BAIRD CREEK WATERSHED MANAGEMENT STUDY

INTRODUCTION

Baird Creek is a subwatershed draining 25 square miles in the northeast corner of the East River watershed. The creek is 31.1 miles long originating in agricultural lands to flow east through wetland, park and urban areas. The lower 3.5 miles is perennial and classified as FAL-B (warm water sport fish communities) with the upper 27.6 miles of intermittent stream designated as FAL-C warm water forage fish. The predominate land use in the upper reaches of the watershed is agriculture but is quickly being altered to urban as the population of the Green Bay metropolitan area spreads eastward. The sub watershed is unique in that a large portion (330 acres) along the stream corridor within the City of Green Bay has been designated as park land which includes the 270 acre Baird Creek Parkway with hiking and bicycling trails. The parkway is a mix of City, County, nonprofit and private ownership. The City of Green Bay is currently in the process of formalizing the parkway plan as a part of it's new comprehensive land use planning process.

In general water quality ranges from good in the upper reaches to poor in the lower urban reaches. The stream suffers from nonpoint rural and urban storm water, barnyard runoff, stream bank and cropland erosion causing turbidity, and nutrient problems as well as sedimentation and habitat loss. Historic stream habitat assessment surveys indicate poor to fair habitat and macroinveribrate studies indicate very good to poor water quality (WI DNR 1999)

Study Rational

The purpose of the watershed management study is to collect baseline information on the existing physical, chemical and biological conditions in Baird Creek and to determine if current water quality criteria and standards are being met. The information collected can be used to assess the environmental quality of Baird Creek using biotic indexes for fish, macroinvertebrates and habitat. The information can be used for future management decisions for the improvement and protection of the water resource.

METHODS

Three sampling stations were selected based on the surrounding land use. The uppermost site was located at Northview Road and represents an agricultural use site. The middle station was located in the Baird Creek Parkway just downstream of I-43 and is identified as the Railroad Bridge site. All stage recording was done from the railroad trestle crossing the creek This site represented a transitional site between agriculture and urban land use. The third site was located at the Main Street bridge just before it's confluence with the East River and represented an urban setting. See Figure 1.

The study began in the spring of 2001 with the establishment of the stations and was scheduled to run through Spring 2003. Unfortunately due to funding constraints the number of water quality samples were reduced in the fall of 2002 and the project terminated in October 2002.

Discharge

Stream flow was measured in the field at each site with a Marsh McBirney flow gauge and a top setting rod repeatedly over time during varying flow conditions. At the same time a measurement was taken with a tape measure from a fixed point (on top of the bridge) to the top of the water in the stream and the stage elevation recorded in feet and inches. With this information a discharge rating curve was developed for each site plotting flow in cubic feet per second (cfs) against the measured stream stage in feet and inches. After the discharge rating curve was developed only the tape measure reading was taken to establish stage, and the flow was estimated from the discharge rating curve.

At the railroad site a stream gauging station was established and continuous water elevations were recorded using a Telog 4110 pressure transducer. Flows can be calculated when compared to field flow measurements collected at a specified time with the Marsh McBirney flow instrument. A corrugated steel culvert with locked lid was set in the stream bank to house the Telog recorder. The Telog cable was run through a slot in the culvert to the middle of the stream bed and set on the bottom using rocks to anchor the cable. Data from the Telog was downloaded routinely onto a laptop computer in the field and brought back to the office.

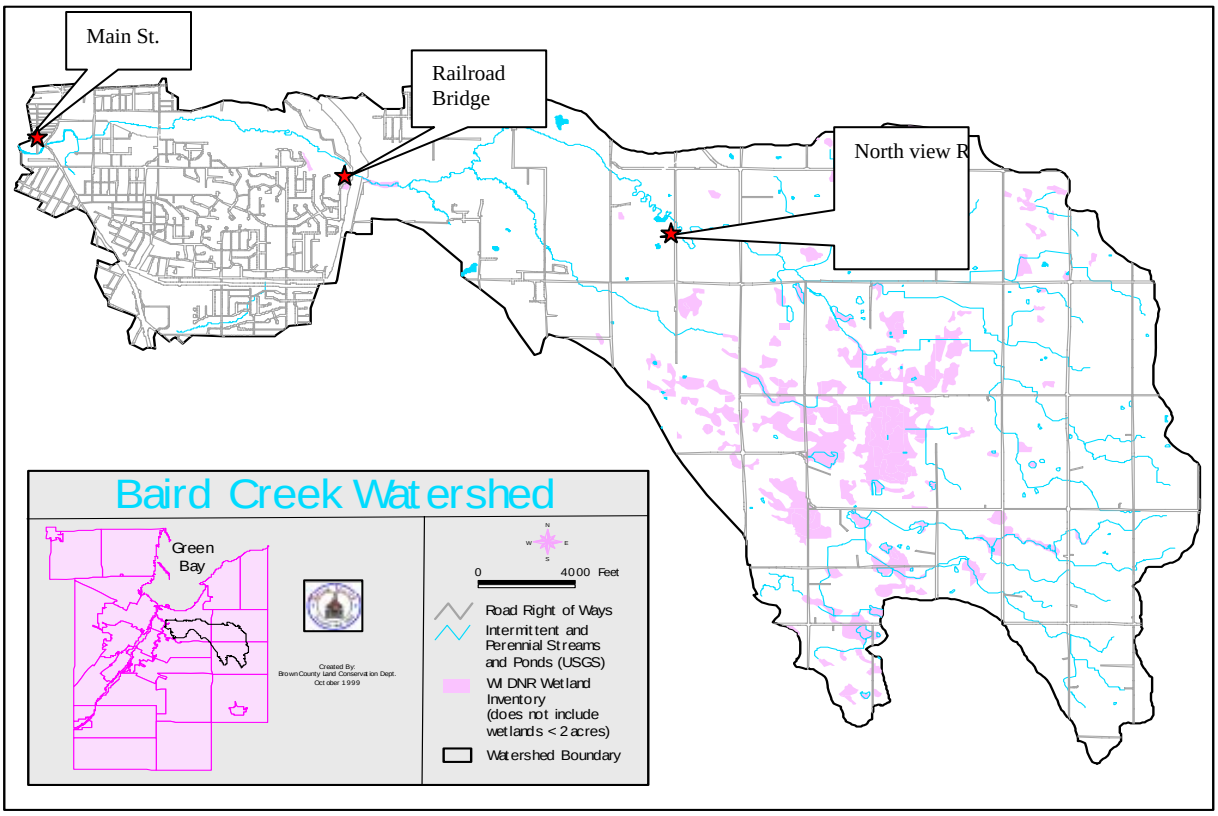


Figure 1 Baird Creek Watershed Sampling Sites

Water Quality

Water quality was sampled at all three sites once every two weeks. No attempt was made to time sampling to participation events. The water stage elevations were taken with a weighted tape measure. Field measurements for temperature, pH, conductivity and dissolved oxygen were taken with a Hydrolab Quanta instrument. Water samples were sent to the State Laboratory of Hygiene and run for ortho and total phosphorous, kjeldahl nitrogen, nitrate, nitrite, ammonia, suspended solids and fecal coliform. Quality assurance guidelines provided by the laboratory were adhered to in the field.

Sample results are compared to the Wisconsin Administrative Code Chapter NR 102 Water quality Standards. The dissolved oxygen (DO) standard for full fish and aquatic life is 5.0 ppm. The recreational use biological guideline states the fecal coliform count may not exceed 200 counts per 100 ml as a geometric mean based on not less than 5 samples per month, nor exceed 400 counts per 100 ml in more than 10% of the samples during any month. There are no NR102 nutrient, suspended solid or chlorophyl water quality standards at this time. For comparison purposes the average total phosphorus value for surface water impoundments in Wisconsin is .065 mg/l. and the Great Lakes discharge permit level for total phosphorous is 0.1 mg/l. For urban nonpoint source runoff the recommended Wisconsin Pollution Discharge Elimination System (WPDES) permit level for suspended solids is 45 milligrams per liter (mg/l).

Water Temperature

Continuous water temperature was recorded at the Railroad and Main Street sites for four weeks during the summer of 2001. A Hobo H8 temperature data logger was placed on the stream bed in a pool location and cabled to a tree on the bank. The data from the logger was downloaded in the field with a Hobo shuttle and transferred the office PC using Hobo Boxcar software.

Habitat Assessment

Habitat assessment was conducted at the three sample sites using the DNR Guidelines for Evaluating Habitat of Wadable Streams – revised July 2000. The guidelines call for the establishment of a stream station at each site with a minimum of 12 transects established across the stream at set intervals for the entire stream station length. Stream station length is based on the mean stream width (MSW). For streams between 2.9 and 20 meters in width the station length is 35 times the MSW. If the MSW is less than 2.9 meters, a minimum of 100 meter long station will be sampled. Four data sheets are used to evaluate habit to include station summary, flow data, map data and transect data. Data collected includes characteristics of width, depth, imbeddedness, substrate, canopy/shading, fish cover, percent macrophytes, algae ,bank erosion, land use and habitat type. Using a U.S Dept of Agriculture report NC-164 habitat rating form, a numeric value can be calculated to evaluate and rank the habitat quality. A score less than 25 is poor and a score greater than 75 is considered excellent

Biological Assessments

Biological assessment was done in the summer of 2001at all three sites to include the collection of stream macroinvertebrate and fish. Due to low/no flow conditions at the Northview Rd. site at the time of sampling, the sample location was moved to the downstream road crossing at Woodside Rd. Maroinvertibrates were collected with a D frame kick net, preserved in ethanol and transferred to UW-Stevens Point entomology lab for sorting and identification. A Hilsenhoff Biotic Index (HBI) was calculated for each site. The HBI score can range from 1 -10 and is determined by species diversity, abundance and water pollution tolerance. Invertebrate samples were collected from stream riffle areas using standard Department sampling procedures. An HBI score of < 3.5 is considered excellent water quality and a score of > 8.5 is considered very poor water quality.

Fish were sampled using standard backpack electrofishing equipment for the established stream station length of 35 times the mean stream width.. One upstream pass was made collecting all fish with small nets. All fish were counted and identified in the field prior to release. Any fish that could not be identified in the field were returned to the lab and preserved for later identification. Using the guidelines contained in report NC-149 U.S. Dept of Agriculture, the number of fish, fish species, condition and community structure is determined and an index of biotic integrity (IBI) value calculated for each site. The IBI value range from 0 (poor) to 100 (excellent) and is a general indicator as to the overall environmental quality of a stream site. A low score indicates that a environmental problem exists.

A summary of the macroinvertebrate and fish species collected

Toxicity Testing

Based on the macroinvertibrate results from samples collected at the Main Street site, sediment samples were collected on November 27, 2001 for toxicity testing. Two samples were collected at the Main St. site and a reference sample collected at the Northview site. Sediments were collected in 4 liter polyetylene bottles and sent to the Wisconsin State Laboratory of Hygiene. Samples are homogenized and placed in test beakers with dechlorinated tap water with a 1:1.75 sediment to overlying water ratio. A synthetic laboratory control is prepared containing sand, clay, organic mater and 1% buffer which is used to gauge the health of the test organisms. Two test organisms juvinile Hyalella azteca and larval Chironomus tentans are placed in the test beakers with the sediment. Dissolved oxygen,pH, and temperature of the overlying water is recorded daily. After 10 days the organisms are recovered to determine the number of survivors.

Pesticide Analysis

In cooperation with the US Fish and Wildlife Service water samples were collected at the Railroad and Main Street sites and run for pesticides at the State Laboratory of Hygiene. Samples were collected in March 26, May 28, July 29 and October 1 in 2002 at both sites and run for atrazine,deethylatrazine,deisopropylatrazine, diaminoatrazine, alachlor, metolachlor, cyanazine, metribuzin, simiazine and promethon.

RESULTS

The 2001 and 2002 chemistry results with flows and calculated phosphorous loads are summarized in Table 1 below.

TABLE 1

	2001 BAIRD CREEK DATA														
Site	**Date**	**Temp**	**D.O.**	**Discharge**	**Tape**	**Stage**	**Conductivity**	**Ortho-P**	**Tot-P**	**Pho. Load.**	**Kjl-N**	**NH3-N**	**NO2-NO3**	**SS**	**MFFCC**
		C	**ppm/% Sat.**	**cfs**	**Down Ft.**	**Ft.**	**u/s**	**mg/l**	**mg/l**	**lbs/day**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Northview	11-Apr-01	7.86	6.52	35.7	3.46	2.96	774	0.175	0.315	60.6	2.24	0.181	1.81	13	600
Railroad	11-Apr-01	8.10	10.90	44.2	15.2	1.36	709	0.161	0.326	77.7	2.17	0.24	1.04	39	2000
Main	11-Apr-01	8.30	10.10	45.4	20.44	2.46	750	0.118	0.323	79.0	1.94	0.205	0.743	63	1000
Northview	23-Apr-01	14.17	8.0/79.6%	8.88	5.16	1.26	758	0.143	0.21	10.1	0.042	0.043	0.075	2	20
Railroad	23-Apr-01	13.82	10.2/98.4%	10.35	16	0.56	769	0.117	0.185	10.3	1.92	0.023	0.116	5	70
Main	23-Apr-01	12.90	9.67/92%	13.2	22.9?	0	994	0.084	0.163	11.6	1.7	0.073	0.389	11	240
Northview	09-May-01	18.11	11.04/117.7%	6.95	5.17	1.25	848	0.213	0.277	10.4	2.27	0.043	0.079	2	10
Railroad	09-May-01	15.74	11.28/114%	10.77	16.3	0.26	864	0.163	0.23	13.4		0.03	0.047	3	80
Main	09-May-01	13.59	8.93/86.3%	10.77	21	1.9	1071	0.122	0.218	12.7	1.73	0.074	0.567	27	200
Northview	29-May-01	19.34	13.82/150.3%	2.5	5.7	0.72	940	0.292	0.357	4.8	2.55	0.053	No detect	No detect	200
Railroad	29-May-01	16.33	10.42/106.3%	3.29	16.3	0.26	968	0.209	0.287	5.1	2.09	0.061	0.185	5	No Data
Main	29-May-01	15.14	8.13/80.8%	4.39	21.3	1.6	1071	0.095	0.25	5.9	1.68	0.116	0.384	32	500
Nothview	07-Jun-01	15.52	5.26/52.9%	12.7	4.29	2.13	770	0.188	0.248	17.0	2.29	0.043	0.349	No Data	30
Railroad	07-Jun-01	15.40	9.68/97.1%	21.8	15.79	0.77	780	0.164	0.244	28.7	2.1	0.044	0.477	No Data	130
Main	07-Jun-01	14.37	8.2/81.6%	19.87	20.79	2.11	897	0.133	0.23	24.6	1.35	0.075	0.751	No Data	260
Northview	19-Jun-01	19.80	4.13/45.6%	25.2	3.6	2.82	758	0.437	0.533	72.4	2.59	0.082	0.395	No Detect	100
Railroad	19-Jun-01	19.05	8.69/93.9%	33.9	15.71	0.85	733	0.385	0.535	97.8	2.35	0.08	0.817	21	310

Main	19-Jun-01	18.54	7.69/82.2%	30.9	20.92	1.98	822	0.305	0.509	84.8	2.28	0.111	1.21	59	390
Northview	11-Jul-01	25.67	4.80/59.3%	0.07	6.42	0	961	0.398	0.69	0.3	4.12	0.175	ND	NS	120
Railroad	11-Jul-01	26.66	9.20/116.3 %	0.09	16.42	0.14	925	0.17	0.25	0.12	1.18	0.037	0.128	NS	
Main	11-Jul-01	24.61	2.63/32.4%	0.73	21.29	1.61	887	0.101	0.349	1.4	2.44	0.659	0.754	NS	
Northview	24-Jul-01	No Flow	NS	0	6.5	0	NS	NS	NS	0	NS	NS	NS	NS	NS
Railroad	24-Jul-01	27.34	9.81/124.4 %	0	16.56	0	864	0.166	0.238	0	0.64	0.033	0.1	9	230
Main	24-Jul-01	26.52	4.52/54.9%	1.7	21.33	1.57	1,008	0.221	0.416	3.8	1.45	0.281	0.47		600
Northview	09-Aug-01	No Flow	NS	0	6.5	0		NS	NS	0	NS	NS	NS	NS	NS
Railroad	09-Aug-01	29.3	9.95	0	16.65	0		0.174	0.238	0	0.56	0.038	0.07	18	1200
Main	09-Aug-01	26.9	4.56/54%	0.47	21.08	1.82		0.137	0.305	0.8	3.64	2.85	0.802	20	500
Northview	23-Aug-01	22.7	5.7	0.8	6.17	0.25	1107	0.06	0.742	3.2	4.27	0.057	0.101	182	58000
Railroad	23-Aug-01	22.7	6.7	0.05	16.5	0.06	1009	0.072	0.249	0.07	1.27	0.034	0.293	8	700
Main	23-Aug-01	23.7	5.2	19 ?	20.83	2.07	1161	0.107	0.241	24 ?	1.4	0.17	1.07	23	2100
Northview	05-Sep	No Flow	NS	0	6.5	0	NS	NS	NS	0	NS	NS	NS	NS	NS
Railroad	05-Sep-01	19.3	10.8	0	16.58	0	950	0.095	0.143	0	0.55	0.026	0.037	5	100
Main	05-Sep-01	14.7	6.4	0.02	21.5	1.4	153	0.059	0.165	0.02	1.23	0.485	0.958	20	1100
Northview	20-Sep-01	14.6	2.7	0.05	6.45	0	1190	0.139	0.54	0.15	4.07	0.172	0.016	28	400
Railroad	20-Sep-01	14	9.8	0.05	16.5	0.06	908	0.074	0.127	0.03	0.43	0.032	0.072	7	500
Main	20-Sep-01	15.6	6.9	1	21.42	1.48	860	0.057	0.163	0.9	0.78	0.148	0.583	21	3000
Northview	04-Oct-01	no flow	NS	0	6.5	0	NS	NS	NS	0	NS	NS	NS	NS	NS
Railroad	04-Oct-01	12.6	10.0/93.9%	0.08	16.46	0.1	887	0.061	0.111	0.05	0.61	0.036	ND	<20	
Main	04-Oct-01	14.3	3.5/34.0%	1.2	21.41	1.5	761	0.093	0.268	0.9	1.25	0.018	0.279	19	
Northview	16-Oct-01	10.3	6.9	0.02	6.47	0	1257	0.132	0.272	0.03	2.36	0.07	ND	NS	270
Railroad	16-Oct-01	10.5	12.2	0.05	16.5	0.06	947	0.06	0.1	0.03	0.44	0.024	ND	NS	70
Main	16-Oct-01	10.7	7	1.5	21.35	1.55	1174	0.081	0.183	1.5	0.69	0.115	0.25	NS	700
Northview	29-Oct-01	5.5	8.7	1.5	6	0.42	1420	0.239	0.319	2.6	2.03	0.217	0.39	9	900
Railroad	29-Oct-01	6.2	12.7	1.2	16.42	0.14	1005	0.056	0.168	1.1	0.78	0.116	0.1	2	50
Maim	29-Oct-01	7.6	8.4	36 ?	20.5 ?	2.4	1247	0.05	0.131	25.4 ?	0.54	0.092	0.31	6	500

Northview	13-Nov-01	6.6	14.8	1.3	6.08	0.34	1335	0.078	0.224	1.6	2.26	0.03	0.019	NS	20
Railroad	13-Nov-01	6.5	13.6	2.5	16.37	0.19	948	0.025	0.063	0.8	0.44	ND	0.018	NS	60
Main	13-Nov-01	8.7	10.4	1	21.42	1.48	487	0.165	0.324	1.7	1.61	0.539	0.472	NS	9500
Northview	29-Nov-01	3.9	9.9	3.5	5.67	0.75	1340	0.211	0.324	6.1	2.47	0.217	0.307	5	
Railroad	29-Nov-01	4.8	13.3	8	16.17	0.39	1083	0.097	0.183	7.9	1.11	0.062	0.253	8	
Main	29-Nov-01	5.9	12.1	7	21.17	1.73	897	0.039	0.111	4.2	0.97	0.096	0.396	6	
Northview	13-Dec-01	2.9	9.6	3	5.83	0.59	1329	0.266	0.435	7	4.19	0.871	1.44	10	36000
Railroad	13-Dec-01	3.4	13.5	9	16.25	0.31	1162	0.071	0.167	8.1	1.57	0.019	0.738	6	130
Main	13-Dec-01	4.7	12.1	9	21.25	1.65	858	0.036	0.109	5.3	0.95	0.088	0.644	12	2000

2002 BAIRD CREEK DATA	**DATE**	**TEMP**	**D.O.**	**Discharge**	**Tape down**	**Stage**	**Cond**	**OrthoP**	**Tot P**	**P Load**	**Kji-N**	**NH3-N**	**NO2-NO3**	**SS**	**MFFCC**
Northview	03-Jan-02	0.5	14.5	0.00	ice	0	197	0.042	0.111	0	2.84	0.073	0.487	8	10
Railroad	03-Jan-02	0.1	13.2	13.3	16.17	0.39	1308	0.015	0.051	3.66	0.88	ND	0.246	3	10
Main	03-Jan-02	1.4	12.2	0.02	21.5	1.4	158	0.027	0.072	0.01	4.8	3.99	0.594	4	280
Northview	16-Jan-02	-0.12	9.8	0	ice	0	1387	0.037	0.109	0.00	2.17	0.122	0.268	11	40
Railroad	16-Jan-02	-0.08	10.6	9	16.25	0.31	1068	0.017	0.045	2.18	0.65	0.025	0.185	3	100
Main	16-Jan-02	1.1	11.9	1	21.42	1.48	309	0.026	0.099	0.53	1.15	0.224	0.464	10	3400
Northview	30-Jan-02	0.01	14.5	0	ice	0	1394	0.04	0.101	0.00	1.74	0.034	0.229	5	<10
Railroad	30-Jan-02	0	15.7	0	ice	0	1062	0.015	0.05	0.00	0.67	0.057	0.469	2	10
Main	30-Jan-02	1.5	14.9	1	21.42	1.48	1356	0.021	0.069	0.37	0.72	0.188	0.411	6	700
Northview	12-Feb-02	-0.1	10.4	0	ice	0	1386	0.087	0.167	0.00	2.15	0.459	0.426	5	20
Railroad	12-Feb-02	0.1	13.8	0	ice	0	1390	0.012	0.037	0.00	0.46	0.018	0.179	5	<10
Main	12-Feb-02	1.8	13.9	0.03	21.46	1.44	1433	0.016	0.076	0.01	0.75	0.141	0.55	17	10
Northview	28-Feb-02	-0.04	7.6	10	4.42	2	794	0.238	0.344	18.54	2.7	0.423	3.74	4	10
Railroad	28-Feb-02	-0.2	13.2	19	15.83	0.73	784	0.226	0.349	35.74	2.67	0.437	3.41	11	<10
Main	28-Feb-02	0.4	13.4	9	21.25	1.65	882	0.188	0.35	16.98	2.7	0.484	3.1	46	20
Northview	11-Mar-02	-0.2	10.3	28	3.53	2.89	409	0.271	0.372	0.00	2.51	0.737	1.98	10	540
Railroad	11-Mar-02	-0.2	14	19	15.83	0.73	448	0.214	0.345	35.33	2.34	0.679	1.83	27	520
Main	11-Mar-02	0.6	13.1	25	20.67	2.23	633	0.171	0.271	36.52	2.27	0.652	1.99	15	1000
Northview	29-Mar-02	0.2	14.4	9	4.75	1.67	786	0.047	0.13	6.31	1.92	0.098	1.68	8	10

Railroad	29-Mar-02	1.2	14.6	15	16	0.56	787	0.083	0.149	12.05	1.75	0.179	1.26	5	10
Main	29-Mar-02	2.6	13.6	17	20.83	2.07	794	0.048	0.232	21.26	2.36	0.465	1.57	90	1300
Northview	11-Apr-02	4.2	10.8	20	3.8	2.62	694	0.043	0.116	12.50	1.81	0.046	0.879	4	
Railroad	11-Apr-02	9.1	12.2	31	15.59	0.97	704	0.049	0.129	21.55	1.65	0.029	0.926	9	30
Main	11-Apr-02	9.1	11.7	19	20.67	2.23	811	0.042	0.133	13.62	1.73	0.064	1.1	20	40
Northview	24-Apr-02	10.3	10.7	11	4.5	1.92	894	0.08	0.128	7.59	1.98	0.046	0.117	3	100
Railroad	24-Apr-02	11.2	12	11	16.08	0.48	898	0.099	0.122	7.23	2.07	0.559	0.09	3	40
Main	24-Apr-02	11.1	11.5	?	?	?	1067	0.068	0.117	0.00	1.51	0.156	0.434	14	40
Northview	07-May-02	13.2	8.8	13	4.41	2.01	728	0.163	0.228	15.98	2.03	0.056	0.112	ND	70
Railroad	07-May-02	13.3	11	15	16	0.56	747	0.11	0.166	13.42	1.56	0.038	0.101	3	20
Main	07-May-02	12.2	9.1	37	20.5	2.4	947	0.072	0.182	36.30	1.69	0.088	0.344	33	260
Northview	21-May-02	15.2	12.3	5.7	4.08	2.34	789	0.13	0.23	7.07	2.01	0.036	ND	3	40
Railroad	21-May-02	13.6	11.4	11	16.08	0.48	808	0.067	0.136	8.06	1.49	0.024	ND	2	40
Main	21-May-02	14.1	10.3	36	20.5	2.4	1100	0.039	0.151	29.30	1.15	0.085	0.335	44	150
Northview	04-Jun-02	11.4	6.5	31	3.4	3	620	0.281	0.453	75.69	3.22	0.15	4.87	8	71000
Railroad	04-Jun-02	11.4	10.4	37	15.42	1.14	662	0.256	0.447	89.15	3.2	0.263	4.24	27	2500
Main	04-Jun-02	11.3	9.3	45+	20.08	2.82	763	0.211	0.395	?	2.8	0.236	3.89	25	30000
Northview	19-Jun-02	18.9	6.2	25	3.62	2.8	637	0.378	0.462	62.25	2.29	0.049	0.109	5	190
Railroad	19-Jun-02	18.9	8.7	23	15.75	0.81	648	0.317	0.462	57.27	2.25	0.044	0.182	16	140
Main	19-Jun-02	18.9	7	36	20.08	2.82	750	0.266	0.452	87.71	3.05	0.746	0.347	114	440
Northview	02-Jul-02	25.8	2.9	2.7	4.83	1.59	773	0.629	0.738	10.74	3.34	0.37	ND	ND	270
Railroad	02-Jul-02	24.3	7	0.09	16.42	0.14	773	0.386	0.474	0.23	2	0.053	0.307	18	570
Main	02-Jul-02	23.4	3.9	1.1	21.41	1.49	1178	0.23	0.449	2.66	1.95	0.213	0.612	67	21000
Northview	17-Jul-02		0	no flow	0	0				0.00					
Railroad	17-Jul-02	26	9.6	0.05	16.5	0.06	902	0.151	0.211	0.06	0.72	0.037	0.087	23	250
Main	17-Jul-02	23.8	6	1	21.42	1.48	1414	0.118	0.654	3.53	3.58	0.167	0.672	14	8900
Northview	16-Sep-02		0	no flow	0	0				0.00					
Railroad	16-Sep-02	15.7	8.9	0.05	16.5	0.06	907	0.073	0.114	0.03	0.33	0.036	0.042	6.6	140
Main	16-Sep-02	16.1	4.9	0.02	21.5	1.4	910	0.102	0.243	0.03	1.14	0.366	0.543	8.4	32000
Northview	02-Oct-02		0	no flow	0	0				0.00					
Railroad	02-Oct-02	15.7	10.6	0.05	16.5	0.06	954	0.069	0.106	0.03	0.37	0.025	ND	ND	70

Main	02-Oct-02	16.7	6.7	0.01	21.83	1.1	1013	0.038	0.116	0.01	0.8	0.193	0.359	7	3600
Northview	16-Oct-02		0	no flow	0	0				0.00					
Railroad	16-Oct-02	7	11.4	0.09	16.42	0.014	906	0.059	0.099	0.05	0.33	0.004	ND	2.8	70
Main	16-Oct-02	8.1	7.9	9	21.25	1.65	1180	0.046	0.158	7.66	0.64	0.12	0.329	11.2	990

MAIN STREET SITE

Habitat Study - the habitat section began 17.5 meters upstream from the Main Street bridge crossing and continued upstream 368. 9 m. The bottom was composed primarily of silt with one transect having some (20-30%) sand and gravel. This section of the river was the farthest downstream and contained three runs, two pools and two bends. The stream in this section ran through an urban\industrial setting with truck trailer storage on the north bank and manufacturing/retail on the south bank. The width of the stream in this section ranged from 9.5 m to 12.2 m with a mean stream width of 10.54m. The depth of water ranged from 0.165 m to 1.14 m. A habitat rating form was completed and a score of 18 indicated poor habitat quality

Discharge – As shown in Table 1, the calculated discharge at Main Street ranged from a low of 0 cubic feet per second (cfs) to 45.4 cfs. The average flow was 11.2 cfs. The flow at this site was the most consistent over the study period. Due to this station's close proximity to it's confluence with the East River, it is possible that a seiche effect could influence flow at certain times.

Figure 2 – Main Street Site

Water Quality – The dissolved oxygen data indicates that for most of the study period the DO levels were above the NR 102 Water Quality standard of 5.0 ppm. The DO standard of 5.0 ppm was not met on July 11, July 24, August 9, and October 4 in 2001 and again on July 2 and August 2 in 2002. These periods of low DO correspond to periods of low flow. The NR 102 recreational use bacteriological guideline states fecal coliform shall not exceed 400 counts per 100 ml in more than 10% of the samples during any month . The fecal coliform count of 400 was routinely exceeded and ranged from 10 counts on February 12, 2002 to 32000 on September 16, 2002. The total phosphorus concentration ranged from 0.069 mg/l to 0.654 mg/l, and averaged 0.238 mg/l for the study period.This is about three times the surface water impoundment average of 0.065 and two and a half times the Great lake discharge value.te for the study period was .238 mg/l. Continuous Hobo temperature data was recorded from August 10, 2001 until October 25, 2001 and ranged from a daytime high of 75F on August 10,2001 decreasing over time with a low of 53F on October 25, 2001. The suspended solid values at this site were consistently higher than the other two stations, ranging from 4 mg/l on January 2, 2003 to 114 on June 19, 2003. The WPDES urban nonpoint permit value of 45 mg/l was exceeded only 6 times out of the 31 sample events. The average suspended solid value for the study period was 27.7 mg/l.

The only pesticides identified at this station in the four quarterly sample events was 0.22 ug/l atrizine on May 28, 2002 and 0.2 ug/l simizine in the July 29, 2002 sample.

Biological Assessment – The macroinvertibrate sampling was done on October 4, 2001 and a follow up sampling event conducted several days later. The only specimen found was one oligochete, therefore no sample was sent to the lab and no HBI value calculated.

A total of 121 fish were collected representing 11 species. Of those 11 species 10 species were indicative of tolerant species and one species (rock bass) was considered intolerant. Attached is Table 2 that is an ex-cell spread shead used to calculate the IBI. The Baird Creek Main street site had a calculated IBI of 0.

Toxicity analysis – Because no macroinvertebrates were found at this site it was suspected that a toxic sediment condition may exist . Sediment samples were collected above and below the Main St. bridge(S-1 and S-1A) and at a reference site at Nortview Rd. on November 27, 2001. Analysis of data using the Students t-test indicated a significant difference in the mean survival rate of the amphipod *Hyalella azteca* between the reference site and S-1A. Survival results for the larval midge *Chironomus tentans* also showed

a significant reduction in survival between the reference site and S-1A. Growth and measured wieghts of the recovered *C. tentens* were much higher in the reference site than in the other sites S-1 or S-1A. Based on the toxicity analysis it appears that the *chironomus tentens* were impacted to a greater extent and site S-1A, upstream of the Main St. bridge appears to be more impacted than the downstream siteS-1.

Pesticide assessment – pesticide analysis conducted in March, May, July and October of 2002 showed a detect of 0.22 ug/l for atrazine on May 28, 2002 . Simizaine was detected in the July 29, 2002 sample at 0.2 ug/l.. Both of these values are only slightly above the detection limit of 0.1 ug/l.

IBI Calculator for Central and Southern WI (REV. 10/12/2001)

Sample Date	Aug. 13, 2001
SITE	Baird Creek, upstream from Main St.
PERSONNEL	Reyburn, Lange, Schroeder

MATRIX	VALUE	SCORE			
total # of fish	121	n/a	**Equipment Type =**	Back Pack	
total # of native spp.	10	2	**Stream width (m) =**	10.54	
total # of darter spp.	0	0	Ln stream width (m) =	2.36	
total # of sucker spp.	1	0	**Distance shocked (m)=**	368.9	
total # of sunfish spp. < 8km from lake	2	5	Is your sample site greater than 8 km from a lake?		n
total # of sunfish spp. >8km from lake	0	0			
total # of intolerant spp.	1	0			
total # of tolerant fish	103	0			
total # of omnivores	64	0			
total # of insectivores	33	0	% of tolerant spp.		85
total # of top carnivores	3	0	% of omnivorous spp.		53
total # of simple lithophils	7	0	% of insevtivores		27
	subtotal	7	% of carnivores		2
			% of simple lithophilous		6
Correction Factors		-3	Correction Factors		
total # of DELT fish	0	-3	# of nontolerant fish per 300m		15
Total after correction factors =		-3	% DELT		0
IBI SCORE =		**0**			

Biotic Integrity Rating **VERY POOR**

Table 2 – IBI for Main St.

RAILROAD BRIDGE SITE

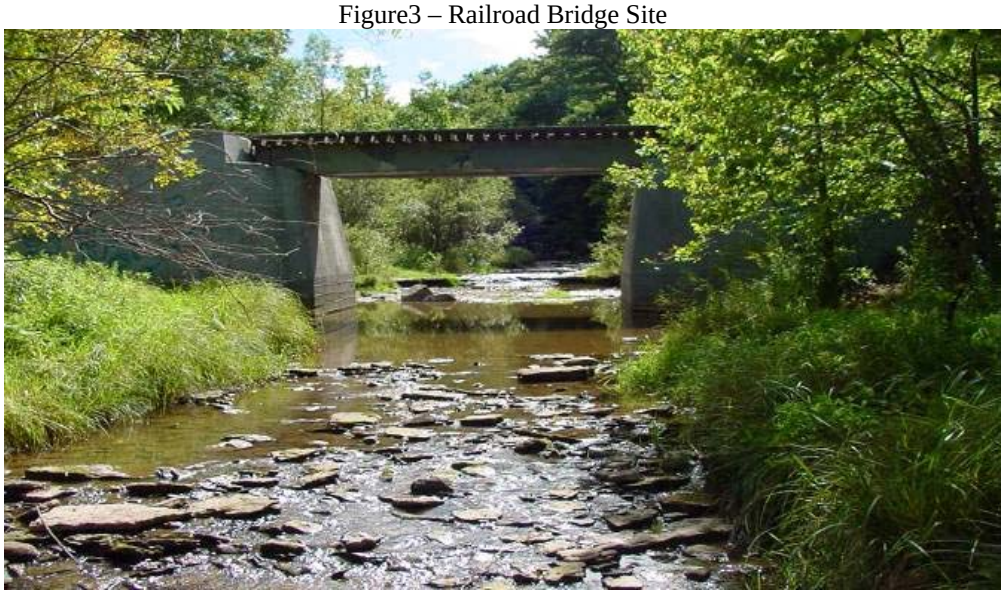
Habitat Study Section – the habitat section began 271.7 meters downstream of the railroad trestle and continued 179.2 meters downstream. The stream bottom consisted primarily of limestone bedrock and boulders with lesser amounts of rubble and gravel. Very little silt and detritus was observed. The were no macrophytes or algea observed. This section of the river contained five runs, three pools and six riffle areas. The stream section runs through the Baird Creek Parkway with the adjoining stream bank vegetated with trees and shrubs. Stream width ranged from 2.3 meters to 8.7 m with a mean stream width of 5.12 m. The water in this section was shallow ranging from 0.01m to 0.30m deep. The habitat rating score was 65 indicating good habitat quality.

Discharge - The calculated discharge in Table 1 ranged from 0 cfs to 44.2 cfs at this location. No flow was recorded on three occasions and ice cover prevented the stage recording on two occasions. The average discharge for the 2 year period was calculated to be 9.4 cfs. Generally the flow was low, less than 1cfs during the summer months. The Telog data logging recorder was installed within the parkway adjacent to a heavily used trail. The recorder performed well and the data was downloaded and is available for analysis. Unfortunately some of the data is suspect because on at least three occasions during the study the cable and probe had been tampered with and found laying on the stream bank.

Water Quality – The dissolved oxygen values for the entire study period were above the state dissolved oxygen standard of 5.0 ppm. Fecal coliform bacteria ranged from <10 to 2500 and exceeded 400 counts seven times during the study. Total phosphorus ranged from 0.037mg/l on February 2002 to 0.535 on June 19, 2001. The average phosphorus concentration for the study period was .195 mg/l which is three times the surface water impoundment average of .065 mg/l. and almost twice the Great Lake discharge permit level of 100 ug/l. Continuous temperature data was recorded from August 2, 2001 until October 9, 2001. The daily high temperature value of 82 oF was recorded on August 8th and daily high temperature of 64.9 oF was recorded on October 9, 2001. The suspended solid value ranged from one no detect on October 2, 2002 to a high of 39 mg/l on April 11, 2001. The average suspended solid concentration for the study period was 9.7 mg/l. The discharge permit limit of 45 mg/l was not exceeded during the study period.

Pesticide Analysis – The pesticide analysis identified atrizine at 0.23 ug/l on May 28 and 0.16 ug/l atrazine on July 29, 2002.

Figure3 – Railroad Bridge Site



BIOLOGICAL ASSESSMENT

The fish survey was done downstream of the railroad bridge on August 13, 2001. The distanced shocked was 179m and 149 individual fish were collected. The majority (104) of the fish were creek chubs. The IBI rating for this site was 2 giving it a rating of very poor. The very poor IBI is felt to be a result of the shallow water depth in this section. Table 3 is the calculated IBI for the railroad site.

The macroinvertebrate sampling was done on October 4, 2001 downstream of the railroad bridge . A total of 21 taxa were found and 143 individual organisms. The most common organism identified was from the order trichoptera, (genera cheumatopsyche sp) totaling 70 organisms. The Hilsenhoff Biotic Index (HBI) was 4.596 indicating good water quality.

Table 3 – IBI for Railroad Site

IBI Calculator for Central and Southern WI (REV. 10/12/2001)

Sample Date	Aug. 13, 2001
SITE	Baird Creek, Downstream from RR trestle. 44 30.235 87 56.446
PERSONNEL	Reyburn. Lange, Schroeder

MATRIX	VALUE	SCORE
total # of fish	149	n/a
total # of native spp.	8	0
total # of darter spp.	1	0
total # of sucker spp.	1	0
total # of sunfish spp. < 8km from lake	1	0
total # of sunfish spp. >8km from lake	0	2
total # of intolerant spp.	1	0
total # of tolerant fish	137	0
total # of omnivores	4	10
total # of insectivores	21	0
total # of top carnivores	0	0
total # of simple lithophils	25	0
	Subtotal	12
Correction Factors		2
total # of DELT fish	0	2
Total after correction factors =		2
IBI SCORE =		**2**

Equipment Type =	Back Pack
Stream width (m) =	5.12
Ln stream width (m) =	1.63
Distance shocked (m)=	179.2
Is your sample site greater than 8 km from a lake?	
% of tolerant spp.	92
% of omnivorous spp.	3
% of insevtivores	14
% of carnivores	0
% of simple lithophilous	17
Correction Factors	
# of nontolerant fish per 300m	20
% DELT	0

Biotic Integrity Rating **VERY POOR**

NORTHVIEW SITE

The water chemistry and flow stage measurements were taken at the Northview Road bridge crossing. Due to little or no flow at this site later in the year, the habitat and biological assessments were taken at a doownstream crossing at Woodside Rd.

Habitat Study Section – The habitat evaluation section began 43.5m upstream of the Woodside Rd. bridge crossing and extended 108.8m upstream. The bottom was composed primarily of rubble and gravel with minor amounts of sand and silt. The section had 8 riffles totaling 41.5 m, 10 runs for 53.45m and 3 pools totaling 14m. The riparian land use within 5m of the stream was primarily shrubs, however the overall land use in this area is developed/agriculture. The minimum stream depth was 0.02 m and the maximum depth was 0.315m . The stream width ranged from 2.4m to 4.1m with a calculated mean stream width of 3.1m. The habitat rating score for this section was 52 indicating good habitat.

Discharge – Table 1 shows a calculated stream discharge at Northview Rd ranging from 35.7 on April 11, 2001 to no discharge on nine occasions. There was ice cover recorded 4 times preventing the recording of the stage. Average discharge over the study period was 9.28 cfs. In April of 2002, a section of the Northview bridge used as a reference point to measure stage collapsed into Baird Creek. A new reference point was established at the top of the middle culvert. This required additional flow measurements and development of a new discharge rating curve, adding variability to the discharge calculations. Discharge at this site was intermittent during the summer and fall of 2001 and 2002.


Figure 4 –Northview Rd.


Figure 5 – Woodside Rd.

Water Quality - Water Chemistry and field measurements were not taken during periods of no flow. Dissolved oxygen levels were recorded below the standard of 5.0 ppm four times out of the twenty-eight times sampled. Coliform bacteria exceeded 400 counts six times and ranged from 10 counts/100ml to 71000 counts/ 100ml on June 4, 2002. Total phosphorous concentrations ranged from 0.10 mg/l on January 30, 2002 to 0.74 mg/l on August 23, 2001. The average total phosphorous value at this site for the study period was 0.42 mg/l. These values are considered very high compared to the statewide surface water phosphorous average of 0.065. Continuos water temperatures were not recorded at this site due to the intermittent flow. The suspended solids ranged from no detect on four occasions to a high of 182 mg/l on August 23, 2001. The average suspended solid concentration was 13.5 mg/l.. The discharge permit value of 45 mg/l was exceeded only once out of the 19 times sampled.

Biological Assessment – Invertebrate samples were collected on October 4, 2001 upstream of the Woodside Road bridge crossing. A total of 23 taxa were identified and 143 individual organisms counted. The orders Tricoptera (50 organisms) and Coleopetera (35 organisms) comprised the majority of the macro invertebrates found. The Hilsenhoff biotic index value of 4.867 was calculated indicating good water quality.

A total of 206 fish representing 12 native species were collected on August 14, 2001 (see Table 4). Seven specimens of redside dace (*Clinostomus elongatus*) were collected. This species is identified as rare or uncommon in Wisconsin. The IBI score for the woodside site is 32 indicating fair biotic integrity.

Table 4 – IBI Woodside Road

)/12/2001)

Sample Date	Aug. 14, 2001
SITE	Baird Creek, upstream from Woodside Ave. 44 30.452 87 54.689
PERSONNEL	Reyburn, Lange, Schroeder

MATRIX	VALUE	SCORE		
total # of fish	206	n/a	**Equipment Type =**	Back Pack
total # of native spp.	12	5	**Stream width (m) =**	3.17
total # of darter spp.	1	0	Ln stream width (m) =	1.15
total # of sucker spp.	1	2	**Distance shocked (m)=**	108.8
total # of sunfish spp. < 8km from lake	0	0	Is your sample site greater than 8 km from a lake?	
total # of sunfish spp. >8km from lake	0	0		
total # of intolerant spp.	2	5		
total # of tolerant fish	110	0		
total # of omnivores	15	10		
total # of insectivores	73	5	% of tolerant spp.	53
total # of top carnivores	0	0	% of omnivorous spp.	7
total # of simple lithophils	47	5	% of insevtivores	35
	subtotal	32	% of carnivores	0
			% of simple lithophilous	23
Correction Factors		32	Correction Factors	
total # of DELT fish	0	32	# of nontolerant fish per 300m	265
Total after correction factors =		32	% DELT	0
	IBI SCORE =	**32**		
Biotic Integrity Rating			**FAIR**	

CONCLUSIONS

The water chemistry data collected suggests a subwatershed severely impacted by agricultural and rural nonpoint nutrient loading. The average concentration of total phosphorous was highest at the Northview site (0.343 mg/l), less in the middle RR Bridge site reach (0.195mg/l), increasing again slightly in the lower reach at the Main St. site (0.238 mg/l). The average suspended solid concentration was 27.7mg/l at Main St., 10.0 mg/l at the RR Bridge station and 13.5 mg/l at the Northview site. The permit value for total suspended solids of 45 mg/l was not exceeded at the RR Bridge site . The improvements in water quality observed at the RR Bridge site may be attributed to the benificial buffering capacity of the Baird Creek Parkway in this reach.

A preliminary comparison of the Baird Creek average total phosphorous data was made to event data collected as part of a nonpoint source assessment, (Gansberg DNR March 1995). The average Baird Creek total phosphorous concentration was higher at all three stations than the average total P of 0.18 mg/l at Mud Creek, slightly below the total P average of .416 mg/l at Garner Creek and well below the total P average of 1.31 mg/l at Kankapot Creek. The Baird Creek phosporous concentration is two to three times higher when compared to the average phosphorous concentration of (0.11 mg/l) for the Fox River at Depere from 1996 through 1999 using DNR ambient water monitoring data.

Wisconsin Administrative Code Chapter NR 102 Water Quality Standards for Wisconsin Surface Waters has established standards for dissolved oxygen (5.0 ppm) and temperature (89 oF), for fish and aquatic life and a fecal colifom standard for recreational use. The temperature standard was not exceeded during the study period with the highs in August reaching the mid 80 degree farenheit late in the day around 4 pm. Water temperatures dropped overnight reaching a low around 6 am, at which time it began warming throughout the day. The dissolved oxygen concentration was normally adequate (> 5.0 ppm) to support aquatic life at all the sites except during summer periods of extreme low flow. The fecal coliform standard was routinely exceeded at all times of the year. Suspended solids was lower in the upper and middle reaches significantly increasing in the lower urban Main St. Station, perhaps due to the increased urban nonpoint runoff in the lower reaches.

The pesticide samples taken in 2002 indicated very low concentrations of atrazine and simazine just above the limit of detection of 0.1 ug/l. These levels do not appear to be a humane health risk and no other pesticides were detected in Baird Creek at that time.

Problems were encountered at the RR bridge site with vandalism to the continuous water level recorder and data from the recorder is suspect. The flow estimate based on tape down from a fixed point is more accurate but the flow calculation accuracy is limited during low flow conditions. There was often no summer flow at the Northview site and it appeared that low flow conditions dominated the system during the entire study period. The stream could be characterized as flashy from the Northview site downstream to its confluence with the East River below Main Street. Even after periods of moderate rainfall there was little flow observed in the upper to middle reaches the following day.

Habitat assessment ranked the sites from poor at Main Street to good at the upper two stations. This was generally a factor of low flow and high suspended solid loading. It does not appear that the stream habitat has improved significantly from an earlier habitat assessments conducted by DNR in 1992 and 1999. The macroinvertibrate index indicated good water quality at the two upstream stations but no macroinvetibrates were found at Main Street. It appears that a sediment toxicity problem is adversely impacting the benthic community at the Main Street site. The laboratory could not identify a chemical of concern but the problem could be caused by nonpoint runoff of oil/grease and heavy metals. Additional study is needed to identify the source of the impacts.

In general additional work is needed to limit the agricultural and nonpoint nutrient and suspended solid loading to Baird Creek in order for the system to attain its full fish and aquatic life potential.

MACROINVEREBRATE SUMMARY October 4, 2001

	Baird @ Woodside organism count	Baird @ RR Bridge organism count	Baird @ Main St. organism count
EPHEMEROPTERA			
Baetis brunneicolor	12		
Baetis flavistriga		4	
Stenacron interpunctatum	10	2	
Stenonema vicarium	11	17	
Stenonema femoratum		1	
Stenonema sp.		1	
TRICOPTERA			
Hydropsychidea	1	1	
Chematopsyche sp.	35	70	
Hydropsyche betteni	14	4	
Ceratopsyche alhedra		2	
Ceratopsyche bronta		5	
Ceratopsyche slossonae		2	
COLEOPTERA			
Optioservus sp.	1	1	
Optioservus fastiditus	33	11	
Stenelmis crenata		1	
Stenelmis sp.	1		
DIPTERA			
Dicranota sp.		1	
Chironominea	1		
Corynoneura sp.		1	
Conchapelopia sp.	1		
Cricotopus tremulus	1		
Eukiefferiella claripennis		1	
Limonia sp.	1		
Microtendipes sp.	6		
Orthocladius sp.	1	1	
Paratendipes sp.	1		
Polypedilum NR. Convictum	1		
Rheotanytarsus sp.	1		
Stictochironomus sp	4	1	
Tipula sp.	2		
AMPHIPODA			
Gammarus pseudolimnaeus		12	
ISOPODA			
Caecidotea intermedia		4	
Caecidotea sp.	3		
OLIGOCHAETA			
Tubificidae	1		
Total Organisms	143	143	0
Biotic Index	4.867	4.596	0

FISH COLLECTION SUMMARY

August 14,2001

Baird Creek
Upstream From Woodside Ave. 44 30.452 &87 54.689
Temperature= 68F
Total Electrofishing Time=16 Minutes
Total Length=108.8 Meters

Total Counts:

Creek Chubs	Fatheads	Black Nose Dace	Brook Stickleback	Pearl Dace	Central Mud Minnow
64	6	28	8	31	3
Northern red Belly Dace	**White Sucker**	**Common Shiner**	**Spottail Shiner**	**Red Side Dace**	**Johny Darter**
26	9	3	1	7	20

August 13,2001

Baird Creek
Baird Creek Park - Downstream from RR Trestle 44 30.235 & 87 56.446
Temperature= 75F
Total Electrofishing Time = 29 Minutes
Total Length = 179.2 Meters

Total Counts:

Creek Chubs	Black Nose Dace	Green Sunfish	Black Bullhead	Southern Redbelly Dace	
104	17	12	1	3	

Red Side Dace	White Sucker	Johny Darter
1	4	7

August 13,2001

Baird Creek
Upstream From Main St. 44 30.318 & 87 59.127
Temperature= 67F
Total Electrofishing Time=34 Minutes
Total Length = 368.9 Meters

Total Counts:

Creek Chubs	Fatheads	Common Shiner	Spottail Shiner	Bluntnose Minnow	Emerald Shiner	Black Bullhead Adult
21	7	5	12	3	1	1

Black Bullhead YOY	Green Sunfish	Yelow Perch YOY	Rock Bass	Carp YOY	Carp Adult	White Sucker
7	18	1	3	52	1	104

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