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FISH-COMMUNITY COMPOSITION IN OULEOUT CREEK, IN THE VICINITY OF EAST SIDNEY LAKE, DELAWARE COUNTY, NEW YORK, 2000

Open-File Report 01-80

Prepared in cooperation with the

U.S. ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT

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by Robin A. Brightbill and Michael D. Bilger

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New Cumberland, Pennsylvania
2001

U.S. DEPARTMENT OF THE INTERIOR

GALE A. NORTON, Secretary

U.S. GEOLOGICAL SURVEY

Charles G. Groat, Director

For additional information write to:

District Chief
U.S. Geological Survey
215 Limekiln Road
New Cumberland, Pennsylvania 17070-2424

Copies of this report may be purchased from:

U.S. Geological Survey
Branch of Information Services
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CONVERSION FACTORS AND ABBREVIATIONS

Multiply	By	To obtain
	Length	
millimeter (mm)	0.03937	inch
meter (m)	3.281	foot
kilometer (km)	0.6214	mile
	Area	
square meter (m^2)	10.76	square foot
square kilometer (km^2)	0.3861	square mile
	Mass	
gram (g)	0.03527	ounce, avoirdupois
	Temperature	
degree Fahrenheit (F)	°F = 1.8°C + 32	degree Celsius

Abbreviated water-quality units used in report:

μS/cm, microsiemens per centimeter at 25 degrees Celsius

Fish-Community Composition in Ouleout Creek, in the Vicinity of East Sidney Lake, Delaware County, New York, 2000

by Robin A. Brightbill and Michael D. Bilger

ABSTRACT

The U.S. Army Corps of Engineers, Baltimore District, has been conducting biological surveys of the inflow and outflow streams of East Sidney Lake since the early 1980's. These surveys are made to identify possible detrimental effects as well as benefits of the lake and to better understand the aquatic communities in the vicinity of the lake at the present and over time. The U.S. Army Corps of Engineers and the U.S. Geological Survey jointly conducted a survey of the fish communities upstream and downstream of the reservoir in Ouleout Creek in September 2000. The fish communities upstream and downstream were compared and any differences or similarities seen in the fish communities were noted.

This study found the fish communities upstream and downstream of East Sidney Lake to be in good condition, with Index of Biotic Integrity (IBI) scores 4.5 upstream and 4.3 downstream. The habitat conditions of both reaches were of optimal quality, with a score of 18 upstream and 17 downstream as determined by use of the U.S. Environmental Protection Agency's Rapid Bioassessment Protocols, and are capable of supporting fish communities. The Shannon Index was 2.95 upstream and 2.61 downstream of the lake, indicating that both reaches are slightly impacted by species richness and individual evenness among the species. Downstream, the dominant taxa was twice that of the co-dominant taxa. The Jaccards Coefficient and the Index of Similarity statistically shows these communities are similar, with scores of 0.76 and 0.86, respectively. Of the 19 species captured downstream, 16 of those also were captured upstream.

INTRODUCTION

Biological surveys of streams in the vicinity of selected lakes were initiated in 1982 by the Baltimore District, U.S. Army Corps of Engineers (COE). The principal objective of the surveys is to identify possible detrimental effects as well as benefits of the reservoirs, add to a database that was developed for monitoring the composition, abundance, diversity, and distribution of fishes over time, and provide a better understanding of the aquatic resources in the vicinity of the lakes. The fish communities at the inflow and outflow of the East Sidney Lake were surveyed on September 13 and 14, 2000.

The study was a joint effort between the COE and the U.S. Geological Survey (USGS). An assessment of the habitat suitability for sustaining fish communities also was included in the study. Fish communities were sampled to determine their structure and health and any differences that may exist upstream and downstream of the lake.

DESCRIPTION OF THE DAM AND STREAM STUDY REACHES

The East Sidney Dam was completed in 1950 for the purpose of flood control in the Ouleout Creek (U.S. Army Corps of Engineers, 2000). The dam is operated by use of a gated outlet bottom release system. Ouleout Creek is a tributary to the Susquehanna River near Unadilla, N.Y.

Stream reaches were selected to correspond with existing COE macroinvertebrate reaches and previously sampled fish-community reaches. Each reach was a minimum of 100 m (330 ft) long and included a proportional representation of the available geomorphologic units for the stream—riffle, run, or pool.

Two reaches, one upstream and one downstream of East Sidney Dam, were chosen for the fish-community study (fig. 1). The upstream reach is Ouleout Creek upstream of East Sidney Lake, N.Y. (latitude / longitude = 42°19′58″ / 75°10′30″). The downstream reach is Ouleout Creek downstream of East Sidney Lake at the KOA campground, N.Y. (latitude / longitude = 42°20′24″ / 75°14′47″).

Ouleout Creek upstream of East Sidney Lake begins approximately 2 stream km (1 mi) upstream from where the creek flows into the reservoir and extends upstream 148 m (486 ft). The drainage area is 179 km^2 (69 mi^2). The approximate area sampled was 2,368 m^2 (25,480 ft^2). The geomorphic channel units were riffle and pool, and bottom material was gravel, cobble, and boulder. The left bank had a riparian zone of approximately 15 m (49 ft) and there was some earth removal on the floodplain in the lower portion of the reach. The right bank had a riparian zone of greater than 18 m (59 ft) and was a densely forested hillside. There had been some rainfall 2 days prior to sampling, and according to Kenneth Kulp of the COE, the water level was higher than normal. Close to the middle of the reach, a deep pool extended most of the width of the reach, and along the left edge of water just above the pool was a deep backwater pool with many tree roots and woody debris. Water-quality parameters for the reach were a pH of 8.27, a water temperature of 17.0°C (62.6°F), and specific conductance of 128 µS / cm.

Ouleout Creek downstream of East Sidney Lake begins approximately 3 km (2 mi) downstream of the dam just below the Union Church Road Bridge and extends upstream 160 m (525 ft). The drainage area is 275 km^2 (106 mi^2). The approximate area sampled was 2,400 m^2 (25,824 ft^2). The geomorphic channel units were riffle and pool, and the bottom material was gravel and cobble. The riparian zone on the left bank was between 12 and 18 m (39 and 59 ft) wide and on the right bank was less than 6 m (20 ft) wide. The left edge riparian zone was forested; the right edge riparian area below the bridge was a corn field and above the bridge a campground. Around the area of the bridge was a shallow pooled area and the remaining area was riffle habitat. Because of rain the day before, the COE was releasing water from the reservoir and the streamflow was too great to effectively electrofish when we first arrived at the reach. The release was reduced so that the fish survey could continue and within an hour the water was at a level where it could be effectively sampled. Water-quality parameters for the reach were a pH of 8.02, a water temperature of 17.0°C (62.6°F), and a specific conductance of 98 µS / cm.

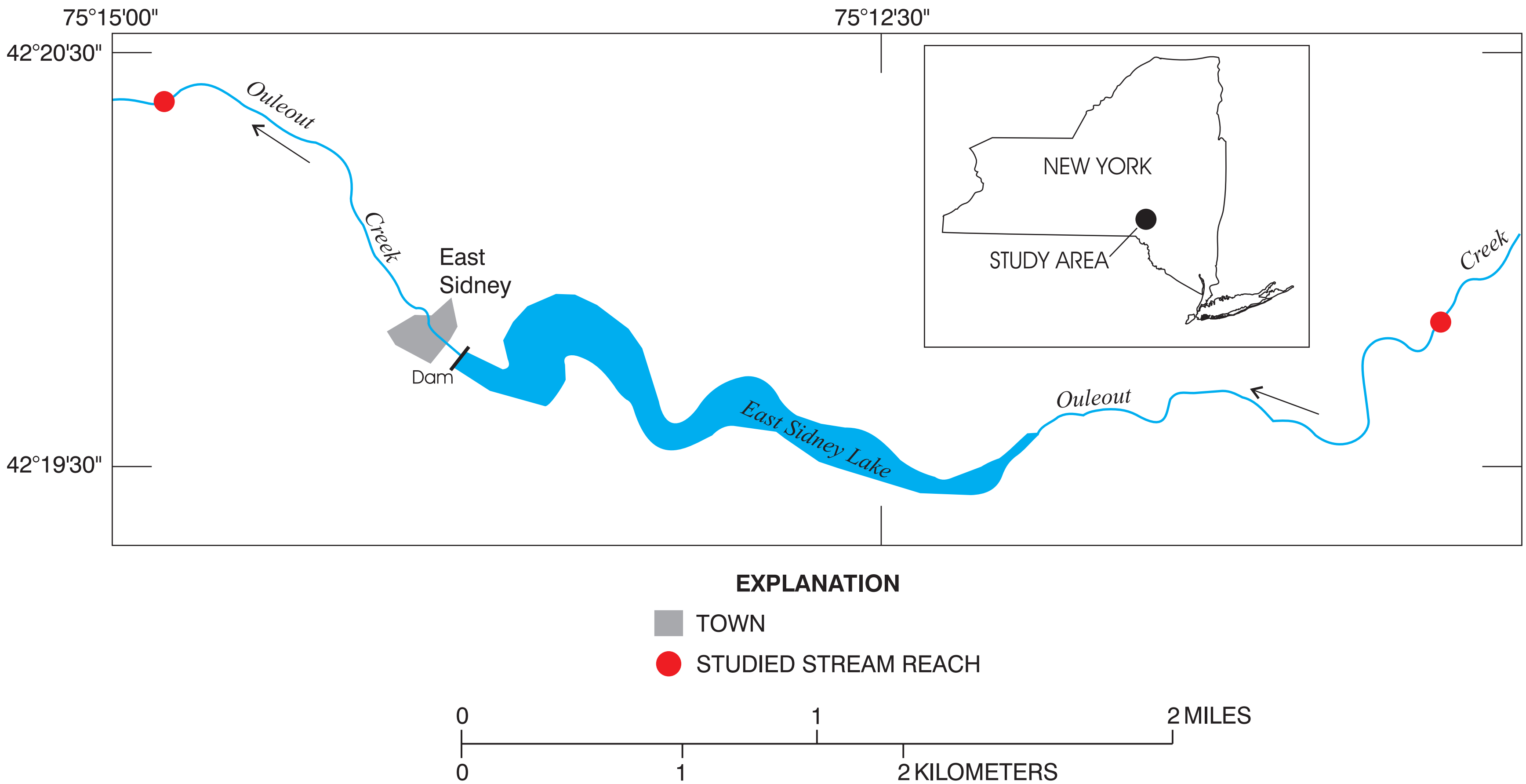

Figure 1. Location of reaches sampled for fish communities upstream and downstream of East Sidney Lake, N.Y., 2000.

STUDY METHODS

The fish communities upstream and downstream of East Sidney Lake were surveyed on September 13 and 14, 2000. These communities were characterized by total number of species collected and relative abundance of each species. Habitat was assessed and related to the fish communities present in each stream reach.

Fish Sampling

Both reaches were wadable. A Smith-Root Model 12-B backpack electroshocker incorporating pulsed DC was used at each sampling reach. Both reaches were covered with a double pass in an upstream direction. Crew size consisted of six individuals upstream (shock time of 6,921 seconds) and downstream (shock time of 6,006 seconds). The backpack electroshocker, an electrode, and a net were carried by one person. The other individuals on the crew netted the fish and put them in buckets.

After each pass, the captured fish were placed into rubber tubs with aerators, sorted, and identified to species using regional texts to confirm identifications (Jenkins and Burkhead, 1994; Page and Burr, 1991; Smith, 1985). A maximum of 30 individuals per species were weighed (grams), measured for total and standard lengths (millimeters), and examined for external anomalies (Meador and others, 1993). After 30 individuals of a species were weighed and measured, the remaining fish were counted and mass weighed to the nearest gram. A summary of the fish data can be found in the Appendix. A few specimens were put into 10-percent buffered formaldehyde for a voucher collection and verification in the USGS laboratory in Lemoyne, Pa. Fish from the first pass were placed in a live cage away from the reach being shocked to prevent further trauma. After both passes were completed, the fish were released back into the stream.

Habitat Quantification

Habitat assessment was conducted according to the Rapid Bioassessment Protocols (RBP) (Barbour and others, 1999). The riffle and run prevalence data form was used. Ten criteria were used to assess the quality of the fish habitat. Each criterion is rated on a score of 1 to 20. These scores were summed for a total habitat score. An average was then calculated and assessment was made on this averaged score. A score of 0-5 is poor, 6-10 is marginal, 11-15 is suboptimal, and 16-20 is optimal (Barbour and others, 1999; Klemm and Lazorchak, 1995). A reach with a higher habitat score should, theoretically, support a healthier fish community than a reach with a lower habitat score.

Data Analysis

The numbers of fish and their weights were totalled by species. The catch-per-unit-effort (CPUE) was calculated by dividing the number of fish collected by the total electroshocking time (Nielsen and Johnson, 1983). CPUE was used to compare the number of fish collected at each reach for the amount of time used for the effort. A higher CPUE would show more fish in an area than a lower CPUE. The reach with the lower CPUE is typically considered to be more impaired than a reach with a higher CPUE (Nielsen and Johnson, 1983).

Four indices were generated to further assess the health of the fish communities found in these reaches. The Shannon Index (H') is a value that combines species richness and evenness where >3.99 can be considered non-impacted; 3.00-3.99, slightly impacted; 2.00-2.99, moderately impacted; and <2.00, severely impacted (Bode and others, 1993). This calculation gives one estimate of the health of the entire fish community in each reach. A Jaccard Coefficient of Similarity and an Index of Similarity (Klemm and others, 1990) measure community similarity using the species present in both reaches and those found only in one reach or the other. These index scores can range between 0.0 and 1.0, with values increasing as the similarities between reaches increase (Plafkin and others, 1989). The fourth index is an Index of Biotic Integrity (IBI). The Maryland IBI for non-coastal streams (Roth and others, 1997) was used because no IBI's have been developed for Pennsylvania and New York streams. The IBI score is used to measure the health of a fish community taking into consideration the number of native species, feeding habits of the species present, and their tolerance or intolerance to water pollution and sediment. The first two metrics for the IBI, number of native species and number of benthic species, are adjusted for watershed areas using the formula in Roth and others (1997). A numeric scale where 1.0-1.9 is very poor, 2.0-2.9 is poor, 3.0-3.9 is fair, and 4.0-5.0 is good (Roth and others, 1997) is used to show the health of the community. These indices in combination with the CPUE are used to show any differences between the fish communities in the reaches surveyed, to determine if the fish communities show any impairment, and to aid in assessing if differences seen in the communities are because of the dam.

The state of New York is in the process of developing IBI's for each drainage basin in the state (K.R. Murray, U.S. Geological Survey, oral commun., 2000). However, the IBI will not be complete before the end of this project. Because of this fact, the well-researched and highly tested model developed by the Maryland Biological Stream Survey (MBSS) was selected. The use of regional IBI's has been endorsed by Miller and others (1988) and use of regional reference sites by Hughes and others (1986). These studies indicate that when geographically specific IBI's or reference conditions are not available, reasonably comparative conditions from ecologically similar areas may be used.

Although somewhat geographically distant, the fish faunal assemblages of Maryland were thought to better represent the Susquehanna River Basin drainage than the species depauperate northeastern region or the Ohio region where species are dissimilar to those found in the Susquehanna River drainage. Many metrics included in all multi-metric scoring systems seem to have 4-5 core metrics that explain most of the classification efficiency of the index. The remaining metrics add redundancy to ensure that a strong mathematical signal is developed. For example, 4 of the 12 metrics in the original IBI (Karr, 1981) are influenced by sediment.

The Maryland area where the IBI was developed may not be locally specific, but it does include a portion of the lower Susquehanna River drainage. The IBI also includes many sites, covers many species collected in the study area, and very importantly is adjusted for basin size. It is the logical alternative to use under these conditions.

FISH-COMMUNITY COMPOSITION

In the East Sidney Lake river system, the number of fish species identified at the upstream site was 18 and 19 downstream. The dominant species in both reaches were sculpin (table 1).

The Jaccard Coefficient and the Index of Similarity were 0.76 and 0.86, respectively (table 1). The CPUE score was 4.5 upstream and 11 downstream. The IBI scores of the two reaches were 4.5 upstream and 4.3 downstream (table 2).Average habitat scores were 18 upstream and 17 downstream, indicating the habitat was optimal (table 3). The differences seen were in individual parameters of vegetative protection and riparian vegetative zone width.

The IBI scores for both reaches indicate that the communities in each reach are in good condition. Upstream appears to be slightly better than downstream. However, the Shannon Index indicates that both reaches are slightly impacted as far as species richness and evenness is concerned. The IBI score takes into account the types of species found and their functions in the community; the Shannon Index only takes into account the number of species and the number of individuals. The IBI shows the communities are in good condition and that the species richness and evenness downstream is slightly more impacted than upstream.

The Jaccard Coefficient and the Index of Similarity indicate that the communities are similar. A Jaccard Coefficient of 0.76 shows the similarity in the fish communities and is supported by an Index of Similarity of 0.86. Of the 19 species captured in the downstream reach, only 3 were not captured in the upstream reach.

The dominant species of both reaches were sculpin (table 1). The two species captured upstream and not downstream were rock bass and bluegill (table 1). Both are centrarchids and only two rock bass and one bluegill were captured. These were small centrarchids not weighing more than a few grams each. These two species are typically found in areas where there is aquatic vegetation or woody debris (Smith, 1985).

The species captured downstream and not upstream were spotfin shiner, largemouth bass, and shield darter (table 1). Only two spotfin shiners and one small largemouth bass were captured. There were 22 shield darters captured, but this was not a dominant species. Shield darters are typically captured in rock and gravel riffles (Page and Burr, 1991) with a moderate current (Cooper, 1983).

Even though the CPUE downstream is higher than upstream, the species are not as evenly distributed throughout the community. The dominant species downstream is twice that of the second dominant species. Upstream, the top two dominant species are fairly close in number, 141 and 155 (table 1). The community upstream is more even in numbers of individual species than downstream. The IBI score shows this difference with the score of percentage abundance of dominant species (table 2). The species unevenness is why the IBI score is lower for the downstream community. More fish were captured in the downstream reach, but the upstream reach is more even and is a healthier community.

The fish communities appear to be in good condition, according to the IBI score. External anomalies included blackspot, some parasites on the margined madtoms, a small percentage of fin erosion upstream, and some species were missing an eye (see Appendix). The missing eyes are thought to be caused by the presence of cutlips minnows, which in confined spaces will attack other fish, knock their eye(s) out, and then eat the eye(s) (Jenkins and Burkhead, 1994; Smith, 1985). This behavior is thought to be a territorial response to overcrowding (Jenkins and Burkhead, 1994). With the exception of blackspot, less than 50 percent of the fish captured showed signs of anomalies (see Appendix). Parasitic anomalies show an inconsistent relation with water quality, and therefore, they are recorded but not used in assessments of water quality but can be used to show fish health (Sanders and others, 1999). Fin erosion seems to correlate nicely with point-source discharges of factories and wastewater treatment facilities where chlorine products are used (Sanders and others, 1999) or can be a clinical sign for possible bacterial infections (Nielson and Johnson, 1983). The anomalies do not indicate that there are any serious water-quality problems.

Table 1. *Taxa list, native or exotic, trophic status, tolerance value, number of individuals, total weight by species and for all species, total number of individuals, total number of species, catch-per-unit effort, Shannon Index, Jaccard Coefficient, and Index of Similarity for fish communities upstream and downstream of East Sidney Lake, N.Y., 2000*

[N, native; E, exotic; G, generalist; H, herbivore; S, insectivore; P, piscivore; I, intolerant; M, intermediate; T, tolerant; —, not collected in this sample]

Taxa	Native or exotic[1]	Trophic status[2]	Tolerance value[2]	Ouleout Creek upstream		Ouleout Creek downstream	
				Number of individuals	Species total weight in grams	Number of individuals	Species total weight in grams
Central stoneroller, *Campostoma anomalum*	N	H	T	17	71	7	126
Spotfin shiner, *Cyprinella spiloptera*	N	S	T	—	—	2	6
Cutlips minnow, *Exoglossum maxillingua*	N	S	I	35	324	148	1,305
Common shiner, *Luxilus cornutus*	N	S	M	3	12	4	18
River chub, *Nocomis micropogon*	N	G	M	8	103	59	613
Bluntnose minnow, *Pimephales notatus*	N	G	T	21	77	4	11
Blacknose dace, *Rhinichthys atratulus*	N	G	T	141	332	109	321
Longnose dace, *Rhinichthys cataractae*	N	S	M	62	230	228	1,388
Creek chub, *Semotilus atromaculatus*	N	G	M	2	12	3	39
Fallfish, *Semotilus corporalis*	N	G	M	3	5	20	60
White sucker, *Catostomus commersoni*	N	G	T	36	5,518	12	138
Margined madtom, *Noturus insignis*	N	S	M	23	139	28	235
Brown trout, *Salmo trutta*	E	P	I	2	271	8	178
Sculpin, *Cottus spp.*	N	S	M	155	442	469	1,114
Rock bass, *Ambloplites rupestris*	N	P	M	2	12	—	—
Pumpkinseed, *Lepomis gibbosus*	N	G	M	1	4	1	6
Bluegill, *Lepomis macrochirus*	N	G	T	1	4	—	—
Smallmouth bass, *Micropterus dolomieu*	N	P	M	2	10	6	63
Largemouth bass, *Micropterus salmoides*	N	P	M	—	—	1	1
Tessellated darter, *Etheostoma olmstedi*	N	S	M	19	34	3	6
Shield darter, *Percina peltata*	N	S	M	—	—	22	78
Totals				533	7,600	1,134	5,706
Total number of species				18		19	
CPUE (number of individuals per shocking time in minutes)				4.5		11	
H' (Shannon Index)				2.95		2.61	
Jaccard Coefficient				.76			
Index of Similarity				.86			

[1] Halliwell and others, 1999.
[2] Barbour and others, 1999.

Table 2. *Index of Biotic Integrity (IBI) metrics and scores for fish communities upstream and downstream of East Sidney Lake, N.Y., 2000*

[Scores: 4.0-5.0, good; 3.0-3.9, fair; 2.0-2.9, poor; 1.0-1.9, very poor]

IBI metric [1]	Ouleout Creek upstream	Ouleout Creek downstream
Number of native species (adjusted value)	5	5
Number of benthic species (adjusted value)	5	5
Percentage tolerant individuals	5	5
Percentage abundance of dominant species	5	3
Percentage generalists, omnivores, and invertivores	5	5
Percentage insectivores	5	5
Number of individuals per square meter	3	3
Percentage lithophilic spawners	3	3
Average IBI score	4.5	4.3

[1] Roth and others, 1997.

Table 3. *Habitat parameters and assessment upstream and downstream of East Sidney Lake, N.Y., 2000*

[Scores: 0-5, poor; 6-10, marginal; 11-15, suboptimal; 16-20, optimal]

Habitat parameter[1]	Ouleout Creek upstream	Ouleout Creek downstream
Epifaunal substrate / available cover	15	15
Embeddedness	19	18
Velocity / depth regime	20	18
Sediment deposition	19	19
Channel flow status	20	19
Channel alteration	19	19
Frequency of riffles (or bends)	16	19
Bank stability	16	15
Vegetative protection	20	14
Riparian vegetative zone width	17	9
Total score	181	165
Average score	18	17

[1] Barbour and others, 1999.

The East Sidney Lake does not appear to have affected the downstream portion of Ouleout Creek. Both communities appear to be in good health as indicated by the IBI scores (table 2) and are similar in community structure. Specific conductance, temperature, and pH of the two reaches were similar. The habitats were similar in both reaches with the exception of the riparian zone width and vegetative protection. The only major difference was in the percentage of dominant taxa. The installation of the dam and its operation seems to have had little affect on the fish communities of this creek.

SUMMARY

Ouleout Creek upstream and downstream of the East Sidney Lake was studied to evaluate the current status of fish communities in the vicinity of the lake. The intent was to determine if the communities above and below the reservoir are similar or different and to comment on the health of the communities present in each reach.

On the basis of calculated Index of Biotic Integrity (IBI) scores, both fish communities are in good condition. The habitats in both reaches were optimal. The Jaccards Coefficient of 0.76 and an Index of Similarity of 0.86 statistically show the communities are similar. The reaches both contain 16 of the same species and only differ in 2 or 3 species depending on the reach. The Shannon Index indicates that both communities are slightly impacted with downstream being more impacted than upstream. The species evenness in the downstream reach is lower than that of the upstream reach. This is seen by one species being much more dominant than any other species downstream, while upstream, the top two dominant species are very close in number of individuals.

With these two reaches being so similar, it appears that the dam and its operation do not have a significant impact on the downstream reach of Ouleout Creek. There may be a problem downstream as noted by the imbalance in the community evenness caused by the dominant species being twice the number of the next dominant species. Other than this detail, the communities of both reaches appear in good condition, similar in species, and have optimal quality habitat to support these fish communities.

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APPENDIX

Study Unit: COE
Station Name: Ouleout Creek upstream of East Sidney Lake, N.Y.
Sampling Gear: backpack electroshocker

Date of Collection: 9/14/00
Number of Species at Site: 18
Time (min)/Pass: 59/pass 1; 60/pass 2

Species name	Total number of fish per species	Percentage of total number of fish	Total weight per species (grams)	Percentage total weight	Average weight (grams)	Range of weights (grams)	Average total length (millimeters)	Range of total lengths (millimeters)	Average standard length (millimeters)	Range of standard lengths (millimeters)
Central stoneroller, *Campostoma anomalum*	17	3	71	1	4	1-11	66	39-96	54	30-80
Cutlips minnow, *Exoglossum maxillingua*	35	7	324	4	9	1-31	81	30-127	67	25-110
Common shiner, *Luxilus cornutus*	3	<1	12	<1	4	2-6	75	60-84	59	46-66
River chub, *Nocomis micropogon*	8	2	103	1	13	4-23	98	61-124	83	50-115
Bluntnose minnow, *Pimephales notatus*	21	4	77	1	4	1-7	67	34-83	55	26-70
Blacknose dace, *Rhinichthys atratulus*	141	26	332	4	2	1-5	57	22-72	46	15-61
Longnose dace, *Rhinichthys cataractae*	62	12	230	3	4	1-9	66	39-91	53	29-79
Creek chub, *Semotilus atromaculatus*	2	<1	12	<1	6	6-6	86	84-87	70	70-71
Fallfish, *Semotilus corporalis*	3	<1	5	<1	2	1-2	56	55-57	46	45-46
White sucker, *Catostomus commersoni*	36	7	5,518	73	153	1-762	147	45-412	120	34-345
Margined madtom, *Noturus insignis*	23	4	139	2	6	2-22	78	55-129	67	50-110
Brown trout, *Salmo trutta*	2	<1	271	4	136	72-199	237	196-278	204	171-237
Sculpin, *Cottus spp.*	155	29	442	6	3	1-7	57	32-79	46	25-65
Rockbass, *Ambloplites rupestris*	2	<1	12	<1	6	5-7	58	57-60	48	45-50
Pumpkinseed, *Lepomis gibbosus*	1	<1	4	<1	4	4	60	60	48	48
Bluegill, *Lepomis macrochirus*	1	<1	4	<1	4	4	46	46	36	36
Smallmouth bass, *Micropterus dolomieu*	2	<1	10	<1	5	4-6	62	55-70	50	46-55
Tessellated darter, *Etheostoma olmstedi*	19	4	34	<1	2	1-3	48	30-64	39	25-50
Totals for site:	533		7,600							

Reported anomalies: Cutlips minnow—3 percent with blackspot; Creek chub—50 percent with blackspot; Margined madtom—9 percent with parasites, 4 percent with fin erosion; Rockbass—50 percent with missing eyes

Study Unit: COE
Station Name: Ouleout Creek at KOA campground downstream of East Sidney Lake, N.Y.
Sampling Gear: backpack electroshocker

Date of Collection: 9/13/00
Number of Species at Site: 19
Time (min)/Pass: 51/pass 1; 49/pass 2

Species name	Total number of fish per species	Percentage of total number of fish	Total weight per species (grams)	Percentage total weight	Average weight (grams)	Range of weights (grams)	Average total length (millimeters)	Range of total lengths (millimeters)	Average standard length (millimeters)	Range of standard lengths (millimeters)
Central stoneroller, *Campostoma anomalum*	7	1	126	2	18	2-35	103	51-136	86	40-115
Spotfin shiner, *Cyprinella spiloptera*	2	<1	6	<1	33	1-5	66	51-80	53	41-65
Cutlips minnow, *Exoglossum maxillingua*	148	13	1,305	23	9	1-38	83	29-140	70	22-120
Common shiner, *Luxilus cornutus*	4	<1	18	<1	5	2-7	80	62-93	61	47-74
River chub, *Nocomis micropogon*	59	5	613	11	10	1-36	87	35-140	73	27-120
Bluntnose minnow, *Pimephales notatus*	4	<1	11	<1	3	1-5	56	41-65	49	43-52
Blacknose dace, *Rhinichthys atratulus*	109	10	321	6	3	1-6	61	27-75	50	20-65
Longnose dace, *Rhinichthys cataractae*	228	20	1,388	24	6	1-14	74	41-106	61	34-90
Creek chub, *Semotilus atromaculatus*	3	<1	39	<1	13	4-23	102	72-130	84	60-109
Fallfish, *Semotilus corporalis*	20	2	60	1	30	1-14	58	39-112	46	30-90
White sucker, *Catostomus commersoni*	12	1	138	2	12	2-29	89	57-130	71	45-105
Margined madtom, *Noturus insignis*	28	2	235	4	8	2-19	89	60-118	73	50-100
Brown trout, *Salmo trutta*	8	1	178	3	22	5-79	112	74-192	93	61-160
Sculpin, *Cottus spp.*	469	41	1,114	20	2	1-6	52	28-71	41	20-56
Pumpkinseed, *Lepomis gibbosus*	1	<1	6	<1	6	6	70	70	55	55
Smallmouth bass, *Micropterus dolomieu*	6	1	63	1	10	1-50	69	35-151	55	27-121
Largemouth bass, *Micropterus salmoides*	1	<1	1	<1	1	1	46	46	36	36
Tessellated darter, *Etheostoma olmstedi*	3	<1	6	<1	2	1-4	54	40-76	44	32-61
Shield darter, *Percina peltata*	22	2	78	1	4	2-5	69	63-76	58	51-66
Totals for site:	1,134		5,706							

Reported anomalies: Central stoneroller—17 percent missing an eye, 43 percent with blackspot; Spotfin shiner—50 percent with blackspot; Cutlips minnow—67 percent with blackspot; River chub—58 percent with blackspot; Bluntnose minnow—25 percent with blackspot; Blacknose dace—76 percent with blackspot; Longnose dace—57 percent with blackspot; Creek chub—33 percent with blackspot; Fallfish—5 percent with blackspot; White sucker—17 percent with blackspot; Margined madtom—36 percent with parasites