Watershed Stewardship Program
Summary of Programs and Research 2013

Adirondack Watershed Institute
Report # AWI 2014-01

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

The Year in Review

Aquatic invasive species (AIS) continue to be a great concern all across the Adirondack region, demanding increasing attention and resources from communities and agencies far and wide. The Watershed Stewardship Program (WSP) is part of coordinated efforts at the local, regional and statewide levels to arrest the spread of AIS. The Adirondack Watershed Institute (AWI) works year-round with partner organizations, communities and government agencies to understand and manage a range of environmental quality issues through research and education. 2013 was the fourteenth field season for the AWI's WSP.

2013 highlights:

- **Clean, Drain, Dry!** AWI WSP Stewards covered 22 lakes and ponds this season sharing the message of "*Clean*, *drain*, and *dry* your watercraft before and after use!"
- **New Tech!** This season the AWI WSP Stewards used iPads and an electronic survey for data collection at boat launches, making for much more accurate and easy data collection compared with paper survey forms.
- **New Boat!** The AWI purchased a Carolina Skiff, the *Watersheld*, for AIS monitoring and to launch its very own floating classroom program.
- **Political Outreach!** Public officials such as Governor Andrew Cuomo, Congressman Bill Owens, and NYS DEC Commissioner Joseph Martens took the time to stop and see what the AWI was all about.
- **Turning up the heat on milfoil!** AWI WSP Science Director Dr. Celia Evans and stewards conducted research on the effects of a warming climate on the growth of three species of watermilfoil.

Round-up of accomplishments, by the numbers:

- AWI WSP Stewards confirmed and removed 503 AIS.
- Stewards educated 38,776 visitors and inspected 19,292 watercraft at boat launches.
- The AWI WSP funded 23 full-time stewards and 2 part-time stewards.
- The AWI WSP was funded by 4 lake associations, 1 tax district, 1 federal agency, 1 private foundation, and 1 college.
- 22 lakes and ponds were covered by AWI WSP Stewards this season.
- With 94 waterbodies in the Adirondack Park confirmed for AIS there are still 235 waterbodies that are clean and need protection!

This is just a sample of the of the work at the WSP. What else have we been up to, and what is to come? Read on to find out!

The AWI Team

Table of Contents

Contact information:
Dr. Eric Holmlund, Director
Watershed Stewardship Program
Paul Smith's College, Box 265
Paul Smiths, New York, 12970.
Telephone: (518) 327-6341. Email eholmlund@paulsmiths.edu

The 2013 Watershed Stewardship Program was funded by:

Osgood Pond Association

Rainbow Lake Association

Adirondack White Lake Association/White Lake Shores Association

List of Tables and Figures

Table 1: Abbreviation List

Abbreviation	Complete Text
AIS	Aquatic Invasive Species
APA	Adirondack Park Agency
APIPP	Adirondack Park Invasive Plant Program
AWI	Paul Smith's College Adirondack Watershed Institute
DEC	New York State Department of Environmental Conservation
GLRI	Great Lakes Restoration Initiative
LCBP	Lake Champlain Basin Program
NYS	New York State
PSC	Paul Smith's College
Steward	Paul Smith's College Watershed Steward
QAPP	Quality Assurance Project Plan
WSP	Adirondack Watershed Institute Watershed Stewardship Program

Abstract

This report summarizes the data and program highlights for the 2013 field season of the Adirondack Watershed Institute's Watershed Stewardship Program at Paul Smith's College in Paul Smiths, New York. 23 Watershed Stewards were stationed at 22 lakes across the Adirondack region to execute a coordinated aquatic invasive species (AIS) spread prevention program. Stewards greeted and educated 38,776 visitors about AIS issues and spread prevention techniques while inspecting and removing visible organisms from 19,292 watercraft of all types. Watershed Stewards removed 2,038 organisms from approximately 9% of all watercraft inspected. Stewards discovered and removed 503 instances of confirmed AIS, approximately 3% of all watercraft inspected. A comparative analysis of data from all 22 lakes revealed great variation in a number of factors including traffic encountered, AIS transport rate, portion of visitors taking AIS spread prevention measures, and type of watercraft launched. Visitors reported that they had used their watercraft previously on a total of 366 different waterbodies from all over the United States and Canada. The report also includes reports on steward projects and research including public education and outreach, field management of invasive species, banded loon monitoring, and a laboratory study of variable-leaf milfoil response to climate change conditions. The program was funded in 2013 by the United States Fish and Wildlife Service/Great Lakes Restoration Initiative, the St. Regis Foundation, the Lake Placid Shoreowners' Association, the Saratoga Lake Protection and Improvement District, the Rainbow Lake Association, the Osgood Pond Association, the Adirondack White Lake Association/ White Lake Shores Association, and Paul Smith's College.

Introduction and Program Findings

Eric Holmlund, PhD

Director, Watershed Stewardship Program

Introduction and Historical Perspective

In 2013, the Paul Smith's College Watershed Stewardship Program (WSP) conducted its fourteenth consecutive summer field season of public education and aquatic invasive species (AIS) spread prevention at 22 public-access lakes located across the Adirondack region. Uniformed stewards inspected watercraft and educated visitors at locations ranging from Chateaugay Lake in the north, to Saratoga Lake in the south, to White Lake in the west. The WSP collaborates with partners including the New York State Department of Environmental Conservation (NYSDEC), the Adirondack Park Agency (APA), the Adirondack Park Invasive Plant Program (APIPP), the Lake Champlain Basin Program (LCBP), the Lake George Association (LGA), and many local lake associations in designing and delivering the program each year. The goal of the program is to reduce or prevent the spread of AIS across the Adirondack region by directly inspecting

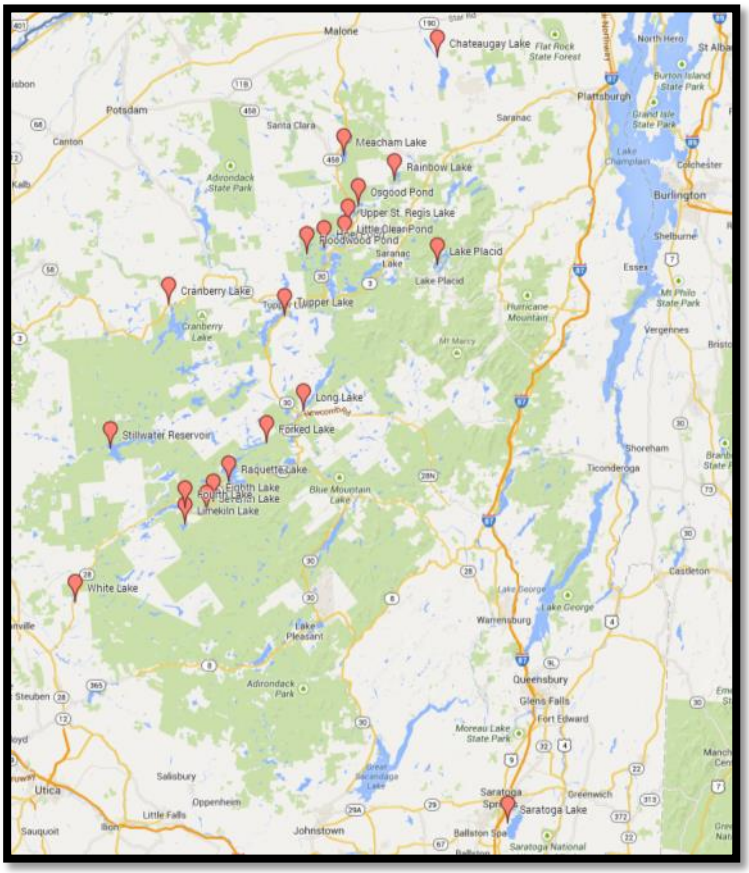


Figure 1- 2013 Watershed Stewardship Program steward locations.

watercraft and hand-removing plant and animal materials and by raising public awareness of AIS concerns as well as the critical AIS spread prevention steps that boat owners can and should take prior to and following boat use.

The WSP would like to acknowledge its funders for the 2013 field season, which included the United States Fish and Wildlife Service (Great Lakes Restoration Initiative), the St. Regis Foundation, the Lake Placid Shoreowners' Association, the Rainbow Lake Association, the Saratoga Lake Protection and Improvement District, the Osgood Pond Association, and the White Lake Shores Association. These sources represent private land owners, municipalities, and the federal government.

Watershed Steward Greg Redling at Saratoga Lake boat launch.

The WSP has grown dramatically over the past decade and a half, tracking to great extent the rise in concern regarding the costly proliferation of AIS in water systems throughout the world, including at last northern New York. At full summer strength, the WSP employed 25 people in 2013, all but two as full-time seasonal watershed stewards drawn largely from colleges and universities in New England with strong environmental programming. The dramatic rise in the scope of the program in 2011 and thereafter derives from the recognition and support the program garnered from federal funding sources including in 2013 the United States Fish and Wildlife Service through the Great Lakes Restoration Initiative.

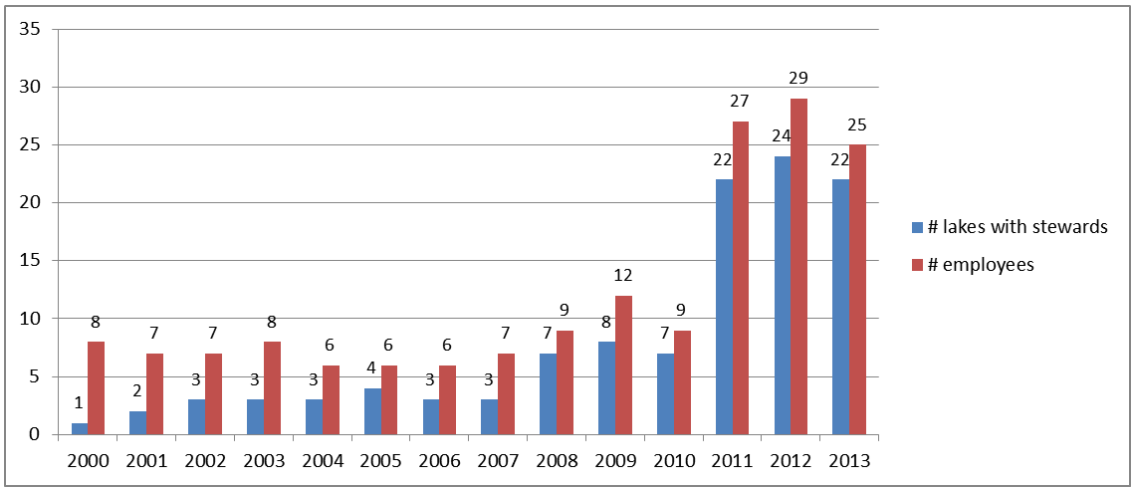


Figure 2- WSP growth, boat ramps and employees, 2000-2013.

Similarly, the WSP has inspected an increasing number of watercraft at a range of waterways over the past 14 summers. In total, program employees have inspected and cleaned 106,738 watercraft of different types over the history of the program.

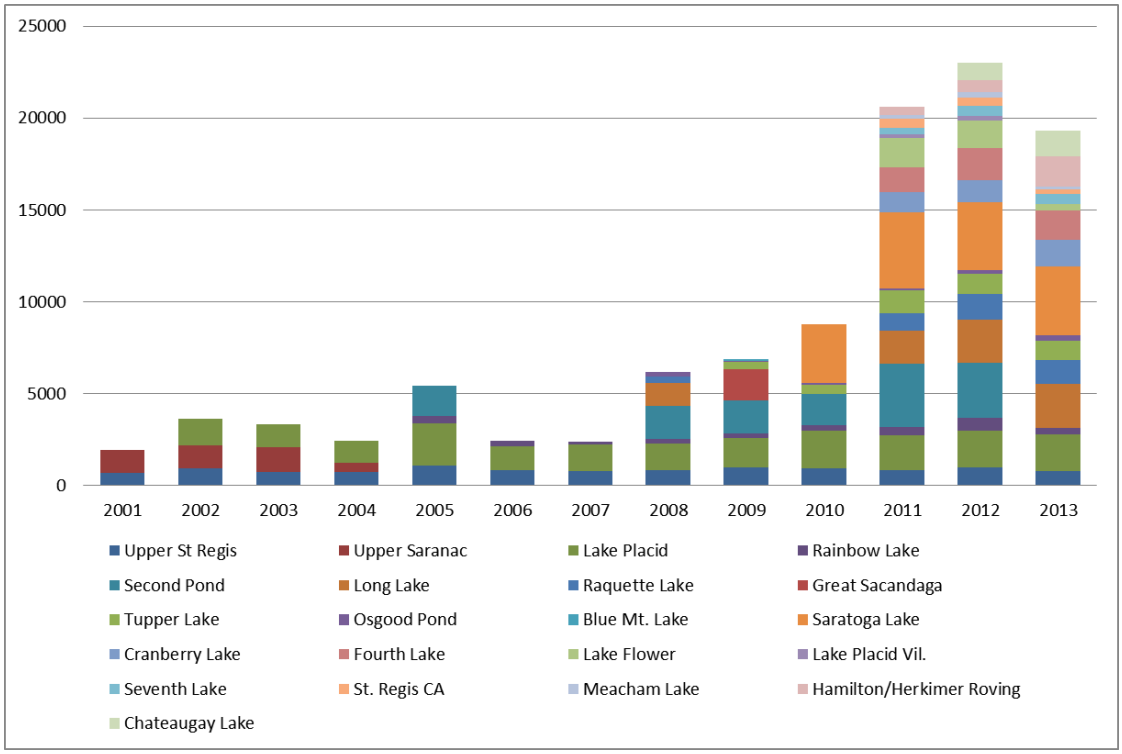
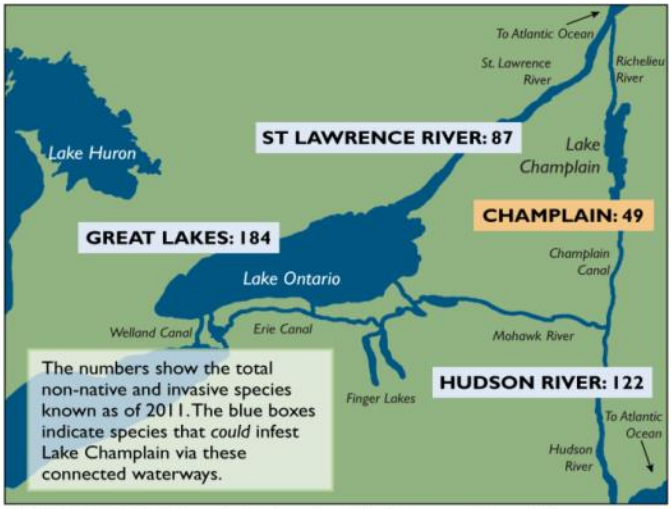


Figure 3- Number of watercraft inspected by Watershed Stewardship Program stewards, 2000-2013.

The Adirondack Region and the Threat of Aquatic Invasive Species

The Adirondack Region is home to some of the highest quality intact lacustrine and riverine ecosystems in the eastern United States. The Adirondack Park protects almost six million acres of forests, mountains and waterways, attracting hundreds of thousands of visitors and seasonal residents annually. Chief among the many attractions of the region are its opportunities for aquatic recreation, including paddling, sailing, motorboating, swimming, diving, camping, and fishing, as well as winter sports including skiing, skating, fishing, and snowmobiling. Most of these activities can and have spread AIS over the past two decades to over 90 Adirondack lakes. A now-seminal paper published in 2010 by Notre Dame University quantified the role of recreational watercraft and trailers in spreading AIS overland between water bodies (Rothlisberger, Chadderton, McNulty, & Lodge, 2010). Previous research has shown that zebra mussels are dispersed when they are attached to aquatic vegetation entrained on boat propellers and trailers (Johnson, Ricciardi, & Carlton, 2001). New AIS continue to make inroads in New York State with each season, including an increasingly serious infestation of Asian clam (*Corbicula fluminea*) in Lake George starting in 2010 along with the sobering detections of *Hydrilla verticillata* in Cayuga Lake and Lower Croton River in 2011 and 2013 respectively. While the Adirondack Park has 94 waterways infested with eight aquatic invasive plant species and three aquatic invasive animal species, it is surrounded by highly visited waterways with dozens more AIS (Smith, Quirion, & Johnstone, 2013). Although the threat of AIS introduction is present and growing, there are hundreds of waterways in the Adirondack region with few or no AIS at present, which underscores both the opportunity as well as the obligation for concerted, coordinated AIS spread prevention activity.



DATA SOURCE: UVM, Lake Champlain Sea Grant, Great Lakes Environmental Research Laboratory, Lafontaine and Costan 2002, and Strayer 2012.

Figure 4- AIS in waterways surrounding the Adirondack Park.

Key Regional Findings

In the 2013 field season, which ran from Memorial Day to Labor Day, 23 summer Watershed Stewards stationed at 22 different lakes inspected 19,292 watercraft for invasive species while educating a total of 38,776 visitors about the ecology and impacts of AIS, including spread prevention techniques. Traffic and visitation at the boat ramps varied from a low of 56 boats inspected at Eighth Lake to a high of 3,779 at Saratoga Lake. 65% of the watercraft were motorboats, followed by kayaks (16%) and canoes (12%). Other boat types were tallied in the single percentages.

Table 2- Comprehensive data summary, 2013. M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance.

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Chateaugay Lake	1137	165	9	29	16	0	9	0	0	1365
Cranberry Lake	1141	69	6	107	96	0	4	0	0	1423
Eighth Lake	17	0	1	20	15	0	1	2	0	56
Forked Lake	33	0	0	94	65	0	0	1	0	193
Fourth Lake	1202	237	6	22	114	1	3	2	0	1587
Hoel/Little Clear/Floodwood Ponds	0	0	0	113	105	0	1	1	0	220
Lake Flower	260	28	0	17	45	0	1	0	0	351
Lake Placid	1040	0	14	175	682	3	0	80	0	1994
Limekiln Lake	21	4	0	22	59	0	1	0	0	107
Long Lake	1352	129	11	563	306	0	5	0	11	2377
Meacham Lake	92	12	2	13	25	0	1	0	0	145
Osgood Pond	36	0	1	104	119	0	4	0	0	264
Rainbow Lake	136	2	0	67	141	0	2	0	1	349
Raquette Lake	706	67	6	251	279	0	10	2	4	1325
Saratoga Lake	3529	183	15	11	29	0	10	2	0	3779
Seventh Lake	227	16	13	64	264	0	3	5	0	592
Stillwater Reservoir	479	29	4	207	299	0	3	3	4	1028
Tupper Lake	759	61	7	98	112	0	2	4	2	1045
Upper St. Regis Lake	311	0	5	240	230	8	3	4	3	804
White Lake	152	38	2	4	73	0	4	7	8	288
totals	**12630**	**1040**	**102**	**2221**	**3074**	**12**	**67**	**113**	**33**	**19292**
% of all watercraft	65%	5%	1%	12%	16%	0%	0%	1%	0%	100%

Watershed Stewards observed and removed organisms from watercraft at different frequencies depending on the location. While the overall frequency of visible

organism transport was 9% of all watercraft, the frequencies varied from a low of 0% of boats found to have visible organisms at Eighth Lake, to a high of 19% of boats at Chateaugay Lake boat launch. This variation could be explained by boat ramp proximity to weed beds, traffic volume, wind and wave action, employee persistence, or the layout and physical characteristics of the different boat ramps. Overall, more boats were found to be transporting visible organisms as they departed waterways than upon launching.

Table 3- Comprehensive data summary, 2013: # visitors and # organisms removed from watercraft.

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Chateaugay Lake	3423	32	404	248	1339	19%
Cranberry Lake	3259	80	68	124	1296	10%
Eighth Lake	109	0	0	0	43	0%
Forked Lake	336	2	11	10	135	7%
Fourth Lake	3815	92	54	120	1504	8%
Hoel/Little Clear/Floodwood Ponds	324	2	7	10	115	9%
Lake Flower	711	33	36	55	307	18%
Lake Placid	3593	26	11	33	1522	2%
Limekiln Lake	184	0	3	3	72	4%
Long Lake	4842	102	103	182	1860	10%
Meacham Lake	139	4	5	7	128	5%
Osgood Pond	439	2	9	8	201	4%
Rainbow Lake	633	12	11	20	264	8%
Raquette Lake	2565	83	113	170	1053	16%
Saratoga Lake	8466	309	190	344	3757	9%
Seventh Lake	998	31	32	55	420	13%
Stillwater Reservoir	2102	21	17	36	784	5%
Tupper Lake	1025	15	79	91	958	9%
Upper St. Regis Lake	1239	18	10	24	588	4%
White Lake	574	11	0	11	243	5%
totals	**38776**	**875**	**1163**	**1551**	**16589**	**9%**

Over the course of almost 17,000 boat inspections, Watershed Stewards discovered 2,038 organisms on 1,551 watercraft of various kinds. Stewards discovered and removed 503 instances of confirmed AIS, including curly-leaf pondweed (100 instances), Eurasian watermilfoil (323), variable leaf milfoil (55), spiny waterflea (1), water chestnuts (9), and zebra mussels (15). Stewards bagged and labeled each sample, bringing the bags into weekly staff meetings for confirmation with regional supervisors. AIS and possible AIS samples were transported to the Adirondack Watershed Institute

laboratory at Paul Smith's College for further scrutiny and entry into a study of fragment viability. Overall, 3% of inspections discovered AIS.

Table 4- Summary of organisms removed from watercraft, 2013; BW = bladderwort; CLP = curly-leaf pondweed; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; VLM = variable leaf milfoil; WC= water chestnut; ZM = Zebra mussel.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Chateaugay Lake	0	23	151	139	94	11	4	2	5	0	0	0	7	164	12%
Cranberry Lake	0	3	3	19	65	3	1	4	36	0	0	0	14	26	2%
Eighth Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Forked Lake	0	0	0	1	5	0	0	1	4	0	0	0	2	2	1%
Fourth Lake	0	3	5	8	75	4	5	9	14	0	2	1	20	23	2%
Hoel/Little Clear/Floodwood Ponds	0	0	0	0	2	0	0	0	5	0	0	0	1	0	0%
Lake Flower	0	0	3	0	33	3	3	16	7	0	0	0	4	16	5.2%
Lake Placid	0	0	1	1	18	0	1	2	10	0	0	0	4	3	0.2%
Limekiln Lake	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0.0%
Long Lake	0	0	4	5	58	0	6	2	99	0	0	0	30	7	0.4%
Meacham Lake	0	0	0	0	5	0	0	0	2	0	0	0	2	0	0%
Osgood Pond	0	0	0	0	7	0	0	0	2	0	0	0	2	0	0.0%
Rainbow Lake	0	0	1	0	8	1	0	0	8	0	0	0	5	0	0%
Raquette Lake	0	0	0	8	56	1	4	11	69	0	0	0	47	19	2%
Saratoga Lake	0	69	19	138	158	16	7	0	3	1	7	14	67	229	6%
Seventh Lake	0	0	0	4	16	0	1	4	27	0	0	0	11	8	2%
Stillwater Reservoir	0	2	0	0	26	0	1	0	7	0	0	0	4	2	0.3%
Tupper Lake	1	0	1	0	71	3	0	4	2	0	0	0	12	4	0.4%
Upper St. Regis Lake	0	0	0	0	12	3	2	0	5	0	0	0	6	0	0%
White Lake	0	0	1	0	5	0	0	0	3	0	0	0	1	0	0%
totals	1	100	189	323	715	45	35	55	309	1	9	15	240	503	3%
organism presence as % of inspections	0%	1%	1%	2%	4%	0.3%	0.2%	0.3%	2%	0%	0.1%	0.1%	1%	3%	

The various types of watercraft transported organisms and AIS at differing rates. Non-motorized watercraft were less likely to transport anything (including grass, pine needles, and other organic material), and again were less likely to transport AIS than motorboats. While only 0.6% of canoe groups (canoes and kayaks frequently travel in groups) and 0.7% of kayak groups transported any organism, 7.4% of motorboats were found with some kind of foreign organic organism. Overall, stewards found materials on 9.4% of watercraft.

Lower Saranac Lake

Table 5- Organism transport rates and AIS spread prevention steps taken by each type of watercraft.

Type of Watercraft	# boat groups transporting any organism	% of 1590 boat groups transporting any organism	Total # groups inspected	% of groups transporting any organism	% of groups taking AIS spread prevention steps
Barge- construction	3	0.2%	21	0.0%	48%
Canoe	102	6.4%	1316	0.6%	50%
Dock	6	0.4%	28	0.0%	18%
Kayak	119	7.5%	1631	0.7%	53%
Motorboat	1248	78.5%	12702	7.4%	65%
Personal Watercraft	95	6.0%	964	0.6%	59%
Rowboat	7	0.4%	70	0.0%	46%
Sailboat	9	0.6%	104	0.1%	61%
Stand-up paddleboard	1	0.1%	64	0.0%	31%
grand total of boat groups transporting any organism	1590		16900	9.4%	64%

This pattern is repeated in the analysis of the transport of AIS on the various types of watercraft. 0% of canoes, 0.1% of kayaks, 3% of personal watercraft and 4% of motorboats were confirmed to be transporting visible AIS (curly leaf pondweed, Eurasian watermilfoil, variable-leaf milfoil, spiny waterflea, water chestnut, or zebra mussels). Thus, we found that motorboats are 40 times more likely to transport AIS than are kayaks. An implication of this finding is that greater priority and time for inspections should be allocated to motorized watercraft in time or space-constrained conditions at boat launches.

Table 6- AIS transport rates by type of watercraft.

Watercraft type	CLP	EWM	VLM	SWF	WC	ZM	Total # groups w/ AIS	Total # groups inspected	% of groups transporting AIS
Barge- construction			2				2	21	10%
Canoe							0	1316	0%
Dock							0	28	0%
Kayak		1	1				2	1631	0.1%
Motorboat	90	304	65	1	9	15	484	12702	4%
Personal Watercraft	9	18	3				30	964	3%
Rowboat		1					1	70	1%
Sailboat	1						1	104	1%
Stand-up paddleboard							0	64	0%
Grand Total	100	324	71	1	9	15	520	16900	3%

Overall, 64% of visitors reported taking some measure to prevent the spread of AIS prior to arriving at the boat launch. In order to be tallied as taking a spread prevention measure, the visitor would have to know that the measure they adopted was intended to prevent the spread of AIS. In other words, washing one's boat for

cosmetic reasons will also prevent the spread of AIS, but for the purposes of this study, would not count as a *consciously adopted spread prevention measure*. 48% of groups surveyed washed their watercraft, followed by 28% who inspected their watercraft for AIS. Other AIS spread prevention measures were less commonly reported. It is important to note that the "yes" percentages varied widely across the twenty-one sites. Visitors at Forked Lake and Stillwater Reservoir were much less likely to have adopted an AIS spread prevention measure (31%, 39%) than visitors at Chateaugay Lake (86%) or Osgood Pond (91%).

Table 7- AIS spread prevention information, 2013. Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	# groups taking AIS spread prevention measures										# groups
Waterbody	yes	yes %	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Chateaugay Lake	1152	86%	1126	423	14	0	6	0	53	12	1341
Cranberry Lake	998	77%	462	449	309	5	58	0	205	15	1290
Eighth Lake	25	58%	20	9	1	0	0	0	3	0	43
Forked Lake	41	31%	5	27	1	0	1	0	13	4	133
Fourth Lake	934	63%	387	621	98	2	26	2	129	39	1484
Hoel/Little Clear/Floodwood Ponds	45	50%	14	34	0	0	0	0	9	4	90
Lake Flower	223	72%	152	181	9	1	4	1	7	2	308
Lake Placid	1001	68%	458	789	45	0	8	1	62	89	1468
Limekiln Lake	35	49%	11	27	2	0	0	0	4	2	72
Long Lake	864	47%	193	639	101	0	15	1	143	31	1829
Meacham Lake	89	70%	39	73	13	1	3	0	23	1	127
Osgood Pond	181	91%	99	140	3	1	0	0	24	1	200
Rainbow Lake	203	77%	100	151	11	1	2	1	46	3	264
Raquette Lake	654	63%	238	450	76	0	8	2	98	29	1041
Saratoga Lake	2103	58%	376	1490	202	0	77	2	161	67	3606
Seventh Lake	227	55%	92	147	9	0	5	1	32	10	411
Stillwater Reservoir	312	39%	200	239	37	4	0	2	33	1	790
Tupper Lake	675	71%	291	450	45	1	14	1	95	16	954
Upper St. Regis Lake	464	79%	249	376	27	0	7	1	48	21	586
White Lake	142	59%	70	89	17	0	14	0	51	5	241
totals	**10368**		**4582**	**6804**	**1020**	**16**	**248**	**15**	**1239**	**352**	**16278**
% of groups taking measures	64%		28%	42%	6%	0%	2%	0%	8%	2%	100%

Previously Visited Waterways

The stewards stationed at each of the 22 lakes covered by the program asked each of the 16,900 groups the last waterbody their boat had been in during the previous two week period. The list of previously visited waterways varied greatly from lake to lake; details of each lake's responses can be found in each lake's tables in the appendix.

When combined, the list of most common visits for all groups in the program is fairly stable over the past three years. Once again, in 2013 the top two responses were the same lake they were visiting that day (39% of visitor responses), or “none” (36%). This implies that 75% of visitors to the 22 lakes in the WSP network did not present a high level of risk of transporting new AIS to individual waterways because either their boat had been out of water for at least two weeks (drying the watercraft) or they had simply taken out from a lake only to launch again in that same lake at a later point in time.

After these top two responses, visitors cited a total of 366 different waterbodies as previously visited, which is down significantly from 2012, when 525 different waterbodies were reported by visitors. There is considerable stability in the top five lakes on the list, somewhat less stability in the next five, then greater movement further down the list when the three different years are compared. It should be noted that the most frequently cited previous destination, the Saranac Lake Chain of Lakes, represented only 1.8% of responses, meaning that lakes with single visits from the list of 366 previously visited waterbodies each represented only 0.01% of responses.

The variation in the list is more significant than the percentage of visits coming from any one waterbody. The implication is that lakes in the Adirondack region are facing AIS spread pressure from a highly diverse array of inputs (spread vectors), meaning that the region needs to develop effective capacity for interception and decontamination as boats arrive to the region, and cannot depend on stewardship, inspection or decontamination at all of the previously visited waterbodies, because there are so many of them, from so many different regions of the continent.

White Pine Camp on Osgood Pond

Table 8-50 most-visited waterways in previous two-week period, all WSP lakes, 2013.

Previously Visited Waterway	total visits 2013	% of total visits	2013 rank	2012 rank	2011 rank
Same-lake previous visit	6545	39%	1	2	1
None	5346	32%	2	1	2
Rental	322	2%	3	3	4
Saranac Lake Chain	312	2%	4	4	3
Fulton Chain of Lakes	261	2%	5	5	5
Lake Champlain	176	1%	6	6	8
Hudson River	152	1%	7	8	10
Raquette Lake	122	1%	8	9	15
Lake George	118	1%	9	12	9
St. Lawrence River	105	1%	10	11	13
Sacandaga Lake	104	1%	11	35	49
Lake Ontario	95	1%	12	14	11
Oneida Lake	91	1%	13	13	24
Mohawk River	87	1%	14	18	14
Long Lake	85	1%	15	17	20
Tupper Lake	80	0.5%	16	15	11
Mirror Lake	64	0.4%	17	10	18
Schroon Lake	63	0.4%	18	30	23
Lake Placid	58	0.3%	19	7	7
Buck Pond	56	0.3%	20	92	18
Delta Lake	55	0.3%	21	23	39
Great Sacandaga Lake	52	0.3%	22	22	16
Forked Lake	43	0.3%	23	44	86
Indian Lake	36	0.2%	24	28	52
Upper St. Regis Lake	35	0.2%	25	16	19
Big Moose Lake	34	0.2%	26	48	64
Chazy Lake	32	0.2%	27	58	76
Lake Kushaqua	32	0.2%	27	51	53
Raquette River	30	0.2%	29	26	25
Lake Bonaparte	29	0.2%	30	32	28
Chateaugay Lake	27	0.2%	31	35	27
Osgood Pond	26	0.2%	32	48	28
Blue Mountain Lake	25	0.2%	33	32	39
Black Lake	23	0.1%	34	35	45
Atlantic Ocean	22	0.1%	35	40	26
Cranberry Lake	22	0.1%	35	65	28
Black River	21	0.1%	37	29	71
Canandaigua Lake	21	0.1%	37	39	36
Stillwater Reservoir	21	0.1%	37	76	106
Rainbow Lake	20	0.1%	40	46	32
Skaneateles Lake	20	0.1%	40	46	51
Fish Creek Ponds	19	0.1%	42	40	21
Lake Eaton	19	0.1%	42	54	80
Saratoga Lake	19	0.1%	42	32	30
Lake Erie	18	0.1%	45	54	69
Little Clear Pond	18	0.1%	45	62	22
Cayuga Lake	17	0.1%	47	48	57
Lake Abanakee	17	0.1%	47	151	173
Limekiln Lake	17	0.1%	47	80	92
Oswegatchie River	16	0.1%	51	66	70
Rollins Pond	16	0.1%	51	58	37

Watershed Steward Network Analysis

We examined various dimensions of boat ramp activity and findings to better understand how the boat launches might function as a landscape-level system. By analyzing visitor responses to the question about where their boat has been last within the preceding two weeks, we were able to tally the number of confirmed outbound trips between lakes in the network of waterways with WSP stewards by considering the previous visit in reverse. For example, a visitor to Lake Placid states that their boat was last used in Saratoga Lake, which represents a confirmed *outbound* trip from Saratoga Lake to Lake Placid. By plotting the most frequently occurring two or three outbound trip connections within our steward network, we begin to understand the pattern of most-frequent interconnections among the lakes. Such information is helpful in determining, in concert with the NYSDEC and APIPP, the optimal placement of watershed stewards. When data from cooperating steward programs is considered in concert with WSP data, a model of regional boat launch visit interconnection with implications for AIS spread emerges (DeBolt, Holmlund, Johnstone, Rohne, & Smith, 2014).

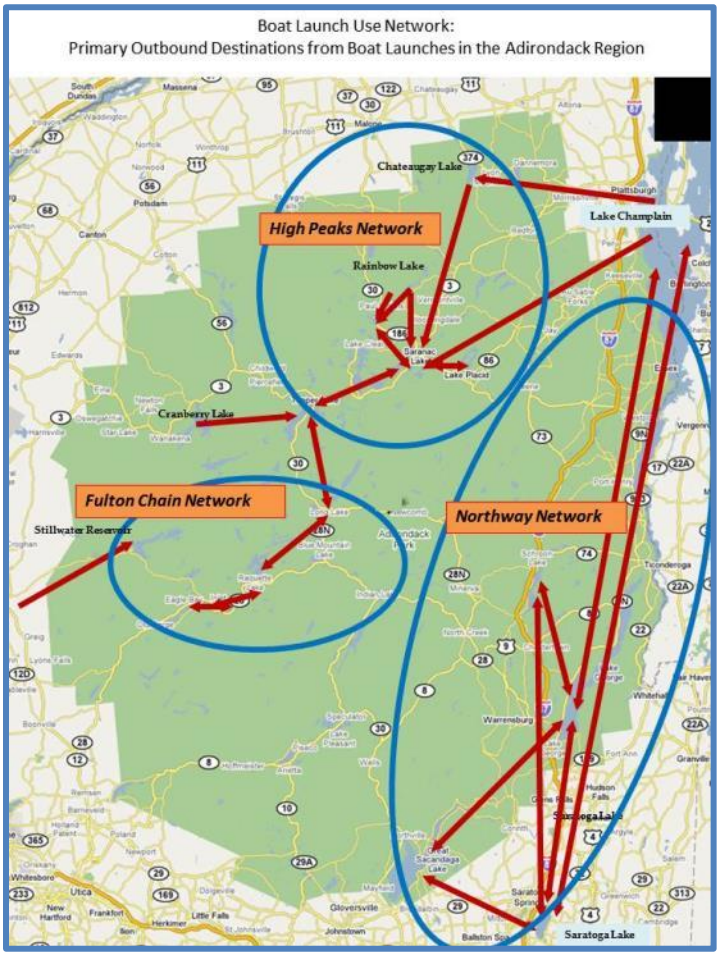


Figure 5- Theoretical outbound visit network, Paul Smith's College, Lake George Association, Schroon Lake Association, Lake Champlain Basin Program combined data, 2012.

Program managers and public resource managers need to make resource allocation decisions based on well-informed risk management for minimizing the spread of AIS. At the landscape level, resource managers cannot allocate limited resources according only to preference, assumption, or public wishes. Managers recognize that each boat ramp presents a unique combination of risk, visitor use patterns, and endemic ecology. Simultaneously, we must carefully analyze the interactions between the ecology and users of each of the region's waterways. We considered the combined

effect of the presence of AIS plants, AIS animals, comparative boat traffic, at-risk boat calculation, organism and AIS transport rates, and diversity of previously visited waterbodies. Each of these factors influences the risk of boats entering or exiting the waterbody to transport AIS. By assigning three risk categories based on relative impact of each criterion, we can begin to see patterns of colors indicating risk levels. Red and yellow represent high and moderate risk, respectively, while green indicates low comparative risk (not no-risk).

The pattern of colors allows us to shape the intervention at each boat ramp, and among all boat ramps. That is, if the dominant inbound pattern is from waterways with AIS which are not established in the receiving lake, the stewards prioritize the assessment of risk, inspection, and removal of organisms from boats attempting to launch into the waterway (Table 9, Column H). Conversely, if the dominant outbound pattern is from an infested lake to uninfested lakes, stewards need to prioritize inspection and removal of visible organisms on boats departing the waterway (Table 10, Column I). Ideally, since traffic levels are ordinarily not overwhelming at most of the boat ramps in the program, stewards can spend equal time carefully examining and cleaning boats both launching and retrieving. We will repeat this analysis with additional 2013 steward data from the Lake George Association, Schroon Lake Association and Lake Champlain Basin Program when it is available.

Recommendations and Anticipated Changes for 2014

The WSP enjoyed another productive and challenging summer season. We successfully introduced a digital tablet-based survey system which greatly limited human error and data processing time, freeing up stewards to do other projects of benefit to the watersheds. We learned that we need to purchase shock and water-resistant cases for the iPad Mini's, since even the careful stewards dropped their tablets on several occasions. Since the grant program from the LCBP was not in place for 2013, we did not have full steward coverage on Lake Flower or any on Second Pond, which enabled a summer's worth of AIS export from those two waterways, which are both infested with curly-leaf pondweed, Eurasian watermilfoil, and variable-leaf milfoil. Additionally, the dearth of data from both launches changed the steward network findings to some extent. We look forward to resuming full coverage at both launches in 2014 thanks to the LCBP and the Lower Saranac Lake Association.

Because we are anticipating a much larger program in 2014 due to successful grants funding stewards at Rainbow Lake, Lake Flower, Second Pond and Upper Saranac Lake, we will have more stewards to hire and manage. In addition, we have grant-funded resources to expand coverage in the upper Lake Ontario watershed at locations

which might include Lake Eaton and other state boat ramps in the Lake Lila and Little Tupper Lake units. For this reason, we are planning to allocate resources for increased administrative support and field supervision in the Inlet and Tupper Lake subregions.

Finally, we plan on designing and offering a floating classroom experience using our new 21' boat, the *Watershield*, based on the successful and long-running program offered by the Lake George Association on Lake George. We plan on developing a series of experiences that we can offer to students of all ages across our project area. This will hopefully be an engaging and positive way to raise awareness of aquatic ecology and stewardship issues. We recognize that our education and outreach efforts, while growing in sophistication (we have ran social media campaigns for the last two seasons), are not yet sufficiently effective. We have invested in a redesigned website and better periodic publications.

Steward Kim Hahn, her display table, and the WSP boat.

Concluding Comments

Aquatic invasive species continue to be an ecological, social and economic challenge for communities everywhere. Many of the people our stewards speak with at the boat ramps decry the perceived inconvenience and expense of steward programs in the face of what they consider the inevitable victory of AIS over native ecosystems. Some more imaginative or philosophical skeptics even question the hubris of having stewards defend "native" or "natural" ecosystems against the invaders. They ask, who are we to say what is "natural" and what is not? Some resource managers are among the skeptics who question the efficacy and rate of return of having boat launch stewards inspect and hand-remove fragments from boats when the transport rate of any organism on boats is below 10%, and below 4% for confirmed AIS. All this effort and expense for a 3% AIS interdiction rate? Aren't steward programs only delaying the inevitable? It is a challenge for our seasonal staff, along with our full-time professional staff, to counter such questions.

But counter them we must. We take solace in the reaction of the vast majority of visitors, who applaud the efforts of our staff to protect the beauty and integrity of beloved waterways which have been the setting for generations of treasured experiences. Our stewards hear story after story from visitors about unforgettable wildlife sightings, landing healthy cold-water fish, swimming and skiing in clean water, paddling through channels not choked with invasive weeds, and camping near the shore of unspoiled waters at sunset. These people see us as stewards, and come to see themselves as stewards, recognizing their own responsibility to take the simple steps we describe to protect a shared and highly valued place, not only for themselves, but for the non-human members of the ecological community. In the end, the success of programs like this depends entirely upon opening minds and hearts. The process of kindling an ecological conscience in each visitor will ultimately be recognized as anything but a gratuitous indulgence by soft-hearted eco-sentimentalists. As we witness the accelerating degradation and transformation of global environmental resources, it becomes clearer each day that an ecological conscience forms the foundation of a hard-headed survival strategy for each of us in the turbulent decades ahead. At their best, boat ramp steward programs form a crucial link between the visitor and the aquatic resource, enlarging the sense of community to include other visitors, resource managers, and the land we all cherish.

Table 9- Comprehensive AIS transport risk analysis: AIS presence, daily traffic, and risk factors. (See notes below.)

Watershed Steward Network[1]							
Lake	A. # AIS present (plants)	B. # AIS present (animals)	C. Average # of boats inspected per day[2]	D. % of Incoming Boats At-Risk of AIS transport (boat operators report a visit to another waterbody within the previous two weeks)	E. % of all boats encountered transporting any organism (launching plus retrieving)[3]	F. % of all boats encountered transporting AIS (launching plus retrieving)	G. Number of *different* previously-visited waterbodies reported by all boat operators over the summer. (higher values = greater degree of potential connectivity)
Chateaugay Lake	2	0	22	35%	19%	12.2%	36
Cranberry Lake	1	0	23	60%	10%	2.0%	76
Eighth Lake	0	0	5	56%	0%	0.0%	9
Forked Lake	0	0	18	69%	7%	1.5%	28
Fourth Lake	2	0	22	21%	8%	1.5%	91
Hoel, Little Clear, Floodwood Pond	0	0	10	67%	9%	0.0%	40
Lake Flower	3	0	22	37%	18%	5.2%	45
Lake Placid	1	0	21	37%	2%	0.2%	102
Long Lake	1	0	27	26%	10%	0.4%	141
Meacham Lake	1	0	7	25%	5%	0.0%	16
Osgood Pond	0	0	10	51%	4%	0.0%	49
Rainbow Lake	0	0	13	44%	8%	0.0%	38
Raquette Lake	1	0	14	24%	16%	1.8%	86
Saratoga Lake	3	1	42	20%	9%	6.1%	72
Seventh Lake	2	0	13	32%	13%	1.9%	45
Stillwater Reservoir	1	0	20	14%	5%	0.3%	36
Tupper Lake	1	0	19	19%	9%	0.4%	63
Upper St. Regis Lake	0	0	8	40%	4%	0.0%	72
White Lake	0	0	7	11%	5%	0.0%	19

Table 10- Comprehensive AIS transport risk analysis: Previous visits and outbound connections. (See notes below.)

Lake	H. Top 2 or 3 previously visited water bodies	I. Most frequently occuring outbound connections to lakes in WSP steward network[4] (lakes in WSP steward network that are next in the AIS spread vector chain. *Uninvaded lakes in italics*)
Chateaugay Lake	Lake Champlain, St. Lawrence River, Chazy Lake	Long Lake, Meacham Lake
Cranberry Lake	St. Lawrence River, Lake Ontario, Lake Bonaparte	Tupper Lake, Long Lake
Eighth Lake	Seventh Lake, Raquette Lake	Fourth Lake, Raquette Lake
Forked Lake	Rental, Raquette Lake	Long Lake, Raquette Lake
Fourth Lake	Delta Lake, Raquette Lake, Seventh Lake	Raquette Lake, Seventh Lake, Stillwater Reservoir
Hoel, Little Clear, Floodwood Pond	Fish Creek Ponds, Long Lake, Upper Saranac Lake	not enough outbound visits to lakes in WSP network
Lake Flower	Lake Placid, Saranac Lake Chain	Lake Placid
Lake Placid	Mirror Lake, Saranac Lake Chain, Lake Champlain	*Upper St. Regis Lake, Osgood Pond*
Long Lake	Raquette Lake, Tupper Lake, Forked Lake	Tupper Lake, Raquette Lake
Meacham Lake	Chateaugay Lake, St. Lawrence River, Lake Champlain	Chateaugay Lake, *Rainbow Lake*
Osgood Pond	Lake Placid, Upper St. Regis Lake, Lake Kushaqua	*Upper St. Regis Lake*
Rainbow Lake	Buck Pond, Lake Kushaqua, Lake Champlain	*Upper St. Regis Lake*, Tupper Lake, *Osgood Pond*
Raquette Lake	Fourth Lake, Long Lake, Seventh Lake	Long Lake, Fourth Lake, Seventh Lake
Saratoga Lake	Hudson River, Lake George, Sacandaga Lake	not enough outbound visits to lakes in WSP network
Seventh Lake	Fourth Lake, Raquette Lake, Sacandaga Lake	Fourth Lake, Raquette Lake
Stillwater Reservoir	Fourth, Lake Ontario, St. Lawrence River	not enough outbound visits to lakes in WSP network
Tupper Lake	Long Lake, Raquette River, Massawepie Lake	Long Lake, Cranberry Lake
Upper St. Regis Lake	Osgood Pond, Upper Saranac Lake, Lower Saranac Lake	Chateaugay Lake
White Lake	Otter Lake, Kayuta Lake, Mohawk River	not enough outbound visits to lakes in WSP network

Notes:

Explanation of the assignation of risk colors: The team assigned the three AIS spread risk colors (green = lowest risk; yellow = medium risk; red = high risk) according to defensible breaks in the data and collective judgment. A summary of the categorization rules follows. Column A: low = 0 AIS plants; medium = 1; high >1. B: low = 0 AIS animals; no medium-risk category; high > 0. C: low = 0-9 boats per day; medium = 10-20; high >20. D: low = 0-19% of boats at risk of AIS transport; medium = 20-49%; high >50%. E: low = 0-.9% organism transport rate; medium = 1-4%; high >9%. F: low = 0-1% AIS transport rate; medium = >1 – 4%; high > 4%. G: low = 0-39 previous waterbodies; medium = 40- 74; high >75. H: low = previous waterways that have no different AIS compared with destination lake; medium = previous waterways with 1 AIS different from destination lake; high = previous waterway with >1 different AIS compared with destination lake. I: low = outbound destination or origination lake has no AIS; medium = outbound destination with same AIS as origination lake; high = outbound destination has 1 or more AIS that destination lakes do not have.

1. The Watershed Steward network consists of the twenty-two waterways with stewards administered by Paul Smith's College. Note that steward presence at the launches varies from 7 days per week to a several days over the summer.

2. Unequal boat launch coverage was accounted for by dividing the total number of boats inspected by total days of service over the field season. Figures for lakes with multiple launches are combined and averaged using available data. These figures are based on 2013 steward coverage from Memorial Day to Labor Day. Not all sites had 7 day per week steward coverage. Steward coverage is limited to working hours (typically 8 hours per day), less breaks. Actual traffic is undoubtedly higher at each location for a 24 hour period.

3. The AIS transport rate is influenced by the combination of human factors (steward effort, ability, work pattern) and environmental factors (variation in annual density of vegetation growth, prevailing wind, water temperature, etc.).

4. Confirmed “outbound visits” take place when a boat is retrieved from one lake and launched in another, within a two-week period. “Confirmed” indicates that these visits are actual visits based on voluntary visitor statements about the last waterway they had visited prior to steward contact. E.g., if a visitor to Lake Placid states that they had visited Lake George last, this counts as a confirmed outbound visit from Lake George to Lake Placid.

Volunteer Steward training, Paradox Lake, New York.

Program Description

Kathleen Wiley, Assistant Director

Background

Paul Smith's College's Watershed Stewardship Program is the public education and AIS spread prevention element of PSC's Adirondack Watershed Institute. The AWI works to improve the quality of ecosystems through environmental research and management of AIS infestations across the Adirondack Park. The WSP mission involves providing on-site stewardship of terrestrial and aquatic natural resources, primarily through public education, field monitoring, and service work. The WSP works closely with state environmental agencies and local advocacy groups, such as lake property-owner associations and regional environmental organizations, to protect the integrity of native ecosystems from the negative effects of AIS. Since 2000, when the WSP began posting stewards at Upper St. Regis Lake and St. Regis Mountain, the program has gradually expanded through the central Adirondacks, building relationships with lake associations, state foresters, forest rangers, fisheries staff, and conservation police as the challenge of AIS becomes an ever greater priority among the science, property owner, and tourism communities of the region. The WSP worked at 22 lakes in 2013. Through a grant of continued Great Lakes Restoration Initiative funding designated by the U.S. Fish and Wildlife Service, the WSP at Paul Smith's College was able to provide a third year of stewardship in the west-central Adirondack region. The WSP provided part and full-time coverage at 17 public and private boat launches within the Black River, Oswegatchie River, and Raquette River watersheds.

Training

The stewards participated in a weeklong staff training program to familiarize them with inspection methods, data collection protocol, safety, AIS identification and ecology, AIS spread prevention steps, public education techniques, and the natural and cultural history of the Adirondack Park. Part of the week's training program was a two-day collaborative workshop for New York State and Vermont boat ramp steward programs. For the sixth year, the WSP hosted a regional steward training from the Lake

George Association, the Lake Champlain Basin Program, our own WSP stewards, and stewards sponsored by individual lake associations across New York. Participants traveled to Paul Smith's College's Joan Weill Student Center during the week prior to Memorial Day to experience this multiple-element training. Staffers from the APIPP, AWI, LCBP, Lake George Association (LGA), and WSP gave hands-on training sessions on AIS identification and ecology, public interaction and education skills, and data collection procedures. In addition, trainees benefited from presentations by the New York State Department of Environmental Conservation, Lake Champlain Sea Grant and the Adirondack Park Agency. This is the second year the female WSP stewards have participated in the Rape, Aggression, Defense training provided by the Paul Smith's Public Safety Department to prevent sexual harassment.

Statewide boat ramp steward training hosted by Paul Smith's College

Methods

For the fourteen weeks from May 25 to August 25, and then through September 2 as staff was available (Memorial Day weekend to Labor Day weekend), WSP stewards were stationed at 22 different lakes from 7:00AM to 4:00PM with one hour off for breaks and lunch. Some boat launches were covered seven days per week while others

were staffed part of the week. Boat ramps were selected based on funding sources and risk assessment in conjunction with NYSDEC, APIPP and AWI. Stewards were instructed to stand up, gather visible data on each visitor party, including group size, type of watercraft, time, etc., greet each group whether launching or retrieiving, offer a short educational message, share brochures and resources, and perform a careful boat inspection. Stewards shaped their approach according to the characteristics of the particular boat launch, their assessment of visitor background and receptivity, and environmental considerations. Steward coverage at individual boat launches depended upon funding and usage rates. Stewards were present seven days per week at Lake Placid, Long Lake, and Upper St. Regis Lake. Most sites had regular weekly coverage. At a few sites, such as Second Pond and Hollywood Hills, a steward was present only once for educational purposes.

Table 11: Boat Launch Coverage

Boat Launch	Coverage
*** Chateaugay Lake**	5 days/week (Wed. – Sun.)
*** Cranberry Lake**	Up to 7 days/week (depending on staff availability)
*** Eighth Lake State Campground**	Thursday
*** Forked Lake State Campground**	Friday/Saturday
*** Fourth Lake**	5 days/week (Wed. – Sun.)
Lake Flower	Sunday
Lake Placid	7 days/week
*** Limekiln Lake State Campground**	Thursday
*** Long Lake**	7 days/week
*** Meacham Lake**	Most weekends
Osgood Pond	July/August – weekends & ½ day Th & Fr as staff availability allowed
Rainbow Lake	weekends
*** Raquette Lake**	Village - 7 days/week, Burke's Marina - Friday
Saratoga Lake	7 days/week
*** Seventh Lake**	4 days/week (Th – Sun.)
*** Stillwater Reservoir**	4 days/week (Th-Su)
*** St. Regis Canoe Area (Hoel & Little Clear Ponds, Floodwood Road)**	Average 1 site/1 weekday/ week
*** Tupper Lake**	Up to 7 days/week (depending on staff availability)
Upper St. Regis Lake	7 days/week
*** White Lake**	Fri/Sat/Sun

* = Great Lakes Restoration Initiative (GLRI) funding

Watershed Steward resource display table.

Each steward set up a station depending on the site layout and amenities at each location that included an informational table, a chair, a sandwich board sign positioned to alert visitors to the steward's presence and protection from the elements and bugs. Each table included brochures, handouts, maps, plant samples, identification guides, and other resources to expand the boaters' knowledge of AIS. The stewards competed in a table display competition during mid-summer in which some stewards created posters and even painted rocks as paper weights for their tables. 2013 marked the first year of digital data entry on iPads instead of paper data sheets. The stewards wore a PSC cap, khaki button-up shirt displaying the WSP logo, and a WSP nametag. Depending on the weather they also wore a dark green sweatshirt with the WSP logo and "clean/drain/dry" message.

Rock painted by Watershed Steward Skyler Wysocki as part of the display table competition.

Stewards provided boaters and visitors with interpretive information concerning AIS and conducted a short survey. The survey questions included what body of water boaters had most recently visited in the past two weeks with their watercraft and what steps were taken to prevent the transport of AIS between waterbodies. Stewards collected observable data including group size, horsepower of outboard engines, state registration and if the outboard engine was a 4-stroke or direct injection 2-stroke. Boater responses were recorded on an iPad using proprietary survey software and uploaded wirelessly to a server, for weekly download and analysis by the program Director.

All stewards provided a courtesy inspection of boats entering and leaving through the boat launch. Stewards performed a visual inspection of propellers, outdrives, trailer bunks, axles, livewells, bilges, areas containing standing water, and any

other potential location of AIS. Stewards also asked visitors to lower their motors to a vertical position to drain out water and drain their bilges into a bucket provided by the steward. Stewards offered boaters informational literature on AIS and how to prevent them from infecting other waterways. Although the stewards performed inspections for visitors they also recommended that boaters take responsibility for washing and inspecting their boats.

Logistics

Weekly staff meetings held on Wednesday mornings at Paul Smith's College and Thursday mornings at the Raquette Lake Union Free School run by the assistant director gave the stewards a chance to share information with each other as well as their supervisor. Most stewards lived within driving distance of one of these locations, although a few stewards attended meetings every two to three weeks due to extreme distance or poor roads. The meetings also provided continued staff training and identification and collection of AIS found during the previous week. The stewards first attempted to identify the AIS samples they collected. Then the Assistant Director transported them to PSC for a second review by the Director and further identification from the scientific staff at the AWI if necessary. The Director also reviewed the data weekly for omissions, errors, or irregularities and followed up with the stewards for clarification.

Familiarization of the stewards to the boat launches they worked at occurred through a driving tour during training, often meeting lake association members; boat tours provided by lake association members; and boat tours using the WSP boat. The Assistant Director conducted unannounced site visits during the week to speak with each steward individually. A steward based in Raquette Lake and another in Saranac Lake functioned as weekend supervisors for their respective areas. Weekend supervisors conducted site visits to support and monitor each steward.

Special Projects

The stewards spent one day per week working on a special project other than AIS prevention at the boat launches. These projects served as another avenue to get out the WSP message, assist our coordinating organizations, and give the stewards an opportunity to spend a day away from the boat launches and gain some hands-on skills. Some of the projects incorporated the stewards' interests and what type of activity would benefit the region. Stewards monitored loons on Big Moose Lake, Nick's Lake, Upper St. Regis Lake and Spitfire Lake for the Biodiversity Research Institute. A steward worked with APIPP eradicating garlic mustard and surveying for pale swallowwort in the

southern portion of the Adirondack Park. The Regional Inlet Invasive Plant Program (RIIPP) enlisted Watershed Stewards to identify Japanese knotweed stands on private property for future pesticide application. Stewards were involved with purple loosestrife eradication, both through hand pulling and biocontrol by releasing insects. Stewards also worked with the WSP Science Director on laboratory experiments involving milfoil response to climate change as detailed elsewhere in this report.

A steward hiked up Bald Mt. weekly and St. Regis Mt. intermittently to interact with hikers on the summits of these small mountains. Stewards worked on the WSP social media project by posting to a blog, Facebook page, and Twitter feed. Three original newsletters were produced throughout the summer. Stewards attended and presented at area special events and lake association meetings. The WSP also outreached through educational programs at the Paul Smith's Visitor's Interpretive Center. A stewards assisted the New York State Forest Ranger at Stillwater Reservoir with trail maintenance, campsite stewardship, and patrols. A steward assisted the staff at Golden Beach Campground on Raquette Lake by removing variable leaf milfoil fragments from the beach and boat launch.

Observations about the field season

The 2013 season went smoothly as the WSP entered its third expanded season of GLRI funding. The Director focused on administration and managing boat inspection data and conducted few site visits. The Assistant Director directly supervised all the stewards, created the work schedules, ran both weekly staff meetings, and conducted most of the site visits. The Science Director supervised the stewards' scientific special projects.

Several stewards participated in the Annual Adirondack Intern Mixer that was held at the Adirondack Museum in Blue Mt. Lake in the summer of 2013. Other stewards gathered for a staff dinner in Saranac Lake once during the summer. It is important to schedule some social activities for the stewards to gather outside of work and especially attempt to reinforce teamwork because the stewards are spread out across such a large area.

It was the first season of attempting to identify all potential AIS. Digital data entry in the field, management of the data base, and identification of all potential AIS will become more streamlined in the second season of implementation. June 2013 was a very wet month, which tested the stewards. The WSP purchased each steward a green hoodie sweatshirt displaying the WSP logo, which were used extensively over the

summer. It was again determined that access to a personal vehicle is necessary for the individual steward's job performance and also so as not to burden the team.

Other activities

The Director presented at the New York State Federation of Lake Associations, Inc. 30th annual conference in Hamilton, NY on May 3, 2013. The Director trained the NYS DEC Region 5 campground staff with the APIPP and the LCBP on April 26. The Lake Moraine Association, near Hamilton, NY, requested a presentation on starting a steward program on October 17. The Director also attended regular meetings of APIPP, Adirondack AIS Committee, and LCBP. He was also co-authoring writing a white paper, *Recommendations on the Utility of Boat Inspection and Decontamination as Components of an Integrated Aquatic Invasive Species Prevention Strategy in the Adirondack Region,* during 2013 to deliver to the NYS DEC and other audiences.

The Assistant Director presented 2013 data from the Long and Raquette Lake Launches to the Long Lake Town Board on February 27, 2013. A poster was presented at the New England Association of Environmental Biologists Conference in Lake Placid in March, 2013. The Assistant Director also presented a poster at the Adirondack Research Consortium's Annual Conference in Lake Placid in May. The Assistant Director and one steward attended the Adirondack Day in the New York State Legislative Office Building in Albany on April 29. The Assistant Director served on a Boat Launch Steward Panel at the 2013 Cornell Cooperative Extension Agriculture & Food Systems In-Service November 20-21, 2013.

A WSP staff person attended the SUNY ESF Career Fair on February 27, 2013. The WSP also participates in the biannual career fairs at Paul Smith's College and works with many colleges to advertise the Watershed Steward job announcement. The WSP hosted two Volunteer Lake Steward Trainings over the summer for the Paradox Lake Association and at the Adirondack Museum in Blue Mt. Lake. The WSP participated in NYS's Invasive Species Awareness Week in July, which is coordinated by the APIPP in this region. A steward attended the Japanese Knotweed Summit hosted by APIPP on August 5, 2013.

Recommendations

The WSP covered a large territory across the Adirondack Park, which presented a supervisory challenge. Adding an additional supervisory position in the west-central Adirondacks would provide the opportunity for additional site visits and that position could run the weekly staff meeting in Raquette Lake. More supervision in the Cranberry, Tupper, and Long Lake area could also be beneficial.

Conclusion

Overall the WSP completed another successful season. The quality of the stewards is the backbone of the program. The stewards need to be extremely outgoing and friendly towards the public, mature enough to handle low supervision, and creative enough to avoid boredom with the position. The WSP continues to be involved in outreach beyond boat launch inspections to present the message to all boaters.

Acknowledgements

We would like to acknowledge the funding support of the United States Fish and Wildlife Service, the Great Lakes Restoration Initiative, the Lake Champlain Basin Program, the Nature Conservancy, the St. Regis Foundation, the Saratoga Lake Improvement District, the Rainbow Lake Association, the Adirondack White Lake Association and The Shores Association, and the Lake Placid Shore Owners' Association. In addition to financial support, the invaluable enthusiasm and contributions of people at each of the previously mentioned agencies and associations has injected creativity, enthusiasm and vision into what we do. The Fulton Chain of Lake Association, Chateaugay Lakes Association, Cranberry Lake Association, Sixth and Seventh Lakes Improvement Association, Raquette Lake Preservation Society, Long Lake Association, Hollywood Hills Association, Big Moose Lake Association, Limekiln Lake Association, and the Twitchell Lake Fish and Game Club all assisted the WSP throughout the summer. Town Supervisors John Frey, Inlet, and Clark Seaman, Long Lake, are supportive of AIS prevention. We gratefully rely on the collaboration of Anne Weld, Mark Wilson, Pat Willis, Jim Hauber, Bob Hall, Pat Deyle, Ken Hawks, Bill Landmesser, Danielle Mazuy, Courtney Wellar, Lou Burke, Mike Burke, Jim Dillon, Alan McCauley, Bud Thompson, Barbara Taylor, Jackie Mallory, Allen Splete, Phyllis Thompson, Caitlin Stewart, Mitch Lee, Gary Lee, Amy Sauer, Nina Schoch, Brendan Quirion, Doug Johnson, Steve Guglielmi, Nick McKay, Kris Alberga, Joe LaPierre, Jim Waters, Jason Scott, Gary Miller, Luke Evans, and our close working group of Hilary Smith, Meghan Johnstone, Emily Debolt, Kristen Rohne, and Meg Modley.

Overview of Steward Locations

Overview Map

Key:
Blue Markers – Great Lakes Restoration Initiative (GLRI) funded
Red Markers- Various sources of funding

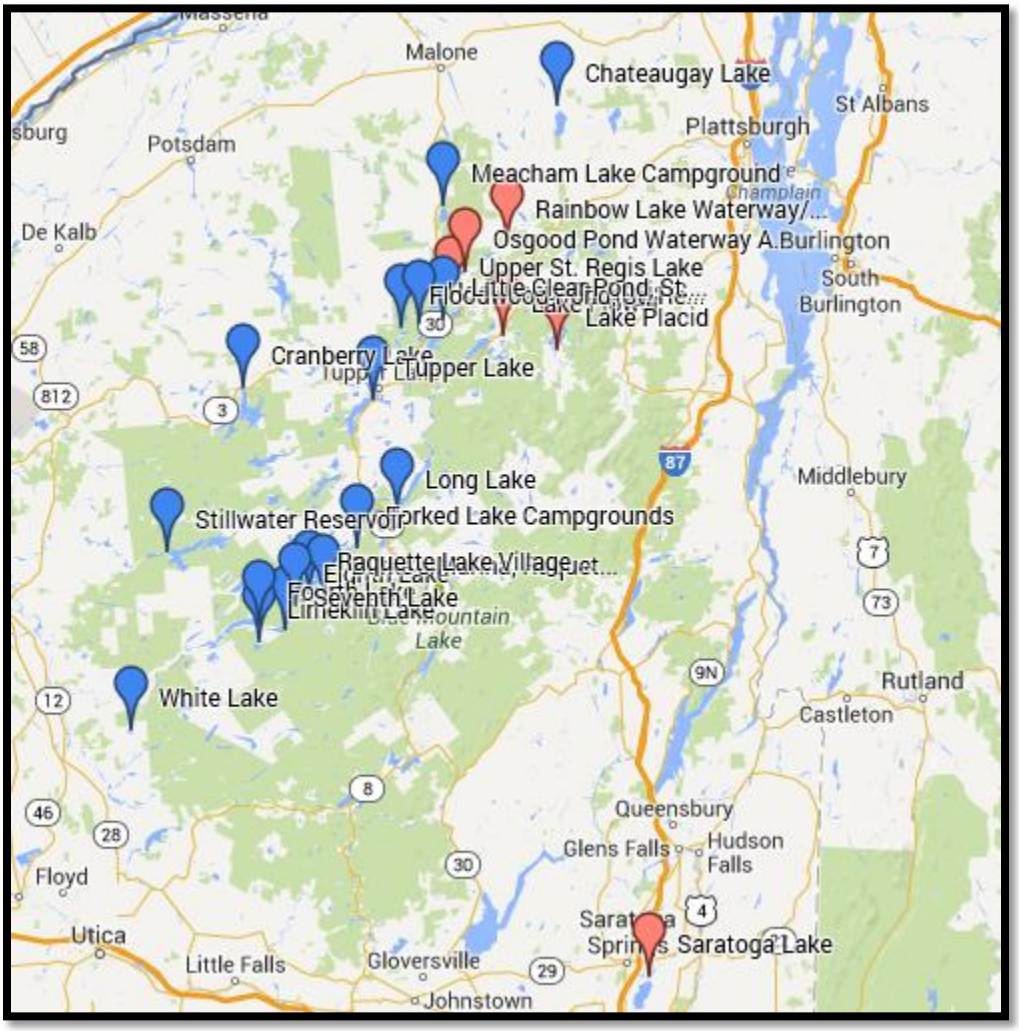


Figure 6: Overview Map of WSP steward locations

Watershed Steward Locations, detailed view

Key:

Red Markers –Funded by lake associations and private foundations

Blue Markers – GLRI funded

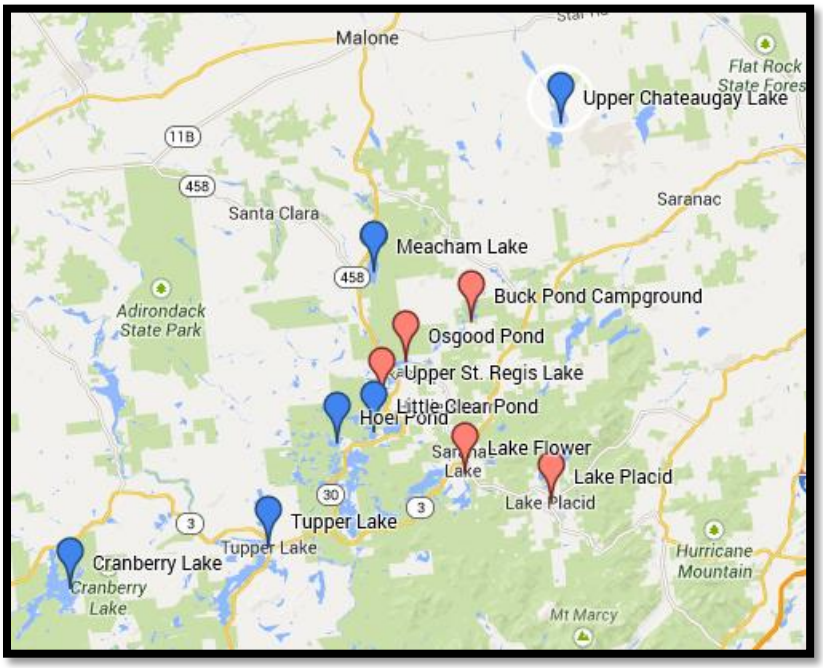


Figure 7: Saranac Lake Region Overview Map

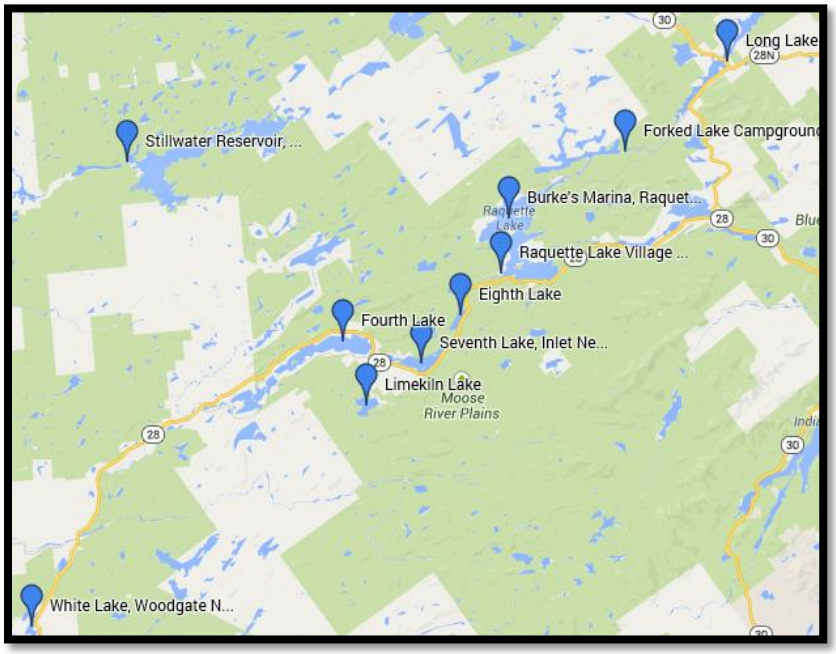


Figure 8: West-Central Region Overview Map

***Note: For fully detailed results from each waterway, below please view the Boat Launch Use Data Summaries located in the Appendix.**

Chateaugay Lake – 2013 marked the second year that the program stationed a Watershed Steward at the NYS boat launch at Chateaugay Lake, located in the northeastern coverage area of the WSP. The steward stationed at Chateaugay Lake usually worked Wednesday through Sunday in 2013. The boat launch is located on Route 374 in between the Upper and Lower Lakes. The Chateaugay Lakes Association is extremely supportive of the WSP's efforts. It should be noted that a steward may have difficulty finding local housing if they do not have a personal resource in the area. Chateaugay Lake stewards educated 3,423 total visitors, inspected 1,365 boats, and found that 86% of visitors had taken prevention steps for AIS. Stewards removed 104 AIS and found that 19% of the inspected boats had some organism on them. Boat owners reported visiting 36 different waterways within the previous 2 weeks.

Cranberry Lake – Stewards were only present on weekends until the first week of July when one additional steward was hired. The additional steward allowed for seven day per week coverage until late August when shifts were reverted back to Thursday through Monday coverage as in previous years. Overall, 2013 was similar to the previous two seasons though with a slightly lower number of boaters. This is likely due to the poor weather conditions that plagued the early part of the season.

The steward on duty also manned the unofficial boat launch located in Wanakena on two separate occasions. This boat launch poses a greater risk to the lake as it is upstream from the lake rather than downstream where the NYS boat launch is located. While this launch does receive a fair amount of traffic on weekends and holidays, the numbers are insignificant when compared to the NYS boat launch. The steward then must weigh the option of monitoring the much higher volume launch as opposed to the lower volume, but potentially higher risk launch site.

While the majority of boaters who visit Cranberry Lake take some precaution against transporting AIS in some form or another, there are still a relatively large percentage of boaters which take no precautionary steps at all. However, it must be noted that of this percentage of boaters which take no precautionary steps, a

large portion only use their boat in one waterway which negates the possibility of transporting AIS from a foreign water body into Cranberry Lake.

A relatively large (30 boats) Fishing Derby was encountered in 2012, and 2013.

Cranberry Lake stewards educated 3,259 total visitors, inspected 1,423 boats, and found that 77% of visitors had taken prevention steps for AIS. Stewards removed 26 AIS and found that 10% of the inspected boats had some organism on them. Boat owners reported visiting 76 different waterways within the previous 2 weeks.

Eighth Lake – A part of the Fulton Chain of Lakes, Eighth Lake is located along New York State Route 28 between the Hamlet of Inlet and Raquette Lake. This was the third consecutive year of coverage for Eighth Lake with funding through GLRI with a U.S. Fish and Wildlife Service Grant. While visitation is light, Eighth Lake provides a tranquil setting for the steward to reach a different user group- primarily families and campers. Coverage by the WSP occurred on Thursdays. Eighth Lake stewards educated 109 total visitors and received 56 total boats in 43 groups. Stewards removed 0 AIS and found that 0% of the inspected boats had some organism on them.

Forked Lake Campground – Located in the Town of Long Lake, New York, Forked Lake was the site of the third consecutive season of boat ramp coverage. Funded through the GLRI, Forked Lake was covered by a WSP steward on Fridays and Saturdays. Forked Lake stewards educated 336 total visitors, tallied 193 total boats, in 135 groups. Stewards removed 2 AIS and found that 7% of the inspected boats had some organism on them.

Fourth Lake – The Fulton Chain of Lakes is located in the Central Adirondack Mountains of New York State. There are eight lakes starting at the dam in Old Forge extending through navigable waters into Fifth Lake and then by portage to the dam at Sixth Lake through Eighth Lake. The boat launch is located off NYS Route 28. Fourth Lake State Boat Launch has been one of the busiest lakes for the west-central Adirondack Region. It is the only public access point for motorboats to the lower lakes of the Fulton Chain. Fourth Lake stewards educated 3,815 total visitors, inspected 1,587 total boats in 1,504 groups. 120 boats were dirty and 8% of the inspected boats had some organism on them.

Lake Flower – A steward was present most Sundays throughout the summer. Being one of the primary launching points for both Lower and Middle Saranac Lakes, this boat launch offers access to the very popular Saranac Lake Islands Campground.

The Lake Flower Boat Launch is located within the Village of Saranac Lake on Route 86. This is the third summer that Lake Flower has had some steward coverage. In 1829 the Saranac River was dammed in order to create the lake. The Saranac Chain of Lakes is known to have Eurasian watermilfoil (*Myriophyllum spicatum*), variable-leaf milfoil (*Myriophyllum verticillatum*), and curly leaf pondweed (*Potamogeton crispus*). In 2013, Lake Flower stewards educated 711 total visitors, inspected 351 boats, and found that 72% of visitors had taken prevention steps for AIS. Stewards removed 16 AIS and found that 18% of the inspected boats had some organism on them. The steward was sponsored by Paul Smith's College Adirondack Watershed Institute.

Lake Placid – The Lake Placid Shore Owners' Association funded seven day per week coverage at the New York State Boat Launch. The boat launch is located off Mirror Lake Drive. The Association has sponsored stewards at Lake Placid each year since 2002. In 2013, Lake Placid stewards educated 3,593 total visitors, inspected 1,994 boats, and found that 68% of visitors had taken prevention steps for AIS. Stewards removed 3 AIS and found that 2% of the inspected boats had some organism on them. Boat owners reported visiting 101 different waterways within the previous 2 weeks.

Limekiln Lake Campground– Located just outside of the Hamlet of Inlet, New York, Limekiln Lake public boat launch lies within the Limekiln Lake Public Campground and Day Use Area. There are currently no AIS in Limekiln Lake which is why it is important to continue monitoring the area. Funding for coverage was provided through GLRI for the third consecutive year with a U.S. Fish and Wildlife Service Grant. Limekiln Lake was covered by the WSP on Thursdays. Limekiln Lake stewards educated 184 total visitors, and inspected 107 total boats. 3 boats were dirty and 4% of the inspected boats had some organism on them.

Long Lake –Watershed Stewards have been posted at Long Lake since in 2008, initially as a combined effort between the Town of Long Lake, the Long Lake Association (LLA), and a state grant designated by New York State Senator Betty Little. In 2009 and 2010 the steward position was funded solely through the LLA and the Town of Long Lake. In 2011 and 2012 a WSP steward was employed through a Great Lakes Restoration Initiative Grant awarded by the U.S. Fish and Wildlife Service (2011) and the U.S. Environmental Protection Agency (2012). In 2013, the steward position was again funded by USFWS/GLRI. In 2013, Long Lake stewards educated 4,282 total visitors, inspected 2,377 boats, and found that 47% of visitors had taken prevention steps for AIS. Stewards removed 7 AIS from

watercraft and found that 10% of the inspected boats had some organism on them. Boat owners reported visiting 141 different waterways within the previous 2 weeks.

Meacham Lake Campground – This was the third consecutive annual season of a steward presence inspecting watercraft at the Meacham Lake State Campground Boat Launch. The public boat launch at Meacham Lake State Campground is located approximately 10 miles north of Paul Smith's College on New York State Route 30. There was steward coverage on most weekends during the season at this site. The Meacham Lake State Campground steward was once again funded through the support of GLRI and the US Fish and Wildlife Service. Meacham Lake stewards educated 139 total visitors and inspected 145 total boats. 5% of the inspected boats had some organism on them.

Osgood Pond Waterway Access Site – 2013 marked the sixth consecutive annual season of steward presence inspecting watercraft at the public boat launch on Osgood Pond. The Osgood Pond Association funds the stationing of stewards on Osgood Pond on the weekends. Steward coverage was focused on July and August to maximize the coverage with the funds available. The boat launch is located on the White Pine Road. Osgood Pond stewards educated 439 total visitors and inspected 264 boats. 4% of the inspected boats had some organism on them.

Rainbow Lake Waterway/ Buck Pond Campground – There was steward coverage on weekends at this site. Stewardship is funded by the Rainbow Lake Association. The boat launch is located in the NYS campground off the Gabriels-Onchiota Road. Lake Kushaqua is home to an aquatic plant species called southern naiad (*Najas guadalupensis*). The exact reasons for this excessive growth is unknown; however rainfall patterns, lake water level, and changing weather conditions may have been contributing factors. Rainbow Lake stewards educated 633 total visitors, inspected 349 boats, and found that 77% of visitors had taken prevention steps for AIS. Stewards found that 8% of the inspected boats had some organism on them. Boat owners reported visiting 42 different waterways within the previous 2 weeks.

Raquette Lake Boat Launches – The Raquette Lake Village boat launch located in the Town of Long Lake has been covered by the boat launch stewards since 2008. Burke's Marina, also located in the Town of Long Lake, has been covered by the WSP for the last few seasons. This season's financial support was provided by GLRI through a U.S. Fish and Wildlife Grant which allowed for seven-day coverage at the village launch and Friday coverage at Burke's Marina. In addition

to the financial support, the Raquette Lake Preservation Foundation (RLPF) continued to provide mentoring and material support for the WSP. In 2011 the RLPF installed an I-LIDS device, which is a surveillance device used to record video of all boats entering and exiting the launch site. This has served as a great aid to the RLPF as well as the WSP in the effort to stop the spread of AIS, through discouraging potentially contaminated boats from entering the water when a WSP steward is not present. Raquette Lake stewards educated 2,565 total visitors, inspected 1,325 boats, and found that 63% of visitors had taken prevention steps for AIS. Stewards removed 19 AIS from watercraft and found that 16% of the inspected boats had some organism on them. Boat owners reported visiting 86 different waterways within the previous 2 weeks.

Saratoga Lake – Beginning in 2010, the Saratoga Lake Protection and Improvement District (SLPID) has sponsored boat launch stewards at the New York State boat launch on the north end of Saratoga Lake. The number of stewards dedicated to this site increased to three, from two in 2012. SLPID provides a volunteer liaison that provides weekly contact, support and mentorship for the stewards. Saratoga Lake is the only lake in the program that is not part of the Adirondack State Park. The boat launch is located on Fish Creek, just off of Route 9P. The boat launch on Saratoga Lake has the highest boat traffic of any of the lakes in the WSP. Saratoga Lake has four AIS including Eurasian watermilfoil, curly-leaf pondweed, water chestnut, and zebra mussels. Chemical herbicides are being used that specifically target curly-leaf pondweed and Eurasian watermilfoil. Two mechanical harvesters are also being used to control the general weed population around the lake. Saratoga Lake stewards educated 8,466 total visitors, inspected 3,779 boats, and found that 55% of visitors had taken prevention steps for AIS. Stewards removed 229 AIS from watercraft and found that 9% of the inspected boats had some organism on them. Boat owners reported visiting 73 different waterways within the previous 2 weeks.

Seventh Lake – Located on New York State Route 28 in Hamilton County three miles east of the Hamlet of Inlet, Seventh Lake has been continually covered by the WSP since 2011. This lake was covered 4 days a week, Thursday through Sunday through GLRI and a U.S. Fish and Wildlife Service Grant. Seventh Lake is a part of the Fulton Chain of Lakes and is has one of the shallowest launches in the area. Eurasian watermilfoil is the only AIS of concern in Seventh Lake and the WSP has worked to keep it from spreading, which complements the Sixth and Seventh Lakes Improvement Association's milfoil control efforts. Seventh Lake stewards

educated 998 total visitors and inspected 592 total boats. 13% of the inspected boats had some organism on them.

St. Regis Canoe Area: Hoel and Little Clear Ponds, Floodwood Pond – The St. Regis Canoe Area has had coverage by the WSP on Hoel and Little Clear Ponds since 2011 and Floodwood Pond since 2012. Little Clear Pond is located off of New York State Route 30 on the Fish Hatchery Road, which also gives one access to the NYS DEC Fish Hatchery site. Hoel Pond and Floodwood Pond are also located off of New York State Route 30 near the St. Regis Canoe Outfitters and the Saranac Inn's Golf Course on Floodwood Road. The St. Regis Canoe Area had coverage funded by GLRI through a U.S. Fish and Wildlife Service Grant, which allowed for coverage of 1 site per week for 1 day. It is important to continue coverage of the St. Regis Canoe Area since it is still free of any AIS. St. Regis Canoe Area stewards educated 324 total visitors and inspected 220 total boats. 9% of the inspected boats had some organism on them.

Stillwater Reservoir – Located 18 miles from Eagle Bay and 28 miles from Lowville, Stillwater Reservoir is a 6,700 acre reservoir surrounded by the Five Ponds Wilderness, Independence River Wild Forest, private lands and is adjacent to the Pepper Box Wilderness Area. There was steward coverage 4 days a week from Thursday through Sunday, which is an added day from last season's coverage. Funding was provided through a U.S. Fish and Wildlife Service Grant from GLRI. There are still no AIS in Stillwater Reservoir, however its close proximity and easy access to multiple AIS infested water bodies makes the reservoir an important place to continue monitoring. Stillwater Reservoir stewards educated 2,102 total visitors, inspected 1,028 boats, and found that 39% of visitors had taken prevention steps for AIS. Stewards removed 2 AIS from watercraft and found that 5% of the inspected boats had some organism on them. Boat owners reported visiting 37 different waterways within the previous 2 weeks.

Tupper Lake – Since 2008 Tupper Lake public boat launch has been continually covered each season by the WSP. This season's funding was provided by GLRI with the U.S. Fish and Wildlife Service Grant, which allowed a WSP steward to cover the launch site up to 7 days a week depending on staff availability. Tupper Lake is known to be the host of the AIS Variable Leaf milfoil (*Myriophyllum heterophyllum*), however the WSP has been able to keep other AIS out of the lake. Tupper Lake stewards educated 1,025 total visitors, inspected 1,045 boats, and found that 71% of visitors had taken prevention steps for AIS. Stewards removed 3 AIS from watercraft and found that 9% of the inspected boats had

some organism on them. Boat owners reported visiting 64 different waterways within the previous 2 weeks.

Upper St. Regis Lake– Since 2000, the St. Regis Foundation has sponsored full-time coverage at the boat launch into Upper St. Regis Lake. There is a boat wash station on the property, which the stewards ask all boaters to use on the way in and out. The boat launch is located off NYS Route 30. Upper St. Regis Lake stewards educated 1,239 total visitors, inspected 804 boats, and found that 79% of visitors had taken prevention steps for AIS. Stewards removed 0 AIS from watercraft and found that 4% of the inspected boats had some organism on them. Boat owners reported visiting 74 different waterways within the previous 2 weeks.

White Lake – This is the second year that White Lake has been covered by the WSP. The Adirondack White Lake Association and the GLRI/U.S. Fish and Wildlife Service Grant sponsored steward coverage on weekends (Friday – Sunday). White Lake is the first lake one encounters when entering the Adirondack Park from the west on New York State Route 28. There is no public access to this lake so it is appreciated that the Lake Associations make it possible for the WSP to steward on private property. White Lake stewards educated 574 total visitors and inspected 288 total boats. 5% of the inspected boats had some organism on them.

Special Projects

Education and Outreach

Stephanie Korzec, Jacqueline McCabe and Kimberly Hahn

NYS DEC Commissioner Joe Martens with Stewards Kimberly Hahn and Stephanie Korzec at the Adirondack Challenge

Introduction

In addition to the normal outreach to visitors at the boat launches, Watershed Stewardship Program staff members provided outreach at many events across the Tri-Lakes and Western-Central region. Many of them were meetings but they included social and community events as well. Since the Watershed Stewardship Program has been active in these regions for a few years now, more recreationists are aware of the presence and function of the stewards. However, attendance and participation in various events and meetings is still helping many new people to understand the program and AIS issues.

This season three stewards provided education and outreach for their region, which included Stephanie Korzec and Jacqueline McCabe from the Tri-Lakes region

(Saranac Lake, Tupper Lake and Lake Placid) and Kimberly Hahn from the Western-Central region (Fulton Chain of Lakes to Long Lake). In addition there were numerous other stewards that assisted at the various events as well as heading their own outreach efforts. Steward Kimberly Hahn was funded through the Great Lakes Restoration Initiative (GLRI).

Saranac Lake Region

Stewards Stephanie Korzec and Jacqueline McCabe on a Naturalist Walk at the VIC

Adirondack Stand-Up Paddle Board Fest

On June 22 and 23, Stephanie Korzec and Jackie McCabe attended the second annual stand-up paddle board fest in Saranac Lake NY, on Lake Colby. The event was hosted by Adirondack Lakes and Trails Outfitters, who asked the AWI- stewards be present to spread awarness on the growing problem of AIS in our area, and other waterbodies. Durring the time spent here, there were many paddlers and other venders who approached Stephanie and Jackie to ask many questions about AIS and the issues that lie in the waterbodies. Many people were interested in how this issue could effect their recreation and what they can do when transfering from one waterbody to the next with there SUP, kayak, or whatever they may be recreating with. Stephanie and Jackie

felt that they had a great impact there; working along side APIPP (Adirondack Park Invasive Plant Program) they educated and informed many people to potentially help prevent the further spread of AIS not only around the Adirondack Park, but possibly around the country.

Bioblitz

A Bioblitz is when leading taxonomists, scientists, teachers, students, and local enthusiasts alike come together to locate and identify as many species as possible in a 24-hour period. This year there was a Bioblitz event held at the Intervale Lowlands Farm in Lake Placid, New York on July 21, 2013, led by the property owners Dr. Larry and Nancy Master and Dr. Ezra Schwartzberg. This kind of surveying allows for the area to have a record of its ecological makeup to monitor for the years to follow. The Intervale Lowlands Farm is using this data to start a long-term climate change monitoring plan for the property, which is subject to a conservation land easement. Steward Jackie McCabe worked with Professor Craig Milewski from Paul Smith's College on his fish monitoring data collection. They collected approximately 15 minnow traps from 4 different sites on the property, and identified and measured each fish and recorded their species. They then did electrofishing and netting to collect and identify even more species. In total they found 13 different fish species and a tadpole, 10 of which were new to the property's existing database. Working at the Bioblitz was rewarding for Jackie, who got to meet lots of different naturalists from all over who were all just as excited as she was to be a part of the event. Participating in the Bioblitz was a great way for stewards to expand their knowledge base as well as spread the message about the AWI program. It is recommended that a steward should be sent to the event in upcoming years.

Cranberry Lake Biological Station

On June 26, Steward Samantha Durfey had the opportunity to present to the students at the Cranberry Lake Biological Station, a campus of SUNY Environmental Science and Forestry School. Students are required to attend a two-week summer field research session. Steward Durfey's presentation was in the form of a PowerPoint and lasted about 45 minutes. She covered the major aspects of the WSP, Cranberry Lake's data from last year, and some of the common AIS in New York State. It was optional for the students and about 25 people attended. The attendees included several professors, students, and the daughters of one of the professors. They were very inquisitive and asked many questions throughout the presentation. Steward Durfey thoroughly enjoyed the experience. In addition, Sam arrived early, so she was able to explore the campus and its trail system, as well as attend dinner with the students. They also provided her with boat transportation to and from the Biological Station. This is

another highly recommended outreach opportunity which shares the WSP mission and AIS issues to a group of environmental professionals in training.

VIC

The Visitor Interpretive Center run by Paul Smith's College in Paul Smiths New York is focused on educating the public about the Adirondack environment through its trails and educational programs. The VIC has a representation of all the ecosystems present in the Adirondack Park, minus a mountain summit which can be found just down the road atop St. Regis Mountain. This makes the VIC a perfect place to learn about the natural wonders of the Adirondack Park. The AWI's role in 2013 began with a dual table display with APIPP for Invasive Species Awareness Week. During the week's normal visiting hours there was a steward posted at the table to answer questions and spread awareness. With the general public entering the VIC with the expectation of learning, people were eager to approach the steward. Overall the stewards had an outreach to an estimated 100 interested visitors. Later on in the summer the stewards offered the VIC's daily Nature Walks. On July 28th, Stephanie Korezc and a VIC employee took two people on the nature walk, discussing water quality and AIS. The following Sunday, August 4th Jackie McCabe worked a table display from 10am until 5pm when the VIC closed, during which she led a walk with Brian McAllister for a group of 7 people. This talk was centered on the different bird, mushroom, and plant species with a portion about how the VIC has no AIS on its property. It is recommended that the WSP should continue performing outreach at the VIC and take part in the Nature Walks on weekends. Jackie and Stephanie found this to be very valuable to not only themselves but also to the visitors of the VIC and the AWI program.

West-Central Adirondack Region

Fulton Chain of Lakes Association Board of Directors Meeting - May 25

Cranberry Lake Volunteer Fire Department Showing Support for AIS Awareness Week

This is by far one of the largest lake associations in the area. The monthly meetings consisted of the board members and guests. The meetings helped the stewardship program and the lake association members to stay on the same page and updated with what was happening on the lakes and at the launches. Meetings like these were very informative. The status of milfoil in the lakes was a main topic at meetings.

Long Lake Fishing Derby - June 15

A steward was stationed at Long Lake beach early in the morning for a few hours talking to boaters and fishermen at the registration for the Long Lake Fishing Derby. Coverage hours at the launch were extended this day to accommodate the derby and heavy boat traffic. Many recreationists and fishermen in particular were reached out to.

Fulton Chain of Lakes Association Board of Directors Meeting - June 29

Limekiln Lake Association Meeting - July 6

Although Limekiln Lake has few coverage days by the program, this meeting was helpful in that it allowed the stewardship program to keep the property owners on this lake updated and to let them know we still had a presence. They appreciated our input and updates on how the program was running.

Long Lake Flotilla - July 12

Approximately three hours were spent on the Long Lake beach on the day of the Long Lake Flotilla, a part of the Adirondack Challenge Festival. About five to ten people were spoken with about AIS and the program.

Antique Boat Show - July 13

A steward attended the antique boat show in Old Forge. A table was set up alongside the Fulton Chain of Lakes Association display. This event was very busy with passers-through and it enabled the steward to speak with many people interested in the program, the lakes, and AIS. This lasted about four hours.

Old Forge Farmer's Market - July 19

A table was set up at the Old Forge farmers' market to display what the Watershed Stewardship Program is about. The steward interacted with about ten people.

Loon Census - July 20

A steward spent an hour on Long Lake participating in the Wildlife Conservation Society's Annual Loon Census. Long Lake was divided among several census-takers; everyone was asked to paddle from 8 to 9 A.M. The steward covered the South End up to Endion Point. One loon was seen and data was sent to the Society to help with their loon counting project.

ADK Challenge/Canoe Race - July 21

Two stewards attended this event. They spent some time at the canoe race talking to visitors about the program and AIS. Once the race had started, they spent time at the festival talking to many people.

Raquette Lake Bass Derby - July 27

The program conducted inspections and outreach at the Raquette Lake Village launch with extended hours on the bass derby day. This allowed for many fishermen to be reached.

Long Lake Farmer's Market - August 1

From 10 to 2, a steward manned a table at the market at Mount Sabattis. Several pamphlets were dispersed and had good conversations with about ten people, telling them about our program and especially how it pertains to Long Lake.

Steward Meg Smith at the Long Lake Farmer's Market

Fulton Chain of Lakes Association Annual Meeting - August 2

The annual meeting consisted of those on the board who are at all of the monthly meetings as well as the general body of members. Two stewards were in attendance for a couple of hours. This allowed for us to talk to many people who had

questions about how we were doing and the program itself. There were many people present who had not been to monthly meetings.

Sixth and Seventh Lake Association Picnic/Annual Meeting - August 3

A steward attended this annual meeting which was part of a larger picnic. Those in attendance included property owners and members of the Sixth and Seventh Lakes Association. The steward was able to get up and give a small talk about the program and how we are working with the association. Many of the members had questions about how the program is running and our success and presence at the Seventh Lake public boat launch.

Raquette Lake Boat Parade - August 3

Two stewards stood in as judges for the Raquette Lake Boat Parade. This allowed for them to talk with many people watching the parade about the Watershed Stewardship Program.

White Lake Association Sink-a-Boat Competition- August 3

In addition to normal inspections and outreach on this day, the steward at White Lake was able to reach out to people visiting the "Sink-a-Boat" competition where different fire companies try to sink each other's boats on the beach.

Loon Banding Night - August 5

Some stewards were able to assist and watch as loons were captured and banded at Sixth Lake in the evening. They were able to field questions about the program and discuss loon protection with those watching.

Raquette Lake Preservation Foundation (RLPF) Annual Meeting - August 9

The RLPF had its annual meeting on this Friday. Two stewards were in attendance and were able to talk in front of group about the program and its status in the Village of Raquette Lake. This meeting was a good way to keep in the know with what the Foundation is doing regarding AIS and to keep updated for both parties.

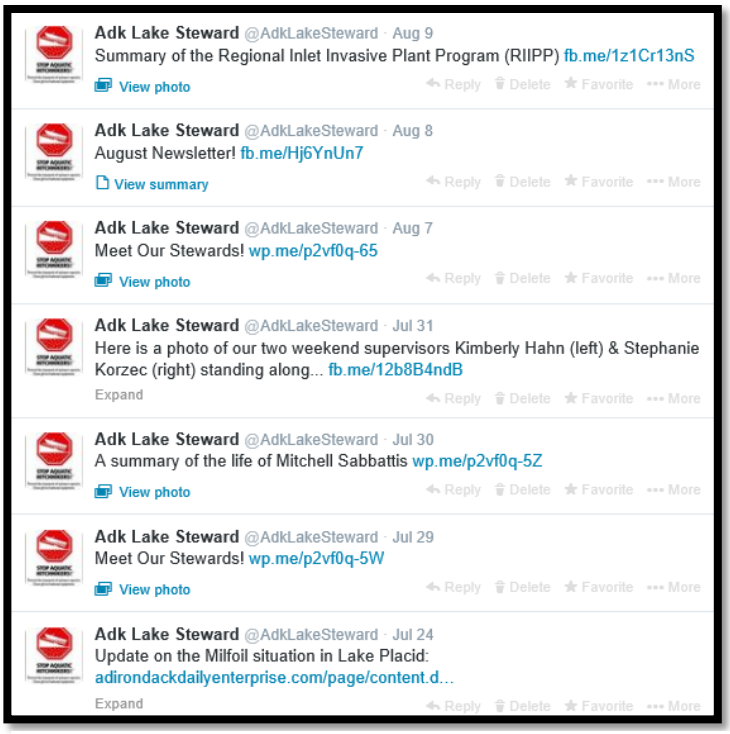
Long Lake Association Meeting - August 17

Two stewards attended this meeting and gave a formal presentation. There were about thirty people there. The stewards were able to field questions about the program and the progress over the summer.

Fulton Chain of Lakes Board of Directors Meeting - August 24

Twitchell Lake Fish & Game Meeting - August 31

The weekend supervisor attended this meeting and gave a presentation regarding the WSP and their progress this summer. The steward was able to answer many questions about it. Although there is not a steward attending to the Twitchell Lake launch, it was very beneficial to know what is going on with the Fish & Game club and to update them on what we were doing across the Adirondacks.

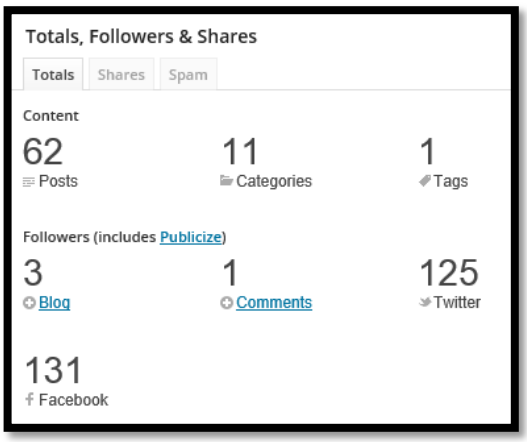


Tweets from @ADKStewards , 2013

Social Media

The WSP also used our monthly newsletters, Facebook, and blog, as well as word-of-mouth as outreach pathways. Print materials were used and articles were often written by the stewards which were put online and in "The Channel," the WSP's newsletter. Articles included information about the Asian Clam, Spiny Waterflea, European Frogbit, and the stewards' special projects. Steward Sam Durfey was in charge of putting together each month's newsletter "The Channel". She was able to change the format and add another month. In years past, there was a July and August newsletter, so this year Sam added a June newsletter. In addition to printing the newsletters for dissemination, director Dr. Eric Holmlund emailed a PDF version to his email list. The PDF version was also posted to the blog, Twitter, and Facebook. The newsletters were the same for both the Eastern and Western regions, except for July, which introduced the stewards. For the August newsletter, Sam reformatted the color version to make it more copier-friendly. Additionally, using line drawings for the invasive species photos helped with clarity for photocopying.

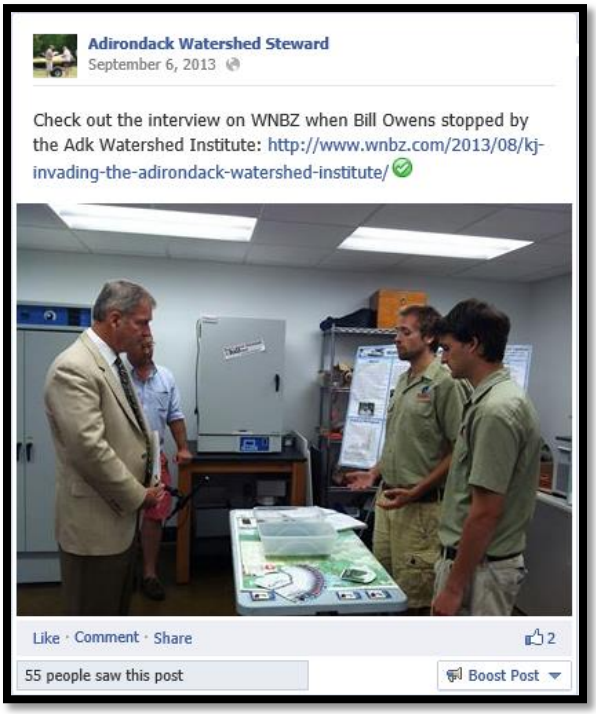
Steward Anthony Ventello was in charge of heading the social media aspect of the WSP this season. Anthony updated our Facebook page in addition to revamping our twitter feed and updating our Wordpress blog weekly. This year's success continued with our ability to post on Wordpress and have all the posts link to Twitter and Facebook automatically. Our Twitter feed gained popularity this season, increasing our followers from 49 last season to 137 this season and adding 55 new Tweets since last season. Facebook also sparked some interest with an increase from 86 page likes last season to 136 page likes this season. Facebook had many posts including the most recent post about Congressman Bill Owens's visit to the Paolozzi Research Center at Paul Smith's College and talk about the milfoil research being conducted for the AWI. In addition, our Wordpress Blog was increasingly successful with a total of 2,556 views since its launch in addition to 3 blog followers, 125 Twitter followers and 131 Facebook followers.



Wordpress Blog Statistics, 2013

Conclusion

Outreach was very successful in the summer of 2013. The WSP is attending more events and meetings thereby enhancing the programs ability to spread its message to greater numbers of people. Although outreach might have been more effective had the dates of events been known much earlier in the season, outreach was generally successful. The stewards received great feedback from both the public and the community as a whole.



Facebook Post by Adirondack Watershed Steward, 2013

Bald Mountain and St. Regis Mountain Stewardship

Christopher Broccoli and Jacqueline McCabe

Introduction

Bald Mountain is one of the most visited mountains in the Old Forge, NY area. It is located off route 28 just North of Old Forge. The hike, being less than a mile to the summit, makes it a local favorite and also a main tourist destination. From the summit, which sits overtop Third Lake, one gets a wonderful view of the Fulton Chain of Lakes. At the top of the 2,350 ft summit sits a fire tower that was active up until the early 1990's.

Bald Mtn. Summit View

This fire tower is only one of a comparatively few fire towers left standing in the Adirondacks which carries a lot of history with it. It was closed to the public from 1995 to 2005 because no one was taking care of it. However in 2005 the "Friends of Bald Mountain", a volunteer organization, rebuilt the tower and made it safe for the public. As it stands, the fire tower is a main historical and tourist attraction because of the history and ease of access.

St. Regis Mountain is one of the most visited mountains in the Santa Clara, NY area. It is located off of Keese Mills Road just west of Paul Smith's College. The hike up to the 2,874 foot summit is approximately 3 miles long with steep elevation grades during the latter part of the ascent. From the summit one gets a spectacular view of the Saranac Lake Chain and the St. Regis Canoe Area. There is also a fire tower atop the summit of St. Regis Mountain which is currently being considered for renovations.

Methods

For Bald Mountain the summit steward would hike up the mountain at 8 AM every Wednesday morning and stay at the top until around 3:30 and start the hike back

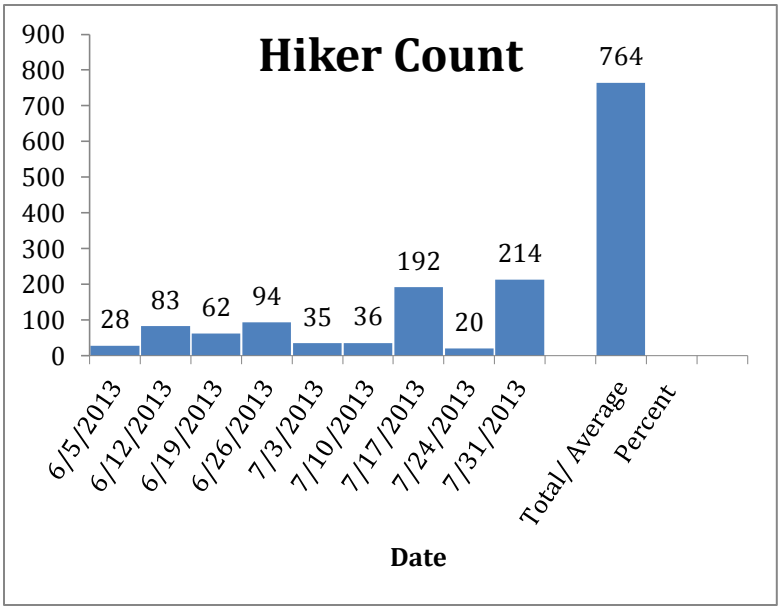


Figure 9: Hiker Count for Bald Mountain 2013 Season

down. At the top, they recorded data on every group that came up such as group size, gender, time stayed, equipment, behavior at the top, and pets. This same process was repeated with the St. Regis Mountain summit steward between the hours of 8am-5pm.

The steward would greet the hikers as they came up and answer any questions they had. The majority of questions involved what they were looking at and what elevation they were at. The steward also distributed handouts preaching leave no trace ethics. This is very important to Bald Mountain and St. Regis Mountain because of the vast amount of traffic on the mountains upon already heavily eroded summits.

Discussion

The amount of visitors to Bald Mountain increased as the summer went on due to better weather and more tourist travel. Weather was the main factor in amount of traffic. On the day of 7/10/13 severe thunderstorms moved in and resulted in only 2 groups all day. However on 7/17 and 7/31 the weather was warm and sunny all day which resulted in about 200 visitors on each day.

Due to the relatively short hike, most hikers were unprepared wearing cotton clothes and sneakers and also 40 percent not having backpacks. Also, a lot of people prefer sneakers because you have to climb up rock face for most of the hike. When the hikers got to the top, 60% climbed the fire tower while everyone else stayed on the rocks. Since there is a slim patch of grass at the top, less than 1% stayed on the grass.

For St. Regis Mountain the summit steward was only able to summit twice, mainly due to weather restrictions, but was still able to connect with over 80 hikers between the two days on the summit. Each day that the summit steward was able to hike, the weather was warm and dry with a slight breeze. On June 15thth, there were lots of large groups summiting that day, which allowed for great outreaching

opportunities. July 27th's groups were much smaller and they came up less frequently than the previous summiting experience. It was noted that many of the hikers were not prepared for a hike up a mountain like St. Regis; with hiking groups mainly wearing cotton clothing and not having a backpack within their group.

St. Regis Mtn. Summit View (J.McCabe)

Conclusion

Summit stewarding should be continued in the future since it is a different way for the program to reach out to the public and it was also very enjoyable alternative duty post for the summit stewards to do this type of outreach.

Loon Monitoring

Lead author, Timothy Grossman
Co-authors, Paul Garrison, Skyler Wysocki

Loon Feeding Chick (N. Schoch)

Introduction

The Biodiversity Research Institute (BRI) is a nonprofit organization that is based in Gorham, Maine. The institute's mission is to assess emerging threats to wildlife and ecosystems through collaborative research, and to use these findings to advance environmental awareness and inform decision makers. BRI has a center in the Adirondacks that monitors loons because of the impact human activity has on the species, the biggest being mercury poisoning. They are most susceptible to this because their diet consists of aquatic animals and fish, which are heavily influenced by air and water quality.

Methods

The BRI center and the Adirondacks for Loon Conservation have been getting help from the Adirondack Watershed Stewardship Program for the last few years. The watershed stewards responsible for loon monitoring were trained in loon behavior and tactics for observing loons and loon legs were observed. Each steward is responsible for monitoring each lake assigned for them at the beginning of the summer. Monitoring began on June 5th and ended August 21st, each site being visited once a week. Some

sites were visited on different days each week because of varying weather conditions.

Kayaks were used to navigate the lakes and observations began between 6:00 A.M. to 7:00 A.M. because of loons' activity levels at this time, and in order to take advantage of calm waters and low boat traffic. Observations on a lake varied from 5-6 hours depending on the lake size and weather. The loons were observed with 10 x 42 binoculars. Such a high powered binocular was used to observe the loons so they could be observed from a distance and be undisturbed, as getting too close to nests or chicks could become detrimental to loon activity. Data was recorded into a field notebook, including time of day, weather, Beaufort scale, water conditions, number of loons observed, territorial pairs, nesting pairs, nest location, nest type, number of eggs, and number of fledges. Adult loons were observed for bands on their legs that are specific to that bird only. The band identifies the bird and can tell information such as where this specific bird has travelled since its banding. The recorded information was entered into BRI data forms and given to a local BRI representative.

Results

Tri-Lakes Region

Figure 10: Tri-Lakes Region Loon Monitor Map

Upper Saint Regis and Spitfire Lake

Upper Saint Regis Lake is a 742 acre lake located next to Spitfire Lake, a 250 acre Lake. These lakes are located about 3 miles south from Paul Smith's College on NY 30 in the hamlet of Upper Saint Regis. The lakes are famous for the great camps located on the lakes from some of America's wealthiest historic figures. Upper Saint Regis consists of six loon territories, most of them being shared territories. The territories on Upper Saint Regis are Pearl Island, Birch Island, Middle, North Bay and Spring Bay. Spitfire Lake only has only one territory which is Paradox Bay. The lakes were observed from June 5th to August 21st and each site was visited every week.

Pearl Island

The Pearl Island territory has been home to two nesting loons for the last couple of seasons and in 2013 the territory was occupied by the same nesting pair. Despite being very close to the public and private boat launch this nesting pair was quite successful and had two fledglings. The location of their nest was elusive and was never found.

Birch Island

The Birch Island territory has also been a home to a pair of nesting loons for the last couple seasons, and was home to a nesting pair in 2013. Rather than their usual nesting spot, the nesting pair nested on a little island right next to Birch Island. The nest was located right across from the channel into Spitfire Lake, which is one of the most heavily trafficked areas on the lake. Despite having two eggs, no fledglings were observed, most likely due to a combination of the unusually high water levels and the heavy boat traffic. However, one loon had an orange and red band on the left leg.

Middle

The Middle territory is one of the commonly shared territories on the lake. Many loons used this territory as a common fishing ground, and towards the end of the season many loons would congregate here to fish together in large groups. Many legs were often observed in the Middle territory, and no bands were observed other than the orange/red band on the left leg of the reoccurring loon.

Paradox Bay

Paradox bay is located in the Southwest part of the lake and is a somewhat isolated area from the rest of the lake. A nest was discovered in the bay, but the number of eggs was never found because every time the nest was visited a loon was sitting on the nest, and the nest wasn't thoroughly investigated as it is better left undisturbed. The nesting pair of loons had been there every week throughout the season.

West-Central Adirondack Region

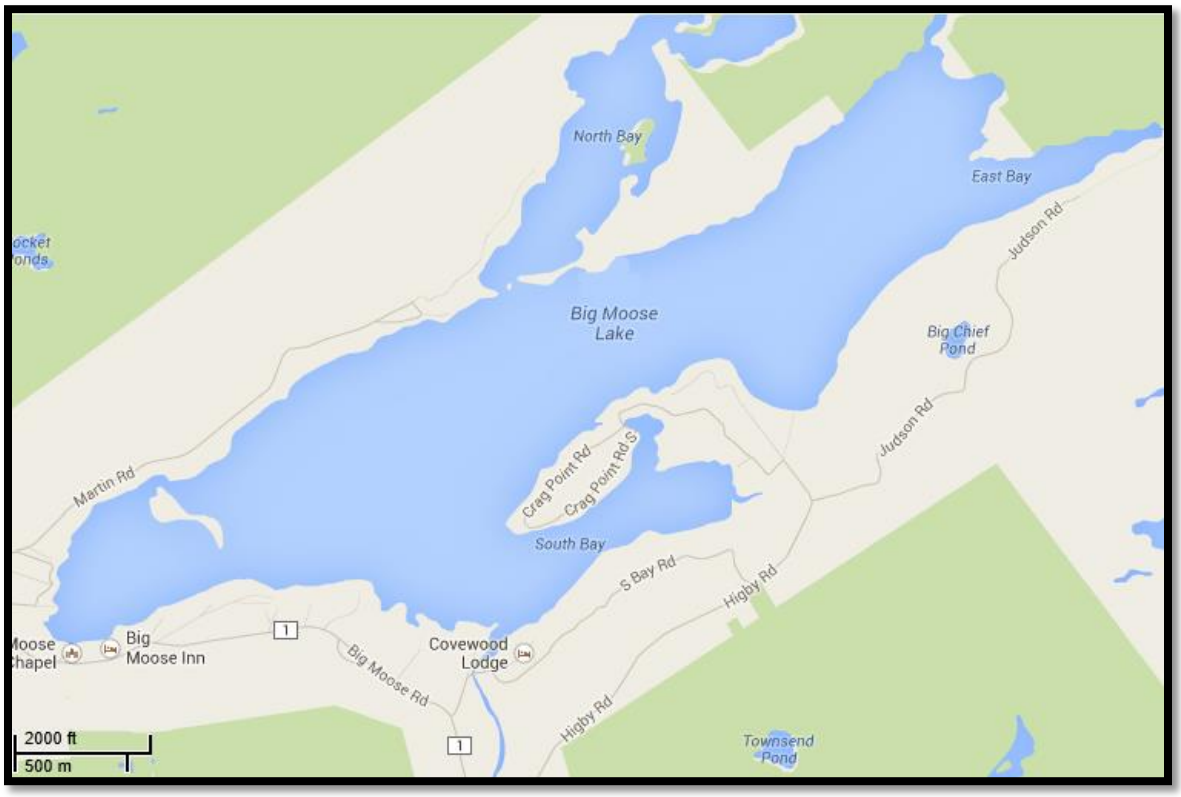


Figure 11: Big Moose Lake Loon Monitor Map

Big Moose Lake

Big Moose Lake is the headwater of the Moose River in the Southwestern Adirondacks. It is located in the town of Webb five miles North of Fourth Lake. The lake covers an area of 1,265 acres and has one island. The lake consists of five loon territories, and four of the five were observed once a week from June 5th through August 21st. The observed territories of the lake were North Bay, South Bay, West Bay, and the Inlet in the Eastern portion of the lake. Because of the size of the lake, only two territories were observed each week, and the observed territories were rotated every week, making each territory being observed every two weeks.

North Bay

North Bay, the largest bay on Big Moose Lake, provides the optimal habitat for a nesting pair of loons. With a large island and bogs located throughout the territory, a pair of loons was successfully able to nest and hatch a chick. Two possible nest locations were found on the island in the territory, but it is unknown which nest was used. The

chick was believed to have hatched around July 7th. The two adult loons were not able to be identified by the steward.

South Bay

During the summer a nesting pair of loons was observed throughout the summer. Located in South Bay was an artificial platform which has been used by nesting pairs in previous years. During observations, one of the loons was observed sitting on the artificial nest. This behavior indicates that there may have been an egg present on the nest. Later in the summer the steward checked the nest and saw no signs of an egg and no chick with the two adult loons. The failure of the nest is unknown.

West Bay

An island in West Bay has home to a nesting pair during the summer. The pair had a nest on the southern part of the island. The pair did have an egg on the nest, but the egg was later discovered to have holes in it which could have been caused by a predator. The two adult loons in this territory were identified as 0938-788-09 and 0938-788-10. The two loons identified were a returning pair according to the Biodiversity Research Institute.

Inlet

The Inlet territory located in the eastern part of Big Moose Lake was a prime location for a nesting pair of loons primarily because of the vast amount of bogs in this territory. Throughout the summer, a nesting pair was observed in the Inlet territory. One loon was identified as 669-205-03, which according to the Biodiversity Research Institute was a returning loon. The mate was unidentified. Their nest was located on one of the bogs and showed signs of added materials to keep the nest above the rising water level. During a visit to the Inlet territory, the Steward observed a loon sitting on the nest, indicating that there was an egg on the nest. Further visits to the nest showed no signs of the egg. The failure of the nest is unknown.

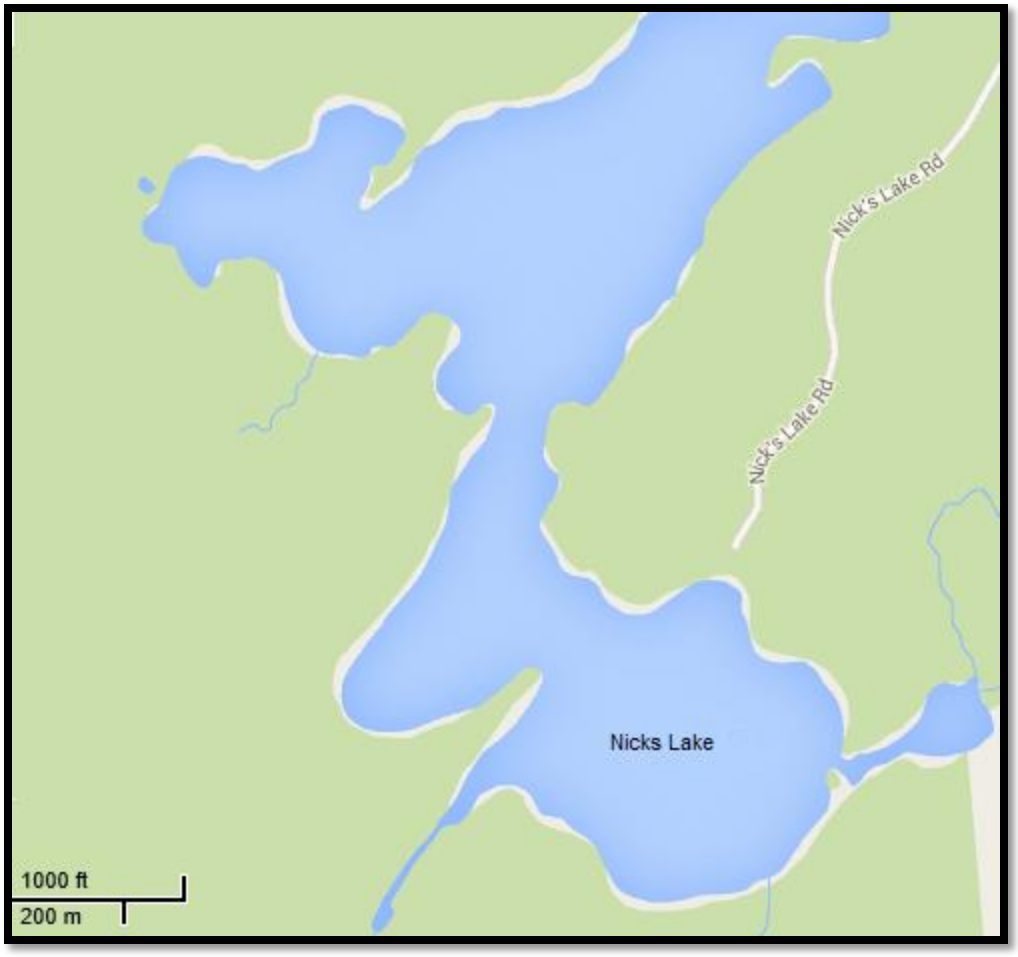


Figure 12: Nicks Lake Loon Monitor Map

Nicks Lake

Nicks Lake is a N.Y. state campground site located in Old Forge, near the Southwest part of the Adirondack Park, and is a very busy and well used tourist attraction. Nicks Lake borders forests and the campground is located in a wooded setting. Historically, there has not been a lot of loon activity on the lake, but is usually home to a territorial and nesting pair of loons.

Nicks Lake Territory

Nicks Lake consisted of one loon territory. There were two un-banded loons observed from the week of June 3rd to August 12th. They were found courting in a small cove on the east side of the lake. The next week they had built a bowl nest in the same area. Due to flooding the nest was lost in the week of June 24th. The loons then moved to the southwest end of the lake and built another bowl nest on a small island made from a rock and a fallen tree. An egg was on the nest the same week. The next week one loon was gone, and there was no sign of the egg/chick. The remaining single loon had been observed on the lake near the nest every week since.

Adult Common Loon – Big Moose Lake

Discussion

In total for the 2013 season, there were nine territorial pairs and two loner loons observed amongst the lakes of the two regions. From these nesting pairs there were three successful fledglings and six failed nests due to flooding, abandonment and predation. It is essential to stress the implications of human impacts on the Common Loons' population and habitat. Therefore it was also essential that each loon monitor observed the loons from a distance, so as to not disturb the loon's activities. Stewards who did not monitor loons were able to place fishing line recyclers at their boat launches for fishermen to place broken fishing line and lures in, rather than having the line becoming tangled on a loon's bill and making it unable to eat. These fishing line recyclers were provided by Dr. Nina Schoch, who works for the Adirondack Center for Loon Conservation and who also trained our loon monitors at the beginning of the season.

Conclusion

With so many people aware of the issues surrounding the Common Loon's survival, their future in the Adirondacks is looking brighter every year. The AWI's role in the monitoring of the Common Loon is vital to the success of the efforts to restore the loon's populations in the Adirondack Park. In addition, the stewards who monitor the loons are better able to survey the waters for AIS and any other potential threats. The loon monitors enjoyed their dual role in protecting the Adirondack lakes they care so much about and in the future this monitoring should continue to occur. If we stay diligent on protecting and monitoring the Common Loon we are taking the proper steps to ensure the call of the loon will be heard by generations to come on the lakes of the Adirondacks.

Investigating growth and growth form in invasive and native watermilfoil species across a range of water temperatures: Implications for aquatic plant communities under climate change scenarios

Celia Evans, Dan Kelting, Martin Serwatka, Derek Scott, Megan O'Reilly

Introduction

Invasive species often result in negative ecological, economic and human-health effects (Ruiz and Carlton, 2003). These effects include – but are not limited to – reducing native plant diversity, altering sediment and nutrient processing, disturbing natural wildlife habitat, interfering with recreational activities, and decreasing property values (Pimentel, Lach, Zuniga and Morrison, 2000). A rise in invasive species on a global level has been observed to be causing a decline and even extinction in many indigenous species populations (Lovell and Stone, 2005).

Concurrently, climate change threatens the planet's ecosystems in a dynamic way that is difficult to predict (Hellmann, Bryers, Bierwagen, and Dukes, 2008). In the Northeastern region of the United States, the temperature is expected to increase 2.5 to 4 degrees Fahrenheit in the winter season, and 1.5 to 3.5 degrees Fahrenheit in the summer. If this trend continues until the end of the century, Northeastern winters are expected to shorten by half, providing for a longer growing season and earlier first-leaf and first-bloom dates for terrestrial plants (Frumhoff, McCarthy, Melillo, Moser and Wuebbles, 2007). These changes in the length of the growing season will also be reflected in lakes with earlier ice out and warmer spring water temperatures along with higher summer peaks (Bornette and Puijalon, 2011). Additionally, these changes should lead to longer growing season for aquatic plants.

Very little existing published research examines the effect of temperature change on AIS growth, particularly invasive species, in the Northeastern United States. Some research has led to the hypothesis that an increase in temperature may be disadvantageous for native species that are adapted to historical conditions, and may give a competitive advantage to invasive species from warmer climates (Patrick et al 2012; Byers 2002; Dukes & Mooney 1999; Thuiller et al. 2007; Vilà et al. 2007). The details of community response will, however, depend on the capacity for

acclimatization, environmental tolerance and relative competitive ability of individual species that make up different macrophyte communities.

In the Adirondack Park of northern NY, the two most frequently occurring invasive aquatic macrophytes are Eurasian watermilfoil (*Myriophyllum spicatum*) and variable leaf milfoil (*Myriophyllum heterophyllum*). Eurasian watermilfoil (EWM), is among the most troublesome aquatic plants in North America. Variable-leaf milfoil (VLM) is considered invasive in the Adirondacks in northern New York, but is native to southwestern Quebec, North Dakota, New Mexico and Florida (Glomski and Netherland, 2008). Dense mats tend to reduce circulation in shallow waters, causing an increase in temperature (Argue et al. 2005). VLM has only been identified in 25 of more than 3,000 lakes in the Adirondack Park, and has only recently been labeled as invasive species to the Adirondacks. The date of origin of variable-leaf milfoil in the Adirondack Park is unknown; however, it was first listed as an invasive species by the Adirondack Park Invasive Plant Program (APIPP) in 2009. Over the past several years it has been identified in an increasing number of lakes and begun to grow aggressively in many of those (D. Kelting pers. comm.). A common native milfoil is northern watermilfoil (*Myriophyllum sibericum*). Northern watermilfoil (NWM) is a common member of littoral communities in the Adirondacks. When present in Adirondack lakes these three species may co-occur in littoral zone communities. Researchers have noted that while NWM & EWM prefer similar habitats, they rarely coexist (Aiken et al.1980; Smith and Barko, 1990).

This laboratory study was designed to study the physiological responses of fragments of these three species of milfoil over a range of water temperatures that reflect early through late season water temperatures, and still warmer temperatures that are predicted due to global change scenarios. These types of controlled laboratory studies are the first steps in developing hypotheses about competition outcomes that might alter community composition in a future of warming summer water temperatures. Additionally, if we determine that one invasive macrophyte benefits more than another from warmer water temperatures, we can focus our education outreach and management efforts appropriately.

Methods

Experimental Design

Six replicate water baths at each of the 5 target temperatures (14°C, 21°C, 24°C, 26°C, 31°C) were filled with tap water. Water baths were wrapped in a layer of plumbing insulation to help reduce heat transfer among water baths which were in

close contact. Aquarium heaters were used to maintain the appropriate temperature except for the 14° C temperature. Those six water baths were fitted with two coils of Nalgene tubing attached to the inside of each water bath through which water from a continuously circulating cooling unit, lowering the temperature to the set value.

Thirty fragments of each milfoil species were placed into individual glass containers with water collected from Lower St Regis Lake, and one container of each species was placed into each water bath. Fragments were each 8 to 10 cm long, had intact apical meristems, and were unbranched. Ideally, we chose fragments with no rootlet growth at the start of the experiment. However this was impossible with the NWM since they begin to develop roots early in summer. Therefore the number of initial rootlets was recorded.

For each experimental species there were six replicate fragments at each of five water temperatures. In each water bath a D.O. control containing lake water only was added in the second week of the experiment. Lake water was completely replaced in all experimental containers weekly and topped off every two days. Water baths were kept at a constant height using tap water. Fragments in higher temperature water baths were topped off more often. Temperature and D.O. were monitored and recorded each time water was added or changed (3 times per week). Grow lights set at 16 hours on and 8 hours off for 6 weeks of the experiment (Figure 13).

Figure 13: Images of experimental set up for 6 week milfoil temperature response experiment. Image taken in the first week so D.O. control jars are not yet present in each bin.

Data Collection

Initial data and dry mass estimates

We collected data on the fresh weight and length of all strands. Wet mass was obtained after individual fragments had been 'spun' dry and patted gently to remove the majority of external moisture. Initial dry biomass of each fragment was estimated by drying a set of 15 initial control fragments of each species and using the relationships between fresh weight and dry weight to estimate the initial dry weight of experimental fragments. For EWM, 92% of the variability in the dry mass could be predicted by the wet mass, however, in VLM and NWM only 72 and 40% of the variance in dry mass respectively could be predicted by wet mass (and no other models produced better results). Because of this discrepancy between species (due to fragment morphology differences), in this report we only report changes on a fresh weight basis so comparisons among species can be more equivalent.

Final data collection

After 6 weeks (on August 5th) we measured final wet biomass and length of fragments. We recorded the number of new lateral buds that had resulted in growth, and the total length of lateral bud related growth. Additionally we recorded the number of nodes with rootlet growth. Fragments were dried at 60° C for 7 days and dry weight was recorded. From these data we determined change in biomass overall, change in viable biomass, new biomass growth (total) and lateral versus apical growth in length and biomass, and number of nodes that produced rootlets across the range of temperature treatments for each species. In this report we will only report changes in viable biomass or 'green biomass' rather than including change in total biomass in which parts of fragments that are no longer viable and have died over the experiment are included.

Analyses

Here we report preliminary qualitative analyses based on summary statistics and visual patterns prior to developing more complex models to statistically analyze the outcomes of this experiment.

Results and Discussion

We were quite successful in keeping temperatures in replicate bins within a narrow range of temperatures and in the ranges intended for the experiment (Table 12). Dissolved oxygen values for each treatment were within the range dictated by water temperature (data not shown).

Table 12: Average (+ SD) of water temperature in individual containers within a treatment for each experimental species across the entire 6 week experimental period

Temp. treatment	EWM	NWM	VLM	Control
Highest	32.15 ± 0.86	32.48 ± 0.88	32.38 ± 0.79	32.25 ±0.79
High	28.44 ± 1.0	28.41 ± 1.03	28.44 ± 0.87	28.45 ± 0.92
Medium	25.11 ± 0.96	25.24 ± 0.72	25.14 ± 0.67	25.18 ± 0.73
Medium Low	20.05 ± 0.34	20.23 ± 0.26	20.13 ± 0.40	20.16 ± 0.38
Low	14.09 ± 0.46	13.78 ± 0.22	13.86 ± 0.42	13.89 ± 0.28

We found that fragments ultimately lose biomass when they are detached from their parent plant and free to float, regardless of species (Figure 14). Species specific differences shown here suggest that EWM and NWM lost fairly consistent amounts of biomass across all treatments while VLM showed the greatest loss of biomass in moderate temperatures, much more than the other species, but did not show an appreciable net change in biomass in the 14° C and 31° C temperature treatments. These differences are likely due to the way photosynthetic and respiration rates are influenced by temperature in each of the different species. Studies have shown that temperature optima for photosynthesis in aquatic plants tend to be high (from 20° to 35° C) (Santamaria and vanVierssen, 1997). For example, in some plants cold temperatures can reduce fluidity of membranes and thus slow membrane embedded systems such as the light reactions of photosynthesis. Plants may also use colder temperatures as cues for dormancy thus reducing respiration rates. Warmer temperatures, depending on physiological tolerance, will increase reaction rates which can include both the processes mentioned. Detailed mechanisms are, however outside the scope of this experiment.

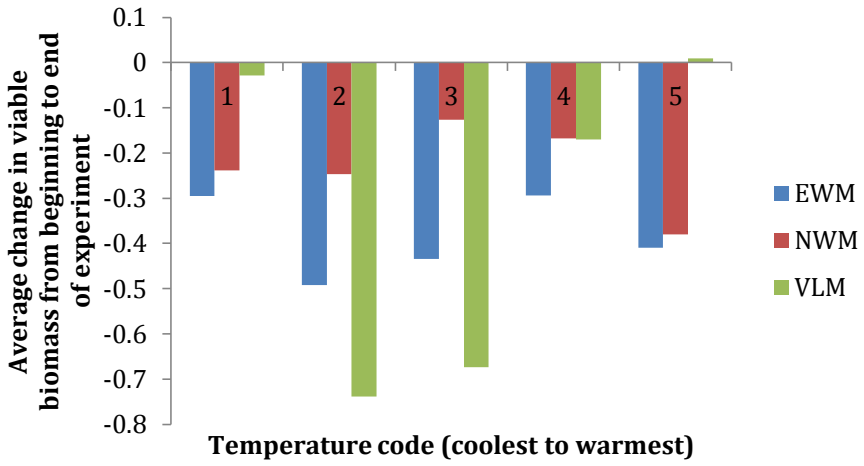


Figure 14: Average change in viable (green) biomass of milfoil fragments over the 6 week experiment period from June to August, 2013. n=6 fragments per species per temperature treatment. Temperature codes correspond to 1= 14°C, 2 = 21°C, 3 = 24°C, 4 = 26°C, 5 = 31°C)

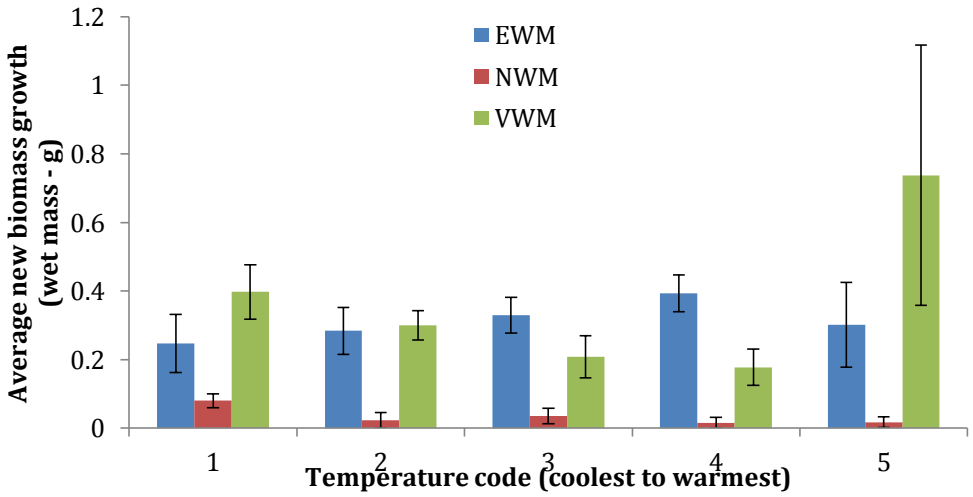


Figure 15: Average Growth of new biomass on fragments of 3 milfoil species fragments over the 6 week experiment period from July to August, 2013. n=6 fragments per species per temperature treatment. Temperature codes correspond to 1= 14°C, 2 = 21°C, 3 = 24°C, 4 = 26°C, 5= 31°C).

Growth of NWM is minimal in comparison to other species regardless of temperature, and also decreases as temperature increases. EWM growth increases with temperature until the highest temperature, then appeared to decrease. VLM again has the most different pattern of growth across temperature. Growth is greatest in the coolest and the warmest temperature (particularly the warmest) and seems depressed in the moderate temperatures (Figure 15). In general EWM and VLM added about the same amount of new biomass over the experiment except in the warmest temperature water.

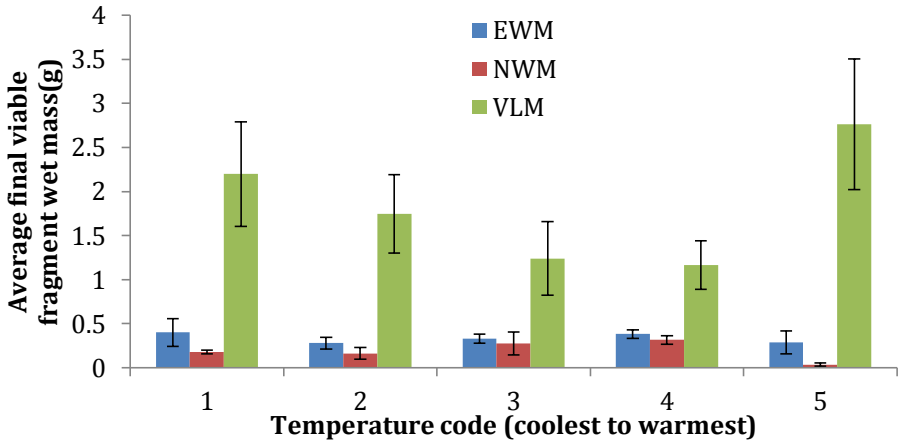


Figure 16: Final viable (green) biomass on fragments of 3 milfoil species fragments over the 6 week experiment period from July to August, 2013. n=6 fragments per species per temperature treatment. Temperature codes correspond to 1= 14C, 2 = 21C, 3 = 24C, 4 = 26C, 5= 31C.

Whereas Figure 15 shows exclusively new growth, Figure 16 includes all viable fragment mass at the end of the experiment. VLM fragments begin as very robust, maintain much of the green biomass of the initial fragment, and grow some new tissue (Figure 17a). NWM maintains a fair amount of green initial biomass but has very low growth rates at any temperature and grows particularly poorly at the higher temperatures that we expect to see in global change scenarios. EWM (in this study and others done in our lab) essentially puts no carbon into maintenance of initial fragment biomass. As the original fragment browns and dies, new growth occurs through lateral bud development and/ or apical elongation (Figure 17b). The outcome of these physiological strategies leaves VLM with a great deal more photosynthetic tissue after 6 weeks in any treatment, and the pattern in Figure 18 results.

Figure 17 (a,b): a. Shows VLM fragment has viable old and new tissue at the end of the experiment. b. Shows an EWM fragment at the end of the experiment with dead original fragment and 2 new lateral bud shoots of viable growth.

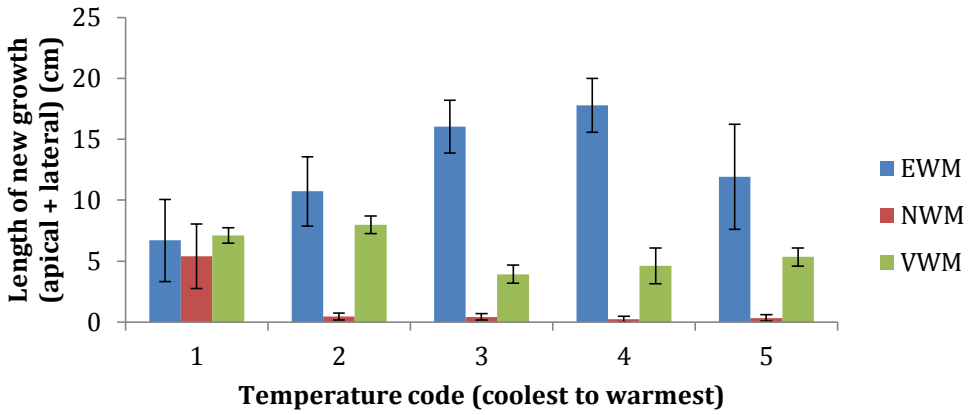


Figure 18: Average length of new growth including apical and lateral on fragments of 3 milfoil species fragments over the 6 week experiment period from July to August, 2013. n=6 fragments per species per temperature treatment. Temperature codes correspond to 1= 14C, 2= 21C, 3= 24C, 4= 26C, 5= 31C).

EWM has the greatest length growth in all but the coolest temperatures and length of growth is optimum in the moderate (24 – 26 C temperatures). These moderate and warmer temperatures represent typical and warm summer water temperatures currently experienced in the Adirondacks. Again NWM had the least growth, and growth decreased with temperature. VLM has an intermediate growth rate and the least variability in growth across the temperature gradient (Figure 19).

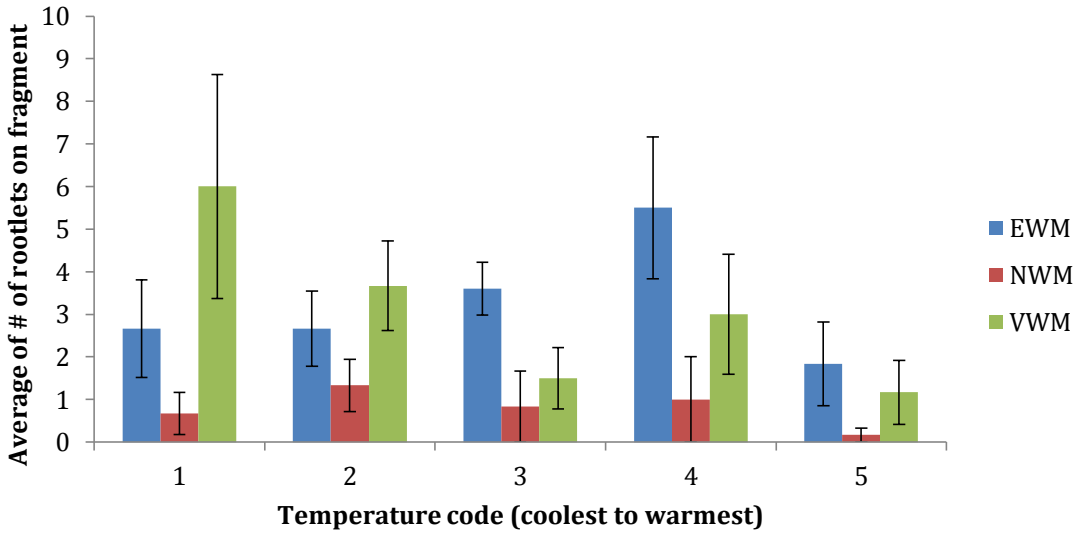


Figure 19: Rootlet growth on fragments of 3 milfoil species at different temperatures over the 6 week experiment period from July to August, 2013. n=6 fragments per species per temperature treatment. Temperature codes correspond to 1= 14C, 2 = 21C, 3 = 24C, 4 = 26C, 5= 31C).

For EWM, rootlet growth appears to follow the pattern of new biomass growth. Figure 20 shows that there is a strong correlation between biomass growth and rootlet growth in EWM but not in the other two species.

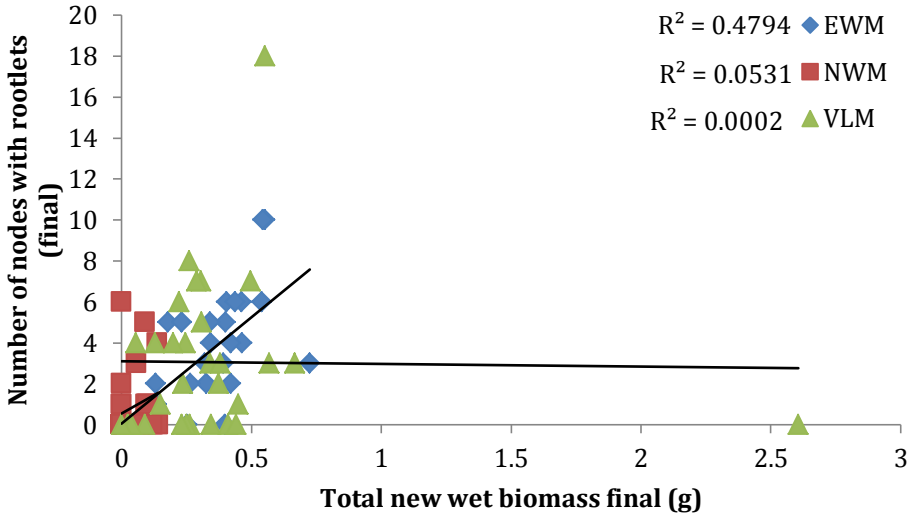


Figure 20: The relationships between total new wet biomass at the end of the experiment and the number of nodes that had rootlets growing at the end of the experiment. R2 values are included for each of the three species.

Discussion and Conclusions

The clearest conclusion from these data is that our NWM (*M. sibericum*) is a slow growing, cool water species. Based on response to water temperatures in the lab, early spring growth (and perhaps early rootlet development which we have observed) may allow this native to colonize and establish when other species are not yet crowding out light availability. At current summer water temperatures, fragments of this plant have very limited growth and increasing temperature only decreases its growth.

EWM (*M. spicatum*) and variable leaf milfoil, the two common invasive aquatics both respond positively to warmer water temperatures and appear to have different response curves along the gradient we used. EWM increases biomass and length with warmer temperatures until the warmest water temperature (approximately 32^0 C) at which growth decreases. In natural growth situations, length growth may be a critical factor in the competition for light. Increased growth due to warmer temperatures may enhance the competitive ability of 'tall' growing plants (Bornette and Puijalon, 2011). Temperatures in the medium and high temperature treatments (Table 12) are representative of current typical (Robinson, 2010) and extreme mid-summer water temperatures in the Adirondacks. Under these conditions, EWM puts on the most new biomass and the greatest amount of growth in length. VLM new growth is greatest in

the warmest temperature. This is an extreme temperature but not one that is out of the question given climate change scenarios. In a study by Robinson and others (2010) water temperatures in Adirondack lakes with maximum depths of 5.5 meters regularly exceeded 21 ^{o}C with maximum temperatures often recorded between 23 and 25 ^{o}C. Additionally, Fang and Stefan (1999) predicted that temperature increases in the contiguous U.S. could be as great as 5.2 ^{o}C in the face of a 2 X CO_2 scenario. Given this information, a scenario in which future plants in littoral zones of Adirondack lakes would experience water in the range of 30 to 35 ^{o}C is not out of the question.

At the end of 6 weeks, VLM had by far the most viable (photosynthetic) biomass at all water temperatures, even though new growth was greater in EWM. This is due to different life history strategies and growth forms. EWM fragments die and are replaced with temperature dependent new growth from the apical tip or lateral buds. VLM maintains much of the original photosynthetic fragment and adds some new growth over time (also temperature dependent). These different strategies along with biomass growth responses will play into how temperatures alter plant communities. There may be differences in what increased temperature means for fragment persistence and establishment in new lakes or new areas of lakes where they are present versus competition in-situ for communities in which these species co-occur. The next logical step in this research will be to incorporate the ability of fragments to establish into these experiments and to do competition experiments with rooted plants across this same range of temperature.

Literature Cited

Adirondack Park Invasive Plant Program (APIPP). 2011. Retrieved September 20, 2012 from APIPP, Aquatic Invasive Plant Locations website, http://www.adkAIS.com/Aquatic/Maps/Maps.asp.

Argue, D.M., R.G. Kiah, J.F. Denny, J.R. Deacon, W.W. Danforth, C.M. Johnston, and A.P. Smagula. 2005. Relation of lake-floor characteristics to the distribution of variable leaf water-milfoil in Moultonborough Bay, Lake Winnipesaukee, New Hampshire. Reston, VA: U.S. Geological Survey.

Barko, J.W. and R.M. Smart. 1986. Sediment-related mechanisms of growth limitation in submersed macrophytes. Ecology, 67: 1328-1340.

Blumberg, A.F. and D.M. Di Toro. 1990. Effects of climate warming on dissolved oxygen concentrations in Lake Erie. American Fisheries Society, 119: 210-223.

Bornette, G., and S. Puijalon. 2011. Response of aquatic plants to abiotic factors: a review. Aquat Sci 73:1–14.

Byers, J. E. (2002). Impact of non-indigenous species on natives enhanced by

anthropogenic alteration of selection regimes. Oikos, 97: 449–458.

Capers, R.S., R. Selsky, G.J. Bugbee, and J.C. White. 2007. Aquatic plant community invasibility and scale-dependent patterns in native and invasive species richness. Ecology, 88(12): 3135 – 3143.

Dukes, J.S. and H.A. Mooney. 1999. Does global change increase the success of biological invaders? Trends Ecol. Evol. 14(4): 135-139.

Fang, X. and H.G. Stefan. 1999. Projections of climate change effects on water temperature characteristics of small lakes in the contiguous U.S. Climatic Change 42: 377-412.

Frumhoff, P.C., J.J. McCarthy, J.M. Melillo, S.C. Moser, and D.J. Wuebbles. 2007. Confronting climate change in the U.S. northeast: Science, impacts and solutions. Cambridge, MA: Union of Concerned Scientists.

Glomski, L.M. and M.D. Netherland. 2008. Effect of water temperature on 2,4-D ester and Carfentrazone-ethyl applications for control of variable-leaf milfoil. J. Aquat. Plant Manage, 46: 119-121.

Hellmann, J.J., J.E. Byers, B.G. Bierwagen, and J. S. Dukes. 2008. Five Potential Consequences of Climate Change for Invasive Species. Conservation Biology, 22: 534–543.

Lovell, S.J. and S.F. Stone. 2005. The economic impacts of AIS: A review of the literature. Washington D.C.: National Center for Environmental Economics.

Patrick, D.A., N. Boudreau, Z. Bozic, G.S. Carpenter, D.M. Langdon, S.R. LeMay, S.M.

Martin, R.M. Mourse, S.L. Prince, and K.M. Quinn. 2012. Effects of climate change on late-season growth and survival of native and non-native species of watermilfoil (*Myriophyllum* spp.): Implications for invasive potential and ecosystem change. Aquatic Botany, 103: 83-88.

Pimentel, D., L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs of nonindigenous species in the United States. BioScience 53:53-65.

Robinson, J.M., D.C. Josephson, B.C Weidel, C.E. Kraft. 2010. Influence of variable interannual summer water temperatures on brook trout growth, consumption, reproduction and mortality in an unstratified Adirondack lake. Transactions of the American Fisheries Society 139: 685-699.

Ruiz, G.M., and J.T. Carlton. 2003. Invasive species: Vectors and management strategies. Washington D.C.: Island Press.

Santamaria, L., and W. van Vierssen, 1997. Photosynthetic temperature responses of fresh- and brackish-water macrophytes: a review. Aquatic Botany, 58: 135-150.

Thuiller, W., D. M. Richardson, and G. F. Midgley. 2007. Will climate change promote alien invasions? Pages 197–211 in W.Nentwig, editor. Biological invasions. Springer-Verlag, Berlin.

Vilà, M., J. D. Corbin, J. S. Dukes, J. Pino, and S. D. Smith. 2007. Linking plant invasions to global environmental change. Pages 93–102 in J. Canadell, D. Pataki, and L. Pitelka, editors. Terrestrial ecosystems in a changing world. Springer-Verlag, New York .

Status of Eurasian watermilfoil collected from incoming boats and trailers at Adirondack boat launches: Implications for viability and spread.

Celia Evans, PhD., Watershed Stewardship Program Science Director

Introduction

In 2010 we conducted a laboratory study on the role of desiccation (drying) in reducing viability of fragments of Eurasian Water milfoil (EWM), a prevalent aquatic invasive plant in Adirondack Lakes. In that study, desiccation significantly reduced the viability of milfoil strands (Evans et al, 2011). However, even fragments that were approaching complete desiccation still had a very low probability of being able to rehydrate and begin new bud growth. Specifically, fragments at 87% desiccation had a 6% chance of becoming viable and fragments that were 96 and 100% dry still had at 3% and 2% likelihood of viability after rehydration respectively (Evans et al, 2011). Due to relatively small sample size the confidence intervals around those percentages were large, but the results suggested that we cannot assume that milfoil fragment drying, while in transit on boats and trailers, will stop the transfer of viable EWM from one lake to another.

In 2012, we conducted another laboratory study to examine the role of the presence of the apical meristem on EWM fragments on the rate of drying and subsequent growth. Our unpublished results showed that after three hours of drying, the average % desiccation of 10 EWM fragments with apices intact retained 10% more moisture than 10 fragments with apices removed (62.4 and 73.1% desiccation respectively). Additionally, viability and vigor after rehydration appeared to be greater in fragments with apical meristems dried for up to three hours. To continue to build on these studies, and to ground them in more realistic scenarios, we began to gather information on the actual status of EWM fragments that were found on boats and trailers entering the lakes where Paul Smith's College Watershed Stewards worked. These fragments represent propagule pressure on the lakes to which they would have been introduced. Knowing how dry 'entering' fragments are, the location where they are attached to boats and trailers, and the effect of fragment location, and morphology on desiccation, could be valuable for ultimately predicting invasibility of the lakes we monitor for EWM.

In this report we add 2013 data to the 2012 data published in the annual report last year and ask: 1) What is the frequency distribution of % desiccation of the fragments traveling on boats and trailers from lakes of origin to lakes where they were identified and removed?, 2) Do fragments collected from trailers and watercraft without apices tend to be more desiccated than those with apices?, 4) Does the location where fragments are specifically located on the boat or trailer appear to influence percent desiccation?

Methods

At all boat launches monitored by Watershed Stewards in the 2012 and 2013 seasons, we collected information on the size, state of desiccation, and morphological features of strands that were actually being transported to these lakes from other lakes. Stewards were provided with heavy duty Ziploc bags to which a data label was adhered. Stewards collected as much of the following demographic data as they could: 1) the date and time of the finding, 2) the site at which it was detected, 3) the specific location of the strand on the boat or trailer, and 4) the last lake the watercraft had visited. They also collected data on the fragment morphology including the length (cm), number of nodes on the strand, and whether there was an apical tip present. Strands were sealed in the bag, and kept in a cooler or refrigerator and transported to the laboratory where data were double checked, fragments were weighed (to get initial weight) and then transferred into paper bags and dried for 3 to 4 days at 60^{o}C and reweighed to get final mass.

Percent desiccation was calculated by weighing the transported strands (fresh mass) and then completely drying (dry mass)them and using the information from the previous study to estimate saturated mass and the % desiccation of strands when they were pulled off boats and trailers at launches. Microsoft Excel was used to calculate values, sort data and summarize the information.

Results and Discussion

We collected data on a total of 53 EWM fragments in 2012 and 2013 from boats entering launches at the following lakes: 4th lake, 7th lake, Chateguay Lake, Lake Flower, Lake Placid, Raquette Lake, Stillwater Reservoir, Cranberry Lake, Upper St. Regis Lake, Tupper Lake, and Long lake. Desiccation ranged from 54% to 100%, with only two fragments having desiccation values under 90%. All in all, fragments are fairly dry when they reached the launches.

<u>Desiccation of fragments with and without apical meristems</u>

We were able to collect data on 41 EWM fragments that were confirmed by Stewards to have or not have an apical meristem. Not all fragments are included in this analysis because Stewards could not always determine the presence or absence of an apical tip. Our analysis showed that fragments being transported with growing tips intact tend to stay more wet than those without (Figure 21) and fragments transported in clumps and on the trailer under the boat also are wetter (data not shown).

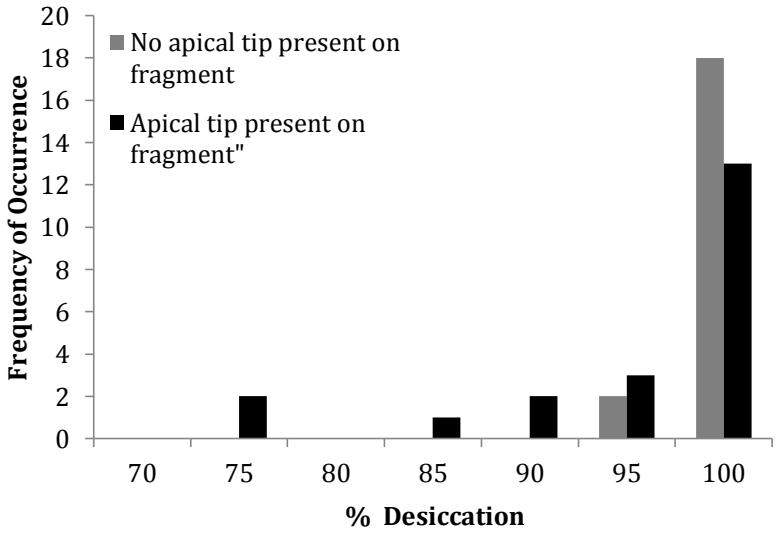


Figure 21: Comparison of the frequency distributions of % desiccation of EWM fragments from launching boats found with or without an apical tip present. (2012- 2013 data. n= 20 fragments with no apex and n= 21 fragments with an apical tip present).

Note that three fragments were less than 90% desiccated and those were fragments that had their apical meristems intact. Our study in 2010 showed that fragments that were 86% desiccated had a 6% chance of being viable when rehydrated (Evans et al, 2011).

Also, when we compared the % desiccation of 14 EWM fragments that were transported to boat launches either hanging off trailers or watercraft versus 17 EWM fragments that were transported underneath boats (typically on carpeted bunks) we found that the former had an average desiccation % of 99.6% $\pm$ 1.3% dry while the latter had an average desiccation of 92.1% $\pm$ 11.2%. These data are similar to data reported for the 2012 season. It is notable but not surprising that exposed fragments are both drier and less variable in their dryness. Fragments travelling on carpeted bunks under boats appear to be wetter and more variable. Little has been published outside our lab on the topic of transport and viability of invasive aquatic plant growth. This work is related to and builds on the work of Jerde et al, 2012 who showed that longer and more coiled fragments dried more slowly under the same conditions.

These differences do not yet take into account the distance traveled from the previous lake, which likely interacts strongly with fragment moisture levels. As we continue to collect more of these fragments and focus in on the factors that influence desiccation during transport we can begin to develop models that rank the likelihood of invasion at various boat launches. Data on the number of fragments transported to each lake and the most recent lakes those boats traveled, have been collected by our Stewards for 12 years. Gathering this new information on the moisture status and morphology of fragments integrates the geographic pattern data with the EWM physiology data to give us a better understanding of potential risk to lakes.

Conclusions

Our small but growing data set suggests, as predicted, that fragments with intact apical meristems that are transported, tend to stay wetter than those without, given the same travel conditions. Additionally those transported on the boat trailer, covered by a boat tend to stay wetter than those that are exposed to the air by hanging off trailers or boat motors etc. These data suggest we need to continue to educate boaters not only to check their water crafts but also to carefully look for invasive fragments on their boat trailers. Again, these data do not consider distances travelled between lakes for each fragment. However, over time those data along with the moisture data can raise our awareness about which lakes may pose the most likely threat as a source for new infestations for any given lake.

Literature Cited

C. L. Jerde, Barnes M.A. , DeBuysser E.K., Noveroske A. Chadderton W.L. and Lodge D.M. 2012. Eurasian watermilfoil fitness loss and invasion potential following desiccation during simulated overland transport Aquatic Invasions 7: 135–142 doi: 10.3391/ai.2012.7.1.015 (Open Access).

C. A. Evans, K. M. Forrest, D. L. Kelting, L. E. Steblin**.** 2011**.** Likelihood of fragment viability and rootlet formation in Eurasian watermilfoil (*Myrophyllum spicatum* L.) after desiccation. Journal of Aquatic Plant Management 49: 57-62.

Purple Loosestrife abundance and vigor after 4 weeks of predation by *Galerucella* sp. beetles: The first year of a long-term monitoring project.

Derek Scott, Watershed Steward and Celia Evans, Science Director

Figure 22- Purple loosestrife quadrats

Introduction

Introduced beetle species, *Galerucella calmariensis* and *Galerucella pusilla,* have been documented to effectively predate and reduce purple loosestrife (*Lythrum salicaria*) biomass and abundance (Boag and Eckert, 2013; Schooler, Combs, and McEvoy, 2003; Lindgren 2003). Both Species of beetles have been shown to be host specific, though some studies have reported the ability of the beetles to feed on, but not complete their life cycles on non- Lythraceae plants (Schooler et al, 2003). Within the family Lythraceae, one study comparing beetle damage on purple loosestrife with damage on native swamp loosestrife (*Lythrum alatum*) and winged loosestrife (*Decodon verticillatus*) showed that beetles may lay some egg masses on the native species, but ultimately little larval feeding occurs and resulting damage is minimal (Katovich, Becker, Ragsdale and Skinner, 2008).

The amount of purple loosestrife defoliation by *Galerucella* beetles at a given site will be influenced by beetle dispersal, which may, in turn, be influenced by habitat

matrix. Under ideal conditions, beetles tend to aggregate and thus can cause complete plant defoliation on a local scale (Davalos and Blossey, 2011). A study using both *Galerucella* species determined that *G. calmariensis* tends to disperse further than *G. pusilla* and both species dispersed further in a meadow matrix than in a forest matrix. In addition, the beetles are more likely to colonize and predate plants that have already been attacked (Davalos and Blossey, 2011). Beetle numbers decrease with distance from the release point in short-term studies (Schooler et al, 2003; Davalos and Blossey 2003) but over multiple years they continue to persist and expand their local distributions. *G. calmariensis* have been recorded as far as up to 9km from a release site after 5 years, indicating that the beetles are capable of spreading over larger areas (Albright et al., 2004). Because a single defoliation event will not cause mortality, it is important that reproduction and recolonization occur over multiple years within the target area (Davalos and Blossey, 2003). Larval feeding on shoot buds reduce the number of seed capsules, biomass and plant height (Katovich et al, 2008). In addition to reduction in purple loosestrife biomass, other native species increase in abundance when beetle release is successful (Albright et al, 2004).

We chose a small area with a fairly dense and developing purple loosestrife infestation along the edge of the Saranac River, along State Rt 3, close to Saranac Lake NY, to conduct and monitor a small release of *Galerucella spp*. during the summer of 2013. Beetle releases have occurred in the region in the past, however this specific location had not been the site of a beetle release. We were interested in observing changes in loosestrife health indices and beetle abundance within our small area over a 4 week period. We collected initial and final observations for number of beetles per stem, percent loosestrife cover, and number of individual plant stems. We used a categorical index for initial and final beetle holes and plant vigor. We intend to use this study as the basis for future monitoring of beetle damage in this same area over several seasons. This study will help determine if we should incorporate more beetle release sites to our Watershed Stewardship Program research agenda.

Methods

The site was chosen for its fairly dense pockets of purple loosestrife plants in the roadside wetland area on the edge of Rt. 3 near the Saranac River approximately 5 kilometers from Saranac Lake NY. We targeted this area because it seemed to be partially isolated from other wet areas that contain loosestrife along the road and we hoped that management might help contain and eliminate it from that area. Once the site was selected, two arrays of 5, 8 meter transects each were set up, approximately 30 meters apart. The center plot of each array was where the beetle release occurred. The

five transects radiated from the center plot in the pattern of spokes on a semi-circle, with transects 1 and 5 running parallel to the road with transects 2,3, and 4 on radiating away from the road in between (Figure 24). Center plots of the two arrays were approximately 30 meters apart within 2 meters of the road shoulder. Data were collected from 1m^2 quadrats at the center and at 2m intervals along each transect.

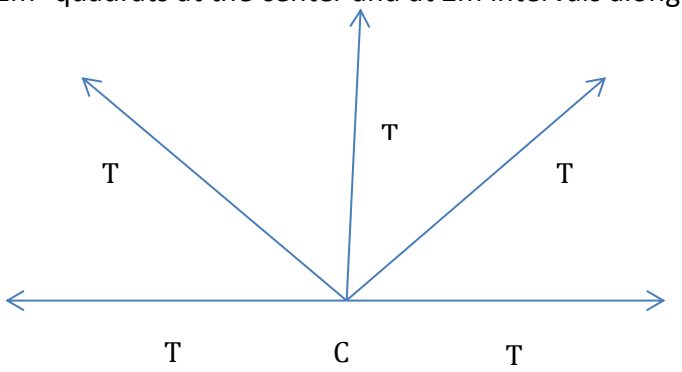


Figure 23: Schematic diagram of transect array design for a single array. 1 meter square quadrats at the center and at 2 meter intervals along each transect (4 per transect) are not shown on the diagram.

Five hundred beetles (permitted and obtained from the NY, DEC) were released at each of the center plots in the arrays on July 12, 2013. Beetles were released by removing the lid of the transport container and pulling out the loosestrife material on which the adults were feeding and placing the container and material at the base of loosestrife stalks in the center plots. Five days later, (July 17, 2013) we conducted the initial sampling. At that time all beetles had left the material in which they were transported. In each quadrat, the number of purple loosestrife stalks were counted and a percentage of vertical cover was categorically determined (1=1-5%; 2=6-10%; 3=11-25%; 4=>25%). Stalks were checked for the presence of *Galarucella spp.* and tallied for each individual plant. Then, the number of beetle holes were counted for each plant and each plant was assigned a plant health rating based on the percent of necrosis (1=0%; 2=<25%; 3=<50%; 4=>50%). Initial data were only collected on transects 1,2, and 3 for Array #1.On August 14th the final data were collected from each plot on all transects in both arrays. The numbers of stalks with inflorescence (if any) were counted and the lengths of each were totaled for each loosestrife plant in the final collection. However, in our short experimental time we had very few plants that had developed inflorescences and so did not analyze those data.

Results and Discussion

Surprisingly, we found evidence of beetle presence at the site prior to our release. Beetle holes were present as well as visual sighting of beetles on 2 loosestrife plants in our initial site reconnaissance.

Figure 24: Image of Galerucella beetle taken in June 2013 at our proposed site prior to the release of beetles obtained from the NYS DEC.

Previous beetle releases in other parts of the local area have likely resulted in dispersal into new locations of which our roadside location was one. We know that at the Saranac Lake Central High School, quite a number of years ago, beetles were released by students and faculty at a campus pond that had become dense with loosestrife. Albright et al (2004) reported that within a single season beetles were recorded 9 km away from the release site at the end of just one season. The high school is less than 9 km away from our site and the release occurred approximately a decade ago, thus there has been time for movement in the local area.

Over the course of our study, the two arrays showed similar responses. Because of this, and since one array only had initial and final data for 2 transects, we combined the data for both arrays to examine changes in beetle presence, beetle damage (holes) and plant vigor and cover across the distance of 8 meters from the release plot.

<u>Beetle abundance</u>

Five days after the release when we took our initial measurements there were only an average of 3 to 4 beetles on loosestrife stalks at the release locations. These numbers decreased with distance. After 4 weeks no beetles were found on plants 2

meters and further from the center of the arrays suggesting that beetles disperse quickly and fairly far in short periods of time. This is circumstantially corroborated by research on these beetles that has shown rapid and distant dispersal over short time periods (Albright et al, 2004).

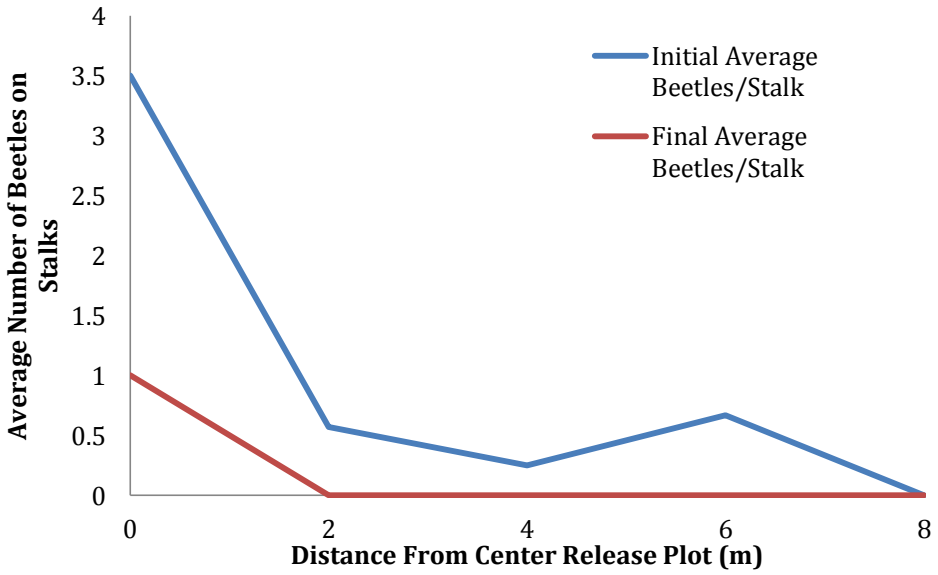


Figure 25: Average number of beetles found on purple loosestrife plants in 1m2 quadrats at 2 meter intervals (up to 8 meters) form the center release plot. Data were collected in July 17 (initial) and August 14 (final) in a patch of wetland bordered by State Rt. 3 and near the Saranac River close to Saranac Lake, NY.

Beetle Damage

As previously mentioned, there was some beetle damage at the site when we first chose it for our study. We did not quantify the amount at that time, thus our initial beetle hole indices likely included holes that were already present as well as those made by our released beetles in the 5 days from release to data collection.

Initially, most plants had on average between 6 and 21(rating of 2) beetle holes regardless of where they were along transects. At the end of the 4 weeks, beetle damage appears to have increased substantially particularly at the further distances from the release area. At 6 and 8 meters final beetle hole estimates were closer to 21 to 50 (rating of 3) per plant (Figure 26).

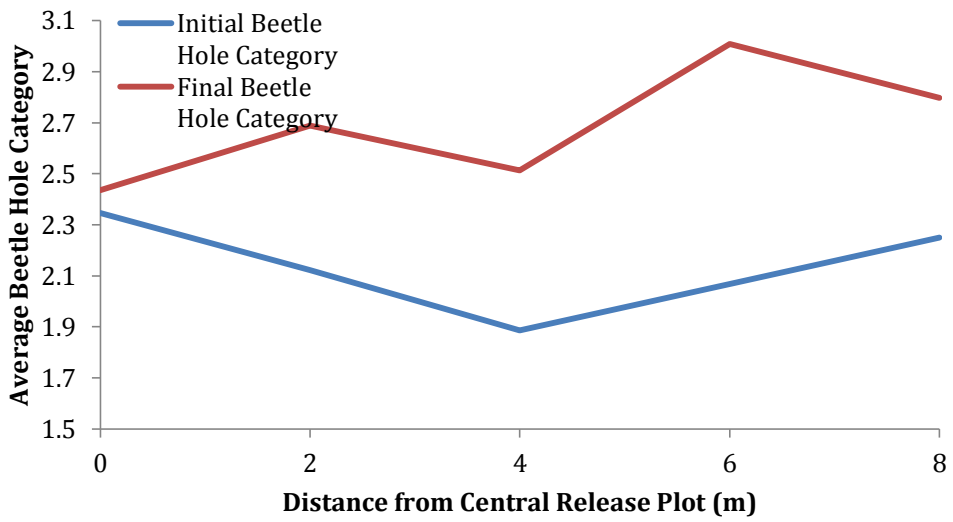


Figure 26: Average beetle hole category on purple loosestrife plants (<5 holes from beetles = 1, 6 - 20 = 2, 21- 50 = 3, 51 to 75 = 4 and above that = 5) in 1m2 quadrats at 2 meter intervals (up to 8 meters) form the center release plot. Data were collected on July 17 (initial) and August 14 (final) in a patch of wetland bordered by State Rt. 3 and near the Saranac River close to Saranac Lake, NY.

Plant Vigor

Overall plant vigor appears to have increased over the 4 weeks that we allowed the beetles to disperse and feed before resampling. However, in plots closest to the release area the increase in vigor was greatest, and at 6 and 8 meters away there was little change in plant vigor (Figure 27). This spatial pattern is consistent with changes in beetle holes increasing with distance from the center plots.

The overall increase in vigor can likely be accounted for by the timing of growth of the loosestrife at the site. The early summer was very wet and the areas on the roadside including the site we chose were inundated with standing water until mid-July when we released our beetles. Many of the smaller loosestrife stalks were underwater until late in the season and growth began later. A Minnesota common garden study on loosestrife phenology showed that shoot emergence for purple loosestrife at that location occurred throughout the month of May (Katovich et al, 2008). Additionally, at the time we did our final sampling (August 14), very few inflourescences were present and none were opened. The Minnesota study also reported flowers of purple loosestrife in a common garden in Minnesota were completely open by June 28th. Thus, we hypothesize that while beetles fed on leaves of larger plants, the bulk of seasonal growth and development occurred late this season and was after beetle release and subsequent dispersal.

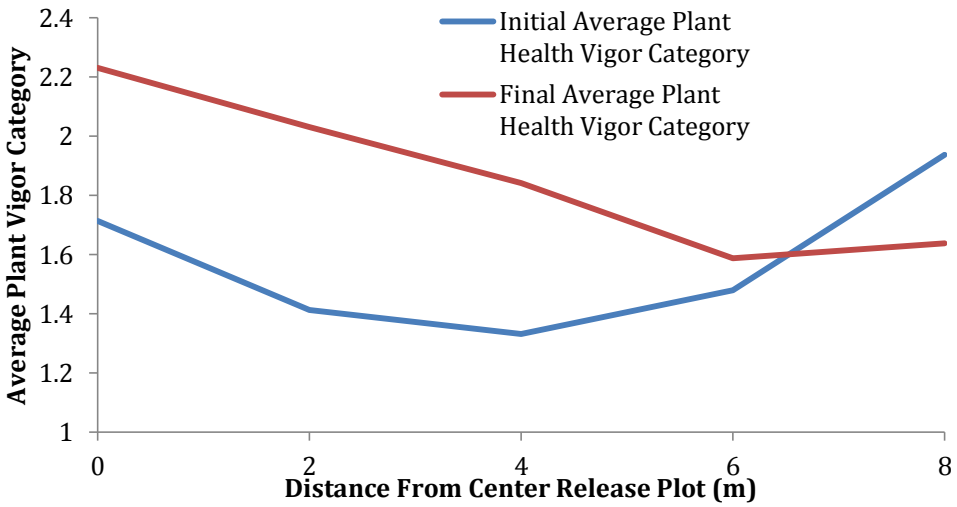


Figure 27: Average Plant Vigor of purple loosestrife stems in 1m2 quadrats at 2 meter intervals (up to 8 meters) form the center release plot. Data were collected in July 17 (initial) and August 14 (final) in a patch of wetland bordered by State Rt. 3 and near the Saranac River close to Saranac Lake, NY.

Purple Loosestrife % Cover

Overall, there was no appreciable change in % plant cover across the transects in the 4 weeks after beetle release. This is not surprising or discouraging. As we hypothesized for plant

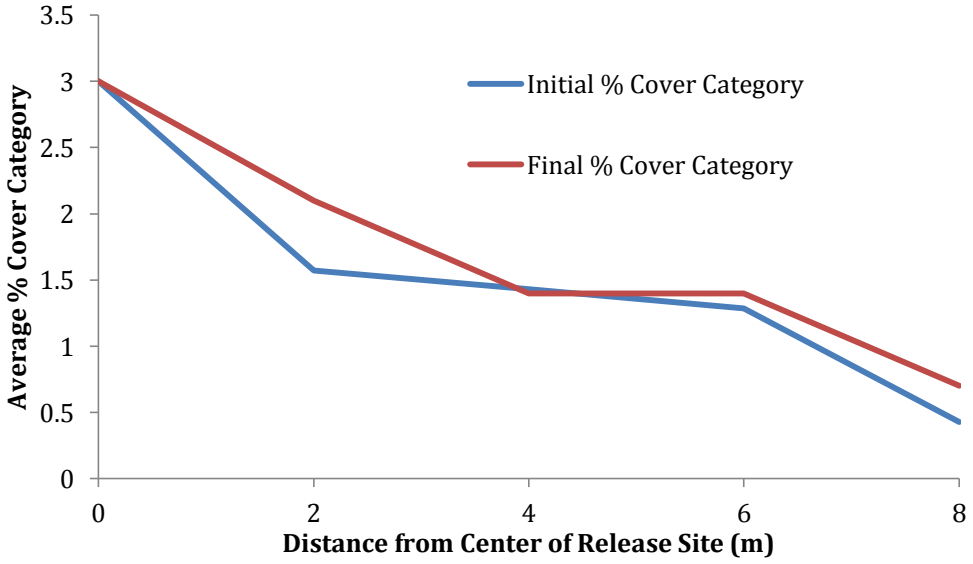


Figure 28: Average % cover of purple loosestrife stems in 1m2 quadrats at 2 meter intervals (up to 8 meters) form the center release plot. Data were collected in July 17 (initial) and August 14 (final) in a patch of wetland bordered by State Rt. 3 and near the Saranac River close to Saranac Lake, NY.

vigor, it is likely that immediate damage from beetle herbivory and subsequent loss of vigor in some of the more mature plants was compensated by growth occurring later in

the season for many of the plants at our site. Documented changes in biomass (and % cover) in other studies occur after multiple seasons of defoliation on individual plants and after larval feeding on buds has reduced reproductive capacity. If the release at our site is successful, we will continue to monitor these variables and ultimately hope to see a reduction in % cover of loosestrife over several years.

Conclusions

These extremely preliminary results are encouraging. Beetles clearly predated loosestrife at the site and readily dispersed during our short study. Our observations suggest that vigor of individual mature stems did decrease, however plants that were very small and underwater for much of June likely added to new biomass/cover that was recorded at the time of our final sampling and which masked some of the damage from the beetles on individual stems.

One concern is that beetles may have dispersed immediately and fairly far, out of our immediate site, due to fairly low loosestrife abundance at the site, particularly since many plants were very small at the time of the release. The success of the release is dependent on the beetles establishing larger populations within the site and larval feeding over years. Albright et al (2004) released 50 adult beetles in 1997 at a swamp in Otsego County, NY and the abundance of eggs and larvae increased for 4 years, and adult numbers increased for 5 years. Future work will include yearly monitoring at this site (and nearby sites) for the next several years. Because of the concern of introducing non-native organisms as a biocontrol, it will be valuable to do laboratory feeding trials using both common and rare native plant species, as well as sample in the field, to confirm that *Galerucella* beetles do not cause significant damage to or reduction of conspecific wetland plant species here in the Adirondacks. Beetle release may be a valuable component of control strategies at problematic sites in combination with hand harvesting.

Literature Cited

Albright, M., W. Harman, S. Fickbohm, H. Meehan, S. Groff, and T. Austin. 2004. Recovery of Native Flora and Behavioral Responses by Galerucella Spp. Following Biocontrol of Purple Loosestrife. *American Midland Naturalist* 152: 248-54.

Boag, A., and C. Eckert. 2013. Effect of Host Abundance on the Distribution and Impact of Biocontrol Agents on Purple Loosestrife (*Lythrum Salicaria, Lythraceae*). *Ecoscience* 20: 90-99.

Davalos, A., and B. Blossey.2011. Matrix Habitat and Plant Damage Influence Colonization of Purple Loosestrife Patches by Specialist Leaf-Beetles. *Environmental Entomology* 40: 1074-1080.

Katovich, E.J.S., R.L. Becker, D.W. Ragsdale and L.C. Skinner. 2008. Growth and Phenology of Three Lythraceae Species in Relation to Feeding by *Galerucella calmariensis* and *Galerucella pusilla*: Predicting Ecological Host Range from Laboratory Host Range Testing. Invasive Plant Science and Management 1: 207-215.

Lindgren, C. 2003. Using 1-min Scans and Stem Height Data in a Post-release Monitoring Strategy for *Galerucella calmariensis* (L.) (Coleoptera: Chrysomelidae) on Purple Loosestrife, *Lythrum Salicaria L*. (Lythraceae), in Manitoba. *Biological Control* 27: 201.

Schooler, S.S., E.M. Coombs, P.B. McEvoy. 2003. Nontarget effects on crepe myrtle by *Galerucella pusilla* and G. *calmariensis* (Chrysomelidae), used for biological control of purple loosestrife (*Lythrum salicaria*). Weed Science. 51: 449-455.

Purple Loosestrife Management on the St. Regis Chain of Lakes

Derek Scott, William Martin and Stephanie Korzec, Watershed Stewards

Introduction

Lythrum salicaria or purple loosestrife is a known terrestrial/wetland invader, not only in the Adirondack Park, but throughout the country. This perennial, purple flowering plant is native to Eurasia and arrived in North America during the early 1800's (Chun, Nason, & Moloney, 2009). In its native setting, purple loosestrife is controlled by a diverse arthropod community. Unfortunately, there are no known native species to restrict the growth of purple loosestrife in its new setting (Albright, Harman, Fickbohm, Meehan, Groff, & Austin, 2004).

Purple loosestrife's competitiveness for habitat space and nutrient availability is unmatched by native species. Once established, it can lead to reductions in overall plant biodiversity resulting in the degradation of wetland wildlife habitat. By altering the native flora composition that waterfowl and other wildlife feed upon, purple loosestrifes' effects cascade along the food chain ultimately leading to alterations of overall wetland function (Chun, Nason, & Moloney, 2009).

The plant was originally transported to the United States through the ballast water of European ships and also as a medicinal herb for treatment of diarrhea, dysentery, bleeding wounds, ulcers and sores. Through these vectors, purple loosestrife was well established along the New England sea board by the 1830's. The construction of inland canals in the 1880's favored the expansion of the plant to the interior of New York State (Malecki, Blossey, Hight, & Schroeder, 1993).

The capacity of purple loosestrife to compete has increased in disturbed areas. Horticulturists and bee-keepers further aided the spread of purple loosestrife through its sale for ornamental and pollination purposes. Also, in western states, the invasion was encouraged through road construction and irrigation systems (Wilcox, 1989)ultimately leading to disruptions in the flow of water resulting in economic and agricultural losses. Other agricultural losses include the non-palatable purple loosestrife outcompeting hay and feed grass for livestock in areas suitable for its growth (Malecki, Blossey, Hight, & Schroeder, 1993).

One adult purple loosestrife plant can produce over 2 million seeds per year, and can grow to over 200 cm in height (Albright, Harman, Fickbohm, Meehan, Groff, & Austin, 2004). The seeds are long lived and easily dispersed by water and mud that adheres to wildlife, livestock and people. Seedling growth rates have been known to exceed 1 cm/day and adults can harbor anywhere from 30-50 stems that dominate the herbaceous understory canopy. Under natural conditions, seedling densities can approach 10,000-20,000 plants/m^2. The hardy root stock of adult plants serves as a nutrient storage dump which can be used to jump start growth in the spring growing season and help establish regrowth if the above ground stems are cut, burned or killed (Malecki, Blossey, Hight, & Schroeder, 1993).

Attempts at controlling the invasion of purple loosestrife using methods such as cutting, herbicidal treatment, water manipulation, and burning have historically been unsuccessful. More recent use of biological control agents such as *Galerucella spp.* (leaf-eating and root boring beetles) have been documented as successful means of management and eradication for larger, densely populated stands (Albright, Harman, Fickbohm, Meehan, Groff, & Austin, 2004). Though, when purple loosestrife invasions occur in small, localized patches, similar to those that are present on the Lower St. Regis, Spitfire, and Upper St. Regis Lakes, eradication is possible by way of uprooting the plant by hand and ensuring the removal of all vegetative parts of the plant. This method requires intense, long-term maintenance for success (Malecki, Blossey, Hight, & Schroeder, 1993).

Methods

Each year manual hand-harvesting is the chosen method for controlling purple loosestrife in the St. Regis Lakes. This has been and has been proven effective on small, localized stands of purple loosestrife (Malecki, Blossey, Hight, & Schroeder, 1993). Hand-harvesting of purple loosestrife started on the St. Regis Lakes chain on July 26th, 31st, and August 9th. Previously infested sites where removal took place were revisited and once again cleared of purple loosestrife. Site locations were recorded using maps of all three lakes. Several of the previous sites have been condensed and one new removal location exists on Spitfire Lake. Loosestrife plants were removed entirely, including the vegetative parts below the surface. Removing these root stocks ensures that purple loosestrife will not re-emerge the following year with an established food source. Harvested plants were placed in 50 gallon black garbage bags and allowed to desiccate in the sun for two and a half weeks. The purple loosestrife was then disposed of using waste management facilities on-campus.

Results and Discussion

A total of 416 purple loosestrife plants were removed during the three days of hand harvesting that occurred on the St. Regis Lakes chain (July 26th, 31st, and August 2nd) . In comparison to previous years, the total number of plants was the lowest seen since 2009, when only 309 plants were removed. This year's numbers were slightly lower than 2011 and 2012, with 431 and 430 loosestrife plants being removed. Many of the previous sites saw similar or lower plant numbers to last year, with only sites 3 and 9 showing significant increases in purple loosestrife abundance. Steadily declining loosestrife numbers in the remaining sites, as well as sites 12, 13, 23, and 2, 4 being condensed into single sites suggests that the project has been effective at controlling the spread of the plant.

Table 13: 13 years of purple loosestrife data at sites on Upper St. Regis Lake, Spitfire Lake, and Lower St. Regis Lake. (Years 2002-4, 2006-9 omitted)

Site	2001	2005	2010	2011	2012	2013
1	0	0	0	0	0	0
2	0	0	0	0	0	
3	450	130	222	197	103	154
4	5	5	0	10	21	
5	0	15	2	4	2	0
6	0	0	0	15	19	22
7	250	250	39	76	24	11
8	110	150	6	4	6	2
9	0	25	72	30	67	152
10	0	25	4	7	8	0
11	0	10	3	8	0	7
12	18	10	1	4	1	
13	25	100	89	17	20	
14	0	0	0	9	0	0
15	30	40	25	11	21	0
16	0	0	3	0	0	0
17	0	0	0	0	0	0
18	0	4	0	16	0	0
19	0	0	0	1	0	0
20					1	0
21	0	0	0	0	1	
22	0	0	305	20	91	68
23	0	0	2	2	0	
24	0	0	0	0	45	0
25						43
26 (12, 13, 23)						30
27 (2,4)						19
Total	**888**	**764**	**773**	**431**	**430**	**416**

Lower St. Regis Lake

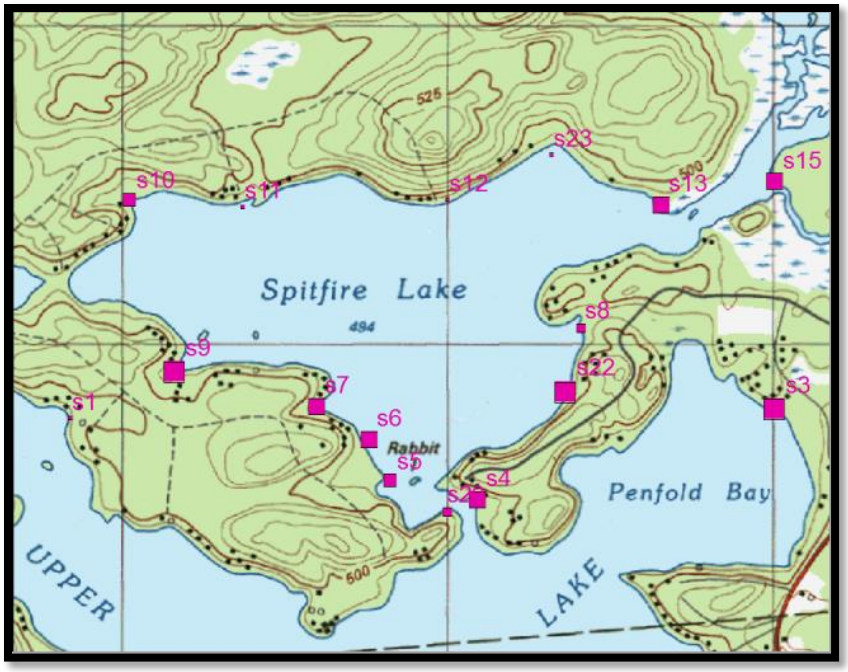
The purple loosestrife sites previously managed in past years have remained free of loosestrife plants, with no signs of regrowth. No new locations were found on Lower St. Regis this season either, making the lake's management a success.

Spitfire Lake and the Slough

All of the previous sites with the exception of site 9 had less than or equal to the number of loosestrife plants removed and recorded in 2012. Site 22 saw a decrease in the total number of purple loosestrife plants this year, as did sites 10 and 15, which had no regrowth from previous years, lowering the total number of sites on Spitfire Lake and in the Slough. Site 9 saw a large spike in loosestrife numbers, with almost three times as many plants from the previous year. With the number of purple loosestrife plants reaching 152 (up from 67), this location needs to be a primary objective for next year's management.

Upper St Regis Lake and the Channel

Sites 2 and 4 are now known as Site 27. This location in the Channel between Upper St. Regis and Spitfire showed no change in the abundance of purple loosestrife from previous years. Site 3, located at Camp Applejack has been the primary loosestrife infestation on Upper St. Regis. This year, site 3 saw an increase in the total number of loosestrife plants, from 103 to 154, making this location important to containing purple loosestrife spread on Upper St. Regis Lake.



Conclusions

Over 13 years, the Adirondack Watershed Institute's, Watershed Stewardship Program's hand harvesting of purple loosestrife has been quite successful in reducing and even eliminating stems of purple loosestrife in many localized area. Hand-harvesting seems to be a particularly effective strategy in sites with smaller numbers (Malecki, Blossey, Hight, & Schroeder, 1993), but sites with higher abundances of stems such as 3 and 9 appear to require additional efforts. One option for addressing the trouble sites are inspections and harvesting earlier in the season and perhaps multiple times, to remove as many plants prior to seeding (Malecki, Blossey, Hight, & Schroeder, 1993). Additionally we suggest that the option of *Galerucella* beetle release be considered for site 9 on Spitfire Lake since hand harvesting is not successful there and a large population will be a ready source of propagules.

Literature Cited

Albright, M. F., Harman, W. N., Fickbohm, S. S., Meehan, H., Groff, S., & Austin, T. (2004). Recovery of Native Flora and Behavioral Responses by Galerucella spp. Following Biocontrol of Purple Loosestrife. *American Midland Naturalist*, 248-254.

Chun, Y. J., Nason, J. D., & Moloney, K. A. (2009). Comparison of quantitative and molecular genetic variation of native vs. invasive populations of purple loosestrife. *Molecular Ecology*, 1-18.

Malecki, R. A., Blossey, B., Hight, S. D., & Schroeder, D. (1993). Biological Control of Purlple Loosestrife. *Bioscience*, 680-687.

Wilcox, D. (1989). Migration and control of purple loosestrife (Lythrum salicaria) along highway corridors. *Environmental Management*, 365-370.

Pale Swallowwort

Japanese Knotweed

Garlic Mustard

Terrestrial Invasive Plant Monitoring and Control

Garlic Mustard, Pale Swallowwort, and Japanese Knotweed

Zachary Simek

Terrestrial invasive species are those which grow on land, are not native to a region, and have negative economic, social or environmental impacts. Terrestrial invasive species are able to outcompete native vegetation for space and vital resources due to a lack of predators, parasites and diseases that are present in their native range.

The introduction and spread of terrestrial invasive species across the Adirondacks is an ever growing problem. If their movement continues unchecked, terrestrial invaders threaten to limit land use for present and future generations. Invasive species can decrease our ability to partake in recreational activities such as hunting, bird watching and hiking. They also degrade the health of our native forests, fields and wetlands. The longer we wait to address non-native species, the more expensive and difficult they become to manage.

In addition to normal stewarding duty at the boat launches, watershed stewards were able to partner with other organizations to participate in terrestrial invasive plant monitoring and control. Stewards Eric Paul, Dan Johnson and Zachary Simek joined the Regional Inlet Invasive Plant Program (RIPP) to aid their efforts in eradicating Japanese Knotweed across the Adirondacks. Steward Zachary Simek also assisted the Adirondack Park Invasive Plant Program (APIPP) with monitoring and control of Garlic Mustard and Pale Swallowwort.

The Regional Inlet Invasive Plant Program (RIIPP) is a not for profit organization that was launched in 2008 with the mission to eradicate all Adirondack Park lands of invasive Japanese Knotweed. Commonly found along roadways and near wetlands, the plant is capable of growing to heights of 10 feet in very dense stands. Early emergence in the spring allows knotweed to outcompete native Adirondack plants for water, soil nutrients and sunlight. RIPP's founder, Douglas Johnson, is a long time summer resident of Seventh Lake and active outdoor enthusiast. After learning about knotweed and witnessing the plants destructive potential near his wife's family farm in Vermont, Johnson took it upon himself to prevent similar infestations from occurring in the Adirondacks. This summer watershed stewards assisted the organization by obtaining property owner permissions allowing herbicide treatment of Japanese knotweed on their land. In addition, Steward Dan Johnson assisted with management of wild parsnip between the towns of Inlet and Old Forge. Wild parsnip is a noxious plant capable of rapidly invading disturbed areas.

Watershed steward Zachary Simek also assisted APIPP with monitoring and control of garlic mustard and pale swallowwort. Garlic mustard is a biennial herb and prolific seed producer that can quickly take over a disturbed forest landscape. Seedlings emerge early in the spring and quickly outcompete native Adirondack flora. In addition, phytotoxins in the garlic mustard's root tissue works to suppress the growth of adjacent plants. Zachary Simek conducted management of garlic mustard on the Moose River Road in the town of Forestport by hand pulling second year plants. The removal of second year individuals with their root system helps to decrease the population of viable plants and the existing seed bank. Over several years of active management, this will ideally result in complete eradication. Over a 3 week period, Simek removed more than 10 large contractor bags of plants from the site and disposed of them properly. On July 10th, he also assisted CAP-21 in their efforts to remove garlic mustard from the village of Old Forge.

Steward Zachary Simek also assisted APIPP by monitoring for pale swallowwort along Farr Road and North Lake Road in the town of Remsen. Pale swallowwort is a perennial, twining herbaceous vine. It is capable of growing in very dense patches that can crowd out native vegetation from fields, grasslands and roadsides. APIPP's terrestrial invasive species coordinator, Brendan Quirion, identified one small patch of pale swallowwort on Farr Road in early May. Simek surveyed seven miles of Farr road in late July and did not observe any additional plants. The steward removed the previously identified plant by digging up the entire root ball before the plant was able to reach seed. In addition, Simek surveyed an eight mile section of nearby North Lake Road for any other isolated patches of swallowwort plants. No plants were observed on this section.

Adirondack Park Invasive Plant Program: Volunteer Aquatic Monitoring

Zachary Simek

Eurasian watermilfoil

Variable Leaf milfoil

Early detection of AIS is vital to their control and possible eradication. Plant surveys are an essential step in determining what, if any, AIS are present in a water body. Surveys are used to locate new infestations, as well as track the spread of known populations. The Adirondack Park Invasive Plant Program runs a monitoring project that allows citizen volunteers to survey a lake or pond of their choice for AIS. This summer watershed stewards Whitney Boshart, Dan Johnson, Zachary Simek and Meg Smith conducted an aquatic plant survey of 6th and 7th Lake.

On May 27th stewards attended APIPP's Aquatic Invasive Plant training in Raquette Lake to hone their identification skills and learn the necessary steps of the survey process. The survey was conducted on August 8th using the rake toss method aboard the Watershed Stewardship Program boat. Stewards cruised the shoreline and casted the rake into areas that could potentially harbor AIS. Areas of interest included inlets, outlets, boat launching sites and existing native plant beds. Stewards identified nine instances of aquatic AIS on 7th Lake. The identified organisms included 7 locations of Eurasian watermilfoil and 2 locations containing Variable Leaf Milfoil. The infestations ranged from single plants to extensive dense beds greater than 250 square feet. Stewards also identified 4 locations containing Variable Leaf Milfoil on 6th Lake.

All areas containing AIS were documented, mapped and the results were sent to APIPP for their consideration. Additionally, all survey data was input to imapinvaisives.org, an online data management system that allows users to view documented locations of invasive species.

Appendix

Staff Profiles

	Whitney Boshart is originally from Calcium, NY where she attended Indian River High School. She is 2013 graduate from the State University of New York (SUNY) at Potsdam where she majored in biology and psychology. While attending SUNY Potsdam she played lacrosse. The main reason why Whitney is a steward is to help prevent AIS from taking over the Stillwater Reservoir. She grew up near the Reservoir and has spent a majority of her life enjoying its beauty. Whitney assisted DEC forest ranger Luke Evans, a former PSC grad, with some of his duties this summer.
	Chris Broccoli is going into his third year at Paul Smiths College, where he is studying natural resource management and policy. Chris was born and raised in New Hartford, NY where he graduated from New Hartford High School. Chris loves the outdoors and enjoys snowmobiling, hunting and fishing in the Adirondacks. Chris has grown up in the Adirondacks and feels that it is vital to preserve its clean lakes for future generations, which is one of the main reasons that he is a steward.
	Sam Durfey is from Tupper Lake, NY. She is a junior at the University of Alabama (Roll Tide!) where she is studying microbiology and working in an ecology research lab. Sam enjoys horseback riding, swing dancing, kayaking, and playing board games. She decided to become a steward because she grew up fishing and canoeing on the local lakes with her dad, and she wants future generations of kids to be able to have that experience, too.
	Margaret Empsall is from Chateaugay, New York and is a student at SUNY Plattsburgh. She studies art history and paints in her spare time. Margaret has previously volunteered with the Chateaugay Lakes Association monitoring AIS in the lake and is proud to work with the Paul Smith's Adirondack Watershed Institute.

	Paul Garrison is in his junior year at Paul Smith's College where he is pursuing a degree in environmental studies. Paul is originally from Albany, New York but moved to Petersburg, New York a few years ago. His family owns a summer home on Fourth Lake where he visits frequently throughout the summer. His favorite outdoor activities include fishing, kayaking, and water skiing. Paul chose to be a watershed steward because he wanted to protect the lakes that he has grown up on and loves so much. Paul was a loon monitor on Big Moose Lake.
	Tim Grossman is originally from Westmoreland, NY and is in his senior year at Paul Smith's College. This is Tim's second year working as a lake steward and he says that he really enjoys keeping the lakes free from AIS. Tim enjoys doing just about everything outdoors including cross-country skiing and running. Along with being a lake steward, Tim is also working on a loon monitoring project.
	Kimberly Hahn is a recent graduate from the State University of New York at Buffalo with a B.S. in environmental studies and a minor in geography. She has always loved the mountains and the outdoors in general. She enjoys helping people become interested in the environment so that they can learn how to protect it. Kimberly is the West-Central WSP weekend supervisor. She lived at the Great Camp Sagamore for the summer which is one of several historic Great Camps located in the Adirondack Park
	Dan Johnson is originally from Sayville, New York and is in his senior year at SUNY Potsdam. Some of Dan's hobbies include fly fishing, bow hunting, ice hockey and skiing. Dan says he is a steward because he grew up camping in the Adirondacks every summer and he has fallen in love with the area over the years and he wants to help protect it. Dan lived in Raquette Lake, NY for the summer and primarily worked there.

	Stephanie Korzec is originally from Hardwick, Massachusetts. She is a recent graduate from Paul Smith's College where she graduated with a B.S. in natural resources management and policy. Some of her hobbies include fishing, hiking, camping and being with friends. Stephanie is the Watershed Stewardship Program weekend supervisor for all of the eastern lake stewards.
	Kirsten Lajoie is a senior at Cornell University where she is majoring in the science of natural and environmental systems with a concentration in environmental information science. Kirsten grew up in Queensbury, NY, a small town at the base of the Adirondacks. She enjoys hiking, trail running and Nordic skiing. The stewardship program appealed to her as an exciting experience to help save the Adirondack lakes and learn about AIS. Kirsten is going to be stewarding at Saratoga Lake this summer.
	Daniel Levy is a mathematics major at the University of Massachusetts in Amherst. He is 23 years old and plans on becoming a high school math teacher. During his time at UMass, he was part of the UMass Drum line in the marching band. If he had to describe himself, he would say he is a computer nerd who enjoys both video and board games. Dan is both living and stewarding at Long Lake for the summer.

	Jackie McCabe is a senior at Paul Smith's College where she is an environmental studies major with a minor in geographic information systems (GIS). Jackie is a steward at Rainbow Lake, Lake Placid, and Upper St. Regis Lake as well as a summit steward for St. Regis Mountain. The reason she loves being a watershed steward is because it allows her to educate people as to why it is so important to keep our lakes safe from aquatic hitch hikers and also because she has found a strong love for these lakes after being surrounded by them while attending Paul Smith's College.
	Megan O'Reilly is a 2010 graduate from Le Moyne College and a local of Saranac Lake, NY. She is a steward because she wants to help protect the lakes that she has enjoyed by growing up in this area. She enjoys traveling and learning languages in her spare time. Megan will be helping WSP Science Director Dr. Celia Evans with her milfoil desiccation project.
	Eric is a returning steward and a recent graduate of Paul Smith's College. He received his first Bachelor's degree in business and technology management from Clarkson University, and has just completed his second Bachelor's in natural resources management and policy at Paul Smiths College. Eric enjoys hiking and paddling in the Adirondack High Peaks region.
	Deanna is a junior at Paul Smith's College pursuing a degree in natural resource management and policy; she plans on graduating early in December of 2014. The Adirondacks have been a big part of her life, which sparked her interest in going to school to protect the land and waters she loves. Public outreach is something she feels is very important and loves to be involved with. She enjoys being outside during the summer months and staying busy with all kinds of different things. Deanna is going to be stewarding at Saratoga Lake this summer.

	Greg Redling lives in the Town of Waterford, NY. He graduated from Shenendehowa High School with an Advanced Regent's diploma and is a recent graduate of Paul Smith's College studying environmental studies with a dual major in natural resources management and policy. As a child the outdoors was a place of adventure and discovery. To this day that sense of adventure has morphed into a partnership with nature and the outdoors. He wants to strengthen his bond with it because it lent so much of itself to him as a child. He is also an avid kayaker and hiker and enjoys playing basketball in the winter months.
	Derek Scott is a senior at Paul Smith's College, where he is currently majoring in environmental science, as well as minoring in chemistry. Derek is originally from Pennsylvania but he now lives in Goshen, New York. He loves spending time outside, whether it's running, hiking, or snowshoeing. This is Derek's second season working as a watershed steward. Derek is working with Dr. Celia Evans on a purple loosestrife management project along with being a steward.
	Jake Sewartka is originally from northern New Jersey and is currently majoring in ecological forest management along with forest biology at Paul Smith's College. Jake is also minoring in biology, environmental science and GIS. He feels that the importance of educating the public about AIS is vital to maintaining a healthy ecosystem. This is Jake's first year working as a watershed steward.
	Martin Sewartka is originally from northern New Jersey and is currently majoring in environmental sciences at Paul Smith's College. He enjoys any outdoor activity as long as he's not in New Jersey. Aside from spending his summer as a lake steward, he also works as a lab technician for the AWI. After graduating next semester, Martin plans on continuing his education in the field of paleoecology.

	Zachary Simek is originally from Gloversville, NY. He is currently majoring in natural resource management and policy at Paul Smith's College. Zack enjoys hiking, camping, fishing and pretty much anything else outdoors. He became a watershed steward to help protect a valuable resource that he loves. Zack lived in the town of Inlet, NY for the summer and stewarded on both Fourth and Raquette Lakes. Zack is also worked with APIPP (Adirondack Park Invasive Plant Program), where he surveyed for AIS as well as worked on the management of garlic mustard and pale swallowwort.
	Meg Smith is a 2013 graduate of Long Lake Central School, where she attended from pre-K through 12th grade. She has spent her whole life in Long Lake, New York and loves the Adirondacks very much. Meg says she is very happy to be working as a Watershed Steward this summer helping to protect the Adirondack lakes. In her spare time Meg likes to paint, swim, hike, play music, and canoe.
	Skyler Wysocki lived in Otter Lake, NY for the summer where she stewarded both White and Fourth Lakes. Skyler is a current student at Paul Smith's College and is majoring in biology; she is also minoring in chemistry as well as GIS. Skyler loves hiking, running, biking, kayaking, bird watching, painting, scuba diving, skiing, and really anything you can do outside with family and friends! She became a steward due to her love of the Adirondacks; she loves the people here, the wildlife, the culture and its history. She says she is honored to help protect it. Skyler is also the loon monitor on Nick's Lake.
	Anthony Ventello is originally from Towanda, Pennsylvania which is where he says he found his love for the outdoors. He is a senior at Paul Smith's College where he is majoring in natural resource management and policy. Anthony is an avid skier and fisherman; he also plays soccer for Paul Smith's where he is the team captain. Anthony lived in Bloomingdale, NY for the summer and stewarded numerous lakes throughout the region. He said the main reason that he decided to become a steward is due to his overwhelming love for the Adirondacks and he would hate to see its lakes infested with AIS. Anthony is also in charge of the social media aspect of the WSP (Facebook and twitter).

	WSP Science Director Celia Evans 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 a Professor of Ecology in the School of Natural Resource Management and Ecology plant / soil / herbivore interactions and plant physiology and nutrition in forested and aquatic ecosystems. Celia also conducts research in science education with particular emphasis on Place based science education and ecological literacy. Dr. Evans has published in the Canadian Journal of Forest Research (1998), Conservation Biology (2005), Journal of Aquatic Plant Management (2011) and other journals.
	WSP Assistant Director Kathleen Wiley is working with the Watershed Stewardship Program for the third season. She has a bachelor's degree in environmental science and a master's degree in environmental and forest biology from SUNY Environmental Science and Forestry. She is pursuing a doctorate in conservation biology at Antioch University in Keene, NH. She has three cats and a dog and enjoys getting outside with her husband whenever she can.
	Professor Eric Holmlund is Program Director for Liberal Arts, Environmental Studies and Recreation at Paul Smith's College as well as the Director of the WSP. He is co-author of a book, The Camper's Guide to Outdoor Pursuits and has been a full time faculty member at PSC since 1998. He and his wife Kim have a daughter, Dana, and twin boys, Will and John. He enjoys most outdoor activities, especially canoeing, xc skiing, and camping. Eric has a Ph.D. in Environmental Studies.

Quality Assurance Project Plan

Lake Ontario Headwaters Watercraft Inspection Program (2012-2014)

Version 2 (Excerpts)

Prepared by:

Dr. Eric Holmlund, Director, Paul Smith's College Watershed Stewardship Program

Prepared for:

United States Environmental Protection Agency

U.S. EPA Region 2

Great Lakes National Program Office

77 West Jackson Blvd., G-17J

Chicago IL, 60604

(…)

Problem Definition/Background:

The Lake Ontario Headwaters Watercraft Inspection Program will protect the integrity of the headwaters of eastern Lake Ontario through aquatic invasive species (AIS) prevention activities in the western Adirondack Park. This project is a continuation/renewal of a project of the same title funded by the U.S. EPA and implemented in January of 2012, concluding in January of 2013. Watercraft inspectors at public boat launches educate the public about aquatic invasive species and intercept new introductions of aquatic invasive species through inspection and hand removal of boat-borne organisms. The project is part of an integrated approach to invasive

species management and safeguards public waterways within the Great Lakes basin in the long term.

Beginning in October 2012, Paul Smith's College Watershed Stewardship Program (WSP) will initiate a two-year project to implement a landscape-level watercraft inspector program, continuing the Eastern Lake Ontario-Upper Watershed Watercraft Inspection Program funded by the GLRI/USFWS in the 2011 and 2013 field seasons, and the GLRI/EPA in 2012, also managed by Paul Smith's College. The program will be supervised by staff at Paul Smith's College Adirondack Watershed Institute (AWI). Watercraft inspections will take place within waterways located within five watersheds of Lake Ontario: the Oswegatchie River, Raquette River, Black River, St. Regis River and Chateaugay River watersheds. Waterways with public access sites where inspectors will be located within the Oswegatchie River Watershed will include Cranberry Lake and access sites along the Oswegatchie River. Within the Black River Watershed, watercraft inspectors will be located at public boat ramps including 4th Lake (located in village of Inlet), 7th Lake, 8th Lake State Campground, Stillwater Reservoir, and Limekiln Lake State Campground. Within the Raquette River watershed, watercraft inspectors will be located at Raquette Lake, Long Lake and Tupper Lake. Within the St. Regis River watershed, watershed inspectors will be located at the St. Regis Canoe Area and Meacham Lake State Campground. Within the Chateaugay River Watershed, watercraft inspectors will be located at the Chateaugay Lake State Boat Launch. Inspectors will prevent the spread of AIS by performing careful inspections of all watercraft launched at and exiting these sites, as well as educating the public in order to increase visitor understanding of AIS issues and spread prevention measures that they can take themselves.

(…)

A7 – Quality Objective and Criteria for Measurement of Data

The boat launch survey information that will be collected to support overland aquatic invasive species spread prevention will meet the quality assurance objective described in this section.

Objective.

The project data-quality objective is to collect, provide, maintain, analyze, document, and disseminate valid boat launch user survey information.

Data Quality Criteria.

Data will be evaluated for accuracy, precision, completeness, and comparability. Each steward program will collect the following data from each visitor group: launch or retrieve, boat type, state of registration, aquatic organisms found, species identification, spread prevention

methods, and last body of water visited in two weeks.

Data accuracy: Data will be evaluated for accuracy by comparing documented data with reasonable standards and benchmarks for traffic levels, boat types, and prior-visit gathered in past-year or early-season records. Stewards will review their data at the end of shifts to catch obvious errors or mistakes in data entry. For example, if a common total number of motorboats encountered at a given boat ramp is 25, the steward will question whether a total of 250 is accurate and find and correct the error. Example #2: a steward records the state of registration as MX. No such state abbreviation exists. Program administrators will scrutinize data from each boat ramp on a weekly basis to catch possible errors in accuracy.

Data precision: Data precision refers to illegibility of hand-written data forms and cell/column transposition or keyboard entry errors in the case of digital data capture. Stewards will examine each day's data entry at the end of their shifts for precision. Administrators will do the same on a weekly basis.

Data completeness: Data completeness refers to blank cells on hand-written forms and databases. Blank cells are problematic as it becomes unclear whether the blank indicates a negative/absent value or a neglected observation. Stewards will examine each line of data on an ongoing basis to complete each required cell. Negative/absent values will be indicated by a dash (--) on handwritten forms. Administrators will review data forms and databases on a weekly basis to clarify and populate empty cells and/or lines of data by querying the steward responsible for the data.

Stewards are to attempt to inspect 100% of watercraft encountered during duty hours at boat ramps.

Data comparability: Data comparability refers to a given time period's data being comparable to other days, weeks or months at the same boat ramp and between boat ramps and years. Data that is unusually variable (+/- 20% in total visits or invasive species encountered, for example) will necessitate a review of the suspect data by the program manager. Data will be reviewed for comparability by program administrators every two weeks or more frequently.

Data Quality Assurance Procedures:

The Watershed Stewardship Program administrative team (Director, Science Director, Assistant Director) is responsible for checking in with the stewards weekly to review and collect the field survey forms (or digital equivalents) and check their completeness. Administrators or designees will review each and every data sheet weekly, make a photocopy of each, and return the originals to the stewards responsible for data entry. A data entry that includes incomplete or

unclear fields will be marked for QA review. If the data point cannot be clarified then it will be excluded from the data set. Boat launch stewards are responsible for recording their field survey forms into an electronic Excel sheet form on a weekly basis. The WSP administrative team (Quality Assurance Managers) is responsible for receiving, saving and storing the electronic data and checking the accuracy of the electronic data entry against the field survey forms. If there are inconsistencies the QA Manager will alert the steward to the issue to prevent further inaccuracies and correct the data point. If the QA Manager finds multiple inaccuracies within the same data field then the steward will be asked to review entries in that field for accuracy.

The weekly review of both the field survey forms and the electronically submitted data will allow for the quick correction or clarification of mis-entered, confusing, or incomplete data. Weekly review will allow the QA Manager to meet with and correct any data entry issues with the boat launch stewards quickly.

The Program Manager may alter the boat launch field survey form to meet the needs of the grantee organization. However, parameters that have been indicated as mandatory data points must be collected.

(…)

Performance and acceptance criteria. All field survey forms must be filled out completely and clearly (legibly) by the boat launch stewards. Stewards are responsible for entering their field survey data into electronic Excel format at the end of every week. Commitment and dedication to timely submittal and quality assurance review by the QA Manager will help to identify and/or clear up any confusion about data entry early in the season. Any discrepancies between the field survey forms and the electronic data that are discovered by the QA Manager should be resolved with the steward immediately so data accuracy is maintained. Should irresolvable discrepancies between the electronic and field data forms or uncertainties due to incomplete data recording arise, then the questionable data will be omitted from totals and further statistical analysis. The data reviewer will provide an explanation regarding why (quality, accuracy, legibility, etc.) data is omitted.

Boat launch stewards are responsible for recording their field survey forms into an electronic Excel sheet form and sending them to the Boat Launch Steward Manager weekly. The Boat Launch Steward Manager is responsible for receiving, saving and storing the electronic data and checking the accuracy of the electronic data entry against the field survey forms. The data manager will review at least 10% of each steward's field and electronic data sheets at random. If there are inconsistencies the QA Manager will alert the steward to the issue to prevent further inaccuracies and correct the data point. If the QA Manager finds multiple inaccuracies within the same data field then the steward will be asked to review entries in that field for accuracy.

A8 – Special Training Requirements/Certifications

Boat launch stewards will attend the Paul Smith's College Watershed Stewardship Program training in Paul Smiths, NY. Training will include interpretive techniques, background on invasive species ecology and identification, boat inspection guidelines, safety and risk management, data collection and entry procedures, orientation to the Adirondack Park, interaction with resource management and law enforcement officials, significance of data within natural resource management planning, cultural history, on-site orientations, first aid, and interactions with local stakeholders.

A9 – Documentation and Records

Data sources will include boat launch survey interviews (paper, electronic) with boat launch users. Both the boat launch stewards and the WSP administrative team are responsible for keeping copies of the electronic data that is entered for the duration of the season. The data will be saved in Microsoft Office Excel (and/or Access) format, and will be sent to the EPA Project Officer upon project completion.

All field survey data will be collected and recorded by the boat launch stewards in the field. Each steward is responsible for entering their field survey data weekly into an electronic Excel format. Stewards must also provide the Boat Launch Steward Manager with the field survey forms after the data has been entered so that the Boat Launch Steward Manager may conduct a quality review of the data (every 1-2 weeks).

The electronic Excel formatted data may be imported into Access or Excel (or equivalent software). The Program Manager is responsible for providing a summary of the information from the program in the final report.

B – Measurement/Data Acquisition

(…)

B2 – Sampling and Data Acquisition Methods

Boat launch stewards will collect all data in the field at select boat launches. Stewards are able to collect nearly half of the boat launch user data without talking to the boat launch user. The steward will be trained in a number of different ways with which to deliver their aquatic invasive species spread prevention interpretive message. Stewards need to take care and use their best judgment of when to engage the boat launch user at the boat launch so as to avoid conflict. Stewards should aim to deliver their message to boat launch users retrieving their boats before they have them loaded onto their trailer and pulling away from the launch. Stewards should deliver their message to boat launch users launching their boats as they are preparing their vessels for launch on the boat launch and before the boat touches the water. If a visitor refuses to engage the steward, and/or refuses to engage in a boat inspection, the steward will note this

in the data form. This is a limitation of the data: stewards will not perform boat inspections on vessels owned by visitors who refuse to participate.

All boat launch steward field survey forms must be filled out completely (See Appendix A). Lack of data entry in the field survey form will be considered as "no information was collected". Legible and organized field survey forms are imperative for quality assurance checks against the electronic data. Descriptions of each column of the Boat Launch Steward field survey form and how entries should be recorded are below (note that not all of these parameters are mandatory).

- **Time** will be recorded in military time with a semicolon separating the hour from the minutes. The time that is recorded is the time when the boat approaches the boat launch to either launch (from the road or boat launch) or retrieve (from the body of water) and the steward then begins collecting the survey data. This data may be collected without any contact with the boat launch user.
- **Launch/Retrieve** is indicated when stewards record the time of contact in the appropriate box on the form: either under "launching" or "retrieving." If the boat is inspected as it launches and again as it is retrieved, then the steward will enter two times of contact. This data may be collected without any contact with the boat launch user.
- **Boat type** is recorded as "M" if it is a motorized vessel, "PWC" if it is a personal watercraft or jetski, "S" if it is a sailboat, "C" if it is a canoe, "K" if it is a kayak, and "R" if it is a rowboat. If there is another boat type, the steward should record the best match for the vessel encountered. For example, a barge is a not represented in the survey key, but is motorized and should be recorded as "M". This data may be collected without any contact with the boat launch user.
- **Group size** is recorded as the total number of people that are part of the vessel party. It is recorded as a numeral. This data may be collected without any contact with the boat launch user.
- **State of registration** is recorded in two capital letters that represent the U.S. state of vessel registration, as observed on the registration stickers on motorboats. Non-motorized vessels do not have a state of registration and the field should then be left blank. If the vessel is registered in a Canadian province that should be represented similarly with two capital letters representing the province, with the exception of Prince Edward Island (PEI). Quebec would be represented as "QC". New Brunswick is represented as "NB", etc. This data may be collected by observation without any contact with the boat launch user. Note that there are some discrepancies between Coast Guard abbreviations (used on boat registration stickers) and U.S. Postal Service abbreviations for states. Stewards are directed to record what they see; in the data analysis procedure, translations to US Postal Service abbreviations will be made. (Example, Massachusetts is denoted on boat registration stickers as "MS" while the Postal Service abbreviation is "MA.")
- **Prior BLS contact (Y/N)** is a simple question that the steward asks the boat launch user. The appropriate question to ask is "Have you ever encountered a boat launch steward before"? This is recorded with a "Y" if the boat launch user has encountered a boat launch steward before and "N" if it is the first time the user has encountered a boat launch steward; contact with any boat launch steward (not just regional stewards)

receives a yes answer. The answer to this question will help the steward form their interpretive message to the boat launch user. This question is an optional part of the data set for 2014.

- **Aquatic organism(s) found (Y/N**) represents whether the steward found any aquatic plants or animals on the boat, trailer, or other recreational equipment during their inspection. "Y" indicates that organisms, native or non native, were found. "N" indicates that no organisms were found. A blank cell indicates that the steward did not inspect the boat or have time to look for organisms. This is a mandatory data point.
- **Species identification** is where the steward fills in the abbreviation for the species found or writes in the species name if no abbreviation is provided on the field survey form. If multiple species are found they must all be recorded in this cell. A blank cell indicates that no species were found (which should be indicated in Aquatic organism(s) found cell as "N") or that a species was found but was not able to be identified in the field**.** In such a case the steward is required to take a sample to send to the state of Vermont for identification. The steward is responsible for filling in this data point once the species has been identified. This is a mandatory data point.
- Stewards must contact their Boat Launch Steward Manager to let them know they have found a species that they were not able to identify. All samples may be sent to:

  Corey Laxson, Research Associate

  Adirondack Watershed Institute
  Paul Smith's College, P.O. Box 265
  Paul Smiths, NY 12970

  518-327-6101

  claxson@paulsmiths.edu

  Protocol for collecting aquatic organism specimens is provided in Appendix B and procedures will be reviewed at the steward training.

- **Spread prevention methods** is the place where the steward indicates whether or not the boat launch user/vessel owner has taken any spread prevention measures to reduce the spread of AIS. Abbreviations are provided for common spread prevention steps on the field survey form. If the vessel owner takes some action to prevent the spread of AIS that is not indicated on the sheet then the steward should write that method in. A blank indicates that the steward did not have time to ask the question or the vessel owner did not answer the question. If the vessel owner has not/does not take steps to prevent the spread of AIS, that should be indicated on the field survey form as "none". Multiple spread prevention measures may be entered in the space provided. The appropriate question the steward should ask is "Do you take any steps to prevent the spread of AIS?" The steward should not list possible spread prevention measures in order to elicit a response from the vessel owner, but if the owner indicates that they do not take any measures the steward should record that and then provide examples of easy measures the vessel owner may take.
- **Last waterbody visited in 2 weeks (name, town, state)** is recorded as the name of the body of water, the town, and the state. The name of the body of water and the state in which it is located must be recorded. The town name should be collected when

possible. In the case of Lake Champlain no town or state is necessary. Stewards must pay particular attention to spelling. Many vessels will not have been in any body of water in the past two weeks and in that case the steward will record "none". Stewards should only record the name of the body of water, the town, and the state of the body of water if the vessel has visited it in the past two weeks. If a vessel has been in multiple bodies of water in the past two weeks then the steward must only record the most recent body of water that the vessel was in during the past two weeks. A blank indicates that no data was collected because the steward did not have time to ask the question or the vessel owner refused to answer.

(…)

B6- Specimen identification procedures

In the event that a steward cannot identify a sample in the field, the following procedure will be applied. Using permanent ink, stewards will label a plastic, sealable bag with the following information: Date, location, name of steward, time sample was obtained, location on boat/trailer, type of watercraft, water body visited last. See Appendix B for further details and the appropriate form. Samples will be kept cool (not frozen) and transported to the AWI building and inserted into the sample refrigerator in the basement laboratory as soon as possible after the end of the steward's shift. Stewards will notify their supervisor immediately once they have submitted a sample. The supervisor will alert the designated aquatic plant specialist, Research Associate Corey Laxson, if a sample is present and requires examination. The aquatic plant specialist will supply a final identification, if possible, which will be added to the appropriate place in the database (associated with the boat inspection, place, time, etc.). After identification, aquatic plants will be disposed of by composting on dry land, well away from surface water or intermittent stream flow areas.

B7- Data Management

See section A9 above.

C – Assessment/Oversight

C1 – Assessments and Response Actions

The Program QA Officer will review all project output. The Program QA Officer (or designee) will have the authority to issue a stop work order upon finding a significant condition that would adversely affect the quality and usability of the data. The Program QA Officer will document, implement, and verify the effectiveness of corrective actions, such as an amendment to the QAPP, and take steps to ensure that everyone on the distribution list is notified.

The Program Manager and WSP Administrative Team (Science Director and Assistant Director) will perform regular site inspections on a weekly basis with each employee. Each employee will receive at least two visits per month in the field, depending on work load and external conditions. WSP administrators will assess the data collection process and the effectiveness of employee interactions with the public, if there are visitors at the time of the inspection.

C2 – Reports to Management

Quarterly reports will be submitted to Mario Paula, EPA Project Officer. There will be a comprehensive final report including recommendations for improvement. Additional reports or other information related to project status, concerns, completed deliverables, or any other project needs will be provided when requested.

D – Data Validation and Usability

D1 – Data Review, Validation, and Verification Requirements

The data quality will be reviewed for logical consistency and coding errors as identified in appropriate standards. The Program QA Officer will be responsible for overall validation and final approval of the data in accordance with project purpose and use of the data.

D2 – Validation and Verification Methods

The Program QA Officer will provide review and approval of the data before closure of the project. The Program QA Officer will also compare final datasets with original source information for consistency.

D3 – Reconciliation with User Requirements

Once the data results are compiled, QA Officer and EPA Project Officer will review the data quality to determine if it meets standards for acceptance and dissemination. The QA Officer and EPA Project Officer will apply their professional and institutional standards, which will likely include internal consistency (data sums equally across categories), correctness (proper use of formulas, calculations and statistical tests), and completeness. Applicability of the data will be evaluated on a project-by-project basis when necessary. Limitations of the data will be discussed with the EPA Project Officer and documented within the project final report. Completeness will be evaluated to determine if the completeness goal for this project has been met. The completeness goal is 14 weeks of data for boat launches staffed on a weekly basis. If the quality of the data does not meet the project's requirements, the data may be reevaluated to determine why the data quality did not meet the goals. Efforts will be made to determine inconsistencies in the base data or correct errors in the attribute data. If inconsistencies are found in the quality of the base data, an effort will be made to identify and obtain more accurate base data.

(…/end)

Boat Launch Use Data Summaries

Chateaugay Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: CHATEAUGAY LAKE 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 1365 **% of visitors taking spread prevention measures: 86%**
AIS intercepted: 164 **% inspected boats with organisms: 19%**
 # visitors: 3423 **# of previously visited waterways: 36**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Chateaugay Lake	1137	165	9	29	16	0	9	0	0	1365
percentage of total boats	83%	12%	1%	2%	1%	0%	1%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Chateaugay Lake	3423	32	404	248	1339	19%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Chateaugay Lake	1152	1126	423	14	0	6	0	53	12	1341
percentage of total # groups asked	86%	84%	32%	1%	0%	0%	0%	4%	NA	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Chateaugay Lake	0	23	151	139	94	11	4	2	5	0	0	0	7	164	12%
percentage of organisms removed	0%	5%	35%	32%	22%	3%	1%	0%	1%	0%	0%	0%	2%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

Chateaugay Lake: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
curly-leaf pondweed	0		23	Chateaugay Lake (23)
Eurasian watermilfoil	6	Chateaugay Lake (5), St. Lawrence River	133	Chateaugay Lake (123), Chazy Lake (5), None (3), Lake Champlain, Richelieu River
variable-leaf milfoil	2	Chateaugay Lake (2)	0	
totals	**8**		**156**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

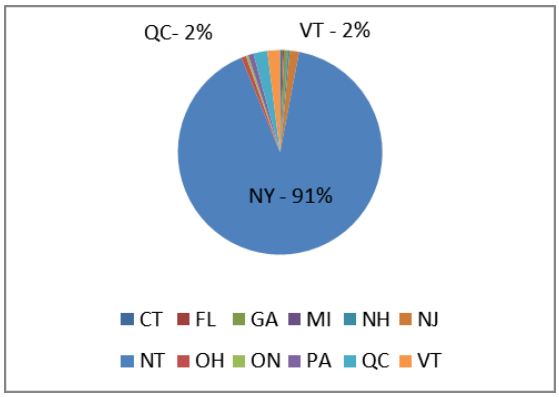
December 31, 2013

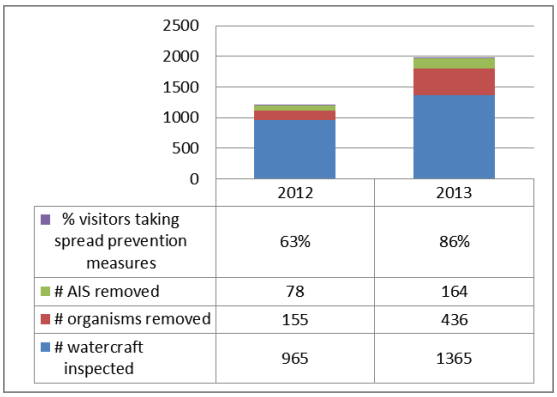
ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: CHATEAUGAY LAKE 2013 BOAT LAUNCH USE SUMMARY

Chateaugay Lake: Waterways visited in previous two weeks, 2013	# visits
Chateaugay Lake	879
None	290
Lake Champlain	47
St. Lawrence River	29
Chazy Lake	28
Upper St. Regis Lake	11
Mountain View Lake	9
Oneida Lake	8
Buck Pond	7
Meacham Lake	6
Upper Saranac Lake	6
Saranac Lake Chain	5
Did not ask	4
Fish Creek Ponds	4
Lebanon Resevoir	4
Norwood Lake	3
Chesapeake	2
Indian Lake	2
Lake Ontario	2

Chateaugay Lake: Waterways visited in previous two weeks, 2013	# visits
Lake Roxanne	2
Little Tupper Lake	2
St Regis River	2
Tupper Lake	2
Connecticut Lakes, NH	1
Cranberry Lake	1
Did not know	1
Jones Pond	1
Lake Flower	1
Lake George	1
Lake Kushaqua	1
Lake Titus	1
Lower Saranac Lake	1
Rental	1
Richelieu River	1
Round Valley, NJ	1
Silver Lake	1
Skaneateles Lake	1
Wilcox pond	1
total	1346

State/Province of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Cornwall
Brockville
Napanee
Kingston
Watertown
Syracuse
Auburn
Utica
Plattsburgh
Saratoga Springs
Montpelier
VERMONT
Rutland
Keene
Brattleboro
NEW YORK
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft
Inspected at Chateaugay Lake, NY. 2013.
N
Legend
Prior_Waterway_Visits
Vector Lines
Adirondack Park Boundary

Cranberry Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: CRANBERRY LAKE 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 1423 **% of visitors taking spread prevention measures: 77%**
AIS intercepted: 26 **% inspected boats with organisms: 10%**
 # visitors: 3259 **# of previously visited waterways: 76**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Cranberry Lake	1141	69	6	107	96	0	4	0	0	1423
percentage of total boats	80%	5%	0%	8%	7%	0%	0%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Cranberry Lake	3259	80	68	124	1296	10%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Cranberry Lake	998	462	449	309	5	58	0	205	15	1290
percentage of total # groups asked	77%	36%	35%	24%	0%	4%	0%	16%	NA	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Cranberry Lake	0	3	3	19	65	3	1	4	36	0	0	0	14	26	2%
percentage of organisms removed	0%	2%	2%	13%	44%	2%	1%	3%	24%	0%	0%	0%	9%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

Cranberry Lake: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
curly-leaf pondweed	3	Cranberry Lake, Red Lake, St. Lawrence River	0	
Eurasian watermilfoil	14	No data (3), Black Lake (2), Canesius Lake (2), St. Lawrence River (2), Cranberry Lake, Lake Ontario, Red Lake, Upper Saranac Lake, Sandy Bottom Lake	5	No data (2), None (2), Otisco Lake
variable-leaf milfoil	1	Lake Bonaparte	3	Black Lake, Cranberry Lake, None
totals	**18**		**8**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

December 31, 2013

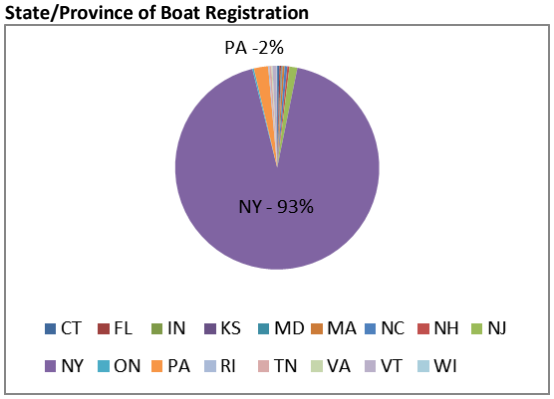
ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: CRANBERRY LAKE 2013 BOAT LAUNCH USE SUMMARY

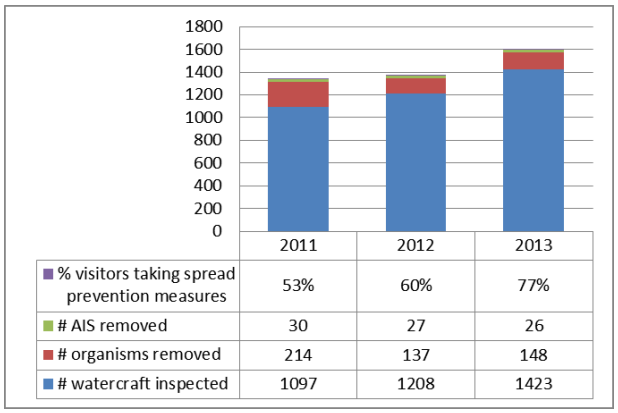
Cranberry Lake: Waterways visited in previous two weeks, 2013	# visits
Cranberry Lake	342
None	262
St. Lawrence River	42
Lake Ontario	30
Lake Bonaparte	19
Did not ask	16
Tupper Lake	15
Black Lake	14
Higley Reservoir	11
Black River	10
Oneida Lake	9
Oswegatchie river	9
Rental	9
Carry Falls Reservoir	8
Lake Champlain	8
Canandaigua Lake	7
Keuka Lake	6
Upper Saranac Lake	6
Hudson River	5
Lake Erie	4
Lake Flower	4
Lower Saranac Lake	4
Star Lake	4
Atlantic Ocean	3
Canesius Lake	3
Cayuga Lake	3

Cranberry Lake: Waterways visited in previous two weeks, 2013	# visits
Grasse River	3
Lake Placid	3
Lake Winnepesaukee	3
Long Lake	3
Red Lake	3
Salmon River Reservoir	3
Saranac Lake Chain	3
Skaneateles Lake	3
Sylvia Lake	3
Toronto Reservoir	3
Blake Falls Reservoir	2
Brantingham lake	2
Canada Lake	2
Charleston Lake, ON	2
Chateaugay Lake	2
Chubb pond	2
Cooperstown Lake	2
Erie Canal	2
Flat Rock Lake	2
Fourth Lake	2
Hatch Lake	2
Otter Lake	2
Rainbow Lake	2
Raquette River	2
Sandy Bottom Lake, MI	2
Saratoga Lake	2

Cranberry Lake: Waterways visited in previous two weeks, 2013	# visits
Stillwater Reservoir	2
Wallum Lake, MA	2
Allegheny Reservoir	1
Canadarago Lake	1
Cazenovia Lake	1
Conesus Lake	1
DeRuyter Reservoir	1
Fair Haven Bay	1
Finger Lakes	1
Fish Creek Ponds	1
Great Sacandaga Reservoir	1
Kayuta lake	1
Lake Kushaqua	1
Lake Waccamaw, NC	1
Lake Willoughby, VT	1
Lowes Lake	1
Newton Falls Reservoir	1
Norwood Lake	1
Otisco Lake	1
Otsego Lake	1
PA	1
Pleasant Lake	1
Schroon Lake	1
Seneca River	1
Watchaug Pond, RI	1
WI	1
total	853

State/Province of Boat Registration

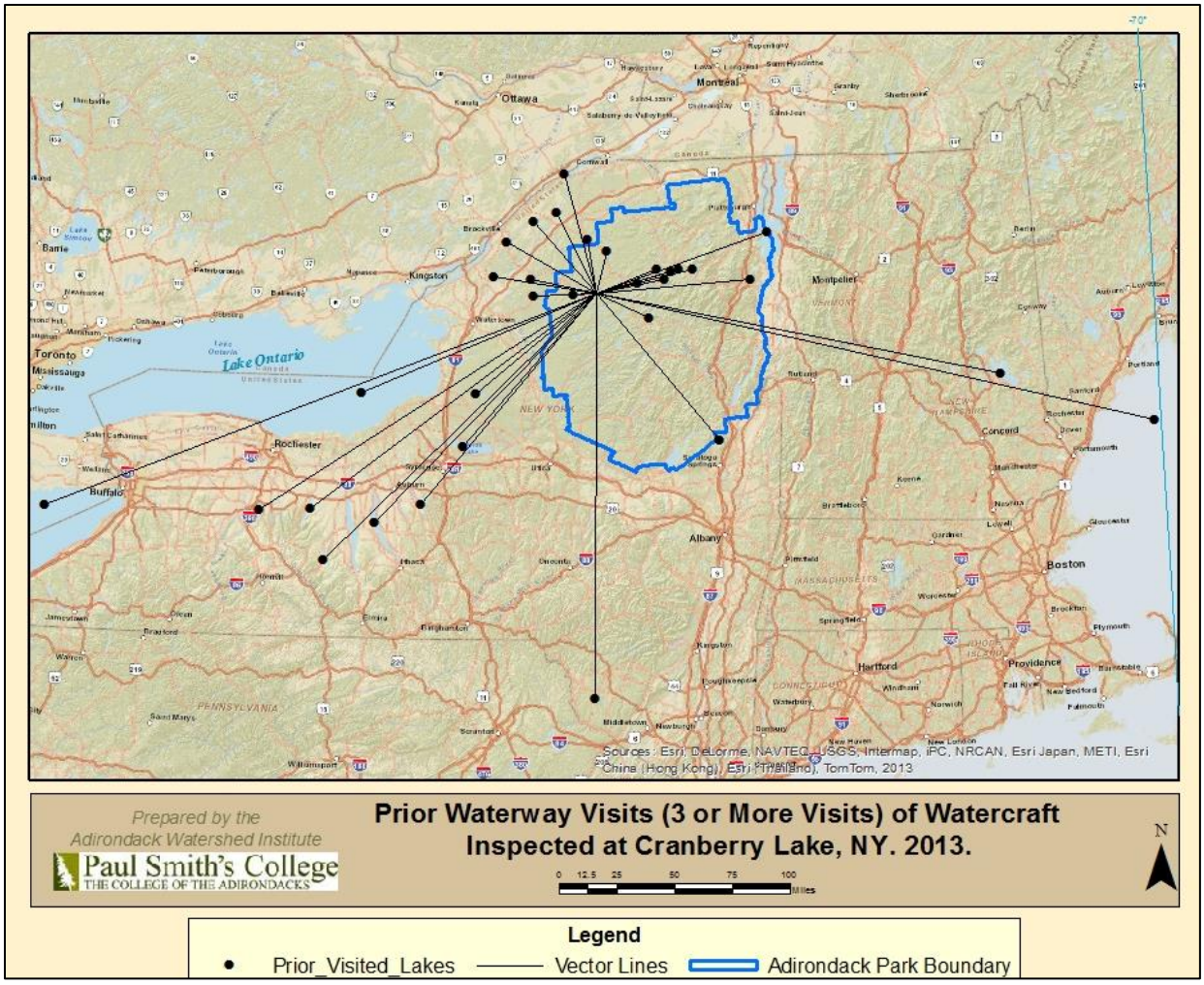




	2011	2012	2013
% visitors taking spread prevention measures	53%	60%	77%
# AIS removed	30	27	26
# organisms removed	214	137	148
# watercraft inspected	1097	1208	1423

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Ottawa
Montreal
Kingston
Toronto
Mississauga
Lake Ontario
Rochester
Buffalo
Albany
Boston
Hartford
Providence
Montpelier
Concord
Sources: Esri, DeLorme, NAVTEC, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri Thailand), TomTom, 2013
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft Inspected at Cranberry Lake, NY. 2013.
0 12.5 25 50 75 100
Miles
N
Legend
Prior_Visited_Lakes
Vector Lines
Adirondack Park Boundary

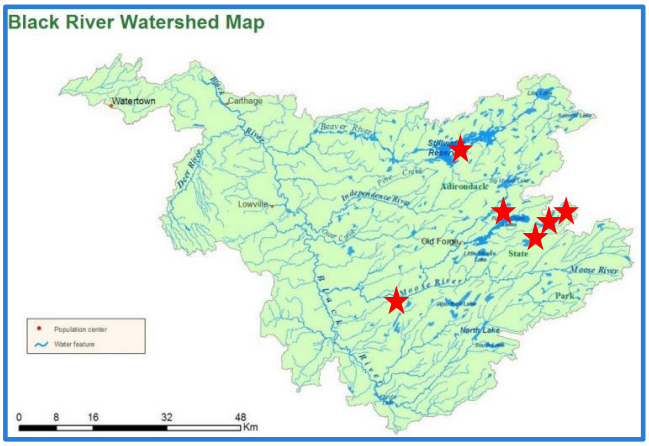

TAHOE

Eighth Lake, Fourth Lake, Limekiln Lake, Seventh Lake, Stillwater Reservoir and White Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: BLACK RIVER WATERSHED LAKES 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 3658
% of visitors taking spread prevention measures: 55%
AIS intercepted: 33
% inspected boats with organisms: 7%
 # visitors: 7782
# of previously visited waterways: 121



Map credit: NYSDEC

WSP Data Summary, 2013	Boat Type									total #
Black River Watershed Lakes	M	PWC	S	C	K	B	R	SUP	Docks	boats
Eighth Lake	17	0	1	20	15	0	1	2	0	56
percentage of total boats	30%	0%	2%	36%	27%	0%	2%	4%	0%	100%
Fourth Lake	1202	237	6	22	114	1	3	2	0	1587
percentage of total boats	76%	15%	0%	1%	7%	0%	0%	0%	0%	100%
Limekiln Lake	21	4	0	22	59	0	1	0	0	107
percentage of total boats	20%	4%	0%	21%	55%	0%	1%	0%	0%	100%
Seventh Lake	227	16	13	64	264	0	3	5	0	592
percentage of total boats	38%	3%	2%	11%	45%	0%	1%	1%	0%	100%
Stillwater Reservoir	479	29	4	207	299	0	3	3	4	1028
percentage of total boats	47%	3%	0%	20%	29%	0%	0%	0%	0%	100%
White Lake	152	38	2	4	73	0	4	7	8	288
percentage of total boats	53%	13%	1%	1%	25%	0%	1%	2%	3%	100%
totals	2098	324	26	339	824	1	15	19	12	3658
percentage of total boats	57%	9%	1%	9%	23%	0%	0%	1%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Black River Watershed Lakes	people	entering	leaving	dirty	inspections	boats dirty
Eighth Lake	109	0	0	0	43	0%
Fourth Lake	3815	92	54	120	1504	8%
Limekiln Lake	184	0	3	3	72	4%
Seventh Lake	998	31	32	55	420	13%
Stillwater Reservoir	2102	21	17	36	784	5%
White Lake	574	11	0	11	243	5%
totals	7782	155	106	225	3066	7%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: BLACK RIVER WATERSHED LAKES 2013 BOAT LAUNCH USE SUMMARY

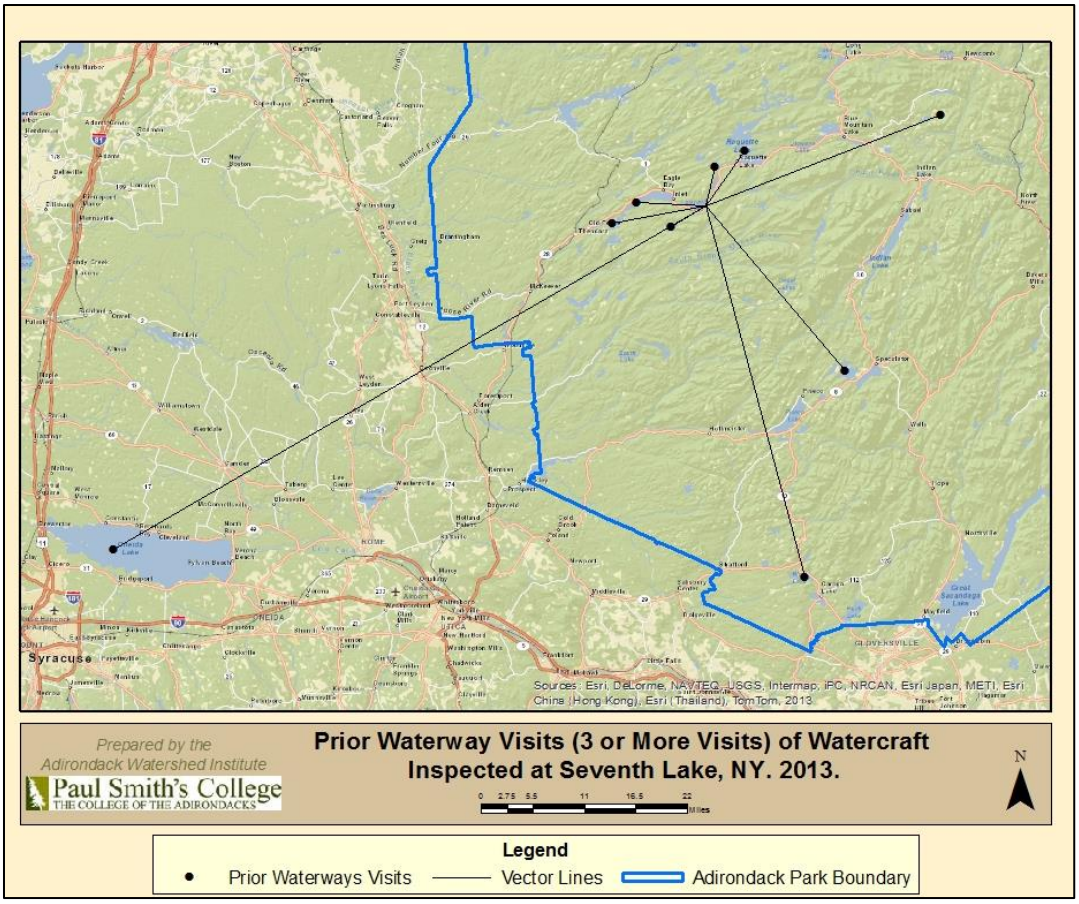
Black River Watershed Lakes: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
curly-leaf pondweed	5	Fourth Lake: Jamestown Reservoir, None, Oneida Lake; Stillwater Reservoir: Cayuga Lake, St. Lawrence River	0	
Eurasian watermilfoil	7	Fourth Lake: None (3), Cazenovia Lake, Lake Ontario, Oneida Lake, St. Lawrence River	5	Seventh Lake: None (2), Seventh Lake (2); Fourth Lake: None
variable-leaf milfoil	0		13	Fourth Lake: None (3), Fourth Lake (2), Delta Lake, First Lake, Lake Ontario, St. Lawrence River; Seventh Lake: Seventh Lake (3), None
water chestnut	1	Fourth Lake: Swinging Bridge Reservoir	1	Fourth Lake: None
zebra mussel	1	Fourth Lake: Lake Ontario	0	
totals	**14**		**19**	

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Black River Watershed Lakes	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Eighth Lake	25	20	9	1	0	0	0	3	0	43
percentage of total # groups asked	58%	47%	21%	2%	0%	0%	0%	7%	NA	100%
Fourth Lake	934	387	621	98	2	26	2	129	39	1484
percentage of total # groups asked	63%	26%	42%	7%	0%	2%	0%	9%	NA	100%
Limekiln Lake	35	11	27	2	0	0	0	4	2	72
percentage of total # groups asked	49%	15%	38%	3%	0%	0%	0%	6%	NA	100%
Seventh Lake	227	92	147	9	0	5	1	32	10	411
percentage of total # groups asked	55%	22%	36%	2%	0%	1%	0%	8%	NA	100%
Stillwater Reservoir	312	200	239	37	4	0	2	33	1	790
percentage of total # groups asked	39%	25%	30%	5%	1%	0%	0%	4%	NA	100%
White Lake	142	70	89	17	0	14	0	51	5	241
percentage of total # groups asked	59%	29%	37%	7%	0%	6%	0%	21%	NA	100%
totals	1675	780	1132	164	6	45	5	252	57	3041
percentage of total # groups asked	55%	26%	37%	5%	0%	1%	0%	8%	NA	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

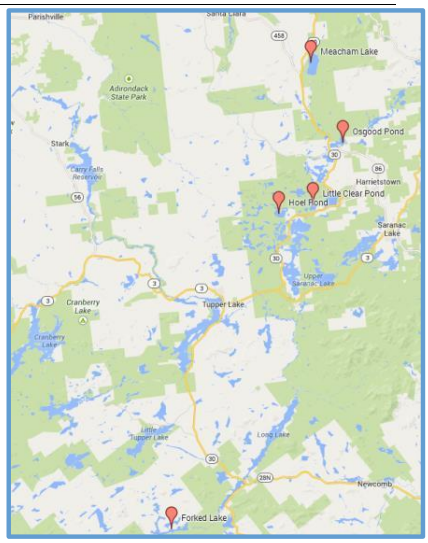
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Syracuse
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft Inspected at Seventh Lake, NY. 2013.
0 2.75 5.5 11 16.5 22
Miles
N
Legend
Prior Waterways Visits
Vector Lines
Adirondack Park Boundary

Forked Lake, Hoel Pond, Little Clear Pond, Floodwood Pond, Meacham Lake and Osgood Pond

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: GLRI NORTH LAKES 2013 BOAT LAUNCH USE SUMMARY



Boats inspected: 822
% of visitors taking spread prevention measures: 65%
AIS intercepted: 2
% inspected boats with organisms: 6%
 # visitors: 1238
# of previously visited waterways: 92

WSP Data Summary, 2013	Boat Type									total #
GLRI North Lakes	M	PWC	S	C	K	B	R	SUP	Docks	boats
Forked Lake	33	0	0	94	65	0	0	1	0	193
percentage of total boats	17%	0%	0%	49%	34%	0%	0%	1%	0%	100%
Hoel/Little Clear/Floodwood Ponds	0	0	0	113	105	0	1	1	0	220
percentage of total boats	0%	0%	0%	51%	48%	0%	0%	0%	0%	100%
Meacham Lake	92	12	2	13	25	0	1	0	0	145
percentage of total boats	63%	8%	1%	9%	17%	0%	1%	0%	0%	100%
Osgood Pond	36	0	1	104	119	0	4	0	0	264
percentage of total boats	14%	0%	0%	39%	45%	0%	2%	0%	0%	100%
totals	161	12	3	324	314	0	6	2	0	822
percentage of total boats	20%	1%	0%	39%	38%	0%	1%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
GLRI North Lakes	people	entering	leaving	dirty	inspections	boats dirty
Forked Lake	336	2	11	10	135	7%
Hoel/Little Clear/Floodwood Ponds	324	2	7	10	115	9%
Meacham Lake	139	4	5	7	128	5%
Osgood Pond	439	2	9	8	201	4%
totals	1238	10	32	35	579	6%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

GLRI North Lakes: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian watermilfoil	0		1	Forked Lake: Forked Lake
variable-leaf milfoil	0		1	Forked Lake: None
totals	**0**		**2**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: GLRI NORTH LAKES 2013 BOAT LAUNCH USE SUMMARY

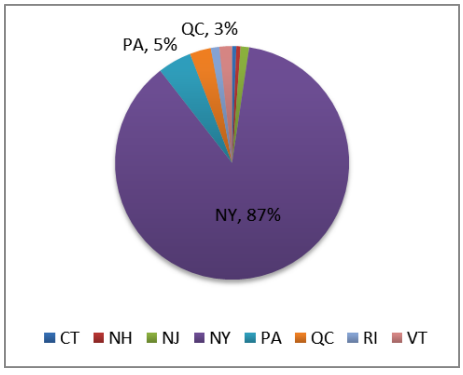
WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
GLRI North Lakes	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Forked Lake	41	5	27	1	0	1	0	13	4	133
percentage of total # groups asked	31%	4%	20%	1%	0%	1%	0%	10%	NA	100%
Hoel/Little Clear Ponds	64	28	45	0	0	0	0	12	4	116
percentage of total # groups asked	55%	24%	39%	0%	0%	0%	0%	10%	NA	100%
Meacham Lake	89	39	73	13	1	3	0	23	1	127
percentage of total # groups asked	70%	31%	57%	10%	1%	2%	0%	18%	NA	100%
Osgood Pond	181	99	140	3	1	0	0	24	1	200
percentage of total # groups asked	91%	50%	70%	2%	1%	0%	0%	12%	NA	100%
totals	375	171	285	17	2	4	0	72	10	576
percentage of total # groups asked	65%	30%	49%	3%	0%	1%	0%	13%	NA	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	organism type													total	% of inspected
GLRI North Lakes	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Forked Lake	0	0	0	1	5	0	0	1	4	0	0	0	2	2	1%
percentage of organisms removed	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Hoel/Little Clear/Floodwood Ponds	0	0	0	0	3	0	0	0	5	0	0	0	1	0	0%
percentage of organisms removed	0%	0%	0%	0%	33%	0%	0%	0%	56%	0%	0%	0%	11%		
Meacham Lake	0	0	0	0	5	0	0	0	2	0	0	0	2	0	0%
percentage of organisms removed	0%	0%	0%	0%	56%	0%	0%	0%	22%	0%	0%	0%	22%		
Osgood Pond	0	0	0	0	7	0	0	0	2	0	0	0	2	0	0.0%
percentage of organisms removed	0%	0%	0%	0%	64%	0%	0%	0%	18%	0%	0%	0%	18%		
totals	0	0	0	1	20	0	0	1	13	0	0	0	7	2	0%
percentage of organisms removed	0%	0%	0%	2%	48%	0%	0%	2%	31%	0%	0%	0%	17%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

State/Province of Boat Registration



Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

Fourth Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: FOURTH LAKE 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 1587 **% of visitors taking spread prevention measures: 63%**
AIS intercepted: 23 **% inspected boats with organisms: 8%**
 # visitors: 3815 **# of previously visited waterways: 80**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Fourth Lake	1202	237	6	22	114	1	3	2	0	1587
percentage of total boats	76%	15%	0%	1%	7%	0%	0%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Fourth Lake	3815	92	54	120	1504	8%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Fourth Lake	934	387	621	98	2	26	2	129	39	1484
percentage of total # groups asked	63%	26%	42%	7%	0%	2%	0%	9%	NA	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Fourth Lake	0	3	5	8	75	4	5	9	14	0	2	1	20	23	2%
percentage of organisms removed	0%	2%	3%	5%	51%	3%	3%	6%	10%	0%	1%	1%	14%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

Fourth Lake: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
curly-leaf pondweed	3	Jamestown, NY reservoir, none, Oneida Lake		
Eurasian watermilfoil	7	None (3), Cazenovia Lake, Lake Ontario, Oneida Lake, St. Lawrence River	1	None
variable-leaf milfoil	0		9	None (3), Fourth Lake (2), Delta Lake, First Lake, Lake Ontario, St. Lawrence River
water chestnut	1	Swinging Bridge Reservoir	1	None
zebra mussel	1	Lake Ontario	0	
totals	**12**		**11**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

December 31, 2013

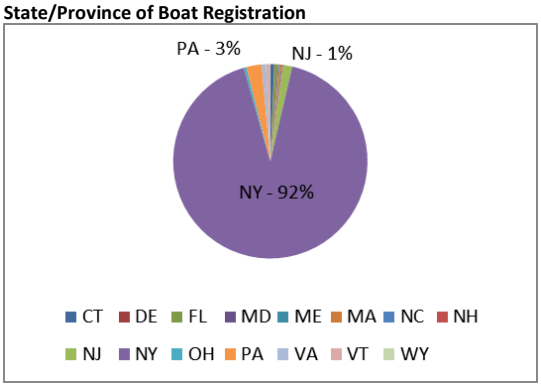
ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: FOURTH LAKE 2013 BOAT LAUNCH USE SUMMARY

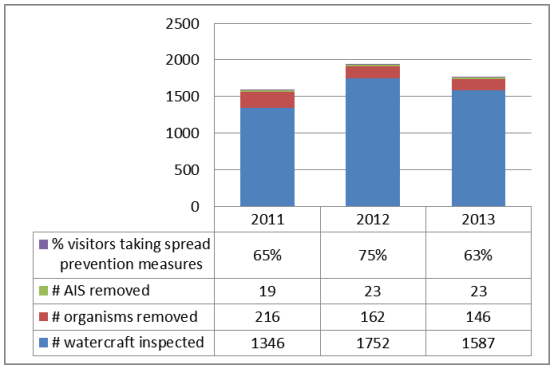
Fourth Lake: Waterways visited in previous two weeks, 2013	# visits
None	728
Fourth Lake	401
Delta Lake	36
Raquette Lake	32
Seventh Lake	29
Oneida Lake	27
Lake Ontario	26
Big Moose Lake	18
Eighth Lake	12
Conesus Lake	8
First Lake	8
Hinkley Reservoir	8
Long Lake	8
Did not ask	7
Limekiln Lake	7
Canandaigua Lake	6
Otter Lake	6
St. Lawrence River	6
Cayuga Lake	5
Hudson River	5
Indian Lake	5
Lake Erie	5
Blue Mountain Lake	4
Fulton Chain of Lakes	4
Seneca Lake	4
Sixth Lake	4
Canadarago Lake	3
Fifth Lake	3
Great Sacandaga Reservoir	3
Lake Placid	3
Saratoga Lake	3
Stillwater Reservoir	3

Fourth Lake: Waterways visited in previous two weeks, 2013	# visits
Black River	2
Canada Lake	2
Chateaugay Lake	2
Cranberry Lake	2
Erie Canal	2
Hatch Lake	2
Honeoye Lake	2
Lake Abanakee	2
Lake Bonaparte	2
Lake George	2
Lake Moraine	2
Lebanon Reservoir	2
Little Long Lake	2
Mohawk River	2
Moose River	2
Owasco Lake	2
Piseco Lake	2
Rushford Lake	2
Sacandaga Lake	2
Skaneateles Lake	2
Swinging Bridge Reservoir	2
Tupper Lake	2
Atlantic Ocean	1
Beaver Lake	1
Blue Marsh Creek	1
Cazenovia lake	1
Coventry lake, CT	1
Delaware River	1
Deruyter Reservoir	1
Falls Lake, NC	1
Forked Lake	1

Fourth Lake: Waterways visited in previous two weeks, 2013	# visits
Glimmerglass Lake	1
Greenwood lake, NJ	1
Jamestown Reservoir	1
Kayuta Lake	1
Lake Champlain	1
Lake Colby	1
Lake Marie	1
Lake Sebago	1
Lake Sunapee NH	1
Long Island	1
Marshfield Reservoir, VT	1
Nelson Lake	1
Niagara River	1
Oswego River	1
Otisco Lake	1
Pontoosuc Lake, MA	1
Port Gibson	1
Redfield Reservoir	1
Rental	1
Sandy Pond, Jefferson County	1
Saranac Lake Chain	1
Schroon Lake	1
Seneca River	1
Silver Lake	1
Snyder Lake	1
Soft Maple Reservoir	1
Speculator	1
Thousand Islands	1
Twitchell Lake	1
White Lake	1
Total	1427

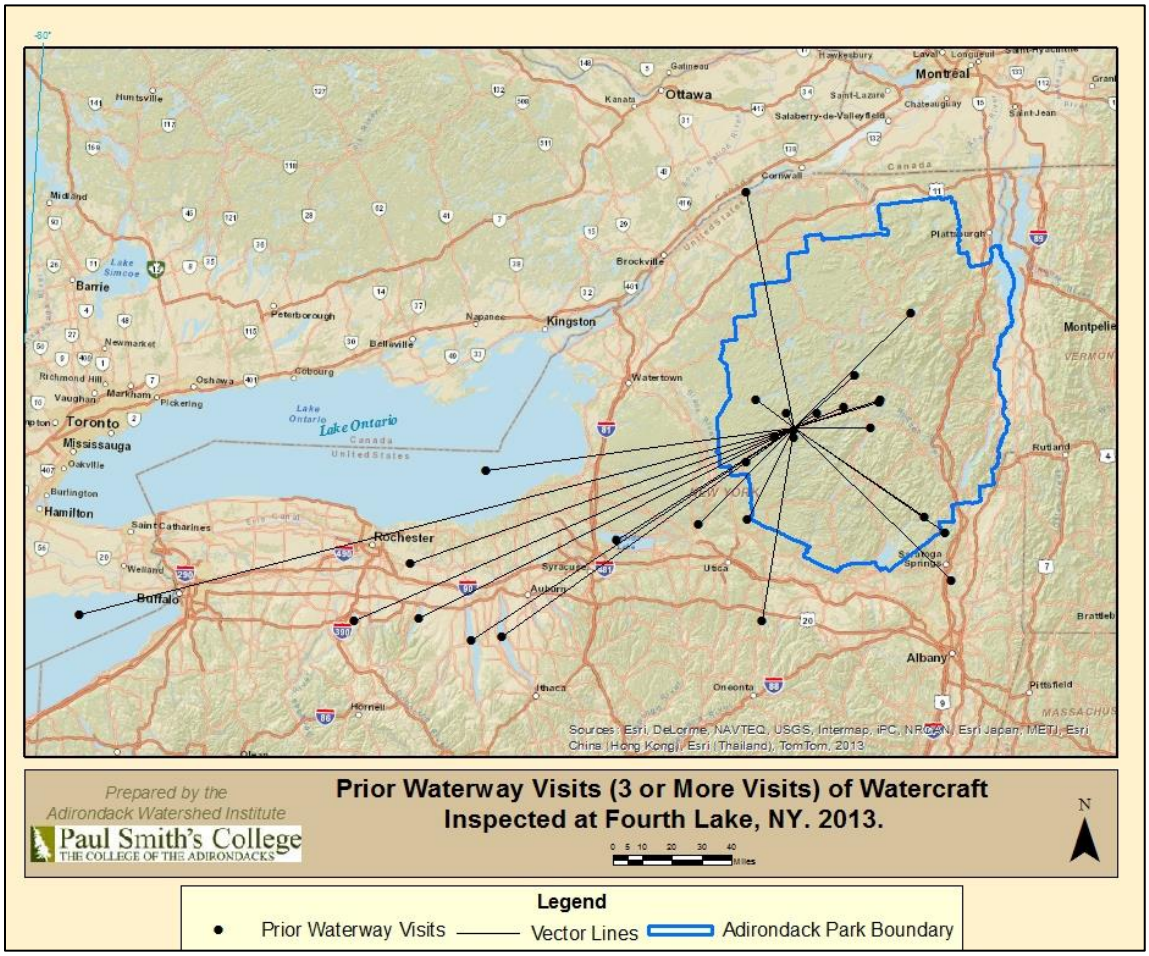
State/Province of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Ottawa
Montreal
Kingston
Toronto
Mississauga
Hamilton
Rochester
Buffalo
Albany
Watertown
Plattsburgh
Brockville
Cornwall
Peterborough
Barrie
Oshawa
Lake Ontario
Canada
United States
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft Inspected at Fourth Lake, NY. 2013.
0 5 10 20 30 40
Miles
N
Legend
Prior Waterway Visits
Vector Lines
Adirondack Park Boundary

Lake Placid

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: LAKE PLACID 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 1994 **% of visitors taking spread prevention measures: 68%**
AIS intercepted: 3 **% inspected boats with organisms: 2%**
 # visitors: 3593 **# of previously visited waterways: 101**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Lake Placid	1040	0	14	175	682	3	0	80	0	1994
Lake Placid - percentage of total boats	52%	0%	1%	9%	34%	0%	0%	4%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Lake Placid	1001	458	789	45	0	8	1	62	89	1468
Lake Placid - percentage of total # groups	68%	31%	54%	3%	0%	1%	0%	4%	6%	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Lake Placid	3593	26	11	33	1522	2%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Lake Placid	0	0	1	1	18	0	1	2	10	0	0	0	4	3	0.2%
Lake Placid - percentage of organ	0%	0%	3%	3%	49%	0%	3%	5%	27%	0%	0%	0%	11%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

Lake Placid: Aquatic Invasive Species Intercepted by Stewards,	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	1	Lake Champlain	0	
variable-leaf milfoil	0		2	Lake Flower, Saranac Lake Chain
totals	**1**		**2**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

December 31, 2013

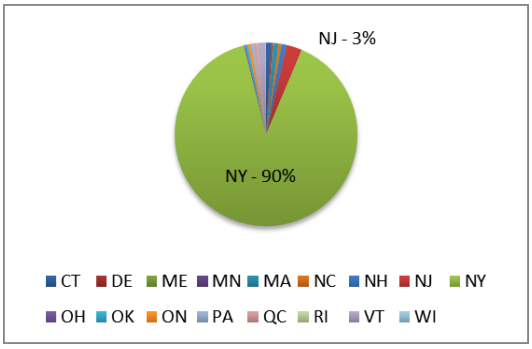
ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: LAKE PLACID 2013 BOAT LAUNCH USE SUMMARY

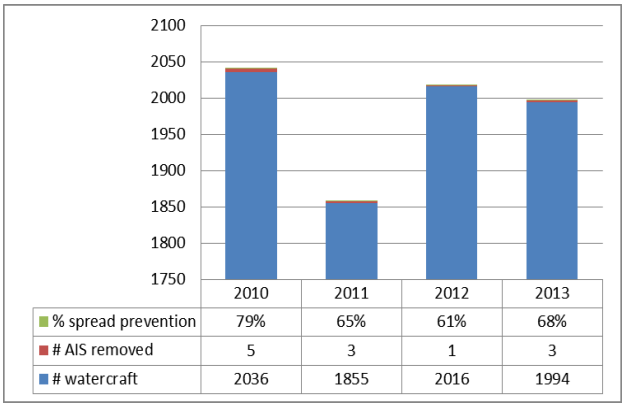
Lake Placid: Previous waterways visited, 2013	# visits
Lake Placid	641
None	316
Rental	168
Mirror Lake	57
Did not ask	38
Saranac Lake Chain	33
Lake Champlain	30
Lake Flower	27
Lower Saranac Lake	21
Upper Saranac Lake	20
Lake George	14
Tupper Lake	9
Atlantic Ocean	7
Ausable River	6
Cascade Lake	5
Lake Ontario	5
Middle Saranac Lake	5
Long Island Sound	4
Mohawk River	4
Ossipie Lake	4
Raquette Lake	4
St. Lawrence River	4
Upper St Regis Lake	4
Buck Pond	3
Cape Cod	3
Fourth Lake	3
Indian Lake	3
Kiwassa Lake	3
Lake Colby	3
Lake Erie	3
Lower St Regis lake	3
Moose Pond	3
New Boat	3
Schroon Lake	3
Boston Lake	2

Lake Placid: Previous waterways visited, 2013	# visits
Cazenovia Lake	2
Chazy Lake	2
Chubb River	2
Erie Canal	2
Fish Creek Ponds	2
Franklin Falls	2
Hudson River	2
Lake Delta	2
Lake Hopatcong, NJ	2
Lake Minnetonka	2
Lake Sunapee, NH	2
Lowes Lake	2
Marsh Creek Lake, PA	2
Michigan	2
Moose River	2
Paradox Lake	2
Passaic River NJ	2
Saratoga Lake	2
Simond Pond	2
Thompson's Lake	2
Turtle pond	2
Union Falls Flow	2
Albany, NY	1
Ballston Lake NY	1
Big Moose Pond	1
Brandy Pond, ME	1
Buck Lake, Canada	1
Canandaigua Lake	1
Candlewood Lake, CT	1
Chateaugay Lake	1
Conesus Lake	1
Cowanesque Lake, PA	1
Crocked Lake	1
DEC boat	1
Delaware	1

Lake Placid: Previous waterways visited, 2013	# visits
Doesn't know	1
Eagle Lake	1
Fern Lake	1
Floodwood Pond	1
Fulton Chain of Lakes	1
Grafton Lakes State Park, NY	1
Great Sacandaga Reservoir	1
Lake Bonaparte	1
Lake Harris	1
Lake Kushaqua	1
Lake Pleasant, Hamilton County	1
Lincoln Pond	1
Little Clear Pond	1
Lower Cascade Lake	1
Midway Reservoir, NJ	1
Milsight Lake	1
Morrisville, VT	1
Niagara River	1
Norwood Lake, St. Lawrence County	1
Oseetah Lake	1
Osgood Pond	1
Quebec	1
Rainbow Lake	1
Raquette River	1
Round Lake	1
Round Pond	1
Sacandaga Lake	1
Seneca River	1
St. Regis Pond	1
Stillwater Reservoir	1
Syracuse	1
Taylor Pond	1
Union Falls, Saratoga	1
Weller Pond	1
total	1518

State/Province of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Ottawa
Montréal
Sherbrooke
Toronto
Rochester
Buffalo
Syracuse
Utica
Albany
Boston
Hartford
Providence
New York
Binghamton
Scranton
Allentown
Harrisburg
Reading
Trenton
Edison
Bridgeport
Springfield
Worcester
Lowell
Nashua
Concord
Portland
Augusta
Montpelier
Burlington
Kingston
Peterborough
Belleville
Oshawa
Pickering
Vaughan
Mississauga
Oakville
Hamilton
Saint Catharines
Welland
Lake Ontario
NEW YORK
PENNSYLVANIA
MASSACHUSETTS
CONNECTICUT
RHODE ISLAND
Waterbury
New Bedford
Barnstable
Plymouth
Falmouth
State College
Altoona
Cornwall
Kanata
Gatineau
Saint-Jean
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft
Inspected at Lake Placid, NY. 2013.
N
Legend
Adirondack Park Boundary

Long Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: LONG LAKE 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 2377 **% of visitors taking spread prevention measures: 47%**
AIS intercepted: 7 **% inspected boats with organisms: 10%**
 # visitors: 4282 **# of previously visited waterways: 141**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Long Lake	1352	129	11	563	306	0	5	0	11	2377
percentage of total boats	57%	5%	0%	24%	13%	0%	0%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Long Lake	4842	102	103	182	1860	10%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Long Lake	864	193	639	101	0	15	1	143	31	1829
percentage of total # groups asked	47%	11%	35%	6%	0%	1%	0%	8%	NA	100%

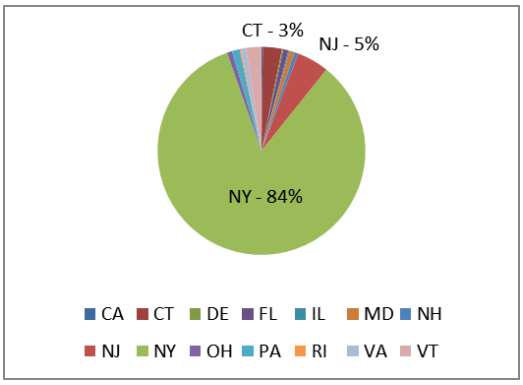
Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

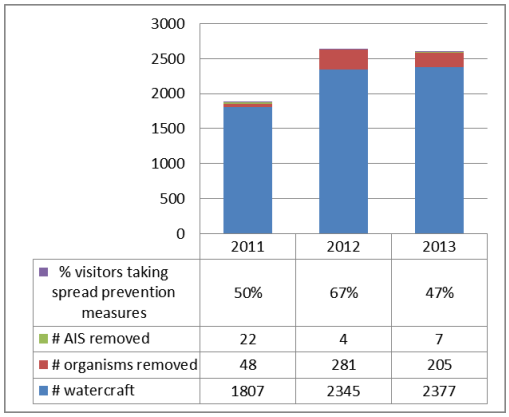
Long Lake: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway
Eurasian water milfoil	5	None (2), Oneida Lake, Seneca Lake, Saranac Lake
variable-leaf milfoil	2	Oneida Lake, Seneca Lake
totals	7	

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Long Lake	0	0	4	5	58	0	6	2	99	0	0	0	30	7	0.4%
percentage of organisms removed	0%	0%	2%	2%	28%	0%	3%	1%	49%	0%	0%	0%	15%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

State/Province of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

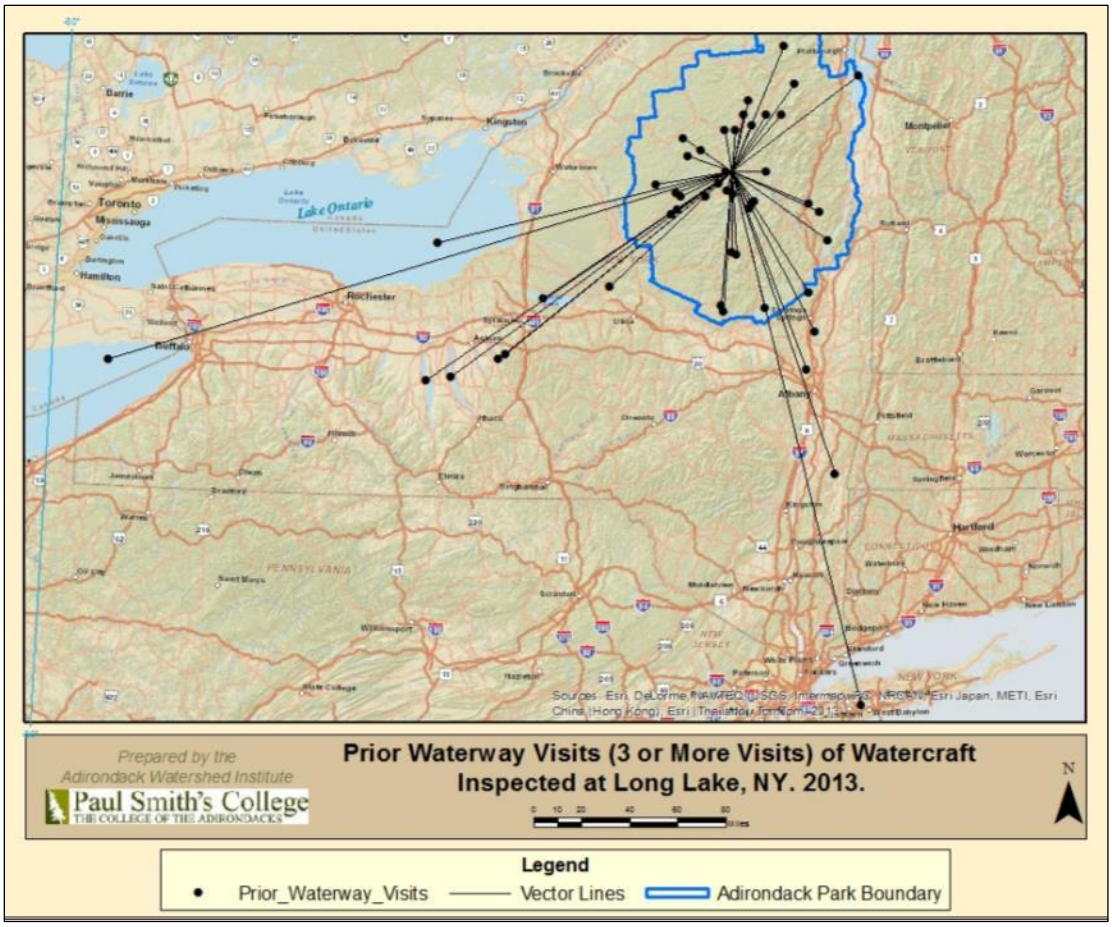
December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: LONG LAKE 2013 BOAT LAUNCH USE SUMMARY

Long Lake: Waterways visited in previous two weeks, 2013	# visits	Long Lake: Waterways visited in previous two weeks, 2013	# visits	Long Lake: Waterways visited in previous two weeks, 2013	# visits
None	717	Lake Erie	3	Heart Lake	1
Long Lake	579	Otisco Lake	3	Highland Lakes, NJ	1
Raquette Lake	41	Seneca Lake	3	Higley Flow	1
Tupper Lake	37	Stillwater Reservoir	3	Irondequoit Creek	1
Rental	34	Black River	2	Kashwakamak Lake, ON	1
Forked Lake	32	Brandreth Lake	2	Kasoag Lake	1
Hudson River	24	Brantingham Lake	2	Lake Alice	1
Schroon Lake	19	Canandaigua Lake	2	Lake Clear	1
Oneida Lake	16	Cedar River	2	Lake Cochituate, MA	1
Sacandaga Lake	16	Dunham Reservoir	2	Lake Dunmore, VT	1
Saranac Lake Chain	16	Erie Canal	2	Lake Hopatcong, NJ	1
Lake Eaton	15	Fish Creek	2	Lake Sunapee, NH	1
Lake Champlain	14	Fulton Chain of Lakes	2	Leadmine Pond, MA	1
Indian Lake	12	Lake Bomoseen, VT	2	Like Harris	1
Lake George	11	Lake Moraine, PA	2	Little Clear Pond	1
Mohawk River	11	Lake Winola, PA	2	Little Wolf Pond	1
Fourth Lake	8	Long Island Sound	2	Long Lake, ME	1
Great Sacandaga Reservoir	8	Lower Saranac Lake	2	Lower Beverley Lake, ON	1
Upper Saranac Lake	8	Massaweepie Lake	2	Mason Lake	1
Blue Mountain lake	7	Minerva Lake	2	Mercer Lake, NJ	1
Brandt lake	7	Neversink Reservoir	2	Moose River	1
Lake Harris	7	Oseetah Lake	2	Niagara River	1
Lake Placid	7	Otter Creek, VT	2	Nubanusit Lake, NH	1
Saratoga Lake	7	St. Lawrence River	2	Oak Orchard River, NY	1
Chateaugay Lake	6	Star Lake	2	OK Slip Pond	1
Did not ask	6	Susquehanna River	2	ON	1
Lake Abanakee	6	White Lake	2	Orange Lake	1
Bog River	5	Adirondack Lake	1	Oswegatchie River	1
Cranberry Lake	5	Ballston Lake	1	Otsego lake	1
Lake Flower	5	Barnegat Bay, NJ	1	Oxbow Lake	1
Long Island	5	Candlewood Lake, CT	1	Paradox Lake	1
Raquette River	5	Cedar River Flow	1	Pine Barrens, NJ	1
Silver Lake	5	Chatiemac Lake, NY	1	Piseco Lake	1
Skaneateles Lake	5	Chautauqua Lake	1	Rainbow Lake	1
Copake Lake	4	Chubb River	1	Rainbow Reservoir, CT	1
Delta Lake	4	Cobbetts Pond, NH	1	Rangely Lake, ME	1
Lake Ontario	4	Cold Spring Pond, NH	1	RI	1
Lake Pleasant	4	Conesus Lake	1	Rich Lake	1
Lowes Lake	4	Connecticut River	1	Rondout Creek	1
Twitchell Lake	4	Cross Lake	1	Round Lake	1
Upper St. Regis Lake	4	Crumhorn Lake	1	Round Valley Reservoir, NJ	1
Big Moose Lake	3	Delaware Bay	1	Seneca River	1
Canada Lake	3	Delaware River	1	Soft Maple Reservoir, NY	1
Caroga Lake	3	East River	1	Thirteenth Lake	1
Cayuga Lake	3	Eighth Lake	1	Trout Lake	1
First Lake	3	Fish Creek Pond	1	West Canada Lake	1
Lake Adirondack	3	Follensby Clear Pond	1	West Lake	1
Lake Durant	3	Glen Lake	1	total	1755

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft
Inspected at Long Lake, NY. 2013.
N
Legend
Prior_Waterway_Visits
Vector Lines
Adirondack Park Boundary


Watershed Steward on Duty
Courtesy Boat Inspections for
Aquatic Invasive Species
Adirondack Watershed
Institute
Thank you for keeping
Long Lake
FREE
of invasive species!

Rainbow Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: RAINBOW LAKE 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 349 **% of visitors taking spread prevention measures: 77%**
AIS intercepted: 0 **% inspected boats with organisms: 8%**
 # visitors: 633 **# of previously visited waterways: 42**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Pedal boat	boats
Rainbow Lake	136	2	0	67	141	0	2	0	1	349
percentage of total boats	39%	1%	0%	19%	40%	0%	1%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Rainbow Lake	633	12	11	20	264	8%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

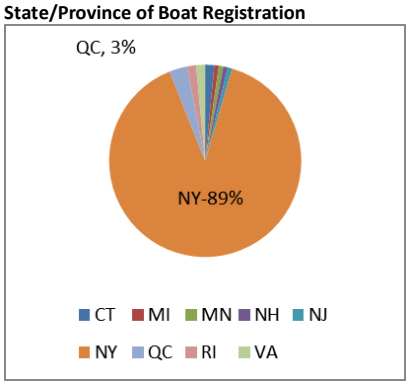
WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups	# groups using
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked	boat wash
Rainbow Lake	203	100	151	11	1	2	1	46	3	264	28
percentage of total # groups asked	77%	38%	57%	4%	0%	1%	0%	17%	NA	100%	11%

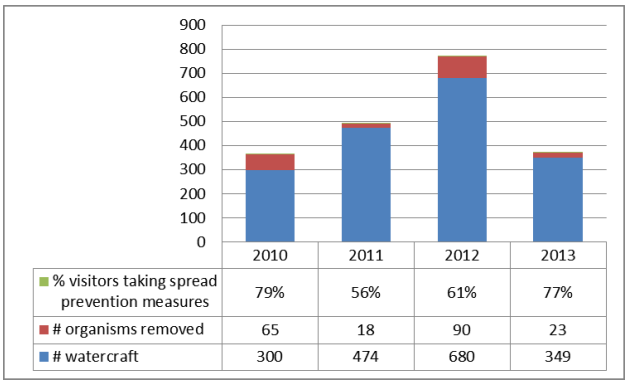
Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Rainbow Lake	0	0	1	0	8	1	0	0	8	0	0	0	5	0	0%
percentage of organisms removed	0%	0%	4%	0%	35%	4%	0%	0%	35%	0%	0%	0%	22%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

State/Province of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

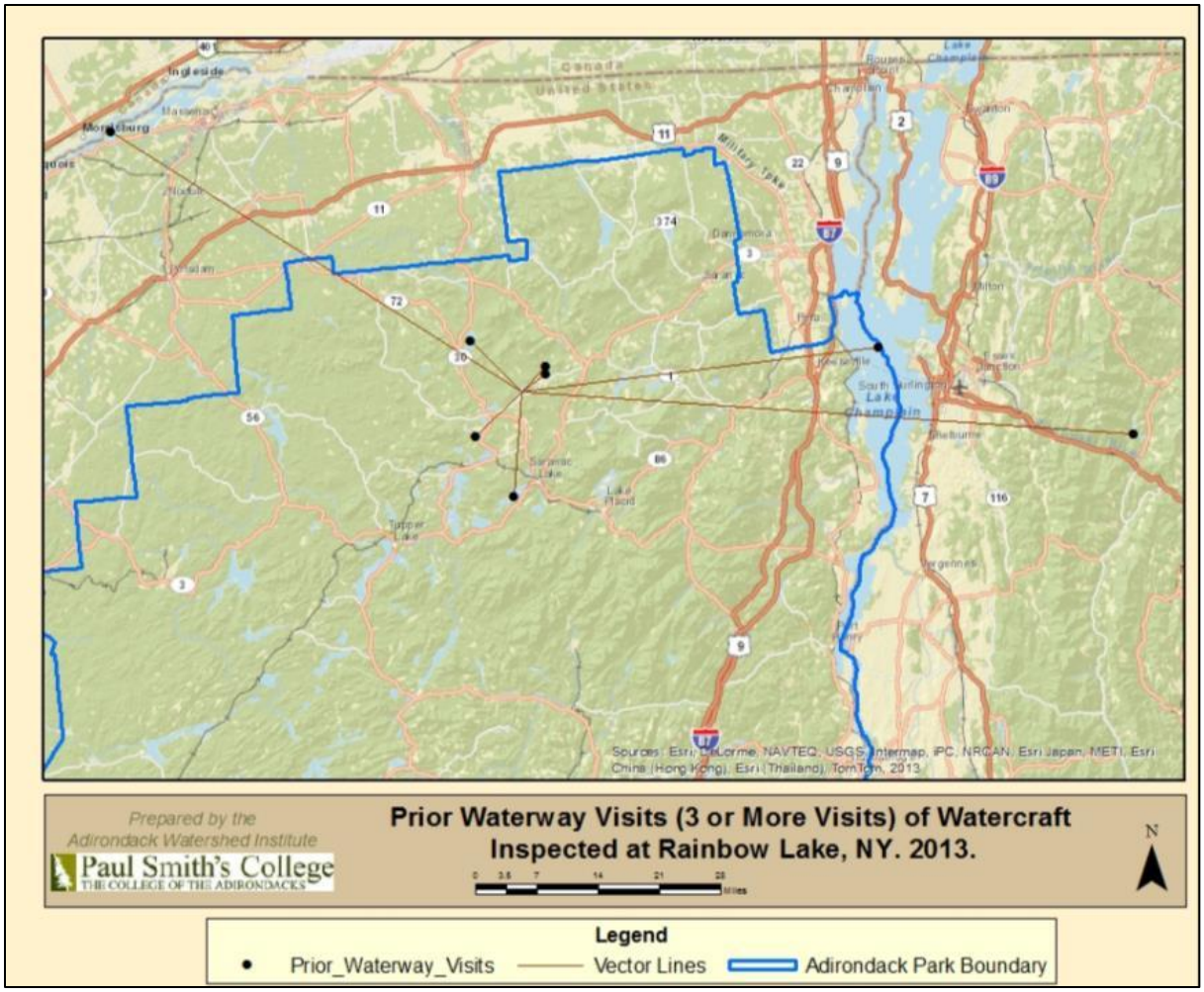
December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: RAINBOW LAKE 2013 BOAT LAUNCH USE SUMMARY

Rainbow Lake: Previous waterways visited, 2013	# visits	Rainbow Lake: Previous waterways visited, 2013	# visits
None	85	Cayuga Lake	1
Rainbow Lake	46	Chateaugay Lake	1
Buck Pond	34	ENCON Officer	1
Lake Kushaqua	14	Erie Canal	1
Lake Champlain	13	Indian Lake	1
Rental	5	Iroquois Lake (VT)	1
Lower Saranac Lake	4	Kiamika Reservoir, QC	1
Meacham Lake	4	Kiwassa Lake	1
St. Lawrence River	3	Lake Colby	1
Upper St Regis Lake	3	Lake Erie	1
Waterbury Reservoir, VT	3	Lake Iroquois	1
Connecticut River	2	Lake Placid	1
Debar Pond	2	Lake Winnipesaukee (NH)	1
Grand Lake	2	Lincoln Pond	1
Hudson River	2	Mud Pond	1
Lake Flower	2	NYC	1
Mohawk River	2	Sacandaga Lake	1
Osgood Pond	2	Saranac Lake Chain	1
Upper Saranac Lake	2	Stillwater Reservoir	1
Winooski River, Vt	2	Taylor Pond	1
Black Pond, Franklin County	1	Tupper Lake	1
		total	233

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft
Inspected at Rainbow Lake, NY. 2013.
N
Legend
Prior_Waterway_Visits
Vector Lines
Adirondack Park Boundary

Raquette Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: RAQUETTE LAKE 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 1325 **% of visitors taking spread prevention measures: 63%**
AIS intercepted: 19 **% inspected boats with organisms: 16%**
 # visitors: 2565 **# of previously visited waterways: 86**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Raquette Lake	706	67	6	251	279	0	10	2	4	1325
percentage of total boats	53%	5%	0%	19%	21%	0%	1%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Raquette Lake	2565	83	113	170	1053	16%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Raquette Lake	654	238	450	76	0	8	2	98	29	1041
percentage of total # groups asked	63%	23%	43%	7%	0%	1%	0%	9%	NA	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Raquette Lake	0	0	0	8	56	1	4	11	69	0	0	0	47	19	2%
percentage of organisms removed	0%	0%	0%	4%	29%	1%	2%	6%	35%	0%	0%	0%	24%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

Raquette Lake: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	8	None (4), Lake Canadarago, Seneca Lake, Seneca River	0	
variable-leaf milfoil	3	Raquette Lake, Oneida Lake, Seventh Lake	8	Raquette Lake (4), None (2), NJ, Lake Ontario
totals	**11**		**8**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

December 31, 2013

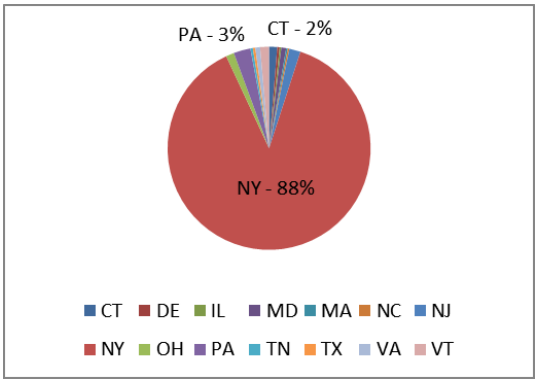
ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: RAQUETTE LAKE 2013 BOAT LAUNCH USE SUMMARY

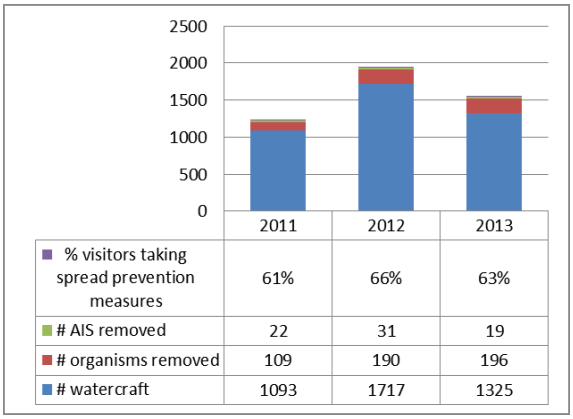
Raquette Lake: Waterways visited in previous two weeks, 2013	# visits
None	446
Raquette Lake	324
Fourth Lake	55
Long Lake	25
Seventh Lake	21
Rental	13
Delta Lake	10
Lake Ontario	10
Oneida Lake	9
Big Moose Lake	8
Blue Mountain Lake	8
Eighth Lake	8
Sacandaga Lake	8
Limekiln Lake	7
Forked Lake	6
Lake Abanakee	6
Lake Champlain	6
Stillwater Reservoir	5
Tupper Lake	5
Did not ask	4
First Lake	4
Lake Adirondack	4
Mohawk River	4
Saranac Lake Chain	4
Brown's Tract Pond	3
Canadarago Lake	3
Doesn't know	3
Fulton Chain of Lakes	3
Hudson River	3
Lake George	3

Raquette Lake: Waterways visited in previous two weeks, 2013	# visits
Lower Saranac Lake	3
New Jersey	3
Nicks Lake	3
OK Slip Pond	3
Piseco Lake	3
Skaneateles lake	3
Wanita Lake	3
Atlantic Ocean	2
Black Lake	2
Cayuta Lake	2
Cazenovia Creek	2
Cedar River	2
Hinkley Reservoir	2
Lake Bonaparte	2
Lake Durant	2
Loon Lake	2
Pierceville Flow	2
Raquette River	2
Redfield Reservoir	2
Rensselear Lake	2
Schroon Lake	2
Seneca River	2
Sleepy Hollow Lake	2
South Lake	2
Thirteenth Lake	2
Utowana Lake	2
Black River	1
Blue Mountain Lake, ME	1
Brant Lake	1
Buck Pond	1

Raquette Lake: Waterways visited in previous two weeks, 2013	# visits
Cedar Lake, NJ	1
Chateaugay Lake	1
Conesus Lake	1
Conway Lake, NH	1
Cross Lake, Cayuga County	1
Forest ranger boat	1
Goodyear Lake	1
Indian Lake	1
Kayuta Lake, forestport, NY	1
Lake Algonquin	1
Lake Kushaqua	1
Lamoka Lake	1
Mirror Lake	1
Moss Lake	1
Osgood Lake	1
Oswego River	1
Otisco Lake	1
Otsego lake	1
Rollins Pond	1
Sagamore Lake	1
Saratoga Lake	1
Sixth Lake	1
Soft Maple Reservoir	1
St. Lawrence River	1
Third Lake	1
Thompsons Lake	1
Tioga Lake	1
Upper Saranac Lake	1
total	1018

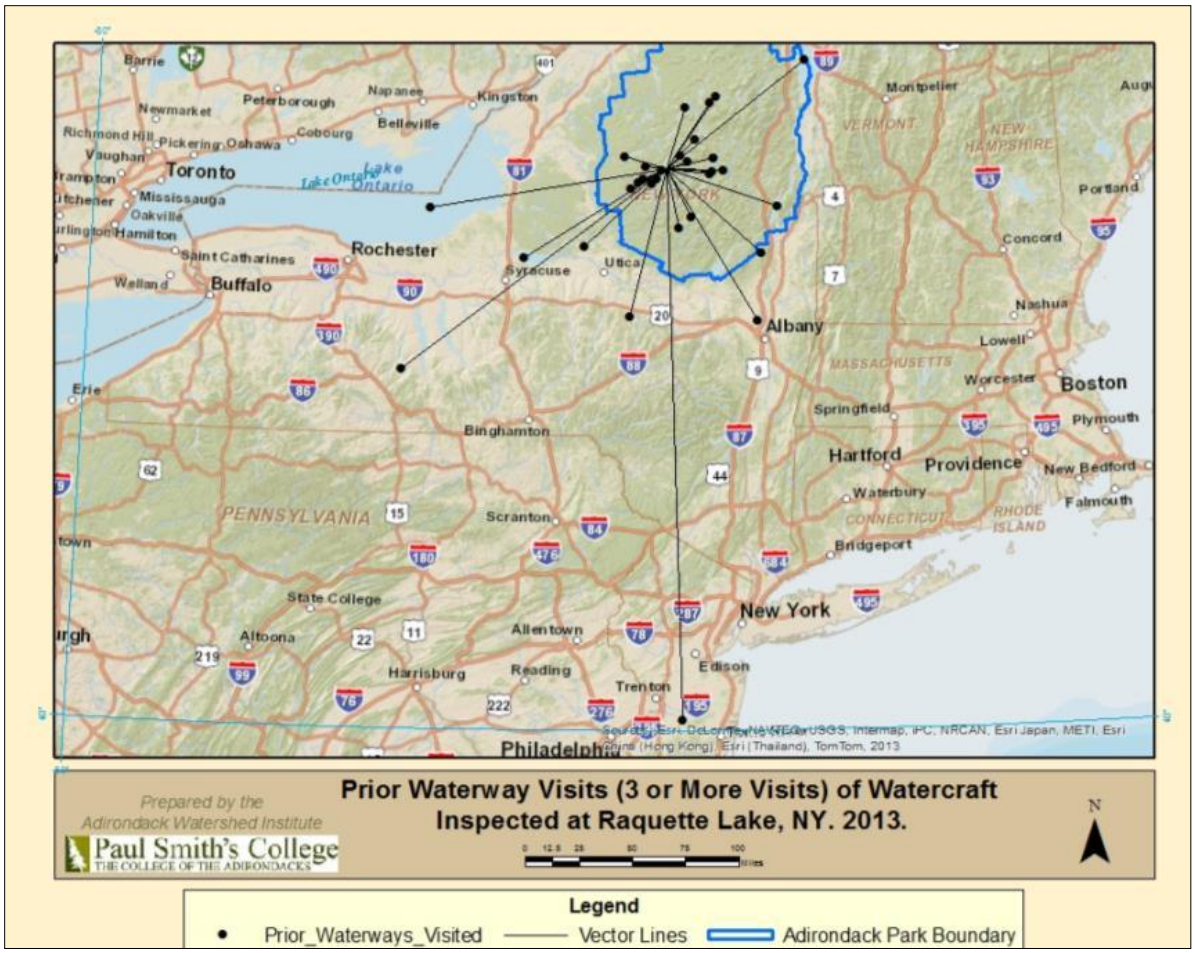
State/Province of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Barrie
Peterborough
Napanee
Kingston
Newmarket
Belleville
Richmond Hill
Pickering
Oshawa
Cobourg
Vaughan
Toronto
Lake Ontario
Mississauga
Oakville
Hamilton
Saint Catharines
Rochester
Welland
Buffalo
Syracuse
Utica
Albany
Montpelier
VERMONT
NEW HAMPSHIRE
Portland
Concord
Nashua
Lowell
MASSACHUSETTS
Worcester
Boston
Springfield
Plymouth
Hartford
Providence
New Bedford
Waterbury
Falmouth
CONNECTICUT
RHODE ISLAND
Bridgeport
Erie
Binghamton
PENNSYLVANIA
Scranton
State College
Altoona
Allentown
Harrisburg
Reading
Trenton
Edison
New York
Philadelphia
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft
Inspected at Raquette Lake, NY. 2013.
N
Legend
Prior_Waterways_Visited
Vector Lines
Adirondack Park Boundary

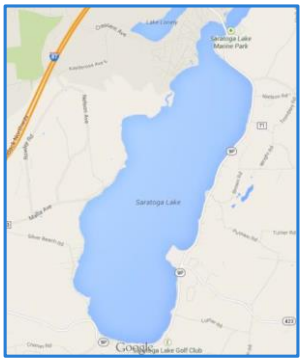

BURKE'S
Mobil

Saratoga Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: SARATOGA LAKE 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 3779 **% of visitors taking spread prevention measures: 58%**
AIS intercepted: 229 **% inspected boats with organisms: 9%**
 # visitors: 8466 **# of previously visited waterways: 73**



WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Saratoga Lake	3529	183	15	11	29	0	10	2	0	3779
Saratoga Lake - percentage of total boats	93%	5%	0%	0%	1%	0%	0%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	# groups
Saratoga Lake	2103	376	1490	202	0	77	2	161	67	3606
Saratoga Lake - percentage of total # groups	58%	10%	41%	6%	0%	2%	0%	4%	2%	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	total #	organisms found		boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Saratoga Lake	8466	309	190	344	3757	9%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Saratoga Lake	0	69	19	138	158	16	7	0	3	1	7	14	67	229	6%
Saratoga Lake - percentage of organisms removed	0%	14%	4%	28%	32%	3%	1%	0%	1%	0%	1%	3%	13%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

Saratoga Lake: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
curly-leaf pondweed	37	Saratoga Lake (34), none (2), did not know (1)	32	Saratoga Lake (16), none (9), did not ask (4), Cossayuna Lake (1), Sacandaga Lake (1)
Eurasian water milfoil	99	Saratoga Lake (87), none (6), Lake Lonely (2), Oneida Lake (2), did not ask (1), Lake Champlain (1)	39	Saratoga Lake (28), none (5), did not ask (3), Lake Flower (1), Oneida Lake (1), Sacandaga Lake (1)
spiny waterflea	1	Saratoga Lake (on fishing pole)		
water chestnut	4	Hudson River (2), Saratoga Lake (1), none (1)	3	Saratoga Lake (2), Hudson River (1)
zebra mussel	11	Saratoga Lake (9), Great Sacandaga Res. (1), none (1)	3	Saratoga Lake (3)
totals	**152**		**77**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

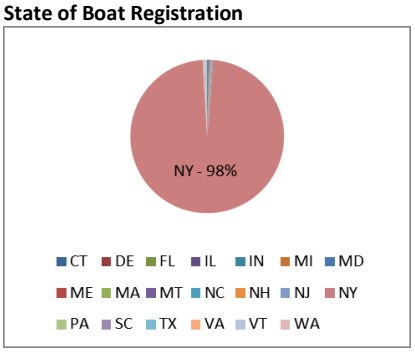
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

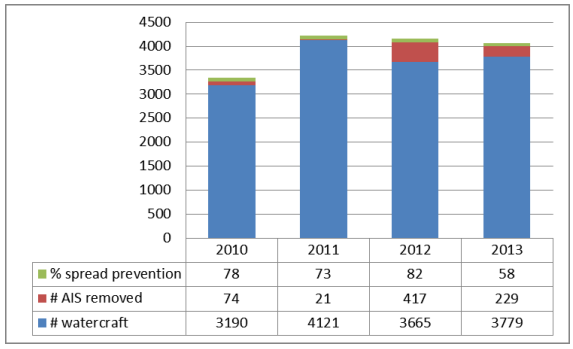
December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: SARATOGA LAKE 2013 BOAT LAUNCH USE SUMMARY

Saratoga Lake: Previous waterways visited, 2013	# visits		Saratoga Lake: Previous waterways visited, 2013	# visits
Saratoga Lake	2194		Cape Cod	1
None	932		Caroga Lake	1
No response	140		Crotch Lake, Canada (Ontario)	1
Hudson River	103		Dealer	1
Lake George	80		Delaware River	1
Did not ask	67		Duck Pond	1
Sacandaga Lake	67		Fourth Lake	1
Mohawk River	60		Ft. Edward	1
Lake Champlain	41		Fulton Chain Lakes	1
Great Sacandaga Reservoir	33		James River, VA	1
Schroon Lake	31		Lake Bonaparte	1
Cossayuna Lake	15		Lake Erie	1
Oneida Lake	12		Lake Luzerne	1
Ballston Lake	11		Lake Pleasant	1
Rental	9		Lily Pond	1
Round Lake, NY	8		Long Island Sound	1
Brant Lake	7		Loon Lake	1
Long Lake	7		MA	1
Lake Lonely	6		Maine	1
Atlantic Ocean	5		Onderdonk Lake	1
Did not know	5		Orange Lake, Orange County, NY	1
Black Lake	4		Plymouth, MA	1
First time out	3		Rainbow Lake	1
Indian Lake	3		Raquette Lake	1
Lake Flower	3		Saranac Lake Chain	1
Lake Ontario	3		Seneca River	1
St. Lawrence River	3		Snyder Lake, NY	1
Battenkill River	2		Spire Falls	1
Canada lake	2		Stillwater Reservoir	1
Canadarago Lake	2		Summerset Reservoir	1
Connecticut River	2		Swinging Bridge	1
Copake Lake	2		Taylor Pond	1
Lake Placid	2		Thompson's Lake	1
Paradox Lake	2		Vermont	1
Piseco Lake	2		Waltham lake, MA	1
Stewart's Pond	2		Warner Lake	1
PA	1		West Canada Lake	1
Algonquin	1		Grand Total	3910
Candlewood Lake, CT	1			

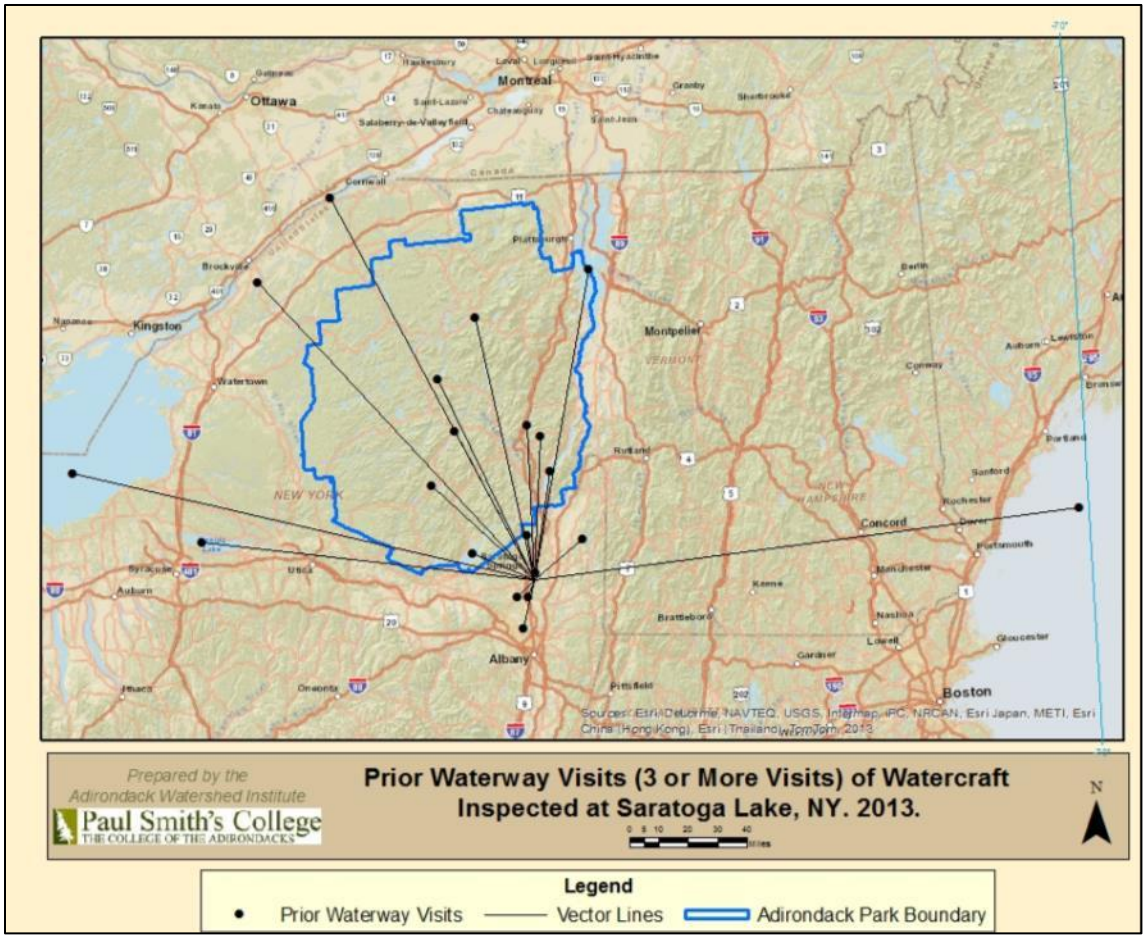
State of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Montreal
Ottawa
Kingston
Watertown
Montpelier
Albany
Boston
Concord
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft
Inspected at Saratoga Lake, NY. 2013.
N
Legend
Prior Waterway Visits
Vector Lines
Adirondack Park Boundary


Ranger Trail

Stillwater Reservoir

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: STILLWATER RESERVOIR 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 1028 **% of visitors taking spread prevention measures: 39%**
AIS intercepted: 2 **% inspected boats with organisms: 5%**
 # visitors: 2102 **# of previously visited waterways: 37**

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Stillwater Reservoir	2102	21	17	36	784	5%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Stillwater Reservoir	479	29	4	207	299	0	3	3	4	1028
percentage of total boats	47%	3%	0%	20%	29%	0%	0%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Stillwater Reservoir	312	200	239	37	4	0	2	33	1	790
percentage of total # groups asked	39%	25%	30%	5%	1%	0%	0%	4%	NA	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Stillwater Reservoir	0	2	0	0	26	0	1	0	7	0	0	0	4	2	0.3%
percentage of organisms removed	0%	5%	0%	0%	65%	0%	3%	0%	18%	0%	0%	0%	10%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

Stillwater Reservoir: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
curly-leaf pondweed	2	St. Lawrence River, Cayuga Lake		
totals	**2**		**0**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

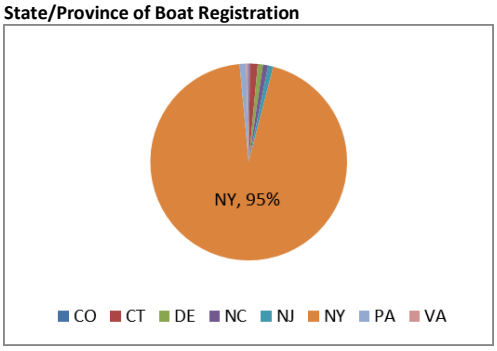
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

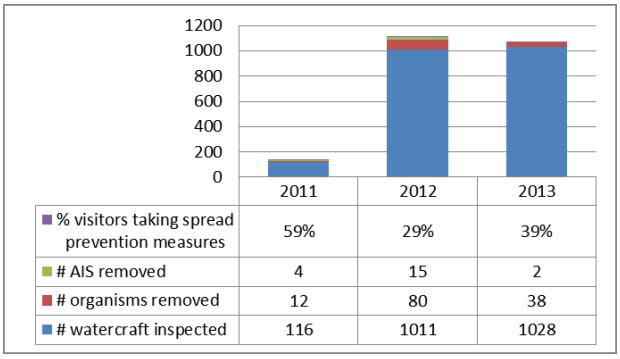
December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: STILLWATER RESERVOIR 2013 BOAT LAUNCH USE SUMMARY

Stillwater Reservoir: Waterways visited in previous two weeks, 2013	# visits	Stillwater Reservoir: Waterways visited in previous two weeks, 2013	# visits
None	678	Lake Placid	2
Stillwater Reservoir	15	Oneida Lake	2
Fourth Lake	11	Oswegatchie River	2
Lake Ontario	7	Otter Lake	2
St. Lawrence River	6	Raquette Lake	2
Long Lake	5	Seneca lake	2
Black River	4	Seventh Lake	2
Lake Bonaparte	4	Beaver Lake	1
Rental	4	Black Lake	1
Soft Maple Reservoir	4	Cayuga lake	1
Did not ask	3	Congamond Lakes, CT	1
Hinkley Reservoir	3	Delta Lake	1
Indian Lake	3	Lake Champlain	1
Skaneateles Lake	3	Lake George	1
Chateaugay Lake	2	Lake Lila	1
Connecticut River	2	Lake Wallenpaupack	1
Cranberry Lake	2	Moose River	1
Cross Lake	2	Sacandaga Lake	1
Did not know	2	Schroon Lake	1
Grass River	2	Taylor Pond	1
		total	762

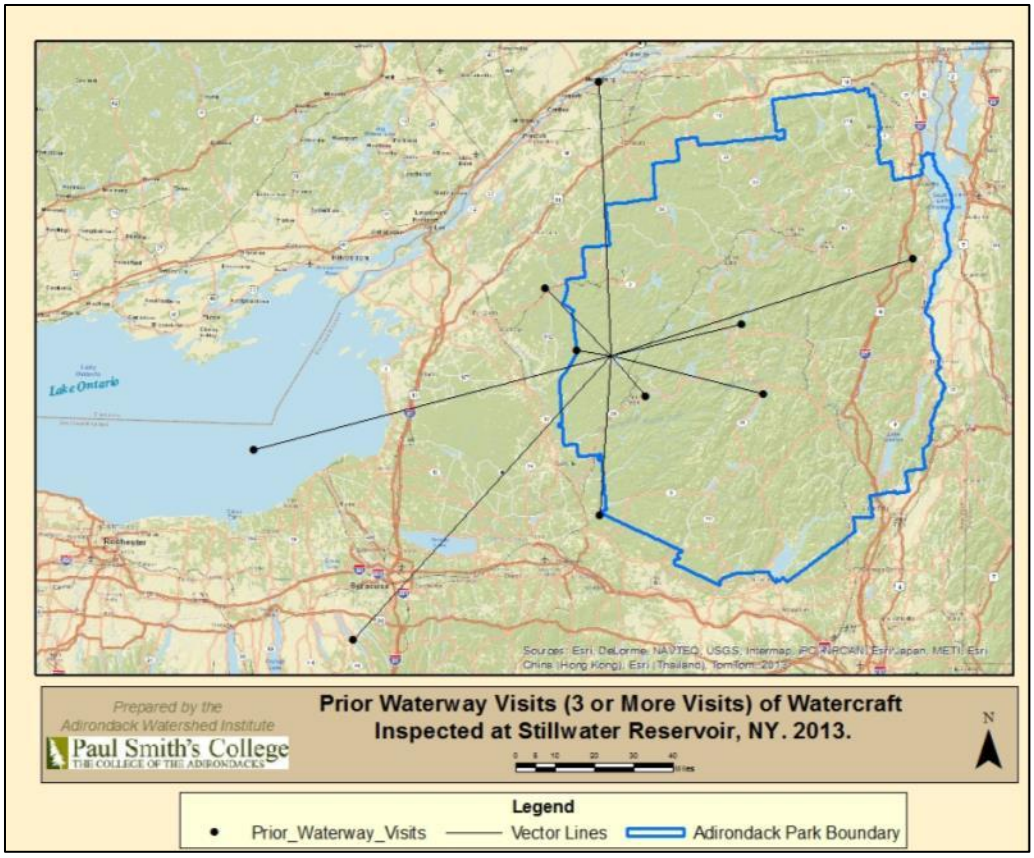
State/Province of Boat Registration

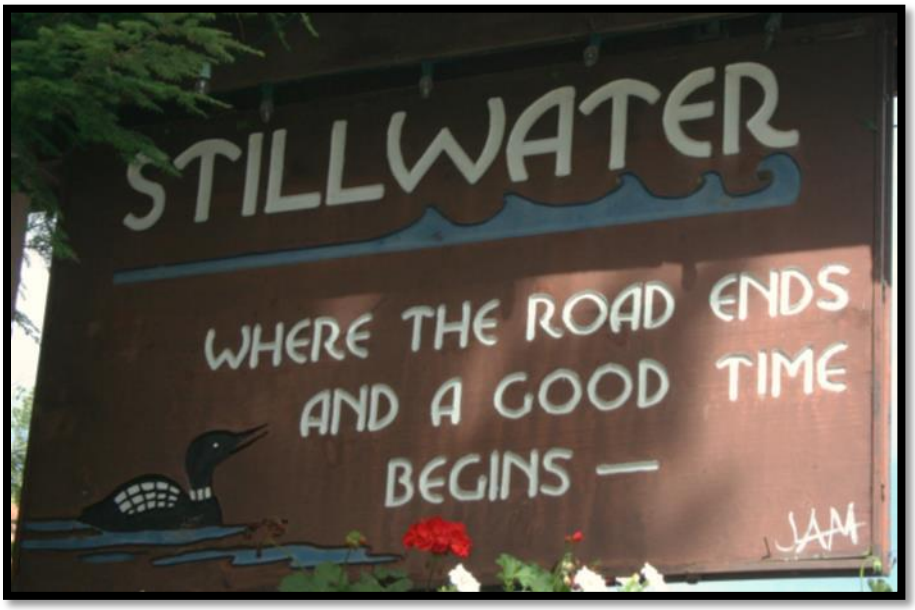




Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

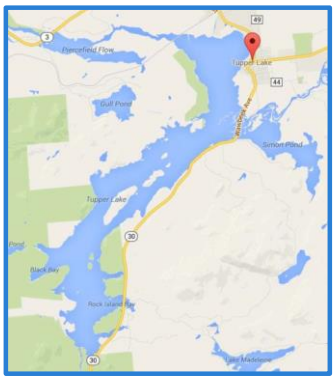

Lake Ontario
Rochester
Syracuse
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft Inspected at Stillwater Reservoir, NY. 2013.
N
Legend
Prior_Waterway_Visits
Vector Lines
Adirondack Park Boundary


STILLWATER
WHERE THE ROAD ENDS
AND A GOOD TIME
BEGINS —
JAM

Tupper Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: TUPPER LAKE 2013 BOAT LAUNCH USE SUMMARY



Boats inspected: 1045 **% of visitors taking spread prevention measures: 71%**
AIS intercepted: 3 **% inspected boats with organisms: 9%**
 # visitors: 1025 **# of previously visited waterways: 64**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Tupper Lake	759	61	7	98	112	0	2	4	2	1045
percentage of total boats	73%	6%	1%	9%	11%	0%	0%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked
Tupper Lake	675	291	450	45	1	14	1	95	16	954
percentage of total # groups asked	71%	31%	47%	5%	0%	1%	0%	10%	NA	100%

Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Tupper Lake	1025	15	79	91	958	9%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Tupper Lake	1	0	1	0	71	3	0	3	2	0	0	0	12	3	0.3%
percentage of organisms removed	1%	0%	1%	0%	76%	3%	0%	3%	2%	0%	0%	0%	13%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

Tupper Lake: Aquatic Invasive Species Intercepted by Stewards, 2013	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
variable-leaf milfoil	1	Piercefield Flow	3	Tupper Lake (2), None
totals	**1**		**3**	

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

December 31, 2013

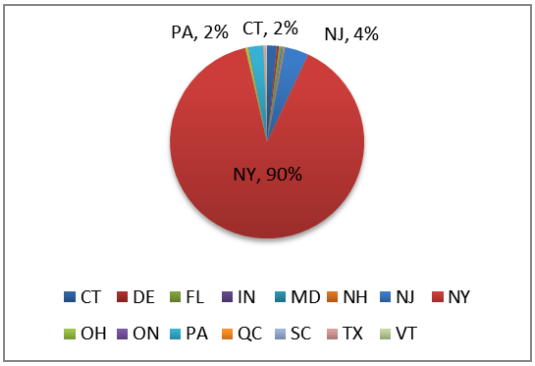
ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: TUPPER LAKE 2013 BOAT LAUNCH USE SUMMARY

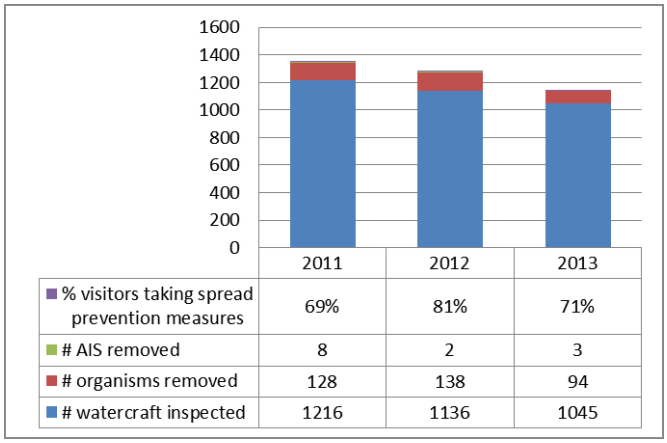
Tupper Lake: Waterways visited in previous two weeks, 2013	# visits
Tupper Lake	466
None	227
Long Lake	30
Raquette River	16
Rental	14
Massawepie Lake	11
Cranberry Lake	10
Raquette Lake	10
Upper Saranac Lake	9
Did not ask	8
Hudson River	7
Lake Flower	7
Saranac Lake Chain	7
Lake Champlain	5
Little Clear Pond	4
Lower Saranac Lake	4
Rainbow Lake	4
Schroon Lake	4
Upper St Regis Lake	4
Blue Mountain Lake	3
Chateaugay Lake	3
Did not know	3

Tupper Lake: Waterways visited in previous two weeks, 2013	# visits
Lake George	3
Lake Placid	3
Piercefield Flow	3
Atlantic Ocean	2
Buck Pond	2
Fish Creek Ponds	2
Forked Lake	2
Lake Clear	2
Lake Colby	2
Long Island Sound	2
Loon Lake	2
Moose Pond	2
Oneida Lake	2
Oswegatchie River	2
Raquette Pond	2
Rollins Pond	2
Saranac River	2
Saratoga Lake	2
St. Lawrence River	2
Adirondack Lake	1
Cayuga Lake	1
Follensby Clear Pond	1

Tupper Lake: Waterways visited in previous two weeks, 2013	# visits
Great Sacandaga Reservoir	1
Green Pond	1
Lake Barnegat, NJ	1
Lake Harris	1
Lake Simond	1
Little Tupper Lake	1
Little Wolf	1
Long Pond	1
Lower St Regis	1
Maine	1
Mohawk River	1
Moose River	1
Nabnasset Lake, MA	1
New Hampshire	1
New Jersey	1
Pocono Lake, NJ	1
Redfield Reservoir	1
Sacandaga Lake	1
Seneca River	1
Stillwater Reservoir	1
Taylor Pond	1
Windy Point Reservoir	1
total	856

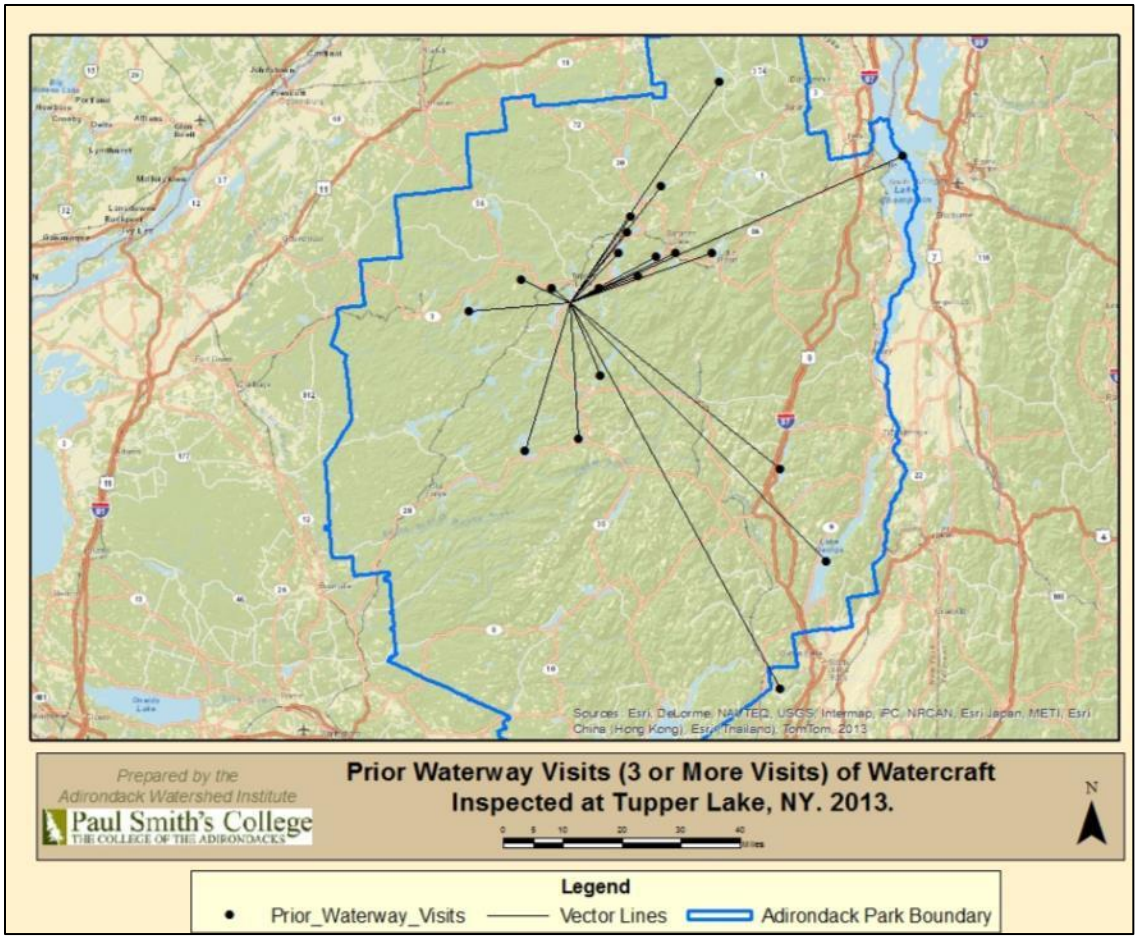
State/Province of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS



Credit: NYSDEC

Upper St. Regis Lake

December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: UPPER ST. REGIS LAKE 2013 BOAT LAUNCH USE SUMMARY

Boats inspected: 804 **% of visitors taking spread prevention measures: 79%**
AIS intercepted: 0 **% inspected boats with organisms: 4%**
 # visitors: 1239 **# of previously visited waterways: 74**

WSP Data Summary, 2013	Boat Type									total #
Waterbody	M	PWC	S	C	K	B	R	SUP	Docks	boats
Upper St. Regis Lake	311	0	5	240	230	8	3	4	3	804
percentage of total boats	39%	0%	1%	30%	29%	1%	0%	0%	0%	100%

M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B = construction barge; R = rowboat; SUP= stand-up paddleboard; Docks = boat docks launched for seasonal installation/maintenance

WSP Data Summary, 2013	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Upper St. Regis Lake	1239	18	10	24	588	4%

boats dirty = watercraft with any organic material, invasive, non-invasive or unknown.

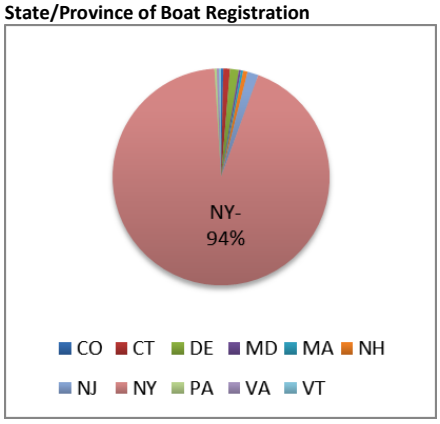
WSP Data Summary, 2013	# groups taking AIS spread prevention measures									# groups	# groups using
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	asked	boat wash
Upper St. Regis Lake	464	249	376	27	0	7	1	48	21	586	254
percentage of total # groups asked	79%	42%	64%	5%	0%	1%	0%	8%	NA	100%	43%

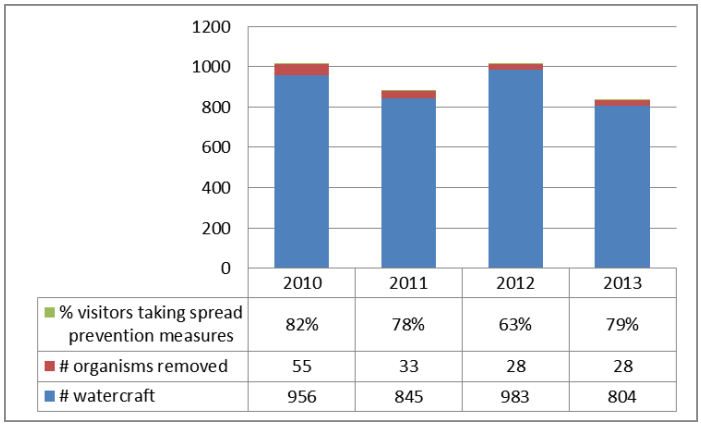
Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

WSP Data Summary, 2013	organism type													total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	ZM*	other	AIS	boats with AIS
Upper St. Regis Lake	0	0	0	0	12	3	2	0	5	0	0	0	6	0	0%
percentage of organisms removed	0%	0%	0%	0%	43%	11%	7%	0%	18%	0%	0%	0%	21%		

BW = bladderwort; CLP = curly-leaf pondweed; ELO = elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM = unknown milfoil; VLM = variable leaf milfoil; PN = pine needles; SWF = spiny waterflea; WC= water chestnut; ZM = Zebra mussel; */AIS = aquatic invasive species.

State/Province of Boat Registration





Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

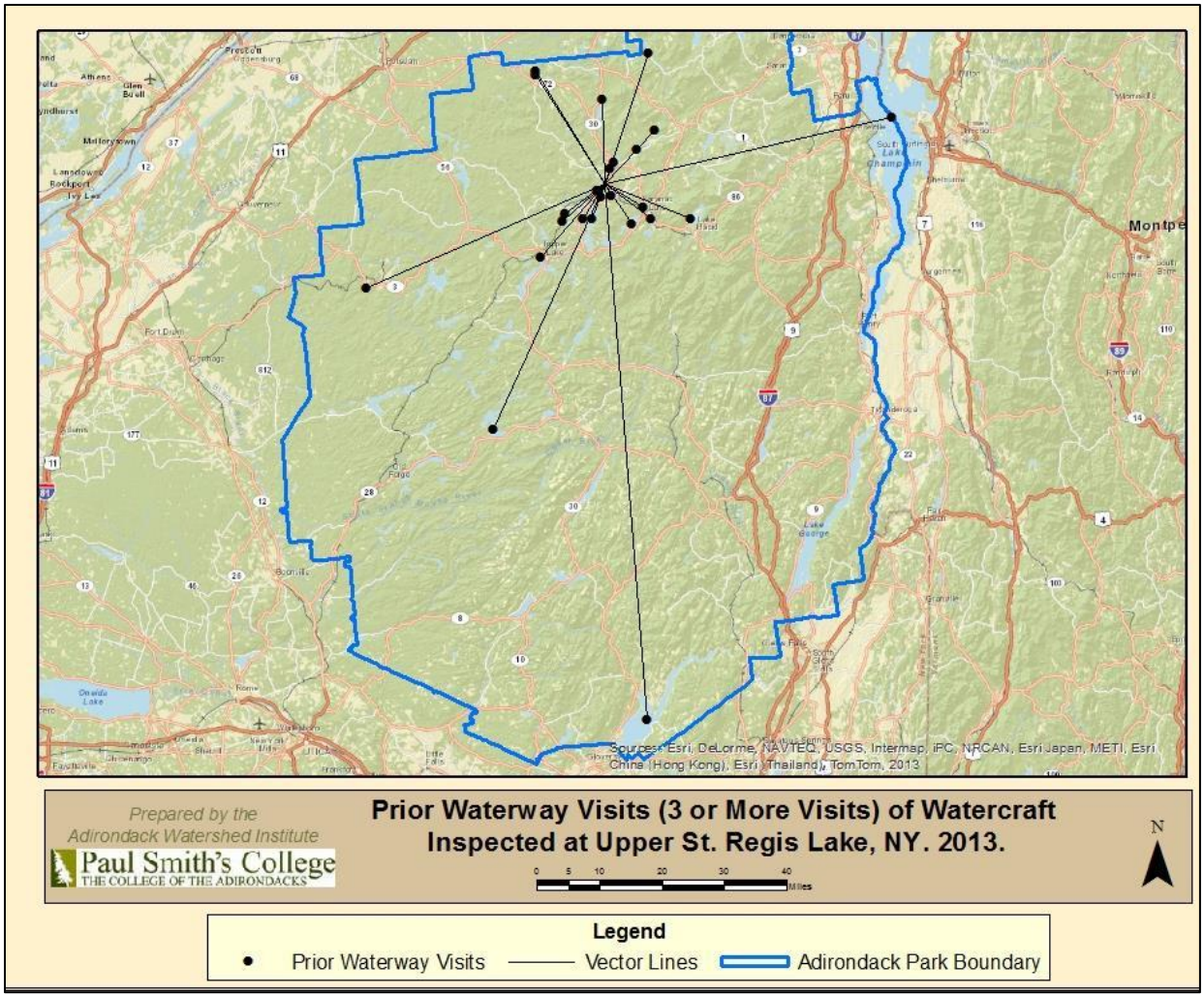
December 31, 2013

ADIRONDACK WATERSHED INSTITUTE WATERSHED STEWARDSHIP PROGRAM: UPPER ST. REGIS LAKE 2013 BOAT LAUNCH USE SUMMARY

Upper St. Regis Lake: Previous waterways visited, 2013	# visits		Upper St. Regis Lake: Previous waterways visited, 2013	# visits
Upper St. Regis Lake	190		Lake Titus	2
None	125		Loon Lake	2
Osgood Pond	18		Meacham Lake	2
Upper Saranac Lake	17		Mirror Lake	2
Lower Saranac Lake	13		Moose Pond	2
Saranac Lake Chain	13		Polliwog Pond	2
Lake Placid	12		Second Pond	2
Did not ask	11		St. Lawrence River	2
Rental	10		Stillwater Reservoir	2
Little Clear Pond	8		Adirondacks	1
Rollins Pond	8		Albany, NY	1
Lake Flower	7		Atlantic Ocean	1
Lake Clear	6		Barnum Pond	1
Lake Colby	6		Black Pond	1
Lake Kushaqua	6		Cazenovia Lake	1
Buck Pond	5		Chapel Pond	1
Did not know	5		Construction	1
Lake Champlain	5		Deer River Flow	1
Lower St. Regis Lake	5		Did not answer	1
Rainbow Lake	5		Eagle Creek	1
Tupper Lake	5		East Pine Pond	1
Follensby Clear Pond	4		Forked Lake	1
Green Pond	4		Grasse River	1
Long Pond	4		Green River	1
Raquette Lake	4		Lake Bomoseen, VT	1
Floodwood Pond	3		Long Lake	1
Great Sacandaga Reservoir	3		Mitchell's Pond	1
Mountain View Lake	3		Moose River	1
Star Lake	3		Oneida Lake	1
Black Lake	2		Parmenter Pond, NY	1
Cascade Pond	2		Piseco Lake	1
Chateaugay Lake	2		Rat Pond	1
Chazy Lake	2		Round Pond	1
Church Pond	2		Saratoga Lake	1
Cranberry Lake	2		Silver Lake	1
Fish Creek Ponds	2		Spitfire Lake	1
Jones Pond	2		St. Regis River	1
Lake George	2		Wolf Pond	1
			total	526

Paul Smith's College Watershed Stewardship Program.
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970.
Telephone: 518-327-6341. Email: eholmlund@paulsmiths.edu

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS


Source: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri Thailand, TomTom, 2013
Prepared by the
Adirondack Watershed Institute
Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS
Prior Waterway Visits (3 or More Visits) of Watercraft
Inspected at Upper St. Regis Lake, NY. 2013.
0 5 10 20 30 40
Miles
N
Legend
Prior Waterway Visits
Vector Lines
Adirondack Park Boundary


NY4947FH