shrub was *Hydrangea arborescens*. The only other shrub observed was *Rosa multiflora*. The only vine observed was *Toxicodendron radicans*. The dominant herbs were *Trifolium repens*, *Polygonum persicaria*, *Pilea pumila*, and *Poa pratensis*. Other herbs present were *Acalypha virginica*, *Agrostis gigantea*, *Artemisia annua*, *Asplenium platyneuron*, *Aster* sp., *Bromus commutatus*, *Capsella bursa-pastoris*, *Carex blanda*, *Chenopodium album*, *Conyza canadensis*, *Cystopteris protrusa*, *Equisetum arvense*, *Erigeron philadelphicus*, *Eupatorium rugosum*, *Festuca elatior*, *Hackelia virginiana*, *Hordeum pusillum*, *Juncus* sp., *Leersia virginica*, *Lepidium virginicum*, *Matricaria matricarioides*, *Oxalis* sp., *Panicum lanuginosum*, *Parietaria pensylvanica*, *Perilla frutescens*, *Plantago rugelii*, *Podophyllum peltatum*, *Polygonum arenastrum*, *Prunella vulgaris*, *Ranunculus recurvatus*, *Solanum carolinense*, *Sphenopholis obtusa*, *Stellaria media*, *Trifolium pratense*, *Verbena urticifolia*, *Veronica peregrina*, and *Viola* sp. Floral abundance, cover, and importance values are given in Appendix 2.

Long Spring

Parameters *	10/11/95	3/13/96	6/12/96	Parameters *	6/12/96	3/13/96
Water Temperature (°C)	13.5		12	Dissolved Copper		0.12
Dissolved Oxygen	5.3		10.1	Dissolved Iron		<DL
pH	7.5			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	952.5		756.7	Dissolved Lithium		<DL
Inorganic Dissolved C			89	Dissolved Magnesium		61.2
Dissolved Organic C			43.3	Dissolved Manganese		<DL
Total Dissolved C			132.3	Dissolved Molybdenum		<DL
Sulfate Sulfur			52.9	Dissolved Sodium		12.7
Ammonia Nitrogen			0.05	Dissolved Nickel		<DL
Nitrite Nitrogen			0.12	Dissolved Lead		<DL
Nitrate Nitrogen		<DL	2.13	Dissolved Antimony		<DL
Total Phosphorus			0.03	Dissolved Scandium		<DL
Hardness (EDTA)			527	Dissolved Selenium		<DL
Chlorides			10.2	Dissolved Silicon		8.67
Total Dissolved Solids			592	Dissolved Strontium		0.16
Total Alkalinity			441	Dissolved Titanium		<DL
Dissolved Aluminum			0.03	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.08
Dissolved Barium			0.09	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		0.29
Dissolved Calcium			110	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL = Value not determined because concentration below detection limit of analysis equipment.

Summary: Visited 11 October 1995: aquatic macroinvertebrates were collected for identification. Visited 13 March 1996: water samples were collected for analysis. Visited 12 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 28 June 1996: A floral census was conducted in and around spring. Fourteen taxa of aquatic macroinvertebrates were collected. A possibly new species of Ostracoda was collected from the springhead and *Lepidostoma libum*, a rare caddisfly in Illinois, was collected at this spring. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level in March and above the background level but below the EPAMCL in June. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Madison Spring: Calhoun County: 1.9 km SSW of Batchtown. This spring resurges from Galena-Platteville limestone of Ordovician age. The springhead is located at the base of a north-facing wooded hillside dominated by blue beech, american elm, sugar maple, and sycamore. Water flows from a large opening (1 m wide, 2.5 m high) over a bedrock limestone substrate. From this opening, water flows along a bedrock springbrook (5-15 cm wide, 25 cm deep, 2 m long), then broadens into a shallow pool (3 m wide, 3 m long) with a bottom substrate comprised of gravel and sand overlying bedrock. The springbrook then broadens to 3-3.5 m wide for 10 m before narrowing to 1 m wide, flowing 10 m to Madison Creek. The bottom substrate of the springbrook is comprised of 60% large cobble, 30% gravel, and 10% sand, with scattered bedrock shelves. Spring discharge on 11 October 1995 was determined to be 474.4 L/sec. **Springhead Fauna:** Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. **Springbrook Fauna:** Platyhelminthes: Planariidae: *Phagocata velata*. Arthropoda: Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, *Limnodrilus* sp., *Varichaetadrilus angustipenis*, Tubificidae (immature spp.). Crustacea: Amphipoda: Crangonyctidae: *Baettrurus brachycaudus*. Gammaridae: *Gammarus pseudolimnaeus*, *G. troglophilus*. Isopoda: Asellidae: *Caecidotea brevicauda*, *C. packardi*. Decapoda: Cambaridae: *Orconectes virilis*. Insecta: Diptera: Ceratopogonidae: *Culicoides* sp. Tipulidae: *Pedicia* sp. **Flora:** Several individuals of the spreading sedge (*Carex laxiculmis*), an Illinois State Threatened species, was located along the springbrook and on the adjacent mesic wooded slope. The collection of *Carex laxiculmis* from Madison Spring represents a new county record for this species, previously known from only nine Illinois counties in the state (Herkert 1991). The dominant trees were *Carpinus caroliniana*, *Ulmus americana*, *Acer saccharum*, and *Platanus occidentalis*. Other trees present were *Acer negundo*, *Carya glabra*, *Celtis occidentalis*, *Fraxanus pennsylvanica*, *Morus rubra*, *Ostrya virginiana*, and *Tilia americana*. The dominant shrub was *Hydrangea arborescens*. Other shrubs were *Lonicera maackii*, *Rosa multiflora*, and *Sambucus*

canadensis. The dominant vine was *Toxicodendron radicans*. Other vines observed were *Smilax hispida* and *Parthenocissus quinquefolia*. The dominant herbs were *Cryptotaenia canadensis* and *Asarum canadense*. Other herbs present were *Amphicarpa bracteata*, *Arisaema triphyllum*, *Asplenium rhizophyllum*, *Aster lateriflorus*, *Carex albursina*, *Carex grisea*, *Carex jamesii*, *Circaea lutetiana*, *Cystopteris protrusa*, *Elymus virginicus*, *Eupatorium rugosum*, *Festuca obtusa*, *Galium triflorum*, *Geum canadense*, *Glyceria striata*, *Hepatica acutiloba*, *Impatiens* sp., *Lactuca* sp., *Laporteia canadensis*, *Leersia virginica*, *Phlox divaricata*, *Poa pratensis*, *Poa sylvestris*, *Polystichum acrostichoides*, *Ranunculus abortivus*, *Ranunculus recurvatus*, *Rudbeckia laciniata*, *Smilacina racemosa*, *Taraxacum officinale*, *Thalictrum dioicum*, *Uvularia perfoliata*, and *Viola* sp. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 11 October 1995: aquatic macroinvertebrates were collected for identification. Visited 13 March 1996: water samples were collected for analysis. Visited 12 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 28 June 1996: A floral census was conducted in and around spring. Twelve taxa of aquatic macroinvertebrates were collected. *Varichaetadrilus angustipenis*, a rare oligochaete in Illinois, was collected in the springbrook. *Baetrus brachycaudus* and *Gammarus troglophilus*, two troglobitic amphipods,

Madison Spring

Parameters *	10/11/95	3/12/96	6/12/96	Parameters *	3/12/96	6/12/96
Water Temperature (°C)	9		13	Dissolved Copper		<DL
Dissolved Oxygen	7.6		7.8	Dissolved Iron		<DL
pH	7.52			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	975.7		947.5	Dissolved Lithium		<DL
Inorganic Dissolved C			71.1	Dissolved Magnesium		45.8
Dissolved Organic C			38.2	Dissolved Manganese		0.03
Total Dissolved C			109.2	Dissolved Molybdenum		<DL
Sulfate Sulfur			36.9	Dissolved Sodium		6.4
Ammonia Nitrogen			0.05	Dissolved Nickel		<DL
Nitrite Nitrogen			0.12	Dissolved Lead		<DL
Nitrate Nitrogen		<DL	1.56	Dissolved Antimony		<DL
Total Phosphorus			0.15	Dissolved Scandium		<DL
Hardness (EDTA)			428	Dissolved Selenium		<DL
Chlorides			5.47	Dissolved Silicon		10.1
Total Dissolved Solids			492	Dissolved Strontium		0.16
Total Alkalinity			371	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.12
Dissolved Barium			0.09	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		0.35
Dissolved Calcium			95.6	Atrazine (µg/L)	<DL	1.44
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	2.34

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL = Value not determined because concentration below detection limit of analysis equipment.

and *Caecidotea packardi*, a troglobitic isopod, were collected in the springbrook. Nitrate nitrogen and herbicide concentrations were sampled in March (1996) and June (1997). Nitrate nitrogen levels were below the background level in March and above the background level in June but below the EPAMCL. Atrazine was detected in June but below the EPAMCL. Cyanazine was detected in June at a level 2.3 times the EPAHAL. Metolachlor and Alachlor were not detected in any of the water samples analyzed from this spring.

McNabb Spring: Calhoun County: 5.5 km WNW Hardin. This spring resurges from Lower Valmeyeran limestone of Mississippian age. The spring flows from and along the base of a grazed open second growth wooded slope. The springhead is situated at the base of a west-facing hillside dominated by box elder, american elm, sycamore, and hackberry. Pasture grasses have been planted beneath the canopy trees; selected areas within the woods have been treated with herbicides to kill undesirable herbs, as have areas along the springbrook. The north side of the springbrook has been bulldozed with the resulting gravel piled along it. The vegetation on the north side of the springbrook is thus heavily disturbed. The springhead opening is 2 m wide and 3.2 m high. From the springhead, water flows through a large cobble substrate as well as through a PVC overflow pipe (10 cm diameter). A small cistern has been embedded in the springhead to capture water for livestock. The springbrook is 1.2 m wide for 2 m, then narrows to about 1 m in width. The springbrook flows for over 1 km before entering an unnamed tributary of the Mississippi River. The bottom substrate of the springbrook is comprised of 70% gravel and 30% sand. Spring discharge on 11 October 1995 was determined to be 45 L/sec.; on 22 August 1996 it was determined to be 330 L/sec. **Springhead Fauna:** Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Trichoptera: Uenoidae: *Neophylax concinnus*. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. **Springbrook Fauna:** Platyhelminthes: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *Gammarus troglophilus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypris pallida*. Insecta: Coleoptera: Hydrophilidae: *Berosus infuscatus*. Diptera: Chironomidae: unidentified spp. Psychodidae: *Psychoda* sp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Uenoidae: *Neophylax concinnus*. **Flora:** The dominant trees were *Ulmus americana*, *Platanus occidentalis*, *Acer negundo*, and *Celtis occidentalis*. Other trees present were *Gleditsia triacanthos*, *Juglans nigra*, *Juniperus virginiana*, and *Prunus serotina*. The dominant shrubs were *Corylus americana* and *Viburnum rufidulum*. The only other shrub present was *Cornus drummondii*. The dominant vine was *Toxicodendron radicans*. The only other vine observed was *Parthenocissus quinquefolia*. The dominant herb was *Glyceria striata*. Other herbs present were *Acalypha rhomboidea*, *Ambrosia trifida*, *Aster* sp.,

Bidens sp., *Botrychium virginianum*, *Bromus commutatus*, *Cardamine pensylvanica*, *Carex grisea*, *Carex normalis*, *Cerastium vulgatum*, *Commelina communis*, *Conyza canadensis*, *Dactylis glomerata*, *Daucus carota*, *Echinochloa crusgalli*, *Elymus villosus*, *Erigeron annuus*, *Erigeron philadelphicus*, *Festuca elatior*, *Festuca obtusa*, *Galium aparine*, *Geum canadense*, *Impatiens* sp., *Juncus tenuis*, *Lactuca* sp., *Leersia virginica*, *Lobelia siphilitica*, *Oxalis* sp., *Panicum clandestinum*, *Parietaria pensylvanica*, *Perilla frutescens*, *Phryma leptostachya*, *Pilea pumila*, *Plantago rugelli*, *Poa pratensis*, *Polygonum persicaria*, *Polygonum* sp., *Polygonum tenue*, *Prunus* sp., *Ranunculus abortivus*, *Rumex obtusifolius*, *Samolus valerandii*, *Sphenopholis obtusa*, *Taraxacum officinale*, *Trifolium repens*, *Veronica arvensis*, *Veronica peregrina*, and *Xanthium strumarium*. Floral abundance, cover, and importance values are given in Appendix 2.

Summary: Visited 11 October 1995: aquatic macroinvertebrates were collected for identification. Visited 13 March 1996: water samples were collected for analysis. Visited 12 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 28 June 1996: A floral census was conducted in and around spring. Fourteen taxa of aquatic macroinvertebrates were collected from this spring, including *Gammarus troglophilus*, a troglophilic amphipod, and *Lepidostoma libum*, a rare caddisfly in Illinois.

McNabb Spring

Parameters *	10/11/95	3/13/96	6/12/96	Parameters *	3/13/96	6/12/96
Water Temperature (°C)	14		12	Dissolved Copper		0.09
Dissolved Oxygen	6.2		9.4	Dissolved Iron		<DL
pH	7.73			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	690.8		723.8	Dissolved Lithium		<DL
Inorganic Dissolved C			73.4	Dissolved Magnesium		49.6
Dissolved Organic C			36.3	Dissolved Manganese		0.01
Total Dissolved C			109.7	Dissolved Molybdenum		<DL
Sulfate Sulfur			51.7	Dissolved Sodium		8.8
Ammonia Nitrogen			0.02	Dissolved Nickel		<DL
Nitrite Nitrogen			0.12	Dissolved Lead		<DL
Nitrate Nitrogen		<DL	1.32	Dissolved Antimony		<DL
Total Phosphorus			0.13	Dissolved Scandium		<DL
Hardness (EDTA)			447	Dissolved Selenium		<DL
Chlorides			6.44	Dissolved Silicon		9.76
Total Dissolved Solids			496	Dissolved Strontium		0.14
Total Alkalinity			381	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.07
Dissolved Barium			0.08	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		0.06
Dissolved Calcium			97.2	Atrazine (µg/L)	<DL	0.57
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	0.08
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL = Value not determined because concentration below detection limit of analysis equipment.

Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level. Atrazine was detected in June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Pancake Hollow Spring: Calhoun County: 6.5 km SE Mozier. **Summary:** Visited 13 October 1995: spring capped by a concrete springhouse (1.5 m long by 1.5 m wide) adjacent to a nearby concrete cistern (1.2 m diameter). Water flows from cistern through a PVC pipe (8 cm diameter) to a small concrete trough for watering cattle.

Rhymer Spring: Calhoun County: 10.9 km NW Kampsville. This spring resurges from Lower Valmeyeran limestone of Mississippian age. It is situated at the base of a south-facing, second growth, wooded hillside dominated by red oak, american elm, and sycamore. However, the south side of spring area is a mowed lawn. The spring opening is large (5 m wide, 3 m high). Water flows along a bedrock springbrook (30 cm wide, 6 m long, 10 cm deep) into an unnamed tributary of East Panther Creek. Spring discharge on 12 October 1995 was determined to be 200 L/sec. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Tipulidae: *Pedicia* sp. **Springbrook Fauna:** Platyhelminthes: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypris pallida*. Insecta: Heteroptera: Corixidae: unidentified sp. (nymphs). Gerridae: *Aquarius remigis*. Veliidae: *Microvelia americana*. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Flora:** The dominant trees were *Quercus rubra*, *Ulmus americana*, and *Platanus occidentalis*. Other trees present were *Carya cordiformis*, *Carya ovalis*, *Celtis occidentalis*, *Cercis canadensis*, *Cornus florida*, *Fraxinus pennsylvanica*, *Salix* sp., and *Sassafras albidum*. The dominant shrub was *Rosa multiflora*. Other shrubs present were *Hydrangea arborescens*, *Rubus occidentalis*, *Symphoricarpos orbiculatus*, and *Viburnum prunifolium*. The dominant vine was *Toxicodendron radicans*. The only other vine observed was *Parthenocissus quinquefolia*. The dominant herb was *Festuca pratensis*. Other herbs present were *Acalypha rhomboidea*, *Acalypha virginica*, *Anemone virginica*, *Artemisia annua*, *Asplenium platyneuron*, *Aster lateriflorus*, *Brassica* sp., *Carex blanda*, *Carex squarrosa*, *Commelina communis*, *Conyza canadensis*, *Cryptotaenia canadensis*, *Cystopteris protrusa*, *Daucus carota*, *Digitaria ischaemum*, *Elymus virginicus*, *Equisetum arvense*, *Erigeron annuus*, *Erigeron philadelphicus*, *Eupatorium rugosum*, *Eupatorium serotinum*, *Festuca obtusa*, *Festuca pratensis*, *Galium triflorum*, *Geum canadense*, *Kummerowia stipulacea*, *Leersia virginica*, *Lobelia siphilitica*,

Monarda fistulosa, *Muhlenbergia frondosa*, *Muhlenbergia schreberi*, *Oxalis* sp., *Panicum clandestinum*, *Pellaea atropurpurea*, *Perilla frutescens*, *Pilea pumila*, *Plantago virginica*, *Polygonatum punctatum*, *Polygonum pensylvanicum*, *Polygonum scandens*, *Polystichum acrostichoides*, *Prunella vulgaris*, *Sanicula odorata*, *Silphium perfoliatum*, *Solidago canadensis*, *Stellaria media*, *Taraxacum officinale*, and *Trifolium* sp. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 12 October 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Visited 12 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Thirteen taxa of aquatic macroinvertebrates were collected, including *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level in March and above the background level in June but below the EPAMCL. Atrazine and Alachlor were detected in June but below the EPAMCL. Metolachlor was detected in June but below the EPAMCL. Cyanazine was detected in June at level 9.2 times the EPAHAL.

Rhymer Spring

Parameters *	3/12/96	3/12/96	6/12/96	Parameters *	3/12/96	6/12/96
Water Temperature (°C)	13.5		11.5	Dissolved Copper		0.04
Dissolved Oxygen	8		10.2	Dissolved Iron		<DL
pH	7.69			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	539.8		638.9	Dissolved Lithium		<DL
Inorganic Dissolved C			47	Dissolved Magnesium		5.71
Dissolved Organic C			21.7	Dissolved Manganese		<DL
Total Dissolved C			68.7	Dissolved Molybdenum		<DL
Sulfate Sulfur			26.5	Dissolved Sodium		3.9
Ammonia Nitrogen			0.21	Dissolved Nickel		<DL
Nitrite Nitrogen			0.14	Dissolved Lead		<DL
Nitrate Nitrogen		1.34	2.53	Dissolved Antimony		<DL
Total Phosphorus			0.08	Dissolved Scandium		<DL
Hardness (EDTA)			117	Dissolved Selenium		<DL
Chlorides			6.58	Dissolved Silicon		3.57
Total Dissolved Solids			348	Dissolved Strontium		0.05
Total Alkalinity			236	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.03
Dissolved Barium			0.02	Dissolved Zirconium		<DL
Dissolved Beryllium			<DL	Total Mercury (µg/L)		0.72
Dissolved Calcium			37.6	Atrazine (µg/L)	<DL	1.16
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	0.02
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	0.03
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	9.24

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL = Value not determined because concentration below detection limit of analysis equipment.

Salt Spring: Calhoun County: 1.8 km NNE Kritesville. **Summary:** This spring is no longer in existence. Although utilized as a medicinal spring around 1900, it has since dried up and been filled.

Schumann Spring: Calhoun County: 5.2 km SW Kampsville. The spring resurges from a bedding plane in Lower Valmeyeran limestone of Mississippian age. The springhead is situated partway up a northwest-facing wooded slope dominated by basswood. Water flows from a small opening (0.6 m wide, 0.5 cm high) into a small dammed pool (0.6-1.2 m wide, 2 m long, 20 cm deep). A thin layer of sand overlies the bedrock limestone substrate. Water from this pool is utilized to water livestock. The springbrook is 0.6-1.5 m wide and 7.5 m long, flowing over bedrock shelves with a small amount of gravel before entering Crawford Creek. This springbrook receives only a small amount of overflow from the retention pool. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Chironomidae: unidentified spp. Trichoptera: Uenoidae: *Neophylax concinnus*. Mollusca: Gastropoda: Pleuroceridae: *Elimia* sp. **Springbrook Fauna:** Platyhelminthes: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbriculidae sp. A. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: Unidentified (possibly new) species. Insecta: Trichoptera: Uenoidae: *Neophylax concinnus*. **Flora:** The dominant tree was *Tilia americana*. Other trees present were *Carya cordiformis*, *Cornus florida*, *Fraxinus americana*, *Ostrya virginiana*, *Quercus alba*, and *Ulmus americana*. The dominant shrub was *Rosa multiflora*. Other shrubs present were *Hydrangea arborescens* and *Staphylea trifolia*. The dominant vine was *Hedera helix*. Other vines observed were *Parthenocissus quinquefolia* and *Vitis* sp. The dominant herbs were *Glyceria striata*, *Prunella vulgaris*, *Rumex obtusifolius*, and *Verbesina alternifolia*. Other herbs present were *Aster drummondii*, *Brassica* sp., *Carex jamesii*, *Cryptotaenia canadensis*, *Cystopteris protrusa*, *Erigeron philadelphicus*, *Festuca obtusa*, *Festuca pratensis*, *Geranium maculatum*, *Impatiens capensis*, *Leersia virginica*, *Pilea pumila*, *Perilla frutescens*, *Plantago rugelii*, *Polygonum punctatum*, *Polygonum virginianum*, *Sanicula odorata*, *Scrophularia americana*, *Taraxacum officinale*, *Verbena urticifolia*, and *Viola* sp. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 12 October 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Visited 12 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Nine taxa of aquatic macroinvertebrates were collected. A possibly new species of Ostracoda was collected at the springhead. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June

Schumann Spring

Parameters *	10/12/95	3/12/96	6/12/96	Parameters *	3/12/96	6/12/96
Water Temperature (°C)	13		13	Dissolved Copper		0.11
Dissolved Oxygen	7.75		9.4	Dissolved Iron		<DL
pH	7.71			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	835.9		803.8	Dissolved Lithium		<DL
Inorganic Dissolved C			56.3	Dissolved Magnesium		29.4
Dissolved Organic C			30.4	Dissolved Manganese		<DL
Total Dissolved C			86.7	Dissolved Molybdenum		<DL
Sulfate Sulfur			32.9	Dissolved Sodium		8.5
Ammonia Nitrogen			0.06	Dissolved Nickel		<DL
Nitrite Nitrogen			<DL	Dissolved Lead		<DL
Nitrate Nitrogen		<DL	0.82	Dissolved Antimony		<DL
Total Phosphorus			0.08	Dissolved Scandium		<DL
Hardness (EDTA)			330	Dissolved Selenium		<DL
Chlorides			5.91	Dissolved Silicon		7.3
Total Dissolved Solids			372	Dissolved Strontium		0.11
Total Alkalinity			281	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.08
Dissolved Barium			0.05	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		1.07
Dissolved Calcium			83.7	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

(1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Unnamed Spring #28: Calhoun County: 10.8 km NW Kampsville. This spring resurges from a fracture in the bedding plane of Lower Valmeyeran limestone of Mississippian age. The springhead is situated at the base of a dry southeast-facing slope. The slope has been cleared of large trees and only a few saplings have resprouted; a few trees (non-native) and herbs (non-native) have been planted. The area immediately along the springbrook has been mowed and is part of a yard. The spring opening is large (1.2 m wide, 2 m high); water flows from this opening over bedrock into a narrow springbrook (0.5 cm wide, 10 m long, less than 3 cm deep). The springbrook then forms a roadside ditch for 100 m before flowing south for over 1 km to its confluence with East Panther Creek. The springbrook has a shallow layer of cobble, gravel, and sand over bedrock limestone. Spring discharge on 12 June 1996 was determined to be 4.1 L/sec.

Springhead Fauna: Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Stratiomyidae: unidentified spp. Tipulidae: *Pedicia* sp. Mollusca: Gastropoda: Pleuroceridae: *Elimia* sp. **Springbrook Fauna:** Platyhelminthes: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Crangonyx forbesi*. Gammaridae: *Gammarus minus*. Isopoda: Asellidae:

Caecidotea brevicauda. Ostracoda: *Potamocypis pallida*. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. **Flora:** Trees (saplings) associated with the spring were *Juglans nigra*, *Quercus muhlenbergii*, *Quercus rubra*, *Salix* sp., and *Taxodium distichum*. The dominant shrub was *Sambucus canadensis*. Other shrubs present were *Cornus drummondii*, *Rosa multiflora*, *Rubus occidentalis*, *Rubus* sp., and *Symphoricarpos orbiculatus*. The dominant vines were *Parthenocissus quinquefolia* and *Toxicodendron radicans*. Other vines observed were *Smilax hispida* and *Vitis* sp. The dominant herbs were *Festuca elatior* and *Poa pratensis*. Other herbs present were *Acalypha rhomboidea*, *Acalypha virginica*, *Agrimonia pubescens*, *Ambrosia artemisiifolia*, *Ambrosia trifida*, *Andropogon virginicus*, *Aster lateriflorus*, *Aster pilosus*, *Bidens frondosa*, *Cirsium* sp., *Conyza canadensis*, *Cystopteris* sp., *Daucus carota*, *Elymus villosus*, *Eragrostis capillaris*, *Erigeron* sp., *Eupatorium rugosum*, *Euphorbia dentata*, *Fragaria virginiana*, *Heuchera* sp., *Galium triflorum*, *Hackelia virginiana*, *Hedeoma pulegioides*, *Ipomoea hederacea*, *Lactuca floridana*, *Medicago sativa*, *Melilotus* sp., *Muhlenbergia schreberi*, *Oxalis* sp., *Parietaria pensylvanica*, *Pellaea atropurpurea*, *Plantago rugelii*, *Prunella vulgaris*, *Rumex crispus*, *Setaria viridis*, *Solidago rugosa*, *Taraxacum officinale*, *Verbascum thapsus*, and *Verbena urticifolia*.

Summary: Visited 12 October 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis.

Spring #28

Parameters *	10/12/95	3/12/96	6/12/96	Parameters *	3/12/96	6/12/96
Water Temperature (°C)	13.5		26	Dissolved Copper		0.12
Dissolved Oxygen	9.2		10.2	Dissolved Iron		<DL
pH	7.55		7.8	Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	603.3		813.1	Dissolved Lithium		<DL
Inorganic Dissolved C			44	Dissolved Magnesium		9.18
Dissolved Organic C			21.1	Dissolved Manganese		<DL
Total Dissolved C			65.5	Dissolved Molybdenum		<DL
Sulfate Sulfur			21.9	Dissolved Sodium		4.5
Ammonia Nitrogen			0.02	Dissolved Nickel		<DL
Nitrite Nitrogen			<DL	Dissolved Lead		<DL
Nitrate Nitrogen		0.09	0.37	Dissolved Antimony		<DL
Total Phosphorus			0.04	Dissolved Scandium		<DL
Hardness (EDTA)			241	Dissolved Selenium		<DL
Chlorides			2.66	Dissolved Silicon		8.3
Total Dissolved Solids			288	Dissolved Strontium		0.07
Total Alkalinity			233	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			0.06	Dissolved Zinc		0.6
Dissolved Barium			0.04	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		1.51
Dissolved Calcium			80.8	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Visited 12 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Nine taxa of aquatic macroinvertebrates were collected. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Spring northeast of Schumann Spring: Calhoun County: 7.8 km WSW Kampsville. This spring resurges from a fracture and bedding plane in Lower Valmeyeran limestone of Mississippian age. The springhead lies at the base of a northeast-facing wooded slope dominated by sycamore. Water flows from a moderate-sized opening (2 m wide, 15 cm high), forming a springhead pool (2 m wide, 2.7 m long, 15 cm deep). The bottom substrate of the springhead is comprised of 60% sand, 20% cobble, and 20% gravel substrate. Water flows into a springbrook (2.4-2.7 m wide, 12 m long, 5 cm deep) which narrows to a springbrook (1 m wide, 11 m long) before dropping 1.5 m into an unnamed tributary of Crawford Creek. The bottom substrate of the springbrook is comprised of 70% cobble-gravel and 30% sand. Spring discharge on 12 June 1996 was determined to be 13.7 L/sec. **Springhead Fauna:** Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*. Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Baetrus brachycaudus*: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*, *C. kendeighi*. Insecta: Ceratopogonidae: *Culicoides* sp. Chironomidae: unidentified spp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Springbrook Fauna:** Platyhelminthes: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Candona sigmoides*, *Potamocypris pallida*. Insecta: Diptera: Chironomidae: unidentified spp. Tipulidae: *Pedicia* sp. Heteroptera: Gerridae: *Aquarius remigis*. Megaloptera: Sialidae: *Sialis* sp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Flora:** The dominant tree was *Platanus occidentalis*. Other trees present were *Acer saccharum*, *Carpinus caroliniana*, *Carya cordiformis*, *Cornus florida*, and *Ulmus americana*. The dominant shrub was *Rosa multiflora*. Other shrubs present were *Aralia racemosa*, *Ilex decidua*, and *Lonicera maackii*. The dominant vine was *Vitis riparia*. Other vines observed were *Lonicera japonica* and *Toxicodendron radicans*. The dominant herbs were *Festuca pratensis*, *Poa compressa*, and *Plantago rugelii*. Other herbs present were *Acalypha virginica*, *Ambrosia artemisiifolia*, *Asplenium platyneuron*, *Asplenium rhizophyllum*, *Aster lateriflorus*, *Carex jamesii*, *Cryptotaenia canadensis*, *Cystopteris* sp., *Erigeron annuus*, *Eupatorium rugosum*, *Geranium maculatum*, *Geum canadense*, *Hypericum mutilum*, *Juncus tenuis*, *Leersia virginica*, *Lobelia*

siphilitica, *Muhlenbergia schreberi*, *Oxalis* sp., *Panicum* sp., *Perilla frutescens*, *Phlox divaricata*, *Pilea pumila*, *Poinsettia dentata*, *Polygonum arenastrum*, *Polygonum punctatum*, *Polystichum acrostichoides*, *Prunella vulgaris*, *Rumex obtusifolius*, *Stellaria media*, *Taraxacum officinale*, *Trifolium repens*, *Verbesina alternifolia*, and *Woodsia obtusa*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 13 October 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Visited 12 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Sixteen taxa of aquatic macroinvertebrates were collected in this spring, including *Bactrurus brachycaudus*, a troglomorphic isopod, and *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level in March and above the background level in June but below the EPAMCL. Atrazine was detected in June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Spring northeast of Schumann Spring

Parameters *	10/13/199	3/12/96	6/12/96	Parameters *	3/12/96	6/12/96
Water Temperature (°C)	13		12.5	Dissolved Copper		0.07
Dissolved Oxygen	5.5		8.8	Dissolved Iron		<DL
pH	7.38			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	887.3		689.5	Dissolved Lithium		<DL
Inorganic Dissolved C			61.5	Dissolved Magnesium		31.6
Dissolved Organic C			29.5	Dissolved Manganese		<DL
Total Dissolved C			91	Dissolved Molybdenum		<DL
Sulfate Sulfur			36.5	Dissolved Sodium		10.4
Ammonia Nitrogen			0.03	Dissolved Nickel		<DL
Nitrite Nitrogen			<DL	Dissolved Lead		<DL
Nitrate Nitrogen		0.39	1.88	Dissolved Antimony		<DL
Total Phosphorus			0.1	Dissolved Scandium		<DL
Hardness (EDTA)			364	Dissolved Selenium		<DL
Chlorides			12.7	Dissolved Silicon		7.53
Total Dissolved Solids			432	Dissolved Strontium		0.13
Total Alkalinity			307	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.04
Dissolved Barium			0.07	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		0.88
Dissolved Calcium			93.5	Atrazine (µg/L)	0.06	1.18
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	0.15
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L. values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Airhart Spring: Carroll County: 8 km NW Savanna. This spring resurges from a broad shallow opening in a dolomite bedding plane of Silurian age. The springhead is situated on the slope of a south south-west face of a mature second growth dry-mesic upland woods dominated by basswood and american elm. Water flows from a shallow opening (2.4 m wide, 2 cm high) onto a bed of limestone gravel, then tapers down to a narrow springbrook (0.6 m wide) before flowing through a culvert (50 cm diameter) under a county road. Here the springbrook flows along the base of the wooded hills and the east margin of the Mississippi River floodplain. From the base of the wooded slope the springbrook immediately enters a forb-dominated community beneath a powerline right-of-way, then flows into Rush Creek, a tributary of the Mississippi River. Flow was not measured because of the shallow nature of the springbrook. Much of the springbrook was choked with water cress (*Nasturtium officinale*). **Springhead Fauna:** Nematoda (unidentified sp.). Annelida: Oligochaeta: Lumbricidae (unidentified sp.). Lumbriculidae: Lumbriculidae sp. C. Enchytraeidae: Enchytraeidae (unidentified sp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Hydrophilidae: *Cymbiodyta blanchardi*. Diptera: Chironomidae: unidentified spp. Tipulidae: *Pedicia* sp. Mollusca: Gastropoda: Physidae: *Physella* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Nematoda (unidentified sp.). Annelida: Oligochaeta: Lumbricidae (unidentified sp.). Lumbriculidae: Lumbriculidae sp. A, Lumbriculidae sp. C. Enchytraeidae: *Achaeta* sp., Enchytraeidae (unidentified sp.). Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Hydrophilidae: *Cymbiodyta chamberlaini*. Insecta: Diptera: Ceratopogonidae: *Culicoides* sp. Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Psychodidae: *Psychoda* sp. Stratiomyidae: unidentified spp. Tipulidae: *Pedicia* sp. Ephemeroptera: *Baetis brunneicolor*. Megaloptera: *Chauliodes* sp. Trichoptera: Hydropsychidae: *Cheumatopsyche pettiti*, *Hydropsyche bidens*, *Potamyia flava*. Lepidostomatidae: *Lepidostoma libum*. Leptoceridae: *Ceraclea tarsipunctata*, *C. transversa*, *Leptocerus americanus*, *Nectopsyche candida*, *Oecetis inconspicua*, *Triaenodes baris*. Limnephilidae: *Drusinus uniformis*. Phryganeidae: *Ptilostomis semifasciata*. Polycentropodidae: *Polycentropus interruptus*. Psychomyiidae: *Psychomyia flavida*. Mollusca: Gastropoda: Physidae: *Physella* sp. Pleuroceridae: *Elimia* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant trees were *Tilia americana* and *Ulmus americana*. Other trees included *Juglans nigra*, *Juniperus virginiana*, *Populus deltoides*, *Populus tremuloides*, and *Salix nigra*. The only shrub observed was *Rubus occidentalis*. The dominant vine was *Vitis riparia*. The only other vine observed was *Parthenocissus quinquefolia*. The dominant herbs were *Carex stricta*, *Impatiens capensis*, *Eupatorium maculatum*, *Apios americana*, *Senecio aureus*, and *Nasturtium officinale*. *Nasturtium officinale* was the only aquatic plant observed and was abundant in the

springbrook. Other herbs observed were *Agrostis gigantea*, *Alliaria petiolata*, *Amphicarpa bracteata*, *Aster lanceolatus*, *Aster lateriflorus*, *Aster praealtus*, *Aster puniceus*, *Caltha palustris*, *Campanula americana*, *Campanula aparinoides*, *Carex hystricina*, *Cicuta maculata*, *Cirsium vulgare*, *Cryptotaenia canadensis*, *Epilobium* sp., *Equisetum arvensis*, *Erigeron annuus*, *Eupatorium perfoliatum*, *Galium triflorum*, *Geranium maculatum*, *Helianthus strumosus*, *Juncus* sp., *Lobelia siphilitica*, *Lycopus americanus*, *Mentha arvensis*, *Pilea* sp., *Poa pratensis*, *Rumex crispus*, *Scirpus atrovirens*, *Smilacina racemosa*, *Solidago canadensis*, *Solidago gigantea*, *Taraxacum officinale*, *Teucrium canadense*, and *Viola sororia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 28 June 1994. Visited 4 April 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 12 June 1997: water samples were collected for analysis. Visited 18 June 1997: blacklight collection of aquatic insects made. Visited 30-31 July 1997: A floral census was conducted in and around spring. Thirty-seven taxa of aquatic macroinvertebrates were collected. Three rare caddisflies in Illinois, *Drusus uniformis*, *Lepidostoma libum*, and *Psychomyia flavida*, were collected at this spring. Much of the springbrook is choked with *Nasturtium officinale*. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Airhart Spring

Parameters *	4/4/97	6/12/97	Parameters *	4/4/97	6/12/97
Water Temperature (°C)	10.3	10.2	Dissolved Copper	0.1	<DL
Dissolved Oxygen	15	9.5	Dissolved Iron	<DL	<DL
pH		7.75	Dissolved Potassium	<DL	<DL
Total Alkalinity	296	316	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	543.5	619.2	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	68.5	66.9	Dissolved Magnesium	<DL	39.6
Dissolved Organic C	13.5	19	Dissolved Manganese	39.6	<DL
Total Dissolved C	82	85.8	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	40.7	40.5	Dissolved Sodium	3.8	3.8
Ammonia Nitrogen	0.01	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	0.16	0.25	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.01	0.03	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	350	346	Dissolved Selenium	<DL	<DL
Chlorides	1.57	2.35	Dissolved Silicon	7.49	7.71
Total Dissolved Solids	404	332	Dissolved Strontium	0.14	0.15
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	0.04	0.04	Dissolved Zinc	0.07	0.01
Dissolved Barium	0.06	0.07	Dissolved Zirconium		<DL
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	0.11
Dissolved Calcium	74.6	73.3	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Five Springs Complex: Carroll County: 11 km NNW Savanna. These five small springs resurge from shallow openings in a dolomite bedding plane of Silurian age. The springheads are situated on the west face of a young second growth dry-mesic woods dominated by basswood. The openings are 0.3-0.6 m wide but less than 2 cm high; water flows out into narrow channels of limestone gravel (0.3-0.6 m wide). Discharge from springheads 1 and 2 merge after 3.7 m, flowing southwest for 150 m before dropping 1.2 m over the edge of a road cut and forming a springbrook along the east side of a county road. Discharge from springheads 3 and 4 merge after 3 m, then flow 100 m before dropping over the edge of the road cut and into the springbrook from springs 1 and 2. Discharge from springhead 5 flows 100 m before dropping over the edge of the road cut and into the springbrook from springs 1-4. This combined discharge then flows under the road through a culvert (50 cm diameter) and across a pasture before entering Rush Creek. Total spring discharge on 5 March 1997 was determined to be 5.3 L/sec. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Nematoda (unidentified sp.). Annelida: Oligochaeta: Lumbriculidae: Lumbriculidae sp. A, Lumbriculidae sp. C. Enchytraeidae (unidentified sp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Insecta: Diptera: Ceratopogonidae: unidentified spp. Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Stratiomyidae: unidentified spp. Tipulidae: *Pedicia* sp. Plecoptera: Nemouridae: *Nemoura trispinosa*. Mollusca: Gastropoda: Physidae: *Physella* sp. Planorbidae: *Helisoma* sp. **Springbrook Fauna:** Nematomorpha (unidentified sp.). Nematoda (unidentified sp.). Lumbriculidae: Lumbriculidae sp. C. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Diptera: Ceratopogonidae: *Culicoides* sp. Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Stratiomyidae: unidentified spp. Tipulidae: *Pedicia* sp. Ephemeroptera: *Baetis brunneicolor*, *B. nr. flavistriga*. Plecoptera: Nemouridae: *Amphinemura* sp., *Nemoura trispinosa*. Trichoptera: Hydropsychidae: *Cheumatopsyche campyla*, *Diplectrona modesta*. Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Physidae: *Physella* sp. Planorbidae: *Helisoma* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant tree is *Tilia americana*. Other trees included *Carya cordiformis*, *Celtis occidentalis*, *Fraxinus americana*, *Juglans cinerea*, *Juglans nigra*, *Morus rubra*, *Quercus macrocarpa*, and *Ulmus rubra*. The dominant shrub is *Ribes americana*. Other shrubs included *Cornus alternifolia*, *Cornus obliqua*, *Cornus racemosa*, and *Prunus virginiana*. The dominant vines were *Parthenocissus quinquefolia*, *Smilax hispida*, and *Lonicera prolifera*. The only other vines observed were *Menispermum canadense*, *Toxicodendron radicans*, and *Vitis riparia*. The dominant herbs were *Impatiens capensis*, *Cryptotaenia canadensis*,

Amphicarpa bracteata, and *Leersia virginica*. Other herbs observed were *Actaea pachypoda*, *Adiantum pedatum*, *Alliaria petiolata*, *Aquilegia canadensis*, *Arisaema triphyllum*, *Aster lanceolatus*, *Botrychium virginianum*, *Caltha palustris*, *Campanula americana*, *Carex blanda*, *Carex pensylvanica*, *Carex sparginoidea*, *Cicuta maculata*, *Cinna arundinacea*, *Cirsium altissimum*, *Desmodium glutinosum*, *Elymus villosus*, *Eupatorium rugosum*, *Festuca obtusa*, *Galium concinnum*, *Galium triflorum*, *Geranium maculatum*, *Geum canadense*, *Hackelia virginiana*, *Lilium michiganense*, *Lobelia siphilitica*, *Osmorhiza longistylis*, *Phlox divaricata*, *Phryma leptostachya*, *Pilea* sp., *Prenanthes alba*, *Ranunculus septentrionalis*, *Rudbeckia triloba*, *Sanguinaria canadensis*, *Sanicula odorata*, *Senecio aureus*, *Silphium perfoliatum*, *Smilacina stellata*, *Smilax eccirata*, *Solidago gigantea*, *Thalictrum dasycarpum*, and *Viola sororia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 29 June 1994: aquatic macroinvertebrates were collected for identification and a water sample was collected for analysis. Visited 5 April 1997: aquatic macroinvertebrates were collected for identification and a water sample was collected for analysis. Visited 12 June 1997: water samples were collected for analysis. Visited 18 June 1997: blacklight collection of aquatic insects was made. Visited 30-31 July 1997: A floral census was conducted in and around spring.

Five Springs

Parameters *	6/29/94	4/5/97	6/12/97	Parameters *	6/29/94	4/5/97	6/12/97
Water Temperature (°C)	10.5	9.7	10	Dissolved Copper	<DL	0.02	<DL
Dissolved Oxygen	12.5	11.1	9.2	Dissolved Iron	0.11	<DL	<DL
pH	7.4		7.64	Dissolved Potassium	<DL	<DL	<DL
Total Alkalinity	340	322	321	Dissolved Lanthanum		<DL	<DL
Specific Conductivity	804.2	636.1	718.6	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		72.8	72.3	Dissolved Magnesium	45.10	43.8	43.1
Dissolved Organic C		14.5	16.4	Dissolved Manganese	<DL	<DL	<DL
Total Dissolved C		87.3	88.7	Dissolved Molybdenum	<DL	<DL	<DL
Sulfate Sulfur	37.0	31.1	32.8	Dissolved Sodium	4.90	4.6	5.3
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel	<DL	<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead	<DL	<DL	<DL
Nitrate Nitrogen	3.5	3.5	3.34	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.02	0.03	Dissolved Scandium		<DL	<DL
Hardness (EDTA)	397	393	381	Dissolved Selenium	<DL	<DL	<DL
Chlorides	12.20	7.96	8.81	Dissolved Silicon	8.90	9.1	9.14
Total Dissolved Solids	412	436	420	Dissolved Strontium		0.07	0.1
Turbidity (NTU)	2.6			Dissolved Thallium		<DL	<DL
Dissolved Aluminum	0.07	<DL	<DL	Dissolved Titanium		<DL	<DL
Dissolved Arsenic	<DL	<DL	<DL	Dissolved Vanadium	<DL	<DL	<DL
Dissolved Boron	<DL	<DL	<DL	Dissolved Zinc	<DL	0.02	0.01
Dissolved Barium		0.04	0.11	Dissolved Zirconium			
Dissolved Beryllium	<DL	<DL	<DL	Total Mercury (µg/L)	<DL	<DL	<DL
Dissolved Calcium	84.7	70.5	81.5	Atrazine (µg/L)		<DL	<DL
Dissolved Cadmium	<DL	<DL	<DL	Alachlor (µg/L)		<DL	<DL
Dissolved Cobalt	<DL	<DL	<DL	Metolachlor (µg/L)		<DL	<DL
Dissolved Chromium	<DL	<DL	<DL	Cyanazine (µg/L)		<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Twenty-four taxa of aquatic macroinvertebrates were collected, including *Lepidostoma libum*, a rare caddisfly in Illinois. Nitrate nitrogen levels determined in June (1994), and March and June (1997) were above the background level but below the EPAMCL. Sample for herbicides were collected in April and June (1997). Atrazine, Metolachlor, Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Nadig Spring [#74]: Carroll County: 5.4 km SE Blackhawk. This spring resurges from two shallow openings in a dolomite bedding plane of Silurian age. The springheads are on a south-facing slope of a young second growth dry-mesic woods dominated by white oak and slippery elm. Both openings were flowing when visited in 1992 and 1996, but only the east-facing opening was flowing in 1997. The east-facing opening is 0.3-0.6 m wide and less than 5 cm in height. Water flows into a springbrook (2 m wide, 1 cm deep, 40 m long) before flowing into Mill Hollow Creek. The bottom substrate of the springbrook is comprised of 30% cobble, 50% gravel, and 20% sand. Spring discharge from the east-facing springhead on 4 March 1997 was determined to be 7.5 L/sec. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbriculidae sp. A. Arthropoda: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Dytiscidae: *Sanfilippodytes pseudovilis*. Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Tipulidae: *Pedicia* sp., *Tipula* sp. Ephemeroptera: Baetidae: *Baetis brunneicolor*. Plecoptera: Nemouridae: *Amphinemura delosa*, *Nemoura trispinosa*. Trichoptera. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Nematoda (unidentified sp.). Annelida: Oligochaeta: Lumbricidae (unidentified sp.). Lumbriculidae sp. C. Enchytraeidae (unidentified sp.). Naididae: *Nais communis*, *Nais* sp. Tubificidae: (immature spp.). Hirudinea: Erpobdellidae: (unidentified sp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Dytiscidae: *Agabus seriatus*, *Ilbyius* sp. (immature), *Liodessus* sp. (immature), *Sanfilippodytes pseudovilis*. Elmidae: *Optioservus* sp. (immature). Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Simuliidae: Tipulidae: *Pedicia* sp., *Tipula* sp. Ephemeroptera: Baetidae: *Baetis brunneicolor*, *B. flavistriga*. Megaloptera: *Chauliodes* sp. Plecoptera: Nemouridae: *Amphinemura delosa*, *Nemoura trispinosa*. Trichoptera: Glossosomatidae: *Glossosoma intermedium*. Hydropsychidae: *Diplectrona modesta*, *Hydropsyche bidens*. Lepidostomatidae: *Lepidostoma libum*, *Oecetis inconspicua*. Limnephilidae: *Drusinus uniformis*, *Pycnopsyche antica*. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. **Flora:** The dominant trees were *Quercus alba* and *Ulmus rubra*. Other trees included *Juglans nigra*, *Morus alba*, *Prunus serotina*, *Quercus rubra*, and *Ulmus americana*. The dominant shrubs were *Ribes missouriense*, *Cornus racemosa*, *Prunus virginiana*,

and *Rubus occidentalis*. Other shrubs included *Corylus americana*, *Ribes americana*, *Ribes cynosbati*, *Sambucus canadensis*, and *Viburnum prunifolium*. The dominant vines were *Parthenocissus quinquefolia*, and *Toxicodendron radicans*. Other vines observed were *Menispermum canadense* and *Smilax hispida*. The dominant herbs were *Aster prenanthoides*, *Rudbeckia laciniata*, *Cryptotaenia canadensis*, *Amphicarpa bracteata*, *Adiantum pedatum*, and *Festuca obtusa*. The only aquatic plant present in the springbrook was *Nasturtium officinale*. Other herbs observed were *Actaea pachypoda*, *Adiantum pedatum*, *Alliaria petiolata*, *Angelica atropurpurea*, *Anemone virginica*, *Apios americana*, *Arisaema triphyllum*, *Aruncus dioicus*, *Aster lateriflorus*, *Athyrium filix-femina*, *Cardamine pensylvanica*, *Carex blanda*, *Cinna arundinacea*, *Epilobium* sp., *Erigeron annuus*, *Erigeron philadelphicus*, *Eupatorium rugosum*, *Galium aparine*, *Galium triflorum*, *Geranium maculatum*, *Geum canadense*, *Hydrophyllum virginianum*, *Impatiens capensis*, *Lactuca* sp., *Laportea canadensis*, *Leersia virginica*, *Myosoton aquaticum*, *Osmorhiza longistylis*, *Phalaris arundinacea*, *Phryma leptostachya*, *Pilea* sp., *Ranunculus recurvatus*, *Rumex obtusifolius*, *Sanicula odorata*, *Silene nivea*, *Silphium perfoliatum*, *Smilacina racemosa*, *Solidago gigantea*, *Taraxacum officinale*, *Thalictrum revolutum*, *Veronicastrum virginicum*, and *Viola sororia*. Floral abundance, cover, and importance values are given in Appendix 2.

Nadig Spring

Parameters *	4/4/97	6/18/97	Parameters *	4/4/97	6/18/97
Water Temperature (°C)	11	11.1	Dissolved Copper	0.01	<DL
Dissolved Oxygen	14	8.1	Dissolved Iron	<DL	<DL
pH		8.01	Dissolved Potassium	<DL	<DL
Total Alkalinity	315	305	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	647	572.1	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	68.9	69.6	Dissolved Magnesium	<DL	<DL
Dissolved Organic C	14.3	15.6	Dissolved Manganese	39.4	32.3
Total Dissolved C	83.2	85.2	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	26.7	28.1	Dissolved Sodium	5.7	4.9
Ammonia Nitrogen	<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	3.38	3.35	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.03	0.41	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	379	301	Dissolved Selenium	<DL	<DL
Chlorides	4.75	5.95	Dissolved Silicon	11.9	9.79
Total Dissolved Solids	420	384	Dissolved Strontium	0.1	<DL
Turbidity (NTU)			Dissolved Thallium	<DL	0.08
Dissolved Aluminum	<DL	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.01	<DL
Dissolved Barium	0.08	0.07	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	0.06	<DL
Dissolved Calcium	86.8	67.1	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Reference: Webb and DeWalt (1997), Webb *et al.* (1993). **Summary:** Visited May 27 1992 by G. Gardner, J. K. Krejca, and S. J. Taylor: aquatic macroinvertebrates were collected for identification and a water sample was collected for analysis. Visited 17 October 1996. Visited 4 April 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 14 May 1997: Ephemeroptera, Plecoptera, and Trichoptera were collected. Visited 18 June 1997: water samples were collected for analysis and a blacklight collection for aquatic insects was made. Visited 16 July 1997: blacklight collection for aquatic insects was made. Visited 30-31 July 1997: A floral census was conducted in and around spring. This spring supports a unique and highly diverse fauna. Thirty-two taxa of aquatic macroinvertebrates were collected at this spring. A species of caddisfly new to Illinois, *Pycnopsyche antica*, and four rare species of caddisflies in Illinois, *Diplectrona modesta*, *Drusinus uniformis*, *Glossosoma intermedium*, and *Lepidostoma libum*, were collected at this spring. *Nemoura trispinosa*, a stonefly species known previously from only one locality in Illinois (Frison 1942), was also collected at this spring. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Plum Spring: Carroll County: 4.8 km NE Savanna. This spring resurges from a shallow opening in a dolomite bedding plane of Silurian age. The springhead is on a south-facing wooded slope dominated by bur oak. Water flows from a small opening (0.5 m wide, 1 cm high) into a retention pool (3 m wide, 50 cm deep, 10 m long), before flowing through a culvert (50 cm diameter) under Oakton Road, then through a wooded ditch across farmland before flowing into the Plum River. The bottom substrate of the retention pond is comprised of 10% bedrock dolomite, 10% cobble, 60% gravel, and 20% sand. Spring discharge on 5 March 1995 was determined to be 6.9 L/sec. **Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant tree was *Quercus macrocarpa*. The only other tree observed was *Celtis occidentalis*. The dominant shrub was *Rosa multiflora*. Other shrubs included *Cornus drummondii*, *Salix amygdaloides*, and *Sambucus canadensis*. The dominant vine was *Parthenocissus quinquefolia*. The only other vine observed was *Toxicodendron radicans*. The dominant herbs were *Phalaris arundinacea*, *Impatiens capensis*, and *Nasturtium officinale*. The only aquatic plant observed was *Nasturtium officinale*. Other herbs observed were *Agrostis gigantea*, *Ambrosia artemisiifolia*, *Ambrosia trifida*, *Arctium minus*, *Asclepias syriaca*,

Atriplex sp., *Bromus pubescens*, *Bromus tectorum*, *Cichorium intybus*, *Cryptotaenia canadensis*, *Daucus carota*, *Echinochloa* sp., *Erigeron annuus*, *Eupatorium rugosum*, *Festuca pratensis*, *Geum canadense*, *Leonurus cardiaca*, *Myosoton aquaticum*, *Nepetea cataria*, *Poa pratensis*, *Polygonum persicaria*, *Rumex crispus*, *Solidago canadensis*, *Taraxacum officinale*, *Trifolium repens*, and *Urtica dioica*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 28 June 1994. Visited 5 April 1997: aquatic macroinvertebrates were collected for analysis and water samples were collected for analysis. Visited 12 June 1997: water samples were collected for analysis. Visited 30-31 July 1997: A floral census was conducted in and around spring. Seven taxa of aquatic macroinvertebrates were collected at this spring. *Lepidostoma libum*, a rare caddisfly in Illinois, was collected at this spring. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Plum Spring

Parameters *	4/5/97	6/12/97	Parameters *	4/5/97	6/12/97
Water Temperature (°C)	11	10.2	Dissolved Copper	0.01	<DL
Dissolved Oxygen	6.4	6.2	Dissolved Iron	<DL	<DL
pH		7.63	Dissolved Potassium	1	<DL
Total Alkalinity	350	357	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	754.9	729.3	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	81.1	81.7	Dissolved Magnesium	46.2	40.8
Dissolved Organic C	16.8	18.3	Dissolved Manganese	<DL	<DL
Total Dissolved C	97.9	100	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	31.5	32.8	Dissolved Sodium	5.5	5
Ammonia Nitrogen	0.02	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	2.26	2.3	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.04	0.06	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	416	360	Dissolved Selenium	<DL	<DL
Chlorides	4.42	5.43	Dissolved Silicon	9.7	8.8
Total Dissolved Solids	456	400	Dissolved Strontium	0.09	0.08
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	0.03	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.01	<DL
Dissolved Barium	0.08	<DL	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	0.05
Dissolved Calcium	90.4	77	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Randecker Spring: Carroll County: 9.5 km NW Mount Carroll. This spring resurges from a sand-silt boil in Peoria loess which overlays dolomite of Silurian age. The springhead is situated in a sparsely forested pasture. Water boils up into a retention pool (4-5 m wide, 50 cm to 100 cm

deep, 30 m long) with a bottom substrate comprised of 20% sand and 80% silt. The pond flows into a narrow springbrook (1 m wide) with a bottom substrate comprised of 60% gravel, 30% sand, and 10% silt. The springbrook flows for 100 m, then through a culvert (50 cm diameter) under Polsgrove Road and across a sparsely wooded pasture before its confluence with an unnamed tributary of the Plum River. Flow was not measured because of the shallow nature of the springbrook. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Dugesia dorotocephala*, *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Dytiscidae: *Agabus/Ilybius* sp. (immatures). Diptera: Tipulidae: *Pedicia* sp. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant tree was *Quercus macrocarpa*. Other trees observed included *Acer negundo*, *Morus alba*, *Populus deltoides*, *Prunus serotina*, and *Ulmus americana*. Only two shrubs were present, *Sambucus canadensis* and *Salix amygdaloides*. The only vine observed was *Vitis riparia*. The dominant herbs were *Phalaris arundinacea*, *Nasturtium officinale*, *Impatiens capensis*, and *Poa pratensis*. The only aquatic plant observed was *Nasturtium officinale*. Other herbs observed were *Acalypha rhomboidea*, *Agrostis gigantea*, *Ambrosia trifida*, *Aster lanceolatus*, *Aster lateriflorus*, *Aster pilosus*, *Bidens cernua*, *Bidens frondosa*, *Cirsium vulgare*, *Coronilla varia*, *Cryptotaenia canadensis*, *Daucus carota*, *Echinochloa* sp., *Elymus virginicus*, *Epilobium coloratum*, *Erigeron annuus*, *Festuca elatior*, *Galium aparine*, *Geum canadense*, *Glechoma hederacea*, *Glyceria striata*, *Hackelia virginiana*, *Leersia virginica*, *Leonurus cardiaca*, *Myosoton aquaticum*, *Osmorhiza longistylis*, *Oxalis* sp., *Pilea* sp., *Polygonum persicaria*, *Sanicula odorata*, *Scirpus atrovirens*, *Solidago canadensis*, *Solidago gigantea*, *Taraxacum officinale*, *Teucrium canadense*, *Trifolium repens*, *Urtica dioica*, and *Verbena urticifolia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 17 October 1996. Visited 5 April 1997: water samples were collected for analysis. Visited 12 June 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 30-31 July 1997: A floral census was conducted in and around spring. Eight taxa of aquatic macroinvertebrates were collected. The springhead and springbrook support water cress, *Nasturtium officinale*. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine was detected in both April and June but at levels below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Randecker Spring

Parameters *	4/5/97	6/12/97	Parameters *	4/5/97	6/12/97
Water Temperature (°C)	10.7	10.2	Dissolved Copper	0.03	<DL
Dissolved Oxygen	8.1	8	Dissolved Iron	<DL	<DL
pH		7.71	Dissolved Potassium	<DL	<DL
Total Alkalinity	292	299	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	556.8	470.6	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	67.3	66.4	Dissolved Magnesium	41.1	37.5
Dissolved Organic C	13.8	19.2	Dissolved Manganese	<DL	<DL
Total Dissolved C	81.1	85.6	Dissolved Molybdenum	0.01	<DL
Sulfate Sulfur	20.5	20.8	Dissolved Sodium	4.6	4.3
Ammonia Nitrogen	<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	3.19	3.44	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.02	0.05	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	360	319	Dissolved Selenium	<DL	<DL
Chlorides	7.45	8.63	Dissolved Silicon	7.38	6.73
Total Dissolved Solids	396	364	Dissolved Strontium	0.07	0.07
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.02	0.02
Dissolved Barium	0.05	0.05	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	0.07
Dissolved Calcium	76.4	66	Atrazine (µg/L)	0.07	0.05
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

Sand Boil Spring: Carroll County: 3.9 km ESE Blackhawk. This spring resurges from a sandboil in Peoria loess which overlays dolomite of Silurian age. The springhead is situated in a disturbed sedge meadow. Water boils up through two cone-shaped openings (each 70 cm diameter, 30 cm deep). One boil lies alongside a narrow unnamed tributary ("Sand Boil Tributary") of Rush Creek; the second emanates 1 m east of the first boil. Water from these two boils and "Sand Boil Tributary" flow into a retention pond 25 m west of the two boils. Substrate of the two boils is 100% sand with a thin layer of organic silt floating on the top of the sand. Flow was not measured because of the shallow nature of the springbrook into "Sand Boil Tributary".

Springhead Fauna: Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Insecta: Diptera: Chironomidae: unidentified spp. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbriculidae sp. A. Tubificidae: (immature spp.). Arthropoda: Insecta: Coleoptera: Hydrophilidae: *Berosus striatus*, *Cymbiodyta chamberlaini*, *Enochrus hamiltoni*, *Paracymus subcupreus*. Insecta: Diptera: Ceratopogonidae: *Culicoides* sp. Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Ptychopteridae: *Ptychoptera quadrifasciata*. Tabanidae: *Tabanus* sp. Stratiomyidae: unidentified spp. Plecoptera: Nemouridae: *Nemoura trispinosa*. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda:

Pleuroceridae: *Elimia* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant trees were *Prunus serotina* and *Tilia americana*. Other trees observed included *Ulmus americana* and *Ulmus rubra*. The dominant shrub was *Cornus obliqua*. Other shrubs observed included *Salix amygdaloides* and *Rosa multiflora*. The only vine observed was *Parthenocissus quinquefolia*. The dominant herbs were *Apios americana*, *Carex stricta*, *Impatiens capensis*, *Campanula aparinoides*, and *Eupatorium perfoliatum*. The only aquatic plant observed was *Lemna minor*. Other herbs observed were *Agrostis gigantea*, *Amphicarpa bracteata*, *Aster lateriflorus*, *Aster prenanthoides*, *Bidens cernua*, *Boehmeria cylindrica*, *Carex cristatella*, *Carex hystricina*, *Carex vulpinoidea*, *Circaea lutetiana*, *Cryptotaenia canadensis*, *Cystopteris protrusa*, *Eleocharis erythropoda*, *Epilobium* sp., *Equisetum arvense*, *Erigeron annuus*, *Erigeron philadelphicus*, *Fragaria virginiana*, *Galium triflorum*, *Geranium maculatum*, *Geum canadense*, *Glyceria striata*, *Hypericum* sp., *Juncus dudleyi*, *Leersia oryzoides*, *Lobelia siphilitica*, *Lycopus* sp., *Onoclea sensibilis*, *Oxalis* sp., *Pilea pumila*, *Poa pratensis*, *Polygonum persicaria*, *Potentilla simplex*, *Ranunculus recurvatus*, *Sanicula odorata*, *Scirpus atrovirens*, *Scirpus cyperinus*, *Scutellaria lateriflora*, *Solidago gigantea*, *Sphenopholis obtusa*, *Stellaria media*, *Taraxacum officinale*, *Thelypteris palustris*, and *Viola sororia*. Floral abundance, cover, and importance values are given in Appendix 2.

Sand Boil Spring

Parameters *	4/5/97	6/12/97	Parameters *	4/5/97	6/12/97
Water Temperature (°C)	9	10.3	Dissolved Copper	0.01	<DL
Dissolved Oxygen	10.6	10.2	Dissolved Iron	<DL	<DL
pH		7.89	Dissolved Potassium	<DL	<DL
Total Alkalinity		271	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	152.4	494	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	60.3	59.8	Dissolved Magnesium	33.7	32.7
Dissolved Organic C	14.1	6.3	Dissolved Manganese	0.01	<DL
Total Dissolved C	74.4	66	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	26.8	26.5	Dissolved Sodium	3.8	3.8
Ammonia Nitrogen	0.01	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	1.76	1.56	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.03	0.03	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	315	297	Dissolved Selenium	<DL	<DL
Chlorides	2.32	2.82	Dissolved Silicon	9.19	8.99
Total Dissolved Solids	356	292	Dissolved Strontium	0.07	0.07
Turbidity (NTU)	265		Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.02	0.02
Dissolved Barium	0.04	0.05	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium	70.5	64.9	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium	<DL	0.01	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	0.01	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

Reference: Webb *et al.* (1993). **Summary:** Visited 4 April 1997: aquatic macroinvertebrates were collected for identification and a water sample for analysis. Visited 18 June 1997: water samples were collected for analysis. Visited 30-31 July 1997: A floral census was conducted in and around spring. Eighteen taxa of aquatic macroinvertebrates were collected, including *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Sand Boil Tributary Spring: Carroll County: 4.0 km ESE Blackhawk. This spring resurges from an opening in Peoria loess which overlays dolomite of Silurian age. The springhead is situated in a wooded ravine dominated by basswood and american elm. Water flows from a narrow opening (25 cm wide, 3 cm high) into a springbrook (20 cm wide, 3 cm deep) which forms the beginning of an unnamed tributary ("Sand Boil Tributary") of Rush Creek. This tributary flows 100 m before entering a retention pond. Spring discharge on 5 April 1997 was determined to be 2 L/sec. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Insecta: Plecoptera: Nemouridae: *Nemoura trispinosa*. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Insecta: Coleoptera: Hydrophilidae: *Enochrus ochraceus*. Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Tipulidae: *Pedicia* sp. Plecoptera: Nemouridae: *Nemoura trispinosa*. Trichoptera: Hydroptilidae: *Ochrotrichia riesi*. Lepidostomatidae: *Lepidostoma libum*. Limnephilidae: *Hesperophylax designatus*. Uenoidae: *Neophylax cocinnus*. **Flora:** The dominant trees were *Tilia americana* and *Ulmus americana*. Other trees observed included *Acer negundo*, *Celtis occidentalis*, *Juglans nigra*, and *Ulmus rubra*. The dominant shrubs were *Cornus alternifolia* and *Cornus racemosa*. Other shrubs observed included *Cornus drummondii*, *Corylus americana*, *Ribes americana*, *Ribes missouriense*, and *Sambucus canadensis*. The dominant vine was *Parthenocissus quinquefolia*. Other vines observed included *Smilax hispida* and *Toxicodendron radicans*. The dominant herbs were *Alliaria petiolata* and *Pilea pumila*. Other herbs observed were *Adiantum pedatum*, *Amphicarpa bracteata*, *Aquilegia canadensis*, *Arabis laevigata*, *Aruncus dioicus*, *Aster lateriflorus*, *Aster prenathoides*, *Athyrium filix-femina*, *Campanula americana*, *Carex blanda*, *Carex normalis*, *Chenopodium* sp., *Cinna arundinacea*, *Circaea lutetiana*, *Cirsium altissimum*, *Cryptotaenia canadensis*, *Cystopteris protrusa*, *Desmodium glutinosum*, *Equisetum arvense*, *Erigeron philadelphicus*, *Eupatorium rugosum*, *Festuca obtusa*, *Galium triflorum*, *Geranium maculatum*, *Geum canadense*, *Glyceria striata*, *Hypericum* sp., *Laportea canadensis*, *Leersia virginica*, *Lobelia*

inflata, *Lobelia siphilitica*, *Onoclea sensibilis*, *Osmorhiza longistylis*, *Oxalis* sp., *Phyrma leptostachya*, *Polygonum pensylvanicum*, *Ranunculus abortivus*, *Sanicula odorata*, *Scropularia marilandica*, *Smilacina racemosa*, *Taraxacum officinale*, *Urtica dioica*, and *Viola sororia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 18 October 1996. Visited 4 April 1997: aquatic macroinvertebrates were collected for identification and a water sample was collected for analysis. Visited 12 June 1997: water samples were collected for analysis. Visited 30-31 July 1997: A floral census was conducted in and around spring. Eleven taxa of aquatic macroinvertebrates were collected. *Lepidostoma libum*, a rare caddisfly in Illinois, was collected at this spring. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Sand Boil Tributary Spring

Parameters *	4/5/97	6/12/97	Parameters *	4/5/97	6/12/97
Water Temperature (°C)	9.7	9.2	Dissolved Copper	0.01	<DL
Dissolved Oxygen	11.2	10	Dissolved Iron	<DL	<DL
pH		7.8	Dissolved Potassium	<DL	<DL
Total Alkalinity	286	270	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	512.3	591.4	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	60.5	59.6	Dissolved Magnesium	35.3	31.9
Dissolved Organic C	13.9	13.2	Dissolved Manganese	<DL	<DL
Total Dissolved C	74.4	72.8	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	27.8	27.4	Dissolved Sodium	4.1	3.7
Ammonia Nitrogen	0.02	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	1.85	1.67	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.05	0.04	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	329	290	Dissolved Selenium	<DL	<DL
Chlorides	2.43	2.9	Dissolved Silicon	9.62	8.81
Total Dissolved Solids	364	296	Dissolved Strontium	0.07	0.06
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	0.04	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.03	<DL
Dissolved Barium	0.04	0.04	Dissolved Zirconium	<DL	<DL
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium	73.5	63.3	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

Skeeter Spring: Carroll County: 8 km NNE Savanna. **Summary:** Visited May 28 1992 by B. Handel, G. Gardner, J. K. Krejca, and S. J. Taylor. This spring is located on a wooded hill adjacent to a pasture. The spring resurgence is 0.3-1 m wide and 5 cm deep, with a gravel and clay substrate. The spring had previously been used for watering livestock, but in recent years has not been used. It is possible that a lake will be built in this area which may inundate the spring.

Sorrel Horse Camp Spring [Spring #8 Mississippi Palisades State Park]: Carroll County: Mississippi Palisades State Park, 8 km N Savanna. This spring resurges from a shallow opening in Peoria loess which overlies dolomite of Silurian age. The springhead is situated at the base of a west-facing, heavily disturbed, wooded slope dominated by white mulberry. The surrounding vegetation is dominated by shrub growth and a poorly developed young woods. Water flows from a narrow opening (25 cm wide, 2 cm high) into a springbrook (0.5 m wide, 2 cm deep). The springbrook broadens to 1 m wide and forms the beginning of an unnamed tributary of Rush Creek. The bottom substrate is comprised of 60% gravel, 30% sand and 10% silt. Spring discharge on 3 April 1997 was determined to be 9.5 L/sec. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Nematoda (unidentified sp.). Annelida: Oligochaeta: Lumbricidae (unidentified sp.). Lumbriculidae sp. A. Tubificidae: (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Arthropoda: Insecta: Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Ephemeroptera: *Baetis brunneicolor*. Plecoptera: Nemouridae: *Amphinemura* sp. (immatures). Mollusca: Gastropoda: Physidae: *Physella* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbricidae (unidentified sp.). Tubificidae: (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Dryopidae: *Helichus striatus*. Hydrophilidae: *Laccobius spangleri*. Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Stratiomyidae: unidentified spp. Tipulidae: *Antocha* sp., *Pedicia* sp., *Pilaria* sp. Ephemeroptera: Baetidae: *Baetis brunneicolor*. Plecoptera: Nemouridae: *Nemoura trispinosa*. Trichoptera: Hydropsychidae: *Ceratopsyche bronta*, *Diplectronea modesta*, *Hydropsyche betteni*, *Potamyia flava*. Hydroptilidae: *Hydroptila ajax*, *H. consimilis*. Lepidostomatidae: *Lepidostoma libum*. *Oecetis inconspicua*. Phryganeidae: *Phryganea sayi*. Mollusca: Gastropoda: Physidae: *Physella* sp. Planorbidae: *Helisoma* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant tree was *Morus alba*. Other trees observed included *Acer negundo*, *Malus pumila*, *Salix nigra*, *Ulmus americana*, and *Ulmus rubra*. The dominant shrub was *Lonicera maackii*. Other shrubs observed included *Cornus drummondii*, *Corylus americana*, *Ribes americana*, and *Rubus occidentalis*. The dominant vine was *Parthenocissus quinquefolia*. Other vines observed included *Toxicodendron radicans* and

Vitis riparia. The dominant herbs were *Sanicula odorata*, *Galium triflorum*, *Aster prenanthoides*, *Apios americana*, *Cryptotaenia canadensis*, and *Amphicarpa bracteata*. The only aquatic plant observed was *Nasturtium officinale*. Other herbs observed were *Alliaria petiolata*, *Anemone virginica*, *Arisaema triphyllum*, *Aster lanceolatus*, *Aster lateriflorus*, *Aster novae-angliae*, *Athyrium felix-femina*, *Boehmeria cylindrica*, *Campanula americana*, *Carex blanda*, *Carex grisea*, *Cicuta maculata*, *Circaea lutetiana*, *Elymus villosus*, *Erigeron annuus*, *Festuca obtusa*, *Galium aparine*, *Geranium maculatum*, *Geum canadense*, *Hydrophyllum virginianum*, *Impatiens capensis*, *Lactuca* sp., *Laportea canadensis*, *Leersia oryzoides*, *Lobelia siphilitica*, *Lycopus* sp., *Osmorhiza longistylis*, *Oxalis* sp., *Phryma leptostachya*, *Pilea* sp., *Plantago rugelii*, *Poa pratensis*, *Polymnia canadensis*, *Ranunculus recurvatus*, *Sanicula canadensis*, *Scirpus atrovirens*, *Scutellaria lateriflora*, *Silphium perfoliatum*, *Solidago gigantea*, *Taraxacum officinale*, *Thalictrum dasycarpum*, and *Urtica dioica*. Floral abundance, cover, and importance values are given in Appendix 2. **Reference:** Casler, Houser, and Hutchison (1978); Webb *et al.* (1993). **Summary:** Visited 27 May 1992 by G. Gardner, J. K. Krejca and S. J. Taylor. Visited 29 June 1994: aquatic macroinvertebrates were collected for identification and water samples were collected

Sorrel Horse Camp Spring

Parameters *	6/29/94	4/3/97	6/18/97	Parameters *	6/29/94	4/3/97	6/18/97
Water Temperature (°C)	9.5	10.5	12.2	Dissolved Copper	<DL	0.03	<DL
Dissolved Oxygen	8.35	13.9	8.4	Dissolved Iron	0.14	<DL	<DL
pH	7.7		8.13	Dissolved Potassium	<DL	<DL	<DL
Total Alkalinity	332	344	329	Dissolved Lanthanum		<DL	<DL
Specific Conductivity	852.8	586.1	569	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		75.8	75.4	Dissolved Magnesium	38.90	43.3	43
Dissolved Organic C		16.9	10.5	Dissolved Manganese	<DL	<DL	<DL
Total Dissolved C		92.8	85.8	Dissolved Molybdenum	<DL	<DL	<DL
Sulfate Sulfur	36.8	31	31.6	Dissolved Sodium	4.30	5.24	4.7
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel	<DL	<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead	<DL	<DL	<DL
Nitrate Nitrogen	<DL	0.41	0.46	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.01	0.04	Dissolved Scandium		<DL	<DL
Hardness (EDTA)	347	386	385	Dissolved Selenium	<DL	<DL	<DL
Chlorides	2.70	1.11	1.97	Dissolved Silicon	8.50	9.25	9.61
Total Dissolved Solids	394	432	352	Dissolved Strontium		0.1	0.11
Turbidity (NTU)	5.3			Dissolved Thallium		<DL	<DL
Dissolved Aluminum	0.08	<DL	<DL	Dissolved Titanium		<DL	<DL
Dissolved Arsenic	<DL	<DL	<DL	Dissolved Vanadium	<DL	<DL	<DL
Dissolved Boron	<DL	<DL	<DL	Dissolved Zinc	<DL	0.02	<DL
Dissolved Barium	0.09	0.1	0.1	Total Mercury (µg/L)	<DL	<DL	<DL
Dissolved Beryllium	<DL	<DL	<DL	Atrazine (µg/L)		<DL	<DL
Dissolved Calcium	75.0	83.1	83.3	Alachlor (µg/L)		<DL	<DL
Dissolved Cadmium	<DL	<DL	<DL	Metolachlor (µg/L)		<DL	<DL
Dissolved Cobalt	<DL	<DL	<DL	Cyanazine (µg/L)		<DL	<DL
Dissolved Chromium	<DL	<DL	<DL				

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L. values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

for analysis. Visited 29 June 1994: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 3 March 1997: water samples were collected for analysis. Visited 3 April 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 14 May 1997: Ephemeroptera, Plecoptera, and Trichoptera collected. Visited 18 June 1997: aquatic macroinvertebrates were collected for identification, water samples were collected for analysis, and a blacklight collection of aquatic insects was made. Visited 16 July 1997: blacklight collection of aquatic insects was made. Visited 30-31 July 1997: A floral census was conducted in and around spring. Thirty taxa of aquatic macroinvertebrates were collected at this spring. Two rare species of caddisflies in Illinois, *Diplectrona modesta* and *Lepidostoma libum*, and a rare stonefly species *Nemoura trispinosa*, were collected. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Well House Spring: Carroll County: 7.6 km NW Savanna. This spring resurges from a dolomite bedding plane of Silurian age. The springhead is covered with a concrete wellhouse on a west-facing wooded slope dominated by black walnut and american elm. Water flows from the wellhouse through a plastic pipe (8 cm diameter); this discharge then spreads out into a springbrook (0.5 m wide, 3 cm deep, 10 m long); then spreads again to 1-3 m wide. The water then flows 100 m southwest over the wooded slope before flowing under Illinois Route 84 and into the bottomland marshes of the Mississippi River. The bottom substrate is comprised of 30% cobble, 50% gravel, and 20% sand. Spring discharge on 5 April 1997 was determined to be 23 L/sec. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Nematoda (unidentified sp.). Annelida: Oligochaeta: Lumbricidae (unidentified sp.). Enchytraeidae (unidentified sp.). Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Stygobromus iowae*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Nematoda (unidentified sp.). Annelida: Oligochaeta: Lumbricidae (unidentified sp.). Enchytraeidae (unidentified sp.). Hirudinea: Erpobdellidae (unidentified sp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Dytiscidae: *Agabus seriatus*, *Liodes* sp. (immature), *Sanfilippodytes pseudovilis*. Hydrophilidae: *Enochrus ochraceus*, Sphaeriinae: sphaerid sp. 1. Diptera: Ceratopogonidae: *Culicoides* sp. Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Ephydriidae: Stratiomyidae: unidentified spp. Tipulidae: *Pedicia* sp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda:

Planorbidae: *Helisoma* sp. **Flora:** marsh marigold, *Caltha palustris*, was present in the springbrook. The dominant trees were *Juglans nigra* and *Ulmus americana*. Other trees observed included *Acer negundo*, *Celtis occidentalis*, *Fraxinus americana*, *Gleditsia triacanthos*, *Juniperus virginiana*, *Morus alba*, *Tilia americana*, and *Ulmus rubra*. The dominant shrub was *Prunus virginiana*. Other shrubs observed included *Cornus racemosa*, *Ribes missouriense*, and *Rubus occidentalis*. The dominant vine was *Parthenocissus quinquefolia*. Other vines observed included *Smilax hispida* and *Vitis riparia*. The dominant herbs were *Alliaria petiolata*, *Sanicula odorata*, *Pilea pumila*, *Impatiens capensis*, and *Eupatorium rugosum*. Other herbs observed were *Aster lanceolatus*, *Aster lateriflorus*, *Aster shortii*, *Campanula americana*, *Carex blanda*, *Carex rosea*, *Circaea lutetiana*, *Cryptotaenia canadensis*, *Equisetum arvense*, *Galium triflorum*, *Geum canadense*, *Glyceria striata*, *Leersia virginica*, *Osmorhiza longistylis*, *Oxalis* sp., *Phyrma leptostachya*, *Poa pratensis*, *Prunella vulgaris*, *Ranunculus recurvatus*, *Sanicula canadensis*, *Scrophularia marilandica*, *Smilacina racemosa*, *Smilax ecirrhata*, and *Vilva sororia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 29 June 1994: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 5 April 1997: aquatic macroinvertebrates were collected for identification and

Wellhouse Spring

Parameters *	6/29/94	4/5/97	6/12/97	Parameters *	6/29/94	4/5/97	6/12/97
Water Temperature (°C)	10	11.2	9.9	Dissolved Copper	<DL	0.01	<DL
Dissolved Oxygen	8.4	11.9	11.3	Dissolved Iron	0.03	0.01	<DL
pH	7.6		7.85	Dissolved Potassium	<DL	<DL	<DL
Total Alkalinity	311	320	317	Dissolved Lanthanum		<DL	<DL
Specific Conductivity	801.6	589.6	671.7	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		72.1	70.3	Dissolved Magnesium	40.00	45.1	36.7
Dissolved Organic C		15.1	18.7	Dissolved Manganese	<DL	<DL	<DL
Total Dissolved C		87.2	89	Dissolved Molybdenum	<DL	<DL	<DL
Sulfate Sulfur	38.0	34.3	33.8	Dissolved Sodium	4.20	4.5	3.8
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel	<DL	<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead	<DL	<DL	<DL
Nitrate Nitrogen	1.3	1.09	1.26	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.01	0.06	Dissolved Scandium		<DL	<DL
Hardness (EDTA)	345	391	310	Dissolved Selenium	<DL	<DL	<DL
Chlorides	3.10	1.51	2.13	Dissolved Silicon	9.50	9.98	8.44
Total Dissolved Solids	369	412	352	Dissolved Strontium		0.1	0.08
Turbidity (NTU)	1.3			Dissolved Thallium		<DL	<DL
Dissolved Aluminum	0.03	<DL	0.04	Dissolved Titanium		<DL	<DL
Dissolved Arsenic	<DL	<DL	<DL	Dissolved Vanadium	<DL	<DL	<DL
Dissolved Boron	<DL	<DL	<DL	Dissolved Zinc	<DL	0.06	<DL
Dissolved Barium	0.08	0.09	0.08	Dissolved Zirconium			
Dissolved Beryllium	<DL	<DL	<DL	Total Mercury (µg/L)	<DL	<DL	<DL
Dissolved Calcium	72.4	82	63.6	Atrazine (µg/L)		<DL	<DL
Dissolved Cadmium	<DL	<DL	<DL	Alachlor (µg/L)		<DL	<DL
Dissolved Cobalt	<DL	<DL	<DL	Metolachlor (µg/L)		<DL	<DL
Dissolved Chromium	<DL	<DL	<DL	Cyanazine (µg/L)		<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

water samples were collected for analysis. Visited 12 June 1997: water samples were collected for analysis. Visited 30-31 July 1997: A floral census was conducted in and around spring. Twenty-one taxa of aquatic macroinvertebrates were collected at this spring, including *Stygobromus iowae*, a rare amphipod, and *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Unnamed Spring east of Thomson: Carroll County: 8.0 km E Thomson. **Summary:** Visited 17 October 1996: no spring could be located flowing into Otter Creek from either the north or south side of the county road. This spring was referenced from specimens deposited in the Illinois Natural History Survey Crustacea Collection.

Spring #1 [South Gate Spring] in Mississippi Palisades State Park: Carroll County: 4.2 km N Savanna. This spring is currently capped and used as a public drinking fountain, but the water resurges from a dolomite bedding plane of Silurian age. The springhead is situated on a southwest-facing slope dominated by cottonwood. The surrounding vegetation is primarily a heavily disturbed young second growth floodplain forest. Water flows through a pipe (5 cm diameter) onto a large concrete apron, then into a springbrook (50 cm wide, 3 cm deep) which flows 20 m west into a shallow pool alongside a mowed lawn before flowing through a culvert (50 cm diameter) under Illinois Route 84 and into the Mississippi River. The bottom substrate of the springbrook is comprised of 15% gravel, 10% sand, and 75% silt. Flow was not measured because of the shallow nature of the springbrook. **Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbricidae (unidentifiable). Lumbriculidae: Lumbriculidae sp. D, Lumbriculidae sp. E. Enchytraeidae: Enchytraeidae (unidentifiable). Naididae: *Nais communis*. Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Stygobromus iowae*. Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Dytiscidae: *Agabus seriatus*. Diptera: Chironomidae: *Chironomus* sp. Trichoptera: Hydropsychidae: *Cheumatopsyche campyla*, *Hydropsyche bidens*, *Potamyia flava*. Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant tree was *Populus deltoides*. Other trees observed included *Celtis occidentalis*, *Fraxinus pennsylvanica*, *Juniperus virginiana*, and *Platanus occidentalis*. The dominant shrub was *Rhamnus cathartica*. The only other shrub observed was *Cornus drummondii*. The dominant vines were *Parthenocissus quinquefolia* and *Vitis riparia*. Other vines observed included *Smilax hispida* and *Toxicodendron radicans*. The

dominant herbs were *Leersia virginica*, *Poa pratensis*, *Taraxacum officinalis*, and *Nasturtium officinale*. The only aquatic plant observed was *Nasturtium officinale*. Other herbs observed were *Alliaria petiolata*, *Apios americana*, *Aster lateriflorus*, *Cerastium nutans*, *Circaea lutetiana*, *Cryptotaenia canadensis*, *Geranium maculatum*, *Lythrum salicaria*, *Mentha arvensis*, *Myosodon aquaticum*, *Phalaris arundinacea*, *Pilea* sp., *Rumex crispus*, and *Trifolium repens*. Floral abundance, cover, and importance values are given in Appendix 2. **Reference:** Casler, Houser, and Hutchison (1978). **Summary:** Visited 16 June 1994. Visted 15 April 1995: aquatic macroinvertebrates were collected for identification. Visited 5 April 1997: water samples were collected for analysis. Visited 12 June 1997: water samples were collected for analysis. Visited 30-31 July 1997: A floral census was conducted in and around spring. Eighteen taxa of aquatic macroinvertebrates were collected from the springbrook, including *Stygobromus iowae*, a rare isopod, and a rare caddisfly, *Lepidostoma libum*. Samples for nitrate nitrogen and herbicides were collected in April and June 1997. Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Mississippi Palisades State Park #1 Spring

Parameters *	4/5/97	6/12/97	Parameters *	4/5/97	6/12/97
Water Temperature (°C)	11.5	12.4	Dissolved Copper	0.03	<DL
Dissolved Oxygen	11.4	10.1	Dissolved Iron	<DL	<DL
pH		8.03	Dissolved Potassium	<DL	<DL
Total Alkalinity	364	357	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	718.7	601.1	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	82.8	82.4	Dissolved Magnesium	48	45.2
Dissolved Organic C	17.3	7.5	Dissolved Manganese	<DL	<DL
Total Dissolved C	100.2	89.9	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	36.3	38.5	Dissolved Sodium	4.9	5.1
Ammonia Nitrogen	<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	0.5	0.49	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.01	0.04	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	422	401	Dissolved Selenium	<DL	<DL
Chlorides	2.39	3.72	Dissolved Silicon	9.9	9.96
Total Dissolved Solids	448	392	Dissolved Strontium	0.1	0.1
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.03	0.07
Dissolved Barium	0.08	0.09	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium	90	86	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Unnamed Spring #96 [Spring #2 in Mississippi Palisades State Park]: Carroll County. **Reference:** Casler, Houser, and Hutchison (1978). **Summary:** Visited 16 June 1994: this spring is capped.

Unammed Spring #73 [Spring #3 in Mississippi Palisades State Park]: Carroll County: 5.4 km SE Blackhawk. **Reference:** (Casler, Houser, and Hutchison 1978). **Summary:** Visited 16 June 1994: this spring is capped.

Unnamed Spring #99: DeKalb County, 1.6 km SE Shabbona. **Summary:** Visited 15 May 1997: this is a very small spring on the edge of a golf course that currently emanates from a vertical PVC pipe (5 cm diameter) which protrudes 30 cm from the ground. The groundskeeper reported that, because of excess standing water around the spring, the discharge and flow may be altered and diverted.

Carle Spring: DeWitt County, 3.2 km N Wapella. **Summary:** Visited 5 November 1995: the name of this spring applies to a rural community of three houses. No evidence of a spring in this area was observed, however.

Clinton Lake Spring [#58]: DeWitt County, 6.3 km NNW DeWitt. **Summary:** Visited 5 November 1996: this is a small seep spring on the north-facing slope of a hillside. Discharge was too low to measure during this site visit.

Weldon Springs: DeWitt County, 4.2 km SE Clinton. **Reference:** Peck and Lewis (1978); Ross (1944). **Summary:** Visited 6 November 1996: this spring is covered with a cobblestone-mortared crib (1.5 m diameter, 1 m deep) which extends about 0.6 m into the creek bank. Water is 50 cm deep in the crib; the top of the crib is covered with a steel lid. Two horizontal pipes protrude through the crib wall (one 5 cm diameter, the other 3 cm diameter). Spring water discharges up from the bottom of the crib. **Springbrook Fauna:** Arthropoda: Crustacea: Isopoda: Asellidae: *Caecidotea spatulata*. Insecta: Trichoptera: Hydropsychidae: *Cheumatopsyche pettiti*, *Hydropsyche bettini*.

Spring SE of Paris: Edgar County, 8 km SE Paris. **Summary:** Visited 13 May 1997: no spring was found at the given location; either it has long since been dry, or locality information was incorrect. The area investigated was a pasture and wooded stream corridor with several eroded drainages that may be all that remains of a historic spring locality.

Unnamed Spring #85: Edgar County, 9.7 km N Paris. **Summary:** Visited 13 May 1997: this capped spring is located in a rural yard surrounded by row crops. Water from this spring site emanated at a very low rate from the ground about 17 m downstream of the concrete cap. It has created a small wetland area in a yard which is dominated by cattail (*Typha* sp.).

Unnamed Spring #110: Edgar County, 5.6 km ESE Chrisman. **Summary:** Visited 13 May 1997: located in a wooded stream corridor surrounded by pasture with cattle, this very small spring is reported to flow all year.

Dodson Spring: Greene County: 5.2 km WNW Kane. This circular sinkhole spring boils up through Peoria loess which overlies Lower Valmeyeran limestone of Mississippian age. The slope above the springhead historically was forested, but now supports only a few scattered trees in a grazed pasture. The springhead, which lies alongside a county road, is 3 m in diameter, and 40 cm deep in the middle. The bottom substrate is comprised of 50% gravel and 50% sand. The area around the springhead is heavily disturbed and mowed periodically. Discharge from the spring flows under the county road through a culvert (50 cm diameter) and into a springbrook (2 m wide, 6-10 cm deep) then flowing southwest 15 m before entering a tributary of the west branch of Wines Branch of Macoupin Creek. The bottom substrate of the springbrook is comprised of 60% gravel and 40% sand. Spring discharge on 20 September 1995 was determined to be 8.5 L/sec.

Springhead Fauna: Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata gracilis*, *P. velata*. Annelida: Oligochaeta: Lumbriculidae: (unidentified sp.). Naididae: *Nais pardalis*, *Nais variabilis*, *Nais* sp. Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*, *G. troglophilus*. Isopoda: Asellidae: *Caecidotea brevicauda*, *C. kendeighi*. Ostracoda: *Ilyocypris gibba*. Diptera: Ceratopogonidae: *Bezzia/Palpomyia* sp. Chironomidae: unidentified spp. Culicidae: *Anopheles* sp. Tipulidae: *Pilaria* sp. Mollusca: Gastropoda: Physidae: *Physella* sp. Pleuroceridae: *Elimia* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Springbrook Fauna:** Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*, *G. troglophilus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Coleoptera: Dytiscidae: *Laccophilus fasciatus*. Hydrophilidae: *Berosus infuscatus*. Diptera: Stratiomyidae: unidentified spp. Ephemeroptera: *Callibaetis fluctuans*. Heteroptera: Corixidae: *Sigara* spp. Gerridae: *Aquarius remigis*. Notonectidae: *Notonecta irrorata*. Plecoptera: Capniidae: *Allocapnia vivipara*. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. Vertebrata: Pisces: Cyprinidae: *Campostoma anomalum*. **Flora:** White walnut (*Juglans cinerea*) was found here and is a tree listed by the Illinois Species Protection Board as a species of Special Concern. Species of

special concern are those not currently endangered or threatened, but are experiencing serious population declines such that they may become listed as either Threatened or Endangered in Illinois in the foreseeable future. The dominant tree was *Platanus occidentalis*. Only one other tree, *Juglans cinerea*, was present. There were no shrubs present within one meter of the springhead. There were no vines present within one meter of the springhead. The dominant herbs were *Phalaris arundinacea*, *Poa pratensis*, and *Pilea pumila*. Other herbs present were *Arctium minus*, *Aster* sp., *Cryptotaenia canadensis*, *Festuca pratensis*, *Geum canadense*, *Glyceria striata*, *Lycopus* sp., *Oxalis* sp., *Perilla frutescens*, *Plantago rugelii*, *Polygonum* sp., *Rumex altissimus*, *Sanicula canadensis*, *Stellaria media*, *Taraxacum officinale*, and *Viola* sp. **Summary:** Visited 20 September 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Visited 11 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27 June 1996: A floral census was conducted in and around spring. Twenty-seven taxa of aquatic macroinvertebrates were collected, including *Gammarus troglophilus*, a troglophilic amphipod. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL.

Dodson Spring

Parameters *	9/20/95	3/12/96	6/11/96	Parameters *	3/12/96	6/11/96
Water Temperature (°C)	12.5		13	Dissolved Copper		0.22
Dissolved Oxygen	5.8		7.5	Dissolved Iron		<DL
pH	7.15			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	676.5		771.6	Dissolved Lithium		<DL
Inorganic Dissolved C			50.1	Dissolved Magnesium		24.4
Dissolved Organic C			30.2	Dissolved Manganese		<DL
Total Dissolved C			80.3	Dissolved Molybdenum		<DL
Sulfate Sulfur			43.3	Dissolved Sodium		11.3
Ammonia Nitrogen			0.03	Dissolved Nickel		<DL
Nitrite Nitrogen			<DL	Dissolved Lead		<DL
Nitrate Nitrogen		1.62	5.38	Dissolved Antimony		<DL
Total Phosphorus			0.03	Dissolved Scandium		<DL
Hardness (EDTA)			341	Dissolved Selenium		<DL
Chlorides			20.5	Dissolved Silicon		8.25
Total Dissolved Solids			448	Dissolved Strontium		0.14
Total Alkalinity			268	Dissolved Titanium		<DL
Dissolved Aluminum			0.03	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.17
Dissolved Barium			0.06	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		<DL
Dissolved Calcium			96	Atrazine (µg/L)	<DL	0.5
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Atrazine was detected in June but at levels below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Old Settlers Spring: Greene County: 7.65 km SE Hillview. This spring resurges from a broad seam in a bedding plane of Lower Valmeyeran limestone of Mississippian age. The slope above the spring is an open woods dominated by osage orange (*Maclura pomifera*) and bur oak (*Quercus macrocarpa*) with numerous scattered colonies of multiflora rose (*Rosa multiflora*) and is presently a heavily grazed pasture. Heavily grazed pasture also is present on both sides of the springbrook. The narrow outcrop of limestone from which the spring emanates is situated at the base of this wooded slope, where it flattens out into heavily disturbed pasture. Water flows out into a broad retention pond (3 m wide, 30 cm deep) with a bottom substrate comprised of silt. This retention pond is used for watering cattle. Water from this retention pond flows west as a tributary of Crooked Creek. Spring discharge on 11 June 1996 was determined to be 4.5 L/sec.

Springhead Fauna: Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, *Tubifex tubifex*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Chironomidae: unidentified spp. Tipulidae: *Tipula* sp. Heteroptera: Corixidae: *Sigara* spp. Mollusca: Gastropoda: Physidae: *Physella* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata* sp. Annelida: Oligochaeta: Tubificidae: *Limnodrilus cervix*, *Tubifex tubifex*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Ilyocypris gibba*, *Potamocypris pallida*. Insecta: Coleoptera: Dytiscidae: *Ilybius biguttulus*. Diptera: Ceratopogonidae: *Culicoides* sp. Heteroptera: Corixidae: *Sigara* spp. Gerridae: *Aquarius* spp. (nymphs). Veliidae: *Microvelia americana*. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The springbrook supported two aquatic plants, an emergent water cress (*Nasturtium officinale*) and a floating leaved duckweed (*Lemna minor*). The dominant tree was *Quercus muhlenbergii*. Other trees present were *Maclura pomifera* and *Ulmus americana*. The dominant shrub was *Ilex decidua*. Other shrubs present were *Lonicera maackii*, *Rubus* sp. *Rosa multiflora*, *Rosa setigera*, and *Zanthoxylum americanum*. The only vine present was *Lonicera japonica*. The dominant herbs were *Festuca pratensis* and *Nasturtium officinale*. Other herbs were *Agrostis gigantea*, *Ambrosia artemisiifolia*, *Aster ontarionis*, *Bidens comosa*, *Bromus japonicus*, *Carex vulpinoidea*, *Carex frankii*, *Cerastium vulgatum*, *Digitaria* sp., *Echinochloa crusgalli*, *Eclipta prostrata*, *Erigeron annuus*, *Erigeron philadelphicus*, *Festuca obtusa*, *Glechoma hederacea*, *Glyceria striata*, *Hystrix patula*, *Impatiens capensis*, *Juncus tenuis*, *Leersia oryzoides*, *Leersia virginica*, *Lemna minor*, *Lobelia siphilitica*, *Lycopus* sp., *Medicago lupulina*, *Melilotus alba*, *Mentha spicata*, *Phleum pratense*, *Plantago rugelii*, *Polygonum persicaria*.

Ranunculus abortivus, *Scirpus atrovirens*, *Stellaria media*, *Trifolium campestre*, *Trifolium repens*, *Verbascum thapsus*, and *Verbena urticifolia*. Floral abundance, cover, and importance values are given in Appendix 2. **Reference:** Peck and Lewis (1978). **Summary:** Visited 20 September 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Visited 11 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27 June 1996: A floral census was conducted in and around spring. Eighteen taxa of aquatic macroinvertebrates were collected. Samples for nitrate nitrogen and herbicides were collected on March and June (1996). Nitrate nitrogen levels were below the background level in March and above the background level in June but below the EPAMCL. Atrazine was detected in June but below the EPAMCL. Cyanazine and Metolachlor were detected in June but below the EPAHAL. Alachlor was not detected.

Old Settler Spring

Parameters *	3/12/96	3/12/96	6/11/96	Parameters *	3/12/96	6/11/96
Water Temperature (°C)	11.5		15	Dissolved Copper		<DL
Dissolved Oxygen	7.5		12	Dissolved Iron		<DL
pH	7.8			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	719.2		797.6	Dissolved Lithium		<DL
Inorganic Dissolved C			63.7	Dissolved Magnesium		39.7
Dissolved Organic C			34.1	Dissolved Manganese		0.02
Total Dissolved C			97.8	Dissolved Molybdenum		<DL
Sulfate Sulfur			37.3	Dissolved Sodium		8.5
Ammonia Nitrogen			0.08	Dissolved Nickel		<DL
Nitrite Nitrogen			<DL	Dissolved Lead		<DL
Nitrate Nitrogen		0.01	2.32	Dissolved Antimony		<DL
Total Phosphorus			0.08	Dissolved Scandium		<DL
Hardness (EDTA)			390	Dissolved Selenium		<DL
Chlorides			11.7	Dissolved Silicon		7.6
Total Dissolved Solids			468	Dissolved Strontium		0.12
Total Alkalinity			337	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.11
Dissolved Barium			0.07	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		0.26
Dissolved Calcium			90.8	Atrazine (µg/L)	<DL	1.14
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	0.13
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	0.31

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

Calumet Springs: Hancock County: 3.2 km south of Warsaw. **Fauna:** Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Crangonyx gracilis*. Decapoda: Cambaridae: *Cambarus diogenes*. Isopoda: Asellidae: *Caecidotea forbesi*. **Summary:** Visited 14 May 1975 (L. M. Page & R. A. Evers): aquatic macroinvertebrates were collected for identification. Visited 16 October

1996: this spring is principally a large seep area; water from this area flows through a PVC pipe (10 cm diameter) into a drainage ditch.

Large House Spring: Hancock County: 3 miles WSW Stillwell. **Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. **Summary:** Visited 15 May 1975 (L. M. Page & R. A. Evers): aquatic macroinvertebrates were collected for identification. Visited 15 October 1996: no evidence of this spring was found.

Wildcat Spring [#64]: Hancock County: in Hamilton. This spring resurges from a bedding plane in Lower Valmeyeran limestone of Mississippian age. The springhead is situated partway up a steep wooded bluff above Chaney Creek. Water flows from the bedding plane into a small pool (0.3-1 m wide, 10 cm deep) with a bottom substrate comprised of 50% cobble and 50% gravel which overlies bedrock limestone. Discharge from the springhead pool then drops 3 m down the bluffside into Chaney Creek. Flow was not measured because of the shallow nature of the springbrook. **Fauna:** Arthropoda: Crustacea: Amphipoda: Crangonyctidae:

Wildcat Spring

Parameters *	6/12/97	Parameters *	6/12/97
Water Temperature (°C)	11.2	Dissolved Copper	<DL
Dissolved Oxygen	8.9	Dissolved Iron	<DL
pH	7.63	Dissolved Potassium	<DL
Total Alkalinity	272	Dissolved Lanthanum	<DL
Specific Conductivity	804	Dissolved Lithium	<DL
Inorganic Dissolved C	62.5	Dissolved Magnesium	24.1
Dissolved Organic C	15.5	Dissolved Manganese	<DL
Total Dissolved C	78.1	Dissolved Molybdenum	<DL
Sulfate Sulfur	46.3	Dissolved Sodium	32.3
Ammonia Nitrogen	<DL	Dissolved Nickel	0.04
Nitrite Nitrogen	<DL	Dissolved Lead	<DL
Nitrate Nitrogen	1.19	Dissolved Antimony	<DL
Total Phosphorus	0.04	Dissolved Scandium	<DL
Hardness (EDTA)	328	Dissolved Selenium	<DL
Chlorides	54.1	Dissolved Silicon	8.6
Total Dissolved Solids	444	Dissolved Strontium	0.17
Turbidity (NTU)		Dissolved Thallium	<DL
Dissolved Aluminum	<DL	Dissolved Titanium	<DL
Dissolved Arsenic	<DL	Dissolved Vanadium	<DL
Dissolved Boron	<DL	Dissolved Zinc	0.02
Dissolved Barium	0.07	Dissolved Zirconium	-
Dissolved Beryllium	<DL	Total Mercury (µg/L)	0.07
Dissolved Calcium	91.4	Atrazine (µg/L)	<DL
Dissolved Cadmium	<DL	Alachlor (µg/L)	<DL
Dissolved Cobalt	<DL	Metolachlor (µg/L)	<DL
Dissolved Chromium	<DL	Cyanazine (µg/L)	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

Baetris masoni. Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*, *C. kendeighi*. Insecta: Diptera: Stratiomyidae: unidentified spp. Trichoptera: Hydropsychidae: *Hydropsyche betteni*. Lepidostomatidae: *Lepidostoma libum*. **Reference:** Kammerer (1984), Lewis and Bowman (1981). **Summary:** Visited 14 May 1975 (L. M. Page & R. A. Evers): aquatic macroinvertebrates were collected for identification. Visited 16 October 1996. This spring and the surrounding park have been present since the 1880's (Kammerer 1984) and reportedly draws its name from local legend that the last wildcat in the area was killed there. Visited 13 June 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Seven taxa of aquatic macroinvertebrates were collected, including *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in June (1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Unnamed Spring south of Warsaw: Hancock County: 5.5 miles south of Warsaw. **Summary:** Visited 16 October 1996: this spring emanates from a combination galvanized and PVC pipe (8 cm diameter) embedded into a hillside; only a small discharge was evident, which flowed 2 m east into a small hillside creek.

Unnamed Spring in Warsaw: Hancock County: in Warsaw. **Summary:** Visited 16 October 1996: this spring is located on an east-facing hillside three blocks north of the center of Warsaw. The original spring has been silted in by hillside erosion and all that remains is a seep. There are several seeps nearby which flow into a small impoundment. Flow from this impoundment is moderate, but none of the seeps has sufficient flow to form a distinct springbrook.

Clary Spring: Jersey County: 6.5 km SSE Nutwood. **Summary:** Visited 19 September 1995: this springhead is enclosed in a concrete springhouse and utilized by the landowner for drinking water.

Dunham Spring: Jersey County: 7.2 km NNE Fieldon. This spring resurges from a bedding plane in Lower Valmeyeran limestone of Mississippian age. The springhead is 30 cm wide and 3 cm high; water flows into a circular pool (3 m diameter, 20 cm deep) with a bottom substrate comprised of silt overlying bedrock limestone. From the pool, water flows under an old road through a culvert (30 cm diameter) and into a springbrook (1.5 m wide, 5 cm deep, 20 m long) before it enters Boyer Creek. The bottom substrate is comprised of 60% gravel, 30% sand, and 10% silt. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae:

Gammarus minus, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. **Springbrook Fauna:** Annelida: Oligochaeta: Tubificidae: (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Tipulidae: *Pedicia* sp. Heteroptera: Gerridae: *Aquarius remigis*. **Summary:** Visited 20 September 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Six taxa of aquatic macroinvertebrates were collected. Samples for nitrate nitrogen and herbicides were collected in March (1996). Nitrate nitrogen was detected but below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Dunham Spring

Parameters *	9/20/95	3/12/96	Parameters *	3/14/96
Water Temperature (°C)	13.5		Dissolved Copper	
Dissolved Oxygen	7.2		Dissolved Iron	
pH	9.06?		Dissolved Potassium	
Turbidity (NTU)			Dissolved Lanthanum	
Specific Conductivity	644.6		Dissolved Lithium	
Inorganic Dissolved C			Dissolved Magnesium	
Dissolved Organic C			Dissolved Manganese	
Total Dissolved C			Dissolved Molybdenum	
Sulfate Sulfur			Dissolved Sodium	
Ammonia Nitrogen			Dissolved Nickel	
Nitrite Nitrogen			Dissolved Lead	
Nitrate Nitrogen		0.99	Dissolved Antimony	
Total Phosphorus			Dissolved Scandium	
Hardness (EDTA)			Dissolved Selenium	
Chlorides			Dissolved Silicon	
Total Dissolved Solids			Dissolved Strontium	
Total Alkalinity			Dissolved Titanium	
Dissolved Aluminum			Dissolved Thallium	
Dissolved Arsenic			Dissolved Vanadium	
Dissolved Boron			Dissolved Zinc	
Dissolved Barium			Dissolved Zirconium	
Dissolved Beryllium			Total Mercury (µg/L)	
Dissolved Calcium			Atrazine (µg/L)	<DL
Dissolved Cadmium			Alachlor (µg/L)	<DL
Dissolved Cobalt			Metolachlor (µg/L)	<DL
Dissolved Chromium			Cyanazine (µg/L)	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

Elsah Spring: Jersey County: in Fountain Square Park, Elsah. **Summary:** Visited 21 April 1995: very little discharge observed. Visited 12 October 1995: this small spring resurges from a limestone hillside along a small tributary of the Mississippi River that flows through the town of Elsah. The springhead has been enclosed in a concrete basin; very little discharge was observed. Visited 11 June 1996: very little discharge observed.

Twin Springs: Jersey County: 9.4 km WNW Grafton, along western edge of Pere Marquette State Park. This spring has two small springheads flowing from a bedding plane in Lower Valmeyeran limestone of Mississippian age. The springs are situated at the bottom of a west-facing, young second growth wooded slope, dominated by box elder. Discharge from the main springhead flows from a narrow opening (35 cm wide, 3 cm high) into a small pool (65 cm wide, 15 cm deep); the bottom substrate of this pool is comprised of large cobble overlying gravel. From this pool, water flows through a small cobble dam into a springbrook (50 cm wide, 3 cm deep). The springbrook flows southwest for 12 m, then under Illinois Route 100 through a culvert (50 cm diameter) before its confluence with the Illinois River. The bottom substrate of this springbrook is comprised of 20% cobble, 60% gravel, and 20% sand. Spring discharge on 19 September 1995 was determined to be 1.8 L/sec. The second springhead had only a small discharge and was not sampled. **Springhead Fauna:** Platyhelminthes: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Haplotaxidae: *Haplotaxis* cf. *gordioides*. Lumbriculidae: (unidentified sp.). Enchytraeidae (unidentified sp.). Tubificidae: *Limnodrilus hoffmeisteri*, *Varichaetadrilus angustipennis*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Diptera: Chironomidae: unidentified spp. Mollusca: Gastropoda: Pleuroceridae: *Elimia* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Candona* sp., unidentified (possibly new) species. Diptera: Chaoboridae: *Chaoborus punctipennis*. Chironomidae: unidentified spp. Culicidae: *Anopheles* sp. Mollusca: Gastropoda: Physidae: *Physella* sp. Planorbidae: *Helisoma* sp. Pleuroceridae: *Elimia* sp. **Flora:** The dominant tree was *Acer negundo*. Other trees included *Fraxinus pennsylvanica*, *Juglans nigra*, *Platanus occidentalis* and *Ulmus americana*. The shrubs were *Cephalanthus occidentalis* and *Ilex decidua*. The only vines present were *Smilax hispida* and *Vitis* sp. The dominant herbs were *Elymus virginicus*, *Poa sylvestris*, and *Ranunculus abortivus*. Other herbs included *Bidens* sp., *Boehmeria cylindrica*, *Carex grisea*, *Carex stipata*, *Cryptotaenia canadensis*, *Laportea canadensis*, *Sanicula canadensis*, *Saururus cernuus*, *Scirpus fluviatilis*, and *Scutellaria lateriflora*. Floral abundance, cover, and importance values are given in Appendix 2. **Reference:** Peck and Lewis (1978). **Summary:** Visited 19 September 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Visited 11 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27 June 1996: A floral census was conducted in and around spring. Seventeen taxa of aquatic macroinvertebrates were collected at this spring, including *Lepidostoma libum*, a rare caddisfly in Illinois, a possibly new species of Ostracoda, and *Varichaetadrilus*

angustipennis, a rare oligochaete in Illinois. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Twin Springs

Parameters *	9/19/95	3/12/96	6/11/96	Parameters *	3/12/96	6/11/96
Water Temperature (°C)	11.5		14	Dissolved Copper		0.22
Dissolved Oxygen	8.7		7.5	Dissolved Iron		<DL
pH				Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	958.3		942	Dissolved Lithium		<DL
Inorganic Dissolved C			87.6	Dissolved Magnesium		72.8
Dissolved Organic C			48.4	Dissolved Manganese		<DL
Total Dissolved C			136	Dissolved Molybdenum		<DL
Sulfate Sulfur			93.2	Dissolved Sodium		7.7
Ammonia Nitrogen			48.4	Dissolved Nickel		<DL
Nitrite Nitrogen			0.14	Dissolved Lead		<DL
Nitrate Nitrogen		<DL	1.11	Dissolved Antimony		<DL
Total Phosphorus			0.04	Dissolved Scandium		<DL
Hardness (EDTA)			562	Dissolved Selenium		<DL
Chlorides			6.38	Dissolved Silicon		8.85
Total Dissolved Solids			640	Dissolved Strontium		0.17
Total Alkalinity			465	Dissolved Titanium		<DL
Dissolved Aluminum			0.03	Dissolved Thallium		<DL
Dissolved Arsenic			<.1	Dissolved Vanadium		<DL
Dissolved Boron			0.11	Dissolved Zinc		0.2
Dissolved Barium			0.06	Dissolved Zirconium		
Dissolved Beryllium			<.001	Total Mercury (µg/L)		<DL
Dissolved Calcium			105	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium			<.01	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<.01	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium			<.01	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

Unnamed Spring #19: Jersey County. **Summary:** Visited 19 September 1995: unable to locate spring along Boyer Creek.

Ice Spring: Jo Daviess County: 5.7 km NE Galena. This spring resurges from a bedding plane in Galena-Platteville dolomite of Ordovician age. The springhead is situated on a north-facing, second growth upland wooded slope, dominated by black ash and american elm. Water flows from an shallow opening (1 m wide, 3 cm high) over bedrock limestone, then drops 3 m to the base of the slope, and flows north for 5 m before entering the East Fork of the Galena River. Near the base of the springhead, a section of roofing-gutter has been placed to divert water to a watering trough for horses or cattle. **Springhead:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Nematoda: (unidentified). Annelida: Oligochaeta: Lumbriculidae:

Lumbriculidae sp. C. Naididae: *Allonais paraguayensis*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. **Flora:** The dominant trees were *Fraxinus nigra* and *Ulmus americana*. Other trees observed included *Acer negundo* and *Acer saccharum*. The dominant shrub was *Ribes missouriense*. The only other shrub observed was *Staphylea trifolia*. Vines were not observed within the project area. The dominant herbs were *Poa pratensis*, *Cystopteris bulbifera*, *Impatiens capensis*, and *Solidago flexicaulis*. Other herbs observed were *Arisaema triphyllum*, *Asarum canadense*, *Aster ontarionis*, *Brassica* sp., *Campanula americana*, *Circaea lutetiana*, *Epilobium* sp., *Eupatorium rugosum*, *Galium triflorum*, *Geum canadense*, *Glechoma hederacea*, *Glyceria striata*, *Hydrophyllum virginianum*, *Myosodon aquaticum*, *Phalaris arundinacea*, *Ranunculus septentrionalis*, *Rudbeckia laciniata*, *Rumex crispus*, *Scutellaria lateriflora*, *Solanum dulcamara*, *Thalictrum dasycarpum*, and *Urtica dioica*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 4 April 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 12 June 1997: water samples were collected for analysis.

Ice Spring

Parameters *	4/4/97	6/12/97	Parameters *	4/4/97	6/12/97
Water Temperature (°C)	10.5	9.9	Dissolved Copper	0.06	<DL
Dissolved Oxygen	14.1	10.8	Dissolved Iron	<DL	2.18
pH		7.76	Dissolved Potassium	<DL	<DL
Total Alkalinity	346	344	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	681.5	706.4	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	175	74.9	Dissolved Magnesium	48.5	44.1
Dissolved Organic C	16.9	22.3	Dissolved Manganese	<DL	0.03
Total Dissolved C	91.8	97.2	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	48.6	49	Dissolved Sodium	3.99	3.8
Ammonia Nitrogen	0.02	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	1.69	1.68	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.01	0.03	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	413	384	Dissolved Selenium	<DL	<DL
Chlorides	2.59	3.52	Dissolved Silicon	7.43	7.05
Total Dissolved Solids	444	380	Dissolved Strontium	0.07	0.08
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.1	0.06
Dissolved Barium	0.06	0.1	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium	85.5	79.4	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Visited 29 July 1997: A floral census was conducted in and around spring. Ten taxa of aquatic macroinvertebrates were collected in this spring, including *Allonais paraguayensis*, a rare oligochaete, and *Lepidostoma libum*, a rare caddisfly in Illinois. Nitrate nitrogen and herbicides were sampled for in April and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Bell Spring: Johnson County: 1.6 km E. Grantsburg. This spring resurges from a bedding plane in upper Chesterian limestone of Mississippian age. The springhead is located at the base of a north-facing, young, second growth, dry mesic upland forest dominated by red and sugar maple at the south edge of Grantsburg swamp. Water flows from a narrow opening (50 cm wide, 3 cm high) into a short narrow springbrook (15 cm wide, 2 cm deep) with a bottom substrate comprised of 60% gravel, 30% sand, and 10% silt. The springbrook extends for 4 m, then flows into Grantsburg swamp. Flow was not measured because of the shallow nature of the springbrook.

Springhead Fauna: Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata gracilis*. Annelida: Oligochaeta: Lumbriculidae: *Lumbriculus variegatus*, Lumbriculidae (unidentified sp.). Enchytraeidae (unidentified sp.). Naididae: *Nais communis*, *Nais* sp., *Pristina leidyi*. Tubificidae: *Limnodrilus hoffmeisteri*, *Limnodrilus* sp., *Quistadrilus multisetosus*, *Varichaetadrilus angustipenis*, *Tubifex tubifex*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Stygobromus subtilis*. Isopoda: Asellidae: *Caecidotea bicrenata*, *Caecidotea* n. sp. Insecta: Diptera: Chironomidae: unidentified spp. Heteroptera: Notonectidae: *Notonecta irrorata*. Mollusca: Gastropoda: Physidae: *Physella* sp. Planorbidae: *Helisoma* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant trees were *Acer rubrum* and *Acer saccharum*. Other trees observed included *Acer negundo*, *Morus rubra*, *Nyssa aquatic*, and *Taxodium distichum*. The dominant shrubs was *Itea virginica* and *Cephalanthus occidentalis*. The only other shrubs observed were *Cornus stricta* and *Lindera benzoin*. Vines were not observed within the project area. The dominant herbs were *Lemna minor*, *Ludwigia palustris*, *Rumex verticillatus*, *Polygonum hydropiperoides*, *Pilea pumila*, and *Boehmeria cylindrica*. Aquatic plants observed within the spring and its springbrook included *Azolla mexicana*, *Ceratophyllum dimersum*, and *Lemna minor*. Other herbs observed were *Bidens discoidea*, *Cuscuta* sp., *Cyperus erythrorhizos*, *Digitaria sanguinalis*, *Eclipta prostrata*, *Leersia lenticularis*, *Lycopus rubellus*, *Mimulus alatus*, *Peltandra virginica*, *Penthorum sedoides*, *Saururus cernuus*, *Scutellaria lateriflora*, and *Triadenum walteri*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 15 September 1992: aquatic macroinvertebrates were collected for identification. Visited 19 April 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Eighteen taxa of aquatic macroinvertebrates, including *Varichaetadrilus*

angustipennis, a rare oligochaete in Illinois, *Stygobromus subtilis*, a troglobitic amphipods, and a new species of aquatic Isopoda. Samples for nitrate nitrogen and herbicides were collected in April (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine was detected but below the EPAMCL. Metolachlor, Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Bell Spring

Parameters *	9/15/92	4/19/97	Parameters *	4/19/97
Water Temperature (°C)	12.6	13	Dissolved Copper	<DL
Dissolved Oxygen	2.6	3.7	Dissolved Iron	<DL
pH	6.9		Dissolved Potassium	4
Total Alkalinity	74	143	Dissolved Lanthanum	<DL
Specific Conductivity	517.9	428.2	Dissolved Lithium	<DL
Inorganic Dissolved C		32.3	Dissolved Magnesium	11.5
Dissolved Organic C		7.2	Dissolved Manganese	<DL
Total Dissolved C		39.5	Dissolved Molybdenum	<DL
Sulfate Sulfur		50.7	Dissolved Sodium	12.5
Ammonia Nitrogen		<DL	Dissolved Nickel	<DL
Nitrite Nitrogen		<DL	Dissolved Lead	<DL
Nitrate Nitrogen		1.73	Dissolved Antimony	<DL
Total Phosphorus		0.03	Dissolved Scandium	<DL
Hardness (EDTA)		195	Dissolved Selenium	<DL
Chlorides		18.3	Dissolved Silicon	6.6
Total Dissolved Solids		240	Dissolved Strontium	0.19
Turbidity (NTU)			Dissolved Thallium	<DL
Dissolved Aluminum		<DL	Dissolved Titanium	<DL
Dissolved Arsenic		<DL	Dissolved Vanadium	<DL
Dissolved Boron		<DL	Dissolved Zinc	0.01
Dissolved Barium		0.08	Dissolved Zirconium	
Dissolved Beryllium		<DL	Total Mercury (µg/L)	<DL
Dissolved Calcium		59	Atrazine (µg/L)	0.05
Dissolved Cadmium		<DL	Alachlor (µg/L)	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL
Dissolved Chromium		0.01	Cyanazine (µg/L)	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Jug Spring: Johnson County: 8.3 km NNW Vienna (center). This spring resurges from a moderate-sized opening in Upper Chesterian limestone of Mississippian age. The springhead is located on a west-facing, second growth, young to mature, mesic upland forest dominated by red and sugar maple, yellow chestnut, red oak, and sycamore. Water flows from a moderate-sized opening along a bedrock trough which is dammed with a cement plug. A PVC pipe (10 cm diameter) through the cement plug allows water to fall into a broad pool and then into a springbrook (1 m wide, 3 cm deep) with a bottom substrate comprised of 40% large cobble, 40% gravel, and 20% sand, before entering a small tributary of Dutchman Creek. There was the appearance of soap foam on the surface of the water as it emanated from the limestone bedding plane. Spring discharge on 18 April 1997 was determined to be 6.8 L/sec. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae:

Caecidotea brevicauda. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Planariidae: *Phagocata gracilis*. Annelida: Oligochaeta: Lumbriculidae (unidentified sp.). Naididae: *Nais communis*. Crustacea: Cambaridae: *Cambarus diogenes*, *C. tenebrosus*. Insecta: Diptera: Chironomidae: unidentified spp. Tipulidae: *Pilaria* sp. Trichoptera: Uenoidae: *Neophylax concinnus*. Vertebrata: Pisces: *Cottus carolinae*. **Flora:** The dominant trees were *Acer negundo*, *Acer saccharum*, *Quercus muhlenbergii*, *Platanus occidentalis*, and *Quercus rubra*. Other trees observed included *Asimina triloba*, *Carpinus caroliniana*, *Carya cordiformis*, *Carya tomentosa*, *Fraxinus americana*, *Liriodendron tulipifera*, *Prunus serotina*, and *Quercus americana*. The dominant shrub was *Lindera benzoin*. The only other shrubs observed were *Hydrangea arborescens* and *Staphylea trifolia*. The dominant vines were *Parthenocissus quinquefolia* and *Toxicodendron radicans*. The only other vine observed was *Smilax hispida*. The dominant herbs were *Festuca obtusa*, *Polystichum acrostichoides*, *Leersia virginica*, *Verbesina alternifolia*, and *Pilea pumila*. Other herbs included *Amphicarpa bracteata*, *Arabis laevigata*, *Arundinaria gigantea*, *Asarum canadense*, *Aster lanceolatus*, *Aster lateriflorus*, *Boehmeria cylindrica*, *Carex blanda*, *Carex frankii*, *Carex grisea*, *Carex radiata*, *Cinna arundinacea*, *Cryptotaenia canadensis*, *Cystopteris* sp., *Dicentra canadensis*, *Elymus villosus*, *Elymus virginicus*, *Eupatorium rugosum*,

Jug Spring

Parameters *	4/18/97	6/14/97	Parameters *	4/18/97	6/14/97
Water Temperature (°C)	11.3	13	Dissolved Copper	<DL	<DL
Dissolved Oxygen	11.9	9.9	Dissolved Iron	<DL	<DL
pH			Dissolved Potassium	<DL	<DL
Total Alkalinity	96.1	89.2	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	216.4	186.5	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	23	17.8	Dissolved Magnesium	4.59	4.52
Dissolved Organic C	4.7	16.1	Dissolved Manganese	<DL	<DL
Total Dissolved C	27.6	33.8	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	18.3	14.4	Dissolved Sodium	5.7	2.5
Ammonia Nitrogen	<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	0.08	0.06	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.01	0.03	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	120	91	Dissolved Selenium	<DL	<DL
Chlorides	1.52	1.16	Dissolved Silicon	7.25	6.2
Total Dissolved Solids	320	116	Dissolved Strontium	0.11	0.07
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.03	<DL
Dissolved Barium	0.04	0.03	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium	40.3	28.9	Atrazine (µg/L)	0.25	<DL
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

Galium aparine, *Galium triflorum*, *Geranium maculatum*, *Geum canadense*, *Isopyrum biternatum*, *Laportea canadensis*, *Lobelia inflata*, *Lobelia siphilitica*, *Mimulus alatus*, *Osmorhiza longistylis*, *Phlox divaricata*, *Polemonium reptans*, *Polygonum cespitosum*, *Polygonum punctatum*, *Polygonum virginianum*, *Ranunculus recurvatus*, *Rudbeckia laciniata*, *Sanicula canadensis*, *Sanicula odorata*, *Scrophularia marilandica*, *Sicyos angulatus*, *Silphium perfoliatum*, *Solidago caesia*, *Solidago flexicaulis*, *Valeriana pauciflora*, *Verbena urticifolia*, *Viola eriocarpa*, and *Viola sororia*. Floral abundance, cover, and importance values are given in Appendix 2. **Reference:** Peck and Lewis (1978). **Summary:** Visited 18 April 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 14 June 1997: aquatic macroinvertebrates were collected for identification water samples were collected for analysis. Ten taxa of aquatic macroinvertebrates were collected in this spring. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels were below the background level. Atrazine was detected in April, but below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Ferne Clyffe Spring #2: Johnson County: Ferne Clyffe State Park. **Fauna:** Platyhelminthes: Tricladida: Planariidae: *Phagocata gracilis*. **Summary:** Visited 18 April 1997: this small ephemeral seep spring, located at the base of a sandstone cliff, derives most of its water from surface runoff.

Ferne Clyffe Spring #3: Johnson County: Ferne Clyffe State Park. **Summary:** Visited 18 April 1997: this small ephemeral seep spring, located at the base of a sandstone cliff, derives most of its water from surface runoff.

Ferne Clyffe Spring #4 [#103]: Johnson County: Ferne Clyffe State Park. **Water Quality:** (15 September 1992) Water temperature 12.9^o C, specific conductivity 181 μ mhos, pH 6.2, alkalinity 74 mg/L CaCO₃. **Summary:** Visited 19 April 1997: This seep spring is formed at the base of a sandstone cliff from surface runoff from the sandstone cliffs, then flows north down the hillside where it enters a man-made reservoir. The bottom substrate of this seep spring at its outflow is sand and gravel.

Mason Spring: Johnson County: 0.8 km WSW Joppa Junction. **Summary:** Visited 18 April 1997: this spring drains a karst area which includes woods, farmland, and rural homes. It originates at the base of a wooded hillside. A pumphouse (1.5 m long by 1.5 m wide) has been built over the spring.

Spring Complex, Trout Park [Elgin Botanical Garden, North Spring, Trout Spring, Rainbow Spring]: Kane County: in Elgin. In Trout Park, several springs and seeps resurge in Henry formation sand and gravel overlying the Wedron formation. The springhead of the North Spring (the largest spring in the Park) is located on a west-facing, second growth, mesic upland forested ravine dominated by box elder. It is positioned farthest up the ravine and is the most disturbed area observed within this park. The numerous small springs and seep areas located south southwest of North Spring support a variety of native taxa not observed within the immediate vicinity of North Spring itself. Water boils up from a large springhead (3 m wide, 3 cm deep) then flows west in a springbrook (50 cm to 1 m wide, with a bottom substrate comprised of 70% gravel, 30% sand) before flowing into the Fox River. **Fauna:** [including that reported by Burks 1953; Evers and Page 1977; Frison 1942; Ross 1944, Vinikour and Anderson (1981, 1984)]: Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Dugesia dorotocephala*. Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Asellus intermedius*. Insecta: Coleoptera: Dryopidae: *Helichus fastigiatus*. Dytiscidae: *Agabus* sp., *Copelatus glyphicus*. Elmidae: *Optioservus fastiditus*. Eubriidae: *Ectopria leechi* (?). Hydrophilidae: *Anacaena limbata*, *Cymbiodyta* sp., *Hydrobius tumidus* (?). Diptera: Chironomidae: *Corynoneura* sp., *Cricotopus* sp., *Eukiefferiella* sp. *Orthocladius* sp., *Parametriocnemus* sp., *Rheocricotopus* sp., *Polypedilum* sp., *Micropsectra* sp. Dixidae: *Dixa* sp. Simuliidae: *Simulium venustum*. Stratiomyidae: *Euparyphus* sp. Tipulidae: *Dicranota* sp., *Limonia* sp., *Tipula abdominalis*. Ephemeroptera: Ametropodidae: *Siphloplecton* sp. Baetidae: *Baetis tricaudatus*, *Cloeon* sp., *Pseudocloeon* sp. Caenidae: *Caenis hilaris* (?). Ephemerellidae: *Ephemerella* sp. Ephemeridae: *Ephemera* sp. Heptageniidae: *Epeorus* sp. Leptophlebiidae: *Paraleptophlebia moerens*, *P. praepedita*. Potamanthidae: *Anthopotamus myops*. Heteroptera: Gerridae: *Aquarius remigis*. Veliidae: *Microvelia americana*. Megaloptera: Sialidae: *Sialis* sp. Plecoptera: Leuctridae: *Leuctra tenuis*. Nemouridae: *Amphinemura delosa*, *Nemoura trispinosa*. Perlodidae: *Clioperla clio*. Trichoptera: Glossosomatidae: *Glossosoma intermedium*. Hydropsychidae: *Ceratopsyche bronta*, *C. slossonae*, *Cheumatopsyche analis*, *C. campyla*, *Diptetronea modesta*, *Hydropsyche betteni*, *H. bidens*, *H. orris*, *H. placoda*, *Macrostemum zebratum*, *Potamyia flava*. Hydroptilidae: *Hydroptila consimilis*. Lepidostomatidae: *Lepidostoma libum*. Leptoceridae: *Ceraclea cancellata*, *C. tarsipunctata*, *C. transversa*, *Oecetis cinerascens*, *Triaenodes tarda*. Limnephilidae: *Hesperophylax designatus*, *Limnephilus rhombicus*. Philopotamidae: *Wormaldia moestus*. Phryganeidae: *Ptilostomis semifasciata*. Polycentropodidae: *Cyrnellus fraternus*, *Nyctiophylax vestitus*, *Polycentropus cinereus*. Rhyacophilidae: *Rhyacophila vibox*. Uenoidae: *Neophylax concinnus*. Vertebrata: Pisces: Cottidae: *Cottus bairdi*. Cyprinidae: *Semotilus atromaculatus*. Gasterosteidae: *Culaea inconstans*. **Flora:** The dominant tree was *Acer negundo*. Other trees observed included

Fraxinus nigra, *Fraxinus pennsylvanica*, *Juglans nigra*, *Morus alba*, and *Tilia americana*. The dominant shrubs were *Frangula alnus* and *Lonicera morrowi*. Other shrubs observed were *Ribes missouriense*, *Rubus occidentalis*, and *Sambucus canadensis*. The dominant vine was *Vitis riparia*. The only other vine observed was *Parthenocissus quinquefolia*. The dominant herbs were *Impatiens capensis*, *Poa pratensis*, and *Solanum dulcamara*. Other herbs observed were *Agrimonia gryposepala*, *Alliaria petiolata*, *Arctium minus*, *Arisaema triphyllum*, *Aster lateriflorus*, *Eupatorium rugosum*, *Geum canadense*, *Glechoma hederacea*, *Lobelia siphilitica*, *Nasturtium officinale*, *Plantago rugelii*, *Polymnia canadensis*, *Rudbeckia laciniata*, *Rumex crispus*, *Scirpus atrovirens*, *Scrophularia marilandica*, and *Solidago uliginosa*. Floral abundance, cover, and importance values are given in Appendix 2. **Reference:** Burks (1953), Evers and Page (1997), Frison (1942), Paulson (1972), Ross (1944), Vinikour and Anderson (1981, 1984). **Summary:** Visited 6 April 1997: water samples were collected for analysis. Visited 19 June 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Seventy-three taxa of aquatic macroinvertebrates have been collected from this spring/seep complex. This spring has the greatest diversity of aquatic macroinvertebrates found in any spring habitat in Illinois. Prior to our study, seven caddisflies (*Glossosoma intermedium*,

Spring Complex, Trout Park

Parameters *	4/6/97	6/19/97	Parameters *	4/6/97	6/19/97
Water Temperature (°C)	9.4	13	Dissolved Copper	0.02	<DL
Dissolved Oxygen	12.2	9.6	Dissolved Iron	<DL	<DL
pH		8.22	Dissolved Potassium	4	<DL
Total Alkalinity	316	300	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	1527.1	1043	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	67.5	67	Dissolved Magnesium	54.7	36.9
Dissolved Organic C	15.9	24.5	Dissolved Manganese	<DL	<DL
Total Dissolved C	83.4	91.5	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	90.5	40.2	Dissolved Sodium	186	40.2
Ammonia Nitrogen	<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	1.67	7.6	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.01	0.03	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	485	336	Dissolved Selenium	<DL	<DL
Chlorides	284	107	Dissolved Silicon	7.48	5.58
Total Dissolved Solids	924	556	Dissolved Strontium	0.12	0.09
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	0.06	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.01	<DL
Dissolved Barium	0.07	0.07	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium	104	73.7	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

Dolophilus moestus, *Drusinus uniformis*, *Hesperophylax designatus*, *Limnephilus rhombicus*, *Molanna tryphena*, and *Rhyacophila vibox*) and one stonefly, *Nemoura trispinosa* were reported only from this locality in the state. Two other rare Illinois caddisflies *Diplectrona modesta* and *Lepidostoma libum* have also been collected from this spring/seep complex. Nitrate nitrogen and herbicide concentrations were samples for in April and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Silver Springs: Kendall County: 3.2 km SE Plano. This spring resurges from two gravel springheads in the Henry Formation which overlies Galena-Platteville limestone of Ordovician age. The springheads are located in a mature, second growth, mesic, upland forest, dominated by sugar maple, basswood and black ash. The surrounding forest is heavily grazed by deer, nearly eliminating the herbaceous flora. The two springs (2 m apart) discharge from two small openings below a footbridge; the discharge from each spring flows for 2 m to their confluence, then for 3 m into a shallow pool (9 m wide, 30 cm deep). The bottom substrate of the pool is comprised of 10% cobble, 50% gravel, 20% sand, and 20% silt; the pool is partially covered by large areas of water cress (*Nasturtium officinale*). From this pool, water flows north through a water cress (*Nasturtium officinale*) choked springbrook (30 cm wide, 10 cm deep); the gravel substrate of the springbrook is quickly covered over with silt before flowing into the Fox River. **Springhead Fauna:** Nematomorpha (unidentified sp.). Annelida: Oligochaeta: Lumbriculidae: (unidentified sp.). Enchytraeidae: (unidentified sp.). Naididae: *Nais elinguis*. Tubificidae: *Aulodrilus pluriset*a, *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Diptera: Chironomidae: unidentified spp. Heteroptera: Gerridae: *Aquarius remigis*. Mollusca: Gastropoda: Physidae: *Physella* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Dugesia dorotocephala*. Annelida: Oligochaeta: Naididae: *Nais elinguis*, *Nais variabilis*. Tubificidae: *Aulodrilus pluriset*a, *Limnodrilus hoffmeisteri*, *Tubifex tubifex*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Heteroptera: Corixidae: *Sigara* spp. Gerridae: *Aquarius remigis*. Veliidae: *Microvelia americana*, *M. fontinalis*. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant trees were *Acer saccharum*, *Tilia americana*, and *Fraxinus nigra*. Other trees observed included *Carya cordiformis*, *Celtis occidentalis*, *Fraxinus pennsylvanica*, *Quercus muhlenbergii*, *Tilia americana*, and *Ulmus americana*. The only shrubs observed were *Rhamnus cathartica*, *Ribes americana*, *Ribes missouriense*, and *Sambucus canadensis*. The only vines observed were *Toxicodendron radicans* and *Vitis riparia*. The

dominant herbs were *Leersia virginica*, *Pilea fontana*, *Impatiens capensis*, *Nasturtium officinale*, and *Lysimachia nummularia*. The only aquatic plants observed were *Nasturtium officinale* and *Spirodela poylrhiza*. Other herbs observed were *Agrimonia pubescens*, *Angelica atropurpurea*, *Aster lateriflorus*, *Bidens frondosa*, *Caltha palustris*, *Carex* sp., *Chelone obliqua*, *Cinna arundinacea*, *Circaea lutetiana*, *Elymus virginicus*, *Eupatorium maculatum*, *Eupatorium rugosum*, *Geum canadense*, *Glyceria striata*, *Hydrophyllum canadense*, *Laportea canadensis*, *Myosotis scorpioides*, *Phalaris arundinacea*, *Plantago rugelii*, *Polygonum virginianum*, *Ranunculus septentrionalis*, *Rumex obtusifolius*, *Saururus cernuus*, *Scutellaria lateriflora*, *Solanum dulcamara*, *Solidago canadensis*, *Symplocarpus foetidus*, *Taraxacum officinale*, and *Viola pranticola*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 6 April 1997: field water quality data collected. Visited 15 May 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 19 June 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Twenty taxa of aquatic macroinvertebrates were collected at this spring. Samples for nitrate nitrogen and herbicides were collected in May and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Silver Springs

Parameters *	4/6/97	5/15/97	6/19/97	Parameters *	5/15/97	6/19/97
Water Temperature (°C)	10.5	11.7	10.5	Dissolved Copper	0.02	<DL
Dissolved Oxygen	7.8	-	7.6	Dissolved Iron	<DL	<DL
pH			7.99	Dissolved Potassium	2	<DL
Total Alkalinity		348	333	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	1417.5	690.6	694.8	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C		80.2	77.1	Dissolved Magnesium	50.8	38
Dissolved Organic C		17.4	9.9	Dissolved Manganese	<DL	<DL
Total Dissolved C		97.6	87	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur		53.2	41.6	Dissolved Sodium	11.2	7.6
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen		1.46	1.48	Dissolved Antimony	<DL	<DL
Total Phosphorus		0.01	0.03	Dissolved Scandium	<DL	<DL
Hardness (EDTA)		464	325	Dissolved Selenium	<DL	<DL
Chlorides		10.3	13.6	Dissolved Silicon	7.29	5.96
Total Dissolved Solids		540	460	Dissolved Strontium	0.14	0.11
Turbidity (NTU)				Dissolved Thallium	<DL	<DL
Dissolved Aluminum		<DL	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron		<DL	<DL	Dissolved Zinc	0.01	0.01
Dissolved Barium		0.05	0.04	Dissolved Zirconium		
Dissolved Beryllium		<DL	<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium		102	67.4	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium		<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Illinois Canyon Spring: LaSalle County: 8 km SE Ottawa. **Summary:** Visited 14 May 1997: this spring is located at the bridge over the creek flowing down through Illinois Canyon. There is a small roadside park at the springhead, which has been built up with a 1 m square concrete box and a small pavilion. The springbrook flows 10 m through mowed grass to the creek. This spring is identified as "salt well" on the U. S. Geological Survey topographic quadrangle map for this area.

Brookfield Spring: LaSalle County: 3.2 km SE Marseilles. This spring resurges in an opening in Cahokia Alluvium of the Henry Formation which overlies Carbondale sandstone of Pennsylvanian age. The springhead is located near the base of a gentle sloping hayfield. Water immediately flows into retention pond (25 m long, 12 m wide) with a depth greater than 5 m. The spring overflows into a ditch along Gentleman Road and then through a culvert into a large high quality sedge meadow north of the road. **Springbrook Fauna:** Arthropoda: Insecta: Trichoptera: Limnephilidae: *Anobolia consocius*. **Flora:** The only tree observed was *Salix x rubens*. The dominant shrub was *Salix exigua*. Other shrubs observed were *Cornus sericea*, *Ptelea tirolia*, and *Rosa multiflora*. The only vine observed was *Toxicodendron radicans*. The dominant herbs were *Juncus nodosus*, *Phragmites australis*, *Lobelia siphilitica*, *Carex hystricina*, *Lycopus virginicus*, *Agrostis gigantea*, *Solidago riddellii*, and *Eleocharis verrucosa*. The only aquatic plants observed were *Chara vulgaris* (a macrophytic green alga), *Lemna minor*, and *Nasturtium officinale*. Other herbs observed were *Ambrosia artemisiifolia*, *Asclepias incarnata*, *Aster ericoides*, *Aster lanceolatus*, *Aster lateriflorus*, *Aster novae-angliae*, *Bidens cernua*, *Bidens coronata*, *Cyperus rivularis*, *Daucus carota*, *Epilobium* sp., *Equisetum arvense*, *Eupatorium maculatum*, *Eupatorium perfoliatum*, *Euthamia graminifolia*, *Festuca elatior*, *Impatiens capensis*, *Juncus dudleyi*, *Kummerowia stipulacea*, *Liparis loeselii*, *Melilotus alba*, *Pastinaca sativa*, *Scirpus atrovirens*, *Setaria glauca*, *Solidago canadensis*, *Sonchus arvensis*, *Taraxacum officinale*, *Teucrium canadense*, *Trifolium repens*, and *Verbena hastata*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 10 June 1997: water samples were collected for analysis. A limited collection for aquatic macroinvertebrates was taken at this spring. Samples for nitrate nitrogen and herbicides were collected in June (1997). Nitrate nitrogen levels were below the background level. Atrazine was detected but below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Brookfield Spring

Parameters *	6/10/97	Parameters *	6/10/97
Water Temperature (°C)	20.5	Dissolved Copper	<DL
Dissolved Oxygen	11.5	Dissolved Iron	<DL
pH	7.92	Dissolved Potassium	<DL
Total Alkalinity	289	Dissolved Lanthanum	<DL
Specific Conductivity	611	Dissolved Lithium	<DL
Inorganic Dissolved C	64.5	Dissolved Magnesium	45.3
Dissolved Organic C	16.4	Dissolved Manganese	<DL
Total Dissolved C	81	Dissolved Molybdenum	<DL
Sulfate Sulfur	97.8	Dissolved Sodium	15.5
Ammonia Nitrogen	<DL	Dissolved Nickel	<DL
Nitrite Nitrogen	<DL	Dissolved Lead	<DL
Nitrate Nitrogen	0.1	Dissolved Antimony	<DL
Total Phosphorus	0.03	Dissolved Scandium	<DL
Hardness (EDTA)	369	Dissolved Selenium	<DL
Chlorides	4.79	Dissolved Silicon	4.73
Total Dissolved Solids	416	Dissolved Strontium	0.22
Turbidity (NTU)		Dissolved Thallium	<DL
Dissolved Aluminum	<DL	Dissolved Titanium	<DL
Dissolved Arsenic	<DL	Dissolved Vanadium	<DL
Dissolved Boron	0.14	Dissolved Zinc	0.02
Dissolved Barium	0.05	Dissolved Zirconium	
Dissolved Beryllium	<DL	Total Mercury (µg/L)	<DL
Dissolved Calcium	72.8	Atrazine (µg/L)	0.08
Dissolved Cadmium	<DL	Alachlor (µg/L)	<DL
Dissolved Cobalt	<DL	Metolachlor (µg/L)	<DL
Dissolved Chromium	<DL	Cyanazine (µg/L)	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Halfway House Spring: LaSalle County: 8 km WSW Ottawa. This spring resurges from an opening in Cahokia Alluvium of the Henry Formation which overlies Carbondale sandstone of Pennsylvanian age. The springhead is located in row crops near an unoccupied rural home. The springhead is a small seep area (3 m diameter) surrounded by cattails (*Typha* sp.). Water meanders slowly from the springhead south into the Illinois River. The bottom substrate is comprised of 40% gravel and 60% silt. A thin oily film was seen floating on the surface of the water at the springhead. **Springhead Fauna:** Annelida: Oligochaeta: Tubificidae: *Ilyodrilus templetoni*, *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Crangonyx richmondensis*. Gammaridae: *Gammarus fasciatus*. Isopoda: Asellidae: *Caecidotea intermedia*. Diptera: Chironomidae: unidentified spp. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Summary:** Visited 14 May 1997: aquatic macroinvertebrates were collected for identification and field water quality parameters were measured. Eight taxa of aquatic macroinvertebrates were collected.

Hunting Preserve Spring: LaSalle County: 9.7 km W Ottawa. **Summary:** Visited 14 May 1997: this is a small seep-like spring with very little flow. An old barrel is sunk into the

ground at the springhead, but was full of wet debris rather than fresh water. It is located near row crops in a hunting preserve, with some cattails and trees adjacent to the springhead.

Spring E of Horseshoe Canyon: LaSalle County: 6.4 km SW Ottawa. **Summary:** Visited 14 May 1997: the bluff and floodplain at this location were thoroughly searched but no spring was found. A marshy area located at the base of the bluff may be the historic location of this spring, as noted on an old 15' U. S. Geological Survey topographic quadrangle map.

St. Joseph Mineral Springs: LaSalle County: 8 km NE Ottawa. **Summary:** Visited 15 May 1997: this spring was not flowing, but was marked by a small muddy pool underneath a rock outcrop (0.3 m high, 1 m wide). This site is located next to St. Joseph Health Resort (not operational now) and had been built up as an outdoor spa. All that remains of the resort are 4 m high stone walls, concrete stairs, channels, and a pumphouse. When flowing, the spring would discharge immediately (15 m) into the Fox River.

Two Springs SW Ottawa: LaSalle County: 2.4 km SW Ottawa. **Summary:** Visited 14 May 1997: there were several seeps in this area, but no springs observed.

Mill Spring: Lee County: 4 km WNW Franklin Grove. This spring resurges from two openings in a bedding plane and minor fracture in New Richmond sandstone of Ordovician age. The springheads are located at the base of a north-facing, mature, second growth, wet mesic, upland forest dominated by sugar maple, white oak, and hop hornbeam. The west side of the springbrook is heavily disturbed with a picnic table, a wheelchair-accessible walkway, and a planted lawn. A heavily used path crosses over the spring source. The south opening is 1 m wide and 10-15 cm high; the west opening is 25-40 cm wide and 12 cm high. Water flows from these two openings into a short springbrook (2-5 m wide, 2-4 cm deep) over a bottom substrate comprised of 20% cobble, 60% gravel, and 20% sand for 10 m before emptying into Franklin Creek. Spring discharge on 10 April 1993 was determined to be 12 L/sec; on 6 April 1997 the spring discharge was determined to be 17.4 L/sec. **Springhead Fauna:** Arthropoda: Crustacea: Isopoda: Asellidae: *Caecidotea intermedia*, *C. kendeighi*. **Springbrook Fauna:** Nematoda (unidentified sp.). Annelida: Oligochaeta: Enchytraeidae (unidentified sp.). Naididae: *Nais communis*. Tubificidae: (immature spp.). Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Baetrus mucronatus*. Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*, *C. kendeighi*. Insecta: Coleoptera: Elmidae: *Dubiraphia vittata*, *Optioservus* sp. (immature), *Stenelmis crenata*. Psephenidae: *Psephenus herricki*. Diptera: Chironomidae: unidentified spp. Tipulidae: *Pedicia* sp. Ephemeroptera: Heptageniidae: *Stenacron interpunctatum*.

Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Uenoidae: *Neophylax concinnus*. Mollusca: Gastropoda: Physidae: *Physella* sp. Planorbidae: *Helisoma* sp. **Flora:** The dominant trees were *Acer saccharum*, *Quercus alba*, and *Ostrya virginiana*. Other trees observed were *Acer negundo*, *Platanus occidentalis*, *Tilia americana*, and *Ulmus rubra*. The only shrubs observed were *Cornus alternifolia* and *Sambucus canadensis*. Vines were not observed within the project area. The dominant herbs were *Nasturtium officinale*, *Pilea* sp., and *Poa pratensis*. The only aquatic plant observed was *Nasturtium officinale*. Other herbs observed were *Agrostis gigantea*, *Aster lateriflorus*, *Cryptotaenia canadensis*, *Festuca elatior*, *Geum canadense*, *Glechoma hederacea*, *Glyceria striata*, *Juncus tenuis*, *Mentha arvensis*, *Plantago rugelii*, *Polygonum persicaria*, *Prunella vulgaris*, *Ranunculus recurvatus*, *Scutellaria lateriflora*, *Stellaria media*, *Taraxacum officinale*, and *Trifolium repens*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 10 April 1993 (P. C. Reed & P. Orozco): water samples were collected for analysis. Visited 18 October 1996. Visited 6 April 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 12 June 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for

Mill Spring

Parameters *	4/10/93	4/6/97	6/12/97	Parameters *	4/10/93	4/6/97	6/12/97
Water Temperature (°C)		10.8	10.5	Dissolved Copper		0.02	<DL
Dissolved Oxygen		6	11.6	Dissolved Iron	<DL	<DL	<DL
pH	7.6		8.07	Dissolved Potassium	<DL	<DL	<DL
Total Alkalinity	280	288	289	Dissolved Lanthanum		<DL	<DL
Specific Conductivity		608.9	543.8	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		64.4	64	Dissolved Magnesium	37.30	41.6	32.4
Dissolved Organic C		13.4	12.4	Dissolved Manganese	<DL	<DL	<DL
Total Dissolved C		77.8	76.3	Dissolved Molybdenum	<DL	<DL	<DL
Sulfate Sulfur	43.1	43.9	45	Dissolved Sodium	5.60	6.2	5.2
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel	<DL	<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	16.6	4.28	4.4	Dissolved Antimony	<DL	<DL	<DL
Total Phosphorus		0.01	0.03	Dissolved Scandium		<DL	<DL
Hardness (EDTA)	347	388	292	Dissolved Selenium	<DL	<DL	<DL
Chlorides	9.90	9.16	10.4	Dissolved Silicon	7.94	8.27	6.45
Total Dissolved Solids	334	416	432	Dissolved Strontium		0.1	0.08
Turbidity (NTU)	<1			Dissolved Thallium		<DL	<DL
Dissolved Aluminum	<DL	<DL	<DL	Dissolved Titanium		<DL	<DL
Dissolved Arsenic	<DL	<DL	<DL	Dissolved Vanadium	<DL	<DL	<DL
Dissolved Boron	<DL	<DL	<DL	Dissolved Zinc	<DL	0.02	0.01
Dissolved Barium	0.03	0.03	<DL	Dissolved Zirconium			
Dissolved Beryllium	<DL	<DL	<DL	Total Mercury (µg/L)	<DL	<DL	<DL
Dissolved Calcium	77.4	86.7	63.5	Atrazine (µg/L)		0.09	0.08
Dissolved Cadmium	<DL	<DL	<DL	Alachlor (µg/L)		<DL	<DL
Dissolved Cobalt	<DL	<DL	<DL	Metolachlor (µg/L)		<DL	<DL
Dissolved Chromium	0.01	<DL	<DL	Cyanazine (µg/L)		<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

analysis. Twenty taxa of aquatic macroinvertebrates were collected at this spring, including *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen were collected in April (1993), and April and June (1997). Nitrate nitrogen levels were 1.6 times greater than the EPAMCL in April (1993) and above the background level but below the EPAMCL in April and June (1997). Samples for herbicides were collected in April and June (1997). Atrazine was detected in April and June but below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Gold Spring: Logan County, 3.1 km SE Union. **Summary:** this spring is named for the gold flakes that were reportedly found in nearby Sugar Creek about 1880 (Stringer 1911). Visited 5 November 1996: during 1996: the spring was capped with a cement and brick spring house (3 m long, 3 m wide); five PVC pipes (3 cm diameter) were embedded into the hillside. These pipes now divert spring discharge into the cistern formed by the springhouse so that water can be bottled for commercial sale (R. Bellrose, personal communication).

Boiling Springs: Macon County, 6 km NW Decatur (center). **Reference:** Palmer (1909). **Summary:** Visited 5 November 1996: no evidence of a spring was observed at this location, although a narrow, dry channel extends 3 m into Stephens Creek. Historically, this was the site of a small community in the mid 1800's (Benton 1976).

Casner Spring [#82]: Macon County, 0.6 km W Casner. **Summary:** Visited 5 November 1996: a broad circular pool is present at this site although there was no discharge up through the gravel substrate of the pool. Measurable discharge may occur during periods of heavy rain.

Rock Spring: Macon County, 7.5 km SW Decatur (center). **Reference:** Benton (1976). **Summary:** Visited 15 October 1996: this spring is situated on a low bluff alongside the Sangamon River. Historically (Banton 1976) this spring was most likely used by Indians and early settlers. In 1915, a two-story concrete building for bottling water was built over the spring. Today, the spring has only a small amount of discharge, although remains of the concrete building are still present.

Unnamed Spring west of Decatur: Macon County, 3.2 km SSW Harristown (center). **Summary:** Visited 21 April 1992 (P. C. Reed): at that time, the spring existed as a dry seepage area in a slight depression (0.6 m by 3 m) with a defined springbrook flowing to Field Creek. Visited 15 October 1996: this spring remains as a dry seepage area although a measurable spring discharge may be evident during periods of heavy rain.

Diamond Mineral Spring: Madison County, in Grantfork. **Summary:** Visited 30 April 1997: the spring was beside the currently active Diamond Mineral Springs Restaurant, owned by Brad Michael. Located in a disturbed wooded area in town, the spring was reported to have ceased flowing about 80 years ago. No obvious springhead was found, though there were old pipes with valves that were likely part of the historically active spa and resort.

Indian Spring [#88]: McLean County, 2.8 km WNW Saybrook (center). **Summary:** Visited 5 November 1996: this is a small seep spring on a north-facing slope of a low hill. A tile (0.3 m diameter) has been buried into the springhead and is capped with a cement block. The discharge from this spring was too low to measure.

Meyers Spring [Unnamed Spring #105]: Ogle County: 4 km E Oregon. This spring resurges from a small opening in Peorian Loess and Roxana silt which overlies Galena-Platteville dolomite of Ordovician age. The springhead is located at the base of a steep slope with a few scattered trees dominated by white oak. Water discharges from an opening 1.3 m wide into a springbrook (1.6 m wide, 10 cm deep) then flows 13 m before emptying into a small lake. The bottom substrate of the springbrook is comprised of 60% gravel and 40% sand. Flow was not measured because of the shallow nature of the springbrook. This spring is submerged when lake levels rise. **Springhead Fauna:** Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Insecta: Diptera: Chironomidae: unidentified spp. Ephemeroptera: Baetidae: *Baetis brunneicolor*. Heptageniidae: *Stenacron interpunctatum*. **Flora:** The dominant tree was *Quercus alba*. Other trees observed were *Carya ovata*, *Celtis occidentalis*, *Prunus virginiana*, *Quercus macrocarpa*, *Robinia pseudoacacia*, and *Ulmus rubra*. The dominant shrubs were *Ribes missouriense* and *Zanthoxylum americanum*. Other shrubs observed were *Cornus racemosa*, *Rubus occidentalis*, and *Sambucus canadensis*. The only vines observed were *Toxicodendron radicans* and *Vitis riparia*. The dominant herb was *Impatiens capensis*. The only aquatic plant observed was *Lemna minor*. Other herbs observed were *Agrostis gigantea*, *Alliaria petiolata*, *Anemone virginiana*, *Aster ontarionis*, *Carex cristatella*, *Carex* sp., *Cryptotaenia canadensis*, *Desmodium glutinosum*, *Elymus villosus*, *Elymus virginicus*, *Eupatorium rugosum*, *Festuca elatior*, *Geranium maculatum*, *Geum canadense*, *Glechoma hederacea*, *Leersia virginica*, *Lobelia siphilitica*, *Osmorhiza longistylis*, *Phryma leptostachya*, *Plantago rugelii*, *Poa pratensis*, *Polygonatum biflorum*, *Rumex crispus*, *Scutellaria lateriflora*, *Silene stellata*, *Solidago ulmifolia*, *Taraxacum officinale*, and *Viola pranticola*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 21 May 1997: aquatic macroinvertebrates were collected for identification. Visited 10 June 1997: water samples were collected for analysis. Five taxa of aquatic macroinvertebrates were

Meyers Spring

Parameters *	5/21/97	6/10/97	Parameters *	6/10/97
Water Temperature (°C)	9	9	Dissolved Copper	0.01
Dissolved Oxygen	8.75	6	Dissolved Iron	>DL
pH		7.56	Dissolved Potassium	>DL
Total Alkalinity		380	Dissolved Lanthanum	>DL
Specific Conductivity	791.8	777.7	Dissolved Lithium	>DL
Inorganic Dissolved C		84.1	Dissolved Magnesium	50
Dissolved Organic C		5.8	Dissolved Manganese	>DL
Total Dissolved C		89.9	Dissolved Molybdenum	>DL
Sulfate Sulfur		27.8	Dissolved Sodium	7.9
Ammonia Nitrogen		>DL	Dissolved Nickel	>DL
Nitrite Nitrogen		>DL	Dissolved Lead	>DL
Nitrate Nitrogen		2.4	Dissolved Antimony	>DL
Total Phosphorus		0.04	Dissolved Scandium	>DL
Hardness (EDTA)		429	Dissolved Selenium	>DL
Chlorides		15.6	Dissolved Silicon	8.33
Total Dissolved Solids		396	Dissolved Strontium	>DL
Turbidity (NTU)			Dissolved Thallium	0.07
Dissolved Aluminum		0.04	Dissolved Titanium	>DL
Dissolved Arsenic		>DL	Dissolved Vanadium	>DL
Dissolved Boron		>DL	Dissolved Zinc	0.03
Dissolved Barium		0.06	Total Mercury (µg/L)	>DL
Dissolved Beryllium		>DL	Atrazine (µg/L)	<DL
Dissolved Calcium		89.2	Alachlor (µg/L)	<DL
Dissolved Cadmium		>DL	Metolachlor (µg/L)	<DL
Dissolved Cobalt		>DL	Cyanazine (µg/L)	<DL
Dissolved Chromium		0.01		

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

collected. Samples for nitrate nitrogen and herbicides were collected in June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Wishing Spring [Unnamed Spring #106]: Ogle County: White Pines Forest State Park, 11.3 km W Oregon. This spring is located in a mowed grass field, 10 m from the road, and is marked with a brown wooden sign (that reads Wishing Spring), as is the adjacent "wetland restoration project". The spring is capped with a concrete culvert (1 m diameter) with a 9 cm overflow pipe. Water boils up through Cahokia Alluvium which overlies Galena-Platteville dolomite of Ordovician age, flowing into a short springbrook (5 m long, 0.5-1 m wide, 5-10 cm deep) with a bottom substrate comprised of 20% gravel and 80% silt. The springbrook is choked with water cress, *Nasturtium officinale*. Flow was not measured because of the shallow nature of the springbrook. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, *Tubifex tubifex*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Diptera: Chironomidae: unidentified spp. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp.

Springbrook Fauna: Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Nematoda (unidentified sp.). Annelida: Oligochaeta: Lumbriculidae sp. C. Enchytraeidae (unidentified sp.). Tubificidae: *Ilyodrilus templetoni*, *Limnodrilus hoffmeisteri*, *Rhyacodrilus* cf. *montana*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Dytiscidae: *Agabus seriatus*. Diptera: Chironomidae: unidentified spp. Mollusca: Gastropoda: Physidae: *Physella* sp. **Summary:** Visited 20 May 1997: aquatic macroinvertebrates were collected for identification. Visited 10 June 1997: aquatic macroinvertebrates were collected for identification. Fourteen taxa of aquatic macroinvertebrates were collected, including *Rhyacodrilus* cf. *montana*, a rare oligochaete in Illinois.

Unnamed Spring #76: Ogle County: 16.1 km NE Dixon. **Summary:** Visited 21 May 1997: no single spring was observed here, but two seeps were found in the given location. The area adjacent to these seeps is primarily row crops, with some small woodlots.

Unnamed Spring #104: Ogle County: 1.6 km E Oregon. **Summary:** Attempted visit 20 May 1997: historic location in this wooded valley was identified by two neighbors and the landowner, but it is possible that trash and fill dumping by the landowner has covered the spring. Permission to visit was denied.

Unnamed Spring #77: Piatt County: 4 km SW Monticello. **Summary:** Visited 29 May 1997: this spring is being used as a goldfish pond in front of a residence; a seep was found 0.4 km NW of this locality that drains into this pond.

Allerton Spring [#107]: Piatt County: 6.4 km SW Monticello. This spring boils up through Wedron formation sand and silt overlain by Richland Loess. The springhead is located in an open prairie reconstruction area. Water boils up into a small springhead (60 cm diameter, 30 cm deep) with a bottom substrate comprised of 70% sand and 30% silt. From the springhead, water flows into a narrow springbrook (20 cm wide, 10 cm deep) for a distance of 2.6 m before emptying into a small tributary of the Sangamon River. Flow was not measured because of the shallow nature of the springbrook. **Springhead Fauna:** Annelida: Oligochaeta: Naididae: *Pristina leidy*. Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Crangonyx minor*. Decapoda: Cambaridae: *Procambarus gracilis*. Isopoda: Asellidae: *Caecidotea intermedia*. Diptera: Ceratopogonidae. Chironomidae: unidentified spp. Ephemeroptera: Leptophlebiidae: *Paraleptophlebia praepedita*. **Springbrook Fauna:** Crustacea: Amphipoda: Crangonyctidae: *Crangonyx minor*. Isopoda: Asellidae: *Caecidotea intermedia*. Diptera: Chironomidae:

unidentified spp. **Flora:** The dominant trees were *Salix nigra*, *Ulmus rubra*, and *Acer saccharinum*. Other trees included *Crataegus crusgalli* and *Crataegus punctata*. None of the trees were nearly as abundant as the herbaceous flora. The dominant shrub was *Rosa setigera*. The only other shrubs were *Ceanothus americanus*, *Ligustrum vulgare*, and *Ribes missouriense*. The dominant vine was *Toxicodendron radicans*. Other vines observed were *Parthenocissus quinquefolia*, *Smilax hispida*, and *Vitis cinerea*. The dominant herbs were *Scirpus pendulus*, *Solidago canadensis*, *Eleocharis verrucosa*, and *Apocynum cannabinum*. Other herbs observed were *Achillea millefolium*, *Agrostis gigantea*, *Andropogon gerardii*, *Asclepias syriaca*, *Asclepias verticillata*, *Aster lanceolatus*, *Aster lateriflorus*, *Boehmeria cylindrica*, *Carex annectens*, *Cerastium vulgatum*, *Cirsium discolor*, *Cuscuta* sp., *Daucus carota*, *Desmodium* sp., *Dicentra armeria*, *Elymus virginicus*, *Epilobium coloratum*, *Eupatorium altissimum*, *Eupatorium serotinum*, *Galium triflorum*, *Geum laciniatum*, *Glyceria striata*, *Hypericum sphaerocarpum*, *Juncus canadensis*, *Juncus dudleyi*, *Lespedeza virginica*, *Lycopus* sp., *Melilotus alba*, *Pastinaca sativa*, *Phleum pratense*, *Poa compressa*, *Poa pratensis*, *Prunella vulgaris*, *Pycnanthemum pilosum*, *Silphium laciniatum*, *Solidago juncea*, *Sorghastrum nutans*, and *Vernonia missurica*. Floral abundance, cover, and importance values are given in Appendix 2.

Allerton Spring

Parameters *	5/29/97	6/10.97	Parameters *	6/10/97
Water Temperature (°C)	11.2	13	Dissolved Copper	<DL
Dissolved Oxygen	6.85	6.3	Dissolved Iron	<DL
pH		7.57	Dissolved Potassium	<DL
Total Alkalinity		202	Dissolved Lanthanum	<DL
Specific Conductivity	28.8	379.4	Dissolved Lithium	<DL
Inorganic Dissolved C		44.1	Dissolved Magnesium	22
Dissolved Organic C		16.7	Dissolved Manganese	<DL
Total Dissolved C		60.8	Dissolved Molybdenum	<DL
Sulfate Sulfur		14.7	Dissolved Sodium	3.3
Ammonia Nitrogen		<DL	Dissolved Nickel	<DL
Nitrite Nitrogen		<DL	Dissolved Lead	<DL
Nitrate Nitrogen		0.07	Dissolved Antimony	<DL
Total Phosphorus		0.06	Dissolved Scandium	<DL
Hardness (EDTA)		208	Dissolved Selenium	<DL
Chlorides		0.99	Dissolved Silicon	6.2
Total Dissolved Solids		344	Dissolved Strontium	0.08
Turbidity (NTU)			Dissolved Thallium	<DL
Dissolved Aluminum		0.06	Dissolved Titanium	<DL
Dissolved Arsenic		<DL	Dissolved Vanadium	<DL
Dissolved Boron		0.05	Dissolved Zinc	0.09
Dissolved Barium		0.05	Dissolved Zirconium	-
Dissolved Beryllium		<DL	Total Mercury (µg/L)	0.06
Dissolved Calcium		46.9	Atrazine (µg/L)	<DL
Dissolved Cadmium		<DL	Alachlor (µg/L)	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L. values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Summary: Visited 29 May 1997: aquatic macroinvertebrates were collected for identification. Visited 10 June 1997: water samples were collected for analysis. Visited 21 July 1997: A floral census was conducted in and around spring. Seven taxa of aquatic macroinvertebrates were collected in this spring. Samples for nitrate nitrogen and herbicides were collected in June (1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Akers Spring [Hill Creek Spring]: Pike County: 3.1 km WNW Pearl. This spring resurges from a bedding plane of Lower Valmeyeran limestone of Mississippian age. The springhead is located at the base of an east-facing wooded slope. It has been heavily degraded by cattle which utilized the spring for watering. The water flows east from a collapsed opening into a springbrook channel (2 m long, 2.5 m wide, 3-5 cm deep) with a bottom substrate of limestone cobble over gravel with some sand, then into a shallow pool (3 m long, 3-3.5 m wide, 2-4 cm deep) with a bottom substrate comprised of sand and silt. From there water flows into a narrow springbrook (0.75 m wide, 2-4 cm deep) with a bottom substrate comprised of 20% small gravel and 80% silt. The springbrook then flows southeast under a driveway into Hill Creek, then east into the Illinois River. Flow was not measured because of the shallow nature of the springbrook.

Springhead Fauna: Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Uenoidae: *Neophylax concinnus*. Mollusca: Gastropoda: Pleuroceridae: *Elimia* sp. Vertebrata: Amphibia: Caudata: Plethodontidae: *Eurycea longicauda*. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypis pallida*. Insecta: Diptera: Chironomidae: unidentified spp. Tabanidae: *Tabanus* sp. Heteroptera: Gerridae: *Aquarius remigis*. Veliidae: *Microvelia americana*. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp.

Summary: Visited 12 March 1996: water samples were collected for analysis. Visited 13 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Fourteen taxa of aquatic macroinvertebrates were collected in this spring, including *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level. Atrazine was detected in June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Akers Spring [Hill Creek #30]

Parameters *	3/12/96	6/13/96	Parameters *	3/12/96	6/13/96
Water Temperature (°C)		12	Dissolved Copper		0.07
Dissolved Oxygen		8	Dissolved Iron		<DL
pH			Dissolved Potassium		<DL
Total Alkalinity			Dissolved Lanthanum		<DL
Specific Conductivity		579	Dissolved Lithium		<DL
Inorganic Dissolved C		47.9	Dissolved Magnesium		8.76
Dissolved Organic C		23.3	Dissolved Manganese		<DL
Total Dissolved C		71.1	Dissolved Molybdenum		<DL
Sulfate Sulfur		21.9	Dissolved Sodium		6.7
Ammonia Nitrogen		0.04	Dissolved Nickel		<DL
Nitrite Nitrogen		0.12	Dissolved Lead		<DL
Nitrate Nitrogen	0.62	1.01	Dissolved Antimony		<DL
Total Phosphorus		0.03	Dissolved Scandium		<DL
Hardness (EDTA)		274	Dissolved Selenium		<DL
Chlorides		2.82	Dissolved Silicon		8.73
Total Dissolved Solids		320	Dissolved Strontium		<DL
Turbidity (NTU)		244	Dissolved Thallium		<DL
Dissolved Aluminum		3	Dissolved Titanium		<DL
Dissolved Arsenic		<DL	Dissolved Vanadium		<DL
Dissolved Boron		<DL	Dissolved Zinc		0.06
Dissolved Barium		0.04	Dissolved Zirconium		
Dissolved Beryllium		<DL	Total Mercury (µg/L)		0.57
Dissolved Calcium		93.8	Atrazine (µg/L)	<DL	0.18
Dissolved Cadmium		<DL	Atachlor (µg/L)	<DL	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL	0.03
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

Allison Cemetery Spring: Pike County: 3.2 km SSW Nebo. **Summary:** Visited 12 October 1995: this spring has cease to flow, no evidence of this spring remains.

Anderson Spring: Pike County: 6.8 km ENE Griggsville. This spring resurges from a bedding plane of Lower Valmeyeran limestone of Mississippian age. The springhead, which boils up into a pond, is located on a east-facing open overgrazed pasture. The pond (4 m long, 3.5 m wide, 2.5 m deep) is dammed by a cemented limestone wall; the bottom substrate is comprised of 30% gravel and 70% silt. Water flows out of this pond for 6 m through a pipe (10 cm diameter), then empties into the springbrook. Spring discharge also seeps through the limestone wall. The springbrook (1 m wide, 10 cm deep) flows east-northeast into a channelized tributary of the Illinois River. The springbrook bottom substrate is comprised of 10% cobble, 30% gravel and 60% sand. Spring discharge on 14 June 1996 was determined to be 57.8 L/sec. **Springhead Fauna:** Platyhelminthes: Tricladida: Planariidae: *Phagocata velata*. Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, *Limnodrilus* sp., Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Candona sigmoides*, *Ilyocypris gibba*, *Potamocypris pallida*. Insecta: Coleoptera: Dytiscidae:

Agabus confusus. Hydrophilidae: *Tropisternus lateralis nimbatus*. Diptera: Tabanidae: *Tabanus* sp. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Oligochaeta: Tubificidae: *Limnodrilus cervix*, *L. hoffmeisteri*, *Limnodrilus* sp., Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Diptera: Chironomidae: unidentified spp. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** No trees were present. Only two shrubs (both infrequent) were present, *Cornus drummondii* and *Rosa multiflora*. Only one vine, *Parthenocissus quinquefolia*, was present. The dominant herbs were *Festuca pratensis*, *Echinochloa crusgalli*, *Artemisia annua*, and *Polygonum punctatum*. Other herbs included *Acalypha rhomboidea*, *Agrostis gigantea*, *Ambrosia artemisiifolia*, *Asclepias syriaca*, *Aster* sp., *Bidens cernua*, *Calystegia sepium*, *Conyza canadensis*, *Cyperus rivularis*, *Cyperus strigosus*, *Digitaria sanguinalis*, *Eleusine indica*, *Eragrostis cilianensis*, *Erigeron annuus*, *Eupatorium serotinum*, *Glyceria striata*, *Impatiens capensis*, *Juncus tenuis*, *Leersia oryzoides*, *Leonurus cardiaca*, *Lepidium virginicum*, *Oenothera biennis*, *Oxalis* sp., *Panicum philadelphicum*, *Phytolacca americana*, *Pilea pumila*, *Plantago rugelii*, *Polygonum lapathifolium*,

Anderson Spring

Parameters *	10/10/95	3/14/96	6/14/96	Parameters *	3/14/96	6/14/96
Water Temperature (°C)	13		13	Dissolved Copper		0.05
Dissolved Oxygen	5.2		8.1	Dissolved Iron		<DL
pH	7.4			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity			745.9	Dissolved Lithium		<DL
Inorganic Dissolved C			78.7	Dissolved Magnesium		24.6
Dissolved Organic C			30.3	Dissolved Manganese		0.01
Total Dissolved C			109	Dissolved Molybdenum		<DL
Sulfate Sulfur			39.8	Dissolved Sodium		3.9
Ammonia Nitrogen			0.02	Dissolved Nickel		<DL
Nitrite Nitrogen			0.12	Dissolved Lead		<DL
Nitrate Nitrogen		1.25	5.76	Dissolved Antimony		<DL
Total Phosphorus			0.06	Dissolved Scandium		<DL
Hardness (EDTA)			230	Dissolved Selenium		<DL
Chlorides			14.3	Dissolved Silicon		4.53
Total Dissolved Solids			572	Dissolved Strontium		0.07
Total Alkalinity			404	Dissolved Titanium		<DL
Dissolved Aluminum			0.02	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.06
Dissolved Barium			0.02	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		0.67
Dissolved Calcium			51.5	Atrazine (µg/L)	0.05	0.47
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	0.18
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Polygonum persicaria, *Potentilla norvegica*, *Rumex obtusifolius*, *Setaria faberi*, *Setaria glauca*, *Sida spinosa*, *Solanum carolinense*, *Solidago canadensis*, *Trifolium pratense*, *Trifolium repens*, *Verbascum thapsus*, *Verbena stricta*, and *Xanthium strumarium*. **Summary:** Visited 12 October 1995: aquatic macroinvertebrates were collected for identification. Visited 14 March 1996: water samples were collected for analysis. Visited 14 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Sixteen taxa of aquatic macroinvertebrates were collected. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level in March and above the background level but below the EPAMCL in June. Atrazine was detected in March (1996) and June (1997) but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Cecil Long Spring: Pike County: 2.9 km NW Martinsburg. This spring resurges from a bedding plane of Lower Valmeyeran limestone of Mississippian age. The springhead is located at the base of a young sparsely wooded hillside. Water resurges from an opening (1 m wide) filled with limestone cobble and gravel, then flows into a springbrook (1.5-2 m wide, 10 cm deep) with a bottom substrate comprised of 20% cobble, 40% gravel, 20% sand, and 20% silt. The springbrook flows along the base of this hillside for a brief distance and then into an open old field where it meanders to an unnamed tributary of Sixmile Creek. The open old field has a few sparse trees previously associated with a barn lot. The springbrook supports an abundance of water cress (*Nasturtium officinale*). Spring discharge on 21 August 1996 was determined to be 8.6 L/sec. **Springhead Fauna:** Annelida: Oligochaeta: Lumbriculidae: Lumbriculidae sp. A. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Chironomidae: unidentified spp. Dixidae: *Dixa* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Crustacea: Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypris pallida*. Insecta: Coleoptera: Dryopidae: *Helichus lithophilus*. Dytiscidae: *Ilybius* sp. (immature), *Laccophilus fasciatus*, *Neoporus/Heterosternuta* sp. (immature). Elmidae: *Stenelmis grossa*. Haliplidae: *Peltodytes edentulus*, *P. sexmaculatus*. Hydrophilidae: *Berosus fraternus*, *B. infuscatus*, *B. pantherinus*, *Dibolocelus ovatus*, *Enochrus pygmaeus nebulosus*, *Hydrochus rufipes*, Sphaeriidiinae: sphaeridine sp. (immature). Diptera: Ceratopogonidae: unidentified spp. Chaoboridae: *Chaoborus punctipennis*. Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Stratiomyidae: unidentified spp.

Tabanidae: *Tabanus* sp. Ephemeroptera: Heptageniidae: *Stenonema femoratum*. Heteroptera: Corixidae: *Corisella edulis*, *Sigara* sp. (immature), *Trichocorixa calva*, *T. kanza*. Trichoptera: *Cheumatopsyche pettiti*, *Potamyia flava*. Lepidostomatidae: *Lepidostoma libum*, *Oecetis inconspicua*. Philopotamidae: *Chimmara obscura*. Phryganeidae: *Phryganea sayi*. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant tree was *Ulmus americana* and *Juglans nigra*. Other trees included *Gleditsia triacanthos*, *Juniperus virginiana*, *Maclura pomifera*, *Platanus occidentalis*, *Prunus serotina*, *Salix nigra*, and *Sassafras albidum*. The dominant shrub was *Rosa multiflora*. Other shrubs observed included *Rubus occidentalis*, *Symphoricarpos orbiculatus*, and *Sambucus canadensis*. The dominant vine was *Parthenocissus quinquefolia*. Other vines observed included *Toxicodendron radicans* and *Vitis* sp. The dominant herbs were *Impatiens capensis*, *Acorus* sp., *Glyceria striata*, *Leersia virginica*, *Phalaris arundinacea*, and *Aster lateriflorus*. Other herbs included *Acalypha rhomboidea*, *Agrostis gigantea*, *Ambrosia trifida*, *Bidens tripartita*, *Bromus* sp., *Campanula americana*, *Carex annectens*, *Carex frankii*, *Carex* sp., *Cryptotaenia canadensis*, *Cyperus strigosus*, *Echinochloa crusgalli*, *Elymus vilosus*, *Eupatorium rugosum*, *Festuca obtusa*, *Festuca pratensis*, *Geum canadense*, *Leersia oryzoides*,

Cecil Long Spring

Parameters *	3/13/96	8/21/96	Parameters *	3/13/96	8/21/96
Water Temperature (°C)		13	Dissolved Copper		<DL
Dissolved Oxygen		7.9	Dissolved Iron		0.01
pH			Dissolved Potassium		2
Total Alkalinity		268	Dissolved Lanthanum		<DL
Specific Conductivity		784.4	Dissolved Lithium		<DL
Inorganic Dissolved C		39.5	Dissolved Magnesium		16.2
Dissolved Organic C		29.7	Dissolved Manganese		<DL
Total Dissolved C		69.2	Dissolved Molybdenum		<DL
Sulfate Sulfur		19	Dissolved Sodium		10.5
Ammonia Nitrogen		0.07	Dissolved Nickel		<DL
Nitrite Nitrogen		<DL	Dissolved Lead		<DL
Nitrate Nitrogen	<DL	2.43	Dissolved Antimony		<DL
Total Phosphorus		0.06	Dissolved Scandium		<DL
Hardness (EDTA)		261	Dissolved Selenium		<DL
Chlorides		10.4	Dissolved Silicon		6.93
Total Dissolved Solids		320	Dissolved Strontium		0.11
Turbidity (NTU)			Dissolved Titanium		<DL
Dissolved Aluminum		<DL	Dissolved Thallium		<DL
Dissolved Arsenic		<DL	Dissolved Vanadium		<DL
Dissolved Boron		<DL	Dissolved Zinc		0.01
Dissolved Barium		0.06	Dissolved Zirconium		<DL
Dissolved Beryllium		<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium		77.9	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium		<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Muhlenbergia frondosa, *Panicum dichotomiflorum*, *Pilea pumila*, *Poa compressa*, *Poa pratensis*, *Polygonum lapathifolium*, *Polygonum punctatum*, *Polygonum scandens*, *Prunella vulgaris*, *Rumex obtusifolius*, *Sanicula odorata*, *Scirpus atrovirens*, *Solanum carolinense*, *Solidago canadensis*, and *Verbena urticifolia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 13 March 1996: water samples were collected for analysis. Visited 21 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Thirty-nine taxa of aquatic macroinvertebrates were collected in this spring, including *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in March and August (1996). Nitrate nitrogen levels were below the background level in March and above the background level in August but below the EPAMCL. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Chambersburg Spring: Pike County: in Chambersburg. **Summary:** Visited 10 October 1995: this spring resurges from a limestone hillside, then immediately is diverted through a galvanized pipe (3 cm diameter) to a galvanized tank (2 m diameter, 0.5 m high) located one-half block north of Illinois Route 104 on the main north-south street in Chambersburg. The bottom of the tank is covered with gravel and fish are present in this tank. This water is utilized for drinking water by the local townspeople.

Dewey Spring #1: Pike County: 2.9 km SW Martinsburg. This spring resurges from a bedding plane in Lower Valmeyeran limestone of Mississippian age. The springhead is located on a wooded east-facing hillside dominated with some red oak, american elm, and basswood. Water resurges from an opening (40 cm wide, 30 cm high) with a bottom substrate of bedrock limestone; it extends for 0.5 m before emptying into a retention pond (3 m long, 2 m wide, 2 m deep). The pond overflows through a pipe (10 cm diameter), dropping onto the substrate of the springbrook (0.5-1 m wide, 5 cm deep). The bottom substrate of the springbrook is comprised of 15% cobble, 60% gravel, 15% sand, and 10% silt. The springbrook flows about 8 m away from the base of the wooded hillside and through an open old field before it enters a small pond. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Coleoptera: Hydrophilidae: *Cymbiodyta blanchardi*. **Springbrook Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Cypridopsis vidua*, *Potamocypris pallida*. Insecta: Coleoptera: Dryopidae: *Helichus lithophilus*. Dytiscidae: *Coptotomus loticus*. Haliplidae: *Peltodytes edentulus*. Hydrophilidae:

Berosus infuscatus, *B. pantherinus*, *Enochrus ochraceus*, *E. pygmaeus nebulosus*, *E. sayi*, *Hydrochara spangleri*, *Tropisternus mixtus*. Diptera: Chaoboridae: *Chaoborus punctipennis*. Dixidae: *Dixa* sp. Ephemeroptera: Caenidae: *Caenis latipennis*. Heptageniidae: *Stenacron interpunctatum*, *Stenonema femoratum*. Heteroptera: Corixidae: *Corisella edulis*, *Trichocorixa kanza*. Trichoptera: Glossosomatidae: *Agapetus illini*, *Glossosoma intermedium*. Hydropsychidae: *Ceratopsyche bronta*, *C. slossonae*, *Cheumatopsyche pettiti*, *Hydropsyche betteni*, *H. bidens*. Lepidostomatidae: *Lepidostoma libum*, *Oecetis inconspicua*. Philopotamidae: *Chimmara obscura*. Phryganeidae: *Phryganea sayi*. **Flora:** The dominant trees were *Juglans nigra*, *Acer saccharum*, and *Platanus occidentalis*. Other trees included *Tilia americana* and *Ulmus americana*. The dominant shrub was *Rosa multiflora*. Other shrubs observed were *Hydrangea arborescens*, *Rubus occidentalis*, and *Staphylea trifolia*. The dominant vines were *Menispermum canadense* and *Parthenocissus quinquefolia*. The other vine observed was *Vitis* sp. The dominant herbs were *Pilea pumila*, *Phalaris arundinacea*, *Leersia oryzoides*, *Agrostis gigantea*, and *Aster lateriflorus*. Other herbs included *Acalypha rhomboidea*, *Agrostis gigantea*, *Amphicarpa bracteata*, *Aster lanceolatus*, *Bidens tripartita*, *Carex* sp., *Cerastium nutans*, *Circaea lutetiana*,

Dewey Spring

Parameters *	3/13/96	8/21/96	Parameters *	3/13/96	8/21/96
Water Temperature (°C)		14	Dissolved Copper		<DL
Dissolved Oxygen		7.9	Dissolved Iron		<DL
pH			Dissolved Potassium		<DL
Total Alkalinity		337	Dissolved Lanthanum		<DL
Specific Conductivity		753.6	Dissolved Lithium		<DL
Inorganic Dissolved C		51.6	Dissolved Magnesium		18.8
Dissolved Organic C		36.4	Dissolved Manganese		<DL
Total Dissolved C		91	Dissolved Molybdenum		<DL
Sulfate Sulfur		16.5	Dissolved Sodium		10.2
Ammonia Nitrogen		<DL	Dissolved Nickel		<DL
Nitrite Nitrogen		<DL	Dissolved Lead		<DL
Nitrate Nitrogen	0.25	3.32	Dissolved Antimony		<DL
Total Phosphorus		0.04	Dissolved Scandium		<DL
Hardness (EDTA)		311	Dissolved Selenium		<DL
Chlorides		9.3	Dissolved Silicon		7.72
Total Dissolved Solids		364	Dissolved Strontium		0.09
Turbidity (NTU)			Dissolved Titanium		<DL
Dissolved Aluminum		<DL	Dissolved Thallium		<DL
Dissolved Arsenic		<DL	Dissolved Vanadium		<DL
Dissolved Boron		<DL	Dissolved Zinc		<DL
Dissolved Barium		0.04	Dissolved Zirconium		
Dissolved Beryllium		<DL	Total Mercury (µg/L)		<DL
Dissolved Calcium		93.7	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium		<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Cryptotaenia canadensis, *Cystopteris* sp., *Epilobium coloratum*, *Eupatorium rugosum*, *Festuca pratensis*, *Galium triflorum*, *Geum canadense*, *Glyceria striata*, *Impatiens capensis*, *Lactuca floridana*, *Leersia virginica*, *Lobelia siphilitica*, *Phryma leptostachya*, *Polygonum punctatum*, *Prunella vulgaris*, *Rumex crispus*, *Scirpus atrovirens*, *Scrophularia americana*, *Solidago canadensis*, and *Solidago flexicaulis*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 13 March 1996: water samples were collected for analysis. Visited 21 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Thirty-four taxa of aquatic macroinvertebrates were collected, including *Glossosoma intermedium* and *Lepidostoma libum*, two rare caddisflies in Illinois. *Agapetus illini*, a caddisfly known only from the Shawnee Hills in southern Illinois, was also collected. Samples for nitrate nitrogen and herbicides were collected in March and August (1996). Nitrate nitrogen levels were below the background level in March and above the background level but below the EPAMCL in August. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Dewey Spring #2: Pike County: 2.7 km SW Martinsburg. **Summary:** Visited 13 March 1996: this spring was covered with a springhouse (1.5 m by 1 m), only a small trickle of water was observed flowing from the spring.

Florence Spring: Pike County: 0.5 km S Florence. This spring boils up through sand of the Glasford formation of Peorian Loess and Roxana silt overlying Kinderhookian limestone of Mississippian age. The springhead is located on the east side of a county road in the floodplain of the Illinois River, 30 m from the base of a steep wood bluff. Water resurges in a springhead (250 cm long, 170 cm wide, 40 cm deep) with a bottom substrate comprised of sand and silt. Water then flows east through a narrow springbrook (1 m wide, 5 cm deep) for 40 m to the Illinois River. The springbrook has a bottom substrate comprised of silt and small amounts of organic debris along its margins. The vegetation near the spring has been altered by tree removal and mowing of the herbaceous vegetation. Spring discharge on 21 August 1996 was determined to be 9-11 L/sec. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Decapoda: *Cambarus diogenes*, *Orconectes immunis*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypis pallida*. Insecta: Coleoptera: Dytiscidae: *Neoporus clypealis*. Diptera: Tipulidae: unidentified spp. Heteroptera: Corixidae: *Sigara* spp. Gerridae: *Aquarius remigis*. Mollusca: Gastropoda: Pleuroceridae: *Elimia* sp. **Springbrook Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea*

brevicauda. Insecta: Diptera: Chironomidae: unidentified spp. Trichoptera: Hydropsychidae: *Hydropsyche orris*, *Potamyia flava*. **Flora:** Trees observed included *Acer saccharinum*, *Celtis occidentalis*, *Populus deltoides*, and *Ulmus americana*. All tree species were present in seedling stage except *Acer saccharinum*, which had a single tree of (82.8 cm dbh) near the springhead. Shrubs observed included *Salix* sp. and *Cephalanthus occidentalis*. The *Salix* was present along the Illinois River bank; the *Cephalanthus occidentalis* was present as a seedling along the springbrook. The only woody vine present was *Vitis riparia*. The dominant herbs were *Amaranthus rudis*, *Eragrostis hypnoides*, *Polygonum amphibium*, and *Bidens* sp. Other herbs present were *Acalypha rhomboidea*, *Ambrosia artemisiifolia*, *Artemisia annua*, *Aster lanceolatus*, *Carex* sp., *Chamaesyce nutans*, *Commelina diffusa*, *Cyperus erythrorhizos*, *Cyperus esculentus*, *Digitaria sanguinalis*, *Echinochloa crusgalli*, *Eclipta prostrata*, *Eragrostis capillaris*, *Lindernia dubia*, *Lippia lanceolata*, *Oxalis stricta*, *Panicum* sp., *Pilea pumila*, *Polygonum* sp., *Rumex altissima*, *Sicyos angulatus*, and *Xanthium strumarium*. **Summary:** Visited 10 October 1995: aquatic macroinvertebrates were collected for identification. Visited 15 March 1996: water samples were collected for analysis. Visited 21 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996:

Florence Spring

Parameters *	10/10/95	3/15/96	8/21/96	Parameters *	3/15/96	8/21/96
Water Temperature (°C)	13		13	Dissolved Copper		0.13
Dissolved Oxygen	8		8.2	Dissolved Iron		<DL
pH				Dissolved Potassium		2
Total Alkalinity			465	Dissolved Lanthanum		<DL
Specific Conductivity	835.9		694.4	Dissolved Lithium		<DL
Inorganic Dissolved C			74	Dissolved Magnesium		50.3
Dissolved Organic C			56	Dissolved Manganese		<DL
Total Dissolved C			130	Dissolved Molybdenum		<DL
Sulfate Sulfur			26.2	Dissolved Sodium		8
Ammonia Nitrogen			<DL	Dissolved Nickel		<DL
Nitrite Nitrogen			<DL	Dissolved Lead		<DL
Nitrate Nitrogen		1.37	4.27	Dissolved Antimony		<DL
Total Phosphorus			0.04	Dissolved Scandium		<DL
Hardness (EDTA)			469	Dissolved Selenium		<DL
Chlorides			14	Dissolved Silicon		8.05
Total Dissolved Solids			496	Dissolved Strontium		0.12
Turbidity (NTU)				Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.09
Dissolved Barium			0.05	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		<DL
Dissolved Calcium			105	Atrazine (µg/L)	0.27	0.58
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

A floral census was conducted in and around spring. Fourteen taxa of aquatic macroinvertebrates were collected. Samples for nitrate nitrogen and herbicides were collected in March and August (1996). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine was detected in March but below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Hollis Spring: Pike County: 2.4 km SE Nebo. This spring resurges from a bedding plane in Lower Valmeyeran limestone of Mississippian age. The springhead is located at the base of northeast-facing wooded slope. The springhead is collapsed; water flows over a bedrock cascade (0.8 m high, 1 m wide) into a broad springbrook (5 m long, 2 m wide, 0.5 cm deep) before it turns north and meanders across open pasture towards its confluence with Spring Creek. The bottom substrate of the springbrook is comprised of 30% cobble, 30% gravel, 15% sand, and 15% silt. Spring discharge on 12 June 1996 was determined to be 15.4 L/sec. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Chironomidae: unidentified spp. Mollusca: Gastropoda:

Hollis Spring [#23]

Parameters *	3/12/96	6/13/96	Parameters *	3/12/96	6/13/96
Water Temperature (°C)		12	Dissolved Copper		0.07
Dissolved Oxygen		10.4	Dissolved Iron		<DL
pH			Dissolved Potassium		<DL
Turbidity (NTU)			Dissolved Lanthanum		<DL
Specific Conductivity		592.2	Dissolved Lithium		<DL
Inorganic Dissolved C		37.2	Dissolved Magnesium		8.76
Dissolved Organic C		18.3	Dissolved Manganese		<DL
Total Dissolved C		55.5	Dissolved Molybdenum		<DL
Sulfate Sulfur		20.2	Dissolved Sodium		6.1
Ammonia Nitrogen		0.03	Dissolved Nickel		<DL
Nitrite Nitrogen		<DL	Dissolved Lead		<DL
Nitrate Nitrogen	0.01	0.8	Dissolved Antimony		<DL
Total Phosphorus		0.03	Dissolved Scandium		<DL
Hardness (EDTA)		199	Dissolved Selenium		<DL
Chlorides		2.94	Dissolved Silicon		7.17
Total Dissolved Solids		260	Dissolved Strontium		0.06
Total Alkalinity		201	Dissolved Titanium		<DL
Dissolved Aluminum		<DL	Dissolved Thallium		<DL
Dissolved Arsenic		<DL	Dissolved Vanadium		<.01
Dissolved Boron		<DL	Dissolved Zinc		0.05
Dissolved Barium		0.03	Dissolved Zirconium		
Dissolved Beryllium		<DL	Total Mercury (µg/L)		0.71
Dissolved Calcium		65.3	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium		<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL = Value not determined because concentration below detection limit of analysis equipment.

Planorbidae: *Helisoma* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: *Limnodrilus hoffmeisteri*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypris pallida*. Mollusca: Gastropoda: Physidae: *Physella* sp. **Summary:** Visited 12 March 1996: water samples were collected for analysis. Visited 13 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Eight taxa of aquatic macroinvertebrates were collected in this spring. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Jennings Spring: Pike County: 3.7 km NNE New Canton. This spring resurges from a bedding plane in Lower Valmeyeran limestone of Mississippian age. The springhead is located on a gentle wooded west-facing hillside dominated by wild black cherry, sycamore, and red oak. The spring opening has been enclosed with bricks and is now a small pool (35 cm deep) which overflows into a springbrook (1-1.2 m wide, 1-3 cm deep) with a bottom substrate comprised of bedrock, then flowing for 7 m before forming a shallow gravel pool (3.5 m wide, 1-5 cm deep). The springbrook then divides into two gravel substrate channels which flow southwest for 10 m through an open *Phalaris* sp. meadow, before forming an unnamed tributary of Kiser Creek. Spring discharge on 13 June 1996 was determined to be 10.1 L/sec. **Springhead Fauna:** Annelida: Oligochaeta: Enchytraeidae (unidentified sp.). Lumbriculidae: (unidentified sp.). Tubificidae: *Varichaetadrilus angustipenis*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Chironomidae: unidentified spp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Enchytraeidae (unidentified sp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypris pallida*. Insecta: Chironomidae: unidentified spp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Flora:** The dominant trees were *Prunus serotina*, *Platanus occidentalis*, and *Quercus rubra*. Other trees included *Acer negundo*, *Acer saccharinum*, *Carya tomentosa*, *Celtis occidentalis*, *Crataegus mollis*, *Juglans nigra*, *Robinia pseudoacacia*, and *Ulmus americana*. The dominant shrub was *Rosa multiflora*. The only other shrub present was *Rubus occidentalis*. The dominant vine was *Apios americana*. The only other vine observed was *Vitis* sp. The dominant herbs were *Phalaris arundinacea*, *Impatiens capensis*, *Elymus virginicus*, *Eupatorium rugosum*, and *Cryptotaenia canadensis*. Other herbs present were *Asplenium platyneuron*, *Aster drummondii*, *Aster lanceolatus*, *Aster lateriflorus*, *Campanula americana*, *Convolvulus arvensis*,

Galium sp., *Geum canadense*, *Glyceria striata*, *Lactuca floridana*, *Leersia virginica*, *Lobelia siphilitica*, *Osmorhiza* sp., *Oxalis* sp., *Phlox divaricata*, *Pilea pumila*, *Polygonum virginianum*, *Rumex obtusifolius*, *Scrophularia marilandica*, *Solidago canadensis*, *Stellaria media*, and *Woodsia obtusa*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 10 October 1995. Visited 15 March 1996: water samples were collected for analysis. Visited 13 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Ten taxa of aquatic macroinvertebrates were collected from this spring, including *Varichaetadrilus angustipennis*, a rare species of oligochaete in Illinois, and *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine was detected in March (1996) and June (1997) but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Jennings Spring

Parameters *	3/15/96	6/13/96	Parameters *	3/15/96	6/13/96
Water Temperature (°C)			Dissolved Copper		0.07
Dissolved Oxygen			Dissolved Iron		<DL
pH			Dissolved Potassium		<DL
Turbidity (NTU)			Dissolved Lanthanum		<DL
Specific Conductivity			Dissolved Lithium		<DL
Inorganic Dissolved C		41.2	Dissolved Magnesium		11.1
Dissolved Organic C		20.3	Dissolved Manganese		0.01
Total Dissolved C		61.5	Dissolved Molybdenum		<DL
Sulfate Sulfur		19.6	Dissolved Sodium		10.2
Ammonia Nitrogen		0.01	Dissolved Nickel		<DL
Nitrite Nitrogen		<DL	Dissolved Lead		<DL
Nitrate Nitrogen	2.02	6	Dissolved Antimony		<DL
Total Phosphorus		0.03	Dissolved Scandium		<DL
Hardness (EDTA)		264	Dissolved Selenium		<DL
Chlorides		17.2	Dissolved Silicon		8.7
Total Dissolved Solids		344	Dissolved Strontium		0.07
Total Alkalinity		207	Dissolved Titanium		<DL
Dissolved Aluminum		<DL	Dissolved Thallium		<DL
Dissolved Arsenic		<DL	Dissolved Vanadium		<DL
Dissolved Boron		<DL	Dissolved Zinc		0.05
Dissolved Barium		0.06	Dissolved Zirconium		
Dissolved Beryllium		<DL	Total Mercury (µg/L)		1.44
Dissolved Calcium		87.4	Atrazine (µg/L)	0.05	0.66
Dissolved Cadmium		<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL	0.1
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Perry Spring: Pike County. **Summary:** Visited 10 October 1995: three springs occurred here around 1900; all were utilized as mineral spas. At that time, two hotels had been built near these springs to accommodate guests; the hotels have since been demolished. All three springs are now capped. Water from one of these springs, is now covered by a gazebo.

Potter's Spring #1: Pike County: 6.1 km NW Barry. This spring resurges as a sand boil at the base of a north-facing wooded slope overlying Lower Valmeyeran limestone of Mississippian age. The woods are dominated by hop hornbeam, white oak, and river birch. It situated at the edge of a small tributary stream which flows along the base of this slope adjacent to an open fallow, ungrazed pasture; the springbrook then flows northwest to its confluence with Beebe Creek. The springhead is 2.5 m in diameter and 30 cm deep with a bottom substrate comprised of sand covered by a thin layer of silt and organic debris. Flow was not measured because the springhead was contiguous with a tributary of Beebe Creek. **Springhead Fauna:** Annelida: Oligochaeta. Lumbriculidae: Lumbriculidae sp. A. Naididae: *Dero digitata*. Tubificidae: *Limnodrilus claparedianus*, *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*, *C. packardi*. Insecta: Coleoptera: Dytiscidae: *Acilius mediatius*. Diptera: Chironomidae: unidentified spp. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Springbrook Fauna:** Annelida: Oligochaeta: Haplotaxidae: *Haplotaxis* cf. *gordioides*. **Flora:** The dominant trees were *Ostrya virginiana*, *Quercus alba*, and *Betula nigra*. Other trees included *Aesculus glabra*, *Carya ovata*, *Celtis occidentalis*, *Gleditsia triacanthos*, *Populus deltoides*, *Prunus serotina*, *Sassafras albidum*, and *Ulmus americana*. The dominant shrub was *Rosa multiflora*. Other shrubs observed were *Ribes missouriense*, *Rubus* sp., and *Symphoricarpos orbiculatus*. The dominant vines were *Toxicodendron radicans* and *Parthenocissus quinquefolia*. Other vines observed included *Smilax hispida* and *Vitis vulpina*. The dominant herbs were *Festuca pratensis*, *Impatiens capensis*, *Polygonum punctatum*, and *Commelina communis*. Other herbs present were *Abutilon theophrastii*, *Acalypha rhomboidea*, *Ambrosia artemisiifolia*, *Ambrosia trifida*, *Artemisia annua*, *Asplenium platyneuron*, *Aster anomalus*, *Aster lanceolatus*, *Aster lateriflorus*, *Aster ontarionis*, *Capsella bursa-pastoris*, *Cardamine pensylvanica*, *Carex* spp., *Cirsium* sp., *Conyza canadensis*, *Cryptotaenia canadensis*, *Echinochloa crusgalli*, *Eleusine indica*, *Elymus virginicus*, *Erigeron* sp., *Geum canadense*, *Glyceria striata*, *Gratiola neglecta*, *Ipomoea hederacea*, *Juncus tenuis*, *Leersia oryzoides*, *Leersia virginica*, *Lobelia inflata*, *Lobelia siphilitica*, *Melilotus* sp., *Mollugo verticillata*, *Muhlenbergia frondosa*, *Oxalis* sp., *Phytolacca americana*, *Pilea pumila*, *Poa compressa*, *Poa pratensis*, *Polygonum pensylvanicum*, *Polygonum punctatum*, *Ranunculus abortivus*, *Rorippa palustris*, *Rumex crispus*, *Rumex obtusifolius*, *Setaria faberi*, *Solanum ptycanthum*, *Solidago gigantea*, *Solidago ulmifolia*, *Stellaria media*, *Taraxacum officinale*,

Trifolium pratense, *Verbena urticifolia*, *Veronica peregrina*, and *Woodsia obtusa*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 14 March 1996: water samples were collected for analysis. Visited 22 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Visited 18 June 1997: water samples were collected for analysis. Twelve taxa of aquatic macroinvertebrates were collected. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level in March and above the background level but below the EPAMCL in June. Atrazine was detected in March (1996) and June (1997) but below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Potter Spring #1

Parameters *	3/14/96	8/23/96	6/18/97	Parameters *	3/14/96	8/23/96	6/18/97
Water Temperature (°C)		12	11	Dissolved Copper		<DL	<DL
Dissolved Oxygen		6.2	6.8	Dissolved Iron		<DL	<DL
pH			7.84	Dissolved Potassium		<DL	<DL
Total Alkalinity		205	264	Dissolved Lanthanum		<DL	<DL
Specific Conductivity		618.5	647	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		51.7	60.9	Dissolved Magnesium		13.6	11.3
Dissolved Organic C		37.9	10.5	Dissolved Manganese		<DL	<DL
Total Dissolved C		89.7	71.5	Dissolved Molybdenum		<DL	<DL
Sulfate Sulfur		14.8	16.6	Dissolved Sodium		13.8	10.5
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel		<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	0.06	5.62	6.1	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.04	0.06	Dissolved Scandium		<DL	<DL
Hardness (EDTA)		326	253	Dissolved Selenium		<DL	<DL
Chlorides		13.2	12.9	Dissolved Silicon		7.99	6.83
Total Dissolved Solids		396	332	Dissolved Strontium		0.11	0.09
Turbidity (NTU)				Dissolved Titanium		<DL	<DL
Dissolved Aluminum		<DL	<DL	Dissolved Thallium		<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium		<DL	<DL
Dissolved Boron		<DL	<DL	Dissolved Zinc		<DL	<DL
Dissolved Barium		0.1	0.06	Dissolved Zirconium			
Dissolved Beryllium		<DL	<DL	Total Mercury (µg/L)		<DL	<DL
Dissolved Calcium		113	82.6	Atrazine (µg/L)	0.03		0.27
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL		<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL		<DL
Dissolved Chromium		<DL	<DL	Cyanazine (µg/L)	<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Potter's Spring #2: Pike County: 6.1 km NW Barry. **Summary:** Visited 14 March 1996: water samples were collected for analysis. Visited 22 August 1996: this ephemeral spring was dry during this visit. Visited 18 June 1997: water samples were collected for analysis.

Potter Spring #2

Parameters *	3/14/96	6/18/97	Parameters *	3/14/96	6/18/97
Water Temperature (°C)		10.5	Dissolved Copper		<DL
Dissolved Oxygen		6.7	Dissolved Iron		<DL
pH		8.06	Dissolved Potassium		<DL
Total Alkalinity		259	Dissolved Lanthanum		<DL
Specific Conductivity		675.7	Dissolved Lithium		<DL
Inorganic Dissolved C		55.2	Dissolved Magnesium		12.8
Dissolved Organic C		16.5	Dissolved Manganese		<DL
Total Dissolved C		71.7	Dissolved Molybdenum		<DL
Sulfate Sulfur		17.5	Dissolved Sodium		11.6
Ammonia Nitrogen		<DL	Dissolved Nickel		<DL
Nitrite Nitrogen		<DL	Dissolved Lead		<DL
Nitrate Nitrogen	0.6	3.13	Dissolved Antimony		<DL
Total Phosphorus		0.05	Dissolved Scandium		<DL
Hardness (EDTA)		293	Dissolved Selenium		<DL
Chlorides		10.5	Dissolved Silicon		8.95
Total Dissolved Solids		292	Dissolved Strontium		0.1
Turbidity (NTU)			Dissolved Titanium		<DL
Dissolved Aluminum		<DL	Dissolved Thallium		<DL
Dissolved Arsenic		<DL	Dissolved Vanadium		<DL
Dissolved Boron		<DL	Dissolved Zinc		<DL
Dissolved Barium		0.06	Dissolved Zirconium		
Dissolved Beryllium		<DL	Total Mercury (µg/L)		<DL
Dissolved Calcium		96.3	Atrazine (µg/L)	0.38	0.63
Dissolved Cadmium		0.01	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Walch Spring: Pike County: 6.3 km NW Barry. This spring resurges from a bedding plane ledge of Lower Valmeyeran limestone of Mississippian age. The springhead is located near the base of an east northeast-facing sparsely wooded slope dominated by american elm. Discharge from the spring opening drops some 10 m over a cobblestone slope before forming a springbrook (0.75 m wide, 15 cm deep). The springbrook flows 12 m, then through a mowed lawn, into a small duck pond, then exits the pond before flowing towards its confluence with Beebe Creek. The bottom substrate of the springbrook is comprised of 20% cobble, 40% gravel, 20% sand, and 20% organic debris. Many of the trees along the base of the slope have been cleared; the vegetation along the springbrook had been sprayed with herbicide. Spring discharge on 23 August 1996 was determined to be 15.5 L/sec. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Ceratopogonidae: unidentified sp. Chironomidae: unidentified spp. Stratiomyidae: unidentified spp. Tipulidae: *Pilaria* sp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Flora:** The dominant tree was *Ulmus americana*. Other trees included *Celtis occidentalis*, *Morus alba*, *Quercus muhlenbergii*, *Quercus rubra*, and *Tilia*

americana. The dominant shrub was *Staphylea trifolia*. Other shrubs present were *Ribes missouriense*, *Rosa multiflora*, *Sambucus canadensis*, and *Symphoricarpos orbiculatus*. The dominant vine was *Parthenocissus quinquefolia*. Other vines observed were *Lonicera japonica*, *Smilax hispida*, and *Toxicodendron radicans*. The dominant herbs were *Pilea pumila* and *Elymus villosus*. Other herbs present included *Aquilegia canadensis*, *Arctium minus*, *Aster* sp., *Campanula americana*, *Carex* sp., *Chenopodium simplex*, *Cystopteris bulbifera*, *Elymus virginicus*, *Epilobium coloratum*, *Eupatorium rugosum*, *Festuca obtusa*, *Festuca pratensis*, *Galium* sp., *Geum canadense*, *Glyceria striata*, *Osmorhiza* sp., *Phryma leptostachya*, *Polygonum pennsylvanicum*, *Polygonum* sp., *Polygonum virginianum*, *Rumex crispus*, *Sanicula canadensis*, *Stellaria* sp., and *Trifolium repens*. The lichen *Dermatocarpon miniatum* is present on the vertical limestone rock face above the springhead. **Summary:** Visited 14 March 1996: adult chironomids were collected for identification and water samples were collected for analysis. Visited 22 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Visited 18 June 1997: water samples were collected for analysis. Eight taxa of aquatic macroinvertebrates were collected from this spring, including *Lepidostoma libum*, a rare caddisfly

Walch Spring

Parameters *	3/14/96	8/23/96	6/18/97	Parameters *	3/14/96	8/23/96	6/18/97
Water Temperature (°C)			12	Dissolved Copper		0.06	<DL
Dissolved Oxygen			9.1	Dissolved Iron		<DL	<DL
pH			8.02	Dissolved Potassium		<DL	<DL
Total Alkalinity		244	258	Dissolved Lanthanum		<DL	<DL
Specific Conductivity			717.2	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		49.2	57	Dissolved Magnesium		15.7	13.4
Dissolved Organic C		33.5	18.9	Dissolved Manganese		<DL	<DL
Total Dissolved C		83.1	75.9	Dissolved Molybdenum		<DL	<DL
Sulfate Sulfur		20.6	22.3	Dissolved Sodium		15.8	<DL
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel		<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	1.08	2.86	2.92	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.03	0.08	Dissolved Scandium		<DL	<DL
Hardness (EDTA)		325	253	Dissolved Selenium		<DL	<DL
Chlorides		24	27.4	Dissolved Silicon		7.72	6.98
Total Dissolved Solids		400	348	Dissolved Strontium		0.11	0.09
Turbidity (NTU)				Dissolved Titanium		<DL	<DL
Dissolved Aluminum		<DL	0.05	Dissolved Thallium		<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium		<DL	<DL
Dissolved Boron		<DL	<DL	Dissolved Zinc		0.06	<DL
Dissolved Barium		0.06	0.05	Dissolved Zirconium			
Dissolved Beryllium		<DL	<DL	Total Mercury (µg/L)		<DL	<DL
Dissolved Calcium		104	79.2	Atrazine (µg/L)	0.12		0.24
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL		<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL		<DL
Dissolved Chromium		<DL	0.01	Cyanazine (µg/L)	<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

in Illinois. Water samples for nitrate nitrogen were collected in March and August (1996) and in June (1997). Nitrate nitrogen levels were below the background level in March and above the background level but below the EPAMCL in June and August. Water samples for herbicides were collected in March (1996) and June (1997). Atrazine was detected in March (1996) and June (1997) but below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Weber Spring: Pike County: 2.3 km NW Barry. This spring originates from a capped cistern opening in the bedding plane of Lower Valmeyeran limestone of Mississippian age. It emanates about one-third of the way up a northeast-facing mesic second growth wooded slope dominated by sugar maple and hackberry. Water overflowing the cistern cascades for 10 m down a bedrock channel (4.5-5.5 m wide) into a cobble/gravel pool before flowing as a springbrook (2 m wide) along the base of the slope into a tributary of Hadley Creek. The bottom substrate of the springbrook is comprised of 70% gravel and 30% sand. The area opposite the slope along the springbrook is a mowed lawn under a very sparsely wooded area adjacent to small cottages that formerly were part of an old highway motel court. Spring discharge on 13 June 1996 was determined to be 34.0 L/sec. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Insecta: Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbriculidae: (unidentified sp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Ostracoda: *Potamocypris pallida*. Insecta: Diptera: Tipulidae: *Pedicia* sp. Heteroptera: Gerridae: *Gerris marginatus*. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. **Flora:** The dominant trees were *Acer saccharum* and *Celtis occidentalis*. Other trees present included *Acer negundo*, *Cornus florida*, *Liquidambar styraciflua*, *Platanus occidentalis*, and *Prunus serotina*. The dominant shrub was *Sambucus canadensis*. The only other shrub present was *Staphylea trifolia*. The dominant vine was *Parthenocissus quinquefolia*. Other vines observed included *Menispermum canadense*, *Smilax hispida*, *Toxicodendron radicans*, and *Vitis* sp. The dominant herbs were *Laportea canadensis*, *Cystopteris bulbifera*, *Eupatorium rugosum*, *Viola sororia*, *Galium triflorum*, *Pilea pumila*, and *Carex granularis*. Other herbs present included *Acalypha rhomboidea*, *Carex conjuncta*, *Cryptotaenia canadensis*, *Impatiens capensis*, *Oxalis* sp., *Phryma leptostachya*, *Plantago rugelii*, *Poa pratensis*, *Polygonum persicaria*, and *Stellaria media*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 15 May 1975: collections of crustaceans made by L. M. Page and R. A. Evers (INHS), including *Baetris bairdii*, *Baetris brachycaudus*, *Caecidotea packardi*, and *Gammarus minus*. Visited 12 June 1980: collections of aquatic macroinvertebrates were made by M. J. Wetzel (INHS), including *Baetris bairdii*, *Baetris brachycaudus*, *Caecidotea intermedia*, *Caecidotea packardi*, and *Gammarus*

minus. Visited 13 March 1996: water samples were collected for analysis. Visited 14 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Visited 14 June 1997: water samples were collected for analysis. Seven taxa of aquatic macroinvertebrates were collected in this spring, including *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were below the background level in March and above the background level but below the EPAMCL in June. Atrazine and Alachlor were detected in March (1996) and June (1997) but below the EPAMCL. Metolachlor was detected in March (1996) and June (1997) and Cvanazine in June but all were below the EPAHAL.

Weber Spring

Parameters *	3/14/96	6/14/96	Parameters *	3/14/96	6/14/96
Water Temperature (°C)		11.5	Dissolved Copper		0.03
Dissolved Oxygen		10.2	Dissolved Iron		<DL
pH			Dissolved Potassium		<DL
Turbidity (NTU)			Dissolved Lanthanum		<DL
Specific Conductivity		599	Dissolved Lithium		<DL
Inorganic Dissolved C		36.2	Dissolved Magnesium		11.8
Dissolved Organic C		20.3	Dissolved Manganese		0.01
Total Dissolved C		56.5	Dissolved Molybdenum		<DL
Sulfate Sulfur		38.2	Dissolved Sodium		23.4
Ammonia Nitrogen		0.03	Dissolved Nickel		<DL
Nitrite Nitrogen		<DL	Dissolved Lead		<DL
Nitrate Nitrogen	1.17	3.94	Dissolved Antimony		<DL
Total Phosphorus		0.06	Dissolved Scandium		<DL
Hardness (EDTA)		252	Dissolved Selenium		<DL
Chlorides		41.5	Dissolved Silicon		7.39
Total Dissolved Solids		392	Dissolved Strontium		0.15
Total Alkalinity		201	Dissolved Titanium		<DL
Dissolved Aluminum		0.05	Dissolved Thallium		<DL
Dissolved Arsenic		<DL	Dissolved Vanadium		<DL
Dissolved Boron		<DL	Dissolved Zinc		0.02
Dissolved Barium		0.07	Dissolved Zirconium		
Dissolved Beryllium		<DL	Total Mercury (µg/L)		1.4
Dissolved Calcium		81.3	Atrazine (µg/L)	0.13	1.4
Dissolved Cadmium		<DL	Alachlor (µg/L)	0.03	0.02
Dissolved Cobalt		<DL	Metolachlor (µg/L)	0.02	0.05
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL	0.45

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L. <DL= Value not determined because concentration below detection limit of analysis equipment.

Winegar Spring: Pike County: 4.75 km ENE Griggsville. This spring resurges as a sand boil pond at the base of a gentle east-facing slope overlying Lower Valmeyeran limestone of Mississippian age. The springhead pond is 4 m long and 13 m wide with a depth of 40 cm at its center; the bottom substrate is comprised of sand and silt. Embedded in the southwest corner of the pond is a culvert (1.25 m diameter) from which water is pumped to a residence on the top of the hillside. The overflow water from the pond flows under a county road through a culvert (0.75

m diameter) and forming the springbrook (3.5 m wide, 10 cm deep) with a bottom substrate of comprised of 60% gravel, 30% sand, and 10% silt/organic debris. On the north side of the springbrook is a hog lot and on the south side a large corn field. The springbrook flows east through the Illinois River floodplain to its confluence with the river. The area above the spring includes a mowed lawn and pasture. The area surrounding the springhead pond is mowed and open. The spring is owned and shared by two separate landowners, and is utilized for livestock and human water supplies. Spring discharge on 10 October 1995 was determined to be 15.3 L/sec. **Springhead Fauna:** Platyhelminthes: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbricidae (unidentifiable). Lumbriculidae: Lumbriculidae sp. D. Lumbriculidae sp. E. Enchytraeidae: Enchytraeidae (unidentifiable). Naididae: *Dero digitata*, *Nais communis*. Tubificidae: *Ilyodrilus templetoni*, *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Baetris ruficauda*. Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*, *C. intermedia*. Ostracoda: *Candona sigmoides*, *Ilyocypris gibba*, *Potamocypis pallida*. Insecta: Coleoptera: Dytiscidae: *Agabus semivittatus*, *Hydroporus niger*, *Ilybius biguttulus*, *Laccophilus fasciatus*, *L. maculosus*, *Neoporus clypealis*, *N. undulatus*. Haliplidae: *Peltodytes sexmaculatus*. Heteroceridae: heterocerid sp. 1. Hydroptilidae: *Berosus infuscatus*, *Helophorus lineatus*, *Tropisternus collaris*, *T. ellipticus*, *T. glaber*, *T. lateralis nimbatus*. Diptera: Chironomidae: unidentified spp. Heteroptera: Corixidae: *Sigara* spp. Veliidae: *Microvelia americana*, *M. hinei*. Megaloptera: *Chauliodes* sp. Mollusca: Gastropoda: Physidae: *Physella* sp. Planorbidae: *Helisoma* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Oligochaeta: Naididae: *Dero digitata*. Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Chironomidae: unidentified spp. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** Trees associated with this spring and its springbrook included *Celtis occidentalis*, *Fraxinus pennsylvanica*, *Platanus occidentalis*, and *Populus deltoides*. The *Platanus occidentalis* and *Fraxinus pennsylvanica* are present as small isolated trees; the largest *Platanus occidentalis* has a 18.9 cm dbh. The *Celtis occidentalis* were present as seedlings while the *Populus deltoides* were represented by a few saplings. The dominant shrub was *Cornus drummondii*. The only other shrub observed was *Rosa multiflora*. Vines observed included *Parthenocissus quinquefolia*, *Toxicodendron radicans*, and *Vitis* sp. The dominant herbs were *Festuca pratensis* and *Leersia oryzoides*. Other herbs present included *Acalypha rhomboidea*, *Agrostis gigantea*, *Asclepias syriaca*, *Aster pilosus*, *Bidens cernua*, *Bidens* sp., *Bromus inermis*, *Bromus* sp., *Calystegia sepium*, *Carex annectens*, *Cyperus strigosus*, *Equisetum arvense*, *Eupatorium rugosum*, *Geum*

canadense, *Glyceria striata*, *Kummerowia stipulacea*, *Lactuca canadensis*, *Lemna minor* (duckweed, a floating leaved aquatic plant), *Oxalis* sp., *Plantago rugelii*, *Polygonum persicaria*, *Polygonatum punctatum*, *Rumex crispus*, *Rumex obtusifolius*, *Scirpus atrovirens*, *Setaria faberi*, *Solidago canadensis*, *Teucrium canadense*, *Tridens flavus*, and *Verbena urticifolia*. **Summary:** Visited 10 October 1995: aquatic macroinvertebrates were collected for identification. Visited 14 March 1996: water samples were collected for analysis. Visited 14 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 27-29 August 1996: A floral census was conducted in and around spring. Visited 14 June 1997: water samples were collected for analysis. Thirty-nine taxa of aquatic macroinvertebrates, including *Bactrurus brachycaudus*, a troglobitic amphipod, were collected at this spring. Water samples for nitrate nitrogen and herbicides were collected in March and June (1996). Nitrate nitrogen levels were below the background level in March and above the background level but below the EPAMCL in June. Atrazine, Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Winegar Spring

Parameters *	3/14/96	6/14/96	Parameters *	3/14/96	6/14/96
Water Temperature (°C)		13.5	Dissolved Copper		0.09
Dissolved Oxygen		10.6	Dissolved Iron		<DL
pH			Dissolved Potassium		<DL
Turbidity (NTU)			Dissolved Lanthanum		<DL
Specific Conductivity		723.9	Dissolved Lithium		<DL
Inorganic Dissolved C		78.1	Dissolved Magnesium		52.4
Dissolved Organic C		31.5	Dissolved Manganese		0.01
Total Dissolved C		109.6	Dissolved Molybdenum		<DL
Sulfate Sulfur		45.4	Dissolved Sodium		7.8
Ammonia Nitrogen		0.05	Dissolved Nickel		<DL
Nitrite Nitrogen		0.12	Dissolved Lead		<DL
Nitrate Nitrogen	0.17	2.43	Dissolved Antimony		<DL
Total Phosphorus		0.06	Dissolved Scandium		<DL
Hardness (EDTA)		483	Dissolved Selenium		<DL
Chlorides		11	Dissolved Silicon		8.63
Total Dissolved Solids		556	Dissolved Strontium		0.13
Total Alkalinity		407	Dissolved Titanium		<DL
Dissolved Aluminum		<DL	Dissolved Thallium		<DL
Dissolved Arsenic		<DL	Dissolved Vanadium		<DL
Dissolved Boron		<DL	Dissolved Zinc		0.09
Dissolved Barium		0.05	Dissolved Zirconium		
Dissolved Beryllium		<DL	Total Mercury (µg/L)		1.39
Dissolved Calcium		107	Atrazine (µg/L)	<DL	<DL
Dissolved Cadmium		<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt		<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium		<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

Unnamed Spring #24: Pike County. **Summary:** Visited 13 March 1996: this spring is situated about 12 m up from the base of a hillside with some limestone out-crops above the springhead. The spring is covered with a concrete springhouse (1 m long, 1 m wide, 0.6 m high) with a pipe (5 cm diameter) running to the side of a county road before flowing into a watering trough.

Unnamed Spring #33: Pike County: 1.9 km SSE center of Pearl. This spring flows out of a small opening (30 cm wide, 50 cm high) in the bedding plane of Lower Valmeyeran limestone of Mississippian age. The springhead is located on the east-facing slope of a young second growth disturbed wooded hillside dominated by hackberry, sugar maple, and red oak. The springhead emanates as a large pool (7 m long, 1.5-3.5 m wide, 10-15 cm deep) with a bottom substrate comprised of 40% gravel, 50% sand, and 10% cobble over bedrock. From this pool, water flows under a narrow road through a culvert (12 m long, 40 cm diameter) then falls 1 m into a springbrook (4 m long, 2 m wide, 15 cm deep) with a bottom substrate comprised of 10% cobble, 60% gravel, and 30% sand. This short springbrook then flows into an intermittent stream that drains the small wooded ravine. Except for the road, the springhead and springbrook flow entirely within this wooded area. The wooded area has been grazed and was partially cleared of timber within the last ten years. The quality of this woodlot is poor; *Robinia pseudoacacia* is present in the tree canopy, *Alliaria petiolata* in the herbaceous layer. This spring water is utilized extensively for drinking by many of the local residents. Spring discharge on 13 June 1996 was determined to be 34.5 L/sec. **Springhead Fauna:** Platyhelminthes: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Enchytraeidae: Enchytraeidae (unidentified sp.). Tubificidae: *Limnodrilus hoffmeisteri*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypris pallida*. Insecta: Diptera: Chironomidae: unidentified spp. Tipulidae: *Pedicia albivitta*. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Rhyacophilidae: *Rhyacophila vibox*. Mollusca: Gastropoda: Planorbidae: *Helisoma* sp. Pelecypoda: Sphaeriidae: unidentified spp. Vertebrata: Amphibia: Caudata: Plethodontidae: *Eurycea longicauda*. **Springbrook Fauna:** Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Baetris bairdii*. Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Chironomidae: unidentified spp. Stratiomyidae: unidentified spp. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Rhyacophilidae: *Rhyacophila vibox*. Uenoidae: *Neophylax concinnus*. Mollusca: Gastropoda: Physidae: *Physella* sp. Planorbidae: *Helisoma* sp. Amphibia: Caudata: Plethodontidae: *Eurycea longicauda*. **Flora:** The dominant trees were *Celtis occidentalis*, *Acer saccharum*, and *Quercus rubra*. Other trees present included *Acer negundo*, *Diospyros virginiana*, *Fraxinus pennsylvanica*, *Morus alba*, *Platanus occidentalis*, *Robinia*

pseudoacacia, and *Ulmus americana*. The dominant shrubs were *Rosa multiflora* and *Sambucus canadensis*. The dominant vine was *Vitis* sp. The only other vine observed was *Smilax hispida*. The dominant herbs were *Polygonum cespitosum*, *Elymus villosus*, *Pilea pumila*, *Eupatorium rugosum*, *Conyza canadensis*, and *Festuca obtusa*. Other herbs present were *Alliaria petiolata*, *Aster drummondii*, *Aster lateriflorus*, *Campanula americana*, *Carex* sp., *Cryptotaenia canadensis*, *Cystopteris* sp., *Elymus virginicus*, *Erigeron annuus*, *Erigeron philadelphicus*, *Festuca pratensis*, *Geum canadense*, *Hemerocallis fulva*, *Impatiens capensis*, *Juncus tenuis*, *Lactuca floridana*, *Leersia virginica*, *Osmorhiza* sp., *Perilla frutescens*, *Phytolacca americana*, *Plantago rugelii*, *Poa pratensis*, *Polygonum virginianum*, *Polymnia canadense*, *Ranunculus recurvatus*, *Viola eriocarpa*, and *Viola* sp. Floral abundance, cover, and importance values are given in Appendix 2.

Summary: Visited 13 October 1995: aquatic macroinvertebrates were collected for identification. Visited 12 March 1996: water samples were collected for analysis. Visited 13 June 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Seventeen taxa of benthic macroinvertebrates were collected from this spring, including *Baetrus brachycaudus*, a troglobitic amphipod, and *Lepidostoma libum*, a rare caddisfly in Illinois.

Spring SE Pearl [#33]

Parameters *	10/13/95	3/12/96	6/13/96	Parameters *	3/12/96	6/13/96
Water Temperature (°C)	14		12	Dissolved Copper		0.13
Dissolved Oxygen	6.8		9.6	Dissolved Iron		<DL
pH	7.62			Dissolved Potassium		<DL
Turbidity (NTU)				Dissolved Lanthanum		<DL
Specific Conductivity	533.8		776.4	Dissolved Lithium		<DL
Inorganic Dissolved C			39.1	Dissolved Magnesium		18.8
Dissolved Organic C			19.2	Dissolved Manganese		<DL
Total Dissolved C			58.2	Dissolved Molybdenum		<DL
Sulfate Sulfur			19.4	Dissolved Sodium		12
Ammonia Nitrogen			0.02	Dissolved Nickel		<DL
Nitrite Nitrogen			<DL	Dissolved Lead		<DL
Nitrate Nitrogen		3.55	7.77	Dissolved Antimony		<DL
Total Phosphorus			0.05	Dissolved Scandium		<DL
Hardness (EDTA)			248	Dissolved Selenium		<DL
Chlorides			14	Dissolved Silicon		10.9
Total Dissolved Solids			352	Dissolved Strontium		0.07
Total Alkalinity			205	Dissolved Titanium		<DL
Dissolved Aluminum			<DL	Dissolved Thallium		<DL
Dissolved Arsenic			<DL	Dissolved Vanadium		<DL
Dissolved Boron			<DL	Dissolved Zinc		0.12
Dissolved Barium			0.03	Dissolved Zirconium		
Dissolved Beryllium			<DL	Total Mercury (µg/L)		0.72
Dissolved Calcium			68.1	Atrazine (µg/L)	0.6	<DL
Dissolved Cadmium			<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt			<DL	Metolachlor (µg/L)	<DL	<DL
Dissolved Chromium			<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

Samples for nitrate nitrogen and herbicides were collected in March (1996) and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Atrazine was detected in March but below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Unnamed Spring #41: Pike County. **Summary:** Visited 13 March 1996: this spring has been capped and is used as a water supply for cattle.

Unnamed Spring #42: Pike County: 2.8 km WNW New Hartford. This spring flows from a narrow opening in a bedding plane of Lower Valmeyeran limestone of Mississippian age. The springhead is located at the base of a gentle, sparsely wooded, south-facing slope dominated by Ohio buckeye. The wooded area is primarily a *Juglans nigra* plantation, with an understory of pasture grasses. Water flows from a collapsed opening directly south from the wooded slope as a springbrook (0.5 m wide, 10 cm deep) through a former hog lot that is dominated by forbs. The bottom substrate of the springbrook is comprised of 40% gravel, 40% sand and 20% silt/organic debris. Woody vegetation associated with the spring are all found at the immediate base of the slope at the source of the spring. Spring discharge on 21 August 1996 was determined to be 0.6 L/sec. **Springhead Fauna:** Platyhelminthes: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Physidae: *Physella* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Tubificidae: Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Cypridopsis vidua*. Mollusca: Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant tree was *Aesculus glabra*. The only other tree associated with the spring was *Ulmus americana*. The dominant shrub was *Rosa multiflora*. The dominant vine was *Parthenocissus quinquefolia*. The only other vine observed was *Toxicodendron radicans*. The dominant herbs were *Festuca pratensis*, *Carex annectens*, *Solidago canadensis*, and *Plantago rugelii*. Other herbs present were *Acalypha rhomboidea*, *Agrostis gigantea*, *Ambrosia artemisiifolia*, *Aster lateriflorus*, *Aster pilosus*, *Bidens frondosa*, *Bromus tectorum*, *Carex* sp., *Commelina communis*, *Conyza canadensis*, *Cyperus strigosus*, *Daucus carota*, *Desmodium paniculatum*, *Digitaria ischaemum*, *Echinochloa crusgalli*, *Eclipta prostrata*, *Elymus villosus*, *Eragrostis* sp., *Erigeron annuus*, *Geum canadense*, *Glyceria striata*, *Hackelia virginiana*, *Juncus tenuis*, *Kummerowia stipulacea*, *Muhlenbergia schreberi*, *Oxalis* sp., *Panicum dichotomiflorum*, *Perilla frutescens*, *Phleum pratense*, *Pilea pumila*, *Phytolacca americana*, *Plantago lanceolata*, *Poa compressa*, *Poa pratensis*, *Polygonum punctatum*,

Rumex altissima, *Rumex crispus*, *Scirpus atrovirens*, *Sorghum halepense*, *Stachys* sp., *Taraxacum officinale*, *Trifolium pratense*, *Trifolium repens*, *Verbena urticifolia*, and *Xanthium strumarium*. Floral abundance, cover, and importance values are given in Appendix 2.

Summary: Visited 21 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Visited 18 June 1997: water samples were collected for analysis. Eight taxa of aquatic macroinvertebrates were collected at this spring, including *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen were collected in August (1996) and June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. A samples for herbicide analysis was collected in June (1997). Atrazine and Metolachlor were detected but below the EPAMCL and the EPAHAL, respectively. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Spring #42

Parameters *	8/21/96	6/18/97	Parameters *	8/21/96	6/18/97
Water Temperature (°C)	13	11	Dissolved Copper	0.03	<DL
Dissolved Oxygen	6.5	8.6	Dissolved Iron	<DL	<DL
pH		7.87	Dissolved Potassium	<DL	2
Total Alkalinity	441	176	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	630.1	723.8	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	37.8	40	Dissolved Magnesium	13.3	14.4
Dissolved Organic C	28	15.2	Dissolved Manganese	<DL	<DL
Total Dissolved C	65.8	55.2	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	21.3	26.3	Dissolved Sodium	9.9	11.8
Ammonia Nitrogen	<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	6.58	6.99	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.18	0.16	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	248	242	Dissolved Selenium	<DL	<DL
Chlorides	12.4	15.6	Dissolved Silicon	6.87	7.55
Total Dissolved Solids	320	288	Dissolved Strontium	0.12	0.15
Turbidity (NTU)			Dissolved Titanium	<DL	<DL
Dissolved Aluminum	<DL	<DL	Dissolved Thallium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.03	<DL
Dissolved Barium	0.07	0.09	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	<DL
Dissolved Calcium	77.2	73	Atrazine (µg/L)		1.74
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)		<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)		0.32
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Unnamed Spring #44: Pike County: 8.4 km SE New Canton. This spring flows from a small opening in Lower Valmeyeran limestone of Mississippian age. The springhead is located at the base of a west-facing limestone ridge in a second growth forest dominated by basswood and hackberry. Water flows west from the springhead into a springbrook (25 m long, 0.5 m wide, 10

cm deep) with a bottom substrate comprised of 70% gravel and 25% sand. The woods above the limestone ridge appear lightly grazed but structurally in good condition. The springbrook flows from the wooded base of a limestone outcropping, through a small, open, disturbed forb-dominated area before flowing beneath a fence and entering Horton Creek. Spring discharge on 21 August 1996 was determined to be 7.7 L/sec. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Insecta: Diptera: Chironomidae: unidentified spp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea brevicauda*. Ostracoda: *Potamocypris pallida*. **Flora:** The dominant trees were *Tilia americana* and *Celtis occidentalis*. Other trees present included *Acer negundo*, *Juglans nigra*, *Ostrya virginiana*, *Prunus serotina*, *Quercus rubra*, and *Ulmus americana*. The dominant shrub was *Rosa multiflora*. Other shrubs present included *Cornus racemosa*, *Ribes missouriense*, *Staphylea trifolia*, and *Symphoricarpos orbiculatus*. The dominant vine was *Smilax hispida*. Other vines observed included *Toxicodendron radicans*, *Vitis* sp. The dominant herbs were *Phalaris arundinacea*, *Lobelia siphilitica*, *Solidago gigantea*, *Cryptotaenia canadensis*, *Rumex obtusifolius*, *Eupatorium rugosum*, *Galium triflorum*, and *Glechoma hederacea*. Other herbs present were *Acalypha rhomboidea*, *Amphicarpa bracteata*, *Arctium minus*, *Aster lateriflorus*, *Bidens connata*, *Brassica* sp., *Carex annectens*, *Carex radiata*, *Cirsium vulgare*, *Cystopteris* sp., *Elymus virginicus*, *Equisetum arvense*, *Erigeron annuus*, *Festuca obtusa*, *Festuca pratensis*, *Geum canadense*, *Glyceria striata*, *Hemerocallis fulva*, *Impatiens capensis*, *Lysimachia nummularia*, *Oxalis* sp., *Phytolacca americana*, *Pilea pumila*, *Plantago rugelli*, *Poa pratensis*, *Polygonum pensylvanicum*, *Polygonatum punctatum*, *Polygonum virginianum*, *Prunella vulgaris*, *Scirpus atrovirens*, *Taraxacum officinale*, *Trifolium repens*, and *Verbesina alternifolia*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 15 March 1996: water samples were collected for analysis. Visited 21 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Visited 18 June 1997: water samples were collected for analysis. Six taxa of aquatic macroinvertebrates were collected in this spring. Samples for nitrate nitrogen were collected in March and August (1996) and in June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Samples for herbicides were collected in March (1996) and June (1997). Atrazine was detected in March and June but below the EPAMCL. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Spring #44

Parameters *	3/15/96	8/21/96	6/18/97	Parameters *	3/15/96	8/21/96	6/18/97
Water Temperature (°C)		11	12	Dissolved Copper		0.04	<DL
Dissolved Oxygen		8.7	8.4	Dissolved Iron		<DL	<DL
pH			8.15	Dissolved Potassium		<DL	<DL
Total Alkalinity		381	174	Dissolved Lanthanum		<DL	<DL
Specific Conductivity		754.9	697.5	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		39.5	38.1	Dissolved Magnesium		16.8	15.4
Dissolved Organic C		26.5	11	Dissolved Manganese		<DL	<DL
Total Dissolved C		66.1	49.2	Dissolved Molybdenum		<DL	<DL
Sulfate Sulfur		18.7	24.2	Dissolved Sodium		9.8	11.1
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel		<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	3.77	5.07	7.28	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.04	0.08	Dissolved Scandium		<DL	<DL
Hardness (EDTA)		261	233	Dissolved Selenium		<DL	<DL
Chlorides		7.92	12.8	Dissolved Silicon		7.2	8.3
Total Dissolved Solids		324	264	Dissolved Strontium		0.09	0.11
Turbidity (NTU)				Dissolved Titanium		<DL	<DL
Dissolved Aluminum		<DL	<DL	Dissolved Thallium		<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium		<DL	<DL
Dissolved Boron		0.04	<DL	Dissolved Zinc		<DL	<DL
Dissolved Barium		0.04	0.05	Dissolved Zirconium			
Dissolved Beryllium		<DL	<DL	Total Mercury (µg/L)		<DL	<DL
Dissolved Calcium		76.6	67.9	Atrazine (µg/L)	0.18		1.09
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL		<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL		0.28
Dissolved Chromium		<DL	<DL	Cyanazine (µg/L)	<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm);
values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
<DL= Value not determined because concentration below detection limit of analysis equipment.

Unnamed Spring #45: Pike County: 6.3 km SE New Canton. This spring boils up in an old concrete springhouse (3 m long, 3 m wide, 15 cm deep) with a bottom substrate comprised of sand and silt which overlies Lower Valmeyeran limestone of Mississippian age. Discharge from the springhouse flows 31 m down a springbrook (0.75 m wide, 10 cm deep) along the base of the wooded slope before entering Horton Creek. The bottom substrate of the springbrook is comprised of 40% cobble, 40% gravel, and 20% sand. The wooded slope, is a young, second growth woods of *Fraxinus americana*, *Celtis occidentalis*, and *Quercus alba*, and has been heavily grazed. The level area above from the springhead and opposite the wooded slope is an open field that historically had been grazed, but now supported scattered *Acer saccharinum*, *Ulmus americana*, and *Juglans nigra*. A large *Platanus occidentalis* (115.9 cm dbh) is located at the source of the spring. **Springhead Fauna:** Arthropoda: Crustacea: Amphipoda: Crangonyctidae: *Batrurus brachycaudus*. Gammaridae: *Gammarus minus*. Insecta: Trichoptera: Hydropsychidae: *Cheumatopsyche* sp. Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Pleuroceridae: *Elimia* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*. Ostracoda: *Potamocypris pallida*. Insecta: Diptera: Chaoboridae: *Chaoborus punctipennis*.

Heteroptera: Corixidae: *Trichocorixa kanza*. **Flora:** The dominant trees were *Platanus occidentalis* and *Celtis occidentalis*. Other trees present were *Acer saccharinum*, *Acer saccharum*, *Aesculus glabra*, *Fraxinus americana*, and *Ulmus americana*. The dominant shrubs were *Rubus occidentalis* and *Symphoricarpos orbiculatus*. Other shrubs present included *Rosa multiflora* and *Sambucus canadensis*. The dominant vine was *Smilax hispida*. Other vines observed included *Parthenocissus quinquefolia* and *Vitis* sp. The dominant herbs were *Phalaris arundinacea*, *Pilea pumila*, *Cryptotaenia canadensis*, *Elymus virginicus*, *Leersia virginica*, *Phlox divaricata*, *Aster lanceolatus*, and *Eupatorium rugosum*. Other herbs present were *Ambrosia trifida*, *Artemisia annua*, *Asplenium platyneuron*, *Aster lateriflorus*, *Campanula americana*, *Carex* sp., *Digitaria ischaemum*, *Elymus villosus*, *Equisetum* sp., *Festuca obtusa*, *Galium aparine*, *Geum canadense*, *Gratiola neglecta*, *Hackelia virginiana*, *Juncus tenuis*, *Lactuca floridana*, *Laportea canadensis*, *Lobelia siphilitica*, *Mimulus alatus*, *Oxalis* sp., *Panicum dichotomiflorum*, *Penthorum sedoides*, *Phytolacca americana*, *Plantago virginica*, *Poa pratensis*, *Polygonum punctatum*, *Sanicula odorata*, *Scrophularia marilandica*, *Silphium perfoliatum*, *Solidago canadensis*, *Solidago gigantea*,

Spring #45

Parameters *	3/15/96	8/21/96	6/18/97	Parameters *	3/15/96	8/21/96	6/18/97
Water Temperature (°C)		12	12	Dissolved Copper		<DL	<DL
Dissolved Oxygen		8.5	8.6	Dissolved Iron		<DL	<DL
pH			7.76	Dissolved Potassium		<DL	<DL
Total Alkalinity		371	260	Dissolved Lanthanum		<DL	<DL
Specific Conductivity		644.8	737	Dissolved Lithium		<DL	<DL
Inorganic Dissolved C		47.8	58.8	Dissolved Magnesium		23.8	25.4
Dissolved Organic C		35.6	16.4	Dissolved Manganese		<DL	<DL
Total Dissolved C		83.4	75.2	Dissolved Molybdenum		<DL	<DL
Sulfate Sulfur		22.3	24.9	Dissolved Sodium		11.9	13
Ammonia Nitrogen		<DL	<DL	Dissolved Nickel		<DL	<DL
Nitrite Nitrogen		<DL	<DL	Dissolved Lead		<DL	<DL
Nitrate Nitrogen	1.88	4.81	4.71	Dissolved Antimony		<DL	<DL
Total Phosphorus		0.04	0.05	Dissolved Scandium		<DL	<DL
Hardness (EDTA)		314	317	Dissolved Selenium		<DL	<DL
Chlorides		16.4	17.7	Dissolved Silicon		8.84	9.16
Total Dissolved Solids		372	340	Dissolved Strontium		0.08	0.09
Turbidity (NTU)				Dissolved Titanium		<DL	<DL
Dissolved Aluminum		<DL	0.02	Dissolved Thallium		<DL	<DL
Dissolved Arsenic		<DL	<DL	Dissolved Vanadium		<DL	<DL
Dissolved Boron		<DL	<DL	Dissolved Zinc		<DL	<DL
Dissolved Barium		0.05	0.06	Dissolved Zirconium			
Dissolved Beryllium		<DL	<DL	Total Mercury (µg/L)		<DL	<DL
Dissolved Calcium		86.3	84.8	Atrazine (µg/L)	<DL		0.34
Dissolved Cadmium		<DL	<DL	Alachlor (µg/L)	<DL		<DL
Dissolved Cobalt		<DL	<DL	Metolachlor (µg/L)	<DL		<DL
Dissolved Chromium		<DL	<DL	Cyanazine (µg/L)	<DL		<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Verbesina alternifolia, and *Viola* sp. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 15 March 1996: water samples were collected for analysis. Visited 21 August 1996: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 1-3 October 1996: A floral census was conducted in and around spring. Visited 18 June 1997: water samples were collected for analysis. Nine taxa of aquatic macroinvertebrates were collected at this spring, including *Bactrurus brachycaudus*, a troglobitic amphipod, and *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen were collected in March and August (1996) and in June (1997). Nitrate nitrogen levels were above the background level but below the EPAMCL. Samples for herbicides were collected in March (1996) and June (1997). Atrazine was detected in June but below the EPAMCL. Metolachlor, Cyanazine, and Alachlor were not detected in any of the water samples analyzed from this spring.

Unnamed Spring #46: Pike County: 5 km SE New Canton. **Summary:** Visited 15 March 1996: water samples were collected for analysis.

Unnamed Spring #47: Pike County: 5.2 km SE New Canton. **Summary:** Visited 15 March 1996: only a small amount of water was flowing from this spring, which most likely is ephemeral.

Unnamed Spring: Pike County: 3.7 km NW Barry. **Summary:** Visited 14 March 1996: this spring is situated along a limestone hillside: very little water flow was observed; this spring is probably ephemeral.

Unnamed Spring: Pike County: 6.6 km WNW Barry. **Summary:** Visited 14 March 1996: this spring is capped by a springhouse.

Unnamed Spring #59 [Schuyler County Spring?]: Schuyler County: 4.8 km SW Camden. **Summary:** Visited 14 March 1996: no water was observed flowing; this spring is probably ephemeral.

Unnamed Spring #68: Stephenson County: 5.6 km NW Orangeville. **Summary:** Visited 18 October 1996: spring indicated on topographic map as being in farm field. A search of the stream flowing through a pasture failed to determine the presence of this spring. Numerous small seeps trickled into the stream.

McConnell Spring: Stephenson County: in McConnell. **Summary:** Visited 18 October 1996: no springhead was located; water flow begins from runoff culvert to form a shallow grass-filled ditch which flows into a tributary of the Pecatonica River.

Mineral Springs: Whiteside County: 6.6 km NNW Erie. **Summary:** Visited 17 October 1996: historically, a hotel was associated with this spring around 1900. No evidence of the hotel remains and the spring appears to be a large seep area on the west side of Mineral Creek. The spring discharge area has been silted in by hillside erosion.

Two Springs: Whiteside County: 11.8 km NNW Morrison. These two springs resurge out of Peorian Loess and Roxana silt which overlies dolomite of Silurian age. The springheads are located approximately 4 m apart along the base of a steep wooded slope in an open horse pasture. The north springhead is 1.5 m wide and the northeast springhead is 0.5 m wide. They converge after flowing 2 m to form a springbrook (2 m wide, 10 cm deep) with a bottom substrate comprised of 60% gravel, 30% sand, and 10% silt/organic debris that flows south into Otter Creek. The pasture has a few scattered trees and scrub growth on the steeper slopes. The area north of these springheads is cultivated with row crops. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbriculidae: (unidentified sp.). Tubificidae: (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Diptera: Ceratopogonidae: unidentified spp. Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Psychodidae: *Psychoda* sp. Tipulidae: *Pilaria* sp. Ephemeroptera: Baetidae: *Baetis brunneicolor*. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Physidae: *Physella* sp. **Springbrook Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Phagocata velata*. Annelida: Oligochaeta: Lumbriculidae (unidentified sp.). Enchytraeidae: (unidentified sp.). Tubificidae: *Limnodrilus hoffmeisteri*, *Limnodrilus* sp. (developing), *Varichaetadrilus angustipenis*, Tubificidae (immature spp.). Arthropoda: Crustacea: Amphipoda: Gammaridae: *Gammarus minus*, *G. pseudolimnaeus*. Isopoda: Asellidae: *Caecidotea intermedia*. Insecta: Coleoptera: Dytiscidae: *Agabus seriatus*. Diptera: Ceratopogonidae: *Culicoides* sp. Chironomidae: unidentified spp. Dixidae: *Dixa* sp. Psychodidae: *Psychoda* sp. Stratiomyidae: unidentified spp. Tabanidae: *Tabanus* sp. Tipulidae: *Pilaria* sp. Ephemeroptera: Baetidae: *Baetis brunneicolor*. Trichoptera: Lepidostomatidae: *Lepidostoma libum*. Mollusca: Gastropoda: Physidae: *Physella* sp. Pelecypoda: Sphaeriidae: unidentified spp. **Flora:** The dominant trees were *Ulmus americana*, *Salix nigra*, and *Maclura pomifera*. Other trees observed were *Acer negundo* and *Quercus rubra*. The dominant shrubs were *Rubus occidentalis* and *Sambucus canadensis*. Other shrubs observed were *Ribes americana*, *Ribes missouriense*, *Rosa*

multiflora, and *Salix amygdaloides*. The dominant vine was *Vitis riparia*. The only other vine observed was *Parthenocissus quinquefolia*. The dominant herbs were *Agrostis gigantea*, *Solidago canadensis*, *Poa pratensis*, and *Lobelia siphilitica*. The only aquatic plant observed was *Nasturtium officinale*. Other herbs observed were *Ambrosia trifida*, *Apocynum* sp., *Arctium* sp., *Aster novae-angliae*, *Calystegia sepium*, *Carex hystericina*, *Circaea lutetiana*, *Cirsium vulgare*, *Cryptotaenia canadensis*, *Daucus carota*, *Echinocystis lobata*, *Epilobium* sp., *Equisetum arvense*, *Erigeron annuus*, *Eupatorium perfoliatum*, *Eupatorium rugosum*, *Geum canadense*, *Hackelia virginiana*, *Lactuca* sp., *Lycopus* sp., *Monarda fistulosa*, *Onoclea sensibilis*, *Phleum pratense*, *Pilea* sp., *Plantago rugelii*, *Polygonum persicaria*, *Prunella vulgaris*, *Sanicula canadensis*, *Scirpus atrovirens*, *Solidago gigantea*, *Stachys palustris*, *Stellaria media*, *Taraxacum officinale*, *Urtica dioica*, *Verbena urticifolia*, and *Viola pranticola*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 17 October 1996. Visited 3 April 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Visited 12 June 1997: water samples were collected for analysis. Visited 29 July 1997: A floral census was conducted in and around spring. Twenty-one taxa of aquatic macroinvertebrates were collected in this spring, including *Varichaetadrilus angustipennis*, a rare oligochaete in Illinois,

Two Springs

Parameters *	4/3/97	6/12/97	Parameters *	4/3/97	6/12/97
Water Temperature (°C)	10.5	10.3	Dissolved Copper	0.04	<DL
Dissolved Oxygen	12.7	11.2	Dissolved Iron	<DL	<DL
pH		7.72	Dissolved Potassium	<DL	<DL
Total Alkalinity	291	290	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	817.8	807.7	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	65.5	64.1	Dissolved Magnesium	44.5	43.1
Dissolved Organic C	15.6	15.3	Dissolved Manganese	<DL	<DL
Total Dissolved C	81.1	79.4	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	29.9	30	Dissolved Sodium	27.5	7.2
Ammonia Nitrogen	<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	14.4	18.6	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.01	0.03	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	406	379	Dissolved Selenium	<DL	<DL
Chlorides	15.1	17.6	Dissolved Silicon	7.63	7.33
Total Dissolved Solids	540	464	Dissolved Strontium	0.1	0.09
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	0.06	<DL	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL		Dissolved Zinc	0.03	0.01
Dissolved Barium	0.04	0.04	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	0.06	<DL
Dissolved Calcium	89.2	80.7	Atrazine (µg/L)	0.49	0.68
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	<DL	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	0.06	0.05
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

and *Lepidostoma libum*, a rare caddisfly in Illinois. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels in April were 1.4 times, and in June 1.9 times the EPAMCL. Atrazine and Metolachlor were detected in April and June but below EPAMCL, respectively. Metolachlor was detected in June but below the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

Unnamed Spring #81: Whiteside County. **Summary:** Visited 17 October 1996: no trace of this spring could be located.

Page Artesian Well: Winnebago County: 7.4 km NW Rockford, in Anna R. Page Forest Preserve. This spring is capped by a concrete culvert (3 m diameter, 1.3 m high). Water flows out of this culvert through a pipe (5 cm diameter) where it spills onto several slab cobblestones; it then forms a narrow springbrook (30 cm wide, 10 cm deep) with a bottom substrate comprised of sand and gravel that is choked with water cress. This springbrook flows southeast for 3 m to its confluence with a tributary of the North Fork of Kent Creek. The area around the spring is dominated by forbs and is part of a larger degraded sedge meadow. This spring is utilized as a

Page Spring

Parameters *	4/6/97	6/11/97	Parameters *	4/6/97	6/11/97
Water Temperature (°C)	10.5	10.8	Dissolved Copper	0.02	<DL
Dissolved Oxygen	8.5	7.4	Dissolved Iron	<DL	<DL
pH		8.14	Dissolved Potassium	<DL	<DL
Total Alkalinity	288	287	Dissolved Lanthanum	<DL	<DL
Specific Conductivity	811	703.6	Dissolved Lithium	<DL	<DL
Inorganic Dissolved C	63.1	63.5	Dissolved Magnesium	46.3	37.4
Dissolved Organic C	13.7	17.6	Dissolved Manganese	<DL	<DL
Total Dissolved C	76.8	81.2	Dissolved Molybdenum	<DL	<DL
Sulfate Sulfur	25.8	25.1	Dissolved Sodium	10.5	9.5
Ammonia Nitrogen	<DL	<DL	Dissolved Nickel	<DL	<DL
Nitrite Nitrogen	<DL	<DL	Dissolved Lead	<DL	<DL
Nitrate Nitrogen	14.2	14.9	Dissolved Antimony	<DL	<DL
Total Phosphorus	0.01	0.03	Dissolved Scandium	<DL	<DL
Hardness (EDTA)	403	317	Dissolved Selenium	<DL	<DL
Chlorides	28.4	31.3	Dissolved Silicon	5.53	4.53
Total Dissolved Solids	464	512	Dissolved Strontium	0.06	0.05
Turbidity (NTU)			Dissolved Thallium	<DL	<DL
Dissolved Aluminum	<DL	0.03	Dissolved Titanium	<DL	<DL
Dissolved Arsenic	<DL	<DL	Dissolved Vanadium	<DL	<DL
Dissolved Boron	<DL	<DL	Dissolved Zinc	0.01	<DL
Dissolved Barium	0.04	0.03	Dissolved Zirconium		
Dissolved Beryllium	<DL	<DL	Total Mercury (µg/L)	<DL	0.15
Dissolved Calcium	85.1	65.4	Atrazine (µg/L)	0.18	0.27
Dissolved Cadmium	<DL	<DL	Alachlor (µg/L)	0.03	<DL
Dissolved Cobalt	<DL	<DL	Metolachlor (µg/L)	0.26	0.11
Dissolved Chromium	<DL	<DL	Cyanazine (µg/L)	<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm); values for anions and cations expressed in mg/L, values for mercury and herbicides in µg/L.
 <DL= Value not determined because concentration below detection limit of analysis equipment.

water supply by local residents. **Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Dugesia dorotocephala*. **Flora:** The only tree observed was *Salix x rubens*. The only shrubs observed were *Frangula alnus*, *Salix exigua*, and *Sambucus canadensis*. The only vine observed was *Vitis riparia*. The dominant herbs were *Myosotis scoropoides*, *Impatiens capensis*, *Nasturtium officinale*, and *Phalaris arundinacea*. The only aquatic plants observed were *Myosotis scoropoides* and *Nasturtium officinale*. Other herbs observed were *Agrostis gigantea*, *Alliaria petiolata*, *Angelica atropurpurea*, *Aster puniceus*, *Eupatorium maculatum*, *Juncus tenuis*, *Phleum pratense*, *Poa pratensis*, *Polygonum persicaria*, *Polygonum punctatum*, *Rumex crispus*, *Solanum dulcamara*, and *Urtica dioica*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 6 April 1997: water samples were collected for analysis. Visited 11 June 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Samples for nitrate nitrogen and herbicides were collected in April and June (1997). Nitrate nitrogen levels in March were 1.4 times, and in June 1.5 times the EPAMCL. Atrazine and Metolachlor were detected in March (1996) and June (1997) but below EPAMCL and the EPAHAL. Alachlor was detected in March but below the EPAMCL. Cyanazine was not detected.

Rhule Spring [#69] [Franklin Spring ?]. Winnebago County: 15.6 km NW Rockford. This spring is covered by a cement springhouse (6.5 m long, 4 m wide, 2.5 m high). Water boils up through fine grained silt and clay in the Equality formation of Peoria Loess. Spring outflow from the springhouse forms a springbrook (25-50 cm wide, 3-6 m deep) with a bottoms substrate comprised of 60% gravel and 40% sand. The downstream end of the springbrook is stabilized with railroad ties, two ties in height. This springbrook flows for 10 m before it confluence with the downstream (west) end of a "boat basin" — a rectangular area that has been built around a secondary spring outflow area. This "boat basin" (12 m long, 2.8 m wide, 20-30 cm deep) is enclosed on three sides by a cobblestone retaining wall (1.7 m high). The area surrounding the springhouse, short springbrook, and "boat basin" is the mowed yard of a farmstead; some forbs, including *Poa pratensis* and *Coronilla varia* are present in the immediate vicinity of the springhouse and its short springbrook. Immediately after the confluence, the combined discharges from the springhouse, springbrook, and "boat basin" flow under a fence; here the springbrook widens to 2-3 m as it flows for 33 m through a barnyard denuded of vegetation by cattle. This springbrook then flows in a westerly direction through an overgrazed pasture for approximately 400 m to its confluence with Rhule Creek. **Springhead Fauna:** Platyhelminthes: Turbellaria: Tricladida: Planariidae: *Dugesia dorotocephala*. Annelida: Oligochaeta: Naididae: *Nais communis*, *Nais bretscheri*. Tubificidae: *Tubifex tubifex*, Tubificidae (immature spp.). **Springbrook Fauna:** Nematoda (unidentified). Annelida: Oligochaeta: Enchytraeidae (unidentified sp.). Naididae: *Nais*

communis, *Nais bretscheri*. Tubificidae: *Rhyacodrilus cf. montana*, Tubificidae (immature spp.). Insecta: Coleoptera: Dytiscidae: *Agabus* sp., *Sanfilippodytes planuisculus*. Heteroptera: Corixidae: *Sigara* sp. Vertebrata: Pisces: *Pimephales promelas*. **Flora:** The only trees observed were *Acer saccharinum* and *Betula nigra*. The only shrub observed was *Sambucus canadensis*. The only vine observed was *Toxicodendron radicans*. The dominant herbs were *Bidens cernua*, *Poa pratensis*, *Eleocharis smallii*, *Leersia oryzoides*, *Agrostis gigantea*, *Polygonum persicaria*, and *Coronilla varia*. Although aquatic plants were absent at this time, the owner (Mrs. Hoople, personal communications) said that water cress [*Nasturtium officinale*] was common here but had been harvested for human consumption [salad] until it was eliminated from the spring. Other herbs observed were *Abutilon theophrastii*, *Acalypha rhomboidea*, *Agropyron repens*, *Amaranthus hybridus*, *Amaranthus retroflexus*, *Ambrosia trifida*, *Arctium minus*, *Calystegia sepium*, *Carex annectens*, *Carex stricta*, *Chenopodium album*, *Cirsium vulgare*, *Cyperus rivularis*, *Echinochloa* sp., *Epilobium* sp., *Festuca elatior*, *Lactuca canadensis*, *Lobelia siphilitica*, *Lolium perenne*, *Lychnis alba*, *Malva neglecta*, *Plantago rugelii*, *Polygonum lapathifolium*, *Polygonum pennsylvanicum*, *Polygonum punctatum*, *Polygonum tenue*, *Rumex crispus*, *Scirpus atrovirens*, *Solanum nigrum*, *Taraxacum officinale*, *Trifolium repens*, *Urtica dioica*, *Verbena urticifolia*,

Rhule Spring

Parameters *	10/12/95	4/6/97	6/11/97	Parameters *	10/12/95	4/6/97	6/11/97
Water Temperature (°C)	10.6	1/11/04	9.2	Dissolved Copper	<DL	0.03	<DL
Dissolved Oxygen	8.1	9.2	9.3	Dissolved Iron	<DL	0.01	<DL
pH	8.26		8.04	Dissolved Potassium	<DL	1	<DL
Total Alkalinity	272	287	288	Dissolved Lanthanum	<DL	<DL	<DL
Specific Conductivity	816.6	663.4	626.6	Dissolved Lithium	<DL	<DL	<DL
Inorganic Dissolved C	59.1	63.1	64	Dissolved Magnesium	42.90	44.6	37.6
Dissolved Organic C	17.8	14.5	18.6	Dissolved Manganese	0.01	<DL	<DL
Total Dissolved C	76.9	77.6	82.5	Dissolved Molybdenum	<DL	<DL	<DL
Sulfate Sulfur	27.4	25	24.3	Dissolved Sodium	6.90	8.4	11.3
Ammonia Nitrogen	<DL	0.02	<DL	Dissolved Nickel	<DL	<DL	<DL
Nitrite Nitrogen	0.06	<DL	<DL	Dissolved Lead	<DL	<DL	<DL
Nitrate Nitrogen	13.9	11.5	13.5	Dissolved Antimony	<DL	<DL	<DL
Total Phosphorus	0.03	0.01	0.03	Dissolved Scandium	<DL	<DL	<DL
Hardness (EDTA)	376	394	326	Dissolved Selenium	<DL	<DL	<DL
Chlorides	24.00	20.8	22.5	Dissolved Silicon	5.10	5.34	4.58
Total Dissolved Solids	412	452	452	Dissolved Strontium	0.063	0.06	0.05
Turbidity (NTU)	0			Dissolved Thallium	<DL	<DL	<DL
Dissolved Aluminum	<DL	<DL	0.05	Dissolved Titanium	<DL	<DL	<DL
Dissolved Arsenic	<DL	<DL	<DL	Dissolved Vanadium	<DL	<DL	<DL
Dissolved Boron	<DL	<DL	<DL	Dissolved Zinc	<DL	0.06	0.02
Dissolved Barium	0.03	0.03	0.03	Dissolved Zirconium	<DL		
Dissolved Beryllium	<DL	<DL	<DL	Total Mercury (µg/L)	<DL	<DL	0.06
Dissolved Calcium	79.8	84.1	68.4	Atrazine (µg/L)		0.19	0.22
Dissolved Cadmium	<DL	<DL	<DL	Alachlor (µg/L)		<DL	<DL
Dissolved Cobalt	<DL	<DL	<DL	Metolachlor (µg/L)		0.41	0.31
Dissolved Chromium	<DL	<DL	<DL	Cyanazine (µg/L)		<DL	<DL

* Hydrogen ion concentrations expressed as pH; values for specific conductivity expressed in (µmhos/cm);

values for anions and cations expressed in mg/L. values for mercury and herbicides in µg/L.

<DL= Value not determined because concentration below detection limit of analysis equipment.

Viola pranticola, and *Zea mays*. Floral abundance, cover, and importance values are given in Appendix 2. **Summary:** Visited 12 October 1995: water samples were collected for analysis. Visited 6 April 1997: water samples were collected for analysis. Visited 11 June 1997: aquatic macroinvertebrates were collected for identification and water samples were collected for analysis. Ten taxa of aquatic macroinvertebrates were collected in this spring, including *Rhyacodrilus* cf. *montana*, a rare oligochaete in Illinois. Samples for nitrate nitrogen were collected in October (1995) and in April and June (1997). The nitrate nitrogen level in October (1995) was 1.4 times greater than the EPAMCL; in April (1997) it was 1.2 times greater than the EPAMCL, and in June (1997) it was 1.4 times greater than the EPAMCL. Samples for herbicides were collected in April and June (1997). Atrazine and Metolachlor were detected in April and June but below EPAMCL and the EPAHAL. Cyanazine and Alachlor were not detected in any of the water samples analyzed from this spring.

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Literature Cited

- American Public Health Association, American Water Works Association, and Water Pollution Control Federation. 1985. Standard methods for the examination of water and wastewater. 16th edition. American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005. xlvix + 1268 pp.
- Bailey, A. W. and C. E. Poulton. 1968. Plant communities and environmental relationships in a portion of the Tillamook burn, northwest Oregon. *Ecology* 49:1-13.
- Banton, O. T. (ed.). 1976. History of Macon County. Macon County Historical Society. 555 pp.
- Barnby, M. A. and V. H. Resh. 1988. Factors affecting the distribution of an endemic and a widespread species of brine fly (Diptera: Ephydriidae) in a northern California thermal saline spring. *Annals of the Entomological Society of America* 81:437-446.
- Berg, R. C., and J. P. Kempton. 1988. Stack-unit mapping of geologic materials in Illinois to a depth of 15 meters. Illinois State Geological Survey Circular 542:1-23 + 4 maps.
- Brues, C. T. 1924. Observations on animal life in the thermal waters of Yellowstone Park, with a consideration of the thermal environment. *Proceedings of the American Academy of Arts and Sciences* 59:371-437.
- Burks, B. D. 1953. The mayflies, or Ephemeroptera, of Illinois. *Bulletin of the Illinois Natural History Survey* 26(1):1-216.
- Butler M. G. 1984. Life histories of aquatic insects. Pages 24-55. *In*: V. H. Resh and D. M. Rosenberg (eds.). *The Ecology of Aquatic Insects*. Praeger, New York. 625 pp.
- Casler, W. R., P. L. Houser, and G. L. Hutchison. 1978. A well inventory for the year 1976, Mississippi Palisades State Park. Casler, Houser & Hutchison, Inc. Jacksonville, Illinois. 26 pp.
- Chou, S. F. J. and W. R. Roy. 1993. An inter-laboratory comparison of soil and water pesticide analyses. Pages 285-298. *In*: Davis, M. (ed.). *Research on Agricultural Chemicals in Illinois Groundwater: Status and Future Directions. III. Proceedings of the Third Annual Conference, Illinois Groundwater Consortium, March 31-April 1, 1993*. Makanda, Illinois. 304 pp.
- Colbo, M. H. 1991. A comparison of the spring-inhabiting genera of Chironomidae from the Holarctic with those from natural and manmade springs in Labrador, Canada. Pages 169-179. *In*: Williams, D. D. and H. V. Danks (eds.). *Arthropods of springs, with particular reference to Canada*. *Memoirs of the Entomological Society of Canada* 155. 217 pp.

- Daubenmire, R. F. 1959. Canopy coverage method of vegetation analysis. *Northwest Science* 33:43-64.
- Daubenmire, R. F. 1968. *Plant communities: A textbook of plant synecology*. Harper and Row, New York. 300 pp.
- Davidson, F. A. and J. L. Wilding. 1943. A quantitative investigation of a cold spring community. *American Midland Naturalist* 29:200-209.
- Elton, C. S. 1966. *The pattern of animal communities*. Methuen, London.
- Erman, N. A. and D. C. Erman. 1990. Biogeography of caddisfly (Trichoptera) assemblages in cold springs of the Sierra Nevada (California, USA). Contribution 200, California Water Resources Center, University of California, Riverside, California.
- Evers, R. A. and L. M. Page. 1977. Some unusual natural areas in Illinois. *Illinois Natural History Survey, Biological Notes* 100:1-47.
- Forester, R. M. 1991. Ostracode assemblages from springs in the western United States: Implications for paleohydrology. Pages 181-201. *In: Williams, D. D. and H. V. Danks (eds.). Arthropods of springs, with particular reference to Canada. Memoirs of the Entomological Society of Canada* 155. 217 pp.
- Frison, T. H. 1942. Studies of North American Plecoptera with special reference to the fauna of Illinois. *Bulletin of the Illinois Natural History Survey* 22(2):235-355.
- Glazier, D. S. 1991. The fauna of North American temperate cold springs: patterns and hypotheses. *Freshwater Biology* 26:527-542.
- Glazier, D. W. and J. L. Gooch. 1987. Macroinvertebrate assemblages in Pennsylvania (U.S.A.) springs. *Hydrobiologia* 150:33-43.
- Gleason, H. A., and A. Cronquist. 1991. *Manual of vascular plants of northeastern United States and adjacent Canada*. The New York Botanical Garden, Bronx, N. Y. Second Edition. 910 pp.
- Gooch, J. L. and D. S. Glazier. 1991. Temporal and spatial patterns in mid-Appalachian springs. Pages 29-49. *In: Williams, D. D. and H. V. Danks (eds.). Arthropods of springs, with particular reference to Canada. Memoirs of the Entomological Society of Canada* 155. 217 pp.
- Herkert, J. R. 1991. *Endangered and threatened species of Illinois: status and distribution, Volume 1 - Plants*. Illinois Endangered Species Protection Board, Springfield. i + 158 pp.
- Herkert, J. R. 1992. *Endangered and threatened species of Illinois: status and distribution, Volume 2 - Animals*. Illinois Endangered Species Protection Board, Springfield. iv + 142 pp.
- Herkert, J. R. 1994. *Endangered and threatened species in Illinois: status and distribution, Volume 3 - 1994 changes to the Illinois list of endangered and threatened species*. Illinois Endangered Species Protection Board, Springfield. iv + 33 pp.

- Illinois Endangered Species Protection Board. 1994. Checklist of endangered and threatened animals and plants of Illinois. Illinois Endangered Species Protection Board, Springfield. ii + 20 pp.
- Kammerer, J. L. 1984. History of Hamilton, Illinois. Journal Printing Co., Carthage, Illinois. 94 pp.
- Lewis, J. J. and T. E. Bowman. 1981. The subterranean asellids (*Caecidotea*) of Illinois (Crustacea: Isopoda: Asellidae). *Smithsonian Contributions to Zoology* 335:1-66.
- Meffe, G. K. and P. C. Marsh. 1983. Distribution of aquatic macroinvertebrates in three Sonoran Desert springbrooks. *Journal of Arid Environments* 6:363-371.
- Minshall, G. W. 1968. Community dynamics of the benthic fauna in a woodland springbrook. *Hydrobiologia* 32:305-339.
- Mohlenbrock, R. H. 1986. Guide to the vascular flora of Illinois. Southern Illinois University Press, Carbondale. VIII + 507 pp.
- Palmer, G. T. 1909. The medicinal springs of Illinois. Pages 62-75. *In*: Bartow, E., J. A. Udden, S. W. Parr, and G. T. Palmer. The mineral content of Illinois waters. *Bulletin of the Illinois State Geological Survey* 10: 1-192.
- Panno, S. V., I. G. Krapac, C. P. Weibel, and J. D. Bade. 1996. Ground-water contamination in karst terrain of southwestern Illinois. *Illinois State Geological Survey Environmental Geology* 151:1-43.
- Paulson, G. A. 1972. Trout Park (Elgin Botanical Gardens) Master Plan. Illinois Nature Preserves Commission, Rockford. August 11, 1972.
- Peck, S. B. and J. J. Lewis. 1978. Zoogeography and evolution of the subterranean invertebrate faunas of Illinois and southeastern Missouri. *National Speleological Society Bulletin* 40(2):39-63.
- Pritchard, G. 1991. Insects in thermal springs. Pages 89-106. *In*: Williams, D. D. and H. V. Danks (eds.). *Arthropods of springs, with particular reference to Canada. Memoirs of the Entomological Society of Canada* 155. 217 pp.
- Ring, R. A. 1991. The insect fauna and some other characteristics of natural salt springs on Saltspring Island, British Columbia. Pages 51-61. *In*: Williams, D. D. and H. V. Danks (eds.). *Arthropods of springs, with particular reference to Canada. Memoirs of the Entomological Society of Canada* 155. 217 pp.
- Ross, H. H. 1944. The caddis flies, or Trichoptera, of Illinois. *Bulletin of the Illinois Natural History Survey* 23(1):1-326.
- Roughley, R. E. and D. J. Larson. 1991. Aquatic Coleoptera of springs in Canada. Pages 125-140. *In*: Williams, D. D. and H. V. Danks (eds.). *Arthropods of springs, with particular reference to Canada. Memoirs of the Entomological Society of Canada* 155. 217 pp.

- Sinclair, A. 1974. Selection of threshold values in geochemical data using probability graphs. *Geochemical Exploration* 3:129-149.
- Smith, I. M. 1991. Water mites (Acari: Parasitengona: Hydrachnida) of spring habitats in Canada. Pages 141-167. *In: Williams, D. D. and H. V. Danks (eds.). Arthropods of springs, with particular reference to Canada. Memoirs of the Entomological Society of Canada* 155. 217 pp.
- Stringer, L. B. 1911. History of Logan County, Illinois. A record of its settlement, organization, progress and achievement. Pioneer Publishing Co., Chicago. Volume 1, 630 pp.
- U. S. Department of the Interior, Fish and Wildlife Service. 1996. Endangered and threatened species, plant and animal taxa. Federal Register. Part III. 50 CFR Part 17. February 28, 1996.
- U. S. Environmental Protection Agency. 1988. Methods for the determination of organic compounds in drinking water. Method 508. U.S. EPA, Environmental Monitoring System Laboratory, Cincinnati, OH, EPA/600/4-88/039:171-198.
- Vinikour, W. S., and R. V. Anderson. 1981. Diptera larvae (Empididae and Chironomidae) in Trichoptera pupal cases (Glossosomatidae and Limnephilidae). *Entomological News* 92(2):69-74.
- Vinikour, W. S., and R. V. Anderson. 1984. Macroinvertebrates and fishes of Trout Park Nature Preserve, Elgin, Illinois. *Transactions of Illinois Academy of Sciences* 77(1/2):95-102.
- Webb, D. W., and R. E. DeWalt. 1997. A search for *Alloperla roberti* Surdick in northwestern Illinois (Plecoptera: Chloroperlidae). Illinois Natural History Survey, Center for Biodiversity, Technical Report 1997(11):1-15.
- Webb, D. W., P. C. Reed, and M. J. Wetzel. 1992. The Springs of Illinois: A Report on the Fauna, Flora, and Hydrogeology of Six Basic-Water Springs in Southern Illinois. Report to the Illinois Nature Preserves Commission. 41 pp.
- Webb, D. W., S. J. Taylor and J. K. Krejca. 1993. The Biological Resources of Illinois Caves and Other Subterranean Environments. Determination of the Diversity, Distribution, and Status of the Subterranean Faunas of Illinois Caves and How These Faunas are Related to Groundwater Quality. Illinois Natural History Survey, Center for Biodiversity, Technical Report 1993(8):1-127. The Environmental Protection Trust Fund Commission and the Illinois Department of Energy and Natural Resources.
- Webb, D. W., M. J. Wetzel, P. C. Reed, L. R. Phillippe, and M. A. Harris. 1995. Aquatic Biodiversity in Illinois Springs. Pages 93-107. *In: Biodiversity of Aquatic Insects and other Invertebrates in Springs. L. C. Ferrington, Jr. (ed.). Journal of the Kansas Entomological Society, Supplement to April 1995, Volume 69(2).* 165 pp.
- Webb, D. W., M. J. Wetzel, P. C. Reed, L. R. Phillippe, and T. C. Young. 1996. Biodiversity, hydrogeology, and water quality of 10 karst springs in the Salem Plateau Section of Illinois.

- Pages 146-185. *In* M. Davis, ed. Research on agricultural chemicals in Illinois groundwater: status and future directions VI. Illinois Groundwater Consortium. Proceedings of Sixth Annual Conference, Makanda, 27-28 March 1996. 320 pp.
- Williams, D. D. and H. V. Danks. 1991. Arthropods of springs: Introduction. Pages 3-5. *In*: Williams, D. D. and H. V. Danks (eds.). Arthropods of springs, with particular reference to Canada. *Memoirs of the Entomological Society of Canada* 155. 217 pp.
- Williams, D. D., N. E. Williams, and Y. Cao. 1997. Spatial differences in macroinvertebrate community structure in springs in southeastern Ontario in relation to their chemical and physical environments. *Canadian Journal of Zoology* 75:1404-1414.
- Williams, N. E. 1991. Geographical and environmental patterns in caddisfly (Trichoptera) assemblages from coldwater springs in Canada. Pages 107-124. *In*: Williams, D. D. and H. V. Danks (eds.). Arthropods of springs, with particular reference to Canada. *Memoirs of the Entomological Society of Canada* 155. 217 pp.
- Willman, H. B., and Others. 1967. Geologic map of Illinois. Illinois State Geological Survey.

APPENDIX 1:
Aquatic Macroinvertebrate Fauna

Phylum Annelida

- Class Turbellaria
 - Order Tricladida
 - Family Planariidae
 - Dugesia dorotocephala*
 - Phagocata gracilis*
 - Phagocata velata*
- Class Nematoda
 - Unidentified spp.
- Class Nematomorpha
 - Unidentified sp.
- Class Oligochaeta
 - Order Opisthopora
 - Family Lumbricidae
 - Unidentified spp.
 - Order Enchytraeida
 - Family Enchytraeidae
 - Achaeta* sp.
 - Unidentified spp.
 - Order Haplotaxida
 - Family Haplotaxidae
 - Haplotaxis* cf. *gordioides*
 - Order Lumbriculida
 - Family Lumbriculidae
 - Lumbriculus variegatus*
 - Unidentified sp B
 - Unidentified sp C
 - Unidentified sp D
 - Unidentified sp E
 - Order Tubificida
 - Family Naididae
 - Allonais paraguayensis*
 - Nais bretscheri*
 - Nais communis*
 - Nais elinguis*
 - Nais pardalis*
 - Nais variabilis*
 - Nais* sp.
 - Pristina leidy*
 - Family Tubificidae
 - Aulodrilus pluriset*
 - Ilyodrilus templetoni*
 - Limnodrilus cervix*
 - Limnodrilus hoffmeisteri*
 - Limnodrilus* sp.
 - Rhyacodrilus* cf. *montana*
 - Quistadrilus multisetosus*
 - Tubifex tubifex*
 - Quistadrilus multisetosus*
 - Varichaetadrilus angustipenis*
 - Tubificidae immature spp.

- Class Hirudinea
 - Order Pharyngobdellida
 - Family Erpobdellidae
 - Unidentifiable sp.

Phylum Arthropoda

- Class Crustacea
 - Order Amphipoda
 - Family Crangonyctidae
 - Bactrurus brachycaudus*
 - Bactrurus mucronatus*
 - Crangonyx forbesi*
 - Crangonyx gracilis*
 - Crangonyx minor*
 - Crangonyx richmondensis*
 - Stygobromus iowae*
 - Family Gammaridae
 - Gammarus fasciatus*
 - Gammarus minus*
 - Gammarus pseudolimnaeus*
 - Gammarus troglophilus*
 - Order Decapoda
 - Family Cambaridae
 - Cambarus diogenes*
 - Cambarus tenebrosus*
 - Orconectes virilis*
 - Procambarus gracilis*
 - Order Isopoda
 - Family Asellidae
 - Caecidotea bicrenata*
 - Caecidotea brevicauda*
 - Caecidotea intermedia*
 - Caecidotea kendeighi*
 - Caecidotea packardi*
 - Caecidotea* n. sp.
 - Order Ostracoda
 - Family Cypridae
 - Candona* sp.
 - Candona sigmoides*
 - Cypridopsis vidua*
 - Ilyocypris gibba*
 - Potamocypris pallida*
 - Unidentified species #4
 - Unidentified species #5
- Class Insecta
 - Order Coleoptera
 - Family Dryopidae
 - Helichus fastigiatus*
 - Helichus lithophilus*
 - Helichus striatus*
 - Family Dytiscidae
 - Acilius mediat*
 - Agabus confusus*
 - Agabus semivittatus*
 - Agabus seriatus*
 - Agabus* sp.
 - Copelatus glyphicus*
 - Coptotomus loticus*

- Hydroporus niger*
Ilbyius biguttulus
Ilbyius sp. (immatures)
Laccophilus fasciatus
Laccophilus maculosus
Liodessus sp. (immature)
Neoporus clypealis
Neoporus undulatus
Neoporus/Heterosternuta sp. (immature)
Sanfilippodytes planiusculus
Sanfilippodytes pseudovilis
- Family Elmidae
Dubiraphia vittata
Optioservus fastiditus
Stenelmis crenata
Stenelmis grossa
- Family Eubriidae
Ectopria leechi (?)
- Family Haliplidae
Peltodytes edentulus
Peltodytes sexmaculatus
- Family Heteroceridae
 Unidentified sp.
- Family Hydrophilidae
Anacaena limbata
Berosus fraternus
Berosus infuscatus
Berosus pantherinus
Berosus striatus
Cymbiodyta blanchardi
Cymbiodyta chamberlaini
Cymbiodyta sp.
Dibolocelus ovatus
Enochrus hamiltoni
Enochrus ochraceus
Enochrus pymaeus nebulosus
Enochrus sayi
Helophorus lineatus
Hydrobius tumidus (?)
Hydrochara spangleri
Hydrochus rufipes
Laccobius spangleri
Paracymus subcupreus
 Sphaeridiinae sp. (immature)
Tropisternus collaris
Tropisternus ellipticus
Tropisternus glaber
Tropisternus lateralis nimbatus
Tropisternus mixtus
- Family Psephenidae
Psephenus herricki
- Order Diptera
 Family Ceratopogonidae
Bezzia/Palpomyia sp.
Culicoides sp.
 Unidentified spp.
- Family Chaoboridae
Chaoborus (Sayomyia) punctipennis
- Family Chironomidae
Chironomus sp.
Corynoneura sp.
Cricotopus sp.
Eukiefferiella sp.
Orthocladius sp.
Parametriocnemus sp.
Rheocricotopus sp.
Polypedilum sp.
Micropsectra sp.
 Unidentified spp.
- Family Culicidae
Anopheles sp.
- Family Dixidae
Dixa sp.
- Family Ephydriidae
 Unidentified spp.
- Family Psychodidae
Psychoda sp.
- Family Ptychopteridae
Ptychoptera quadrifasciata
- Family Simuliidae
Simulium venustum
 Unidentified spp.
- Family Stratiomyidae
Euparyphus sp.
 Unidentified spp.
- Family Tabanidae
Tabanus sp.
- Family Tipulidae
Dicranota sp.
Limonia sp.
Pedicia albovittatus
Pedicia sp.
Pilaria sp.
Tipula abdominalis
Tipula sp.
 Unidentified spp.
- Order Ephemeroptera
 Family Ametropodidae
Siphloplecton sp.
- Family Baetidae
Baetis flavistriga
Baetis brunneicolor
Baetis tricaudatus
Callibaetis fluctuans
Cloeon sp.
Pseudocloeon sp.
- Family Caenidae
Caenis hilaris (?)
Caenis latipennis
- Family Ephemerellidae
Ephemerella sp.
- Family Ephemeridae
Ephemera sp.

Family Heptageniidae
 Epeorus sp.
 Stenonema femoratum
 Stenacron interpunctatum
 Family Leptophlebiidae
 Paraleptophlebia moerens
 Paraleptophlebia praepedita
 Family Potamanthidae
 Anthopotamus myops
 Order Heteroptera
 Family Corixidae
 Corisella edulis
 Sigara sp. (immature)
 Trichocorxia calva
 Trichocorxia kanza
 Family Gerridae
 Aquarius remigis
 Gerris marginatus
 Family Notonectidae
 Notonecta irrorata
 Family Veliidae
 Microvelia americana
 Microvelia fontinalis
 Microvelia hinei
 Order Megaloptera
 Family Corydalidae
 Chauliodes sp.
 Family Sialidae
 Sialis sp.
 Order Plecoptera
 Family Capniidae
 Allocapnia vivipara
 Family Leuctridae
 Leuctra tenuis
 Family Nemouridae
 Amphinemura delosa
 Amphinemura sp.
 Nemoura trispinosa
 Family Perlodidae
 Clioperla clio
 Order Trichoptera
 Family Glossosomatidae
 Agapetus illini
 Glossosoma intermedium
 Family Hydropsychidae
 Ceratopsyche bronta
 Ceratopsyche slossonae
 Chemuatopsyche campyla
 Cheumatopsyche pettiti
 Diplectronea modesta
 Hydropsyche betteni
 Hydropsyche bidens
 Hydropsyche orris
 Hydropsyche placoda
 Macrostemum zebratum
 Potamyia flava

Family Hydroptilidae
 Hydroptila ajax
 Hydroptila consimilis
 Ochrotrichia riesi
 Family Lepidostomatidae
 Lepidostoma libum
 Family Leptoceridae
 Ceraclea cancellata
 Ceraclea tarsipunctata
 Ceraclea transversa
 Leptocerus americanus
 Nectopsyche candida
 Oecetis cinerascens
 Oecetis inconspicua
 Triaenodes baris
 Triaenodes tardus
 Family Limnephilidae
 Anabolia consocia
 Drusinus uniformis
 Hesperophylax designatus
 Limnephilus rhombicus
 Pycnopsyche antica
 Family Philopotamidae
 Chimara obscura
 Wormaldia moestus
 Family Phryganeidae
 Phryganea sayi
 Ptilostomis semifasciata
 Family Polycentropodidae
 Cyrnellus fraternus
 Nyctiophylax vestitus
 Polycentropus cinereus
 Polycentropus interruptus
 Family Psychomyiidae
 Psychomyia flavida
 Family Rhyacophilidae
 Rhyacophila vibox
 Family Uenoidae
 Neophylax concinnus
 Class Mollusca
 Order Gastropoda
 Family Hydrobiidae
 Amnicola sp.
 Family Physidae
 Physella gyrina
 Physella sp.
 Family Planorbidae
 Gyraulus parvus
 Helisoma sp.
 Family Pleuroceridae
 Elimia sp.
 Order Pelecypoda
 Family Sphaeriidae
 Unidentified spp.

APPENDIX 2

Average Mean Cover, Relative Frequency, Percent Relative Average Mean Cover, and Percent Importance Value for floral components determined for various Illinois Springs

Cole Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Ulmus americana</i>	100.00	36.94	44.44	46.98	45.71
<i>Quercus rubra</i>	50.00	08.81	22.22	11.21	16.72
<i>Prunus serotina</i>	25.00	15.31	11.11	19.47	15.29
<i>Celtis occidentalis</i>	12.50	10.63	05.56	13.52	09.54
<i>Juglans nigra</i>	25.00	02.25	11.11	02.86	06.98
<i>Populus deltoides</i>	12.50	04.69	05.56	05.96	05.76
SHRUB					
<i>Cornus drummondii</i>	12.50	01.88	50.00	50.00	50.00
<i>Rosa multiflora</i>	12.50	01.88	50.00	50.00	50.00
VINES					
<i>Toxicodendron radicans</i>	25.00	00.44	100.00	100.00	100.00
HERBS					
<i>Phalaris arundinacea</i>	25.00	12.50	04.45	30.58	17.52
<i>Cryptotaenia canadensis</i>	62.50	07.88	11.11	19.28	15.20
<i>Pilea pumila</i>	50.00	04.19	08.89	10.25	09.57
<i>Sanicula odorata</i>	12.50	04.69	02.22	11.48	06.85
<i>Leersia virginica</i>	37.50	02.63	06.67	06.44	06.56
<i>Aster simplex</i>	37.50	02.00	06.67	04.89	05.78
<i>Aster ontarionis</i>	12.50	01.88	02.22	04.60	03.41
<i>Cinna arundinacea</i>	25.00	00.75	04.45	01.84	03.15
<i>Rumex obtusifolius</i>	25.00	00.75	04.45	01.84	03.15
<i>Polygonatum punctatum</i>	25.00	00.44	04.45	01.08	02.77
<i>Eupatorium rugosum</i>	25.00	00.13	04.45	00.32	02.39
<i>Lactuca floridana</i>	25.00	00.13	04.45	00.32	02.39
<i>Ranunculus abortivus</i>	25.00	00.13	04.44	00.32	02.38
<i>Viola sororia</i>	25.00	00.13	04.44	00.32	02.38
<i>Amphicarpa bracteata</i>	12.50	00.38	02.22	00.93	01.57
<i>Carex</i> sp.	12.50	00.38	02.22	00.93	01.57
<i>Festuca obtusa</i>	12.50	00.38	02.22	00.93	01.57
<i>Glyceria striata</i>	12.50	00.38	02.22	00.93	01.57
<i>Lobelia siphilitica</i>	12.50	00.38	02.22	00.93	01.57
<i>Prunella vulgaris</i>	12.50	00.38	02.22	00.93	01.57
<i>Acalypha rhomboidea</i>	12.50	00.06	02.22	00.14	01.18
<i>Aster lateriflorus</i>	12.50	00.06	02.22	00.14	01.18
<i>Carex blanda</i>	12.50	00.06	02.22	00.14	01.18
<i>Impatiens</i> sp.	12.50	00.06	02.22	00.14	01.18
<i>Phlox divaricata</i>	12.50	00.06	02.22	00.15	01.18
<i>Trifolium repens</i>	12.50	00.06	02.22	00.15	01.18

Payson Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I. V.
TREES					
<i>Ulmus americana</i>	66.67	40.83	22.22	40.29	31.26
<i>Celtis occidentalis</i>	100.00	17.67	33.33	17.44	25.38
<i>Platanus occidentalis</i>	100.00	14.50	33.33	14.31	23.82
<i>Aesculus glabra</i>	33.33	28.33	11.12	27.96	19.54
SHRUBS					
<i>Symphoricarpos orbiculatus</i>	33.33	05.00	50.00	83.33	66.66
<i>Rosa multiflora</i>	33.33	01.00	50.00	16.67	33.34
VINES					
<i>Parthenocissus quinquefolia</i>	33.33	01.00	100.00	100.00	100.00
HERBS					
<i>Pilea pumila</i>	100.00	22.50	10.35	21.77	16.06
<i>Phalaris arundinacea</i>	66.66	13.50	06.89	13.06	09.98
<i>Carex squarrosa</i>	66.67	10.00	06.89	09.68	08.29
<i>Glyceria striata</i>	33.33	12.50	03.45	12.10	07.78
<i>Polygonum punctatum</i>	66.67	06.00	06.90	05.81	06.36
<i>Aster lateriflorus</i>	66.67	06.00	06.89	05.81	06.35
<i>Cryptotaenia canadensis</i>	66.67	06.00	06.89	05.81	06.35
<i>Carex conjuncta</i>	66.67	05.17	06.89	05.00	05.95
<i>Polygonum cespitosum</i>	66.67	02.00	06.90	01.93	04.42
<i>Acalypha deamii</i>	33.33	05.00	03.45	04.84	04.14
<i>Geum canadensis</i>	33.33	05.00	03.45	04.84	04.14
<i>Viola sororia</i>	33.33	05.00	03.45	04.84	04.14
<i>Verbena urticifolia</i>	66.67	00.33	06.90	00.31	03.60
<i>Solanum americanum</i>	33.33	01.00	03.45	00.97	02.21
<i>Taraxacum officinale</i>	33.33	01.00	03.45	00.97	02.21
<i>Acalypha rhomboidea</i>	33.33	01.00	03.45	00.97	02.21
<i>Bidens frondosa</i>	33.33	01.00	03.45	00.97	02.21
<i>Oxalis</i> sp.	33.33	00.17	03.45	00.16	01.80
<i>Trifolium repens</i>	33.33	00.17	03.45	00.16	01.80

Wand Spring

	%	Ave.	%	%	%
	Frequency	Mean Cover	Relative Frequency	Relative Ave. Mean Cover	I. V.
TREES					
<i>Acer saccharum</i>	33.33	24.58	22.23	35.49	28.86
<i>Quercus alba</i>	33.33	18.75	22.22	27.08	24.65
<i>Betula nigra</i>	16.67	10.42	11.11	15.05	13.08
<i>Ulmus americana</i>	16.67	10.42	11.11	15.05	13.08
<i>Celtis occidentalis</i>	16.67	02.50	11.11	03.61	07.36
<i>Ostrya virginiana</i>	16.67	02.50	11.11	03.61	07.36
<i>Acer saccharinum</i>	16.67	00.08	11.11	00.11	05.61
SHRUBS					
<i>Rosa multiflora</i>	16.67	06.25	100.00	100.00	100.00
HERBS					
<i>Nasturtium officinale</i>	83.33	34.75	11.63	34.28	22.96
<i>Impatiens capensis</i>	33.33	24.58	04.65	24.25	14.45
<i>Leersia oryzoides</i>	66.67	15.92	09.30	15.70	12.50
<i>Pilea pumila</i>	66.67	05.58	09.30	05.50	07.40
<i>Polygonum punctatum</i>	50.00	03.50	06.98	03.45	05.22
<i>Acalypha rhomboidea</i>	50.00	03.08	06.98	03.03	05.01
<i>Bidens cernua</i>	50.00	01.08	06.98	01.07	04.03
<i>Polygonum persicaria</i>	33.33	03.00	04.65	02.96	03.80
<i>Cyperus sp.</i>	33.33	00.58	04.65	00.57	02.61
<i>Plantago rugelii</i>	33.33	00.58	04.65	00.57	02.61
<i>Trifolium repens</i>	33.33	00.17	04.65	00.16	02.40
<i>Cyperus rivularis</i>	16.67	02.50	02.32	02.47	02.39
<i>Phalaris arundinacea</i>	16.67	02.50	02.33	02.47	02.39
<i>Typha latifolia</i>	16.67	02.50	02.33	02.47	02.39
<i>Aster lateriflorus</i>	16.67	00.50	02.32	00.49	01.40
<i>Eclipta prostrata</i>	16.67	00.08	02.33	00.08	01.21
<i>Oxalis sp.</i>	16.67	00.08	02.33	00.08	01.21
<i>Panicum dichotomiflorum</i>	16.67	00.08	02.33	00.08	01.21
<i>Ranunculus abortivus</i>	16.67	00.08	02.33	00.08	01.21
<i>Carex sp.</i>	16.67	00.08	02.32	00.08	01.20
<i>Digitaria sp.</i>	16.67	00.08	02.32	00.08	01.20
<i>Echinochloa crusgalli</i>	16.67	00.08	02.32	00.08	01.20

Spring East of Siloam Spring #2

	%	Ave.	%	%	%
	Frequency	Mean Cover	Relative Frequency	Relative Ave. Mean Cover	I. V.
TREES					
<i>Acer saccharum</i>	70.00	31.25	25.93	43.80	34.86
<i>Quercus alba</i>	60.00	17.05	22.23	23.90	23.07
<i>Ulmus americana</i>	40.00	09.55	14.82	13.39	14.10
<i>Sassafras albidum</i>	30.00	01.85	11.11	02.59	06.85
<i>Cercis canadensis</i>	10.00	06.25	03.70	08.76	06.23
<i>Fraxinus americana</i>	20.00	01.80	07.41	02.52	04.97
<i>Carpinus caroliniana</i>	10.00	01.50	03.70	02.10	02.90
<i>Quercus velutina</i>	10.00	01.50	03.70	02.10	02.90
<i>Carya ovata</i>	10.00	00.30	03.70	00.42	02.06
<i>Juniperus virginiana</i>	10.00	00.30	03.70	00.42	02.06
SHRUBS					
<i>Rubus allegheniensis</i>	30.00	01.60	75.00	96.97	85.99
<i>Rubus occidentalis</i>	10.00	00.05	25.00	03.03	14.01
VINES					
<i>Parthenocissus quinquefolia</i>	40.00	02.15	80.00	58.90	69.45
<i>Toxicodendron radicans</i>	10.00	01.50	20.00	41.10	30.55
HERBS					
<i>Amphicarpa bracteata</i>	50.00	11.60	04.39	12.80	08.60
<i>Carex stricta</i>	40.00	11.55	03.51	12.75	08.13
<i>Equisetum arvense</i>	70.00	07.60	06.14	08.39	07.27
<i>Aster lateriflorus</i>	80.00	06.70	07.01	07.40	07.21
<i>Pilea pumila</i>	80.00	05.25	07.01	05.79	06.40
<i>Galium triflorum</i>	50.00	07.10	04.39	07.84	06.12
<i>Eupatorium rugosum</i>	50.00	03.90	04.39	04.30	04.35
<i>Leersia virginica</i>	70.00	02.30	06.14	02.54	04.34
<i>Cryptotaenia canadensis</i>	50.00	03.65	04.39	04.03	04.21
<i>Glyceria striata</i>	40.00	04.40	03.51	04.86	04.19
<i>Solidago rugosa</i>	10.00	03.75	00.88	04.14	02.51
<i>Impatiens capensis</i>	40.00	01.20	03.51	01.32	02.42
<i>Carex granularis</i>	30.00	01.85	02.63	02.04	02.34
<i>Geum canadense</i>	30.00	01.85	02.63	02.04	02.34
<i>Lobelia siphilitica</i>	30.00	01.85	02.63	02.04	02.34
<i>Prunella vulgaris</i>	30.00	00.90	02.63	00.99	01.81
<i>Anemone virginiana</i>	20.00	01.55	01.75	01.71	01.73
<i>Desmodium paniculatum</i>	20.00	01.55	01.75	01.71	01.73
<i>Festuca obtusa</i>	30.00	00.65	02.63	00.72	01.68
<i>Phlox divaricata</i>	30.00	00.40	02.63	00.44	01.53
<i>Carex hirtifolia</i>	10.00	01.50	00.88	01.66	01.27
<i>Laportea canadensis</i>	10.00	01.50	00.88	01.66	01.27
<i>Rudbeckia triloba</i>	10.00	01.50	00.88	01.66	01.27
<i>Scirpus atrovirens</i>	10.00	01.50	00.88	01.66	01.27
<i>Solidago gigantea</i>	10.00	01.50	00.88	01.66	01.27
<i>Circaea luteana</i>	20.00	00.40	01.75	00.44	01.09
<i>Carex muhlenbergii</i>	20.00	00.35	01.75	00.39	01.07
<i>Galium concinnum</i>	20.00	00.35	01.75	00.39	01.07

Spring East of Siloam Spring #2 (continued)

<i>Polemonium reptans</i>	20.00	00.35	01.75	00.39	01.07
<i>Polystichum acrostichoides</i>	20.00	00.35	01.75	00.39	01.07
<i>Erigeron annuus</i>	20.00	00.10	01.75	00.11	00.93
<i>Glechoma hederacea</i>	20.00	00.10	01.75	00.11	00.93
<i>Carex pensylvanica</i>	10.00	00.30	00.88	00.33	00.60
<i>Galium aparine</i>	10.00	00.30	00.88	00.33	00.60
<i>Teucrium canadense</i>	10.00	00.30	00.88	00.33	00.60
<i>Viola</i> sp.	10.00	00.30	00.88	00.33	00.60
<i>Arisaema triphyllum</i>	10.00	00.05	00.88	00.05	00.47
<i>Fragaria virginiana</i>	10.00	00.05	00.88	00.05	00.46
<i>Oxalis</i> sp.	10.00	00.05	00.88	00.06	00.46
<i>Poa pratensis</i>	10.00	00.05	00.88	00.05	00.46
<i>Ranunculus abortivus</i>	10.00	00.05	00.88	00.05	00.46
<i>Ranunculus recurvatus</i>	10.00	00.05	00.88	00.05	00.46

Ferguson Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Tilia americana</i>	100.00	26.83	42.86	28.70	35.78
<i>Ulmus rubra</i>	66.67	33.33	28.58	35.65	32.11
<i>Acer saccharum</i>	33.33	20.83	14.28	22.28	18.28
<i>Quercus rubra</i>	33.33	12.50	14.28	13.37	13.83
SHRUBS					
<i>Rosa multiflora</i>	33.33	12.50	50.00	80.65	65.32
<i>Hydrangea arborescens</i>	33.33	03.00	50.00	19.35	34.68
VINES					
<i>Parthenocissus quinquefolia</i>	66.67	06.00	66.67	54.55	60.61
<i>Toxicodendron radicans</i>	33.33	05.00	33.33	45.45	39.39
HERBS					
<i>Eupatorium rugosum</i>	33.33	05.00	07.14	17.64	12.39
<i>Penthorum sedoides</i>	33.33	05.00	07.14	17.64	12.39
<i>Campanula americana</i>	66.67	02.00	14.29	07.06	10.68
<i>Aquilegia canadensis</i>	33.33	03.00	07.14	10.59	08.87
<i>Aster drummondii</i>	33.33	03.00	07.14	10.59	08.87
<i>Aster lateriflorus</i>	33.33	03.00	07.14	10.59	08.87
<i>Woodsia obtusa</i>	33.33	03.00	07.14	10.59	08.87
<i>Amphicarpa bracteata</i>	33.33	01.00	07.14	03.53	05.33
<i>Circaea lutetiana</i>	33.33	01.00	07.15	03.53	05.33
<i>Festuca obtusa</i>	33.33	01.00	07.15	03.53	05.33
<i>Polygonum punctatum</i>	33.33	01.00	07.15	03.53	05.33
<i>Geum canadense</i>	33.33	00.17	07.14	00.59	03.87

Long Spring (Calhoun County)

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I. V.
TREES					
<i>Ostrya virginiana</i>	33.33	25.83	21.43	29.27	25.35
<i>Acer saccharum</i>	33.33	12.50	21.43	14.16	17.80
<i>Fraxinus pennsylvanica</i>	22.22	13.89	14.29	15.74	15.02
<i>Quercus rubra</i>	22.22	13.61	14.29	15.42	14.85
<i>Ulmus americana</i>	22.22	11.11	14.29	12.59	13.44
<i>Carya ovalis</i>	11.11	09.44	07.14	10.69	08.91
<i>Cornus florida</i>	11.11	01.88	07.14	02.13	04.63
SHRUBS					
<i>Hydrangea arborescens</i>	11.11	01.88	100.00	100.00	100.00
HERBS					
<i>Trifolium repens</i>	22.22	11.11	03.63	24.64	14.13
<i>Polygonum periscaria</i>	66.67	07.06	10.91	15.66	13.29
<i>Pilea pumila</i>	22.22	07.00	03.64	15.52	09.58
<i>Poa pratensis</i>	44.44	05.06	07.27	11.22	09.25
<i>Festuca elatior</i>	33.33	03.67	05.45	08.14	06.80
<i>Leersia virginica</i>	44.44	02.11	07.27	04.68	05.97
<i>Polygonum arenastrum</i>	22.22	03.33	03.64	07.39	05.52
<i>Perilla frutescens</i>	33.33	01.78	05.45	03.95	04.70
<i>Parietaria pensylvanica</i>	33.33	00.45	05.45	01.00	03.23
<i>Plantago rugelii</i>	33.33	00.44	05.45	00.98	03.22
<i>Viola</i> sp.	22.22	00.39	03.63	00.87	02.25
<i>Cystopteris protrusa</i>	22.22	00.33	03.64	00.73	02.19
<i>Stellaria media</i>	22.22	00.28	03.63	00.62	02.13
<i>Eupatorium rugosum</i>	22.22	00.11	03.64	00.25	01.95
<i>Chenopodium album</i>	11.11	00.33	01.82	00.73	01.28
<i>Oxalis</i> sp.	11.11	00.33	01.82	00.73	01.28
<i>Solanum carolinense</i>	11.11	00.33	01.82	00.73	01.28
<i>Trifolium pratense</i>	11.11	00.33	01.82	00.73	01.28
<i>Acalypha virginica</i>	11.11	00.06	01.82	00.13	00.97
<i>Artemisia annua</i>	11.11	00.06	01.82	00.13	00.97
<i>Aster</i> sp.	11.11	00.06	01.82	00.13	00.97
<i>Bromus commutatus</i>	11.11	00.06	01.82	00.13	00.97
<i>Capsella bursa-pastoris</i>	11.11	00.06	01.82	00.13	00.97
<i>Erigeron philadelphicus</i>	11.11	00.06	01.82	00.13	00.97
<i>Hordeum pusillum</i>	11.11	00.06	01.82	00.13	00.97
<i>Panicum lanuginosum</i>	11.11	00.06	01.82	00.13	00.97
<i>Ranunculus recurvatus</i>	11.11	00.06	01.82	00.13	00.97
<i>Verbena urticifolia</i>	11.11	00.06	01.82	00.13	00.97
<i>Veronica peregrina</i>	11.11	00.06	01.82	00.13	00.97

McNabb Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Ulmus americana</i>	55.56	26.39	27.78	35.37	31.57
<i>Platanus occidentalis</i>	44.44	14.44	22.22	19.36	20.79
<i>Acer negundo</i>	33.33	11.17	16.67	14.97	15.82
<i>Celtis occidentalis</i>	22.22	11.11	11.11	14.89	13.00
<i>Juglans nigra</i>	11.11	09.44	05.56	12.65	09.10
<i>Prunus serotina</i>	11.11	01.67	05.56	02.24	03.90
<i>Gleditsia triacanthos</i>	11.11	00.33	05.55	00.44	03.00
<i>Juniperus virginiana</i>	11.11	00.06	05.55	00.08	02.82
SHRUBS					
<i>Corylus americana</i>	11.11	01.67	33.33	49.12	41.23
<i>Viburnum rufidulum</i>	11.11	01.67	33.33	49.12	41.23
<i>Cornus drummondii</i>	11.11	00.06	33.34	01.76	17.54
VINES					
<i>Toxicodendron radicans</i>	11.11	01.67	33.33	93.82	63.57
<i>Parthenocissus quinquefolius</i>	22.22	00.11	66.67	06.18	36.43
HERBS					
<i>Glyceria striata</i>	77.78	30.61	07.87	32.80	20.34
<i>Festuca elatior</i>	33.33	07.50	03.37	08.04	05.71
<i>Bidens</i> sp.	55.56	05.39	05.62	05.78	05.70
<i>Pilea pumila</i>	55.56	03.78	05.62	04.05	04.84
<i>Rumex obtusifolius</i>	33.33	05.00	03.37	05.36	04.37
<i>Plantago rugelli</i>	55.56	02.72	05.62	02.92	04.27
<i>Polygonum</i> sp.	33.33	03.67	03.37	03.93	03.65
<i>Veronica peregrina</i>	55.56	00.83	05.62	00.89	03.26
<i>Elymus villosus</i>	22.22	03.33	02.25	03.57	02.91
<i>Impatiens</i> sp.	22.22	03.33	02.25	03.57	02.91
<i>Carex grisea?</i>	33.33	02.06	03.37	02.21	02.79
<i>Geum canadense</i>	33.33	02.06	03.37	02.21	02.79
<i>Festuca obtusa</i>	22.22	02.00	02.25	02.14	02.20
<i>Poa pratensis</i>	22.22	02.00	02.25	02.14	02.20
<i>Cerastium vulgatum</i>	33.33	00.72	03.37	00.77	02.07
<i>Erigeron annuus</i>	22.22	01.72	02.25	01.84	02.05
<i>Aster</i> sp.	22.22	00.67	02.25	00.72	01.49
<i>Carex normalis</i>	11.11	01.67	01.12	01.79	01.46
<i>Lactuca</i> sp.	11.11	01.67	01.12	01.79	01.46
<i>Panicum clandestinum</i>	11.11	01.67	01.12	01.79	01.46
<i>Polygonum persicaria</i>	11.11	01.67	01.12	01.79	01.46
<i>Samolus valerandii</i>	11.11	01.67	01.12	01.79	01.46
<i>Sphenopholis obtusa</i>	11.11	01.67	01.12	01.79	01.46
<i>Trifolium repens</i>	11.11	01.67	01.12	01.79	01.46
<i>Echinochloa crusgalli</i>	22.22	00.39	02.25	00.42	01.34
<i>Veronica arvensis</i>	22.22	00.39	02.25	00.42	01.34
<i>Ranunculus abortivus</i>	22.22	00.39	02.25	00.42	01.33
<i>Erigeron philadelphicus</i>	22.22	00.11	02.25	00.12	01.18
<i>Perilla frutescens</i>	22.22	00.11	02.25	00.12	01.18

McNabb Spring (continued)

<i>Botrychium virginianum</i>	11.11	00.33	01.12	00.35	00.73
<i>Dactylis glomerata</i>	11.11	00.33	01.12	00.35	00.73
<i>Galium aparine</i>	11.11	00.33	01.13	00.35	00.73
<i>Parietaria pensylvanica</i>	11.11	00.33	01.13	00.35	00.73
<i>Phryma leptostachya</i>	11.11	00.33	01.13	00.35	00.73
<i>Oxalis</i> sp.	11.11	00.33	01.12	00.35	00.73
<i>Taraxacum officinale</i>	11.11	00.33	01.13	00.35	00.73
<i>Xanthium strumarium</i>	11.11	00.11	01.12	00.12	00.62
<i>Acalypha rhomboidea</i>	11.11	00.06	01.12	00.07	00.59
<i>Ambrosia trifida</i>	11.11	00.06	01.12	00.07	00.59
<i>Commelina communis</i>	11.11	00.06	01.12	00.07	00.59
<i>Daucus carota</i>	11.11	00.06	01.12	00.07	00.59
<i>Juncus tenuis</i>	11.11	00.06	01.12	00.06	00.59
<i>Leersia virginica</i>	11.11	00.06	01.12	00.06	00.59
<i>Polygonum tenue</i>	11.11	00.06	01.12	00.06	00.59

Madison Spring

	%	Ave.		%	%	
	Frequency	Mean	%	Relative	Relative	%
		Cover	Frequency	Mean	Ave.	I. V.
				Cover		
TREES						
<i>Carpinus caroliniana</i>	57.14	33.57	16.00	26.86	21.43	
<i>Ulmus americana</i>	42.86	22.86	12.00	18.29	15.15	
<i>Acer saccharum</i>	42.86	19.64	12.00	15.72	13.86	
<i>Platanus occidentalis</i>	42.86	14.71	12.00	11.77	11.89	
<i>Ostrya virginiana</i>	28.57	11.07	08.00	08.86	08.43	
<i>Tilia americana</i>	14.29	12.14	04.00	09.71	06.86	
<i>Celtis occidentalis</i>	28.57	04.29	08.00	03.43	05.72	
<i>Carya glabra</i>	28.57	02.21	08.00	01.77	04.88	
<i>Fraxinus pennsylvanica</i>	28.57	02.21	08.00	01.77	04.88	
<i>Acer negundo</i>	28.57	00.14	08.00	00.11	04.05	
<i>Morus rubra</i>	14.29	02.14	04.00	01.71	02.85	
SHRUBS						
<i>Hydrangea arborescens</i>	42.86	11.14	60.00	83.45	71.72	
<i>Sambucus canadensis</i>	14.29	02.14	20.00	16.03	18.02	
<i>Rosa multiflora</i>	14.29	00.07	20.00	00.52	10.26	
VINES						
<i>Toxicodendron radicans</i>	14.29	02.14	33.33	81.06	57.19	
<i>Smilax hispida</i>	14.29	00.43	33.33	16.29	24.81	
<i>Parthenocissus quinquefolia</i>	14.29	00.07	33.34	02.65	18.00	
HERBS						
<i>Cryptotaenia canadensis</i>	57.14	11.93	08.00	17.38	12.69	
<i>Asarum canadense</i>	28.57	11.07	04.00	16.13	10.07	
<i>Cystopteris protrusa</i>	57.14	04.79	08.00	06.98	07.49	
<i>Rudbeckia laciniata</i>	28.57	07.50	04.00	10.93	07.47	
<i>Elymus virginicus</i>	42.86	04.71	06.00	06.86	06.43	
<i>Laportea canadensis</i>	28.57	05.79	04.00	08.44	06.22	
<i>Carex grisea</i>	42.86	03.00	06.00	04.37	05.19	
<i>Carex jamesii</i>	28.57	04.29	04.00	06.25	05.13	
<i>Polystichum acrostichoides</i>	28.57	04.29	04.00	06.25	05.13	
<i>Viola</i> sp.	28.57	02.57	04.00	03.74	03.87	
<i>Leersia virginica</i>	42.86	00.21	06.00	00.30	03.15	
<i>Phlox divaricata</i>	28.57	00.86	04.00	01.25	02.63	
<i>Impatiens</i> sp.	14.29	02.14	02.00	03.12	02.56	
<i>Uvularia perfoliata</i>	14.29	02.14	02.00	03.12	02.56	
<i>Circaea lutetiana</i>	28.57	00.50	04.00	00.73	02.36	
<i>Festuca obtusa</i>	28.57	00.50	04.00	00.73	02.36	
<i>Ranunculus abortivus</i>	28.57	00.14	04.00	00.20	02.10	
<i>Amphicarpa bracteata</i>	14.29	00.43	02.00	00.63	01.31	
<i>Arisaema triphyllum</i>	14.29	00.43	02.00	00.63	01.31	
<i>Poa sylvestris</i>	14.29	00.43	02.00	00.63	01.31	
<i>Thalictrum dioicum</i>	14.29	00.43	02.00	00.63	01.31	
<i>Aster lateriflorus</i>	14.29	00.07	02.00	00.10	01.05	
<i>Carex albursina</i>	14.29	00.07	02.00	00.10	01.05	
<i>Galium triflorum</i>	14.29	00.07	02.00	00.10	01.05	
<i>Geum canadense</i>	14.29	00.07	02.00	00.10	01.05	
<i>Lactuca</i> sp.	14.29	00.07	02.00	00.10	01.05	
<i>Poa pratensis</i>	14.29	00.07	02.00	00.10	01.05	
<i>Ranunculus recurvatus</i>	14.29	00.07	02.00	00.10	01.05	

Rhymer Spring

	%	Ave.	%	%	%
	Frequency	Mean Cover	Relative Frequency	Relative Ave. Mean Cover	I. V.
TREES					
<i>Quercus rubra</i>	90.00	39.25	34.62	42.12	38.37
<i>Ulmus americana</i>	60.00	10.85	23.08	11.64	17.36
<i>Platanus occidentalis</i>	40.00	17.55	15.38	18.83	17.11
<i>Cornus florida</i>	30.00	10.30	11.54	11.05	11.29
<i>Sassafras albidum</i>	10.00	06.25	03.85	06.71	05.28
<i>Celtis occidentalis</i>	10.00	03.75	03.84	04.02	03.93
<i>Fraxinus pennsylvanica</i>	10.00	03.75	03.84	04.02	03.93
<i>Cercis canadensis</i>	10.00	01.50	03.85	01.61	02.73
SHRUBS					
<i>Rosa multiflora</i>	40.00	06.80	57.13	67.33	62.23
<i>Hydrangea arborescens</i>	10.00	01.50	14.29	14.85	14.57
<i>Viburnum prunifolium</i>	10.00	01.50	14.29	14.85	14.57
<i>Symphoricarpos orbiculatus</i>	10.00	00.30	14.29	02.97	08.63
VINES					
<i>Toxicodendron radicans</i>	30.00	01.60	75.00	84.21	79.60
<i>Parthenocissus quinquefolia</i>	10.00	00.30	25.00	15.79	20.40
HERBS					
<i>Festuca pratensis</i>	70.00	17.55	10.00	37.26	23.63
<i>Equisetum arvense</i>	40.00	04.80	05.71	10.19	07.95
<i>Aster lateriflorus</i>	50.00	03.15	07.14	06.69	06.92
<i>Eupatorium rugosum</i>	30.00	03.30	04.29	07.01	05.65
<i>Conyza canadensis</i>	30.00	01.85	04.29	03.93	04.11
<i>Perilla frutescens</i>	30.00	01.85	04.29	03.93	04.11
<i>Panicum clandestinum</i>	20.00	01.80	02.86	03.82	03.34
<i>Polygonum pensylvanicum</i>	20.00	01.55	02.86	03.29	03.08
<i>Polygonatum punctatum</i>	30.00	00.65	04.29	01.38	02.84
<i>Sanicula odorata</i>	30.00	00.65	04.29	01.38	02.84
<i>Pilea pumila</i>	30.00	00.40	04.29	00.85	02.57
<i>Elymus virginicus</i>	10.00	01.50	01.43	03.18	02.31
<i>Leersia virginica</i>	10.00	01.50	01.43	03.18	02.31
<i>Oxalis</i> sp.	30.00	00.15	04.29	00.32	02.31
<i>Daucus carota</i>	10.00	01.50	01.42	03.18	02.30
<i>Prunella vulgaris</i>	20.00	00.35	02.86	00.74	01.80
<i>Carex blanda</i>	20.00	00.30	02.86	00.64	01.75
<i>Acalypha rhomboidea</i>	20.00	00.10	02.86	00.21	01.54
<i>Plantago virginica</i>	10.00	00.50	01.43	01.06	01.25
<i>Digitaria ischaemum</i>	10.00	00.50	01.42	01.06	01.24
<i>Brassica</i> sp.	10.00	00.30	01.42	00.64	01.03
<i>Carex squarrosa</i>	10.00	00.30	01.42	00.64	01.03
<i>Commelina communis</i>	10.00	00.30	01.42	00.64	01.03
<i>Erigeron annuus</i>	10.00	00.30	01.43	00.64	01.03
<i>Geum canadense</i>	10.00	00.30	01.43	00.64	01.03
<i>Muhlenbergia frondosa</i>	10.00	00.30	01.43	00.64	01.03
<i>Muhlenbergia schreberi</i>	10.00	00.30	01.43	00.64	01.03
<i>Polygonum scandens</i>	10.00	00.30	01.43	00.64	01.03
<i>Stellaria media</i>	10.00	00.30	01.43	00.64	01.03

Rhymer Spring (continued)

<i>Kummerowia stipulacea</i>	10.00	00.05	01.43	00.11	00.77
<i>Monarda fistulosa</i>	10.00	00.05	01.43	00.11	00.77
<i>Taraxacum officinale</i>	10.00	00.05	01.43	00.11	00.77
<i>Trifolium</i> sp.	10.00	00.05	01.43	00.11	00.77
<i>Anemone virginica</i>	10.00	00.05	01.42	00.10	00.76
<i>Cryptotaenia canadensis</i>	10.00	00.05	01.42	00.10	00.76
<i>Erigeron philadelphicus</i>	10.00	00.05	01.43	00.10	00.76
<i>Festuca obtusa</i>	10.00	00.05	01.43	00.10	00.76
<i>Galium triflorum</i>	10.00	00.05	01.43	00.10	00.76

Schuman Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Tilia americana</i>	66.67	56.67	28.57	58.92	43.73
<i>Carya cordiformis</i>	33.33	12.50	14.29	13.00	13.65
<i>Fraxinus americana</i>	33.33	12.50	14.29	13.00	13.65
<i>Quercus alba</i>	33.33	12.50	14.29	13.00	13.65
<i>Cornus florida</i>	33.33	01.00	14.28	01.04	07.66
<i>Ostrya virginiana</i>	33.33	01.00	14.28	01.04	07.66
SHRUBS					
<i>Rosa multiflora</i>	100.00	17.67	60.00	30.20	45.10
<i>Staphylea trifolia</i>	33.33	28.33	20.00	48.43	34.22
<i>Hydrangea arborescens</i>	33.33	12.50	20.00	21.37	20.68
VINES					
<i>Hedera helix</i>	33.33	20.83	50.00	99.19	74.60
<i>Parthenocissus quinquefolia</i>	33.33	00.17	50.00	00.81	25.40
HERBS					
<i>Glyceria striata</i>	33.33	05.00	07.69	19.60	13.64
<i>Prunella vulgaris</i>	33.33	05.00	07.69	19.60	13.64
<i>Rumex obtusifolius</i>	33.33	05.00	07.69	19.60	13.64
<i>Verbesina alternifolia</i>	33.33	05.00	07.69	19.60	13.64
<i>Pilea pumila</i>	66.67	01.00	15.38	03.92	09.65
<i>Carex jamesii</i>	33.33	01.00	07.69	03.92	05.81
<i>Cryptotaenia canadensis</i>	33.33	01.00	07.69	03.92	05.81
<i>Festuca pratensis</i>	33.33	01.00	07.69	03.92	05.81
<i>Geranium maculatum</i>	33.33	01.00	07.69	03.92	05.81
<i>Perilla frutescens</i>	33.33	00.17	07.70	00.67	04.19
<i>Festuca obtusa</i>	33.33	00.17	07.70	00.67	04.18
<i>Verbena urticifolia</i>	33.33	00.17	07.70	00.66	04.18

Spring Northeast of Schumann Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Platanus occidentalis</i>	75.00	46.25	33.33	41.29	37.31
<i>Carya cordiformis</i>	50.00	25.00	22.23	22.32	22.28
<i>Carpinus caroliniana</i>	25.00	21.25	11.11	18.97	15.04
<i>Acer saccharum</i>	25.00	15.63	11.11	13.95	12.53
<i>Ulmus americana</i>	25.00	03.75	11.11	03.35	07.23
<i>Cornus florida</i>	25.00	00.13	11.11	00.12	05.61
SHRUBS					
<i>Rosa multiflora</i>	25.00	09.38	50.00	92.60	71.30
<i>Ilex decidua</i>	25.00	00.75	50.00	07.40	28.70
VINES					
<i>Vitis riparia</i>	25.00	00.13	100.00	100.00	100.00
HERBS					
<i>Festuca pratensis</i>	75.00	25.75	10.34	37.50	23.92
<i>Poa compressa</i>	50.00	10.13	06.89	14.75	10.82
<i>Plantago rugelii</i>	50.00	07.50	06.89	10.92	08.91
<i>Stellaria media</i>	50.00	04.50	06.89	06.56	06.73
<i>Muhlenbergia schreberi</i>	25.00	03.75	03.45	05.46	04.46
<i>Asplenium platyneuron</i>	25.00	03.75	03.45	05.46	04.45
<i>Carex jamesii</i>	25.00	03.75	03.45	05.46	04.45
<i>Erigeron annuus</i>	25.00	03.75	03.45	05.46	04.45
<i>Perilla frutescens</i>	50.00	00.25	06.89	00.37	03.63
<i>Acalypha virginica</i>	25.00	00.75	03.45	01.09	02.27
<i>Ambrosia artemisiifolia</i>	25.00	00.75	03.45	01.09	02.27
<i>Cystopteris sp.</i>	25.00	00.75	03.45	01.09	02.27
<i>Geranium maculatum</i>	25.00	00.75	03.45	01.09	02.27
<i>Leersia virginica</i>	25.00	00.75	03.45	01.09	02.27
<i>Woodsia obtusa</i>	25.00	00.75	03.45	01.09	02.27
<i>Hypericum sp.</i>	25.00	00.13	03.45	00.19	01.82
<i>Oxalis sp.</i>	25.00	00.13	03.45	00.19	01.82
<i>Phlox divaricata</i>	25.00	00.13	03.45	00.19	01.82
<i>Pilea pumila</i>	25.00	00.13	03.45	00.19	01.82
<i>Polygonum arenastrum</i>	25.00	00.13	03.45	00.19	01.82
<i>Polystichum acrostichoides</i>	25.00	00.13	03.45	00.19	01.82
<i>Taraxacum officinale</i>	25.00	00.13	03.45	00.19	01.82
<i>Trifolium repens</i>	25.00	00.13	03.45	00.19	01.82

Old Settlers Spring

	%	Ave.		%	
	Frequency	Mean Cover	%	Relative Mean Cover	%
			Frequency	Ave. Cover	I.V.
TREES					
<i>Quercus muhlenbergii</i>	11.11	09.44	50.00	57.63	53.82
<i>Ulmus americana</i>	11.11	06.94	50.00	42.37	46.18
SHRUBS					
<i>Ilex decidua</i>	11.11	04.17	33.33	97.20	65.26
<i>Rosa setigera</i>	11.11	00.06	33.33	01.40	17.37
<i>Rubus</i> sp.	11.11	00.06	33.34	01.40	17.37
VINES					
<i>Lonicera japonica</i>	11.11	06.94	100.00	100.00	100.00
HERBS					
<i>Festuca pratensis</i>	88.89	11.94	09.20	14.44	11.82
<i>Nasturtium officinale</i>	77.78	12.11	08.04	14.65	11.35
<i>Lycopus</i> sp.	44.44	11.67	04.60	14.11	09.36
<i>Juncus tenuis</i>	66.67	05.72	06.89	06.92	06.91
<i>Melilotus alba</i>	55.56	05.67	05.74	06.86	06.30
<i>Echinochloa crusgalli</i>	33.33	07.50	03.45	09.07	06.26
<i>Carex frankii</i>	55.56	05.11	05.74	06.18	05.96
<i>Aster ontarionis</i>	55.56	01.83	05.74	02.21	03.98
<i>Scirpus atrovirens</i>	33.33	03.39	03.45	04.10	03.78
<i>Polygonum persicaria</i>	44.44	02.39	04.60	02.89	03.75
<i>Ambrosia artemisiifolia</i>	44.44	00.22	04.60	00.27	02.44
<i>Leersia oryzoides</i>	22.22	02.00	02.30	02.42	02.36
<i>Agrostis gigantea</i>	33.33	01.00	03.45	01.21	02.33
<i>Trifolium repens</i>	22.22	01.72	02.30	02.08	02.19
<i>Trifolium campestre</i>	11.11	01.67	01.15	02.02	01.59
<i>Carex annectens</i>	11.11	01.67	01.15	02.02	01.58
<i>Impatiens capensis</i>	11.11	01.67	01.15	02.02	01.58
<i>Mentha spicata</i>	11.11	01.67	01.15	02.02	01.58
<i>Verbena urticifolia</i>	22.22	00.67	02.30	00.81	01.56
<i>Erigeron philadelphicus</i>	22.22	00.39	02.30	00.47	01.38
<i>Plantago rugelii</i>	22.22	00.39	02.30	00.47	01.38
<i>Stellaria media</i>	22.22	00.39	02.30	00.47	01.38
<i>Lemna minor</i>	22.22	00.11	02.30	00.13	01.22
<i>Glechoma hederacea</i>	11.11	00.33	01.15	00.40	00.77
<i>Lobelia siphilitica</i>	11.11	00.33	01.15	00.40	00.77
<i>Medicago lupulina</i>	11.11	00.33	01.15	00.40	00.77
<i>Verbascum thapsus</i>	11.11	00.33	01.15	00.40	00.77
<i>Bidens comosa</i>	11.11	00.06	01.15	00.07	00.61
<i>Digitaria</i> sp.	11.11	00.06	01.15	00.07	00.61
<i>Eclipta prostrata</i>	11.11	00.06	01.15	00.07	00.61
<i>Festuca obtusa</i>	11.11	00.06	01.15	00.07	00.61
<i>Glyceria striata</i>	11.11	00.06	01.15	00.07	00.61
<i>Leersia virginica</i>	11.11	00.06	01.15	00.07	00.61
<i>Phleum pratense</i>	11.11	00.06	01.15	00.07	00.61
<i>Ranunculus abortivus</i>	11.11	00.06	01.15	00.07	00.61

Allerton Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Acer saccharinum</i>	12.50	07.81	14.28	31.47	22.88
<i>Crataegus crusgalli</i>	12.50	00.38	14.29	01.53	07.91
<i>Crataegus punctata</i>	12.50	00.38	14.29	01.53	07.91
<i>Salix nigra</i>	25.00	09.69	28.57	39.04	33.80
<i>Ulmus rubra</i> 25.00	06.56	28.57	26.43	27.50	
SHRUB					
<i>Ceanothus americanus</i>	12.50	00.38	25.00	01.36	13.18
<i>Rosa setigera</i>	37.50	27.50	75.00	98.64	86.82
VINES					
<i>Parthenocissus quinquefolia</i>	12.50	02.50	14.29	14.23	14.26
<i>Toxicodendron radicans</i>	62.50	10.38	71.42	59.08	65.25
<i>Vitis cinerea</i>	12.50	04.69	14.29	26.69	20.49
HERBS					
<i>Agrostis gigantea</i>	62.50	04.88	05.81	03.37	04.59
<i>Andropogon gerardii</i>	50.00	04.50	04.65	03.11	03.88
<i>Apocynum cannabinum</i>	62.50	09.38	05.81	06.48	06.15
<i>Asclepias verticillata</i>	12.50	00.06	01.17	00.04	00.60
<i>Aster lanceolatus</i>	12.50	00.06	01.16	00.04	00.60
<i>Aster lateriflorus</i>	50.00	00.81	04.65	00.56	02.61
<i>Boehmeria cylindrica</i>	37.50	05.63	03.49	03.89	03.69
<i>Carex annectens</i>	25.00	02.25	02.33	01.56	01.95
<i>Cerastium vulgatum</i>	25.00	00.44	02.33	00.31	01.32
<i>Cirsium discolor</i>	12.50	00.38	01.16	00.26	00.71
<i>Daucus carota</i>	25.00	00.44	02.33	00.31	01.32
<i>Desmodium</i> sp.	12.50	00.06	01.16	00.04	00.60
<i>Eleocharis verrucosa</i>	25.00	15.63	02.33	10.80	06.57
<i>Epilobium coloratum</i>	37.50	03.81	03.49	02.63	03.06
<i>Eupatorium altissimum</i>	12.50	00.38	01.16	00.26	00.71
<i>Eupatorium serotinum</i>	62.50	06.06	05.81	04.19	05.00
<i>Galium triflorum</i>	25.00	00.38	02.33	00.26	01.29
<i>Geum laciniatum</i>	12.50	02.25	01.16	01.56	01.36
<i>Hypericum sphaerocarpum</i>	37.50	02.63	03.49	01.82	02.66
<i>Juncus canadensis</i>	37.50	04.13	03.49	02.86	03.17
<i>Juncus dudleyi</i>	12.50	00.38	01.16	00.26	00.71
<i>Lespedeza virginica</i>	12.50	00.38	01.16	00.26	00.71
<i>Lycopus</i> sp.	50.00	04.50	04.65	03.11	03.88
<i>Phleum pratense</i>	25.00	02.25	02.33	01.56	01.94
<i>Poa compressa</i>	12.50	00.38	01.16	00.26	00.71
<i>Poa pratensis</i>	37.50	06.94	03.49	04.80	04.14
<i>Prunella vulgaris</i>	37.50	00.50	03.49	00.35	01.92
<i>Pycnanthemum pilosum</i>	12.50	00.06	01.16	00.04	00.60
<i>Scirpus pendulus</i>	87.50	43.81	08.14	30.28	19.21
<i>Solidago canadensis</i>	100.00	14.31	09.30	09.89	09.60
<i>Solidago juncea</i>	12.50	00.06	01.16	00.04	00.60
<i>Sorghastrum nutans</i>	12.50	04.69	01.16	03.24	02.20
<i>Vernonia missurica</i>	25.00	02.25	02.33	01.56	01.94

Airhart Spring

	%	Ave.		%	%	
	Frequency	Mean Cover		Relative Frequency	Relative Ave. Mean Cover	I.V.
TREES						
<i>Juglans nigra</i>	10.00	00.30	11.11	01.41	06.26	
<i>Juniperus virginiana</i>	10.00	00.30	11.11	11.11	01.41	06.26
<i>Populus deltoides</i>	10.00	00.05	11.11	11.11	00.23	05.67
<i>Salix nigra</i>	20.00	00.60	22.22	22.22	02.82	12.52
<i>Tilia americana</i>	30.00	11.55	33.34	33.34	54.22	43.78
<i>Ulmus americana</i>	10.00	08.50	11.11	11.11	39.91	25.51
SHRUB						
<i>Rubus occidentalis</i>	10.00	00.30	100.00	100.00	100.00	100.00
VINES						
<i>Parthenocissus quinquefolia</i>	10.00	00.30	50.00	50.00	16.66	33.33
<i>Vitis riparia</i>	10.00	01.50	50.00	50.00	83.34	66.67
HERBS						
<i>Agrostis gigantea</i>	10.00	00.30	01.07	01.07	00.15	00.61
<i>Alliaria petiolata</i>	40.00	07.15	04.30	04.30	03.63	03.97
<i>Amphicarpa bracteata</i>	30.00	03.05	03.23	03.23	01.55	02.39
<i>Apios americana</i>	70.00	16.00	07.53	07.53	08.12	07.82
<i>Aster lanceolatus</i>	10.00	00.30	01.07	01.07	00.15	00.61
<i>Aster lateriflorus</i>	50.00	05.90	05.38	05.38	03.00	04.19
<i>Aster praealtus</i>	10.00	00.30	01.07	01.07	00.15	00.61
<i>Aster puniceus</i>	10.00	00.30	01.07	01.07	00.15	00.61
<i>Caltha palustris</i>	30.00	06.75	03.23	03.23	03.43	03.33
<i>Campanula americana</i>	10.00	00.30	01.07	01.07	00.15	00.61
<i>Campanula aparinoides</i>	50.00	05.10	05.38	05.38	02.59	03.99
<i>Carex stricta</i>	60.00	41.75	06.45	06.45	21.19	13.82
<i>Cicuta maculata</i>	20.00	01.80	02.15	02.15	00.91	01.53
<i>Cryptotaenia canadensis</i>	10.00	00.05	01.07	01.07	00.03	00.55
<i>Equisetum arvensis</i>	70.00	04.20	07.53	07.53	02.13	04.83
<i>Erigeron annuus</i>	20.00	00.35	02.15	02.15	00.18	01.16
<i>Eupatorium maculatum</i>	60.00	18.25	06.45	06.45	09.26	07.86
<i>Galium triflorum</i>	10.00	00.05	01.07	01.07	00.03	00.55
<i>Geranium maculatum</i>	10.00	00.30	01.07	01.07	00.15	00.61
<i>Impatiens capensis</i>	80.00	36.55	08.60	08.60	18.55	13.58
<i>Juncus</i> sp.	10.00	00.30	01.07	01.07	00.15	00.61
<i>Lycopus americanus</i>	30.00	01.85	03.23	03.23	00.94	02.08
<i>Nasturtium officinale</i>	70.00	13.80	07.53	07.53	07.01	07.27
<i>Pilea</i> sp.	30.00	02.10	03.23	03.23	01.07	02.15
<i>Poa pratensis</i>	10.00	01.50	01.08	01.08	00.76	00.92
<i>Senecio aureus</i>	50.00	19.00	05.38	05.38	09.64	07.51
<i>Solidago canadensis</i>	10.00	03.75	01.08	01.08	01.90	01.49
<i>Solidago gigantea</i>	30.00	05.55	03.23	03.23	02.82	03.03
<i>Taraxacum officinale</i>	10.00	00.05	01.08	01.08	00.03	00.55
<i>Viola sororia</i>	20.00	00.35	02.15	02.15	00.18	01.16

Five Spring Complex

	%	Ave.		%		%
	Frequency	Mean Cover	%	Relative Frequency	%	Relative Ave. Cover
						I.V.
TREES						
<i>Carya cordiformis</i>	20.00	03.00	08.69	02.30	05.49	
<i>Celtis occidentalis</i>	20.00	05.25	08.69	04.02	06.35	
<i>Fraxinus americana</i>	10.00	00.30	04.35	00.23	02.30	
<i>Juglans cinerea</i>	10.00	08.50	04.35	06.51	05.43	
<i>Juglans nigra</i>	30.00	18.75	13.04	14.36	13.70	
<i>Morus rubra</i>	10.00	09.75	04.35	07.47	05.91	
<i>Quercus macrocarpa</i>	20.00	13.50	08.70	10.34	09.52	
<i>Tilia americana</i>	100.00	63.00	43.48	48.26	45.87	
<i>Ulmus rubra</i>	10.00	08.50	04.35	06.51	05.43	
SHRUB						
<i>Cornus obliqua</i>	10.00	00.30	16.67	01.57	09.12	
<i>Cornus racemosa</i>	10.00	03.75	16.68	19.58	18.13	
<i>Prunus virginiana</i>	10.00	00.05	16.67	00.26	08.46	
<i>Ribes americana</i>	30.00	15.05	50.00	78.59	64.29	
VINES						
<i>Lonicera prolifera</i>	20.00	03.80	22.22	19.05	20.63	
<i>Menispermum canadense</i>	10.00	01.50	11.11	07.52	09.31	
<i>Parthenocissus quinquefolia</i>	30.00	08.05	33.34	40.35	36.85	
<i>Smilax hispida</i>	20.00	06.30	22.22	31.58	26.90	
<i>Toxicodendron radicans</i>	10.00	00.30	11.11	01.50	06.31	
HERBS						
<i>Alliaria petiolata</i>	20.00	00.10	02.08	00.08	01.08	
<i>Amphicarpa bracteata</i>	30.00	10.30	03.13	08.40	05.77	
<i>Aquilegia canadensis</i>	10.00	01.50	01.04	01.22	01.13	
<i>Arisaema triphyllum</i>	50.00	02.70	05.21	02.20	03.71	
<i>Aster lanceolatus</i>	20.00	03.80	02.08	03.10	02.59	
<i>Caltha palustris</i>	40.00	02.40	04.17	01.96	03.07	
<i>Campanula americana</i>	10.00	00.05	01.04	00.04	00.54	
<i>Carex blanda</i>	20.00	01.80	02.08	01.47	01.78	
<i>Carex pensylvanica</i>	10.00	03.75	01.04	03.06	02.05	
<i>Cicuta maculata</i>	10.00	01.50	01.04	01.22	01.13	
<i>Cinna arundinacea</i>	20.00	01.80	02.08	01.47	01.77	
<i>Circaea lutetiana</i>	30.00	04.50	03.13	03.67	03.40	
<i>Cryptotaenia canadensis</i>	80.00	09.20	08.34	07.50	07.92	
<i>Desmodium glutinosum</i>	20.00	03.00	02.08	02.45	02.27	
<i>Elymus villosus</i>	10.00	00.05	01.04	00.04	00.54	
<i>Eupatorium rugosum</i>	20.00	01.80	02.08	01.47	01.77	
<i>Festuca obtusa</i>	30.00	06.75	03.13	05.50	04.31	
<i>Galium concinnum</i>	30.00	03.10	03.13	02.53	02.83	
<i>Galium triflorum</i>	10.00	01.50	01.04	01.22	01.13	
<i>Geranium maculatum</i>	30.00	04.35	03.13	03.55	03.34	
<i>Geum canadense</i>	30.00	03.85	03.13	03.14	03.14	
<i>Hackelia virginiana</i>	10.00	01.50	01.04	01.22	01.13	
<i>Impatiens capensis</i>	30.00	23.25	03.13	18.96	11.05	

Five Spring Complex (continued)

<i>Leersia virginica</i>	50.00	06.15	05.21	05.01	05.11
<i>Lilium michiganense</i>	10.00	00.30	01.04	00.24	00.64
<i>Osmorhiza longistylis</i>	10.00	00.05	01.04	00.04	00.54
<i>Phlox divaricata</i>	20.00	00.35	02.08	00.29	01.18
<i>Phryma leptostachya</i>	10.00	01.50	01.04	01.22	01.13
<i>Pilea</i> sp.	50.00	03.65	05.21	02.98	04.09
<i>Prenanthes alba</i>	20.00	00.35	02.08	00.29	01.18
<i>Ranunculus septentrionalis</i>	20.00	03.80	02.08	03.10	02.59
<i>Rudbeckia tribloba</i>	10.00	01.50	01.04	01.22	01.13
<i>Sanguinaria canadensis</i>	20.00	00.35	02.08	00.29	01.18
<i>Sanicula odorata</i>	40.00	06.00	04.17	04.89	04.53
<i>Silphium perfoliatum</i>	20.00	04.05	02.08	03.30	02.69
<i>Smilacina racemosa</i>	10.00	00.05	01.04	00.04	00.54
<i>Smilacina stellata</i>	40.00	00.95	04.17	00.77	02.47
<i>Solidago gigantea</i>	10.00	00.30	01.04	00.24	00.64
<i>Viola sororia</i>	50.00	00.75	05.21	00.61	02.91

Nadig Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Juglans nigra</i>	20.00	06.55	11.11	07.06	09.08
<i>Morus alba</i>	20.00	06.55	11.11	07.06	09.08
<i>Prunus serotina</i>	10.00	08.50	05.55	09.17	07.36
<i>Quercus alba</i>	60.00	37.25	33.33	40.16	36.74
<i>Quercus rubra</i>	10.00	00.30	05.56	00.32	02.95
<i>Ulmus americana</i>	30.00	09.10	16.67	09.81	13.24
<i>Ulmus rubra</i>	30.00	24.50	16.67	26.42	21.55
SHRUB					
<i>Cornus racemosa</i>	30.00	03.30	21.43	11.28	16.36
<i>Corylus americana</i>	10.00	01.50	07.14	05.13	06.14
<i>Prunus virginiana</i>	10.00	06.25	07.14	21.37	14.26
<i>Ribes cynosbati</i>	10.00	00.30	07.14	01.03	04.08
<i>Ribes missouriensis</i>	30.00	14.00	21.43	47.86	34.64
<i>Rubus occidentalis</i>	20.00	03.00	14.29	10.25	12.27
<i>Sambucus canadensis</i>	20.00	00.60	14.29	02.05	08.17
<i>Viburnum prunifolium</i>	10.00	00.30	07.14	01.03	04.08
VINES					
<i>Menispermum canadense</i>	10.00	00.30	11.11	01.65	06.38
<i>Parthenocissus quinquefolia</i>	40.00	14.30	44.45	78.57	61.51
<i>Smilax hispida</i>	10.00	00.30	11.11	01.65	06.38
<i>Toxicodendron radicans</i>	30.00	03.30	33.33	18.13	25.73
HERBS					
<i>Adiantum pedatum</i>	20.00	08.80	01.96	06.30	
<i>Alliaria petiolata</i>	40.00	05.85	03.92	04.19	
<i>Amphicarpa bracteata</i>	60.00	08.85	05.89	06.34	
<i>Angelica atropurpurea</i>	10.00	03.75	00.98	02.69	
<i>Apios americana</i>	20.00	04.05	01.96	02.90	
<i>Arisaema triphyllum</i>	10.00	00.30	00.98	00.21	
<i>Aster lateriflorus</i>	30.00	04.50	02.94	03.22	
<i>Aster prenanthoides</i>	80.00	17.40	07.84	12.47	
<i>Athyrium filix-femina</i>	10.00	01.50	00.98	01.08	
<i>Cinna arundinacea</i>	20.00	00.60	01.96	00.43	
<i>Cryptotaenia canadensis</i>	70.00	12.60	06.87	09.03	
<i>Epilobium sp.</i>	10.00	00.30	00.98	00.21	
<i>Erigeron annuus</i>	10.00	00.30	00.98	00.21	
<i>Erigeron philadelphicus</i>	20.00	00.60	01.96	00.43	
<i>Eupatorium rugosum</i>	20.00	00.60	01.96	00.43	
<i>Festuca obtusa</i>	80.00	08.40	07.84	06.02	
<i>Galium aparine</i>	10.00	01.50	00.98	01.07	
<i>Galium triflorum</i>	20.00	00.60	01.96	00.43	
<i>Geranium maculatum</i>	10.00	03.75	00.98	02.69	
<i>Geum canadense</i>	20.00	01.80	01.96	01.29	
<i>Hydrophyllum virginianum</i>	60.00	00.55	05.89	00.40	
<i>Impatiens capensis</i>	10.00	00.30	00.98	00.21	
<i>Laportea canadensis</i>	20.00	07.50	01.96	05.37	

Nadig Spring (continued)

<i>Nasturtium officinale</i>	40.00	03.90	03.92	02.79
<i>Osmorhiza longistylis</i>	20.00	01.80	01.96	01.29
<i>Phalaris arundinacea</i>	10.00	00.30	00.98	00.21
<i>Phryma leptostachya</i>	40.00	03.35	03.92	02.40
<i>Pilea pumila</i>	60.00	02.25	05.89	01.61
<i>Ranunculus recurvatus</i>	30.00	01.85	02.94	01.35
<i>Rudbeckia laciniata</i>	40.00	15.25	03.92	10.93
<i>Sanicula odorata</i>	30.00	04.50	02.94	03.22
<i>Silene nivea</i>	10.00	00.30	00.98	00.21
<i>Silphium perfoliatum</i>	10.00	03.75	00.98	02.69
<i>Smilacina racemosa</i>	10.00	00.30	00.98	00.21
<i>Solidago gigantea</i>	10.00	00.30	00.98	00.21
<i>Thalictrum revolutum</i>	30.00	06.75	02.94	04.84
<i>Veronicastrum virginicum</i>	10.00	00.30	00.98	00.21
<i>Viola sororia</i>	10.00	00.30	00.98	00.21

Plum Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Celtis occidentalis</i>	25.00	24.38	25.00	33.05	29.03
<i>Quercus macrocarpa</i>	75.00	49.38	75.00	66.95	70.97
SHRUB					
<i>Cornus drummondii</i>	25.00	09.38	25.00	40.33	32.67
<i>Rosa multiflora</i>	50.00	13.13	50.00	56.45	53.22
<i>Salix amygdaloides</i>	25.00	00.75	25.00	03.22	14.11
VINES					
<i>Parthenocissus quinquefolia</i>	50.00	01.50	66.67	66.67	66.67
<i>Toxicodendron radicans</i>	25.00	00.75	33.33	33.33	33.33
HERBS					
<i>Agrostis gigantea</i>	50.00	01.50	06.45	01.12	03.79
<i>Ambrosia trifida</i>	25.00	00.75	03.22	00.56	01.89
<i>Arctium minus</i>	50.00	04.50	06.45	03.35	04.90
<i>Atriplex</i> sp.	25.00	03.75	03.22	02.79	03.00
<i>Cryptotaenia canadensis</i>	25.00	09.38	03.23	06.98	05.11
<i>Daucus carota</i>	50.00	03.88	06.45	02.89	04.67
<i>Eupatorium rugosum</i>	25.00	00.75	03.23	00.56	01.89
<i>Geum canadense</i>	25.00	03.75	03.22	02.79	03.00
<i>Impatiens capensis</i>	75.00	11.25	09.68	08.37	09.03
<i>Leonurus cardiaca</i>	50.00	00.25	06.45	00.19	03.32
<i>Myosoton aquaticum</i>	100.00	05.38	12.90	04.00	08.45
<i>Nasturtium officinale</i>	75.00	11.25	09.68	08.37	09.03
<i>Phalaris arundinacea</i>	100.00	76.88	12.90	57.20	35.05
<i>Poa pratensis</i>	25.00	00.75	03.23	00.56	01.89
<i>Polygonum persicaria</i>	25.00	00.13	03.23	00.09	01.66
<i>Taraxacum officinale</i>	25.00	00.13	03.23	00.09	01.66
<i>Trifolium pratense</i>	25.00	00.13	03.23	00.09	01.66

Randecker Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Acer negundo</i>	10.00	01.50	14.29	06.11	10.20
<i>Prunus serotina</i>	10.00	01.50	14.29	06.11	10.20
<i>Quercus macrocarpa</i>	40.00	20.05	57.13	81.67	69.40
<i>Ulmus americana</i>	10.00	01.50	14.29	06.11	10.20
SHRUB					
<i>Salix amygdaloides</i>	10.00	00.05	100.0	100.0	100.0
VINES					
<i>Vitis riparia</i>	30.00	03.30	100.0	100.0	100.0
HERBS					
<i>Aster lanceolatus</i>	20.00	00.60	02.35	00.45	01.40
<i>Aster lateriflorus</i>	10.00	00.30	01.17	00.23	00.70
<i>Aster pilosus</i>	10.00	00.30	01.17	00.23	00.70
<i>Bidens cernua</i>	40.00	08.25	04.71	06.16	05.44
<i>Bidens frondosa</i>	10.00	00.30	01.17	00.23	00.70
<i>Cirsium vulgare</i>	30.00	00.15	03.53	00.11	01.82
<i>Coronilla varia</i>	10.00	01.50	01.17	01.12	01.14
<i>Cryptotaenia canadensis</i>	10.00	03.75	01.17	02.80	01.98
<i>Echinochloa sp.</i>	10.00	00.30	01.17	00.22	00.69
<i>Elymus virginicus</i>	10.00	00.30	01.18	00.22	00.69
<i>Epilobium coloratum</i>	20.00	00.60	02.35	00.45	01.40
<i>Erigeron annuus</i>	10.00	00.30	01.18	00.22	00.69
<i>Festuca elatior</i>	20.00	04.05	02.35	03.02	02.69
<i>Galium aparine</i>	10.00	01.50	01.18	01.12	01.15
<i>Geum canadense</i>	10.00	01.50	01.18	01.12	01.15
<i>Glechoma hederacea</i>	70.00	04.25	08.24	03.17	05.71
<i>Impatiens capensis</i>	30.00	16.00	03.53	11.95	07.74
<i>Leersia virginica</i>	10.00	00.30	01.18	00.22	00.69
<i>Leonurus cardiaca</i>	10.00	00.30	01.18	00.22	00.70
<i>Myosoton aquaticum</i>	50.00	03.65	05.88	02.73	04.31
<i>Nasturtium officinale</i>	80.00	25.85	09.41	19.30	14.36
<i>Osmorhiza longistylis</i>	10.00	00.30	01.18	00.22	00.70
<i>Oxalis sp.</i>	10.00	00.05	01.18	00.04	00.61
<i>Phalaris arundinacea</i>	90.00	28.36	10.59	21.18	15.89
<i>Pilea sp.</i>	40.00	00.45	04.71	00.34	02.53
<i>Poa pratensis</i>	40.00	13.00	04.71	09.71	07.21
<i>Polygonum persicaria</i>	50.00	05.10	05.88	03.81	04.85
<i>Sanicula odorata</i>	10.00	01.50	01.18	01.12	01.15
<i>Scirpus atrovirens</i>	20.00	00.60	02.35	00.45	01.40
<i>Taraxacum officinale</i>	30.00	00.40	03.53	00.30	01.92
<i>Trifolium repens</i>	30.00	01.85	03.53	01.38	02.45
<i>Urtica dioica</i>	40.00	08.25	04.71	06.16	05.44

Sand Boil Spring

	%	Ave.		%	
	Frequency	Mean Cover	%	Relative Frequency	%
			Relative Frequency	Ave. Mean Cover	I. V.
TREES					
<i>Prunus serotina</i>	14.29	05.36	25.00	46.29	35.65
<i>Tilia americana</i>	14.29	05.36	25.00	46.29	35.65
<i>Ulmus americana</i>	14.29	00.43	25.00	03.71	14.35
<i>Ulmus rubra</i>	14.29	00.43	25.00	03.71	14.35
SHRUB					
<i>Cornus obliqua</i>	14.29	13.93	20.00	73.04	46.52
<i>Salix amygdaloides</i>	28.57	02.57	40.00	13.48	26.74
<i>Rosa multiflora</i>	28.57	02.57	40.00	13.48	26.74
VINES					
<i>Parthenocissus quinquefolia</i>	14.29	02.14	100	100	100
HERBS					
<i>Agrostis gigantea</i>	28.57	04.29	02.22	02.24	02.23
<i>Amphicarpa bracteata</i>	14.29	02.14	01.11	01.12	01.12
<i>Apios americana</i>	57.14	25.36	04.45	13.23	08.84
<i>Aster lateriflorus</i>	14.29	00.43	01.11	00.22	00.66
<i>Aster prenanthoides</i>	42.86	04.71	03.34	02.46	02.90
<i>Bidens cernua</i>	28.57	02.57	02.22	01.34	01.78
<i>Boehmeria cylindrica</i>	57.14	06.29	04.45	03.28	03.87
<i>Campanula aparinoides</i>	71.43	15.43	05.56	08.05	06.81
<i>Carex cristatella</i>	14.29	00.43	01.11	00.22	00.66
<i>Carex hystericina</i>	28.57	02.57	02.22	01.34	01.78
<i>Carex stricta</i>	57.14	25.36	04.45	13.23	08.84
<i>Carex vulpinoides</i>	28.57	00.86	02.22	00.45	01.34
<i>Circaea lutetiana</i>	28.57	02.21	02.22	01.15	01.69
<i>Cryptotaenia canadensis</i>	28.57	02.57	02.22	01.34	01.78
<i>Cystopteris protrusa</i>	14.29	00.07	01.11	00.04	00.58
<i>Eleocharis erythropoda</i>	14.29	12.14	01.11	06.33	03.72
<i>Equisetum arvense</i>	57.14	06.64	04.45	03.46	03.96
<i>Erigeron annuus</i>	14.29	00.43	01.11	00.22	00.66
<i>Erigeron philadelphicus</i>	14.29	00.07	01.11	00.04	00.58
<i>Eupatorium perfoliatum</i>	57.14	16.86	04.45	08.79	06.62
<i>Fragaria virginiana</i>	14.29	00.43	01.11	00.22	00.66
<i>Galium triflorum</i>	14.29	00.43	01.11	00.22	00.66
<i>Geum canadense</i>	14.29	00.43	01.11	00.22	00.66
<i>Glyceria striata</i>	28.57	04.29	02.22	02.24	02.23
<i>Impatiens capensis</i>	85.71	15.86	06.67	08.27	07.47
<i>Juncus dudleyi</i>	14.29	00.43	01.11	00.22	00.66
<i>Lemna minor</i>	14.29	00.43	01.11	00.22	00.66
<i>Leersia oryzoides</i>	14.29	05.36	01.11	02.80	01.96
<i>Lobelia siphilitica</i>	28.57	04.29	02.22	02.24	02.23
<i>Lycopus sp.</i>	57.14	01.36	04.45	00.71	02.58
<i>Onoclea sensibilis</i>	14.29	02.14	01.11	01.12	01.12
<i>Oxalis sp.</i>	14.29	00.07	01.11	00.04	00.58
<i>Pilea pumila</i>	14.29	00.43	01.11	00.22	00.66
<i>Poa pratensis</i>	42.86	06.43	03.34	03.36	03.35

Sand Boil Spring (continue)

<i>Polygonum persicaria</i>	14.29	05.36	01.11	02.80	01.96
<i>Potentilla simplex</i>	14.29	00.43	01.11	00.22	00.66
<i>Ranunculus recurvatus</i>	14.29	00.43	01.11	00.22	00.66
<i>Sanicula odorata</i>	14.29	00.43	01.11	00.22	00.66
<i>Scirpus atrovirens</i>	28.57	02.14	02.22	01.12	01.66
<i>Scirpus cyperinus</i>	14.29	00.43	01.11	00.22	00.67
<i>Scutellaria lateriflora</i>	57.14	03.43	04.45	01.79	03.12
<i>Solidago gigantea</i>	28.57	04.29	02.22	02.24	02.23
<i>Sphenopholis obtusa</i>	14.29	00.07	01.11	00.04	00.58
<i>Stellaria media</i>	14.29	00.43	01.11	00.22	00.66
<i>Taraxacum officinale</i>	14.29	00.07	01.11	00.04	00.58
<i>Viola sororia</i>	14.29	00.43	01.11	00.22	00.66

Sand Boil Tributary Spring

	%	Ave.		%	
	Frequency	Mean	%	Relative	%
		Cover	Frequency	Ave.	I.V.
				Mean	
				Cover	
TREES					
<i>Acer negundo</i>	20.00	12.25	10.00	12.15	11.07
<i>Celtis occidentalis</i>	30.00	03.00	15.00	02.98	08.99
<i>Juglans nigra</i>	30.00	13.75	15.00	13.64	14.32
<i>Tilia americana</i>	50.00	32.00	25.00	31.75	28.38
<i>Ulmus americana</i>	40.00	27.25	20.00	27.03	23.52
<i>Ulmus rubra</i>	30.00	12.55	15.00	12.45	13.72
SHRUB					
<i>Cornus alternifolia</i>	30.00	03.85	42.86	35.32	39.09
<i>Cornus drummondii</i>	10.00	01.50	14.28	13.76	14.02
<i>Cornus racemosa</i>	10.00	03.75	14.28	34.41	24.35
<i>Ribes missouriense</i>	10.00	00.30	14.29	02.75	08.52
<i>Sambucus canadensis</i>	10.00	01.50	14.29	13.76	14.02
VINES					
<i>Parthenocissus quinquefolia</i>	50.00	12.80	41.67	82.05	61.86
<i>Smilax hispida</i>	50.00	01.00	41.67	06.41	24.04
<i>Toxicodendron radicans</i>	20.00	01.80	16.66	11.54	14.10
HERBS					
<i>Adiantum pedatum</i>	50.00	03.40	04.54	03.27	03.90
<i>Alliaria petiolata</i>	80.00	19.80	07.27	19.03	13.15
<i>Amphicarpa bracteata</i>	10.00	00.30	00.91	00.29	00.60
<i>Aquilegia canadensis</i>	10.00	01.50	00.91	01.44	01.17
<i>Arabis laevigata</i>	20.00	00.60	01.82	00.58	01.20
<i>Aster lateriflorus</i>	10.00	00.30	00.91	00.29	00.60
<i>Aster prenanthoides</i>	10.00	00.30	00.91	00.29	00.60
<i>Athyrium filix-femina</i>	20.00	01.80	01.82	01.73	01.77
<i>Campanula americana</i>	20.00	03.00	01.82	02.88	02.35
<i>Carex blanda</i>	40.00	03.60	03.63	03.46	03.55
<i>Chenopodium sp.</i>	10.00	00.30	00.91	00.29	00.60
<i>Cinna arundinacea</i>	10.00	00.05	00.91	00.05	00.47
<i>Circaea lutetiana</i>	30.00	04.50	02.73	04.32	03.53
<i>Cirsium altissimum</i>	10.00	01.50	00.91	01.44	01.17
<i>Cryptotaenia canadensis</i>	50.00	04.85	04.54	04.66	04.60
<i>Cystopteris protrusa</i>	40.00	00.70	03.63	00.67	02.15
<i>Desmodium glutinosum</i>	10.00	00.30	00.91	00.29	00.60
<i>Equisetum arvense</i>	10.00	00.30	00.91	00.29	00.60
<i>Erigeron philadelphicus</i>	20.00	01.80	01.82	01.73	01.77
<i>Eupatorium rugosum</i>	50.00	02.45	04.54	02.35	03.45
<i>Festuca obtusa</i>	50.00	08.65	04.54	08.31	06.43
<i>Galium triflorum</i>	40.00	03.60	03.63	03.46	03.55
<i>Geranium maculatum</i>	40.00	03.60	03.64	03.46	03.55
<i>Geum canadense</i>	30.00	03.30	02.73	03.17	02.95
<i>Glyceria striata</i>	10.00	01.50	00.91	01.44	01.17
<i>Hypericum sp.</i>	10.00	00.30	00.91	00.29	00.60
<i>Laportea canadensis</i>	10.00	01.50	00.91	01.44	01.18
<i>Leersia virginica</i>	30.00	04.10	02.73	03.94	03.34

Sand Boil Tributary Spring (continue)

<i>Lobelia inflata</i>	10.00	00.30	00.91	00.29	00.60
<i>Lobelia siphilitica</i>	10.00	00.30	00.91	00.29	00.60
<i>Onoclea sensibilis</i>	20.00	00.10	01.82	00.10	00.96
<i>Osmorhiza longistylis</i>	40.00	02.40	03.64	02.31	02.98
<i>Oxalis</i> sp.	20.00	00.35	01.82	00.34	01.08
<i>Phryma leptostachya</i>	20.00	00.60	01.82	00.58	01.20
<i>Pilea pumila</i>	90.00	13.00	08.18	12.49	10.34
<i>Polygonum virginianum</i>	10.00	00.30	00.91	00.29	00.60
<i>Ranunculus abortivus</i>	30.00	00.90	02.73	00.86	01.80
<i>Sanicula odorata</i>	30.00	03.30	02.73	03.17	02.95
<i>Scrophularia marilandica</i>	10.00	01.50	00.91	01.44	01.17
<i>Smilacina racemosa</i>	10.00	01.50	00.91	01.44	01.17
<i>Taraxacum officinale</i>	20.00	00.35	01.82	00.34	01.08
<i>Viola sororia</i>	50.00	01.25	04.54	01.20	02.87

Sorrel Horse Camp Spring

	%	Ave.		%	
	Frequency	Mean	%	Relative	%
		Cover	Frequency	Ave.	I.V.
			Mean	Cover	
TREES					
<i>Acer negundo</i>	22.22	08.61	11.76	11.64	11.70
<i>Malus pumila</i>	11.11	01.67	05.88	02.26	04.07
<i>Morus alba</i>	55.56	31.94	29.42	43.20	36.31
<i>Salix nigra</i>	44.44	10.61	23.53	14.35	18.94
<i>Ulmus americana</i>	33.33	12.78	17.65	17.28	17.47
<i>Ulmus rubra</i>	22.22	08.33	11.76	11.27	11.51
SHRUB					
<i>Cornus drummondii</i>	11.11	00.33	12.50	01.59	07.05
<i>Lonicera maackii</i>	66.67	20.11	75.00	96.82	85.90
<i>Rubus occidentalis</i>	11.11	00.33	12.50	01.59	07.05
VINES					
<i>Parthenocissus quinquefolia</i>	66.67	11.00	75.00	76.70	75.84
<i>Toxicodendron radicans</i>	11.11	01.67	12.50	11.65	12.08
<i>Vitis riparia</i>	11.11	01.67	12.50	11.65	12.08
HERBS					
<i>Alliaria petiolata</i>	11.11	04.17	00.80	02.50	01.65
<i>Amphicarpa bracteata</i>	66.67	10.00	04.80	06.00	05.40
<i>Anemone virginiana</i>	11.11	00.33	00.80	00.20	00.50
<i>Apios americana</i>	66.67	13.94	04.80	08.36	06.58
<i>Arisaema triphyllum</i>	22.22	00.67	01.60	00.40	01.00
<i>Aster lanceolatus</i>	22.22	00.67	01.60	00.40	01.00
<i>Aster lateriflorus</i>	33.33	01.00	02.40	00.60	01.50
<i>Aster novae-angliae</i>	11.11	01.67	00.80	01.00	00.90
<i>Aster prenanthoides</i>	77.78	16.78	05.60	10.06	07.83
<i>Boehmeria cylindrica</i>	11.11	00.06	00.80	00.04	00.42
<i>Campanula americana</i>	22.22	00.67	01.60	00.40	01.00
<i>Carex blanda</i>	66.67	04.39	04.80	02.63	03.71
<i>Cicuta maculata</i>	11.11	01.67	00.80	01.00	00.90
<i>Circaea lutetiana</i>	55.56	08.17	04.00	04.90	04.45
<i>Cryptotaenia canadensis</i>	77.78	09.00	05.60	05.40	05.50
<i>Elymus villosus</i>	22.22	00.39	01.60	00.23	00.91
<i>Erigeron annuus</i>	33.33	00.72	02.40	00.43	01.41
<i>Eupatorium rugosum</i>	44.44	05.33	03.20	03.20	03.20
<i>Festuca obtusa</i>	44.44	09.00	03.20	05.40	04.30
<i>Galium aparine</i>	11.11	00.33	00.80	00.20	00.50
<i>Galium triflorum</i>	77.78	17.83	05.60	10.69	08.15
<i>Geranium maculatum</i>	22.22	02.00	01.60	01.20	01.40
<i>Geum canadense</i>	22.22	00.67	01.60	00.40	01.00
<i>Hydrophyllum virginianum</i>	11.11	00.33	00.80	00.20	00.50
<i>Impatiens capensis</i>	22.22	00.39	01.60	00.22	00.91
<i>Lactuca sp.</i>	11.11	01.67	00.80	01.00	00.90
<i>Laportea canadensis</i>	22.22	02.00	01.60	01.20	01.40
<i>Leersia oryzoides</i>	44.44	01.33	03.20	00.80	02.00
<i>Lobelia siphilitica</i>	22.22	00.67	01.60	00.40	01.00
<i>Lycopus sp.</i>	22.22	00.67	01.60	00.40	01.00

Sorrel Horse Camp Spring (continued)

<i>Nasturtium officinale</i>	33.33	00.72	02.40	00.43	01.42
<i>Osmorhiza longistylis</i>	44.44	00.78	03.20	00.47	01.84
<i>Oxalis</i> sp.	11.11	00.06	00.80	00.04	00.42
<i>Phryma leptostachya</i>	11.11	00.33	00.80	00.20	00.50
<i>Pilea</i> sp.	22.22	00.39	01.60	00.22	00.91
<i>Plantago rugelii</i>	22.22	02.00	01.60	01.20	01.40
<i>Poa pratensis</i>	33.33	01.00	02.40	00.60	01.50
<i>Polymnia canadensis</i>	11.11	01.67	00.80	01.00	00.90
<i>Ranunculus recurvatus</i>	44.44	01.83	03.20	01.10	02.15
<i>Sanicula odorata</i>	100.00	35.83	07.20	21.48	14.34
<i>Silphium perfoliatum</i>	11.11	01.67	00.80	01.00	00.90
<i>Solidago gigantea</i>	11.11	01.67	00.80	01.00	00.90
<i>Taraxacum officinale</i>	11.11	00.33	00.80	00.20	00.50
<i>Urtica dioica</i>	22.22	02.00	01.60	01.20	01.40

Well House Spring

	%	Ave.		%	%
	Frequency	Mean Cover		Relative Frequency	Relative Ave. Mean Cover
					I. V.
TREES					
<i>Acer negundo</i>	30.00	21.00		10.71	12.54
<i>Celtis occidentalis</i>	40.00	08.10		14.29	09.91
<i>Fraxinus americana</i>	40.00	11.80		14.29	11.18
<i>Juglans nigra</i>	40.00	36.50		14.29	19.63
<i>Juniperus virginiana</i>	30.00	18.50		10.71	11.68
<i>Morus alba</i>	20.00	10.00		07.14	06.99
<i>Tilia americana</i>	10.00	00.30		03.57	01.89
<i>Ulmus americana</i>	50.00	27.50		17.86	18.34
<i>Ulmus rubra</i>	20.00	12.50		07.14	07.84
SHRUB					
<i>Cornus racemosa</i>	10.00	00.05		25.00	12.75
<i>Prunus virginiana</i>	10.00	09.75		25.00	60.52
<i>Ribes missouriense</i>	10.00	00.30		25.00	13.98
<i>Rubus occidentalis</i>	10.00	00.05		25.00	12.75
VINES					
<i>Parthenocissus quinquefolia</i>	40.00	07.05		50.00	48.27
<i>Smilax hispida</i>	20.00	01.80		25.00	18.44
<i>Vitis riparia</i>	20.00	06.30		25.00	33.29
HERBS					
<i>Alliaria petiolata</i>	80.00	20.85		12.12	17.04
<i>Aster lanceolatus</i>	20.00	01.80		03.03	02.46
<i>Aster lateriflorus</i>	20.00	01.55		03.03	02.33
<i>Campanula americana</i>	20.00	05.25		03.03	04.28
<i>Carex blanda</i>	10.00	00.30		01.51	00.91
<i>Carex rosea</i>	10.00	00.30		01.51	00.91
<i>Circaea lutetiana</i>	20.00	04.05		03.03	03.65
<i>Cryptotaenia canadensis</i>	30.00	02.10		04.55	03.38
<i>Eupatorium rugosum</i>	40.00	06.65		06.06	06.53
<i>Galium triflorum</i>	20.00	01.80		03.03	02.46
<i>Geum canadense</i>	10.00	01.50		01.51	01.54
<i>Impatiens capensis</i>	30.00	09.25		04.55	07.15
<i>Leersia virginica</i>	10.00	01.50		01.51	01.54
<i>Osmorhiza longistylis</i>	40.00	02.15		06.06	04.17
<i>Oxalis</i> sp.	20.00	00.35		03.03	01.70
<i>Phryma leptostachya</i>	30.00	03.30		04.55	04.02
<i>Pilea pumila</i>	70.00	06.00		10.61	08.47
<i>Poa pratensis</i>	10.00	03.75		01.51	02.73
<i>Ranunculus recurvatus</i>	30.00	00.15		04.55	02.36
<i>Sanicula canadensis</i>	10.00	01.50		01.51	01.54
<i>Sanicula odorata</i>	80.00	11.45		12.12	12.10
<i>Smilacina racemosa</i>	10.00	06.25		01.52	04.06
<i>Smilax ecirrhata</i>	10.00	00.05		01.52	00.79
<i>Viola sororia</i>	30.00	03.05		04.55	03.88

Mississippi Palisades State Park Spring #1

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Celtis occidentalis</i>	20.00	07.50	14.29	11.88	13.08
<i>Platanus occidentalis</i>	40.00	03.60	28.57	05.71	17.14
<i>Populus deltoides</i>	80.00	52.00	57.14	82.41	69.78
SHRUB					
<i>Cornus drummondii</i>	20.00	00.60	25.00	01.59	13.30
<i>Rhamnus cathartica</i>	60.00	37.10	75.00	98.41	86.70
VINES					
<i>Parthenocissus quinquefolia</i>	40.00	13.10	40.00	48.88	44.44
<i>Smilax hispida</i>	20.00	00.60	20.00	02.24	11.12
<i>Toxicodendron radicans</i>	20.00	00.60	20.00	02.24	11.12
<i>Vitis riparia</i>	20.00	12.50	20.00	46.64	33.32
HERBS					
<i>Alliaria petiolata</i>	20.00	00.60	03.45	00.76	02.10
<i>Apios americana</i>	20.00	00.10	03.45	00.13	01.79
<i>Aster lateriflorus</i>	20.00	00.60	03.45	00.76	02.10
<i>Cerastium nutans</i>	20.00	00.10	03.45	00.13	01.79
<i>Circaea lutetiana</i>	20.00	00.10	03.45	00.13	01.79
<i>Cryptotaenia canadensis</i>	20.00	00.60	03.45	00.76	02.10
<i>Geranium maculatum</i>	20.00	00.10	03.45	00.13	01.79
<i>Leersia virginica</i>	100.00	38.10	17.24	48.28	32.76
<i>Lythrum salicaria</i>	40.00	00.70	06.90	00.89	03.90
<i>Mentha arvensis</i>	20.00	03.00	03.45	03.80	03.63
<i>Nasturtium officinale</i>	60.00	06.10	10.34	07.73	09.04
<i>Pilea sp.</i>	40.00	00.70	06.89	00.89	03.89
<i>Poa pratensis</i>	60.00	23.10	10.34	29.27	19.81
<i>Rumex crispus</i>	20.00	00.60	03.45	00.76	02.10
<i>Taraxacum officinale</i>	80.00	03.80	13.79	04.82	09.31
<i>Trifolium repens</i>	20.00	00.60	03.45	00.76	02.10

Ice Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Acer negundo</i>	50.00	31.25	20.00	27.72	23.86
<i>Fraxinus nigra</i>	100.00	42.75	40.00	37.91	38.95
<i>Ulmus americana</i>	100.00	38.75	40.00	34.37	37.19
SHRUB					
<i>Ribes missouriense</i>	100.00	31.50	66.67	62.69	64.68
<i>Staphylea trifolia</i>	50.00	18.75	33.33	37.31	35.32
HERBS					
<i>Brassica sp.</i>	50.00	00.25	06.66	00.16	03.41
<i>Cystopteris bulbifera</i>	50.00	42.50	06.67	27.51	17.09
<i>Eupatorium rugosum</i>	50.00	01.50	06.67	00.97	03.82
<i>Geum canadensis</i>	50.00	01.50	06.67	00.97	03.82
<i>Glechoma hederacea</i>	50.00	01.50	06.67	00.97	03.82
<i>Hydrophyllum virginianum</i>	50.00	01.50	06.67	00.97	03.82
<i>Impatiens capensis</i>	100.00	31.50	13.33	20.39	16.86
<i>Poa pratensis</i>	100.00	38.75	13.33	25.08	19.20
<i>Scutellaria lateriflora</i>	50.00	00.25	06.66	00.16	03.41
<i>Solanum dulcamara</i>	50.00	07.50	06.66	04.86	05.76
<i>Solidago flexicaulis</i>	50.00	18.75	06.67	12.14	09.41
<i>Thalictrum dasycarpum</i>	50.00	01.50	06.67	00.97	03.82
<i>Urtica dioica</i>	50.00	07.50	06.67	04.85	05.76

Bell Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I. V.
TREES					
<i>Acer negundo</i>	25.00	00.13	12.50	00.18	06.34
<i>Acer rubrum</i>	50.00	19.38	25.00	26.58	25.79
<i>Acer saccharum</i>	50.00	22.00	25.00	30.18	27.59
<i>Morus rubra</i>	25.00	15.63	12.50	21.44	16.97
<i>Nyssa aquatica</i>	25.00	15.63	12.50	21.44	16.97
<i>Taxodium distichum</i>	25.00	00.13	12.50	00.18	06.34
SHRUB					
<i>Cephalanthus occidentalis</i>	50.00	18.75	33.33	41.09	37.21
<i>Cornus stricta</i>	25.00	03.75	16.67	08.22	12.44
<i>Itea virginica</i>	75.00	23.13	50.00	50.69	50.35
HERBS					
<i>Azolla mexicana</i>	25.00	00.13	03.57	00.11	01.84
<i>Bidens discoidea</i>	25.00	03.75	03.57	03.18	03.37
<i>Boehmeria cylindrica</i>	75.00	07.63	10.72	06.47	08.60
<i>Ceratophyllum dimersum</i>	25.00	00.75	03.57	00.64	02.11
<i>Cyperus erythrorhizos</i>	25.00	00.13	03.57	00.11	01.84
<i>Digitaria sanguinalis</i>	25.00	03.75	03.57	03.18	03.37
<i>Leersia lenticularis</i>	25.00	00.13	03.57	00.11	01.84
<i>Lemna minor</i>	100.00	20.63	14.29	17.50	15.90
<i>Ludwigia palustris</i>	75.00	22.50	10.72	19.08	14.90
<i>Lycopus rubellus</i>	25.00	03.75	03.57	03.18	03.37
<i>Pilea pumila</i>	75.00	08.25	10.72	07.00	08.86
<i>Polygonum hydropiperoides</i>	50.00	13.13	07.14	11.14	09.14
<i>Rumex verticillatus</i>	50.00	25.00	07.14	21.20	14.17
<i>Saururus cernuus</i>	75.00	04.63	10.71	03.92	07.32
<i>Triadenum walteri</i>	25.00	03.75	03.57	03.18	03.37

Jug Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Acer negundo</i>	70.00	24.35	24.14	19.69	21.91
<i>Acer saccharum</i>	40.00	17.75	13.79	14.36	14.07
<i>Asimina triloba</i>	10.00	03.75	03.45	03.04	03.25
<i>Carpinus caroliniana</i>	10.00	00.30	03.45	00.24	01.84
<i>Carya cordiformis</i>	10.00	03.75	03.45	03.04	03.25
<i>Carya tomentosa</i>	10.00	01.50	03.45	01.21	02.33
<i>Fraxinus americana</i>	10.00	01.50	03.45	01.21	02.33
<i>Liriodendron tulipifera</i>	10.00	01.50	03.45	01.21	02.33
<i>Platanus occidentalis</i>	30.00	18.50	10.34	14.96	12.65
<i>Prunus serotina</i>	10.00	01.50	03.45	01.21	02.33
<i>Quercus muhlenbergii</i>	30.00	20.75	10.34	16.78	13.56
<i>Quercus rubra</i>	30.00	18.50	10.34	14.96	12.65
<i>Ulmus americana</i>	20.00	10.00	06.90	08.09	07.50
SHRUB					
<i>Hydrangea arborescens</i>	20.00	10.00	25.00	36.97	30.98
<i>Lindera benzoin</i>	50.00	15.55	62.50	57.49	60.00
<i>Staphylea trifolia</i>	10.00	01.50	12.50	05.54	09.02
VINES					
<i>Parthenocissus quinquefolia</i>	30.00	03.30	50.00	43.14	46.57
<i>Smilax hispida</i>	10.00	00.30	16.67	03.92	10.30
<i>Toxicodendron radicans</i>	20.00	04.05	33.33	52.94	43.13
HERBS					
<i>Amphicarpa bracteata</i>	10.00	01.50	00.97	01.41	01.19
<i>Arabis laevigata</i>	10.00	01.50	00.97	01.41	01.19
<i>Asarum canadense</i>	30.00	00.90	02.91	00.84	01.87
<i>Aster lanceolatus</i>	10.00	01.50	00.97	01.41	01.19
<i>Boehmeria cylindrica</i>	10.00	01.50	00.97	01.41	01.19
<i>Carex blanda</i>	30.00	03.05	02.91	02.86	02.88
<i>Carex grisea</i>	10.00	01.50	00.97	01.41	01.19
<i>Carex radiata</i>	40.00	06.00	03.89	05.62	04.75
<i>Cinna arundinacea</i>	10.00	00.30	00.97	00.28	00.62
<i>Cryptotaenia canadensis</i>	20.00	00.60	01.94	00.56	01.25
<i>Cystopteris</i> sp.	10.00	00.05	00.97	00.05	00.51
<i>Dicentra canadensis</i>	10.00	00.05	00.97	00.05	00.51
<i>Elymus villosus</i>	10.00	01.50	00.97	01.40	01.19
<i>Elymus virginicus</i>	10.00	01.50	00.97	01.40	01.19
<i>Eupatorium rugosum</i>	50.00	03.65	04.86	03.42	04.14
<i>Festuca obtusa</i>	90.00	14.55	08.74	13.63	11.19
<i>Galium aparine</i>	10.00	01.50	00.97	01.40	01.19
<i>Galium triflorum</i>	10.00	01.50	00.97	01.40	01.19
<i>Geranium maculatum</i>	10.00	00.30	00.97	00.28	00.62
<i>Geum canadense</i>	50.00	02.70	04.86	02.53	03.69
<i>Impatiens pallida</i>	40.00	03.60	03.88	03.37	03.62
<i>Isopyrum biternatum</i>	10.00	00.05	00.97	00.05	00.50
<i>Laportea canadensis</i>	20.00	03.00	01.94	02.81	02.38

Jug Spring (continued)

<i>Leersia virginica</i>	60.00	06.60	05.83	06.18	06.01
<i>Osmorhiza longistylis</i>	10.00	00.05	00.97	00.05	00.50
<i>Phlox divaricata</i>	40.00	03.35	03.88	03.14	03.50
<i>Pilea pumila</i>	70.00	03.50	06.80	03.28	05.04
<i>Polemonium reptans</i>	10.00	00.30	00.97	00.28	00.63
<i>Polygonum virginianum</i>	40.00	04.80	03.88	04.50	04.19
<i>Polystichum acrostichoides</i>	60.00	10.85	05.83	10.16	08.00
<i>Ranunculus recurvatus</i>	20.00	00.10	01.94	00.09	01.02
<i>Sanicula canadensis</i>	20.00	01.55	01.94	01.45	01.70
<i>Scrophularia marilandica</i>	10.00	00.30	00.97	00.28	00.62
<i>Sicyos angulatus</i>	10.00	01.50	00.97	01.40	01.19
<i>Solidago flexicaulis</i>	10.00	06.25	00.97	05.85	03.41
<i>Valeriana pauciflora</i>	50.00	03.60	04.86	03.37	04.12
<i>Verbesina alternifolia</i>	50.00	07.50	04.86	07.03	05.95
<i>Viola eriocarpa</i>	30.00	02.10	02.91	01.97	02.44
<i>Viola sororia</i>	30.00	02.10	02.91	01.97	02.44

Spring Complex, Trout Park

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I. V.
TREES					
<i>Acer negundo</i>	50.00	34.50	41.67	55.20	48.43
<i>Fraxinus nigra</i>	20.00	03.00	16.67	04.80	10.74
<i>Fraxinus pennsylvanica</i>	40.00	15.25	33.33	24.40	28.86
<i>Tilia americana</i>	10.00	09.75	08.33	15.60	11.97
SHRUB					
<i>Frangula alnus</i>	40.00	08.10	66.67	44.75	55.71
<i>Lonicera morrowi</i>	20.00	10.00	33.33	55.25	44.29
VINES					
<i>Vitis riparia</i>	20.00	05.25	100.00	100.00	100.00
HERBS					
<i>Agrimonia gryposepala</i>	10.00	00.05	02.70	00.05	01.37
<i>Alliaria petiolata</i>	10.00	08.50	02.70	08.68	05.69
<i>Arctium minus</i>	10.00	00.05	02.70	00.05	01.37
<i>Aster lateriflorus</i>	10.00	01.50	02.70	01.53	02.11
<i>Eupatorium rugosum</i>	20.00	00.60	05.41	00.61	03.01
<i>Geum canadense</i>	40.00	02.15	10.81	02.20	06.51
<i>Impatiens capensis</i>	80.00	47.25	21.62	48.24	34.93
<i>Nasturtium officinale</i>	40.00	01.90	10.81	01.94	06.38
<i>Poa pratensis</i>	70.00	21.85	18.92	22.31	20.62
<i>Solanum dulcamara</i>	60.00	11.10	16.22	11.33	13.78
<i>Solidago uliginosa</i>	20.00	03.00	05.41	03.06	04.23

Silver Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Acer saccharum</i>	70.00	35.00	30.43	28.71	29.57
<i>Fraxinus nigra</i>	40.00	20.00	17.39	16.41	16.90
<i>Fraxinus pensylvanica</i>	20.00	10.00	08.70	08.20	08.45
<i>Quercus muehlenbergii</i>	20.00	14.75	08.70	12.10	10.40
<i>Tilia americana</i>	50.00	32.05	21.74	26.29	24.02
<i>Ulmus americana</i>	30.00	10.10	13.04	08.29	10.66
VINES					
<i>Toxicodendron radicans</i>	20.00	03.80	100.00	100.00	100.00
HERBS					
<i>Angelica atropurpurea</i>	10.00	00.30	02.17	00.39	01.28
<i>Aster lateriflorus</i>	10.00	00.30	02.18	00.39	01.28
<i>Carex sp.</i>	30.00	01.85	06.52	02.41	04.46
<i>Cinna arundinacea</i>	10.00	01.50	02.17	01.96	02.06
<i>Geum canadense</i>	30.00	00.65	06.52	00.84	03.69
<i>Impatiens capensis</i>	30.00	11.50	06.52	15.01	10.77
<i>Leersia virginica</i>	70.00	17.10	15.22	22.32	18.77
<i>Lysimachia nummularia</i>	20.00	12.25	04.35	15.99	10.17
<i>Nasturtium officinale</i>	60.00	06.20	13.04	08.09	10.57
<i>Pilea fontana</i>	70.00	16.85	15.22	22.00	18.61
<i>Plantago rugelii</i>	10.00	00.05	02.18	00.07	01.12
<i>Polygonum virginianum</i>	20.00	03.00	04.34	03.92	04.13
<i>Ranunculus septentrionalis</i>	10.00	01.50	02.17	01.96	02.07
<i>Rumex obtusifolius</i>	20.00	01.80	04.35	02.35	03.35
<i>Spirodella polyrhiza</i>	30.00	00.15	06.52	00.20	03.36
<i>Symplocarpus foetidus</i>	10.00	01.50	02.17	01.96	02.07
<i>Taraxacum officinale</i>	10.00	00.05	02.18	00.07	01.12
<i>Viola pranticola</i>	10.00	00.05	02.18	00.07	01.12

Brookfield Spring

	%	Ave.		%	%
	Frequency	Mean Cover		Relative Frequency	Relative Ave. Mean Cover
					I. V.
TREES					
<i>Salix X rubens</i>	40.00	06.00		100.00	100.00
SHRUBS					
<i>Rosa multiflora</i>	10.00	00.05		50.00	14.29
<i>Salix exigua</i>	10.00	00.30		50.00	67.85
HERBS					
<i>Agrostis gigantea</i>	80.00	17.40		05.26	08.37
<i>Ambrosia artemisiifolia</i>	20.00	00.60		01.32	00.29
<i>Asclepias incarnata</i>	20.00	00.60		01.32	00.29
<i>Aster ericoides</i>	30.00	00.40		01.97	00.20
<i>Aster lanceolatus</i>	10.00	00.30		00.66	00.14
<i>Aster lateriflorus</i>	20.00	00.60		01.32	00.29
<i>Aster novae-angliae</i>	40.00	01.90		02.63	00.91
<i>Bidens cernua</i>	10.00	00.05		00.66	00.02
<i>Bidens coronata</i>	30.00	01.85		01.97	00.89
<i>Carex hystricina</i>	100.00	19.35		06.57	09.31
<i>Cyperus rivularis</i>	50.00	03.90		03.29	01.88
<i>Daucus carota</i>	30.00	01.60		01.97	00.77
<i>Eleocharis verrucosa</i>	80.00	15.15		05.26	07.29
<i>Epilobium sp.</i>	10.00	00.05		00.66	00.02
<i>Equisetum arvense</i>	70.00	03.75		04.61	01.80
<i>Eupatorium maculatum</i>	30.00	02.10		01.97	01.01
<i>Eupatorium perfoliatum</i>	70.00	08.65		04.61	04.16
<i>Euthamia graminifolia</i>	10.00	03.75		00.66	01.80
<i>Festuca elatior</i>	20.00	00.60		01.32	00.29
<i>Impatiens capensis</i>	40.00	03.35		02.63	01.61
<i>Juncus dudleyi</i>	10.00	01.50		00.66	00.72
<i>Juncus nodosus</i>	90.00	25.50		05.92	12.27
<i>Kummerowia stipulacea</i>	10.00	00.05		00.66	00.02
<i>Lobelia siphilitica</i>	90.00	22.50		05.92	10.82
<i>Lycopus virginicus</i>	100.00	14.80		06.57	07.12
<i>Melilotus alba</i>	30.00	02.10		01.97	01.01
<i>Pastinaca sativa</i>	20.00	00.10		01.32	00.05
<i>Phragmites australis</i>	60.00	27.30		03.95	13.13
<i>Plantago virginica</i>	50.00	03.15		03.29	01.52
<i>Polygonum pennsylvanicum</i>	10.00	00.05		00.66	00.02
<i>Prunella vulgaris</i>	30.00	00.90		01.97	00.43
<i>Scirpus atrovirens</i>	20.00	05.25		01.32	02.53
<i>Setaria glauca</i>	50.00	01.95		03.29	00.94
<i>Solidago canadensis</i>	10.00	01.50		00.66	00.72
<i>Solidago riddellii</i>	90.00	13.90		05.92	06.69
<i>Taraxacum officinale</i>	30.00	00.15		01.97	00.07
<i>Trifolium repens</i>	20.00	00.35		01.32	00.17
<i>Verbena hastata</i>	30.00	00.90		01.97	00.43

Mill Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Acer saccharum</i>	25.00	21.25	25.00	37.77	31.39
<i>Ostrya virginiana</i>	25.00	15.63	25.00	27.78	26.39
<i>Quercus alba</i>	25.00	15.63	25.00	27.78	26.39
<i>Ulmus rubra</i>	25.00	03.75	25.00	06.67	15.83
HERBS					
<i>Agrostis gigantea</i>	25.00	03.75	06.25	09.75	08.00
<i>Aster lateriflorus</i>	25.00	03.75	06.25	09.75	08.00
<i>Glyceria striata</i>	25.00	03.75	06.25	09.75	08.00
<i>Mentha arvensis</i>	25.00	03.75	06.25	09.75	08.00
<i>Nasturtium officinale</i>	50.00	04.50	12.50	11.71	12.10
<i>Pilea sp.</i>	75.00	00.65	18.75	01.70	10.22
<i>Plantago rugelii</i>	25.00	03.75	06.25	09.75	08.00
<i>Poa pratensis</i>	50.00	03.00	12.50	07.81	10.16
<i>Prunella vulgaris</i>	25.00	03.75	06.25	09.75	08.00
<i>Stellaria media</i>	25.00	00.30	06.25	00.78	03.52
<i>Taraxacum officinale</i>	25.00	03.75	06.25	09.75	08.00
<i>Trifolium repens</i>	25.00	03.75	06.25	09.75	08.00

Meyers Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Carya ovata</i>	25.00	09.38	09.09	06.39	07.74
<i>Quercus alba</i>	100.0	62.50	36.37	42.55	39.46
<i>Quercus macrocarpa</i>	50.00	25.00	18.18	17.02	17.60
<i>Robinia pseudoacacia</i>	50.00	25.00	18.18	17.02	17.60
<i>Ulmus rubra</i>	50.00	22.00	18.18	17.02	17.60
SHRUBS					
<i>Ribes missouriense</i>	25.00	03.75	33.33	45.45	39.39
<i>Rubus occidentalis</i>	25.00	00.75	33.34	09.10	21.22
<i>Zanthoxylum americanum</i>	25.00	03.75	33.33	45.45	39.39
VINES					
<i>Parthenocissus quinquefolia</i>	25.00	00.75	100.00	100.00	100.00
HERBS					
<i>Agrostis gigantea</i>	25.00	03.75	03.85	03.10	03.47
<i>Anemone virginiana</i>	25.00	00.75	03.85	00.61	02.23
<i>Aster ontarionis</i>	50.00	07.50	07.69	06.19	06.94
<i>Carex cristatella</i>	25.00	09.38	03.85	07.74	05.80
<i>Carex</i> sp.	25.00	03.75	03.85	03.10	03.47
<i>Cryptotaenia canadensis</i>	50.00	04.50	07.69	03.71	05.70
<i>Eupatorium rugosum</i>	25.00	03.75	03.85	03.10	03.47
<i>Festuca elatior</i>	25.00	03.75	03.85	03.10	03.47
<i>Geranium maculatum</i>	25.00	03.75	03.85	03.10	03.47
<i>Geum canadense</i>	25.00	00.75	03.85	00.61	02.23
<i>Glechoma hederacea</i>	50.00	04.50	07.69	03.71	05.70
<i>Impatiens capensis</i>	100.00	61.88	15.38	51.08	33.23
<i>Leersia virginica</i>	25.00	03.75	03.85	03.10	03.48
<i>Osmorhiza longistylis</i>	25.00	00.13	03.85	00.11	01.98
<i>Phryma leptostachya</i>	25.00	00.75	03.85	00.61	02.23
<i>Plantago rugelii</i>	25.00	00.75	03.84	00.61	02.23
<i>Poa pratensis</i>	25.00	03.75	03.84	03.10	03.47
<i>Solidago ulmigolia</i>	25.00	03.75	03.84	03.10	03.47
<i>Taraxacum officinale</i>	25.00	00.13	03.84	00.11	01.98
<i>Viola pranticola</i>	25.00	00.13	03.84	00.11	01.98

Two Spring

	Ave. %	Mean Cover	% Relative % Relative Frequency	Ave. Mean Cover	% I.V.
TREES					
<i>Acer negundo</i>	10.00	03.75	11.11	10.32	10.72
<i>Maclura pomifera</i>	20.00	10.00	22.22	27.51	24.86
<i>Salix nigra</i>	20.00	12.25	22.22	33.70	27.96
<i>Ulmus americana</i>	40.00	10.35	44.45	28.47	36.46
SHRUBS					
<i>Ribes americana</i>	10.00	03.75	08.33	20.38	14.35
<i>Ribes missouriense</i>	20.00	04.05	16.67	22.01	19.34
<i>Rosa multiflora</i>	30.00	01.60	25.00	08.69	16.85
<i>Rubus occidentalis</i>	30.00	04.50	25.00	24.46	24.73
<i>Sambucus canadensis</i>	30.00	04.50	25.00	24.46	24.73
VINES					
<i>Parthenocissus quinquefolia</i>	30.00	04.10	50.00	31.66	40.83
<i>Vitis riparia</i>	30.00	08.85	50.00	68.34	59.17
HERBS					
<i>Agrostis gigantea</i>	90.00	50.80	10.11	32.61	21.36
<i>Apocynum sp.</i>	10.00	00.05	01.12	00.03	00.58
<i>Aster novae-angliae</i>	30.00	06.75	03.37	04.33	03.85
<i>Circaea lutetiana</i>	10.00	00.05	01.12	00.03	00.58
<i>Cirsium vulgare</i>	10.00	00.05	01.12	00.03	00.58
<i>Cryptotaenia canadensis</i>	40.00	02.15	04.50	01.38	02.94
<i>Daucus carota</i>	20.00	00.35	02.25	00.23	01.24
<i>Epilobium sp.</i>	20.00	07.50	02.25	04.81	03.53
<i>Equisetum arvense</i>	40.00	01.20	04.50	00.77	02.63
<i>Erigeron annuus</i>	30.00	03.30	03.37	02.12	02.75
<i>Eupatorium rugosum</i>	10.00	00.05	01.12	00.03	00.58
<i>Geum canadense</i>	20.00	04.05	02.25	02.60	02.43
<i>Hackelia virginiana</i>	10.00	00.30	01.12	00.19	00.66
<i>Lactuca sp.</i>	10.00	00.30	01.12	00.19	00.66
<i>Lobelia siphilitica</i>	90.00	07.25	10.11	04.65	07.38
<i>Lycopus sp.</i>	10.00	00.05	01.12	00.03	00.58
<i>Monarda fistulosa</i>	20.00	00.60	02.25	00.39	01.32
<i>Nasturtium officinale</i>	50.00	05.90	05.62	03.79	04.71
<i>Phleum pratense</i>	10.00	00.30	01.12	00.19	00.66
<i>Pilea sp.</i>	20.00	00.10	02.25	00.07	01.16
<i>Plantago rugelii</i>	40.00	00.70	04.50	00.45	02.48
<i>Poa pratensis</i>	40.00	17.80	04.50	11.43	07.97
<i>Polygonum persicaria</i>	20.00	05.25	02.25	03.37	02.81
<i>Prunella vulgaris</i>	10.00	00.05	01.12	00.03	00.58
<i>Sanicula canadensis</i>	10.00	00.30	01.12	00.19	00.66
<i>Scirpus atrovirens</i>	20.00	00.35	02.25	00.23	01.24
<i>Solidago canadensis</i>	90.00	25.65	10.11	16.46	13.29
<i>Solidago gigantea</i>	30.00	09.10	03.37	05.84	04.61
<i>Stellaria media</i>	10.00	00.05	01.12	00.03	00.58
<i>Taraxacum officinale</i>	20.00	00.35	02.25	00.23	01.24
<i>Urtica dioica</i>	40.00	04.80	04.50	03.08	03.79
<i>Verbena urticifolia</i>	10.00	00.30	01.12	00.19	00.66

Page Spring

	% Frequency	Ave. Mean Cover	% Relative Frequency	% Relative Ave. Mean Cover	% I.V.
TREES					
<i>Salix x rubens</i>	50.00	07.50	100.00	100.00	100.00
HERBS					
<i>Alliaria petiolata</i>	50.00	00.25	07.69	00.13	03.91
<i>Aster puniceus</i>	50.00	07.50	07.69	03.94	05.82
<i>Impatiens capensis</i>	100.00	62.50	15.38	32.81	24.10
<i>Myosotis scorpioides</i>	100.00	73.75	15.38	38.71	27.05
<i>Nasturtium officinale</i>	100.00	15.00	15.38	07.87	11.62
<i>Phalaris arundinacea</i>	100.00	15.00	15.38	07.87	11.62
<i>Polygonum punctatum</i>	50.00	07.50	07.69	03.94	05.82
<i>Rumex crispus</i>	50.00	07.50	07.69	03.94	05.82
<i>Solanum dulcamara</i>	50.00	01.50	07.69	00.79	04.24

Rhule Spring

	%	Ave.		%	
	Frequency	Mean Cover	%	Relative Ave.	%
			Frequency	Mean Cover	I.V.
TREES					
<i>Acer saccharinum</i>	40.00	00.45	80.00	05.03	42.52
<i>Betula nigra</i>	10.00	08.50	20.00	94.97	57.48
SHRUBS					
<i>Sambucus canadensis</i>	10.00	03.75	100.00	100.00	100.00
HERBS					
<i>Acalypha rhomboidea</i>	10.00	00.05	01.39	00.04	00.71
<i>Agropyron repens</i>	20.00	03.80	02.78	02.85	02.81
<i>Agrostis gigantea</i>	40.00	10.75	05.55	08.06	06.80
<i>Arctium minus</i>	10.00	01.50	01.39	01.13	01.26
<i>Bidens cernua</i>	50.00	17.80	06.94	13.35	10.14
<i>Calystegium sepium</i>	10.00	03.75	01.39	02.81	02.10
<i>Carex annectens</i>	10.00	01.50	01.39	01.13	01.26
<i>Carex stricta</i>	10.00	01.50	01.39	01.13	01.26
<i>Chenopodium albidum</i>	10.00	00.30	01.39	00.22	00.80
<i>Cirsium vulgare</i>	20.00	00.35	02.78	00.26	01.52
<i>Coronilla varia</i>	20.00	12.50	02.78	09.37	06.08
<i>Cyperus rivularis</i>	50.00	05.10	06.94	03.82	05.38
<i>Echinochloa sp.</i>	20.00	03.00	02.78	02.25	02.52
<i>Eleocharis obtusa</i>	10.00	01.50	01.39	01.13	01.26
<i>Eleocharis smallii</i>	40.00	15.25	05.55	11.44	08.50
<i>Festuca elatior</i>	10.00	01.50	01.39	01.13	01.26
<i>Leersia oryzoides</i>	50.00	09.75	06.94	07.31	07.13
<i>Lolium perenne</i>	10.00	00.30	01.39	00.22	00.80
<i>Plantago rugelii</i>	20.00	00.60	02.78	00.45	01.62
<i>Poa pratensis</i>	80.00	10.80	11.11	08.10	09.61
<i>Polygonum lapathifolium</i>	10.00	01.50	01.39	01.13	01.26
<i>Polygonum persicaria</i>	50.00	08.30	06.94	06.22	06.58
<i>Polygonum punctatum</i>	20.00	10.00	02.78	07.50	05.14
<i>Polygonum tenue</i>	10.00	00.30	01.39	00.22	00.80
<i>Solanum nigrum</i>	10.00	00.30	01.39	00.22	00.80
<i>Taraxacum officinale</i>	40.00	00.95	05.56	00.71	03.14
<i>Trifolium repens</i>	40.00	04.80	05.55	03.60	04.58
<i>Urtica dioica</i>	20.00	05.25	02.78	03.94	03.36
<i>Viola pranticola</i>	10.00	00.30	01.39	00.22	00.80
<i>Zea mays</i>	10.00	00.05	01.39	00.04	00.72