Species richness of Otsego Lake submergent macrophytes: A chronology 1935 - 2005

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INTRODUCTION

Submergent aquatic plants have been periodically surveyed in Otsego Lake since 1935 (Muenscher 1936) (Table 1). In 1969 the first collections by Biological Field Station personnel were made (Harman and Doane 1970) (Table 1). A series of intensive studies were conducted in the period between 1972 and 1980 starting with a paper on the phenology and physiognomy of the submergent plants of Rat Cove (Harman 1974) followed by research on macrophyte productivity (Vertucci and Harman 1978a), biomass of *Chara vulgaris* (Vertucci and Harman 1978b), and phytosociology (Vertucci and Harman 1978c; Vertucci et al., 1981). Another survey was conducted the summer of 1976 by Brady and Lamb (1977) (Table 1). In 1986 Dayton and Swift (1987) documented submergent plants in the lake observed during a lakewide quantitative study of the plant communities (Table 1). They were the first to (unknowingly) observe *Myriophyllum spicatum* in Otsego Lake. Shortly thereafter Merrifield and Harman (1988) conducted an in depth work on *Myriophyllum* spp. in Otsego Lake clarifying the situation. The colonization and rise to dominance in Otsego Lake by *M. Spicatum* was documented by Stalter (1989), Sanders (1991) and Harman (1994). Concurrently, Harman conducted the 1993 survey shown in Table 1.

RESULTS AND DISCUSSION

When Harman and Doane (1969) first observed the macrophytes in Otsego Lake in 1968, *Potamogeton crispus* formed continuous bands along the shorelines in the deeper littoral areas creating serious recreational problems early in the season. *Chara vulgaris* dominated much of the littoral substrate. Most other species appeared to have moved into somewhat shallower water since Muencher's work in the early 1930s (Muenscher, 1935). We assumed the latter phenomenon occurred concurrently with decreasing water clarity between the 1930s and 1960s. In the late 1970s, during the period of Vertucci's studies, it was noted that *Chara vulgaris* was being decimated leaving large bare areas (Vertucci and Harman 1978b). That action occurred concurrently with increasing phosphorus concentrations in the substrate and was attributed to eutrophication problems. The introduction and colonization of *M. spicatum*, first observed by Dayton and Swift (1987) in 1986 occurred concurrently with the elimination of *P. crispus* as a recreational concern.

Harman and Merrifield (1988) first observed the arthropod herbivore *Acentria ephemerella* (Lepidopetra:Nymphalidae) feeding on *M. spicatum* in 1987. At that time it was recognized that damage to apical meristems appeared to be affecting the ability of *M.*

Table 1. Presence, absence, and abundance of aquatic macrophytes in Otsego Lake (modified from Harman *et al*., 1997). Note: *Myriophyllim spicatum* was confused with *M. exalbescens* in the 1986 study.

Taxa	1935	1969	1976	1986	1993	2005
Potamogeton americanus	F	-	-	-	-	-
Potamogeton amplifolius	F	R	R	-	C	F
Potamogeton angustifolius	F	-	-	-	-	-
*Potamogeton crispus**	-	A	A	F	F	F
Potamogeton eipihydrus	R	-	-	-	-	-
Potamogeton foliosus	R	-	-	-	-	-
Potamogeton freisii	C	-	-	-	-	-
Potamogeton gramineus	A	C	C	-	R	R
Potamogeton illinoensis	-	F	F	F	C	C
Potamogeton natans	F	R	R	-	R	R
Potamogeton nodosus	-	R	R	-	R	-
Potamogeton panormitanus	F	-	-	-	-	-
Potamogeton praelongus	C	F	C	C	C	C
Potamogeton pusillus	F	F	A	C	C	C
Potamogeton richardsonii	C	F	C	-	C	R
Potamogeton zosteriformis	C	R	F	C	C	C
Stuckenia pectinata	C	C	A	C	F	A
Najas flexilis	A	A	A	F	C	R
*Najas guadalupensis**	-	-	-	-	-	C
Vallisneria americana	C	C	C	C	C	C
Zosterella dubia	A	A	A	C	F	F
Ceratophyllum demersum	A	F	C	C	C	C
Nymphaea odorata	F	C	C	F	C	C
Nuphar variegatum	F	C	F	C	C	C
Elodea canadensis	A	C	F	F	F	F
Ranunuclus aquatilus	C	F	F	F	C	C
Myriophyllum exalbescens	C	F	F	C	R	-
*Myriophyllum spicatum**	-	-	-	-	A	A
Megalodonta beckii	C	F	F	-	C	C
Chara vulgaris	A	A	A	C	F	F
Nitella flexilis	A	C	F	F	F	F
Total number	26	23	23	17	24	23

A = abundant F = frequent C = common R = rare *introductions of concern

spicatum to reach the surface. To date, *M. spicatum* has not negatively affected recreational activities in Otsego Lake. Since then two other arthropod milfoil herbivores, *Euhrychiopsis lecontei* (Coleoptera: Curculionidae) and *Cricotopus myriophylli* (Diptera: Chironomidae) have been observed and studied in Otsego Lake (Cornwell 2001, Lord 2004, Alfred 2006) concurrent with BFS studies monitoring *M. spicatum* control attempts on other central New York lakes.

In 1999 a single specimen of water chestnut (*Trapa natans*) was found in Otsego Lake by BFS students. An immediate intensive search for more, sponsored by Otsego 2000, revealed one additional specimen. Since then *T. natans* has not been observed despite the annual observance of Water Chestnut Day locally.

Harman reported finding *Najas guadalupensis* (southern naiad) in Otsego Lake in 2000 (in the introduction of the 2000 BFS Annual Report [2001]) and expected it had been present for "…four or five years", being misidentified as *N. flexilis*. Since then populations in shallow water have fluctuated widely.

This work (Table 1) was completed in conjunction with Alfred's (2006) 2005 work via a SUNY Oneonta Faculty Research grant sponsored by the SUNY Research Foundation. The only recognized changes (of interest) other than those mentioned above are the loss of *M. exalbescens* and the increasing abundance of *Potamogeton amplifolius.* Specimens of the latter exhibit a growth pattern that attains a maximum height of less than 0.3m.

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