U.S. Department of the Interior
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FISH-COMMUNITY COMPOSITION IN CANACADEA CREEK, IN THE VICINITY OF ALMOND LAKE, ALLEGANY AND STEUBEN COUNTIES, NEW YORK, 2000

Open-File Report 01-79

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

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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

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ABSTRACT

The U.S. Army Corps of Engineers, Baltimore District, has been conducting biological surveys of the inflow and outflow streams of Almond Lake since the early 1980's. These surveys are made to identify possible detrimental effects as well as benefits of the reservoir 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 lake in Canacadea Creek in September 2000. The fish communities upstream and downstream were compared and any differences or similarities seen in the communities were noted.

This study found the fish communities to be in fair condition upstream and good condition downstream of Almond Lake, with Index of Biotic Integrity (IBI) scores of 3.5 and 5.0, respectively. The habitat conditions of both reaches were of suboptimal quality, with a score of 14 upstream and 15 downstream as determined by use of the U.S. Environmental Protection Agency's (USEPA) Rapid Bioassessment Protocols, and are capable of supporting fish communities. The Shannon Index indicates species richness and evenness and was 1.87 upstream and 3.22 downstream of the lake, indicating the upstream reach is severely impacted and the downstream reach appears to be not impacted. The Jaccards Coefficient and the Index of Similarity statistically show these communities are similar with scores of 0.55 and 0.71, respectively. Of the 12 species captured upstream, 11 of those also were captured downstream along with 8 other species for a total of 19 species downstream.

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 Almond Lake were surveyed on September 26 and 27, 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 Almond Dam was completed in 1949 for the purpose of flood control in the Canacadea Creek (U.S. Army Corps of Engineers, 2000). The dam is operated by use of a gated outlet bottom release system. Canacadea Creek is a tributary to the Canisteo River, which flows into the Chemung River and then into the Susquehanna River.

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 Almond Lake, were chosen for the fish-community study (fig. 1). The upstream reach is Canacadea Creek upstream at Erie Street Bridge in Almond, N.Y. (latitude/longitude = 42°19′08″/77°44′11″). The downstream reach is Canacadea Creek immediately downstream of Almond Lake, N.Y. (latitude/longitude = 42°20′41″/77°41′57″).

The Canacadea Creek upstream of Almond Lake reach begins approximately 60 m (197 ft) downstream of the Erie Street Bridge and extends 141 m (462 ft) upstream. The drainage area is 122 km^2 (47 mi^2). The approximate area sampled was 2,115 m^2 (22,757 ft^2). The geomorphic channel units were riffle and pool, and bottom material was gravel, cobble, and boulder. The riparian zone of the right bank was between 6 and 12 m (20 and 39 ft) wide. The left bank had a riparian zone of less than 6 m (20 ft). Close to the top of the reach was a block wall along the right edge of water and a deep cut in the stream from the channel flow along the wall. The remaining area in the reach was riffle and some backwater along the bottom right edge of the stream. Water quality parameters for the reach were a pH of 8.03, a water temperature of 11.4°C (52.5°F), and specific conductance of 684 µS/cm.

The Canacadea Creek downstream of Almond Lake reach begins approximately 200 m (656 ft) downstream of the dam and extends upstream 170 m (558 ft). The drainage area is 144 km^2 (56 mi^2). The approximate area sampled was 1,700 m^2 (18,292 ft^2). The geomorphic channel units were riffle and pool, and the bottom material was gravel, cobble, and silt. 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 for a few meters, mowed, and then became a forested hillside. The right edge of water had a narrow strip of trees and brush and then was mowed as part of the COE property. Most of the reach was riffle. A small, backwater pool existed at the top of the reach. Water quality parameters for the reach were a pH of 7.28, a water temperature of 12.0°C (53.6°F), and a specific conductance of 581 µS/cm.

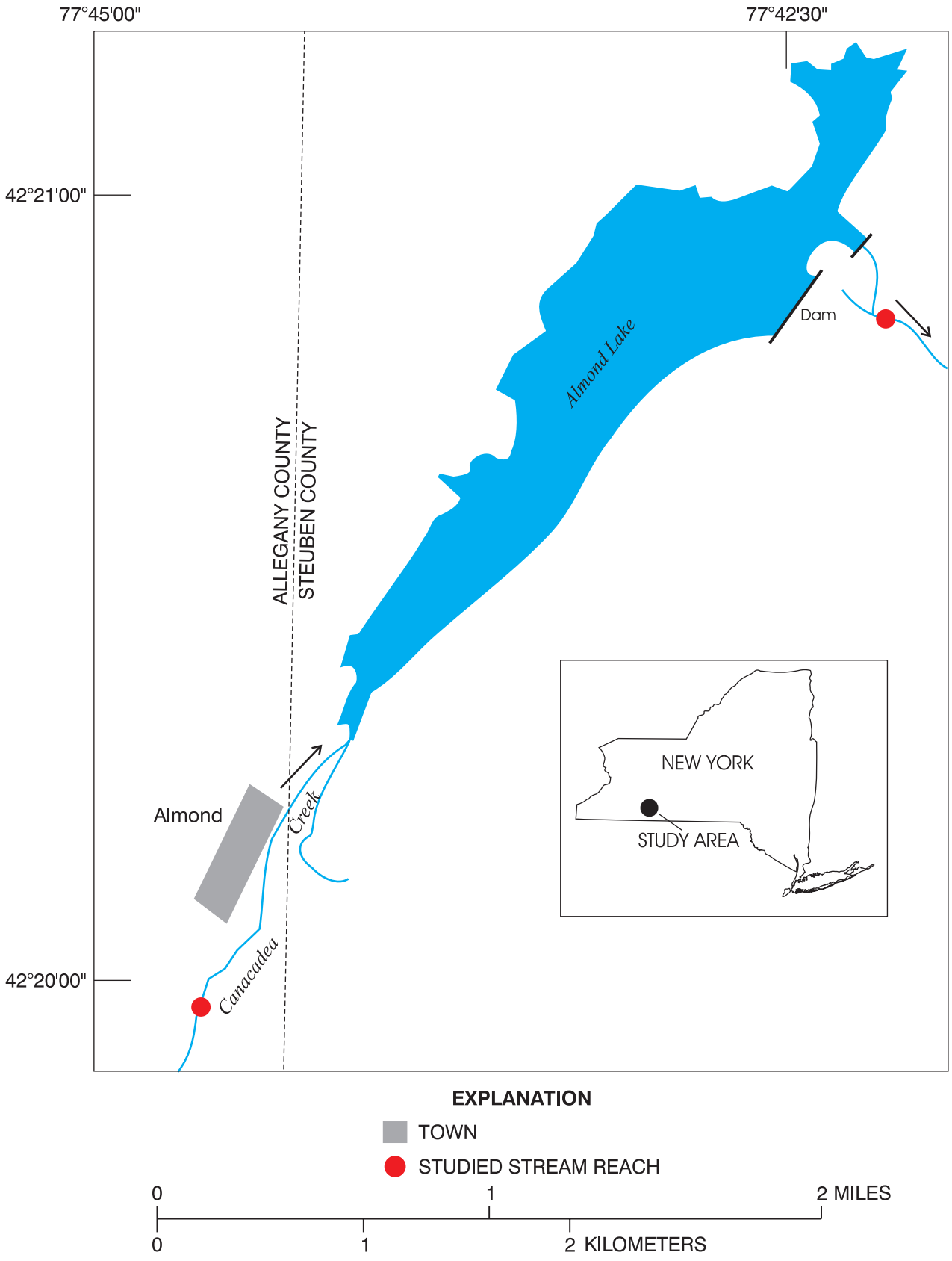

Figure 1. Location of reaches sampled for fish communities upstream and downstream of Almond Lake, N.Y., 2000.

STUDY METHODS

The fish communities upstream and downstream of Almond Lake were surveyed on September 26 and 27, 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 single pass in an upstream direction. Crew size consisted of six individuals upstream (shock time of 4,561 seconds) and downstream (shock time of 6,969 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 the 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. After the fish were identified and counted, they 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 Almond Lake river system, the number of fish species identified at the upstream site was 12 and 19 downstream. The dominant species upstream was blacknose dace and downstream was white sucker (table 1).

The Jaccard Coefficient and the Index of Similarity were 0.55 and 0.71, respectively (table 1). The CPUE score was 31 upstream and 19 downstream. The IBI scores of the two reaches were 3.5 upstream and 5.0 downstream (table 2). Average habitat scores were 14 upstream and 15 downstream, indicating the habitat was suboptimal for both reaches (table 3). The differences seen were in the individual parameters of channel flow status and riparian vegetative zone width.

The IBI scores for both reaches indicate that the community in the upstream reach is in fair condition and that downstream of the dam, the community is in good condition. The Shannon Index indicates that the upstream reach is severely impacted and downstream is not impacted (table 1). The IBI score takes into account the types of species found and their functions in the community; the Shannon Index takes into account the number of species and the number of individuals. Both the IBI score and the Shannon Index show the downstream community to be more stable than the upstream community.

Typically, a higher CPUE score indicates a healthier community than one with a lower score. However, the Canacadea Creek upstream community is not as healthy as the downstream community. The CPUE upstream is higher than downstream, but the IBI and Shannon Index indicate the downstream reach has a better community. Even though there are more fish upstream, the community is less diverse, has fewer species, and the dominant species is more than twice the number of the second dominant species. This is one metric in the IBI that lowers the upstream IBI score and also affects the Shannon Index, which indicates the upstream community is severely impacted. The downstream community is more diverse and the numbers of fish in each species is more even, indicating a healthier community.

The Jaccard Coefficient and the Index of Similarity indicate that the communities are similar. A Jaccard Coefficient of 0.55 shows this similarity in the fish communities and is supported by an Index of Similarity of 0.71. All but 1 species captured upstream was captured downstream; however, there were 8 more species captured downstream in addition to the other 11 shared species.

The dominant species upstream was blacknose dace at a count of 1,241 (table 1). The second dominant species was the central stoneroller with a count of 500 and third was longnose dace at 462 (table 1). These species also were captured downstream, but in smaller numbers. By looking at these numbers, it can be noted that the reach is severely impacted because the species evenness is skewed and the Shannon Index indicates a problem with this community. These three species are found in moderate to high gradient streams with gravel, rock, boulder, and bedrock stream bottoms (Jenkins and Burkhead, 1994; Rohde and others, 1994). The longnose dace is typically captured in the faster flowing riffles and the blacknose dace in the slower moving runs rarely occupying the same niche (Cooper, 1983).

The only species captured upstream but not downstream of the lake was common shiner, and only three individuals were captured. These fish are common to areas of rocky pooled waters near riffles with gravel to rock bottoms (Page and Burr, 1991; Rohde and others, 1994). They do not appear to be very tolerant of silt in the water, and though both streams were in the optimal habitat category for sediment deposition, the downstream reach showed a little more deposition than upstream. Although three fish are not enough to show this difference, it may indicate a slight silt problem downstream of the dam. However, there is no conclusive evidence to show an effect of siltation.

The dominant species in the downstream reach were white sucker, sculpin, and bluntnose minnow followed closely by cutlips minnow (table 1). White sucker are tolerant of many different habitats (Cooper, 1983; Smith, 1985) and are captured in streams that are clean to heavily silted, not vegetated to vegetated (Jenkins and Burkhead, 1994), where rocky pools and riffles exist (Page and Burr, 1991), and where the substrate is gravel or rock (Rohde and others, 1994). This species also was found upstream but fewer numbers were recorded. The sculpin, bluntnose minnow, and cutlips minnow also were found upstream except fewer numbers were recorded.

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 Almond Lake, N.Y., 2000*

[N, native; 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]	Canacadea Creek upstream		Canacadea 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	500	1,454	185	4,036
Cutlips minnow, *Exoglossum maxillingua*	N	S	I	8	44	290	1,804
Common shiner, *Luxilus cornutus*	N	S	M	3	3	—	—
Golden shiner, *Notemigonus crysoleucas*	N	G	M	—	—	4	15
Spottail shiner, *Notropis hudsonius*	N	S	M	—	—	71	522
Bluntnose minnow, *Pimephales notatus*	N	G	T	22	73	296	1,138
Fathead minnow, *Pimephales promelas*	N	G	T	—	—	12	44
Blacknose dace, *Rhinichthys atratulus*	N	G	T	1,241	756	51	103
Longnose dace, *Rhinichthys cataractae*	N	S	M	462	776	277	1,308
Creek chub, *Semotilus atromaculatus*	N	G	M	1	11	11	327
White sucker, *Catostomus commersoni*	N	G	T	19	1,357	422	7,767
Northern hog sucker, *Hypentelium nigricans*	N	G	M	—	—	11	310
Brown bullhead, *Ameiurus nebulosus*	N	G	T	2	27	16	425
Sculpin, *Cottus spp.*	N	S	M	74	494	370	2,104
Pumpkinseed, *Lepomis gibbosus*	N	G	M	—	—	12	60
Largemouth bass, *Micropterus salmoides*	N	P	M	3	20	4	59
Black crappie, *Pomoxis nigromaculatus*	N	P	M	—	—	90	326
Fantail darter, *Etheostoma flabellare*	N	S	M	44	66	34	77
Tessellated darter, *Etheostoma olmstedi*	N	S	M	—	—	6	8
Yellow perch, *Perca flavescens*	N	P	M	—	—	5	80
Totals				2,379	5,081	2,167	20,513
Total number of species				12		19	
CPUE (number of individuals per shocking time in minutes)				31		19	
H' (Shannon Index)				1.87		3.22	
Jaccard Coefficient				.55			
Index of Similarity				.71			

[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 Almond 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]	Canacadea Creek upstream	Canacadea Creek downstream
Number of native species (adjusted value)	5	5
Number of benthic species (adjusted value)	3	5
Percentage tolerant individuals	3	5
Percentage abundance of dominant species	3	5
Percentage generalists, omnivores, and invertivores	3	5
Percentage insectivores	3	5
Number of individuals per square meter	5	5
Percentage lithophilic spawners	3	5
Average IBI score	3.5	5

[1] Roth and others, 1997.

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

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

Habitat parameter[1]	Canacadea Creek upstream	Canacadea Creek downstream
Epifaunal substrate / available cover	18	15
Embeddedness	17	18
Velocity / depth regime	18	17
Sediment deposition	18	16
Channel flow status	7	19
Channel alteration	9	9
Frequency of riffles (or bends)	18	17
Bank stability	15	16
Vegetative protection	16	15
Riparian vegetative zone width	5	9
Total score	141	151
Average score	14	15

[1] Barbour and others, 1999.

Black crappie and spottail shiner are the only two species numbering more than 12 individuals that were captured exclusively in the downstream reach (table 1). Black crappie are typically captured in slow, clear water around logs and in impoundments (Rohde and others, 1994). Spottail shiners are typical of pools and runs (Jenkins and Burkhead, 1994; Page and Burr, 1991; Smith, 1985) where the bottom is sandy to rocky (Rohde and others, 1994) and are usually associated with yellow perch (Cooper, 1983). A few yellow perch were captured in this downstream reach (table 1). Yellow perch are captured in waters with the same qualities as black crappie (Rohde and others, 1994; Page and Burr, 1991).

Channel flow status scored lower in the upstream reach than downstream. Areas of the stream bottom were exposed and the flow appeared channelized. The regulated flow below the dam provided enough flow to keep the channel bottom inundated. This habitat feature was the most different between the reaches. The riparian zone width upstream scored a few points lower than downstream. Whether these features account for the noted community differences can not be determined. Historical data with both community and habitat assessments could help better discern a reason or reasons for the community differences.

No anomalies were noted on the upstream reach fish; only a small percentage of fish downstream had blackspot (see Appendix). Blackspot is a parasitic anomaly that shows an inconsistent relation with water quality. Therefore, its presence is recorded but not used in assessments of water quality, but can be used to show fish health (Sanders and others, 1999). This anomaly does not indicate that there are any serious water-quality problems.

From this assessment, the Almond Lake project appears to have a positive effect on the downstream portion of Canacadea Creek. The channel flow status appears to be better by what could be determined using the USEPA habitat assessment. The fish community downstream has a higher IBI score (table 2) and Shannon Index (table 1) and is considered not impacted by the scoring criteria. Upstream, the community appears to be impacted according to the IBI score and the Shannon Index for that reach. Specific conductance and pH upstream are higher than downstream. However, these do not seem to be at a level to cause damage to the fish community. Why the upstream fish community is impacted cannot be determined from this study, but it seems the dam has a positive effect on the downstream reach.

SUMMARY

Canacadea Creek upstream and downstream of the Almond 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, the upstream fish community is in fair condition and downstream is in good condition. The habitats in both reaches were suboptimal. The Jaccards Coefficient of 0.55 and an Index of Similarity of 0.71 statistically show the communities are similar. The reaches both contain 11 of the same species with 1 species exclusive to the upstream reach and 8 to the downstream reach. The Shannon Index indicates the upstream community is severely impacted and downstream is not impacted. There are fewer species upstream and the dominant species is more than two times greater in number than the second dominant species. This unevenness between species is not seen in the downstream reach.

With these two reaches being similar, it appears that the dam and its operation does not have a negative impact and may even have a positive impact on the downstream reach of Canacadea Creek. There may be a problem upstream as noted by the imbalance in the community evenness. Only historical data can show if the dam has improved the stream condition and fish community below the dam or whether other factors have caused the degradation seen in the upstream reach.

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APPENDIX

Study Unit: COE
Station Name: Canacadea Creek at Erie Street Bridge in Almond upstream of Almond Lake, N.Y.
Sampling Gear: backpack electroshocker

Date of Collection: 9/26/00
Number of Species at Site: 12
Time (min)/Pass: 76/pass 1

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*	500	21	1,454	29	5	1-33	86	32-139	70	24-116
Cutlips minnow, *Exoglossum maxillingua*	8	<1	44	<1	6	1-16	65	35-107	52	27-87
Common shiner, *Luxilus cornutus*	3	<1	3	<1	1	1-1	40	37-44	32	30-34
Bluntnose minnow, *Pimephales notatus*	22	1	73	1	3	1-7	64	46-85	52	36-70
Blacknose dace, *Rhinichthys atratulus*	1,241	52	756	15	1	1-6	46	29-68	37	21-55
Longnose dace, *Rhinichthys cataractae*	462	19	776	15	2	1-8	61	40-94	47	30-75
Creek chub, *Semotilus atromaculatus*	1	<1	11	<1	11	11	95	95	75	75
White sucker, *Catostomus commersoni*	19	<1	1,357	27	74	3-840	139	61-420	113	50-356
Brown bullhead, *Ameiurus nebulosus*	2	<1	27	1	14	11-16	102	97-108	84	77-90
Sculpin, *Cottus spp.*	74	3	494	10	7	3-14	78	63-99	63	50-82
Largemouth bass, *Micropterus salmoides*	3	<1	20	<1	7	6-7	75	75-75	60	60-60
Fantail darter, *Etheostoma flabellare*	44	2	66	1	2	1-2	45	32-65	35	20-52
Totals for site:	2,379		5,081							

Reported anomalies: none

Study Unit: COE
Station Name: Canacadea Creek immediately downstream of Almond Lake, N.Y.
Sampling Gear: backpack electroshocker

Date of Collection: 9/27/00
Number of Species at Site: 19
Time (min)/Pass: 116/pass 1

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*	185	9	4,036	20	22	2-34	111	50-140	93	40-119
Cutlips minnow, *Exoglossum maxillingua*	290	13	1,804	8	6	2-33	83	57-132	69	46-110
Golden shiner, *Notemigonus crysoleucas*	4	<1	15	<1	4	1-9	72	60-97	57	49-76
Spottail shiner, *Notropis hudsonius*	71	3	522	3	7	2-12	91	51-105	73	47-84
Bluntnose minnow, *Pimephales notatus*	296	14	1,138	6	4	1-8	68	55-87	56	43-72
Fathead minnow, *Pimephales promelas*	12	<1	44	<1	4	1-7	67	56-84	54	45-69
Blacknose dace, *Rhinichthys atratulus*	51	2	103	<1	2	1-4	63	45-73	51	36-50
Longnose dace, *Rhinichthys cataractae*	277	13	1,308	6	4	1-13	76	48-101	62	40-88
Creek chub, *Semotilus atromaculatus*	11	<1	327	2	30	3-114	117	53-221	97	41-191
White sucker, *Catostomus commersoni*	422	19	7,767	38	18	2-101	114	64-214	90	50-171
Northern hog sucker, *Hypentelium nigricans*	11	<1	310	2	28	13-52	125	94-158	104	74-135
Brown bullhead, *Ameiurus nebulosus*	16	<1	425	2	27	9-106	124	90-206	101	74-170
Sculpin, *Cottus spp.*	370	17	2,104	10	6	4-17	70	37-89	55	30-65
Pumpkinseed, *Lepomis gibbosus*	12	<1	60	<1	5	3-9	70	62-85	55	47-65
Largemouth bass, *Micropterus salmoides*	4	<1	59	<1	15	6-39	105	87-147	83	66-119
Black crappie, *Pomoxis nigromaculatus*	90	4	326	2	4	1-12	56	40-79	42	29-60
Fantail darter, *Etheostoma flabellare*	34	2	77	<1	2	1-4	59	35-74	48	27-61
Tessellated darter, *Etheostoma olmstedi*	6	<1	8	<1	1	1-2	61	59-66	50	46-52
Yellow perch, *Perca flavescens*	5	<1	80	<1	16	9-20	120	100-131	96	80-105
Totals for site:	2,167		20,513							

Reported anomalies: Creek chub—9 percent with blackspot; Blacknose dace—14 percent with blackspot; Longnose dace—3 percent with blackspot