FINAL REPORT

on

THE LAKE GEORGE EURASIAN WATERMILFOIL SURVEY FOR 1993

prepared for

Lake George Association Fund

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SECTION 1

As of the end of 1993, a total of 106 sites have been identified which have had Eurasian watermilfoil (Table 1-1, Figure 1-1). Of these, 11 sites currently have populations of Eurasian watermilfoil toward which no management activity has been directed. Half of these sites are located in the southern basin, with high concentrations near human population centers and boat-use areas including: Lake George Village, Bolton Landing, west shore, and the south-eastern shallow bays. In the north basin, clusters of Eurasian watermilfoil populations are found near Huletts Landing, Putnam, Hague, and the outlet. A total of 95 sites have been managed for Eurasian watermilfoil. Of these, 62 were cleared of Eurasian watermilfoil. Cleared as defined in this report, means the removal of all visable milfoil plants, including roots.

Clearing of these sites took place during the course of the LGA Fund-sponsored milfoil surveys, the Warren County-sponsored hand harvesting project in 1989-90, or the 1991-93 EPA Clean Lakes - Phase II project. The distribution of these cleared sites is throughout the Lake George basin. An additional 29 sites were managed by either suction harvesting or benthic barrier between 1990 and 1993 as part of the EPA Clean Lakes - Phase II project.

SECTION 2

A survey of the tributary deltas in the northern portion of the Lake George basin was conducted in 1993 to assess the extent of Eurasian watermilfoil (*Myriophyllum spicatum* L.) infestation. The project was conducted by the Rensselaer Fresh Water Institute with financial support from the Lake George Association Fund. Similar surveys were completed in 1988 and 1990 as reference points. Stream delta areas were chosen as readily identifiable points which historically harbor diverse assemblages of native aquatic plants. Results of these surveys can be used to approximate the rate of spread of Eurasian watermilfoil through the Lake George basin.

In 1988, when tributary surveys were initiated, 22 percent of the sites in the northern third of the Lake George basin were found to have Eurasian watermilfoil. By 1990, this percentage had increased to 39 percent with a gain of 7 new Eurasian watermilfoil sites. By 1993, the percentage of tributary sites with active Eurasian watermilfoil populations had declined slightly to 37%. The decrease was due to the hand harvesting of five sites in this portion of the lake basin. Discovery of four new Eurasian watermilfoil sites during the 1993 survey, however, reduced the overall impact of management activities to a net loss of only one active Eurasian watermilfoil site.

Of the four new Eurasian watermilfoil sites, three were restricted to only a few plants which were removed. The one site which was not hand harvested was Holman Hill Creek

(T-85, M-99), where more than 50 Eurasian watermilfoil plants were observed. Hand harvesting will be necessary at this site in the future.

Since 1990, the number of tributary sites in this portion of the Lake George basin with Eurasian watermilfoil present has remained fairly constant. This is largely due to management efforts supported by the US EPA Clean Lakes Program. Eurasian watermilfoil continues to spread through the Lake George basin with an increase in the number of known Eurasian watermilfoil locations of between six and fifteen per year. Management efforts to date have been implemented at 95 of the 106 known Eurasian watermilfoil locations. These management efforts have reduced the Eurasian watermilfoil biomass in these locations. However, Eurasian watermilfoil has only been eliminated at a handful of sites and reintroduction at these locations is likely. At this time, Eurasian watermilfoil is ranked 20th by relative abundance (a function of cumulative percent cover), and 19th by frequency of occurrence.

There is no evidence that the loss of Eurasian watermilfoil populations at specific sites in Lake George can be attributed to natural mortality. Thus maintenance becomes critical following initial management. Maintenance will require site visits yearly or every other year to harvest regrowth of Eurasian watermilfoil. A program to continue maintenance activities following the conclusion of Federal funding in 1993 is imperative. Financial support for such a program should be sought at local, regional and federal levels.

SECTION 3

A principal means of controlling Eurasian watermilfoil (*Myriophyllum spicatum* L.) in Lake George NY has been the use of benthic barriers. Benthic barrier was installed at four sites in 1990. Removal of the benthic barrier material one to two years following installation allowed a systematic study of macrophyte recolonization. Following removal of the benthic barrier material at each site, grids were installed in the barren zone where the benthic barrier had been located. The species present in each grid and their relative abundance were recorded at approximately 30-day intervals through three growing seasons, 1991, 1992, and 1993. At each site, colonization of the grid systems was observed, with typically 9 to 12 species found 30 days after benthic barrier removal. Sixty days after benthic barrier removal (August), both the number of species ($x = 4.7$ per m^2) and plant density ($x = 49\%$ cover) peaked. An overall decline in species number and average percent cover observed after 120 days (October) was related to seasonal patterns of growth and die back of annual species. In the second growing season, the number of species per grid and per square meter stabilized while overall average percent cover (areal coverage) continued to increase. By the end of the second growing season, average percent cover per grid square was 74% and remained relatively stable through year 3. Recolonization varied with site; however, early species to recolonize were generally native plants overwintering as seeds or turions. Eurasian watermilfoil colonized all sites, with 71% and 65% of all grid squares containing milfoil by the end of the second and third growing season, respectively. Eurasian watermilfoil produced an average percent cover of 13.6% and 22.4%, while total community percent cover averaged 74% and 60% by the

end of the second and third growing seasons, respectively. In order to maximize the effectiveness of benthic barrier, it should be used in areas remote from other population of milfoil, or more appropriately, peripheral or adjacent areas containing milfoil should be managed and maintained prior to the removal of the material used.

SECTION 1

EURASIAN WATERMILFOIL SITES

The sites in Lake George that have been identified as colonized by Eurasian watermilfoil (*Myriophyllum spicatum L.*) are listed in this section. A brief description of the extent of infestation is provided for each site. Following these site-by-site descriptions, a final discussion of trends in the distribution of Eurasian watermilfoil (milfoil) is provided.

Eurasian watermilfoil (*M. spicatum*) Locations

As of the end of 1993, a total of 106 sites have been identified which have had Eurasian watermilfoil (Table 1-1, Figure 1-1). Of these, 11 sites currently have populations of Eurasian watermilfoil toward which no management activity has been directed. Half of these sites are located in the southern basin, with high concentrations near human population centers and boat-use areas including: Lake George Village, Bolton Landing, west shore, and the south-eastern shallow bays. In the north basin, clusters of Eurasian watermilfoil populations are found near Huletts Landing, Putnam, Hague, and the outlet. A total of 95 sites have been managed for Eurasian watermilfoil. Of these, 62 were cleared of Eurasian watermilfoil. Cleared, as defined in this report, means the removal of all visable milfoil plants, including roots.

Clearing of these sites took place during the course of the LGA Fund-sponsored milfoil surveys, the Warren County-sponsored hand harvesting project in 1989-90, or the 1991-93 EPA Clean Lakes - Phase II project. The distribution of these cleared sites is throughout the Lake George basin. An additional 29 sites were managed by either suction harvesting or benthic barrier between 1990 and 1993 as part of the EPA Clean Lakes - Phase II project.

Table 1-1. Listing of all known milfoil sites.

Site #	Site Name	Site Type	# of Milfoil Plants	1993 Action
1	NWB-Brook inflow	bed	TNTC	surveyed
2	BB Congers Point	moderate	TNTC	surveyed
3	SW Congers Point	moderate	TNTC	surveyed
4	NW Sweetbriar Island	moderate	TNTC	surveyed
5	W Green Island	moderate	TNTC	surveyed
6	Sunset Bay	bed/mod	TNTC	mat
7	Shepard's Park	scattered	TNTC	surveyed
8	W Brook Delta	moderate	TNTC	mat
9	Million $ Beach	scattered	40	cleared
10	E Brook Delta	bed/scatt	TNTC	mat
11	S end Warner B/T-27	scattered	63	cleared
12	L.G. Outlet	mod/scatt	TNTC	surveyed
13	NE Mossy Pt	scattered	TNTC	surveyed
14	SE Happy Family	mat	0	cleared
15	Finkle Bk-FWI-T102	scattered	27	cleared

Site #	Site Name	Site Type	# of Milfoil Plants	1993 Action
16	Middleworth Bay	mod/scatt	TNTC	surveyed
17	E end Echo Bay	scattered	TNTC	reduced
18	Hague Boat Lnch	moderate	TNTC	surveyed
19	Dunham Bay	mod/bed	TNTC	surveyed
20	Huddle B(HB)	bed	TNTC	surveyed
21	Sheriff Dock	bed	TNTC	surveyed
22	NWB-Shadow B	scattered	173	cleared
23	L.G. Yacht Club	scatt/bed	880	reduced
24	NWB- W Tongue M	moderate	TNTC	surveyed
25	Basin B-T52	scattered	271	cleared
26	SW CannonPt-T45	bed	TNTC	surveyed
27	NW CooperPt-T44	scattered	27	cleared
28	S HearthstoneT43	none	0	cleared
29	B-NE Tea Is_T42	bed/scattered	TNTC	surveyed
30	N Tea Is B-T41b	bed/scattered	TNTC	surveyed
31	English Bk-T41	bed/scatt	TNTC	reduced
32	Crosbyside-T37a	scattered	1	cleared
33	S Plum Pt-T35a	none	0	cleared
34	B Plum & Wds Pt	scattered	2	cleared
35	NWB-B S Fan Pt-T100	none	0	cleared
36	B-E Dark B-T33	scattered	44	cleared
37	S Warner B-T27a	scattered	78	cleared
38	S Warner Bt-T27b	bed	TNTC	surveyed
39	S KatskillB-T27c	scattered	7	cleared
40	B-S Red Rk B-T94	scattered	54	cleared
41	Paradise B-T17	scattered	TNTC	surveyed
42	Bolton B-T55	scattered	630	cleared
43	Bolton B-T54a	scattered	313	cleared
44	Bolton B-NE Brdg	bed	TNTC	surveyed
45	Tiroga/Black Pt	scattered	TNTC	surveyed
46	Leontine/Clay Is	scattered	255	cleared
47	Smith Bay	scattered	8	cleared
48	Gull Bay	scattered	TNTC	surveyed
49	S Burnt Pt	none	0	cleared
50	ClarkHollow T5	none	0	cleared
51	Eichlerv B T11n	scattered	1	cleared
52	Rog Rk BeachT90	none	0	cleared
53	W Tongue Mt	moderate	50+	reduced
54	Cook's Bay, HL/T11	none	0	cleared
55	Indian Bay	none	0	cleared
56	S. Sawmill Bay	bed	TNTC	mat
57	S. Green Island	bed/scatt	TNTC	surveyed
58	Silver Bay	bed/scatt	TNTC	surveyed
59	Hondah Cottages	scattered	558	cleared
60	Camp Andrew Bay	moderate	TNTC	surveyed
61	Harbor Is-Moonlight	bed	TNTC	surveyed
62	Marine Village/T-40	scattered	9	cleared
63	S. Agnes Is.	scattered	1	cleared
64	Three Brothers Is.	scattered	141	cleared
65	W. of 3 Bros. Is	none	0	cleared
66	N. Sawmill Bay	bed	TNTC	surveyed
67	Bluff Head Creek/T8	scattered	1	cleared

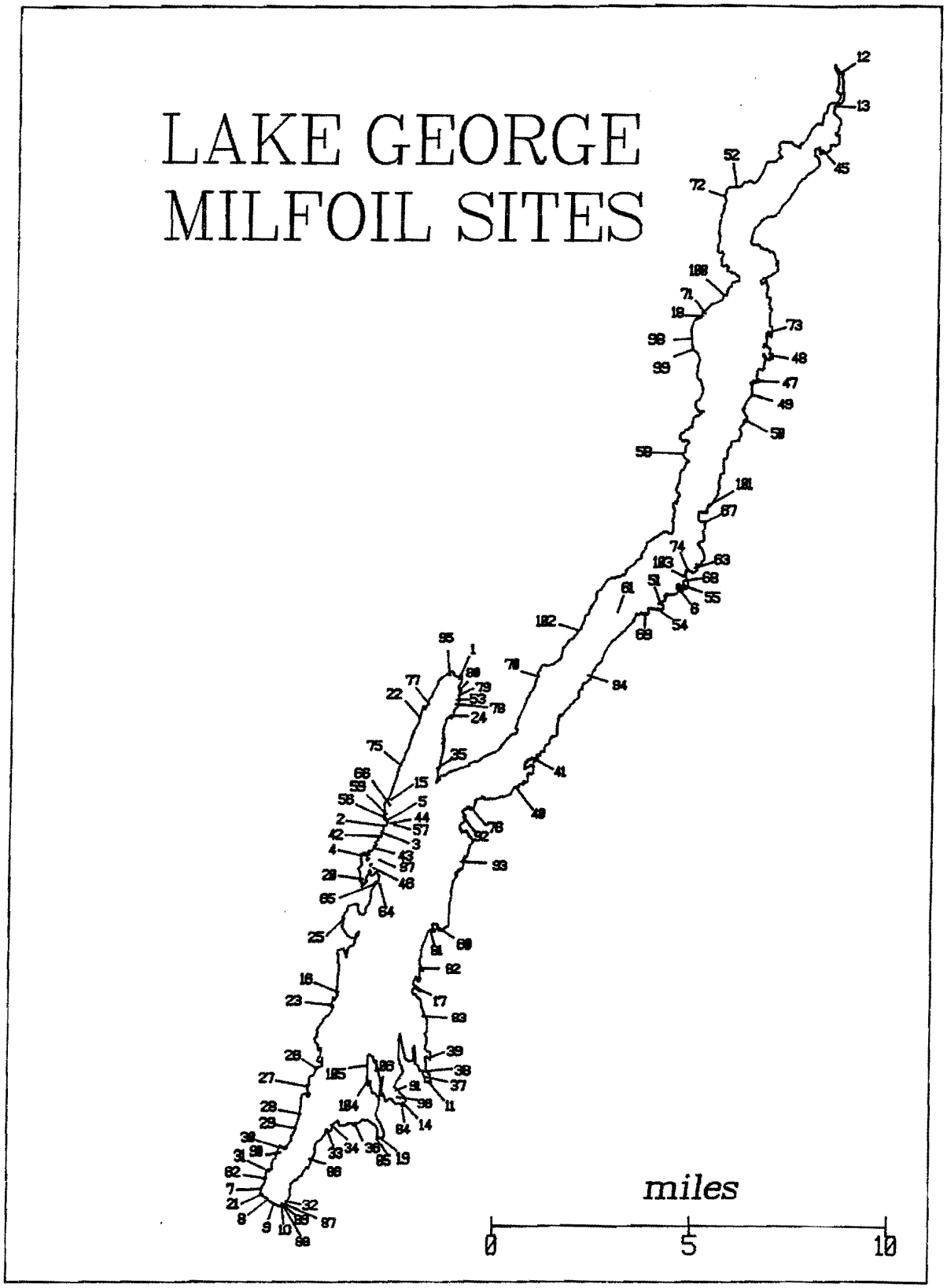
Site #	Site Name	Site Type	# of Milfoil Plants	1993 Action
68	Rock Dund Is/T10A	scattered	8	cleared
69	Kitchal By Hul/T11S	none	0	cleared
70	S Trib W Halfls/T71	none	0	cleared
71	Hague Brook/T86	bed	TNTC	surveyed
72	S Cooks Bay/T89	scattered	4	cleared
73	Trib Dark By/T91A	scattered	9	cleared
74	N. Meadow Point	scattered	7	cleared
75	Bell Point	bed/mod	TNTC	surveyed
76	S Shelving Rck Pt	scattered	77	cleared
77	Walker Point	scattered	95	cleared
78	B. N. W. Tongue Mtn	scattered	6	cleared
79	Shore S. Bear Pt	scattered	2	cleared
80	Bay S. Bear Pt	scattered	15	cleared
81	Butternut Bk/T-21	none	0	cleared
82	Barber Bay/T-22	scattered	42	cleared
83	Van Warmer By/T-25a	scattered	0	surveyed
84	Harris Bay In./T-30a	none	0	cleared
85	Dunham Bay Inlet/T-32	scattered	35	reduced
86	East Shore/T-36d	none	0	cleared
87	Crosbyside/T-37b	none	0	cleared
88	Crosbyside/T-37c	none	0	cleared
89	Crosbyside cul/T-37d	scattered	1	cleared
90	S Tea Is cul./T-41a	scattered	7	cleared
91	Harris Bay - E. side	scatt/moderate	TNTC	surveyed
92	B. E Hens & Chicks Is	scattered	7	cleared
93	East of Refuge Island	none	0	cleared
94	NW 3 Sirens Island	none	0	cleared
95	NWB Head of Bay	scattered	1	cleared
96	Harris Bay/mid-bay	bed	TNTC	surveyed
97	W. Side Clay Island	scattered	82	cleared
98	S. Cape Cod Vil Bk.	scattered	30+	surveyed
99	Holman Hill Creek	scattered	50+	surveyed
100	Temple Island	scattered	2	cleared
101	Bk. N Green Pt	scattered	1	cleared
102	S Trib. 5 Mi Mtn Bk	scattered	8	cleared
103	N N Meadow Pt.	scattered	5	cleared
104	Assembly Pt. W. Bay	moderate	TNTC	surveyed
105	Assembly Pt. NW	scattered	1	cleared
106	Assembly SE Bay	scattered	3	cleared

TNTC = Too Numerous To Count MAT = Benthic Barrier

Descriptions of Eurasian watermilfoil Sites

Three different designations for the degree of milfoil infestation are used in the following summaries; beds, moderate density, and scattered plants. Beds are considered to be areas where 50 percent or more of the total macrophyte community by percent cover was milfoil. Moderate density areas are considered to be communities composed of significant amounts of milfoil, but totalling less than 50 percent cover. Zones of scattered plants were

Figure 1-1. Map of Lake George showing the location of all known milfoil sites.



defined as macrophyte communities composed of less than 10 percent milfoil as determined by percent cover estimates.

Northwest Bay (M-1). The number of scattered Eurasian watermilfoil plants have increased at this site since its discovery in 1986, and the bed has also increased in size to cover a substantial portion of the littoral zone. This site has fine, silty, organic-rich bottom sediments, due to wetland runoff from Northwest Bay Brook and wetland. Slope is moderately flat, except adjacent to the navigation channel into the wetland. The once diverse native aquatic flora has become severely impacted by the development of the dense bed of Eurasian watermilfoil. No management has occurred at this site.

Bolton Bay at Conger's Point (M-2). This site has included a small area with moderately dense scattered plants, a nearby small dense bed, and an extensive area of low density scattered plants throughout this small bay. The bottom is silty, the slope moderately flat. Heavy boat traffic is found in the adjacent open water. Benthic barrier material was installed over the dense bed growth at this site during 1990. Areas of moderate and low density milfoil growth remain to be harvested.

Bolton Bay SW of Conger's Point (M-3). Dense stands of milfoil were found among the docks of a marina, with adjacent areas of low to moderate density plants among the docks. This area has heavy boat traffic both among the docks, and in the adjacent open water area. Approximately 50 meters of shoreline was affected. This site was suction harvested in 1991, however substantial areas of moderate and low density milfoil growth remain.

Huddle Bay SW of Sweetbriar Is (M-4). Few scattered plants were found around the docks of a marina (low density) and commercial establishments (low to moderate density). The bottom is silty, and the slope is shallow. Curly-leaf pondweed (*Potamogeton crispus*) was also observed here. Boat traffic is heavy among the docks and in this small embayment. Approximately 100 m of shoreline was affected. The moderate density areas were suction harvested and the scattered plants hand harvested in 1991. Scattered milfoil plants were present at this location in 1993.

Sawmill Bay W shore of Green Is (M-5). Moderately dense scattered plants were found near a boat ramp for NYSDEC, and around a marine railway at an adjacent private facility. The bottom is composed of mixed silt and rubble, with numerous bottom obstructions. Boat traffic in the adjacent waterway and among the docks is heavy. The milfoil population at this site was managed via suction harvesting in the Fall of 1990, however the bottom obstructions severly hampered this operation. Surveys in 1993 indicate the need for additional management efforts at this site.

Sunset Bay (M-6). The moderate density area surrounding the small bed of milfoil reported in 1989 has increased in density and merged with the small milfoil bed. A majority of this area was covered with benthic barrier in 1992 and 1993. The remainder of this small bay contains scattered plants. A small patch of scattered plants to the north of

the principle milfoil area has increased to moderate density. The slope is gradual, with a silty bottom. Eurasian watermilfoil was found from 1 to 4 meters of depth, the bed was in 2 to 3 meters depth.

Shepard's Park (M-7). The milfoil beds increased in size from 1989 until 1992, and a large population of Curly-leaf Pondweed was also observed. The three beds were controlled using benthic barrier and suction harvesting in 1992. Much of the remaining area had either low density scattered plants, or small clumps of moderate to dense growths, too small to be considered a bed. Hand harvesting removed a number of scattered plants. Sand imported for the public swimming beach was the predominant bottom sediment, but some areas of exposed silt were found at deeper depths. This site is a heavily-used public beach. Additional harvesting is necessary.

West Brook Delta (M-8). Dense and moderately-dense areas of milfoil growth extended in a semicircle from the outlet of West Brook to the western end of the cement seawall, with some low density scattered plants. Numerous Curly-leaf Pondweed plants were also found. This is a heavy use area which is highly disturbed as a result of sediment deposition. The Eurasian watermilfoil was found in a band from 2 to 4 meters depth, on the delta formed where West Brook enters Lake George. In 1992 and 1993 benthic barrier was installed in this area, however groundwater and surface water flow negatively effected the stability of the benthic barrier in this area. Barrier material was also frequently damaged as a result of boat anchors. Slope is moderately steep, with sediment grading from sand in the shallows to deep organic silt beyond 5 meters. Native plant growth was also extensive. Management and maintenance is still required at this site.

Million Dollar Beach (M-9). This site had a string of low density scattered plants between East and West Brook deltas. The plants were located on the deep edge of a public swimming beach with the majority of plants located proximate to West Brook. Sediments grade from sand on the beach, to rock and silt on the steep slope beyond the beach. The steepness of the slope at this site restricts the potential growth of Eurasian watermilfoil. Hand harvesting has been conducted on a regular basis at this site.

East Brook Delta (M-10). There was a moderately large dense bed which was covered with benthic barrier material in 1992-3. An area of moderate to low density scattered plants surrounds the bottom barrier material, requiring further effort to control. Barrier material was also frequently damaged as a result of boats anchoring in this area. As with West Brook Delta, the Eurasian watermilfoil was found in a band from 2 to 4 meters of depth, on the delta formed by the drainage of East Brook into Lake George. Curly-leaf Pondweed was also found at this site. Sediments grade from sand in the shallow areas, to thick organic silts in deeper areas. Native plant growth was also extensive. The site is adjacent to Million Dollar public swimming beach. Maintenance is still required.

Warner Bay, South End (M-11). The entire southern, inner bay had very low density scattered plants. This site description is also applicable to M-37. The slope in this area is flat and the bottom is highly organic silt. Water transparency in the bay tends to be less

than the average for Lake George. This site also supports *M. sibiricum* (formerly taxonomically classified as *M. exalbescens*), so care should be taken in identifying the extent of Eurasian watermilfoil. Warner Bay is an area of intense boating activity, but does have a restrictive speed limit. This area was cleared of milfoil in 1991 through a combination of hand harvesting and suction harvesting. Scattered milfoil plants were harvested in this area in 1993. Regrowth will require continued maintenence.

Lake George Outlet (M-12). The 1993 survey indicated low to moderate density scattered plants throughout the outlet region, between the natural dam (end of lake) and the end of navigation. Since *M. sibiricum* is also found at this site, special care is indicated in evaluating the extent of Eurasian watermilfoil. Water clarity was very poor making survey work difficult. Given the shallow, silty nature of the outlet area, it is an ideal location for the spread of Eurasian watermilfoil. No management activities have occurred at this site.

Mossy Point Boatlaunch (M-13). The NYSDEC boatlaunch facility had dense beds around the southern docks, with moderate density areas in the launch ramp. Eurasian watermilfoil plants were also scattered at the fringes and into an adjacent wetland. The bottom becomes very rocky out from the boatlaunch facility, restricting the expansion of the milfoil community. The slope in this area was slight, and the bottom very silty around the dock facility and wetland. Water clarity tends to be lower than average for Lake George. This site has heavy boat traffic due to the boatlaunch facility and its proximity to the navigable channel to the outlet region. Benthic barrier material was installed over the milfoil bed areas at this site in 1990. Barrier removal and hand harvesting was done in the year following the barrier installation. Scattered plants continue to be found in follow up surveys.

Harris Bay - Happy Family Islands (M-14). A small bed in mid-channel, and numerous scattered plants in the marina were observed. *Myriophyllum alterniflorum*, currently considered a rare plant in New York State, was also found at this location. Slope is shallow, bottom silty. A moderate amount of boat traffic occurrs in this area as a result of the adjacent marina, but boat speed is restricted. Benthic barrier material was installed over the small bed in 1990, and a portion removed in 1993. No milfoil plants were found at this site in 1993.

Sawmill Bay - Outflow of Finkle Brook (M-15). This was one area of moderately dense scattered plants of limited areal extent. The slope is flat, with sediments grading from sand in the shallows to silt in deeper water. The plants were growing on the edge of the delta formed by the inflow of Finkle Brook to Lake George. All of the Eurasian watermilfoil at this site was removed as part of hand harvesting operations in 1989, 1990,1991,1992 and 1993.

Middleworth Bay (M-16). Low to moderate density scattered Eurasian watermilfoil was found in both arms of this bay, in among an unusually dense growth of native plants. The southern arm of this bay had the largest amount of milfoil. Bottom slope is flat, with a

silty bottom. Curly-leaf Pondweed was observed in the north arm of the bay. The south arm of the bay was cleared of milfoil in 1991 through hand and suction harvesting. Surveys in 1993 found a large number of scattered milfoil plants in the south arm of the bay, requiring future management.

Echo Bay - East End (M-17). Scattered Eurasian watermilfoil was observed at this location in the 1991 survey, after not being found in 1989. The majority of plants were found at the eastern end of the bay around and adjacent to a marina. This area is unusually silty, and supports large growths of benthic filamentous algae. Some low density scattered plants were found in shallow water, in the interior portion of the bay in 1988. Plants were removed by hand harvesting in 1991 and 1993.

Hague Boatlaunch (M-18). The area for Eurasian watermilfoil growth was restricted to the boatslip for the boatlaunch, where the bottom is silty. In July, low-to-moderate density scattered Eurasian watermilfoil and Curly-leaf Pondweed were observed. The boatlaunch also supported a dense, near-nuisance growth of native plants and filamentous algae. No management has occurred at this site.

Dunham Bay (M-19). The inner bay has had Eurasian watermilfoil growth to 4 meters of depth. Scattered plants of low to moderate density occurred from the former bed site towards the wetland, and in shallow water throughout the inner bay. This is one location in which the Lake George Park Commission (LGPC) installed benthic barrier in 1986 over a dense bed of milfoil. The slope is uniformly gentle, with a bottom of predominantly silty material. Water clarity is reduced by the wetland drainage. Boat traffic is moderately heavy at this site. . A small bed has developed adjacent to the matted area on the east side. Scattered growth of milfoil has been hand harvested near the mouth of the wetland. Moderate density growth of milfoil is found to the west of the barrier material.

Huddle Bay (M-20). Currently the largest milfoil beds in Lake George, the two beds in Huddle Bay are located along the eastern portion of the bay in water depth of from 1 to 4 meters. Extensive areas of moderate to low density scattered plants occurred throughout the eastern half of the bay, and in deeper water (5 to 6 meters) past Hiawatha Island. The populations at this site have changed little since 1988. Slope is slight, with deep silty substrates in water depths greater than 2 meters. No management has occurred at this site.

Sheriff Dock Area (M-21). This former bed area has now been reduced to a zone of moderate density scattered plants, in the zone of water deeper than the benthic mats installed by the LGPC in 1986. Further expansion is restricted by depth. Scattered and moderate density plants were found around both benthic mats placed at this site. Inspection of the mat in the Fall of 1993 revealed substantial silt deposits on the surface of the mat, particularly at the end nearest the outfall of the Sheriff's Dock storm sewer. Scattered plants were also found growing on the surface of the mats and in seams of the barrier material. The mat material was also showing signs of deterioration. Curly-leaf Pondweed was also found at this site. Slope is moderately steep, with bottom sediments

generally sand and silt. This area has extremely high traffic, but also has a restricted speed limit. No management, other than that conducted by the LGPC, has occurred at this site.

Shadow Bay (M-22). This area was almost entirely filled by a Eurasian watermilfoil dense bed, with few scattered plants. Being a quiet, sheltered area, it is one site at which Eurasian watermilfoil flowers and fruits have been observed. Curly-leaf Pondweed was also observed. Slope is moderately flat, with bottom sediments predominantly silt. The dense bed at this site was covered with benthic barrier material in 1990. Hand harvesting has continued, on an annual basis, since the removal of the bottom barrier (1991) with excellent results.

Lake George Yacht Club (M-23). This site had low to moderate density scattered plants among the docks, with little or no vegetation found beyond the dock area. Curly-leaf Pondweed was also observed in moderate densities. This area has heavy boat traffic. Slope is moderately steep, with variable bottom sediments. The dense milfoil growth at this site was covered with benthic barrier and the scattered plants were hand harvested in 1990 - 1993. Hand harvesting of this site has continued since the barrier was removed in 1991.

NW Bay - Bay Between Fan and Bear Point (M-24). This small bay had low density scattered plants of both Eurasian watermilfoil and Curly-leaf Pondweed. Slope is moderately flat, with highly variable bottom sediments from rocks to silt. The bottom also has numerous logs and other bottom obstructions. All of the Eurasian watermilfoil was removed from this site as part of the 1989 and 1990 hand harvesting project.

Basin Bay - North tributary (M-25). Scattered plants of Eurasian watermilfoil were found as a result of the survey, along with numerous Curly-leaf Pondweed. Plants were found on the delta formed by the inflow of an unnamed brook. The slope was moderately flat out to 4 meters depth, at which point the slope increased greatly. Bottom sediments graded from sand to silt. Eurasian watermilfoil was removed from this site as part of the 1989-90 hand harvesting project and harvesting has continued through 1993.

Bay SW of Cannon Point (M-26). This is a small bay with a moderate size bed of Eurasian watermilfoil and an additional area of moderate density scattered plants that is substantially larger than the area of the bed. An abundant population of Curly-leaf Pondweed was also found. A few individuals of *M. alterniflorum* were also found. Slope is moderately flat, with a silty bottom. Some boat traffic occurs in this area as a result of a sailboat mooring area, and docks for a motel complex constitute the activities using this site. Benthic barrier material was installed over the milfoil bed at this site in 1990 and suction harvesting conducted in the moderate density areas. Barrier was removed in 1991 and substantial regrowth of *P. crispus* and *M. spicatum* has occurred since that time.

Bay NW of Cooper Point (M-27). Scattered plants were found near the docks of a marina, at the north end of the bay and in the southwest corner of the bay adjacent to the seawall. An area of low growing moderately dense plants was also observed in the

wetlands at the northern end. Eurasian watermilfoil was removed from this site as part of the 1989, 1990 and 1993 hand harvesting projects. The short stature of the plants in the wetland area and the shallow depth (0.5 meters) make hand harvesting of plants in this location difficult. Slope is flat, and the bottom is silty.

Bay S of Hearthstone (M-28). The only Eurasian watermilfoil shoot found was removed for a voucher specimen in 1987. No Eurasian watermilfoil was found since that date; therefore, no schematic is presented. The bottom was moderately steep, with sediments grading from sand to silt.

Bay NE of Tea Is (M-29). Moderate density Eurasian watermilfoil was found near and to the north of the tributary outlet. A few low density scattered Eurasian watermilfoil plants were also found among an extensive area of Curly-leaf Pondweed. Slope is moderately steep, with sediments grading from sand to silt. Suction harvesting was used to manage the milfoil at this site in 1990, with hand harvesting conducted in 1991 and 1992.

N Tea Is Bay (M-30). A large area of moderate to high density plants were found around the periphery of this bay, in 1 to 4 meters of water. A dense bed had formed in 2-3 meters water depth. A significant amount of Curly-leaf Pondweed was also present. The bottom is generally silty, the slope is flat. No management has occurred at this site.

English Brook (M-31). A limited area of low density scattered Eurasian watermilfoil plants were found south of the delta. However, all of the Eurasian watermilfoil was removed from this site as part of the 1989 and 1990 hand harvesting projects. In 1993, scattered milfoil plants were cleared from this area, however, a small area of moderate density growth of milfoil plants were found at this time. Sediments grade from sand to silt, with a moderately flat slope. This area is in a zone of heavy boat traffic.

Crosbyside Culvert T-37a (M-32). A single Eurasian watermilfoil shoot was harvested for a voucher specimen in 1987. No Eurasian watermilfoil was found in 1989 or 1990. During the 1991 tributary survey scattered milfoil plants were discovered at this site and harvested. The plants were growing to 5m depth directly in front of Usher's Park beach and in front of a white boathouse to the south of the beach. One milfoil plant was found and removed in 1993. The slope is moderately steep, and sediment is sand and silt.

South of Plum Point (M-33). Eurasian watermilfoil plants were removed for voucher specimens in 1987, and were not sighted again in 1989 or 1990. The bottom is predominantly sand, with a moderately flat slope.

Bay Between Plum Point and Woods Point (M-34). Low density scattered Eurasian watermilfoil plants along the shore north of the stream in 1987 were removed for voucher specimens. Eurasian watermilfoil was not sighted in 1989 or 1990; but two additional plants were removed during the 1993 revisit. The slope is moderately steep, with a sandy bottom.

NW Bay - Bay South of Fan Point (M-35). All Eurasian watermilfoil stems found were harvested for voucher specimens in 1987. No plants were found in 1989, however a single plant was found and removed as a voucher specimen in 1990, and 2 plants were removed in 1992. This steep and rocky site was an unlikely Eurasian watermilfoil site.

Bay E of Dark Bay (M-36). An area of low density scattered Eurasian watermilfoil plants were found on the east side of the bay in 1988. In 1989, a small bed within a boat slip, as well as a few scattered plants were observed. This steep slope site has a sandy/rocky bottom. The scattered plants at this site were removed by hand harvesting in 1989 and 1990. The small bed was covered with benthic barrier in 1990. Hand harvesting at this site has continued since the removal of the benthic barrier.

South Warner Bay culvert (M-37). [see site M-11].

North Warner Bay Culvert (M-38). In 1990 this site was suction harvested, and in 1991 the area was hand harvested. Due to the dense growth of native macrophytes and the presence of native watermilfoil all of the Eurasian watermilfoil in the area was not removed. In 1992 this site was resurveyed and an area of moderately scattered plants was discovered. In 1993 this site was up graded to moderate density growth of Eurasian watermilfoil. The slope at this site is flat, and the sediment is soft silt.

South Kattskill Bay (M-39). Eurasian watermilfoil was found in 1 meter of depth, behind a boathouse in an area of lily pads on the southern shore. Slope is moderately flat, with a mixture of sand and silt substrates. All of the Eurasian watermilfoil was removed from this site as part of the 1989 and 1990 hand harvesting project. Several plants have been taken from this site in subsequent years.

Bay South of Red Rock Bay (M-40). There was a small area of low density scattered Eurasian watermilfoil plants. A moderately-dense area of Curly-leaf Pondweed was also found. Slope is flat, with an organic silt substrate. The Eurasian watermilfoil was removed from this site as part of the 1989 and 1990 hand harvesting project. Hand harvesting has continued during the recent revisits.

Paradise Bay (M-41). There was a moderate-sized area of low density scattered plants in the northern arm of the bay. Eurasian watermilfoil was found at depths of from 1 to 4 meters. The native plant community appears disturbed. This area receives heavy boat traffic. Slope is moderately flat, with a silty substrate. Eurasian watermilfoil was removed from this site as part of the 1989 and 1990 hand harvesting project. Hand harvesting has continued at this site on an annual basis since 1989.

Bolton Bay (M-42). A small area of low density scattered Eurasian watermilfoil plants had been found at this site, but, all the plants were collected for voucher specimens in 1987. No Eurasian watermilfoil was observed in 1989; however, several hundred plants were removed by hand harvesting 1993.

Bolton Bay (M-43). A small area of low density scattered Eurasian watermilfoil plants were found around a submerged dock crib. The sediment is a mixture of rock and silt, with sand in shallow areas, the slope is moderately flat. Eurasian watermilfoil was removed from this site as part of the 1989 and 1990 hand harvesting project. In 1993, over 300 milfoil plants were removed by hand harvesting at this site.

Green Island Bridge (M-44). This site was found in 1988, the area has a small dense bed. The bottom is silty, grading to sand in the boat channel. The site experiences heavy boat traffic under the adjacent bridge. The milfoil at this site was managed via suction harvesting in 1990. Hand harvesting was conducted in 1992, however moderately dense growth of Eurasian watermilfoil was reported for this site in 1993.

Tiroga Point Channel (M-45). Moderate-density scattered Eurasian watermilfoil was found along *with M. verticillatum* in this shallow man-made channel, draining a wetland. The depth was 1-2 meters, with a bottom consisting of organic silt. No management has occurred at this site.

Leontine Island (M-46). A few Eurasian watermilfoil plants were found on the reef to the east of Leontine Island in 1989, and all plants were removed. In 1990, five plants were found along the shoreline near the southern end of the reef. The plants were removed as voucher specimens. In 1993, 255 plants were removed by hand from this site. The slope is moderately steep, with a rocky bottom.

Smith Bay (M-47). In 1988, a single plant of Eurasian watermilfoil was found and removed from this moderately sloping, silty bay. Moderately-dense Curly-leaf Pondweed was found in 1989, but no Eurasian watermilfoil was observed. In 1990, a small area of moderate density growth of milfoil was observed with an outlying area of scattered plants. These plants were in depths of 3 to 4 meters. The milfoil was managed at this site in 1990 with suction harvesting. During follow up visits in 1993, hand harvesting removed 33 milfoil plants.

Gull Bay (M-48). Numerous low density scattered Eurasian watermilfoil plants were found off of the stream adjacent to the public beach in this bay. Curly-leaf Pondweed was also found at this location. During revisits to this site a small bed of Eurasian watermilfoil was found. The slope was moderately flat, the bottom grading from sand in the shallows to silt past 3 meters in depth. The Eurasian watermilfoil was managed at this site as part of the 1989 hand harvesting project. In 1990, both hand and suction harvesting were used for plant management. A small moderate density patch remains after hand harvesting in 1993.

South of Burnt Point (M-49). A single Eurasian watermilfoil plant was found, and collected as a voucher specimen, in 1988. No additional Eurasian watermilfoil has been found since 1989. The slope was moderate at this site, with a rocky bottom.

Clark Hollow Bay Brook (M-50). Scattered Eurasian watermilfoil plants were found in 2-3 meters depth parallel to the shoreline. The slope was moderately flat, with a bottom grading from sand in shallow water to silt in deeper water. All of the Eurasian watermilfoil was removed from this site as part of the 1989 and 1990 hand harvesting project, and during subsequent revisits.

Eichlerville Bay (M-51). Moderate and low density Eurasian watermilfoil plants were found at this site. The majority of plants were in two areas along the outer fringe of the delta, in depths of 3-4 meters. The bottom slope was gradual and sediments were mainly silt with large amounts of detrital material. Milfoil at this site was managed via suction harvesting in 1990, and hand harvesting since that time.

Rogers Rock Park Beach (M-52). Low density scattered Eurasian watermilfoil plants were found along the boat mooring line at the park, adjacent to the public swimming beach, and around the boat launch ramp. The slope at this site was flat, with a predominantly sandy substrate. The plants were restricted to depths of 1-2 meters. All of the Eurasian watermilfoil was removed from this site as part of the 1989 and 1990 hand harvesting project.

Southwest Tongue Mountain [Clay Bay] (M-53). Numerous low density scattered Eurasian watermilfoil plants can still be found in this small bay immediately to the south of the first-named West Tongue Mountain site (M-24). The bottom is composed of clay and silt surrounding numerous exposed boulders. Slope is moderately flat. Eurasian watermilfoil has been removed from this site on an annual basis since 1989.

Cooks Bay, Hulett's Landing (M-54). Nine milfoil plants were removed from this site in 1993, and a single Eurasian watermilfoil plant was found and collected in 1990. No Eurasian watermilfoil was found at this site in 1989. The slope is gradual with sediment predominantly sand and silt.

Indian Bay, Hulett's Landing (M-55). Two Eurasian watermilfoil plants were found by a local resident, and sent to the Fresh Water Institute for identification in 1988. Slope in this bay is gradual with a silt/sand bottom adjacent to the tributary. No Eurasian watermilfoil has been found since 1988.

South Sawmill Bay (M-56). A large dense bed of Eurasian watermilfoil was found southeast of Veteran's Memorial Park in the middle of Sawmill Bay, in 3-5 meters water depth. Adjacent areas of moderately dense and low-density scattered plants were also observed. Benthic barrier was installed in both 1991 and 1992, considerable amounts of milfoil still remain in the area.

South End, Green Island (M-57). Moderate to bed density Eurasian watermilfoil was found within the dock complex at the extreme south end of Green Island. Water depth within the dock area is 2-3 meters, with gradually sloping bottom and soft silty sediments. Numerous obstructions including pipes and old pieces of dock cribbing were found at this

site. The milfoil at this site was managed via suction harvesting in 1990. By 1993, the area that was harvested had returned to bed density, and inside the east crib dock a small, new area of moderately dense milfoil has been discovered.

Silver Bay (M-58). A large number of scattered Eurasian watermilfoil plants were found within the dock and boathouse complex in Silver Bay in 1990, along with a few individuals of Curly-leaf Pondweed. Water depth in this area ranged from 1 to 2 meters. The sediment in this area is sand to clay with a gradually sloping bottom. Milfoil was removed from this area by hand harvesting in 1991, and surveyed in each of the following years.

Hondah Cottages (M-59). Approximately 550 low-density scattered Eurasian watermilfoil plants were found and removed from among the docks south of the Veteran's Memorial Park beach. Sediments in this area were sand and silt and the bottom slope is gradual. Boat traffic in this area is high.

Camp Andrew Bay (M-60). Moderate and low density Eurasian watermilfoil plants were observed in two distinct areas at this location. Milfoil was found in depths of from 2-3 meters. The bottom sediments are silt and the slope is gradual. Eurasian watermilfoil was removed from this area by suction harvesting in 1990, and hand harvested in 1991. In both 1992 and 93 an area of moderately dense milfoil was observed at this site.

Moonlight Bay, Harbor Island (M-61). An area of dense Eurasian watermilfoil remains at this site, along with an extensive area of scattered low-density plants. The dense area is near a beaver lodge in the southern end of this small bay. Numerous small milfoil plants were observed growing in the edges of the beaver lodge, making management of this population difficult. Sediments in the bay were clay and the bottom slope was moderate. Milfoil was managed in this area by suction harvesting in 1990 and hand harvesting in 1991.

Marine Village (M-62). A small number of scattered Eurasian watermilfoil plants were found among the docks at this site. Bottom sediments were sandy and the slope was gradual. The plants were removed by hand harvesting in 1990, 91, and 1993.

South of Agnes Island (M-63). In 1989, approximately 25 low-density scattered plants of Eurasian watermilfoil were found near submerged dock cribs at this northern basin tributary site. Surrounding sediments are sand and clay; however, silt has accumulated between the dock cribs. Hand harvesting has occurred here every year since 1990. One Eurasian watermilfoil plant was removed from this location by hand harvesting in 1993.

Three Brothers Island (M-64). Few scattered plants of Eurasian watermilfoil were found along the western side of these islands within a small area of lily pads. Sediments are sandy to boulders with a moderate slope. All plants were hand harvested in 1993.

West of Three Brothers Island (M-65). Approximately 5 plants of Eurasian watermilfoil were found at the docking facility for Three Brothers Island in 1989. No milfoil was found at this site in 1993.

North Sawmill Bay (M-66). A large area of moderate-density Eurasian watermilfoil plants were found clumped along the western speed and hazard buoys at the north end of Sawmill Bay. Depth of this population was 4-5 meters. Eurasian watermilfoil populations now rim the entire Sawmill Bay area. A portion of the milfoil at this site was covered with benthic barrier in 1990. The barrier positioned in 1990 remains in place at this time. Milfoil now surrounds the barrier at this site.

Bluff Head Creek T-8 (M-67). Two Eurasian watermilfoil plants were found in 1990 at this northern basin tributary site. Surrounding sediments are sand and clay however silt has accumulated between the dock cribs. Both Eurasian watermilfoil plants were removed from this location for voucher specimens in 1990. A single milfoil plant was removed during the 1993 site revisit.

Rock Dunder Island T-10A (M-68). Eight scattered plants and a number of fragments of Eurasian watermilfoil were found on the north side of the tributary. Sediments are sand and clay with a moderate slope. All Eurasian watermilfoil plants were removed during the 1993 site revisit.

Kitchal Bay T-11S (M-69). Four Eurasian watermilfoil plants were found and removed as a voucher specimen during the 1991 survey. The slope is gradual to moderate and the sediments are a mixture of clay and sand at this site. Milfoil has not been recorded at this site since.

West Halfway Island T-71 (M-70). A single Eurasian watermilfoil plant was found and removed as a voucher specimen during the 1990 Tributary Survey. The following year four more plants were removed, No plants have been recorded since.

Hague Brook T-86 (M-71). Two Eurasian watermilfoil plants were found and removed as voucher specimens. Later in the 1990 season, a number of Eurasian watermilfoil plants were observed at the outer edge of the delta near the pin buoys. This site was upgraded to a bed in 1991. A large dense bed of Eurasian watermilfoil now extends along the outer edge of the delta in water depth of from 2 to 5 meters. Sediments at this site are sandy on the delta grading to silt at the edges of the delta. The slope on the delta is gradual with a relatively sharp drop-off at the edge.

South Cooks Bay T-89 (M-72). Single Eurasian watermilfoil plants were found in 1990 and 1991, both were removed as voucher specimens. An additional four plants were removed during the 1993 Tributary Survey. Slope at this site is gradual with sediments of sand and silt.

Tributary in Dark Bay T-91A (M-73). Nine scattered Eurasian watermilfoil plants were hand harvested adjacent to a boathouse north of the tributary in this bay during the 1993 survey. Sediments are sand and rock with steep slopes.

North Meadow Point (M-74). Four Eurasian watermilfoil plants were found and removed as voucher specimens after receiving a letter in 1990 from a resident describing the location. Seven plants were removed during the 1993 survey. The slope is gradual near shore and moderate beyond a depth of 4 meters. Sediments are silt and sand.

Bell Point (M-75). An area of moderate density milfoil was located within the dock area at Bell Point following a description of the area by a local resident. The slope in this area is steep with soft sediments at the south edge of the docks and bedrock at the north. Numerous obstructions are present on the bottom in this area.

South Shelving Rock Point (M-76). An area of scattered Eurasian watermilfoil plants adjacent to a dock on the south side of the point was hand harvested in 1993. The slope of the bottom in this area is gradual and the sediment is sandy.

Walker Point (M-77). An area of scattered milfoil plants was found north of the point and stretched to the boathouses of the Loines estate. The slope in this area was steep; the sediments were soft silt and cobble. All plants were found 1 to 4 meters in depth and were removed during the 1993 site revisit.

Bay North of West Tongue Mountain (M-78). This site is approximately 0.5 km north of the West Tongue Mountain site. The milfoil was found growing among a pair of fallen trees just off shore. The slope at this site is moderately steep, and the sediments consisted of sand, gravel,and silt. Fewer than 10 plants were removed from this area in each of the last 2 years.

Shore South of Bear Point (M-79). The site is approximately 0.5 km south of Bear Point. This site had 2 milfoil plants at the base of a fallen tree. The slope was very steep, and the plants were located on a small shelf in soft silt.

Bay South of Bear Point (M-80). An area of widely scattered milfoil plants was found in this bay. The site was cleared of 15 plants at 1 to 3 meters in depth in 1993. The slope was gradual; the sediment was a mixture of wood chips and silt.

Butternut Brook T-21 (M-81). This site was located south of Point Comfort. A single milfoil plant was found and removed in 1991, from the culvert in the end of the bay. The slope of the bay is very gradual, the sediment is sand and soft silt. No additional milfoil has been found since 1991.

Barber Bay T-22 (M-82). Scattered milfoil plants were found in the center of the bay during the 1991 tributary survey. The majority of the plants were removed from 2-5

meters of water. The slope was gradual, and the sediments consisted of sand and silt. Forty-two milfoil plants were removed during the 1993 revisit.

Van Warmer Bay T-25a (M-83). This site had a single milfoil plant found along a dock just south of the buoy on the east shore. One milfoil plant has been removed from this site annually, for the last 3 years. The slope is gradual, and the bottom sediment is sand.

Harris Bay Inlet T-30a (M-84). In 1991 milfoil was found in an area stretching from the tributary culvert to the boat docks in less than one half meter of water. Approximately 50 milfoil plants were observed. A number of milfoil plants were removed as voucher specimens, however, milfoil remained at this site. This area was exposed (dry) during the 1993 revisit. The sediment in this area is very soft silt, and the slope at this site is flat.

Dunham Bay Inlet T-32 (M-85). Three milfoil plants were found scattered between the bridge and a boat dock to the east in approximately 2 meters of water during the 1991 survey. There were also a large number of milfoil fragments found covering the bottom in the south end of the bay. This site was only surveyed in 1992. In 1993 35 plants were removed from this site. The slope at this site is gradual, the sediment is a combination of sand, silt and cobble.

East Shore T-36d (M-86). Two milfoil plants were found at this site during the 1991 tributary survey. No milfoil plants were found at this site in 1993. The site has a sheer rock wall to the north, and a storm culvert between two docks. The slope at this site is steep, the sediment is sand, light silt, and rock.

Crosbyside T-37b (M-87). This site is approximately 100m north of T-37a. It is adjacent to a culvert in a wooden seawall. A total of 4 milfoil plants were taken for voucher specimens in 1991. No milfoil has been found at this site since that time. The slope is gradual, and the sediment is sand and rock.

Crosbyside T-37c (M-88). Six milfoil plants were removed in 1991 for voucher specimens at this site which is at the mouth of a seasonal tributary. No milfoil plants were found at this site in 1993. The tributary runs to a double slip dock approximately 50m south of T-37d. The slope is moderately steep, the sediment is a combination of silt, sand, and rock.

Crosbyside T-37d (M-89). A pair of milfoil plants were found in 1991 and removed from this site directly in front of a private beach with drainage culverts on each side. This site is approximately 50m north of T-37c, the slope is moderately steep, and the sediment is a combination of sand, silt, and cobble.

South Tea Island Culvert T-41a (M-90). This site is located to the southwest of Tea Island adjacent to the Lake George water treatment plant. Milfoil was first found in 1991 in the outwash area of a culvert. A total of 7 milfoil plants were removed from this site in

1993. The slope at this site was moderate, the bottom sediment consisted of sand and rock.

Harris Bay-East Side (M-91). Milfoil was located in 1991 in the outwash area of a culvert, on the northeast shore of the bay. An area of scattered to moderate density growth of milfoil runs from the marina south along the east shore. The slope was gradual, and the sediment was a mixture of sand, silt, and cobble. Milfoil plants were too numerous to count in 1993. This site has received no management activity.

Bay East of Hens and Chickens (M-92). The site is on the east shore at Shelving Rock Point. The slope is moderate near shore to a depth of 3 meters, the bottom is rocky in shallow waters (less than 2 meters) and changes to sand and silt with logs and debris covering the bottom in deeper waters. Milfoil was first found at this location in 1992, when 1 plant was removed. Seven milfoil plants were removed in 1993.

East of Refuge Island (M-93). A single milfoil plant was found and removed from a small cove on the east shore across from Refuge Island in 1992. No milfoil was found at this site in 1993. The sediments in this area was sand and cobble from 0 to 2 meters, and sandy silt and detritus from 2 to 4 meters. The slope was flat to 2m depth, then moderate.

Northwest of 3 Sirens Islands (M-94). The site is on the east side of Tongue Mountain in a small cut along the shoreline, the slope is steep and rocky with small pockets of silt sediments. A single milfoil plant was found in 1992 and removed, none have been found since.

N.W.B. Head of Bay (M-95). Two plants were harvested from this site in 1992 and a single milfoil plant in 1993. The site is located at the extreme north end of the bay, between two boathouses in approximately 2m of water. The slope is gradual to moderate with sand and silt inshore and soft silt after a depth of 4m.

Harris Bay/mid-bay (M-96). The small milfoil bed at this site, which was first observed in1992, is located south of the 5 mile per hour buoy line and north of a small rock outcropping in the middle of Harris Bay. The slope is flat and the bottom is rocky with large areas covered by bedrock, the plants are growing in large pockets of silt on top of the bedrock. No management has occurred at this site.

West Side Clay Island (M-97). The milfoil at this site was located in 1992, in a sunken coal barge in 3 meters of water. A fine silt sediment was inside the barge along with the majority of the milfoil plants, very few plants were found outside of the barge where the sediments was a mixture of sand and silt. All milfoil observed was hand harvested in 1993.

South Jenkins Brook (M-98). First observed in 1993, the site is just south of a small tributary (Jenkins Brook) on the north side of Jenkins Point, Hague. Approximately 30-50

plants were discovered under a white mooring float. The slope at this site is moderate, with a bottom sediment of sand and light silt. No management has occurred at this site.

Holman Hill Creek (M-99). A scattered area of milfoil (50-100 plants) was first located during the 1993 tributary survey. The site is in front of the boathouse on the north side of Holman Hill Creek. The slope is moderate for the first 20m and the bottom is a sand delta from the stream. Twenty meters from shore there is a steep drop off.

Temple Island T87 (M-100). Two milfoil plants were found at this location in 1993 and removed. from the west shore and 100m south of the culvert across from the Island. The slope is flat to gradual, the bottom sediments are sand and light silt

Brook North of Green Point (M-101). A single milfoil plant was found in 1993 on the delta of this stream in about 1 meter of water. Close to shore the bottom was rocky with numerous logs. Sand and silt dominated the sediments beyond 1 meter depth. The slope is moderate to steep. All milfoil was removed from this site.

South Tributary at 5 Mile Mountain (M-102). The site is in a small cut in the shoreline along the east side of the Tongue Mountain range, the slope is moderate and the sediments were shallow silt in rock depressions. Eight plants were removed during 1993.

North of North Meadow Point (M-103). Five milfoil plants were hand harvested from this site in approximately 3m of water. The site is on the north side of the point east of a large rock on the shore, a small green shed is on shore even with the location of the site.

Assembly Point/West Bay (M-104). A small area of moderate density growth of milfoil plants was found in 1993. This site is 100 meters south of the wetland outlet on the west side of Assembly Point. Milfoil plants were found near a sailboat mooring. Approximately 100 to 200 plants were observed at this location in depths of 2 to 4 meters, slope was moderate and sediments were sand and silt. No management has occurred at this site.

Assembly Point/Northwest (M-105). A single milfoil plant was found and removed, approximately a quarter mile southwest of the tip of Assembly Point, in front of a white boathouse. The plant was in water 3m deep on a sand/silt sediment, the slope was gradual to moderate.

Assembly Point/Southeast Bay (M-106). The site was in the bay on the southeast side of Assembly Point. Three plants were found in the mouth of the bay in 1 to 2 meters of water. The sediments consisted of sand and silt, the slope in this area was flat to gradual. All three plants were removed for voucher specimens.

Summary of Eurasian watermilfoil Trends

Trends in the observations of Eurasian watermilfoil sites since its discovery in 1985 (RFWI, 1986) are indicated in Figure 1-2 and Table 1-2. Trends in the discovery of new sites in the top graph (figure 1-2a) show that the surveys of 1986 and 1987 discovered many more sites than in subsequent years. During 1986 and 1987, easily-observed sites were found, many of these as dense beds. The discovery of new sites since 1987 has ranged from 6 to 15 per year, half of the rate in 1986 and 1987 and reflecting a gradual decline in the number of new sites discovered each year. Most of these sites are recently established populations, although several in 1989, one in 1990, one in 1992, and one in 1993 were of moderate density or even dense beds. In figure 1-2b, the total number of sites, number of active sites, and number of sites cleared of milfoil is indicated. The total number of known sites has increased steadily since 1987. However, the number of active sites currently possessing Eurasian watermilfoil appears to have leveled off since 1988 due to management efforts.

Due to hand harvesting efforts at those sites with few Eurasian watermilfoil plants, the number of active milfoil site has remained stable (see figure 1-2b). A total of 62 sites have been cleared of Eurasian watermilfoil to date. All of the sites were cleared by hand harvesting, or a combination of hand harvesting, benthic barrier or suction harvesting. Fourteen sites were cleared during the Warren County sponsored hand harvesting project in 1989 and 1990 (Madsen et al., 1989). A total of 16 sites were managed by suction harvesting (Figure 1-3) and 13 sites received benthic barrier material (Figure 1-4) as part of the EPA Clean Lakes - Phase II Program since 1990.

Figure 1-2. Trends in Eurasian watermilfoil sites in Lake George since 1985. (1-2a) New Eurasian watermilfoil sites by year. (1-2b) Total known sites, active sites and sites cleared of Eurasian watermilfoil. (1-2c) Number of scattered plant sites and dense bed sites.

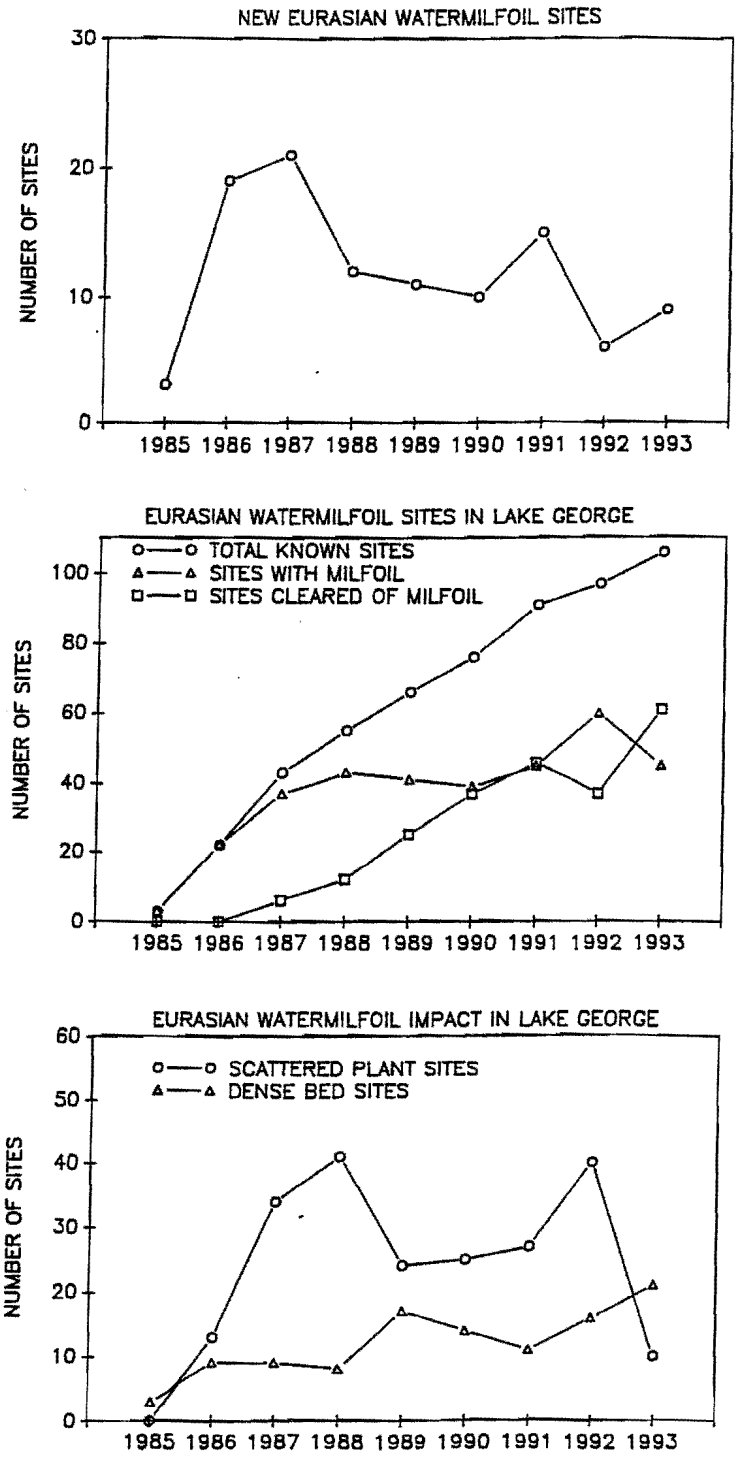


Figure 1-3. Map of Lake George showing sites where benthic barrier has been used to manage the growth of Eurasian watermilfoil.

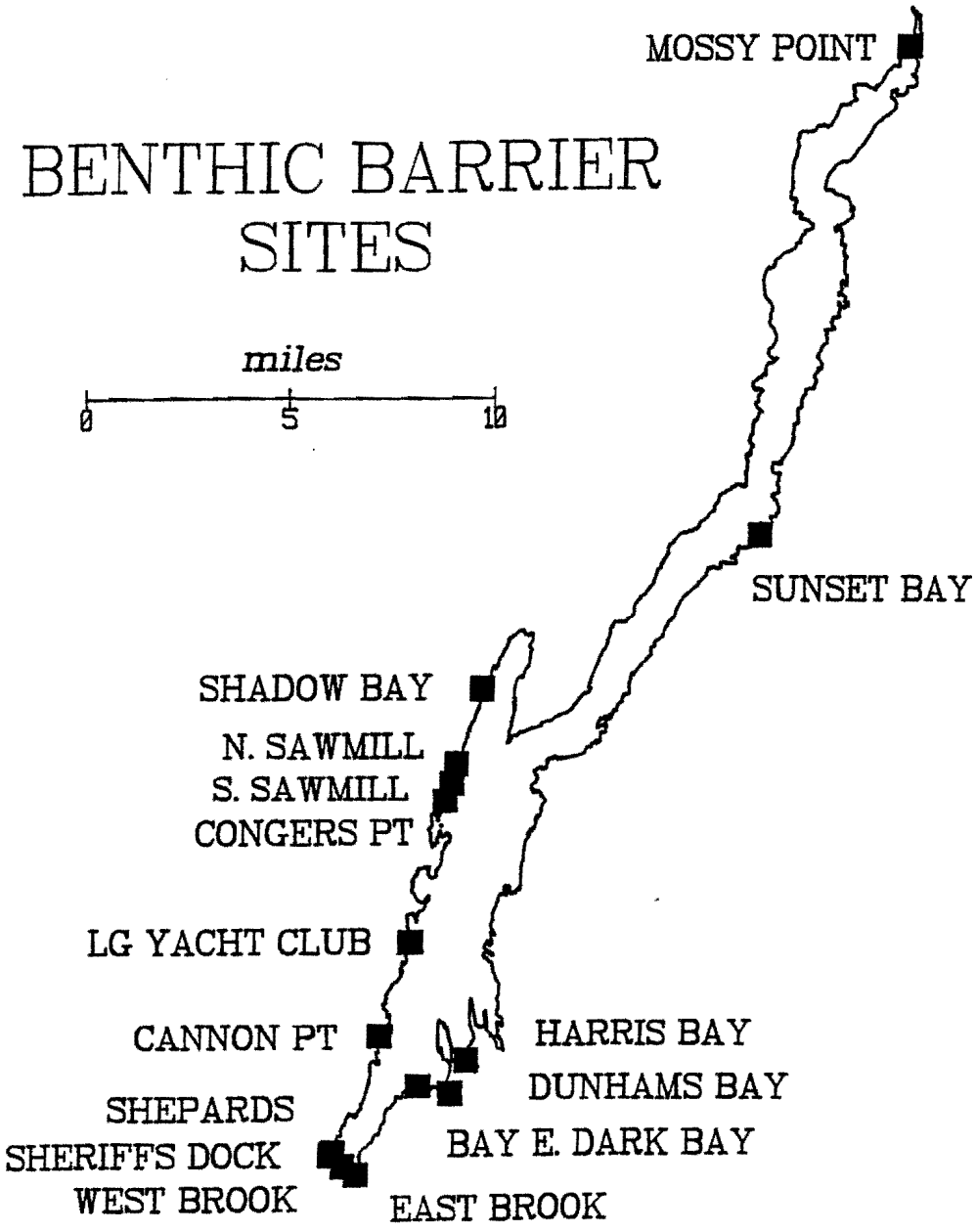


Table 1-2. The number of known milfoil locations and their status from 1985 through 1993.

Year	Total # of Milfoil Sites	Density of Milfoil Growth			Status	
		Bed	Moderate	Scattered	New[1]	Cleared[2]
1985	3	3	0	0	3	0
1986	22	9	0	13	19	0
1987	43	8	0	29	21	6
1988	55	8	0	35	12	12
1989	66	12	6	23	11	25
1990	76	13	8	19	10	36
1991	91	11	7	27	15	46
1992	97	16	4	40	6	37
1993	106	21	13	10	9	62

[1] First year in which Eurasian watermilfoil was observed at a particular site.
[2] Indicates all visible Eurasian watermilfoil removed by management activities.

Hand harvesting new scattered plant sites as they are found, especially if they contain only a few plants appears to be an effective management strategy. At 18 sites where fewer than one hundred milfoil plants were found and cleared by hand harvesting, milfoil was absent for at least two years after the plants removal. Of these 18 sites, 14 have not had milfoil since the initial survey and removal. Only very limited numbers of milfoil plants have been found at the other four sites.

Results of hand harvesting areas with somewhat greater numbers of milfoil plants present (Eichler et al., 1991) indicate that while this technique may not eliminate milfoil populations in a single season of harvesting, a substantial reduction in the number of plants present and management effort necessary to maintain these locations can be achieved.

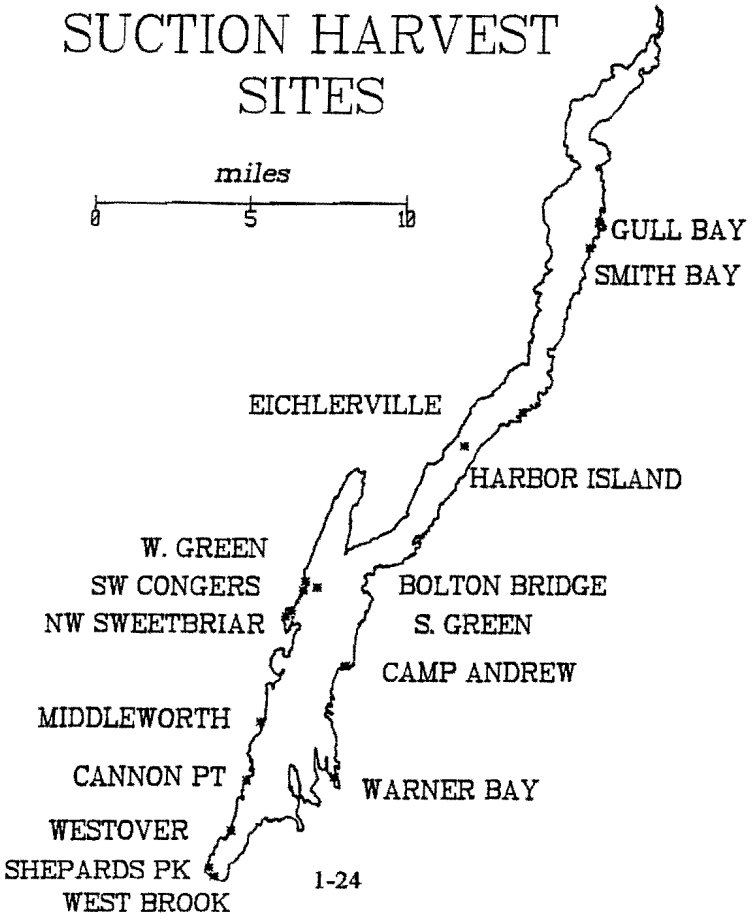
Evaluation of the effectiveness of benthic barrier (Eichler at al., 1994) and suction harvesting (Eichler et al., 1993) suggested that these techniques can also be a valuable tool for aquatic plant management. Sites managed by these techniques are referred to as "managed" rather than "cleared", since removal of all visible milfoil plants by these techniques is not practical or cost effective. Used in conjunction with each other and hand harvesting, these efforts can yield cleared areas. Active maintenance of suction harvest and benthic barrier sites on an annual basis is necesssary to prevent regrowth and recolonization of milfoil in these areas. This is particularly important if other active milfoil sites are in close proximity to managed areas or if sites are not cleared of milfoil prior to benthic barrier removal.

Twelve of the 21 bed sites have been greatly reduced with the use of benthic barrier. However , eight of the twelve remain on the active list of milfoil sites pending further evaluation and maintenance. A serious concern is the conclusion of federal funding in 1993. Future management and maintenance is uncertain and the loss of even a single season of management can negate previous efforts. Examples of this are two sites, Sheriff's Dock (M-19) and Dunhams Bay (M-21), which were managed with benthic barrier by the Lake George Park Commission in 1986. These sites have not been maintained since that time and both require additional management activities.

The final graph (figure 1-2c) shows the relationship of scattered plant sites to bed sites in the past nine years. The rise in the number of beds is caused not only by finding new densely populated areas, but also by the growth of moderately dense patches into the status of beds. Without management activities, the number of sites classified as beds would be much greater. Even with current management levels, the number of bed sites has continued to increase, suggesting the need for even greater efforts.

The sharp decline in the number of active scattered plant sites is a result of management efforts, mainly hand harvesting these scattered populations. Substantial effort was made to reach all known milfoil sites in 1993 due to the cessation of federal funding at the end of the year.

Figure 1-4. Map of Lake George showing sites where suction harvesting has been used to manage the growth of Eurasian watermilfoil.



SECTION 2

1993 TRIBUTARY SURVEY

Introduction

Streams entering Lake George, with nutrients and sediments derived from the terrestrial portion of the basin and deposited on their deltas, are prime locations for the continued establishment of Eurasian watermilfoil (*Myriophyllum spicatum L.*). Delta areas are also disturbed habitats, as a result of sedimentation of terrestrially derived materials and scouring of existing sediments at times of accelerated runoff. The combination of sediment conditions and habitat disruption make tributary deltas prime locations for Eurasian watermilfoil infestation.

Around the entire lakeshore, there are 128 listed stream tributaries (Madsen et al, 1989). Because human activity in the Lake George basin has historically exacerbated water conditions, relative to disturbed areas, the rate of establishment and spread of milfoil has been of particular concern in the management of Eurasian watermilfoil.

A survey of all the tributaries in the basin was performed as part of the 1987-88 Lake George Aquatic Plant Survey (Madsen et al, 1989). The survey provided a procedure for finding new sites with Eurasian watermilfoil, including the establishment of a regular search pattern for milfoil sites to ascertain the relative distribution of milfoil among the native plant communities in Lake George.

In order to balance the number of tributary sites surveyed in each year and to stabilize the cost of the survey, the south basin tributaries were divided into two groups in 1991. With approximately 45 tributaries in each group, a three-year cycle of surveys has been established with a south, central and north component of nearly equal number of tributaries. The tributaries in the southern half of the south basin were surveyed in 1991, those in the northern half of the south basin (central) were the subject of the 1992 survey. The tributaries of the north basin were the subject of the 1993 survey.

The north basin tributary survey was conducted in 1988 and 1990 in order to provide information on the rate of colonization of Eurasian watermilfoil (Madsen et al, 1990). Since these are readily located sites for which the presence or absence of Eurasian watermilfoil was known for 1988 and 1990, these sites were revisited in 1993 to determine whether appreciable new infestation, re-invasion or natural mortality of earlier infestation had occurred.

Methods

The shoreline adjacent to tributary outflows in the north basin was surveyed for the presence of Eurasian watermilfoil. The tributaries comprising this portion of the survey were visited between July 27th and August 4th, 1993. Surveys consisted of swimming a 100-meter segment of shoreline from the water's edge to the outer edge of the littoral zone.

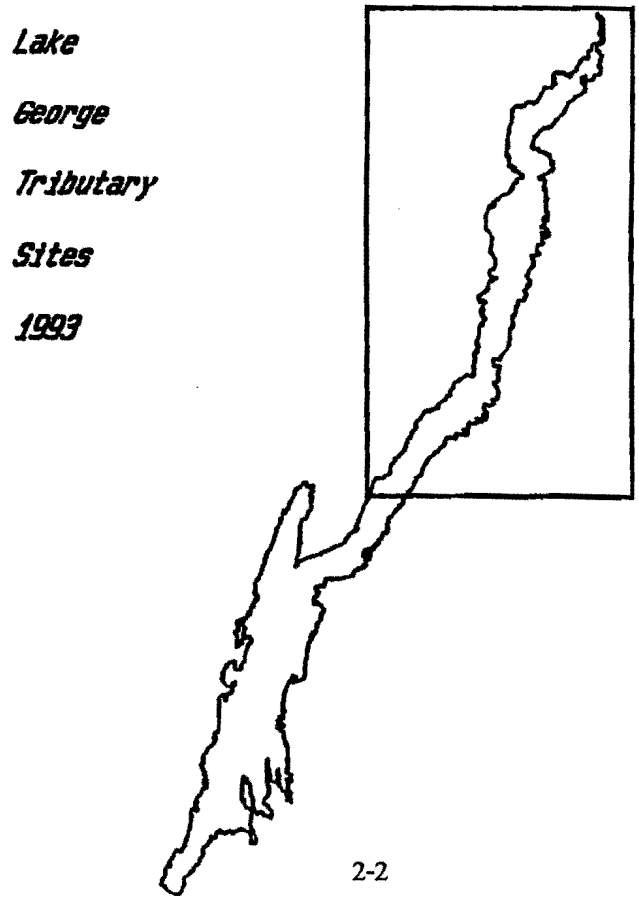
Diver swimover transects were also completed at each site in order to characterize the macrophyte community present. Divers skilled in plant identification estimated the abundance of all aquatic plant species in each 1 meter (3 ft) depth interval using the following abundance classes:

Class	Code	% Cover Range	Centroid
Abundant	A	greater than 50% cover	75.0%
Common	C	25% to 50% cover	37.5%
Present	P	15% to 25% cover	20.0%
Occasional	O	5% to 15% cover	10.0%
Rare	R	less than 5% cover	2.5%

Percent cover data provides both the average depth distribution of the plants present and an estimate of the relative abundance of species at the tributary sites. This information is also important for future management decisions concerning milfoil control alternatives and permit applications required as part of any control strategy.

A map showing the general location of this year's survey activity is shown in Figure 1. Specific tributary locations in the current survey are provided in Appendix A.

Figure 1. Map of Lake George indicating the region included in the 1993 Tributary Survey.



Results and Discussion

The current survey included the northernmost portion of the lake basin tributaries (41 sites). The southern and central portions of the lake basin were completed in 1991 and 1992, respectively. Maps with the locations of the tributaries surveyed in 1993 are provided as Appendix A. The 41 sites compared in the 1988 and 1990 surveys are those included in the 1993 survey. Methodologies employed by the three surveys were the same. The results of the north basin tributary survey for 1988, 1990 and 1993 are presented in Table 1. For each site, the tributary

Table 1. Tributary survey sites and the presence (Y) or absence (N) of Eurasian watermilfoil.

TRIB #	SITE NAME	DATE	1993	1990	1988
T-1	OPPOSITE ROGERS RK	27-Jul-93	N	N	N
T-1A	MOSSY POINT	27-Jul-93	Y	Y	Y
T-2	GLENBURNIE	27-Jul-93	N	N	N
T-3	GULL BAY	27-Jul-93	Y	Y	Y
T-3A	SMITH BAY	29-Jul-93	Y	Y	Y
T-4	SO BURNT POINT	29-Jul-93	N	N	Y
T-5	CLARK HOLLOW BK	30-Jul-93	N	Y	Y
T-6	SHANTY BAY CREEK	30-Jul-93	N	N	N
T-7	BROOK N. GREEN PT	02-Aug-93	Y	N	N
T-8	BLUFF HEAD CREEK	04-Aug-93	Y	Y	N
T-9	BROOK BY AGNES ISLAND	04-Aug-93	Y	Y	N
T-10	SUNSET BAY TRIB	04-Aug-93	Y	Y	Y
T-10A	ROCK DUNDER ISL BROOK	04-Aug-93	Y	Y	N
T-11	COOK BAY, HULETTS LNDG	04-Aug-93	N	Y	Y
T-11S	KITCHAL BAY, HULETTS LNDG	04-Aug-93	N	Y	N
T-11N	EICHLERVILLE BAY, HULETTS	04-Aug-93	Y	Y	Y
T-71	SO TRIB WEST HALFWAY ISL	03-Aug-93	N	Y	N
T-72	NO TRIB WEST HALFWAY ISL	03-Aug-93	N	N	N
T-72A	SO TRIB 5 MI MT BROOK	03-Aug-93	Y	N	N
T-72B	MID TRIB 5MI MT BROOK	03-Aug-93	N	N	N
T-73	NO TRIB 5MI MT BROOK	28-Jul-93	N	N	N
T-74	SO STEERE ISL BROOK	28-Jul-93	N	N	N
T-75	NO STEERE ISL BROOK	28-Jul-93	N	N	N
T-76	SO 9N REST AREA	03-Aug-93	N	N	N
T-78	SABBATH DAY PT BROOK	03-Aug-93	N	N	N
T-79	NORTH SABBATH DAY PT	03-Aug-93	N	N	N
T-80	NORTH BASS BAY	03-Aug-93	N	N	N
T-81	SILVER BAY	03-Aug-93	N	N	N
T-82	VAN BUREN BAY BROOK	02-Aug-93	N	N	N
T-82A	STARK PT WETLAND	02-Aug-93	N	N	N
T-83	SOUTH JENKINS PT	02-Aug-93	N	N	N
T-84	CAPE COD VILLAGE BROOK	02-Aug-93	N	N	N
T-85	HOLMAN HILL CREEK	29-Jul-93	Y	N	N
T-86	HAGUE BROOK	29-Jul-93	Y	Y	N
T-87	TEMPLE ISL BROOK	29-Jul-93	Y	N	N
T-88	S TRIB COOKS BAY	27-Jul-93	N	N	N
T-89	SO COOKS BAY	27-Jul-93	Y	Y	N
T-90	N TRIB COOKS BAY	27-Jul-93	N	Y	Y
T-91	SO CAMP SAGAMORE	27-Jul-93	N	N	N
T-91A	BROOK IN DARK BAY	27-Jul-93	Y	Y	N
T-101	NORTH HAGUE	30-Jul-93	N	N	N

number and site name is given.

The results of the three surveys are further summarized in Tables 2, 3, 4 and Figure 2. In the 1988 survey, a total of 9 (22%) of the 41 sites had Eurasian watermilfoil (Table 3). In 1990

Table 2. Comparison of the presence of Eurasian watermilfoil between survey years 1990 and 1993. Numbers in ( ) represent row percentages, numbers in [ ] represent column percentages.

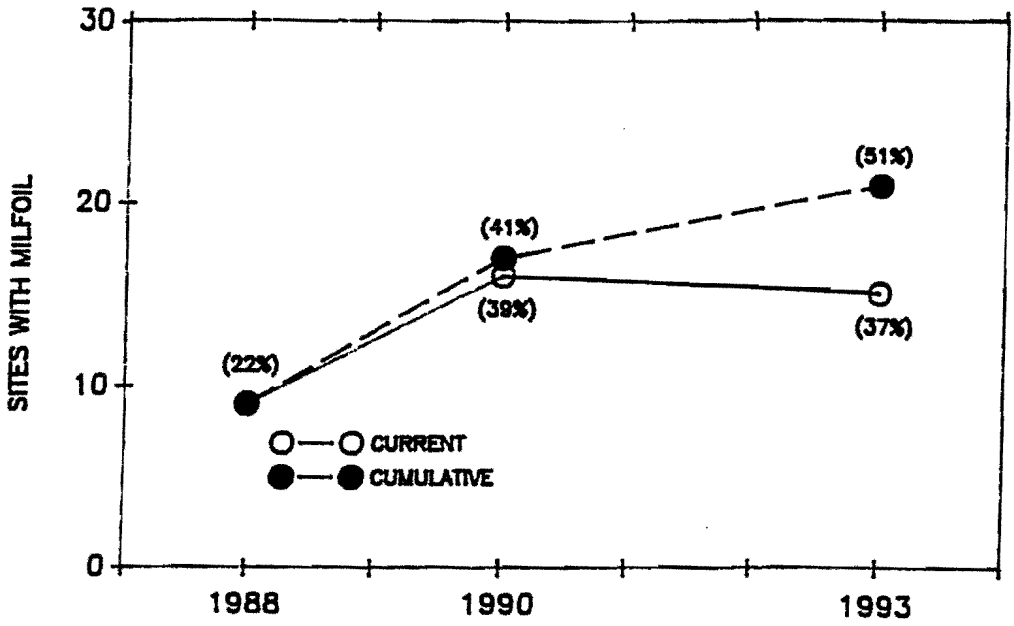
	Eurasian watermilfoil in 1990		
	Present	Absent	Total
Eurasian Watermilfoil in 1993			
Present	11 (73) [69]	4 (27) [16]	15 (100) [37]
Absent	5 (19) [31]	21 (81) [84]	26 (100) [63]
Total	16 (39) [100]	25 (61) [100]	41 (100) [100]

the total increased to 16 (39%) of the 41 sites surveyed having Eurasian watermilfoil (Table 2). Eight new milfoil sites were found during the 1990 survey. In the 1993 survey, 15 (37%) of the sites had Eurasian watermilfoil (Table 2). Of the 41 sites visited, milfoil was found for the first time at 4 (9.8%) of the tributary sites. Five (12%) of the sites at which milfoil occurred were positive for the invasive species since the initial survey in 1988. Three sites (7%) had milfoil

Table 3. Comparison of the presence of Eurasian watermilfoil between survey years 1988 and 1993. Numbers in ( ) represent row percentages, numbers in [ ] represent column percentages.

	Eurasian Watermilfoil in 1988		
	Present	Absent	Total
Eurasian Watermilfoil in 1993			
Present	5 (33) [56]	10 (67) [31]	15 (100) [37]
Absent	4 (15) [44]	22 (85) [69]	26 (100) [63]
Total	9 (22) [100]	32 (78) [100]	41 (100) [100]

Figure 2. Comparison of the number of sites currently with Eurasian watermilfoil versus the number of sites which have had milfoil during any of the surveys (cumulative).



present in 1988 and 1990, but not in 1993. All three sites were hand harvested during the 1990 tributary survey or in subsequent years between surveys. Thus,not only initial colonization but also recolonization of tributary sites by Eurasian watermilfoil is occurring in Lake George. The rate of colonization, however, is variable from year to year and between the three portions of the survey.

Table 4. Comparison of the presence of Eurasian watermilfoil between survey years 1988 and 1990. Numbers in ( ) represent row percentages, numbers in [ ] represent column percentages.

	Eurasian watermilfoil in 1988		
	Present	Absent	Total
Eurasian Watermilfoil in 1990			
Present	8 (50) [89]	8 (50) [25]	16 (100) [39]
Absent	1 (4) [11]	24 (96) [75]	25 (100) [61]
Total	9 (22) [100]	32 (78) [100]	41 (100) [100]

The statistics of most interest are the number of sites that had Eurasian watermilfoil during one survey year, but not during the follow-up surveys. Three sites (7%) had Eurasian watermilfoil in 1988 and 1990 but not in 1993, and five sites had milfoil in 1990 but not in 1993. The five sites were Clark Hollow Brook (M-50), North Tributary in Cooks Bay (M-52), Cook Bay, Huletts Landing (M-54), Kitchal Bay (M-69), and the South Tributary West of Halfway Island (M-70). The milfoil was removed by hand harvesting in the years following or during the 1990 survey. During the 1990 survey two sites were cleared by hand harvesting, those being the North Tributary in Cooks Bay (M-52) which had 50 plants removed, and Kitchal Bay (M-69) where a single plant was removed. In 1991, the site at Cook Bay, Huletts Landing (M-54) had 9 plants removed and the site South Tributary west of Halfway Island (M-70) had 4 plants hand harvested. The remaining site, Clark Hollow Bay (M-50) was harvested in 1992, with 4 plants removed. These results indicate that hand harvesting activities can eliminate small populations of Eurasian watermilfoil. There is no evidence, however, that the loss of Eurasian watermilfoil populations at specific sites in Lake George can be attributed to natural mortality.

The following is a breakdown of the fifteen sites that had milfoil during the 1993 tributary survey. Nine of the fifteen milfoil sites were found to have ten or fewer plants, all of which were hand harvested as voucher specimens. At four of the sites, milfoil was found for the first time:

- Brook North of Green Point (T-7, M-101),
- South Tributary 5 Mile Mountain (T-72A, M-102),
- Holman Hill Creek (T-85, M-99),
- Temple Island Brook (T-87, M-100).

Three of the new sites had fewer than ten milfoil plants and were cleared for voucher specimens. The one site not cleared was Holman Hill Creek (M-99) which had more than 50 plants. Time constraints prevented the clearing of this site. The remaining eleven sites that had milfoil during the 1993 survey all had milfoil populations in one or both of the earlier tributary surveys. Since 1988, the number of tributary sites in this portion of the Lake George basin with milfoil present has increased by six. The small number of plants found at most tributary sites indicates recent colonization or reintroduction at these locations.

Five of the sites surveyed in 1993 have had a milfoil population since the first tributary survey done in 1988. Those sites being Mossy Point (M-13), Gull Bay (M-48), Smith Bay (M-47), Sunset Bay Tributary (M-6), and Eichlerville Bay (M-51). All of these sites have been the subject of management activities in the last three years. The sites at Gull Bay, Smith Bay, and Eichlerville were suction harvested, while Mossy Point and Sunset Bay were covered with benthic barrier in 1990 and 1993, respectively. Hand harvesting was conducted at all of the above sites at least once since they were discovered. Hand harvesting of low density milfoil infestations and the use of suction harvesting and benthic barrier on denser growth have been used as a means for maintaining milfoil at low density levels.

Of the 15 tributary sites in this section of the north basin with milfoil present, hand harvesting and voucher specimen collection cleared 10 sites. Hand harvesting was not completed at the Holman Hill Creek site (T-85, M-99), Mossy Point (T-1A, M-13), and Gull Bay (T-3, M-48) due to time

restrictions. A major portion of the site at Sunset Bay (T-10, M-6) was covered by benthic barrier in 1992-3, but a considerable area remains to be managed.

Table 5. Frequency of occurrence of all macrophyte species at the tributary sites. Species are ranked in order of frequency of occurrence.

	DEPTH INTERVAL (METERS)							
SPECIES	**0-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-6**	**6-7**	**All**
Najas flexilis	25	24	26	26	15	7	4	127
Vallisneria americana	22	28	30	25	15	5	1	126
Potamogeton gramineus	29	33	29	23	5	2	1	122
Isoetes sp.	22	14	16	15	15	9	7	98
Potamogeton perfoliatus	19	21	19	16	11	4		90
Potamogeton amplifolius	2	13	21	18	8	3	1	66
Elodea canadensis	18	19	11	10	6	1	1	66
Potamogeton pusillus	10	16	13	12	9	3	2	65
Potamogeton spirillus	19	14	13	12	3			61
Myriophyllum tenellum	28	19	7	5	2			61
Potamogeton robbinsii		7	14	16	16	6	2	61
Heteranthera dubia	13	14	13	6	1	1		48
Juncus pelocarpus	18	19	7	1				45
Eriocaulon septangulare	22	15	5	1				43
Ranunculus longirostris	9	14	9	4	1			37
Eleocharis acicularis	20	5	4	1				30
Potamogeton vaseyi	3	7	5	5	5	3	1	29
Utricularia resupinata	9	9	9	1				28
Myriophyllum spicatum	6	7	**4**	**5**	**3**	**1**	**1**	27
Chara sp.	6	6	5	5	3			25
Lobelia dortmanna	14	10	1					25
Bidens beckii		2	3	6	6	5		22
Myriophyllum alterniflorum	12	7	1					20
Sparganium sp.	12	6	2					20
Sagittaria graminea	11	6	2					19
Ranunculus reptans	8	7	1					16
Elatine minima	9	7						16
Najas guadalupensis	2	2	2	1	1	1	1	10
Potamogeton zosteriformis			2	2	1			5
Potamogeton epihydrus	3	1						4
Potamogeton pectinatus	1	1	1	1				4
Fontinalis sp.		1	1					2
Potamogeton praelongus			1	1				2
Potamogeton crispus	1							1
Potamogeton foliosus		1						1
Utricularia vulgaris			1					1
Nuphar luteum	1							1
TOTAL FREQUENCY	374	355	278	218	126	51	22	1424
NUMBER OF SPECIES	30	32	32	25	19	14	11	37
AVERAGE # OF SPECIES	9.1	8.7	6.8	5.3	3.1	1.2	0.5	5.8

Percent cover data for all sites is provided in Appendix B. Of the 48 species of submersed aquatic plants identified for Lake George (Ogden et al, 1976), 37 species were found at the tributary sites. Two of these species are on the New York State Rare Plant List (Mitchell, 1986; Clemants, 1989; Young, 1992), *Isoetes macrospora*, and *Myriophyllum alterniflorum*. This is particularly important for plant management considerations given the impact that a given management technique may have on non-target species. The impact of the growth and spread of nuisance aquatic plants on the distribution of rare plants, however, must also be included in any management decisions. The diversity of species present at tributary sites is indicative of the suitability of these sites for aquatic plant growth and conversely, the high probability of milfoil infestation at these sites.

In Table 5, the species present and their depth distribution are ranked in order of the frequency with which they appeared at the tributary sites. The depth distribution of the ten most frequently occurring species is presented in Figure 3. Eurasian watermilfoil, ranked 19th by frequency of occurrence, is also included in the plot. Depth distribution and species diversity remains comparable to that reported in surveys conducted in the north basin of Lake George in 1988 (Madsen et al, 1989).

Frequency, or the number tributaries where each species was present, is an important measure of the distribution of species but does not consider the relative abundance of species within the overall population. Table 6 contains the species present and their depth distribution ranked in order of cumulative percent cover. This ranking is a better measure of the dominance of certain species and, in conjunction with frequency data, provides a more complete picture of aquatic plant community structure. In Figure 4, the depth distribution of the 10 most abundant species is presented. Eurasian watermilfoil, ranked 20th by relative abundance, is also included in the plot. A comparison of Figures 3 and 4 indicates that the 10 most abundant species by frequency of occurrence are not the same as the 10 most abundant species by relative percent cover. Nine of the ten species on the two lists, however, are the same.

A comparison of the major species by frequency of occurrence reported lakewide for 1987-1988 (Madsen et al, 1989) with the current list (Table 5) shows few differences. Six of the ten most abundant species are the same. *Potamogeton perfoliatus, P. pusillus, P. spirillus*, and *Myriophyllum tenellum* were not within the top ten species during the 1987 survey, but were ranked fifth, eighth, ninth, and tenth respectively in the 1993 survey. Eurasian watermilfoil was ranked 22ndand 19th by frequency of occurrence in the 1988 and 1993 surveys, respectively. The increase in frequency of occurrence of Eurasian watermilfoil coincides with an increase in the number of locations where milfoil is found in Lake George.

Although the number of samples is too few to suggest a statistically-reliable rate of colonization, new sites continue to be colonized on a year to year basis. The occurrence of milfoil at sites which had been cleared in previous years also indicates that continued surveillance and maintenance of milfoil sites is necessary. The more sobering indication from the recurrence of milfoil at previously harvested sites, is that there are no sites or cases to indicate any natural

mortality or demise of small populations of Eurasian watermilfoil in Lake George. Although these populations may not expand for several years, clearly they are not dying off on their own.

Figure 3. Frequency and depth distribution of the 10 most common macrophyte species and Eurasian watermilfoil.

NF = Najas flexilis
PG = Potamogeton gramineus
PPu = Potamogeton pusillus
PA = Potamogeton amplifolius
MT = Myriophyllum tenellum
MS = Myriophyllum spicatum
VA = Vallisneria americana
IM = Isoetes sp.
EC = Elodea canadensis
PPe = Potamogeton perfoliatus
PS = Potamogeton spirillus

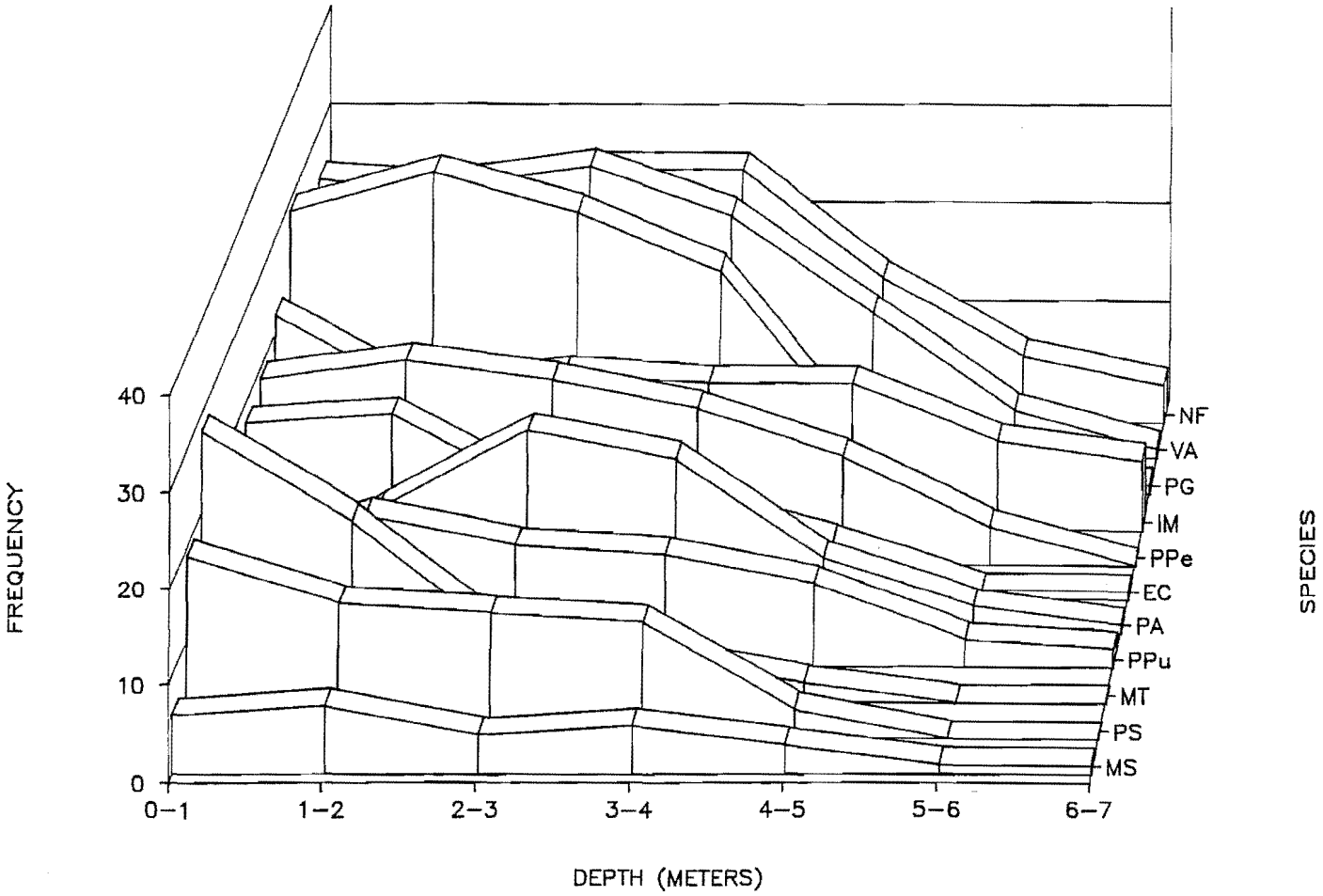


Table 6. Cumulative percent cover of all macrophyte species at the tributary sites. Species are listed in order of decreasing abiundance.

SPECIES	Depth Interval (m) 0-1	1-2	2-3	4-5	5-6	6-7	TOTAL % COVER
Vallisneria americana	315.0	427.5	370.0	145.0	35.0	12.5	1597.5
Najas flexilis	167.5	215.0	270.0	132.5	65.0	17.5	1145.0
Myriophyllum tenellum	425.0	345.0	177.5	30.0			1105.0
Potamogeton gramineus	272.5	307.5	227.5	27.5	5.0	2.5	1020.0
Potamogeton perfoliatus	225.0	232.5	205.0	67.5	17.5		875.0
Potamogeton amplifolius	22.5	135.0	282.5	112.5	30.0	2.5	862.5
Isoetes sp.	142.5	75.0	92.5	130.0	117.5	137.5	787.5
Potamogeton robbinsii		105.0	195.0	197.5	75.0	5.0	762.5
Elodea canadensis	212.5	260.0	105.0	47.5	2.5	2.5	720.0
Potamogeton pusillus	112.5	110.0	127.5	45.0	7.5	12.5	495.0
Heteranthera dubia	50.0	175.0	145.0	10.0	10.0		482.5
Juncus pelocarpus	152.5	167.5	67.5				407.5
Eriocaulon septangulare	225.0	142.5	27.5				405.0
Utricularia resupinata	95.0	105.0	130.0				350.0
Potamogeton spirillus	80.0	67.5	90.0	7.5			290.0
Ranunculus longirostris	50.0	105.0	70.0	10.0			270.0
Sagittaria graminea	155.0	82.5	25.0				262.5
Eleocharis acicularis	195.0	20.0	25.0				250.0
Potamogeton vaseyi	32.5	67.5	35.0	35.0	15.0	2.5	217.5
Myriophyllum spicatum	**50.0**	**62.5**	**37.5**	**10.0**	**2.5**	**2.5**	**205.0**
Ranunculus reptans	82.5	75.0	2.5				160.0
Bidens beckii		5.0	10.0	55.0	27.5		130.0
Lobelia dortmanna	65.0	47.5	2.5				115.0
Myriophyllum alterniflorum	67.5	40.0	2.5				110.0
Chara sp.	15.0	30.0	20.0	15.0			107.5
Elatine minima	60.0	32.5					92.5
Najas guadalupensis	25.0	20.0	5.0	20.0	2.5	2.5	77.5
Nuphar luteum	75.0						75.0
Sparganium sp.	40.0	22.5	5.0				67.5
Potamogeton zosteriformis			5.0	10.0			45.0
Potamogeton epihydrus	22.5	2.5					25.0
Potamogeton praelongus			2.5				25.0
Fontinalis sp.		2.5	10.0				12.5
Potamogeton pectinatus	2.5	2.5	2.5				10.0
Potamogeton crispus	2.5						2.5
Utricularia vulgaris			2.5				2.5
Potamogeton foliosus		2.5					2.5
CUMULATIVE % COVER	3437.5	3490.0	2775.0	1107.5	412.5	200.0	13570.0
NUMBER OF TRANSECTS	41	41	41	41	41	41	246
AVERAGE % COVER	83.8	85.1	67.7	27.0	10.1	4.9	55.2

Figure 4. Cumulative percent cover and depth distribution of the 10 most common macrophyte species and Eurasian watermilfoil.

NF = Najas flexilis
PG = Potamogeton gramineus
PPu = Potamogeton pusillus
PA = Potamogeton amplifolius
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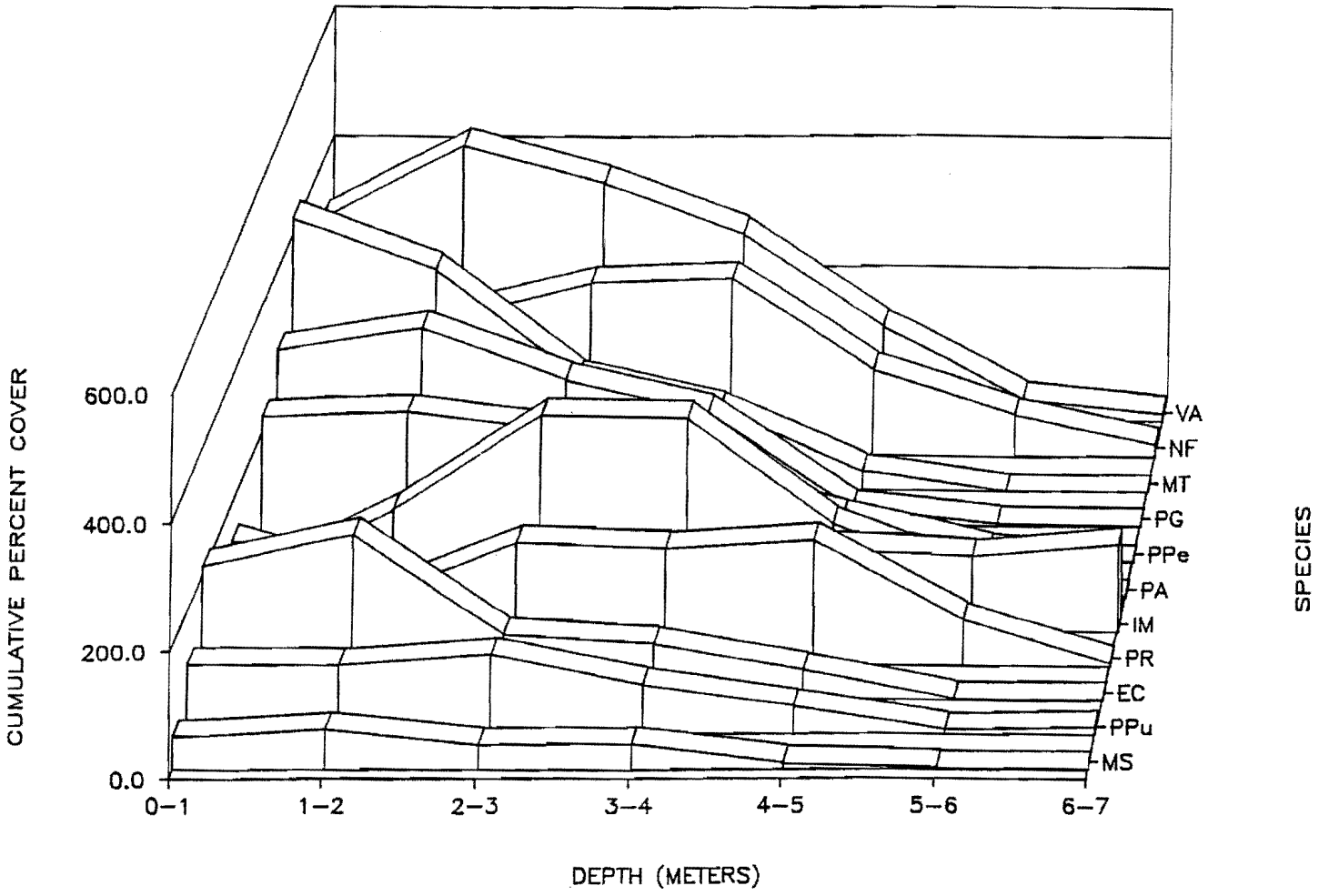
PS = Potamogeton robbinsii



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ACKNOWLEDGMENTS

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SECTION 3

RECOLONIZATION OF THE LITTORAL ZONE BY MACROPHYTES FOLLOWING THE REMOVAL OF BENTHIC BARRIER MATERIAL

Introduction

In ecologically sensitive habitats where the control of excessive aquatic vegetation by herbicides or harvesting is unacceptable, the installation of benthic barrier material on the sediment surface to control macrophyte growth is commonly used (Cooke et al. 1993). Although Eurasian watermilfoil has progressively infested lakes and ponds across temperate zones of North America over the last 50 years, many surface waters are only recently infested or remain, as yet, uninfested. In such situations, local, state and federal agencies should work together to implement management strategies either to prevent introduction of Eurasian watermilfoil to a particular body of water or to limit its spread once introduced. The presence of Eurasian watermilfoil in Lake George, New York, was first reported in 1985 as three small beds (Eichler and Boylen 1986).

Intensive and extensive surveys to document the extent of milfoil infestation and its impacts on native plant communities were conducted at Lake George in 1987 and 1988 (Madsen et al. 1989). These efforts were designed to collect the information necessary to design appropriate management programs. A management strategy utilizing physical control techniques which included hand harvesting, benthic barrier installation, and suction harvesting was initiated in 1989. Lake George serves as a primary drinking water supply causing public concern over herbicide use. The lakewide infestation consists of local populations and mechanical cutting would only exacerbate its spread to other areas.

As part of the US EPA Clean Lakes Phase II program for Lake George, sites to be managed with benthic barrier were limited to areas where Eurasian watermilfoil dominated (greater than 50% of total cover) the aquatic plant community and formed dense beds. This limitation was based on environmental impacts to the native plant community and cost considerations relative to this particular management technique. As part of an overall nuisance aquatic plant control program targeted at Eurasian watermilfoil, 11 sites were scheduled for benthic barrier installation in 1990 and 1991. Nine of the eleven sites were managed with benthic barrier material with alternate management options selected for the two remaining sites based upon site assessment prior to management.

The monitoring and assessment of benthic barrier for controlling of Eurasian watermilfoil in Lake George included documenting the effectiveness of this control technique and evaluating the impact of this technique on the native plant community. To determine the effectiveness of this technique for management of Eurasian watermilfoil, 4 sites were selected for monitoring the effects of benthic barrier on native plant communities.

Materials and Methods

Immediately following benthic barrier removal, a polyvinyl chloride (PVC) grid system of contiguous 1 m^2 quadrats was established in each of the four study areas. Two

grids, each 3 m by 6 m, were installed at sites with sufficient area devoid of plants, while smaller sites received a single grid. The species present in each grid and their relative abundance were recorded at the time of grid installation and at 30-day intervals following installation through late September. Percent cover also was recorded for the following two years at sites where grids were installed in 1991. The following abundance classes (Daubenmire 1968) were used for this purpose:

Class	Code	% Cover Range	Centroid
Abundant	A	greater than 50%	75.0%
Common	C	25 to 50% cover	37.5%
Present	P	15 to 25% cover	20.0%
Occasional	O	5 to 15% cover	10.0%
Rare	R	less than 5% cover	2.5%

Frequency and percent cover data for all aquatic plant species within the grid system were used to evaluate recolonization of areas following barrier removal, and the impact of benthic barrier on native plant communities.

Study Sites

Lake George is an oligotrophic, softwater lake (alkalinity = 25 mg/l as $CaCO_3$) located in northeastern New York State (Figure 1). The lake is large (114 km^2) and deep (18 m Z_{mean}, 58 m Z_{max}), and is the subject of ongoing water quality monitoring (Eichler et al 1993). Eurasian watermilfoil was first observed at 3 locations in 1985 and is currently found in excess of 100 discrete locations along the shoreline (Eichler et al. 1994).

The four study sites and the areal coverage of benthic barrier material installed at each site are listed in Table 1. The location of the four sites is provided in Figure 1. Two types of benthic barrier material were installed in Lake George. A solid PVC sheet 20 mil thick (Palco™) and an open mesh material (Aquascreen™). The amount of the two types of barrier material installed at each site is listed in Table 1.

Table 1. Recolonization study sites with the area and type of benthic barrier installed.

SITE NAME	TOTAL MAT AREA (m^2)	PALCO™ (m^2)	AQUA-SCREEN™ (m^2)
Congers Point	334.7	40.5	294.2
Harris Bay	124.7	---	124.7
Shadow Bay	435.6	435.6	---
Cannon Pt.	460.3	416.3	44.0

Results and Discussion

Recolonization of littoral zone areas following the removal of benthic barrier material was evaluated in two ways: frequency, or the number of species recolonizing the grid areas, and relative percent cover of each species within the population of plants present. Percent cover is the areal extent of lake bottom covered by each species of plant. Frequency provides information on the diversity of the aquatic plant community while percent cover indicates the dominance of species within the community.

Aquatic Plant Communities

No plants were present in the grids immediately following benthic barrier removal when Palco™ Pond Liner served as the benthic barrier material. At the sites where an open mesh type of benthic barrier (Aquascreen™) was used, certain species of plants were able to survive beneath the barrier, root through the barrier or send shoots up through the barrier. At the Cannon Point site *Heteranthera dubia, Elodea canadensis* and *Myriophyllum spicatum* were found growing through the Aquascreen™ bottom liner. All of these species were removed with the removal of the benthic barrier material from the bottom. At the Harris Bay site, *Potamogeton robbinsii* and *Sagittaria graminea* were found growing under the Aquascreen™ bottom barrier and remained following removal of the barrier material. Percent cover and distribution of plants immediately following Aquascreen™ removal, however, was extremely limited; less than one plant per grid square (1.0 m^2). Visual inspection of the rooting zone in the sediments where Palco™ Pond Liner was used indicated that all root masses had decomposed within 60 days of barrier installation. Thus, plants present within the treatment area after barrier removal were not growing from root masses present prior to barrier installation.

Frequency

Data from the initial survey of the treated areas (30 to 90 days post barrier removal) indicated primary recolonization by a large number of species. Six of the seven grid areas had ten or more species established at the time of the first survey, the seventh site had nine species (Figure 2). The number of species within the grids reached a maximum within 30 days after barrier removal and remained constant until Autumn senescence. This suggests rapid initial colonization by a diverse assemblage of species. The most common species present, occurring in at least 6 of the 7 grids were: *Najas flexilis, H. dubia, P. robbinsii, E. canadensis* and *M. spicatum*. These species are common members of the littoral (shallow water) plant community and occur in areas surrounding the treatment zones (Madsen et al. 1989).

Najas flexilis is propagated primarily by seeds. A bank of seeds is present in sediments where members of the genus *Najas* occur since seeds of most macrophyte species can survive for many years in unfrozen sediment prior to germination (Sculthorpe 1967). This bank of seeds may account for the rapid return of *N. flexilis* following barrier

removal. The other four species disperse primarily through fragmentation and/or turion formation. Eurasian watermilfoil spreads primarily by fragmentation. Turions are vegetative, overwintering buds which serve a function similar to seeds, i.e. dispersal and propagation of a species. These methods of dispersal (i.e. seeds, turions and fragments) allow the species to rapidly colonize new areas.

The average number of species per square meter (grid square) ranged from 3.3 to 5.8 within the first 90 days following benthic barrier removal. The average number of species per square meter (4.7 ± 1.6) peaked 60 days post barrier removal (Figure 2). The sampling times 90 and 120 days post barrier removal were generally in September and October when Autumn senescence of annual species was occurring. The Harris Bay site, which was managed with Aquascreen™, had the highest average number of species per square meter (5.8 ± 1.1) within 90 days following benthic barrier removal. This site also had the largest average number of species per square meter (0.9 ± 0.7) at the time of barrier removal and typically harbors a diverse assemblage of native aquatic plants (Madsen et al. 1989). At the majority of other sites, the average number of species per square meter increased to between 3 and 4 at 60 days post barrier removal, and then declined until the Autumn sampling (Figure 2). A decline in the average number of species per square meter was observed in the autumn as a result of senescence of a large number of species.

In the second year (1992), the average number of species per square meter (4.5 ± 1.1) reached its maximum in the August sampling (day 390). The average number of species per square meter (grid square) is representative of the diversity of the plant community. Diversity in the test plots increased rapidly in the first 30 days following barrier removal and then stabilized.

Year three of the study(1993), the average number of species per square meter (5.5 ± 2.0) was reached in July (day 720). Each of the grids had an average of 11.3 species recorded at day 720 of the study.

Percent Cover

Percent cover increased rapidly during the first 60 days following barrier removal in 1991 (Figure 3). Average percent cover was nearly zero for all sites immediately following benthic barrier removal. Within thirty days, average percent cover had increased to approximately 10% at all sites (mean 13.8%) except Harris Bay. At Harris Bay, average percent cover had risen to approximately 30% after the first month, coinciding with the largest increase in the number of species present per square meter.

By the October sampling (day 120) in 1991, average percent cover was declining from the maximum ($49\% \pm 38.3$) observed in August (day 60), coinciding with the time for Autumn senescence of annual species. At sites where the average percent cover was still low (less than 20%) in August, continued increases in percent cover were observed into the October sampling. By the first sampling date in 1992 (day 330, June), average percent cover ($60.7\% \pm 33.3$) exceeded the August maximum (49%) observed in 1991. A portion of this increase, however, may be due to extensive growth of curly leaf pondweed, *Potamogeton crispus*, at one of the Cannon Point grids (Figure 4). Average percent cover per square meter at this site exceeded 110% for the June, 1992 sampling. Curly leaf

pondweed grows rapidly in cold water and generally reaches peak biomass in June. It then declines rapidly and is only a small component of the aquatic plant population in August. Curly leaf pondweed reaches nuisance proportions in a number of regional lakes, and has been the subject of plant management activities (Tobiessen et al. 1992). Percent cover continued to increase through the first sampling in 1993 (July, day 690) indicating continuing growth and colonization. Average percent cover per square meter in August 1992 was 74% ±36.3 for all grids, in July of 1993 it was 82.8.% ±34.6 suggesting the existence of additional area for further growth and/or colonization.

Eurasian watermilfoil

Frequency

Eurasian watermilfoil rapidly colonized all areas treated with benthic barrier. Immediately after barrier removal, Eurasian watermilfoil was not present in any of the grids (Figure 5). Within 30 days, milfoil was found in 44% of grid squares. The maximum number of grid squares containing milfoil (74%) was observed 90 days after benthic barrier removal. This coincides with the month of September, a time of maximum fragmentation of Eurasian watermilfoil in Lake George (Madsen et al. 1988). Many of the grid squares may have contained fragments of milfoil which did not survive since by 120 days after barrier removal, the number of grid squares containing milfoil had declined to 56%. At the conclusion of data collection in August of 1993, 65% of all grid squares contained Eurasian watermilfoil. Proximity to milfoil infested areas had a major effect on the rate of colonization of areas treated with benthic barrier.

The Cannon Point site showed the most rapid colonization and growth of Eurasian watermilfoil (Figure 6) with average percent cover of 63% in 1993 for grid 2, and milfoil was present in all grid squares after one year following barrier removal. Large areas of low and moderate density growth of Eurasian watermilfoil surround this site, acting as a source for fragments, a principal means for dispersal of Eurasian watermilfoil. In areas more remote from large populations of Eurasian watermilfoil such as Shadow Bay (Figure 7), recolonization was much less rapid. Three growing seasons following benthic barrier removal at Shadow Bay, only 36% of grid squares contained milfoil with an average percent cover of 2.8%. Thus, in order to maximize the effectiveness of benthic barrier, it should either be used in areas remote from other populations of milfoil, or perhaps more appropriately, peripheral or adjacent areas containing milfoil should be managed and maintained prior to, and following, benthic barrier removal.

Percent Cover

Average percent cover for milfoil increased throughout the term of the present study (Figure 3). Immediately after barrier removal, Eurasian watermilfoil was not present in any of the grids. By 60 days following benthic barrier removal, average percent cover for milfoil was 3.3%. Between 60 and 90 days following barrier removal, average percent cover for Eurasian watermilfoil increased to 8.1%, while average percent cover for all species declined from 49% to 23.6%. Eurasian watermilfoil, a perennial, contributes a greater portion of the overall percent cover in the fall of the year since it does not die back

to the extent that annual species do. In Lake George, peak milfoil biomass is reported to occur in October (Madsen et al. 1989). For year 2 (1992), average percent cover of milfoil continued to increase reaching a maximum of 13.6% in August of 1992. At this time, average percent cover for all species was 74%. The slope of average percent cover in 1992 is much greater for the total community than for Eurasian watermilfoil, suggesting that growth and colonization by all species, taken as a group, is not impeded by milfoil at the density present at this time. At high density levels, however, milfoil has been shown to cause a decline in native vegetation (Madsen et al. 1991). In year 3 (1993), the average percent cover for milfoil increased to 26.5% in July (day 690), while the total percent cover for all species increased to 82.8% at this time.

Although recolonization varied from site to site, the first species to recolonize generally were native plants which overwinter as seeds or turions (overwintering buds). Eurasian watermilfoil colonized all sites, with 65% of all grid squares containing milfoil by the end of the third growing season. However, Eurasian watermilfoil did not dominate the plant community by the end of either the first or the second growing season following barrier removal. Average percent cover for Eurasian watermilfoil by the end of the third growing season (day 720) was 22.4% while total community percent cover averaged 60.1%. Proximity to milfoil infested areas had a major effect on the rate of colonization of areas treated with benthic barrier. At sites where extensive populations of Eurasian watermilfoil were present in close proximity to treatment areas , e.g. Cannon Point, rapid colonization and growth was observed. At sites where existing milfoil populations were more remote, e.g. Shadow Bay, colonization by milfoil was limited.

Benthic barrier, as a management tool for Eurasian watermilfoil, needs to be incorporated with other control techniques. In order to maximize the effectiveness of benthic barrier, it should either be used in areas remote from other populations of milfoil, or perhaps more appropriately, peripheral areas containing milfoil should be managed and maintained prior to and following benthic barrier removal. Without continued maintenance, sites managed with benthic barrier developed extensive milfoil populations within two growing seasons following the removal of benthic barrier.

Although benthic barrier can be left on the lake bottom indefinitely, there are a number of serious drawbacks to leaving the barrier in place. These include:

1) environmental consequences to lake bottom communities,
2) impacts on the littoral zone vegetation, and
3) costs associated with the barrier material.

While it is not quite clear what the impact of benthic barrier is on the organisms living in or on the sediments covered by the barrier, some impact can be expected (Engel 1984). Impacts can range from smothering at the time of barrier installation to loss of a food source (the plants) to loss of refugia (places to hide from predators). Since many of the organisms associated with the lake bottom act as a source of food for other organisms within the food web, these types of impacts can echo throughout the food web. As with bottom dwelling organisms, the plants covered by the mat serve a number of uses within the lake system including: a food source for a variety of organisms, a source of substrate for attachment and growth of sessile organisms, and as a hiding place from predators for juvenile and adult organisms (e.g. fish). Removal of the barrier allows the plant community to return. Not least among the factors encouraging benthic barrier removal is

the cost of the material itself. At approximately $8000 an acre for the barrier material, without considering installation costs, reuse of this material is important to any plant management effort. Benthic barrier materials (Palco Linings, S. Plainfield, NJ) first installed in Lake George in 1990 have been taken up and reused 2 to 3 times at different locations. Indications are that this material can be reinstalled several more times before replacement is necessary. The longevity of the barrier material is important in evaluating the cost effectiveness of this technique.

ACKNOWLEDGMENTS

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Figure 1. Lake George, New York, showing sampling sites.

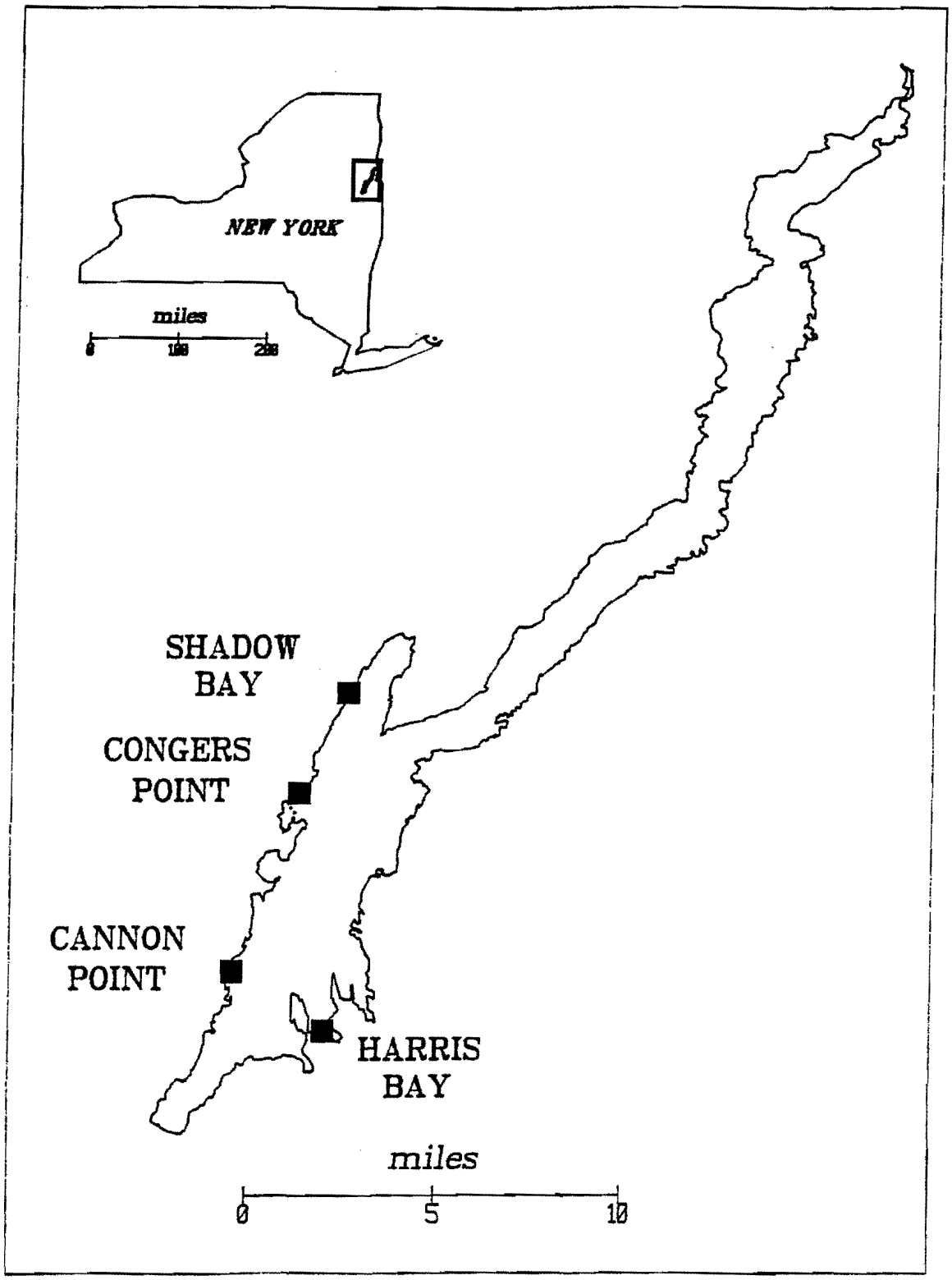


Figure 2. Average numbers of species per grid and per square meter for all the benthic barrier recolonization sites. Error bars are 1 standard deviation of the mean (n = 126).

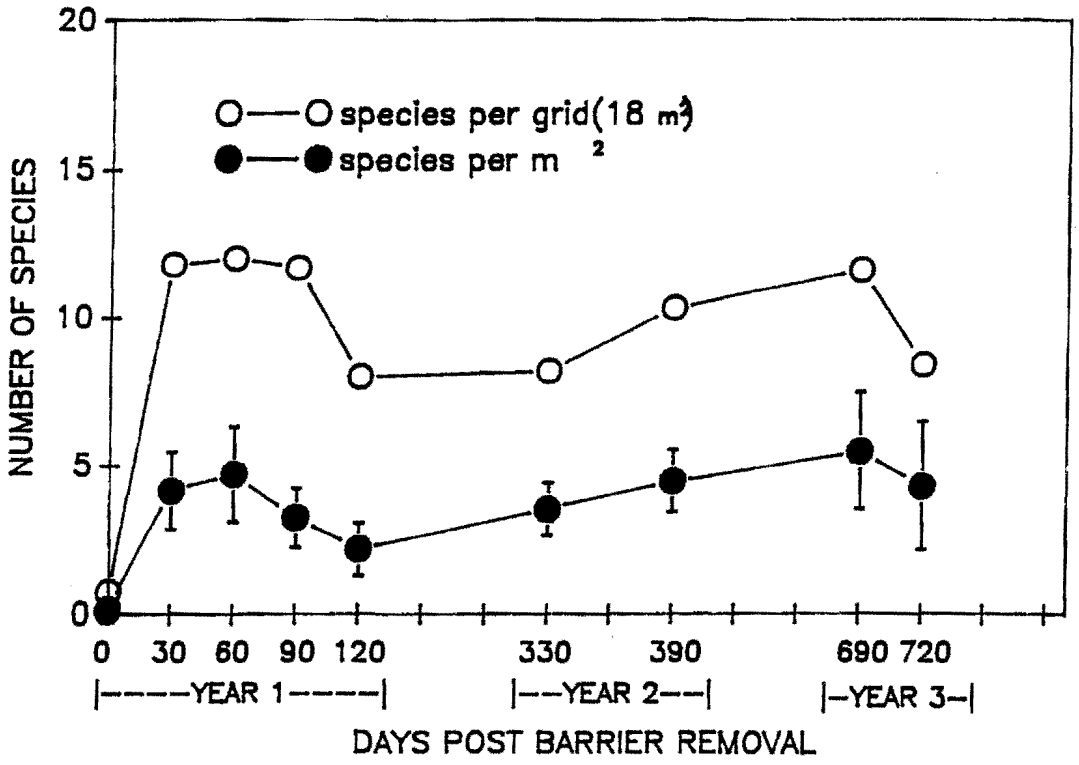


Figure 3. Average percent cover for all species and for Eurasian watermilfoil at the benthic barrier recolonization sites. Error bars are 1 standard deviation of the mean (n = 126).

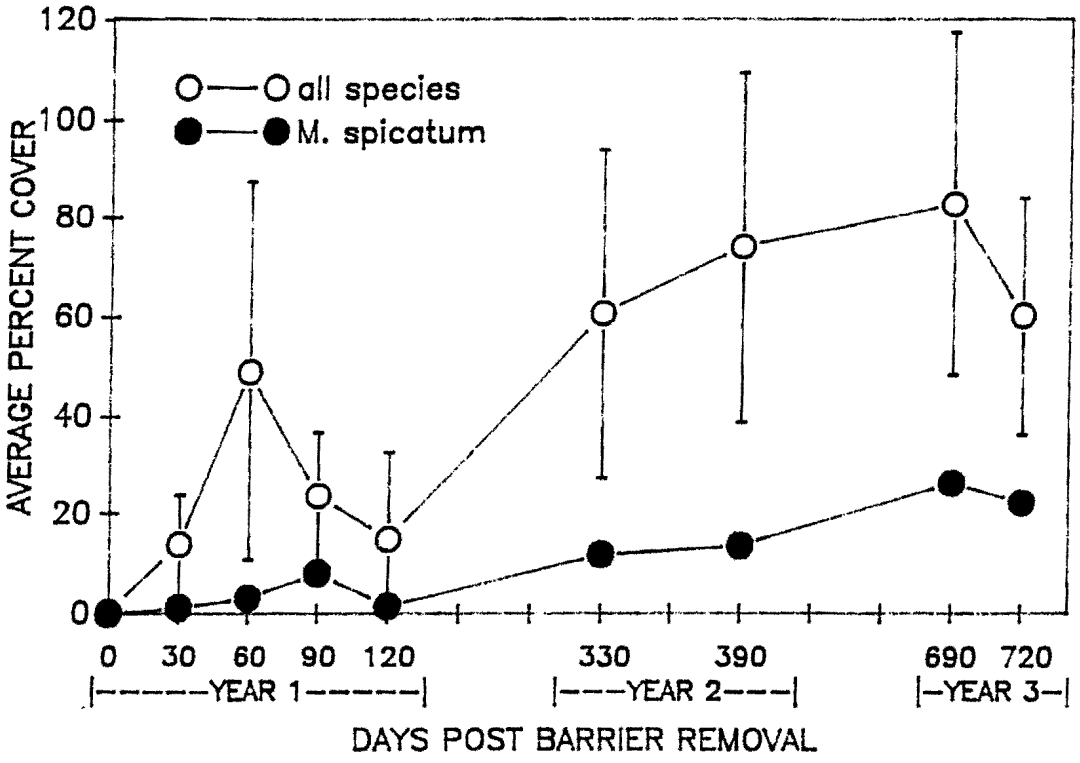


Figure 4. Average percent cover for all species and for Eurasian watermilfoil for grid 3 at the Cannon Point benthic barrier recolonization site. Note: the percent cover at day 330 was largely the result of growth of *Potamogeton crispus*. Error bars are 1 standard deviation of the mean (n = 18).

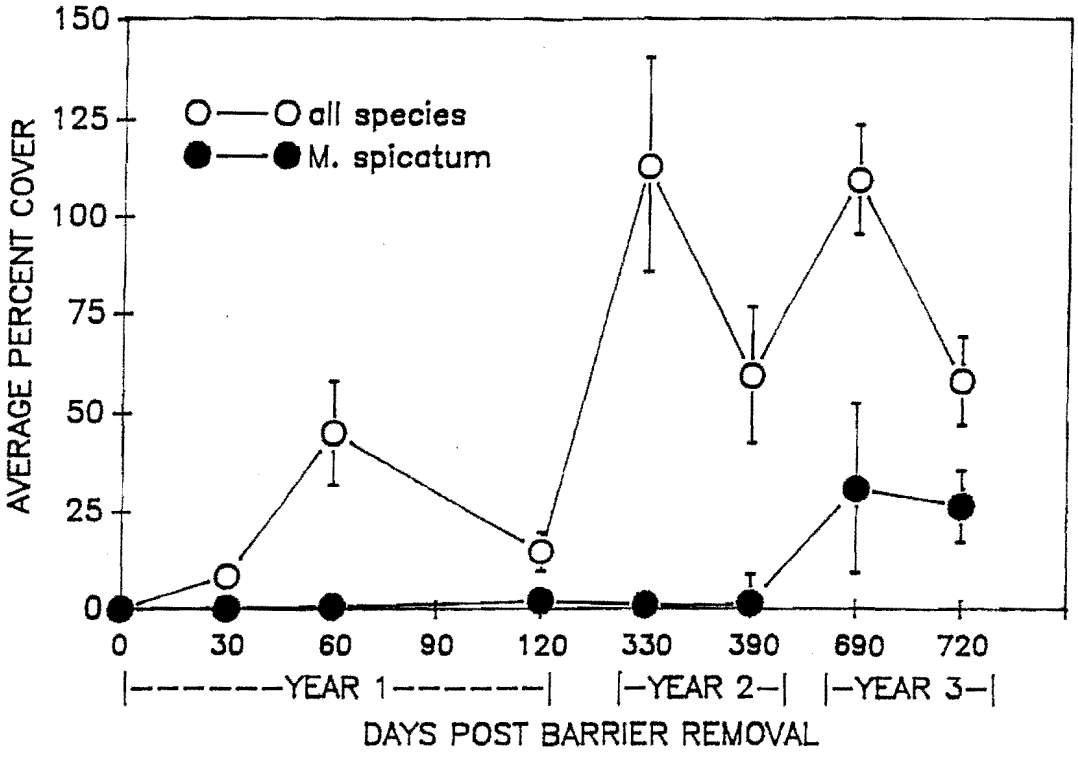


Figure 5. Percent of grid squares at all sites containing Eurasian watermilfoil. Total number of grid squares surveyed was 126.

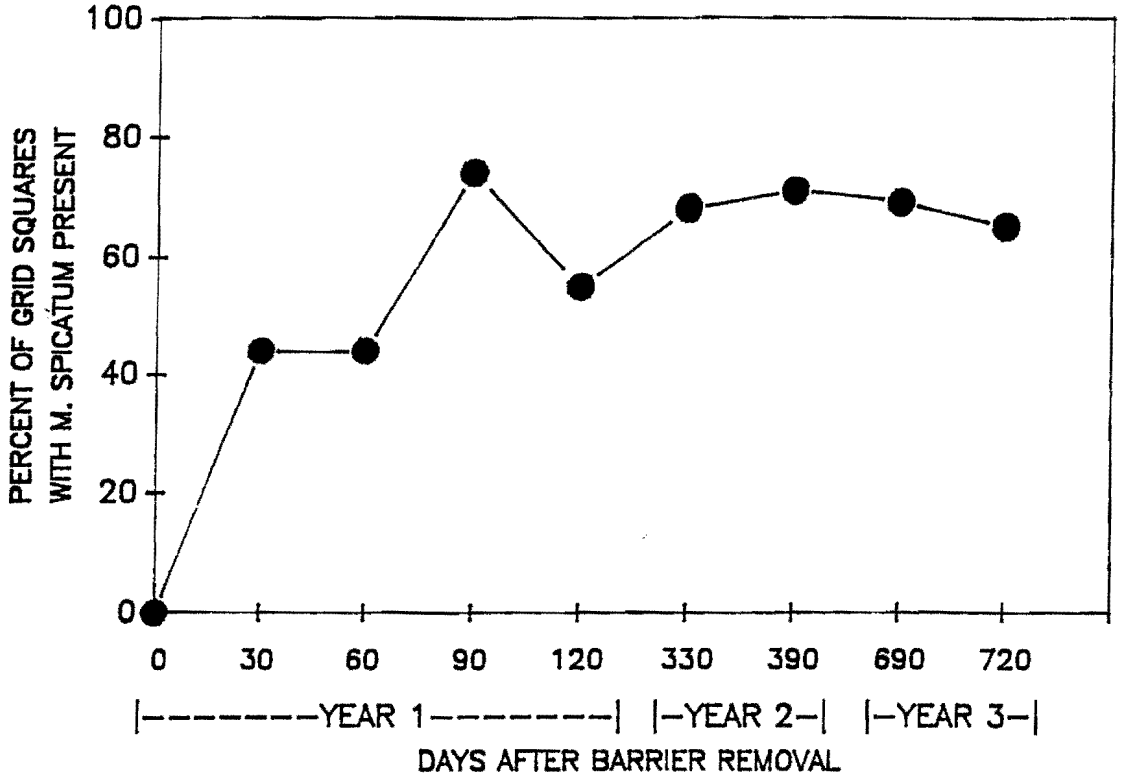


Figure 6. Average percent cover for all species and for Eurasian watermilfoil for grid 2 at the Cannon Point benthic barrier recolonization site. Error bars are 1 standard deviation of the mean (n = 18).

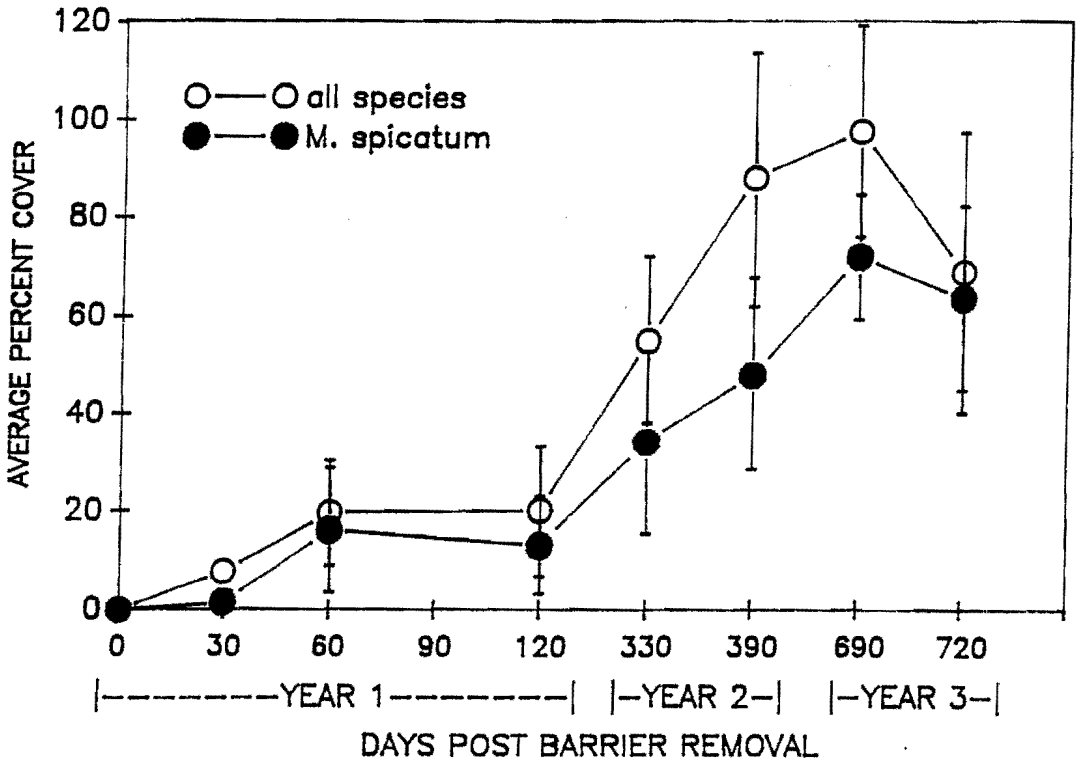
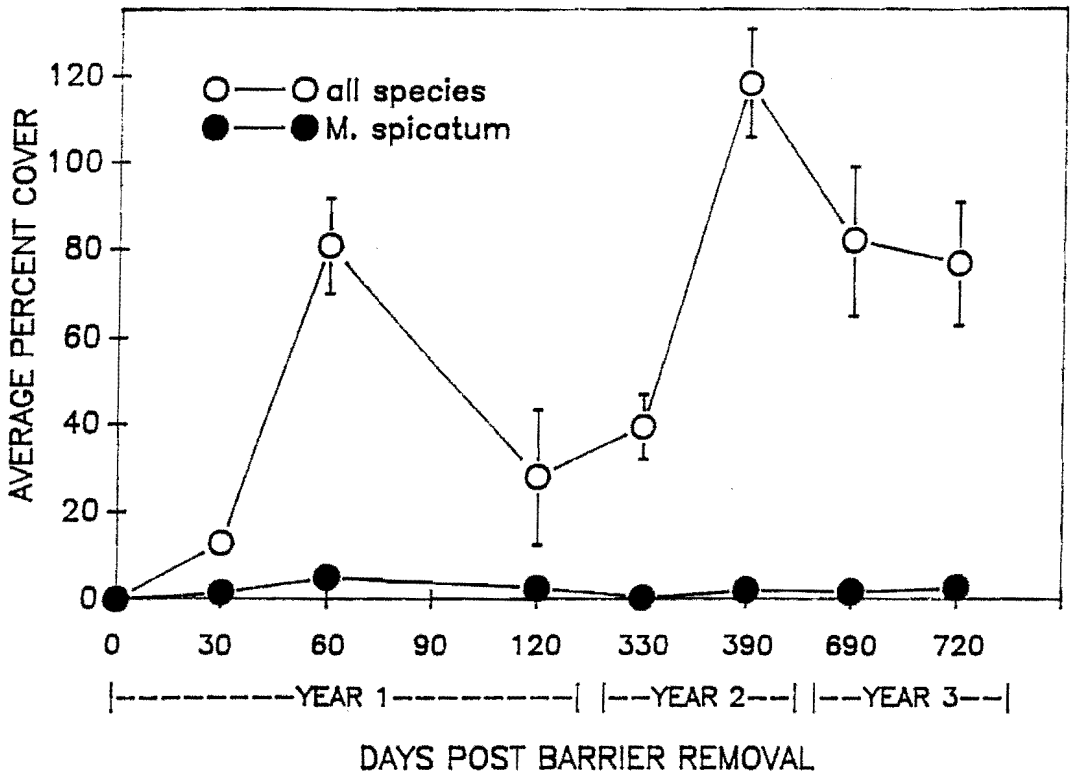
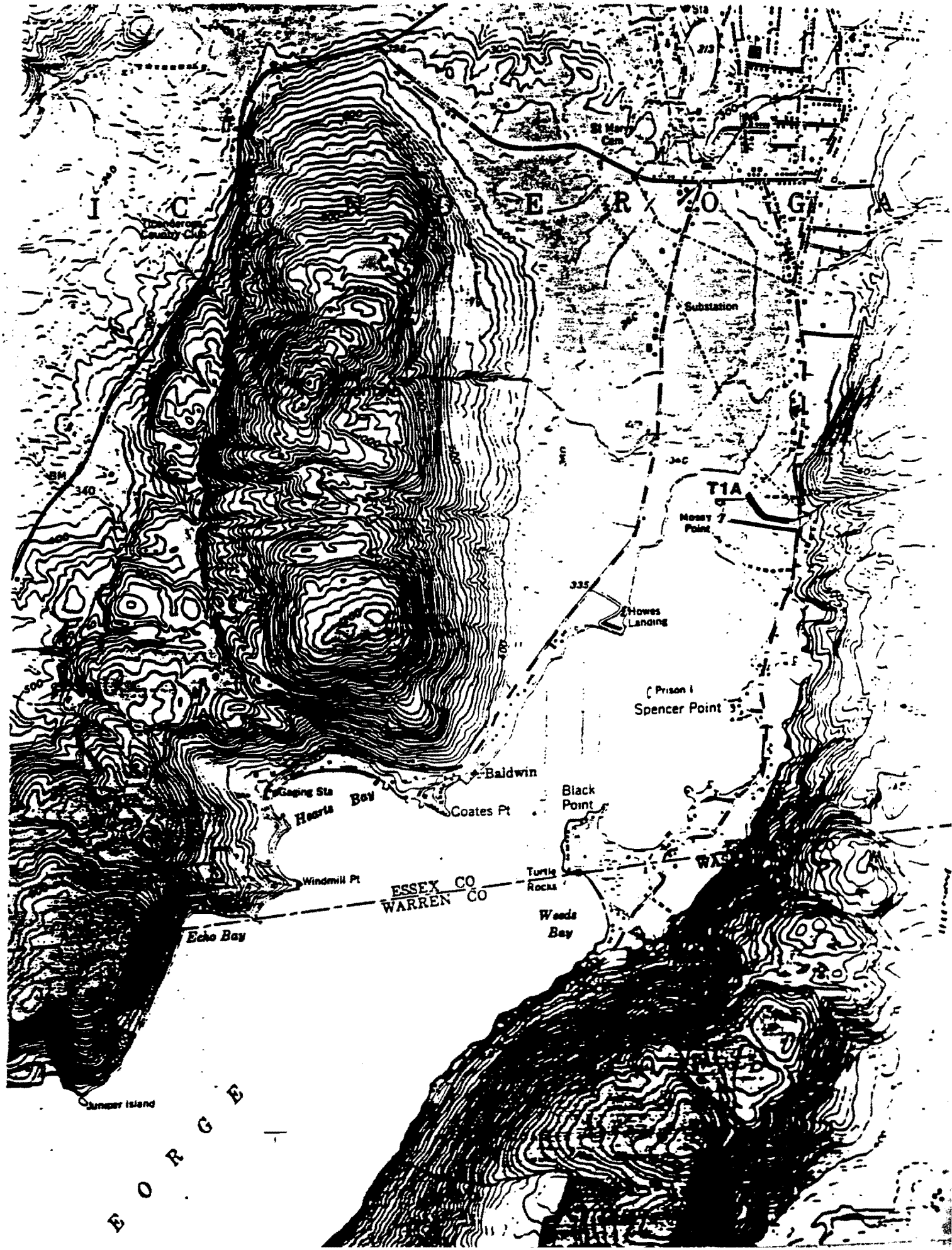


Figure 7. Average percent cover for all species and for Eurasian watermilfoil at the Shadow Bay benthic recolonization site. Error bars are 1 standard deviation of the mean (n = 36).



APPENDIX A

SITE LOCATIONS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Prison I
Spencer Point
Baldwin
Gaping Sta
Bay
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Black Point
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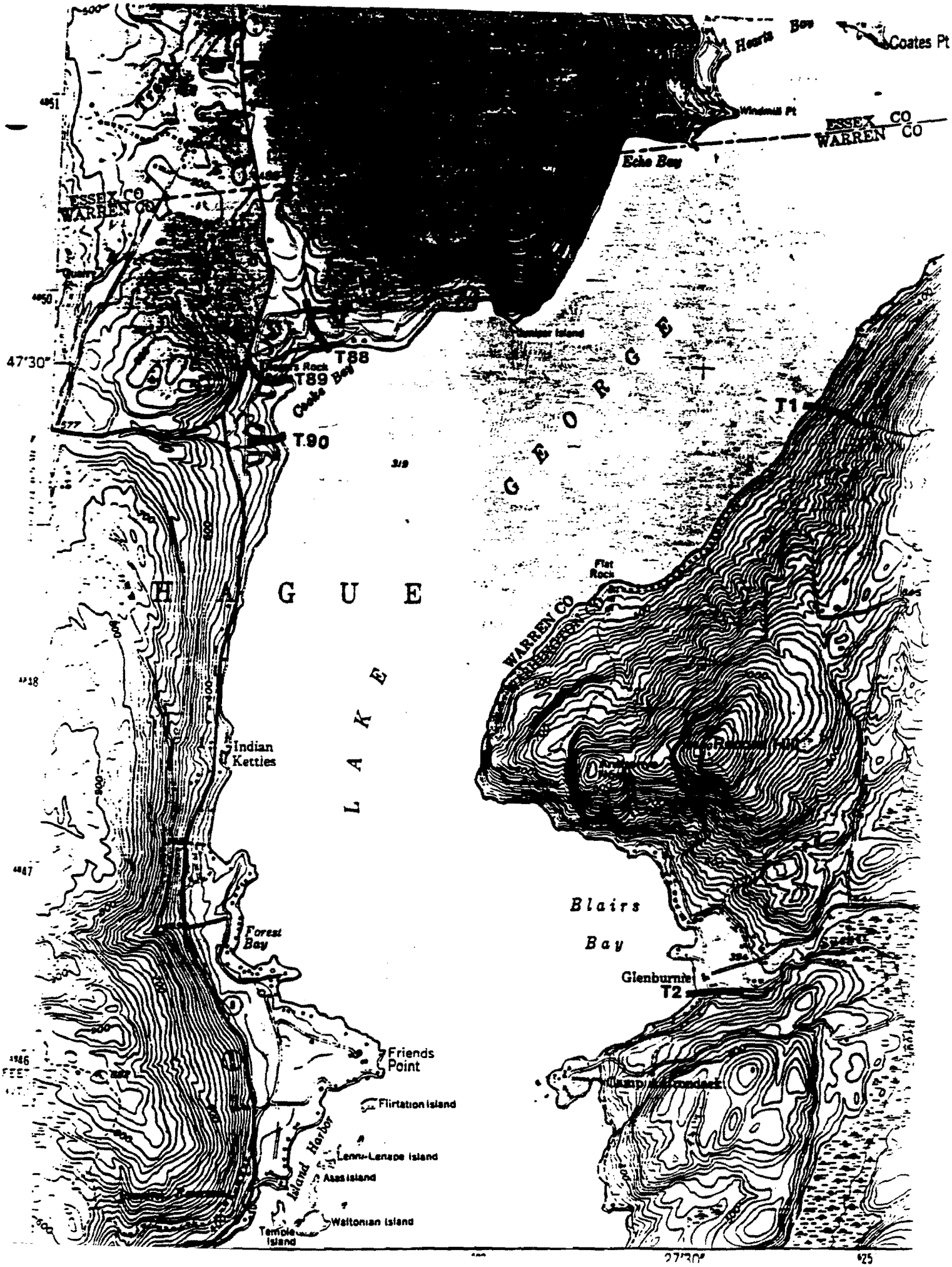
WARREN CO
Turtle Rocks
Weeds Bay
Echo Bay
Juniper Island
FORGE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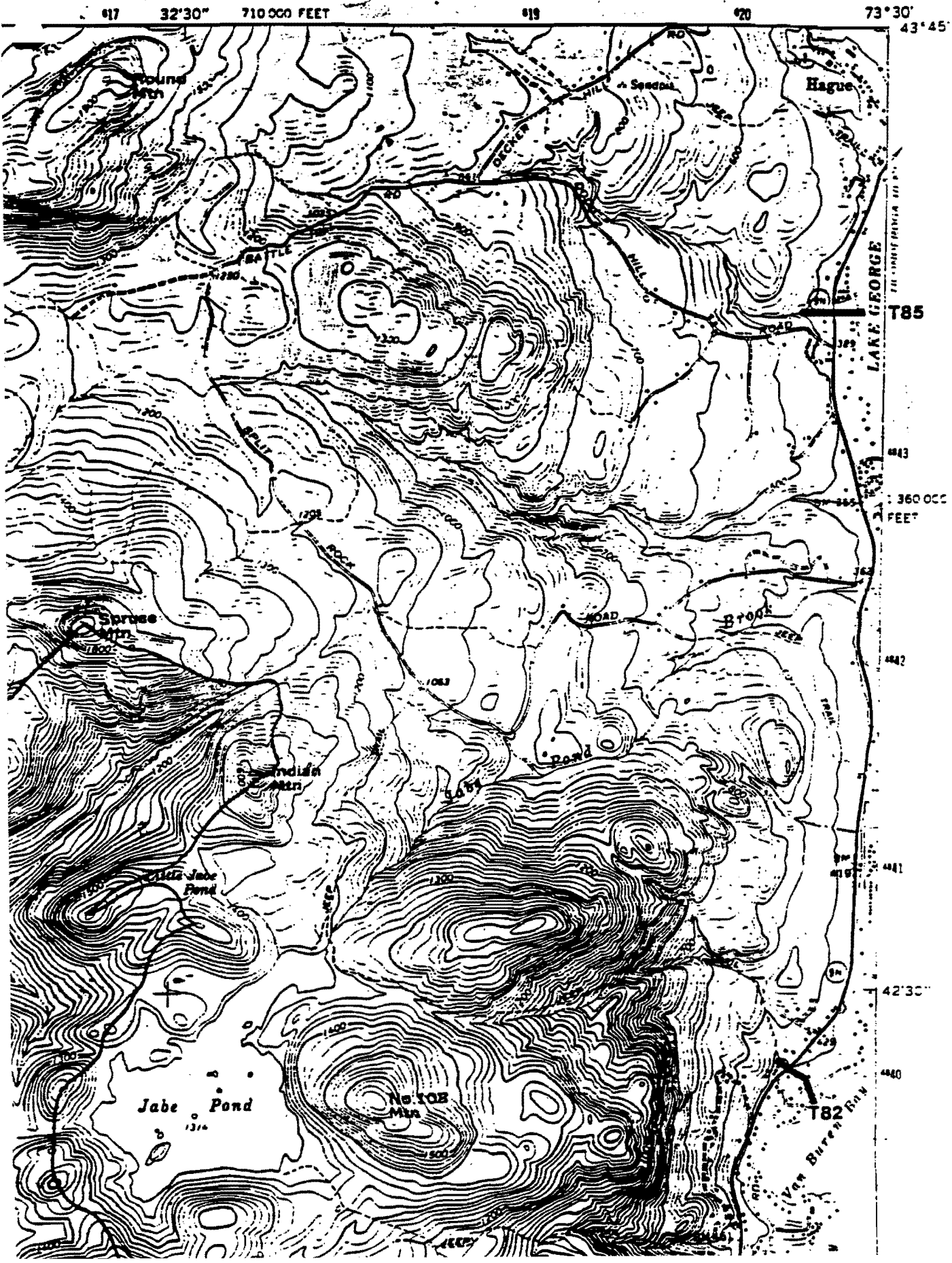
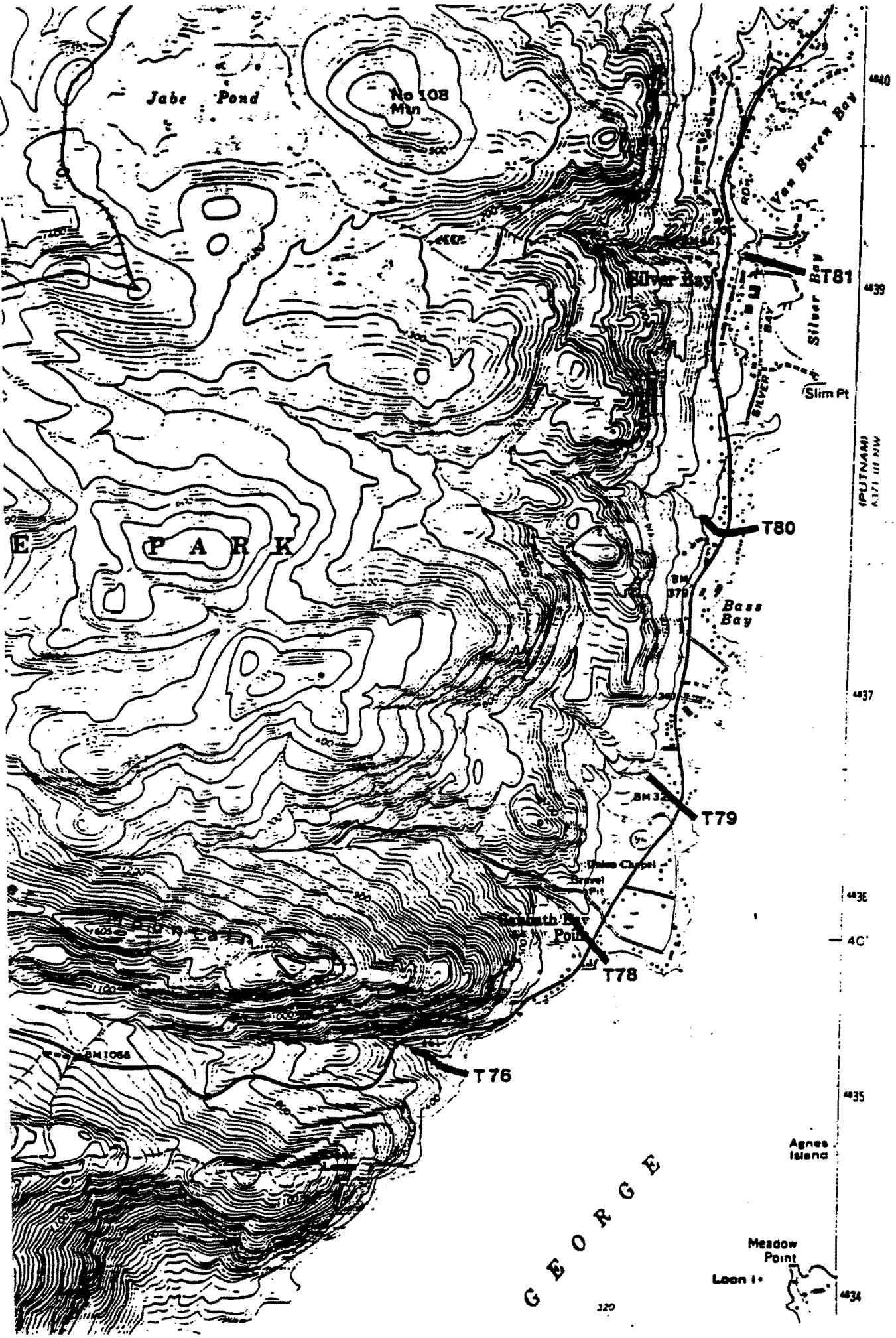
Windmill Pt
ESSEX CO
WARREN CO
Echo Bay
ESSEX CO
WARREN CO
47°30'
T88
T89
T.90
T1
L A K E G E O R G E
H A G U E
Flat Rock
WARREN CO
Indian Kettles
Forest Bay
Blairs Bay
Glenburnie
T2
Friends Point
Flirtation Island
Island Harbor
Lenni-Lenape Island
Assi Island
Waltonian Island
Temple Island

SILVER BAY QUADRANGLE
NEW YORK
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 BOLTON LANDING 15' QUADRANGLE

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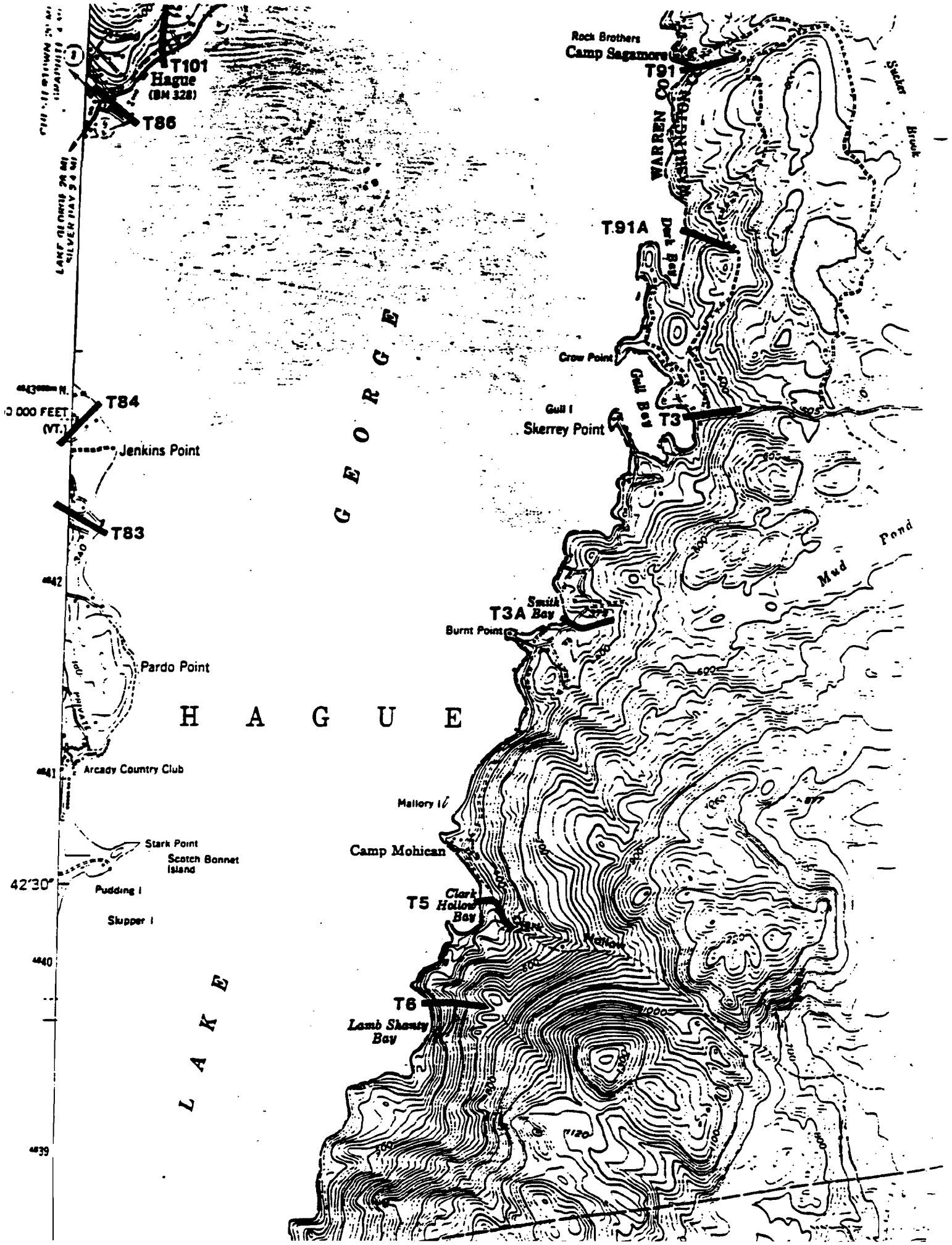
No 108 Mtn
Van Buren Bay
Silver Bay
T81
Silver Bay
Slim Pt
E P A R K
T80
Bass Bay
T79
Seaweed Bay Point
T78
T76
Agnes Island
GEORGE
Meadow Point
Loon I.
4840
4839
4837
4836
4835
4834
40'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Hague
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T86
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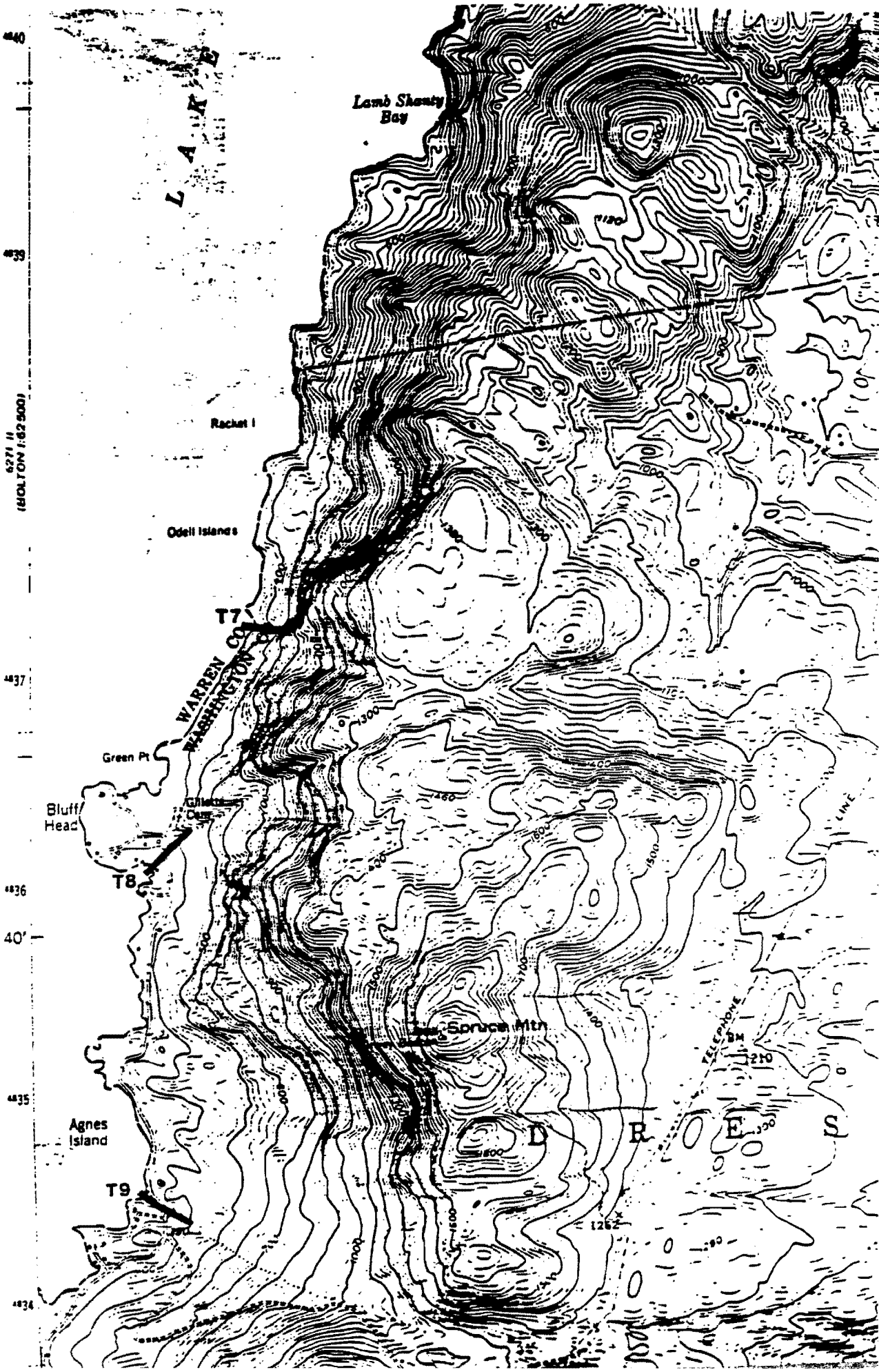
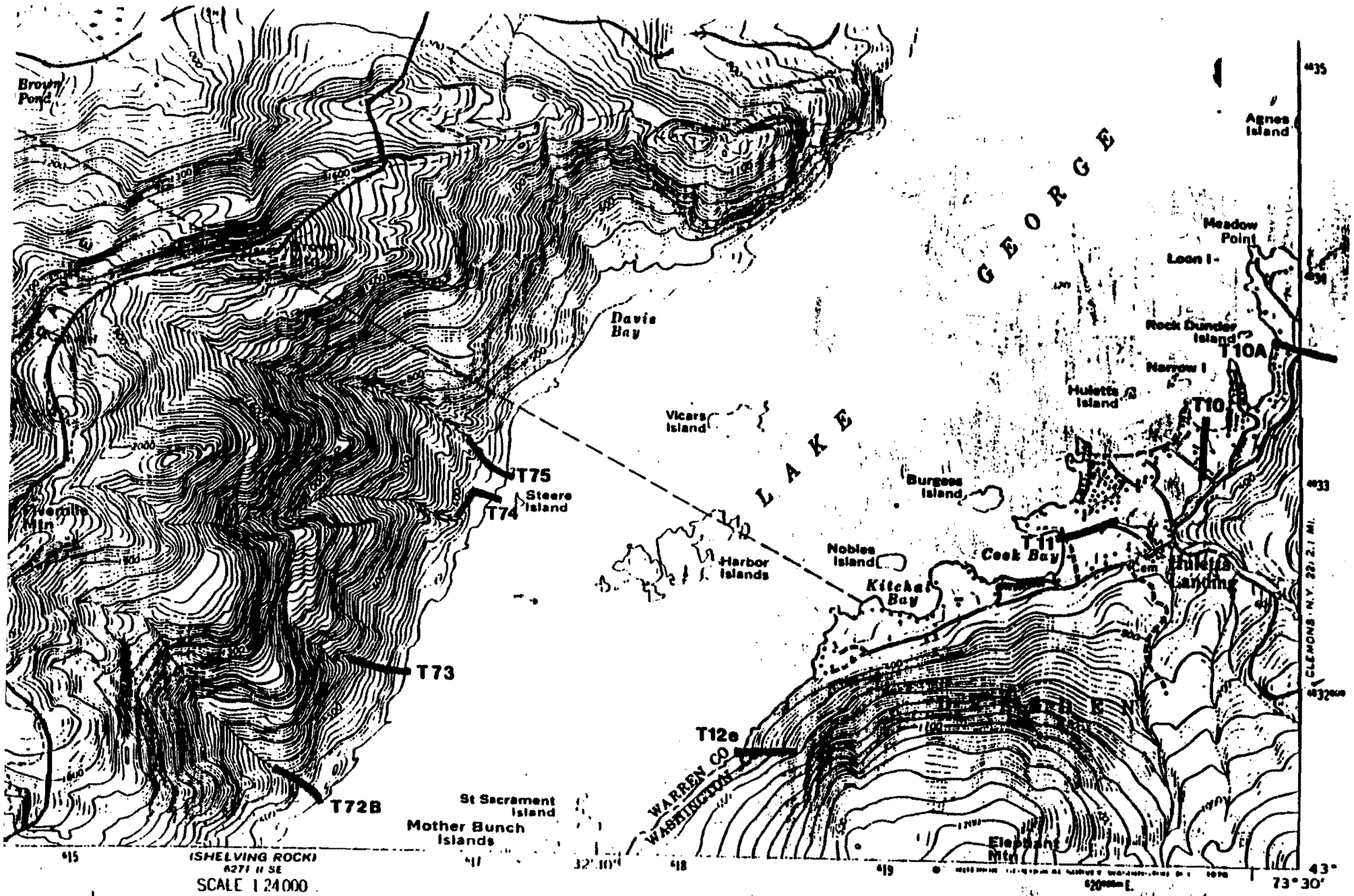
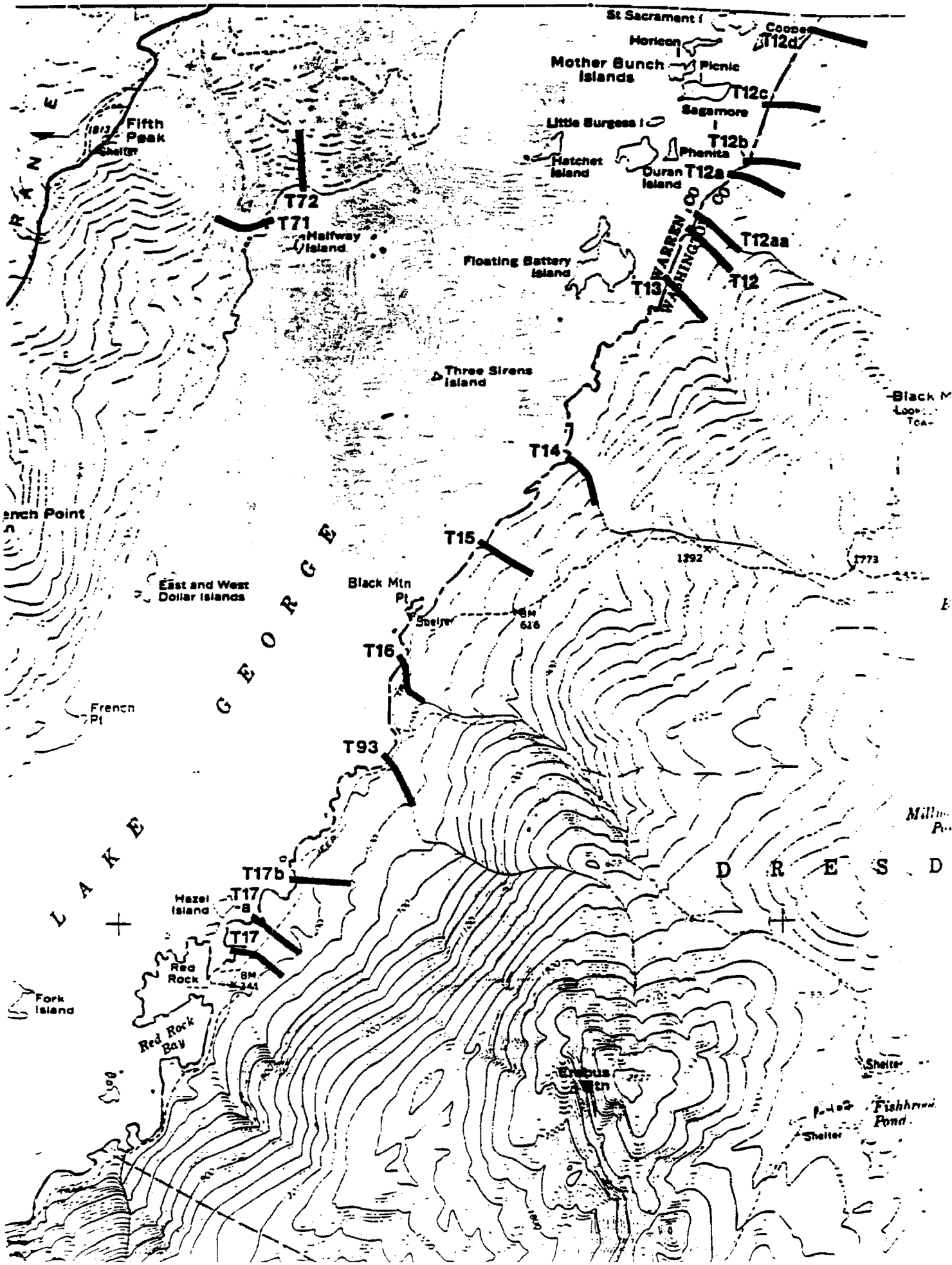
42°30'
Rock Brothers
Camp Sagamore
T91
WARREN CO.
T91A
Crow Point
Gull Bay
Gull I
Skerrey Point
T3
GEORGE
T3A
Smith Bay
Burnt Point
Mud Pond
HAGUE
Mallory I.
Camp Mohican
T5
Clark Hollow Bay
T6
Lamb Shanty Bay
LAKE


Lamb Shanty Bay
Racket I
Odell Islands
T7
WARREN CO
WASHINGTON CO
Green Pt
Bluff Head
T8
Spruce Mtn
Agnes Island
T9
40'
4840
4839
4837
4836
4835
4834


Brown Pond
Davis Bay
LAKE GEORGE
Agnes Island
Meadow Point
Loon I
Rock Dundee Island
T10A
Narrow I
Huletts Island
T10
Vicars Island
T75
T74
Steere Island
Burgess Island
Harbor Islands
Nobles Island
T11
Cook Bay
Kitchen Bay
Huletts Landing
T73
T12e
T72B
St Sacrament Island
Mother Bunch Islands
WARREN CO
WASHINGTON
Elephant Mtn
CLEMONS, N.Y. 22.2 MI.
(SHELVING ROCK)
6271 II SE
SCALE 1:24000
CONTOUR INTERVAL 20 FEET
73°30'
43°
32'30"
ROAD CLASSIFICATION
Primary highway, all weather, hard surface
Secondary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
State Route


St Sacrament I
Horicon
Cooper
T12d
Mother Bunch Islands
Picnic
T12c
Sagamore
Little Burgess I
T12b
Phenita
Hatchet Island
Duran Island
T12a
Fifth Peak
Shelter
T72
T71
Halfway Island
T12aa
Floating Battery Island
T13
T12
Three Sirens Island
T14
T15
East and West Dollar Islands
Black Mtn Pt
Shelter
BM 616
T16
French Pt
T93
T17b
T17-8
T17
Hazel Island
Red Rock
BM 344
Fork Island
Red Rock Bay
Erebus Mtn
Shelter
Fishhouse Pond
Shelter
1292
1773
LAKE GEORGE
WARREN CO

APPENDIX B

MACROPHYTE COMMUNITY ASSESSMENT DATA

Tributary Survey Transect Data
Site: T-1
Date: 07/27/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	10.0						
Juncus pelocarpus	2.5	2.5	2.5				
Myriophyllum tenellum	2.5	2.5					
Najas flexilis	2.5		2.5				
Potamogeton gramineus	10.0	10.0	10.0	2.5			
P. perfoliatus		2.5		2.5			
P. robbinsii			2.5				
Ranunculus longirostris	2.5						
Vallisneria americana	2.5	2.5					

Tributary Survey Transect Data
Site: T-1A
Date: 07/27/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii		2.5					
Eleocharis acicularis	10.0						
Elodea canadensis	10.0	20.0					
Heteranthera dubia	2.5	10.0					
Juncus pelocarpus	2.5	2.5					
Myriophyllum alterniflorum	2.5						
M. spicatum	20.0	20.0					
M. tenellum	75.0	10.0					
Najas flexilis	2.5	10.0					
Nuphar luteum	75.0						
Potamogeton amplifolius	2.5	10.0					
P. perfoliatus	10.0	2.5					
P. pusillus	20.0	10.0					
P. robbinsii		37.5					
P. vaseyi	10.0	20.0					
Ranunculus longirostris		10.0					
Sagittaria graminea	10.0	20.0					
Sparganium sp.	2.5	10.0					
Vallisneria americana	20.0	37.5					

Tributary Survey Transect Data
Site: T-2
Date: 07/27/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii			2.5				
Chara sp.	2.5	10.0					
Eleocharis acicularis			10.0				
Elodea canadensis			2.5				
Eriocaulon septangulare	2.5	2.5	2.5				
Isoetes echinospora	2.5	2.5	2.5				
I. macrospora	2.5						
Myriophyllum tenellum	2.5	10.0	10.0				
Najas flexilis	2.5	2.5	2.5				
Potamogeton amplifolius			10.0				
P. gramineus	10.0	2.5	2.5				
P. perfoliatus			2.5				
P. pusillus		2.5					
P. spirillus			2.5				
Sparganium sp.	2.5	2.5	2.5				
Utricularia resupinata		2.5					
Vallisneria americana	10.0	2.5	10.0				

Tributary Survey Transect Data
Site: T-3
Date: 09/27/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii		2.5	2.5	2.5			
Chara sp.	2.5	10.0	10.0	2.5			
Eleocharis acicularis	2.5	10.0					
Elodea canadensis	10.0	10.0	2.5	2.5			
Heteranthera dubia	2.5	10.0	10.0	2.5			
Isoetes sp.	2.5	2.5					
Myriophyllum alterniflorum	2.5	2.5					
M. spicatum	2.5	2.5	2.5	2.5			
Najas flexilis	2.5	2.5	2.5	2.5			
Potamogeton amplifolius		10.0	2.5	2.5			
P. foliosus		2.5					
P. gramineus			2.5	2.5			
P. perfoliatus	10.0	2.5	2.5	2.5			
P. pusillus	2.5	2.5					
P. robbinsii		37.5	75.0	37.5			
P. spirillus	2.5	2.5					
Ranunculus longirostris	2.5	10.0					
Sagittaria graminea	10.0	2.5					
Vallisneria americana	37.5	37.5					

Tributary Survey Transect Data
Site: T-4
Date: 07/29/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elatine minima	10.0						
Eriocaulon septangulare	10.0						
Isoetes sp.	10.0			2.5	10.0		
Juncus pelocarpus	10.0	10.0					
Lobelia dortmanna	2.5						
Myriophyllum tenellum	10.0						
Najas flexilis	2.5		10.0	20.0	10.0		
N. guadalupensis	2.5						
Potamogeton gramineus	20.0	10.0		2.5			
P. robbinsii				2.5	10.0		
P. spirillus		2.5	2.5				
P. vaseyi				2.5	2.5		
Vallisneria americana		10.0	20.0	2.5	10.0		

Tributary Survey Transect Data
Site: T-5
Date: 08/11/92

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii				10.0	20.0	10.0	
Elodea canadensis	10.0	10.0	10.0	10.0	10.0		
Heteranthera dubia				10.0			
Isoetes sp.					10.0	10.0	
Najas flexilis				2.5	2.5	10.0	10.0
Potamogeton amplifolius		2.5	20.0	20.0	10.0	10.0	2.5
P. gramineus	10.0	10.0		2.5			2.5
P. perfoliatus	10.0			2.5	10.0	10.0	
P. pusillus				2.5		2.5	
P. robbinsii			10.0	20.0	20.0	20.0	
P. vaseyi					2.5		2.5
Ranunculus longirostris		2.5	2.5	2.5			
Vallisneria americana	20.0	20.0	10.0	10.0	10.0	10.0	10.0

Tributary Survey Transect Data
Site: T-6
Date: 07/30/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eriocaulon septangulare	2.5						
Isoetes sp.	10.0	2.5			2.5		20.0
Lobelia dortmanna	2.5						
Myriophyllum tenellum	10.0						
Najas flexilis	2.5		10.0	2.5	10.0	10.0	
Potamogeton amplifolius			2.5	2.5			
P. gramineus	2.5	10.0		10.0			
P. perfoliatus			10.0	2.5			
P. pusillus					2.5	2.5	2.5
P. spirillus	2.5	10.0	10.0				
P. vaseyi				2.5		2.5	
Sparganium sp.		2.5					
Vallisneria americana			10.0	2.5			

Tributary Survey Transect Data
Site: T-7
Date: 08/02/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Chara sp.	2.5	2.5	2.5	10.0	10.0		
Eriocaulon septangulare	20.0	10.0					
Isoetes echinospora	2.5	2.5	2.5	2.5	10.0	2.5	
I. macrospora						2.5	37.5
Lobelia dortmanna	10.0	2.5					
Myriophyllum spicatum	2.5						
M. tenellum	20.0	20.0					
Najas flexilis	2.5	2.5	2.5	10.0	10.0	10.0	2.5
Potamogeton gramineus	2.5	10.0	2.5	2.5	10.0	2.5	
P. perfoliatus					2.5	2.5	
P. pusillus					2.5	2.5	10.0
P. robbinsii					2.5	2.5	2.5
Utricularia resupinata	2.5	10.0	10.0				
Sparganium sp.	2.5		2.5				

Tributary Survey Transect Data
Site: T-8
Date: 08/04/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elatine minima	10.0	10.0					
Eleocharis acicularis	2.5	2.5					
Eriocaulon septangulare	20.0	20.0					
Isoetes sp.	10.0	10.0	10.0				
Juncus pelocarpus	20.0	20.0	20.0				
Lobelia dortmanna	2.5	2.5					
Myriophyllum tenellum	10.0	10.0					
Najas flexilis	10.0	10.0	20.0	20.0			
Potamogeton amplifolius		2.5	10.0				
P. gramineus	10.0	10.0	10.0				
P. perfoliatus			2.5				
P. pusillus		2.5	10.0				
P. spirillus	2.5	2.5	10.0	2.5			
P. vaseyi		2.5	10.0				
Ranunculus reptans		10.0					
Sagittaria graminea			2.5				
Vallisnera americana	2.5	10.0	10.0	20.0			

Tributary Survey Transect Data
Site: T-9
Date: 08/04/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	20.0						
Elodea canadensis	10.0	10.0		10.0	20.0		
Eriocaulon septangulare	2.5						
Heteranthera dubia	2.5	20.0	2.5				
Isoetes sp.	2.5						
Juncus pelocarpus		10.0					
Myriophyllum tenellum	10.0						
Najas flexilis	10.0	10.0	10.0		10.0		
Potamogeton amplifolius			20.0	20.0			
P. gramineus	10.0	20.0	10.0	10.0			
P. perfoliatus	2.5	10.0					
P. pusillus	2.5	10.0	10.0				
P. robbinsii			10.0	20.0	20.0		
P. spirillus	2.5						
P. vaseyi	2.5	10.0	10.0				
Ranunculus longirostris	10.0	10.0	10.0				
R. reptans	2.5						
Sagittaria graminea	10.0						
Vallisnera americana	10.0	20.0	20.0	20.0	20.0		

Tributary Survey Transect Data
Site: T-10
Date: 08/04/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	10.0						
Elodea canadensis	20.0	37.5	20.0	20.0			
Heteranthera dubia	2.5	10.0	20.0	20.0			
Isoetes sp.	10.0						
Myriophyllum alterniflorum	2.5						
M. spicatum	10.0	20.0	20.0	20.0			
M. tenellum	10.0						
Najas flexilis	20.0	20.0					
N. guadalupensis	20.0	10.0					
Potamogeton amplifolius			20.0				
P. gramineus			10.0	20.0			
P. perfoliatus	2.5	20.0	37.5	20.0			
P. pusillus	20.0	10.0					
P. spirillus	10.0	2.5					
P. vaseyi	10.0	10.0					
P. zosteriformis				20.0			
Ranunculus reptans	10.0						
Sparganium sp.	2.5						
Vallisnera americana	20.0	20.0	20.0	20.0			

Tributary Survey Transect Data
Site: T-10a
Date: 08/04/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii				2.5	10.0		
Eleocharis acicularis	10.0						
Elodea canadensis					2.5		
Eriocaulon septangulare	10.0						
Isoetes sp.				10.0	10.0		
Juncus pelocarpus	10.0						
Myriophyllum tenellum	10.0						
Najas flexilis	10.0	2.5	2.5	10.0	10.0		
Potamogeton gramineus	10.0	2.5					
P. perfoliatus	20.0	2.5			2.5		
P. pusillus			2.5	10.0	10.0		
P. robbinsii			2.5	10.0	20.0		
P. vaseyi		2.5			10.0		
Vallisnera americana	10.0	10.0	10.0	10.0	10.0		

Tributary Survey Transect Data
Site: T-11
Date: 08/04/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis		2.5	2.5	10.0			
Eriocaulon septangulare	20.0						
Heteranthera dubia	2.5	2.5					
Isoetes sp.	2.5						
Juncus pelocarpus		2.5	20.0	20.0			
Lobelia dortmanna	2.5						
Myriophyllum tenellum	20.0	2.5	2.5	2.5			
Najas flexilis	10.0	2.5	10.0	10.0			
Potamogeton amplifolius			10.0	10.0			
P. gramineus	2.5	2.5	10.0	10.0			
P. robbinsii			10.0				
P. spirillus	2.5		2.5	2.5			
Ranunculus reptans	10.0	10.0					
Sparganium sp.	2.5						
Utricularia resupinata	20.0	20.0					
Vallisneria americana		2.5	10.0	10.0			

Tributary Survey Transect Data
Site: T-11s
Date: 08/04/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii				2.5			
Eleocharis acicularis	10.0	2.5	2.5				
Eriocaulon septangulare	20.0	10.0	10.0				
Heteranthera dubia			2.5				
Isoetes sp.	10.0		2.5				
Juncus pelocarpus	10.0	20.0					
Najas flexilis	10.0		20.0	20.0			
Potamogeton amplifolius				10.0			
P. epihydrus	2.5						
P. gramineus	10.0	10.0	10.0				
P. perfoliatus	2.5		10.0				
P. pusillus	20.0	10.0	10.0				
P. robbinsii		10.0	10.0	2.5			
P. spirillus	10.0			2.5			
Ranunculus longirostris		10.0	10.0				
Sagittaria graminea	20.0						
Utricularia resupinata	10.0	2.5	10.0				
Vallisneria americana		10.0	20.0	20.0			

Tributary Survey Transect Data
Site: T-11n
Date: 08/04/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elatine minima		2.5					
Eleocharis acicularis	10.0						
Elodea canadensis	2.5	10.0	20.0	10.0	10.0		
Heteranthera dubia	10.0	20.0	20.0	20.0			
Juncus pelocarpus	10.0						
Myriophyllum alterniflorum	2.5						
M. spicatum					2.5		
Najas flexilis	10.0	20.0	10.0	10.0			
Potamogeton amplifolius			20.0	20.0	37.5		
P. gramineus	10.0	20.0	10.0	10.0	10.0		
P. perfoliatus	20.0	10.0	20.0	10.0	10.0		
P. pusillus	2.5	2.5		10.0			
P. spirillus	2.5	10.0	10.0	10.0			
Ranunculus reptans	10.0	10.0					
Sagittaria graminea	10.0						
Vallisneria americana	20.0	10.0	20.0	10.0			

Tributary Survey Transect Data
Site: T-71
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii					10.0		
Elatine minima	10.0	2.5					
Eleocharis acicularis	20.0						
Eriocaulon septangulare	10.0	10.0					
Isoetes sp.	10.0		10.0	2.5	20.0	20.0	37.5
Juncus pelocarpus		10.0					
Najas flexilis		20.0	10.0	10.0			
Potamogeton gramineus	10.0	10.0	10.0	10.0	2.5		
P. perfoliatus		10.0	10.0	2.5			
P. pusillus	10.0	10.0	10.0	10.0	10.0		
P. robbinsii				2.5	20.0		
P. spirillus	10.0	10.0	2.5	2.5	2.5		
P. vaseyi				2.5	10.0		
Vallisneria americana		10.0	10.0	2.5	10.0		

Tributary Survey Transect Data
Site: T-72
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elodea canadensis					2.5		
Isoetes sp.				10.0	10.0	20.0	
Najas flexilis			10.0	10.0			
Potamogeton pusillus			10.0	2.5			
P. spirillus			10.0	2.5			
Vallisneria americana				2.5	2.5		

Tributary Survey Transect Data
Site: T-72a
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii						2.5	
Heteranthera dubia			10.0				
Isoetes sp.			10.0	2.5	2.5	2.5	
Myriophyllum spicatum			2.5	2.5			
Najas flexilis			10.0	2.5	2.5		
Potamogeton amplifolius		2.5		10.0			
P. epihydrus	10.0						
P. gramineus	2.5		10.0				
P. perfoliatus				10.0	2.5		
P. pusillus			10.0		2.5		
P. robbinsii			20.0	20.0	37.5	37.5	
P. zosteriformis				10.0	10.0		
Ranunculus longirostris	2.5		10.0				
Utricularia vulgaris			2.5				
Vallisneria americana			2.5	10.0	2.5		

Tributary Survey Transect Data
Site: T-72b
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elatine minima	10.0	10.0					
Eleocharis acicularis		2.5					
Elodea canadensis	10.0	2.5					
Eriocaulon septangulare	10.0	10.0					
Heteranthera dubia	2.5	2.5					
Isoetes sp.		2.5	2.5	2.5	10.0	10.0	20.0
Juncus pelocarpus	10.0	10.0					
Myriophyllum alterniflorum	2.5						
Najas flexilis	2.5	2.5	10.0	10.0			
Potamogeton amplifolius		2.5	2.5	10.0			
P. epihydrus	10.0						
P. gramineus	10.0	10.0	10.0	10.0			
P. perfoliatus	10.0	10.0			2.5		
P. pusillus	10.0	2.5	10.0	2.5			
P. robbinsii					2.5	2.5	
P. spirillus	2.5	2.5					
Ranunculus reptans	10.0	2.5					
Vallisneria americana			10.0		10.0	10.0	2.5

Tributary Survey Transect Data
Site: T-73
Date: 07/28/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	10.0						
Eriocaulon septangulare	2.5	10.0					
Isoetes sp.	2.5	2.5		10.0	10.0	10.0	10.0
Juncus pelocarpus	2.5						
Lobelia dortmanna	2.5	2.5					
Myriophyllum tenellum	10.0	10.0					
Najas flexilis			10.0	10.0	2.5		
Potamogeton gramineus		10.0	10.0	10.0			
P. pusillus					2.5		
Utricularia resupinata	10.0						
Vallisneria americana		2.5					

Tributary Survey Transect Data
Site: T-74
Date: 07/28/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elatine minima	2.5						
Eleocharis acicularis	2.5						
Eriocaulon septangulare	20.0	2.5	2.5				
Juncus pelocarpus		2.5	10.0				
Lobelia dortmanna	10.0	2.5					
Myriophyllum tenellum	10.0						
Najas flexilis				2.5			
Potamogeton gramineus	2.5	2.5	2.5	10.0			
P. pusillus				2.5			
P. spirillus				2.5			
Ranunculus reptans	10.0						
Utricularia resupinata			10.0				
Vallisneria americana				2.5			

Tributary Survey Transect Data
Site: T-75
Date: 07/28/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elatine minima	2.5	2.5					
Eriocaulon septangulare	20.0			10.0			
Fontinalis sp.		2.5	10.0				
Isoetes sp.	10.0	10.0	2.5	10.0			
Juncus pelocarpus		2.5					
Myriophyllum tenellum	2.5	2.5					
Najas flexilis	2.5	2.5	2.5	10.0			
Potamogeton amplifolius			10.0				
P. gramineus		2.5	2.5	2.5			
P. praelongus			2.5	2.5			
P. spirillus	2.5	2.5					
P. vaseyi		2.5					
P. zosteriformis			2.5				
Sparganium sp.	2.5						
Utricularia resupinata				20.0			
Vallisneria americana			10.0	10.0			

Tributary Survey Transect Data
Site: T-76
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elatine minima	2.5						
Elodea canadensis		2.5					
Eriocaulon septangulare		2.5					
Heteranthera dubia	2.5	10.0					
Lobelia dortmanna	10.0	2.5					
Myriophyllum alterniflorum	10.0						
M. tenellum	20.0	2.5					
Najas flexilis	10.0	10.0		2.5		2.5	
Potamogeton gramineus	10.0	20.0	10.0				
P. perfoliatus	10.0	20.0	10.0	2.5	2.5	2.5	
P. pusillus	2.5	10.0	10.0				
P. spirillus	2.5	2.5	10.0				
Ranunculus reptans		10.0					

Tributary Survey Transect Data
Site: T-78
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	10.0						
Eriocaulon septangulare	10.0	10.0					
Isoetes sp.	10.0						
Juncus pelocarpus	10.0	10.0					
Lobelia dortmanna		10.0					
Myriophyllum alterniflorum	10.0						
M. tenellum	10.0						
Najas flexilis	2.5						
Potamogeton gramineus	10.0	10.0					
P. perfoliatus		10.0	2.5				
P. spirillus	2.5						
P. zosteriformis			2.5				
Ranunculus reptans	10.0	10.0	2.5				
Sparganium sp.	10.0						
Utricularia resupinata			20.0				
Vallisneria americana			2.5				

Tributary Survey Transect Data
Site: T-79
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	2.5						
Eriocaulon septangulare	2.5	2.5					
Isoetes sp.	2.5						
Juncus pelocarpus	2.5	10.0					
Lobelia dortmanna	2.5	2.5					
Myriophyllum alterniflorum	2.5	2.5					
M. tenellum	10.0	10.0					
Najas flexilis	2.5						
Potamogeton gramineus	2.5	2.5	2.5				
P. spirillus	2.5						
Ranunculus reptans	10.0						
Sparganium sp.	2.5	2.5					
Utricularia resupinata	10.0	10.0	10.0				
Vallisneria americana			2.5				

Tributary Survey Transect Data
Site: T-80
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	10.0						
Elodea canadensis	10.0	2.5					
Eriocaulon septangulare	2.5	2.5					
Isoetes sp.	10.0						
Juncus pelocarpus	10.0	10.0					
Lobelia dortmanna	2.5	10.0					
Myriophyllum tenellum	20.0	10.0					
Najas flexilis	10.0	10.0					
Potamogeton gramineus	2.5	10.0					
P. perfoliatus	10.0	2.5					
P. pusillus		2.5					
Ranunculus longirostris	2.5						
R. reptans	10.0	20.0					
Sagittaria graminea	10.0						
Utricularia resupinata	2.5	20.0	37.5				
Vallisneria americana	10.0	2.5					

Tributary Survey Transect Data
Site: T-81
Date: 08/03/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	10.0						
Eriocaulon septangulare	2.5						
Isoetes sp.	2.5	10.0	2.5	10.0			
Juncus pelocarpus	10.0		2.5				
Myriphyllum alterniflorum		2.5					
M. tenellum	20.0						
Najas flexilis	2.5	10.0	20.0	20.0			
Potamogeton gramineus	20.0	20.0	10.0	2.5			
P. pectinatus			2.5	2.5			
P. perfoliatus	10.0	20.0	2.5	2.5			
P. pusillus			20.0	20.0			
P. spirillus		2.5	2.5	2.5			
Sparganium sp.	2.5						
Utricularia resupinata	20.0	10.0					

Tributary Survey Transect Data
Site: T-82
Date: 08/02/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii					2.5	10.0	
Eleocharis acicularis	10.0						
Elodea canadensis	10.0	10.0					
Isoetes sp.	10.0	2.5	2.5				
Najas flexilis				2.5	20.0		
Potamogeton gramineus	10.0	20.0	20.0	2.5			
P. perfoliatus	10.0	10.0	10.0	2.5	10.0		
P. pusillus				10.0	10.0		
P. robbinsii				2.5	10.0		
Ranunculus longirostris	20.0	10.0					
Sagittaria graminea	37.5	20.0					
Vallisneria americana	20.0	20.0	2.5	10.0	10.0		

Tributary Survey Transect Data
Site: T-82A
Date: 08/27/92

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	2.5						
Heteranthera dubia			2.5				
Isoetes sp.			10.0				
Najas flexilis		2.5	20.0				
Potamogeton amplifolius			10.0				
P. gramineus	2.5	2.5	2.5				
P. pectinatus	2.5	2.5					
P. perfoliatus			2.5				
P. pusillus			10.0				
P. robbinsii			2.5				
Utricularia resupinata	10.0	10.0	2.5				
Vallisneria americana		2.5	10.0				

Tributary Survey Transect Data
Site: T-83
Date: 08/02/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elodea canadensis	2.5	2.5					
Heteranthera dubia	2.5		20.0				
Isoetes sp.		2.5	10.0				
Juncus pelocarpus			10.0				
Myriophyllum alterniflorum	10.0	10.0					
M. tenellum	10.0	2.5					
Najas flexilis			20.0				
Potamogeton amplifolius		2.5	10.0				
P. perfoliatus	10.0	10.0	10.0				
P. pusillus			2.5				
P. robbinsii		2.5	10.0				
P. spirillus	2.5		10.0				
P. vaseyi			2.5				
Ranunculus longirostris	2.5	2.5					
Sagittaria graminea	2.5	10.0					
Vallisneria americana	10.0	20.0	10.0				

Tributary Survey Transect Data
Site: T-84
Date: 08/27/92

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	2.5						
Elodea canadensis	2.5	2.5	2.5				
Isoetes sp.	10.0						
Lobelia dortmanna	2.5						
Myriophyllum alterniflorum	10.0	10.0					
M. tenellum	20.0	12.5					
Najas flexilis		10.0					
Potamogeton crispus	2.5						
P. gramineus	10.0	10.0	10.0				
P. perfoliatus	2.5	20.0	10.0				
P. pusillus		10.0					
Sparganium sp.	2.5						
Vallisneria americana	10.0	20.0	10.0				

Tributary Survey Transect Data
Site: T-84A
Date: 07/30/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii			2.5		10.0	2.5	
Elatine minima	10.0	2.5					
Elodea canadensis	2.5	10.0	10.0	10.0			
Heteranthera dubia	2.5	10.0	20.0	20.0		10.0	
Isoetes sp.	2.5						
Juncus pelocarpus	10.0	2.5					
Lobelia dortmanna	2.5						
Myriophyllum spicatum		2.5		2.5	2.5		
M. tenellum	20.0	20.0					
Najas flexilis		2.5	10.0	10.0	10.0	10.0	
Potamogeton amplifolius	20.0	20.0	20.0	20.0	20.0	10.0	
P. gramineus	10.0	2.5	10.0	10.0		2.5	
P. perfoliatus	37.5	2.5	2.5	10.0	10.0		
P. robbinsii				10.0	10.0	10.0	
P. spirillus	2.5	2.5	10.0	10.0			
P. vaseyi			10.0	10.0		10.0	
Ranunculus longirostris	2.5	10.0	2.5	10.0			
Sagittaria graminea	20.0						
Vallisneria americana	10.0	10.0	10.0	20.0	10.0	10.0	

Tributary Survey Transect Data
Site: T-85
Date: 07/29/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii				2.5	2.5	2.5	
Elodea canadensis	2.5	20.0					
Heteranthera dubia		10.0					
Myriophyllum alterniflorum		10.0					
Najas flexilis	2.5	10.0					
Potamogeton amplifolius		20.0	20.0	10.0			
P. pusillus		2.5					
P. robbinsii			10.0				
Ranunculus longirostris		10.0	10.0	10.0	10.0		
Sagittaria graminea	20.0						
Vallisneria americana		20.0	20.0	10.0	10.0	2.5	

Tributary Survey Transect Data
Site: T-86
Date: 07/29/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eleocharis acicularis	20.0						
Elodea canadensis	75.0	75.0	20.0	10.0		2.5	2.5
Heteranthera dubia	10.0	37.5	10.0	10.0	10.0		
Juncus pelocarpus	10.0						
Myriophyllum alterniflorum	10.0						
M. tenellum	20.0						
M. spicatum	10.0	10.0	10.0	10.0	2.5	2.5	2.5
Potamogeton amplifolius		37.5	37.5	37.5	20.0		
P. gramineus		10.0					
P. perfoliatus	10.0	10.0	20.0	10.0			
P. robbinsii		10.0		10.0	10.0		
P. vaseyi						2.5	
Ranunculus longirostris		10.0					
Sagittaria graminea		10.0					
Sparganium sp.	2.5	2.5					
Vallisneria americana	2.5	10.0	20.0	20.0	10.0	2.5	

Tributary Survey Transect Data
Site: T-87
Date: 07/29/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Bidens beckii				2.5			
Elatine minima		2.5					
Eleocharis acicularis			10.0				
Heteranthera dubia		2.5					
Isoetes sp.	2.5						
Juncus pelocarpus		10.0					
Lobelia dortmanna	2.5	10.0					
Myriophyllum tenellum	20.0		20.0	20.0			
Najas flexilis	10.0	10.0	10.0	10.0			
Potamogeton amplifolius			2.5	10.0			
P. epihydrus		2.5					
P. gramineus	10.0	2.5	2.5				
P. perfoliatus	2.5			10.0			
P. robbinsii				2.5			
Sparganium sp.		2.5					
Utricularia resupinata			10.0				
Vallisneria americana	20.0			10.0			

Tributary Survey Transect Data
Site: T-88
Date: 07/29/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Chara sp.	2.5	2.5	2.5	10.0	2.5		
Elodea canadensis	2.5	2.5	2.5				
Eriocaulon septangulare	2.5	10.0	2.5				
Heteranthera dubia		10.0	2.5				
Isoetes sp.			10.0	10.0	10.0		
Lobelia dortmanna			2.5				
Myriophyllum alterniflorum	2.5	2.5	2.5				
M. tenellum		37.5	37.5	20.0	20.0		
Najas flexilis	2.5	10.0	10.0	20.0	10.0		
Potamogeton amplifolius		2.5	2.5	10.0	10.0		
P. gramineus	2.5	10.0	2.5	2.5			
P. perfoliatus	2.5	2.5	2.5				
P. pusillus	2.5	2.5	2.5	2.5	2.5		
P. robbinsii			10.0	10.0	10.0		
P. spirillus	2.5	2.5	2.5	2.5	2.5		
Ranunculus longirostris		2.5	10.0				
Vallisneria americana	10.0	20.0	10.0	10.0	10.0		

Tributary Survey Transect Data
Site: T-89
Date: 07/27/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Chara sp.	2.5	2.5	2.5	2.5			
Elodea canadensis	10.0	10.0	2.5	2.5			
Heteranthera dubia	2.5	10.0	2.5				
Isoetes sp.		2.5	2.5	2.5			
Lobelia dortmanna		2.5					
Myriophyllum spicatum	2.5	2.5					
M. tenellum	2.5	75.0	75.0	75.0			
Potamogeton amplifolius		2.5	10.0	2.5			
P. gramineus		2.5	2.5	2.5			
P. perfoliatus	2.5	2.5	2.5	2.5			
P. robbinsii		2.5	10.0	10.0			
Ranunculus longirostris		2.5	2.5	2.5			
Sagittaria graminea	2.5	2.5	2.5				
Vallisneria americana	37.5	37.5	10.0	10.0			

Tributary Survey Transect Data
Site: T-90
Date: 07/27/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Chara sp.	2.5	2.5	2.5	2.5	2.5		
Elatine minima	2.5						
Elodea canadensis	2.5	2.5	2.5	2.5	2.5		
Eriocaulon septangulare	2.5	37.5	10.0				
Heteranthera dubia	2.5						
Isoetes echinospora	2.5	2.5	2.5	2.5			
I. macrospora				2.5	10.0		
Juncus pelocarpus	2.5	2.5					
Najas flexilis					2.5		
Myriophyllum tenellum	10.0	37.5	10.0	10.0	10.0		
Potamogeton amplifolius			2.5	2.5	10.0		
P. gramineus		2.5	2.5	2.5	2.5		
P. perfoliatus		2.5	2.5	2.5			
P. robbinsii		2.5	10.0	2.5	2.5		
P. spirillus	2.5						
Ranunculus longirostris	2.5	2.5					
R. reptans		2.5					
Sparganium sp.	2.5						
Vallisneria americana	10.0	10.0	10.0	10.0	10.0		

Tributary Survey Transect Data
Site: T-91
Date: 07/27/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Eriocaulon septangulare		2.5					
Isoetes sp.		10.0	10.0	10.0	2.5		
Juncus pelocarpus	10.0	10.0	2.5				
Najas flexilis		10.0	2.5	10.0	10.0		
N. guadalupensis		10.0	2.5				
Myriophyllum tenellum	10.0	10.0	2.5				
Potamogeton amplifolius				2.5	2.5		
P. gramineus	10.0	10.0	10.0		2.5		
P. perfoliatus		10.0		2.5	2.5		
P. pusillus		10.0		2.5	2.5		
P. robbinsii				2.5	2.5		
P. spirillus	2.5	2.5					
P.vaseyi		10.0					
Vallisneria americana	2.5	10.0	10.0				

Tributary Survey Transect Data
Site: T-91a
Date: 07/27/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elodea canadensis	10.0	10.0					
Eriocaulon septangulare	20.0						
Heteranthera dubia			2.5				
Isoetes sp.				2.5	10.0	37.5	10.0
Najas flexilis	10.0			10.0	2.5	20.0	2.5
N. guadalupensis	2.5		2.5	2.5	20.0	2.5	2.5
Myriophyllum spicatum		2.5			2.5		
Potamogeton amplifolius		10.0	20.0				
P. gramineus	20.0	10.0	10.0	20.0			
P. perfoliatus	10.0	20.0	2.5		2.5		
P. pusillus				2.5			
P. robbinsii					10.0		
P. spirillus			2.5	2.5	2.5		
P. vaseyi			2.5	2.5	10.0		
Ranunculus longirostris		2.5	2.5				
Vallisneria americana	10.0	20.0	20.0	10.0			

Tributary Survey Transect Data
Site: T-101
Date: 07/30/93

Species	Depth Interval (m)						
	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Elodea canadensis				2.5			
Eriocaulon septangulare	10.0						
Isoetes sp.					2.5	2.5	2.5
Juncus pelocarpus	10.0	10.0					
Lobelia dortmanna	10.0						
Myriophyllum tenellum	10.0	10.0					
Najas flexilis	2.5	2.5	2.5	10.0	20.0	2.5	2.5
Potamogeton amplifolius				2.5	2.5	10.0	
P. gramineus				10.0			
P. perfoliatus				10.0	10.0	2.5	
P. robbinsii					10.0	2.5	2.5
P. spirillus				2.5			
Utricularia resupinata	10.0	20.0	20.0				
Vallisneria americana			10.0	20.0	10.0		