

## A Limnological Survey of Woodchuck Pond, Greenwoods Conservancy

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### ABSTRACT

During the summer of 1995, a preliminary biological survey of Woodchuck Pond, at Greenwoods Conservancy, Burlington, NY, was conducted to characterize this water body. In addition an assessment was made for its capability of sustaining a population of *Salmo gairdneri* (rainbow trout). Water quality analysis was conducted using a Hydrolab (model SVR2-SU), a portable water monitoring device. Floral and faunal specimens were collected to characterize the Woodchuck Pond ecosystem. This work, facilitated by the Biological Field Station, SUNY Oneonta, was done in connection with similar studies to gain a greater understanding of Greenwoods Conservancy. After further investigation it was found that the eutrophic nature of this pond is not conducive to the long-term survival of *Salmo gairdneri*.

### INTRODUCTION

Greenwoods Conservancy is a thousand-plus acre preserve in Burlington, New York. It is protected under a conservation easement with the Otsego Land Trust, under which most of the Conservancy is designated "forever wild". For research purposes, restrictions on development and maintenance within the Conservancy vary. Regulations for the area around Woodchuck Pond, a 60 meter by 35 meter man-made farm pond within the Conservancy, allow mowing near the pond. In addition to this upkeep, Woodchuck Pond was stocked with trout by the owner of Greenwoods, Dr. Earle Peterson. The fish were introduced in the summer of 1993 and lived for at least a few weeks, but they had died off by the spring of the following year. Dr. Peterson asked the Biological Field Station, which monitors Greenwoods, to investigate possible biological limitations which prohibit the survival of the trout.

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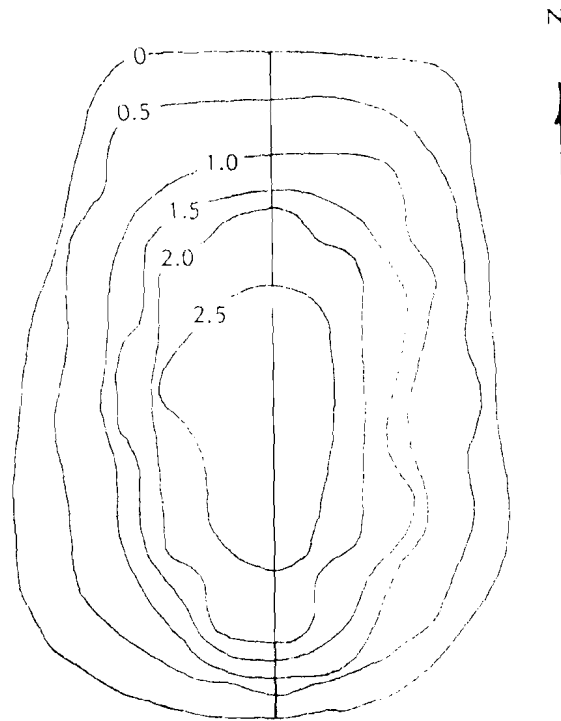


Figure 1. Woodchuck Pond, Greenwoods Conservancy, Otsego County, N.Y.

Max Length	60 m
Max Width	40 m
Max Depth	2.7 m
Surface Area	225 m <sup>2</sup>

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## METHODS and MATERIALS

### Hydrolab Readings

On 10 July 95 a Hydrolab (model SVR2-SU) was used to measure temperature, pH, dissolved oxygen content, and conductivity at Woodchuck Pond, Greenwoods Conservancy. Measurements were taken from the bottom and the surface at six sites around the pond. On 12 July 95 and 10 August 95, dissolved oxygen measurements were taken at about every ten feet across the pond's surface at .5 meter intervals. These data were used to create dissolved oxygen profiles (see Figures 2 and 3). At the same time temperature was also measured on the surface and the bottom of the pond to establish the extent of thermal stratification.

### Benthic Invertebrates

On 21 July 95, specimens were collected from Woodchuck Pond. Collecting was done near the shore using seines, sieves, triangle nets, and forceps. Collectors used a canoe in conjunction with sieves and triangle nets to collect further from shore. The specimens were then brought to the Biological Field Station and immersed in boiling water. The specimens were then placed in labeled vials containing alcohol and classified taxonomically according to Harman (1982).

### Vertebrates

On 21 July 95, specimens were collected by manually gathering living vertebrates in the water. The samples were placed in 10% Formalin solution which killed and preserved them. Later these specimens were identified using the Vertebrates of the United States, Blair (1968), and the Handbook of Frogs and Toads, Wright and Wright (1949). An attempt was also made to collect fish using seines.

### Zooplankton

On 19 July 95, zooplankton were collected at Woodchuck Pond by manually dragging a plankton net with a #20 cup through the pond. In an attempt to collect plankton from different depths in the pond the net was pulled at different speeds. The sides of the plankton cup were washed with tap water in order to rinse all of the plankton into a jar. The strained plankton were placed into a labeled specimen jar and Lugol's iodine was added to preserve and stain it. When the plankton settled to the bottom of the specimen

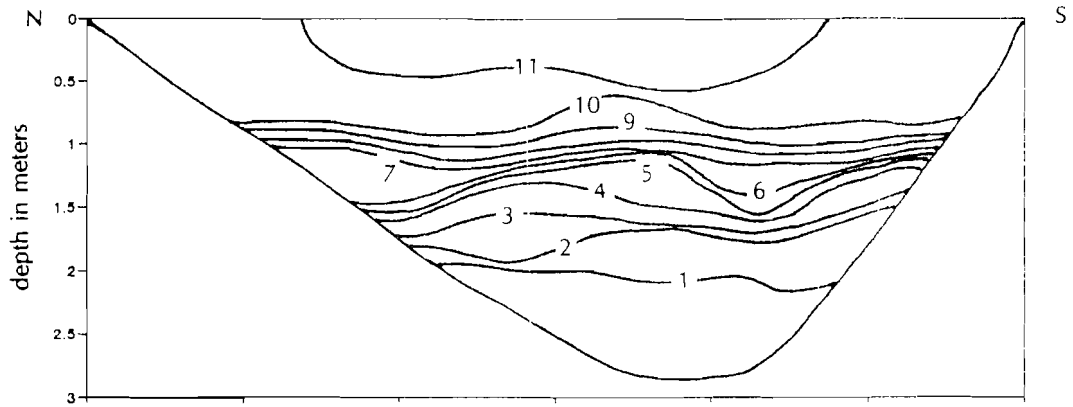


Figure 2. Dissolved oxygen concentrationn (mg/l) in a transect from N to S through the deepest parts of Woodchuck Pond, Greenwoods Conservancy, Otsego County, N.Y. 12 July 95.

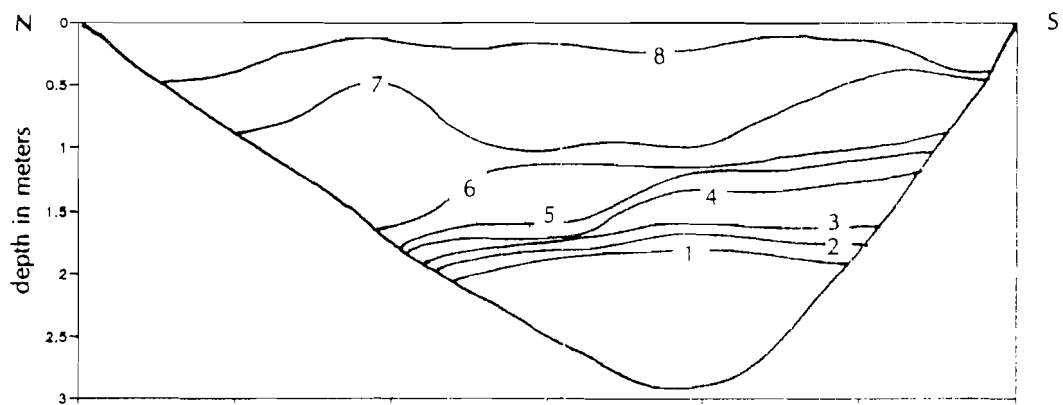


Figure 3. Dissolved oxygen concentrationn (mg/l) in a transect from N to S through the deepest parts of Woodchuck Pond, Greenwoods Conservancy, Otsego County, N.Y. 10 August 95.

jar extra water was decanted. The plankton were then placed on a Sedgewick Rafter cell and viewed through a compound microscope. This allowed plankton to be identified using Pennak (1989).

### Aquatic and Terrestrial Plants

On 21 July 95, a plant survey of Woodchuck Pond and adjacent areas was conducted. Terrestrial plants, within a one meter radius, were placed in vasculums, while aquatic plants from within the pond itself were placed in a tub full of water for transportation. The plants were taken to the Biological Field Station, where they were pressed and dried at 100°F for about 15 hours. The dried plants were then identified with the assistance of field manuals (Brown, 1979; Knobel, 1980; Peterson, 1977; Peterson/McKenny, 1968; Petrides, 1958; Prescott, 1969; Preston, 1980). In most cases, family, genus, and species were recorded, but it was impossible to identify some plants to species, due to a poor sample or the lack of flowers or fruit. Identified specimens were mounted on herbarium paper for preservation.

## RESULTS

### Hydrolab Readings

The results of the Hydrolab readings are presented in Figures 2,3 and Table 1. The dissolved oxygen levels near the bottom of the pond were below 6 mg/l. The temperature at the bottom of the pond, on 10 July 95, was between 18.70°C and 19.60°C. The temperature at the top of the pond was between 19.60°C and 19.75°C. The temperature at the bottom of the pond, on 10 August 95, was between 18.99°C and 19.40°C. The temperature at the top was between 22.43°C and 22.54°C.

### Benthic Invertebrates

Three phyla, represented by eight orders, were found at Woodchuck Pond. A complete list is given in Table 2.

### Vertebrates

Three species of vertebrates were found at Woodchuck Pond. All were amphibians. Refer to Table 3 for a complete listing.

### Zooplankton

Table 4 shows the plankton collected at Woodchuck Pond. In the phylum Rotifera, family Brachionidae, the two genera,

*Brachionus* and *Platlyias* were not differentiated, as it was difficult to distinguish between them due to specific characteristics that were unable to be detected by the processes initiated for classification.

#### Aquatic and Terrestrial Plants

Table 5 is a complete taxonomic list of the plants collected at Woodchuck Pond.

**Table 1. Water quality data collected at Woodchuck Pond, Greenwoods Conservancy, summer 1995.**

<u>HYDROLAB</u> <u>SITE</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>
<u>SURFACE</u>						
TEMP.	19.75	19.60	19.69	19.64	19.69	19.73
pH	8.67	8.70	8.89	8.78	8.85	8.85
D.O.	7.64	7.75	8.43	8.36	8.33	8.52
COND.	90	89	89	89	89	89
<u>BOTTOM</u>						
TEMP.	19.60	19.56	19.45	19.29	18.70	19.26
pH	8.64	8.62	8.64	7.77	7.72	7.66
D.O.	7.20	7.35	7.04	2.25	1.20	1.90
COND.	90	91	92	120	110	112

**Table 2. Macrobenthic invertebrates collected at Woodchuck Pond, Greenwood Conservancy, summer 1995.**

Phylum: Annelida  
 Class: Hirudinea  
 Order: Placobdellida

Phylum: Arthropoda  
 Class: Crustacea  
 Order: Amphipoda  
 Class: Insecta  
 Order: Coleoptera  
 Order: Hemiptera  
 Order: Megaloptera  
 Order: Odonata

Phylum: Mollusca  
 Class: Bivalvia  
 Order: Prosobranchia  
 Class: Gastropoda  
 Order: Basommatophora

**Table 3. Vertebrates collected at Woodchuck Pond, Greenwood Conservancy, Summer 1995.**

Phylum: Vertebrata  
 Class: Amphibia  
 Superorder: Lepspondyli  
 Order: Urodela  
 Suborder: Salamandroidea  
 Family: Plethodontidae  
*Notophthalmus viridescens*  
 Eastern newt

Class: Amphibia  
 Order: Salienta  
 Family: Ranidae  
*Rana catesbeiana* Bullfrog  
 Family: Ranidae  
*Rana clamitans melanota* Green frog





Order: Glumiflorae	
Family: Cyperaceae	
<i>Carex folliculata</i>	sedge
<i>Carex scoparia</i>	sedge
<i>Carex vulpinoidea</i>	sedge
<i>Eleocharis ovata</i>	Spike rush
Family: Graminae	
<i>Agrostis alba</i>	Red top
<i>Glyceria grandis</i>	Reed meadow grass
<i>Leersia oryzoides</i>	Rice cat grass
<i>Phalaris arundinaceo</i>	Reed canary grass
* <i>Phleum pratense</i>	Timothy
Order: Helobiae	
Family: Naidaceae	
<i>Potamogeton natans</i>	pondweed
<i>Potamogeton sp.</i>	pondweed
Order: Liliiflorae	
Family: Juncaceae	
<i>Juncus canadecisis</i>	Canada rush
<i>Juncus effusus</i>	Soft rush
Order: Myrtiflorae	
Family: Haloragaceae	
<i>Myriophyllum exalbescens</i>	Milfoil
Order: Pandanales	
Family: Typhaeaceae	
<i>Typha latifolia</i>	Cattail
Order: Parietales	
Family: Guttiferae	
<i>Hypericum mutilum</i>	Dwarf St. Johnswort
<i>Hypericum perforatum</i>	Common St. Johnswort
Order: Polygonales	
Family: Polygonaceae	
<i>Polygonum hydropiper</i>	Common smartweed
Order: Ranales	
Family: Ranunculaceae	
<i>Ranunculus acris</i>	Common buttercup
Order: Rhoadales	
Family: Cruciferae	
<i>Barbarea vulgaris</i>	Wintercress

Order: Rosales		
Family: Leguminosae		
* <i>Trifolium hybridum</i>		Alsike clover
<i>Vicia cracca</i>		Cow vetch
Family: Rosaceae		
<i>Spiraea latifolia</i>		Meadowsweet
Order: Rubiales		
Family: Rubiaceae		
<i>Galium asprellum</i>		Rough bedstraw
* <i>Galium boreale</i>		Northern bedstraw
Family: Valerianaceae		
<i>Valeriana officinalis</i>		Valerian
Order: Salicales		
Family: Salicaceae		
<i>Salix nigra</i>		Black willow
<i>Salix sericea</i>		Silky willow
<i>Salix serissima</i>		Autumn willow
Order: Tubiflorae		
Family: Labiatae		
<i>Galeopsis tetrahit</i>		Hemp nettle
<i>Lycopus virginicus</i>		Bugleweed
<i>Mentha piperita</i>		Peppermint
<i>Satureja vulgaris</i>		Basil

\* Two samples collected

#### DISCUSSION

The research done on Woodchuck Pond will be used in conjunction with other biological surveys conducted within the conservancy to help gain a greater understanding of the biotope.

Since trout are threatened in dissolved oxygen levels of less than 6 mg/l (Piper, 1982), it can be determined that the oxygen levels in Woodchuck Pond were too low to sustain the introduced rainbow trout. Additionally, temperature may be an important consideration concerning trout survival. Rainbow trout are intolerant of temperatures above 21°C (70°F) (Smith, 1985). Due to the shallowness of this pond, temperature throughout the pond likely exceeds this by late summer.

However, the other data collected represent a reasonable biotope for trout. The predominant limiting factor for the trout in Woodchuck Pond is low dissolved oxygen levels. Though the trout may be able to survive for a short time, this pond seems more suitable for habitation by warm water fish species.

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