Preliminary Survey of NYPA Blenheim-Gilboa Reservoir Lower Pool

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Abstract

On August 31, 2005 the SUNY Cobleskill Aquatic and Marine Ecology class conducted a survey of the Blenheim-Gilboa lower reservoir. The purpose of the study was to complement a recent lecture the class received regarding reservoir ecology and limiting factors regarding primary production, thermal stratification, water quality and potential fish habitat. The fish community was sampled with trap nets, haul seines, and a trammel net. Physical-chemical conditions were tested with a YSI multi-meter and HACH test kits. Most benthic invertebrate species were found between 2 and 5 meters in depth from the existing shore line indicating water level fluctuations. Most water parameters were good to marginal, save low alkalinity (34.2 mg/L at the surface and 17.1 mg/L on the bottom) which is very low. Alkalinity should be higher to maintain pH stability. Bottom turbidity was high at 33 NTU's. A 3-min. horizontal plankton tow yielded an abundance of rotifers, and very few large cladoceran zooplankton. Non-game fish species were dominated by pumpkinseed (*Lepomis gibbosus*) (30%), rock bass (*Ambloplites rupestris*) (28%), and fallfish (*Semotilus corporalis*) (13%). Game fish such as largemouth bass (*Micropterus salmoides*) (1%) and smallmouth bass (*Micropterus dolomieu*) (1%) were scarce.

Introduction

At the request of the New York Power Authority (NYPA-Blenheim-Gilboa) and the Schoharie County Conservation Association the class conducted a survey of the reservoir to provide them with as much information as possible to gauge the condition of the overall health of this important regional resource. The lower reservoir is stocked annually with trout and is known to support a population of largemouth bass, smallmouth bass, walleye, bullhead and numerous species of non-game fishes.

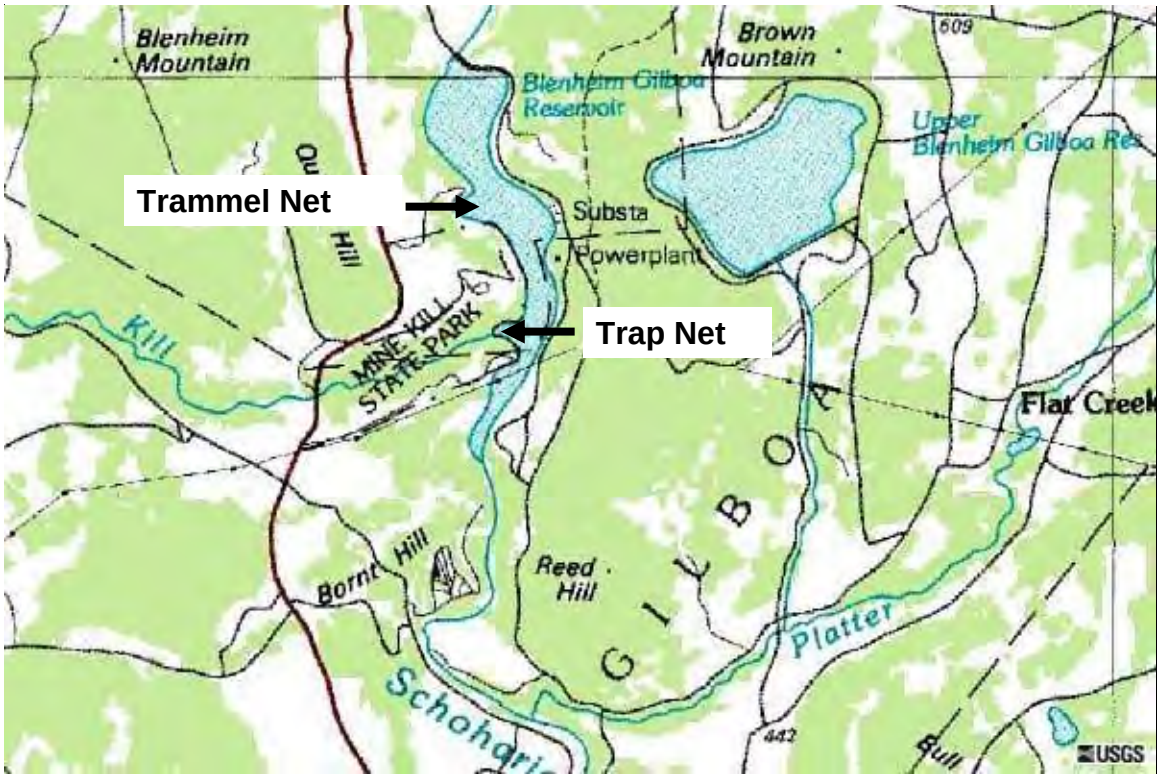
NYPA operates the Blenheim-Gilboa project as a pumped storage power facility. An impoundment of the Schoharie Creek comprises the lower reservoir and another reservoir at the top of the Brown Mountain serves as the receiving pool for pumped water. Power generation is accomplished by letting water fall to the lower pool through the power house located on the lower pool. Water fluctuations of 20-40 feet per day are common in the lower pool.

The goal of this survey was to perform a preliminary survey of the physical-chemical environment, plankton, benthic and fish communities found in the lower pool with an emphasis on factors that may limit the fishery.

Materials and Methods

The study was conducted in the town of Blenheim on property owned by the New York Power Authority (74. 4.603 N latitude, 42.40.065 W longitude).

Figure 1. NYPA Blenhiem-Gilboa Study Site & Net Locations
7 November 2005



The study was conducted on the 31 August, 2005 at 2:00 pm. The weather was unseasonably hot and humid for the region for that time of year. The study began by breaking the class into four groups each with a specific responsibility. The near shore fish group was to first check for any species captured in a 24hr trap net that was set on the afternoon of 30 August. This group recorded all fish total lengths and took scale samples from two fish of each species. The group then conducted a series of shore seines around the lower pool, again taking scale samples and recording fish lengths. They used the following equipment: buckets, totes, haul seine, boat with motor, measuring board, scale envelopes, iodine, and forceps.

The water quality group used a YSI 556 multi-parameter water analyzer to measure temperature, dissolved oxygen, conductivity, pH and total dissolved solids at one meter increments from the surface to the bottom. Several test kits were also used to check total hardness, alkalinity, hydrogen sulfide and ammonia at the surface and bottom. Water from the bottom of the reservoir was collected with a 1L Kemmerer bottle. A sample was saved to check turbidity at a university lab. The group used the following: kemmerer bottle, hach test kits, sample jars, YSI water analyzer and a secci disk.

The invertebrate group's goal was to access the number of benthic species present using a ponar grab at one meter depths from the shoreline towards the center of the reservoir. Any plants found were to be placed in a bag indicating depth found. The benthic samples were placed in a bucket sieve and any inverts found were placed in a labeled jar indicating depth. The group also conducted a three minute horizontal plankton tow with a motor boat using a Wisconsin plankton net resulting in a 1 liter combined sample. All results were recorded in field books. The invertebrate group used the following: ponar grab, rose bengal/ethanol vital stain and preservative, Wisconsin plankton net, bucket sieve, 100' measuring tape and a plankton cup.

A second offshore fish group was utilized to record any fish captured in a 24-hr trammel net set the previous day. The goal was to record numbers and sizes of fish captured and take scale samples from two fish of each species. This group also brought back one fish of each species to the lab for future study. They used the following equipment: trammel net, buckets, totes, measuring board, scale envelopes and iodine.

Results and Discussion

The benthic group found results typical to a body of water with constantly changing water levels. Most populations of benthic invertebrates were found at 2 meter to 5 meter areas (Table 1). A typical scenario of a lake community would be to find higher biomasses of benthic invertebrates closer to the waters edge. At B-G this biomass peaked at 2-5m (Table 2). A high percentage of suspended plankton was found in the water column during the plankton tow with the highest represented by rotifers at 57% (Table 1). A higher percentage of large cladocerans would be expected in a well balanced fishery. B-G is dominated by small bodied rotifers which are inefficient filter feeders and are poor fish food.

Table 1. Relative abundance of common zooplankton tax in B-G Lower Reservoir 31 August 2005

Taxa	Dominant Group	Relative abundance
Copepods	Calanoid	18%
Cladocerans	*Bosmina sp.*	25%
Rotifers	*Keratella cochlearis*	57%

Table 2. Relative abundance of common zooplankton tax in B-G Lower Reservoir 7 August 2005

Depth meters	Species	#
0	Sludge worm	3
0.5	None	0
1	Sludge worm	1
2	Bloodworm	6
	Rattail maggot	1
3	Sludge worm	1
4	Mayfly	1
	Sludge worm	1
5	Mayfly	12
	Bloodworm	3
	Caddis fly	1
6	None	0

The physical/chemical group found trace amounts of ammonia which could indicate anaerobic conditions somewhere in the reservoir. Alkalinity was low which could lead to pH fluctuations at some point in the future. Conductivity was low at 127 umhos indicating low productivity. Turbidity at the bottom was quite high at 33 NTU (Table 3). This was not surprising with a before hand knowledge of the bottom topography of the reservoir and methods of water displacement to the upper reservoir during pumping and power generation on return to the lower pool.

Table 3. Physical/Chemical parameters B-G Lower Reservoir, 31 August 2005

Parameter	Surface	Bottom	Data Range
Ammonia	1.3 mg/L	1.0 mg/L	High
Alkalinity	34.2 mg/L	17.1 mg/L	Low
Hardness	51.3 mg/L	68.4 mg/L	Low-Moderate
Hydrogen sulfide	0	0	Excellent
Turbidity	3 NTU	33 NTU	High
Salinity	.06 ppt	.05 ppt	N/A
PH	7.41	7.53	Good
Dissolved Oxygen	8.2 mg/L	7.1 mg/L	Good
Conductivity	127 umhos	110 umhos	Low-Moderate

Table 4. Number and relative abundance of fish collected at B-G lower pool 31 August 2005

Species	# collected	Rel. Abundance (%)
brown bullhead	8	8.9
fallfish	12	13.3
pumpkinseed	26	28.9
golden shiner	1	1.1
largemouth bass	1	1.1
smallmouth bass	1	1.1
white sucker	4	4.4
rockbass	25	27.8
yellow perch	12	13.3
Total	90	100

Figure 2. Relative Abundance of fish captured Trammel Net and Haul Seine, BG Lower Pool 31 August 2005.

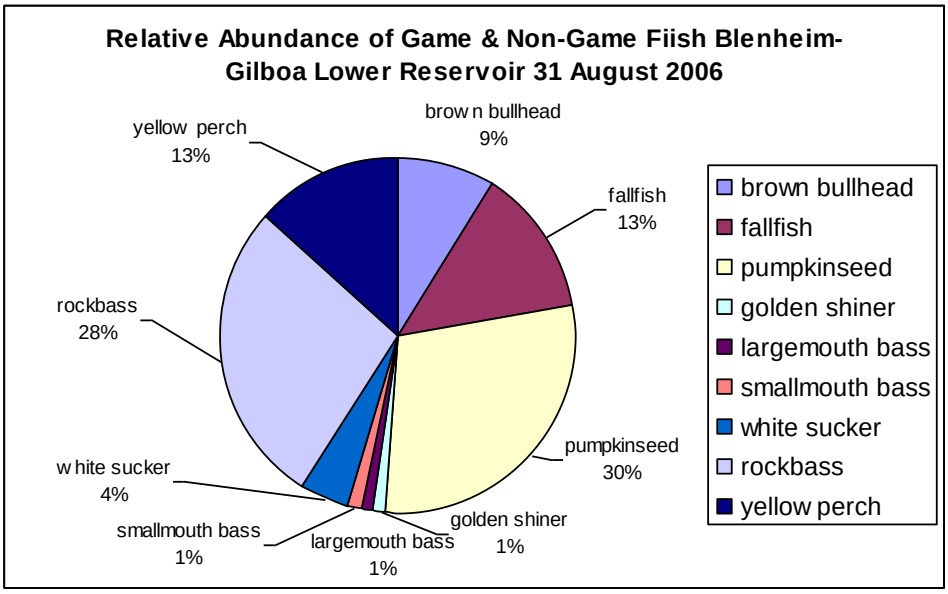


Table 5. Ages of common fish found in B-G lower pool on 7 November 2005.

Species	Length (mm)	Age (yrs)
Small mouth bass	83	1+
Yellow perch	134	3+
Large mouth bass	255	3+
Rock bass	233	7+
Rock bass	228	7+
Rock bass	191	5+

Preliminary Conclusions

The goal of this study was to gain a better perspective as to what was occurring within the Blenheim-Gilboa reservoir. The studies conducted helped reach the following conclusions. The water chemistry is minimally adequate to sustain a healthy fishery capable of hosting warm water species.

Turbidity at the bottom of the B-G lower pool was high (33 NTU's). Optimal levels for finfish should not exceed 10 NTU's. Alkalinity and hardness were moderately low, indicating that these waters are poorly buffered and may not resist shifts in pH. Conductivity was also low, indicating that the BG lower pool is not overly productive.

There is a modest population of benthic organisms as well as planktonic organisms in the water column. Benthic invertebrate density and biomass peaked at 2-5 meters, compared to a natural lake benthic biomass should peak nearer to shore. Rotifer density is high and large cladoceran density is low. This indicates either a problem with planktonic algae or excessive planktivory on large bodied zooplankton by small open water fish.

Despite water quality problems, ninety (90) fish were caught during our study including smallmouth bass, largemouth bass, yellow perch, rock bass, pumpkinseed, brown bull head, white sucker and fall fish. The highest percentage of fish caught were pumpkinseed (30%) and rockbass (28%). Limited aging from a small amount of scale samples indicated that rockbass are growing slowly, however a larger sample size should be looked at to make any sound conclusions. Game fish like largemouth bass (1%) and smallmouth bass (1%) had a low relative abundance. In a traditional reservoir setting the

abundance of these gamefish would be expected to be higher. Other species showing a significant abundance were fallfish (13%) and yellow perch (13%).

These observations represent one visit to B-G and are mere snapshot of the physical and biological environment. Management decisions derived from these data should be reinforced with a larger more comprehensive study. This report is provided as a summary of SUNY Cobleskill's activities at NYPA B-G and is a preliminary document only.

Acknowledgements

Thank you to the NYPA Blenheim-Gilboa for access to their reservoir. Thanks to SUNY Cobleskill for transportation to and from the site as well as use of their lab to complete this study. Thanks to Mark Cornwell for instruction and guidance.