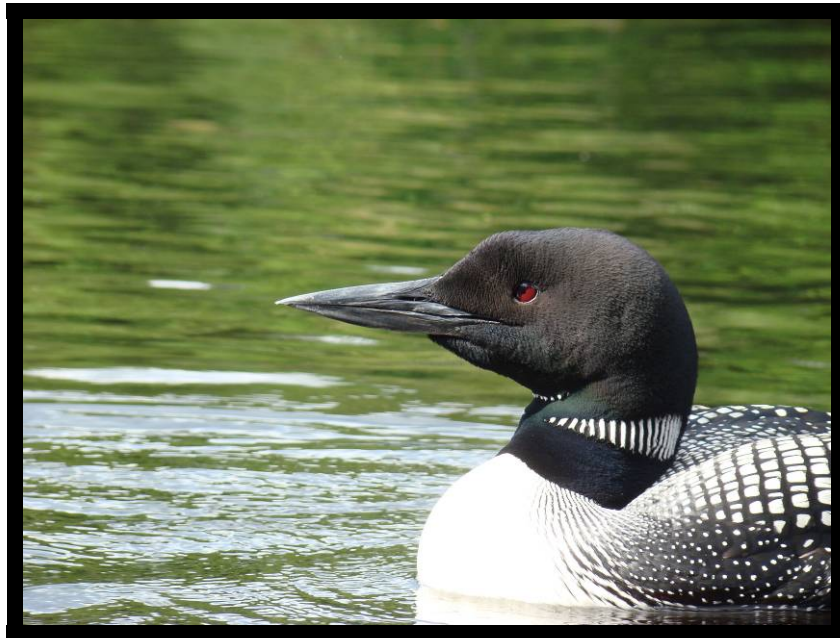


Watershed Stewardship Program
Summary of Programs and Research
2008



Adirondack
Watershed
Institute



Table of Contents

<u>Introduction and Key Findings – 2008</u>	3
<u>Watershed Stewardship Program- Staff Biographies, Summer, 2008</u>	10
<u>Recreation Use Study: Lake Placid State Boat Launch</u>	12
<u>Recreation Use Study: Long Lake State Boat Launch</u>	22
<u>Recreation Use Study: Osgood Pond</u>	28
<u>Recreation Use Study: Rainbow Lake</u>	37
<u>Recreation Use Study: Raquette Lake</u>	46
<u>Recreation Use Study: Second Pond/Lower Saranac Lake</u>	55
<u>Recreation Use Study: St. Regis Lakes</u>	60
<u>Purple Loosestrife Monitoring and Control Project, St. Regis Lakes, 2008</u>	69
<u>Loon Monitoring Report: St. Regis Lakes</u>	76
<u>Public Outreach and Education in the Raquette Lake Area</u>	79
<u>Invasive Plant Monitoring and Mapping Project: Long Lake</u>	82
<u>Comparative Wetland Structure Study (short title)</u>	88
<u>Paul Smith's College Horse Barn Wetland Pond Development Project</u>	94
<u>Lake Placid Eurasian Water Milfoil Viability Review and Lake George Comparison</u>	97
<u>Northern Pitcher Plants and the Effects of Light Variability and Prey Capture Rates on Pitcher Morphologies</u>	100

Updated Version- March 11, 2009

Introduction and Key Findings – 2008

By Eric Holmlund, Director, Watershed Stewardship Program
and Associate Professor, Paul Smith's College

Introduction

Part of Paul Smith's College's Adirondack Watershed Institute, the Watershed Stewardship Program (WSP) has served the Adirondack region in its effort to prevent the spread of invasive species to lakes in the Saranac Lake-Lake Placid region since 2000. For several years the program has served as a model and critical collaborator with conservation and advocacy groups across the region, including the Adirondack Park Invasive Plant Program, the Lake George Watershed Conference, and the Lake Champlain Basin Program.

The Watershed Stewardship Program is a cooperative, community-based effort to conserve natural resources, including water quality, wildlife and soil, through targeted educational efforts at specific locations near Paul Smith's College in New York State's Adirondack Park. The program is a cooperative effort by members of the Paul Smith's College faculty, New York State land management agencies, including the Department of Environmental Conservation, non-governmental environmental organizations including the Nature Conservancy, the Adirondack Park Invasive Plant Program, Lake Champlain Basin Program and the Adirondack Cooperative Loon Program, and shore owner organizations from the St. Regis Lakes, Rainbow Lake, Lake Placid, Osgood Pond, Long Lake and Raquette Lake.

The WSP's wide ranging programs include point-specific environmental interpretation, watercraft inspection, educational outreach, field-based invasive species monitoring and various data-collecting projects aimed at better understanding human pressures on waterways and local trails and the mitigation of associated environmental impacts. The program hires college students with expertise in the natural resources to act as educators, researchers and field technicians. This report is an annual effort to consolidate and report on all aspects of program activities for the summer of 2008.

Summer 2008 Highlights

The Watershed Stewardship Program provided educational services and invasive species inspections at northern Adirondack boat launches for the ninth consecutive year. Along with returning stewardship at the St. Regis Lake, Lake Placid and Rainbow Lake boat launches, this year saw expansion of boat launch inspection/education to Second Pond (reprising the effort from 2005), Osgood Pond (along with volunteers), Long Lake and Raquette Lake. This year featured the continuation of efforts to monitor and control the exotic invasive plant purple loosestrife, monitor loon pairs on the St. Regis Lakes, assess invasive plant presence on Lake Placid, provide public outreach programming around Raquette Lake and create aquatic macrophyte maps of Long Lake. Stewards also conducted a wetland transplant project, a wetland composition and function study, a study of pitcher plant morphology and a literature review of milfoil growth on Adirondack lakes. The WSP's Volunteer Lake Steward Program was at work on Rainbow Lake and Osgood Pond, with volunteers inspecting boats and educating the public.

The primary thrust of this year's program was once again to educate people launching watercraft about the threat of introduced invasive species, primarily Eurasian watermilfoil (*Myriophyllum spicatum*) and how to minimize exposure of lakes to the threat. Stewards also gathered detailed information about the character of boat launch use, including such information as total boats launched, type of watercraft, and demographic information. Watershed Stewards also asked boaters if

they routinely take preventative measures, such as removing vegetation, washing boat and trailer, immediately emptying bilges, etc., to avoid the risk of spreading invasive species. Stewards were ordinarily stationed at the boat launches, but had other duties, such as paddling kayaks to observe loons, monitoring and controlling purple loosestrife on waterways, and conducting public outreach in addition to maintaining data bases and meeting weekly to share information.



Watershed Steward Korinna Marino stationed at Raquette Lake

Program Mission

The Adirondack Watershed Institute's (AWI) Watershed Stewardship Program (WSP) at Paul Smith's College is a community-based program designed primarily to educate the public about conservation, preservation, and stewardship issues of the Lower and Upper St. Regis Lakes, Spitfire Lake, Lake Placid, the Rainbow Lake waterway, Long Lake, Raquette Lake and Osgood Pond. The WSP also fulfills research and service functions. Baseline data concerning recreational use patterns and the status of natural resources gathered by the WSP aids in the development of area unit management plans by the New York State Department of Environmental Conservation. Stewards also identify and remove invasive purple loosestrife plants from the waterfronts of cooperating property owners on the St. Regis Lake chain and Lake Placid. The WSP takes advantage of the skills and training of students of Paul Smith's College's Natural Resources, Environmental and Forestry programs with direction from the Paul Smith's College faculty, including a faculty program director.

The Watershed Stewardship Program has evolved over the years from its first year of service in 2000. In that year, the program served the St. Regis Lakes and St. Regis Mountain, both seven days per week during the summer. In 2001, the program expanded to serve Upper Saranac Lake for seven days per week, and in 2002, the WSP was welcomed on Lake Placid for four days per week. In 2004, coverage on Upper Saranac Lake shrank to weekends while coverage on Lake Placid expanded to five days per week. In 2005, coverage ceased for Upper Saranac Lake, but began on weekends at Lake Kushaqua (Rainbow Lake waterway) and Second Pond (Lower Saranac Lake waterway). In 2006, coverage ceased on Second Pond due to lack of funding, but expanded to six days per week at the Lake Placid site. In 2007, coverage was expanded to seven days per week on Lake Placid and resumed on weekends on St. Regis Mountain. In addition, the Volunteer Lake Steward Program expanded its coverage to Schroon Lake. In 2008, Long Lake and Raquette Lake added full-time stewards.

Staff

The program was funded to employ eight employees for the summer of 2008 in a variety of full and part-time positions. Seven of the Watershed Stewards were Paul Smith's College students or recent graduates. Positions included a Director, a Science Director, an Assistant Director, 6 full-time stewards and a part time steward. The Science Director position was new for 2008. Dr. Celia Evans, an ecologist specializing in wetland and upland plants, joined the staff part-time to provide leadership and mentor science projects with the Stewards. Dr. Evans also shared responsibility with the Director as Volunteer Steward Program co-coordinator.

Staff Training

A week of staff training sessions began on May 19, 2008. Stewards began boat launch duties on May 24, in time for Memorial Day. Staff training included program orientation, safety and risk management, interpretation principles, interpretive message development, role-playing public contact, and introduction to WSP research program data collection and entry, all by the program director. Paul Smith's College's Recreation and Intramurals Director Jim Tucker provided First Aid and CPR instruction, Marge and Ted Glowa of the Rainbow Lake Association provided Boater Safety certification, Forest Ranger Keith Bassage and forester Steve Guglielmi provided an orientation to the



Joint Boat Launch Steward training at Paul Smith's College, May, 2008

DEC, PSC Professor Mike DeAngelo addressed principles of limnology, Professor Craig Milewski presented on Adirondack fish morphology and Hilary Smith of the Adirondack Park Invasive Plant Program addressed invasive plants. Meg Modley presented the invasive species concerns of Lake Champlain. Dr. Nina Schoch trained our loon monitor. Mike Quenell provided an orientation to the St. Regis Lakes, Nicole Broderick and Sue Riggins oriented employees to Lake Placid and Josh Wilson from the Association for the Protection of the Adirondacks presented information on the forest preserve. Dan Kelting provided a field trip to orient stewards to the Eurasian watermilfoil research and management activities on Lake Colby. This year, stewards were joined for part of staff training by boat

launch stewards employed by the Lake Champlain Basin Program and Lake George Association. A grand total of 22 people attended our staff training.

Key Findings and Program Activities

Overall, Watershed Stewards tallied 11,904 members of the public launching 6,152 watercraft at the Lake Placid, Upper St. Regis, Second Pond, Long Lake, Raquette Lake, Osgood Pond and Buck Pond (Rainbow Lake Waterway) boat launches for the summer of 2008. Numbers of watercraft and members of the public encountered were over twice as large as those reported in 2007, owing to the greatly expanded scope of the program in 2008 (new sites at Raquette Lake, Long Lake and Second Pond).

Table 1: Recreation Use Data from WSP launches.

Summary of season- 2008

All Boat Launches- Watershed Stewardship Program

Site	Boat Type								total # boats	Summer Avg HP outboard	Four stroke	Group Size	Pets
	M	PWC	S	C	K	B	R						
Lake Placid	912	8	8	132	405	14	3	1480	71	217	3042	89	
Long Lake	691	65	5	327	168	0	0	1258	66	52	2536	69	
Osgood Pond	18	1	0	56	61	0	2	233	n/a	3	383	10	
Rainbow Lake	113	8	0	62	68	0	0	251	41	35	586	27	
Raquette Lake	225	16	4	61	39	7	0	355	68	42	810	n/a	
Second Pond	526	17	5	591	622	3	1	1765	61	160	3223	165	
St. Regis	249	0	9	290	202	60	2	810	57	84	1324	26	
2008 totals	2734	115	31	1519	1565	84	8	6152		593	11904	386	

Site	Avg time to launch	organisms found		organism type				Boat Wash	
		launching	retrieving	EWM	BW	NM	other	entering	leaving
Lake Placid	0:16	76	20	7	2	2	91	n/a	n/a
Long Lake	0:22	27	5	11	0	4	17	n/a	n/a
Osgood Pond	0:18	1	6	0	3	1	5	n/a	n/a
Rainbow Lake	0:16	15	28	0	2	1	31	23	48
Raquette Lake	0:04	1	1	1	1	0	1	n/a	n/a
Second Pond	0:23	48	44	19	2	10	70	n/a	n/a
St. Regis	0:18	25	23	2	4	0	40	203	79
2008 totals		193	127	40	14	18	255	226	127

Notes: The values are grand totals for the 15 week 2008 season (May 24 to August 31, 2008). Key: (hp) indicates average horsepower of all observed motors. M = motorboat, PWC= personal watercraft, S = sailboat, C = canoe, K = kayak, B = *barge, R = rowboat,. *Barges were recorded each time they utilized the launch area in an attempt to assess commercial/ construction use of the launch. EWM= Eurasian watermilfoil, BW = native bladderwort, NM = native milfoil. Osgood Pond numbers include observations from volunteer stewards.

Use trends over the years indicate some variability, with generally stable or slightly increasing numbers of watercraft launched over the last three years. As usual, Watershed Stewards compiled data on the recent use history of boats putting into program waterways. This information yielded a detailed picture of the web of interconnections between our lakes and those both within and without the Adirondack Park. Specific information from each lake may be found within this report. All of the WSP lakes were demonstrated to be connected in terms of potential invasive species exposure with hundreds of lakes and rivers from New York State and beyond.

In total, almost 12,000 people were directly given an interpretive message centering on conservation and natural resource health in the summer of 2008 while untold numbers received the message indirectly through their peers or WSP publications.



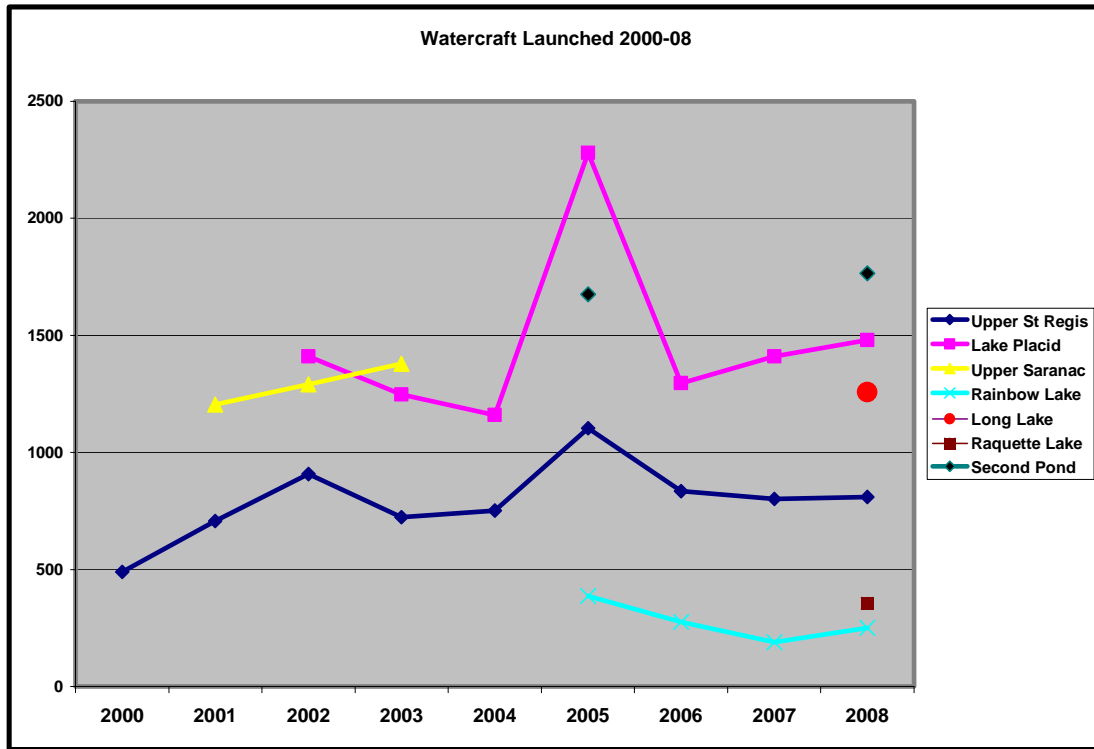


Figure 1: Multi-year trends in boat launch usage

Other Programs

Our Stewards are given the opportunity to pursue their interests beyond public education in the Watershed Stewardship Program. This is what sets this program apart from similar efforts across the country. Our Stewards engage in public contact with experts from area natural resource management and advocacy agencies to solve conservation and research problems. Watershed Stewards once again teamed up with Steven Flint from the Adirondack Nature Conservancy to track down, map, count and remove as many purple loosestrife plants as possible on the St. Regis Lakes Chain and on Lake Placid. Our program has been instrumental in this struggle against the exotic invasive plant for seven years. This year's efforts removed 450 of the purple loosestrife plants from sensitive areas on the St. Regis Lakes chain and approximately 40 plants from the single patch on Lake Placid's Buck Island and a small new site on Paradox Bay.

Once again, a steward spent one day per week monitoring the pairs of banded loons that are residents of the St. Regis Lakes chain under the aegis of the Adirondack Cooperative Loon Program. The loons seem to be persisting despite the threat of environmental mercury deposited as a result of acid rain.

In a collaborative effort with the Adirondack Park Invasive Plant Program (APIPP), funded by the United States Fish and Wildlife Service, the WSP Science Director Celia Evans served as the Volunteer Lake Steward (VLS) Program Coordinator, sharing the responsibility with Eric Holmlund. The VLS program focused on bringing boat inspection instruction and support to interested lake associations in the area. This year's VLS program included the participation of volunteer groups from the Chateaugay Lakes, Rainbow Lake, Osgood Pond, Mountain View Lake and Long Lake. Eric Holmlund offered two VLS training sessions covering invasive species identification, public education,

boat inspection and data management at Paul Smith's College on June 27 and July 25. A total of 22 volunteers from the various lake associations attended. At the training sessions participants received VLS handbooks, informative brochures, stickers, data sheets and t-shirts to aid them in their volunteer efforts. Celia Evans was the primary contact person for the balance of the summer for the various volunteer steward programs.

This summer saw a the initiation of paid steward programs at Long Lake and Raquette Lake, funded by New York State through the action of the Long Lake Association, Raquette Lake Association, the Town of Long Lake and the office of Senator Betty Little. These two full-time summer steward positions offered steady and consistent public service, boat inspection and special project support for invasive species containment and public education in two new program areas. Overall, while both programs were successful, with over 3,300 visitors encountered, the WSP did encounter some challenge in providing consistent support to these employees, who were located up to 90 minutes away by car. In order to properly support the employees, members of the Raquette Lake and Long Lake Associations provided outstanding supplemental contact and guidance for the employees. These programs represent a new format for the relationships the WSP has with its cooperating lake associations in that they succeed through higher level interaction with association staff. This is to be recognized as a significant evolution of the Watershed Stewardship Program's offerings and strategy.

In 2008, the WSP was fortunate to have partial funding support from a grant for invasive species management by the United States Fish and Wildlife Service (USFWS). This support allowed us to fund the Rainbow Lake Waterway program and underwrote a significant portion of the rest of the program, principally the Science Director/Volunteer Lake Steward coordinator position. This support helped the WSP to develop its science offerings and allowed us to benefit from the expertise, enthusiasm and creativity of Dr. Celia Evans, a member of the Paul Smith's College faculty. The program is significantly stronger as a result.

Each of the special projects described above allows the WSP to respond to current needs, both of the community around us and of the students themselves. In this way, the program becomes a vital bridging experience between academic study and the world of productive conservation work.

Program recommendations

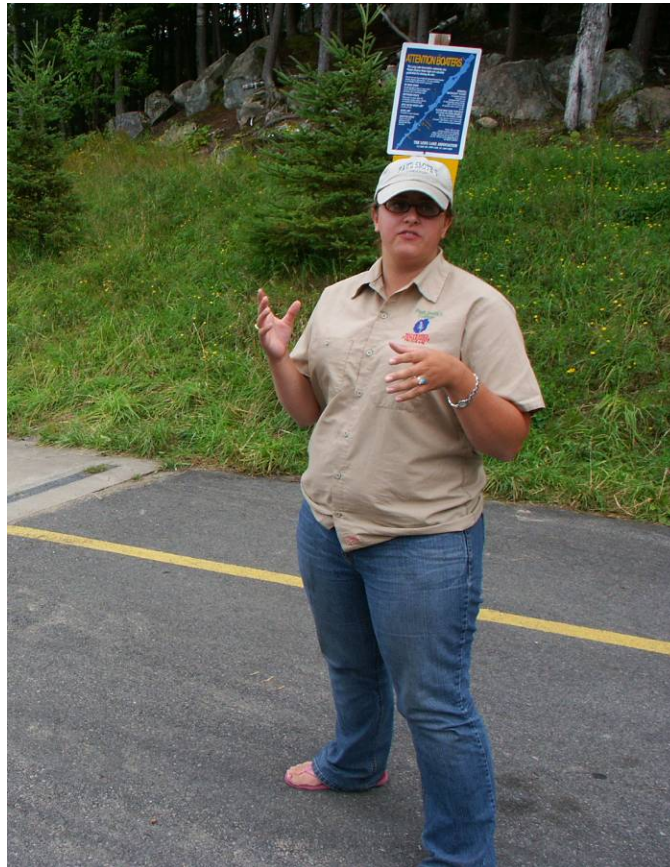
For the 2009 season, we look forward to:

- Continuing to offer the Science Director position
- Continuing and expanding the Volunteer Lake Steward program
- Adding more special project activities for Watershed Stewards to prevent employee burnout from the repetitive nature of boat launch duty. Increase special projects from 1 day per five-day work week to 1.5 days per five-day work week.
- Continue monitoring and education at the Second Pond/Lower Saranac Lake boat launch, pending funding.
- Increasing collaboration with the Lake Steward programs at Lake George, Blue Mountain Lake and Lake Champlain
- Discussions with Long Lake and Raquette Lake regarding plans for 2009

Watershed Stewardship Program Funding

The Watershed Stewardship Program was funded for the 2007 season by the United States Fish and Wildlife Service, the St. Regis Foundation, the Lake Placid Shore Owners' Association, the Rainbow Lake Association, and the State of New York. We are profoundly grateful for their support and contributions to our program vision. We invite current funders to continue their support of this multifaceted and proven program and welcome new supporters to join this effort to serve Adirondack watersheds through education, research and service. The program director is eager to meet with

interested parties to discuss future plans and opportunities for the Watershed Stewardship Program. We also would like to appreciate the readers of this document and the many members of the public with whom we have interacted over the past seven years in the course of our efforts raise general awareness of critical watershed issues.



Watershed Stewardship Program- Staff Biographies, Summer, 2008



Jessie Gardner, *Watershed Steward*

Jessie is currently a junior at Paul Smith's College majoring in Fish and Wildlife Science. She is from Hudson, NY. Jessie will be performing studies and projects for the Watershed Stewardship Program including ongoing loon monitoring, a wetland study, monitoring water chemistry in the St. Regis Lake chain, and creating an educational activity packet for children. Jessie's hobbies are running, horseback riding, needlework, and paddling. Jessie's ideal job would be to study wild mustang herding behaviors.



Korinna Marino, *Watershed Steward*

Korinna is in her second year the Environmental Studies associate's degree program at Paul Smith's College, and intends to continue her studies in a four year program after graduation. Originally from Caroga Lake, NY, Korinna hopes to have a career working with people to address environmental issues through education and innovation. Korinna is currently working at a boat launch, and also on a number of outreach and education projects for the WSP. Her hobbies are writing, dancing, hiking, kayaking and canoeing.



Eric Munley, *Watershed Steward*

Eric is a junior at Paul Smith's College majoring in Ecological Forest Management. He is passionate about mapping, removing and controlling the spread of invasive plants. Eric is from Raritan, NJ and is currently learning to play the guitar and mandolin. He enjoys hiking and paddling when he is not working at the boat launches or participating in a purple loosestrife control and mapping project around Lake Placid and the St. Regis lakes.



James Parmeter, *Watershed Steward*

James is a senior at Paul Smith's College with majors in Environmental Science: Biology track, and Fish and Wildlife Science. He is from Lisbon, NY and he enjoys fly-fishing, kayaking, hiking and rock climbing in the Adirondacks. James chose to be a 2008 Watershed Steward in order to develop his public relations skills, spend the summer outdoors, and because he wanted to learn more about the water bodies of the northern Adirondacks, and the invasive species that threaten those aquatic systems.



Brittany Ravenscraft, *Watershed Steward*

Brittany is originally from Markleysburg, PA. She is a recent graduate from Paul Smith's College with a degree in Natural Resources, Concentration in Environmental Science and a certificate in Geographic Information Systems (GIS). This summer, Brittany will work on a project to map aquatic plants in the littoral zone, or shallows, of Long Lake. She will also give educational presentations at a town hall meeting and at the public library in Long Lake. Her hobbies are trout fishing, photography,

cooking and paddling.

Sarah Ryan, Program Director.



Sarah is a graduate of the University of Massachusetts at Amherst with a BS in Natural Resource Studies and minors in Environmental Science, Political Science and Fish and Wildlife Conservation. Sarah also completed a course of study in outdoor recreation in the Outdoor Leadership Program in Greenfield, MA. This summer Sarah will be giving a variety of public presentations to community members of all ages, creating Watershed Stewardship publications, participating in the wetland study, as well as performing boat launch, and supervisory duties.

Naomi Thompson, Watershed Steward.



Naomi is a senior at Paul Smith's College majoring in Biology/ Ecology. She is from Groveland, NY. Naomi hopes to have a career as a wetland field biologist, and is currently performing a pitcher plant study in local wetlands. Naomi loves the beauty and remoteness of the Adirondacks and she spends her days off hiking, biking, and fishing in area streams. She chose to spend her summer as a Watershed Steward for the opportunity to be outside and educate people about wetlands.

Celia Evans, Science Director.



Celia has her Ph.D. in Ecology and Evolutionary Biology from Dartmouth College. Celia joined the faculty at Paul Smith's College in 2001 where she is an Associate Professor of Ecology in the Science Liberal Arts and Business Division specializing in biogeochemical cycling and plant / soil / herbivore interactions in forested ecosystems. Celia also conducts research in science education with particular emphasis on student / scientist partnerships and citizen science. Dr. Evans has published in the *Canadian Journal of Forest Research* (1998), *American Biology Teacher* (2001), and *Plant and Soil* (2001).

Eric Holmlund, WSP Director



Eric is an Associate Professor of Environmental Studies at Paul Smith's College. In addition to his work as Director of the Watershed Stewardship Program, Eric teaches in Paul Smith's College's baccalaureate program in Nature and Culture. Eric is co-author of a book, *The Camper's Guide to Outdoor Pursuits*. Eric and his wife Kim have a ten-year-old daughter, Dana, and twin nine-year-old boys, Will and John. He enjoys most outdoor activities, especially canoeing and camping. Eric is pursuing a Ph.D. in Environmental Studies from Antioch University New England.

Recreation Use Study: Lake Placid State Boat Launch

By James Parmeter

Introduction:

For the past seven years the Watershed Stewardship Program has had a Steward stationed at the state boat launch located on Lake Placid. Stewards were present at the launch five days a week starting from the 25th of May 2008 and ending on the 1st of September 2008.

The Watershed Stewards had a significant function at the Lake Placid boat launch. Stewards provided visitors and boaters a crucial message about the spread of aquatic invasive species, how invasives affect native terrestrial and aquatic ecosystems throughout the Adirondacks, how they can affect recreational boating and fishing. Stewards informed boaters on what prevention steps can be taken to help avoid infecting waterways with aquatic invasive species.



New Invasive Species Disposal Site installed by NYSDEC- Lake Placid Boat Launch

Methods:

Stewards were present at the launch between the hours of 7:00 am to 4:00 pm each day of the week except Tuesdays and Wednesdays from 25 May 2008 through 1 September 2008. Stewards filled out recreation data sheets about boat launch use during their shifts each day. Stewards gathered a variety of information from each boater that visited the launch, including boat type (inboard, outboard, or inboard/outboard), if the engine was four or two stroke, horsepower of the engine, group size, and in which state the boat was registered, if applicable. The time that the boater arrived and departed (launching) was recorded, along with the time that they arrived and departed (hauling away) from the dock. The number of pets, if any were accompanying the boater(s) was also recorded.

Users were asked if their boat had been on other water bodies during the previous two weeks, and if any prevention steps were taken (washing the boat and trailer, inspecting for plant fragments, draining the bilges, disposing of bait or draining the live well) before entering another water body. To ensure the removal of aquatic hitchhikers, boats were inspected by stewards for the presence of weeds prior to launching and after retrieving the boat from the water. The data collected was entered into an Excel database where it was analyzed and compared to other weeks and previous summers. The data gives the state and shore owners an idea of boat launch usage, but also provides insight into the risk of an invasive entering the lake.

Results:

Between the 25th of May and Labor Day there was a total of 3,042 people launching 1480 watercraft. The average time spent at the launch was 15.5 minutes. The peak usage of the year was the week of the 21st of August to the 27th of August, 2008 (202 boats, 406 people) and the week of the 3rd of July to the 7th of July in which 409 people launched 177 boats (Figure 1). Use levels peaked for the week of the 4th of July and then declined till the week of the 7th of August when they began to rise again.

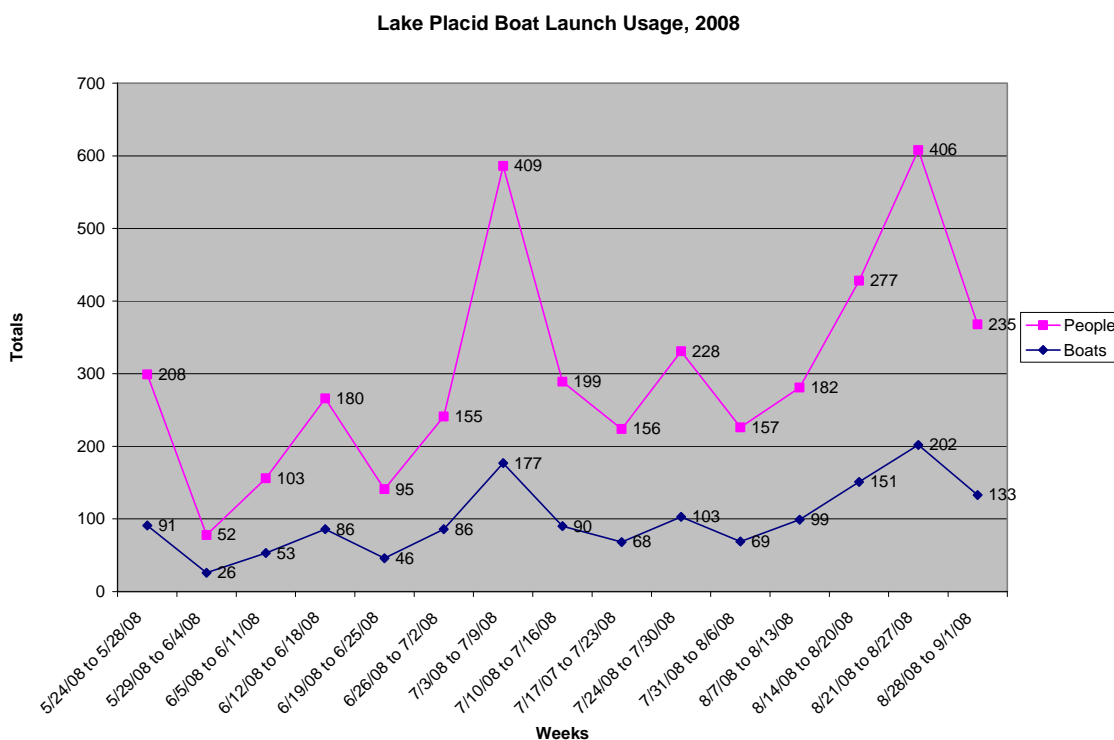


Figure 1. Weekly use of the New York State Boat Launch on Lake Placid during the summer of 2008.

Motorboats were the most numerous type of watercraft launched in the summer of 2008 (912 total; 61% of total watercraft), followed by kayaks (405; 27%), and then canoes (132, 9%), Barges (14, 1%), PWC (8, 1%), Sailboats (8, 1%), and Rowboats (3, 0%; figure 2). Even with the ban of Personal Water Craft (PWC) eight cases were encountered making up 1% of the boat launch use. Motorized watercraft outnumbered human-powered watercraft by a total of 934 (63% of total watercraft) to 548 (37%). Average horsepower of motors observed was 70. Two hundred and seventeen 4-stroke motors were observed (23% of the 934 total motorized boats), which was significantly lower than the 293 recorded from 2007.

Lake Placid Boat Types, 2008

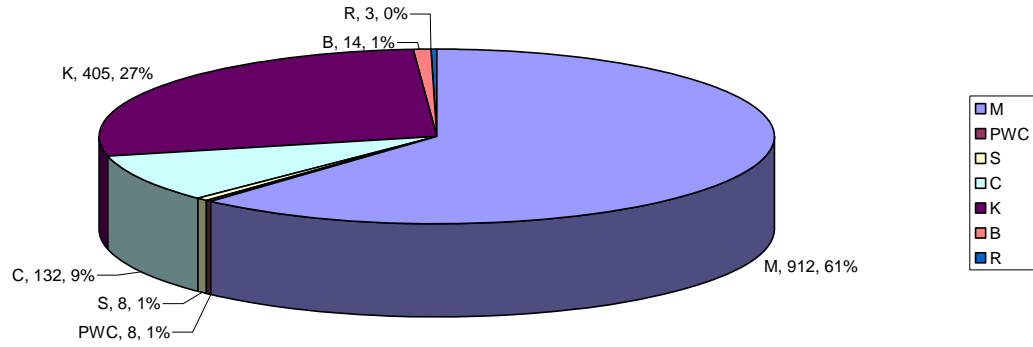


Figure 2: Percent of watercraft type launched at the New York State Boat Launch on Lake Placid during the summer of 2008. [M= Motorboat PWC= Personal water craft, S= Sailboat, R= Rowboat,, C= Canoe, K= Kayak, B= Barge]

State/Province of Origin

As expected, most boats (902) were registered in New York, while others came from a wide range of places (Table 1). The second most represented state was New Jersey, with 30 boats, followed by Connecticut, Maryland, and Vermont (13 boats). Lake Placid attracts boaters from a wide range with 18 states and two Canadian provinces. Watershed stewards determined originating state by observing registration stickers on motorized watercraft and asking other boaters their place of origin. It is likely that some of the unregistered watercraft would have originated in states outside New York.

Origin	total	Origin	total
NY	902	ON	6
NJ	30	QU	3
CT	13	VA	3
MD	13	DE	2
VT	13	MA	2
FL	12	OH	2
PA	11	NC	1
CA	11	RI	1
NH	7	WS	1
MS	7	total	1019

Table 1. Place of origin observed from boats launched into Lake Placid from the New York State Boat Launch during the summer of 2008.

Use Patterns

In 2008 Watershed Stewards were stationed at Lake Placid 5 days per week, from Wednesday to Sunday. We found the peak use weeks to be the 3rd of July through the 9th of July (177 boats) and the week of the 21st of August through the 27th of August, 2008 (202 boats; Figure 1), which was one of the peak weeks in the summer of 2007 and the same for 2005, but different from 2006. The rainy weather this summer could be a contributing factor to the decline in boaters for the 2008 season. Most boats were launched on the weekend with Saturday having the most launches (total 428, Figure 3) with an average of 31 boats per Saturday. Average boats launched by day are as follows: Thursday – 12, Friday – 21, Sunday – 21, and Monday – 20.

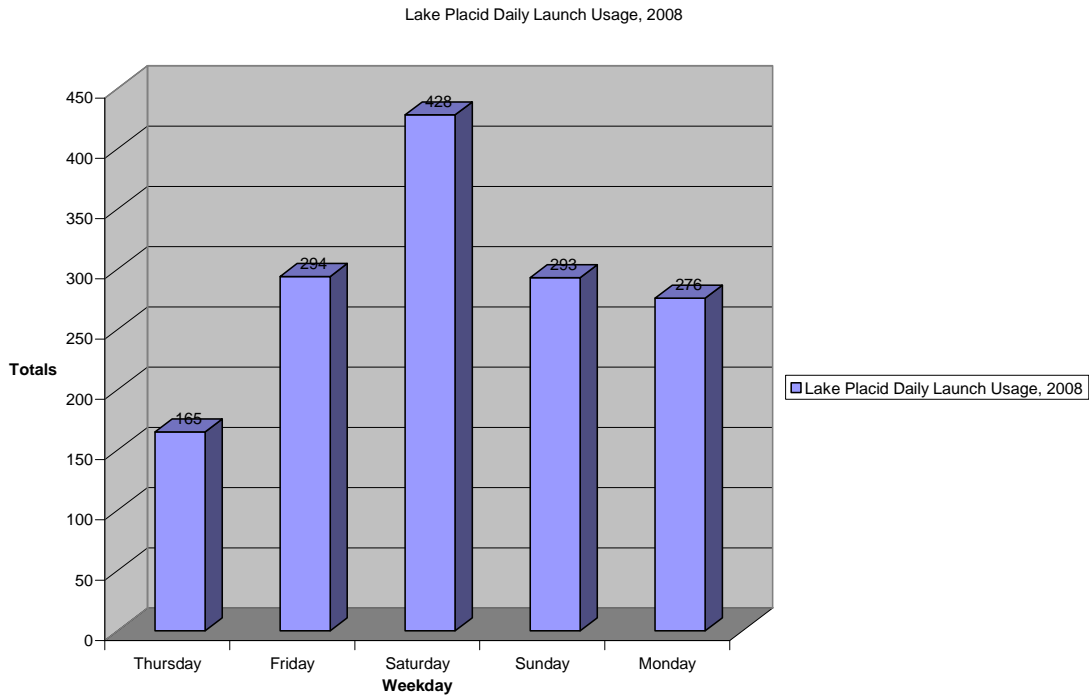


Figure 3. Total number of boats launched from the New York State Public Boat Launch on Lake Placid by day of week during the summer of 2008.



water body	Known Infected	Total Visits	water body	Known Infected	Total Visits
Assunpink Lake, NJ	Yes	1	Lake Ossipee (NH)	Yes	1
Atlantic Ocean	Yes	1	Lake Temagami (ON)	Yes	1
Ausable	?	1	Lincoln Pond	Yes	2
Ballston Lake	?	1	Long Island	Yes	1
Beaver Lake (Lewis County)	?	1	Long Island Sound	Yes	1
Big Moose Lake		1	Long Lake		9
Black River		2	Long Pond (Essex)	Yes	1
Bolton Lake (CT)		1	Loon Lake	Yes	2
Boquet River		1	Louis Lake		1
Boston Harbor	Yes	1	Lower Saranac	Yes	33
Brant Lake	Yes	2	Lower St. Regis		1
Buck Pond		1	Marion River		1
Canandaigua	Yes	2	Meacham Lake	Yes	2
Cascade Lakes		5	Middle Saranac	Yes	20
Cazenovia Lake	Yes	2	Mirror Lake		65
Chapel Pond		1	Mohawk River	Yes	3
Chateaugay Lake	Yes	5	Moose Pond		2
Chazy Lake	Yes	1	North Lake	?	1
Chesapeake Bay	Yes	2	Norwood		1
Chester River (MD)	?	1	NY City Area	Yes	1
Chubb River		4	Ocean	Yes	2
Church Pond		1	Oneida Lake	Yes	1
Clear Lake		1	Oseetah Lake	Yes	11
Copperas Pond		1	Osgood Pond		3
Corey's Pond		1	Oswegatchie River		1
Cranberry Lake	Yes	1	Otsego Lake	Yes	3
CT River	Yes	1	Paradox Lake		2
Cayuga	Yes	1	Patapsco River (MD)	Yes	1
Deerfield		1	Potomac River	Yes	1
Dunham Reservoir Lake		1	Peeks Pond		1
Everest		1	Plattsburgh		1
Fern River		1	Plutoric River		1
Finger Lakes	Yes	4	Rainbow Lake		1
Fish Creek	Yes	1	Rangely (ME)		1
Florida	Yes	1	Raquette Lake		2
Follensby Clear	Yes	5	Raquette River		7
Fourth Lake		2	Rideau Canal	Yes	1
Franklin Falls	Yes	4	Rollins Pond		1
Fulton Chain 1st - 4th		2	Sacandaga Lake	Yes	1
Gardeners Bay		1	Sacandaga Reservoir	Yes	2
Garnet Lake		1	Saltwater (MA)	Yes	1
Glenwood Pond		1	Saranac	Yes	2
Grafton State Park		1	Saranac Chain	Yes	3
Grass River	?	1	Saranac Lake	Yes	12
Great Sacandaga Lake	Yes	1	Saranac River	Yes	3
Great South Bay (Long Island)	Yes	1	Saranacs	Yes	7
Haliburton Lake (Ontario)		1	Schroon Lake	Yes	2

Hannawa Pond		1	Second Pond	Yes	2
Harrington State Park		2	Susquehanna River	Yes	3
Hoel Pond		1	Seventh Lake	Yes	1
Horseshoe Pond	Yes	1	Silver Lake	Yes	2
Hudson River	Yes	3	South Lake		1
Indian Lake	Yes	2	Spitfire Lake		1
Joe's Pond (VT)		1	Square Pond	Yes	1
Jones Pond		1	St. Francis Lake		1
Kiwassa Lake	Yes	10	St. Lawrence	Yes	7
Lake Bonaparte	Yes	1	St. Regis		3
Lake Champlain	Yes	17	St. Regis Chain		2
Lake Clear		1	Stillwater		1
Lake Colby	Yes	5	Taylor Pond	Yes	7
Lake Delta		1	Three Mile Harbor		1
Lake Dunmore (VT)		1	Tupper Lake		2
Lake Erie	Yes	3	Union Falls	Yes	1
Lake Eton		1	Union Falls Pond	Yes	3
Lake Everest		1	Upper Chateaugay	Yes	2
Lake Flower	Yes	28	Upper Saranac	Yes	20
Lake George	Yes	12	Upper St. Regis		7
Lake Hopatcong, NJ	Yes	1	VA Lakes	Yes	1
Lake Iroquois (VT)	Yes	1	Valens Pond		1
Lake Kinzua		1	Whey Pond		1
Lake Kushaquua		1	Walker Lake		3
Lake Ontario	Yes	2	White Lake		1

Table 2: Lakes visited in the previous two weeks before visiting Lake Placid, 2008. Note: Many of the blanks under the "infected" column result from lack of data. Those water bodies may indeed be infested with invasive species.

Where has your boat been?

Watershed Stewards asked boaters what other bodies of water their boats had been on in the previous two weeks before visiting Lake Placid. This gave us a scope of the likelihood the lake may be exposed to an invasive aquatic species. Three hundred and fifty-four boats were reported to have been used in other lakes in the preceding two weeks. This represents 24% of the total boats launched (1480). We expect that more boats had been used in other waterways in the preceding two weeks, but at high use periods it was difficult to ask this question of all boaters. These 354 boats had visited a total of 420 lakes in the preceding two weeks. Some boat owners reported visiting more than one lake in the preceding two weeks. Of the 420 reported visits to other lakes, 65% (271) were to a lake with a known infestation of aquatic invasive species. Overall, then, a strong majority of the boats reporting prior waterway visits represent a risk of transporting invasive species to Lake Placid.

The breakdown of lakes visited prior to Lake Placid helps us to understand patterns of visitation and invasive species transport. The body of water reported most was the Saranac Lakes Chain (total 97). Because of the various responses given, any answer mentioning Saranac Lake was tallied together (Lower Saranac – 33, Upper Saranac – 20, Middle Saranac – 20, Saranac Lake – 12, Saranacs – 7, Saranac – 2, and Saranac Lakes Chain – 3). The second most visited body of water visited was Mirror Lake with 65 responses. The third, fourth and fifth lakes most visited were Boston Harbor (33), Cascade Lakes (20) and Lake Flower (20). The Saranac Lakes Chain, Lake Flower and Lake George all host Eurasian watermilfoil and Lake Champlain is known to host many aquatic invasive species including Eurasian watermilfoil, hydrilla, water chestnut, and zebra mussels. Most out of state boaters

responded to the question about previous water bodies in the last two weeks with “This is the first time the boat’s been used this year” or “The boat only goes in this lake.” This is an interesting finding considering that you would assume that invasive species are being transported to our lakes by out-of-state visitors, when in actuality the most significant potential source of invasives tends to be local boaters. Vacationers appear to only use their boat on vacation and park it in their yard for the remainder of the year, while locals tend to boat throughout the spring, summer, and fall.

Have You Taken Prevention Steps?

This is the third year stewards asked, “What, if any, prevention steps did you take to stop the spread of aquatic invasive species?” Possible prevention steps a boater could have taken included washing or inspecting their boat, draining the bilge, and emptying live wells, and bait buckets. We found that out of the total 1,484 boats launched 604 (41%) took some form of prevention steps. Of the 604 boaters who took preventative steps washing the boat was the main prevention step reported (378 boats) followed by boat inspection (331) and bilge draining (204, Figure 5).

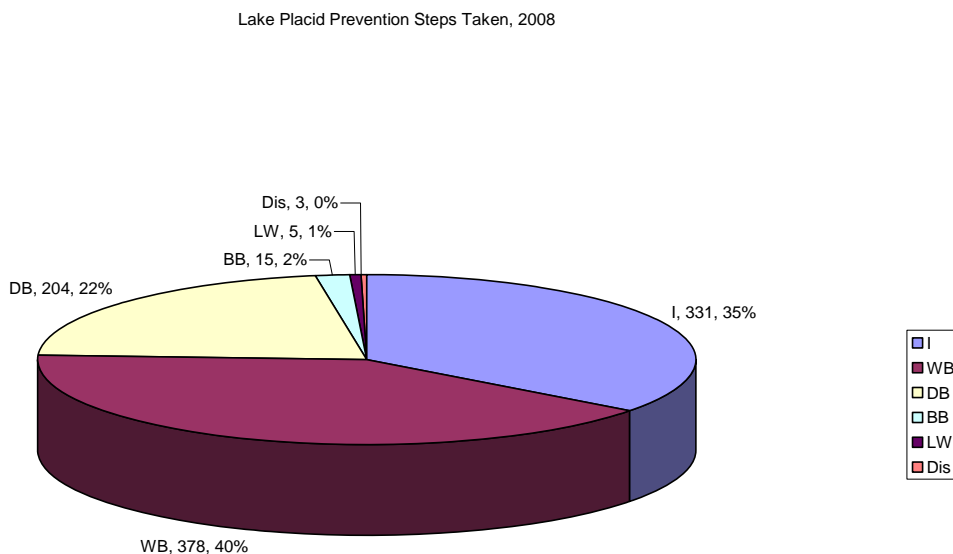


Figure 5. Prevention steps taken by boaters to help stop the spread of aquatic invasive species by boats, recorded at the New York State Public Boat Launch on Lake Placid.

Results of Boat Inspections- Found Organisms

This summer, Watershed Stewards tracked the organisms they found on boats being launched and retrieved at the state boat launch. Overall, 75 groups were found to be transporting organisms somewhere on the boat, trailer or tow vehicle as they launched their watercraft. 20 boats being retrieved from Lake Placid were carrying organisms. Overall, these 95 boats represent 6.4% of all boats inspected in 2008.

	Launching	Retrieving
Eurasian WM	6	1
Grass	23	4
Native Milfoil	2	0
Elodea	2	0
Variable Leaf Milfoil	1	0
Pine needles	1	3
Other	13	6
Unidentified	27	6
	75	20

Table 3- Organisms found on boats Lake Placid 2008

The “other” category reflects the best guesses of stewards as they scrutinized leaf fragments, insect larvae, stems, etc. The “unknown” category reflected greatly degraded plant and/or animal material. It is likely that the elodea found by the stewards is the native species, not the Brazilian invasive, although this is unconfirmed owing to the degraded state of the fragments retrieved. The Eurasian Watermilfoil fragment found on a boat exiting Lake Placid likely does *not* reflect an established bed of this invasive species in Lake Placid, but merely a weed remaining from previous boating. The boat in question was not inspected on the way in (it could have launched on a day when stewards were off duty, or a period when they were on lunch break), and did report having been in the Saranac Lake chain in the previous two week period. Variable leaf milfoil is not considered (yet) an invasive species in the Adirondacks, but is being “watched” by the Adirondack Park Invasive Plant Program because of its vigorous growth in other Adirondack lakes including Raquette Lake. Overall, this level of detail is helpful in terms of establishing protocol and assuring complete coverage and inspection rigor. The stewards took it as a point of pride to take off any and all matter, and to try their best to determine what it was.

Purple Loosestrife Control Efforts

Again, Watershed Stewards removed purple loosestrife from Camp Sunshine on Lake Placid’s Buck Island. This year, stewards removed only 36 plants, down from approximately 200 plants in 2007. Unfortunately, stewards identified another small site of purple loosestrife infestation, near the Whiteface Lodge boathouse in Paradox Bay. We will keep an eye on this site. Stewards did a careful shoreline survey of the entire lake and islands and found no other purple loosestrife growing.



Watershed Steward Eric Munley educating property owner about how to identify purple loosestrife.

Discussion

The summer of 2008 saw a small decrease in the number of users at the Lake Placid Public Boat Launch from the previous summer along with a small increase in boats launched/inspected (Figure 6). Observed use levels were certainly influenced by the decrease in steward coverage from 7 days per week in 2007 to 5 days per week in 2008. If the other two days per week had been included, it is likely that use levels in 2008 would have significantly exceeded those in 2007. The type of watercraft launched this season was similar to years past with non-motorized boats accounting for most of the usage. The average horsepower of motorboats decreased from the 2007 season (81) to the 2008 season (70). The number of four stroke engines also decreased with 217 this year compared to 293 in 2007. However, the total number of boats increased slightly in 2008 (1480) compared to the 2007 (1410) season (figure 6). Visually inspecting boats for hanging weeds found 92 organisms on boats and trailers, of the 92 cases nine were invasives; Eurasian Watermilfoil (7), Eel Grass (1), and Variable Leaf Milfoil (1). In eight of the nine cases the organisms were found before entering Lake Placid and the fifth case (Friday the 22nd of August, 2008) of Eurasian Watermilfoil was found leaving Lake Placid on a boat that had been on the Saranac Lakes Chain. The increasing percentage of prevention steps taken by users indicates the effectiveness of stewards and other programs informing boat owners of the transport of invasive species. Stewards did encounter a few instances of boaters and boat servicing operation giving them a hard time and arguing with stewards about their monitoring efforts. For ease of analysis future data managers may want to setup additional columns for boaters who visited other lakes and then of those boaters who has been on an infected water body.

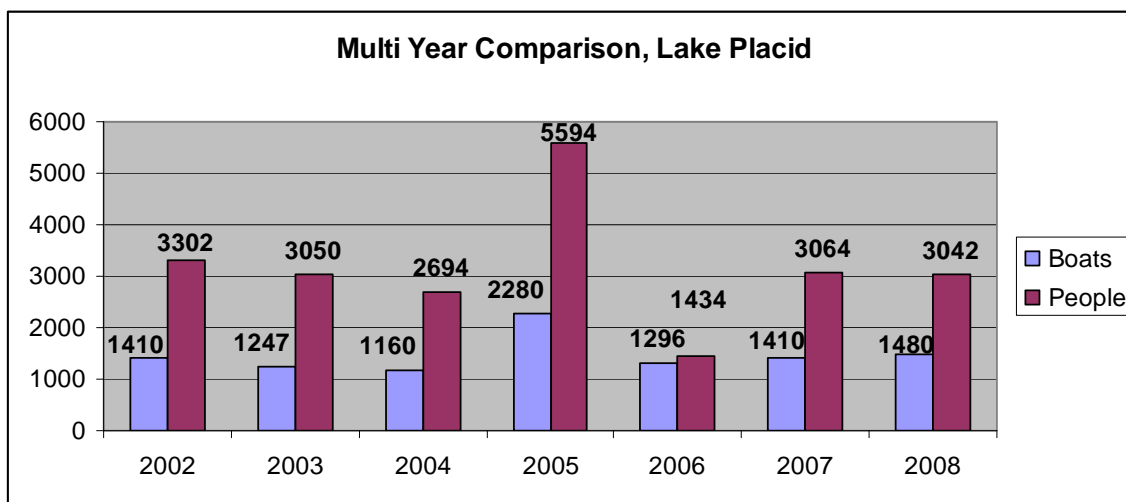


Figure 6: Multi-year comparison of total numbers of boats and users at the Public boat launch for the St. Regis Lakes Chain, 2008.

Conclusion

The summer of 2008 was another success year for the Watershed Stewards stationed at the Lake Placid Public Boat Launch. Three thousand and forty-two people in 1,480 boats received a message regarding invasive species and their possible transport on watercraft. All 1,480 boats were inspected for weeds, with only a few boaters being uncooperative or unresponsive. However, with 65% of all boats with prior use having come from infected waterways within the preceding two week period, the threat of the spread of invasive species being introduced into Lake Placid deserves attention and continued monitoring. Despite this, only seven cases of invasive organism finds were recorded this season.

The Watershed Stewardship Program has been in effect since 2000. Each year our primary sponsor, the Lake Placid Shore Owners' Association (LPSOA) for their vision and dedication to the

health of Lake Placid and all waterways in the Adirondack Park. The energetic and dedicated officers of the LPSOA provided guidance and encouragement in addition to the financial support of the association. The Watershed Stewards truly feel part of a team committed to the health of Lake Placid and enjoy every opportunity they get to get out onto the lake and help. So many visitors to the Lake Placid Boat Launch benefit from the program and the leadership of the LPSOA, the support of the New York State Forest Rangers and the goodwill of the property owners in general. We sincerely thank the Association for supporting this program, working not only to protect the Lake Placid but to educate all visitors about the responsibility we have to aquatic ecosystems everywhere. As boat users receive an educational message, environmental awareness is spread to all waterways in which those users then travel.

Table 4: Lake Placid Recreation Study Results, 2008

Summary of season- 2008

Lake Placid

NY State Boat Launch

Date	Boat Type							total # boats	Weekly Avg HP outboard	Four stroke	Group Size	Pets	Avg time to launch	Avg time to retrieve
	M	PWC	S	C	K	B	R							
5/24/08 to 5/28/08	61	0	0	2	28	0	0	91	53	37	208	8	0:14	0:32
5/29/08 to 6/4/08	20	0	0	3	3	0	0	26	59	0	52	2	0:21	0:13
6/5/08 to 6/11/08	43	0	0	4	6	0	0	53	76	12	103	4	0:16	0:16
6/12/08 to 6/18/08	64	0	0	7	15	0	0	86	60	17	180	2	0:12	0:12
6/19/08 to 6/25/08	34	0	0	4	8	0	0	46	61	10	95	3	0:15	0:18
6/26/08 to 7/2/08	45	1	0	10	30	0	0	86	77	15	155	7	0:18	0:14
7/3/08 to 7/9/08	118	0	0	18	41	0	0	177	76	31	409	8	0:21	0:15
7/10/08 to 7/16/08	60	0	1	9	20	0	0	90	63	13	199	5	0:14	0:13
7/17/07 to 7/23/08	47	1	2	3	14	0	1	68	75	8	156	7	0:15	0:10
7/24/08 to 7/30/08	73	1	2	9	17	1	0	103	99	22	228	10	0:21	0:15
7/31/08 to 8/6/08	43	4	0	5	13	4	0	69	75	8	157	6	0:15	0:16
8/7/08 to 8/13/08	58	0	0	6	31	4	0	99	79	6	182	2	0:15	0:18
8/14/08 to 8/20/08	62	0	2	17	68	2	1	151	67	11	277	3	0:17	0:16
8/21/08 to 8/27/08	122	1	0	13	64	2	1	202	67	21	406	12	0:15	0:15
8/28/08 to 9/1/08	62	0	1	22	47	1	0	133	58	6	235	10	0:12	0:07
summer totals	912	8	8	132	405	14	3	1480	Summer Avg=71	217	3042	89	0:16	0:15
									Median HP = 70					

Key: M = Motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = barge (construction); R = rowboat

Date	organisms found		organism type				Measures Taken by Visitors to Prevent Inv. Spec.						
	launching	retrieving	EWM	BW	NM	other	took steps	I	WB	DB	BB	LW	Dis
5/24/08 to 5/28/08	0	0	0	0	0	0	20	21	17	1	0	0	0
5/29/08 to 6/4/08	0	0	0	0	0	0	14	5	8	8	0	0	0
6/5/08 to 6/11/08	1	0	0	0	0	0	16	3	10	9	0	0	0
6/12/08 to 6/18/08	0	2	0	0	0	2	34	8	30	3	0	1	0
6/19/08 to 6/25/08	0	0	0	0	0	0	14	6	7	4	0	1	0
6/26/08 to 7/2/08	5	0	0	1	0	4	20	5	11	8	0	0	0
7/3/08 to 7/9/08	0	0	0	1	0	7	55	54	19	37	15	1	2
7/10/08 to 7/16/08	10	0	3	0	0	7	44	19	27	15	0	0	0
7/17/07 to 7/23/08	6	2	1	0	1	6	42	14	24	19	0	0	0
7/24/08 to 7/30/08	10	1	1	0	0	10	38	21	31	13	0	0	0
7/31/08 to 8/6/08	12	6	0	0	1	18	34	14	22	15	0	1	1
8/7/08 to 8/13/08	10	2	0	0	0	11	46	11	26	21	0	0	0
8/14/08 to 8/20/08	6	3	0	0	0	9	59	28	34	25	0	1	0
8/21/08 to 8/27/08	11	3	1	0	0	12	107	83	72	21	0	0	0
8/28/08 to 9/1/08	5	1	1	0	0	5	61	39	40	5	0	0	0
summer totals	76	20	7	2	2	91	604	331	378	204	15	5	3

Key: EWM = Eurasian Watermilfoil; BW = native bladderwort; NM = native milfoil; I = Inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = emptied livewell; Dis = disposed of bait.

Recreation Use Study: Long Lake State Boat Launch By Brittney Ravenscraft

Introduction

The Watershed Stewardship Program, a division of Paul Smith's College's Adirondack Watershed Institute strives to educate the public of threat of invasive species and promote their prevention. Long Lake is a new participant to our program this 2008 season. A steward was stationed at the state boat launch four days a week to present boaters with a short interpretive message and to inspect all watercrafts and their trailers before entering the lake. In addition data was compiled regarding both boater and watercraft characteristics and bodies of water visited.



Figure 1: Watershed Steward Brittney Ravenscraft at Long Lake Boat Launch

Methods

A steward was stationed at the Long Lake State Boat Launch from Memorial Day weekend until Labor Day. The shift was from 7am to 4pm every Friday, Saturday, Sunday, and Monday throughout the 2008 season. As boats approached the launching area, the steward collected observable data such as type of boat, number of people in the group, outboard horsepower, state of origin, time arrived/leaving and boat registration number. The steward then interacted with the boaters handing out brochures from the Long Lake Association and Watershed Stewardship Program about invasive species and their prevention. The steward also supplemented the brochures with a brief interpretative message and asked the boater a couple of questions. The questions directed to boaters were as follows:

- 1) Has the boat been in any body of water in the past two weeks?
- 2) Do you take any steps to prevent the spread of invasive species such as washing or inspecting the boat, draining the bilge water, emptying the bait buckets or live wells?

Next, the steward would inspect the boats and trailers for any weeds. All information was compiled and entered into the database. This allowed for analysis of any potential trends throughout the summer.

Results

Demographics

The total use of the Long Lake boat launch for 2008 totaled 1,258 boats with 2,536 people. Of the total boats launched this season motor boats were launched the most (55%) followed by canoes (26%), kayaks (13%) personal watercrafts (5%) and sailboats (1%) (Figure 1).

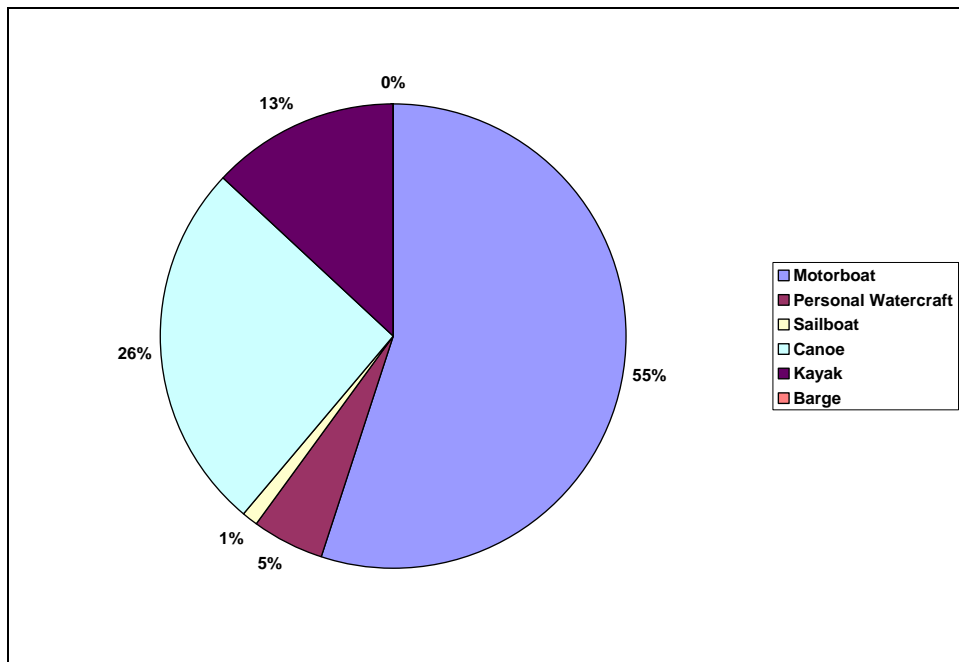


Figure 2. The total usage of the Long Lake boat launch by watercraft type.

Most boats entering Long Lake originated from New York State (781). Other origins were New Jersey, Vermont, Connecticut, Pennsylvania, Ohio, New Hampshire, Maryland, Massachusetts, Virginia, Rhode Island, North Carolina, Quebec, New Mexico, Missouri, Maine, Illinois and Florida (Table 1.).

Table 1. Origin of boats/groups entering Long Lake.

STATES	# of Groups	STATES	# of Groups
NY	781	VA	5
NJ	49	RI	3
VT	22	NC	2
CT	20	QUE	1
PA	20	NM	1
OH	7	MS	1
NH	6	ME	1
MD	6	IL	1
MA	5	FL	1

Boat Launch Usage

The average amount of time that boaters spent at the boat launch was 15 minutes. Canoe/kayak groups however took more time than the average at the launch. This increase in time was because more canoe/kayak groups were on camping trips and the boats required packing. The peak use of the boat launch occurred during the week of 7/3/08 – 7/9/08 (week 7) with 216 boats. This was also the week with highest influx of total number of people. Week 7 was the Independence Day weekend which kicks off the busy summer in Long Lake according to the locals. The slowest week in regards to boats launched and individuals occurred during the week of 5/29/08 – 6/4/08 with a total of 26 boats and 47 people.

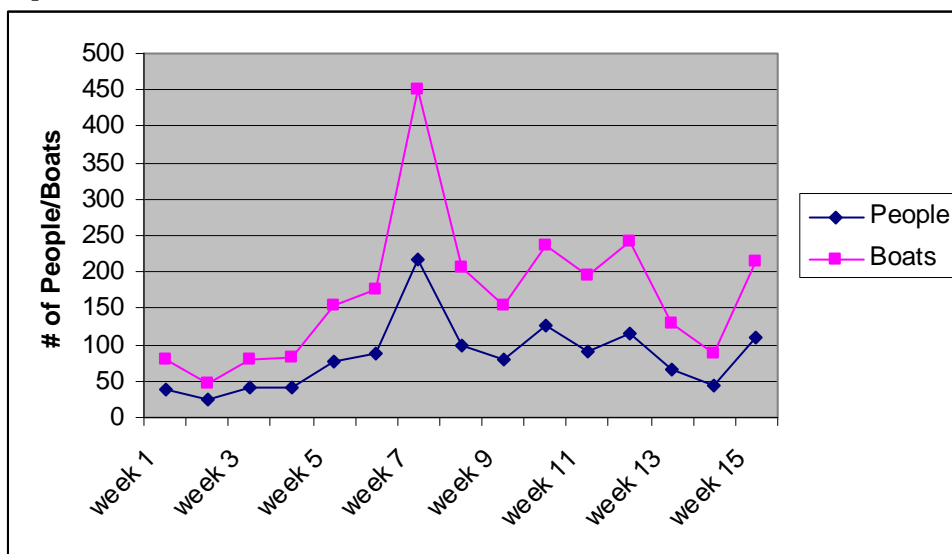


Figure 3: Usage by week, summer 2008, Long Lake Boat Launch

Prevention Steps Taken

The question of which if any prevention steps were taken results was asked to most boaters. A total of 943 out of a total of 453 groups (48%) take some kind of prevention step when asked the question. Thirty-eight percent inspected the boat, 55% wash, 42% drain bilge, 0.7% drain live well, and 2% empty bait bucket. Many of these groups that take prevention steps take more than just one. Usually this was some combination of inspecting, washing, and draining the bilge. Hopefully with increase awareness the percentage people taking prevention steps will increase as well.

Bodies of Water Visited

Boaters were asked whether their boat(s) were in any other body of water in the past two weeks prior to launching at Long Lake. Most boaters have been only on Long Lake (46%) in past two weeks. About 19% of boats have never been in the water this season prior to launching at Long Lake. Lakes visited that were not infected or not observed to be infected with invasive species were 16%. 19% of boats were on infected bodies of water within the prior 2 weeks (Figure 2).

Of the other water bodies visited, Hudson River had the highest frequency at 23 groups each. Closely following behind is Raquette Lake with 18 groups. Both of these bodies of water are infected with invasive species or species of concern. Hudson River has been known to contain water chestnut and Eurasian watermilfoil. Raquette Lake has recently been found to contain variable-leaf milfoil

which is a potentially problematic species under observation by the Adirondack Park Invasive Plant Program.

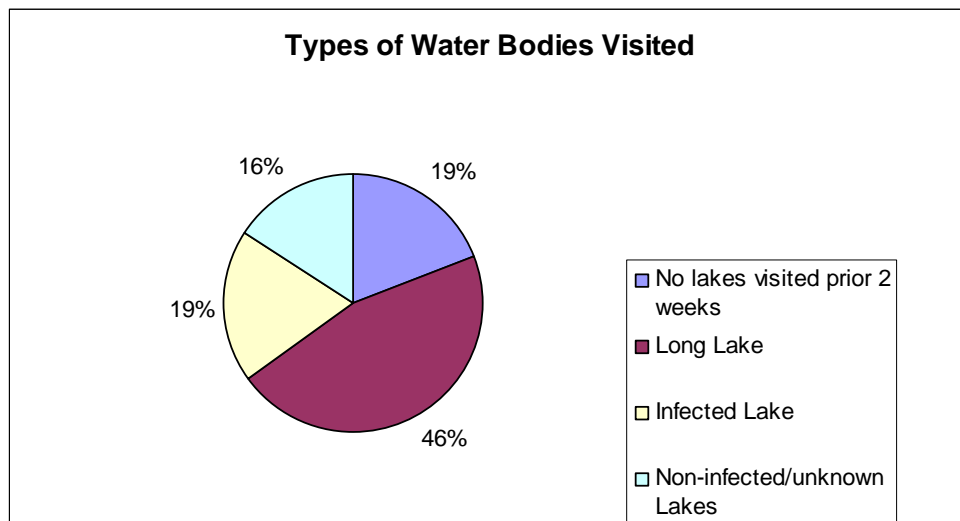


Figure 4. Bodies of water visited prior to arriving at Long Lake boat launch

Invasive Species Found

Throughout the 2008 season invasive species were found on boats entering Long Lake. These included Eurasian watermilfoil, water chestnut and zebra mussels. Eurasian watermilfoil was found 11 times, followed by water chestnut on 3 occasions, then zebra mussels, which were found twice. Other organisms found on boats entering the lake were coontail, waterlilies, aquatic grasses, and barnacles. All of these are not consider invasive but some like the coontail are not present in Long Lake.

Discussion

The Watershed Stewardship Program had a first successful year at Long Lake during the 2008 summer season. This program educated many tourists and locals on the impact of invasive species and how they themselves can help prevent this growing epidemic from spreading. Most people were open and receptive to the boat inspection and the brief invasive species education. I believe this boat launch will continue to have success with the Watershed Stewardship Program in the future due to the concern and passion of the visitors and locals have for Long Lake.



Long Lake 2008 2-Week Prior Use History	Infected?	Total visits	Long Lake 2008 2-Week Prior Use History	Infected?	Total visits
Hudson River	Y	23	Silver Lake	No/Unknown	3
Raquette Lake	Y	18	1st lake	No/Unknown	2
Tupper Lake	Y	18	2nd lake	No/Unknown	2
Lake George	Y	13	8th Lake	No/Unknown	2
Saratoga Lake	Y	11	Hinkley Flow	No/Unknown	2
Great Sacandaga Lake	Y	8	Jennings Pond	No/Unknown	2
Indian Lake	Y	8	Lake Clear	No/Unknown	2
Oneida Lake	Y	8	Little Tupper Lake	No/Unknown	2
Lake Ontario	Y	6	Rochester Bay	No/Unknown	2
Mohawk River	Y	6	13th Lake	No/Unknown	1
St. Lawrence River	Y	6	3rd Lake	No/Unknown	1
Lake Champlain	Y	5	Antler Lake	No/Unknown	1
Middle Saranac	Y	5	Beaver River	No/Unknown	1
Schroon Lake	Y	5	Black Lake	No/Unknown	1
Lower Saranac	Y	4	Black Pond (CT)	No/Unknown	1
4th lake	Y	3	Black River	No/Unknown	1
Cranberry Lake	Y	3	Bob's Lake (Canada)	No/Unknown	1
Seneca River	Y	3	Bog River	No/Unknown	1
7th Lake	Y	2	Canada Lake	No/Unknown	1
Atlantic Ocean	Y	2	Casey Park Lake	No/Unknown	1
Skaneateles Lake	Y	2	Cheekatowaga Lake	No/Unknown	1
6th Lake	Y	1	Chemgy River	No/Unknown	1
Ballston Lake	Y	1	Corsound (Raiford, NC)	No/Unknown	1
Bonaparte Lake	Y	1	Crystal Lake (CT)	No/Unknown	1
Canadaigua	Y	1	Dexter Lake	No/Unknown	1
Cayuga Lake	Y	1	Goodnow Flow	No/Unknown	1
Chesapeake Bay Area	Y	1	Habernack Lake	No/Unknown	1
Florida	Y	1	Hackinsack River	No/Unknown	1
Follensby Clear Pond	Y	1	Higley Flow	No/Unknown	1
Fulton Chain	Y	1	Hollin Lake (CT)	No/Unknown	1
Gunpowder River (MD)	Y	1	Horseshoe Lake	No/Unknown	1
Lake Chazy	Y	1	Hutchson Pond	No/Unknown	1
Lake Erie	Y	1	Inlet	No/Unknown	1
Lake Flower	Y	1	Lake Bama (VT)	No/Unknown	1
Munkville Res.	Y	1	Lake Dunn (VT)	No/Unknown	1
Onandaga Lake	Y	1	Lake Hopang (NJ)	No/Unknown	1
Paradox Lake	Y	1	Lake Hopatcong (CT)	No/Unknown	1
Schootamata Lake (Canada)	Y	1	Lake Lilanoah (CT)	No/Unknown	1
Second Pond	Y	1	Lake Titus	No/Unknown	1
Seneca Lake	Y	1	Little Long	No/Unknown	1
Stillwater Res.	Y	1	Little Wolf Pond	No/Unknown	1
Synder's Lake	Y	1	Long Pond (Ontario)	No/Unknown	1
Long Lake	No/Unknown	434	Lovey Lake	No/Unknown	1
No lake visited prior 2 weeks	No/Unknown	292	Lowes Lake	No/Unknown	1
Lake Eaton	No/Unknown	14	Mariaville Lake	No/Unknown	1
Raquette River	No/Unknown	12	Marion River	No/Unknown	1
Forked Lake	No/Unknown	11	Middle River (MD)	No/Unknown	1
Blue Mountain Lake	No/Unknown	10	Piseco Lake	No/Unknown	1
Susquehanna River (NY)	No/Unknown	6	Raystown Lake (PA)	No/Unknown	1
Delta Lake	No/Unknown	5	Schoharie Creek	No/Unknown	1
Harris Lake	No/Unknown	5	Schroon River	No/Unknown	1
Lake Placid	No/Unknown	5	Thompson Lake (Knox, NY)	No/Unknown	1
Round Pond	No/Unknown	5	Trout Lake	No/Unknown	1
Upper St. Regis	No/Unknown	5	Whitakun Lake	No/Unknown	1
Lake Lila	No/Unknown	3	Whitney Point Reservoir	No/Unknown	1
Pleasant Lake	No/Unknown	3	Woodhull Lake	No/Unknown	1

Table 4: Lakes visited in the previous two weeks before visiting Long Lake, 2008.

Table 3: Long Lake Recreation Study Results, 2008

Summary of season- 2008

Long Lake

State Boat Launch Date	Boat Type						total # boats	Weekly Avg HP Outboard	Four stroke	Group Size	Pets (1 or 0)	Avg time to launch	Avg time to retrieve		
	M	PWC	S	C	K	B									
5/24/08 to 5/25/08	42	4	0	8	14	0	38	68	3	80	4	0:22	0:24		
5/30/08 to 6/2/08	16	2	0	7	3	0	26	68	4	47	1	0:27	0:27		
6/6/08 to 6/9/08	34	0	0	3	3	0	40	68	3	80	4	0:13	0:16		
6/13/08 to 6/16/08	31	1	0	9	1	0	42	68	0	82	1	0:16	0:22		
6/20/08 to 6/23/08	44	0	0	28	5	0	77	64	5	154	4	0:34	0:18		
6/27/08 to 6/30/08	44	5	0	26	12	0	87	61	3	177	11	0:31	0:20		
7/4/08 to 7/7/08	130	14	3	45	24	0	216	69	6	450	17	0:20	0:21		
7/11/08 to 7/14/08	58	4	0	33	3	0	98	81	3	206	8	0:16	0:18		
7/18/07 to 7/21/08	33	6	0	38	4	0	81	78	2	155	3	0:20	0:20		
7/24/08 to 7/27/08	49	4	0	43	31	0	127	69	4	237	0	0:20	0:22		
8/1/08 to 8/3/08	39	9	0	3	7	0	92	59	3	195	0	0:18	0:18		
8/8/08 to 8/12/08	42	0	1	52	20	0	115	65	3	241	5	0:27	0:23		
8/15/08 to 8/16/08	33	2	0	13	17	0	65	58	6	130	3	0:23	0:21		
8/22/08 to 8/23/08	27	2	0	8	7	0	44	61	4	88	1	0:25	0:17		
8/29/08 to 9/1/08	69	12	1	11	17	0	110	49	3	214	7	0:19	0:16		
summer totals	691	65	5	327	168	0	1258	Summer Avg=66	52	2536	69	0:22	0:20		
								Median HP = 50							

Key: M = Motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = barge (construction); R = rowboat

Long Lake

State Boat Launch Date	Organisms Found		Organism Type						Measures Taken by Visitors to Prevent Inv. Spec.							
	launching	retrieving	EWM	BW	NM	WC	ZM	other	took steps	I	WB	DB	BB	LW	Dis	didn't ask
5/24/08 to 5/25/08	1	0	0	0	0	0		0	19	9	11	7	0	1	0	3
5/30/08 to 6/2/08	0	0	0	0	0	0		0	15	9	11	2	0	0	0	3
6/6/08 to 6/9/08	0	0	0	0	0	0		0	20	9	11	7	0	1	0	3
6/13/08 to 6/16/08	1	0	0	0	0	0		1	19	8	14	2	0	0	0	10
6/20/08 to 6/23/08	0	0	0	0	0	0		0	38	8	33	8	1	0	0	6
6/27/08 to 6/30/08	1	0	1	0	0	0		0	39	27	25	10	0	0	0	5
7/4/08 to 7/7/08	5	1	2	0	1	1	1	3	106	36	55	49	0	0	0	22
7/11/08 to 7/14/08	1	2	1	0	0	1		2	46	15	17	29	0	0	0	13
7/18/07 to 7/21/08	3	1	1	0	1	1		1	19	2	6	12	1	0	0	2
7/24/08 to 7/27/08	3	0	0	0	1			2	36	12	23	13	0	1	0	1
8/1/08 to 8/3/08	5	0	2	0	1		1	3	20	3	8	13	6	0	0	4
8/8/08 to 8/12/08	0	0	0	0	0			0	24	9	13	11	0	0	0	5
8/15/08 to 8/16/08	3	1	3	0	0			2	7	9	7	5	0	0	0	0
8/22/08 to 8/23/08	1	0	1	0	0			0	19	5	8	10	0	0	0	1
8/29/08 to 9/1/08	3	0	0	0	0			3	26	10	8	14	0	0	0	4
summer totals	27	5	11	0	4	3	2	17	453	171	250	192	8	3	0	82

Key: EWM = Eurasian Watermilfoil; BW = native bladderwort; NM = native milfoil; I = Inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = emptied livewell; Dis = disposed of bait.

Recreation Use Study: Osgood Pond

By James Parmeter

Introduction:

The Watershed Stewardship Program is a part of Paul Smith's College's Adirondack Watershed Institute, which works to help protect the quality of the local waterways. The program has been in existence since 2000, but this was the first year it was implemented at Osgood Pond. The program helps to prevent the spread of invasive species through public outreach. Stewards were stationed at Osgood Pond to present an interpretive message to launch users about invasive species and how to fight the spread of these species throughout the Adirondack Park. The steward inspected all watercraft and trailers to ensure boats were free of invasive weeds. Stewards also collected recreational data to determine the number and type of boats that visited the lake. Questions regarding where the boat has been in the prior two weeks, and whether any prevention steps were taken against invasive species were also asked. These actions along with the encouragement of users to wash their boats at available boat wash station helped in deterring the spread of invasive species from lake to lake.



Osgood Pond Waterway Access Site

Methods:

A steward was stationed at the Osgood Waterway Access Site from 12:00 pm to 5pm. Stewards were present each Friday afternoon from the 30th of May to Labor Day. A steward was also stationed at the launch on Saturday and Sunday afternoons (1-5) from the 26th of July to Labor Day for the 2008 season. As a boat approached the launch area, the steward recorded all observable data from each boater that visited the launch, including boat type (inboard, outboard, or inboard/outboard), if the engine was four or two stroke, horsepower of the engine, group size, if visitors took preventative steps (washing the

boat, draining bilges and live wells, or inspecting the boat for plant fragments), and which state the boat was registered, if applicable. The time that the boater arrived and departed (launching) was recorded, along with the time that they arrived and departed (hauling away) from the dock. The number of pets, if any were accompanying the boater(s) was also recorded. Stewards would then give a brief interpretive message regarding invasive species, and proceed to ask the user where the boat had been in the previous two weeks. In addition, all boats and trailers were inspected for weeds. All data collected was written on a prepared sheet which was later entered into a database so all information could be compiled. The database allowed for comparison of data and a chance to observe any trends from the summer. In addition to providing recreational use insights, the database allows a better idea as to what launch users are doing to help prevent the spread of invasive species.

Watershed stewards were supplemented by Volunteer Stewards organized by the Osgood Pond Association. Volunteer Steward shifts were normally Sundays. Volunteer Stewards filled out a simplified data sheet, so some of the data reported below represents only Watershed Steward data. This is indicated in the text.

Results:

The totals reported reflect, when possible, the combined data of volunteer stewards and paid watershed stewards. In the combined data set, between the 25th of May and Labor Day there were a total of 383 people launching 233 watercraft. The average time spent at the launch was 18 minutes when entering and 13 minutes when leaving the water body. The peak usage weekends of the year were the Labor Day weekend, followed by the weekend of the 21st of August to the 27th of August, 2008. During Labor Day weekend, 74 people launched a total of 42 boats (Figure 1). Use levels trended upward for the entire summer, except in the weeks of the 10th of July through the 23rd of July, 2008 and another lull in early August.

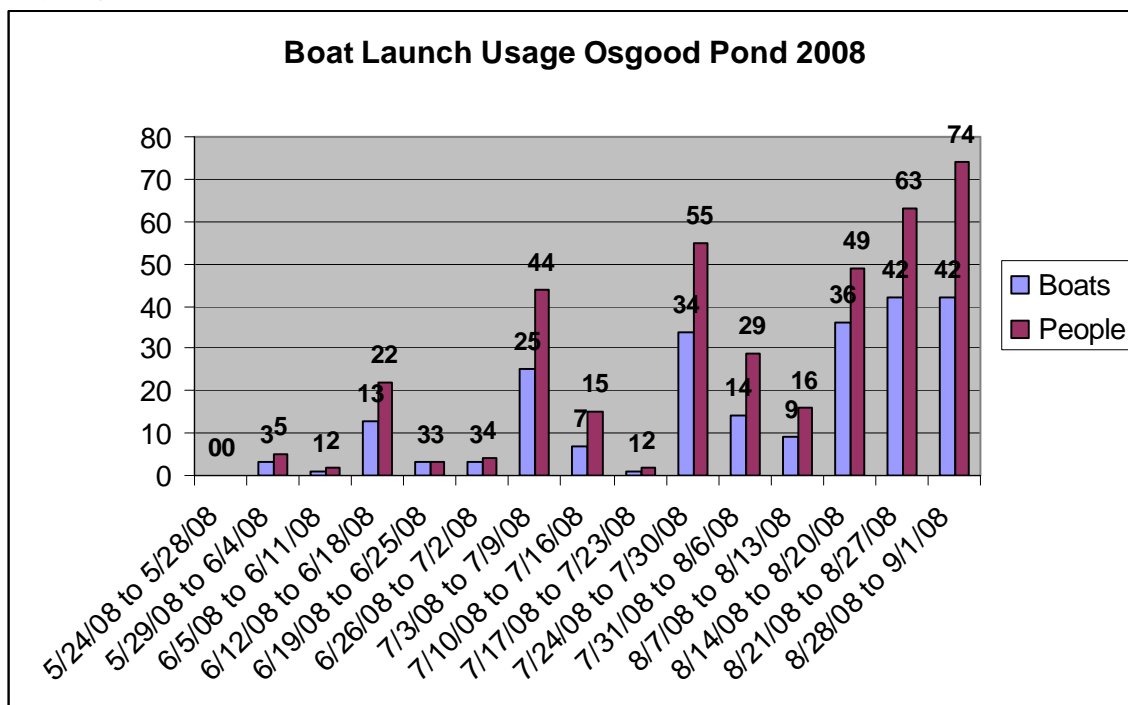


Figure 2. Weekly use of the New York State Boat Launch on Osgood Pond during the summer of 2008.

The following data reflects only Watershed Steward tallies, since Volunteer Stewards did not record boat type in detail. Kayaks were the most numerous type of watercraft launched in the summer of 2008

(61 total; 44% of total watercraft), followed by canoes (56; 41%), motorboats (18, 13%), Rowboats (2, 1%), and then Personal water craft (PWC 1, 1%; figure 2). Sailboats (0, 0%) and Barges (0, 0%) were not observed at the launch. Non-motorized watercraft outnumbered motorized watercraft by a total of 119 (86% of total watercraft) to 19 (14%). Average horsepower of motors observed was 23. Three 4-stroke motors were observed (16% of the 19 total motorized boats).

Osgood Pond Boat Types, 2008

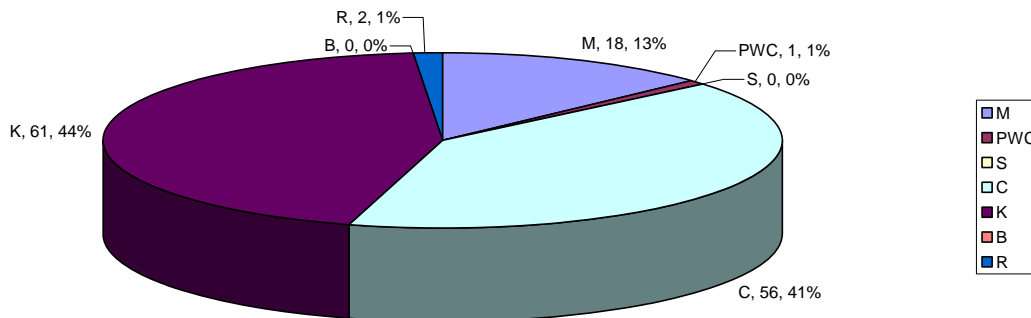


Figure 2: Percent of watercraft type launched at the New York State Waterway Access Site on Osgood Pond during the summer of 2008. [M= Motorboat PWC= Personal water craft, S= Sailboat, R= Rowboat, C= Canoe, K= Kayak, B= Barge]

State/Province of Origin

Only Watershed Stewards recorded state of origin. As expected, most boats (31) were registered in New York, while others came from a range of places (Table 1). The second most represented state was Massachusetts, with 2 boats, followed by Ontario, Quebec, Pennsylvania, Virginia, Rhode Island, and Connecticut all with 1 boats (Table 1). Osgood Pond attracts mostly local boaters and a few others who visited as children and return regularly. Watershed stewards determined originating state by observing registration stickers on motorized watercraft, asking other boaters their place of origin, and observing license plates. It is likely that some of the unregistered watercraft would have originated in states outside New York.

Origin	Total
NY	31
MA	2
ON	1
QU	1
PA	1
VA	1
RI	1
CT	1

Table 5. Place of origin observed from boats launched into Osgood Pond from the New York State Boat Launch during the summer of 2008.

Use Patterns

In 2008 Watershed Stewards were stationed at Osgood Pond 3 days per week, from Friday to Sunday. Saturdays and Sundays were added halfway through the summer. We found the peak use week to be the 3rd of July through the 9th of July (177 boats; Figure 1), which was one of the peak weeks in the summer of 2007 and the same for 2005, but different from 2006. As stated in the 2006 report high winds and rain may have led to the lower numbers for the 4th of July holiday week in that year.

The following data reflects only Watershed Stewardship Program results. Most boats were launched on the weekend with Friday having the most launches (total 54, Figure 3) with an average of 4 boats per Friday. Average boats launched by day are as follows: Saturday – 4 and Sunday – 2.5 (figure 3). This is the case if you account for numbers over the entire summer. If you look at the figures for weeks when the boat launch was monitored three days a week (July 26-August 31) there is a different trend. In this case Saturdays have the most boat traffic with 50 boats being launched, with an average of 8 boats per day. The number of boats per day when you include weeks when three days of monitoring occurred (i.e., after July 26th) are as follows: Friday – 30, Saturday – 50, and Sunday – 32. Average boats launched per day using this method are as follows: Friday – 4, Saturday – 8, and Sunday – 5 (figure 4).

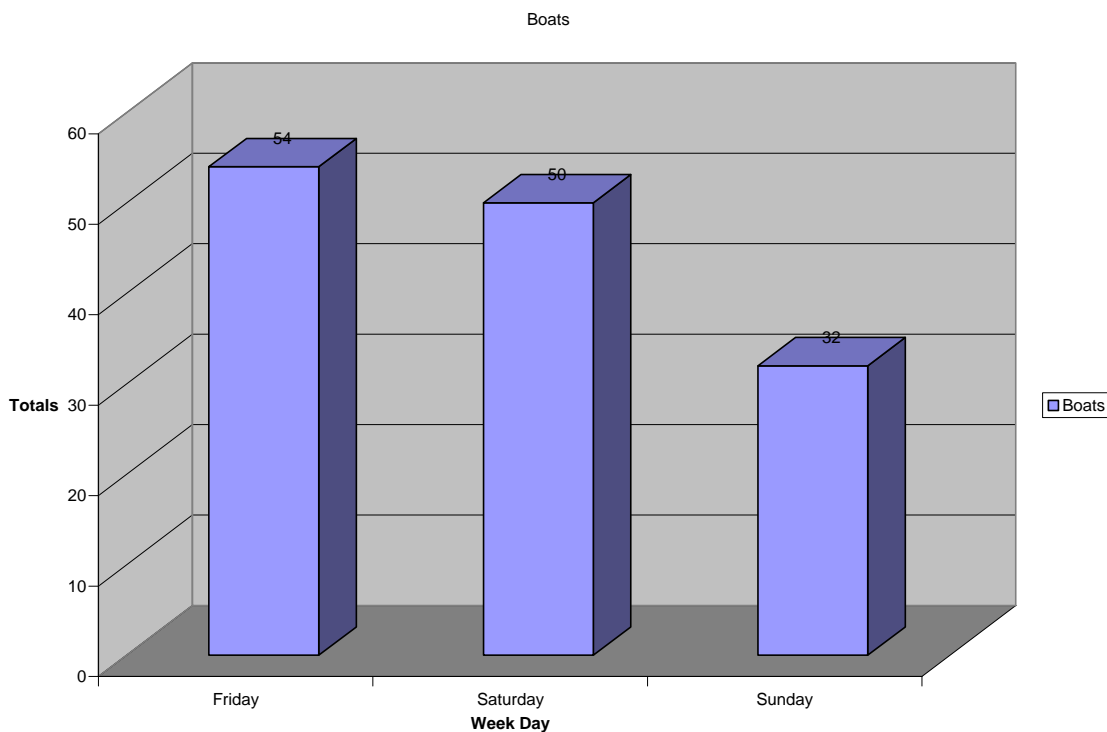


Figure 3. Total number of boats launched from the New York State Public Boat Launch on Osgood Pond by day of week during the summer of 2008.

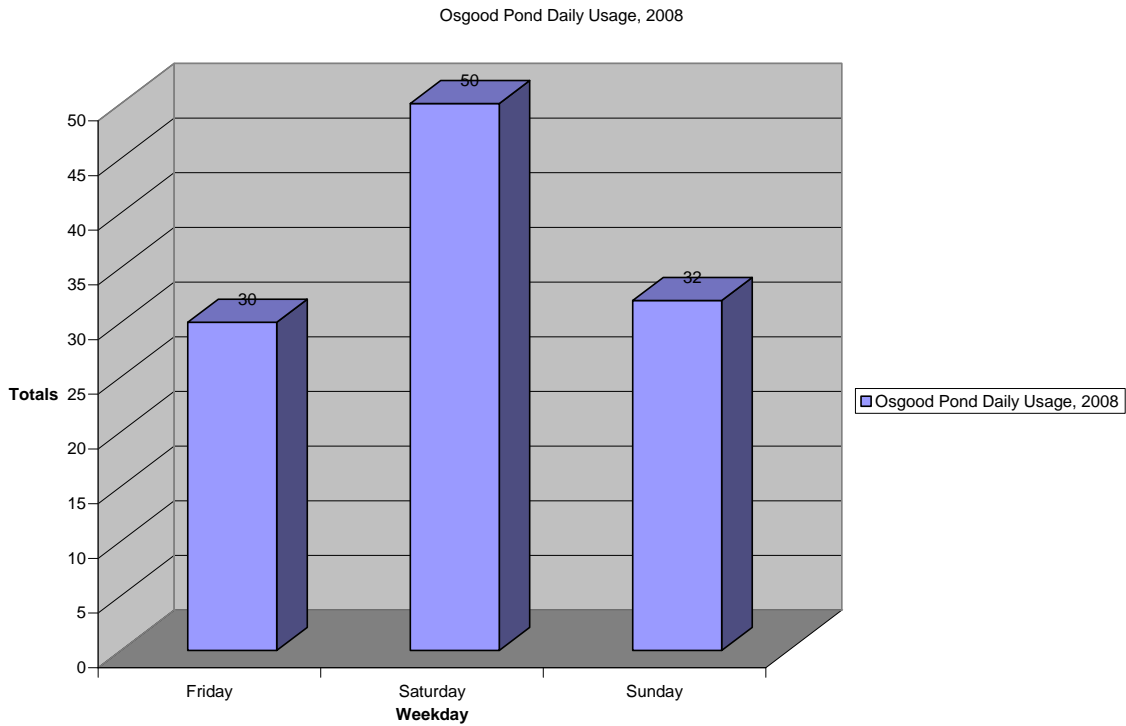


Figure 4: Total number of boats launched from the New York State Public Boat Launch on Osgood Pond by day of week during weeks when three days were observed in the summer of 2008 (July 26th through August 31).

Water Body	Infected	Total Visits	Water Body	Infected	Total Visits
Follensby Clear	Y	2	Osgood Pond	Unknown	2
Hudson River	Y	2	Rainbow Lake	Unknown	2
Lake Champlain	Y	2	St. Regis River	Unknown	2
Lake Flower	Y	2	Ausable River	Unknown	1
Meacham	Y	2	Cascade Lake	Unknown	1
Saranac River	Y	2	Chazy River	Unknown	1
Connecticut River	Y	1	Chubb River	Unknown	1
Floodwood	Y	1	Kushaqua	Unknown	1
Horseshoe Pond	Y	1	Lake Clear	Unknown	1
Lake Chateauguay	Y	1	Lake Placid	Unknown	1
Lake Colby	Y	1	Little Tupper Lake	Unknown	1
Lower Saranac	Y	1	Mountain Pond	Unknown	1
Middle Saranac	Y	1	Raquette River	Unknown	1
St. Lawrence	Y	1	Rollins	Unknown	1
Union Falls	Y	1	Round Lake	Unknown	1
Upper Saranac	Y	1	Spitfire	Unknown	1
Church Pond	Unknown	4	St. Regis	Unknown	1
Buck Pond	Unknown	2	St. Regis canoe area	Unknown	1
Lower St. Regis	Unknown	2	Upper St. Regis	Unknown	1

Table 6: Osgood Pond previous lakes visited within two weeks, 2008.

Where has your boat been?

The following data reflects only Watershed Stewardship Program results. Watershed Stewards asked boaters what other bodies of water their boats had been on in the previous two weeks before visiting Osgood Pond. This gave us a scope of the likelihood the lake may be exposed to an invasive aquatic species. 40 boats were reported to have been used in other lakes in the preceding two weeks. This represents 29% of the total boats launched (138). We expect that more boats had been used in other waterways in the preceding two weeks, but at high use periods it was difficult to ask this question of all boaters. These 40 boats had visited a total of 52 lakes in the preceding two weeks. Some boat owners reported visiting more than one lake in the preceding two weeks. Of the 40 boat owners reporting prior use, 55% (22) had visited a lake with a known infestation of aquatic invasive species. Overall, then, 22 of the total 138 boats (16%) launched at Osgood Pond in 2008 present a risk of transporting invasive species to Osgood Pond.

The breakdown of lakes visited prior to Osgood Pond helps us to understand patterns of visitation and invasive species transport. We found that 45% of the 40 prior lake visits had been to lakes that are known by WSP to have a presence of at least one invasive aquatic plant (Table 2). The body of water reported most was the Church Pond (total 4). The second most visited body of water visited was the Saranac Lakes Chain with 3 responses. Because of the various responses given, any answer mentioning Saranac Lake (3) was tallied together (Lower Saranac – 1, Upper Saranac – 1, and Middle Saranac – 1). Lake Champlain was one of the third most visited lakes with three boats visiting the lake in the two weeks prior to visiting Osgood Pond. The Saranac Lakes Chain hosts Eurasian watermilfoil and Lake Champlain are known to host many aquatic invasive species including Eurasian watermilfoil, hydrilla, water chestnut, and zebra mussels. Lake Flower and Lake George also play host to Eurasian Watermilfoil, although they were not reported to have been visited they are commonly visited by boaters in the Adirondacks.

Most out of state boaters responded to the question about previous water bodies in the last two weeks with this is the first time in this year or it only goes in this lake. This is an interesting finding considering that you would assume that invasive species are being transported to our lakes by out-of-state visitors, when in actuality the most significant potential source of invasives tends to be local boaters. Vacationers appear to only use their boat on vacation and park it in their yard for the remainder of the year, while locals tend to boat throughout the spring, summer, and fall.

Have You Taken Prevention Steps?

Stewards asked boaters, "What, if any, prevention steps did you take to stop the spread of aquatic invasive species?" Possible prevention steps a boater could have taken included washing or inspecting their boat, draining the bilge, and emptying live wells, and bait buckets. We found that out of the total 138 boats launched 46 (33%) took some form of prevention steps. Of the 46 boaters who took preventative steps inspection ("I" - 25) was the step most taken. Boat washing ("WB" - 24), draining bilge water ("DB" - 16), and then draining bait buckets ("BB" - 2) were the following steps taken (Figure 5). "LW" means drained live well and "Dis" means disposed of leftover bait.

Osgood Pond Prevention Steps Taken, 2008

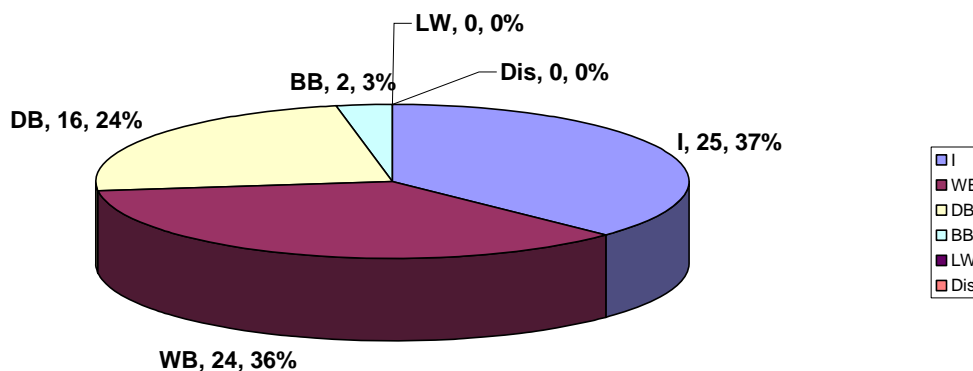


Figure 5. Prevention steps taken by boaters to help stop the spread of aquatic invasive species by boats, recorded at the New York State Public Boat Launch on Osgood Pond.

Discussion

Overall the 2008 season at the Osgood Pond Boat Launch saw an increase in users throughout the summer season. In 2008 the total number of boats was 233 with a total of 383 users (total of Watershed and Volunteer Steward figures). The types of boats most commonly launched were kayaks, canoes, and finally motorboats. 2008 showed more non-motorized watercraft compared to motorized ones, the average motor horsepower was 23. The number of four stroke engines was three. The number of boat launch users taking preventative steps was 33%. Without previous data it is difficult to say if this is an increase or decrease in the amount of boaters taking prevention steps. One can assume with the overall trend that more users are taking prevention steps than in previous years. Of the 138 boats that Watershed Stewards counted entering Osgood Pond 13% had visited an infested lake within the previous two weeks. For ease of analysis future data managers may want to setup additional columns for boaters who visited other lakes and then of those boaters who has been on an infested water body.

Conclusion

The summer of 2008 was successful for the Watershed Stewardship Program stationed at the Osgood Pond Public Boat Launch. 383 users received a message regarding invasive species and their possible transport on watercraft. 233 boats were visually inspected for hanging weeds and no invasive species were detected. The potential exposure of invasive species transport into the Osgood Pond Waterway from previous lakes visited was 13%. Of the total 138 boaters Watershed Stewards encountered, 41% of had been on another waterway in the previous two weeks. The Watershed Stewards and Volunteer Stewards working together are a means of preventing the spread of invasive species into the Osgood Pond Waterway.

The stewards would like to thank the Osgood Pond Association for granting the stewards the opportunity to work at the Osgood Pond Public Boat Launch for the first year, and for their contribution to help protect the Adirondack lakes. Thank you to the residents and associates of the White Pine Camp who visited and expressed their appreciation for the programs presence at the boat

launch. The WSP is looking forward to continuing their work at Osgood Pond and another great summer in 2009.

Volunteer Steward Report

The program was a successful start-up for a continuing Volunteer Pond Steward program at the Osgood Pond DEC Waterway Access Site. The Site had a Watershed Stewardship Program staffer on duty Friday afternoons, provided pro bono by Paul Smith's College. On Saturday and Sunday morning, Osgood Pond Association members volunteered as Pond Stewards. And Saturday and Sunday afternoons were staffed for part of the summer by a Watershed Stewardship Program-trained student paid by a grant to the College from DEC.

The data gathered by Osgood Pond Association stewards can be summarized as follows:

The Volunteer Pond Stewards reported meeting 16 motorized boats and 80 nonmotorized boats for a total of 96 boats. The launches and retrievals were managed by 167 boaters. None of the boats was observed to carry plants into Osgood Pond. The 16 trailered motorized boats entered Osgood Pond illegally according to the DEC definition of a Waterway Access Site (cartop boats only).

Submitted by Bob Hall
President, Osgood Pond Association



Osgood Pond Association Volunteer Stewards

Table 7: Osgood Pond Recreation Study Results, 2008

Summary of season- 2008

Osgood Pond Date	Boat Type							total # boats	Volunteer Steward total # boats	HP of outboard	Four stroke	Group Size	Volunteer Steward Group Size	Pets	Avg time to launch	Avg time to retrieve	
	M	PWC	S	C	K	B	R										
5/24/08 to 5/28/08	0	0	0	0	0	0	0	0	0			0	0				
5/29/08 to 6/4/08	1	0	0	2	0	0	0	3	0	5	0	5	0	0	0:07	0:12	
6/5/08 to 6/11/08	1	0	0	0	0	0	0	1	0	5	1	2	0	0		0:29	
6/12/08 to 6/18/08	2	0	0	0	3	0	0	5	8			6	16	0	0:10	0:07	
6/19/08 to 6/25/08	0	0	0	0	2	0	0	2	1			0	2	1	0	0:08	
6/26/08 to 7/2/08	0	0	0	3	0	0	0	3	0			0	4	0	0:16	0:06	
7/3/08 to 7/9/08	0	0	0	5	7	0	0	12	13			0	17	27	2	0:04	0:24
7/10/08 to 7/16/08	1	1	0	0	1	0	0	3	4	15	0	5	10	0			
7/17/08 to 7/23/08	1	0	0	0	0	0	0	1	0			0	2	0	0		
7/24/08 to 7/30/08	1	0	0	6	6	0	0	13	21			0	21	34	1	0:07	0:10
7/31/08 to 8/6/08	5	0	0	3	2	0	0	10	4	30.6	2	22	7	1	1:35	0:16	
8/7/08 to 8/13/08	2	0	0	1	5	0	1	9	0	25	0	14	2	0	0:07	0:05	
8/14/08 to 8/20/08	0	0	0	12	11	0	0	23	13	35	0	31	18	1	0:10	0:18	
8/21/08 to 8/27/08	0	0	0	17	13	0	1	31	11			0	47	16	1	1:35	0:16
8/28/08 to 9/1/08	4	0	0	7	11	0	0	22	20	44.9	0	40	34	4	0:13	0:14	
Paid Steward totals	18	1	0	56	61	0	2	138	95		3	218	165	10	0:18	0:13	
Paid + Vol Stew Totals								233				3	383				

Key: M = Motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = barge (construction); R = rowboat

Osgood Pond Date	organisms found		organism type				Measures Taken by Visitors to Prevent Inv. Spec.							
	entering	leaving	EWM	BW	NM	other	took measures	I	WB	DB	BB	LW	Dis	didn't ask
5/24/08 to 5/28/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/29/08 to 6/4/08	0	0	0	0	0	0	0	3	0	3	3	0	0	0
6/5/08 to 6/11/08	0	1	0	0	0	0	1	0	0	0	0	0	0	0
6/12/08 to 6/18/08	0	0	0	0	0	0	0	2	0	0	2	0	0	0
6/19/08 to 6/25/08	0	0	0	0	0	0	0	1	0	0	1	0	0	0
6/26/08 to 7/2/08	0	0	0	0	0	0	0	1	0	0	1	1	0	0
7/3/08 to 7/9/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/10/08 to 7/16/08	0	0	0	0	0	0	0	2	0	0	2	1	0	0
7/17/08 to 7/23/08	0	0	0	0	0	0	0	1	1	0	0	0	0	0
7/24/08 to 7/30/08	0	0	0	0	0	0	0	7	6	2	0	0	0	0
7/31/08 to 8/6/08	0	1	0	1	1	1	1	8	3	6	4	0	0	0
8/7/08 to 8/13/08	0	0	0	0	0	0	0	2	2	0	0	0	0	0
8/14/08 to 8/20/08	0	1	0	1	0	0	0	9	4	6	0	0	0	0
8/21/08 to 8/27/08	0	1	0	0	0	0	1	2	2	4	0	0	0	0
8/28/08 to 9/1/08	1	2	0	1	0	2	2	8	7	3	3	0	0	0
Paid Steward totals	1	6	0	3	1	5		46	25	24	16	2	0	0

Key: EWM = Eurasian Watermilfoil; BW = native bladderwort; NM = native milfoil; I = Inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = emptied livewell; Dis = disposed of bait.

Recreation Use Study: Rainbow Lake

By James Parmeter

Introduction:

Stewards from the Watershed Stewardship Program were stationed at the Rainbow Lake Waterway boat launch located in the Buck Pond State Campground during the weekend (Saturday and Sunday) for the fourth summer. The stewards helped to spread the word about stopping the transport of invasive species from boats and trailers throughout the Adirondacks. Stewards used interpretive messages to help educate launch users about protecting watersheds for future users to enjoy. Boats and trailers were visually inspected for any plants (mostly the invasive aquatic organisms; Eurasian watermilfoil: *Myriophyllum spicatum*, European Water Chestnut: *Trapa natans*, and zebra mussels: *Dreissenia polymorpha*), and boats leaving the lake were also inspected due to the densely growing aquatic plant, Southern naiad (*Najas guadalupensis*) that is present in the Rainbow Lake waterway. Along with a visual inspection recreational use data, water bodies in the previous two weeks, and whether prevention steps were taken by boaters against the spread of invasive species were also collected.



Buck Pond Campground Boat Launch on Rainbow Lake Waterway/Lake Kushaqua

Methods:

A steward was stationed at the Lake Kushaqua boat launch from 7am to 4pm on the weekends from the 25th of May 2008 through the 1st of September 2008. As a boat approached the launch, the number of users, pets (yes or no), motor size, two or four stroke, and registration state were documented on a data form. The launch user was then presented with a brief interpretive message regarding aquatic invasive species, and southern naiad, and then was asked if they had any questions. Users were asked if their boat had been on other water bodies during the previous two weeks, and if any invasive species transport prevention steps were taken (washing the boat and trailer, inspecting for plant fragments, draining the bilges, disposing of bait or draining the live well) before entering another water body. All users were asked to wash their boats before entering and leaving the water body at the boat wash station. To ensure the removal of aquatic hitchhikers, boats were inspected by stewards for the presence of weeds prior to launching and after retrieving the boat from the water. The data collected was entered into an Excel database where it was analyzed and compared to other weeks and

previous summers. The data gives the campground and shore owners an idea of boat launch use, but also provides insight into the risk of an invasive entering the lake.

A cooperating volunteer steward program was staffed and coordinated by the Rainbow Lake Association. Volunteer Stewards were posted on Friday afternoons weekly. The data in this report does not include data gathered by the volunteer stewards.

Results:

Between the 25th of May and Labor Day paid Watershed Stewards recorded a total of 586 people launching 251 watercraft. The average time spent at the launch was 16.5 minutes. The peak number of people was the week of the 3rd of July to the 9th of July, 2008. During the peak in July 95 people launched a total of 22 boats (Figure 1). The peak usage for boats was the week of the 31st of July through the 6th of August 2008, in which 64 persons launched 33 boats (Figure 1). Use began to rise after this week and then dropped off after the week of the 31st of July, 2008.

Rainbow Lake Launch Usage, 2008

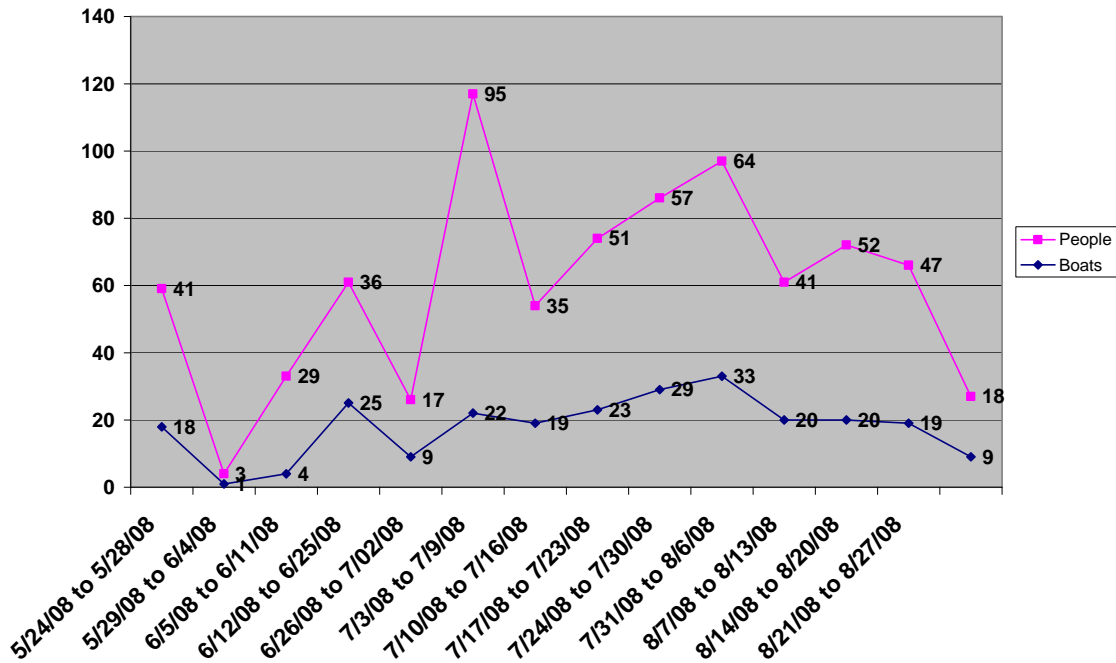


Figure 3. Weekly use of the New York State Boat Launch on St. Regis during the summer of 2008.

Motorboats were the most numerous type of watercraft launched in the summer of 2008 (113 total; 45% of total watercraft), followed by kayaks (68; 27%), and then canoes (62, 25%), and then personal watercraft (PWC) (8, 3%; figure 2). No sailboats, barges, or rowboats were observed. Non-motorized watercraft outnumbered motorized watercraft by a total of 130 (52% of total watercraft) to 121 (48%). Average motor size observed was 43 horsepower. Thirty-five 4-stroke motors were observed (29% of the 121 total motorized boats).

Rainbow Lake Boat Types, 2008

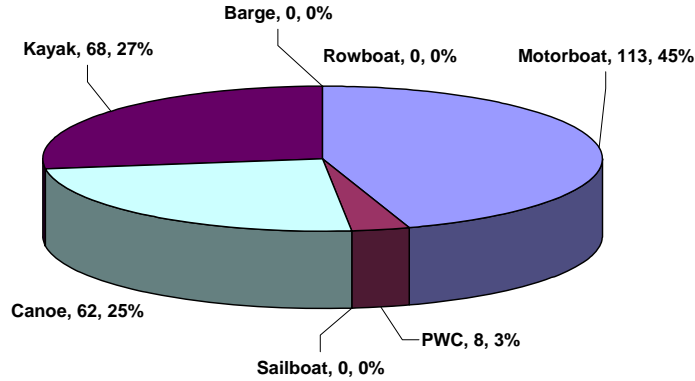


Figure 2: Percent of watercraft type launched at the New York State Boat Launch on Lake Placid during the summer of 2008.

State/Province of Origin

As expected, most boats (181) were registered in New York, while others came from a wide range of places (Table 1). The second most represented state was Quebec, with 16 boats, followed by Vermont (8 boats). Rainbow Lake attracted boaters from six states outside of New York and two Canadian provinces (QU, ON). Watershed stewards determined originating state by observing registration stickers on motorized watercraft, asking other boaters their place of origin, and observing vehicle license plates. Rainbow Lake attracts many boats from the surrounding area and boaters who are camping at the Buck Pond State Camp Ground.

Origin	total
NY	181
QU	16
VT	8
PA	7
NJ	2
CT	2
NH	1
Mass	1
ON	1
VA	1

Table 7. Place of origin of boats launched into the Rainbow Lake Waterway from the New York State Boat Launch, summer 2008.

Use Patterns

In 2008 Watershed Stewards were stationed at Rainbow Lake two days per week (Saturday and Sunday). We found the peak use of people was the week of the 3rd of July through the 9th of July (95 boats; Figure1), which was one of the peak weeks in the summer of 2007 and the same for 2005, but different from 2006. The peak usage for boats was the week of the 31st of July through the 6th of August 2008, in which 64 persons launched 33 boats (Figure 1). Most boats were launched on Saturday

(total 164, Figure 3) with an average of twelve boats per Saturday. A total of 132 boats were launched on Sundays with an average of nine boats launched per day.

Rainbow Lake Daily Usage, 2008

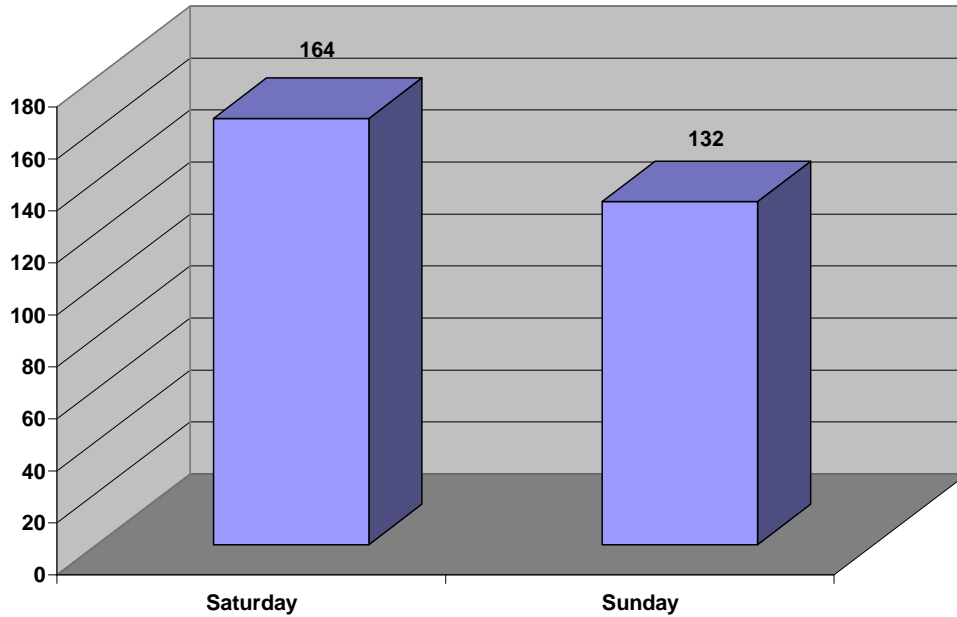


Figure 3. Total number of boats launched from the New York State Public Boat Launch on Rainbow Lake Waterway by day of week during the summer of 2008.

Water Body	Infected	Total Visits	Water Body	Infected	Total Visits
Lake Champlain	Yes	8	Jones Pond	Unknown	4
Lake Flower	Yes	3	Rainbow Lake	Unknown	4
Saranac Lakes	Yes	3	Osgood Pond	Unknown	3
Chateauguay lake	Yes	2	Heart Lake (NY)	Unknown	2
Kiawassa	Yes	2	Lake Kushaqua	Unknown	2
Sacandaga Lake	Yes	2	Altimont Pond	Unknown	1
St. Lawrence	Yes	2	Black Pond	Unknown	1
Taylor Pond	Yes	2	Delaware River	Unknown	1
Union Falls	Yes	2	Great Chazy River	Unknown	1
Upper Saranac	Yes	2	Kauta Lake, Tug Hill	Unknown	1
Chazy Lake	Yes	1	Lake Clear	Unknown	1
Fish Creek	Yes	1	Lake Lila	Unknown	1
Florida	Yes	1	Lake Spatford (VT)	Unknown	1
Graphton Lake	Yes	1	Lewey Lake	Unknown	1
Hudson River	Yes	1	Long Lake	Unknown	1
Indian Lake	Yes	1	Lower St. Regis	Unknown	1
Lake Ontario	Yes	1	Moose Pond	Unknown	1
Long Pond	Yes	1	Norwood Reservoir	Unknown	1
Lower Saranac	Yes	1	Rollins Pond	Unknown	1
Middle Saranac	Yes	1	Spitfire	Unknown	1
Buck Pond	Unknown	18	Tohekin Creek (PA)	Unknown	1
St. Regis	Unknown	6	Upper St. Regis	Unknown	1
Little Clear Pond	Unknown	5	Winooski River	Unknown	1

Table 8: Two-week prior visitation history of boats using Rainbow Lake waterway boat launch, 2008

Where has your boat been?

Watershed Stewards asked boaters what other bodies of water their boats had been on in the previous two weeks before visiting the Rainbow Lake Waterway. This gave us a scope of the likelihood the lake may be exposed to an invasive aquatic species. 66 boats reported to have been used in other lakes in the preceding two weeks. This represents 26% of the total boats launched (251). These 64 boats had visited a total of 100 lakes in the preceding two weeks. Some boat owners reported visiting more than one lake in the preceding two weeks. Of the 66 boats reported to have visited lakes prior to entering the Rainbow Lake Waterway, 47% (31) had visited a lake with a known infestation of aquatic invasive species. Overall, then, of the total 251 boats (12%) launched at Rainbow Lake Launch in 2008 present a risk of transporting invasive species to the Rainbow Lake Waterway.

The breakdown of lakes visited prior to Rainbow Lake helps us to understand patterns of visitation and invasive species transport. We found that 45% of the 64 prior lake visits had been to lakes that are known by WSP to have a presence of at least one invasive aquatic plant (Table 2). The body of water reported most was Buck Pond, (total 17). The second most visited body of water visited was the Saranac Lake Chain (7). Because of the various responses given, any answer mentioning Saranac Lake was tallied together (Lower Saranac – 1, Upper Saranac – 2, Middle Saranac – 1, and Saranac Lakes – 3). Lake Champlain and St. Regis Lakes were third/fourth with 6 responses each. Most out of state boaters responded to the question about previous water bodies in the last two weeks with this is the first time in this year or it only goes in this lake. This is an interesting finding considering that you would assume that invasive species are being transported to our lakes by out-of-state visitors, when in actuality the most significant potential source of invasives tends to be local boaters. Vacationers appear to only use their boat on vacation and park it in their yard for the remainder of the year, while locals tend to boat throughout the spring, summer, and fall months.

Have You Taken Prevention Steps?

This is the third year stewards asked, “What, if any, prevention steps did you take to stop the spread of aquatic invasive species?” Possible prevention steps a boater could have taken included washing or inspecting their boat, draining the bilge, and emptying live wells, and bait buckets. We found that out of the total 251 boats launched 158 (63%) took some form of prevention steps. Of the 158 boaters who took preventative steps inspecting the boat was the main prevention step reported (130 boats) followed by washing (107) and then draining the bilge water (49, Figure 5).

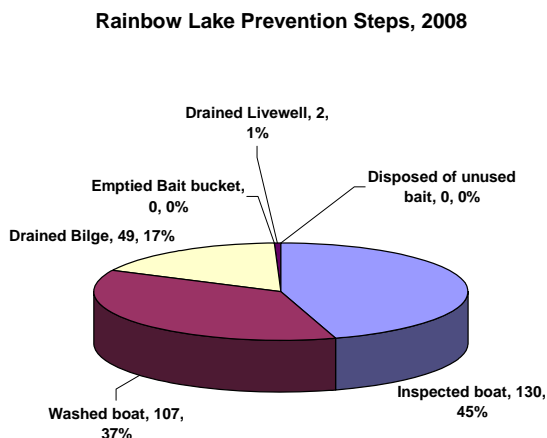


Figure 4. Prevention steps taken by boaters to help stop the spread of aquatic invasive species by boats, Rainbow Lake Waterway.

Boat Inspection Results

As in previous years, stewards tallied total instances of organisms found on boats and trailers, both when launching and retrieving from the Rainbow Lake waterway. In 2008, stewards counted 15 instances of organisms on boats entering the waterway and 28 instances of organisms on boats leaving the waterway.

	Launching	Retrieving
Eurasian WM	0	0
Grass	3	0
Native Milfoil	1	0
Southern Naiad	5	23
Barnacles	1	1
Other	1	2
Unidentified	4	1
no data	0	1
total	15	28

Table 9: Organisms found on boats- Rainbow Lake Waterway 2008

Volunteer Steward Effort

Once again, there was a diligent and sustained volunteer steward presence at the Boat Launch, designed to supplement paid steward efforts. Volunteers were led by Dr. Joe Deignan and attended volunteer training by the Watershed Stewardship Program. Volunteers wore the distinctive Volunteer Lake Steward yellow t-shirt and gathered recreation use data via a slightly simplified protocol. The Deignans entered volunteer data into an Excel database and supplied the data to the WSP at the season's end. Volunteers inspected boats, educated visitors about invasive species and generally acted as ambassadors for the Rainbow Lake waterway and association. Volunteer Lake Stewards at Rainbow Lake inspected a total of 132 boats and educated 244 visitors, finding three organisms on boats either leaving or entering the Rainbow Lake waterway. A summary of their data is found on the same page as the data summary for the Watershed Stewards. The Volunteer effort at Rainbow Lake is a model for other programs seeking to stretch limited resources by pairing paid and volunteer staff. The Rainbow Lake Volunteers are exceptionally dedicated and well-organized.



Rainbow Lake Volunteer Lake Stewards on the job!

Discussion

Overall the 2008 season at the Rainbow Lake Boat Launch saw more users on the weekends compared to the 2007 season. In 2008 the total number of boats, including those tallied by the Volunteer Lake Stewards, was 383 with a total of 830 users; however, the 2007 season was over a month shorter, due to a later start up of stewardship coverage. The type of boats most commonly launched were motorboats, followed by kayaks and then canoes. 2008 showed more non-motorized watercraft compared to motorized ones, with average motor horsepower at 44 versus 49 in 2007. The number of four stroke engines also increased from 12 to 35 boats from the 2007 to 2008 summer season. As a positive aspect, the number of boat wash users has increased greatly from last year's number of 35 boats (19%) in 2007, to 71 boats (28%). The 63% of boat launch users who took prevention steps is another indication of how education about invasive species is spreading via stewards and others. Of the total number of boats entering Rainbow Lake 12% had visited an infested lake within the previous two weeks. For ease of analysis future data managers may want to setup additional columns for boaters who visited other lakes and then of those boaters who has been on an infected water body.

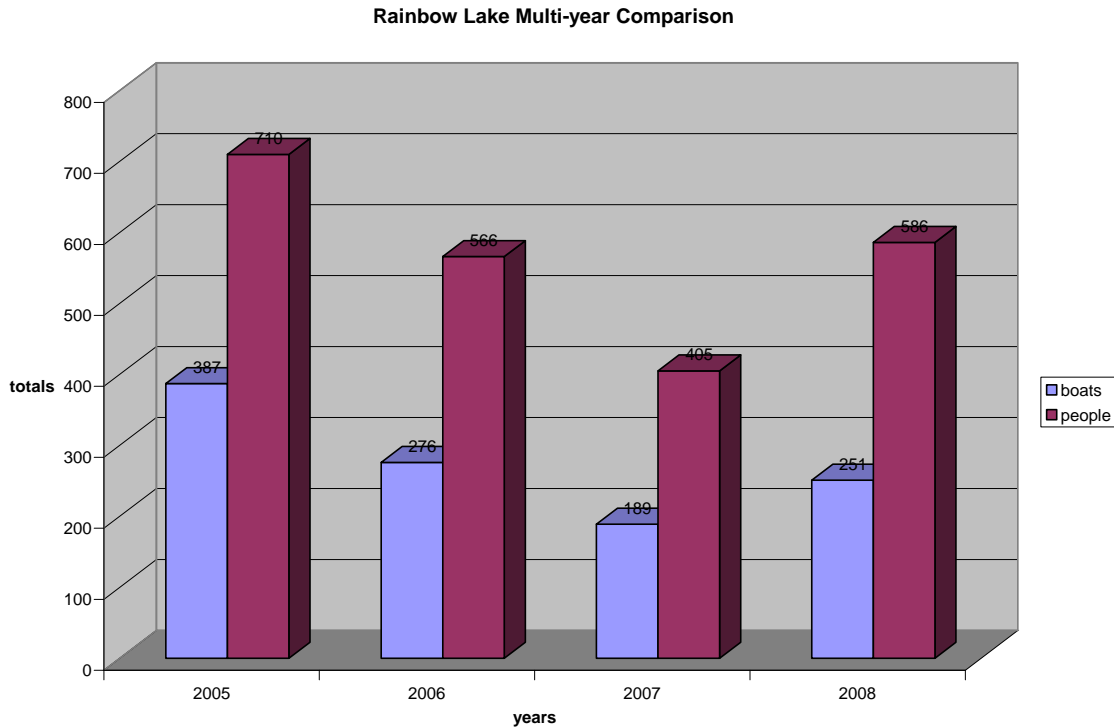


Figure 5: Multi-year comparison of total numbers of boats and users at the Public boat launch for the Rainbow Lake Waterway, 2008. 2008 numbers cited in this graphic do not include Volunteer Lake Steward data for ease of comparison.

Conclusion

The summer of 2008 was successful for the Watershed Stewardship Program stationed at Buck Pond Campground as it expanded boat wash use significantly. 830 people in 383 boats received a message regarding invasive species and their possible transport on watercraft. All boats were visually inspected for hanging weeds and no invasive species were detected. The likelihood of invasive species transport into the Rainbow Lake Waterway is a reality with 12% of the boats having been launched in bodies of water infected with invasive species in the prior two weeks, and 26% of all boats having been on

another waterway in the previous two weeks. Of the 251 boats (noted by paid Watershed Stewards) entering the Rainbow Lake Waterway 12% posed a risk of introducing invasives into the waterway. The Watershed Stewards are a proactive means of preventing the spread of invasive species to the Rainbow Lake Waterway, as well as preventing the spread of southern naiad out of these lakes.

The stewards would like to thank the Rainbow Lake Association for granting the stewards to work at the Rainbow Lake Waterway Public Boat Launch for another year, and for their contribution to help protect the Adirondack lakes. Thank you to the residents and Buck Pond Campground employees who visited and expressed their appreciation for the programs presence at the boat launch. The WSP is looking forward to another great summer in 2009.



Rainbow Lake Association Member and Boater Safety Instructor, Marge Glowa

Table 4: Rainbow Lake Waterway Recreation Study Results, 2008

Summary of season- 2008

Rainbow Lake Waterway- Buck Pond Campground boat launch

Date	Boat Type							total # boats	Weekly Avg HP outboard	Four stroke	Group Size	Pets	Avg time to launch	Avg time to retrieve
	M	PWC	S	C	K	B	R							
5/24/08 to 5/28/08	12	2	0	4	0	0	0	18	36	2	41	1	0:11	0:07
5/29/08 to 6/4/08	1	0	0	0	0	0	0	1	NA	0	3	0	0:10	0:20
6/5/08 to 6/11/08	4	0	0	0	0	0	0	4	50	2	29	2	0:12	0:11
6/12/08 to 6/25/08	9	0	0	5	11	0	0	25	24	4	36	1	0:23	0:24
6/26/08 to 7/02/08	6	0	0	3	0	0	0	9	30	1	17	0	0:13	0:09
7/3/08 to 7/9/08	12	0	0	7	3	0	0	22	32	5	95	2	0:14	0:14
7/10/08 to 7/16/08	6	2	0	3	8	0	0	19	44	1	35	0	0:14	0:19
7/17/08 to 7/23/08	13	1	0	3	6	0	0	23	42	2	51	5	0:13	0:14
7/24/08 to 7/30/08	10	1	0	10	8	0	0	29	18	3	57	5	0:16	0:19
7/31/08 to 8/6/08	11	2	0	6	14	0	0	33	60	2	64	4	0:22	0:25
8/7/08 to 8/13/08	8	0	0	2	10	0	0	20	70	7	41	4	0:18	0:22
8/14/08 to 8/20/08	7	0	0	12	1	0	0	20	48	2	52	1	0:17	0:14
8/21/08 to 8/27/08	9	0	0	5	5	0	0	19	65	2	47	2	0:38	0:25
8/28/08 to 9/1/08	5	0	0	2	2	0	0	9	48	2	18	0	0:11	0:12
Paid Steward data	113	8	0	62	68	0	0	251	Summer Avg=41	35	586	27	0:16	0:17
Volunteer Steward data	49	5	-	79	-	-	-	132	Median HP = 25	-	244			
Grand Total	162	13	0	141	68	0	0	383		35	830			

Key: M = Motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = barge (construction); R = rowboat

Date	Organisms Found		Organism Type				Used Boat Wash		Measures Taken by Visitors to Prevent Inv Species						
	Launching	Retrieving	EWM	BW	NM	other	Launching	Retrieving	Took Steps	I	WB	DB	BB	LW	Dis
5/24/08 to 5/28/08	0	0	0	0	0	0	2	0	13	13	4	0	0	0	0
5/29/08 to 6/4/08	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0
6/5/08 to 6/11/08	1	1	0	0	0	1	0	7	18	15	8	3	0	0	0
6/12/08 to 6/25/08	0	0	0	0	0	0	0	2	13	13	7	5	0	0	0
6/26/08 to 7/02/08	1	1	0	0	0	2	0	3	3	3	3	0	0	0	0
7/3/08 to 7/9/08	0	3	0	0	0	3	0	6	11	11	8	4	0	0	0
7/10/08 to 7/16/08	3	2	0	0	1	5	1	2	12	2	11	3	0	1	0
7/17/08 to 7/23/08	3	5	0	0	0	6	0	5	17	17	9	12	0	0	0
7/24/08 to 7/30/08	3	0	0	0	0	3	2	1	13	12	4	4	0	0	0
7/31/08 to 8/6/08	3	9	0	1	0	4	4	10	17	15	15	6	0	1	0
8/7/08 to 8/13/08	1	1	0	0	0	1	5	2	13	3	13	0	0	0	0
8/14/08 to 8/20/08	0	3	0	0	0	3	1	8	16	15	12	2	0	0	0
8/21/08 to 8/27/08	0	2	0	0	0	2	5	0	5	8	10	5	0	0	0
8/28/08 to 9/1/08	0	1	0	1	0	1	2	2	6	2	2	4	0	0	0
Paid Steward data	15	28	0	2	1	31	23	48	158	130	107	49	0	2	0
Volunteer Steward data	1	2	0	1	1	1	1	2	92	96	86	24	12	13	13
Grand Total	16	30	0	3	2	32		50	158	222	203	135	24	14	13

Volunteer Steward Data

Rainbow Lake Volunteer Data	Boat Type		total # boats	Group Size	organisms found		organisms type				Boat Wash	visitor prevention steps						
	M	PWC			entering	leaving	EWM	BW	NM	other		I	WB	DB	BB	LW	Dis	didn't ask
Summer, 2008																		
weekly total 5/24/08 to 5/28/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
weekly total 5/29/08 to 6/4/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
weekly total 6/5/08 to 6/11/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
weekly total 6/12/08 to 6/25/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
weekly total 6/26/08 to 7/2/08	1	0	1	2	4	0	0	0	0	0	0	2	2	0	0	0		
weekly total 7/3/08 to 7/9/08	12	2	26	39	79	0	0	0	0	0	0	30	33	25	6	1		
weekly total 7/10/08 to 7/16/08	3	1	6	10	19	0	0	0	0	0	0	7	7	9	1	0		
weekly total 7/17/07 to 7/23/08	0	0	3	3	4	0	0	0	0	0	0	2	2	2	0	2		
weekly total 7/24/08 to 7/30/08	5	0	15	20	37	0	0	0	0	0	0	1	11	12	10	2		
weekly total 7/31/08 to 8/6/08	7	0	7	14	26	0	0	0	0	0	0	0	14	12	11	0		
weekly total 8/7/08 to 8/13/08	4	2	8	14	26	0	1	0	0	1	0	9	8	8	0	1		
weekly total 8/14/08 to 8/20/08	3	0	9	12	14	0	0	0	0	0	0	6	5	7	4	0		
weekly total 8/21/08 to 8/27/08	3	0	0	3	4	0	0	0	1	1	0	0	1	1	0	5		
weekly total 8/28/08 to 9/1/08	11	0	4	15	31	0	0	0	0	0	0	1	10	14	14	6		
summer totals	49	5	79	132	244	0	1	0	1	1	2	92	96	86	24	12		

Key: EWM = Eurasian Watermilfoil; BW = native bladderwort; NM = native milfoil; I = Inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = emptied livewell; Dis = disposed of bait.

Recreation Use Study: Raquette Lake

By James Parmeter

Introduction:

The Watershed Stewardship Program is a part of Paul Smith's College's Adirondack Watershed Institute, which works to help protect the quality of the local waterways. The program has been in existence since 2000, but 2008 was the first year it was implemented at Raquette Lake. The program helps to prevent the spread of invasive species through public outreach. Stewards were stationed at Raquette Lake to present an interpretive message to launch users about invasive species and how to fight the spread of these species throughout the Adirondack Park. The steward inspected all watercraft and trailers to ensure boats were free of invasive weeds. Stewards also collected recreational data to determine the number and type of boats that visited the lake. Questions regarding where the boat has been in the prior two weeks, and whether any prevention steps were taken against invasive species were also asked. These actions along with the encouragement of users to wash their boats at available boat wash station helped in deterring the spread of invasive species from lake to lake.



Watershed Steward Korinna Marino at Raquette Lake Launch

Methods:

A steward was stationed at the Raquette Lake Launch from 7:00am to 4:00pm from Saturday the 24th of May to 31st of August. A steward was present at the launch from Friday to Monday, irregularly. There

were times when the steward did boat launch duty on any given day during the week, depending on weather, sickness, personal days and educational outreach programming. Most weekend days were covered, with some exceptions. Table 1 describes boat launch coverage by day of the week over the summer. Rain-out days are included in these figures, but off-site educational outreach programs are not. Coverage started the last week in May and concluded on the Sunday of Labor Day weekend.

	Thurs	Fri	Sat	Sun	Mon	Tues	Weds
May		1	1	1			
June		4	4	4	2		
July	1	4	4	4	2		
August	1	4	5	3	3	1	3

Table 10: Steward coverage at Raquette Lake boat launch, 2008

As a boat approached the launch area, the steward recorded all observable data from each boater that visited the launch, including boat type (inboard, outboard, or inboard/outboard), if the engine was four or two stroke, horsepower of the engine, group size, if visitors took preventative steps (washing the boat, draining bilges and live wells, or inspecting the boat for plant fragments), and which state the boat was registered, if applicable. The time that the boater arrived and departed (launching) was recorded, along with the time that they arrived and departed (hauling away) from the dock. The number of pets, if any were accompanying the boater(s) was also recorded. The steward would then give a brief interpretive message regarding invasive species, and proceed to ask the user where the boat had been in the previous two weeks. In addition, all boats and trailers were inspected for organisms. All data collected was written on a prepared sheet which was later entered into a database so all information could be compiled. The database allowed for comparison of data and a chance to observe any trends from the summer. In addition to providing recreational use insights, the database allows a better idea as to what launch users are doing to help prevent the spread of invasive species.

Results:

Between the 24th of May and the 31st of August there were a total of 810 people launching 355 watercraft. The average time spent launching a boat was four minutes. The peak usages of the year were the week of 7/24/08 to 7/30/08 (52 boats, 100 people) and 7/31/08 to 8/6/08 (52 boats, 108; Figure 1). Use levels fluctuated during the entire summer.

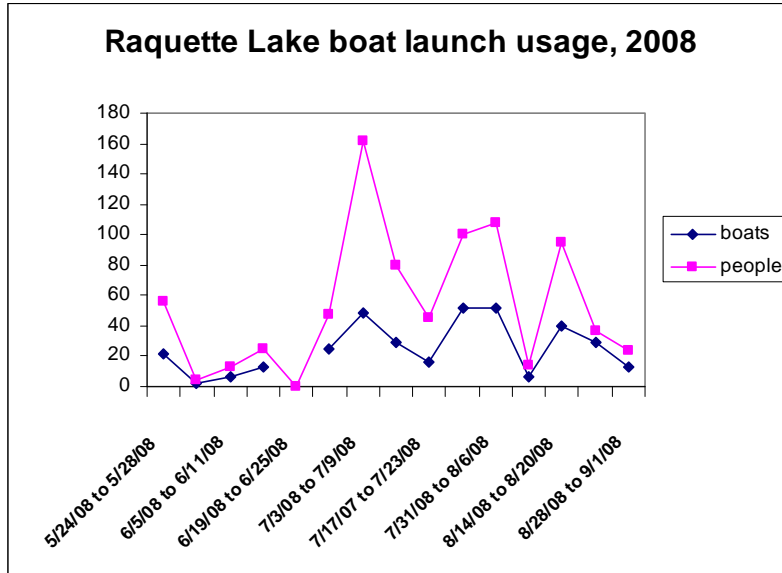


Figure 4. Weekly use of the New York State Boat Launch on Raquette Lake during the summer of 2008.

Motorboats were the most numerous type of watercraft launched in the summer of 2008 (225 total; 64% of total watercraft), followed by canoes (61; 17%), kayaks (39, 11%), Personal water craft (PWC 16, 5%), barges (7, 2%), and then sailboats (4, 1%; figure 2). motorized watercraft outnumbered non-motorized watercraft by a total of 248 (70% of total watercraft) to 104 (30%). Average horsepower of motors observed was 68, with a median horsepower of 50. Forty-two 4-stroke motors were observed (17% of the 248 total motorized watercraft).

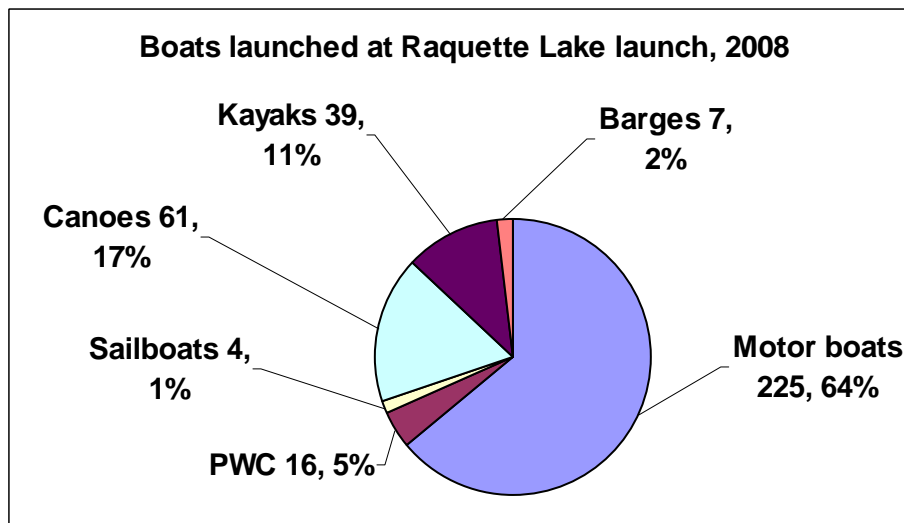


Figure 2: Percent of watercraft type launched at the Raquette Lake boat launch during the summer of 2008.

State/Province of Origin

As expected, most boats (294) were registered in New York, while others came from a range of places (Table 1). The second most represented state was Pennsylvania, with 13 boats, followed by New Jersey (5), Connecticut (4), Canada (2), and Vermont, North Carolina, and Ohio with 1 boat each (Table 1). Raquette Lake attracts mostly local boaters and a few others who visited as children and

return regularly. Watershed stewards determined originating state by observing registration stickers on motorized watercraft, asking other boaters their place of origin, and observing license plates. It is likely that some of the unregistered watercraft would have originated in states outside New York.

Location	Number
NY	294
NJ	5
PA	13
CT	4
VT	1
NC	1
OH	1
Canada	2

Table 11. Place of origin observed from boats launched into Raquette Lake during the summer of 2008.

Use Patterns

In 2008 a Watershed Steward was stationed at Raquette Lake 4 days per week, from Friday to Monday. We found the peak use weeks of 7/24/08 to 7/30/08 and 7/31/08 to 8/6/08 (Figure 1). The rainy weather and lack of nice days may have resulted in low numbers of boaters throughout the year. Without previous data about Raquette Lake it is hard to know if this is an increase or decrease in boat launch usage.

Most boats were launched on the weekend with Friday having the most launches (total 104, Figure 3) with an average of 9.45 boats per Friday. Average boats launched by day are as follows: Saturday – 8.36, Sunday – 8.7, and Monday – 7.66, the other values are not conclusive due to small numbers of weeks when those days were recorded (figure 3).

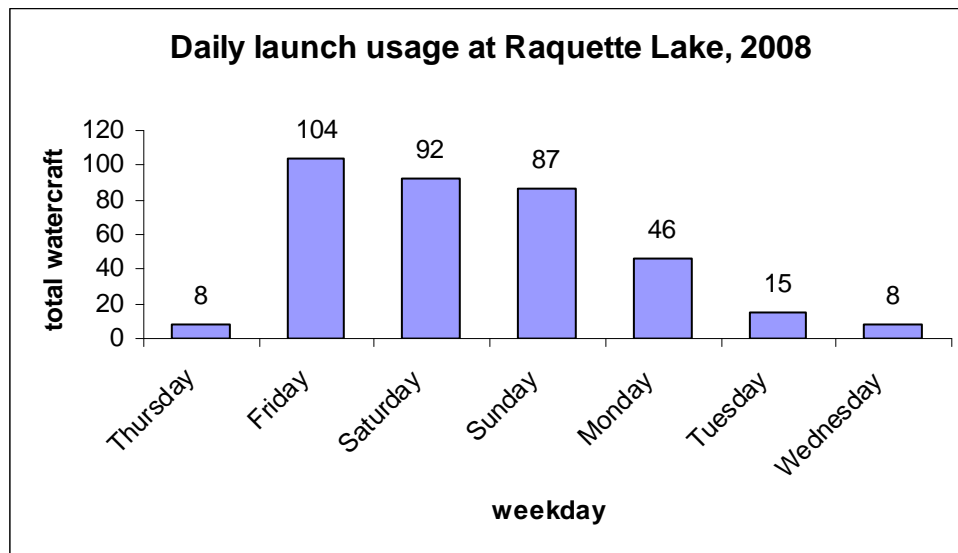


Figure 3. Total number of boats launched into Raquette Lake by day of week during the summer of 2008.



Sign at Raquette Lake Launch placed by Raquette Lake Supply

Water Body	Infected	Total Visits	Water Body	Infected	Total Visits
Oneida Lake	yes	12	3rd Lake	unknown	2
7th Lake	yes	9	Browns Tract pond	unknown	2
Lake George	yes	6	Canadarago Lake	unknown	2
Lake Ontario	yes	6	Eighth Lake	unknown	2
Hudson River	yes	5	Indian Lake	unknown	2
Cayuga Lake	yes	4	Jordan Harbor Canada	unknown	2
Lake Champlain	yes	4	South Lake	unknown	2
Long Island Bay	yes	4	White Lake	unknown	2
Saratoga Lake	yes	4	13th Lake	unknown	1
Fish Creek Pond	yes	3	Alum Creek Res OH	unknown	1
Saranac Lake	yes	3	Beardsley Lake	unknown	1
5th Lake	yes	2	Beaver Island MI	unknown	1
Finger Lakes	yes	2	Black Lake	unknown	1
Atlantic Ocean	yes	1	Black River	unknown	1
Canandaigua	yes	1	Brookville Lake	unknown	1
Great Sacandaga	yes	1	Candlewood Lake CT	unknown	1
Keuka Lake	yes	1	Delta Lake	unknown	1
Lake Erie	yes	1	East Sydney Dam	unknown	1
Lake Hopatcong NJ	yes	1	First Lake	unknown	1
Niagara River	yes	1	Great Pond	unknown	1
Otsego	yes	1	Jefferson Lake	unknown	1
Owasco Lake	yes	1	Lake Adirondack	unknown	1
Sixth Lake	yes	1	Lake Grand QB	unknown	1
St. Lawrence River	yes	1	Lake Lianona	unknown	1
Raquette Lake	unknown	167	Lake Placid	unknown	1
4th Lake	unknown	11	Lake Pleasant	unknown	1
Blue Mountain	unknown	8	Little River ME	unknown	1
Long Lake	unknown	7	Lower Hankly	unknown	1
8th Lake	unknown	5	Marsh Creek PA	unknown	1
Limeklin	unknown	5	Michegroy lake	unknown	1
OK Slip Pond	unknown	5	Redfield Res	unknown	1
Rollins Pond	unknown	4	Seneca River	unknown	1
Sacandaga Lake	unknown	4	Swant Pond CT	unknown	1
Stillwater Reservoir	unknown	4	Tupper Lake	unknown	1
Cedar River	unknown	3	Upper St.Regis	unknown	1
Lake Delta	unknown	3	Wetetnagami	unknown	1
Moose River	unknown	3	Witchwood Lake CT	unknown	1
Mosse River	unknown	3	Woodhull Lake	unknown	1
Sagamore Lake	unknown	3			

Table 12: Raquette Lake previous lakes visited within two weeks, 2008.

Where has your boat been?

Watershed Stewards asked boaters what other bodies of water their boats had been on in the previous two weeks before visiting Raquette Lake. This gave us a scope of the likelihood the lake may be exposed to an invasive aquatic species. One-hundred-ninety-one boats were reported to have been used in other lakes in the preceding two weeks. This represents 54% of the total boats launched (355). We expect that more boats had been used in other waterways in the preceding two weeks, but at high use periods it was difficult to ask this question of all boaters. These 191 boats had visited a total of 80 lakes in the preceding two weeks. No boat owners reported visiting more than one lake in the preceding two weeks. Of the 191 boat owners reporting prior use, 14% (26) had visited a lake with a known infestation of aquatic invasive species. Overall, then, 26 of the total 355 boats (7%) launched at Raquette Lake in 2008 present a risk of transporting invasive species into the waterway.

The breakdown of lakes visited prior to Raquette Lake helps us to understand patterns of visitation and invasive species transport. We found that 7% of the 191 prior lake visits had been to lakes that are known by WSP to have a presence of at least one invasive aquatic plant (Table 2). The body of water reported most was the Fourth Lake (total 11). The second most visited body of water visited was the Seventh Lake (9); most other lakes were visited between 3 and 5 times. Lake Champlain had a total of four visits in the two weeks prior to visiting Raquette Lake. The Saranac Lakes was visited three times and is known to host Eurasian watermilfoil. Lake Champlain is known to host many aquatic invasive species including Eurasian watermilfoil, hydrilla, water chestnut, and zebra mussels. Lake George (6) also play host to Eurasian Watermilfoil and Lake Ontario (6) is known to host many invasives.

Most out of state boaters responded to the question about previous water bodies in the last two weeks with this is the first time in this year or that it had been weeks since it had been in the water. This is an interesting finding considering that you would assume that invasive species are being transported to our lakes by out-of-state visitors, when in actuality the most significant potential source of invasives tends to be local boaters. Vacationers appear to only use their boat on vacation and park it in their yard for the remainder of the year, while locals tend to boat throughout the spring, summer, and fall.

Have You Taken Prevention Steps?

Stewards asked boaters, "What, if any, prevention steps did you take to stop the spread of aquatic invasive species?" Possible prevention steps a boater could have taken included washing or inspecting their boat, draining the bilge, and emptying live wells, and bait buckets. We found that out of the total 355 boats launched 345 (97%) took some form of prevention steps. Of the 345 boaters who took preventative steps inspection (308) was the step most taken. Boat washing (173), draining bilge water (11); some boaters reported taking multiple steps to help prevent the spread of invasive species (Figure 4).

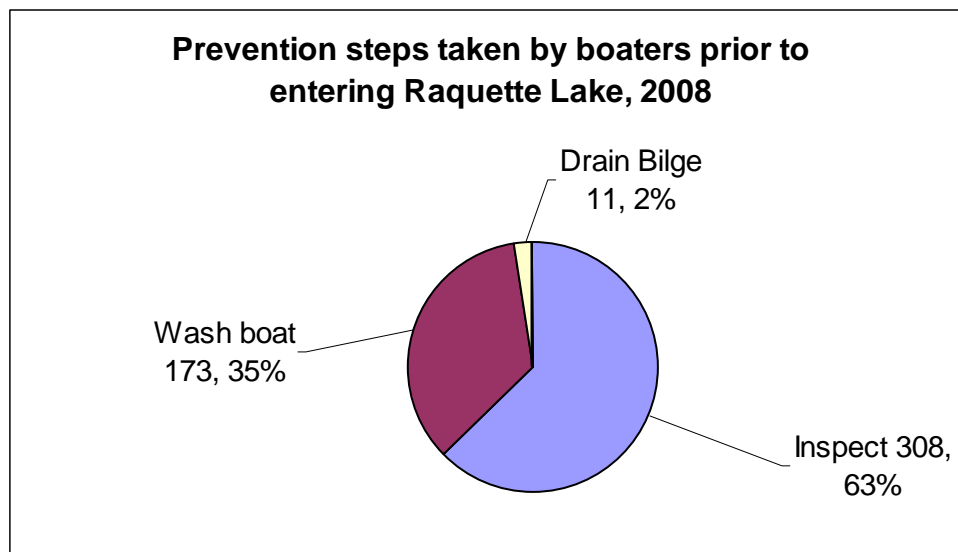


Figure 4. Prevention steps taken by boaters to help stop the spread of aquatic invasive species by boats, recorded at the Raquette Lake boat launch.

Discussion

Overall the 2008 season at the Raquette Lake Boat Launch saw fluctuation in usage throughout the summer season. In 2008 the total number of boats was 355 with a total of 810 users. The types of boats most commonly launched were motorboats, canoes, and kayaks (figure 2). This season showed more motorized watercraft compared to non-motorized ones, with an average horsepower of 61. The number of four stroke engines totaled forty-two. The number of boat launch users taking preventative steps was 97%. Without previous data it is difficult to say if this is an increase in the amount of boaters taking prevention steps; but you can be sure that word is spreading and more individuals are at least checking over their watercraft. Of the 355 boats entering Raquette Lake 7% had visited an infested lake within the previous two weeks. Four instances of finding organisms were encountered during this summer season. One instance was grass, another was a native bladderwort, and the other two were Eurasian watermilfoil caught before it entered the lake.

Conclusion

The summer of 2008 was successful for the Watershed Stewardship Program stationed at the Raquette Lake Boat Launch. Eight-hundred-ten people in three-hundred-fifty-five boats received a message regarding invasive species and their possible transport on watercraft. All boats were visually inspected for hanging weeds and no invasive species were detected. The likelihood of invasive species transport into the Raquette Lake Waterway from previously lakes visited was 7%. Of the total 355 boats 14% had been on another waterway in the previous two weeks. The Watershed Stewards are a means of preventing the spread of invasive species into the Raquette Lake Waterway.

The steward, Korinna Marino, would like to thank the Raquette Lake Association and area businesses for granting the steward the opportunity to work at the Raquette Lake for the first year, and for their contribution to help protect Adirondack lakes. Pat Deyle, along with Peg Deyle, was especially helpful in providing guidance and support. Jim Dillon and his great staff also helped to support the steward and provide information.

Table 4: Raquette Lake Recreation Study Results, 2008

Summary of season- 2008
 Raquette Lake

Fridays-Mondays, irregular coverage

Date	Boat Type						total # boats	Weekly Avg HP Outboard	Four stroke	Group Size	Avg time to launch
	M	PWC	S	C	K	B					
5/24/08 to 5/25/08	18	0	0	4	0	0	22	73	4	56	6
5/30/08 to 6/2/08	2	0	0	0	0	0	2	29	0	4	5
6/6/08 to 6/9/08	4	0	0	2	0	0	6	30	0	13	4
6/13/08 to 6/16/08	11	0	0	0	2	0	13	109	4	25	5
6/20/08 to 6/21/08	No data- rain and steward ill								0	0	na
6/27/08 to 6/29/08	13	2	0	2	8	1	25	54	5	47	5
7/4/08 to 7/6/08	36	3	2	5	3	0	49	55	14	162	5
7/11/08 to 7/14/08	24	1	1	3	0	0	29	71	0	80	3
7/18/07 to 7/21/08	10	2	0	3	1	0	16	66	9	45	3
7/25/08 to 7/28/08	41	0	0	3	3	2	52	87	0	100	3
8/1/08 to 8/6/08	21	3	1	15	11	1	52	46	5	108	2
8/8/08 to 8/13/08	3	0	0	4	0	0	7	78	1	14	5
8/15/08 to 8/18/08	22	2	0	12	4	0	40	47	0	95	4
8/21/08 to 8/25/08	15	0	0	6	4	3	29	74	0	37	2
8/27/08 to 8/31/08	5	3	0	2	3	0	13	103	0	24	3
summer totals	225	16	4	61	39	7	355	Summer Avg=68	42	810	4
								Median HP = 50			

Key: M = Motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = barge (construction); R = rowboat

Date	Organisms Found		organism type				Measures Taken by Visitors to Prevent Inv. Species						
	Launching	Retriev	EWM	BW	NM	other	took steps	I	WB	DB	BB	LW	Dis
5/24/08 to 5/25/08	0	0	0	0	0	0	21	12	14	4	0	0	0
5/30/08 to 6/2/08	0	0	0	0	0	0	2	2	1	0	0	0	0
6/6/08 to 6/9/08	0	0	0	0	0	0	6	5	4	2	0	0	0
6/13/08 to 6/16/08	0	0	0	0	0	0	12	11	11	3	0	0	0
6/20/08 to 6/21/08	0	0	0	0	0	0	0	0	0	0	0	0	0
6/27/08 to 6/29/08	0	0	0	0	0	0	26	19	21	0	0	0	0
7/4/08 to 7/6/08	0	0	0	0	0	0	59	52	34	1	0	0	0
7/11/08 to 7/14/08	0	0	0	0	0	0	29	24	15	0	0	0	0
7/18/07 to 7/21/08	0	0	0	0	0	0	16	14	7	0	0	0	0
7/25/08 to 7/28/08	0	1	0	1	0	0	49	49	15	0	0	0	0
8/1/08 to 8/6/08	0	0	0	0	0	0	46	44	18	1	0	0	0
8/8/08 to 8/13/08	0	0	0	0	0	0	3	3	2	0	0	0	0
8/15/08 to 8/18/08	1	0	1	0	0	1	38	38	13	0	0	0	0
8/21/08 to 8/25/08	0	0	0	0	0	0	25	22	9	0	0	0	0
8/27/08 to 8/31/08	0	0	0	0	0	0	13	13	9	0	0	0	0
	1	1	1	1	0	1	345	308	173	11	0	0	0

Key: EWM = Eurasian Watermilfoil; BW = native bladderwort; NM = native milfoil; I = Inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = emptied livewell; Dis = disposed of bait.

Recreation Use Study: Second Pond/Lower Saranac Lake

By: Naomi Thompson and Eric Holmlund

Introduction:

The Watershed Stewardship Program has been striving to prevent the spread of invasive species from entering our waterways here in the Adirondacks. Second Pond is one of the main entrances to the Saranac Lakes chain for motor boats. It is also the access point for the Saranac Lake Islands public campground which is accessed and used by a variety of people from all over the country. This is a very important vector for the transport of invasive species because the Saranacs do have several invasive species in them and there are people that are transporting their boats from lakes with other known



populations of invasive species. If these imported invasive species were to get into Adirondack waters, they would rapidly spread throughout the region. That is why it is very important that there be a steward at this boat launch and educating people about how invasive species spread and how to properly stop the spread of such invasive species. Several Watershed Stewards were assigned launch duty from Fridays to Mondays each week. They were instructed to check the boats thoroughly and ask important questions such as what steps the boater had taken to prevent the spread of invasive species. Staffing shortages caused coverage to drop to some extent during the second part of the summer.

Methods:

One Steward was placed at the boat launch for a total of 8 hours each day. This lasted from 7am till 4pm with a one hour break for lunch. The stewards would then sit at a table with pamphlets and visual aids till a boater pulled in. They would then approach the boater and ask them a few questions about their boat. These questions included what other lakes the boat had visited in the past two weeks and what steps they had taken to prevent the spread of invasive species. The steward would then ask if they could check over the visitor's boat and talk to them a little bit about invasive species. The steward would then proceed to check over the boat and educate the boater about invasive species focusing on Eurasian Watermilfoil, the main invasive in the Saranacs which has the potential to spread quickly throughout the Adirondacks. Stewards would then give the boater an idea on how to improve their prevention steps against invasive species.

Results:

Between May 25 and August 29, 2008 there were 1,765 boats encountered by Watershed Stewards using the Second Pond New York State Boat Launch. Of these 3 were row boats, 622 were kayaks, 591 were canoes, 5 were sail boats, 17 were personal watercrafts, and 526 were motor boats. This can be seen in figure 1. The Stewards found that 160 of these motorboats had four stroke engines (30%).

Types of Watercraft: Second Pond 2008

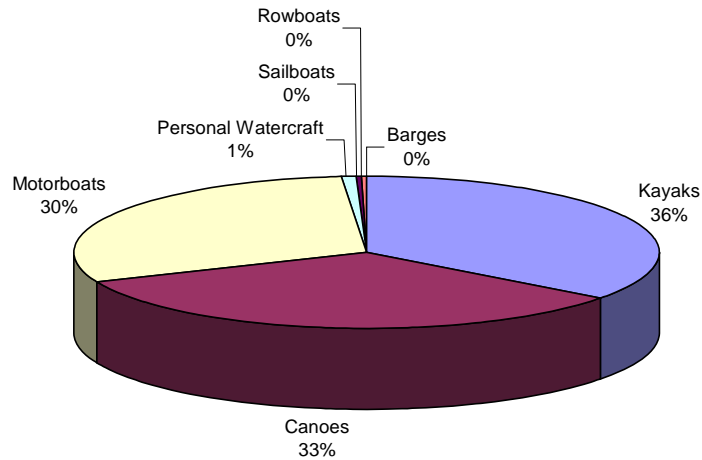


Figure 1: Types of Watercraft observed at Second Pond during summer season, 2008, Fridays-Mondays

Along with these boats there were a total of 3,223 people and 165 user groups brought pets with them. The July 4th weekend was the busiest weekend of the summer with 545 visitors. After the Fourth, use fell, gaining gradually throughout August.

Second Pond Boat Launch Use, Summer 2008

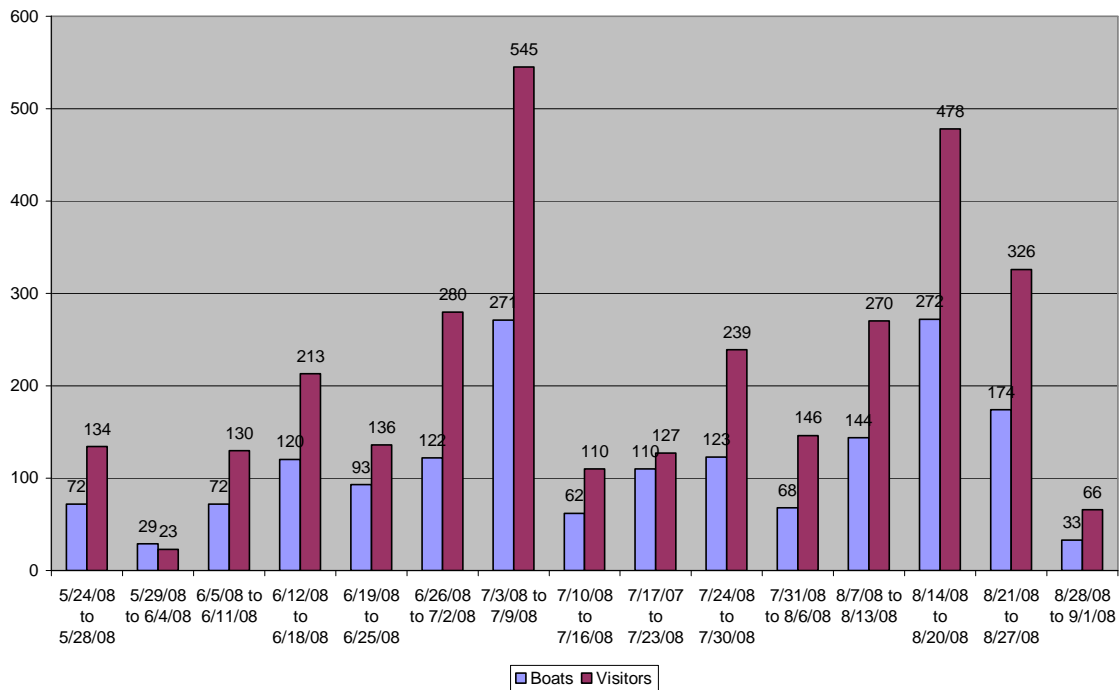


Figure 2: Second Pond visitation pattern, summer, 2008

The Stewards found 48 organisms on boats going in and 44 on boats leaving making a total of 92 organisms found on boats, of a total of 1,765 boats inspected (5.2% presence rate). Of these organisms stewards found that 19 were Eurasian Watermilfoil, that were 2 Bladderwort, that 10 were Native Milfoil, 2 Zebra Mussels, 1 Waterchestnut, and 70 other species that were either unidentifiable or were just non-invasive native plants. This is a large amount of invasive species being found considering stewards were on duty only about half of the time. This number is more than stewards in this program have found in any year before.

One of the Zebra Mussels was found on a boat going into to Second Pond that reported having visited Lake Champlain within the last two weeks. This same zebra mussel was found attached to a piece of Eurasian Watermilfoil, amid a large mass of other weeds that were not identifiable. This incidence happened on Sunday the 27th of July. The other zebra mussel was found on a boat leaving the lake with a water chestnut nutlet and a piece of bladderwort all attached together in a small mass of Eurasian watermilfoil. The boat had been in the Mohawk River within the prior two weeks. This incidence happened on Sunday the 6th of July. Most organisms were found during the weeks of July 4th and August 21 (Figure 3). It is imperative to have good education and inspection on these peak weekends at least, to avoid exporting the Eurasian watermilfoil from Lower Saranac Lake and importing still other invasive species to this highly used waterway.

Organisms Found on Boats by Week- Second Pond

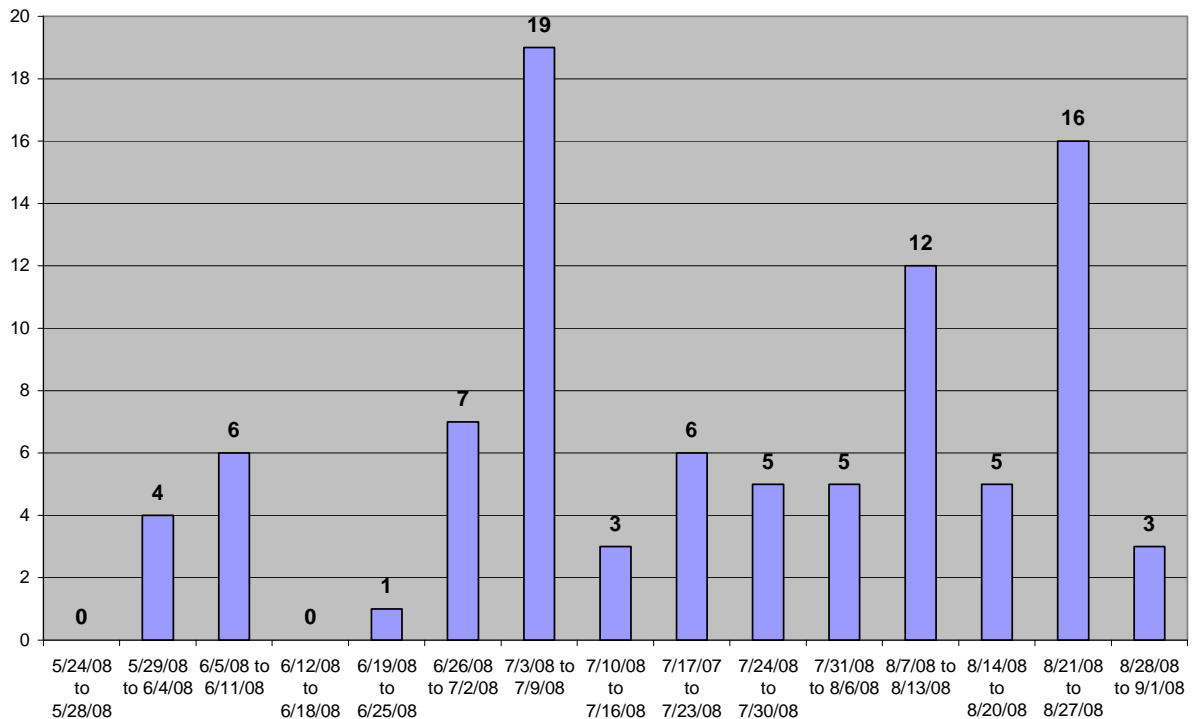


Figure 3: Organisms Found on Visitor Boats by Week at Second Pond State Boat Launch

Measures Taken to Prevent Invasive Species Introduction:

Stewards also asked visitors whether they had taken steps to prevent transporting invasive species, and if so, what steps they had taken. A total of 638 visitors reported having taken some steps, out of 1,765 total boats launched (which is a stand-in for user groups). This is a 36% compliance rate. These 638 visitors took a variety of steps to prevent invasive species transport (Figure 4).

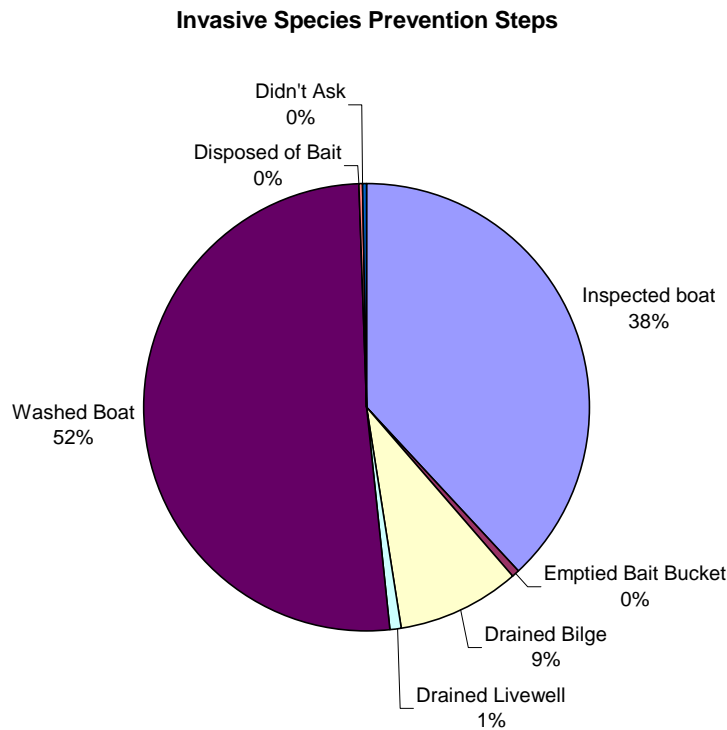


Figure 4: Invasive Species Prevention Steps taken by 638 conscientious boat launch users at Second Pond, 2008

Conclusion:

This is the second summer the Watershed Stewardship Program has been able to post a steward at Second Pond State Boat Launch. The last year, 2005, featured coverage only on the weekends. In 2005, stewards saw 1,676 boats (compared with 1,765 this year) and 3,691 people (compared with 3,223 this year). While the numbers appear comparable, they reflect a likely decline in visitation from 2005, when one considers that in 2008, the WSP added Friday and Monday coverage. It is clear that there are large numbers of people using the Second Pond boat launch, driving from many points of origin, bringing with them, at a 5.2% rate, various organisms on their boats, trailers and tackle. It is evident that there is a need for boat inspection and user education at Second Pond, both to protect Lower Saranac Lake from further degradation and to avoid exporting milfoil to nearby ponds and lakes that so far do not suffer from invasive aquatic species.

Table 1: Second Pond Recreation Study Results, 2008

Summary of season- 2008

Second Pond 2008 Date	Boat Type							total # boats	weekly average HP	Four stroke	Group Size	Pets (1 or 0)	Avg time to launch	Avg time to retrieve
	M	PWC	S	C	K	R	B							
5/24/08 to 5/28/08	22	0	0	17	33	0	0	72	54	5	134	11	0:14	0:17
5/29/08 to 6/4/08	16	0	0	6	7	0	0	29	37	4	23	3	0:24	0:22
6/5/08 to 6/11/08	25	1	0	17	29	0	0	72	69	8	130	7	0:16	0:19
6-12/08 to 6-18/08	43	1	0	33	42	1	0	120	75	11	213	10	0:19	0:24
6/19/08 to 6/25/08	47	1	0	25	20	0	0	93	58	24	136	10	0:32	0:26
6/26/08 to 7/2/08	44	1	0	53	24	0	0	122	41	10	280	16	0:23	0:35
7/3/08 to 7/9/08	82	3	1	81	103	1	0	271	69	16	545	32	0:25	0:24
7/10/08 to 7/16/08	21	0	0	17	24	0	0	62	89	10	110	2	0:21	0:18
7/17/07 to 7/23/08	37	3	0	39	31	0	0	110	69	5	127	11	0:26	0:20
7/24/08 to 7/30/08	32	0	0	54	36	1	0	123	46	11	239	11	0:23	0:26
7/31/08 to 8/6/08	18	0	0	30	20	0	0	68	41	1	146	6	0:27	0:24
8/7/08 to 8/13/08	31	0	3	63	47	0	0	144	59	15	270	11	0:29	0:33
8/14/08 to 8/20/08	53	4	1	90	123	0	1	272	51	14	478	18	0:23	0:25
8/21/08 to 8/27/08	46	3	0	52	73	0	0	174	58	18	326	16	0:20	0:40
8/28/08 to 9/1/08	9	0	0	14	10	0	0	33	118	8	66	1	0:21	0:34
summer totals	526	17	5	591	622	3	1	1765	Summer Avg = 61 Median HP = 50	160	3223	165	0:23	0:26

Key: M = Motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = barge (construction); R = rowboat

Date	Organisms found		Organism type							Measures taken by visitors to prevent inv. Species						
	entering	leaving	EWM	BW	NM	ZM	WC	other	took steps	I	WB	DB	BB	LW	Dis	didn't ask
5/24/08 to 5/28/08	0	0	0	0	0	0	0	0	0	20	6	18	3	0	0	0
5/29/08 to 6/4/08	2	2	0	0	0	0	0	0	4	16	15	10	2	0	0	0
6/5/08 to 6/11/08	2	4	0	0	1	0	0	5	21	8	13	6	0	2	0	1
6-12/08 to 6-18/08	0	0	0	0	0	0	0	0	43	21	29	8	0	0	0	0
6/19/08 to 6/25/08	0	1	0	0	0	0	0	1	36	23	20	0	1	0	0	0
6/26/08 to 7/2/08	3	4	1	0	1	0	0	5	46	18	29	6	1	1	0	0
7/3/08 to 7/9/08	14	5	5	2	3	1	1	12	84	37	61	15	0	2	0	1
7/10/08 to 7/16/08	1	2	0	0	1	0	0	3	23	8	19	0	0	0	0	0
7/17/07 to 7/23/08	3	3	2	0	0	0	0	3	29	19	24	7	0	1	0	0
7/24/08 to 7/30/08	3	2	2	0	1	1	0	3	47	20	25	16	1	0	0	0
7/31/08 to 8/6/08	2	3	2	0	0	0	0	4	31	20	23	5	0	0	0	0
8/7/08 to 8/13/08	7	5	3	0	0	0	0	9	52	19	39	4	0	1	0	0
8/14/08 to 8/20/08	3	2	1	0	0	0	0	4	97	76	71	5	0	1	3	0
8/21/08 to 8/27/08	7	9	3	0	3	0	0	14	75	36	62	4	0	0	0	0
8/28/08 to 9/1/08	1	2	0	0	0	0	0	3	18	13	13	0	0	0	0	0
summer totals	48	44	19	2	10	2	1	70	638	339	456	81	3	8	3	2

Key: EWM = Eurasian Watermilfoil; BW = native bladderwort; NM = native milfoil; I = Inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = emptied livewell; Dis = disposed of bait.

Recreation Use Study: St. Regis Lakes

By James Parmeter

Introduction:

The Watershed Stewardship Program, part of Paul Smith's College's Adirondack Watershed Institute, works to help protect the quality of the local waterways. The program helps to prevent the spread of invasive species through public outreach. Stewards were stationed at the Upper St. Regis Landing to present a brief interpretive message to boaters about invasives and how to fight the spread of these species found throughout the Adirondack Park. The steward inspected all watercraft and trailers to ensure boats were free of invasives. Visitors were also asked to wash their boats before entering the lake and then upon exiting. Stewards also collected recreational data to determine the number and type of boats that visited the lake. Boaters were asked if the boat had been on any other water bodies in the previous two weeks and if so which ones. They were also asked if any prevention steps had been taken to help deter the spread of invasive species between water bodies.



Idem Sailboat Race on Upper St. Regis Lake

Methods:

A steward was stationed at the Upper St. Regis boat launch near the washing station from 7am to 4pm each day of the week from the 25th of May 2008 through the 1st of September 2008. As a boat approached the launch, the number of users, presence of pets, motor size, two or four stroke motor, and state of registration data points were collected. The launch user was then presented with a brief interpretive message regarding aquatic invasive species, and then was asked if they had any questions. Users were asked if their boat had been on other water bodies during the previous two weeks, and if they had taken any steps to prevent transporting invasive species (washing the boat and trailer, inspecting for plant fragments, draining the bilges, disposing of bait or draining the live well) before entering another water body. All users were asked to wash their boats before entering and leaving the water body at the boat wash station. To ensure the removal of aquatic hitchhikers, boats were inspected by stewards for the presence of weeds prior to launching and after retrieving the boat from the water. The data collected was entered into an Excel database where it was analyzed and compared to other weeks and previous summers.

Results:

Between the 25th of May and Labor Day there was a total of 1324 people launching 810 watercraft. The average time spent to launch watercraft was 18 minutes. The peak usage of the year was the week of

the 24th of July to the 30th of July, 2008. During the peak in July 141 people launched a total of 105 boats (Figure 1). Use levels dipped after this week then began to rise again after the week of the 7th of August, 2008.

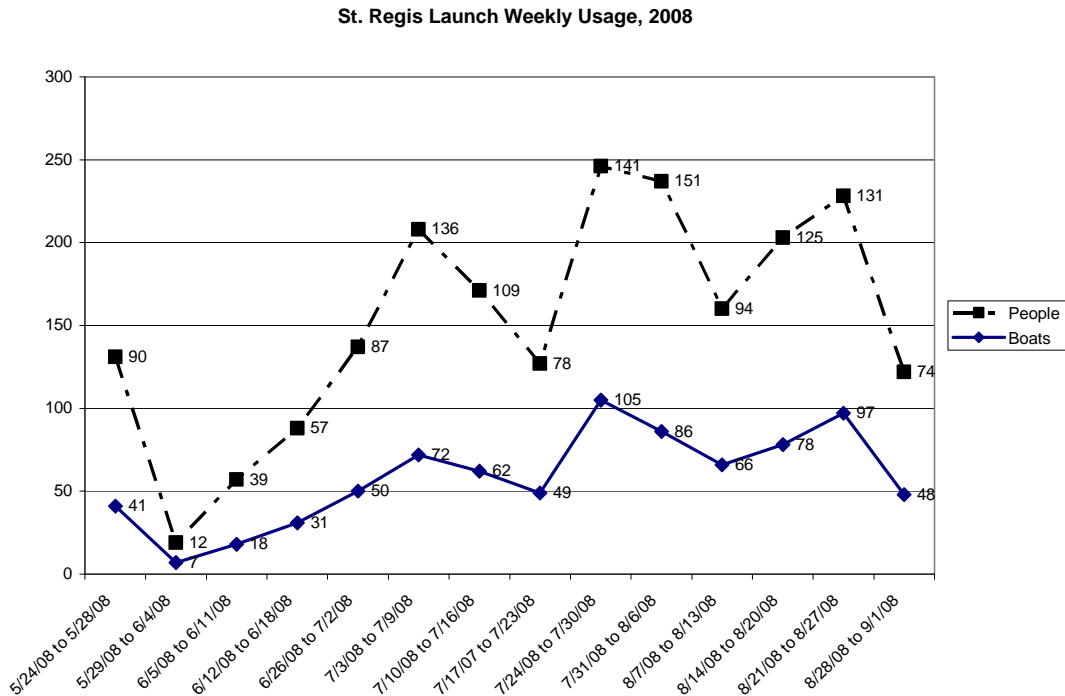


Figure 1. Weekly use of the New York State Boat Launch on St. Regis during the summer of 2008.

Canoes were the most numerous type of watercraft launched in the summer of 2008 (290 total; 36% of total watercraft), followed by motorboats (249; 31%), and then kayaks (202, 25%; figure 2). There were a small numbers of Barges (60, 7%), Sailboats (9, 1%), Rowboats (2, 0%), and no Personal Water Craft (PWC; 0, 0%). Non-Motorized watercraft outnumbered motorized watercraft by a total of 501 (62% of total watercraft) to 309 (38%). Average horsepower of motors observed was 57, with a median horsepower size of 40 for the summer. Eighty-four 4-stroke motors were observed (27% of the 309 total motorized boats).

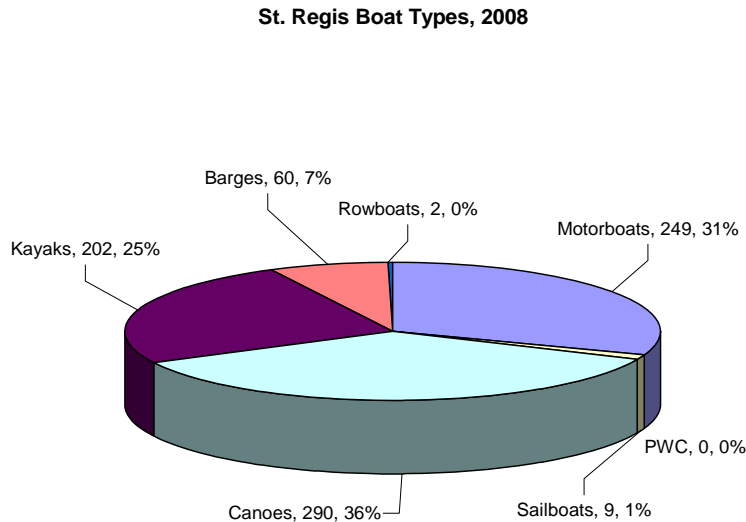


Figure 2: Percent of watercraft type launched at the New York State Boat Launch on Lake Placid during the summer of 2008.

State/Province of Origin

As expected, most boats (355) were registered in New York, while others came from a wide range of places (Table 1). The second most represented state was Vermont, with 13 boats, followed by Pennsylvania (10 boats). Upper St. Regis Lake mostly attracts boaters from the local area and surrounding states. Watershed stewards determined originating state by observing registration stickers on motorized watercraft, asking other boaters their place of origin, and observing license plates.

Origin	Total	Origin	Total
NY	355	AZ	2
VT	13	MS	2
PA	10	SC	1
NJ	11	TX	1
MA	7	NC	1
CT	6	DE	1
VA	5	NH	1
OH	4	NC	1
FL	3	MC	1
MD	2	DL	1
QU	2		

Table 13. Place of origin observed from boats launched into Upper St. Regis from the New York State Boat Launch during the summer of 2008.

Use Patterns

In 2008 Watershed Stewards were stationed at St. Regis 7 days per week. We found the peak use week to be the week of the 24th of July to the 30th of July, 2008 (105 boats; Figure1). Most boats were launched on the weekend with Sunday (160) having the most launches, and then followed closely by Fridays (152, Figure 3) with an average of 11 boats per Sunday. Average boats launched by day are as follows: Thursday – 8, Friday – 11, Saturday – 9, Sunday – 11, Monday – 4, Tuesday – 9 and Wednesday – 9.

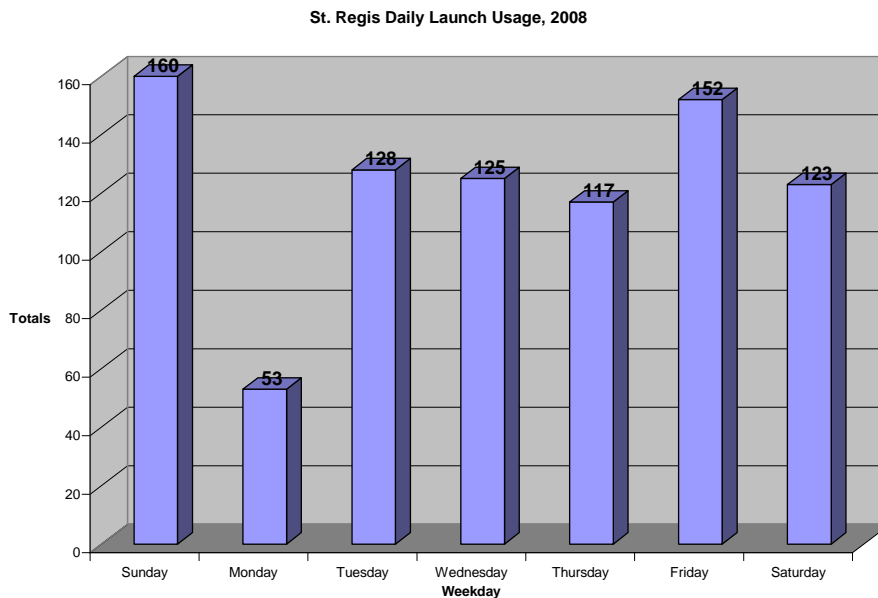


Figure 3. Total number of boats launched from the New York State Public Boat Launch on Lake Placid by day of week during the summer of 2008.

water body	Infected	Total Visits	water body	Infected	Total Visits
Ampersand Brook		1	Long Lake		4
Atlantic Ocean	Yes	2	Long Pond	Yes	7
Barnum Pond		3	Lost Pond		2
Bear Pond		3	Lewey Lake		1
Black Pond		1	Lower Saranac Lake	Yes	11
Bog Pond		4	Lower St. Regis Lake		5
Brant Lake	Yes	3	Lower St. Regis (the flow)		1
Browns Pond		1	Lower Weller		1
Brown's Tract Inlet		1	Maiden Creek (PA)		1
Buck Pond		3	Maryland Lakes	Yes	1
Buffalo		1	Meacham Lake	Yes	1
Butterfield Lake		1	Meech Lake (ON)		1
Canada Lake		4	Middle Saranac Lake	Yes	6
Canal Geneva		1	Mirror Lake		1
Cascade Lakes		2	Moose Pond		3
Axton Landing		1	Niagara River	Yes	2
Chateaugay Lake	Yes	3	Ochre		1
Chazy Lake	Yes	5	Oneida Lake	Yes	4
Church Pond		2	Oseetah Lake	Yes	1
Clear Pond		2	Osgood Pond		14
Colgate		1	Oswegatchie River		1
Cranberry Lake		1	Otsego Lake	Yes	2
Fern Lake		1	Pink Pond		1
Fish Creek	Yes	8	Pollywog		2
Floodwood Area	Yes	7	Ponkapong Pond (MS)		1
Follensby Clear Pond	Yes	10	Rainbow Lake		9
Fern Lake		1	Raquette Lake		2
Fourth Lake	Yes	1	Raquette River		8
Franklin Falls	Yes	1	Rollins Pond		7
Friends Lake		1	Round Lake		1
Fulton Chain Lakes	Yes	1	Jamesville Reservoir		1
Great Sacandaga Lake	Yes	1	Saranac Lake	Yes	6
Green Pond		1	Saranac River	Yes	4
Henderson Lake		1	Schroon Lake	Yes	1
Hole Lakes		2	Second Pond	Yes	2
Hoel Pond		2	Seven Carries		1
Horseshoe Pond	Yes	2	Shermin Reservoir		1
Hudson River	Yes	4	Silver Lake	Yes	2
Island Pond		1	Slang Pond		1
Jones Pond		5	Spitfire Lake		3
Kiwassa Lake	Yes	1	Square Pond		2
Lake Champlain	Yes	7	St. Jones River (FL)	Yes	1
Lake Clear		10	St. Lawrence River	Yes	4
Lake Colby	Yes	2	St. Regis		26
Lake Erie	Yes	2	St. Regis Canoe Area		6

Lake Flower	Yes	6	St. Regis Pond		2
Lake George	Yes	8	St. Regis River		1
Lake Kushaqua		3	Star Lake		1
Lake Lila		2	Stony Creek Ponds		3
Lake Michigan	Yes	1	Swain's Lake (NH)		1
Lake Placid		24	Swift Creek Reservoir (VA)		1
Lincoln Point		1	Sylvia Lake (Watertown)		1
Lincoln Pond	Yes	2	Taylor Pond	Yes	1
Little Clear		1	Tupper Lake		5
Little Clear Pond		4	Turtle Pond		3
Little Colby		1	Turtle Snag		1
Little Pond		1	Upper Saranac	Yes	33
Little Square Pond	Yes	1	Upper St. Regis		70
Little Tupper Lake		1	Whey Pond		1
Little Upper		1	West Pine Pond		1
Little York	?	1	Winnepesauki (NH)	Yes	1
Long Island Sound	Yes	2			

Table 14: Lakes visited in previous two weeks and possible infestations before visiting St. Regis, 2008. Only those water bodies known to be infested with invasive species are indicated as such.

Where has your boat been?

Watershed Stewards asked boaters what other bodies of water their boats had been on in the previous two weeks before visiting the St. Regis Lakes Chain. This gave us a scope of the likelihood the lake may be exposed to an invasive aquatic species. Three hundred and eight boats were reported to have been used in other lakes in the preceding two weeks. This represents 38% of the total boats launched (810). We expect that more boats had been used in other waterways in the preceding two weeks, but at high use periods it was difficult to ask this question of all boaters. These 308 boats had visited a total of 467 lakes in the preceding two weeks. Some boat owners reported visiting more than one lake in the preceding two weeks. Of the 467 prior visits to other lakes, our conservative estimate of the number of those visits that were to water bodies infested with invasive species is 164 (35% of prior visits). The breakdown of lakes visited prior to St. Regis helps us to understand patterns of visitation and invasive species transport. (Table 2).

The most frequently mentioned body of water reported as a prior visit was the Saranac Lakes Chain, consisting of Upper, Middle and Lower Saranac Lake (total 56). Because of the various responses given, any answer mentioning Saranac Lake was tallied together (Lower Saranac – 11, Upper Saranac – 33, Middle Saranac – 6, and Saranac Lake – 6). The second most visited body of water visited was Lake Placid with 24 responses. The third and fourth most visited body of waters were Osgood Pond (14) and Follensby Clear (10). The Saranac Lakes Chain, Lake Flower and Lake George all host Eurasian watermilfoil and Lake Champlain is known to host many aquatic invasive species including Eurasian watermilfoil, hydrilla, water chestnut, and zebra mussels.

Most out of state boaters responded to the question about the two week use history of their boats negatively, responding that the boat was being used for the first time of the year on the occasion of the inspection by the Watershed Steward. This is an interesting finding considering that one would assume that invasive species are being transported to Adirondack lakes by out-of-state visitors, when in actuality the most significant potential source of invasives tends to be local boaters. Vacationers appear to only use their boat on vacation and park it in their yard for the remainder of the year, while locals tend to boat throughout the spring, summer, and fall.

Boat Wash Use

In the summer of 2008, 810 boats were tallied launching or retrieving at the Upper St. Regis boat launch. Stewards were stationed near the boat wash station and made a concerted effort to get people to wash their boats. 203 boats were washed entering the lake and 79 were washed as they exited. This represents 282 total instances of boat wash use, or a 35% compliance rate. It should be noted that at least one of the boat storage services objected to the stewards repeatedly asking him and his employees to wash their boats. This person maintained that the boats were in dry storage for the entire winter and/or were washed by him at the storage site before delivery. The Director of the WSP developed a policy whereby this particular delivery service provider would be expedited through the inspection and boat wash process due to these standard company policies on the part of the service provider.

Have You Taken Prevention Steps?

Again this year stewards asked, "What, if any, prevention steps did you take to stop the spread of aquatic invasive species?" Possible prevention steps a boater could have taken included washing or inspecting their boat, draining the bilge, and emptying live wells, and bait buckets. We found that out of the total 810 boats launched 363 (45%) took some form of prevention steps. Of the 363 boaters who took preventative steps washing the boat was the main prevention step reported (317 boats) followed by boat inspection (215) and bilge draining (57, Figure 5).

St. Regis Prevention Steps Taken, 2008

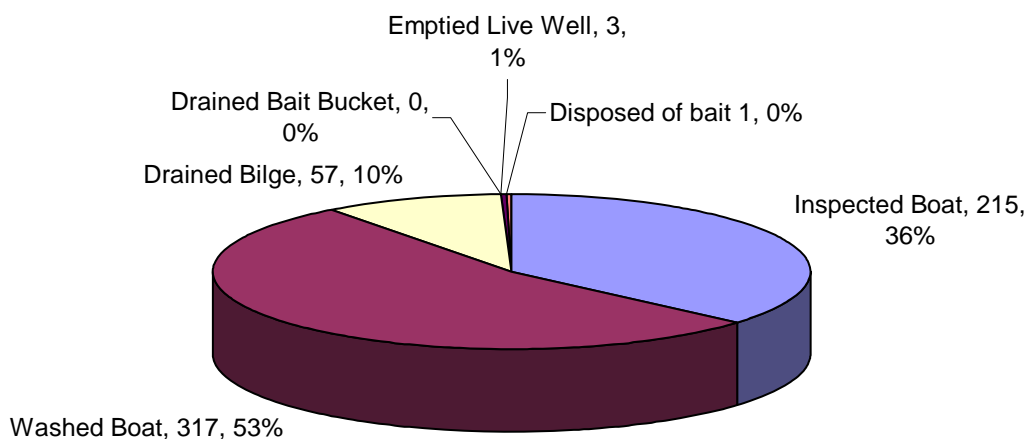


Figure 5. Prevention steps taken by boaters to help stop the spread of aquatic invasive species by boats, recorded at the New York State Public Boat Launch on Upper St. Regis.

Discussion

The summer of 2008 saw a slight increase in the number of boats launched at the Upper St. Regis Boat Launch from the previous summer (Figure 6). The rainy weather and rise in gas prices are likely the main factor in the low numbers of boat launch use. The type of watercraft launched this season was similar to years past with non-motorized boats accounting for most of the usage. The average horsepower of motorboats remained the same from the 2007 season (57) to the 2008 season (57). The number of four stroke engines increased with 84 this year compared to 50 in 2007. The total

number of boats also increased slightly in 2008 compared to the 2007 season. The percentage of boats using the boat wash station remained about the same in both 2007 and 2008, and increased from the 2006 percentage. This greater percentage of wash users is likely due to the fact that stewards were posted near the wash station to ask users to wash their boats prior to launching. Visually inspecting boats for hanging weeds found 46 organisms on boats and trailers, of the 46 cases only two were invasives, both being Eurasian Water Milfoil. The increasing percentage of prevention steps taken by users may suggest the effectiveness of stewards and other programs informing boat owners of the transport of invasive species. Stewards did encounter a few instances of boaters and boat servicing operation resisting the steward education and inspection effort and arguing with stewards about their monitoring efforts.

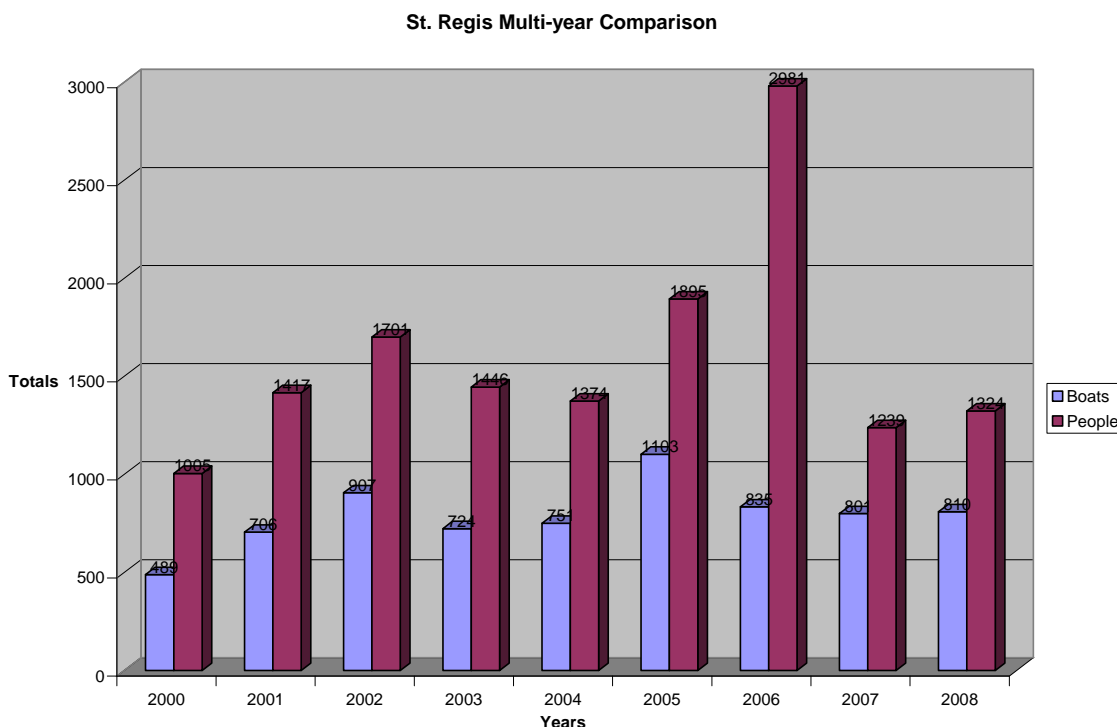


Figure 6: Multi-year comparison of total numbers of boats and users at the Public boat launch for the St. Regis Lakes Chain, 2008.

Conclusion

The summer of 2008 was another success year for the Watershed Stewards stationed at the Upper St. Regis Boat Launch. One thousand three hundred and twenty-four people in 810 boats received a message regarding invasive species and their possible transport on watercraft. All 810 boats were inspected for weeds, with only a few boaters being uncooperative. However, with 35% of the boats reporting prior waterway visits coming from infected waterways within the preceding two week period, the threat of the spread of invasive species being introduced into the St. Regis Chain deserves attention. As evidence of this concern, Eurasian Water Milfoil was discovered and removed twice this season on boats about to enter Upper St. Regis Lake.

The Watershed Stewardship Program has been in effect since 2000. Each year our primary benefactor is the St. Regis Foundation along with the guidance of the Property Owners' Association of the St. Regis Lakes. We sincerely thank the Foundation for supporting this program, working not only to protect the St. Regis Lakes but to educate all visitors about the responsibility we have to aquatic ecosystems everywhere. As boat users receive an educational message, environmental awareness is

spread to all waterways in which those users then travel to. The stewards would like to thank all of the caretakers, employees, and residents of the lake for their words of encouragement throughout the summer. A special thanks to Holly as well for her kindness, advice, and friendship that was a daily treat for the steward.

Table 3: Upper St. Regis Lake Recreation Study Results, 2008

Summary of season- 2008

Upper St. Regis

Boat Launch Date	Boat Type							total # boats	private side	Weekly Avg HP outboard	Four stroke	Group Size	Pets	Avg time to launch	Avg time to retrieve
	M	PWC	S	C	K	B	R								
5/24/08 to 5/28/08	19	0	0	17	5	0	0	41	1	45	8	90	1	0:12	0:08
5/29/08 to 6/4/08	5	0	1	1	0	0	0	7	0	100	5	12	0	0:27	1:06
6/5/08 to 6/11/08	11	0	0	5	2	0	0	18	4	69	4	39	3	0:19	0:12
6/12/08 to 6/18/08	17	0	1	9	4	0	0	31	5	83	3	57	0	0:15	0:14
6/26/08 to 7/2/08	25	0	0	16	6	3	0	50	4	56	6	87	1	0:19	0:21
7/3/08 to 7/9/08	27	0	0	26	19	0	0	72	0	51	10	136	5	0:14	0:28
7/10/08 to 7/16/08	17	0	1	29	15	0	0	62	0	35	8	109	0	0:15	0:19
7/17/07 to 7/23/08	10	0	0	18	20	1	0	49	0	58	7	78	1	0:18	0:19
7/24/08 to 7/30/08	19	0	0	35	43	8	0	105	3	63	5	141	2	0:17	0:21
7/31/08 to 8/6/08	23	0	0	41	11	11	0	86	5	59	7	151	4	0:20	0:20
8/7/08 to 8/13/08	20	0	6	19	12	9	0	66	7	76	6	94	1	0:23	0:29
8/14/08 to 8/20/08	21	0	0	28	15	14	2	78	174	64	3	125	4	0:21	0:20
8/21/08 to 8/27/08	18	0	0	32	38	9	0	97	2	39	7	131	4	0:17	0:16
8/28/08 to 9/1/08	17	0	0	14	12	5	0	48	2	66	5	74	0	0:18	0:18
summer totals	249	0	9	290	202	60	2	810	207	Summer Avg=57	84	1324	26	0:18	0:22
										Median HP = 40					

Key: M = Motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = barge (construction); R = rowboat

Date	organisms found		organism type				Boat Wash		Measures Taken by Visitors to Prevent Inv. Spec.							
	launching	retrievi	EWM	BW	NM	other	entering	leaving	took I	WB	DB	BB	LW	Dis		
5/24/08 to 5/28/08	0	0	0	0	0	0	4	0	29	14	1	0	0	1		
5/29/08 to 6/4/08	0	1	0	0	0	0	1	0	4	4	3	1	0	0		
6/5/08 to 6/11/08	0	0	0	0	0	0	9	2	22	8	21	7	0	1		
6/12/08 to 6/18/08	1	0	0	0	0	0	1	4	2	17	12	11	0	0		
6/26/08 to 7/2/08	3	0	0	0	0	0	3	12	0	25	18	18	3	1		
7/3/08 to 7/9/08	1	4	0	1	0	0	4	14	6	0	24	33	8	0		
7/10/08 to 7/16/08	1	1	0	0	0	0	2	25	3	22	17	17	2	0		
7/17/07 to 7/23/08	2	1	0	0	0	0	1	20	8	25	8	20	3	0		
7/24/08 to 7/30/08	3	4	1	2	0	0	4	18	19	36	20	31	5	0		
7/31/08 to 8/6/08	1	1	0	0	0	0	2	18	0	43	33	39	3	0		
8/7/08 to 8/13/08	3	5	1	1	0	0	7	18	6	33	15	30	9	0		
8/14/08 to 8/20/08	7	2	0	0	0	0	9	14	10	38	9	33	7	1		
8/21/08 to 8/27/08	1	0	0	0	0	0	1	28	16	41	22	40	4	0		
8/28/08 to 9/1/08	2	4	0	0	0	0	5	18	7	28	11	20	5	0		
summer totals	25	23	2	4	0	0	40	203	79	363	215	317	57	0	3	1

Key: EWM = Eurasian Watermilfoil; BW = native bladderwort; NM = native milfoil; I = Inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = emptied livewell; Dis = disposed of bait.

Purple Loosestrife Monitoring and Control Project, St. Regis Lakes, 2008

By Eric Munley

Introduction

Lythrum salicaria, Purple Loosestrife, is originally from Europe and has now invaded and impacted communities across temperate wetlands in North America (Blosser, 2002). Purple Loosestrife is an emergent wetland herb, growing in a wide variety of habitats. By the 1830's, it was well established along the New England seaboard. Initial spread to New York and the St. Lawrence River valley was via inland canals and waterways (Blosser, 2002). Since arrival, it has spread vastly, disrupting the natural balance and biodiversity in wetland ecosystems by displacing native plants and food sources of native organisms. It is now growing in all the contiguous states (except Florida) and all across Canada (Blosser, 2002).

Purple Loosestrife has many invasive qualities that give it the ability to out-compete native plants. It has a wide tolerance of physical and chemical conditions that occur most commonly in disturbed habitats. It reproduces prolifically by seed and propagates vegetatively (WDNR, 2004). Loosestrife is a prolific seeder, "a single stalk can produce from 100,000 to 300,000 seeds per year. Germination is restricted to open, wet soils and requires high temperatures, but seeds remain viable in the soil for many years. Even seeds submerged in water can live for approximately 20 months" (WDNR, 2004). The infested ecosystem can result in a loss of food sources, nesting material, and ground cover for other organisms. Threatened and endangered plants and wildlife may suffer most from these infestations via competition for resources or loss of native food sources (WDNR, 2004).

The Watershed Stewardship Program has been monitoring and removing purple loosestrife from the St. Regis Chain of lakes in the Adirondack Park for the past seven years. We are proud to be working again under the guidance and expertise of Steven Flint, The Nature Conservancy Terrestrial Invasive Species Project Coordinator.



Watershed Steward Eric Munley deep in a purple loosestrife thicket on Lake Placid

Methods:

The Control Project of purple loosestrife in the Saint Regis Lake Chain that includes Upper and Lower Saint Regis lakes, Spitfire Lake and the Saint Regis River. The focus was on 19 known purple loosestrife infestation sites where past removals have occurred and which have been mapped by previous Stewards. A shoreline survey was also completed to monitor the remaining area of the lake chain for possible new infestation sites. A motorboat was supplied by Paul Smith's College to speed the process.

We removed plants manually by grabbing the bottom of the plant just below where the roots meet the stem and pulling up, putting most of the force on the roots. This is to prevent the breaking of the stem and the roots being left in the ground. If the manual pulling of the Loosestrife was not possible the plant was clipped with pruning shears at its lowest point to prevent the production of a seed head on the plant. Chemical control is also a general option but was not an option for this area of removal.

On July 10th, the primary control effort was started. This control effort included the first survey of all shoreline and the first removals at known sites. On the first day Lower Saint Regis as well as the Saint Regis River was surveyed. On the Second work day, Eric Munley accompanied by Sarah Ryan surveyed and removed loosestrife at site 5 though site 17 as well as a complete survey of the shoreline starting at the slew from Lower Saint Regis and the entire Spitfire lake. On July 24th, Eric Munley met with Steven Flint from the Adirondack Park Invasive Plant Program, to visit sites 1, 2 and 4 as well as site 8. After the removal at the known sites, Eric Munley surveyed the shoreline of Upper Saint Regis Lake.

On August 8th the secondary control effort began. High volume sites of purple loosestrife were revisited as well as the shoreline of areas by infestation and areas of high use, including each boat launch area. Sites 9 and 3 the highest volume sites were revisited, as well as a second shoreline cruise of the Saint Regis River. The second effort was done to insure thoroughness of the removal.

Whenever loosestrife was found the location was noted and then the plants were removed and bagged. Once the loosestrife was removed it was tallied. The bagged loosestrife was left in the sun the entire work period to insure death. The sites were revisited to meet the goal of completely removing all of the loosestrife plants.



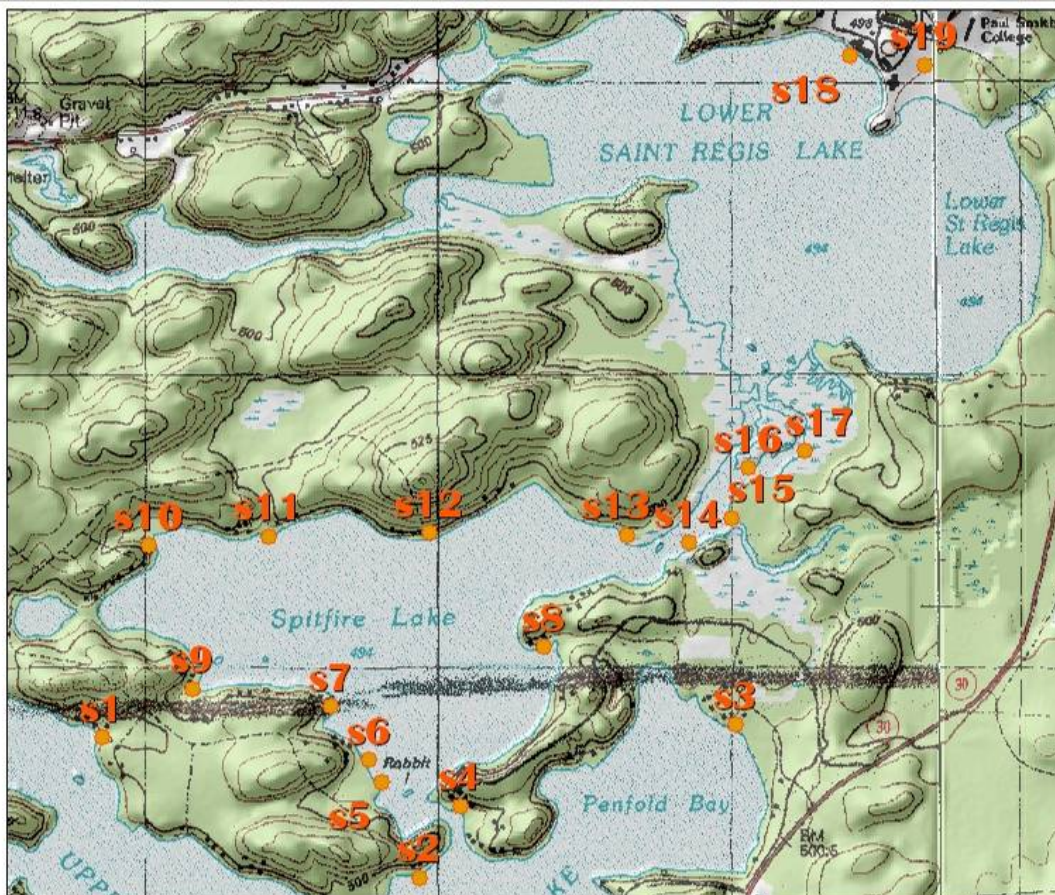


Figure 1: Purple Loosestrife infestation sites, 2007

Results:

The total number of purple loosestrife plants that were removed was 450. This is a decrease of 548 plants from the previous year. There were 2 new infestation sites that were found containing 6 and 3 plants. These two new sites and the continuation of infestation in previously known sites, gave this year the largest number of infected sites

Upper Saint Regis Lake.

Sites 1 through 3 are located on the North Shore line of Upper Saint Regis Lake. Site one continues to not have any infestation consistent with the last 6 years. Site 2, a new site last year, had no purple loosestrife this year. Site 3 is the only significant site on Upper Saint Regis. Located by Camp Regis/Apple Jack, 123 plants were removed there. This is a decrease of 257 from 2007 but is still higher than the low of 14 plants in 2006.

Spitfire Lake

Spitfire Lake including the slough between its waters and the waters of Lower Saint Regis is the location of most of the infestation sites. There are a total of 14 infestation sites (4 through 17). In six of the sites we removed an increased number of plants while in 8 we removed fewer plants compared to last year. Significant site changes are site 8 and sites 6. At site 8, 132 plants were removed, **243**

fewer plants than the previous year. Site 6 has an increased number of loosestrife plants (from 7 plants to 22), from the previous year, the highest increase in all sites.

There were two new sites (site 20, 21) located in one of the streams that enters the slough and by the road edge where the streams crosses the road. Six plants were removed at the site within the slough and 3 from the roadside site.

Site/GPS UTM	2001	2002	2003	2004	2005	2006	2007	2008
S1 N4917982, E556881	0	14	0	0	0	0	0	0
S2 N4917503, 557965	0	0	0	0	0	0	1	0
S3 N4918026, E559045	450	1400	330	742	130	14	380	123
S4 N4917748, E558103	5	63	5	26	5	0	7	10
S5 N4917831, E557837	0	74	23	50	15	54	12	3
S6 N4917905, E557790	0	0	0	0	0	0	7	22
S7 N4918087, E557660	250	915	117	146	250	200	89	34
S8 N4918290, E558390	110	49	3	74	150	101	375	132
S9 N4918149, E557190	0	437	143	116	25	117	107	87
S10 N4918636, E557038	0	123	5	34	25	11	7	3
S11 N4918668, E557451	0	0	0	0	10	0	0	3
S12 N4918680, E5579988	18	11	13	3	10	23	1	0
S13 N4918673, E558675	25	260	35	111	100	96	8	11
S14 N4918647, E558887	0	0	0	0	0	15	0	4
S15 N4918731, E559028	30	8	16	42	40	0	4	9
S16 N4918901, E559086	0	0	0	0	0	3	0	0
S17 N4918960, E559279	0	0	0	1	0	0	0	0
S18 N4920309, E559434	0	0	0	0	4	0	0	0
S 19	0	0	0	0	0	0	6	0
S 20	0	0	0	0	0	0	0	6
S 21	0	0	0	0	0	0	0	3
Total	888	3354	690	1345	764	634	998	450

Table 1, Sites and numbers per year. This table represents past years data of the number of plants removed from each site. Sites are numbered from the headwaters, starting in Upper Saint Regis to Spitfire Lake, followed by Lower Saint Regis Lake.

Lower Saint Regis Lake

Lower Saint Regis Lake includes sites 18 and 19. Site 18 has not been infested in for 2 years and 0 plants were found this year. Site 19 was a new site last year, 6 plants were removed, and this year 0 plants were located there.

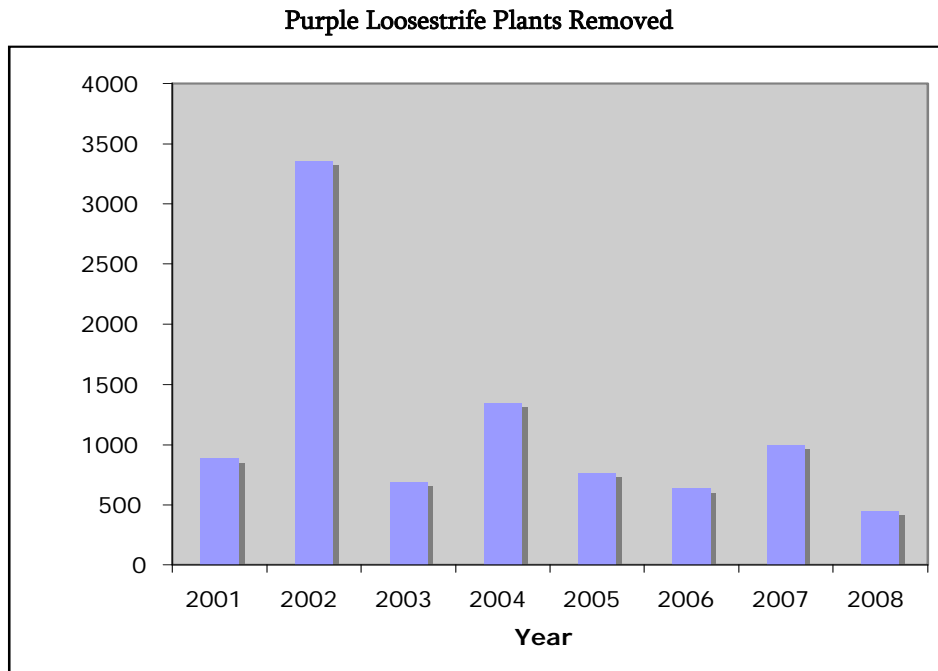


Figure 2: Purple Loosestrife Plants Removed from St. Regis Lakes, 2001-2008

Discussion

This year's data shows that the populations of purple loosestrife are decreasing at most management sites including all high density sites of 150 or more plants. However the loosestrife continues to spread with the addition this year of two new infestation sites. The slough area between Lower Saint Regis and Spitfire including a spot on State Route 30, that is connected with the slough were locations of new sites. Overall there is a decrease in number from last year which shows declining numbers and likely a decline in the seedbed for next year.

The most significant changes happened at sites 3 and 8. Site 3 had 380 plants in 2007 and has decreased to 123 plants; site 8 had 375 plants and decreased to 132 plants. Although the numbers are still not as low as 2006 for these two sites, the effort of last years removal contained the two sites that were had the highest populations. The lower numbers in these sites alone brought the total number of plants down by 500.

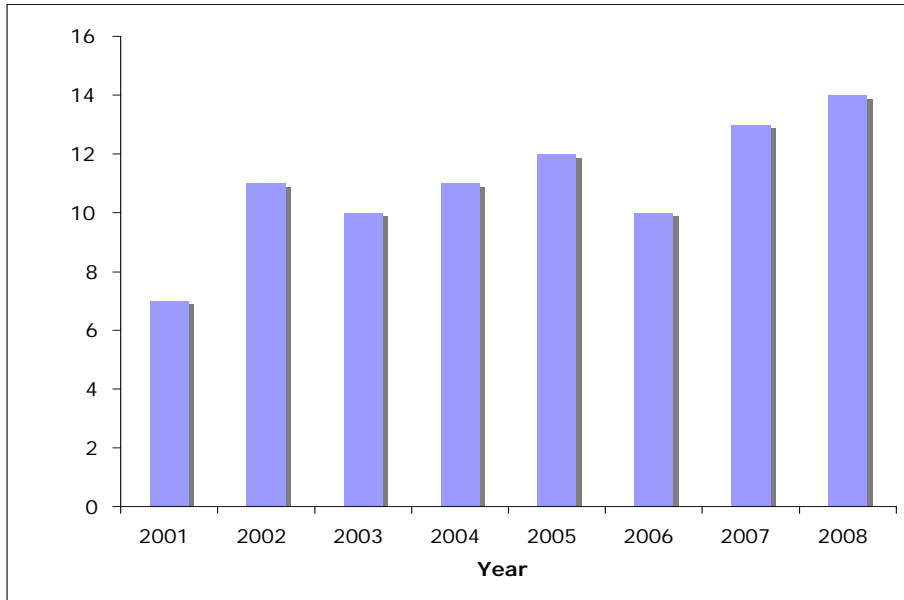


Figure 3, Number of sites per year: The amount of sites harvested during the year.

Over the years, while the total number of sites infested with purple loosestrife has risen (14 in 2008) the average number of plants per site has dropped from its peak in 2002. The average number of plants per site in 2008 is around 20, as opposed to 180 in 2002. This implies that the plants are propagating and spreading, but that control efforts have thus far kept them from taking over entire wetlands, and have thereby allowed native vegetation to thrive.

Avg. Number of Plants Per Infestation Site

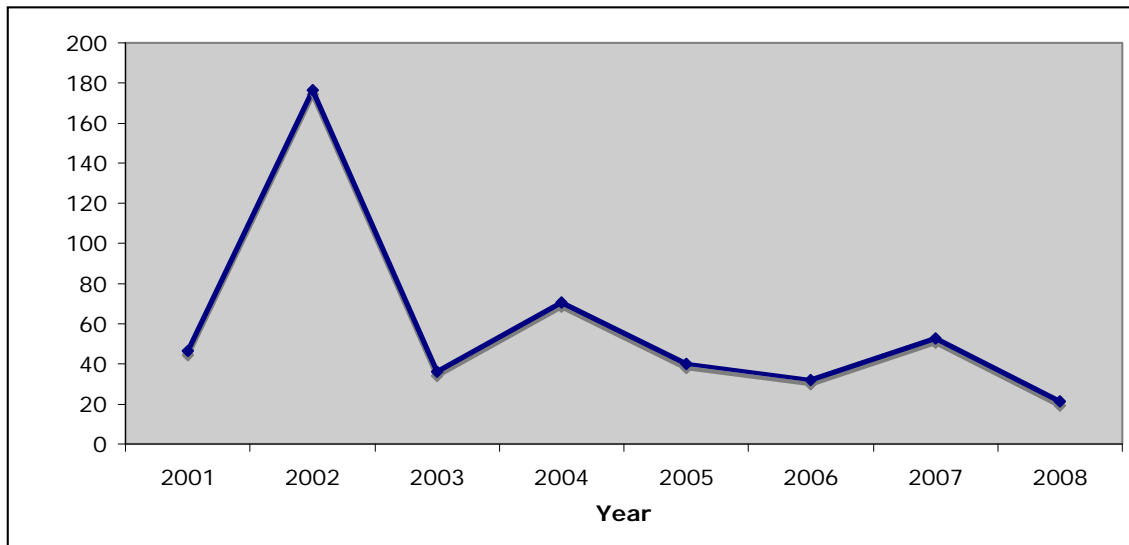


Figure 4, Average number of plants per site by year

An arbitrary classification of infestation intensity shows that the sites themselves are changing in character from high and medium-level purple loosestrife densities to increasing numbers of low density patches. Low is 0 to 20 plants, medium is 21 to 75 plants, and high is 76 + plants (Figure 5). Overall, the removal project continues to successfully contain purple loosestrife, and although we have

not eradicated this nuisance, continual work has minimized the amount of infestation. Continuation of the project could lead to another drastic drop in the coming years if done properly.

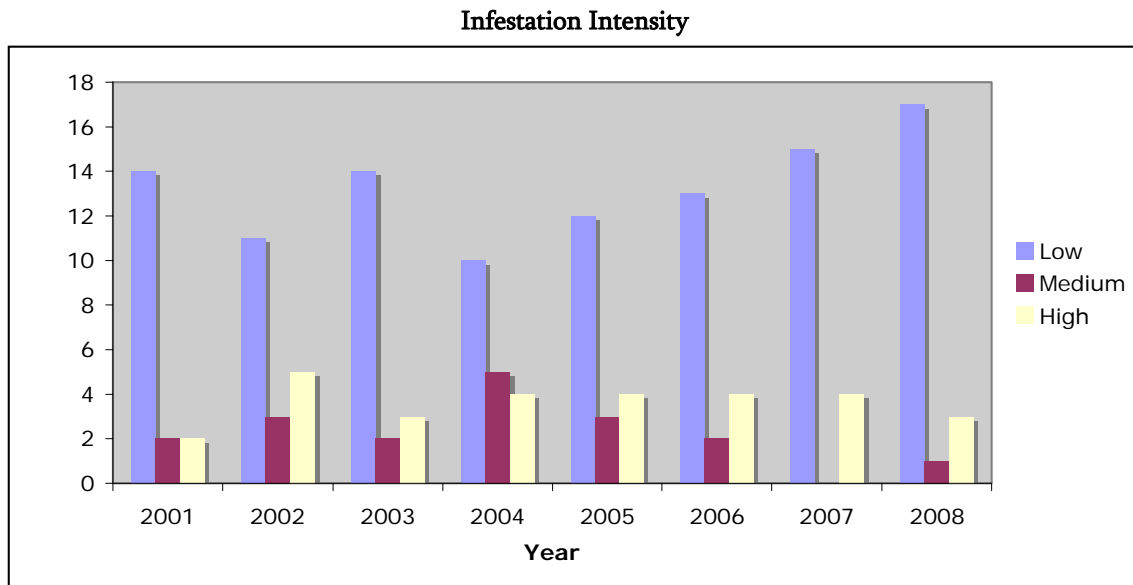


Figure 5, intensities of infestation per year: This figure shows growth intensities of Purple Loosestrife on Upper Saint Regis, Spitfire and Lower Saint Regis Lake throughout the years.

Literature Cited

Blosser, Bernd. "Purple Loosestrife." *Ecology and Management of Invasive Plant Program*. 2002. Invasiveplants.net. 14 Sept. 2008 <<http://www.invasiveplants.net/plants/purpleloosestrife.htm>>.

"Purple Loosestrife (*Lythrum salicaria*)." 3 Sept. 2004. Wisconsin Department of Natural Resources. 14 Sept. 2008 <<http://www.dnr.state.wi.us/invasives/fact/loosestrife.htm>>.

Loon Monitoring Report: St. Regis Lakes

By Jessie Gardner, Steward



Introduction

The breeding success of the common loon, *Gavia immer*, is dependent on the number of fledglings a nesting pair has. The fledglings and the adult loons also depend on certain fish species. As a result of loons being dependent on certain fish species, living in certain types of lakes, and having a fairly low reproductive output, the common loon is highly sensitive to any alterations in the trophic web (Gingrass, B.A., Paszkowski, C.A., 1999). The common loon is highly sensitive to mercury levels which are found in fish species (Evers, D.C., Burgess, N.M, et al. 2005). Mercury adversely affects the common loon as well as other wildlife species. Ingestion of mercury results in behavioral, neurochemical, hormonal, and reproductive changes (Sheuhammer, A.M., Meyer, M.W. 2007). The Adirondack Loon Conservation Program (ALCP) monitors the mercury levels in the common loon. The ALCP also monitors the progress of the common loon from year to year by employing individuals to observe the loons on certain lakes around the Adirondack Park, which are known to have nesting pairs of loons. The Watershed Stewardship Program provides a watershed steward to monitor the loons on Upper St. Regis Lake, Spitfire Lake, and Lower St. Regis Lake from June until August.

Methods

In conjunction with the Wildlife Conservation Society and the ALCP, I monitored the loons on Upper St. Regis Lake, Spitfire Lake, and Lower St. Regis Lake for the summer of 2008. I used a kayak, provided by the Watershed Stewardship Program, every Wednesday to travel to the nesting sites from June 4, 2008 to August 13, 2008. If the weather did not permit, I chose another day during that week to monitor the loons. Starting around 7:30 am, I spent approximately 4 to 6 hours on Wednesdays to monitor the loons. I kayaked through the Birch Island, North Bay, Bare Rock, and Lower St. Regis River territories then kept close to the shore by the nests. Binoculars, which were provided by the Wildlife Conservation Society, were used to observe the loons and to look for any colored bands. For any loons that were observed, the loon's activity, behavior, colored bands (if any),

presence of a mate, presence of successful hatchlings and fledglings, nest location, and number of eggs in a nest were recorded. The time of day, and weather were also recorded.

My materials included a kayak and paddle to travel to the territories and nesting sites, a pen and "Rite in the Rain" waterproof paper book for recording observations, and binoculars to observe the loons at a safe and appropriate distance.

Results

Upper St. Regis Lake

Two pairs of loons were observed on Upper St. Regis Lake during the months of June through August. From June 4th to August 13th, a pair of loons was observed within the Birch Island territory. The female was banded with color leg bands and the male was not banded. The male is also believed to be the same male from the previous year. Eggs were not observed in the nest and thus this pair did not appear to have any chicks. The pair was last seen August 13th and was doing well.

A pair was observed on the North Bay territory from June 25th to July 30th. This was a new pair to the lake. Neither male nor female were banded. Eggs were not observed in the nest and thus this pair did not appear to have any chicks. This pair was last seen July 30th. This pair was doing well and was very active.

Spitfire Lake

A single pair of loons was observed on Spitfire Lake from June 4th to August 13th in the Bare Rock Island territory. They successfully hatched one chick from July 2nd to July 9th which survived the field season. The loon pair laid 2 additional eggs, one which was unsuccessful and the other which hatched. The second egg that hatched could not be found after July 9 and we suspect it was predated. This egg hatched from July 2nd to July 9th. In the beginning of the field season, this loon pair did not have any bands. The Adirondack Loon Conservation Program banded this pair and performed a health test in late July.

Lower St. Regis Lake

From June 21st to August 11th, a pair of loons was observed on the downstream end of the Lower St. Regis River in Lower St. Regis Lake. The female was banded with color leg bands but the male was not banded. This pair was located in Averill Spring Bay of Upper St. Regis Lake in the previous years but since then, they have relocated to the lower St. Regis River. This pair successfully hatched one chick from June 18th to June 25th. They also hatched a second chick from June 18th to June 25th but it is believed that it was predated. The other chick survived through the end of the field season. The pair was last seen August 11th. This pair was monitored primarily by Hillary Appell, a volunteer loon monitor for the Adirondack Loon Conservation Program. Hillary was an immense help in monitoring the loons and the chicks.

Discussion

Over the course of the summer, four pairs of loons, banded and not banded, were observed on Upper St. Regis Lake, Spitfire Lake, and Lower St. Regis Lake. It is believed that one chick on Spitfire Lake and one chick on Lower St. Regis Lake successfully fledged. It is believed that one chick on Spitfire Lake and one chick on Lower St. Regis Lake were predated. The pair on Spitfire Lake was successfully banded and also had a mercury analysis done by the Adirondack Loon Conservation Program.

By studying and assessing the levels of mercury in the common loon, the reproductive success can also be studied. If mercury levels are too high, reproductive success and other necessary functions

are impaired. However, with the reduction of mercury levels in common loons, they will again be abundant and healthy in many northern lakes and ponds (Scheuhammer, A.M., Meyer, M.W. 2007).

A special thanks to Nina Schoch, the director of the Adirondack Loon Conservation Program, who helped out immensely with her knowledge, dedication, and expertise with the loons. Also thanks to Hillary Appell, who primarily monitored the Lower St. Regis River pair. She was a great help in monitoring and providing valuable data. Finally, thanks to Holly Lutz, Ann Weld, and other St. Regis shore owners who provided me with weekly updates on the loons.

Literature Cited

Evers, D.C., Burgess, N.M., Champoux, L., Hoskins, B. et al. (2005). Patterns and Interpretation of Mercury Exposure in Freshwater Avian Communities in Northeastern North America. *Exotoxicology*, 14 (1-2), 193.

Gingrass, B.A. and Paszkowski, C.A. (1999). Breeding Patterns of Common Loons on Lakes with Three Different Fish Assemblages in North-central Alberta. *Canadian Journal of Zoology*, 77 (4), 600.

(2006). *Pictorial Diary, "North Channel."* Retrieved September 3, 2008, from <http://www.canuck2000.blogspot.com>

Scheuhammer, A.M., Meyer, M.W., Sandheinrich, M.B., and Murray, M.W. (2007). Effects of Environmental Methylmercury on the Health of Wild Birds, Mammals, and Fish. *A Journal of the Human Environment*, 36 (1), 12-19.

Public Outreach and Education in the Raquette Lake Area

By Korinna Marino

Introduction:

In the summer of 2008, a boat launch steward program was initiated at Raquette Lake New York, with a primary objective of preventing the introduction of invasive species to Raquette Lake via the village boat launch. The steward spent most of her time at that location. Approximately one day per week over the 15 week summer season (Memorial Day to Labor Day, 2008) was allocated for the steward to plan and conduct educational outreach projects in the region to widen the scope of the overall project.

Goals:

The goals of this outreach project were to:

1. Spread information on invasive plant distribution through-out the south central Adirondack Park.
2. Develop and provide visual and verbal presentations on prevention of invasive aquatic species, the data I collected, and the Adirondack Watershed Stewardship program's previous studies and over all mission
3. Provide example of how to examine and inspect boats and what to look for when checking one's boat. Incorporate out-reach programs – providing information and presentations to boaters and non-boat owners (children and other community).

The focus of the activities was in the Raquette Lake, NY area at boat launches, campgrounds and local organizations. The steward intended to distribute accurate information on aquatic invasive plants, and to provide the community and people who enjoy outdoor recreation activities with important knowledge that they can consciously apply to the world around them. The idea is to help them be a part of the natural world in a way that is safe for the environment and ultimately better for them. Through these educational outreach projects it is hoped to connect local residents and visitors to realistic practices and information that can help them to become more aware of their actions and direct or indirect effects on the environment. It is important to teach them to be more cautious while they are immersing themselves in a natural setting.

Activities included:

- Worked with the Great Camp Sagamore staff during boat house orientation, providing paddlers with invasive plant species information: "Stop Aquatic Hitch Hikers" stickers and "Clean boats Means Clean Lakes" pamphlets before they took the canoes out onto Sagamore Lake. Provided them with information pamphlets and incentive to check their personal boats when vacationing and out boating in general
- Delivered out-reach talk on invasive aquatic plant information and visual presentation with pictures of Eurasian Watermilfoil and Purple loosestrife to second graders at elementary

- school in Gloversville, New York. The steward also provided the “Clean boats Means Clean Lakes” to give to their parents.
- Provided Raquette Lake Property Owners Association with brief power point presentation of goals of the AWSP, current data: Number of boats, people, and invasive plants discovered at Raquette Lake boat launch.
 - Communicated with Rangers at Golden beach, Brown’s Tract Pond, Eighth Lake and Limekiln state campsites. The steward gave them posters that read “Do not pick up Hitchhikers” displaying pictures of Zebra mussel, Eurasian watermilfoil, and Hydrilla, and info on what to do if you find any of these invasive species to hang up by their launches and other invasive pamphlets including “The clean routine 21 ideas to better boating, Clean boats mean Clean lakes, Protect Raquette Lake, and Help stop the drops – A guide for boaters” to put in their information booths.
 - Spent the evening at St. Williams Church on Long point on Raquette Lake displaying the Paul Smith’s College Watershed Stewardship program exhibit made by the steward and information pamphlets: “The clean routine 21 ideas to better boating,” “Clean boats mean Clean lakes,” “Protect Raquette Lake, Help stop the drops – A guide for boaters and Raquette Lake Property Owner Association 2008.” The steward also talked with incoming boaters before they enjoyed a concert at the church. The church is boat access only.
 - Participated in town of Long lake board meeting, where the steward verbally presented the end of summer data totals: How many boats, people and if the steward discovered any plants.
 - Kayaked Brown’s Tract Pond and Otter bay (Raquette Lake) identifying aquatic plants and looking for Variable leaf milfoil. Did this throughout the summer: in early June, early July, and late August.
 - Constructed an exhibit with invasive information and pictures.
 - Spoke with dozens of non-boaters and people passing through the Village of Raquette Lake about aquatic invasive plants and importance of awareness and prevention – over all response was engaging and optimistic toward the goals and motive behind the entire program.

Discussion

Raquette Lake seems to be an essential and nostalgic part of the Adirondacks for most people who visit each summer and for those who live there year around. Its history is deeply embedded and completely built around the lake itself. The allure of Raquette Lake itself is based on its originality and unchanged community over the years. I have noticed during my stay in and around Raquette Lake that many of the boaters who recreate on Raquette Lake have their boats on Raquette only, some renting from Burke’s or Bird’s or Luke’s marina, some returning to summer homes, and some that only bring their boat to one lake all summer, which is Raquette Lake.

This observation has lead me to believe that the threat of infection by aquatic invasive plants to Raquette is low when it comes to the yearly Raquette Lake recreationist, while the threat still remains strong from the incoming boaters from different areas of New York and many other states.

With this threat still pending it is wise for the members of the Raquette Lake community to spread awareness and information about aquatic invasive plants, not only to protect the integrity of Raquette Lake but to establish a common knowledge among the larger population of the Adirondack Park in an effort to raise awareness about environmental issues and the balance between nature and culture.

Recommendations

For next year, it would be helpful to get the Department of Environmental conservation involved and aware of this issue. A helping hand from them would completely enhance the program's efforts, and furthermore spread more knowledge to the surrounding area, so the growth of the knowledge itself could be magnified. Also I and many other members of the community have discussed the importance of DEC inspections as part of the effort to keep boaters aware and conscious of their environmental impacts.

Conclusion

In reflection the time I spent at the Raquette Lake boat launch and around the community was truly a wonderful experience and it gave me a feeling of accomplishment when I talked to the hundreds of people I met. Peoples' overall consideration and awareness for the environment itself was outstanding. I felt a sense of compassion and respect for the place which they call home for all seasons or just one. Even the weekend visitors had a strong impact on the way I perceive people and how they feel and think about the environment and moreover its value to them and its role in their life. Among these people the property owners of Raquette Lake, especially Pat Dyle, Peggy Dyle, Ken Hawks, and many more supporters showed their true devotion to their home, their lake, their environment. I am grateful to have met and talked with these people throughout the duration of the summer and to have shared thoughts and ideas with them. They let me into their beautiful community and welcomed the idea of positive environmental awareness and communication, which I believe is the building blocks of a healthy and aware community.

Invasive Plant Monitoring and Mapping Project: Long Lake

By Brittney Ravenscraft

Introduction

Watershed Steward Brittney Ravenscraft with various volunteers conducted an invasive plants survey on Lake Long Lake. This was conducted a baseline map in the event if invasive species become established, the town will have the proper paper work to help receive help from the state of New York. Also it will provide information on native plant beds locations which may potentially become infested with invasive species.

Volunteers

The following people graciously and enthusiastically volunteer their time by providing their boats, driving skills and observations. Amy VanLaak, Chuck, Barbara, and Sam Taylor, Prudence Churchill, David J. Pittman Jr., Frank and Lorraine Pine and Deborah Jones.

Survey Dates and Times

- 7/18/2008 (3hr.)
- 7/19/2008(1hr.)
- 7/21/2008 (3hr.)
- 7/26/2008 (1hr.)
- 7/27/2008 (1hr.)
- 8/4/2008 (8hr)
- 8/12/2008 (3hr.)
- 8/17/2008 (8hr.)
- 8/18/2008 (8hr.)
- 8/24/2008 (8hr.)
- 8/25/2008 (8hr.)
- 8/29/2008 (2hrs.)
- 8/30/2008 (3hrs.)
- 9/1/2008 (4hrs.)

Total Time = approx. 61 hours

Methods

The mapping of Long Lake began on July 20, 2008 and ended on September 1, 2008. A topographical map of Long Lake was segmented into 11 magnified images. On each image, the shoreline was sectioned off as needed to evenly distribute sampling sites. These sites were labeled alphabetically. When using either the motor boat or kayak, samples were taken using a "Weed Weasel" which is a short handled, double sided rake with a rope attached. This rake was thrown three times at each sampling site alternating the sides of the boat at which it was thrown. All plants collected were identified. In addition to the rake-toss, visual observation of aquatic vegetation was recorded in terms of types of species present.

All collected data (invasive and non-invasive plants) were compiled and entered into ArcMap which was later created into a map.

Results

No invasive species were found in Long Lake. Native plants found in Long Lake are several bladderwort species (*Utricularia spp.*), water shield (*Brasenia schreberi*), water lily (*Nymphae odorata*), spatterdock (*Nuphar advena*), pickerelweed (*Pontederia cordata*), pondweeds (*Potamogeton spp.*) elodea (*Elodea canadensis*) and various species of aquatic grasses. One "watched" species was found, variable-leaf milfoil (*Myriophyllum heterophyllum*). This was found growing in moderately abundant in Jennings Pond. All other locations it was found floating (Figure 1, 2, 3, 4, & 5).

Figure 1. North Long Lake

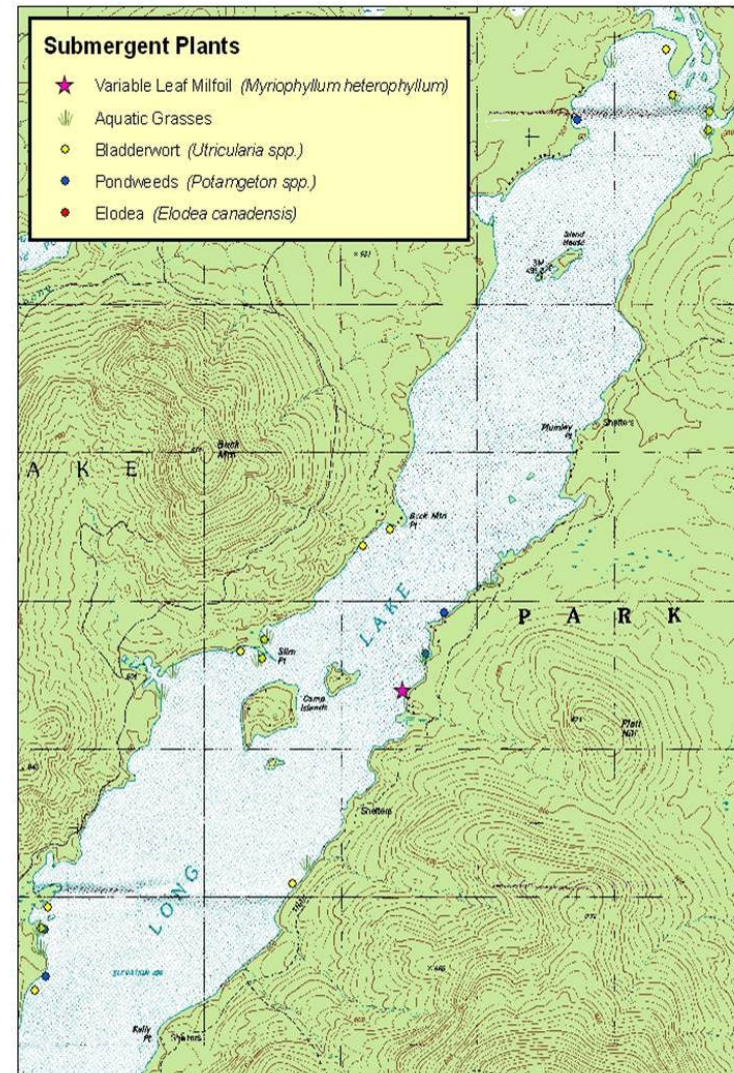
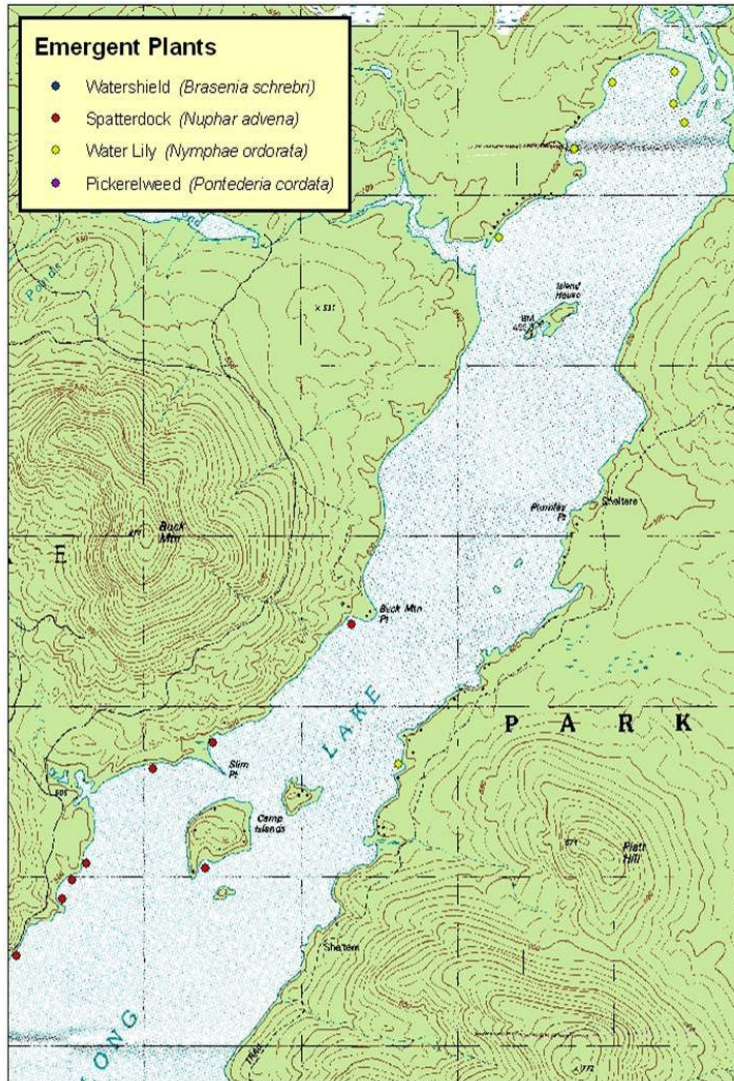


Figure 2. North central Long Lake

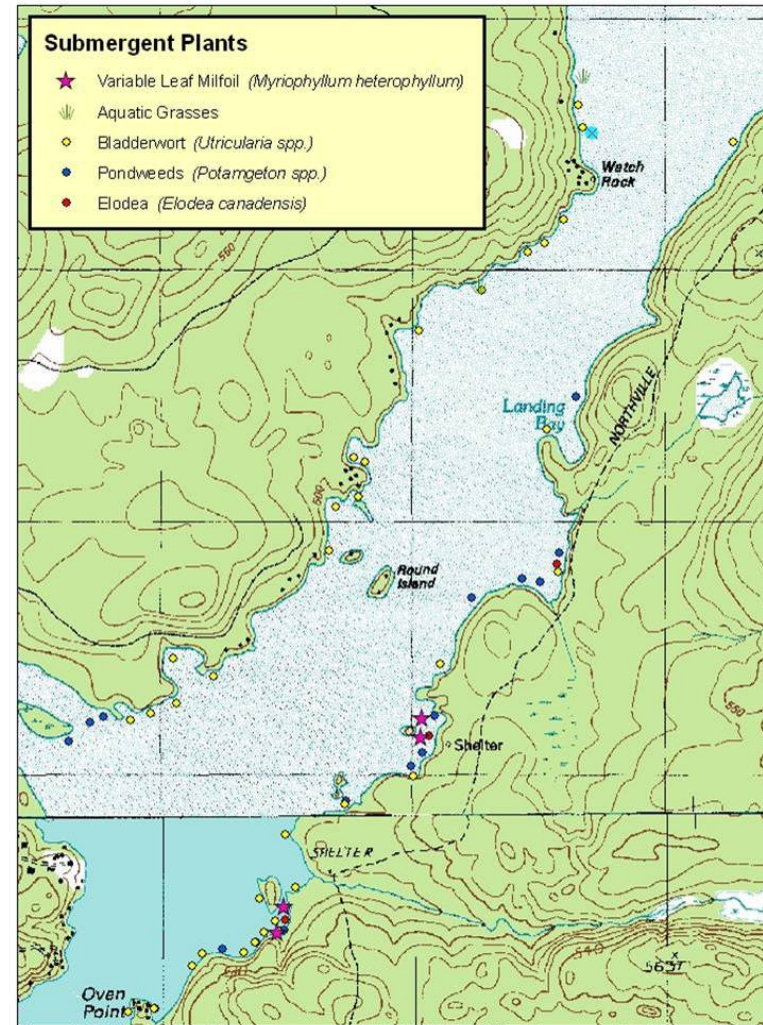
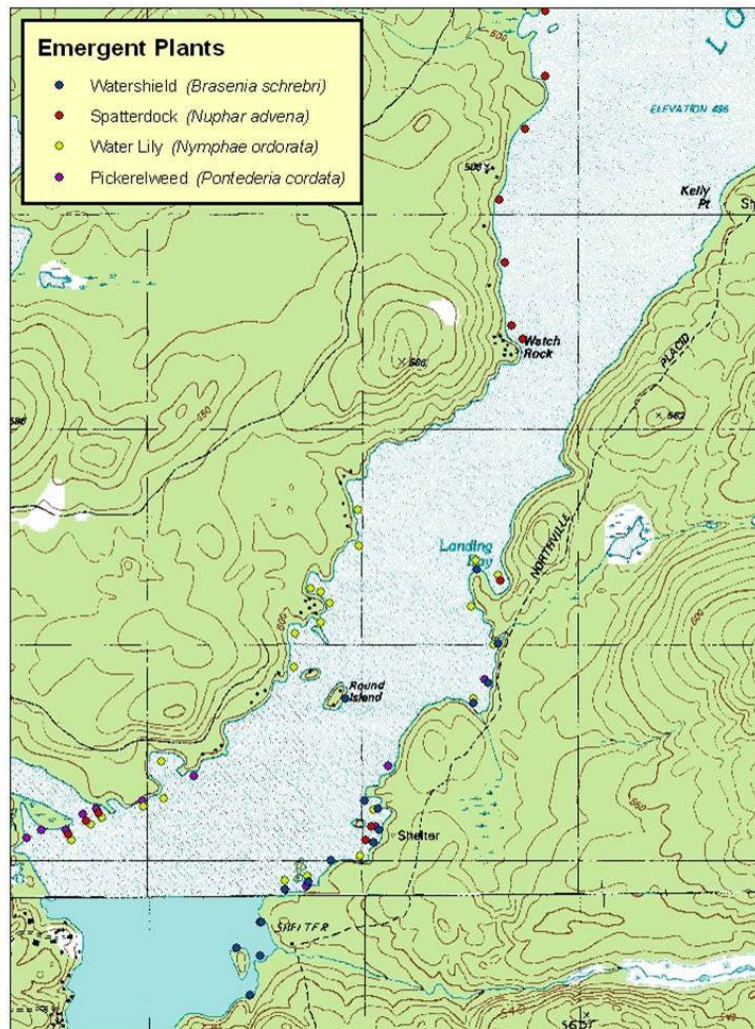


Figure 3. South central Long Lake

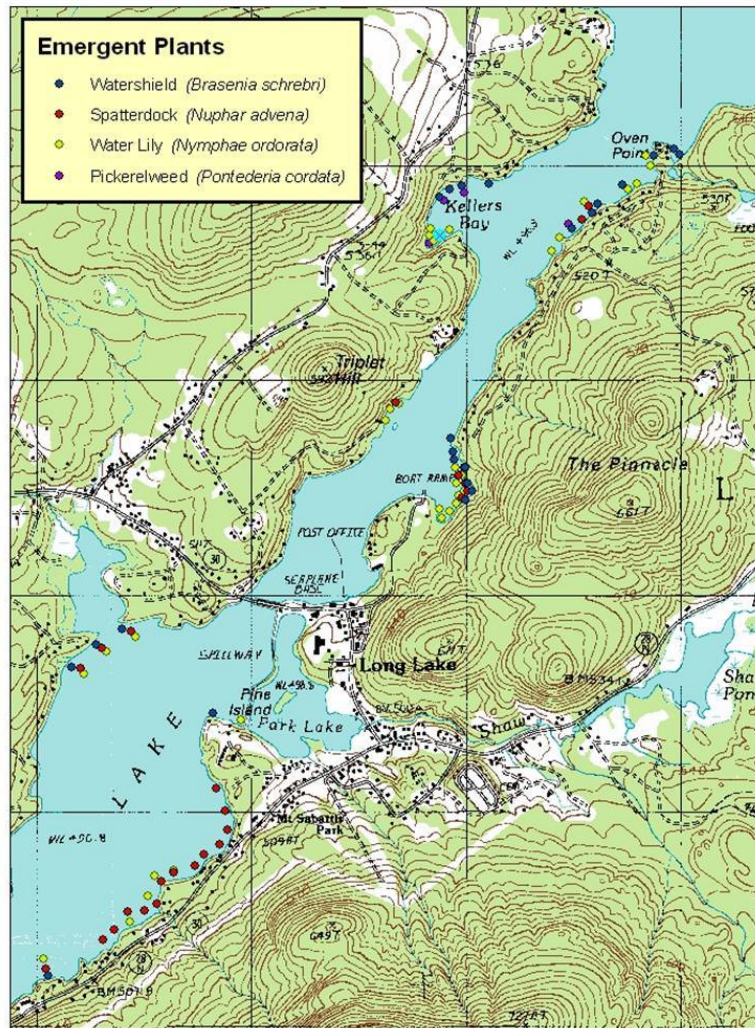


Figure 4. South Long Lake

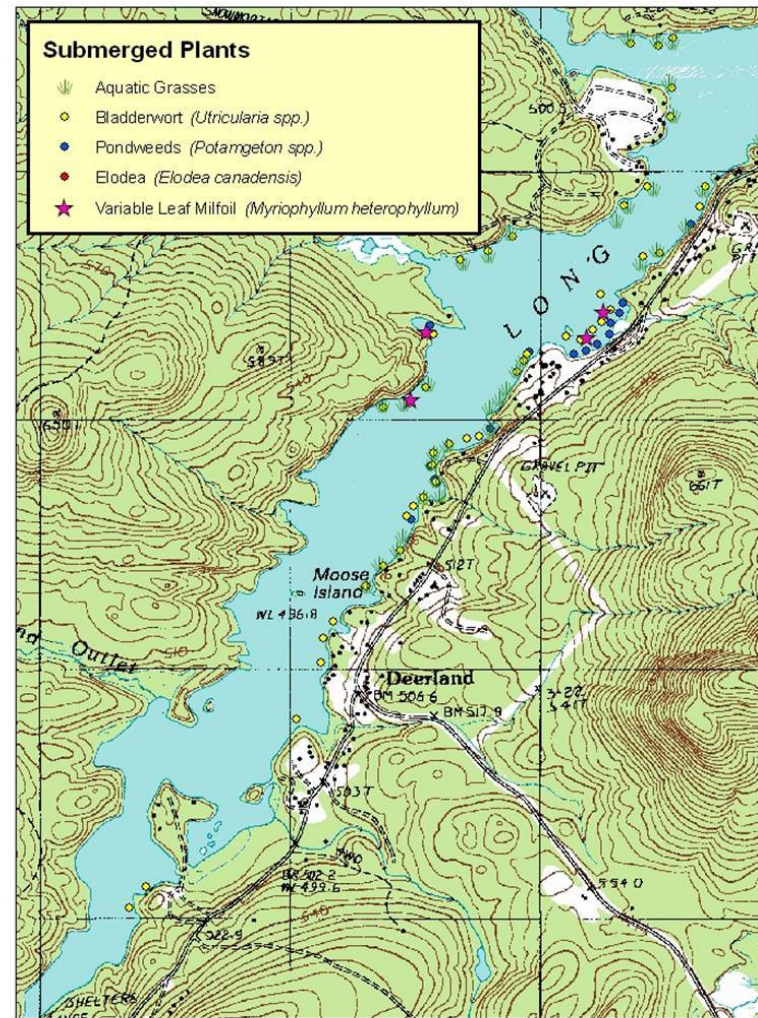
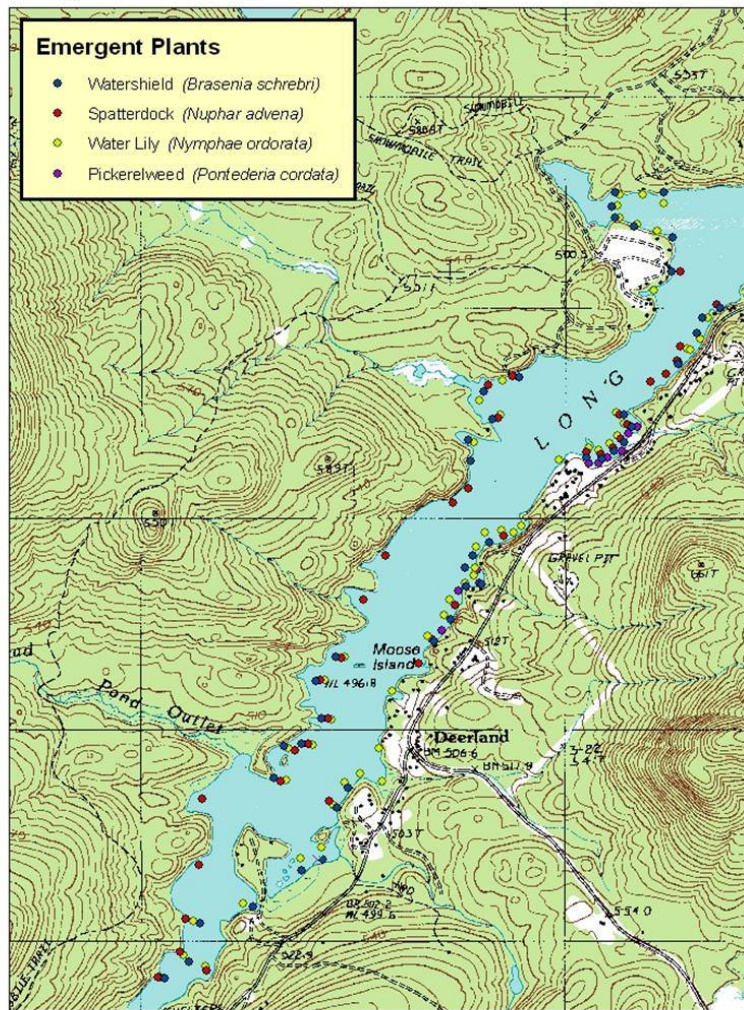


Figure 5. Jennings Pond



Comparative Wetland Structure Study (short title)

A COMPARISON OF THE STRUCTURE OF A WETLAND ECOTONE AND WETLAND ECOSYSTEM IN THE NORTHERN ADIRONDACKS: The Upper St. Regis Wetland at the Upper St. Regis Lake boat launch (ecotone) and the Rainbow Lake Wetland near the Kushaqua boat launch at Buck Pond State Campground (ecosystem).

By Naomi Thompson, Jessie Gardner, James Parmeter, and Celia Evans

Introduction:

Wetlands can be ecologically rich and they are often species diverse. They are important to the life cycle of many plants and animals (Kusler, Mitsch & Larson, 1994). The U.S. Fish and Wildlife Service in 1956, in a publication that is frequently referred to as Circular 39 (Shaw and Fredine, 1956 in Mitsch and Gosselink, 2000, p.29), defines wetlands as follows:

The term "wetlands"... refers to lowlands covered with shallow and sometimes temporary or intermittent waters. They are referred to by such names as marshes, swamps, bogs, wet meadows, potholes, sloughs, and river-overflow lands. Shallow lakes and ponds, usually with emergent vegetation as a conspicuous feature, are included in the definition, but the permanent waters of streams, reservoirs, and deep lakes are not included. Neither are water areas that are so temporary as to have little or no effect on the development of moist-soil vegetation.

Some wetlands have been described as ecotones – transitional ecosystems between upland and wetland ecosystems that are zones of tension between the two systems and may be narrower than they are long, or as ecosystems – systems with conditions and species distinct from the surrounding, typically, upland matrix (Tiner 1999). We studied the St. Regis wetland, that we considered an ecotonal wetland - transitional between the lake and upland forest ecosystem – and compared it to the small wetland on the Rainbow Lake Waterway, near the Buck Pond New York State Campground boat launch which appeared to be more hydrologically similar to a bog (ecosystem) with no apparent above ground connection to the nearby waterway and surrounded by an upland forest.

We compared the plant communities with respect to plant functional group (bryophytes, grasses, shrubs, herbs and trees) and species composition. We also measured pH to learn more about the abiotic conditions the plants experienced. We expected to find differences in structure and species composition of these wetlands because of the differences in their apparent hydrology. Hydrology is the driving force behind differences in wetland ecosystems that are manifested in differences in soil characteristics and plant composition (Mitsch and Gosselink, 2000). Because ecotonal wetlands are zones of tension between upland and wetland, we predicted that the St. Regis wetland would be more diverse, likely containing a mix of overlapping wetland and upland species. We also predicted that the pH in the Rainbow lake waterway wetland would be more acidic due to the lack of direct contact with the more nutrient rich and oxygenated lake water.

Methods:

Vegetation is a good indicator of wetland status since it is driven by hydrology and related to soils characteristics (Mitch and Gosselink, 2000). We ran multiple transects down the length of the two study wetlands. Transects were spaced 10 meters apart. Along each transect we collected data in 1m² quadrats every ten meters.

In each quadrat we measured percent cover at the levels of taxonomic group (bryophytes, shrubs, herbs, trees, and graminoid) and individual species. Bryophytes and graminoids were not identified to species. The percent cover was estimated using 5 cover classifications combined with a number designation of 1 or 2 for each of the classifications (to create a finer scale of abundance estimates: 10 categories total) Plants were listed as rare (R) if, when viewed vertically, they covered less than five percent area of the plot, occasional (O) if they covered between six to fifteen percent, present (P) between sixteen to twenty-five percent, common (C) between twenty-five to fifty percent, and abundant (A) if they had greater than fifty percent cover. An example of how the numbers were used follows. If a species fell into the P = present category but had a percent cover closer to 16% than to 25% it received a P1. If the species had cover closer to 25% than to 16% was assigned P2 (Figure 1).

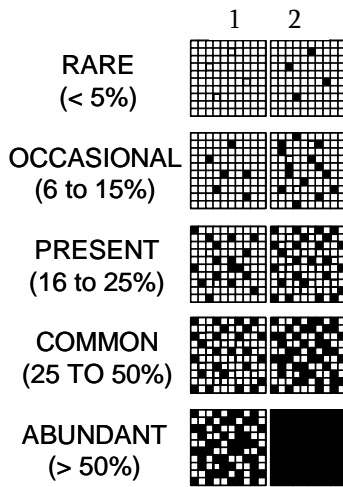


Figure 1. A schematic of the way we classified % cover of wetland species in the St. Regis boat launch wetland and the Rainbow Lake Waterway Wetland.

For each species the wetland indicator status was determined using the Fish and Wildlife Service Wetland indicator status for the Northeast region (http://wetlands.fws.gov/bha/download/1988/r_struct.txt). We also measured pH of the water in each of the 1m² quadrats to examine relationships between species occurrence and pH.

Results:

There were some apparently large differences in the structure and species composition of the two wetlands we studied, however the reader should note the difference in the size of the wetlands and the subsequent difference in the number of quadrats sampled in each. A total of 152 quadrats sampled in the St. Regis Lake Wetland (the larger of the two). Only 20 quadrats were sampled in the Rainbow Lake Wetland. Both wetlands were sampled using the same methods but the Rainbow Lake Wetland area was much smaller. The differences in species composition may be both a function of area and difference in habitat variables.

Species Composition

The St. Regis Lake Wetland had five times as many species of herbs, shrubs and trees as the Rainbow Lake Wetland. There were a total of 20 different plant species recorded in the St. Regis Lake Wetland while only four were present in the smaller Rainbow Lake Wetland (Figures 1 and 2). Again, note that bryophytes and grasses were not identified to species so the number of species reported is an underestimate.

St Regis Boatlaunch Wetland

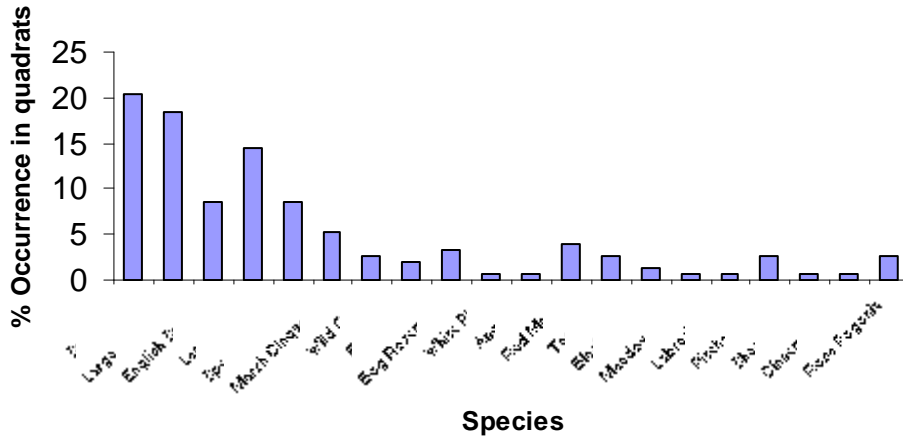


Figure 2. Occurrence of different species of herbs, shrubs and trees in the St. Regis Lake Wetland on Upper St. Regis Lake in the northern Adirondack Park, NY. Data were collected in July and August of 2008 (n= 152 1 m² quadrats)

Rainbow Lake Waterway Wetland



Figure 3. Occurrence of different species of herbs, shrubs and trees in the Rainbow Lake Wetland in the northern Adirondack Park, NY. Data were collected in July and August of 2008. n=20 1 m² quadrats.

At Upper Saint Regis the most common species seen was Sweet Gale (*Myrica gale*) followed closely by large cranberry (*Vaccinium macrocarpon*). The most common species found in the Rainbow Lake Wetland were Bog Laurel (*Kalmia polifolia*) and Labrador tea (*Ledum groenlandicum*). All of these are obligate wetland shrubs. Sweet Gale was present in 20% of the quadrats at the St. Regis site and Bog Laurel was found in 57% of the quadrats at the Rainbow Lake waterway site.

There was a seemingly large difference between the structure of the wetlands based on the proportion of plants in the different taxonomic/functional groups. Both wetlands had equivalent representation of bryophytes and shrubs, but the Rainbow Lake Wetland waterway had much lower incidence of graminoids (sedges and grasses), herbs and, to a lesser extent, trees than the St. Regis wetland.

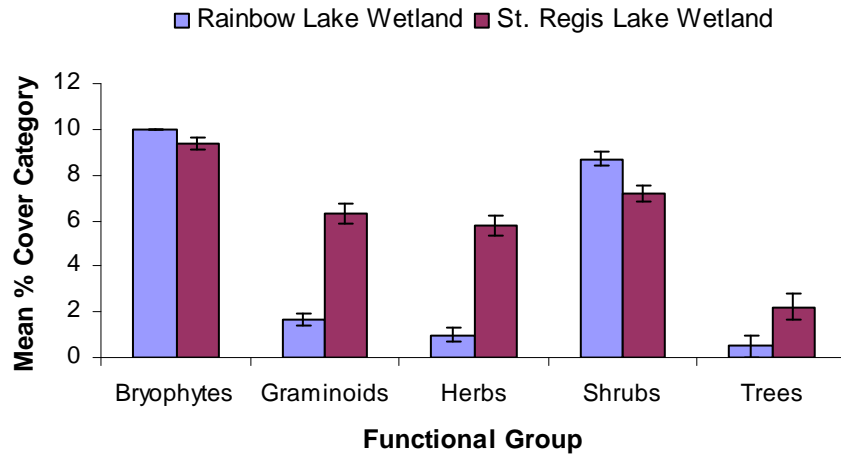


Figure 4. Mean % cover of different taxonomic/functional groups in the Rainbow Lake and St. Regis Lake wetland study sites. n= 152 1 m² quadrats in the St. Regis wetland and 20 1 m² quadrats in the Rainbow Lake Waterway wetland. Data collected in July and August. Bars are + 1 SE of the mean % cover category. Mean % cover of 1 is equivalent to 1 to 2.5%, while a cover category of 10 is equivalent to 75 – 100% cover

Indicator Status:

Sixty and 50% of plants identified at St. Regis and Rainbow Lake wetlands respectively, were obligate wetland plants (Figure 4). These are plants that cannot survive in a soil that is not permanently saturated. These obligate plants were also proportionately more abundant than facultative wetland plants (found in 82% and 81% of the quadrats in St. Regis and Rainbow lake study sites respectively). There is little difference in the indicator status of the plants in the two wetlands we studied.

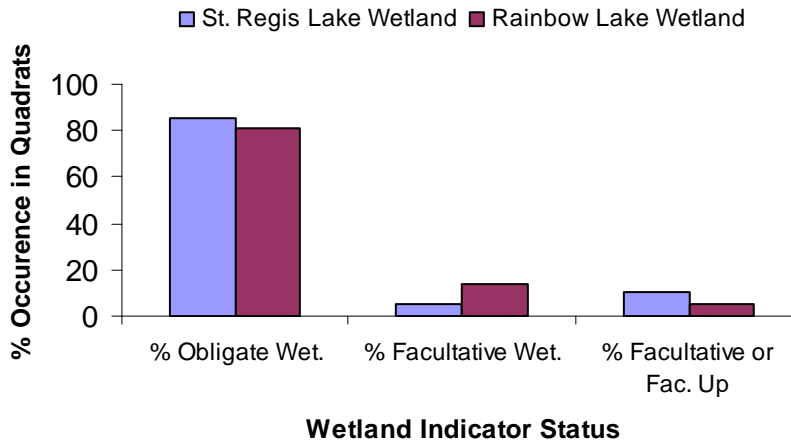


Figure 5. Percent occurrence of plants of different wetland status in St. Regis Lake Wetland and Rainbow Lake Waterway wetland. Data were collected in July and August 2008. n=152 1 m² quadrats in St. Regis Wetland and n=20 1 m² quadrats in the Rainbow lake waterway wetland.

Wetland pH:

The range of pH at the Upper St. Regis wetland was 3.58 – 5.68. The median pH was 4.39. The range at the Rainbow Lake Wetland was 2.98 to 3.82 with a median of 3.27. Mean pH was approximately 1 pH point lower at the Rainbow Lake Wetland. Because pH is the inverse log of the hydrogen ion concentration, this represents a much more acidic environment (a 10 fold difference). The differences in pH are statistically significant ($p < 0.0001$, Table 1).

Table 1. Mean pH values for the two study wetlands (includes standard error).

WETLAND	N	Mean pH + SE
Rainbow Lake	21	3.31 + 0.05
St. Regis	153	4.49 + 0.05

Discussion:

Differences in plant composition and structure in wetlands are good indicators that there are differences in hydrology. Hydrology ultimately influences rates of decomposition, pH, nutrient availability and the amounts of dissolved oxygen (which we did not measure). All of the variables listed above may influence the competitive success of different plant growth forms and species (Lambers et al, 1998). The greater number of species identified at St. Regis may be in part due to the size of the wetland and the number of quadrats we measured there. This relationship is predicted by a typical species-area curve (Townsend et al 2003), which states that the most likely reason to find more species in a larger area is that a larger area is likely to contain a greater number of different habitats. However, in the St Regis Wetland there were an average of $4.8 + 1.4$ (standard deviation) species per $1m^2$ quadrat, while in the Rainbow Lake Wetland area there were only $1.8 + 0.8$ species per quadrat, suggesting that other factors are likely influencing the species richness in these areas.

Sweet gale is a member of the bay family and is typically found at the edges of bogs and fens (Eastman, 1995). Eastman (1995) reports that sweet gale does well in moderate rather than extremely acidic or basic soil pH. There were significant differences between the pH of the two wetlands and sweet gale was very abundant in the less acidic St. Regis wetland. However, we saw no correlation between pH and the abundance of sweet gale across the range of pH present in both wetlands combined. This plant is a nitrogen fixer, and its common occurrence in the St. Regis Wetland area may possibly have increased the nitrogen availability in that wetland. Higher nitrogen availability often does correlate with greater plant species richness, however this is only a hypothesis for this particular study since it was not measured. Large cranberry (*Vaccinium macrocarpon*) is reported to be found in more moderate pH environments, while the small cranberry (*Vaccinium oxycoccus*) is found in more acidic environments (below 3.5) (Eastman, 1995). Across the range of pH in our study where large cranberry was found, we see no correlation between % cover and pH. There was no cranberry reported for the more acidic bog wetland and so this correlation is for quadrats in the St. Regis Wetland only.

We did not observe any obvious differences in the wetland indicator status of plants. Approximately the same of percent of plants were obligate and facultative wetland species at both sites. We had predicted there would be a higher percent of facultative wetland species in the ecotonal wetland, due to more overlap in species from the upland and wetland areas. This lack of difference in wetland indicator status of plant communities suggests that both wetlands remain fairly saturated.

The Upper St. Regis Wetland was in direct contact with the lake which may have implications for nutrient status dissolved oxygen – both factors that can influence the establishment of wetland species (Mitch and Gosselink, 2000). Bog laurel can inhabit the drier areas in bogs (Eastman

1995) and its common occurrence in the Rainbow Lake Wetland suggests that this wetland may dry out more often than the St. Regis Wetland. Since there is not an above ground connection between the Rainbow Lake Wetland and the nearby Rainbow Lake waterway it is likely that when water table levels drop, the wetland might dry out. The second most abundant plant, Labrador tea, is a common plant associate in bog ecosystems.

As expected, there appear to be substantial differences in the plant communities in the two wetland systems we studied. The Rainbow Lake Waterway wetland, a much smaller and more isolated wetland ecosystem, had lower cover of grasses and herbs and much lower species richness. This wetland was dominated by bryophytes and two fairly common obligate wetland shrubs, bog laurel and Labrador tea. The St Regis Wetland, an ecotone between the lake and upland forest, had similar bryophyte and shrub cover as the Rainbow Lake Wetland, but had more grasses and herbs and trees and was dominated by nitrogen fixing shrub, sweet gale and the low growing large cranberry. Any future study should examine the hydroperiod (how the water table fluctuates through the year), nutrient availability, and dissolved oxygen in these wetlands to try and determine causes of differences in structure and understand potential differences in function.

Literature Cited:

- Eastman, J. (1995). *The Book of Swamp and Bog*. Stackpole Books.
- Lambers, H. chapin, F.S. and T.L. Pons. (1998). *Plant Physiological Ecology*. Springer Science+Business Media, Inc.
- Mitsch, W.J. and J.G. Gosselink. (2000). *Wetlands. 3rd Ed.* John Wiley and Sons.
- Tiner, R. (1999). *Wetland Indicators: A Guide to Wetland Identification, Delineation, Classification, and Mapping*. CRC Press, LLC.
- Townsend, C.R., Begon, M. and J.L. Harper. (2003). *Essentials of Ecology 2nd Ed.* Blackwell Publishing.
- NY State Regional Wetland Indicator Plant Species list
http://wetlands.fws.gov/bha/download/1988/r_struct.txt

Paul Smith's College Horse Barn Wetland Pond Development Project

Eric Munley, Steward

Introduction

Runoff from agricultural and pasture areas can add significant nutrients to adjoining water bodies. Both natural and man-made wetlands can mitigate excess nutrient loading to water bodies via microbial activity and nutrient cycling (i.e. nitrogen) or by various ways in which wetland chemistry causes sequestration of nutrients (Mitsch and Gosselink, 2000). Phosphorus may be sequestered within a wetland system by the binding of phosphorus in organic matter and incorporation into living biomass (Gosselink and Turner, 1978).

At the horse barn on Paul Smith's College property, there is a large amount of horse manure, high in phosphorus, which has the potential to result in excess nutrient in runoff. The Horse barn is located next to the Barnum Pond Outlet. Several depressions were dug on the property to act as holding areas for runoff to allow the water to percolate through the soil, rather than run off and enter the Outlet. During two and half Thursdays in June Watershed Stewardship Program staff transplanted obligate and facultative wetland plants from local area wetlands into and around one of the man-made pond at the Paul Smith's College horse barn on Keese Mill road in Paul Smiths, New York. The pond chosen was the one closest to the road. The transplanting was done to help stabilize the sandy soil in the pond and to help with the goal of retaining runoff, especially for the purpose of decreasing the amount of phosphorus runoff.

Methods

I spent the first two work days on the project pulling pig weed (*Amaranthus retroflexus*) from the drainage pond site. Pigweed is a common name for a number of weedy species. In our case, *Amaranthus retroflexus* is a European weed that grows in dense clusters but is easily removed by hand pulling. After removal, I started transplanting from local riparian zone wetlands on Paul Smith's College property near the Barnum Brook Outlet, and from the man-made campus wetland located in front of the Joan Weill Library on campus. On the third work day all of the Stewards and Science Director Celia Evans helped to finish the transplant by removing several species from the Paul Smith's College wetland to be put into the drainage pond (Figure 1 – 2). Table 1 is a list of transplanted species and their wetland status.



Figure 1. Watershed Steward Eric Munley transplanting wetland Ferns and Sedges into the cleared depression



Figure 2. Munley and other stewards working to finish transplants. Note the encroaching pig weed!

Table 1. A list of plants (Genus/Species) transplanted into a small drainage pond on Paul Smiths College property near the horse barn. More upland and disturbance adapted plants were located around the upper edge of the depression. More Facultative wetland (FACW) and Obligate wetland (OBL) species were located in the lowest part of the depression.

Location	Genus/Species	Common Name	Wetland Status
Upper edge of depression	<i>Salix discolor</i>	Pussy Willow	FACW
	<i>Pteridium aquilinum</i>	Bracken fern	FACU
	<i>Asclepias syriaca</i>	Common Milkweed	Upland herb
Lower part of depression	<i>Carex (sp)</i>	Several species of sedges	Range from OBL to FACW
	<i>Onoclea sensibilis</i>	Sensitive fern	FACW
	<i>Osmunda cinnamomea</i>	Cinnamon fern	FACW
	<i>Triadenum virginicum</i>	Marsh St. Johnswort	OBL
	<i>Impatiens capensis</i>	Jewelweed/ spotted touch-me-not	FACW

Results and Discussion

After two weeks, some of the upland transplants had wilted, particularly *Asclepis*. The majority of the transplants however seemed to be doing well and appeared to be over transplant shock. Along with the plant materials we collected and transplanted into the area, there will be seeds in the associated soil. It is likely that many more species associated with transplants will begin to 'volunteer' and take hold in the next years.

Our goal was to expedite the process of turning the depression into a wetland so that organic matter could begin to accumulate in the sandy soil and the wetland vegetation could begin to aid in sequestering phosphorus in runoff from the horse barn and pasture. The amount of runoff that makes its way to the pond will determine the success of many of the plants moved into the depression. We chose plants that came from wetland areas where hydrology was likely to be variable and thus many of the transplants were in the FACW category. These are most likely to survive in drier soil. Because pig weed is fast growing and dense in the pasture, we recommend revisiting the area next season and pulling, where necessary, the non-wetland species to reduce competition for the desired plants.

Literature Cited

- Gosselink, J.G. and R.E. Turner (1978) The role of hydrology in freshwater wetland ecosystems. In: *Freshwater wetlands, ecological processes and management potential*. R.E. Good, and D.F. Whigham, R.L. Simpson, eds. Academic Press, New York.
- Mitsch, W.J. and J.G. Gosselink. (2000). *Wetlands*. 3rd Ed. John Wiley and Sons, New York.

Lake Placid Eurasian Water Milfoil Viability Review and Lake George Comparison

by Eric Munley, Watershed Steward and Celia Evans, PhD., Science Director

Introduction

Myriophyllum spicatum commonly known as Eurasian watermilfoil, is an invasive aquatic plant species first identified in the Potomac River/Chesapeake Bay region of the eastern United States in 1940 (Couch and Nelson, 1985 in Boylen et al, 1996). It is currently established in waterways of most of the lower 48 States and Canadian Provinces (Couch and Nelson, 1985 in Madsen, 1998). Eurasian milfoil is present in many Adirondack Park lakes and has physiological characteristics that allow it to spread and establish in a wide range of lake environments, as evidenced by its broad geographic distribution.

Once Eurasian watermilfoil establishes itself in a lake ecosystem it alters water quality, changes natural communities, and decreases the recreational value of those areas. (Nichols, 1994a in Nichols and Buchan, 1997). Once it invades a water body, it is nearly impossible to get rid of (Boylen et al., 1996), and the cost of control can be extremely high (D. Kelting, pers.comm.).

Lake Placid, in the Adirondack Park, NY is currently free of milfoil. Lake Placid is an oligotrophic lake. Oligotrophic lakes are low productivity lakes containing low nutrient concentrations and low aquatic plant densities. This has led to speculation that Eurasian milfoil, if introduced to Lake Placid, will not take hold and become invasive there. Lake George, also in the Adirondacks, is a lake chemically similar in some ways to Lake Placid but has areas dense with milfoil, suggesting that the plant can infest oligotrophic lakes with low productivity. In this review we use a subset of published studies to consider how likely it is that Lake Placid may become infested with watermilfoil if fragments are introduced into the lake.

Requirements for Eurasian water milfoil establishment and growth

While Eurasian milfoil is most successful in fertile, fine-textured, inorganic sediments (<20% organic matter- Barko and Smart, 1986 in Smith and Barko, 1990), it can take hold in areas of relatively nutrient-rich sediments in lakes with low nutrient water chemistry (Boylen et al, 1996) and also in sand (Kelting, 2007). In Upper Saranac Lake silt loam, the finest textured sediment, hosted an average of over 300 stems/acre while sandy textured sediments had densities that averaged just over 100 stems/acre (Kelting 2007). Milfoils are usually found in water from 3 to 20 feet deep, however plants have been found growing in water depths over 30 feet (Smith and Barko, 1990). In a 3 year study of milfoil growth in Upper Saranac Lake, densities of milfoil were highest where water depth was from 9 to 11 feet, however it was also found in waters as shallow as 5 feet and as deep as 15 feet (Kelting 2007). Milfoil has a high photosynthetic rate and does best in high light conditions. Shoot growth is rapid in water temperatures above 59 degrees F (Kelting, 2007). Phosphorus in lake sediment and the cations Na, K Ca and Mg are important nutrients for milfoil growth. Cations are unlikely to be growth limiting except in extreme low inorganic sediment environments (Smart and Barko, 1986). In summary, a broad combination of sediment type, depth of water, availability of phosphorus and light influence the establishment and density of Eurasian milfoil.

Spread of Eurasian watermilfoil is via stolon (runner) growth, plant fragmentation, and seeding. Though the plants produce copious seeds, studies done in several lakes, including Lake George (Madsen and Boylen, 1989) and Upper Saranac lake (Kelting 2007) suggest that seeding is negligible compared to fragmentation and stolon growth. Fragmentation occurs through both mechanical disturbance (i.e. motor boat propellers) and an adaptation called autofragmentation. The number of fragments floating in lake water increases substantially in August and September after the plants have reached maximum biomass and flowered (Kelting 2007; Madsen et. al., 1988). Even in relatively nutrient poor lake waters, fragments continue to elongate and grow adventitious roots while floating (Madsen et al., 1988). A 2002 study done using mesocosms controlled for different sediment nitrogen concentrations found that in low nitrogen environments

watermilfoil plants produced more fragments than in the high sediments nitrogen treatments (Smith et al. 2002)

History of Invasive Milfoil in Lake George – an oligotrophic lake

Eurasian watermilfoil was first reported in Lake George in 1985. By 1988, in a report by the Rensselaer Fresh Water Institute, milfoil was found throughout the lake basin and in dense single species stands (Madsen and Boylen, 1988). This study showed that local spread of the plant occurred through stolons while medium to long distance (30 to 50 meters) dispersal occurred via autofragmentation. In laboratory experiments using the oligotrophic lake water researchers showed that plant fragments could survive and even grow while floating in low nutrient conditions.

A second study (Madsen and Boylen, 1989) compared the seed ecology of Lake George Eurasian watermilfoil to that of plants in a nearby eutrophic lake. In the eutrophic lake, more plants were female and thus, more seeds were produced on average. This may have to do with availability of nutrients in the eutrophic lake water. The average germination rate of seeds from the eutrophic lake was 69% while seeds from Lake George had an average germination rate of 41%. These are both high germination percentages, particularly considering that seeds are not thought to be important in the expansion of milfoil beds. By 1993 milfoil had spread to 106 different locations in Lake George with an average biomass of close to 1000g/m² (Boylen et al, 1996). Intensive management activities were successful in reducing milfoil densities in the short-term, but none were able to eliminate the plant.

Likelihood of Eurasian Water Milfoil in Lake Placid, NY?

Based on our review of the literature, conditions in Lake Placid are not ideal for watermilfoil establishment. However since 1980, researchers have noticed the increasing incidence of invasion of low nutrient lakes (Boylen et al., 1996). Fragments can survive in low nutrient lake water and even grow (elongate) before they settle into the sediment. In two of the studies we read, Researchers reported milfoil populations growing in 100% sand, albeit at lower densities.

It seems very likely that without monitoring, fragments of milfoil will be introduced into Lake Placid via motor boat trailers or traffic (based on what we know about transport and what the Stewardship Program has seen). The probability of any one fragment of milfoil becoming established in Lake Placid is likely lower than in some other lakes with higher productivity and larger areas with more fine inorganic sediment. However studies have shown that Eurasian watermilfoil will grow readily in a broad range of alkalinity, nutrient availability, and on almost any sediment type. In oligotrophic lakes populations are mostly found initially in areas/bays of the lake have the best resources for establishment and growth and are areas of high traffic (Boylen et al 1996). Lake Placid does host native aquatic plants in Paradox Bay and Whiteface Bay. Paradox bay is also the site of a boat launch. Where conditions are suitable for other macrophytes, it seems reasonable to expect milfoil to take hold, particularly when combined with high boat traffic (Paradox Bay). If Eurasian milfoil did establish, initial densities would be low, since most spread seems to be through stolons and fragmentation rather than by seed. We should note that evidence from other studies suggest that Eurasian watermilfoil prefers high light which would be provided by the clear water in Lake Placid and may also have a higher rate of fragmentation in the lower sediment nitrogen concentrations (Smith et al. 2002) that we would expect in this oligotrophic lake.

There is no evidence in the literature to suggest that Lake Placid is immune to milfoil colonization. The probability of establishment of any introduced fragment is probably low compared to more moderately nutrient rich lakes with finer inorganic sediment. If colonization occurred it is unclear how rapidly milfoil would spread given the information presented here. The information presented here could perhaps be used as an argument to reduce efforts in education and monitoring - play the percentages and hope for the best. However, it could also be argued that user/boater education and inspecting boats and trailers are likely to actually keep Lake Placid free of the non-native milfoil. In the event of establishment, early detection of

individual plants and hand harvesting could be very valuable for the future of the lake. The combination of stewardship and marginal habitat may be the combination that will keep Eurasian watermilfoil out of Lake Placid into the future.

Literature Cited

- Boylen, C.W., Eichler L. W., Sutherland J. W. (1996) Physical control of Eurasian watermilfoil in an oligotrophic lake. *Hydrobiologia* 340: 213-218.
- Kelting, Daniel L. (2007) Investigation of Eurasian watermilfoil in Upper Saranac Lake. Tech.No. Adirondack Watershed Institute.pp. 1-29.
- Madsen, J. D (1998). Predicting invasion success of Eurasian watermilfoil. *J. Aquat. Plant Manage.* 36: 28-32.
- Madsen, J. D. and Boylen C. W. (1989) Eurasian watermilfoil seed ecology from an oligotrophic and eutrophic lake. *J. Aquat. Plant Manage.* 27: 119-121.
- Madsen, J.D., Eichler, L. W. and Boylen, C.W. (1988). Vegetative spread of Eurasian watermilfoil in Lake George, New York. *J. Aquat. Plant Manage.* 26: 47-50.
- Nichols, S. A. and Buchan, L.A.J. (1997) Use of native macrophytes as indicators of suitable Eurasian watermilfoil habitat in Wisconsin Lakes. *J. Aquat. Plant Manage.* 35:21-24.
- Smart, R.M. and Barko, J.W. (1986) Effects of water chemistry on aquatic plants: Growth and Photosynthesis of *Myriophyllum spicatum* L. Technical Report A-86-2, Environmental Laboratory, Us army Engineer Waterways Experiment Station, Vicksburg, MS, 34pp.
- Smith, C.S., and Barko, J.W. (1990). Ecology of Eurasian watermilfoil. *J. Aquat. Plant Manage* 28:55-64.
- Smith D. H., Madsen J. D., Dickson K, L., and Beitinger T. L. (2002). Nutrient effects on autofragmentation of *Myriophyllum spicatum*. *Aquatic Botany* 74:1-17.

Northern Pitcher Plants and the Effects of Light Variability and Prey Capture Rates on Pitcher Morphologies

By Naomi Thompson

Editor's note: Watershed Steward Naomi Thompson was provided paid time in her work week to conduct this research as part of her senior independent Capstone Project. This basic science research increases the Adirondack Watershed Institute's understanding of watershed ecological function, and was a valuable experience for Thompson, allowing her to collaborate with the WSP's Science Director, Dr. Celia Evans.

Abstract:

There is a gap in research when it comes to pitcher plants and how light availability affects plant morphology. My research is to help determine how photosynthetic rate, morphological characteristics and the amount of prey captured is affected by different light regimes. I measured the pitcher height and width, light availability, and prey capture (in a subset of plants) beginning in early August and ending in early September.

This preliminary study was an attempt to help us understand the importance of light availability in pitcher plant physiology and nutrient acquisition (prey capture). No strong conclusions were drawn, mostly because of the lack of a large enough group of pitcher plants growing in the shade, however some interesting trends and ideas for future research were generated. This report is a synopsis of my complete capstone project which is on file at the Paul Smith's College Library.

Introduction:

Northern United States wetlands are characterized by standing water at the surface or water in the root zone some time during the growing season. Wetlands feature very hydric soils and support predominantly hydrophytes (water loving) including carnivorous plants (Mitsch & Gosselink, 2002). Carnivorous plants in Northern United States wetlands have many unique characteristics. They are able to survive in very wet areas where nutrients are poor and pH levels are low due to standing water in the area. They have adapted to survive these conditions by developing carnivorous traits to supplement the lack of nutrients. Carnivorous plants are of various sizes and colors and trap their prey in different ways (Mitsch & Gosselink, 2002).

The northern pitcher plant is a very interesting and well adapted plant of northern wetlands in North America. It is a long lived perennial herb that grows in bogs and fens. It ranges from Eastern United States to Canada. Leaves are formed into tubular pitchers that can vary in size and shape. Pitchers are for capturing both light, and prey. Research on substrate nutrient availability have suggested that increased nitrogen availability results in the formation of smaller, more closed pitchers with wide keels (Ellison and Gotelli, 2002).

Plants typically consist of 3 to 10 leaves on each pitcher and live for from 1 to 2 years. Water falls into their cylindrical base and lures prey to the water using a sweet nectar produced in the bottom of the keel. The prey gets trapped in the keel and is then digested by the plant using digestive enzymes also produced in the base of the keel (Atwater, Butler, & Ellison, 2006). This is used to supplement the lack of nutrients from the soil. With the increase in nutrient absorption there is an increase in plant growth. There are a number of bacteria and invertebrates that live in the pitcher water and also feed on the prey nutrients that the plant is not able to absorb. Heard (1998), found that there was a positive correlation between prey capture and pitcher size. He found that without the nutrients from the prey the pitchers could not grow as well as they could have or as large as they could have. He also found that the pitchers that were the largest caught the most prey.

There has been some work on light availability and how this affects pitcher plant morphology. I expanded on this to add prey capture and to see which has more of an effect on pitcher morphology, prey capture or light availability. This will help when a wetland is being constructed and the people constructing the wetland wish to add pitcher plants to the area. They will be able to know what types of cover, amount of prey, and nitrogen availability will be best for the plant.

In this study I investigated the relationships among pitcher size, number, color and prey capture rates, and light availability to the plant. I determined if the plants in shady regions have larger leaves to capture more light or more prey.

Methods:

Plot Selection:

I selected 6 bogs with pitcher plants in the Adirondack region, close to and around Paul Smith's College. There were 5, 2 X 2.5 meter plots in each wetland with one plot in the center of the wetland and then the rest at random distances and angles from the center plot. I numbered the plants in each plot using metal stakes that I had made using 16-gauge wire and flagging tape. I was then able to number the pitchers by that the pitcher closest to the stake to the right was pitcher number one.

Measuring of Pitchers:

I measured all the pitchers of the plants using a metric ruler and Pitel's (2007) methods for measuring. I measured the width by measuring across the two bottom-most flaps on the pitcher hood. I measured the pitchers from the tip of the hood down to the base of where the pitcher meets the main plant (height). These two areas can be seen in figures 1 and 2.

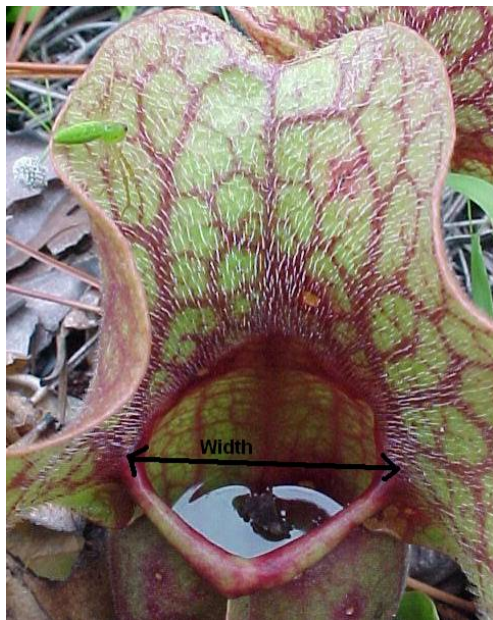


Figure 1- Showing where width was measured



Figure 2- Showing where height was measured on the pitcher plant.

Light above Plants-

I measured the light above and at the plants using a hand held light meter from directly above the plant and the all taller vegetation and also from only a few centimeters above the plant. I did this between 11:00 am and 2:00 pm eastern standard time when the most radiation from the sun was reaching the plant.

Prey Capture-

I measured the amount of prey captured by the carnivorous pitchers once in the morning and did this once for 3 weeks in the end of the summer. I also grouped the prey by sizes (large, medium and small). This is useful because the plant can get the same amount of nutrition from a lot of small prey items as with one large prey item; sometimes it is not the quantity of prey that the pitcher captures but the amount. I did this by using a modified suction method used in Nastase, et al.(1990). I also had to use some tweezers to carefully get the prey that the suction method had left behind. I recorded the length of the prey in centimeters. I measured the length of the prey by measuring along the dorsal side and taking the length from the longest point on the prey. I grouped the prey together by how long they area into similar length groups, as stated above. I then put the prey and the liquid the prey was in back into the pitcher.

Results:

Pitcher Morphology

There does not seem to be a relationship between the mean pitcher height per plant or width with light availability per plant (Figures 1 and 2). However there did seem to be a weak correlation between low light availability and an increase in pitcher number per plant ($p=0.03$, figure 3).

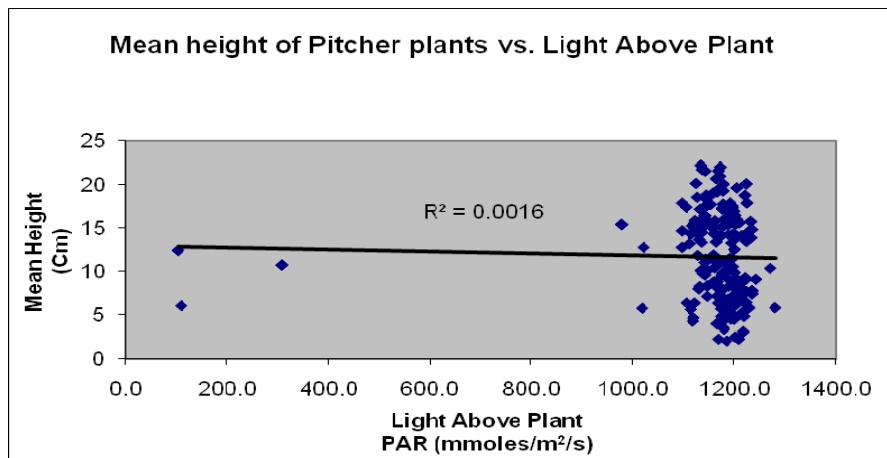


Figure 3- The relationship between mean height of pitchers per plant and the light available to the plant. $P=0.5108$, $R^2=0.0016$.

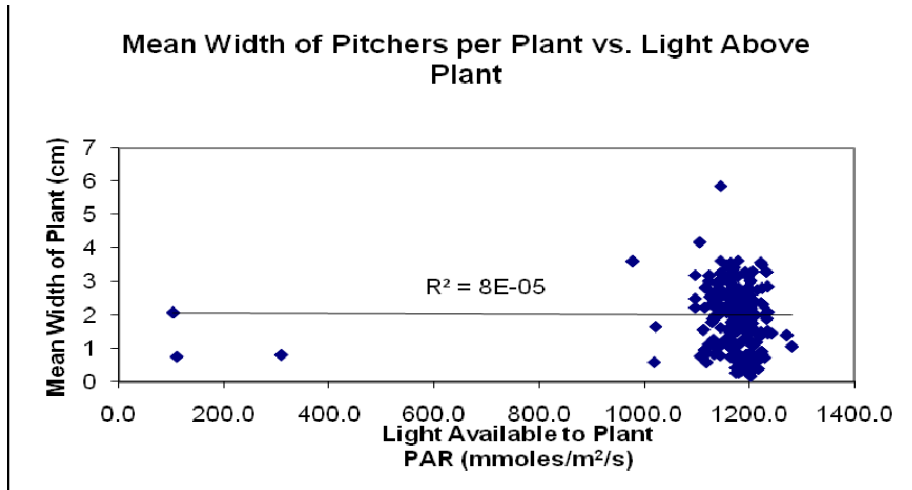


Figure 4-Mean width of pitchers per plant vs light available to the plant. $P = 0.7752$, $r^2 = 0.00008$.

Photosynthesis

Pitchers with a higher rate of photosynthesis tended to be the greener plants ($p = 0.0450$, Table 1). However the moderately red pitchers tended to have a higher photosynthesis rate than the greenest pitchers. Pitcher Height does not appear to have a correlation to maximum photosynthetic rates ($p = 0.6119$). Also, according to the data collected there was no relationship seen with Amax and light measured ($p = 0.1994$).

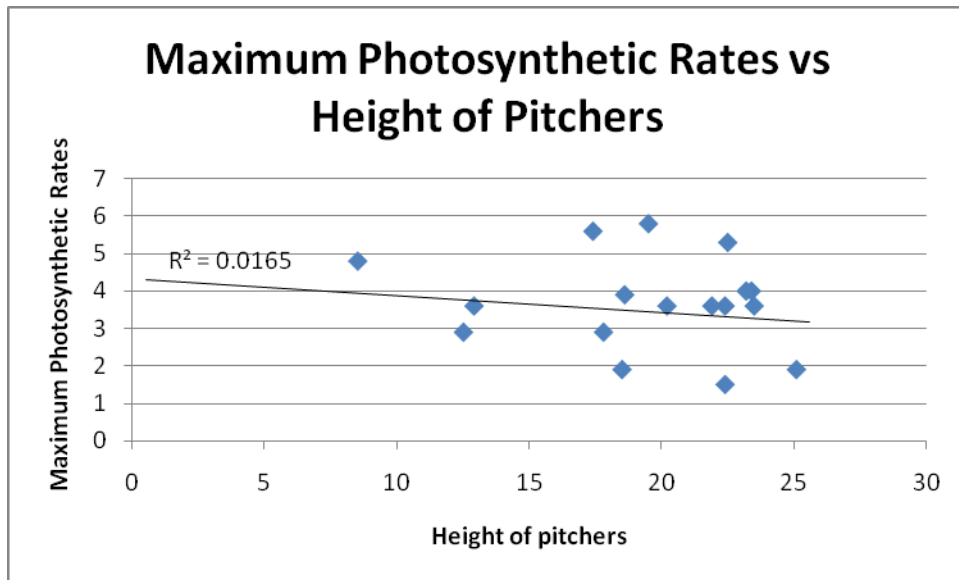


Figure 5. Maximum photosynthetic rate vs. height of individual pitchers.

Table 1-Color Index and photosynthetic rate (where 0 is 0-40% red color, 1 is 41-60% red color, and 2 is 60% red and above).

Color Index (0-2)	Amax (mmoles/m ² /s)	Standard Error
0	3.73077	0.36989
1	4.45000	0.94303
2	1.56667	0.76999

Prey Capture:

Wider pitchers tended to capture more prey on average than narrower pitchers ($p < 0.0001$). Taller pitchers also were seen to capture more prey ($p = 0.002$, Figures 3 and 4). Pitchers with a higher width to height ratio the pitchers tended to capture more prey per plant ($p = 0.0001$, Figure 5). There is a positive trend for number of prey per plant and number of pitchers per plant however the relationship is not statistically significant with $p = 0.21$ (figure 6). There was no relationship between color and prey capture.

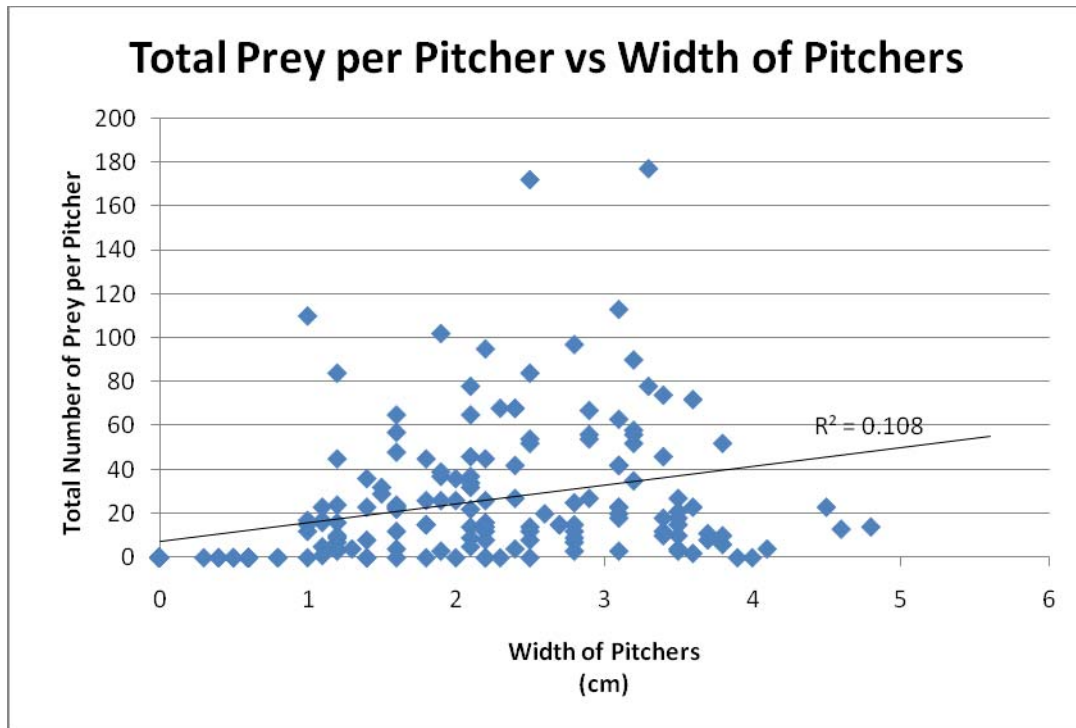


Figure 6- Relationship between total number of prey caught by pitchers per plant over 3 weeks and the width of the pitchers. $P < 0.0001$, $r^2 = 0.108$.

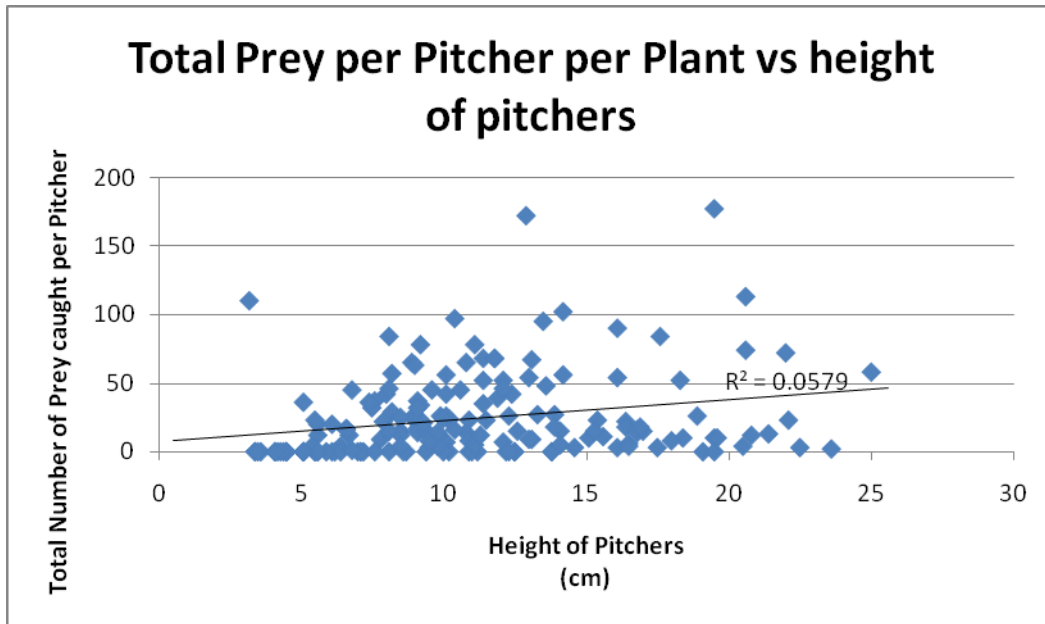


Figure 7-The relationship between total number of prey caught by pitchers per plant over 3 weeks vs the height of pitchers. $P = 0.0001$, $r^2 = 0.0579$

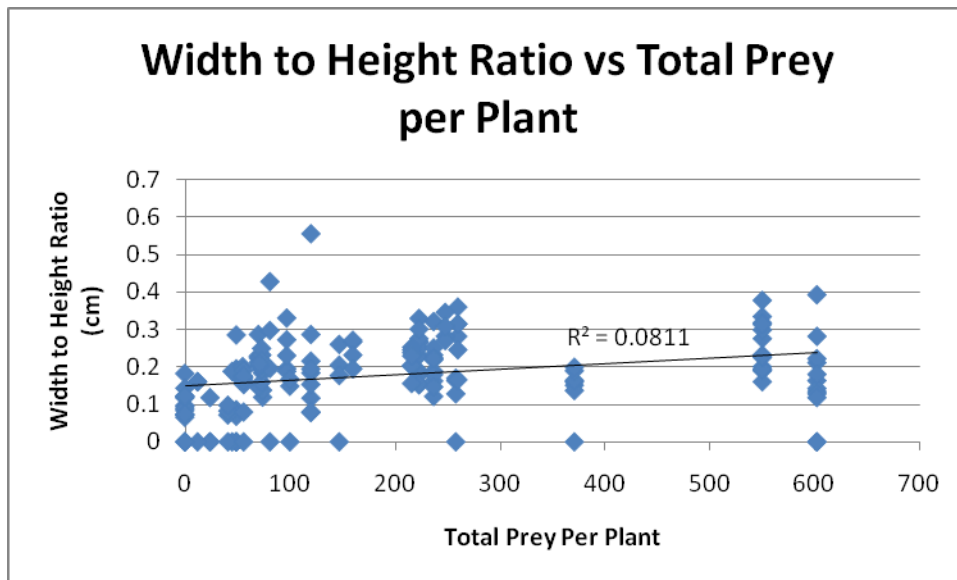


Figure 8 – The relationship between total prey caught by the plant over 3 weeks time and the width of the pitcher opening. ($p = 0.0001$, $r^2 = 0.0811$).

Summary

Overall, there was a weak positive correlation between prey number and pitcher size and number. In shady regions there are more pitchers which also seemed to have a positive affect on prey capture. Unfortunately, our randomly chosen plots had many fewer pitcher plants growing in low light than

growing in high light, so that any weak relationships we have seen in our data must be re-examined in a stratified study, where we are sure to select shaded plots.

It seems that morphology of pitchers is not greatly affected by light availability, but that plants may respond to lower light by increasing the number of pitchers per plant. It is still unclear whether the increase is to produce more photosynthetic surface area or to increase pitchers to capture prey. This is the beginning of some very interesting research that should be continued in the future

Literature Cited:

- Atwater, D.Z, Butler, J.L, Ellison, A.M. (2006). Spatial Distribution and Impacts of Moth Herbivory on Northern Pitcher Plants. *Northeastern Naturalist*, 13(1), 43-56. Retrieved February 1, 2008, from Research Library database. (Document ID: 1034872351).
- Ellison, A.M., Gotelli, N.J. (2002). Nitrogen alters the expression of carnivory in the Northern pitcher plant, *Sarracenia purpurea*. *PNAS*, 99(7), 4409-4412.
<www.pnas.org/cgi/doi/10.1073/pnas.022057199>.
- Heard, S.B. (1998). Capture Rates of Invertebrate Prey by The Pitcher Plant, *Sarracenia purpurea* L. *American Midland Naturalist*, 139, (1), 79-90. Retrieved February 2, 2007, from EBSCO Host Research Database.
- Mitsch, W.J., & Gosselink, J.G. (2000). *Wetlands* (3rd ed.). NY: John Wiley & Sons Inc.
- Nastase, A.J, De La Rosa, C, Newell S.J. (1990). A Comparison of Three Methods for Collecting Dipteran Insect Larvae Which Inhabit the Northern Pitcher Plant (*Sarracenia purpurea*). *American Midland Naturalist*, 125(2), 356. Retrieved March 6, 2008, from The University of Notre Dame.
- Pitel, Nicholas E., A Study of the Northern-Purple Pitcher Plant (*Sarracenia purpurea*) in Five Adirondack Bogs: Relative Abundance, Morphology, and Association with Neighboring Vegetation, in Relationship to Light and pH. 2007, Paul Smith's College Capstone Study, May 2007.