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**SUMMARY REPORT ON THE
1986-1997 ECOLOGICAL STUDIES OF THE
CONNECTICUT RIVER, VERNON, VERMONT**

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1.0 INTRODUCTION AND BACKGROUND

This report summarizes nine years (1986, 1988, and 1990-1997) of historical data collected during required environmental monitoring under Part III of Vermont Yankee Nuclear Power Corporation's NPDES Permit (Permit No. VT0000264). Specific categories of data summarized and reviewed were macroinvertebrate, larval fish, fish, anadromous fish, fish impingement, and water quality collections. Macroinvertebrate data from 1986 and annual reports for 1987 and 1989 were not available at the time this review was conducted. A similar review was conducted for data collected through 1989 and presented as part of a 316 Demonstration (Aquatec 1990).

2.0 MACROINVERTEBRATES

Macroinvertebrates were routinely sampled during 1988-1997 as part of the NPDES monitoring requirements. The sampling effort occurs in June, August, and October at four locations (Stations 2, 3, 4, and 5; Figure 1). Samples are collected by dredge (three times per year) and rock basket (two times per year). Methods of collection and processing have remained the same and are provided in the NPDES annual reports.

During the eight sample years we reviewed, a total of 93,295 macroinvertebrates was collected, representing nine invertebrate phyla (Table 1). Organisms collected by dredge and basket samples comprised 66% and 34% of the total, respectively. Greater than one third of all organisms were collected at Station 4. The proportions collected by each gear type upstream and downstream of Vernon Dam were similar. Macroinvertebrate data by year and gear type are presented in Appendices A and B. Macroinvertebrate data in the NPDES annual reports have been presented as collections upstream and downstream of Vernon Dam. However we believe it was more appropriate for this review to summarize the data by combining Stations 2-4 and isolating Station 5 as a control since it is the only station upstream of the plant discharge, and out of it's potential influence. Comparisons were made of the percent abundance of upstream vs. downstream collections to ascertain trends in abundance over time.

The composition of macroinvertebrates over the eight-year period at all stations consisted primarily of dipterans (39%), oligochaetes (21%), and pelecypods (10%). These trends were similar for upstream and downstream locations, with some minor variations, at each of the monitoring stations. The annual abundance for each of the nine phyla varied throughout the eight years and was likely due to natural yearly and seasonal fluctuations and a relatively small number of samples per year (Figure 2 and Appendices A and B). A comparison of macroinvertebrate abundance collected by both gear types upstream (Station 5 only) and downstream of the discharge shows a random distribution for each of the phyla present (Figure 3). These findings were similar to those reported in the 316 Demonstration (Aquatec 1990) and indicate there has been no adverse trends in the macroinvertebrate populations resulting from the operation of Vermont Yankee.

3.0 FISH

The fish community was routinely sampled during 1986-1997 as part of the NPDES monitoring requirements. The sampling effort occurs during four months per year (May, June, September, and October) at eight stations (Figure 1). Fish were collected with trap nets and electrofishing gear. Methods of collection and processing are provided in the NPDES annual reports.

During the nine sample years we investigated (1986, 1988, 1990-1997), a total 30,202 fish representing 30 species was collected (Table 2). Fish collected by electrofishing and trap netting comprised 54% and 46% of the total, respectively. The proportions collected by each gear type upstream and downstream were similar. Fish collection data by year and gear type are presented in Appendices C and D.

The most common fishes collected over the nine-year period at all stations combined were yellow perch (26%), rock bass (11%), pumpkinseed (10%), spottail shiner (9%), and white sucker (9%). Upstream collections (reservoir habitat) accounted for 66% of the fish caught. Yellow perch (36%), pumpkinseed (14%) and white sucker (9%) were the most abundant fish in the upstream collections. The most

abundant fishes captured downstream of Vernon Dam (riverine and flowing pool habitat) were rock bass (21%), smallmouth bass (14%), and spottail shiner (11%).

The annual abundance for each of the species, which comprised approximately 95% of the total catch ($n=13$), varied throughout the period and was likely due to natural yearly and seasonal fluctuations and recruitment success (Appendices C and D). A comparison of abundance of the dominant species by both gear types upstream and downstream of Vernon Dam showed a random distribution (Figure 4). These findings were similar to those reported in Aquatec (1990) and indicate there has been no adverse trends in the populations resulting in the operation of Vermont Yankee.

A cursory review of the fish collection data indicated there was overlap (similarities in relative abundance) in the fish sampling methods employed. To further evaluate this overlap we analyzed the data by the Spearman rank correlation (r_s) test to determine if the ranks of the percent abundance by gear type changed, and by computing an index of percent similarity (PS_c) in species between gear types (Zar 1974). The Spearman rank test is expressed as follows:

$$r_s = \frac{1 - 6 \sum_{i=1}^n d_i^2}{N^3 - N}$$

The percent similarity index is expressed as follows:

$$PS_c = 100 - 0.5 \sum_{i=1}^n |a - b| = \sum_{i=1}^n \min(a, b)$$

where PS_c is the percent similarity and a and b are the percentage of a species in Sample A (trap net) and B (electrofishing). The PS_c is an empirical measure and is not an estimate of a statistical parameter of the population from which the samples are drawn. The values of PS_c can range from 0 to 100. A value of zero indicates that the species composition in the two samples is entirely different and a value of 100 indicates complete similarity. For this evaluation, we removed anadromous fishes and minnows from the data set due to gear selectivity of these species (i.e., minnows are rarely adequately sampled with trap nets).

Results of these tests indicated there was overlap in collections upstream of Vernon Dam (Table 3). There were strong correlations $r_{(s)} > (r_{(s)})_{0.05}$ within each year as well as high percent similarity. In contrast significant differences $r_{(s)} < (r_{(s)})_{0.05}$ in collection by gear type downstream of the dam were observed. The r_s values and percent similarities were much lower. This difference may be a function of the habitat sampled as opposed to gear efficiencies. The area downstream of Vernon Dam is riverine and likely not conducive to efficient trap net sampling.

4.0 ANADROMOUS FISH SAMPLING

Juvenile shad sampling occurred routinely since 1991 as part of the NPDES monitoring requirements. The sampling effort occurs twice monthly from July-October at three locations: 0.1 mi. below Vernon Dam, Station 3, and Stebbin Island. Fish were collected with electrofishing gear. Methods of collection and processing are provided in the NPDES annual reports. Although sampling has occurred since 1991 data prior to 1996 were not available for this review. The numbers of shad collected in 1996 and 1997 were 142 and 321, respectively (Table 4). The catch by month varied between the two years reviewed. In 1996 the greatest number ($n=103$) of shad were collected in September. In 1997 most ($n=179$) were collected in August. Limited data for the total sampling efforts (1991-1997) precludes further investigation of abundance trends.

5.0 POTENTIAL FISH ENTRAINMENT

Ichthyoplankton sampling was conducted in the Connecticut River in the vicinity of the Vermont Yankee intakes. The numbers of larval fish reported in the review of data for 1988 and 1990-1997 represent fish

that may have become entrained by the operation of Vermont Yankee, not those that necessarily were entrained. Larval fish would have to be collected directly from the intake structure forebay to determine the actual number and taxa of fish entrained.

Ichthyoplankton samples are collected weekly between 1 May and 15 July at the surface, mid-depth, and near bottom from the Connecticut River in the vicinity of the Vermont Yankee intakes during 1988 and 1990 through 1997 (Table 5). Specific methods of collection are outlined in each NPDES annual report.

The review of nine years of data indicates that 5,747 larval fish were collected, representing 14 fish taxa (Table 6 and Appendix E). Minnows and white perch were the most abundant ichthyoplankters; comprising 84% of the larvae collected during the nine years in review (Table 6). Sunfishes, yellow perch, common carp, walleye, and largemouth bass contributed 15.6% to the catch while 0.2% of the catch was unidentifiable. A total of four largemouth bass and one American shad was collected during the review period.

As reported in earlier summaries of Vermont Yankee ichthyoplankton data (Aquatec 1990), yellow perch continued to be the first larvae encountered, usually in early to late May (Table 7). White perch were collected in early May in 1996 and 1997 but not until mid to late-May during all other years in the current review and in earlier reports (Aquatec 1990). Walleye have been consistently collected during mid-May (Table 7). Minnows were usually collected beginning in early June through mid-July and were the single principal component of ichthyoplankton collections during June and July (Table 7).

The review of 1982-1989 entrainment data conducted by Aquatec (1990) indicated that densities of the abundant taxa were relatively low in intake water and were comparable to densities observed in river samples. Because of the low densities in the intake samples observed during the 1990 review and the concomitant and subsequent lack of data indicating that relative abundance and community composition had changed, the effect of larval fish entrainment on the fish community was determined to be minimal (Aquatec 1990). Continued low larval fish entrainment density, reported in the current review (particularly of the seven representative important species identified by the Environmental Advisory Committee), also support earlier findings that the operation of Vermont Yankee results in no adverse impact to the fish community for all species and particularly for American shad.

6.0 FISH IMPINGEMENT

Impingement sampling was conducted weekly at the Vermont Yankee circulating water travelling screens at the cooling water intake structure for the periods of 1 April through 15 June and 1 August through 31 October of each year, except during refueling outages, when the circulating water is not in use.

The maximum number of Atlantic salmon and American shad that can be impinged at the Vermont Yankee intake structure is determined each year, prior to sampling, as outlined in the NPDES permit.

Each weekly impingement sample consists of a 6-day backwash sample and a 24-hour sample. The 6-day backwash sample is examined for anadromous fish and the 24-hour sample is examined for all fish. Therefore, a total census of anadromous fish impingement is obtained for the periods of 1 April through 15 June and 1 August through 31 October of each year. All examined fish are identified to the lowest possible taxon, weighed to the nearest g (wet weight), and total length is measured to the nearest mm.

Nearly 15,000 fish were collected during routine spring and fall impingement sampling between 1988 and 1990-1997 (Table 8). The number of years included in this summary varies for each month presented in Table 8. This is most likely due to refueling outages.

The most abundant fish collected over the summarized years were *Lepomis* sp. (46%), including pumpkinseed and bluegill, followed by yellow perch (15%), rock bass (11%), and spottail shiner (8%); (Table 8). Totals of 387 American shad and 202 Atlantic salmon were impinged during the nine years in review, comprising 3% and 1%, respectively, of the total fish impinged over nine years.

During the nine years in review, the NPDES permit limits for anadromous fish were never exceeded.

7.0 WATER QUALITY

Under current NPDES Permit guidelines (which began in April 1996), monthly grab samples of Connecticut River water from Stations 3, 7, and the plant discharge are analyzed for copper, iron, and zinc. Prior to 1996 additional parameters evaluated were sodium, total solids content, alkalinity to pH4.5, pH aqueous, sulfate, chloride, total suspended solids, and turbidity. Review of the annual reports from 1989 to 1997 indicated no adverse effects of water quality from the operation of Vermont Yankee.

8.0 LITERATURE CITED

Aquatec. 1990. 316 demonstration. Biological, hydrological, and engineering information and environment impact assessment. Prepared for Vermont Yankee Nuclear Power Corporation, Brattleboro, VT. 71 pp.

Zar, J. H. 1974. Biostatistical analysis. Prentice-Hall, Inc., Englewood Cliffs, NJ. 620 pp.

TABLES

Table 1

Summary of macroinvertebrates collected in the vicinity of the Vermont Yankee Nuclear Power Plant, 1988-1997.

	Upstream*		Downstream*						Upstream and Downstream Combined	
	Station 5		Station 2		Station 3		Station 4		Combined	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Crustacea	770	2.90	746	3.84	765	5.33	2,905	8.80	4,416	6.62
Diptera	10,468	39.45	7,772	40.02	6,211	43.31	11,647	35.30	25,630	38.39
Ephemeroptera	1,530	5.77	1,073	5.53	494	3.44	1,548	4.69	3,115	4.67
Gastropoda	648	2.44	1,931	9.94	339	2.36	844	2.56	3,114	4.66
Hydrozoa	99	0.37	224	1.15	638	4.45	43	0.13	905	1.36
Oligochaeta	7,123	26.84	1,677	8.64	1,704	11.88	8,778	26.60	12,159	18.21
Other	1,006	3.79	431	2.22	874	6.09	799	2.42	2,104	3.15
Pelecypoda	2,915	10.98	1,144	5.89	790	5.51	4,726	14.32	6,660	9.98
Trichoptera	1,449	5.46	2,884	14.85	1,737	12.11	1,542	4.67	6,163	9.23
Tricladida	530	2.00	1,536	7.91	789	5.50	166	0.50	2,491	3.73
Total	26,538	100.00	19,418	100.00	14,341	100.00	32,998	100.00	66,757	100.00
									93,295	100.00

*Upstream and downstream of the plant discharge.

Table 2

Summary of fish collected in the vicinity of the Vermont Yankee Nuclear Power Plant, 1986-1997.

Species	Upstream						Downstream							
	Electrofishing		Trap netting		Total		Electrofishing		Trap netting		Total			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent		
Sea lamprey	15	0.13	0	0.00	15	0.07	15	0.30	18	0.35	33	0.33	48	0.16
American eel	42	0.37	7	0.08	49	0.24	59	1.19	32	0.62	91	0.90	140	0.46
Atlantic salmon	0	0.00	0	0.00	0	0.00	1	0.02	2	0.04	3	0.03	3	0.01
Brook trout	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Rainbow smelt	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Clupeidae	0	0.00	0	0.00	0	0.00	0	0.00	5	0.10	5	0.05	5	0.02
Blueback herring	0	0.00	0	0.00	0	0.00	6	0.12	8	0.15	14	0.14	14	0.05
American shad	82	0.73	4	0.05	86	0.43	828	16.72	78	1.50	906	8.93	992	3.28
Gizzard shad	1	0.01	0	0.00	1	0.00	3	0.06	0	0.00	3	0.03	4	0.01
Brown trout	0	0.00	0	0.00	0	0.00	1	0.02	0	0.00	1	0.01	1	0.00
Esocidae	1	0.01	0	0.00	1	0.00	0	0.00	0	0.00	0	0.00	1	0.00
Northern Pike	44	0.39	18	0.20	62	0.31	35	0.71	8	0.15	43	0.42	105	0.35
Chain Pickerel	91	0.81	139	1.58	230	1.15	25	0.50	38	0.73	63	0.62	293	0.97
Cyprinidae	0	0.00	0	0.00	0	0.00	2	0.04	0	0.00	2	0.02	2	0.01
Common carp	102	0.91	69	0.78	171	0.85	34	0.69	19	0.37	53	0.52	224	0.74
Eastern silvery minnow	3	0.03	1	0.01	4	0.02	7	0.14	26	0.50	33	0.33	37	0.12
Longnose dace	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Golden shiner	423	3.76	263	2.99	686	3.42	42	0.85	35	0.67	77	0.76	763	2.53
Notropis sp.	1	0.01	0	0.00	1	0.00	8	0.16	0	0.00	8	0.08	9	0.03
Common shiner	1	0.01	0	0.00	1	0.00	0	0.00	0	0.00	0	0.00	1	0.00
Spottail shiner	1,269	11.27	246	2.79	1,515	7.55	935	18.89	168	3.24	1,103	10.88	2,618	8.67
Mimic shiner	134	1.19	1	0.01	135	0.67	213	4.30	1	0.02	214	2.11	349	1.16
Fallfish	2	0.02	0	0.00	2	0.01	204	4.12	17	0.33	221	2.18	223	0.74
White sucker	1,139	10.12	597	6.78	1,736	8.65	580	11.71	271	5.22	851	8.39	2,587	8.57
Yellow bullhead	32	0.28	35	0.40	67	0.33	2	0.04	6	0.12	8	0.08	75	0.25
Brown bullhead	124	1.10	196	2.23	320	1.60	11	0.22	547	10.54	558	5.50	878	2.91
Banded killifish	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
White perch	273	2.43	436	4.95	709	3.53	19	0.38	52	1.00	71	0.70	780	2.58
Rock bass	294	2.61	807	9.17	1,101	5.49	285	5.76	1,855	35.74	2,140	21.10	3,241	10.73
Lepomis sp.	46	0.41	5	0.06	51	0.25	10	0.20	23	0.44	33	0.33	84	0.28
Pumpkinseed	1,157	10.28	1,636	18.58	2,793	13.92	66	1.33	301	5.80	367	3.62	3,160	10.46
Bluegill	1,132	10.06	558	6.34	1,690	8.42	207	4.18	508	9.79	715	7.05	2,405	7.96

Table 2

Continued.

Species	Upstream						Downstream					
	Electrofishing			Trap netting			Electrofishing			Trap netting		
	Number	Percent	Total	Number	Percent	Total	Number	Percent	Total	Number	Percent	Total
Smallmouth bass	177	1.57	265	3.01	442	2.20	952	19.23	8.21	426	8.21	1,378
Largemouth bass	746	6.63	93	1.06	839	4.18	69	1.39	0.44	23	0.44	92
Tessellated darter	6	0.05	1	0.01	7	0.03	0	0.00	0	0	0.00	0
Black crappie	8	0.07	20	0.23	28	0.14	0	0.00	0.12	6	0.06	6
Yellow perch	3,819	33.93	3,312	37.62	7,131	35.55	242	4.89	11.71	608	11.71	850
Walleye	93	0.83	95	1.08	188	0.94	90	1.82	2.10	109	2.10	199
Etheostoma sp.	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0
Totals	11,257	100.00	8,804	100.00	20,061	100.00	4,951	100.00	5,190	100.00	10,141	100.00
												30,202
												100.00

Table 3

Percent similarities and Spearman Rank correlations of fish collected by trapnet and eletrofishing upstream and downstream of Vernon Dam, 1986-1997.

	1986	1988	1990	1991	1992	1993	1994	1995	1996	1997
<i>Downstream Sampling (Trap net versus Electrofishing)</i>										
PS _C	41.846	55.708	42.007	41.537	39.823	39.482	44.598	51.648	65.094	59.346
$r_{(s)}$	0.645	0.725	0.666	0.374	0.473	0.389	0.712	0.515	0.698	0.752
$(r_{s})_{0.05}$	0.738	0.700	0.700	0.700	0.700	0.700	0.738	0.738	0.700	0.700
<i>Upstream Sampling (Trap net versus Electrofishing)</i>										
PS _C	69.268	74.815	77.795	74.344	69.517	74.263	78.246	74.061	64.012	77.600
$r_{(s)}$	0.76544	0.83272	0.85338	0.7763	0.61249	0.76096	0.61094	0.69693	0.69774	0.57105
$(r_{s})_{0.05}$	0.538	0.521	0.472	0.46	0.503	0.485	0.503	0.485	0.472	0.472

Table 4

Summary of anadromous fish collections in the vicinity of Vermont Yankee Nuclear Power Station, 1991-1997.

Month	Station	1991	1992	1993	1994	1995	1996	Percent by Month	1997	Percent by Month
July	Station 3	*	*	*	*	*	0	0.0	0	0.0
	Stebbin Island	*	*	*	*	*	0	0.0	17	100.0
	0.1 mi. south of Vernon Dam	*	*	*	*	*	0	0.0	0	0.0
<i>Total</i>							0	0.0	17	100.0
August	Station 3	*	*	*	*	*	13	46.4	49	27.4
	Stebbin Island	*	*	*	*	*	10	35.7	83	46.4
	0.1 mi. south of Vernon Dam	*	*	*	*	*	5	17.9	47	26.3
<i>Total</i>							28	100.0	179	100.0
September	Station 3	*	*	*	*	*	15	14.6	28	25.5
	Stebbin Island	*	*	*	*	*	30	29.1	51	46.4
	0.1 mi. south of Vernon Dam	*	*	*	*	*	58	56.3	31	28.2
<i>Total</i>							103	100.0	110	100.0
October	Station 3	*	*	*	*	*	N/A	0.0	1	6.7
	Stebbin Island	*	*	*	*	*	8	72.7	11	73.3
	0.1 mi. south of Vernon Dam	*	*	*	*	*	3	27.3	3	20.0
<i>Total</i>							11	100.0	15	100.0
Total							142		321	

* Sampling occurred but data were not available for summarization.

Table 5

Vermont Yankee ichthyoplankton sampling conducted in the Connecticut River in the vicinity of the intake structure. Summary of 1988 and 1990-1997.

Year	Depth (meters)	Number of Collections			Total
		May	June	July	
1998	0.3	4	5	2	11
	1.5	3	5	2	10
	3.0	3	5	2	10
1990	0.3	5	4	2	11
	1.8	5	4	2	11
	3.7	5	4	2	11
1991	0.3	5	4	3	12
	1.8	5	4	3	12
	3.7	5	4	3	12
1992	0.3	5	4	2	11
	1.8	5	4	2	11
	3.7	5	4	2	11
1993	0.3	5	4	2	11
	1.8	5	4	2	11
	3.7	5	4	2	11
1994	0.3	4	5	2	11
	1.8	4	5	2	11
	3.7	4	5	2	11
1995	0.3	4	4	2	10
	1.8	4	4	2	10
	3.7	4	4	2	10
1996	0.3	4	4	3	11
	1.8	4	4	3	11
	3.7	4	4	3	11
1997	0.3	4	4	3	11
	1.8	4	4	3	11
	3.7	4	4	3	11
Total					295

Table 6

Relative abundance of ichthyoplankton collected in the vicinity of the Vermont Yankee intakes during 1988 and 1990-1997. Numbers of fish reported were obtained from 295 samples.

	Number	Percent
Common carp	18	0.31
Notropis sp.	2,850	49.59
White perch	1,191	20.72
Lepomis sp.	628	10.93
Yellow perch	244	4.25
Cyprinidae	788	13.71
Walleye	8	0.14
American shad	1	0.02
Spottail shiner	2	0.03
Bluegill	2	0.03
Fallfish	1	0.02
White sucker	1	0.02
Largemouth bass	4	0.07
Unknown	9	0.16
Total	5,747	100.0

Table 7

Earliest and latest dates of capture of ichthyoplankton for four game fish species, 1988 and 1990-1997.

Year	Largemouth bass		White perch		Walleye		Yellow perch	
	Earliest	Latest	Earliest	Latest	Earliest	Latest	Earliest	Latest
1988	-	-	16 May	13 Jul	-	-	10 May	24 May
1990	-	-	25 May	12 Jul	-	-	01 May	25 May
1991	-	-	21 May	25 Jun	14 May	14 May	02 May	14 May
1992	-	-	20 May	23 Jun	20 May	20 May	05 May	20 May
1993	-	-	19 May	28 Jun	-	-	10 May	19 May
1994	-	-	25 May	06 Jul	25 May	01 Jun	11 May	25 May
1995	-	-	12 May	27 Jun	12 May	12 May	12 May	25 May
1996	-	-	08 May	03 Jul	-	-	08 May	20 May
1997	02 Jul	02 Jul	05 Jun	18 Jun	-	-	10 May	18 Jun

Table 8

Summary of monthly impingement of fish on Vermont Yankee's circulating water traveling screens. Number of years vary by month because not all months were sampled during each of the nine years summarized (usually due to refueling outages).

	April	May	June	August	September	October	Total
<i>Number of Years in Summary:</i>	8	9	9	9	7	8	
Sea lamprey	100	14	4	2	1	9	130
American eel	0	1	0	2	0	7	10
American shad	0	0	1	23	19	344	387
Blueback herring					2	31	33
Gizzard shad	0	0	0	1	1	7	9
Atlantic salmon	43	147	12	0	0	0	202
Brook trout	1	1	1	0	0	3	6
Brown trout	4	1	0	0	0	2	7
Rainbow trout	0	8	0	0	0	0	8
Rainbow smelt	3	1	0	0	0	0	4
Chain pickerel	25	1	1	0	1	3	31
Northern pike	4	0	1	0	0	0	5
Common carp	2	0	0	0	0	6	8
Cyprinidae	6	12	0	0	0	0	18
Common shiner	0	1	0	0	0	0	1
Eastern silvery minnow	5	13	0	0	0	0	18
Golden shiner	117	15	5	8	0	16	161
Spottail shiner	959	94	15	33	1	37	1,139
Mimic shiner	12	10	0	4	0	2	28
Longnose dace	1	0	0	0	0	0	1
Notropis sp.	113	1	1	0	2	0	117
White sucker	23	20	3	5	2	3	56
Yellow bullhead	121	12	2	0	4	88	227
Brown bullhead	105	355	10	37	3	58	568
Banded killifish		1	0	0	0	0	1
White perch	17	23	6	145	22	235	448
Rock bass	795	210	141	41	65	347	1,599
Lepomis sp.	189	106	14	777	18	1,863	2,967
Pumpkinseed	79	99	27	12	7	629	853
Bluegill	1,074	95	63	118	30	1,557	2,937
Smallmouth bass	89	15	12	61	13	89	279
Largemouth bass	9	4	0	67	4	50	134
Black crappie			1	0	0	0	1
Tessellated darter	17	11	0	3	1	1	33
Yellow perch	1,243	423	138	289	13	141	2,247
Walleye	10	2	1	30	14	48	105
Total	5,166	1,696	459	1,658	223	5,576	14,778

FIGURES

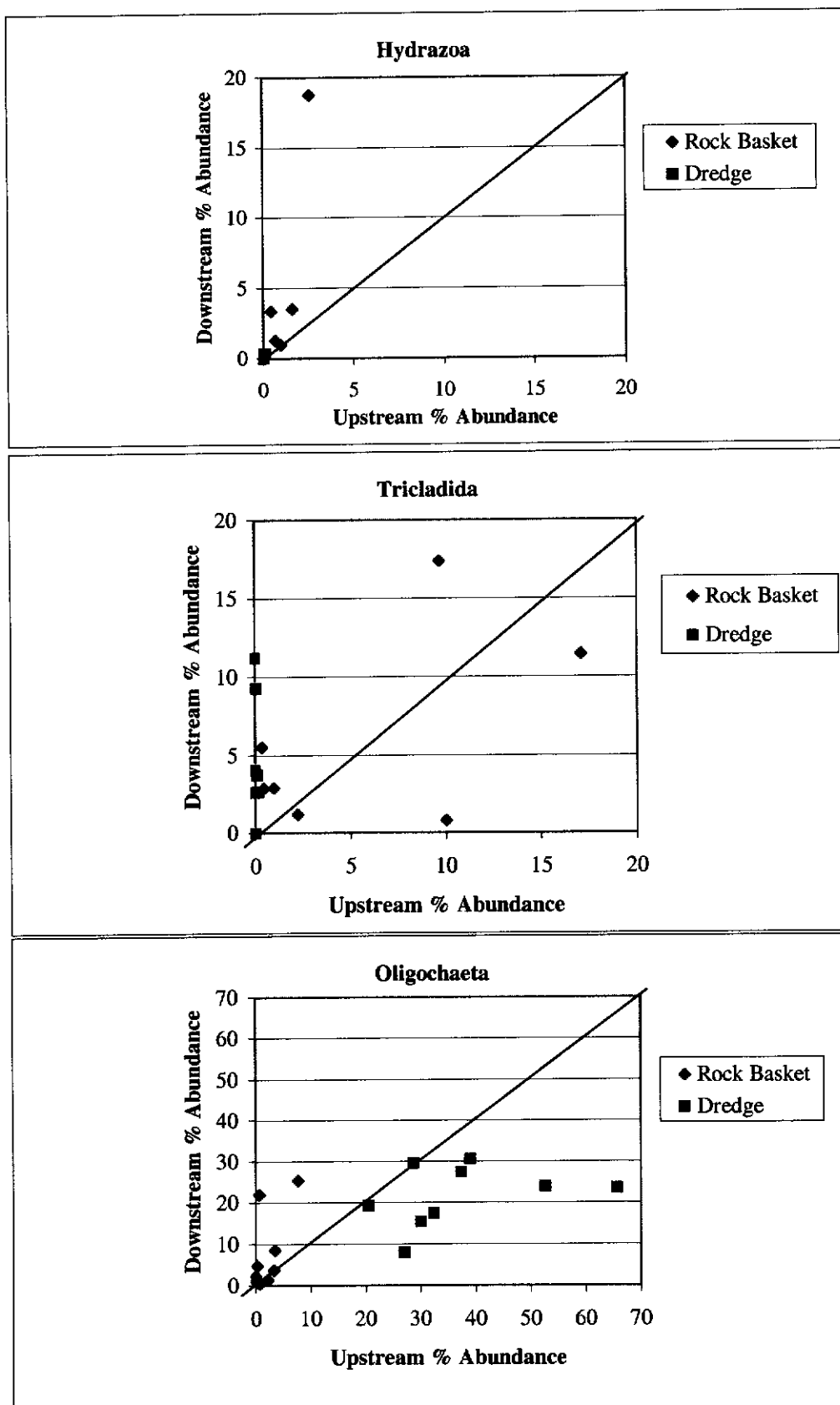


Figure 2

Comparison of upstream and downstream abundance of nine macroinvertebrate phyla collected in the vicinity of the Vermont Yankee discharge, 1988-1997.

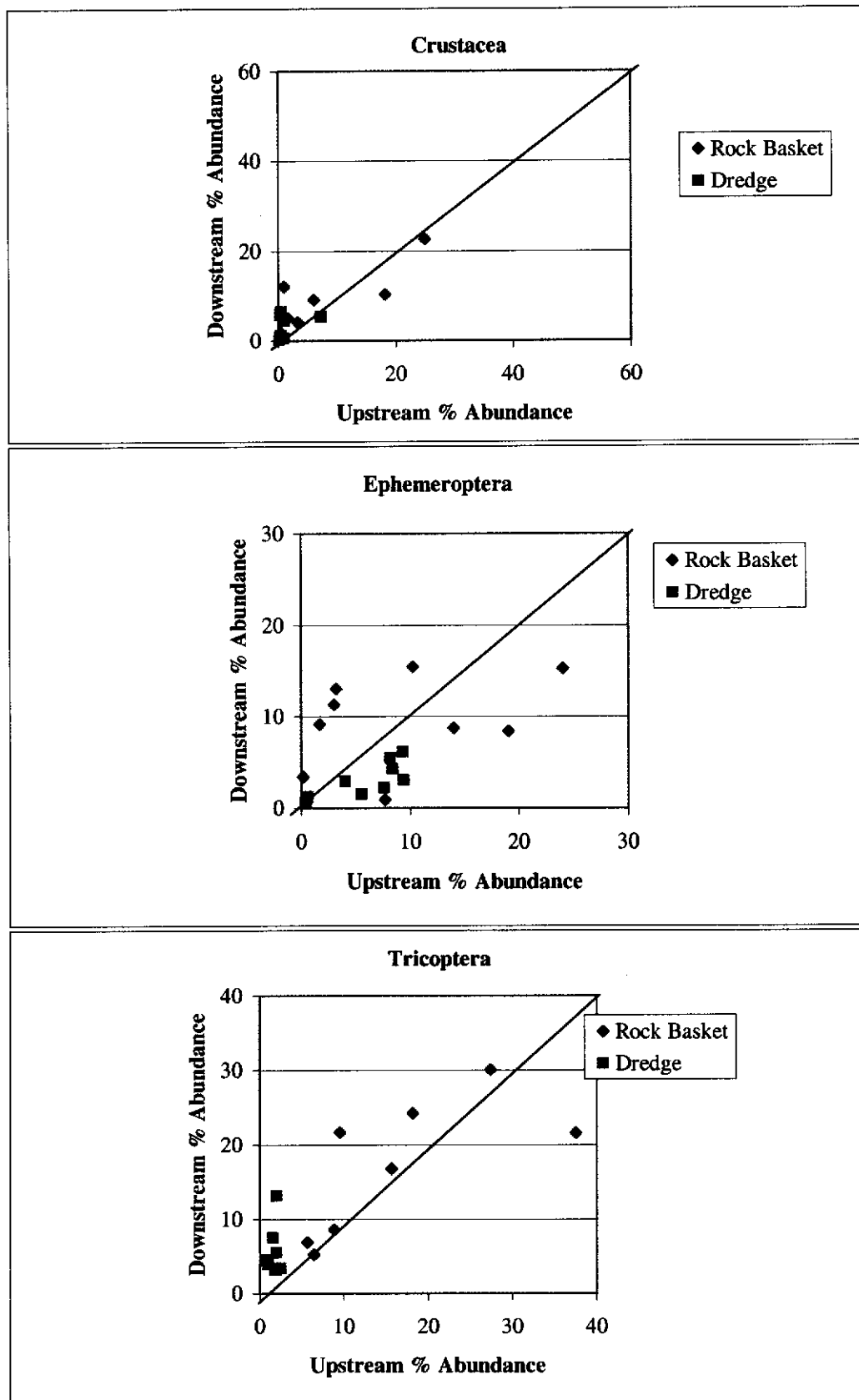


Figure 2

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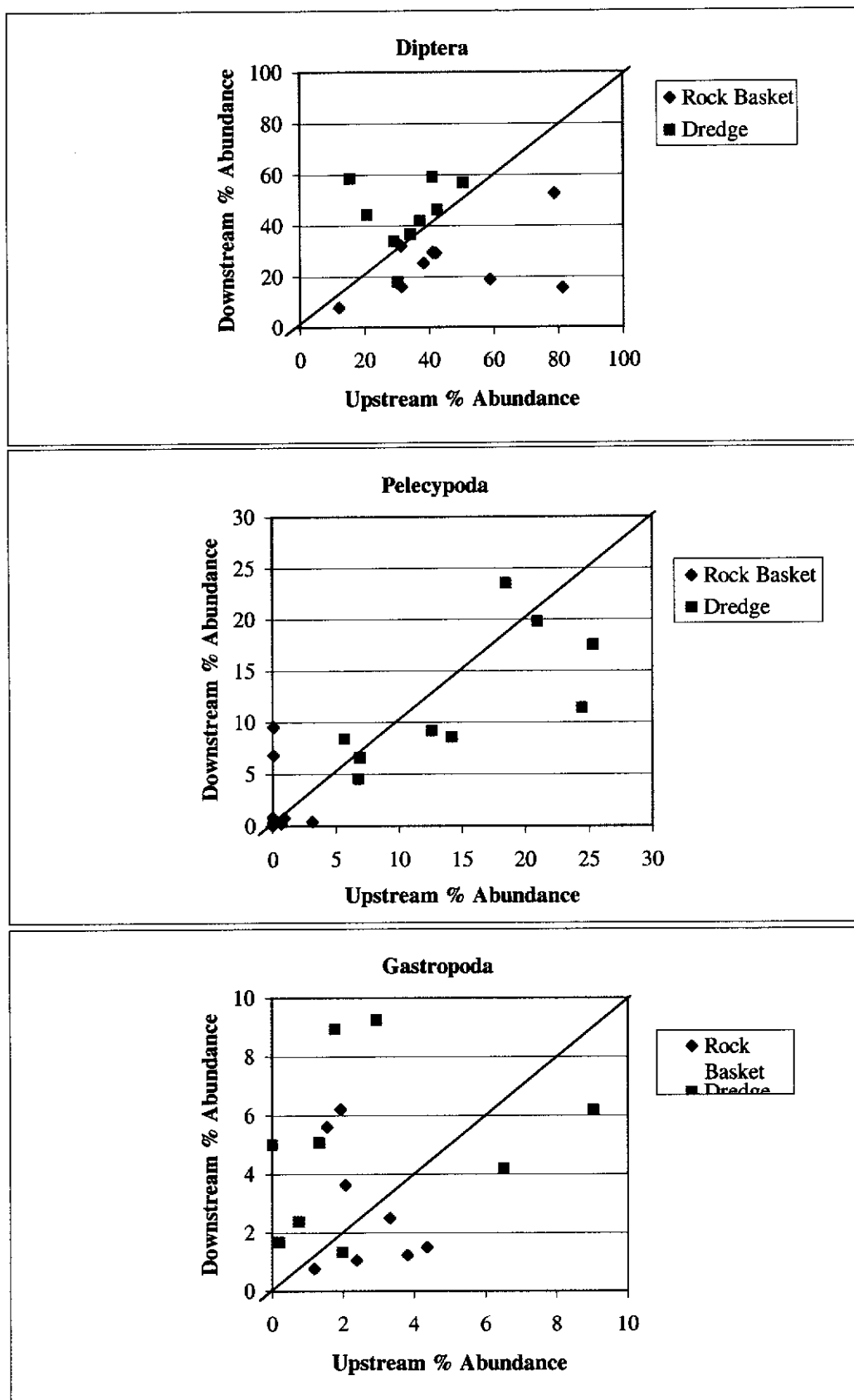


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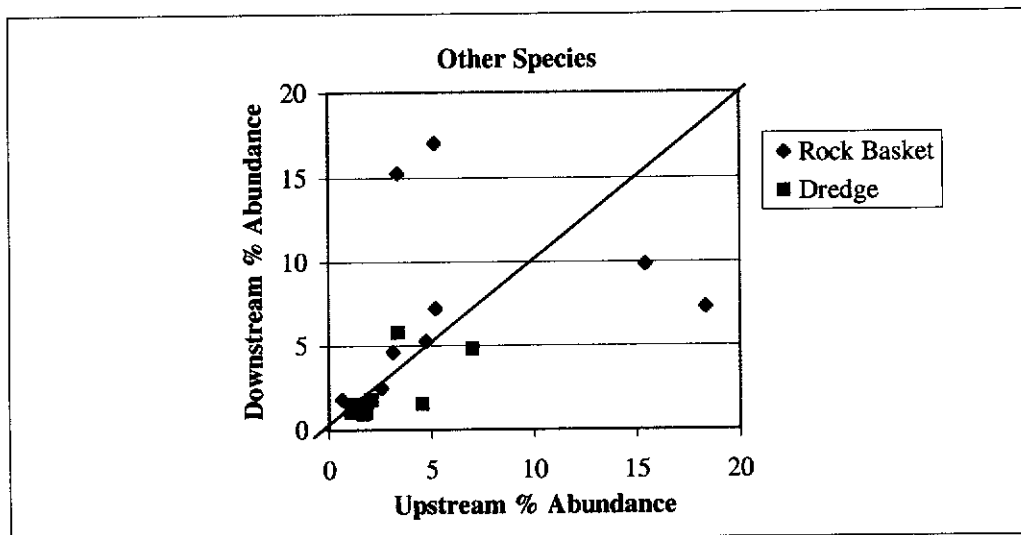


Figure 2

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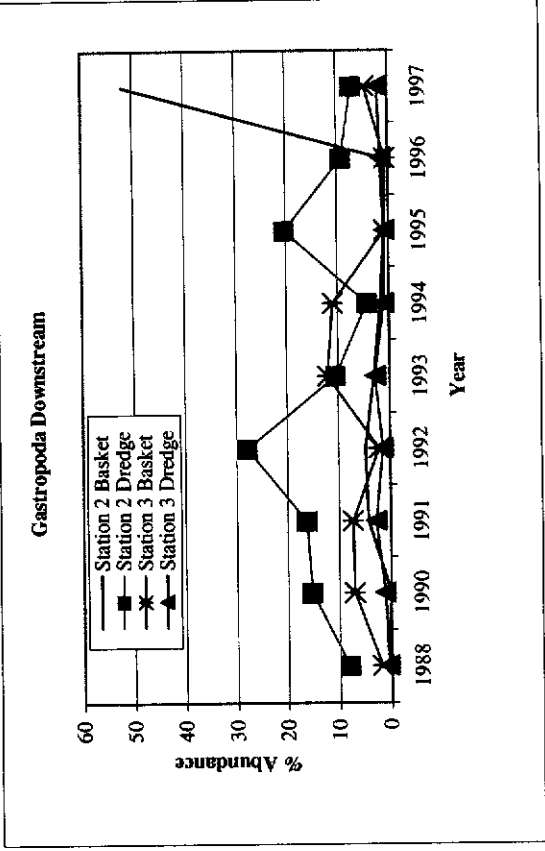
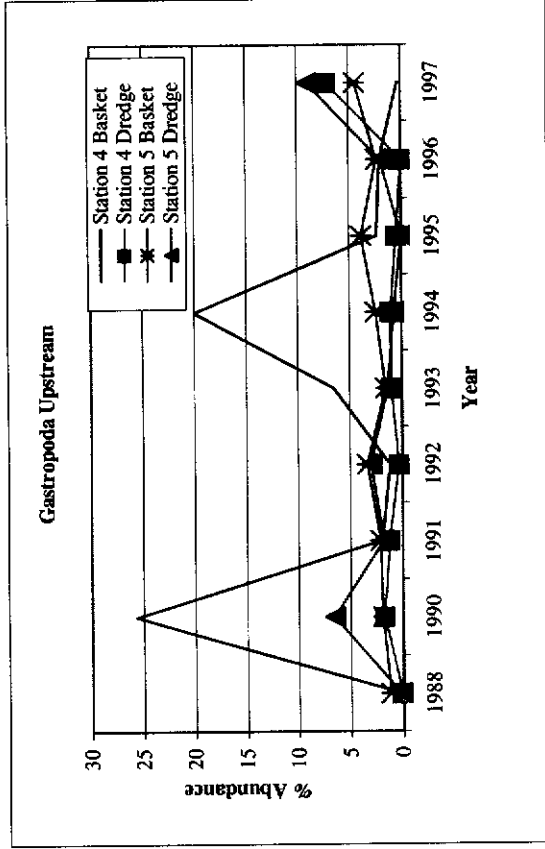
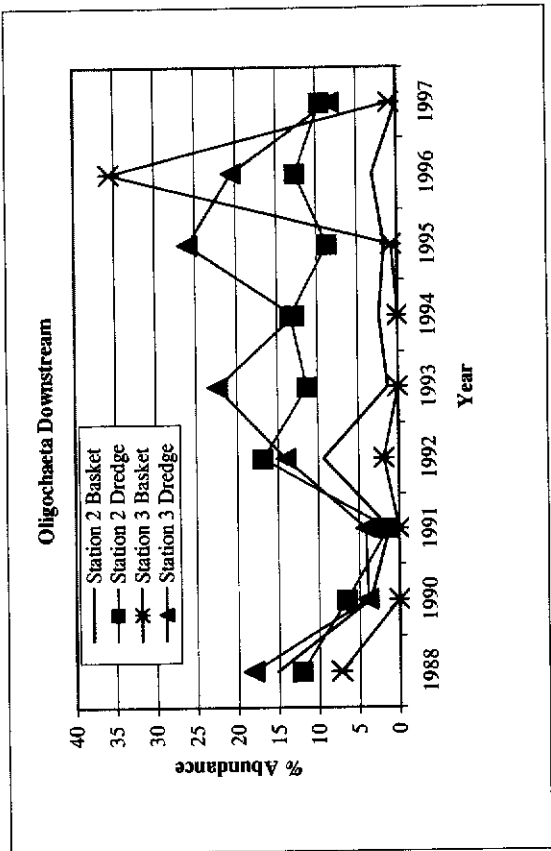
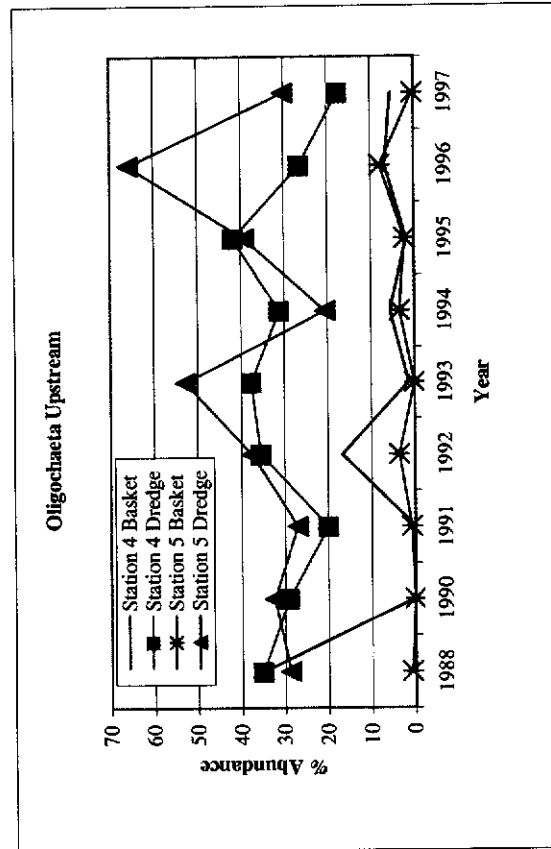


Figure 3

Comparison of annual upstream and downstream abundance of nine macroinvertebrate phyla collected by dredge and rockbasket in the vicinity of Vermont Yankee, 1988-1997.

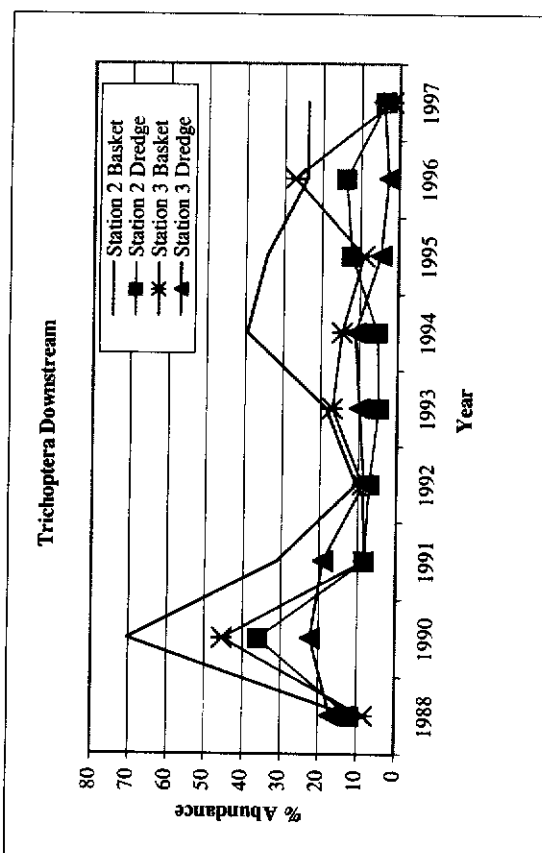
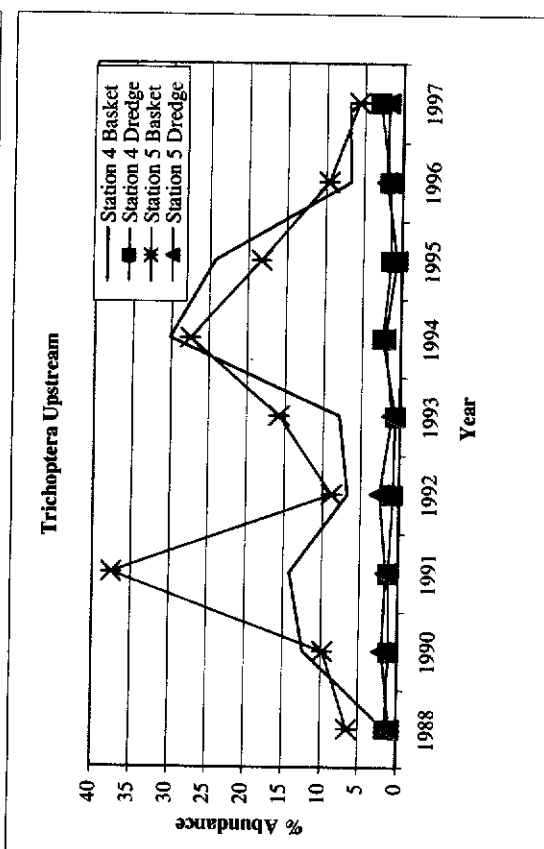
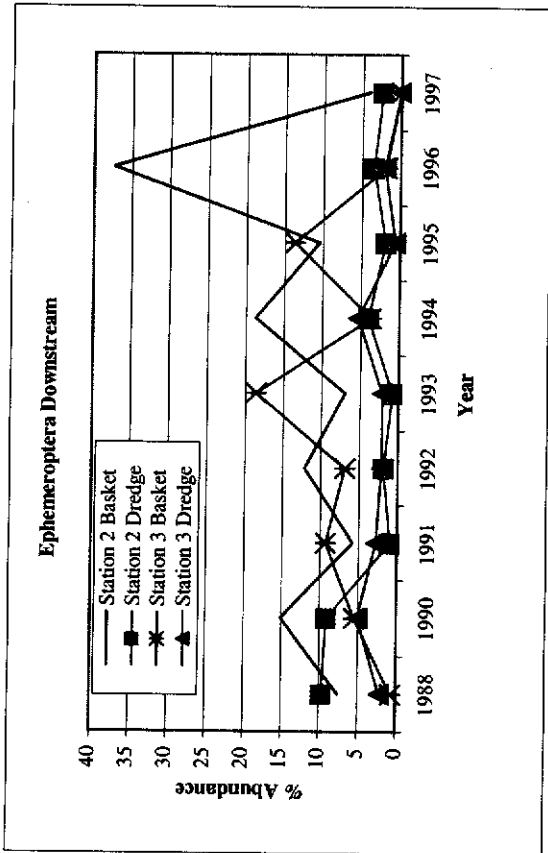
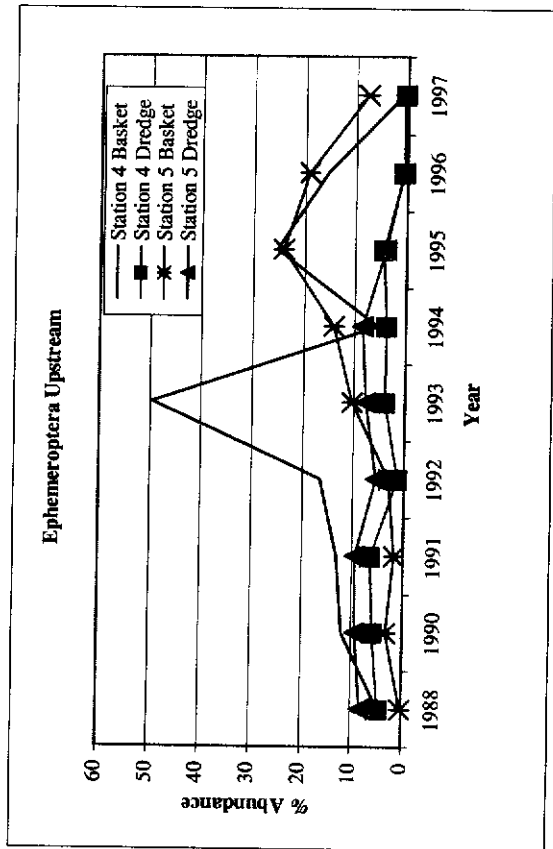


Figure 3

Continued.

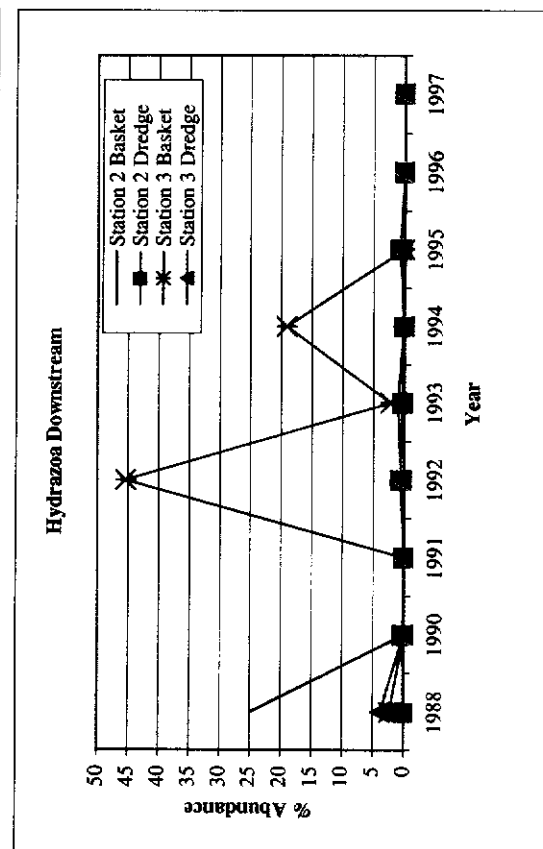
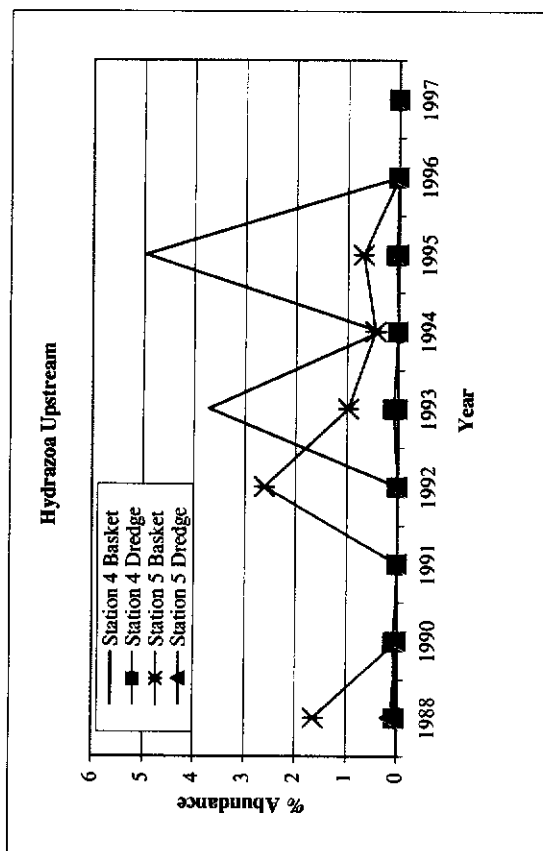
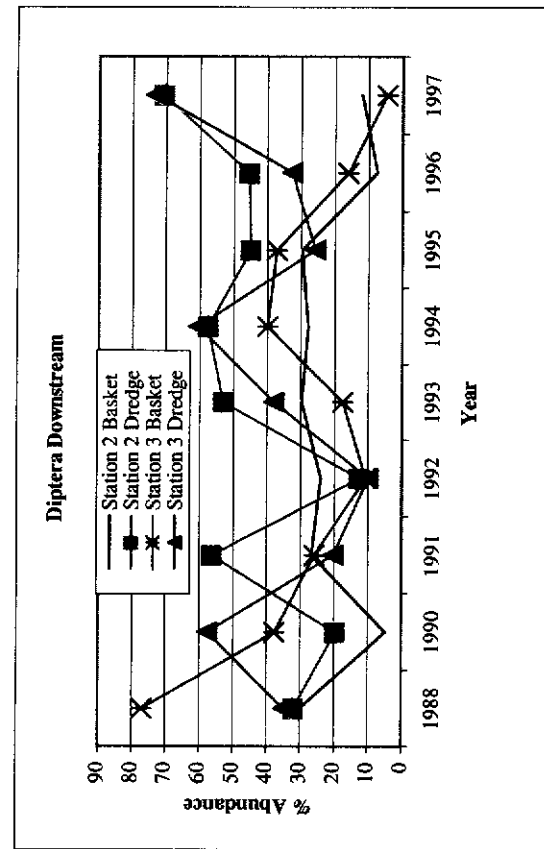
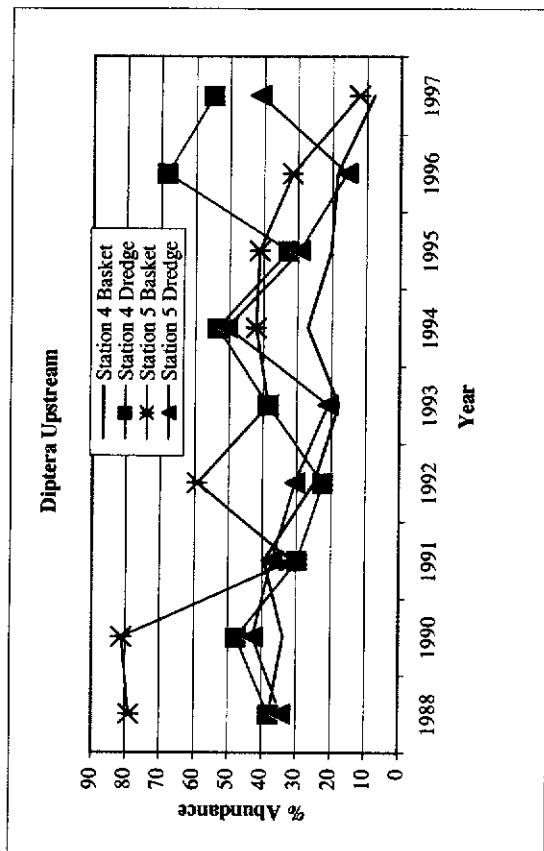


Figure 3

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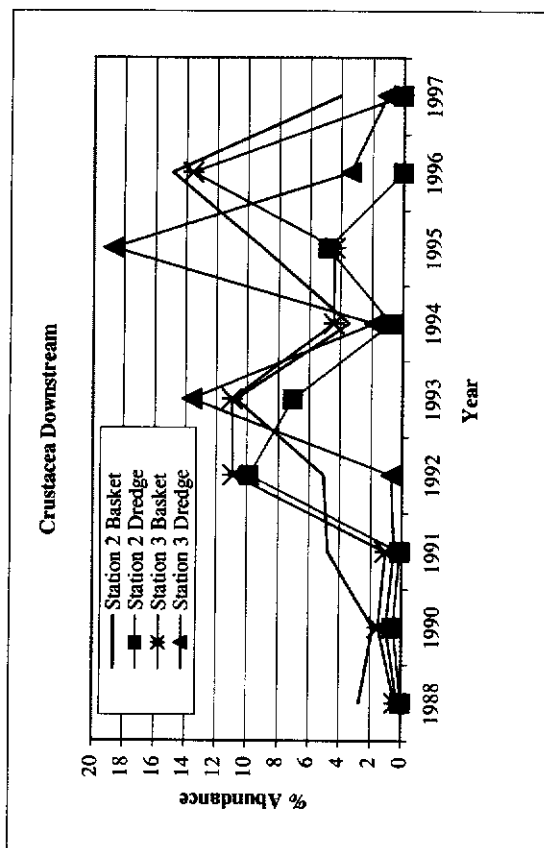
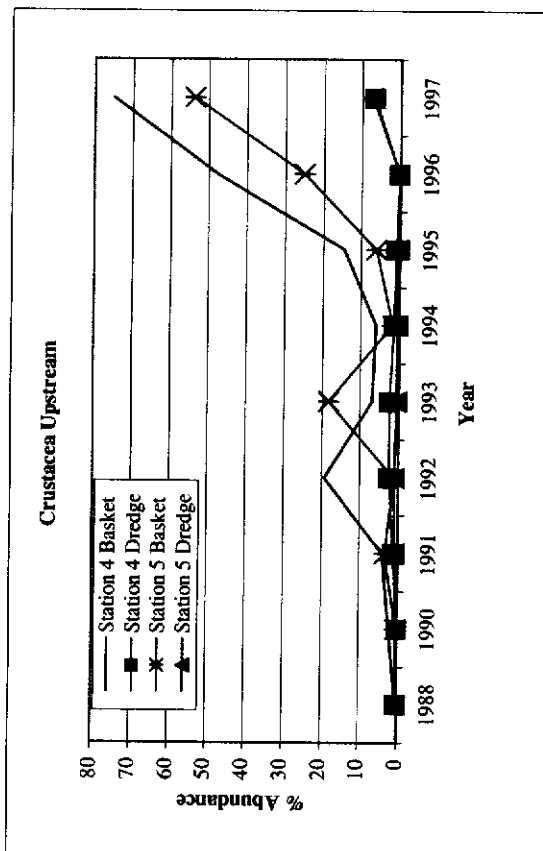
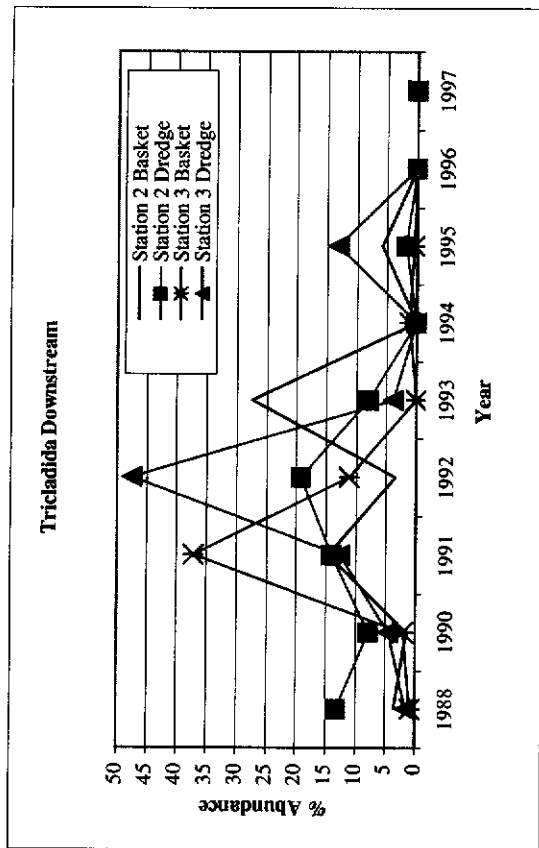
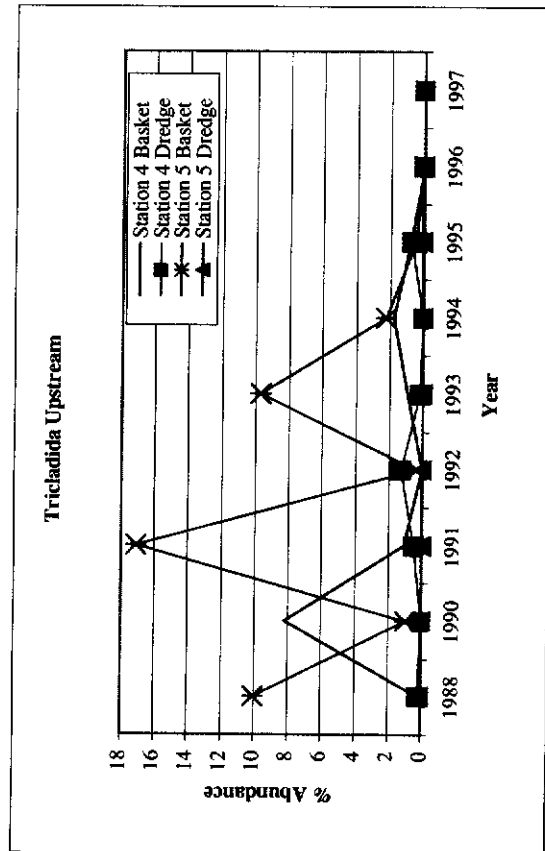


Figure 3

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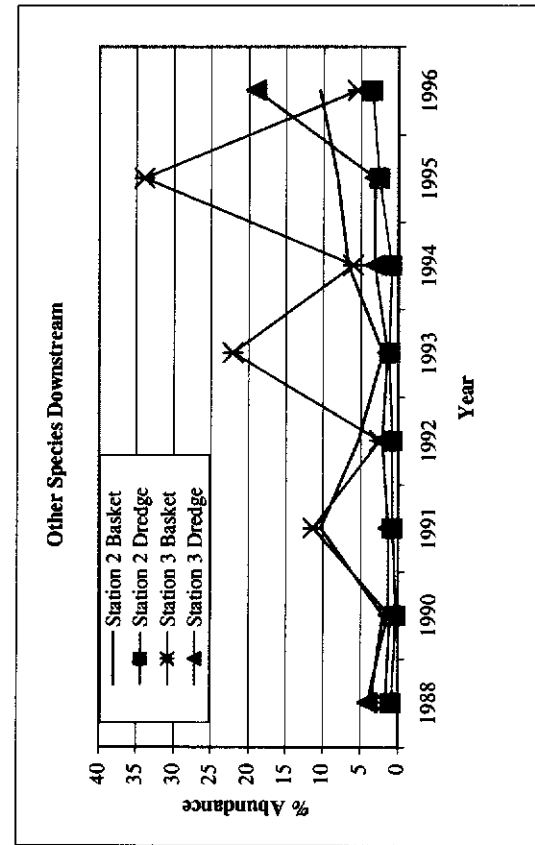
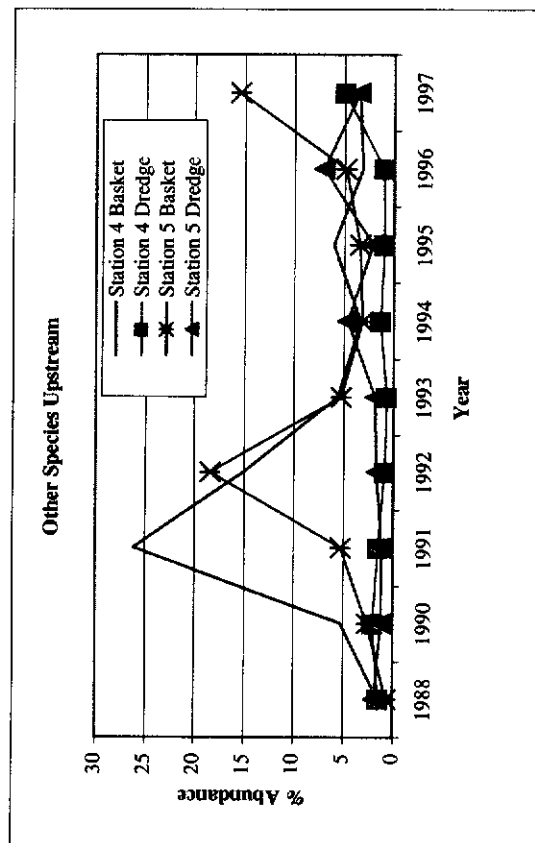
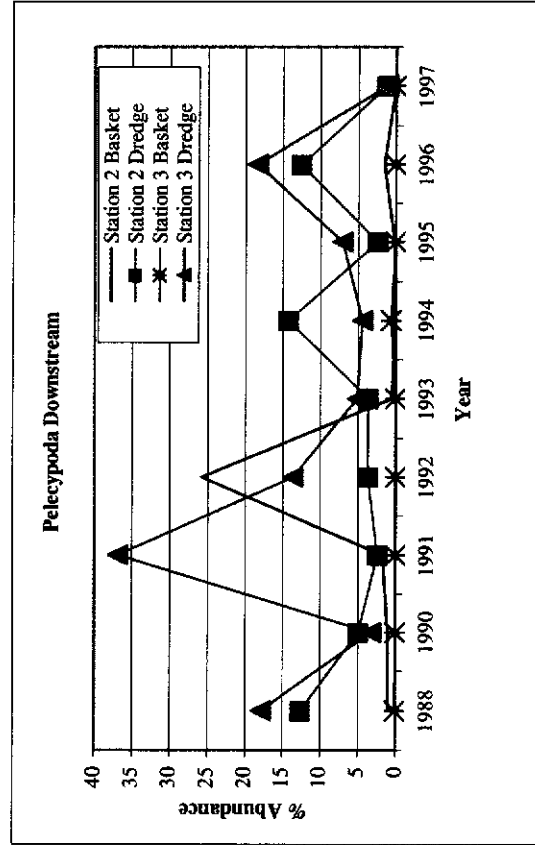
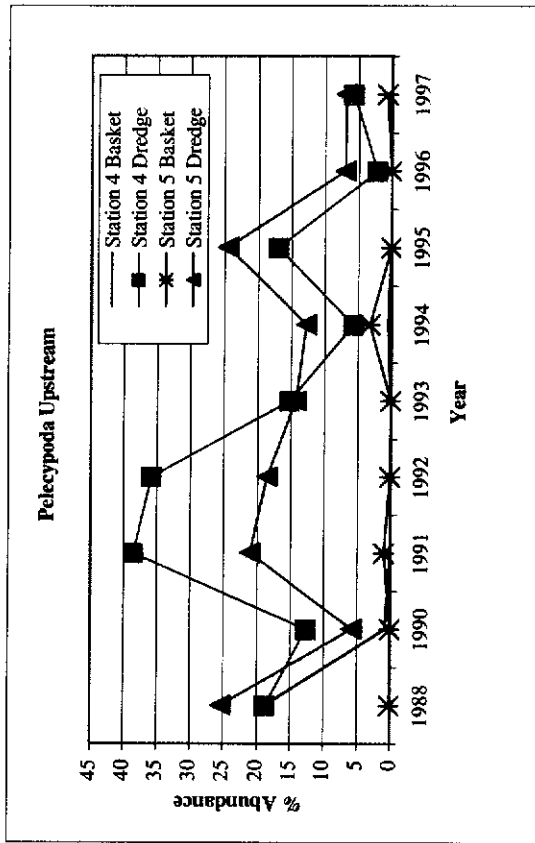


Figure 3
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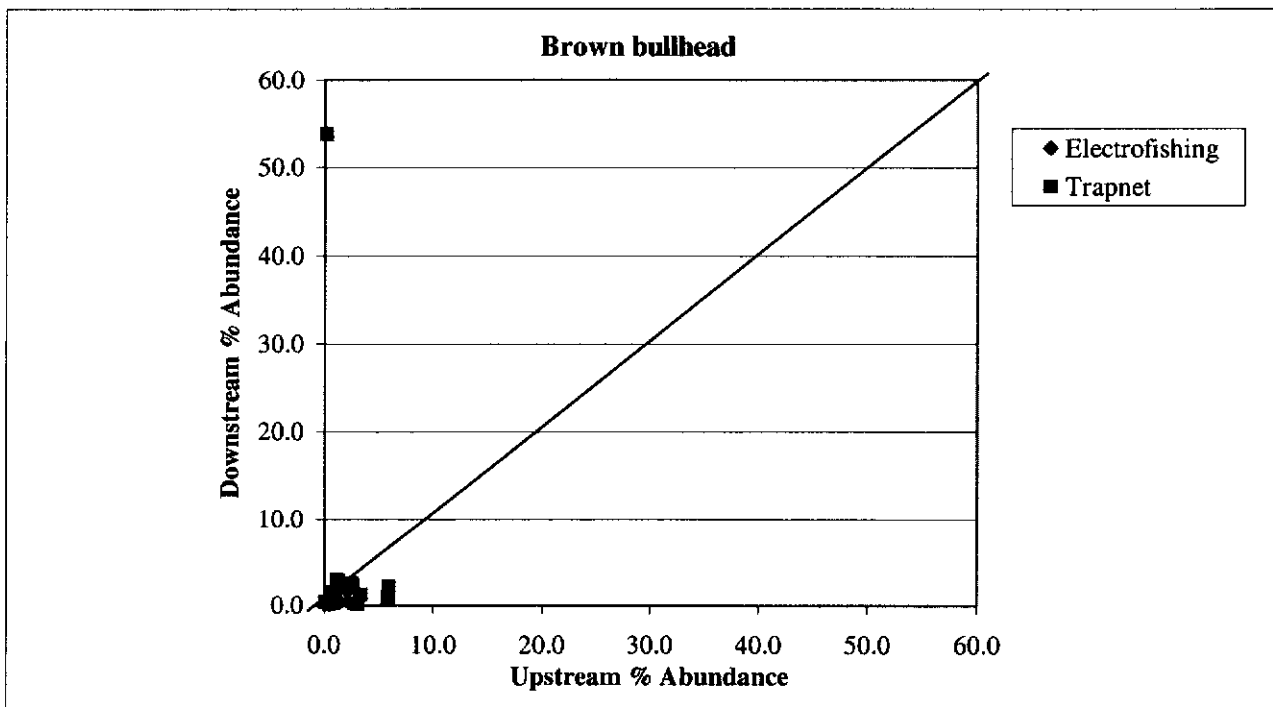
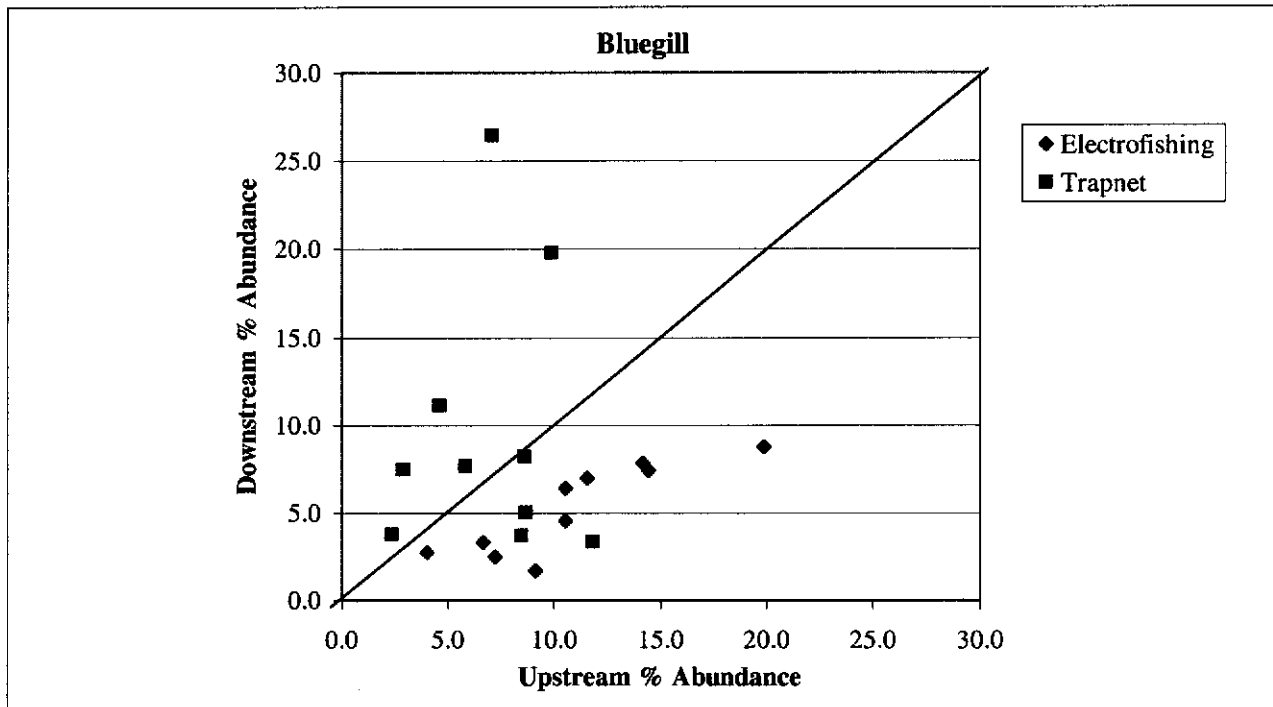


Figure 4

Comparison of upstream and downstream abundance of 13 species of fish collected in the vicinity of Vernon Dam, 1986-1997.

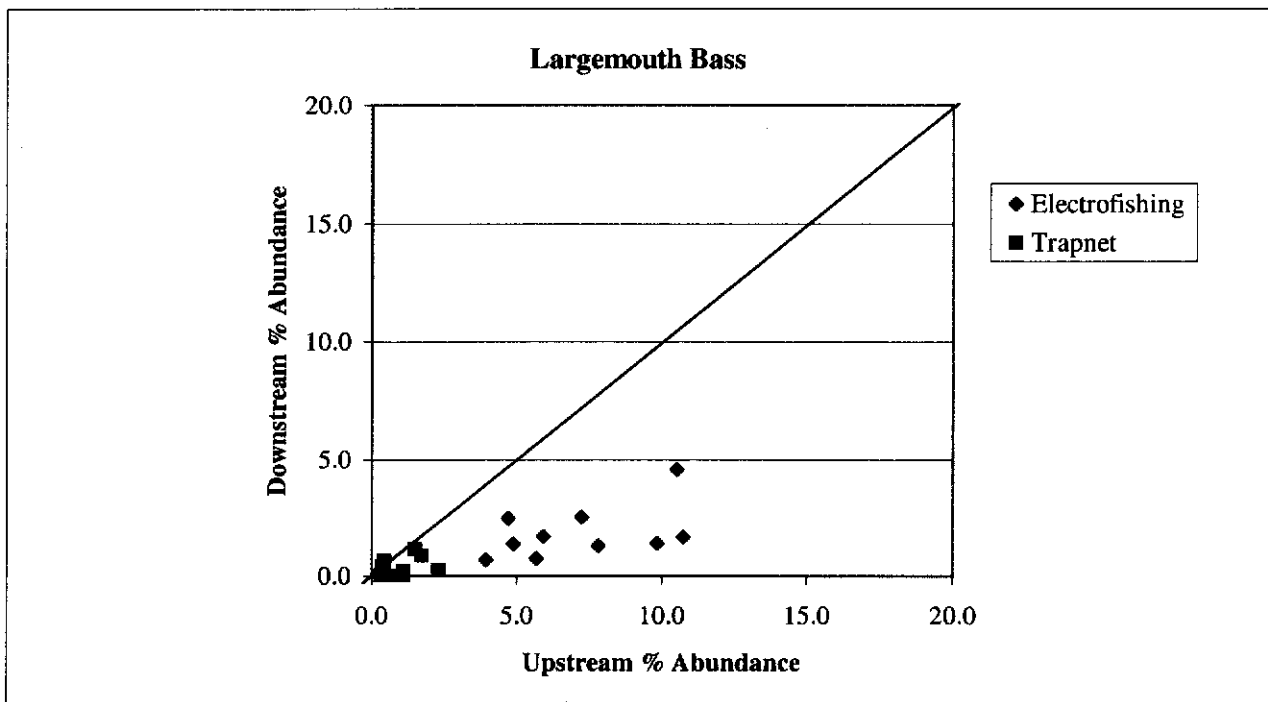
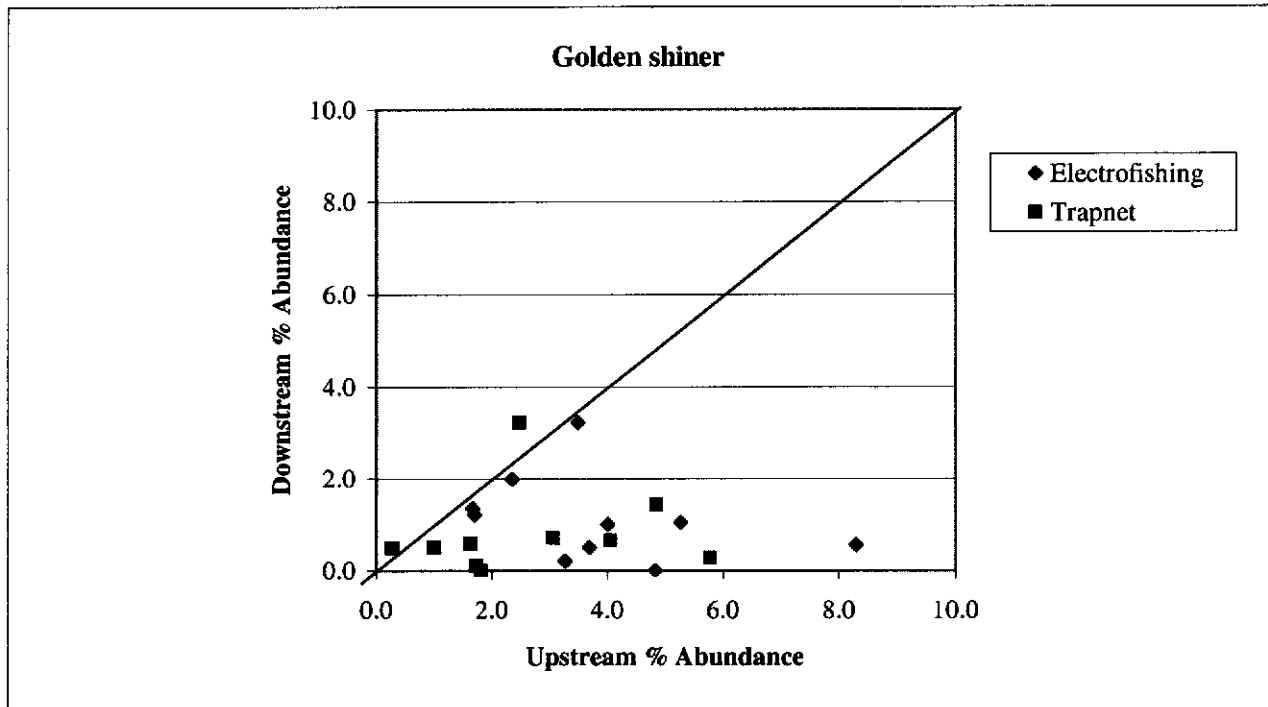


Figure 4

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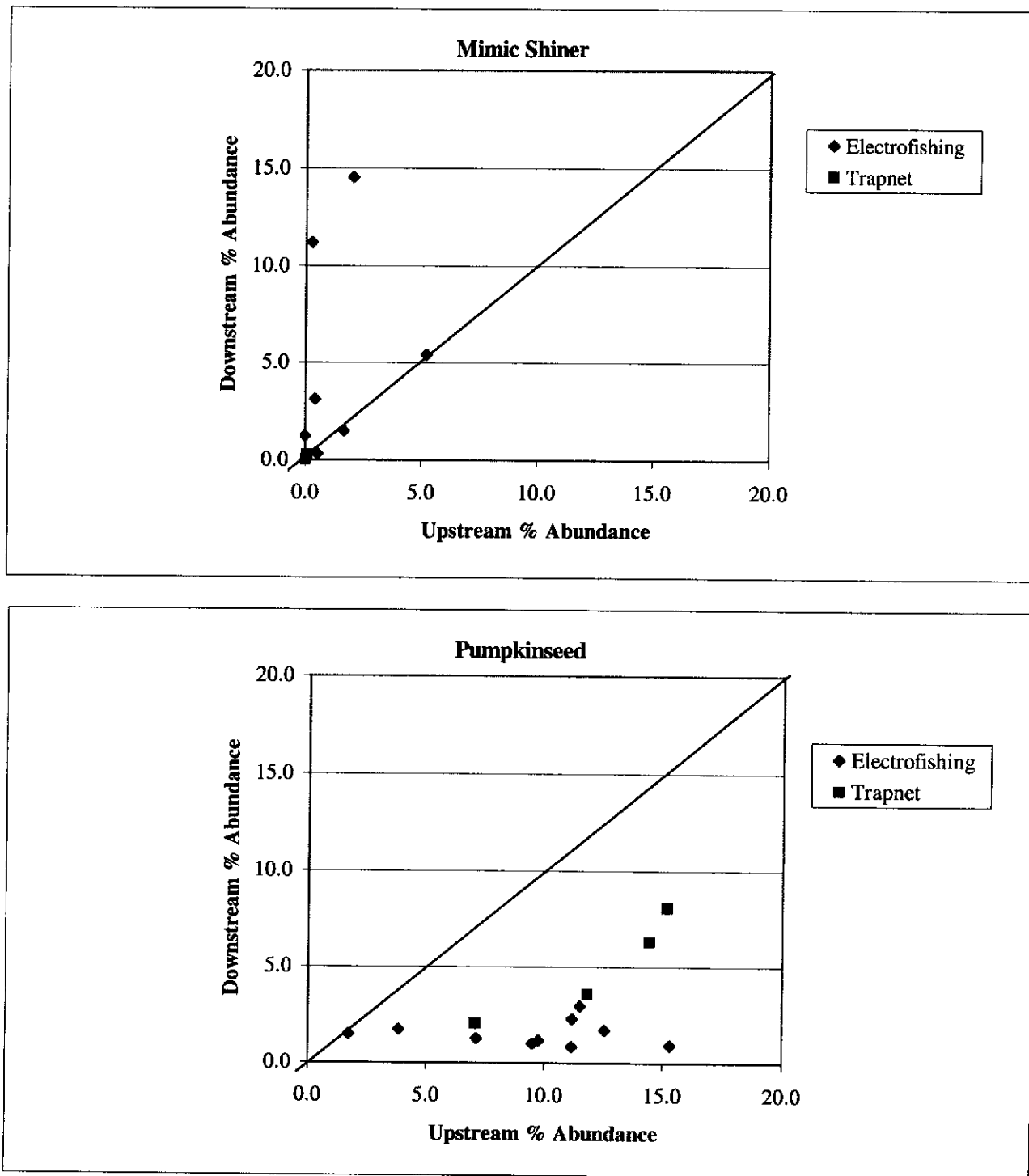


Figure 4

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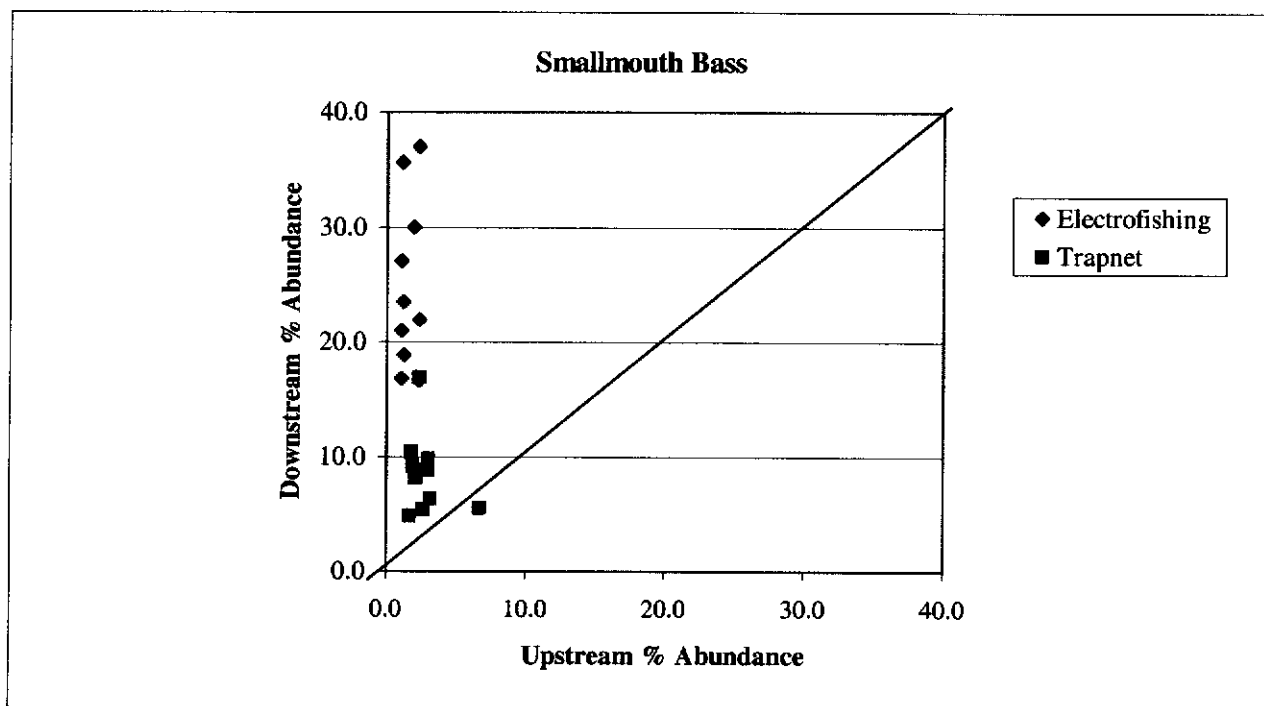
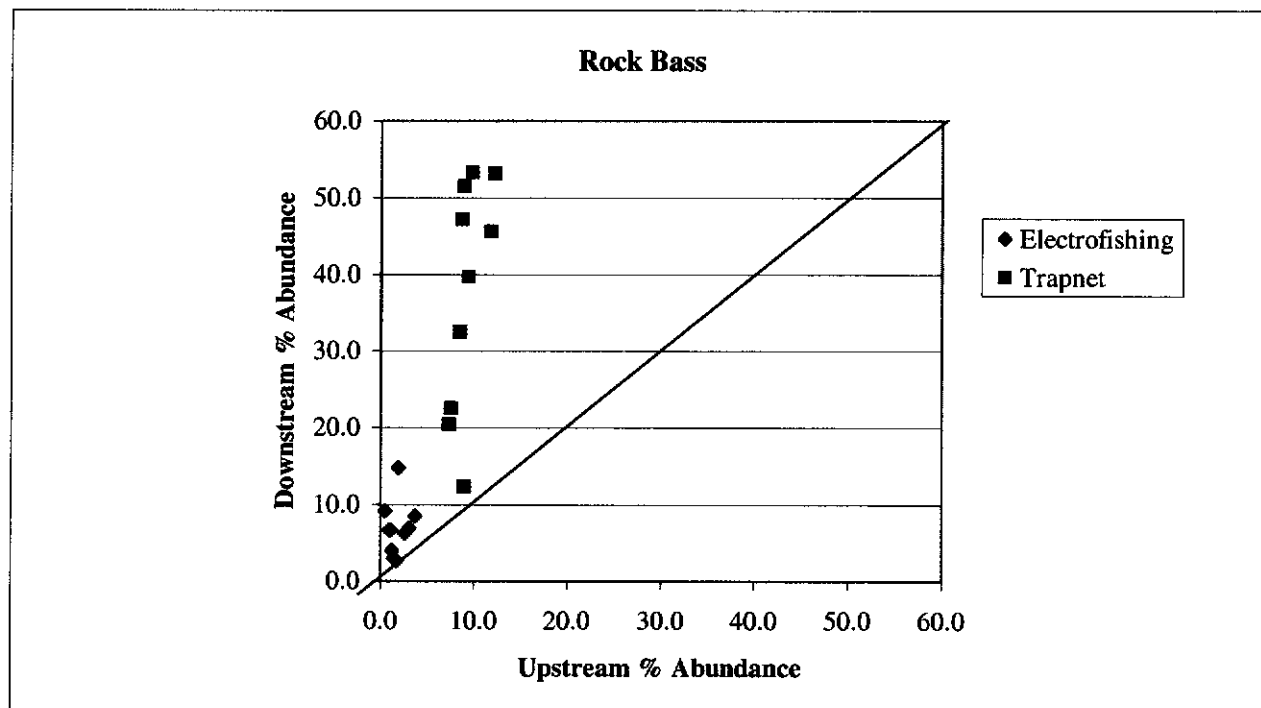


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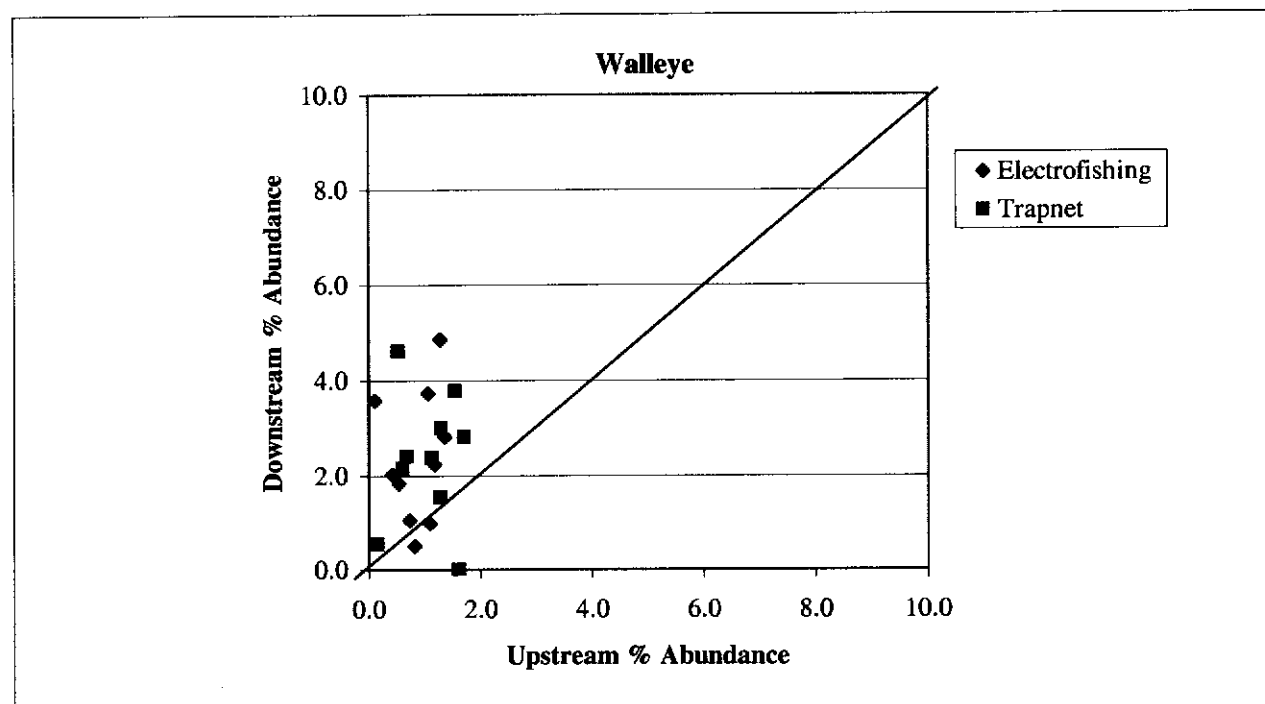
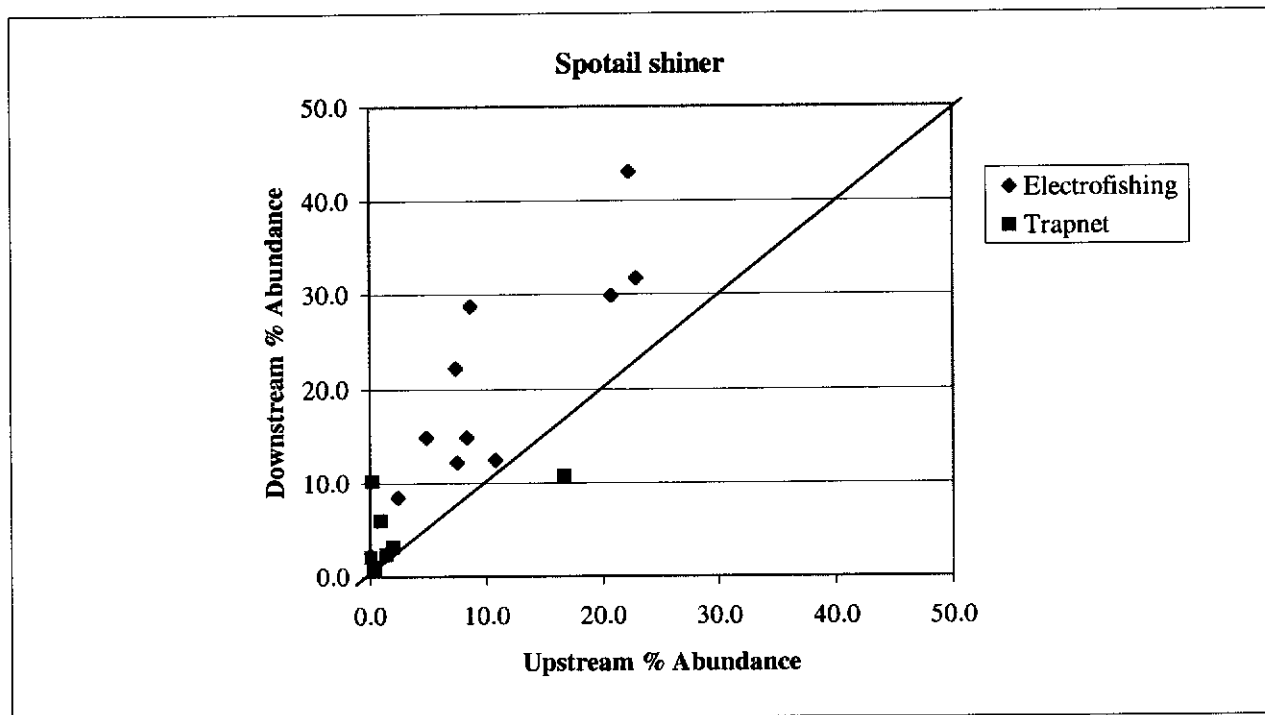


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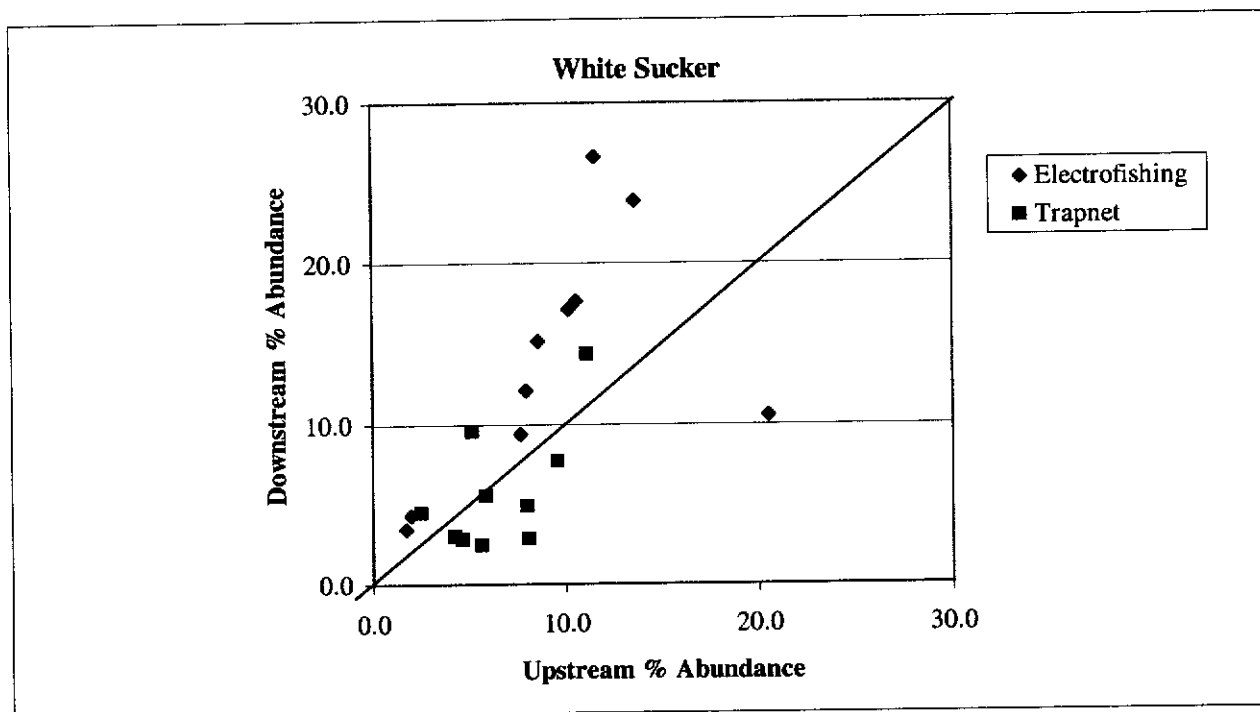
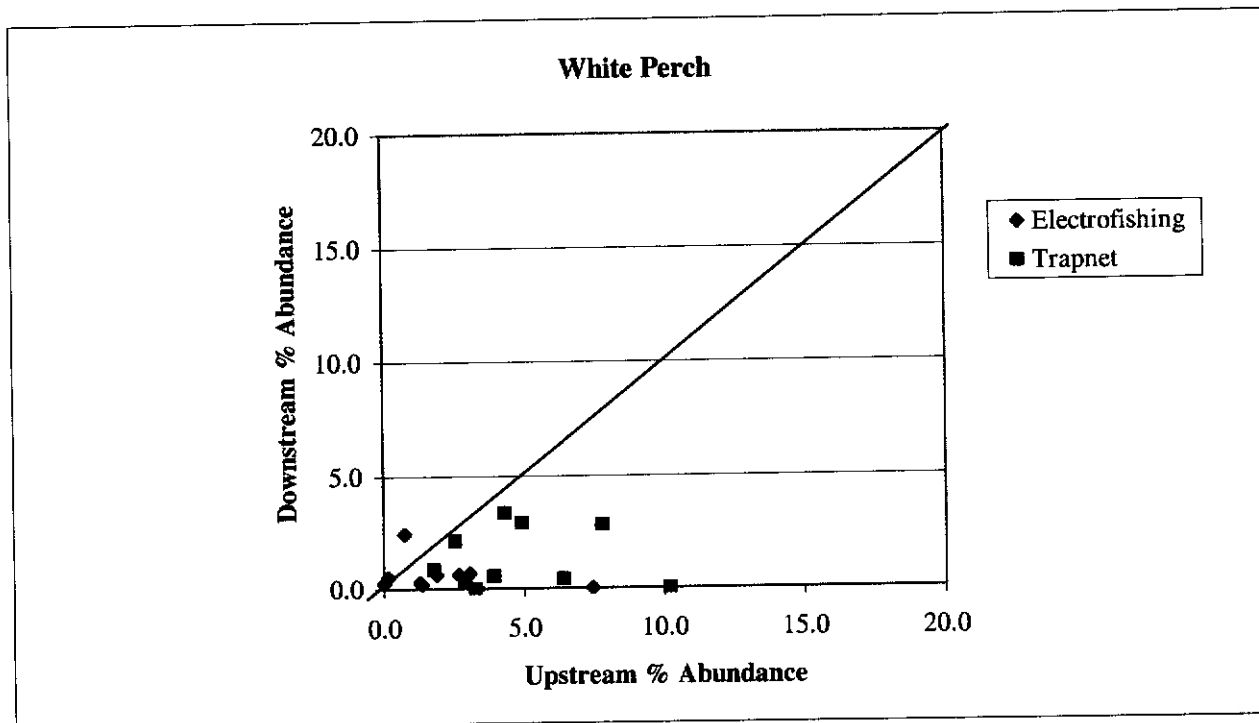


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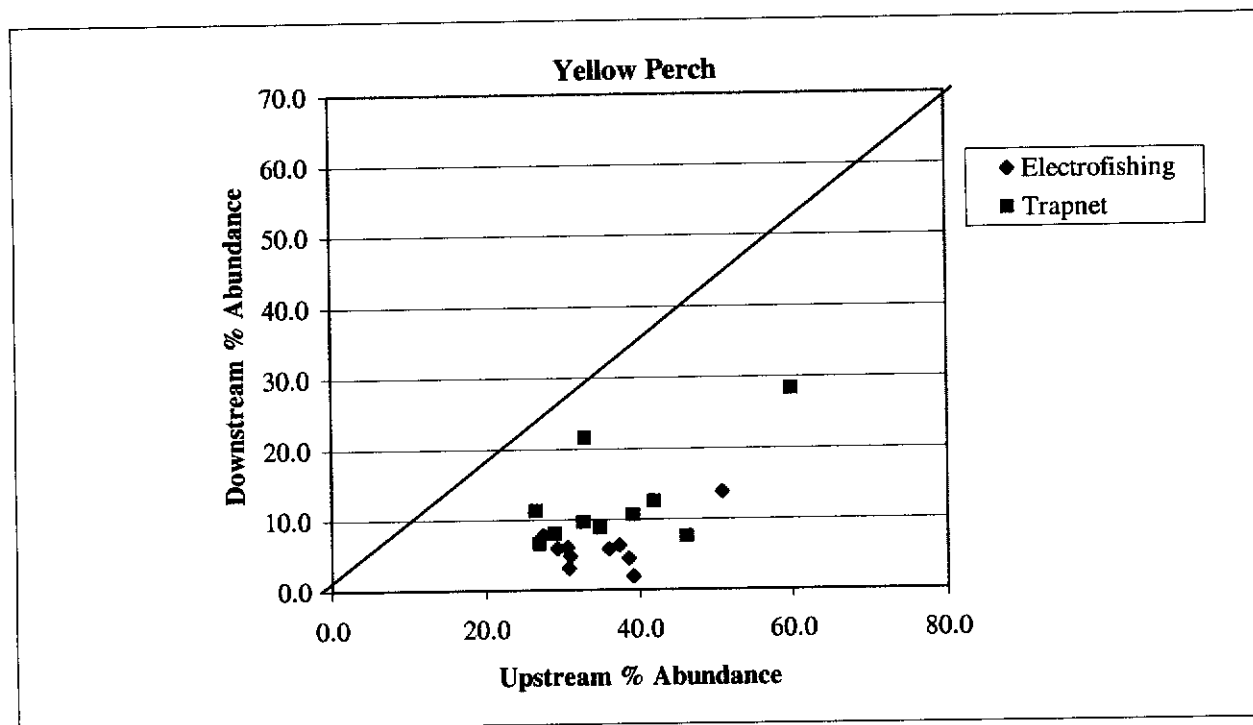


Figure 4

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**APPENDIX A -
MACROINVERTEBRATES
BASKET SAMPLES**

Appendix A

Macroinvertebrates, basket samples.

	1988		1990		1991		1992		1993		1994		1995		1996		1997	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Station 2</i>																		
Crustacea	21	2.68	16	1.83	20	4.77	28	5.07	107	10.71	38	3.43	58	9.02	20	14.93	2	4.00
Diptera	236	30.06	41	4.70	111	26.49	132	23.91	296	29.63	307	27.73	191	29.70	10	7.46	6	12.00
Ephemeroptera	59	7.52	132	15.12	24	5.73	67	12.14	69	6.91	207	18.70	67	10.42	50	37.31	2	4.00
Gastropoda	4	0.51	0	0.00	18	4.30	26	4.71	30	3.00	18	1.63	6	0.93	2	1.49	26	52.00
Hydrozoa	195	24.84	0	0.00	0	0.00	0	0.00	0	0.00	1	0.09	0	0.00	0	0.00	0	0.00
Oligochaeta	119	15.16	31	3.55	5	1.19	51	9.24	13	1.30	25	2.26	10	1.56	4	2.99	0	0.00
Other	28	3.57	17	1.95	43	10.26	29	5.25	20	2.00	73	6.59	52	8.09	14	10.45	2	4.00
Pelecypoda	8	1.02	9	1.03	7	1.67	142	25.72	5	0.50	1	0.09	1	0.16	2	1.49	0	0.00
Trichoptera	87	11.08	614	70.33	130	31.03	58	10.51	185	18.52	437	39.48	221	34.37	32	23.88	12	24.00
Tricladida	28	3.57	13	1.49	61	14.56	19	3.44	274	27.43		0.00	37	5.75	0	0.00	0	0.00
Total	785	100.00	873	100.00	419	100.00	552	100.00	999	100.00	1,107	100.00	643	100.00	134	100.00	50	100.00

Station 3

Crustacea	12	0.40	3	1.51	1	1.03	94	10.90	41	10.99	30	4.41	19	4.39	136	13.57	0	0.00
Diptera	2,326	76.87	75	37.69	25	25.77	91	10.56	65	17.43	271	39.85	161	37.18	160	15.97	10	4.55
Ephemeroptera	19	0.63	11	5.53	9	9.28	59	6.84	69	18.50	25	3.68	59	13.63	18	1.80	0	0.00
Gastropoda	52	1.72	14	7.04	7	7.22	18	2.09	45	12.06	74	10.88	3	0.69	6	0.60	10	4.55
Hydrozoa	71	2.35	0	0.00	0	0.00	391	45.36	8	2.14	130	19.12	0	0.00	0	0.00	0	0.00
Oligochaeta	218	7.20	0	0.00	0	0.00	16	1.86	0	0.00	0	0.00	3	0.69	356	35.53	2	0.91
Other	50	1.65	2	1.01	11	11.34	21	2.44	82	21.98	40	5.88	147	33.95	54	5.39	194	88.18
Pelecypoda	3	0.10	0	0.00	0	0.00	0	0.00	0	0.00	4	0.59	0	0.00	0	0.00	0	0.00
Trichoptera	250	8.26	90	45.23	8	8.25	76	8.82	63	16.89	98	14.41	39	9.01	272	27.15	4	1.82
Tricladida	25	0.83	4	2.01	36	37.11	96	11.14	0	0.00	8	1.18	2	0.46	0	0.00	0	0.00
Total	3,026	100.00	199	100.00	97	100.00	862	100.00	373	100.00	680	100.00	433	100.00	1,002	100.00	220	100.00

Station 4

Crustacea	10	0.26	6	2.23	15	4.09	129	19.23	15	6.94	142	5.97	55	14.36	186	47.69	2,002	75.04
Diptera	1,454	37.96	91	33.83	145	39.51	166	24.74	38	17.59	641	26.94	77	20.10	72	18.46	208	7.80
Ephemeroptera	179	4.67	32	11.90	48	13.08	110	16.39	107	49.54	131	5.51	97	25.33	60	15.38	24	0.90
Gastropoda	2	0.05	69	25.65	7	1.91	8	1.19	14	6.48	476	20.01	9	2.35	8	2.05	8	0.30
Hydrozoa	2	0.05	0	0.00	0	0.00	0	0.00	8	3.70	8	0.34	19	4.96	0	0.00	0	0.00
Oligochaeta	1,344	35.09	0	0.00	0	0.00	112	16.69	3	1.39	132	5.55	7	1.83	26	6.67	140	5.25

Appendix A

Continued.

	1988		1990		1991		1992		1993		1994		1995		1996		1997	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Station 4, continued</i>																		
Other	57	1.49	14	5.20	96	26.16	101	15.05	12	5.56	78	3.28	23	6.01	12	3.08	92	3.45
Pelecypoda	717	18.72	2	0.74	0	0.00	0	0.00	0	0.00	12	0.50	0	0.00	0	0.00	8	0.30
Trichoptera	58	1.51	33	12.27	52	14.17	45	6.71	17	7.87	717	30.14	93	24.28	26	6.67	186	6.97
Tricladida	7	0.18	22	8.18	4	1.09	0	0.00	2	0.93	42	1.77	3	0.78	0	0.00	0	0.00
Total	3,830	100.00	269	100.00	367	100.00	671	100.00	216	100.00	2,379	100.00	383	100.00	390	100.00	2,668	100.00
<i>Station 5</i>																		
Crustacea	7	0.24	1	0.32	29	3.35	14	1.01	94	18.22	15	1.67	27	6.07	84	25.00	320	53.69
Diptera	2,320	78.83	251	81.23	271	31.29	815	58.93	198	38.37	378	42.14	183	41.12	106	31.55	72	12.08
Ephemeroptera	6	0.20	10	3.24	15	1.73	42	3.04	53	10.27	126	14.05	107	24.04	64	19.05	46	7.72
Gastropoda	35	1.19	6	1.94	18	2.08	46	3.33	8	1.55	22	2.45	17	3.82	8	2.38	26	4.36
Hydrozoa	48	1.63	0	0.00	0	0.00	36	2.60	5	0.97	4	0.45	3	0.67	0	0.00	0	0.00
Oligochaeta	21	0.71	0	0.00	7	0.81	48	3.47	0	0.00	30	3.34	10	2.25	26	7.74	2	0.34
Other	19	0.65	8	2.59	45	5.20	254	18.37	27	5.23	28	3.12	15	3.37	16	4.76	92	15.44
Pelecypoda	2	0.07	0	0.00	8	0.92	1	0.07	0	0.00	28	3.12	0	0.00	0	0.00	4	0.67
Trichoptera	190	6.46	30	9.71	325	37.53	122	8.82	81	15.70	246	27.42	81	18.20	32	9.52	34	5.70
Tricladida	295	10.02	3	0.97	148	17.09	5	0.36	50	9.69	20	2.23	2	0.45	0	0.00	0	0.00
Total	2,943	100.00	309	100.00	866	100.00	1,383	100.00	516	100.00	897	100.00	445	100.00	336	100.00	596	100.00

**APPENDIX B -
MACROINVERTEBRATES
DREDGE SAMPLES**

Appendix B

Macroinvertebrates, dredge samples.

	1988		1990		1991		1992		1993		1994		1995		1996		1997	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Station 2</i>																		
Crustacea	0	0.00	2	0.52	4	0.14	185	9.86	158	7.06	29	0.74	58	4.81	0	0.00	0	0.00
Diptera	300	31.91	75	19.48	1,570	56.15	234	12.47	1,185	52.93	2,237	57.46	541	44.82	120	45.45	180	70.59
Ephemeroptera	91	9.68	35	9.09	26	0.93	35	1.86	16	0.71	156	4.01	22	1.82	9	3.41	6	2.35
Gastropoda	75	7.98	59	15.32	456	16.31	522	27.81	234	10.45	168	4.32	245	20.30	24	9.09	18	7.06
Hydrazoa	1	0.11	1	0.26	0	0.00	11	0.59	6	0.27	0	0.00	9	0.75	0	0.00	0	0.00
Oligochaeta	113	12.02	25	6.49	37	1.32	315	16.78	252	11.26	516	13.25	104	8.62	33	12.50	24	9.41
Other	8	0.85	1	0.26	18	0.64	14	0.75	25	1.12	33	0.85	30	2.49	9	3.41	15	5.88
Pelecypoda	118	12.55	19	4.94	67	2.40	68	3.62	80	3.57	552	14.18	29	2.40	33	12.50	3	1.18
Trichoptera	110	11.70	138	35.84	227	8.12	134	7.14	105	4.69	202	5.19	147	12.18	36	13.64	9	3.53
Tricladida	124	13.19	30	7.79	391	13.98	359	19.13	178	7.95	0	0.00	22	1.82	0	0.00	0	0.00
Total	940	100.00	385	100.00	2,796	100.00	1,877	100.00	2,239	100.00	3,893	100.00	1,207	100.00	264	100.00	255	100.00
<i>Station 3</i>																		
Crustacea	1	0.27	8	1.00	4	0.48	4	0.69	135	13.58	35	1.81	224	18.73	15	3.40	3	1.03
Diptera	131	34.93	461	57.55	168	20.17	57	9.81	378	38.03	1,169	60.35	306	25.59	144	32.65	213	73.20
Ephemeroptera	8	2.13	41	5.12	23	2.76	12	2.07	21	2.11	104	5.37	7	0.59	9	2.04	0	0.00
Gastropoda	2	0.53	9	1.12	23	2.76	8	1.38	28	2.82	19	0.98	9	0.75	6	1.36	6	2.06
Hydrazoa	14	3.73	1	0.12		0.00	3	0.52	10	1.01	3	0.15	7	0.59	0	0.00	0	0.00
Oligochaeta	68	18.13	31	3.87	34	4.08	81	13.94	222	22.33	249	12.85	310	25.92	90	20.41	24	8.25
Other	15	4.00	10	1.25	11	1.32	12	2.07	14	1.41	60	3.10	37	3.09	84	19.05	30	10.31
Pelecypoda	67	17.87	26	3.25	307	36.85	79	13.60	51	5.13	85	4.39	84	7.02	81	18.37	3	1.03
Trichoptera	63	16.80	178	22.22	158	18.97	49	8.43	97	9.76	213	11.00	55	4.60	12	2.72	12	4.12
Tricladida	6	1.60	36	4.49	105	12.61	276	47.50	38	3.82		0.00	157	13.13	0	0.00	0	0.00
Total	375	100.00	801	100.00	833	100.00	581	100.00	994	100.00	1,937	100.00	1,196	100.00	441	100.00	291	100.00
<i>Station 4</i>																		
Crustacea	10	0.26		0.00	20	1.09	85	2.37	51	2.34	41	1.38	24	0.82	3	0.19	111	6.75
Diptera	1,454	37.96	626	47.53	544	29.69	794	22.14	839	38.54	1,589	53.36	953	32.72	1,056	68.22	900	54.74
Ephemeroptera	179	4.67	78	5.92	117	6.39	46	1.28	84	3.86	114	3.83	127	4.36	9	0.58	6	0.36
Gastropoda	2	0.05	23	1.75	23	1.26	10	0.28	21	0.96	32	1.07	15	0.51	0	0.00	117	7.12
Hydrazoa	2	0.05	1	0.08		0.00		0.00	2	0.09		0.00	1	0.03	0	0.00	0	0.00
Oligochaeta	1,344	35.09	383	29.08	365	19.92	1,267	35.33	819	37.62	925	31.06	1,215	41.71	408	26.36	288	17.52

Appendix B

Continued.

	1988		1990		1991		1992		1993		1994		1995		1996		1997	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Station 4, continued</i>																		
Other	57	1.49	26	1.97	27	1.47	29	0.81	14	0.64	39	1.31	26	0.89	15	0.97	81	4.93
Pelecypoda	717	18.72	166	12.60	704	38.43	1,283	35.78	331	15.20	169	5.67	491	16.86	33	2.13	93	5.66
Trichoptera	58	1.51	14	1.06	23	1.26	26	0.73	13	0.60	69	2.32	40	1.37	24	1.55	48	2.92
Tricladida	7	0.18		0.00	9	0.49	46	1.28	3	0.14		0.00	21	0.72	0	0.00	0	0.00
Total	3,830	100.00	1,317	100.00	1,832	100.00	3,586	100.00	2,177	100.00	2,978	100.00	2,913	100.00	1,548	100.00	1,644	100.00
<i>Station 5</i>																		
Crustacea	3	0.13	2	0.12	17	0.91	36	0.96	6	0.42	7	0.48	6	0.34	6	0.23	96	7.24
Diptera	810	34.31	732	42.66	693	37.14	1,145	30.40	295	20.83	734	50.62	520	29.25	399	15.54	546	41.18
Ephemeroptera	193	8.17	160	9.32	176	9.43	209	5.55	108	7.63	122	8.41	72	4.05	15	0.58	6	0.45
Gastropoda	5	0.21	112	6.53	33	1.77	111	2.95	19	1.34	11	0.76		0.00	51	1.99	120	9.05
Hydrazoa	3	0.13	0	0.00	0	0.00		0.00		0.00		0.00		0.00	0	0.00	0	0.00
Oligochaeta	680	28.80	557	32.46	504	27.01	1,410	37.44	747	52.75	298	20.55	695	39.09	1,689	65.77	399	30.09
Other	44	1.86	20	1.17	20	1.07	64	1.70	26	1.84	66	4.55	37	2.08	180	7.01	45	3.39
Pelecypoda	598	25.33	98	5.71	392	21.01	698	18.53	201	14.19	183	12.62	435	24.47	177	6.89	90	6.79
Trichoptera	21	0.89	35	2.04	30	1.61	93	2.47	14	0.99	29	2.00	11	0.62	51	1.99	24	1.81
Tricladida	4	0.17	0	0.00	1	0.05		0.00		0.00		0.00	2	0.11	0	0.00	0	0.00
Total	2,361	100.00	1,716	100.00	1,866	100.00	3,766	100.00	1,416	100.00	1,450	100.00	1,778	100.00	2,568	100.00	1,326	100.00

**APPENDIX C –
UPSTREAM FISHERIES**

Appendix C

Upstream fisheries

Species	1986		1988		1990		1991		1992		1993		1994		1995		1996		1997		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sea lamprey	0	0.00	0	0.00	2	0.14	2	0.14	0	0.00	1	0.11	0	0.00	0	0.00	1	0.09	9	1.41	15	0.13
American eel	7	0.53	9	0.60	3	0.21	7	0.49	2	0.23	8	0.85	4	0.39	2	0.20	0	0.00	0	0.00	42	0.37
Atlantic salmon	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Brook trout	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Rainbow smelt	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Clupeidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Blueback herring	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
American shad	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Gizzard shad	0	0.00	0	0.00	0	0.00	19	1.33	29	3.33	5	0.53	2	0.20	24	2.46	3	0.27	0	0.00	82	0.73
Brown trout	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.10	0	0.00	0	0.00	1	0.01
Esocidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Northern pike	0	0.00	4	0.27	4	0.28	7	0.49	11	1.26	6	0.63	2	0.20	6	0.61	4	0.36	0	0.00	1	0.01
Chain pickerel	0	0.00	1	0.07	4	0.28	17	1.19	29	3.33	5	0.53	4	0.39	5	0.51	12	1.07	14	2.20	91	0.81
Cyprinidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Common carp	4	0.30	41	2.74	11	0.77	11	0.77	6	0.69	8	0.85	7	0.68	11	1.13	2	0.18	1	0.16	102	0.91
Eastern silvery minnow	0	0.00	3	0.20	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	0.03
Longnose dace	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Golden shiner	49	3.69	49	3.28	24	1.67	74	5.20	70	8.03	16	1.69	41	4.01	46	4.71	39	3.48	15	2.35	423	3.76
Notropis sp.	0	0.00	0	0.00	0	0.00	0	0.00	1	0.11	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.01
Common shiner	0	0.00	1	0.07	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.01
Spottail shiner	276	20.77	112	7.49	155	10.81	104	7.30	73	8.37	46	4.86	85	8.31	23	2.36	249	22.23	146	22.92	1,269	11.27
Mimic shiner	27	2.03	4	0.27	75	5.23	6	0.42	0	0.00	0	0.00	17	1.66	5	0.51	0	0.00	0	0.00	134	1.19
Fallfish	0	0.00	0	0.00	0	0.00	1	0.07	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	0.02
White sucker	273	20.54	204	13.64	166	11.58	121	8.50	86	9.86	75	7.93	108	10.56	73	7.48	22	1.96	11	1.73	1,139	10.12
Yellow bullhead	0	0.00	3	0.20	2	0.14	5	0.35	4	0.46	5	0.53	4	0.39	7	0.72	2	0.18	0	0.00	32	0.28
Brown bullhead	1	0.08	5	0.33	20	1.39	19	1.33	19	2.18	29	3.07	8	0.78	20	2.05	1	0.09	2	0.31	124	1.10
Banded killifish	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
White perch	99	7.45	40	2.67	44	3.07	19	1.33	11	1.26	7	0.74	34	3.32	18	1.84	0	0.00	0	0.00	0	0.00
Rock bass	13	0.98	18	1.20	25	1.74	37	2.60	26	2.98	10	1.06	5	0.49	110	11.27	41	3.66	9	1.41	273	2.43
Lepomis sp.	1	0.08	12	0.80	18	1.26	0	0.00	1	0.11	1	0.11	12	1.17	0	0.00	0	0.00	1	0.16	294	2.61
Pumpkinseed	51	3.84	172	11.50	180	12.55	157	11.03	94	10.78	144	15.22	97	9.48	142	14.55	109	9.73	11	1.73	1,157	10.28
Bluegill	53	3.99	216	14.44	151	10.53	128	8.99	56	6.42	99	10.47	118	11.53	43	4.41	222	19.82	46	7.22	1,132	10.06
Smallmouth bass	31	2.33	35	2.34	18	1.26	15	1.05	10	1.15	18	1.90	11	1.08	20	2.05	12	1.07	7	1.10	177	1.57
Largemouth bass	65	4.89	117	7.82	85	5.93	151	10.60	83	9.52	99	10.47	58	5.67	14	1.43	44	3.93	30	4.71	746	6.63
Tessellated darter	3	0.23	0	0.00	1	0.07	2	0.14	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	0.05
Black crappie	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	0.45	3	0.47	8	0.07

Appendix C

Continued.

Species	1986		1988		1990		1991		1992		1993		1994		1995		1996		1997		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yellow perch	365	27.46	439	29.34	439	30.61	507	35.60	260	29.82	352	37.21	394	38.51	393	40.27	346	30.89	324	50.86	3,819	33.93
Walleye	11	0.83	11	0.74	6	0.42	15	1.05	1	0.11	12	1.27	12	1.17	12	1.23	6	0.54	7	1.10	93	0.83
Etheostoma sp.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	1,329	100	1,496	100	1,434	100	1,424	100	872	100	946	100	1,023	100	976	100	1,120	100	637	100	11,257	100
<i>Electrofishing, continued</i>																						
Sea lamprey	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
American eel	0	0.00	0	0.00	0	0.00	2	0.31	1	0.18	0	0.00	1	0.11	1	0.11	1	0.17	1	0.09	7	0.08
Atlantic salmon	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Brook trout	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Rainbow smelt	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Clupeidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Blueback herring	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
American shad	1	0.08	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Gizzard shad	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	0.32	0	0.00	0	0.00	4	0.05
Brown trout	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Esocidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Northern pike	0	0.00	0	0.00	0	0.00	7	1.10	0	0.00	0	0.00	2	0.23	4	0.43	1	0.17	4	0.36	18	0.20
Chain pickerel	0	0.00	1	0.07	5	0.68	9	1.42	15	2.65	23	3.31	28	3.16	19	2.02	26	4.42	13	1.18	139	1.58
Cyprinidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Common carp	6	0.51	18	1.21	9	1.23	10	1.57	8	1.42	9	1.30	5	0.56	2	0.21	1	0.17	1	0.09	69	0.78
Eastern silvery minnow	1	0.08	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.01
Longnose dace	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Golden shiner	68	5.77	72	4.85	2	0.27	11	1.73	14	2.48	7	1.01	36	4.06	17	1.81	18	3.06	18	1.63	263	2.99
Notropis sp.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Common shiner	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Spottail shiner	197	16.72	14	0.94	3	0.41	2	0.31	11	1.95	10	1.44	2	0.23	3	0.32	0	0.00	4	0.36	246	2.79
Mimic shiner	1	0.08	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.01
Fallfish	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
White sucker	66	5.60	165	11.12	70	9.58	16	2.52	24	4.25	56	8.07	41	4.62	55	5.85	47	7.99	57	5.17	597	6.78
Yellow bullhead	0	0.00	0	0.00	2	0.27	0	0.00	0	0.00	2	0.29	7	0.79	18	1.91	2	0.34	4	0.36	35	0.40
Brown bullhead	1	0.08	13	0.88	10	1.37	1	0.16	7	1.24	41	5.91	27	3.04	24	2.55	35	5.95	37	3.36	196	2.23
Banded killifish	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
White perch	120	10.19	64	4.31	36	4.92	25	3.94	44	7.79	20	2.88	16	1.80	60	6.38	15	2.55	36	3.27	436	4.95
Rock bass	115	9.76	112	7.55	89	12.18	57	8.98	49	8.67	65	9.37	79	8.91	110	11.70	50	8.50	81	7.35	807	9.17
Lepomis sp.	0	0.00	2	0.13	0	0.00	1	0.16	0	0.00	0	0.00	0	0.00	0	0.00	1	0.17	1	0.09	5	0.06

Appendix C

Continued.

Species	1986		1988		1990		1991		1992		1993		1994		1995		1996		1997		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Pumpkinseed	139	11.80	385	25.94	179	24.49	143	22.52	126	22.30	164	23.63	128	14.43	142	15.11	152	25.85	78	7.08	1,636	18.58
Bluegill	34	2.89	86	5.80	63	8.62	75	11.81	49	8.67	49	7.06	75	8.46	43	4.57	58	9.86	26	2.36	558	6.34
Smallmouth bass	79	6.71	45	3.03	12	1.64	19	2.99	15	2.65	22	3.17	16	1.80	20	2.13	11	1.87	26	2.36	265	3.01
Largemouth bass	13	1.10	9	0.61	7	0.96	7	1.10	2	0.35	16	2.31	4	0.45	14	1.49	2	0.34	19	1.72	93	1.06
Tessellated darter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.09	1	0.01
Black crappie	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	0.34	18	1.63	20	0.23
Yellow perch	318	26.99	489	32.95	239	32.69	249	39.21	197	34.87	201	28.96	410	46.22	393	41.81	156	26.53	660	59.89	3,312	37.62
Walleye	19	1.61	9	0.61	5	0.68	1	0.16	3	0.53	9	1.30	10	1.13	12	1.28	10	1.70	17	1.54	95	1.08
Etheostoma sp.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	1,178	100.00	1,484	100.00	731	100.00	635	100.00	565	100.00	694	100.00	887	100.00	940	100.00	588	100.00	1,102	100.00	8,804	100.00

Trapnet, continued

**APPENDIX D –
DOWNSTREAM FISHERIES**

Appendix D

Downstream fisheries

Species	1986		1988		1990		1991		1992		1993		1994		1995		1996		1997		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sea lamprey	1	0.10	2	0.34	1	0.27	0	0.00	1	0.25	3	0.72	0	0.00	0	0.00	7	1.50	0	0.00	15	0.30
American eel	13	1.34	8	1.37	4	1.08	13	1.99	1	0.25	10	2.42	7	1.57	1	0.26	1	0.21	1	0.38	59	1.19
Atlantic salmon	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.26	0	0.00	0	0.00	1	0.02
Brook trout	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Rainbow smelt	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Clupeidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Blueback herring	3	0.31	1	0.17	0	0.00	0	0.00	2	0.50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
American shad	156	16.07	110	18.80	72	19.51	171	26.19	37	9.23	84	20.29	44	9.84	60	15.79	33	7.05	61	23.19	828	16.72
Gizzard shad	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.26	2	0.43	0	0.00	3	0.06
Brown trout	1	0.10	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.02
Esocidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Northern pike	1	0.10	0	0.00	5	1.36	2	0.31	7	1.75	0	0.00	6	1.34	10	2.63	3	0.64	1	0.38	35	0.71
Chain pickerel	4	0.41	0	0.00	0	0.00	3	0.46	6	1.50	4	0.97	2	0.45	0	0.00	3	0.64	3	1.14	25	0.50
Cyprinidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	0.53	0	0.00	0	0.00	2	0.04
Common carp	3	0.31	5	0.85	3	0.81	3	0.46	1	0.25	3	0.72	4	0.89	7	1.84	5	1.07	0	0.00	34	0.69
Eastern silvery minnow	1	0.10	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	1.58	0	0.00	0	0.00	7	0.14
Longnose dace	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	14	2.99	4	1.52	42	0.85
Golden shiner	4	0.41	1	0.17	4	1.08	5	0.77	2	0.50	4	0.97	4	0.89	0	0.00	0	0.00	0	0.00	0	0.00
Notropis sp.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	8	1.79	0	0.00	0	0.00	0	0.00	8	0.16
Common shiner	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Spottail shiner	242	24.92	58	9.91	37	10.03	107	16.39	104	25.94	49	11.84	60	13.42	27	7.11	187	39.96	64	24.33	935	18.89
Mimic shiner	118	12.15	53	9.06	16	4.34	15	2.30	0	0.00	4	0.97	6	1.34	1	0.26	0	0.00	0	0.00	213	4.30
Fallfish	34	3.50	17	2.91	27	7.32	49	7.50	22	5.49	11	2.66	27	6.04	9	2.37	8	1.71	0	0.00	204	4.12
White sucker	86	8.86	113	19.32	79	21.41	73	11.18	62	15.46	40	9.66	71	15.88	30	7.89	19	4.06	7	2.66	580	11.71
Yellow bullhead	0	0.00	0	0.00	1	0.27	0	0.00	0	0.00	0	0.00	0	0.00	1	0.26	0	0.00	0	0.00	2	0.04
Brown bullhead	1	0.10	0	0.00	1	0.27	1	0.15	1	0.25	2	0.48	0	0.00	5	1.32	0	0.00	0	0.00	11	0.22
Banded killifish	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
White perch	0	0.00	3	0.51	2	0.54	1	0.15	1	0.25	8	1.93	0	0.00	2	0.53	1	0.21	1	0.38	19	0.38
Rock bass	54	5.56	19	3.25	8	2.17	30	4.59	25	6.23	22	5.31	37	8.28	47	12.37	37	7.91	6	2.28	285	5.76
Lepomis sp.	0	0.00	3	0.51	0	0.00	6	0.92	0	0.00	1	0.24	0	0.00	0	0.00	0	0.00	0	0.00	10	0.20
Pumpkinseed	14	1.44	14	2.39	5	1.36	11	1.68	3	0.75	3	0.72	4	0.89	4	1.05	5	1.07	3	1.14	66	1.33
Bluegill	22	2.27	35	5.98	19	5.15	8	1.23	12	2.99	15	3.62	28	6.26	25	6.58	38	8.12	5	1.90	207	4.18
Smallmouth bass	135	13.90	104	17.78	56	15.18	101	15.47	85	21.20	99	23.91	109	24.38	118	31.05	73	15.60	72	27.38	952	19.23
Largemouth bass	11	1.13	6	1.03	5	1.36	8	1.23	5	1.25	15	3.62	3	0.67	8	2.11	3	0.64	5	1.90	69	1.39
Tessellated darter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Black crappie	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Appendix D

Continued.

Species	1986		1988		1990		1991		1992		1993		1994		1995		1996		1997		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yellow perch	63	6.49	28	4.79	18	4.88	28	4.29	11	2.74	21	5.07	18	4.03	6	1.58	21	4.49	28	10.65	242	4.89
Walleye	4	0.41	5	0.85	6	1.63	18	2.76	13	3.24	16	3.86	9	2.01	9	2.37	8	1.71	2	0.76	90	1.82
Etheostoma sp.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	971	100.00	585	100.00	369	100.00	653	100.00	401	100.00	414	100.00	447	100.00	380	100.00	468	100.00	263	100.00	4,951	100.00
<i>Electrofishing, continued</i>																						
Sea lamprey	1	0.27	0	0.00	0	0.00	0	0.00	10	1.95	0	0.00	1	0.22	1	0.10	0	0.00	5	1.40	18	0.35
American eel	1	0.27	0	0.00	0	0.00	2	0.22	1	0.19	1	0.12	2	0.43	9	0.93	0	0.00	16	4.47	32	0.62
Atlantic salmon	0	0.00	0	0.00	0	0.00	2	0.22	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	0.04
Brook trout	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Rainbow smelt	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Clupeidae	5	1.36	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Blueback herring	1	0.27	2	0.47	2	0.95	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	5	0.10
American shad	0	0.00	9	2.10	1	0.48	4	0.44	12	2.34	32	3.85	4	0.86	1	0.10	0	0.00	0	0.00	8	0.15
Gizzard shad	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Brown trout	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Esocidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Northern pike	0	0.00	0	0.00	0	0.00	1	0.11	1	0.19	1	0.12	1	0.22	4	0.41	0	0.00	0	0.00	0	0.00
Chain pickerel	1	0.27	0	0.00	4	1.90	5	0.55	15	2.92	1	0.12	6	1.29	2	0.21	2	1.41	2	0.56	8	0.15
Cyprinidae	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	38	0.73
Common carp	6	1.63	1	0.23	0	0.00	2	0.22	1	0.19	3	0.36	2	0.43	3	0.31	0	0.00	1	0.28	0	0.00
Eastern silvery minnow	25	6.79	1	0.23	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	26	0.50
Longnose dace	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Golden shiner	1	0.27	6	1.40	1	0.48	1	0.11	16	3.12	4	0.48	3	0.65	0	0.00	1	0.70	2	0.56	35	0.67
Notropis sp.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Common shiner	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Spottail shiner	39	10.60	25	5.83	2	0.95	8	0.88	16	3.12	19	2.29	47	10.13	6	0.62	3	2.11	3	0.84	168	3.24
Mimic shiner	1	0.27	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.02
Fallfish	0	0.00	2	0.47	7	3.33	0	0.00	1	0.19	2	0.24	1	0.22	1	0.10	0	0.00	3	0.84	17	0.33
White sucker	9	2.45	60	13.99	16	7.62	41	4.53	15	2.92	23	2.77	13	2.80	54	5.57	7	4.93	33	9.22	271	5.22
Yellow bullhead	0	0.00	0	0.00	0	0.00	0	0.00	1	0.19	0	0.00	0	0.00	5	0.52	0	0.00	0	0.00	6	0.12
Brown bullhead	1	0.27	6	1.40	4	1.90	484	53.48	14	2.73	7	0.84	0	0.00	24	2.47	3	2.11	4	1.12	547	10.54
Banded killifish	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
White perch	0	0.00	14	3.26	6	2.86	5	0.55	14	2.73	2	0.24	4	0.86	4	0.41	3	2.11	0	0.00	52	1.00
Rock bass	193	52.45	94	21.91	110	52.38	111	12.27	235	45.81	317	38.15	237	51.08	442	45.57	46	32.39	70	19.55	1,855	35.74
Lepomis sp.	0	0.00	2	0.47	0	0.00	0	0.00	0	0.00	11	1.32	0	0.00	0	0.00	0	0.00	10	2.79	23	0.44

Appendix D

Continued.

Species	1986		1988		1990		1991		1992		1993		1994		1995		1996		1997		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Pumpkinseed	13	3.53	35	8.16	5	2.38	27	2.98	37	7.21	56	6.74	29	6.25	78	8.04	14	9.86	7	1.96	301	5.80
Bluegill	27	7.34	32	7.46	17	8.10	30	3.31	25	4.87	211	25.39	17	3.66	108	11.13	28	19.72	13	3.63	508	9.79
Smallmouth bass	20	5.43	41	9.56	10	4.76	79	8.73	27	5.26	51	6.14	48	10.34	79	8.14	13	9.15	58	16.20	426	8.21
Largemouth bass	0	0.00	0	0.00	0	0.00	2	0.22	2	0.39	2	0.24	3	0.65	11	1.13	0	0.00	3	0.84	23	0.44
Tessellated darter	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Black crappie	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	0.10	2	1.41	3	0.84	6	0.12
Yellow perch	24	6.52	90	20.98	20	9.52	96	10.61	44	8.58	64	7.70	35	7.54	122	12.58	16	11.27	97	27.09	608	11.71
Walleye	0	0.00	9	2.10	5	2.38	5	0.55	23	4.48	24	2.89	11	2.37	15	1.55	4	2.82	13	3.63	109	2.10
Etheostoma sp.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	368	100.00	429	100.00	210	100.00	905	100.00	513	100.00	831	100.00	464	100.00	970	100.00	142	100.00	358	100.00	5,190	100.00

Trapnet, continued

APPENDIX E –
SUMMARY OF TOTAL NUMBER AND
PERCENT CATCH, BY SPECIES

Appendix E

Summary of total number and percent catch, by species, collected during the years 1988 and 1990-1997 in the Vermont Yankee ichthyoplankton program.

Species	Year	Number Collected	Percent of Catch for Each Year	Relative Abundance
Common carp	1988	1	0.3	0
	1990	2	1.0	0
	1991	1	0.1	0
	1992	3	0.3	0
	1993	6	1.2	0
	1994	1	0.1	0
	1996	3	1.0	0
	1997	1	0.5	0
Notropis sp.	1988	145	37.4	3
	1990	66	31.4	1
	1992	515	59.4	9
	1993	174	35.4	3
	1994	1,658	90.5	29
	1996	129	43.1	2
	1997	163	83.6	3
White perch	1988	110	28.4	2
	1990	84	40.0	1
	1991	174	18.8	3
	1992	212	24.5	4
	1993	248	50.5	4
	1994	109	5.9	2
	1995	90	20.4	2
	1996	149	49.8	3
	1997	15	7.7	0
Lepomis sp.	1988	129	33.2	2
	1990	13	6.2	0
	1991	219	23.7	4
	1992	121	14.0	2
	1993	56	11.4	1
	1994	28	1.5	0
	1995	52	11.8	1
	1996	7	2.3	0
	1997	3	1.5	0

Appendix E

Continued.

Species	Year	Number Collected	Percent of Catch for Each Year	Relative Abundance
Yellow perch	1988	3	0.8	0
	1990	44	21.0	1
	1991	110	11.9	2
	1992	11	1.3	0
	1993	4	0.8	0
	1994	27	1.5	0
	1995	25	5.7	0
	1996	8	2.7	0
	1997	12	6.2	0
Cyprinidae	1991	516	55.8	9
	1995	272	61.5	5
Walleye	1991	4	0.4	0
	1992	1	0.1	0
	1994	2	0.1	0
	1995	1	0.2	0
American shad	1992	1	0.1	0
Spottail shiner	1993	1	0.2	0
	1994	1	0.1	0
Bluegill	1996	2	0.7	0
Fallfish	1996	1	0.3	0
White sucker	1997	1	0.5	0
Largemouth bass	1990	1	0.5	0
	1992	3	0.3	0
Unknown	1993	2	0.4	0
	1994	6	0.3	0
	1995	1	0.2	0
Total (all species, all 9 years)		5,747		100