Adirondack Watershed Institute Stewardship Program Summary of Programs and Research 2014

Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

Adirondack Watershed Institute
Report # PSCAWI 2015-02

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 Adirondack Watershed Institute Stewardship Program (AWISP) is part of coordinated efforts at the local, regional and statewide levels to detect and 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. 2014 marked the fifteenth field season for the AWISP.

2014 highlights:

- **Clean, Drain, Dry!** AWISP stewards provided coverage at 31 launches on 26 lakes and ponds this season sharing the message of "*Clean*, *Drain*, and *Dry!*"
- **New Education Program!** The AWISP launched an off-site environmental education program called the Water Shield Workshop. The program integrates land-based exercises with on-water activities for participants of all ages. Water Shield Workshops were held at Lake Pleasant, Schroon Lake, and Lower Saranac Lake in 2014.
- **Finding *Bythotrephes*!** Survey efforts by AWISP staff confirmed the presence of spiny waterflea (*Bythotrephes longimanus*) in Lake Pleasant and Piseco Lake for the first time.
- **See it! Touch it! Learn it!** The AWISP purchased an Enviroscape watershed model for education and outreach activities.

Round-up of accomplishments, by the numbers:

- AWISP stewards confirmed and removed 834 AIS from inspected watercraft across the Adirondack region.
- Stewards educated 63,471 visitors and inspected 25,033 watercraft.
- The AWISP employed 28 full-time stewards, 4 part-time stewards and 2 regional supervisors.
- The AWISP was funded by 7 lake associations, 1 state authority, 1 tax district, 1 federal agency, 1 private foundation, and 1 college.
- While 94 waterbodies in the Adirondack Park are confirmed AIS sites, there are still 235 waterbodies which remain free of invasive species and need protection!

This is just a sample of the work conducted by the AWISP. What else have we done in 2014, and what is to come? Read on to find out!

The AWI Team

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The 2014 Adirondack Watershed Institute Stewardship Program was funded by:

Great Lakes Restoration
Paul Smith's College, The College of the Adirondacks
The Shore Owners' Association of Lake Placid, Preserving Placid's ecology, history and scenic beauty
St. Regis Foundation

Adirondack White Lake Association
Lower Saranac Lake Association
Great Sacandaga Lake Advisory Council
Rainbow Lake Association
Upper Saranac Lake Association

Saratoga Lake Protection & Improvement District
Lake Champlain Basin Program

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List of Tables and Figures

Table 1. Abbreviation List.

Abbreviation	Complete Text
AIS	Aquatic Invasive Species
ALSC	Adirondack Lake Survey Corporation
APA	Adirondack Park Agency
APIPP	Adirondack Park Invasive Plant Program
AWI	Paul Smith's College Adirondack Watershed Institute
AWISP	Adirondack Watershed Institute Stewardship Program
BRI	Biodiversity Research Institute
NYSDEC	New York State Department of Environmental Conservation
EPA GLRI	United States Environmental Protection Agency Great Lakes Restoration Initiative
LCBP	Lake Champlain Basin Program
PSC	Paul Smith's College
RIIPP	Regional Inlet Invasive Plant Program
SLPID	Saratoga Lake Protecion and Improvement District
steward	Adirondack Watershed Institute Steward
QAPP	Quality Assurance Project Plan
VIC	Paul Smith's College Visitor Interpretive Center

Abstract

This report summarizes the data and program highlights for the 2014 field season of Paul Smith's College (PSC) Adirondack Watershed Institute Stewardship Program (AWISP) in Paul Smiths, New York. 32 stewards were stationed at 26 lakes across the Adirondack region and beyond, receiving support from two Regional Supervisors, the Assistant Director, the Science Director, and the AWISP Program Director, to implement a coordinated aquatic invasive species (AIS) spread prevention program. Stewards greeted and educated 63,471 visitors about AIS issues and spread prevention techniques, while inspecting 25,033 watercraft of various types. Stewards removed 2,873 organisms from 2,084 watercraft, indicating that 8% of all watercraft inspected transported one or more visible organism. Stewards discovered and removed 834 instances of confirmed AIS, approximately 3% of all watercraft inspected. A comparative analysis of data from all 26 lakes revealed great variation in visitor traffic encountered, visitor receptivity to inspection, AIS transport rate, percentage of visitors taking AIS spread prevention measures, and type of watercraft launched. Visitors reported using their watercraft within the previous two weeks on a total of 503 different waterbodies across the United States and Canada. This report also includes summaries of steward projects and research initiatives including public education and outreach, surveying and management of invasive species, banded loon monitoring, and a comprehensive biological stream assessment as part of an ongoing AWI research project. The program was funded in 2014 by a United States Environmental Protection Agency Great Lakes Restoration Initiative (EPA GLRI) grant, the St. Regis Foundation, the Lake Placid Shoreowners' Association, Upper Saranac Lake Association, Lower Saranac Lake Association, the Saratoga Lake Protection and Improvement District, the Rainbow Lake Association, the Adirondack White Lake Association, Great Sacandaga Lake Advisory Council, Lake Champlain Basin Program and Paul Smith's College.

Introduction and Program Findings

Eric Holmlund, PhD
Director, Adirondack Watershed Institute Stewardship Program

Introduction and Historical Perspective

In 2014, the Adirondack Watershed Institute Stewardship Program entered its fifteenth consecutive summer field season of public education and AIS spread prevention at 26 lakes located across the Adirondack region. Paul Smith's College stewards greeted users of boat launches from Chateaugay to Great Sacandaga Lake, and many points in between. The AWISP is made possible through active collaboration with multiple 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 lake associations, foundations, and one public authority in designing and delivering the program each year. The AWISP is an integrated AIS spread prevention program seeking to reduce or prevent the spread of AIS across the Adirondack region by inspecting individual watercraft and hand-removing plant and animal materials, and *indirectly* 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 launch and upon retrieval.

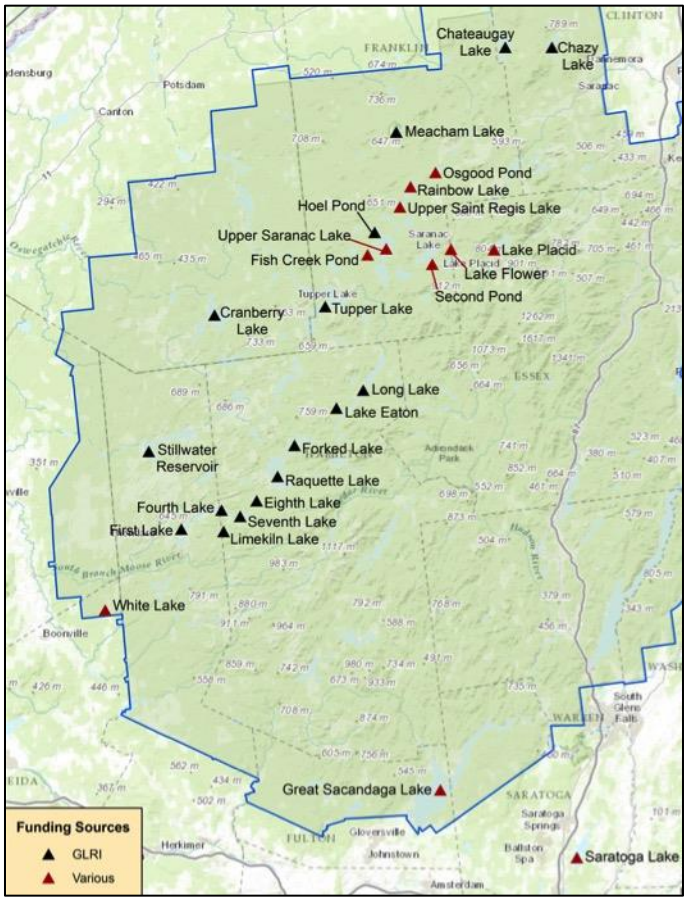


Figure 1. Map of AWISP lakes with coverage in 2014.

The AWISP acknowledges funding sources for the 2014 field season, which included the United States Environmental Protection Agency 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 Adirondack White Lake Association, the Great Sacandaga Lake Advisory Council, the Upper Saranac Lake Association, the Lower Saranac Lake Association, and the Lake Champlain Basin Program. These sources represent private land owners, municipalities, and the federal government.

The AWISP has grown annually over the past fifteen years in response to the rise in concern about the costly proliferation of AIS in water systems in northern New York. The 2014 program was the largest in fifteen years. At full summer strength, the AWISP employed 34 seasonal staff members, including 32 stewards (28 full-time, 4 part-time), and two regional supervisors. Staff members were recruited across the northeast, with

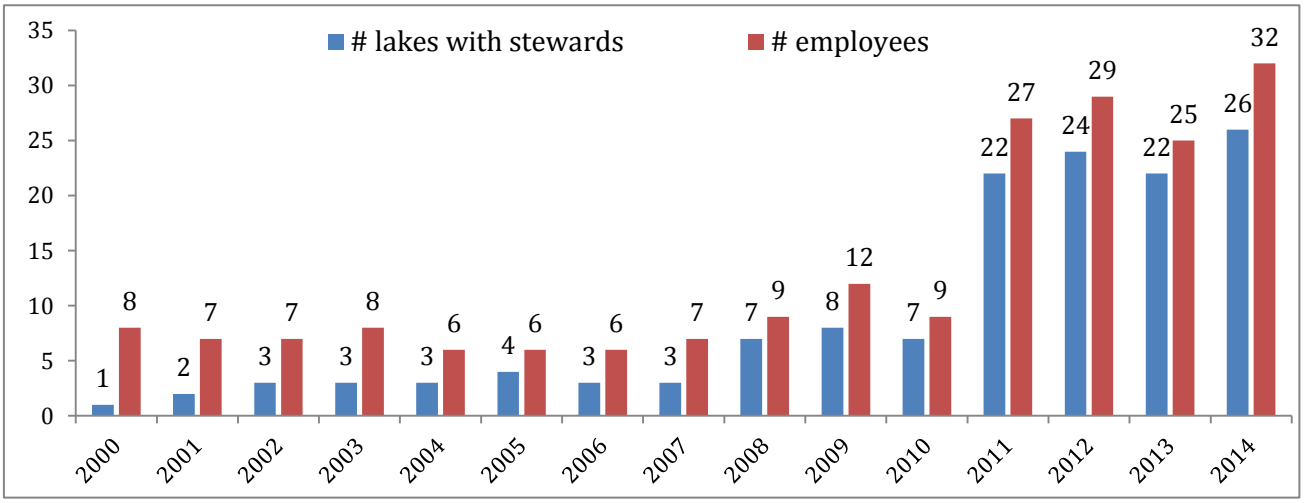


Figure 3. Number of lakes with steward coverage and number of seasonal stewards, 2000-2014.

some traveling from locations as far as Virginia. The dramatic rise in the scope of the program since 2011 reflects a significant investment by the United States federal government in the AWISP, in recognition of the

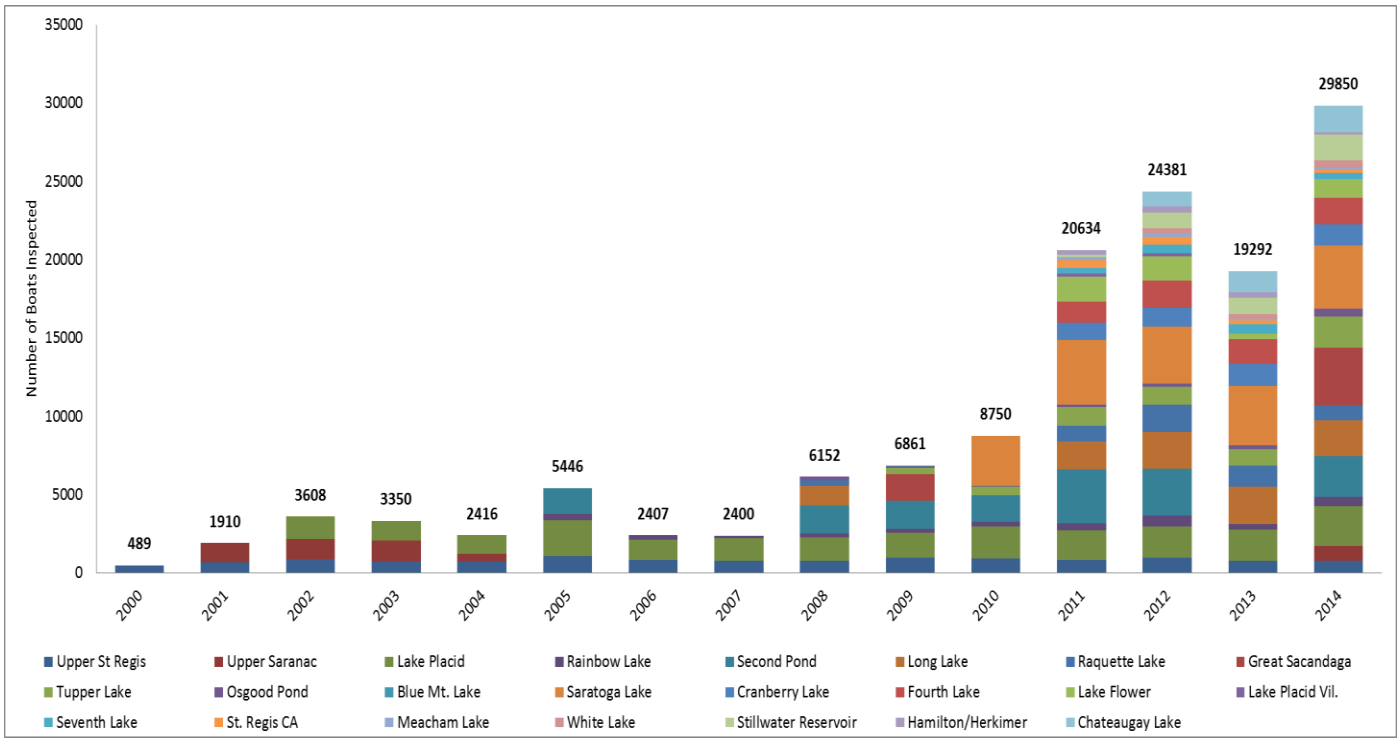


Figure 2. Number of watercraft inspected by Stewards, 2000-2014.

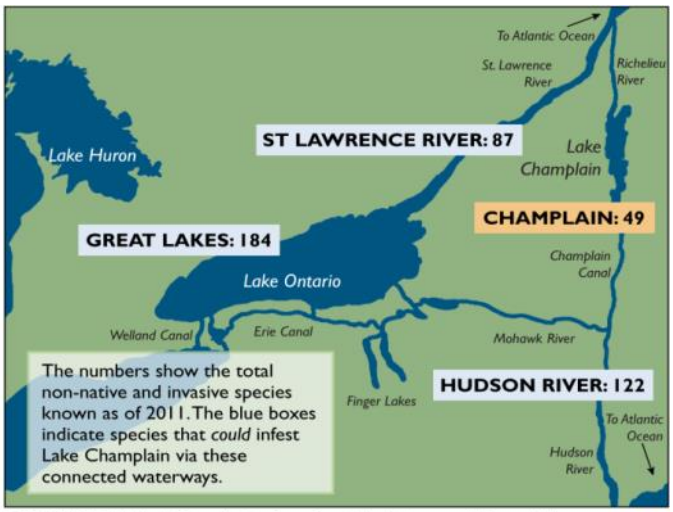
program's history, scope, quality and regional prominence.

With a larger staff size and an expanding coverage area, the AWISP has inspected an ever-increasing number of watercraft at a range of waterways over the past 15 summers. The AWISP initiated service in 2000

with only eight stewards at one boat launch and has since grown to provide coverage for 31 launch sites with the strength of 32 seasonal stewards in 2014 (Figure 2). The total number of watercraft encountered in 2014 reached a record high, with stewards tallying 29,850 total watercraft (Figure 3). Due to multiple factors encountered at boat launches, such as visitor receptiveness, traffic volume, environmental conditions and staff manpower, stewards were not able to inspect every watercraft, but still performed an impressive 25,033 inspections of 25,828 visitor groups (97% of groups were inspected). Since the program's inception, employees have inspected and removed organisms from 137,946 watercraft of varying types.

The Adirondack Region and the Threat of Aquatic Invasive Species

The Adirondack Region is home to an extensive array of globally significant wetlands, thousands of lakes and ponds, and over 30,000 miles of rivers and streams. With an abundance of high quality water resources, the Adirondacks present a crucial opportunity for stewardship. The Park protects almost six million acres of forests, mountains and waterways, attracting hundreds of thousands of visitors and seasonal residents annually. Most prominent among the many attractions of the region are its opportunities in snow-free months for aquatic recreation, including paddling, sailing, motorboating, swimming, diving, camping, and fishing. Visitors to the Park expend $1.2 billion annually, with nearly 70% expressing an interest in water based recreational activities such as swimming, fishing or boating (Kelting, 2006). While productive from a socioeconomic perspective, many of these activities can, and have, spread AIS over the past two decades to over 90 Adirondack lakes. An important paper published in 2010 by Notre Dame University quantified the role of recreational watercraft and trailers in spreading AIS overland between waterbodies (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 each season, including an increasingly serious infestation of Asian clam (*Corbicula fluminea*) in Lake George, expanding to a total of 14 sites in 2014, new detections of spiny waterflea (*Bythotrephes longimanus)* in Adirondack lakes, along with the continued management of *Hydrilla verticillata* in Cayuga Lake and the Lower Croton River. 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



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.

Steward Jesse Smith performs a mock inspection of scuba equipment during AWISP training at PSC.

waterways with dozens more AIS not yet present in the region (Smith, Quirion, & Johnstone, 2013). AIS spread prevention programs are an integral component of an effective invasive species management regimen. Stewardship programs can help reduce the inadvertent introduction of new AIS to the Adirondacks, including species such as Brazilian elodea, Hydrilla, quagga mussel and round goby. Although the threat of AIS introduction and expansion continues to raise alarm, 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.

Key Regional Findings

The 2014 field season ran from Memorial Day weekend (May 24th) to Labor Day (September 1st), with additional weekend coverage at select locations extending to late September. A total of 32 stewards were stationed at 31 boat launch sites providing coverage for 26 different lakes and ponds. In addition, the AWISP added two seasonal administrative positions in 2014 to provide support for the Tupper Lake and west-central

Table 2. Comprehensive data summary, 2014. Total # of visitors and # of organisms removed from watercraft entering and leaving AWISP boat launch sites.

Waterbody	total # people	organisms found		total organisms found	# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving				
Chateaugay Lake	4024	49	351	400	244	1556	16%
Chazy Lake	4	0	0	0	0	2	0%
Cranberry Lake	3270	30	17	47	36	1160	3%
Eighth Lake	84	2	0	2	1	35	3%
First Lake (Hollywood Hills)	41	0	0	0	0	18	0%
Fish Creek Ponds	341	8	34	42	23	129	18%
Forked Lake	91	0	0	0	0	31	0%
Fourth Lake	4190	24	7	31	28	1563	2%
Great Sacandaga Lake	7938	93	30	123	102	3564	3%
Lake Eaton	33	0	0	0	0	14	0%
Lake Flower	2284	49	158	207	141	997	14%
Lake Placid	4899	38	30	68	53	2006	3%
Limekiln Lake	61	0	0	0	0	21	0%
Long Lake	4826	4	6	10	10	1726	1%
Meacham Lake	267	2	3	5	4	101	4%
Osgood Pond	785	91	114	205	140	345	41%
Rainbow Lake	1218	70	98	168	117	462	25%
Raquette Lake	2089	24	61	85	75	840	9%
Saratoga Lake	9292	473	618	1091	774	3717	21%
Second Pond	4701	53	53	106	89	1679	5%
Seventh Lake	836	5	5	10	7	316	2%
Stillwater Reservoir	3617	37	11	48	44	1323	3%
Tupper Lake	3906	12	98	110	102	1654	6%
Upper Saranac Lake	2403	16	24	40	35	819	4%
Upper St. Regis Lake	1303	39	34	73	57	559	10%
White Lake	968	2	0	2	2	396	1%
Totals	**63471**	**1121**	**1752**	**2873**	**2084**	**25033**	**8%**

Adirondack sub-regions. Stewards inspected 25,033 watercraft for invasive species while educating 63,471 visitors about the ecology of AIS, spread prevention techniques and the potential ramifications for the

inadvertent transport of organisms. Traffic and visitation at the boat ramps varied significantly by location with a low of 2 boats inspected at Chazy Lake, to a high of 3,717 boats inspected at Saratoga Lake (Table 2). The range in visitors at each site varied with factors such as popularity, days of steward coverage and ease of accessibility.

The type of watercraft inspected also varied significantly with factors such as lake morphology and the quality of launch facility available. In other words, motorboats were more likely to be encountered at hard surface ramps, while paddlecraft and non-motorized vessels frequented smaller waterway access sites and car top launches. In total, 67% of watercraft inspected were motorboats, followed by kayaks (15%) and canoes (11%). All other boat types were tallied in the single percentages (Table 3). Saratoga Lake had the greatest quantity of motorboats with 3,854 vessels, accounting for 95% of all watercraft inspected, while Second Pond attracted the greatest number of non-motorized watercraft (sailboat, canoe, kayak, rowboat, and SUP) with a total of 1,736 or 67% of boat traffic encountered at that site.

Table 3. Comprehensive data summary, boat types, 2014. Quantity of watercraft type observed at each boat launch site. 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.

Waterbody	Boat Type									total #
	M	PWC	S	C	K	B	R	SUP	Docks	boats
Chateaugay Lake	1363	165	2	52	110	0	4	0	0	1696
Chazy Lake	2	0	0	0	0	0	0	0	0	2
Cranberry Lake	1158	50	0	71	56	0	7	0	1	1343
Eighth Lake	16	1	0	25	2	0	0	0	0	44
First Lake (Hollywood Hills)	2	3	0	11	6	0	0	0	0	22
Fish Creek Ponds	84	18	0	24	37	0	1	0	0	164
Forked Lake	10	0	0	22	21	0	0	1	0	54
Fourth Lake	1290	256	15	28	97	0	5	0	0	1691
Great Sacandaga Lake	3142	293	24	5	112	1	106	0	4	3687
Lake Eaton	7	4	1	3	4	0	0	0	0	19
Lake Flower	780	89	4	141	165	1	2	16	0	1198
Lake Placid	1371	12	14	244	800	1	13	78	0	2533
Limekiln Lake	8	0	0	8	22	0	1	0	0	39
Long Lake	1277	85	12	596	271	1	5	2	17	2266
Meacham Lake	59	12	0	7	48	0	3	0	0	129
Osgood Pond	80	0	4	174	222	0	12	10	0	502
Rainbow Lake	246	11	0	125	214	0	3	8	0	607
Raquette Lake	657	18	7	165	121	0	0	4	0	972
Saratoga Lake	3854	107	33	7	39	0	4	2	0	4046
Second Pond	816	51	0	708	975	1	9	44	0	2604
Seventh Lake	194	16	1	37	178	0	0	2	0	428
Stillwater Reservoir	1066	26	2	213	326	0	7	6	0	1646
Tupper Lake	1394	58	6	271	211	4	3	2	2	1951
Upper Saranac Lake	723	60	17	77	74	0	0	4	0	955
Upper St. Regis Lake	266	1	3	252	259	3	6	0	0	790
White Lake	246	84	7	108	8	0	3	6	0	462
Totals	**20111**	**1420**	**152**	**3374**	**4378**	**12**	**194**	**185**	**24**	**29850**
% of all watercraft	67%	5%	1%	11%	15%	0%	1%	1%	0%	100%

Stewards observed and removed organisms from watercraft at different frequencies depending on location. While the frequency of visible organism transport was 8% for all watercraft, the frequencies varied from a low of 0% at six locations, to a high of 41% of boats at the Osgood Pond Waterway Access Site. Other locations with notably high organism transport rates include Rainbow Lake (25%), Saratoga Lake (21%), Fish Creek Pond (18%), Chateaugay Lake (16%), Lake Flower (14%) and Upper St. Regis (10%) (Table 2). However, it is worth noting for most locations that the high organism transport rate was driven by a prevalence of native vegetation (Table 4). This variation could also be caused 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, with 1,752 organisms detected on vessels retrieving and 1,121 on vessels launching (Table 2).

Table 4. Summary of organisms removed from watercraft, 2014; BW = bladderwort; CLP = curly-leaf pondweed; ELO= elodea; EWM = Eurasian watermilfoil; GRS = grass; NM = native milfoil; UM= unidentified milfoil; VLM = variable leaf milfoil; PN=pine needles; SWF= spiny waterflea; WC= water chestnut; H=Hydrilla; ZM= Zebra mussel; NP=native pondweed; WL=water lily; */=AIS.

Waterbody	organism type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Chateaugay Lake	4	5	64	128	157	1	0	0	10	0	0	0	1	0	21	9	134	9%
Chazy Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Cranberry Lake	0	4	1	5	19	2	1	1	4	0	0	0	0	1	4	5	10	1%
Eighth Lake	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0%
First Lake (Hollywood Hills)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Fish Creek Ponds	2	0	0	3	14	0	2	5	3	0	0	0	0	7	0	6	8	6%
Forked Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Fourth Lake	1	0	0	5	10	3	3	0	2	0	2	0	1	1	0	3	8	1%
Great Sacandaga Lake	1	11	1	35	34	0	2	0	11	3	6	2	6	8	0	3	63	2%
Lake Eaton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Lake Flower	17	0	1	5	51	3	13	9	34	0	0	0	0	42	25	7	14	1%
Lake Placid	3	0	1	1	20	0	3	0	25	0	0	0	0	3	0	12	1	0.05%
Limekiln Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Long Lake	1	0	0	1	1	0	1	2	0	0	0	0	0	2	1	1	3	0.2%
Meacham Lake	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	1	0	0%
Osgood Pond	12	0	3	2	56	1	5	0	43	0	0	0	0	37	10	36	2	1%
Rainbow Lake	9	0	0	0	27	0	0	0	87	0	0	0	0	35	3	7	0	0%
Raquette Lake	6	0	1	2	43	1	7	13	2	0	0	0	0	0	6	4	15	2%
Saratoga Lake	0	189	6	311	284	1	85	1	18	0	13	0	33	125	0	25	547	15%
Second Pond	2	0	2	10	12	0	1	3	51	0	0	0	0	20	1	4	13	1%
Seventh Lake	1	0	0	2	3	1	0	1	1	0	0	0	0	1	0	0	3	1%
Stillwater Reservoir	0	0	0	4	16	0	4	1	14	0	1	0	0	1	0	7	6	0.5%
Tupper Lake	2	1	1	2	75	2	1	0	0	0	2	0	1	7	10	6	6	0.4%
Upper Saranac Lake	1	0	0	0	9	3	0	0	9	0	0	0	0	9	1	8	0	0%
Upper St. Regis Lake	6	0	1	0	18	0	3	0	22	0	0	0	0	6	2	15	0	0%
White Lake	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3%
Totals	**68**	**210**	**82**	**517**	**853**	**18**	**131**	**36**	**337**	**3**	**24**	**2**	**42**	**305**	**85**	**160**	**834**	**3%**
organism presence as % of inspections	0%	1%	0%	2%	3%	0%	1%	0%	1%	0%	0%	0%	0%	1%	0%	1%	3%	

Over the course of 25,033 watercraft inspections, stewards discovered 2,873 organisms on 2,084 watercrafts of various types (Table 2). Stewards detected and removed 834 instances of confirmed AIS, including Eurasian watermilfoil (517), curly-leaf pondweed (210), zebra mussels (42), variable leaf milfoil (36), water chestnut (24), spiny waterflea (3), and Hydrilla (2) (Table 4). The vast majority of samples were bagged,

labeled, and delivered to AWISP Regional Supervisors for confirmation. All AIS and possible AIS samples were transported to the AWI Environmental Research Laboratory at Paul Smith's College for further scrutiny and positive identification by an AWI Research Associate. Saratoga Lake had the greatest quantity of AIS detected with 547 occurrences on 15% of all boats inspected. Chateaugay Lake ranked second in AIS detection with 134 organisms or 9% of boats inspected. Overall, 3% of inspections revealed one or more AIS (Table 4). It's worth noting that the two instances of Hydrilla identified on watercraft launching into Great Sacandaga Lake were identified by the steward using a field key. Due to the logistical constraints, including significant distance between the Great Sacandaga Boat Launch and the AWI Laboratory, neither Hydrilla sample could be positively identified by an AWI Research Associate at AWI facilities.

The various types of watercraft transported organisms and AIS at differing rates. Non-motorized watercraft (sailboat, canoe, kayak, rowboat, and SUP) were less likely to transport anything (including grass, pine needles, and other organic material), and again were less likely to transport AIS than motorboats. Of the 1,905 watercraft found to contain one or more organism, motorboats comprised 87.8% of the dirty vessels. Non-motorized watercraft were found to be transporting 154 organisms, while motorboats were found to contain 1,673 organisms. 7.4% of motorboat groups, 0.4% of canoe groups, 0.3% of personal watercraft groups, and 0.2% of kayaks were found to be transporting any organism. Motorboats, thus, were approximately 18 times more likely to be transporting any organisms than were canoes. Overall, stewards detected and removed organic material on 8.4% of all watercraft inspected (Table 5).

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

Type of Watercraft	# boat groups transporting any organism	% of 1905 boat groups transporting any organism	Total # groups inspected	% of groups transporting any organism	% of groups taking AIS spread prevention steps
Barge- construction	2	0.1%	12	0.0%	50%
Canoe	81	4.3%	1234	0.4%	56%
Dock	2	0.1%	13	0.0%	31%
Kayak	39	2.0%	727	0.2%	56%
Motorboat	1673	87.8%	19329	7.4%	71%
Personal Watercraft	74	3.9%	1014	0.3%	59%
Rowboat	23	1.2%	179	0.1%	55%
Sailboat	10	0.5%	155	0.0%	62%
Stand-up paddleboard	1	0.1%	40	0.0%	32%
Total of boat groups transporting any organism	**1,905**		**22,703**	**8.4%**	**66%**

Barges, docks, kayaks and SUP's were not found to transport any AIS. AIS were most frequently discovered on motorboats (4%) and personal watercraft (3%). Detected AIS species included curly-leaf pondweed, Eurasian watermilfoil, variable leaf milfoil, spiny waterflea, water chestnut, Hydrilla or zebra mussels (Table 6). Our data indicates that motorboats are 20 times more likely to transport *AIS* than are

canoes. 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.

Type of Watercraft	CLP	H	EWM	VLM	SWF	WC	ZM	Total # groups w/ AIS	Total # groups inspected	% of groups transporting AIS
Barge- construction				0				0	12	0%
Canoe				3				3	1234	0.2%
Dock								0	13	0%
Kayak								0	727	0%
Motorboat	204	2	487	25	20		42	780	19329	4%
Personal Watercraft	3		22	6	3			34	1014	3%
Rowboat			2					2	179	1%
Sailboat			2	1				3	155	2%
Stand-up paddleboard								0	40	0%
Grand Total	**207**	**2**	**513**	**35**	**23**	**0**	**42**	**822**	**22703**	**4%**

Overall, 68% of visitors reported taking one or more measures to prevent the spread of AIS prior to arriving at the boat launch (Table 7). In order to be tallied as taking a spread prevention measure, the visitor would have to state 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*. While administering the recreational use survey, stewards would attempt to retrieve information without leading the interviewee to a particular answer. For example, when asking if a visitor had taken any steps to prevent the spread of AIS, the steward would not provide examples of such actions, as the visitor may simply default to the offered choices for the sake of providing an answer. Of the groups surveyed, 47% reportedly washed their watercraft, while 32% inspected their watercraft for AIS, and 20% reported drying their boats (Table 7). Other AIS spread prevention measures were less commonly reported. It is important to note that the "yes" percentages varied widely across the twenty-six lakes. Visitors at White Lake, Eighth Lake, Cranberry Lake and Osgood Pond were much less likely to have adopted an AIS spread prevention measure (39%, 42%, 45% and 48%) than visitors at Stillwater Reservoir (84%) or Lake Eaton (80%) (Table 7). Chazy Lake was not included in the comparison due to the very small quantity of visitors at the location, with only 2 inspections documented (Table 2).

Previously Visited Waterways

Stewards stationed at the 26 lakes covered by the AWISP in 2014 asked all groups launching and retrieving to determine what, if any, waterbodies they had visited in the previous two weeks. The quantity and location of previously visited waterways varied significantly by location; details of each lake's responses can be

Table 7. AIS spread prevention information, 2014. 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.

Waterbody	# groups taking AIS spread prevention measures										# groups asked
	yes	yes %	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Chateaugay Lake	1180	73%	1121	624	94	43	56	45	281	26	1613
Chazy Lake	2	100%	2	2	2	2	2	2	2	0	2
Cranberry Lake	513	45%	269	358	160	92	116	85	98	109	1135
Eighth Lake	14	42%	8	7	4	0	0	0	1	2	33
First Lake (Hollywood Hills)	14	78%	7	9	0	0	0	0	3	0	18
Fish Creek Ponds	93	73%	39	60	30	0	4	1	27	3	128
Forked Lake	19	59%	4	14	0	0	0	0	14	0	32
Fourth Lake	1072	69%	367	883	278	10	17	8	261	43	1552
Great Sacandaga Lake	2213	63%	521	1759	519	46	184	25	133	87	3500
Lake Eaton	12	80%	2	5	1	0	0	0	5	0	15
Lake Flower	620	66%	304	323	203	14	24	4	183	89	935
Lake Placid	1072	57%	384	667	250	9	16	1	300	185	1887
Limekiln Lake	11	55%	2	8	2	0	0	0	3	1	20
Long Lake	1203	70%	676	1026	164	19	36	18	998	23	1728
Meacham Lake	68	68%	33	52	13	0	1	1	3	1	100
Osgood Pond	153	48%	38	123	6	0	0	0	15	32	316
Rainbow Lake	314	68%	187	229	155	1	6	0	207	7	460
Raquette Lake	656	79%	337	561	184	11	20	12	205	9	835
Saratoga Lake	2507	79%	1169	1873	183	31	190	22	155	851	3158
Second Pond	1117	67%	622	570	476	5	30	2	341	29	1674
Seventh Lake	198	62%	85	160	28	4	4	4	71	1	317
Stillwater Reservoir	1065	84%	586	774	619	7	31	12	871	92	1275
Tupper Lake	1043	64%	422	588	106	1	22	7	346	56	1625
Upper Saranac Lake	628	76%	363	356	111	0	20	2	189	43	827
Upper St. Regis Lake	377	69%	140	273	87	1	3	0	100	32	546
White Lake	155	39%	39	38	3	0	0	0	123	1	395
Totals	**16319**	**68%**	**7727**	**11342**	**3678**	**296**	**782**	**251**	**4935**	**1722**	**24106**
% of groups taking measures	68%		32%	47%	15%	1%	3%	1%	20%	7%	

found in each lake's data summary, beginning on page 92. When combined, the list of most common visits for all groups in the program is fairly stable over the past several years. Once again, in 2014 the top two responses were the same lake they were visiting that day (44% of visitor responses), or "none" (28%) (Table 8). This implies that 72% of visitors to the 26 lakes in the AWISP 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 and killing any aquatic hitchhikers) or they had simply taken out from a lake only to launch again in that same lake at a later point in time (Table 8).

After these top two responses, visitors cited a total of 503 different waterbodies as previously visited; an increase from 366 waterbodies in 2013. When comparing the past three years, there is considerable stability in the top five lakes on the list, with an increasing quantity of movement and variation as the list continues. Note that the most frequently cited previous destination, the Saranac Lake Chain with 445 visits, represented only 1.8% of responses, meaning that lakes with single visits from the list of 503 previously visited waterbodies each represented only 0.004% of responses.

Table 8. Twenty-five most-visited waterways in previous two-week period for all AWISP lakes, 2014.

Previously Visited Waterway	total visits 2014	% of total visits	2014 rank	2013 rank	2012 rank
Same Lake - Previous Visit	10960	44.412%	1	1	2
None	7102	28.779%	2	2	1
Rental	809	3.278%	3	3	3
Saranac Lake Chain	445	1.803%	4	4	4
Lake Champlain	281	1.139%	5	6	6
Fulton Chain of Lakes	253	1.025%	6	5	5
Hudson River	201	0.814%	7	7	8
Lake Flower	188	0.762%	8	22	18
Lake George	169	0.685%	9	9	12
Lake Placid	166	0.673%	10	19	7
Lake Ontario	150	0.608%	11	12	14
Saratoga Lake	144	0.584%	12	42	32
Mohawk River	136	0.551%	13	14	18
Tupper Lake	125	0.507%	14	16	15
Lake Kushaqua	123	0.498%	15	27	51
St. Lawrence River	122	0.494%	16	10	11
Oneida Lake	107	0.434%	17	13	13
Long Lake	106	0.430%	18	15	17
Raquette Lake	100	0.405%	19	8	9
Sacandaga Lake	96	0.389%	20	11	35
Raquette River	81	0.328%	21	29	26
Unknown Lake	75	0.304%	22	41	267
Upper St Regis Lake	72	0.292%	23	25	16
Great Sacandaga Lake	70	0.284%	24	22	22
Canandaigua Lake	67	0.271%	25	37	39

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 propagule 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.

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 watershed stewards by

considering the previous visits (inbound) as confirmed *outbound* visits from the originating lake. For example, a visitor to Lake Placid states to the watershed steward that their boat was last used in Saratoga Lake, which represents a confirmed *outbound* trip from Saratoga Lake to Lake Placid. Other studies ask visitors to speculate where they think they might launch their watercraft next. Our method yields *actual*, not *predicted* outbound visits. 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 consultation with the NYSDEC and APIPP, the optimal placement of stewards. When we included data from cooperating steward programs, a model of regional boat launch visit interconnection with implications for AIS spread emerges (DeBolt, Holmlund, Johnstone, Rohne, & Smith, 2014).

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) (Tables 9 & 10).

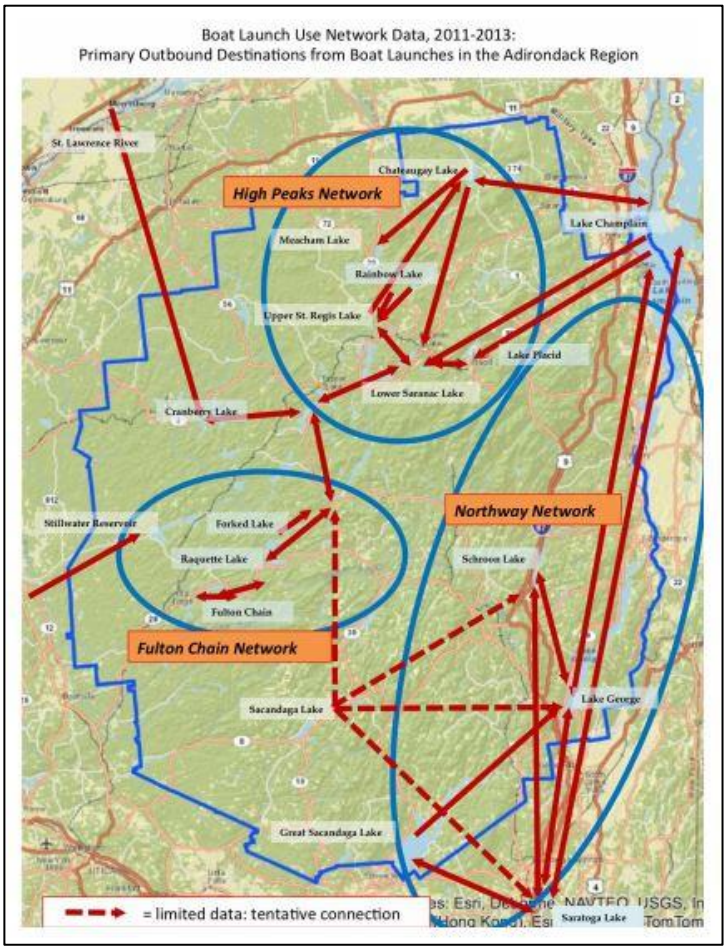


Figure 5. Theoretical outbound visit network, Paul Smith's College, Lake George Association, Schroon Lake Association, Lake Champlain Basin Program combined data, 2011-3.

The pattern of colors in our analysis allowed 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. Conversely, if the dominant outbound pattern is from an infested lake to uninfected lakes, stewards need to prioritize inspection and removal of visible organisms on boats departing

the waterway. 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 2014 steward data from the Lake George Association, Schroon Lake Association and Lake Champlain Basin Program when it is available.

Recommendations and Anticipated Changes for 2015

The AWISP completed another successful and challenging summer season. We continued to use digital tablets for data collection, which has significantly reduced human error and alleviated the time required for a manual data entry process. As a result, stewards have more time available to inspect watercraft and complete various projects that benefit the goals of the AWISP.

We anticipate an expanded program in 2015 which may include the extension of boat inspection programming to previously unserved lakes and communities. Awareness and concern about the potential negative effect of aquatic invasive species continues to grow across the Adirondack Region. As never before, lake associations, homeowners, and municipal officials are calling in an unprecedentedly unified voice for a regional, coordinated, and unified AIS spread prevention program. The NYSDEC is planning appropriate responses and continues to provide leadership and partnership with APIPP, Paul Smith's College, and prominent partners from across the Park.

In 2015, we will refine and expand our floating classroom program using our new 21' boat, the Water Shield. We successfully initiated the program in 2014 and will offer winter educational outreach to Keene Central School and Lake Placid Schools. We are designing an integrated and expanded summer program with the Upper Saranac Lake Foundation and Association. Other community-based programs will follow. We have invested in a redesigned website and better periodic publications.

AWISP Regional Supervisor, Jackie McCabe, educates participants about water clarity aboard the Water Shield.

Concluding Comments

Aquatic invasive species remain an ecological, social and economic challenge for communities everywhere. As new species make inroads to the United States, New York, and ultimately the Adirondack Park; the threat of invasion becomes increasingly significant. However, AIS issues continue to receive greater recognition in the media and legislative progress has been made to address the negative, and costly impacts AIS wreak on our ecosystems and communities. In 2014, the Lake George Park Commission successfully implemented a mandatory inspection and decontamination program for all boats visiting Lake George. In addition, the NYSDEC adopted statewide regulations that require boaters to remove all visible organic material from their watercraft and drain all water holding compartments prior to launch and upon retrieval when utilizing state-owned water

access sites. A succeeding bill, that expands the regulations to cover all navigable waters in New York State, is currently moving through the regulatory process.

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

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	19	14%	16%	9%	59
Chazy Lake	1	0	2	0%	0%	0%	0
Cranberry Lake	1	0	17	17%	3%	1%	65
Eighth Lake	0	0	6	51%	3%	0%	8
First Lake (Hollywood Hills)	1	0	3	44%	0%	0%	8
Fish Creek Ponds	1	0	15	37%	18%	6%	31
Forked Lake	1	0	11	22%	0%	0%	5
Fourth Lake	2	0	20	29%	2%	1%	96
Great Sacandaga Lake	2	1	58	11%	3%	2%	66
Lake Eaton	0	0	6	40%	0%	0%	5
Lake Flower	3	0	21	29%	14%	1%	76
Lake Placid	1	0	28	20%	3%	0.05%	98
Limekiln Lake	0	0	8	52%	0%	0%	7
Long Lake	1	0	26	20%	1%	0.2%	95
Meacham Lake	1	0	9	23%	4%	0%	12
Osgood Pond	0	0	11	47%	41%	1%	55
Rainbow Lake	0	0	14	60%	25%	0%	55
Raquette Lake	1	0	10	27%	9%	2%	70
Saratoga Lake	3	1	46	15%	21%	15%	81
Second Pond	2	0	50	38%	5%	1%	148
Seventh Lake	2	0	11	38%	2%	1%	38
Stillwater Reservoir	1	0	19	21%	3%	0.5%	102
Tupper Lake	1	0	24	20%	6%	0.4%	83
Upper Saranac Lake	1	0	16	31%	4%	0%	52
Upper St. Regis Lake	0	0	9	45%	10%	0%	93
White Lake	0	0	12	8%	1%	0.3%	20

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 = 1-5%; high >5%. F: low = 0-1% AIS transport rate; medium = >1 – 4%; high > 4%. G: low = 0-39 previous waterbodies; medium = 40- 74; high >75.

Despite several advances that address AIS related issues, the need for spread prevention and education programs remains. While a regulatory framework creates a welcome and appropriate foundation to help limit the spread of AIS, stewards serve as the first line of defense for arresting the overland transport of aquatic hitchhikers. Boat ramp steward programs help to proactively connect recreational users with the health of the aquatic resources they use and love. By making visitors aware of the negative impacts AIS inflict

on natural ecosystems, recreation, and the economy, the AWISP helps foster a sense of responsibility and a deeper appreciation of the natural world. As a result, boaters become more inclined to take precautionary steps against AIS, thereby helping to protect an irreplaceable resource enjoyed by the entire community. As our hard-working and friendly stewards continue to receive praise for their efforts, they will continue to strive to raise awareness, reduce the spread of AIS, and most importantly, create a lasting and healthy connection between visitors and the aquatic resources of the Adirondacks.

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, Chazy Lake, St. Lawrence River	Lake Flower, Upper Saranac Lake, *Osgood Pond*
Chazy Lake	None	Chateaugay Lake, Lake Placid, *Upper St. Regis*
Cranberry Lake	St. Lawrence River, Lake Bonaparte, Lake Ontario	Tupper Lake, Stillwater Reservoir, Second Pond
Eighth Lake	Fulton Chain of Lakes, Limekiln Lake, Fourth Lake	not enough outbound visits to lakes in AWISP network
First Lake (Hollywood Hills)	Mohawk River, Minerva Lake, Delta Lake	not enough outbound visits to lakes in AWISP network
Fish Creek Ponds	Lake Champlain, Rental, Lower Saranac Lake	Second Pond, Upper Saranac Lake, Lake Placid
Forked Lake	Lake Eaton, Raquette River, Essex Chain of Lakes	Long Lake, Fourth Lake
Fourth Lake	Seventh Lake, Oneida Lake, Lake Ontario	Seventh Lake, Raquette Lake, Stillwater Reservoir
Great Sacandaga Lake	Saratoga Lake, Mohawk River, Hudson River	Saratoga Lake, Long Lake
Lake Eaton	Oneida Lake, Forked Lake, Great Sacandaga Lake	Long Lake
Lake Flower	Lake Placid, Lower Saranac Lake, Upper Saranac Lake	Second Pond, Lake Placid, Upper Saranac Lake
Lake Placid	Mirror Lake, Lake Champlain, Lake Flower	Second Pond, Lake Flower, Upper Saranac Lake
Limekiln Lake	Fourth Lake, Fulton Chain of Lakes, Big Moose Lake	Fourth Lake, Raquette Lake
Long Lake	Rental, Raquette Lake, Tupper Lake	Tupper Lake, Raquette Lake, Fourth Lake
Meacham Lake	St. Lawrence River, Chateaugay Lake, Lake Champlain	Chateaugay Lake, Second Pond, Lake Flower
Osgood Pond	Upper St. Regis, Lower Saranac Lake, Jones Pond	*Upper St. Regis*, Rainbow Lake, Second Pond
Rainbow Lake	Lake Kushaqua, Buck Pond, Lake Champlain	Lake Placid, Upper Saranac, Fourth Lake
Raquette Lake	Fourth Lake, Seventh Lake, Long Lake	Long Lake, Fourth Lake, Seventh Lake
Saratoga Lake	Hudson River, Lake George, Mohawk River	Great Sacandaga Lake, Fourth Lake, Raquette Lake
Second Pond	Rental, Lake Flower, Lake Placid	Lake Flower, Lake Placid, *Upper St. Regis*
Seventh Lake	Fourth Lake, Fulton Chain of Lakes, Raquette Lake	Fourth Lake, Raquette Lake
Stillwater Reservoir	Black River, Lake Ontario, Rental	Fourth Lake, Long Lake
Tupper Lake	Long Lake, Raquette River, Rental	Long Lake, Second Pond, Upper Saranac Lake
Upper Saranac Lake	Lake Flower, Lake Placid, Lower Saranac Lake	Second Pond, Lake Flower, Lake Placid
Upper St. Regis Lake	Lake Flower, Rental, Osgood Pond	*Osgood Pond*, Second Pond, Upper Saranac Lake
White Lake	Big Moose Lake, Fulton Chain of Lakes, Oneida Lake	not enough outbound visits to lakes in AWISP 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. 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 = origination lake has no AIS; medium = outbound destination with same AIS as origination lake; high = origination lake has 1 or more AIS that destination lakes do not have.

1. The Watershed Steward network consists of the twenty-six 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 2014 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.

Stewards displayed extra outreach materials during NY Invasive Species Awareness Week.

Program Description

Kathleen Wiley

Assistant Director, Adirondack Watershed Institute Stewardship Program

Background

The Stewardship Program is the public education and AIS spread prevention element of the AWI. The AWI works to improve the quality of ecosystems through environmental research and management of AIS infestations across the Adirondack Park. The AWISP mission involves providing on-site stewardship of terrestrial and aquatic natural resources, primarily through public education, field monitoring, and service work. The AWISP 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 AWISP 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. Through continued funding by an EPA GLRI grant, the AWISP at PSC was able to provide a fourth year of stewardship in the west-central Adirondack region falling within the watershed of Lake Ontario. The AWISP provided part and full-time coverage at 31 boat launches, 17 of which were public and private boat launches within the Black River, Oswegatchie River, and Raquette River watersheds.

Training

The stewards participated in a week-long 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 launch steward programs. For the seventh year, the AWISP hosted a regional steward training with the Lake Champlain Basin Program, our own AWISP 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, LGA, and the LCBP 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 NYSDEC and the APA. AWISP spring staff members attended a portion of the Lake George Park Commission's new mandatory watercraft inspection and decontamination training and the AWISP Director gave a short presentation. The stewards were given the opportunity to attend a Standard First Aid and CPR/AED course. Most stewards attended a course taught at PSC by the Athletic and Recreation Department, but a few stewards took classes closer to their homes. This is the third year the female AWISP stewards have participated in the Rape, Aggression, Defense training course provided by the Paul Smith's Public Safety Department to prevent sexual harassment.

2014 Regional Boat Launch Steward Training at Paul Smith's College.

Methods

For the thirteen weeks from May 24th to August 24th, and then through September 22nd as staff was available (the main season is Memorial Day weekend to Labor Day weekend), AWISP stewards were stationed at 26 different lakes from 7:00AM to 4:00PM with one hour off for breaks and lunch. This was the first season that the AWISP provided some coverage on weekends in September thanks to the availability of several stewards who were no longer students. Based on the public's response, we recommend continuing to provide this additional coverage as staff allows. 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 retrieving, 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 Chateaugay Lake, Cranberry Lake, Fourth Lake, Lake Placid, Long Lake, Raquette Lake Village, Saratoga Lake, Stillwater Reservoir, Tupper Lake and Upper St. Regis Lake. Most other sites had regular weekly coverage (Table 11). This represented an increase of three boat launches which had full-time coverage in 2014. At a few sites, such as Chazy Lake and First Lake, a steward was present only a few times for educational purposes.

Table 11. Days of coverage at AWISP steward locations.

Boat Launch	Steward Coverage
*Chateaugay Lake	7 days/week
*Chazy Lake	Occasionally, depending on staff availability
*Cranberry Lake	7 days/week
*Eighth Lake	Occasionally depending on staff availability
*First Lake (Hollywood Hills)	Occasionally, depending on staff availability
Fish Creek Pond	1 day/week
*Forked Lake	1 day/week
*Fourth Lake	7 days/week
Great Sacandaga Lake	Broadalbin - 4 days/week, All other sites - 1 or 2 days/week
*Lake Eaton	Occasionally, depending on staff availability
Lake Flower	5 days/week
Lake Placid	Village - 1 day/week, State Launch - 7 days/week
*Limekiln Lake	1 day/week, depending on staff availability
*Long Lake	7 days/week
*Meacham Lake	1 day/week
*Osgood Pond	3 days/week
*Rainbow Lake	4 days/ week
*Raquette Lake	Village - 7 days/week, Burkes Marina - Fri/Sat
Saratoga Lake	7 days/week
Second Pond	4 days/ week
*Seventh Lake	3-5 days/week
*Stillwater Reservoir	7 days/week
*Tupper Lake	7 days/week
Upper Saranac Lake	4 days/ week
Upper St. Regis Lake	7 days/week
*White Lake	Fri/Sat/Sun

* = Great Lakes Restoration Initiative (GLRI) funding

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 a tent for 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 and appropriate spread prevention measures. This summer, the AWISP included more live plant samples and other props such as Asian Clam shells at every table with positive results. The stewards decked out their table displays during Invasive Species Awareness Week in which some stewards created posters, wrote on the parking lot with chalk, and offered a guess the invasive species game. 2014 marked the second year of digital data entry on iPads instead of paper data sheets. The stewards wore a PSC cap, khaki button-up shirt or dark green polo displaying the AWISP logo, and an AWISP nametag. Depending on the weather, they also wore a dark green sweatshirt with the AWISP logo and "clean/drain/dry" message.

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 with their watercraft in the past two weeks and what steps were taken to prevent the transport of AIS between waterbodies. Stewards collected observable data including group size, boat type, horsepower of outboard engines, and state registration. 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 locations potentially harboring AIS. Stewards also asked visitors to lower their outboard motors to a vertical position to eliminate standing water and drain their bilges into a bucket provided by the steward. Stewards offered informational literature on AIS and educated boaters how to prevent infecting other waterways. Although the stewards performed courtesy inspections for visitors, they also recommended that boaters take responsibility for washing and inspecting their boats offsite.

Steward Jorge Velazquez with bilge flushing equipment at the Second Pond State Boat Launch.

Three boat launches, Second Pond, Cranberry Lake, and Broadalbin on Great Sacandaga Lake, participated in the NYSDEC's Pilot Spread Prevention Bilge Flushing Program. These locations had portable sprayers designed to provide a flushing capacity of a boat's water holding compartments using lake water, at sites that did not have a pressurized water supply or electricity. Stewards asked boaters to allow flushing of their bilge, livewells and baitwells if said areas contained remnant water from a prior boating trip.

Logistics

Weekly staff meetings run by the appropriate regional supervisor, held on Tuesday mornings at PSC, Wednesday mornings at Ivy Terrace in Tupper Lake, and Thursday mornings at the Raquette Lake Union Free School, 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. There was a midsummer break from the staff meetings so the stewards had a respite from driving to the meeting location. The meetings also provided continued staff training and afforded an opportunity for identification of AIS found during the previous week. The stewards attempted to identify the AIS samples they collected before they were transported to PSC for a second review and further identification from the scientific staff at the AWI. The regional supervisors reviewed the survey data for omissions, errors, or irregularities and followed up with the stewards for clarification.

During staff training, stewards were oriented to the boat launches by visiting each site, often meeting lake association members and participating in boat tours provided by lake association members or using the

AWISP boat. The regional supervisors conducted unannounced site visits during the week to speak with each steward individually. One steward based in Raquette Lake, Tupper Lake and in Saranac Lake functioned as weekend supervisor for their respective areas. Weekend supervisors conducted site visits to support and monitor each steward as well as participated in outreach activities.

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 an additional avenue to broadcast the AWISP message, assist our coordinating organizations, and provide the stewards an opportunity to gain hands-on experience and skills. Some of the projects incorporated the stewards' interests with what type of activity would benefit the region. Stewards monitored loons on Big Moose Lake, Nicks Lake, Upper St. Regis Lake and Spitfire Lake for the Biodiversity Research Institute (BRI). Others worked with APIPP to survey for Japanese knotweed along the Moose River and conducted an aquatic plant survey of Lake Eaton. The Regional Inlet Invasive Plant Program (RIIPP) enlisted Zachary Simek to inject glyophosate into Japanese knotweed stems in their ongoing eradication effort. Simek holds a NYSDEC Pesticide Technician certification. Stewards controlled invasive purple loosestrife through hand pulling on the St. Regis Lakes. Stewards also worked with the AWISP Science Director on a Lyme Disease Project collaboration between PSC, Trudeau Institute, and the New York State Department of Health and on AWI's biological stream assessment project.

Other stewards worked on the AWISP social media project by posting to a blog, Facebook page, and Twitter feed. Four original newsletters were produced throughout 2014 and distributed to a list of approximately 300 contacts. Stewards attended and presented at area special events and lake association meetings. The AWISP purchased a tabletop non-point source watershed model to engage people in the concepts of drinking water sources, storm water pollution and prevention, and wetland functions, values, protection and conservation. One steward maintained the SUNY ESF's Ranger School's Arboretum. Another steward drew illustrations of AIS for future use by AWI in outreach efforts. Stewards also worked with AWI staff on a water quality assessment project at Bear Pond, near the PSC campus.

A fishing line collection bin installed by AWISP staff at Saratoga Lake.

The AWISP partnered with the BRI to implement the Boat U.S. Foundation Monofilament Recycling Program. The fishing line collectors are covered and labeled pieces of PVC pipe affixed to a stationary object near the launching ramp. The stewards placed 23 fishing line collectors around the park in hopes that discarded fishing line would not entangle birds. In addition, stewards constructed two AIS disposal stations with materials donated by the NYSDEC. One unit was installed by AWISP staff at the Chateaugay Lake State Boat Launch and the second unit will be installed in the spring.

Observations about the field season

The 2014 season went smoothly as the AWISP entered its fourth 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 the PSC based stewards, Great Sacandaga Lake, and Saratoga Lake stewards as well as oversaw Regional Supervisors in Tupper Lake and Raquette Lake. The three Regional Supervisors created the work schedules, ran weekly staff meetings, and conducted most of the site visits for the approximately ten stewards in their area. The Science Director supervised the stewards' scientific special projects.

It was the second season of a revised protocol requiring the examination of all potential AIS removed from watercraft at the AWI headquarters at Paul Smith's College. Procedures for digital data entry in the field, management of the database, and identification of all potential AIS were reviewed and upgraded. The AWISP hosted the Annual Summer Adirondack Intern Mixer at the PSC Visitor Interpretive Center (VIC), which was well attended.

Other activities

The Director attended regular meetings of APIPP, Adirondack AIS Committee, and LCBP. The Director presented research based on AWISP steward data at the Adirondack Research Forum in February, the New England Association of Environmental Biologists conference in March, the LGA Boat Inspector training in April, and NYSDEC Operations Staff Training in May. The AWISP co-presented with the Long Lake Association at the 2014 Networking Meeting for the Raquette River Blueway Corridor held at the Wild Center in Tupper Lake, NY. Various staff members from all branches of the AWI attended Adirondack Day in the New York State Legislative Office Building in Albany in April. After the field season the Assistant Director presented 2014 data to the Great Sacandaga Lake Advisory Council.

An AWISP staff person attended the SUNY ESF Career Fair on February 26, 2014. The AWISP also participates in the biannual career fairs at PSC and works with many colleges to advertise the watershed steward job announcement. The AWISP staff educated the NYSDEC Region 5 campground staff with assistance from the APIPP and the LCBP at Raybrook, Indian Lake, and Warrensburg during NYSDEC training. The AWISP hosted three Volunteer Lake Steward Trainings at the Horicon Town Hall, Caroga Town Offices and at Jefferson County Community College in Watertown, NY. These three trainings on the edges of the AWISP region allowed us to make new contacts. A returning steward worked as a Communications Assistant starting January 20th 2014 and throughout the following winter season. In addition, AWISP staff attended the first meeting of the Adirondack Lakes Alliance on December 5th in Piseco Lake, NY. The AWISP also hosted a facilitated discussion at Paul Smith's College on December 19th regarding building consensus for an integrated program for boat stewardship, inspection and decontamination in the Adirondack Region.

The AWISP participated in NYS's Invasive Species Awareness Week in July, which is coordinated by the APIPP in this region. A steward attended the Hemlock and Balsam Wooly Adelgid Symposium hosted by the Hamilton County Soil and Water Conservation District. The AWISP partnered with the APIPP, Raquette Lake

Preservation Foundation (RLPF), and Blue Mountain Lake Association during the Adirondack Canoe Classic to prevent the spread of AIS along the race route. The APIPP has previously taken the lead in these efforts, but has asked that the AWISP coordinate efforts in the future.

Recommendations

We anticipate that renewed funding from sponsoring entities will allow the continuation of the seasonal regional supervisors and communications assistant during the fall and spring. If the stewardship program at Great Sacandaga Lake continues, additional supervision in the Saratoga and Great Sacandaga Lake region should be considered.

Conclusion

Overall the AWISP completed its most successful season in 2014. 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 light supervision, and creative enough to avoid boredom with the position. The AWISP 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 Environmental Protection Agency, the Great Lakes Restoration Initiative, the Lake Champlain Basin Program, the St. Regis Foundation, the Saratoga Lake Improvement District, the Rainbow Lake Association, the Adirondack White Lake Association, the Lower Saranac Lake Association, the Upper Saranac Lake Association, the Lake Placid Shore Owners' Association, and the Great Sacandaga Lake Advisory Council. 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 Lakes Association, Chateaugay Lakes Association, Cranberry Lake Association, Sixth and Seventh Lakes Association, White Lake Shores Association, Raquette Lake Preservation Foundation, Long Lake Association, Hollywood Hills Association, the Osgood Pond Association, and Limekiln Lake Association all assisted the AWISP 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 Kris Alberga, Lou Burke, Mike & Nora Burke, Pat Deyle, Jim Dillon, Steve Guglielmi, Bob Hall, Jim Hauber, Ken Hawks, Doug Johnson, Bill Landmesser, Gary Lee, Mitch Lee, Jackie Mallory, Danielle Mazuy, Alan McCauley, Brian McDonnell, Nick McKay, Brendan Quirion, Nick Rose, Amy Sauer, Nina Schoch, Allen Splete, Caitlin Stewart, Barbara Taylor, Bud Thompson, Phyllis Thompson, Anne Weld, Courtney Wellar, Pat Willis, Mark Wilson, Luke Evans, Joe LaPierre, Gary Miller, Jason Scott, Jim Waters, KC Kelly, Lakeview Deli, and our close working group of Hilary Smith, Erin Vennie-Vollrath, Emily Debolt, Kristen Rohne, and Meg Modley.

Robert LaBombard Memorial

by the Saratoga Lake Stewards

At the Saratoga Lake State Boat Launch there are several retired gentleman that spend a portion their days at the launch socializing and enjoying being next to the lake they've spent many of their years on. The man, who perhaps frequented the launch most often, even before stewards were present at Saratoga Lake, was Robert LaBombard or Bob. Bob was always telling stories and jokes which made the hours pass quickly. Bob was a true friend to all the stewards who have worked at Saratoga Lake. Unfortunately, Bob fell ill this summer and was hospitalized. Stewards Megan Johnson, Philip Dumais and Nathan Piché visited him several times in the hospital to catch him up on the new happenings at the boat launch. Although in good care, Bob passed away on July 11th and has been missed greatly. In his obituary, it was said that he was a man of few words, but of many fishing poles which he used daily. Future Saratoga Lake stewards will not know of Bob, but his spirit will live on. A spirit of a man who loved the lake and loved what we did to protect it.

Robert (Bob) LaBombard

Steward Nathan Piché at the Saratoga Lake Boat Launch

Overview of Steward Locations

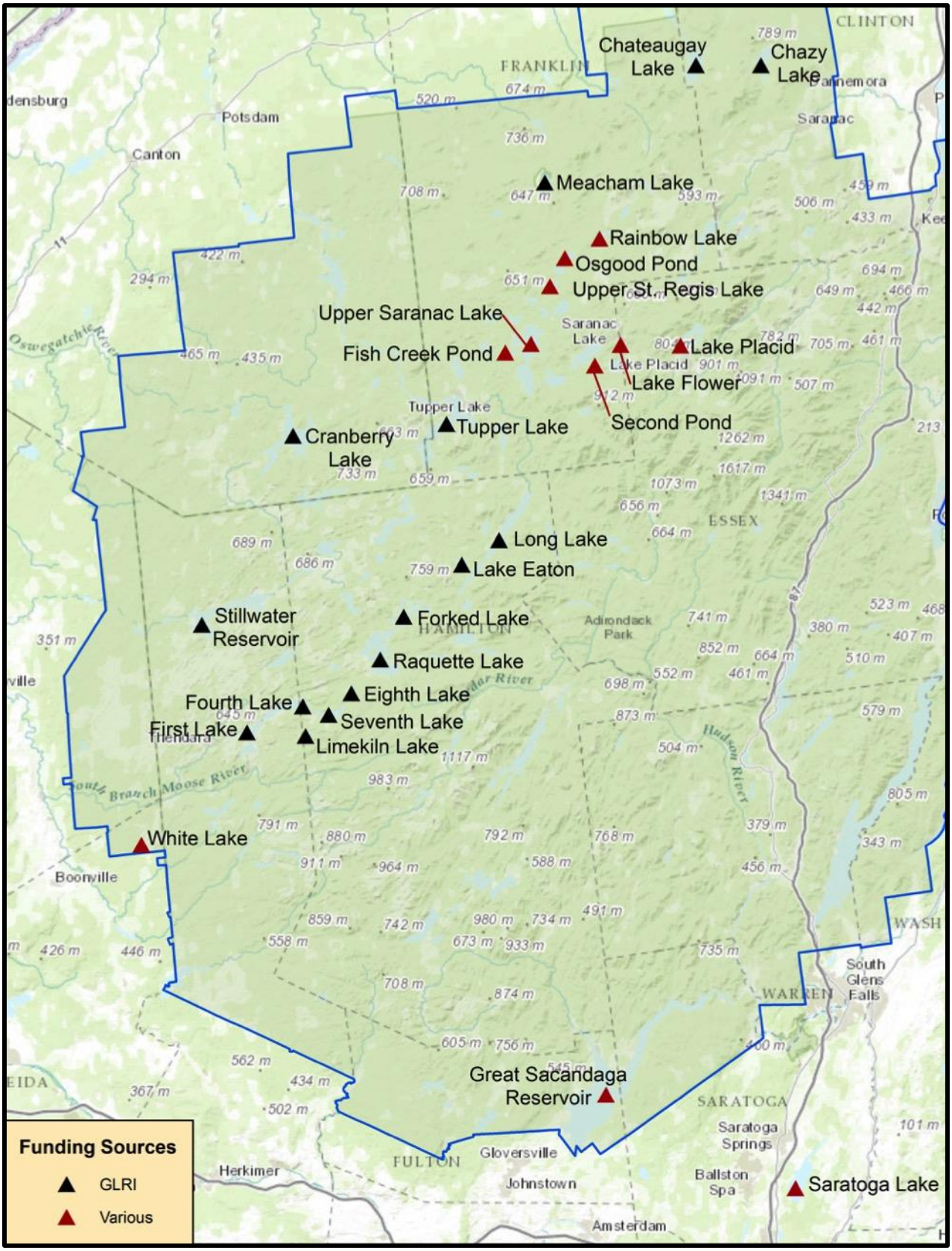


Figure 6. Overview map of AWISP steward locations. Black markers indicate funding from an EPA GLRI grant; Red markers denote funding from various sources.

Watershed Steward Locations, detailed view

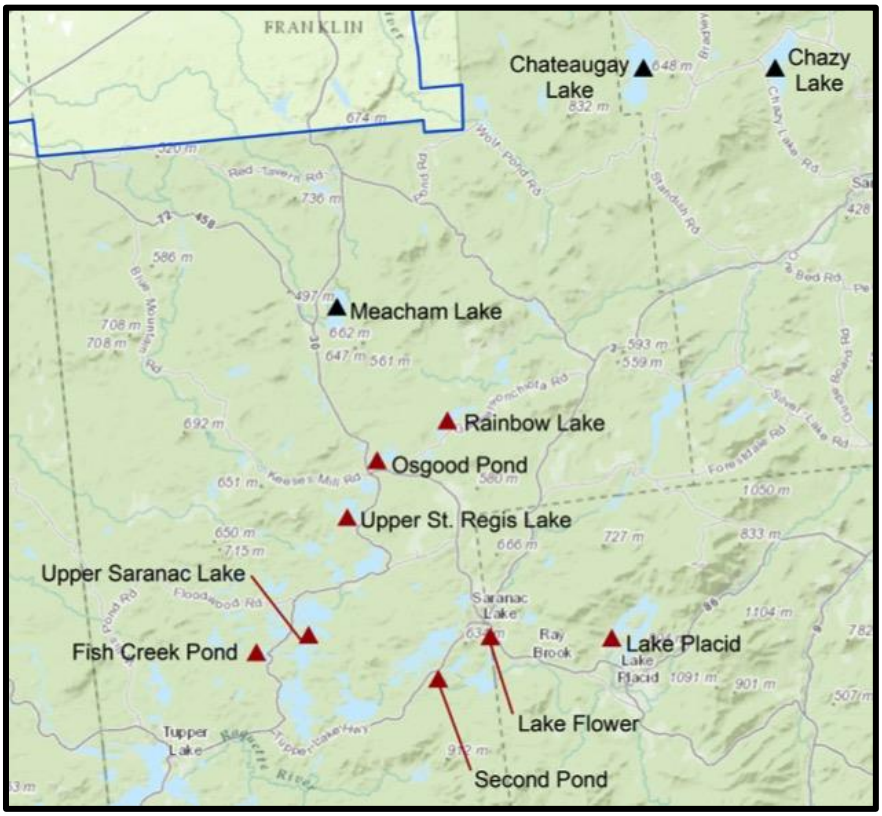


Figure 7. Detailed overview map of AWISP steward locations, Tri-Lakes Region. Black markers indicate funding from an EPA GLRI grant; red markers denote funding from various sources.

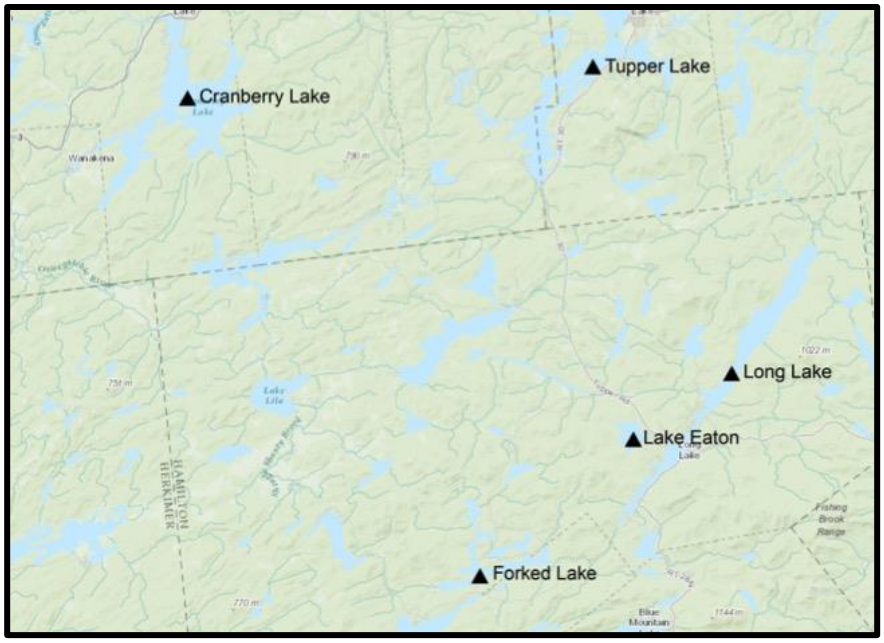


Figure 8. Detailed overview map of AWISP steward locations, Tupper Lake Region. All sites funded by an EPA GLRI grant.

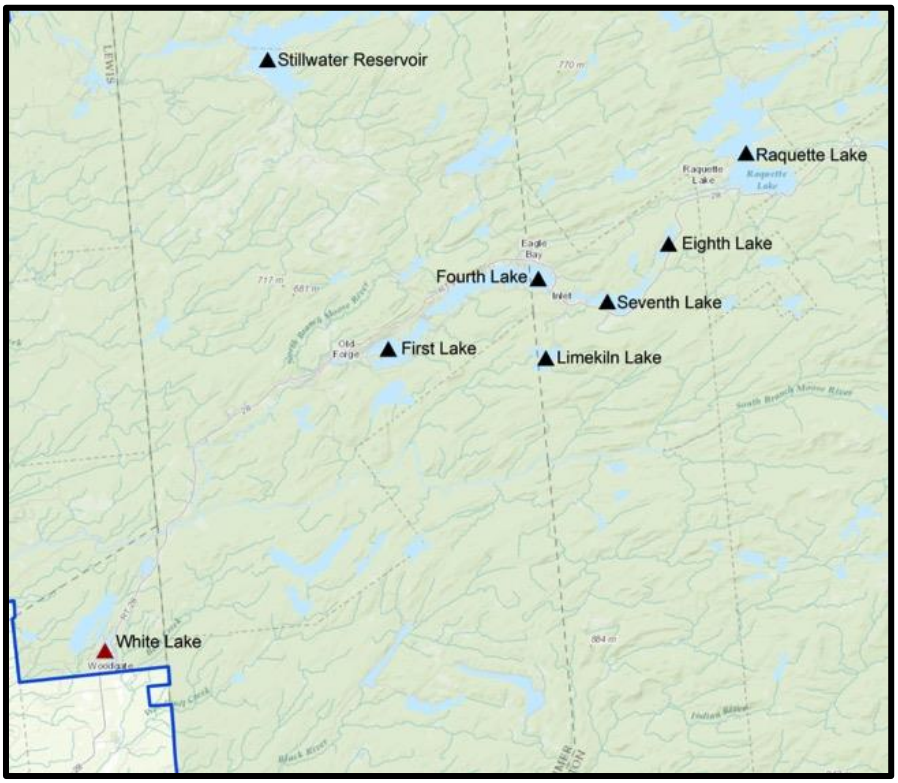


Figure 9. Detailed overview map of AWISP steward locations, West-Central Region. Black markers indicate funding from an EPA GLRI Agency grant; red markers denote funding from various sources.

Meacham Lake boat launch.

Location Descriptions and Program Details

***Note: For fully detailed results from each waterway, below please view the Boat Launch Use Data Summaries beginning on page 92.**

Chateaugay Lake – 2014 marked the third year that the program stationed a steward at the NYS Boat Launch at Chateaugay Lake. Located in the northeastern coverage area of the AWISP, stewards were present at Chateaugay Lake 7 days per week for the 2014 field season. In addition, a steward provided 6 total days of extra coverage following the end of the regular season, from September 5th – 22nd. The boat launch is located on Route 374, on the Chateaugay Narrows, between the Upper and Lower Lakes. The Chateaugay Lakes Association is extremely supportive of the AWISP's efforts. It should be noted that stewards stationed at this location may have difficulty finding local housing if they do not have a personal resource in the area. Chateaugay Lake stewards educated 4,024 total visitors, inspected 1,696 boats, and found that 73% of visitors had taken prevention steps for AIS. Stewards removed 134 AIS and found that 16% of the inspected boats had some organism on them. Boat owners reported visiting 59 different waterways within the previous 2 weeks.

Chazy Lake – In 2014, the AWISP piloted coverage at the Chazy Lake State Boat Launch. Chazy Lake is a 1,600 acre water body located 5 miles west of the village of Dannemora with public access off Route 374. Due to inclement weather and limited staff availability during the pilot period, the steward was only able to provide 1 day of coverage at Chazy Lake. A total of two watercraft were inspected with no organisms detected.

Cranberry Lake – Cranberry Lake is a 7,000 acre waterbody located in southern Clinton County. In 2014, the AWISP provided 7 day coverage from two stewards at the New York State Boat Launch Site. Due to logistical issues, stewards were not present at the unofficial "Pinecone Launch" as in previous years. The program plans to resume coverage of both launch sites in 2015. Cranberry Lake stewards educated 3,270 total visitors, inspected 1,343 boats, and found that 45% of visitors had taken AIS spread prevention measures; a significant drop from 77% in 2013. Stewards removed 10 AIS and found that 3% of the inspected boats had some organism on them. Boat owners reported visiting 76 different waterways within the previous two weeks. Funding was provided by an EPA GLRI grant.

Eighth Lake Campground – The northern terminus of the Fulton Chain of Lakes, Eighth Lake is located adjacent to NYS Route 28 between the Hamlet of Inlet and Raquette Lake in the Eighth Lake State Campground. This was the fourth consecutive year of coverage for Eighth Lake with funding from an EPA GLRI 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 AWISP occurred once per week depending on staff availability. Eighth Lake stewards educated 84 total visitors and received 44 total boats. Stewards encountered 0 AIS at this location.

First Lake (Hollywood Hills) – Hollywood Hills is a private boat launch located in Old Forge, NY that provides access to First Lake of the Fulton Chain of Lakes. The Hollywood Hills Property Owners Association grants steward access to this location. This launch is considered lower priority due to the small volume of visitors, thus, coverage was provided 1 day per week depending on staff availability. In 2014, stewards inspected 396 watercraft and detected two organisms; including one occurrence of Eurasian watermilfoil. Coverage was funded by an EPA GLRI grant.

Fish Creek Pond Campground – The Fish Creek Pond Boat Launch is located within Fish Creek Pond State Campground along Route 3 in Saranac Lake, NY. The AWISP was able to resume coverage in 2014 field season with a grant secured from the Lake Champlain Basin Program. Stewards educated 341 people while inspecting 164 boats. A relatively high quantity of organisms were detected, with 18% of all watercraft found to contain one or more organism. Of the 42 organisms identified, 8 were classified as invasive species. The Fish Creek Pond Launch received 2 days of additional coverage following the regularly scheduled field season.

Forked Lake Campground – Located in the Town of Long Lake, Forked Lake received steward coverage for the fourth consecutive year. Funded through an EPA GLRI grant, Forked Lake was covered one day per week depending on staff availability. Stewards educated 91 total visitors, and inspected 31 watercraft. There were no organisms detected on boats launching or retrieving from Forked Lake.

Fourth Lake – Fourth Lake is the largest waterbody in The Fulton Chain of Lakes, located in the Central Adirondack Mountains of New York State. The chain consists of eight lakes, originating at a dam in Old Forge and extending through navigable waters into Fifth Lake, and then by portage to the dam at Sixth Lake through Seventh Lake, with a final portage to Eighth Lake. The Fourth Lake boat launch is located off NYS Route 28 in Inlet, NY. Fourth Lake State Boat Launch continually ranks as the busiest AWISP launch in 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 4,190 total visitors and inspected 1,563 boats. 28 boats, or 2% of all inspections, were found to harbor one or more organisms. Funding was provided by an EPA GLRI grant.

Great Sacandaga Lake – The Great Sacandaga Lake is a 29 mile long reservoir that was created by damming the Sacandaga River in 1930. The lake extends into parts of Fulton, Saratoga and southern Hamilton counties with the northern portion falling within the Adirondack Park boundary. The AWISP resumed coverage in 2014, having posted stewards previously in 2009. Stewards were stationed at four different locations with varying quantities of coverage. Broadalbin State Boat Launch was staffed 4 days per week, while Day State Boat Launch, Northville State Boat Launch and Northampton State Campground were covered 1 or 2 days per week depending on staff availability. Funding was split between the Great Sacandaga Lake Advisory Council and the Adirondack Watershed Institute. The lake is known to contain invasive Eurasian watermilfoil, spiny waterflea, and brittle naiad. Stewards inspected a combined 3,564 boats and educated 7,938 visitors. Organisms were present on 3% of all watercraft inspected, with 123 organisms detected and removed. 63 AIS were removed from watercraft launching and retrieving.

Lake Eaton Campground – Lake Eaton is a 558 acre water body located just north of the Village of Long Lake. The boat launch is located within the Lake Eaton State Campground and provides lake access to paddle craft and small motorboats. The EPA GLRI provided funding for steward coverage 1 day per week. Lake Eaton is not known to contain any AIS and is therefore a priority site for invasive species prevention efforts. In 2014, stewards inspected 14 vessels and educated 33 people. There were no organisms detected at Lake Eaton.

Lake Flower – A steward was present at Lake Flower 5 days per week throughout the summer, including most weekends. Lake Flower Boat Launch is located within the Village of Saranac Lake on Route 86. This is the fourth summer that the lake has received steward coverage. Lake Flower is known to contain invasive Eurasian watermilfoil, variable-leaf milfoil, and curly-leaf pondweed. In 2014, Lake Flower stewards educated 2,284 total visitors, inspected 997 boats, and found that 66% of visitors had taken prevention steps for AIS. Stewards removed 14 AIS and found that 14% of the inspected boats had some organism on them. The steward was sponsored by the AWI through a LCBP grant. The Lake Flower State Boat Launch received 1 day of additional coverage following the regularly scheduled field season.

Lake Placid – The Lake Placid Shore Owners' Association funded seven day per week coverage at the New York State Boat Launch and one day per week at the Village Boat Launch. The Association has sponsored stewards at Lake Placid each year since 2002. In 2014, Lake Placid stewards educated 4,897 total visitors, inspected 2,005 boats, and found that 57% of visitors had taken AIS spread prevention measures. Stewards removed 1 AIS and found that 3% of all watercraft inspected harbored some type of organisms. Boat owners reported visiting 98 different waterways within the previous 2 weeks. The Lake Placid State Boat Launch received 2 days of additional coverage following the regularly scheduled field season.

Limekiln Lake Campground– Located just outside of the Hamlet of Inlet, the Limekiln Lake launch lies within the Limekiln Lake State Campground. There are currently no known AIS in Limekiln Lake, providing the perfect setting for an AIS prevention campaign. Funding for coverage was provided for the fourth consecutive year by an EPA GLRI grant. Receiving a comparatively low volume of visitors, Limekiln Lake was covered by the AWISP one day per week depending on staff availability. Limekiln Lake stewards educated 61 total visitors and inspected 21 with no organism detected.

Long Lake –Watershed stewards have been posted at Long Lake since 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 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 2014, the steward position was again funded by an EPA GLRI grant. Long Lake stewards educated 4,826 total visitors, inspected 1,726 boats, and found that 70% of visitors had taken prevention steps for AIS. Stewards removed 3 AIS from watercraft and found that 1% of the inspected boats had some organism on them. Boat owners reported visiting 95 different

waterways within the previous 2 weeks. The Long Lake State Boat Launch received 1 day of additional coverage following the regularly scheduled field season.

Meacham Lake Campground – This was the fourth consecutive season with a steward 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. Steward coverage averaged one day per week during 2014. The Meacham Lake State Campground steward was once again funded through the support of an EPA GLRI grant. Meacham Lake stewards educated 267 total visitors and inspected 101 total boats. 4% of the watercraft were found to contain one or more organisms.

Osgood Pond – The Osgood Pond Waterway Access Site, located on White Pine Road, has received steward coverage since 2008. Steward coverage for 2014 was provided under the GLRI award from the USEPA. Osgood Pond stewards educated 785 total visitors and inspected 345 boats. A high percentage of boats inspected (41%), were found to contain some type of organism. However, only 2% of all watercraft inspected contained AIS.

Rainbow Lake/Buck Pond Campground – Steward coverage was provided 4 days per week at this site funded by the Rainbow Lake Association. The boat launch is located within the Buck Pond State Campground off Gabriels-Onchiota Road. Rainbow Lake stewards educated 1,218 total visitors, inspected 462 boats, and found that 68% of visitors had taken prevention steps for AIS. Stewards found that 25% of the inspected boats had some organism on them. However, no watercraft harbored visible AIS. Boat owners reported visiting 55 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 AWISP since 2008. Burke's Marina, also located in the Town of Long Lake, has been covered by the AWISP for the last few seasons. The 2014 season's effort was funded by an EPA GLRI grant which allowed for seven-day coverage at the village launch and Friday/Saturday coverage at Burke's Marina. In addition to the federal financial support, the Raquette Lake Preservation Foundation continued to provide mentoring and material support for the AWISP. 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. The Raquette Lake Village Launch received 1 day of additional coverage following the regularly scheduled field season during the Adirondack Canoe Classic (90 Miler).

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. In 2014, there were five stewards, up from three in 2013, who provided 7 day per week coverage. 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 located within the Adirondack State Park. The boat launch is located on Fish Creek, just off of Route 9P. The boat launch on Saratoga Lake

continues to receive the highest boat traffic of any lake in the AWISP network. Saratoga Lake contains four known AIS including Eurasian watermilfoil, curly-leaf pondweed, water chestnut, and zebra mussels. Selective herbicides are currently being used to target curly-leaf pondweed and Eurasian watermilfoil. In addition, two mechanical harvesters are being used to control the invasive plant population around the lake. Saratoga Lake stewards educated 9,292 total visitors, inspected 3,717 boats, and found that 79% of visitors had taken prevention steps for AIS. Stewards removed 547 AIS from watercraft, the greatest quantity for all AWISP lakes, and found that 21% of the inspected boats had some organism on them. Boat owners reported visiting 81 different waterways within the previous two weeks.

Second Pond – The Second Pond State Boat Launch is situated adjacent to State Route 3 approximately 3½ miles southwest of the Village of Saranac Lake. The facility is the primary access location for Lower Saranac Lake and the Saranac Lake Islands Campground. Second Pond is known to contain variable-leaf milfoil and Eurasian watermilfoil, while the hydrologically connected Saranac Lake Chain is known to contain Eurasian watermilfoil and curly-leaf pondweed. A LCBP grant secured by the Lower Saranac Lake Association provided funding for four days per week of coverage in 2014. Stewards interacted with 4,701 people, inspected 1,679 watercraft and removed 106 organisms. 5% of boats were found to contain one or more organism, while 1% contained at least one AIS. The Second Pond State Boat Launch received 2 days of additional coverage following the regularly scheduled field season.

Seventh Lake – Located adjacent to NY Route 28 in Hamilton County, three miles east of the Hamlet of Inlet, Seventh Lake State Boat Launch has received continual coverage by the AWISP since 2011. This lake was covered on average 4 days a week, through an EPA GLRI grant. The lake contains Eurasian watermilfoil and variable-leaf milfoil, and the AWISP has worked diligently to prevent the AIS from spreading to nearby uninfected waterways. Spread prevention efforts of the AWISP greatly complement milfoil control efforts conducted by the Sixth and Seventh Lakes Association. In 2014, Seventh Lake stewards educated 836 total visitors and inspected 316 total boats. 7 boats, or approximately 2% of all inspections, contained some type of organism.

Stillwater Reservoir – Located 18 miles from Eagle Bay and 28 miles from Lowville, Stillwater Reservoir is a 6,700 acre water course surrounded by the Five Ponds Wilderness, Independence River Wild Forest, private lands and is adjacent to the Pepper Box Wilderness Area. In 2014, coverage at Stillwater Reservoir was increased to seven days per week with efforts from two stewards. Funding was provided through an EPA GLRI grant. Stillwater Reservoir stewards educated 3,617 total visitors and inspected 1,323 boats. Stewards founds that 84% of visitors had taken prevention steps for AIS, a significant increase from the 39% reported in 2013, suggesting that the AWISP message is permeating throughout the boating community. Stewards removed six AIS from watercraft and found that 3% of the inspected boats had some organism on them. Boat owners reported visiting 102 different waterways within the previous two weeks.

Tupper Lake – The Tupper Lake State Boat Launch has received continual coverage by the AWISP since 2008. This season's funding was provided via an EPA GLRI grant, which allowed an AWISP steward to cover

the launch site up to 7 days a week. Tupper Lake is known to host variable-leaf milfoil. Efforts from the AWISP and the boating community have helped keep additional AIS from becoming established in the lake. Tupper Lake stewards educated 3,906 total visitors, inspected 1,654 boats, and found that 64% of visitors had taken prevention steps for AIS. Stewards removed 6 AIS from watercraft and found that 6% of the inspected boats had some organism on them. Boat owners reported visiting 83 different waterways within the previous two weeks.

Upper Saranac Lake – The Upper Saranac Lake State Boat Launch is located ½ mile from Route 30 in Saranac Inn. Coverage at the Upper Saranac Launch was funded by a Lake Champlain Basin Program grant that allowed 4 days/week of coverage. Stewards shared the message of AIS spread prevention with 2,403 visitors and performed 819 watercraft inspections. 4% of boats were found to contain one or more organisms with 40 organisms removed. 76% of survey respondents indicated taking measures to prevent the spread of AIS, with 52 different waterways reportedly visited in the previous two weeks. The Upper Saranac Lake State Boat Launch received 1 day of additional coverage following the regularly scheduled field season.

Upper St. Regis Lake– Since 2000, the St. Regis Foundation has sponsored full-time coverage at the Upper St. Regis Lake Boat Launch. There is a boat wash station present on the property, which the stewards urge all boaters to use prior to launching and upon retrieval. The boat launch is located off NYS Route 30 between Paul Smiths and Lake Clear. Upper St. Regis Lake stewards educated 1,303 total visitors, inspected 559 boats, and found that 69% of visitors had taken prevention steps for AIS. Stewards removed 0 AIS, but found that 10% of the inspected boats had some organism on them. Boat owners reported visiting 93 different waterways within the previous 2 weeks.

White Lake – This is the third year that White Lake has been covered by the AWISP. The Adirondack White Lake Association and an EPA GLRI grant sponsored weekend steward coverage (Friday – Sunday) for this location. White Lake is one of the first waterbodies encountered when entering the Adirondack Park from the west on NYS Route 28. There is no public access to this lake, so the AWISP is very appreciative of the local lake associations that permit steward access to their launch site. White Lake stewards educated 968 total visitors and inspected 462 total boats. Only 1% of the all watercraft inspected were found to harbor organisms. Visitors to White Lake visitors reported visiting very few water bodies within the previous 2 weeks. If can be inferred that most vessels launched were seasonal entries/exits.

Special Project Reports

Aquatic Invasive Species Surveying and Management

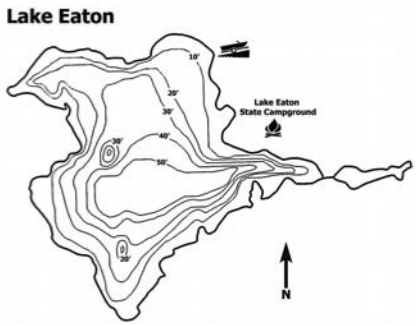
By Zachary Simek, Nathan Piché, Philip Dumais and Megan Johnson

Lake Eaton, Long Lake, NY. Photo Credit: Roy Saplin.

Adirondack Park Invasive Plant Program (APIPP): Aquatic Monitoring Program

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 APIPP runs a monitoring project that uses citizen scientists to survey a lake or pond for AIS. This summer, watershed steward Dan Johnson and regional supervisors Zachary Simek and Jacqueline McCabe, conducted an aquatic plant survey of Lake Eaton in the Town of Long Lake.

Lake Eaton is a 558 acre lake located in northern Hamilton County. It is home to a mixed fishery containing lake trout, landlocked salmon, rainbow trout, brown trout, smallmouth bass, brown bullhead, rainbow smelt and yellow perch. The lake can be accessed by small motorboats and paddlecraft via a NYSDEC boat launch at the state campground on the northeastern shore. Previous surveys of Lake Eaton have identified very little plant cover and no invasive species.



Contour Map of Lake Eaton. Photo Credit: NYS DEC

The aquatic plant survey was conducted on July 30th using a combination of visual and rake toss methods from a canoe. The crew navigated the shoreline and caste the rake into areas that could potentially harbor AIS. Areas of interest included inlets, outlets, boat launching sites and existing native plant beds. The survey crew did not identify any instances of AIS during the survey. The lake was also sampled for spiny waterflea with a 250 µm plankton net. Three samples were collected from the top 30 feet of the water column and sent to the AWI Environmental Research Laboratory. Analysis confirmed spiny waterflea was not present in the sample.

Saratoga Lake Aquatic Plant Harvesting

AIS common to Saratoga Lake, such as Eurasian watermilfoil, water chestnut, and curly-leaf pondweed, impact the lake by impairing recreational opportunities and displacing native vegetation. In addition, decaying vegetation can reduce the quantity of dissolved oxygen present in the water that is needed by many other organisms to survive. However, when harvested, these invasive plants can be put to good use. Aquatic invasive plants make excellent compost and over the course of this summer the Saratoga Lake stewards harvested 445 gallons of aquatic plants from the boat launch vicinity (Table 12). All of the vegetation was properly discarded at an offsite compost pile to eventually be spread as fertilizer in gardens. As a result, plants that are considered harmful were transformed into an incredibly useful soil additive to increase garden productivity.

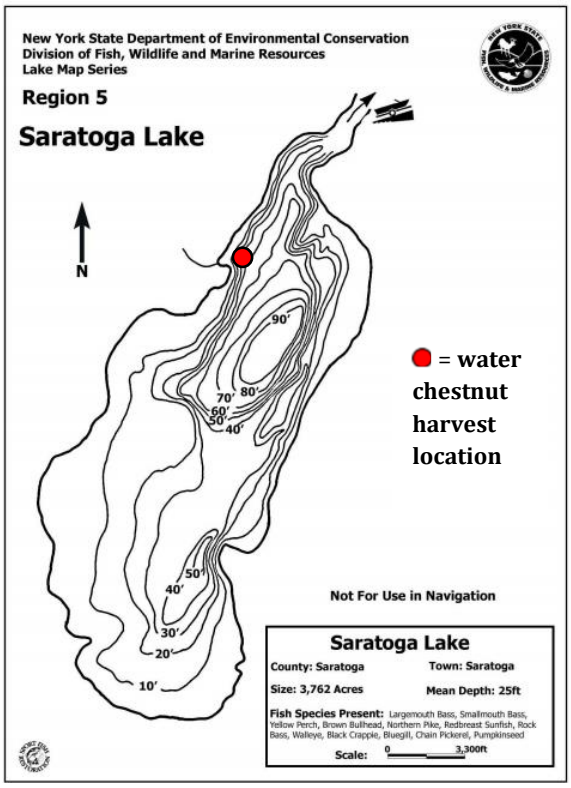
Table 12. Aquatic plants harvested from the Saratoga Lake State Boat Launch. CLP = curly-leaf pondweed; NP = native pondweed; EWM = Eurasian watermilfoil; WC= water chestnut; ZM = zebra mussels; G = grass

Date	Volume (Gallons)	Time (Hours)	Harvesting Method	Species
6/23/2014	35	1	Raking out floating plants	CLP, NP, EWM, ZM, G
6/30/2014	60	1.5	Raking out floating plants	EWM, NP, WC, ZM, G
7/7/2014	35	1	Raking out floating plants	EWM, NP, WC, ZM, G
7/14/2014	60	2.5	Hand Pulling	EWM, WC, ZM
7/21/2014	30	1	Raking out floating plants, Hand Pulling	EWM, ZM
7/30/2014	100	2	Raking out floating plants	EWM
8/2/2014	60	1	Raking out floating plants	EWM
8/2/2014	Unknown volume	3	Hand Pulling	WC
8/11/2014	65	1	Raking out floating plant	EWM, WC, ZM
Total	**445**	**14**		

(left) A Steward removes aquatic vegetation from Saratoga Lake. (right) Composting station for harvested aquatic plants.

Saratoga Lake Water Chestnut Pull

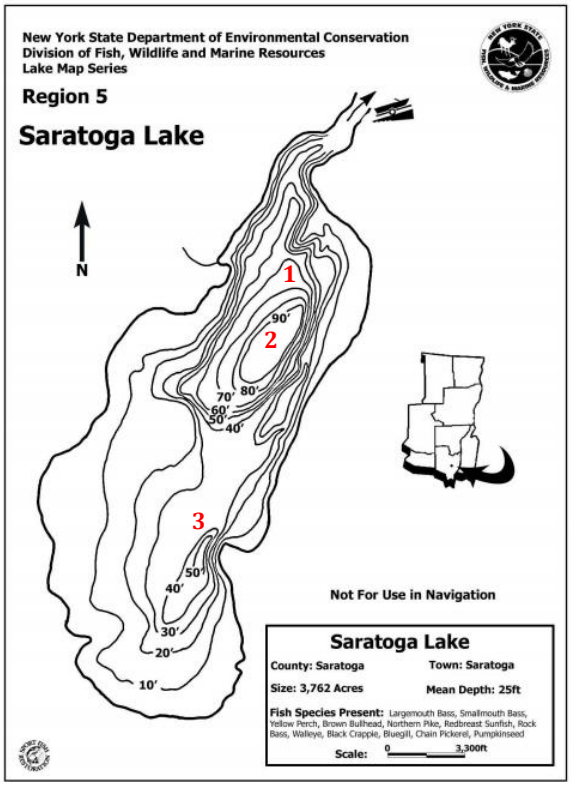
On Saturday August 2nd, stewards Nathan Piché and Megan Johnson participated in a water chestnut pull on Saratoga Lake. They used a rowboat to travel to dense infestations and harvested the plants by hand. There were numerous volunteers who participated in the management event, all with their own kayaks, canoes, or rowboats, attempting to control this harmful invader. The stewards pulled plants for three hours, unloading their rowboat when full of water chestnuts into a nearby harvester. A good effort was made and a substantial area of the lake was cleared.



Map of water chestnut harvesting efforts on Saratoga Lake.

Saratoga Lake Spiny Waterflea Monitoring Project

On Monday August 4th, Megan Johnson, Nathan Piché and high school student Carley Slade, sampled for spiny water-flea in multiple locations on Saratoga Lake. Carley will be a senior in 2014 at Saratoga Springs High School and reached out to the AWISP because she was doing a project on spiny water-flea. Using a 250 µm plankton net, the crew sampled three separate locations at varying depths of the lake. Following the survey, each sample was examined with a hand lens and no spiny waterfleas were identified. All samples were then sent to AWI Environmental Research Laboratory for confirmation. Subsequent analysis did not identify any spiny waterfleas.



Map of spiny waterflea sampling locations on Saratoga Lake. Water depth at each location; Site (1)=50ft, (2)=95ft, (3)=40ft

Great Sacandaga Lake Aquatic Plant Survey

As part of his special project, steward Nick Georgelas visited several homeowner's properties to survey their shorelines for aquatic invasive species. The steward inspected new growths of aquatic vegetation for the presence of invasive species. There were no instances of AIS discovered during the surveys.

Aquatic Invasive Species Illustration Project

By Joshua Howard

Watershed steward, Joshua Howard, assisted the AWI by creating digital illustrations of several common AIS that threaten the Adirondack Park. Howard's illustrations will be added to the AWI website (www.adkwatershed.org) and utilized for future educational materials and outreach publications.

The illustrations were created with Adobe Photoshop using digital painting techniques. A tablet was used to draft each invasive species, with emphasis on creating the most accurate representation possible. Each illustration took roughly 8 hours to complete, but drawing time varied with the intricacy of each species. The illustrations were modeled after online resources and live samples gathered in the field. The list of plants that Howard illustrated includes: curly-leaf pondweed, Eurasian watermilfoil, European frog-bit, fanwort, Hydrilla, variable leaf milfoil, and water chestnut. He also drafted several aquatic invasive animals including zebra mussels, Asian clam, and spiny waterflea.

Figure 10. A digital illustration of Eurasian watermilfoil (*Myriophyllum spicatum*) created using Adobe Photoshop.

The illustrations are presented in a clear and concise manner which accurately portrays the appearance of each species in the field. All of the digital drawings were drawn alongside a penny for scale.

Bear Pond Water Quality Survey and Bathymetric Mapping

By Susan Cragg and Jesse Smith

Bear Pond, Franklin County, NY. Photo Credit: *Northfacet*.

Introduction

Regular water quality monitoring of a lacustrine environment can reveal long-term trends that may indicate changes to the lake or its surrounding watershed. Such changes may be anthropogenic or the result of long-term processes such as natural eutrophication. Chemicals that are introduced to a lake, such as the piscicides toxaphene and rotenone, not only impact plant and animal life, but can alter the chemical characteristics of that waterbody. Surveys that monitor lakes for such changes involve the collection of water samples which can be analyzed for parameters like acidity, alkalinity, dissolved cations and anions, and dissolved metals. Fluctuations in the levels of these factors over time can reflect physical, chemical, and biological changes to the lake on a larger scale, such as the introduction of a chemical contaminant or the impact of a natural disaster.

Bear Pond, Franklin County, NY.

Bear Pond lies west of Upper St. Regis Lake within the St. Regis Canoe Area in Franklin County, New York. Historically, low pH and water clarity levels had been observed, and the pond contained very little aquatic plant life (J. Stager, personal communication, June 24, 2014, Adirondack Lake Survey Corporation, 1985). Additionally, the pond was treated in 1958 with the pesticide toxaphene to remove undesirable fish species (J. Stager, personal communication, August 21, 2014; DEC, 2010). Toxaphene is widely recognized as harmful to non-target organisms and can remain in water bodies at

toxic levels for extended periods of time. While toxaphene was observed to be effective in eradicating fish populations, negative effects on other organisms, such as amphibians, snakes, and invertebrates, have also been observed (Cumming, 1975). Extensive use of toxaphene was banned in the United States in 1990 due to its harmful effects on human health (ATSDR, 2010; EPA, 2011). Currently, Bear Pond contains abundant aquatic plant life and has intermediate water clarity levels (J. Stager, personal communication, June 24, 2014).

Since the 1985 survey conducted by the Adirondack Lake Survey Corporation (ALSC), little data has been collected in regard to the status of Bear Pond's water quality. Similarly, a bathymetric map of the pond has not been created since the 1985 ALSC survey (ALSC, 1985; C. Laxson, personal communication, August 19, 2014). The purpose of this survey was to (1) collect water samples from Bear Pond for water quality analysis and (2) develop an updated bathymetric map using ArcGIS. The resulting information could then be utilized for future studies and monitoring efforts.

Methods

Water Sampling

Water samples were collected from the epilimnion and the hypolimnion on June 3rd and 18th, July 8th, and August 5th 2014, in the deepest area of the pond. Before sampling, all equipment and collection bottles were rinsed 3 times with lake water to remove any potential contaminants. Samples from the epilimnion were collected from the top 2 meters of the water column using a clear plastic 2-meter hose with a weight on one end. Water from the hypolimnion was collected approximately 1 meter from the benthos using a Van Dorn water sampler. The water samples were placed in a small cooler where they could be chilled and protected from sunlight. Dissolved oxygen and temperature measurements were collected on the final day of sampling. Measurements were recorded at one meter depth increments using an YSI 556A Dissolved Oxygen and Temperature Meter.

In addition to the water samples, a Secchi depth was also calculated on each sampling date. To obtain this measurement, a Secchi disk was lowered into the water on the shady side of the boat until it reached a depth where it was no longer visible. The depth of the Secchi disk was recorded and it was then lifted until it reached a depth where it became visible. These two depths were averaged to attain the mean Secchi depth.

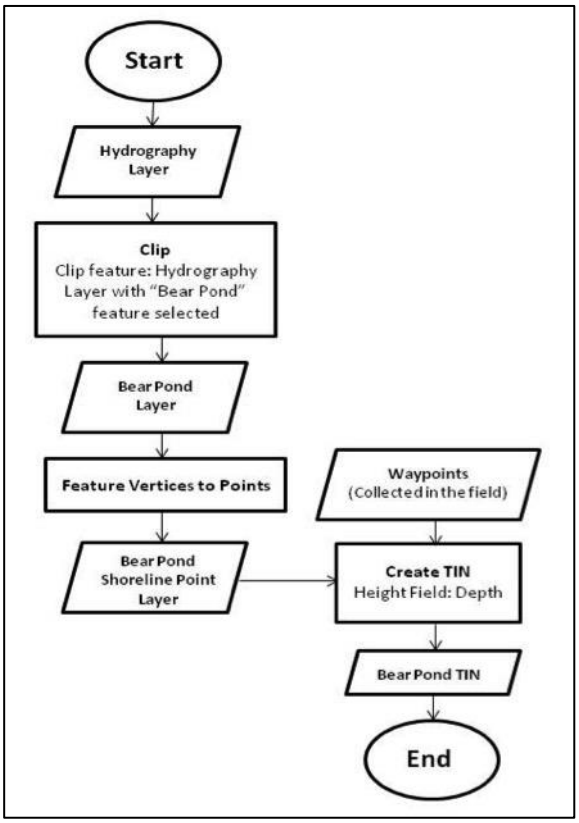


Figure 11. Workflow model illustrating the process used to create a bathymetric map of Bear Pond, Franklin County, New York using ArcMap 10.2.2.

Lab Methods

250 mL of the epilimnion sample was filtered using a hand-operated vacuum pump in order to calculate the quantity of chlorophyll-a present in the epilimnion. The full volume of the water sample was drawn through the filter paper; the filter paper was removed from the vacuum apparatus, folded, covered in aluminum foil to minimize light exposure, placed in a labeled bag, and stored in a freezer. Conductivity and pH and were calculated from water samples collected from both depths using a Mettler-Toledo Conductivity and pH Meter. Water samples that were not immediately analyzed were kept frozen.

Bathymetric Mapping

Data for the bathymetric map was collected on June 3rd and 18th. Waypoints were recorded using a Garmin eTrex Vista handheld GPS unit at 167 locations on the pond. A depth measurement was taken at each waypoint using a handheld depth sounder. The resulting waypoints were imported into ArcMap 10.2 and edited so the elevation attribute for each point contained the corresponding water depth value collected in the field. The National Hydrography Dataset depicting the waters within the St. Regis River watershed was added to the map document and clipped to create a layer displaying only Bear Pond. GPS waypoints that existed outside of the Bear Pond polygon were omitted from the analysis. The Bear Pond polygon layer was used as the input layer for the "vertices to point" tool, which created a layer consisting of several points along the perimeter of the Bear Pond polygon (Figure 11). A "depth" field was added to the attribute table of this layer, and the field calculator was used to set this value to 0 for every point in the layer. The "Create TIN" tool was then run with this layer and the edited waypoints layer as the input features and the "depth" field of both layers as the height field in order to create a triangulated irregular network (TIN) (Figure 11). The symbology of the resulting TIN was then changed to a series of contour lines at 10' intervals.

Results

Water Quality

Water pH in the epilimnion ranged from 5.478 to 6.750 throughout the summer sampling period, while pH in the hypolimnion ranged from 4.843 to 5.804. Conductivity in the epilimnion was recorded between 10 and 11 µS/cm for each date sampled, except for the final sampling date, when conductivity was calculated to be 9.85 µS/cm. The hypolimnion's conductivity was found to be 13.93 µS/cm in the sample collected on June 3rd, and 15-16 µS /cm for each subsequent date. Color ranged between

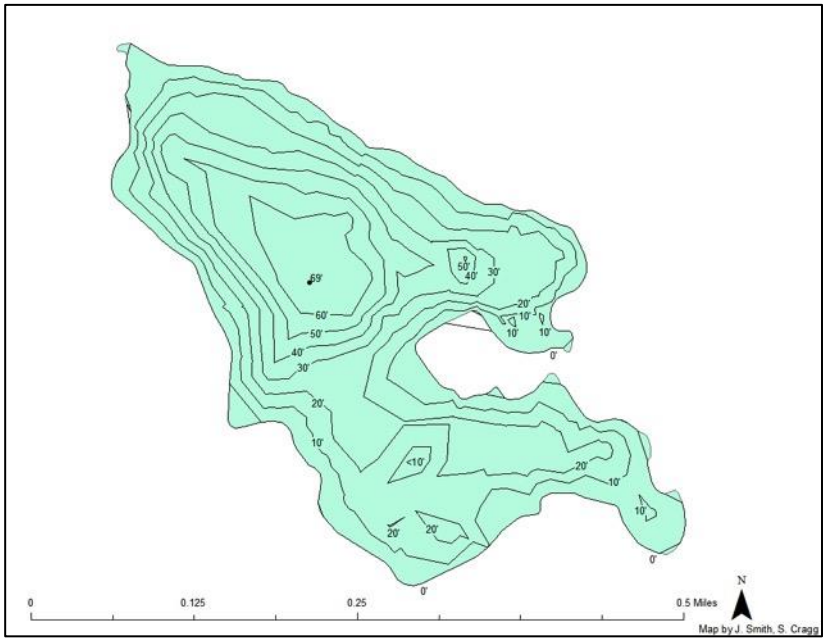


Figure 12. Bathymetric Map of Bear Pond, Franklin County, NY; with 10' contour intervals. Created using ArcMap 10.2.

13.32 and 25.79 Pt-Co in the epilimnion and 19.55 and 89.90 in the hypolimnion throughout the sampling period. Nitrate levels in the epilimnion were found to range from 0.466 to 9.96 parts per billion (ppb), while nitrate levels ranged from 0.724 to 69.8 ppb in the hypolimnion. Chloride levels were found to range from 0.178 to 0.33 parts per million (ppm) in the epilimnion and from 0.209 to 0.24 ppm in the hypolimnion. Sulfate levels were consistently found to be between 2 and 2.5 ppm for both strata over the course of the sampling period, except for in the sample collected on the last sampling date, which yielded 1.51 ppm. Total phosphorus levels ranged from 5.94 to 12.3 ppb in the epilimnion over the course of the survey, while levels in the hypolimnion ranged from 14.5 to 36.4 ppb. Secchi depth averages were found to be between 3.78 and 4.21 meters.

Bathymetric Mapping

The bathymetric map produced in 2014 (Figure 12) remains consistent with the 1985 bathymetric map produced by the ALSC. Small differences of the 2014 bathymetric map include deeper areas in the northeastern and southern regions of the pond, which are not present on the 1985 map. Additionally, while the deepest point in the pond was measured to be 18.3 m, or approximately 60 ft, by ALSC in 1985, the maximum depth on the 2014 map is 69 ft (Figure 12). A deeper area was recorded at 72 ft during a water sampling event that occurred after waypoints and depths for the map were measured.

Discussion

Water Quality

The pH of water in Bear Pond's epilimnion was slightly greater in 2015 than in 1985 tests by the ALSC. This finding may indicate that Bear Pond is recovering from the effects of acid rain, which would have been readily observed in 1985 prior to the establishment of major air pollution statutes. Nitrate levels in August 2014 were many times lower than what they were during the same month in 1985. This finding suggests that inputs of nitrates to Bear Pond, likely anthropocentric, have been significantly reduced. Chloride levels found in August of 2014 were fairly consistent with those found in 1985, while sulfate levels found in August of 2014 were over 5 ppm lower than those calculated by ALSC in 1985.

The differences in the nitrate and sulfate levels sampled in 1985 and those sampled in 2014 reflect a slight change in the water chemistry of Bear Pond. This may suggest that the pond is beginning to recover from the effects of toxaphene and/or acid rain. However, the lack of historical data between 1985 and 2014 is a limiting factor for comparative analysis. Without long term monitoring data, it cannot be determined whether the difference in water quality characteristics between 1985 and 2014 are the result of gradual change over time, or the result of seasonal variation from recent events. Yearly monitoring of Bear Pond's water quality would be required to generate a more extensive dataset that could be used to model trends over time.

Bathymetric Mapping

While some of the differences observed in 2014 may be a result of GPS inaccuracy, it appears that the water level in the lake is higher than in 1985. The small southernmost island that is shown on the 1985 ALSC map was observed to be almost entirely underwater in 2014, while the isthmus connecting the peninsula on the eastern side of the lake was also observed to have water over it. It's worth noting that the observed differences in water levels may also be a result of erosion. That is, the island and peninsula may have been gradually worn away over time by wave action, decreasing their size, and creating the illusion of a higher water level. The increase in water level could also be a result of changes in the local climate. Future studies aimed at creating an updated bathymetric map of Bear Pond should collect more GPS waypoints and depth measurements to yield more accurate results.

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Education and Outreach

Compiled By Teresa Troy

Introduction

While all stewards performed education and outreach at their respective boat launches, AWISP staff members also participated in several special outreach events across the Tri-Lakes and west-central Adirondack region. These events included, but were not limited to, farmers markets, lake association meetings, and interpretive paddles. The goal of these events was to (1) educate the public about AIS, (2) encourage stewardship of the Adirondack Park's natural resources, and (3) engage a wider range of people than those normally encountered at boat launch sites.

Many boaters are already aware of the AWISP and its goals pertaining to AIS spread prevention. Performing education and outreach away from the boat launch helps disseminate the AWISP's message to a more diverse demographic, including younger generations. Many of the outreach events included components that would be appealing to both children and adults. The cumulative effect of the AWISP's presence at the boat launch and at off-site outreach events is a deeper understanding of the program and the threats AIS pose to Adirondack lands and waters.

This season Teresa Troy, Heather Reilly, and Nathan Boyer-Rechlin provided education and outreach for the Tri-lakes Region. Brendan Tully and Lizzie Myers covered the Cranberry Lake area, while Paul Garrison, Agnes Link-Harrington, and Zachary Simek covered the west-central Adirondacks. In addition, several other stewards assisted at various events and some performed their own outreach efforts at locations throughout the Park.

Tri-lakes Region

Adirondack Stand-Up Paddle Board Fest

On June 20th and 21st, Teresa Troy and Heather Reilly attended the third annual stand-up paddle board (SUP) fest in Saranac Lake, NY. The event was held at Lake Colby beach and was hosted by Adirondack Lakes and Trails Outfitters. There were very few attendees on the 20th, as most of the events were not scheduled until the second day.

On the 21st, many SUP fans and vendors approached the AWISP table with questions and congratulated the program on their efforts to protect the Adirondack Park's waterbodies from AIS. There were numerous shore owners present at the event who expressed concern about their property and the use of the lakes they live on by outsiders (those who might not be as aware of AIS).

Stewards spoke with roughly 20 people during the two days they attended this event. The stewards felt they had a great impact by educating and informing many people how to prevent the spread of AIS in the Adirondacks and beyond.

Seventh Annual Runabout Rendezvous

On July 5th, steward Heather Reilly attended the Seventh Annual Runabout Rendezvous in Saranac Lake. The event was held in Riverfront Park along the shoreline of Lake Flower, directly adjacent to the State Boat Launch. Due to the event's location, there were many attendees who were just passing through, increasing the potential for outreach. There was also a DJ who announced to the crowd (about every 15 minutes) which vendors were present. This was helpful, as every time he announced the AWISP, many people would visit the table. Stewards interacted with 25 people at this event.

Antique boats along the shores of Lake Flower during the 7th Annual Runabout Rendezvous.

Paul Smith's College Visitors Interpretive Center

The VIC, operated 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. Due to the shared affiliation of the VIC and PSC, the VIC was an ideal place to perform public outreach.

During the 2014 season, steward Teresa Troy set up a display at the VIC during Adirondack Invasive Species Awareness Week (ISAW), using educational material acquired from APIPP and the AWI. For two days during ISAW, she was posted at a table to answer questions and spread awareness pertaining to AIS. This was helpful since many people had questions, especially following a presentation by the Upper Saranac Lake Association on Saturday which was attended by steward Sue O'Reily. Troy talked to approximately 10 people during ISAW, and distributed a significant amount of literature before removing the display on Saturday, July 12th.

Stewards also attended one canoe paddle on July 8th. During this paddle a steward spoke to a family of four about the dangers of AIS and the importance of preserving pristine habitats like those present at the VIC. It is recommended that the AWISP continue performing outreach at the VIC. In previous years, stewards were more involved with leading walks in collaboration with VIC employees. This practice should be pursued again for the 2015 season.

Interpretive Canoe Paddle

On July 9th, during Invasive Species Awareness Week, stewards Nathan Boyer-Rechlin and Heather Reilly, with assistance from Jesse Smith, advertised and led an interpretive canoe paddle on Follensby-Clear and Fish Creek Pond. The event was advertised utilizing multiple outlets prior to the event.

For this outreach program, stewards led a paddle from the waterway access site at Follensby Clear, through Fish Creek and then back to Follensby Clear via the canoe carry. They focused on education in three main areas: identification of AIS, aquatic plant ecology, and natural resource stewardship. Participants learned to identify many of the native plants common to Adirondack ponds, in addition to Eurasian and variable-leaf milfoil. The thick beds of milfoil found in Fish Creek, particularly near the boat launch, were helpful in conveying the negative ecological impacts of AIS.

The stewardship message, along with information about the AWI, was delivered at the beginning and end of the paddle. Though the format of the paddle was very successful, the event was not well attended

due to inadequate advertising and coordination. If a similar event is attempted in the future, fliers should be distributed earlier and stewards should reach out to lake associations and other organizations that may be interested in this opportunity. Additionally, successfully coordinating with the AWI Aquatic Plant Management Team would add an exciting finale to the paddle and further expand the hands-on, educational potential of this event.

Eastern Mountain Sports Club Days

The EMS outdoor gear store in Lake Placid held their Club Days event on July 12th and 13th this year. Steward Heather Reilly set up an informational display on Saturday, the 12th, while Teresa Troy attended on the 13th. The stewards displayed samples of invasive species, in addition to numerous pictures and brochures. The samples were a big hit and lured people in to look curiously at the table. This was helpful because many of the people walking into EMS were tourists on vacation and were only out shopping for the day. Many of the visitors had little, to no knowledge of our program and this really helped to spread awareness. In total the stewards talked to about 35 people. This is definitely a worthwhile event for stewards to attend in the future.

Adirondack Mountain Club Presentation

On July 29th, Nathan Boyer-Rechlin delivered a presentation to the Adirondack Mountain Club's (ADK) Annual Paddle Outing that was based at PSC. This ADK event was centered on a week of paddling, and many of the attendees were interested in the issues pertaining to water quality and AIS. The presentation was given as the designated evening program for the group, and roughly 40-50 people attended the talk. The steward delivered a power-point presentation, which provided an overview of the AWI and AIS specific issues. Additionally, samples of variable-leaf milfoil and Eurasian watermilfoil were provided and many of the attendees expressed an interest in learning how to identify the plants. This event was very well received and it is suggested that stewards reach out to this group again in the future.

Fish Creek Pond Campground

The Upper Saranac Lake Association requested the AWISP create some form of interpretive event at the Fish Creek Pond Campground. On August 12th and 19th, steward Heather Reilly conducted a scheduled information session at the Fish Creek Pond Boat Launch with samples of native and invasive species present in that water body. She helped visitors identify the plants before heading out on an interpretive paddle where people could search for, and view the plants they had just studied in a natural setting. This event encouraged people to observe the dynamics between native and invasive species. This event should be scheduled much further in advance due to the campground's busy schedule. Heather talked to about 15 people and went on the interpretive paddle with 5.

Adirondack Canoe Classic

The AWISP participated in the Adirondack Canoe Classic beginning on Thursday, September 4th at pre-registration in Old Forge. Assistant Director, Kathleen Wiley, teamed up with Erin Vennie-Volrath, the Aquatic Invasive Species Project Coordinator for APIPP. The team gave out information and answered questions from

Adirondack Canoe Classic paddlers on Second Pond.

paddlers and pit crews concerning AIS, including the location of mandatory "walk areas" (for AIS inspections) and potential spread points.

On September 5th, Kathleen, Erin, and volunteers from the Raquette Lake Preservation Foundation were stationed at the Brown's Tract Carry inspecting boats. In addition, steward Zack Floss joined Erin and Blue Mountain Lake volunteers (headed by Phyllis Georges) at the Marion River Carry. The main goal of the walk areas was to prevent the overland spread of AIS, as the race route takes paddlers from infected locations (such as Raquette Lake/Marion River) to uninfected lakes such as Utowana Lake.

Steward Zack Floss urged volunteers to be extra diligent when inspecting the cockpits of boats. The majority of variable leaf milfoil (VLM) was found inside boats, lifted inadvertently by paddles. About five large strands of VLM were identified and removed between the Marion River and Utowana Lake.

On the whole, it was a very positive experience for the stewards and volunteers. Many boaters thanked boat inspection team members for their work and no one resisted or expressed any frustration with the AIS spread prevention measures.

Cranberry Lake Region

Races

Running From the Flies 5k Race

On Sunday, June 15th, a steward set up a display at John Dillon Park during the annual 5k running event. The steward engaged competitors in discussions about AIS prior to and following the race.

The Cranberry Lake Boat Club 5k and 10k Run

Stewards Tyrah Pollack, Lizzie Myers, and Brendan Tully as Milfoil Man (A.K.A The Aquatic Defender), attended the Firecracker Road Race on July 4th. The event lasted approximately 2 hours, during which the stewards and Milfoil Man talked to numerous participants about the AWISP, AIS, and Paul Smith's College.

Lizzie Myers also engaged the younger audience with an art activity in which children could paint different AIS on rocks to be used as paper weights. Many of the runners owned camps, or were related to a property owner on Cranberry Lake, and were especially interested in learning about invasive species spread prevention.

Stewards Tyrah Pollack, Brendan Tully, and Lizzie Myers at the Cranberry Lake Boat Club 5k and 10k Run.

Long Lake Bass Fishing Tournament

On July 12th, a steward was stationed at the Long Lake State Boat Launch at 5 am to greet anglers and inform boaters about the importance of preventing the spread of AIS. Many boaters launched their watercraft during the early hours of the morning and appreciated the inspections and information.

Long Lake Town Beach Events

Cardboard Boat Races

On July 19th, a steward set up an information table at the Long Lake Town Beach and discussed AIS with people who passed by the display. A group of visitors had many questions about the program and wished to start similar watershed stewardship program to protect their local watersheds. The steward also reminded people who came by the table to clean, drain, and dry boats even if they are only cardboard and duct tape. The steward was present for about 3 hours.

USA Water Ski Show

On July 19th, a steward established an informative display near the Long Lake Town Beach where they spoke to many of the audience members about AIS. Some of the audience members spoke about their own experiences with AIS. Over 2 hours, the steward was able to inform many of people about the distribution of AIS in the Adirondack Park.

Cranberry Lake State Campground

Steward Lizzie Myers spent several days throughout the summer at the Cranberry Lake State Campground spreading awareness of AIS. Myers informed campers what AIS are common to the Adirondacks and explained the difficulty of managing the plants once they become established. In addition, she stressed the importance of taking preventative measure against AIS and informed campers on how they can assist with the process.

Also at the campground, Myers utilized the watershed model to demonstrate the effects of runoff and pollution on a watershed. She used the model to discuss how various best management practices could be implemented to avoid runoff and pollution around Cranberry Lake.

West-Central Region

Adirondack White Lake Association Pancake Breakfast

On May 24th, steward Eric Swiecki and Regional Supervisor Zachary Simek attended the White Lake Association's annual pancake breakfast at The White Otter in Forestport. They were able to meet several officers and members affiliated with the lake association and delivered a brief message about the AWISP's goals and objectives. There were more than 50 people who attended the event.

Old Forge Canoe Classic

On June 28th, steward Agnes Link-Harrington inspected boats at the Old Forge Canoe Classic on Old Forge Pond. The steward inspected canoes prior to launching at the waterfront. She also set up an educational

display to share information about the AWISP and AIS. In total, Agnes interacted with 50 people during this event.

Antique Wooden Boat Show and Fulton Chain Rendezvous

On July 12th, steward Paul Garrison attended the Annual Antique Boat Show in Old Forge. He set up a table alongside the Fulton Chain of Lakes Association (FCLA) display. Both organizations displayed information about various AIS. Garrison talked to roughly 50 people throughout the day.

Wildlife Conservation Society's Annual Adirondack Loon Census

On July 19th, stewards Kathleen Pearson and Kristel Guimara participated in the Wildlife Conservation Society's Annual Loon Census. Kathleen surveyed Stillwater Reservoir where she spent one hour at the state boat launch site actively searching for adult and juvenile loons. Two adult birds were identified and data was sent to the WCS for compilation.

In the Tri-Lakes region, Kristel Guimara joined veteran observer Lew Rosenberg to search for loons on the St. Regis Lakes. Three adult loons were observed on Spitfire Lake while fifteen adult loons and two chicks were observed on Upper St. Regis Lake. Of the loons identified on Upper St. Regis, six adults were observed in Penfold Bay, seven adults were observed south of Pulpit Rock, and two adults with two chicks were observed around the corner of the public boat launch. The chicks were estimated to be about 10 days old.

Old Forge Stand-Up Paddle Board Fest

On July 20th, Paul Garrison set up an informational display at the Annual Stand-Up Paddleboard Fest in Old Forge. Although there were many people who attended the free demo, Paul interacted with less than five people.

Regional Meetings

Regional Inlet Invasive Plant Program (RIIPP) Annual Meeting

On June 29th**,** Paul Garrison and Zachary Simek attended the RIIPP Annual Meeting in Blue Mountain Lake. There were approximately 12 people present from across the Park. Simek and Garrison discussed how they could assist RIIPP with its terrestrial invasive species management efforts. They also informed the organization that the AWI would donate $5,000 to their cause.

Attendees of the 2014 RIIPP meeting.

Town of Forestport Board Meeting

On July 16th, Zachary Simek attended a monthly meeting for the Town of Forestport. He delivered a presentation that provided a general overview of the AWISP and explained how boaters can help reduce the spread and establishment of AIS. There were approximately 35 people present at the meeting and several expressed an interest in posting stewards at their local boat launches.

Raquette Lake Fishing Derby

On August 9th, a steward was stationed at the Raquette Lake village boat launch prior to regular working hours. This allowed for the steward to inspect tournament boats that would've launched before stewards normally arrive at the boat launch. Thus, a larger number of boaters were reached.

Saratoga Lake Region

Saratoga Lake Video

Members of the Saratoga Lake Protection and Improvement District (SLPID) created a short video that featured information about the lake and featured brief commentary by the stewards. The production included interviews with AWISP staff that explained the role and duties of stewards and detailed the inspection process.

Saratoga County Fair

From July 24-27th, Saratoga Lake stewards shared an informational table with the Saratoga County Cornell Cooperative Extension at the Saratoga County Fair. Stewards placed AIS common to Saratoga Lake, such as zebra mussels, water chestnuts, Eurasian watermilfoil, and curly leaf pondweed, in plastic containers and hosted a game called "Guess This Invasive Species". If the visitor was able to correctly identify the AIS, they received a small handout to reward them for their efforts. Through this game, the stewards were able to draw in numerous visitors and discuss the problems associated with AIS. More than 125 groups of people were contacted in the four days the AWISP was present at the fair.

AWISP resource display table at the Saratoga County Fair.

Volunteer Assistant Stewards

Clarkson University student, Jamie Bates, currently working for the Cornell Cooperative Extension, volunteered with the AWISP several times throughout the summer. She experienced the daily steward routine at Saratoga Lake and had the opportunity to speak with boaters and fill out numerous surveys. In addition, Carly Slade, a student at Saratoga Springs High School, worked alongside the AWISP this summer. Carly assisted AWISP staff sample Saratoga Lake for invasive spiny waterflea. She intends to use the date for a high school project on the invasive zooplankton.

Great Sacandaga Lake Region

The Great Sacandaga Lake steward performed a variety of outreach projects throughout the field season. For example, steward Nick Georgelas updated an informational brochure for the GSLAC to increase public awareness on aquatic invasive species and initiated plans for constructing AIS disposal stations at some of the lake's state boat launches.

Social Media

This season, the AWISP's social media included a Facebook page, a Twitter account, a blog, and a monthly newsletter. The Facebook, Twitter, and blog were updated through a cooperative effort between Zachary Simek, Jackie McCabe, and Brendan Tully. Collectively, they engaged followers by posting updates

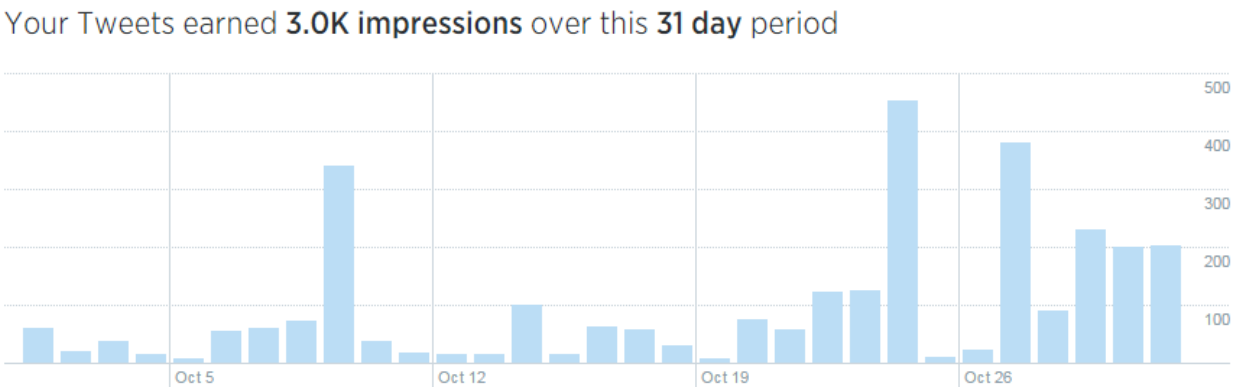

Figure 13. Twitter statistics for October 2014. Impressions indicate the number of times followers viewed tweets posted by the AWI.

such as the staff profiles (singling out a seasonal steward for recognition), AWISP events (such as those occurring during Invasive Species Awareness Week), and information on AIS (such as "The Invasive species of the Week," which profiled a single species of concern). The AWI Facebook and Twitter were updated at least once per week with photos current events, or links to articles of interest; while the blog was undated less frequently with longer narratives. As of December 2014, the AWI Facebook page had 231 likes, while the Twitter feed had 289 followers.

Each month, the social media team distributed a newsletter to over 300 subscribers via Constant Contact. The newsletter contained a list of AWI partners, links to our social media websites, and updates on the progress made by stewards throughout the summer, such as the number of different AIS that were identified and removed. The newsletter also included information regarding activities conducted by the AWI Early Detection and Rapid Response Team, Survey Crew, and Aquatic Plant Management Team.

Water Shield Workshops

In 2014, the AWISP launched an off-site environmental education program called the Water Shield Workshop. The program is suitable for all age groups and covers a variety of topics such as AIS ecology, watershed dynamics, acid rain, and limnology. Participants rotated through multiple stations including land-based informational displays and an on-water component aboard the AWI's 21 foot Carolina Skiff that affords students a hands on opportunity to participate in limnological data collection. A typical workshop involves

Participants and AWISP staff members of the first Water Shield Workshop on Lake Pleasant in Speculator, NY.

sampling for spiny waterflea, measuring dissolved oxygen and water temperature, determining water clarity using a Secchi disk, and collecting aquatic vegetation. The intended goal of the Water Shield Workshop is to generate awareness about the importance of our water bodies and to instill the idea and action of stewardship for the natural environment.

Table 13. Overview of Water Shield Workshop locations, dates, staff members, and participants.

Location	Date	Staff Members	Participants
Lake Pleasant	June 24th	Eric Holmlund, Jacqueline McCabe, Zachary Simek, & Lizzie Myers	Lake Pleasant Central School District (6th, 7th, 8th Grade)
Schroon Lake	August 7th	Jacqueline McCabe & Lizzie Myers	East Shore Schroon Lake Association
Lower Saranac Lake	September 12th	Eric Holmlund, Zachary Simek, Christiaan King, Teresa Troy, Margaret Mahan* & Drew Matott*	Saranac Lake High School (9th Grade)

* of The Peace Paper Project.

Lake Association Meetings

Lake association meetings provide the AWISP and its stewards with an opportunity to directly communicate with stakeholders associated with their respective waterbodies. Stewards generally deliver a presentation or provide brief remarks in regard to the stewardship program goals and philosophy, the status of AIS infestations in various lakes, and provide up to date program data.

Table 14. Overview of lake association meetings attended by AWISP staff.

Association Name	AWISP Staff Attendee(s)	Date(s)
Tri-Lakes Region		
Rainbow Lake Association	Christiaan King	July 12th
Osgood Pond Association	Nathan Boyer-Rechlin & Jesse Smith	July 13th, August 17th
Upper Saranac Lake Association	Sue O'Reilly, Eric Holmlund	July 12th
West-Central Region		
Fulton Chain of Lake Association	Paul Garrison	Monthly; June-August, Annual Meeting; August 16th
6th and 7th Lake Association	Paul Garrison	August 2nd
Raquette Lake Preservation Foundation	Zachary Simek & Daniel Johnson	August 8th

Table 15. Overview of lake association meetings attended by AWISP staff, continued.

Association Name	AWISP Staff Attendee(s)	Date(s)
Tupper Lake Region		
Long Lake Association	Brendan Tully	August 15th
Saratoga Lake Region		
Saratoga Lake Association	Philip Dumais & Nathan Piché	July 17th
Saratoga Lake Protection and Improvement District	Philip Dumais, Nathan Piché & Megan Johnson	June 9th
Great Sacandaga Lake Region		
Great Sacandaga Lake Advisory Council	Nick Georgelas	June 23rd

Farmer's Markets

(left) Agnes Link-Harrington at the Old Forge Farmers Market. (right) Teresa Troy and Nathan Boyer-Rechlin at the Keene Farmers Market.

Stewards and supervisory staff attended several farmers markets as part of the 2014 outreach campaign. Attendees set up an informational display containing live samples of aquatic plants and literature pertinent to the AWISP and AIS. The stewards occasionally utilized the watershed model as an interactive, educational tool to assist with outreach efforts.

Table 16. Overview of farmers markets attended by AWISP staff.

Market Location	Attendees	Date(s)	Number of People Contacted
Lake Placid	Christiaan King, Susan Cragg, Teresa Troy	July 9th & August 13th	40
Saranac Lake	Nathan Boyer-Rechlin, Teresa Troy	July 19th	25
Keene	Nathan Boyer-Rechlin, Teresa Troy	July 13th & August 17th	86
Old Forge	Agnes Link-Harrington, Matt Koester	June 27th, July 11th, & August 15th	90

Media Mentions

Several stewards were featured in various media outlets and publications throughout the summer. The articles generally provided background information related to the AWISP and a summary of stewards' biographical information.

Table 17. Overview of AWISP stewards featured in media outlets, 2014.

Publication	Steward Featured
Upper Saranac Lake Association Newsletter	Sue O'Reilly
The Shoreline Newsletter (Saratoga Lake Protection and Improvement District)	Nathan Piché, Phillip Dumais, Megan Johnson, Ashley Loggins
The Huntedon Democrat (New Jersey)	Jesse Smith
SUNY New Paltz Webpage	Megan Johnson
The Virginia Gazette	Alex Wall
The Sacandaga Express & The Amsterdam Recorder	Phillip Dumais

Conclusion

The summer of 2014 was very successful for outreach. Stewards attended a large variety of events across the Park and were able to reach a larger demographic by utilizing alternative methods such as the Workshop and the watershed model.

There are several ways outreach can become more effective in the future. First, stewards can use this report to determine what types of outreach were most effective. This will help them form a plan in advance and allow more time to pursue new outreach activities. Also, by creating a strong network with Lake Associations, Farmer's Market leaders, and organizations like Adirondack Lakes and Trails Outfitters, stewards will be better able to organize events in the future.


FREE
A PORT JACKSON MEDIA PUBLICATION
SACANDAGA EXPRESS
BER 10
WEEK OF JULY 4-10, 2014
Unwanted visitors
DEC stewards enforcing invasive species regulations
By CAROLINE MURRAY
For the Express
GREAT SACANDAGA LAKE – "Check. Clean. Dry."
That's the state Department of Environmental Conservation's new motto in its quest to stop the spread of invasive species.
The department's new regulation went into effect June 4, requiring all boaters utilizing state boat launches to clean and drain their boats or other water craft prior to setting sail.
Two Paul Smith's College students are working as watershed stewards stationed at the Broadalbin and Northampton state boat launch sites. Their jobs are to inform boaters of the department's newly-adopt-
Please see LAKE, Page 3
Watershed steward Philip Dumais inspects a pontoon boat before it launches on to the Great Sacandaga Lake on June 27.
Caroline Murray

Steward Phillip Dumais featured on the front page of the Sacandaga Express.

Overall, the AWISP team received positive feedback from lake associations, boaters and the public. The program plans to continue and expand outreach efforts in the 2015 season.

Loon Monitoring

By Paul Garrison, Kristel Guimara, Kathleen Pearson and Eric Swiecki

Adult Loon (*Gavia immer*) with Chicks. Photo by Nina Schoch

Introduction

The Biodiversity Research Institute is a non-profit organization based in Portland, Maine. The institute's mission is to assess emerging threats to wildlife and ecosystems through collaborative research and to use the findings to advance environmental awareness and inform decision makers. The BRI maintains a research center in the Adirondacks that focuses on examining the impact of human activity on the Common Loon *(Gavia immer)*. The primary focus of the research is to determine the effect of mercury bioaccumulation on the health of adult and juvenile birds. Loons are highly susceptible to mercury poisoning because they are long lived and consume smaller creatures that are already affected by mercury inputs from air and water pollution.

The AWISP has been contributing to loon research initiatives in the Adirondacks for 13 years. Our monitoring efforts began in 2002 on the St. Regis Lakes in conjunction with the Adirondack Cooperative Loon Program (ACLP) and have continued and expanded with the evolution of the program. In 2007, the ACLP was integrated into the Wildlife Conservation Society's Adirondack Loon Conservation Program (ALCP), under which the AWISP continued monitoring efforts on the St. Regis Lakes. In 2009, the BRI took on the lead administrative role of the program, establishing the Adirondack Center for Loon Conservation (ACLC). Monitoring efforts have continued on the St. Regis Lakes, and since 2011 the AWISP has contributed to monitoring efforts in the west-central Adirondacks on Big Moose Lake, South Pond and Nicks Lake. This summer, three watershed stewards assisted the BRI with their annual loon monitoring efforts. Kristel Guimara was charged with covering the St. Regis Lakes, Eric Swiecki patrolled Nicks Lake and Kathleen Pearson monitored Big Moose Lake.

Methods

The stewards responsible for loon monitoring were trained in loon behavior and observation tactics by Adirondack Center for Loon Conservation director Dr. Nina Schoch on May 28th. Through classroom and field instruction, monitors learned where to search for loons, the meaning of various calls, and how to document sightings of banded birds. Each steward was responsible for monitoring one lake assigned at the beginning of the field season. Monitoring efforts were initiated on June 5th and ended August 21st, with each site being visited once a week unless otherwise noted. Some sites were visited on different days each week due to inclement weather conditions.

Kayaks were used to navigate the lakes and monitoring sessions, usually began between 6:00 A.M. and 7:00 A.M. Timing of the monitoring sessions was intentionally selected to maximize loon activity and take advantage of calm waters and low boat traffic. Observations on a lake ranged from 5-6 hours/day depending on the lakes size and current weather conditions. Loons were observed with high powered 10x42 binoculars in order to minimize disturbance to nesting loons and chicks, which can be detrimental to loon activity. Observation data was recorded in a field notebook and included 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 visually inspected for the presence of unique, identification leg-bands. The presence, color, and arrangement of the bands can be used by BRI staff to identify the bird and provide information such as where the individual has travelled since its initial banding. All field data was recorded, entered into BRI data sheets and sent to a Dr. Schoch for compilation.

A loon monitor at work. Photo by N. Schoch

Results

Tri-Lakes Region

Upper St. Regis Lake **-** Upper Saint Regis Lake is a 742 acre lake located about 3 miles south of Paul Smith's College on NYS Route 30 in the hamlet of Upper Saint Regis. It is the southernmost lake of the St. Regis Lakes and is connected via a channel to Spitfire Lake, followed by a channel into Lower St. Regis. The chain of lakes is famous for the presence of several historic great camps belonging to some of the wealthiest figures of early America. Upper St. Regis Lake is divided into six distinct loon territories, most being shared territories. The territories on Upper Saint Regis Lake are Pearl Island, Birch Island, Middle, North Bay and Spring Bay. Spitfire Lake only includes one territory.

Birch Island Territory
The Birch Island territory has been home to a nesting pair for the last few seasons and in 2014 the same nesting pair occupied the territory. The nesting pairs breeding efforts were successful and they produced two fledglings. The location of the nest was directly across the channel into Spitfire Lake, which is one of the most heavily trafficked areas on the lake by boats.

Figure 14. Aerial image of the St. Regis Lakes with labels denoting loon territories.

Spring Bay Territory
Spring Bay is located in the western part of the lake and is somewhat isolated from the rest of the lake. One nesting pair of loons was observed with two fledglings.

Spitfire Lake - Spitfire is the middle lake, and smallest waterbody, of the St. Regis Lakes. It covers 240 acres and is home to a single loon territory.

Spitfire Territory
Spitfire territory has been home to a nesting pair for multiple seasons. Two chicks were observed on a small island located directly behind Rabbit Island. An account provided by local residents noted an aggressive male disturbed the nesting pair and chicks. The two chicks were killed by the aggressive male. This incidence can occur when shared territories encroach upon one another.

West-Central Region

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 two major islands. The lake consists of five loon territories, and four of the five were observed during the 2014 field season. The territories observed on Big Moose Lake included North Bay, South Bay, West Bay, and the Inlet in the Eastern portion of the lake. Due to the large size of the lake, only two territories were observed each week and the observed territories were rotated each week.

Figure 15. Aerial image of Big Moose Lake with labels denoting loon territories.

North Bay Territory

North Bay was the largest territory observed on the lake, boasting areas with little to no boat traffic. The territory also includes one large island and some bog sections suitable for loon nesting. This summer, loons were only observed in three of eight weekly visits, with no evidence of nesting or chicks. Sites of nests from prior years exhibited no signs of rearrangement or temporary inhabitation. One adult loon of the observed pair could not be identified, and the second appeared to be unbanded.

South Bay Territory

The adult loon pair of South Bay was very active during each sighting, however, a nest was ever located and the artificial nest platform was never used. Unfortunately, Canada geese were frequently observed on the artificial nest platform, potentially inhibiting the loons' ability to utilize the artificial habitat. Also, each observation of this pair indicated that both birds appeared to be unbanded.

West Bay Territory

West Bay, though perhaps the busiest section of the lake with many shorefront homes and motorboats, proved to hold the loon pair easiest to find on nearly every visit. An island at the mouth of the bay offers optimal nesting area on all sides. The female loon 0938-788-09 was identified several times throughout the summer, and is presumed to have had the same mate 0938-788-10 based on one leg's banding, which would make the two a returning pair in BRI data. The pair built their own nest on the bay side of the island, estimated to have been completed within the first week of July, however, the nest and one egg was determined to be abandoned as a result of receding high water that left the nest inaccessible.

Inlet Territory

The Inlet offers ideal loon territory, with adequate wind protection and being almost entirely comprised of bogs. Previous nesting sites were closely monitored and all shorelines carefully observed, but no nesting efforts by the resident pair were evident. The loon monitor was unable to identify the pair of loons in this territory.

Nicks Lake **-** Nicks Lake is a 205 acre waterbody located adjacent to a New York State Campground near Old Forge, in the southwest corner of the Adirondack Park. The lake and campground are popular and heavily trafficked tourist attractions. Nicks Lake borders state forests and the campground is located in a wooded setting. Historically, there has not been an abundance of loon activity on the lake, but it is usually home to one territorial and one nesting pair of loons.

Figure 16. Aerial image of Nicks Lake, located in the southwestern Adirondacks. Only one loon territory is present.

Nicks Lake Territory

Nicks Lake consisted of one loon territory. There were two banded loons identified from the weeks of June 7th to August 9th. They were observed hunting together on the easternmost side of the lake. However, a particularly rainy season flooded their nest area and caused them to seek other suitable nest locations in the territory. After a few weeks, one loon disappeared and only a single loon was left on the lake. No nests or chicks were observed throughout the season.

Discussion

Throughout the 2014 field season, 12 territorial pairs and two loner loons were observed amongst the three monitoring locations. From these nesting pairs, there were four successful fledglings and three failed nests, likely due to high water and flooding. 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, as to not disturb the loons' activities. Stewards who did not monitor loons were able to place fishing line collection tubes at various boat launches across the Adirondack's for fishermen to dispose of monofilament fishing line. The fishing line collectors, provided by Adirondack Center for Loon Conservation Director Nina Schoch, help to reduce the amount of loons who become entangled in fishing line.

Improper disposal of fishing line can cause severe injury or a slow, painful death. Photo by N. Schoch

Conclusion

With increasing public awareness of the issues surrounding the common loons' survival, their future in the Adirondacks is looking brighter every year. The AWISP's role in the monitoring of common loons is vital to

research efforts being conducted by the BRI. Scientific evaluation of the humankind's impact on the common loon will help guide future regulations and management practices to ensure the continued existence of the birds in the Adirondack Park. Loon monitoring efforts are also beneficial to the AWISP because they provide an opportunity for stewards to survey the waters for AIS and any other potential ecological threats. The 2014 loon monitors enjoyed their dual role in protecting the Adirondack lakes they care so much about and participating in ongoing monitoring efforts. If we remain diligent on monitoring and protecting the common loon, we can ensure their haunting call will be heard and enjoyed for generations to come.

A common loon on its nest. Photo credit: B. Schoch.

Management of Purple Loosestrife (*Lythrum salicaria*) on the St. Regis Lakes

By Zachary Simek, Jesse Smith, and Susan Cragg

(left) Purple loosestrife in flower (right) Purple loosestrife foliage with characteristic square shaped stem with whorled lanceolate leaves

Introduction

Purple loosestrife (*Lythrum salicaria*) is a perennial invasive species that is widely distributed among terrestrial and wetland habitats throughout the United States and Canada (Figure 17). *Lythrum salicaria* is easily identified by terminal magenta colored flower spikes that are present from July through September. Purple loosestrife can also be identified by its lanceolate leaves in whorls of 3-5 and a characteristic square-shaped green stem, often with red or purple striations. Purple loosestrife is an aggressive competitor to native plant species and has contributed to the degradation of many wetland habitats across the United States (Malecki et al. 1993). It is able to spread voraciously due to the absence of specialized invertebrate predators and diseases that are present in its native geographic range.

Purple loosestrife can easily displace native plant species and negatively affect nutrient cycling within wetland ecosystems. *L. salicaria* tolerates a wide range of soil conditions, allowing it to quickly outcompete desirable native wetland species for nutrients and space. Purple loosestrife has the ability to reproduce at a rapid rate and is most prone to invade disturbed sites (Dech & Nosko, 2004).

L. salicaria originated in Europe and Asia and was unintentionally introduced to the eastern coast of the United States through transoceanic shipping ballast soil in the early 1800s. It then disseminated outward, spreading along canals and roadways. Purple loosestrife was also introduced intentionally as a medicinal herb used for treating wounds, sores, and diarrhea and was also distributed throughout the country for ornamental purposes (USDA, 2000).

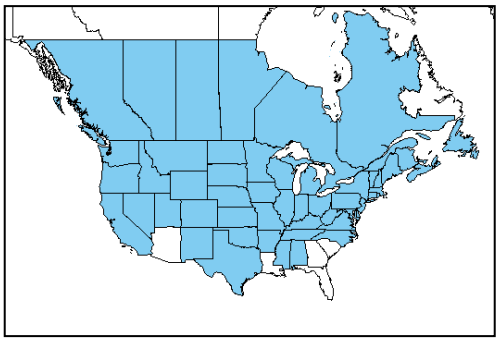

Figure 17. Distribution of purple loosestrife (*Lythrum salicaria*) in the United States. Retrieved from USDA Plant Database.

Established purple loosestrife plants can reach heights of up to 2.5 meters and have the potential to form wide crowns, creating a dense canopy that shades out low growing vegetation (USDA, 2000). *L. salicaria* also has very durable rootstocks which store required nutrients that can be accessed by the plant for early growth during the spring season and regrowth if the stem becomes cut or burned (Malecki et al. 1993). Mature purple loosestrife plants can have very high seed productivity, releasing more than two million seeds per year (Albright et al. 2004).

Historically, unsuccessful management techniques for purple loosestrife include cutting, manipulating water levels, burning, and poorly timed herbicide treatment (Albright et al. 2004). However, there are several well documented alternative techniques for effectively controlling invasive purple loosestrife. Such alternatives include biological control and hand harvesting (Albright et al. 2004). There are several species of host-specific leaf-eating beetles that have been documented as effective biological control agents for *L. salicaria* and have been introduced throughout wetlands in more than 30 states. The most commonly utilized predatory beetles, *Galerucella calmariensis* and *Galerucella pusill,* aggregate on plant foliage and have been documented to inflict little damage on native loosestrife species. Hand harvesting has proven to be effective for managing small, localized populations. However, it is important that the entire root structure is removed in order to prevent growth the following season (Albright et al. 2004).

Methods

Hand harvesting was selected as the primary control technique for 2014 purple loosestrife management efforts. Harvesting occurred on Spitfire Lake, Upper St. Regis Lake, and Lower St. Regis Lake (St. Regis Lakes) on August 12th, August 19th, August 22nd and September 5th. The timing of the management events was intentionally selected to ensure that mature plants were in flower for easy identification, but could be removed before the loosestrife went to seed to prevent further spread and establishment. The management crew navigated to previously identified infestations aboard the AWI vessel Water Shield. Sites that had been previously managed were inspected for re-emergence and all identified purple loosestrife plants were removed. Locations of each treatment site were recorded using a paper map and a GPS unit to provide precise coordinates for subsequent management efforts. All plants were removed individually by pulling from the base of the stem in order to remove a significant portion of the root system and reduce the possibility of regrowth during the following season. All harvested purple loosestrife plants were tallied, placed in 50 gallon garbage bags, and returned to the AWI Environmental Research Laboratory for proper disposal.

A Steward works to remove mature purple loosestrife plants from the shoreline.

Results

Following four days of management efforts, a total of 1,266 plants were removed from 16 different locations. This represents an increase of over 149% from the quantity of plants pulled in 2013. Furthermore, the 2014 total was the 3rd highest since the management project began in 2001. Only management years 2002 and 2004 ranked higher with 3,354 and 1,345 plants respectively (Figure 18). In addition, three new sites were identified, mapped, and added to the existing database (28, 29, and 30).

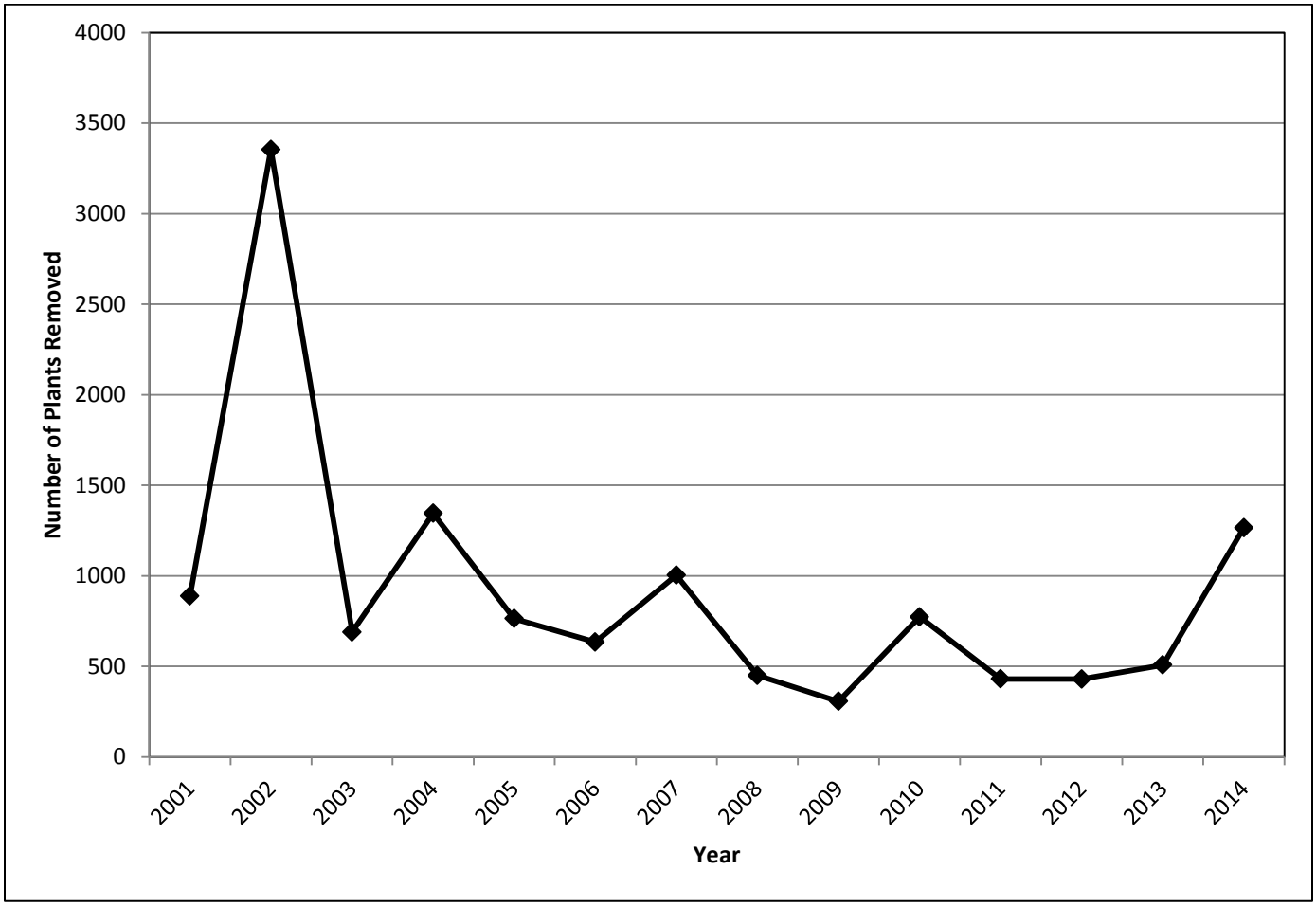

Figure 18. Total number of purple loosestrife plants removed, 2001-2014.

Lower St. Regis

The purple loosestrife management sites located on Lower St. Regis Lake (Sites 18&19) showed no signs of plant re-growth, indicating the success of previous control efforts. No new infestations were identified on the shores of Lower St. Regis Lake.

Upper St. Regis and the Channel

Site 27, which was created in 2013 by combining historic sites 2 and 4, was separated into its former constituents due to the geographic separation between the two locations. All former sites located on Upper St. Regis and the Channel were revisited and surveyed for the presence of new plants. Sites 1 and 2 showed no sign of growth and no control was needed. Site 20 saw a numerically significant increase from 0 plants in 2013 to 67 in 2014. Site 3 had a decrease in the number of plants present from 154 in 2013 to 106 in 2014. In total, 242 plants were removed from Upper St. Regis Lake and the Channel (Table 18).

Table 18. Historic purple loosestrife management data for the St. Regis Lakes. Values indicate total number of plants removed from each site from 2001-2014. Years 2004-2009 omitted.

Site	2001	2002	2003	2010	2011	2012	2013	2014
1	0	14	0	0	0	0	0	0
2	0	0	0	0	0	0	-	0
3	450	1400	330	222	197	103	154	106
4	5	63	5	0	10	21	-	69
5	0	74	23	2	4	2	0	4
6	0	0	0	0	15	19	22	38
7	250	915	117	39	76	24	11	27
8	110	49	3	6	4	6	2	278
9	0	437	143	72	30	67	152	223
10	0	123	5	4	7	8	0	57
11	0	0	0	3	8	0	7	8
12	18	11	13	1	4	1	-	46
13	25	260	35	89	17	20	-	121
14	0	0	0	0	9	0	0	0
15	30	8	16	25	11	21	0	0
16	0	0	0	3	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	16	0	0	0
19	0	0	0	0	1	0	0	0
20		0	0			1	0	67
21	0	0	0	0	0	1		-
22	0	0	0	305	20	91	68	174
23	0	0	0	2	2	0	-	0
24	0	0	0	0	0	45	0	-
25							43	-
26 (12, 13, 23)							30	N/A
27 (2,4)							19	N/A
28	0	0	0	0	0	0	0	17
29	0	0	0	0	0	0	0	5
30	0	0	0	0	0	0	0	26
Total	**888**	**3354**	**690**	**773**	**431**	**430**	**508**	**1266**

Spitfire Lake and the Slough

Spitfire Lake remained the most heavily impacted waterbody of the St. Regis Lakes with 13 distinct infestations. New infestations were identified at sites 28, 29 and 30 with 17, 5 and 26 plants present at each (Table 18). Site 23 was the only location on Spitfire Lake that exhibited no new growth. Eight locations had increased populations since the 2013 management season. The most significant increases in plant growth occurred at sites 8 and 10. Site 8 increased over 125 times from only 2 plants in 2013 to 278 plants in 2014, while site 10 increased from 0 plants to 57. All four previously identified locations in the Slough (Sites 14-17) showed no signs of regrowth. In total, 1,024 plants were removed from Spitfire Lake and the Slough.

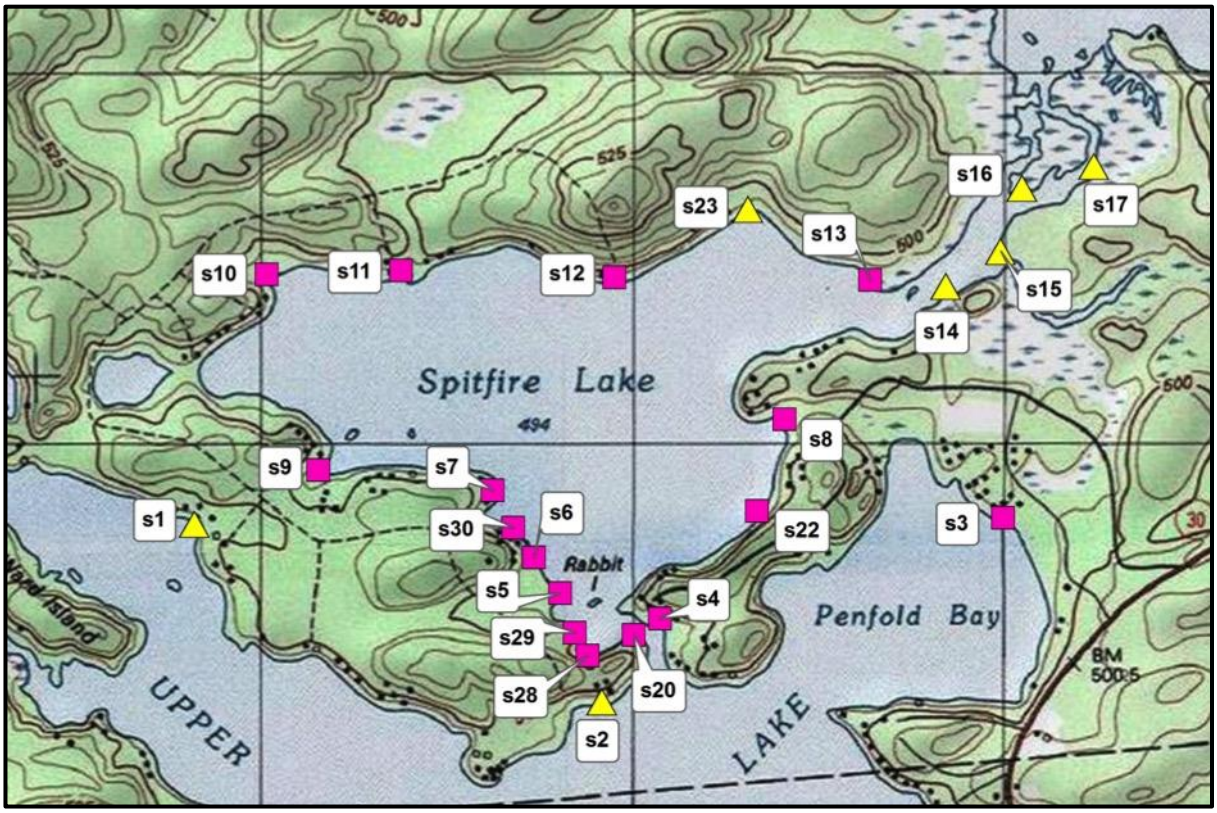

Figure 19. Purple loosestrife *(Lythrum salicaria)* management sites located on the St. Regis Lakes. Yellow triangles indicate locations with no plants observed in 2014; magenta squares indicate locations where plants were removed. Sites 18 and 19 (no plants observed) on Lower St. Regis Lake omitted.

Discussion

Although there was a significant increase in the number of plants removed in 2014, management efforts were still a success. There are several factors that contributed to the significant increase in the total number of plants removed. First, it is worth nothing that the majority of plants removed were small (<15" height) and could have been easily overlooked in previous years' management efforts. The number of mature, flowering plants represented a very small percentage of the overall harvest. In addition, the 2014 management crew had more members and a greater quantity of time available to complete the control efforts. This allowed for a more thorough inspection of the shoreline and subsequently resulted in a greater number of plants pulled. Finally, the increased or sustained number of purple loosestrife plants present at numerous sites may suggest that previous management efforts have been unsuccessful at removing a significant portion of the root system. Subsequent control efforts should focus on digging deeper around the base of each plant to remove all of the root system and prevent reemergence.

Sites 8 and 10, which exhibited the greatest increase in population size, should be given precedence for 2015 management efforts. In order to address the increase in plant populations, 2015 control should be scheduled earlier in the season to allow a follow up survey and subsequent treatment if necessary. Although hand harvesting remains an effective strategy, it is worth considering alternative management options such as biological control with *Galerucella* or chemical control with glyphosate herbicide. In addition, future management efforts should focus on maintaining clear and precise records with an emphasis on accurate

documentation of site locations. The 2014 crew was unable to determine the location of Site 25 due to lack of documentation from 2013. In order to minimize confusion and reduce the establishment of redundant site locations, future management crews should avoid combining existing sites unless absolutely necessary. Anecdotal evidence suggests the boundaries of each infestation can be subjective for different management crews. In other words, what one crew may interpret to be a single large infestation, a future crew may identify as two separate sites. It is also worth noting that continued management efforts may cause a large site to appear as two distinct locations the following year. To avoid discrepancies in reporting, there should be a strong emphasis on accurate, detailed record keeping. In addition, all sites should be marked using a GPS unit to accurately document their location using geospatial software. Established waypoints can then be used for navigation during the next management season.

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Monitoring Lyme Disease in the Adirondacks

By Zachary Simek

AWISP Science Director, Dr. David Patrick, Stewards, and other participants are briefed on proper tick collection protocol.

Throughout the 2014 field season, several AWISP staff members participated in a collaborative research project that aimed to provide a better understanding of the biology of Lyme disease, where it is found in the Adirondack Park, and how factors such as climate change and migratory bird movement are influencing its spread. The research initiative was a joint effort between the Center for Adirondack Biodiversity at PSC, the New York State Department of Health, and the Trudeau Institute. PSC professor, Dr. Lee Ann Sporn, led the college's involvement in the study by training participants and coordinating sampling efforts. The project sampled five sites in various locations across northern New York. Two sites, located in Albany and Queensbury, were known to contain ticks that harbor Lyme disease. The additional three sites, located in Schroon Lake, Black Brook and Paul Smiths, were representative of Adirondack habitats. Two stewards worked closely with the monitoring program, assisting three days per week for five weeks, while other stewards assisted by performing one day of tick dragging. In addition, AWISP Science Director, Dr. David Patrick, provided further administrative support of stewards' efforts.

Researchers utilized several methods to detect the presence of ticks and collect specimens for subsequent Lyme disease testing. First, the team used cloth drags to sample understory vegetation for the nymph stage of deer ticks. Researchers dragged one meter cloth sections over 1000 meters of land area, stopping frequently to inspect the drag for ticks and collecting any organisms present. Approximately six stewards performed tick drags at their respective regions during the early summer to assist with the tick

monitoring efforts. Dr. Sporn's research crew also utilized 200-250 Sherman traps at the five previously mentioned locations to capture small mammals. Throughout the sampling period, more than 75 small mammals were captured and total genomic DNA was extracted to be tested for Lyme disease.

The research is providing important information regarding the current distribution of Lyme disease within the Park and will provide valuable insight to healthcare professionals who are presented with patients displaying Lyme-like symptoms. So far, ticks and small mammals have tested positive for Lyme disease at a variety of different locations. In Schroon Lake eight of twelve small mammals tested positive, while five of eight small mammals captured in Queensbury tested positive. In the northern portion of the Park, two of twenty-two mammals in Paul Smiths tested positive, while one of twenty-seven mammals in Black Brook were found to have Lyme disease. The research will continue in 2015-2016 as the crew continues to capture small mammals and collect ticks. Results from the 2014 research were presented by Science Director Dr. David Patrick, along with representatives from the Trudeau Institute, High Peaks Animal Hospital, Adirondack Health, and students from PSC, at a public forum in Tupper Lake, NY on December 6th.

Participants of the Lyme disease monitoring project inspect a cloth drag for tick nymphs.

Road-Salt Effects on Ecosystem Structure and Function in Headwater Streams in an Intact Forested Landscape

By Patrick, D. A., Kelting, D. L., Laxson, C. L., and Nellis, C.

Introduction

Chemical pollution of freshwater wetlands can lead to widespread changes in native biodiversity (Richter et al. 1997, Brinson 2002, Carpenter et al. 2011). Mitigating these effects requires understanding the role of individual stressors. This can be challenging given that many systems are influenced by a complex suite of anthropogenic factors, often with synergistic effects on biota (Carpenter et al. 1992). Furthermore, understanding the effects of chemical stressors typically involves quantifying variation (occurrence, abundance, biomass etc.) in specific organisms. As the sensitivity of different taxa to stressors ranges considerably (Benbow and Merritt 2004, Sarma et al. 2006, Kefford et al. 2011), inherent variation in community structure among study sites can make extrapolating results difficult and potentially mask any effects of stressors in multi-site studies. Laboratory experimentation with standardized ecological communities offers one venue for targeting specific stressors (Dalinsky et al. 2014). However, these types of studies may exclude potentially important factors operating at larger scales (Woodward et al. 2010). An alternative approach is to select study sites using rigorous criteria to minimize the effects of variation outside of the focal stressor.

Salinization of freshwater riparian systems represents one of the most significant chemical stressors in many temperate regions (Corsi et al. 2010, Van Meter et al. 2011, Canedo-Arguelles et al. 2013). Much of this increased salinity results from the application of road de-icing salt in the form of sodium chloride (NaCl) and subsequent transfer into connected wetlands (Trombulak and Frissell 2000, Kelting et al. 2012). Salinization of wetlands due to road salt has been linked to widespread effects on ecosystem structure and function including changes in soil chemisty (Kelting and Laxson 2010) decreases in zooplankton abundance (Sarma et al. 2006, Van Meter et al. 2011, Dalinsky et al. 2014), declines in native plant communities (Richburg et al. 2001), and increased mortality of macroinvertebrates (Benbow and Merritt 2004) and amphibian larvae (Karraker et al. 2008). However, there is also strong evidence indicating that salt concentrations decrease rapidly downstream from the source and as water volume increases due to dilution (Transportation Research Board 1991). Consequently, small streams (first and second order) close to the source of road-salt (i.e. immediately downstream of the roadway) are likely to see the highest salt concentrations in a given watershed. As such, we focused our research attention on the effects of road-salt application on these “headwater” stream sites.

Although salinization of freshwater wetlands can clearly lead to changes in ecosystem structure and function, identifying the mechanism by which application of road salt translates into specific effects on native biota in headwater streams can be difficult. The challenges in tracking this cause-and-effect relationship stem from a combination of: (1) the range of salinity levels experienced in streams throughout the year, and the challenge of separating the effects of chronic high salt concentrations from episodic short-duration high-

concentration events; and variation in (2) abiotic conditions and (3) biotic conditions among sample sites potentially masking the effects of increased salinity.

Most laboratory studies of the effects of salinization address the effects of a constant concentration of salt (NaCl) on biota (Dalinsky et al. 2014). Similarly, field-based studies typically attempt to relate the mean concentration of salt in a system to biotic responses. However, salt concentrations in natural systems can vary considerably throughout the year. In temperate riparian systems, salt concentrations are likely to be highest during spring snow melt when road-salt applied during the winter is rapidly transferred into wetlands. These high salinity levels are short-lived, however, and occur during a time when most wetland biota is in a resting state. Conversely, summer salinity levels can also be high when base-flow conditions mean that the water in streams is primarily coming from groundwater that has moved through soils saturated with salt from years of application (Kelly et al. 2008). This is also a time of year when biota are typically far more active, and in sensitive life-history stages that may be more prone to the effects of increased salinization. In addition to influencing temporal patterns of salinity, abiotic conditions within the stream including gradient, channel morphology, substrate size, temperature, pH, and hydrology also influence the biotic community (Hawkins et al. 1997, Lammart and Allan 1999). These local conditions are also strongly influenced by the landscape context (Richards et al. 1996). Identifying the effects of road-salt therefore requires both detailed knowledge of temporal patterns of sodium chloride concentrations including both seasonal variation and long-term trends, and understanding the drivers of biotic community structure independent of road-salt.

In this study, we combined intensive monitoring of abiotic conditions within streams coupled with multi-taxa biological assessment to identify the role of road salt in influencing native ecological communities. To reduce the potential effects of natural variability in masking the effects of road salt, we conducted our study within headwater streams in the Adirondack Park in upstate New York where long-term land protection has resulted in largely undisturbed forested watersheds. Our objectives were (1) to assess how native biota are influenced by a range of sodium chloride concentrations as a result of road-salt application; and (2) to identify the role of inherent variation in stream characteristics in influencing our ability to identify the effects of road salt.

Methods

Study site

Our study was conducted in 13 upland streams in the northern Adirondack Park in upstate New York, USA. The focal region is a montane area with dominant terrestrial vegetation including coniferous, mixed, and deciduous forest and encompasses the headwaters of three regionally-important rivers: the Boquet, Ausable, and Saranac. Streams were selected based on the following criteria: (1) occupying separate watersheds; (2) the presence of largely undisturbed upstream terrestrial habitat; (3) encompassing a gradient of road-salt concentrations. Sampling sites within each stream (hereafter “reaches”) were selected based on proximity to

stream gauges and to ensure similarity to upstream and downstream conditions. Within reaches, we established sampling transects to describe the structure of the stream using standard protocols (Harrelson et al. 1994, Simonson et al. 1994).

Physical habitat and water quality

Within each reach we characterized the substrate type, channel profile, bank substrate, bankside vegetation, and canopy closure (Bunte et al. 2009). These data were used to assign each reach to a Rosgen classification (Rosgen 1994). Water temperature and specific conductivity as a surrogate for NaCl concentration were collected using stream gauges established within each reach and set to record every 30 minutes. Using these data, we assessed the mean, minimum and maximum for each reach from August 1st 2013 to August 1st 2014. The mean, minimum, and maximum pH for each stream were calculated from a minimum of 7 repeated measurements taken between May and October 2014.

Stewards measure physical characteristics of the stream channel.

Sampling invertebrate community structure.

To sample stream invertebrates, we established twenty nylon bags (mesh size = 5 mm) in each reach. Bags were filled with 10 ± 0.2 g of air-dried sugar maple leaves from the previous fall. Five groups of 4 bags were tied to the bank side at each site and secured to the stream bottom using nylon fishing line and nails. Bags were placed out of the main current to avoid risk of removal at high water. Each week of the study, we removed five bags (one per set) from each stream and placed them in a sealed ziplock bag. Extending sampling over a month allowed us to capture more of the temporal variability in invertebrate communities found within each site. Following collection, we consolidated samples from the same site and week and stained with rose bengal suspended in 70% isopropyl alcohol for 24 hours. Invertebrates were then enumerated to family. To assess sedimentation rates in each stream, we used a shaker to mechanically separate inorganic material from leaf-litter, followed by removing remaining organic material in a muffle furnace. The remaining inorganic material collected in leaf-litter bags within each stream was then weighed and used to calculate a mean mass (g) per bag.

Sampling stream salamanders

Twelve salamander leaf-litter bags were established in each of the focal streams in late June 2014. Bags were constructed from 50 x 50-cm plastic deer netting with a 2.5-cm mesh size, filled with leaf-litter, and weighted using a rock in the center of each bag. The four corners of the bag were sealed with a zip-tie. Bags were attached to a tree on the shore line using nylon string and placed outside of the main flow of the current for three weeks. We held a D-net under the bag during removal, then placed the bag in a 12 liter container with a little water and agitated to collect animals. Finally the bag was transferred to a plastic sweater box where we opened it and systematically sorted through the leaf litter. Captured salamanders were identified to species, and developmental stage (larval, juvenile, and adult). All salamanders were released at the point of capture following sampling.

Sampling the fish community

We employed a three-pass depletion method to estimate the total abundance of fish in each reach. Each reach was sampled once between June 8 and August 28. Sampling was conducted by a single backpack electrofishing unit, with two technicians helping to catch additional fish due to the high velocity of many of the streams. Captured fish were identified to species, measured, and placed in a 13-L plastic bucket until the conclusion of sampling. To estimate the biomass of fish, we used fisheries data collected by Paul Smith's College students from 2004 to 2008 in the focal region to derive standard weight equations for each species sampled (Appendix 1). Where insufficient data were available, we employed the following standard weight equations (W_s = standard weight; TL = total length): Brown trout, *Salmo trutta*: $\log_{10} W_s$ (g) = -4.867 + 2.960 $\log_{10}$ TL (mm) (Milewski and Brown 1994); white sucker, *Catostomus commersoni*: $\log_{10} W_s$ (g) = -4.755 + 2.940 $\log_{10}$ TL (Bister et al. 2000); rock bass, *Ambloplites rupestris*: $\log_{10} W_s$ (g) = -4.827 + 3.074 $\log_{10}$ TL (Bister et al. 2000); banded killifish, *Fundulus diaphanus*, (based on equations for topminnow): $\text{Log}_{10} W_s$ (g) = -5.5659 + 3.326 $\log_{10}$ TL (Schneider et al. 2000); common shiner, *Luxilus cornutus*: $\text{Log}_{10} W_s$ (g) = -5.6124 + 3.320 $\log_{10}$ TL (Schneider et al. 2000); and golden shiner, *Notemigonus crysoleucas*: $\text{Log}_{10} W_s$ (g) = -5.24775 + 3.08217 $\log_{10}$ TL (Schneider et al. 2000). MicroFish version 3 was used to estimate the total population size and biomass of each fish species in each reach.

Data analysis

We initially assessed correlation among candidate dependent and independent variables using pairwise tests and removed collinear factors (p <0.05). This resulted in the following variables being included in analyses strictly as independent factors: (1) Mean annual conductivity (µS); (2) Mean May to October pH; (3) Mean annual water temperature (°C); (4) Minimum annual water temperature; (5) Road density/km upstream watershed area; (6) Mean canopy openness; and (7) Mass of inorganic material in invertebrate leaf-litter bags. Dependent variables included: (1) Salamander density/100 m^2; (2) Estimated brook trout biomass/100 m^2; (3) the total number of Ephemeroptera, Plecoptera, and Trichoptera sampled in leaf-litter

bags throughout the study period; and (4) the Shannon-Wiener diversity index for EPT at each site throughout the study period. Dependent variables were also included as potential explanatory variables in models where appropriate.

To identify the suite of parameters best explaining variation in our response variables we developed a range of candidate models (Table 19). Because invertebrate communities varied considerably among each of our reaches, we were unable to assess the effects of stream characteristics on abundance of individual families. We used Generalized Linear Models (GLMs) with a Poisson distribution of errors to assess the relationship between the total number of larval EPT and candidate dependent variables. Salamander density and the estimated biomass of brook trout/100 m^2 were not normally distributed with a variance/mean ratio much greater than one, hence we employed GLMs with a negative binomial distribution of errors. To reduce the effects of a strong outlier in our salamander density data without removing a biologically important upper end to our distribution, we log transformed data prior to analysis [$X' = \ln(X + 1)$]. Akaike's Information Criterion corrected for small sample size (AICc) was then used to discriminate among candidate models.

Results

Stream characteristics: The headwater streams we sampled varied in physical structure as a function of topography and flow modification due to upstream wetlands (particularly beaver impoundments) and road culverts. This resulted in a range from steep reaches with boulders as the dominant substrate to more gently graded reaches where silt deposition had occurred (Table 19). Mean annual conductivity ranged from 13.5 to 381.5 µS (mean ± SD = 151.3 ± 104.2) with a maximum conductivity of 4372.0 µS (Table 20). Mean annual water temperatures remained low, but ranged from 5.72 to 8.53 °C (7.09 ± 0.75). While all of the streams were found in forested areas, canopy openness over reaches varied from 5 to 57% (21 ± 17).

Invertebrates: Leaf-litter bags captured a combination of insects, crustaceans, and mollusks. We focused analyses on families of EPT (mayflies, Ephemeroptera; stoneflies, Plecoptera; and caddisflies, Trichoptera) based on the known sensitivity of these orders to variation in salinity (Kefford et al. 2011). The abundance of EPT varied considerably among reaches from Holcomb Brook where only 1 individual mayfly larvae was sampled to Indian Carry where 173 larval EPT were found in leaf-litter bags (Table 21). The most common caddisfly families were Lepidostomatidae (representing 63.5% of the total EPT larvae sampled) and Limnephilidae (12.6% of total EPT). Leuctridae was the only abundant stonefly family (13.5% of total EPT). Mayfly larvae were generally in low abundance in samples, with the most numerous families including Leptophlebiidae (1.4% of total EPT) and Ephemerellidae (0.9% of total EPT).

The total abundance of EPT was best explained by abiotic conditions within the stream including mean annual conductivity, mean pH, mean annual temperature, and minimum annual temperature (Table 22). The strongest driver of EPT larval abundance was the minimum annual temperature with an increase EPT as minima increased (estimated slope ± SE = 3.989 ± 0.295). Larval EPT were also more abundant in streams with

a higher mean conductivity (0.0013 ± 0.0003), higher pH (0.768 ± 0.512), and at lower mean annual temperatures (-0.230 ± 0.077). The diversity of EPT was not well explained by any of our dependent variables (Table 22).

Stream salamanders: Two species of salamander were sampled during the course of the study, northern two-lined salamander, *Eurycea bislineata* (N across all sites = 251), and spring salamander, *Gyrinophilus porphyriticus* (N = 6). The majority of both species were larval individuals (93% of northern two-lined salamanders sampled and 100% of spring salamanders sampled). The density of stream salamanders was best explained by the intercept-only model, indicating a large amount of unexplained variation in the data (Table 22). However, competing best fitting models included the mean conductivity, with an increase in salamander density at higher conductivities (estimated slope of log transformed salamander density = 0.002632 ± 0.001942), and the total number of Ephemeroptera, Plecoptera, and Trichoptera sampled in leaf-litter bags throughout the study period (estimated slope of log transformed salamander density = 0.005088 ± 0.003251).

Fish community: We captured 10 fish species while electrofishing including two species of Salmonidae, brook trout *(Salvelinus fontinalis)* and brown trout *(Salmo trutta)*; one species of Fundulidae, banded killifish *(Fundulus diaphanous)*; one species of Catostomidae, white sucker *(Catostomus commersonii)*; four species of Cyprinidae, blacknose dace *(Rhinichthys atratulus)*, common shiner (*Luxilus cornutus),* creek chub (*Semotilus atromaculatus)*, and golden shiner (*Notemigonus crysoleucas)*; and one species of Centrarchidae, rock bass *(Ambloplites rupestris)* (Table 23).

Qualitative analyses indicated that fish communities were influenced both by conditions within the reach and landscape characteristics, particularly connectivity to upstream and downstream wetlands. Brook trout were the most abundant and widespread species, occurring in all but two of the reaches. The latter two streams were characterized by a more moderate gradient, finer substrate size, and the presence of higher numbers of banded killifish, a species typically associated with lakes and slower moving water. Brown trout were found in two reaches adjacent to larger rivers stocked for sport fishing. A greater diversity of Cyprinid species were seen both in slower-moving reaches, and in streams adjacent to lacustrine habitat. Brook trout constituted the highest fish biomass of the species sampled in the majority of reaches and are of high relevance to regional fisheries management. Furthermore, the biomass of brook trout was highly correlated with the total fish biomass. We therefore focused detailed analyses on this species. The biomass of brook trout/100-m^2 stream area was best explained by the mean annual stream temperature, with a decrease in brook trout biomass as temperature increased (estimated slope -1.2092 ± 0.4162; Table 22).

Discussion

Road salt application represents the single largest source of chemical pollutant in the Adirondack Park, with an average of 160,000 metric tons applied per year for the past decade. This equates to an average annual application of 67 kg/ha over the entire park. Moreover, unlike other chemical pollutants such as acid

rain, road salt is deliberately applied to the environment. Although the Adirondack Park has relatively few roads, the effects of salt application on increased salinity in streams can clearly be seen in our data, with the maximum conductivity observed across sites being 53 times greater than that seen in control streams. As expected, despite the higher concentrations of salinity seen in Adirondack streams downstream of roads, maximum salt levels remain lower than those found in areas with more extensive road networks/areas of impervious surface. Although salt concentrations in Adirondack streams are lower than those reported from other locations, the effects of salinization on ecosystem structure and function in the region are still of concern. Furthermore, we expect to see increases in salt concentrations even if application rates remain constant as a result of long term storage of chloride ions in groundwater (Kelly et al. 2008, Kelting and Laxson 2010). As a consequence, although our research findings suggest a cautious note of optimism that road salt has not led to widespread degradation of headwater streams in the northern Adirondacks, the ecological communities in these habitats may not remain unaltered in the future, particularly if ecological thresholds are reached.

Changes in stream macroinvertebrate communities are often used as an indicator of more widespread shifts in the environment (Metcalfe 1989, Lammart and Allan 1999, Benbow and Merritt 2004). Increased salinity as a result of salt application primarily affects stream macroinvertebrates by disrupting osmoregulation (Kelting and Laxson 2010). As some species and taxa are more tolerant of higher concentrations of salt, shifts in community structure may occur over time in response to salinization (Smith and Kaster 1983, Kefford et al. 2011). In the short term, high levels of salinity can influence survival of macroinvertebrates leading to reduced abundances and local extinction (Demers 1992). However, results from studies of macroinvertebrate communities in response to increased salinity are mixed. For example, research in two streams in Michigan indicated no effect of salinization on macroinvertebrates, but did find that sediment loading was a driver of stream macroinvertebrate communities (Blasius and Merritt 2002). Our study employed a larger sample size than this previous research and we deliberately selected sites across a salt gradient. We did not find that salinity was an important driver of the abundance of sensitive macroinvertebrate taxa (ephemeroptera, plecoptera and trichoptera) or species diversity, with best-fitting models indicating a slight increase in abundance at higher salinity levels. As we were unable to identify larvae to species, this finding may have resulted from replacement of species sensitive to increased salinity with more tolerant species. However, we think it is more likely that NaCl concentrations in streams in our study have not yet reached toxic levels for most macroinvertebrates reported from prior studies (Evans and Frick 2001).

Amphibians have the highest proportion of imperiled species of any vertebrate taxa and are known to be particularly sensitive to chemical pollutants (Collins and Storfer 2003, Stuart et al. 2004, Boone et al. 2007). Prior research has shown that the embryonic and larval survival of wood frogs (*Lithobates sylvaticus*) and spotted salamanders (*Ambystoma maculatum*) decrease with increasing salinity, with wood frog survival reduced at a treatment of 3000 µS, and spotted salamanders to a treatment of 500 µS (Karraker et al. 2008). Furthermore, wood frogs and spotted salamanders were not found breeding in sites with high conductivity (Collins and Russell 2009). While mean conductivity in our streams did not exceed 500 µS, 7 of our sites

experienced maximum conductivities >500 µS and 1 site experienced a maximum >3000 µS. Despite the fact that our streams exceeded conductivities known to decrease amphibian survival, we found an increase in the density of salamanders at higher salinities. This result may be indicative of the fact that the physiological threshold beyond which survival of stream salamanders is decreased had not been reached; amphibians are known to vary in their sensitivity to salinization (Karraker 2007, Collins and Russell 2009), and we are unaware of any published research that has assessed the tolerance of the species we sampled to NaCl concentration.

As with macroinvertebrates, strong interspecific differences are known to exist in the sensitivity of freshwater fish to increased salinity (Evans and Frick 2001, Vosyliene et al. 2006). Laboratory studies have indicated that brook trout, the dominant species in the streams we sampled, have a relatively high tolerance to salt in comparison (Evans and Frick 2001). This may explain why salinity was not a factor implicated in driving brook trout biomass in our streams.

In conclusion, our study clearly demonstrates the importance of longitudinal studies in understanding the effects of chemical stressors, coupled with the need to understand reference community structure (i.e. prior to effects of stressors) at the scale of a focal reach. We observed considerable variation in aquatic biota among our streams despite the standardized approaches taken to site selection. While we did not observe a strong signature of road-salt effects on stream biota, we are unable to determine if this was a result of this inherent variation among streams masking effects or a function of stream not having yet reached sub-lethal or lethal concentrations for different taxa. By continuing to monitor streams over time, we will be able to discriminate the potential effects of salt application from variation in biota. The effects of road salt include episodic high concentrations during spring snow melt, and chronic high concentrations typically seen during summer when hydrology is driven by base flow. Episodic high concentrations occur during a time of year when most stream biota is relatively inactive. Conversely, chronic concentrations during summer occur during the reproductive/larval period for many invertebrate and vertebrate organisms, and thus may have more wide-reaching effects on vital rates and population dynamics. We do not expect to see a marked increase in salt concentration during the spring. However, there is clear evidence that chloride ions are retained in groundwater leading to a continued increase in concentrations during the summer (Kelly et al. 2008, Kelting and Laxson 2010). Continued monitoring of streams will allow us to assess if these summer concentrations reach levels at which biota are affected.

While road-salt application does not appear to have led to widespread declines in native biota in our sampling reaches, we did observe a strong role of water temperature in driving community structure. In the case of brook trout, the decrease in abundance we observed in warmer streams reflects the known sensitivity of this species to rising water temperatures (McCormick et al. 2011, Meisner 2011). Brook trout are the only salmonid found in the majority of our streams, representing a high proportion of the total fish biomass in most of the sites we sampled. As such, understanding the role of continued stream warming as a function of climate change is of clear importance. While brown trout are more tolerant of warmer conditions (McCUllough 1999), this species is non-native, and confined to reaches adjacent to stocked areas in our study system. Consequently, replacement of brook trout by brown trout is unlikely to occur in most of our study sites and may be considered undesirable from a management perspective.

Acknowledgements

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Tables and Figures

Table 19. Candidate models used to identify the factors driving biotic responses to headwater stream characteristics in 11 headwater streams sampled in the northern Adirondack Park, NY. Model variables included: Mean annual conductivity (MEAN_COND); Mean May to October pH (MEAN_PH); Mean annual water temperature (MEAN_TEMP); Minimum annual water temperature (MIN_TEMP); The mean mass of inorganic material in each invertebrate leaf-litter bag at each site (SEDIMENT); Road density/km upstream watershed area (ROAD_DENSITY); Mean canopy openness (CANOPY); Salamander density/100 m2 (SALAMANDER); Estimated brook trout biomass/100 m2 (BROOK_BIOMASS); the total number of Ephemeroptera, Plecoptera, and Trichoptera sampled in leaf-litter bags throughout the study period (TOTAL_EPT); and the Shannon-Wiener diversity index for EPT (DIVERSITY_EPT). K represents the number of parameters. Intercept-only models were also included for all dependent variables.

Dependent variable	Model name	K	Model
TOTAL_EPT	Road salt	2	MEAN_COND
	Road effects	3	MEAN_COND + ROAD_DENSITY
	Water characteristics	5	MEAN_COND + MEAN_PH + MEAN_TEMP+ MIN_TEMP
	Acidification	2	MEAN_PH
	Biotic interactions	3	SALAMANDER + BROOK_BIOMASS
	Food availability	2	CANOPY
	Mean water temperature	2	MEAN_TEMP
	Sedimentation	2	SEDIMENT
DIVERSITY_EPT	Road salt	3	MEAN_COND
	Road effects	4	MEAN_COND + ROAD_DENSITY
	Water characteristics	6	MEAN_COND + MEAN_PH + MEAN_TEMP+ MIN_TEMP
	Acidification	3	MEAN_PH
	Biotic interactions	4	SALAMANDER + BROOK_BIOMASS
	Food availability	3	CANOPY
	Mean water temperature	3	MEAN_TEMP
	Sedimentation		SEDIMENT
SALAMANDER	Road salt	3	MEAN_COND
	Road effects	4	MEAN_COND + ROAD_DENSITY
	Water characteristics	6	MEAN_COND + MEAN_PH + MEAN_TEMP+ MIN_TEMP
	Biotic interactions	4	BROOK_BIOMASS + TOTAL_EPT
	Food availability	3	TOTAL_EPT

Dependent variable	Model name	K	Model
BROOK_BIOMASS	Road salt	3	MEAN_COND
	Road effects	4	MEAN_COND + ROAD_DENSITY
	Water characteristics	6	MEAN_COND + MEAN_PH + MEAN_TEMP+ MIN_TEMP
	Biotic interactions	4	SALAMANDER + TOTAL_EPT
	Food availability	3	TOTAL_EPT
	Mean water temperature	3	MEAN_TEMP
	Min water temperature	3	MIN_TEMP

Table 20. Characteristics of 11 headwater streams sampled in the northern Adirondack Park, NY. * Indicates control streams where no roads are found in the watershed are identified.

Site name	Rosgen stream classification	% canopy openness	Mean annual conductivity (µS)	Maximum annual conductivity (µS)	Mean annual temp (°C)	Road density (lane-km/km^2)	Mean mass of inorganic material/leaf-litter bag (g)
Ampersand Brook	A3	9	84.7	612.2	7.27	0.456	3.27
Brandy Book	B4	57	138.6	307.9	6.84	0.959	9.32
Cascade Brook	A3	46	290.2	2034	7.85	2.674	0.12
Cherry Patch Brook	B4	12	121.0	208.7	8.53	1.109	0.53
Holcomb Brook*	B3	10	39.8	168.5	7.84	0.000	0.36
Indian Carry	B6	10	381.5	4372.0	7.36	2.734	0.17
Mountain Pond	B3	16	212.5	1757.8	6.60	2.420	0.14
North Branch Boquet	B4	5	127.1	416.7	6.68	1.502	1.32
Norton Brook	A2	42	174.8	630.7	6.42	0.659	0.33
Ray Brook	B4	21	153.9	540.3	5.72	1.528	12.90
Sentinel Brook	A3	14	197.2	714.8	6.56	0.300	0.15
Smitty Creek*	B3	19	13.5	22.9	7.67	0.000	0.07
South Branch Brook*	B3	11	32.6	55.2	6.82	0.000	0.06

Table 21. Ephemeroptera, Plecoptera, and Trichoptera (EPT) larvae sampled in leaf-litter bags in 11 headwater streams in the northern Adirondack Park, NY. Numbers are based on samples combined across weeks (n = 20 leaf-litter bags per site).

Site name	EPT Shannon -Wiever index (H)	N individual caddisfly larvae	N individual stonefly larvae	N individual mayfly larvae	N total EPT larvae	N caddisfly families	N stonefly families	N mayfly families	N EPT families
Ampersand Brook	0	6	0	0	6	1	0	0	1
Brandy Book	0.785	25	3	1	29	2	2	1	5
Cascade Brook	0.681	1	5	1	7	1	2	1	4
Cherry Patch Brook	1.418	13	1	2	16	3	1	2	6
Holcomb Brook	0	0	1	0	1	0	1	0	1
Indian Carry	1.249	94	78	1	173	5	1	1	7
Mountain Pond	1.181	59	9	3	71	4	2	1	7
North Branch Boquet	0.864	26	0	1	27	3	0	1	4
Norton Brook	0.687	5	4	0	9	1	1	0	2
Ray Brook	0.873	44	5	0	49	3	3	0	6
Sentinel Brook	0.490	25	3	0	28	2	1	0	3
Smitty Creek	0.874	62	0	8	70	3	0	3	6
South Branch Brook	0.150	165	0	1	166	2	0	1	3

Table 22. Best fitting models identifying the drivers of biotic responses to headwater stream characteristics in 11 headwater streams sampled in the northern Adirondack Park, NY. K = number of parameters estimated, ΔAICc = AICc difference between model with the lowest AICc score and the candidate model, w = AICc weight, and -2LL = -2 x model log-likelihood. Model variables included: Mean annual conductivity (MEAN_COND); Mean May to October pH (MEAN_PH); Mean annual water temperature (MEAN_TEMP); Minimum annual water temperature (MIN_TEMP); Salamander density/100 m2 (SALAMANDER); Estimated brook trout biomass/100 m2 (BROOK_BIOMASS); the total number of Ephemeroptera, Plecoptera, and Trichoptera sampled in leaf-litter bags throughout the study period (TOTAL_EPT); and the Shannon-Wiener diversity index for EPT (DIVERSITY_EPT).

Dependent variable	Model	K	ΔAICc[a]	*w*	-2LL
SALAMANDER	INTERCEPT ONLY	2	0.00	0.51	38.58
	MEAN_COND	3	1.23	0.28	16.36
	TOTAL_EPT	3	1.72	0.22	36.84
BROOK_BIOMASS	MEAN_TEMP	3	0.00	0.70	124.26
	INTERCEPT ONLY	2	1.71	0.30	129.44
TOTAL_EPT	MEAN_COND + MEAN_PH + MEAN_TEMP + MIN_TEMP	5	0.00	1.00	374.18
DIVERSITY_EPT	INTERCEPT ONLY	2	0.00	0.47	24.46

Table 23. Total number of fish sampled in 11 headwater streams in the northern Adirondack Park, NY, using backpack electrofishing and a three-pass depletion method.

Site name	N fish sampled											
	Brook trout	Brown trout	Banded killifish	Slimy sculpin	White sucker	Black-nose dace	Common shiner	Creek chub	Golden shiner	Unknown cyprinid	Rock bass	Total captures
Ampersand Brook	13	0	12	0	0	0	0	0	0	0	0	25
Brandy Book	14	0	0	0	0	20	0	0	0	0	0	34
Cascade Brook	62	0	0	0	0	28	0	0	0	0	0	90
Cherry Patch Brook	0	0	11	0	12	74	0	15	0	20	3	135
Holcomb Brook	3	4	0	0	0	4	0	0	0	0	0	11
Indian Carry	0	0	38	0	0	0	0	0	0	0	0	38
Mountain Pond	15	0	0	0	0	0	2	8	1	0	0	26
North Branch Boquet	58	0	0	0	0	0	0	0	0	0	0	58
Norton Brook	6	1	0	3	0	0	0	1	0	0	0	11
Ray Brook	26	0	0	52	0	0	0	0	0	0	0	78
Sentinel Brook	35	0	0	0	0	0	0	0	0	0	0	35
Smitty Creek	11	0	0	1	0	0	0	0	0	0	0	12

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Appendices

Appendix 1. Functional relationships based on linear models relating the length to the mass of individual fish sampled from 2004-2008 in the focal region. We employed polynomial regression where initial data exploration indicated a curvilinear relationship and selected the most appropriate model by comparing simple linear and polynomial models using ANOVA.

Species	Sample size	Model structure	Parameter estimates
Brook trout	595	Mass ~length + length^2	$y = 13.06 + -0.362x + 0.00315x^2$
Slimy sculpin	17	Mass~length	$y = -9.463 + 0.191x$
Creek chub	58	Mass~ length + length^2	$y = -1.047 + -0.038x + 0.00147x^2$
Black-nosed dace	57	Mass~ length + length^2	$y = 8.738 + -0.331x + 0.00357x^2$

SUNY College of Environmental Science and Forestry Ranger School Arboretum

By Tyrah Pollack

The State University of New York College of Environmental Science and Forestry's Ranger School is located in the small hamlet of Wanakena. As the oldest running forestry school in the country, the Ranger School takes pride in the forests surrounding the area. In addition to roughly 2,800 acres of land owned by the institution, the Ranger School is surrounded by Adirondack Forest Preserve and the Five Ponds Wilderness Area.

The Ranger School is home to an extensive arboretum which provides students and visitors with an opportunity for hands on education. There are numbered stakes throughout the arboretum that permit a self-guided tour along a universal access trail. An interpretive pamphlet is provided to explain what native or non-native species each numbered stake represents. The pamphlet also identifies where the trees are located and provides their common and scientific names.

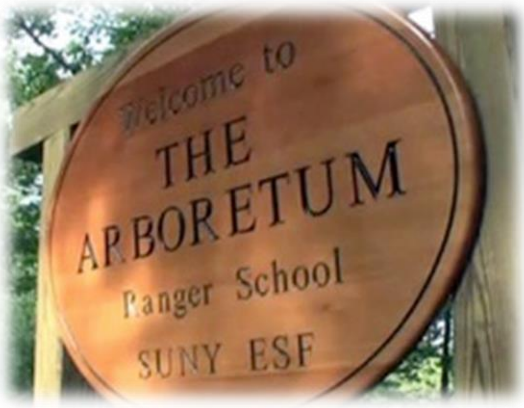


Photo Credit: SUNY-ESF

This summer, Watershed steward Tyrah Pollack assisted at the arboretum by performing routine maintenance of the facilities trails and areas home to specific tree species. Every two weeks she helped mow and trim the trails to keep the pathways clean and open for visitors. Trimming plants such as hay-scented fern and bracken fern allowed for easy maneuvering along the trails and added to the overall aesthetics of the arboretum. Pollack's work helped ensure the arboretum was properly maintained for continuous education throughout the year.

On rainy days, when maintenance was not able to be conducted, Pollack assisted in the archive room. Old year books and records of the school's history were sorted and scanned into a computer to allow for electronic access to the files. Pollack also helped Dr. Mariann Johnston complete some field work as part of an ongoing research project. The research involved measuring specific trees that had been treated and comparing the data with information that had been collected in previous years.

With the growing popularity of the Adirondack Park, it is important to educate the public about the plants and wildlife that are present in this region. The AWISP is working to spread awareness and help prevent the spread of aquatic invasive species AIS, as well as educate the public about what is native to the area. At the Ranger School, the arboretum is a great place to learn about the native and non-native plants that inhabit our forestlands. Working in the arboretum provided Pollack with an enjoyable alternative to the boat launch that afforded her the opportunity to view different types of plants and enjoy the beautiful scenery.

Terrestrial Invasive Species Monitoring and Management

By Zachary Simek

(left) Wild parsnip in full bloom; (right) Japanese knotweed foliage.

Terrestrial invasive species are plants or animals that are found on land, are non-native, and have negative economic, social or environmental impacts. Terrestrial invasive species cause a multitude of negative effects due to the lack of predators and parasites present in their native range. Without vigilant surveying and timely control efforts, terrestrial invasive species can quickly degrade our forests and wildlands to a point that inhibits recreation, cultivation, and habitation. Locating and managing terrestrial invaders is an important activity to protect the vitality of the Adirondack Region.

Several stewards were able to partner with other organizations to help manage invasive wild parsnip and Japanese knotweed. Regional Supervisor Zachary Simek assisted the Regional Inlet Invasive Plant Program with management of wild parsnip and Japanese knotweed. Stewards Dan Johnson, Matt Koester and Zack Floss also assisted Simek with a Japanese knotweed survey of the Moose River for the APIPP.

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 over 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, Simek, a NYS certified Pesticide Technician, assisted the organization by performing numerous herbicide treatments for wild parsnip and Japanese knotweed across the west-central Adirondacks.

From early to mid-July, Simek treated wild parsnip along a 10 mile stretch of Route 28 right-of-way in the Town of Inlet. Wild Parsnip is a biennial herb that grows 2-5 feet tall with alternately arranged, pinnatley compound leaves. From June through August, the plant produces a distinct flat-topped 2-6 inch yellow umbel shape flower. Wild parsnip poses a significant risk to human health due to its toxic sap. If the clear, watery liquid contacts your skin and is exposed to sunlight, it can cause severe phyto-photo-dermatitis, resulting in painful burns and blisters. To treat this harmful invader, Simek applied a selective foliar application of glyphosate based herbicide to eliminate and reduce the spread of wild parsnip and promote native plant regeneration. Significant mortality of the will parsnip was observed within two weeks of the herbicide application. Two additional private properties were also treated with permission obtained from

RIIPP. Simek used a combination of physical and chemical control techniques to rid the properties of this noxious invader. The results of the management efforts were positive for both locations.

Simek also assisted the RIIPP by performing herbicide treatments of Japanese knotweed at a multitude of locations. Japanese knotweed is treated using specialized application equipment that injects concentrated herbicide into the center of each knotweed cane. Plants that are too small to be injected receive a foliar spray of glyphosate based herbicide. In total, Simek treated 19 sites from Otter Lake to Inlet, injecting well over 5,000 knotweed canes.

In addition, on August 7th Zachary Simek, Dan Johnson, Matt Koester and Zack Floss assisted the Adirondack Park Invasive Plant Program by conducting a survey of the Moose River to identify patches of knotweed for future management efforts. The crew paddled the river in canoes and searched the riparian zones for any obvious infestations. They were able to identify 3 large patches of invasive knotweed, and recorded GPS coordinates and descriptions of each site to be referenced for subsequent control efforts. The crew also conducted a roadside survey of the Moose River Road where they identified and recorded information for four additional patches of knotweed.

Japanese knotweed is treated using a specialized herbicide injection tool.

Boat Launch Use Data Summaries

Chateaugay Lake

Boats inspected: 1,696 **% of visitors taking spread prevention measures: 73%**
AIS intercepted: 134 **% inspected boats with organisms: 16%**
 # visitors: 4,024 **# of previously visited waterways: 59**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Chateaugay Lake	1363	165	2	52	110	0	4	0	0	1696
percentage of total boats	80%	10%	0%	3%	6%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Chateaugay Lake	4024	49	351	244	1556	16%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Chateaugay Lake	1180	1121	624	94	43	56	45	281	26	1613
percentage of total # groups asked	73%	69%	39%	6%	3%	3%	3%	17%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Chateaugay Lake	4	5	64	128	157	1	0	0	10	0	0	0	1	0	21	9	134	9%
percentage of organisms removed	1%	1%	16%	32%	39%	0%	0%	0%	3%	0%	0%	0%	0%	0%	5%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Chateaugay Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Top 5 Previous Waterway
Curly-leaf pondweed	0	N/A	5	Chateaugay Lake (5)
Eurasian water milfoil	14	Chateaugay Lake (10), Lake Champlain (3), Did not ask (1)	114	Chateaugay Lake (75), None (16), Lake Champlain (4), Chazy Lake (3), Did not ask (3)
Zebra mussel	1	None (1)	0	N/A
Totals	**15**		**119**	

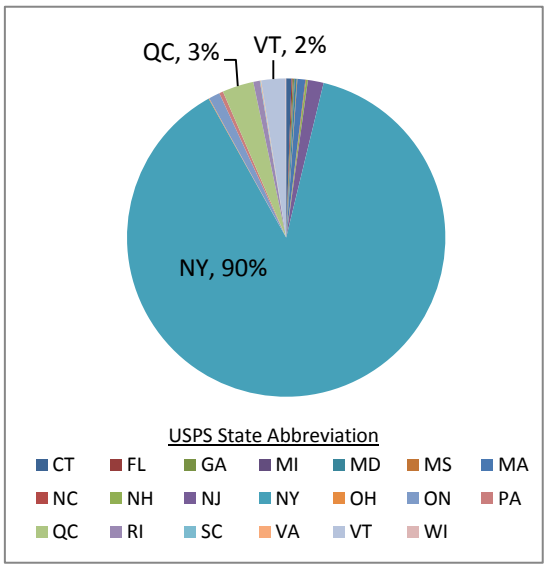
Adirondack Watershed Institute Stewardship Program
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970
Telephone: (518) 327-6341. Email: eholmlund@paulsmiths.edu

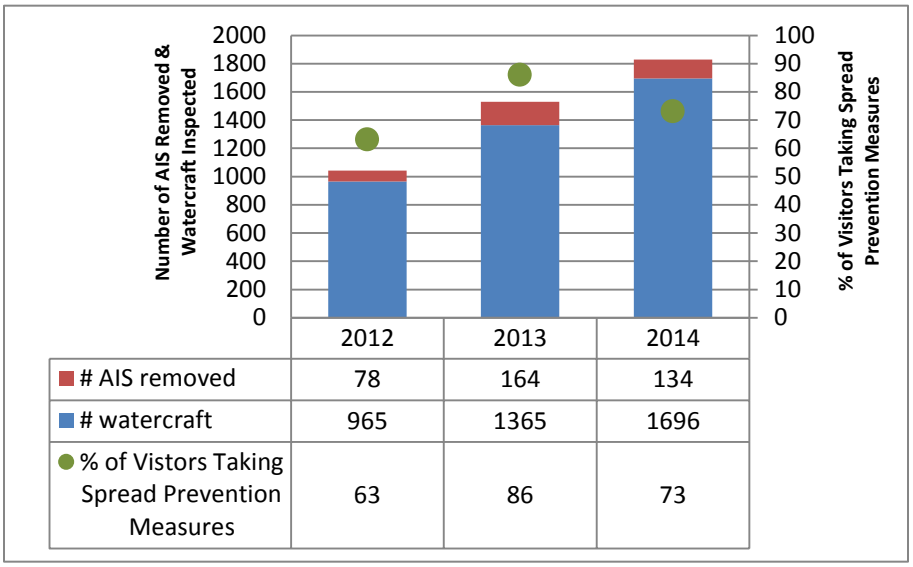
Chateaugay Lake: Previous waterways visited, 2014	# visits
Chateaugay Lake	864
None	517
Lake Champlain	65
Chazy Lake	28
Did not ask	24
St. Lawrence River	22
Indian Lake	9
Meacham Lake	9
Mountain View Lake	9
Upper Saranac Lake	9
Saranac Lake Chain	6
Lower Saranac Lake	4
Fish Creek Ponds	3
Upper St Regis Lake	3
Lake Titus	3
Saranac River	3
Taylor Pond	3
Lake Flower	2
Mirror Lake	2
Tupper Lake	2
Augur Lake	2

Chateaugay Lake: Previous waterways visited, 2014	# visits
Candlewood Lake, CT	2
Church Pond	2
Lake Huron	2
Lake Lila	2
Lake St. Francis, Quebec	2
Little Salmon River	2
Lower St. Regis Lake	2
Massena, NY	2
Ottawa River	2
Syracuse, NY	2
Buck Pond	1
Cranberry Lake	1
Lake George	1
Lake Ontario	1
Rainbow Lake	1
Schroon Lake	1
Black Lake, St. Lawrence County	1
Chazy River	1
Connecticut	1
Deer River Flow	1
Greenwood lake	1

Chateaugay Lake: Previous waterways visited, 2014	# visits
Indian Lake, Franklin County	1
Lake Erie	1
Lake St. Catherine, VT	1
Lake Titus	1
Lebanon Reservoir	1
Massachusetts	1
Mill Pond	1
Moore Reservoir, NH	1
Mooshead Lake, ME	1
Otsego River	1
Piseco Lake	1
Quebec, Canada	1
Raisin River, Ontario	1
Silver Lake	1
South Nation River, Ontario	1
St. Armand, NY	1
St. Regis River	1
Stark Reservoir	1
Union Falls Flow	1
West Virginia	1
Total	**1640**

State of Boat Registration





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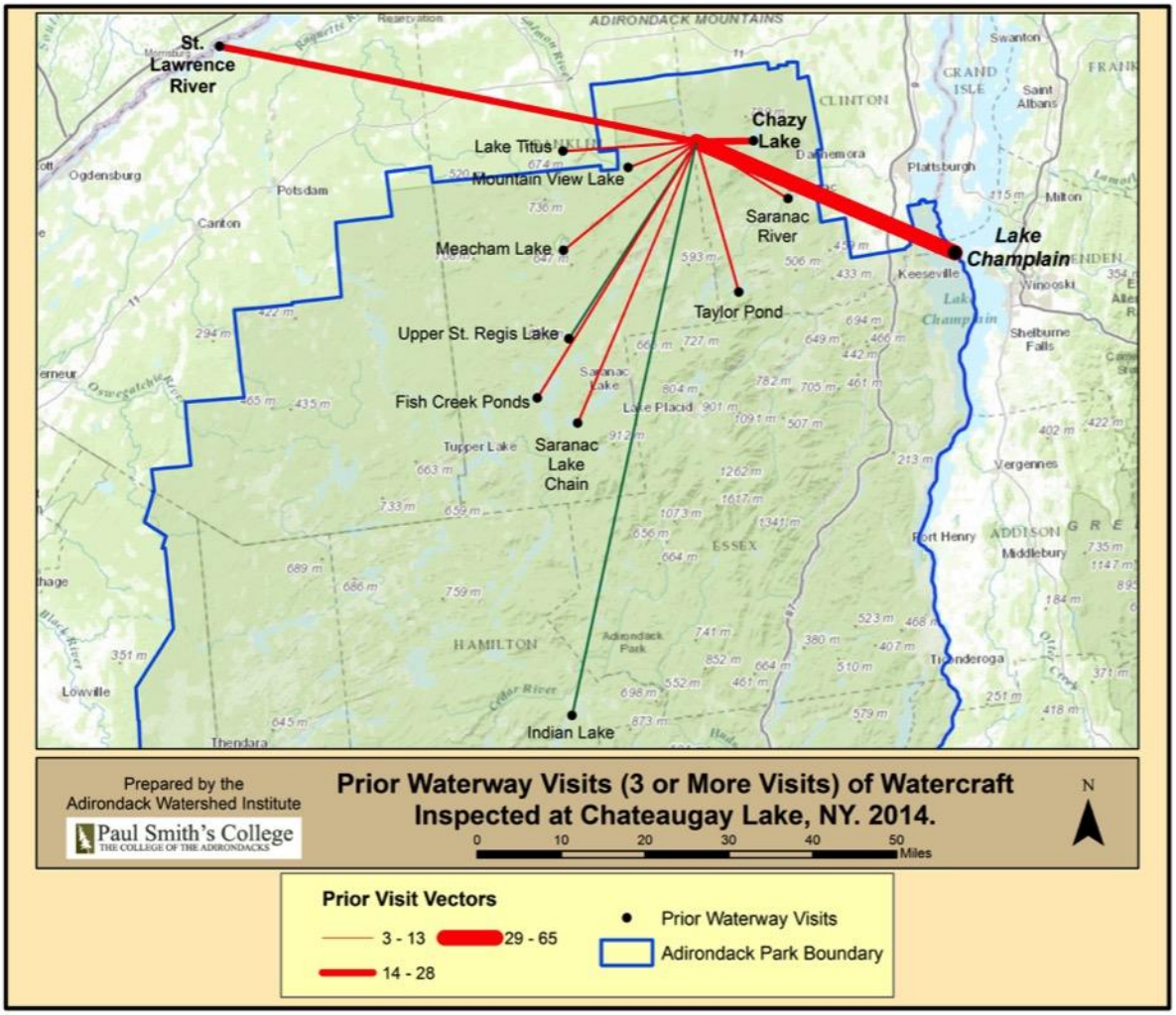

Waterways visited in previous 2 weeks by incoming vessels to Chateaugay Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Invasive species disposal station at Chateaugay Lake constructed and installed by AWISP staff.

Cranberry Lake

Boats inspected: 1,343 **% of visitors taking spread prevention measures: 45%**
AIS intercepted: 10 **% inspected boats with organisms: 3%**
 # visitors: 3,270 **# of previously visited waterways: 65**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Cranberry Lake	1158	50	0	71	56	0	7	0	1	1343
percentage of total boats	86%	4%	0%	5%	4%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Cranberry Lake	3270	30	17	36	1160	3%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Cranberry Lake	513	269	358	160	92	116	85	98	109	1135
percentage of total # groups asked	45%	24%	32%	14%	8%	10%	7%	9%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Cranberry Lake	0	4	1	5	19	2	1	1	4	0	0	0	0	1	4	5	10	1%
percentage of organisms removed	0%	9%	2%	11%	40%	4%	2%	2%	9%	0%	0%	0%	0%	2%	9%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Cranberry Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Curly-leaf pondweed	3	St. Lawrence River (2), None	1	Cranberry Lake (1)
Eurasian water milfoil	5	Lake Bonaparte (3), St. Lawrence River (2)	0	N/A
Variable-leaf milfoil	0	N/A	1	Thousand Islands (1)
Totals	**8**		**2**	

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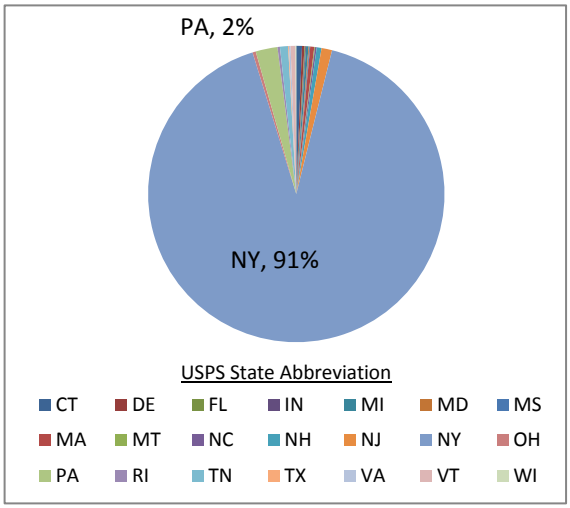
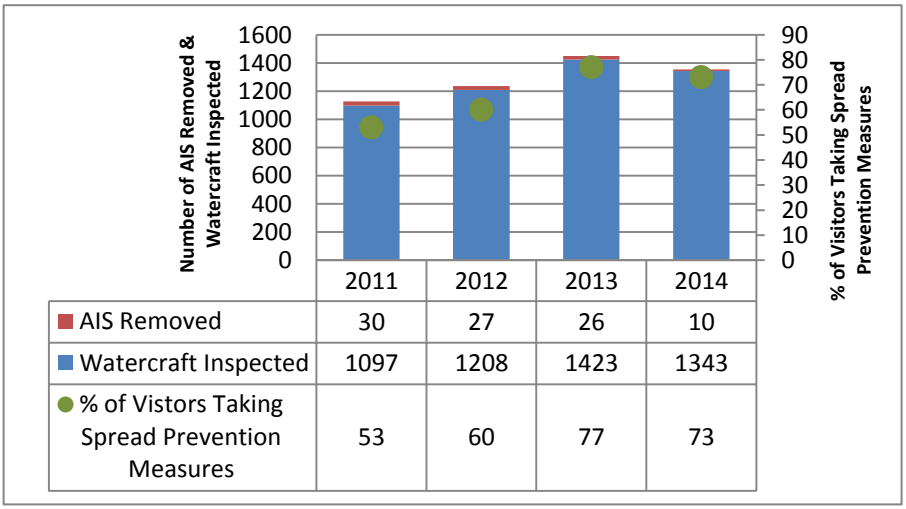
Cranberry Lake: Previous waterways visited, 2014	# visits
Cranberry Lake	625
None	315
Did not ask	81
St. Lawrence River	28
Lake Bonaparte	24
Lake Ontario	22
Tupper Lake	18
Rental	10
Black River	6
Carry Falls Reservoir	5
Higley Flow	5
Lake Erie	5
Oneida Lake	5
Saranac Lake Chain	5
Lake Flower	4
Butterfield Lake	3
Chateaugay Lake	3
Flat Rock Reservoir	3
Fourth Lake	3
Lake Placid	3
Long Lake	3
Oswegatchie River	3
Skaneateles Lake	3

Cranberry Lake: Previous waterways visited, 2014	# visits
Tully Lake	3
Black Lake	2
Brantingham Lake	2
Cayuga Lake	2
Conesus Lake	2
Grasse River	2
Lake Champlain	2
Lake Winnipesaukee, NH	2
Massawepie Lake	2
Mohawk River	2
Raquette River	2
Red Lake	2
Saratoga Lake	2
St. Regis River	2
Star Lake	2
Balsalm Pond	1
Buck Pond	1
Canandaigua Lake	1
Charleston Lake, Ontario	1
Clearwater Reservoir	1
Connecticut River	1
Duck Lake	1
Erie Canal	1

Cranberry Lake: Previous waterways visited, 2014	# visits
Fish Creek Ponds	1
Great Sacandaga Lake	1
Green River Reservoir, VT	1
Irondequoit Bay	1
Joe Indian Pond	1
Lake George	1
Lake Kushaqua	1
Lake Pocotopaug	1
Long Island Sound	1
Lower Saranac Lake	1
Massachusetts	1
New Jersey	1
Oswego River	1
Owasco Lake	1
Pine Lake, WI	1
Schroon Lake	1
Schuyler Lake	1
Silver Lake, Western NY	1
Stillwater Reservoir	1
Thousand Islands	1
Unknown Lake	1
Vermont	1
Whitney Point Reservoir	1
Total	**1244**

State of Boat Registration





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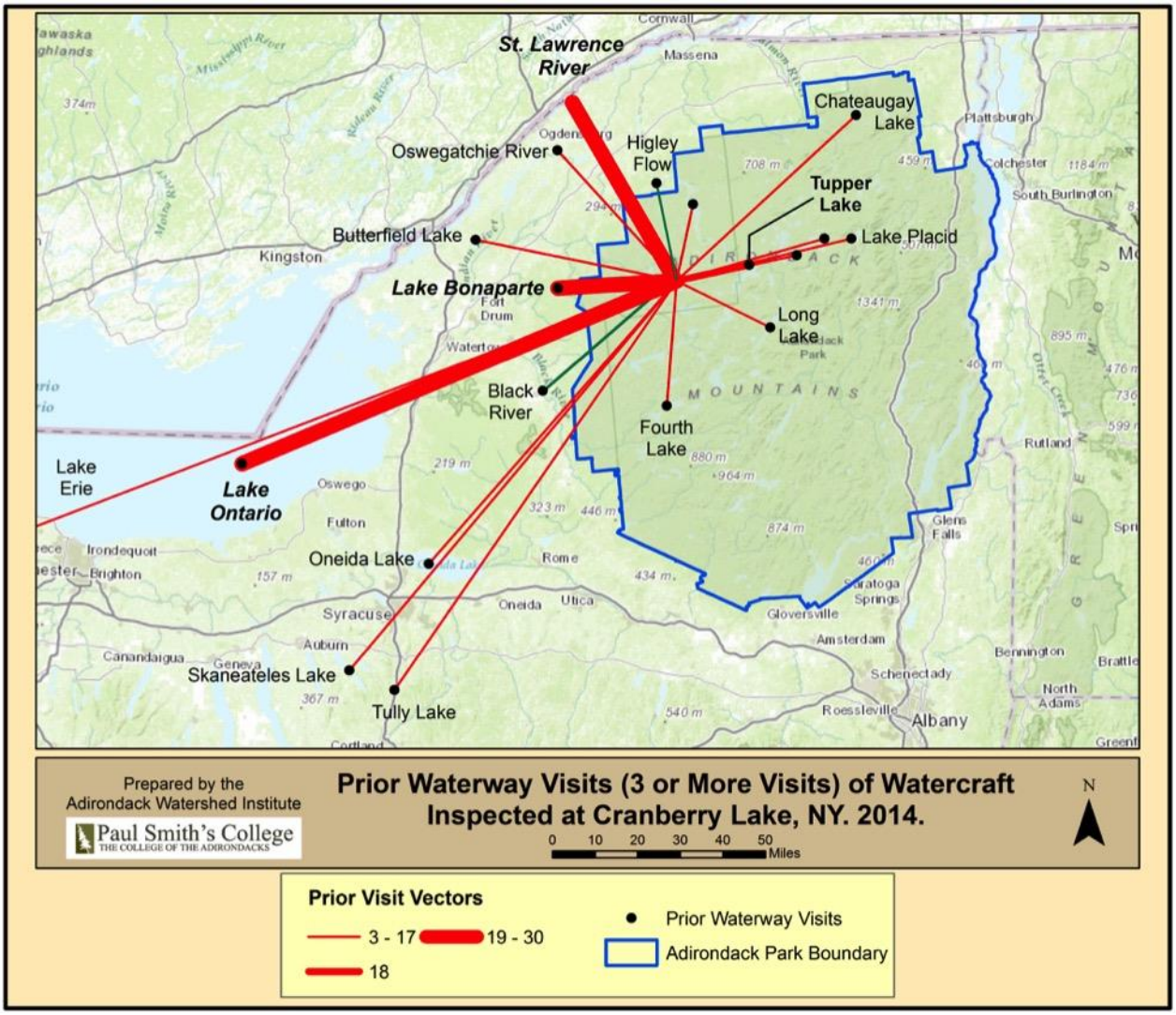
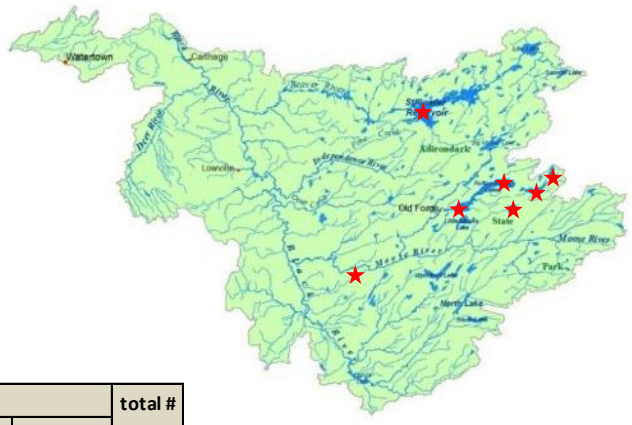


Waterways visited in previous 2 weeks by incoming vessels to Cranberry Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

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



Boats inspected: 4,332
% of visitors taking spread prevention measures: 70%
AIS intercepted: 18
% inspected boats with organisms: 2%
 # visitors: 9,797
# of previously visited waterways: 170

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Eighth Lake	16	1	0	25	2	0	0	0	0	44
percentage of total boats	36%	2%	0%	57%	5%	0%	0%	0%	0%	100%
Fourth Lake	1290	256	15	28	97	0	5	0	0	1691
percentage of total boats	76%	15%	1%	2%	6%	0%	0%	0%	0%	100%
First Lake (Hollywood Hills)	2	3	0	11	6	0	0	0	0	22
percentage of total boats	9%	14%	0%	50%	27%	0%	0%	0%	0%	100%
Limekiln Lake	8	0	0	8	22	0	1	0	0	39
percentage of total boats	21%	0%	0%	21%	56%	0%	3%	0%	0%	100%
Seventh Lake	194	16	1	37	178	0	0	2	0	428
percentage of total boats	45%	4%	0%	9%	42%	0%	0%	0%	0%	100%
Stillwater Reservoir	1066	26	2	213	326	0	7	6	0	1646
percentage of total boats	65%	2%	0%	13%	20%	0%	0%	0%	0%	100%
White Lake	246	84	7	108	8	0	3	6	0	462
percentage of total boats	53%	18%	2%	23%	2%	0%	1%	1%	0%	100%
totals	2820	383	25	419	633	0	16	14	0	4332
percentage of total boats	65%	9%	1%	10%	15%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Eighth Lake	84	2	0	1	35	3%
Fourth Lake	4190	24	7	28	1563	2%
First Lake (Hollywood Hills)	41	0	0	0	18	0%
Limekiln Lake	61	0	0	0	21	0%
Seventh Lake	836	5	5	7	316	2%
Stillwater Reservoir	3617	37	11	44	1323	3%
White Lake	968	2	0	2	396	1%
totals	9797	70	23	82	3672	2%

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

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Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Eighth Lake	14	8	7	4	0	0	0	1	2	33
percentage of total # groups asked	42%	24%	21%	12%	0%	0%	0%	3%	NA	
Fourth Lake	1072	367	883	278	10	17	8	261	43	1552
percentage of total # groups asked	69%	24%	57%	18%	1%	1%	1%	17%	NA	
First Lake (Hollywood Hills)	14	7	9	0	0	0	0	3	0	18
percentage of total # groups asked	78%	39%	50%	0%	0%	0%	0%	17%	NA	
Limekiln Lake	11	2	8	2	0	0	0	3	1	20
percentage of total # groups asked	55%	10%	40%	10%	0%	0%	0%	15%	NA	
Seventh Lake	198	85	160	28	4	4	4	71	1	317
percentage of total # groups asked	62%	27%	50%	9%	1%	1%	1%	22%	NA	
Stillwater Reservoir	1065	586	774	619	7	31	12	871	92	1275
percentage of total # groups asked	84%	46%	61%	49%	1%	2%	1%	68%	NA	
White Lake	155	39	38	3	0	0	0	123	1	395
percentage of total # groups asked	39%	10%	10%	1%	0%	0%	0%	31%	NA	
totals	2529	1094	1879	934	21	52	24	1333	140	3610
percentage of total # groups asked	70%	30%	52%	26%	1%	1%	1%	37%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Eighth Lake	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0%
percentage of organisms removed	0%	0%	0%	0%	50%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%		
Fourth Lake	1	0	0	5	10	3	3	0	2	0	2	0	1	1	0	3	8	1%
percentage of organisms removed	3%	0%	0%	16%	32%	10%	10%	0%	6%	0%	6%	0%	3%	3%	0%	10%		
First Lake (Hollywood Hills)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
percentage of organisms removed	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Limekiln Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
percentage of organisms removed	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Seventh Lake	1	0	0	2	3	1	0	1	1	0	0	0	0	1	0	0	3	1%
percentage of organisms removed	10%	0%	0%	20%	30%	10%	0%	10%	10%	0%	0%	0%	0%	10%	0%	0%		
Stillwater Reservoir	0	0	0	4	16	0	4	1	14	0	1	0	0	1	0	7	6	0%
percentage of organisms removed	0%	0%	0%	8%	33%	0%	8%	2%	29%	0%	2%	0%	0%	2%	0%	15%		
White Lake	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0%
percentage of organisms removed	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%		
totals	2	0	0	12	30	4	7	2	18	0	3	0	1	3	0	11	18	0%
percentage of organisms removed	2%	0%	0%	13%	32%	4%	8%	2%	19%	0%	3%	0%	1%	3%	0%	12%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

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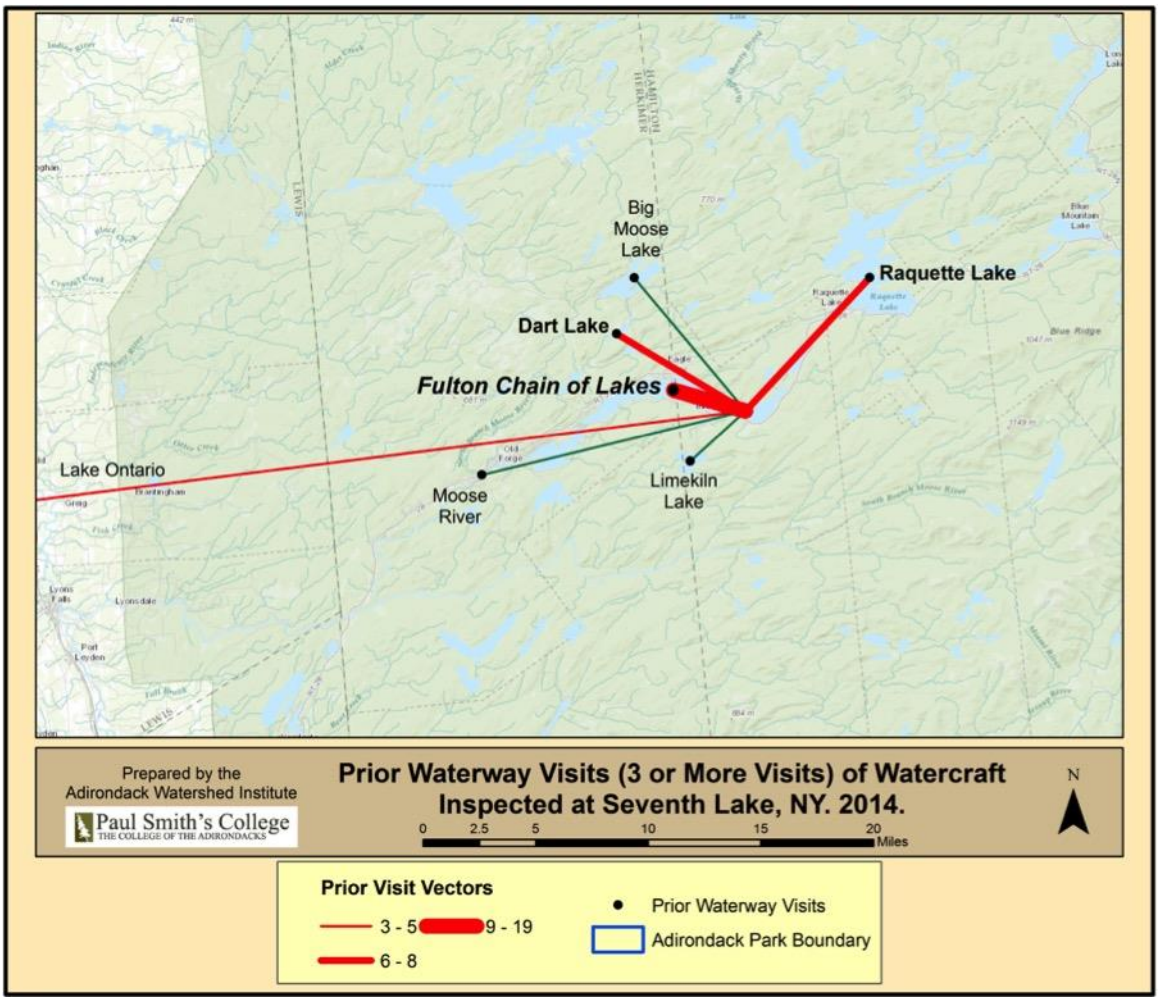
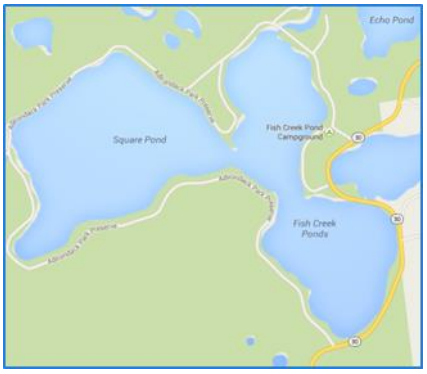
Black River Watershed: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	11	Fourth Lake: None(3), Oneida Lake (1), Saratoga Lake (1) Seventh Lake: None Stillwater: Lake Bonaparte (2) Saratoga Lake (1), Seneca Lake (1) White Lake: Oneida Lake (1)	1	Seventh Lake: Fourth Lake (1)
Variable-leaf milfoil	2	Seventh Lake: Seventh Lake (1) Stillwater Reservoir: Raquette Lake (1)	0	N/A
Water chestnut	3	Fourth Lake: Cross Lake (1), None (1) Stillwater: Stillwater Reservoir (1)	0	N/A
Zebra Mussel	1	Fourth Lake: None (1)	0	N/A
Totals	**17**		**1**	



Waterways visited in previous 2 weeks by incoming vessels to Seventh Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Fish Creek Pond

Boats inspected: 164 **% of visitors taking spread prevention measures: 73%**
AIS intercepted: 8 **% inspected boats with organisms: 23**
 # visitors: 341 **# of previously visited waterways: 31**



Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Fish Creek Pond	84	18	0	24	37	0	1	0	0	164
percentage of total boats	51%	11%	0%	15%	23%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Fish Creek Pond	341	8	34	23	129	18%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Fish Creek Pond	93	39	60	30	0	4	1	27	3	128
percentage of total # groups asked	73%	30%	47%	23%	0%	3%	1%	21%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Fish Creek Pond	2	0	0	3	14	0	2	5	3	0	0	0	0	7	0	6	8	6%
percentage of organisms removed	5%	0%	0%	7%	33%	0%	5%	12%	7%	0%	0%	0%	0%	17%	0%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Fish Creek Pond: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	1	Danbury Lake, CT (1)	2	None (2)
Variable-leaf milfoil	1	Fish Creek Pond (1)	4	Fish Creek Pond (2), None (2)
Totals	**2**		**6**	

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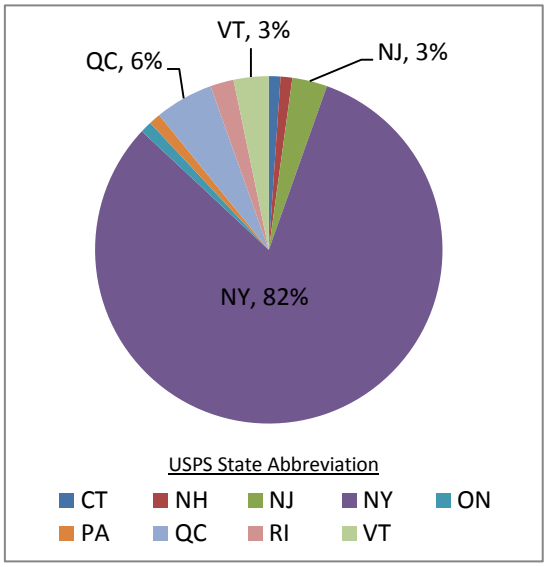
Fish Creek Ponds: Previous waterways visited, 2014	# visits
None	56
Fish Creek Ponds	21
Lake Champlain	5
Rental	5
Lower Saranac Lake	4
Lake George	3
Rollins Pond	3
Conesus Lake	2
Hudson River	2
Lake Flower	2
Lake Ontario	2
Raquette River	2
Saratoga Lake	2
Upper Saranac Lake	2
Canandaigua Lake	1
Chateaugay Lake	1
Chautauqua Lake	1

Fish Creek Ponds: Previous waterways visited, 2014	# visits
Danbury Lake, CT	1
Delta Lake	1
Erie Canal	1
Follensby Clear Pond	1
Hemlock Lake, NY	1
Indian Lake	1
Kayuta Lake	1
Lake Placid	1
Newfound Lake, NH	1
Niagara River	1
Owasco Lake	1
Round Lake	1
Sacandaga Lake	1
Sackett Lake	1
Schroon Lake	1
St. Lawrence River	1
Stony Creek Ponds	1
Total	**131**

State of Boat Registration



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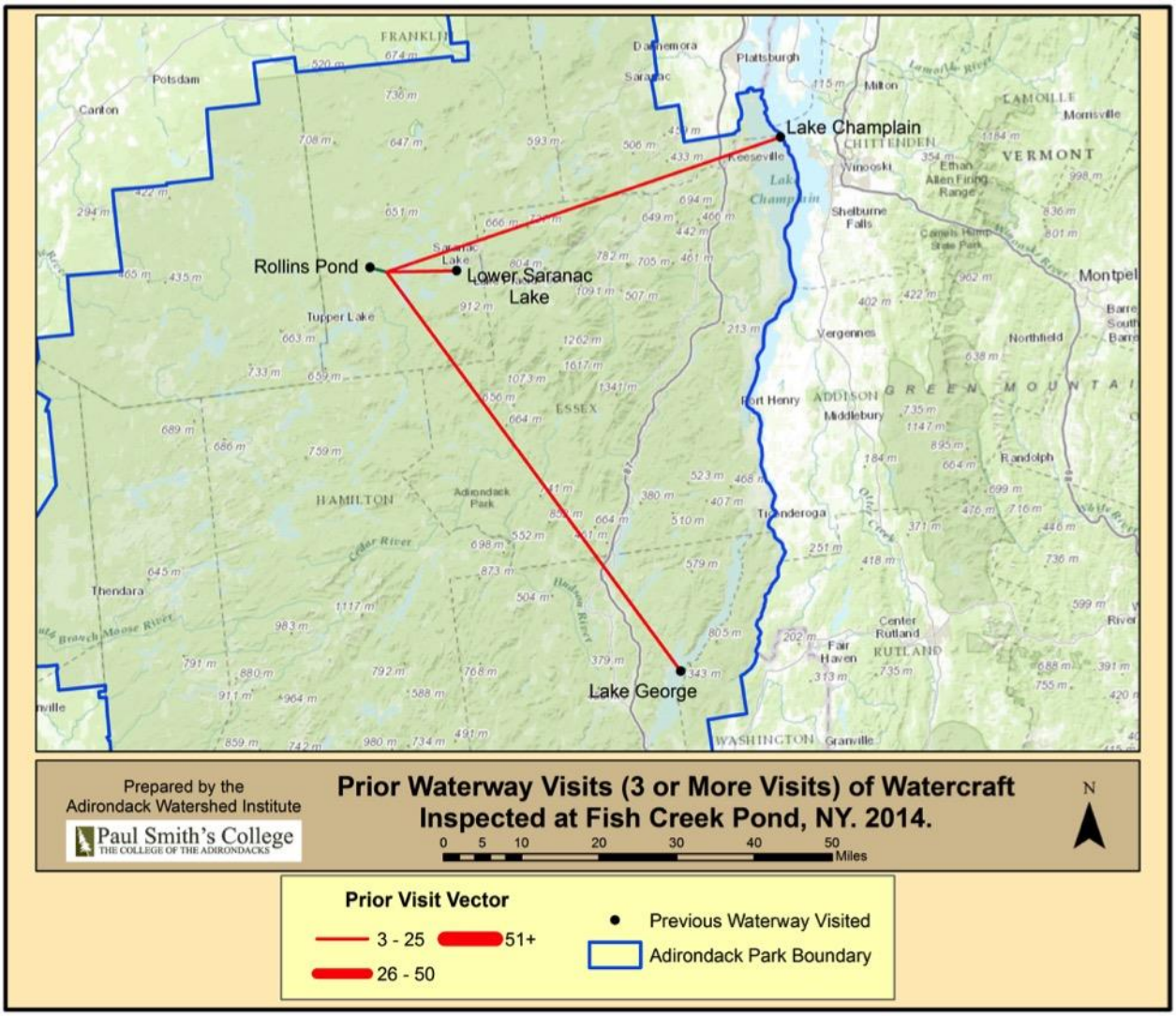
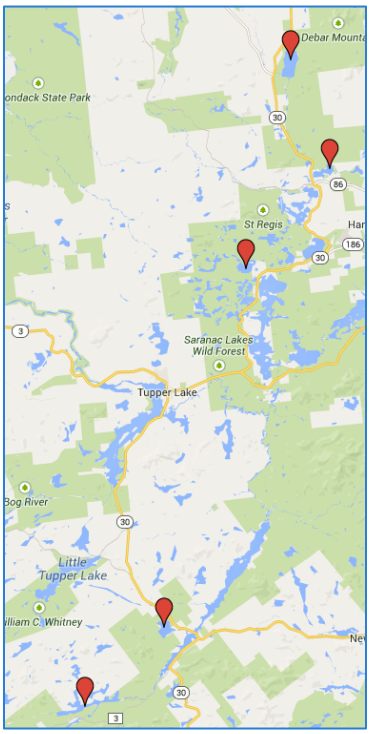


Waterways visited in previous 2 weeks by incoming vessels to Fish Creek Pond. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Forked Lake, Lake Eaton, Meacham Lake and Osgood Pond

Boats inspected: 704 **% of visitors taking spread prevention measures: 54%**
AIS intercepted: 2 **% inspected boats with organisms: 29%**
 # visitors: 1,178 **# of previously visited waterways: 17**



Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Forked Lake	10	0	0	22	21	0	0	1	0	54
percentage of total boats	19%	0%	0%	41%	39%	0%	0%	2%	0%	100%
Lake Eaton	7	4	1	3	4	0	0	0	0	19
percentage of total boats	37%	21%	5%	16%	21%	0%	0%	0%	0%	100%
Meacham Lake	59	12	0	7	48	0	3	0	0	129
percentage of total boats	46%	9%	0%	5%	37%	0%	2%	0%	0%	100%
Osgood Pond	80	0	4	174	222	0	12	10	0	502
percentage of total boats	16%	0%	1%	35%	44%	0%	2%	2%	0%	100%
totals	156	16	5	206	295	0	15	11	0	704
percentage of total boats	22%	2%	1%	29%	42%	0%	2%	2%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Forked Lake	91	0	0	0	31	0%
Lake Eaton	33	0	0	0	14	0%
Meacham Lake	267	2	3	4	101	4%
Osgood Pond	785	91	114	140	345	41%
totals	1176	93	117	144	491	29%

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

GLRI North Lakes: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	2	Osgood Pond: Indian Lake (2)	0	N/A
Totals	**2**		**0**	

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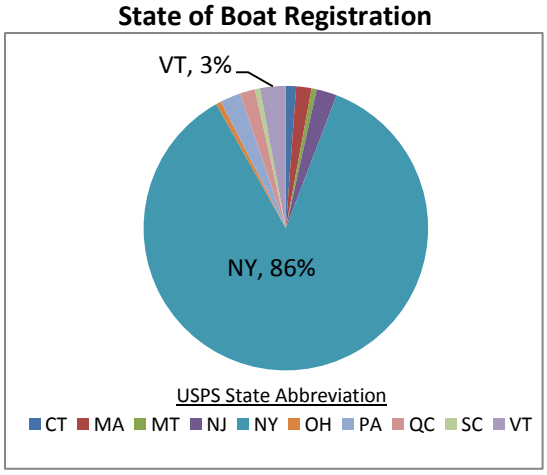
Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Forked Lake	19	4	14	0	0	0	0	14	0	32
percentage of total # groups asked	59%	13%	44%	0%	0%	0%	0%	44%	NA	
Lake Eaton	12	2	5	1	0	0	0	5	0	15
percentage of total # groups asked	80%	13%	33%	7%	0%	0%	0%	33%	NA	
Meacham Lake	68	33	52	13	0	1	1	3	1	100
percentage of total # groups asked	68%	33%	52%	13%	0%	1%	1%	3%	NA	
Osgood Pond	153	38	123	6	0	0	0	15	32	316
percentage of total # groups asked	48%	12%	39%	2%	0%	0%	0%	5%	NA	
totals	252	77	194	20	0	1	1	37	33	463
percentage of total # groups asked	54%	17%	42%	4%	0%	0%	0%	8%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Forked Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
percentage of organisms removed	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Lake Eaton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
percentage of organisms removed	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Meacham Lake	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	1	0	0%
percentage of organisms removed	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%	0%	0%	0%	20%	20%		
Osgood Pond	12	0	3	2	56	1	5	0	43	0	0	0	0	37	10	36	2	1%
percentage of organisms removed	6%	0%	1%	1%	27%	0%	2%	0%	21%	0%	0%	0%	0%	18%	5%	18%		
totals	12	0	3	2	59	1	5	0	43	0	0	0	0	37	11	37	2	0%
percentage of organisms removed	6%	0%	1%	1%	28%	0%	2%	0%	20%	0%	0%	0%	0%	18%	5%	18%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.



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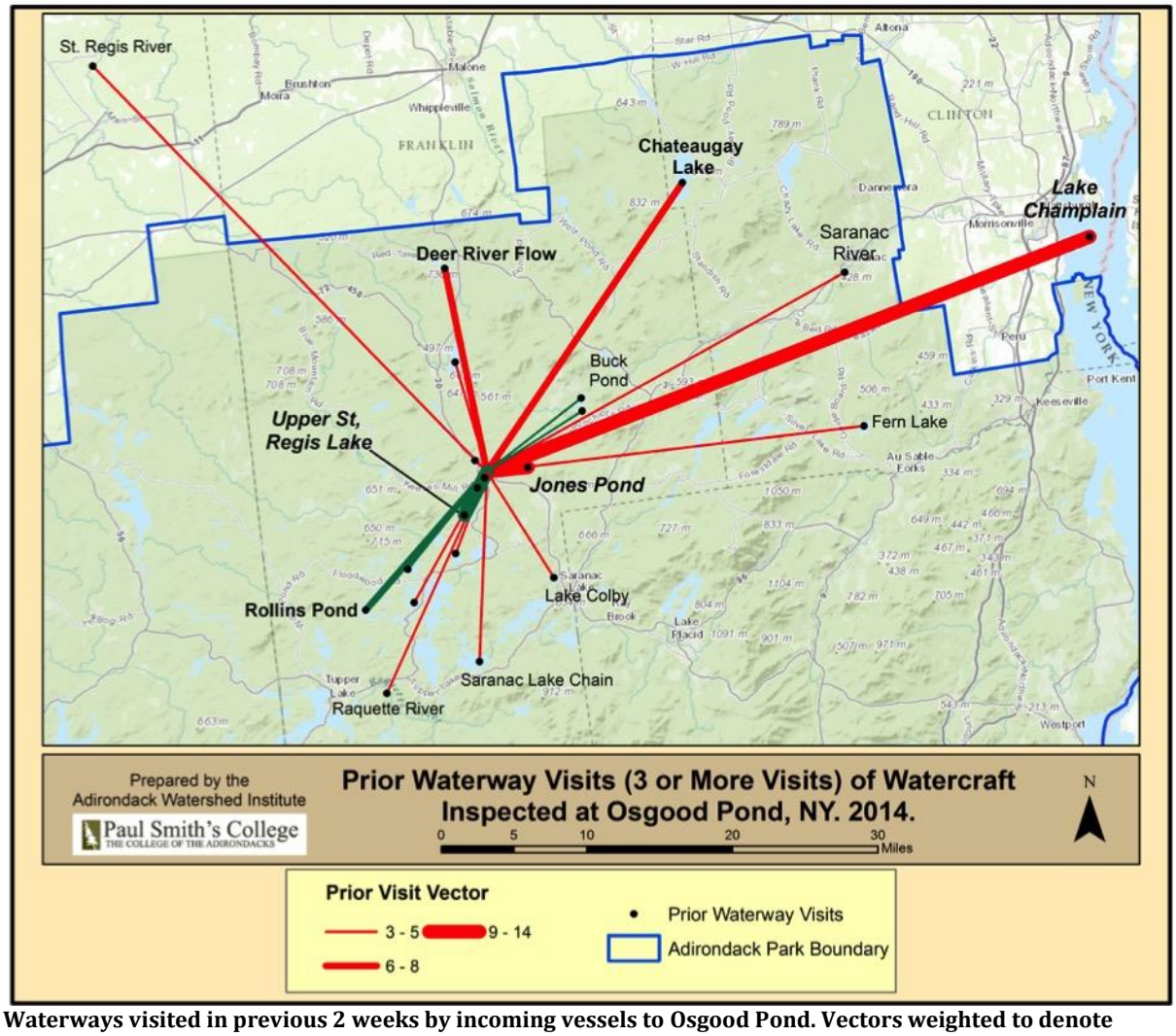
GLRI North Lakes: Previous waterways visited, 2014	# visits
None	163
Meacham Lake	51
Osgood pond	39
Did not ask	33
Upper St Regis Lake	18
Rental	12
Lake Champlain	11
Lower Saranac Lake	10
Chateaugay Lake	10
Jones Pond	9
Rollins Pond	8
Lower St. Regis Lake	8
Deer River Flow	6
Saranac Lake Chain	5
Raquette River	5
Lake Kushaqua	5
Follensby Clear Pond	5
Barnum Pond	4

GLRI North Lakes: Previous waterways visited, 2014	# visits
Upper Saranac Lake	3
St. Regis River	4
St. Lawrence River	4
Saranac River	4
Lake Colby	4
Buck Pond	4
Mountain View Lake	3
Little Clear Pond	3
Lake Placid	3
Hoel Pond	3
Fern Lake	3
Essex Chain of Lakes	3
Church Pond	3
St. Regis River	2
Salmon River	2
Polliwog Pond	2
Oneida Lake	2
Lake Flower	2

GLRI North Lakes: Previous waterways visited, 2014	# visits
Lake Eaton	2
Indian Lake	2
Franklin Falls Flow	2
Forked Lake	2
Floodwood Pond	2
East Pine Pond	2
Deer Pond	2
Chazy Lake	2
Black Pond	2
Weatherhead Hollow Pond, VT	1
Tupper Lake	1
St. Regis Falls	1
Seneca Lake	1
Sacandaga Lake	1
Round Pond	1
Rideau River, Ottowa, Canada	1
Rainbow Lake	1
Otsego Lake	1

GLRI North Lakes: Previous waterways visited, 2014	# visits
Moose Pond	1
Middle Saranac Lake	1
Meadow Pond	1
Loon Lake	1
Long Pond	1
Long Lake	1
Lake St. Francis, Quebec	1
Lake Ontario	1
Lake of Two Mountains, Montrea	1
Lake Bonaparte	1
Kiawassa Lake	1
Grout Pond VT	1
Great Sacandaga Lake	1
Cossayuna Lake	1
Chubb River	1



Waterways visited in previous 2 weeks by incoming vessels to Osgood Pond. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

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Fourth Lake

Boats inspected: 1,691 **% of visitors taking spread prevention measures: 69%**
AIS intercepted: 8 **% inspected boats with organisms: 2%**
 # visitors: 4,190 **# of previously visited waterways: 96**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Fourth Lake	1290	256	15	28	97	0	5	0	0	1691
percentage of total boats	76%	15%	1%	2%	6%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Fourth Lake	4190	24	7	28	1563	2%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Fourth Lake	1072	367	883	278	10	17	8	261	43	1552
percentage of total # groups asked	69%	24%	57%	18%	1%	1%	1%	17%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Fourth Lake	1	0	0	5	10	3	3	0	2	0	2	0	1	1	0	3	8	1%
percentage of organisms removed	3%	0%	0%	16%	32%	10%	10%	0%	6%	0%	6%	0%	3%	3%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Fourth Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	5	None (3), Oneida Lake (1), Saratoga Lake (1)	0	N/A
Water chestnut	2	None (1), Cross Lake (1)	0	N/A
Zebra mussel	1	None (1)	0	N/A
Totals	**8**		**0**	

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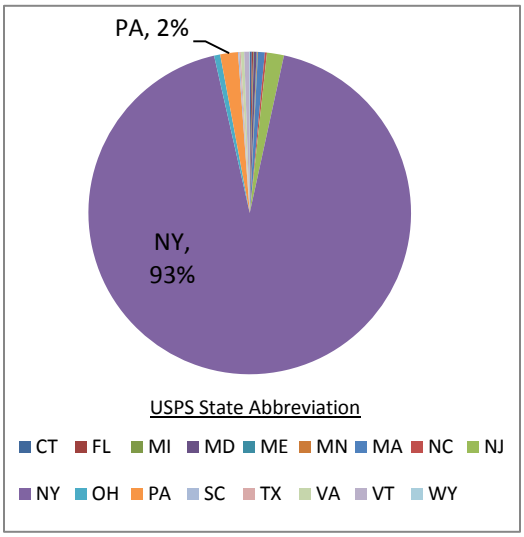
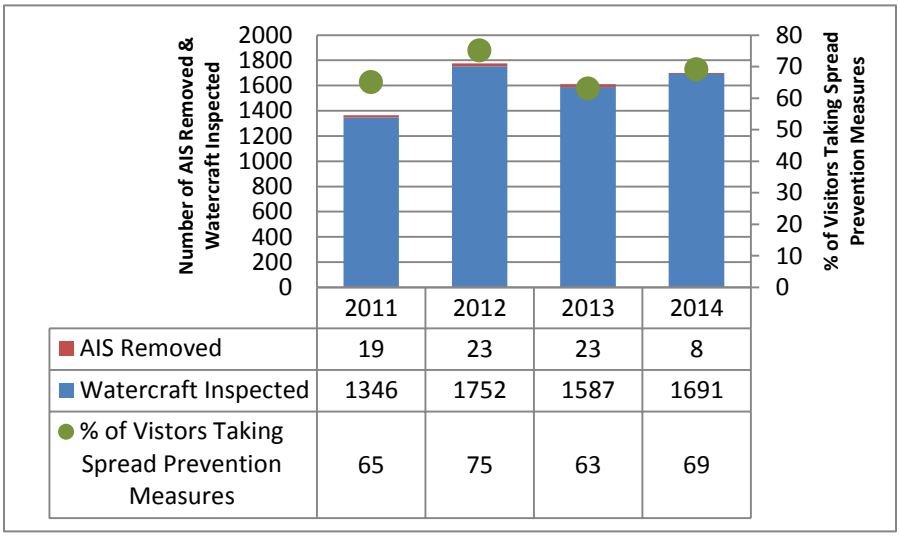
Fourth Lake: Previous waterways visited, 2014	# visits
None	714
Fourth Lake	370
Did not ask	38
Seventh Lake	37
Oneida Lake	35
Lake Ontario	34
Fulton Chain of Lakes	32
Delta Lake	29
Raquette Lake	29
Big Moose Lake	22
Canandaigua Lake	19
St. Lawrence River	13
Hinckley Reservoir	12
Saratoga Lake	11
Canadarago Lake	9
Conesus Lake	9
Lake George	9
Skaneateles Lake	9
Long Lake	7
Stillwater Reservoir	7
Lake Erie	6
Limekiln Lake	6
Rental	6
Forked Lake	5
Cayuga Lake	4
Indian Lake	4
Piseco Lake	4
Cross Lake	3
Erie Canal	3
Hudson River	3
Kayuta Lake	3
Lake Champlain	3
Mohawk River	3
Moose River	3

Fourth Lake: Previous waterways visited, 2014	# visits
Rainbow Lake	3
Salmon River	3
Seneca Lake	3
Black River	2
Blue Mountain Lake	2
Brantingham Lake	2
Butterfield Lake	2
Candlewood Lake, CT	2
Eaton Brook Reservoir	2
Goodnow Flow	2
Honeoye Lake	2
Keuka Lake	2
Lake Galena, PA	2
Lake Placid	2
Lake Pleasant	2
Niagara River	2
Oswego Lake	2
Otisco Lake	2
Owasca Lake	2
Raystown Lake, PA	2
Sacandaga Lake	2
Salmon River Reservoir	2
Silver Lake	2
Unknown Lake	2
Upper Niagara River	2
Upper St Regis Lake	2
White Lake	2
Allegheny River, PA	1
Atlantic Ocean	1
Ballston Lake	1
Beltzville Lake, PA	1
Browns Tract Pond	1
Canadice Lake	1
Cazenovia Lake	1

Fourth Lake: Previous waterways visited, 2014	# visits
Chateaugay Lake	1
Chautauqua Lake	1
Chenango River	1
DeRuyter Lake	1
Fish Creek, near sylvan beach/on	1
Great Sacandaga Lake	1
Great South Bay, Long Island	1
Holman Lake	1
Jamesville Reservoir	1
Kyser Lake	1
Lake Chesdin, VA	1
Lake Colby	1
Lake Durant	1
Lake Flower	1
Lake Morey, VT	1
Long Lake, ME	1
Lower Saranac Lake	1
Moss Lake	1
North Carolina	1
Ohio	1
Onondaga Lake	1
Oswegatchie River	1
Oswego River	1
Otter Lake	1
Private Pond	1
Schroon Lake	1
Shadow Lake, VT	1
Susquehanna River, PA	1
The Redeaux Chain of lakes in Ca	1
Tully Lake	1
Waterport Reservoir	1
Winnisquam Lake, NH	1
Total	**1597**

State of Boat Registration





	2011	2012	2013	2014
AIS Removed	19	23	23	8
Watercraft Inspected	1346	1752	1587	1691
% of Vistors Taking Spread Prevention Measures	65	75	63	69

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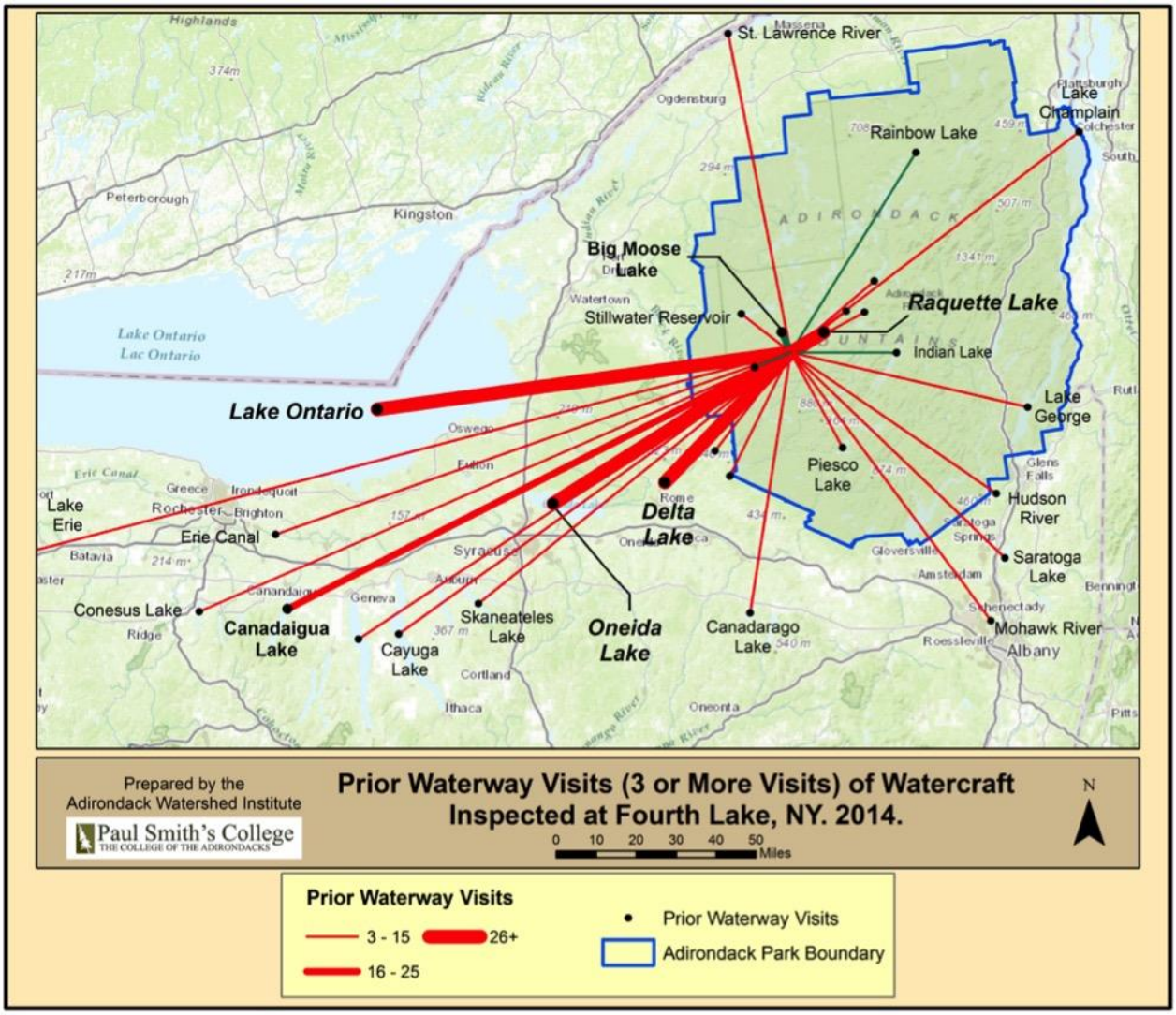


Waterways visited in previous 2 weeks by incoming vessels to Fourth Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Great Sacandaga Lake

Boats inspected: 3,687 **% of visitors taking spread prevention measures: 63%**
AIS intercepted: 63 **% inspected boats with organisms: 3%**
 # visitors: 7,938 **# of previously visited waterways: 66**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Great Sacandaga Lake	3142	293	24	5	112	1	106	0	4	3687
percentage of total boats	85%	8%	1%	0%	3%	0%	3%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Great Sacandaga Lake	7938	93	30	102	3564	3%

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

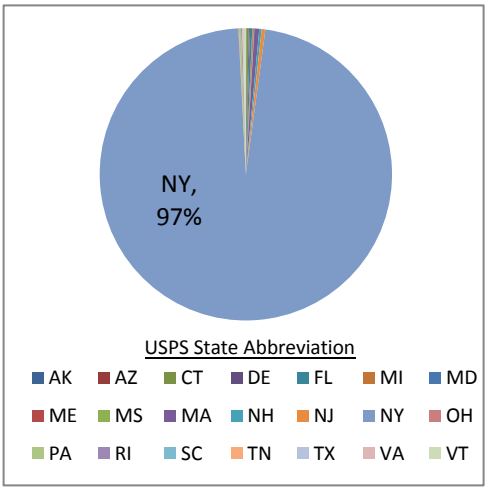
Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Great Sacandaga Lake	2213	521	1759	519	46	184	25	133	87	3500
percentage of total # groups asked	63%	15%	50%	15%	1%	5%	1%	4%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Great Sacandaga Lake	1	11	1	35	34	0	2	0	11	3	6	2	6	8	0	3	63	2%
percentage of organisms removed	1%	9%	1%	28%	28%	0%	2%	0%	9%	2%	5%	2%	5%	7%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

State of Boat Registration



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Great Sacandaga Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Top 5 Previous Waterway	# found on boats retrieving	Top 5 Previous Waterway
Curly-leaf pondweed	10	Saratoga Lake (10)	1	Saratoga Lake (1)
Eurasian water milfoil	33	Saratoga Lake (16), None (4), Great Sacandaga Lake (2), Lake Champlain (2), Oneida Lake (1)	2	Great Sacandaga Lake (1), None (1)
Spiny waterflea	3	Great Sacandaga Lake (3)	0	N/A
Water chestnut	5	Hudson River (2), Mohawk River (1), None (1), Unknown Lake (1)	1	Hudson River (1)
Hydrilla	2	Redhorse Lake, Canada (1), Laurel Lake, MA (1)	0	N/A
Zebra mussel	6	Saratoga Lake (4), Lake Champlain (1), Redhorse Lake, Canada (1)	0	N/A
Totals	**59**		**4**	

Great Sacandaga Lake: Previous waterways visited, 2014	# visits
Great Sacandaga Lake	2109
None	1002
Saratoga Lake	103
Did not ask	64
Mohawk River	50
Hudson River	41
Lake George	27
Lake Champlain	20
Oneida Lake	18
Sacandaga Lake	14
Schroon Lake	10
Ballston Lake	9
Round Lake	9
West Canada Lake	9
Caroga Lake	6
Indian Lake	5
Canandaigua Lake	4
Lake Algonquin	4
Lake Ontario	4
Otsego Lake	4
Stewarts Pond	4
Atlantic Ocean	3
Brant Lake	3
Cossayuna Lake	3

Great Sacandaga Lake: Previous waterways visited, 2014	# visits
Fourth Lake	3
St. Lawrence River	3
Unknown Lake	3
Eagle Lake	2
Lake Bomoseen	2
Lake Erie	2
Lake Pleasant	2
Lake Wallenpaupack, PA	2
Laurel Lake, MA	2
Onota Lake, MA	2
Piseco Lake	2
Seneca Lake	2
Woods Lake	2
Barge Canal	1
Boston Harbor	1
Canadarago Lake	1
Chautauqua Lake	1
Chazy Lake	1
Chesapeake Bay, Atlantic Ocean	1
Goose Pond, MA	1
Harris Lake	1
Lake Hoptacong, New Jersey	1
Lake Lillinonah, CT	1
Lake Placid	1

Great Sacandaga Lake: Previous waterways visited, 2014	# visits
Lake Winnipesaukee, NH	1
Lewey Lake	1
Lond Pond, Freetown, MA	1
Long Lake	1
Mayfield Lake	1
New Jersey	1
Newfound Lake, NH	1
Niagara River	1
Rainbow Lake	1
Raquette Lake	1
Redhorse Lake, Canada	1
Rental	1
Saranac Lake Chain	1
Schoharie Reservoir	1
Seventh Lake	1
Skaneateles Lake	1
Spy Lake	1
Stillwater Reservoir	1
Susquehanna River	1
Thompsons Lake	1
Tupper Lake	1
Upper Saranac Lake	1
Total	**3587**

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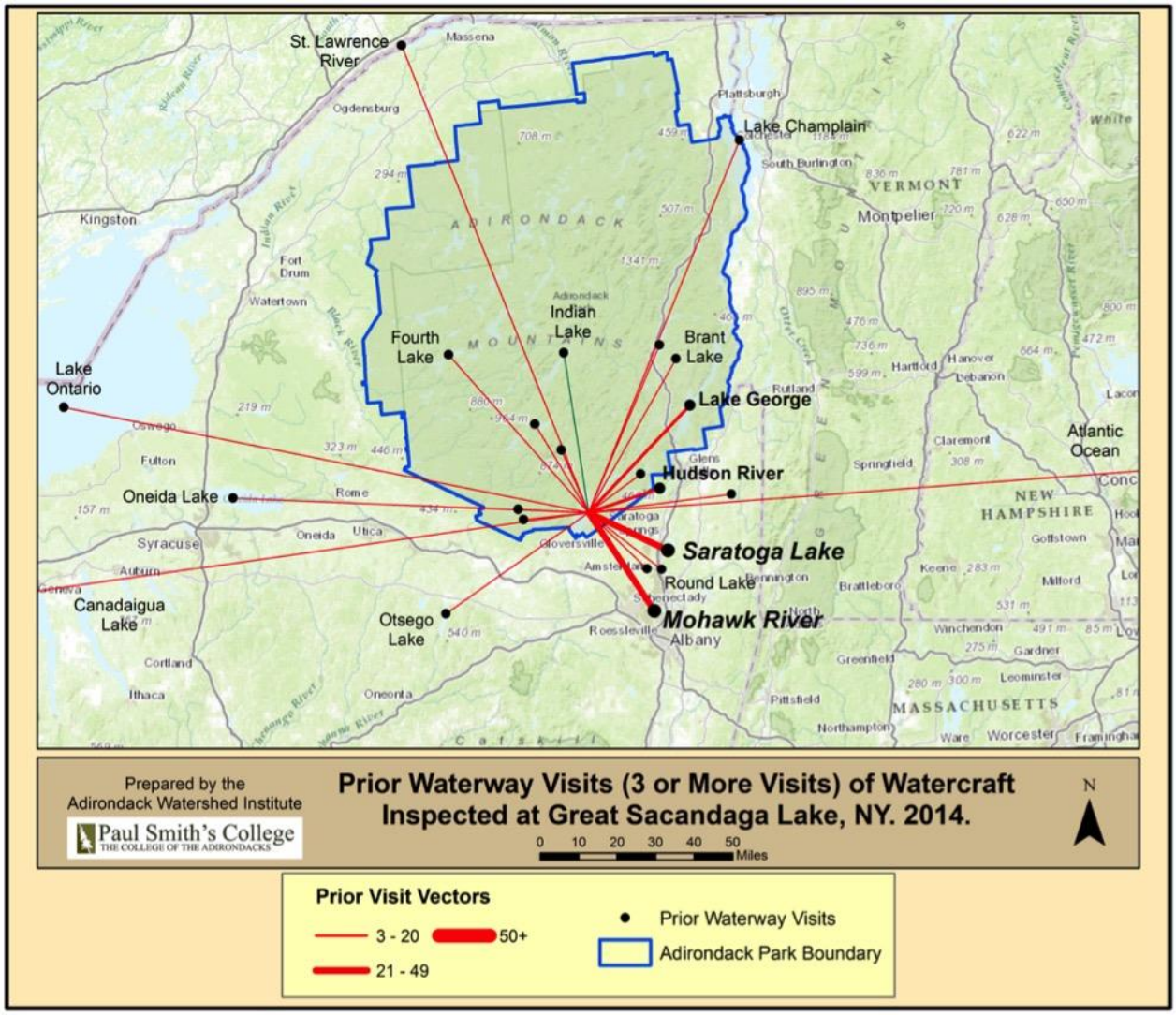
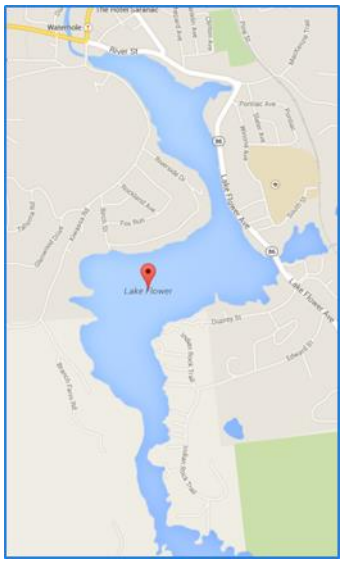


Waterways visited in previous 2 weeks by incoming vessels to Great Sacandaga Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Lake Flower



Boats inspected: 1,198 **% of visitors taking spread prevention measures: 66%**
AIS intercepted: 14 **% inspected boats with organisms: 14%**
 # visitors: 2,284 **# of previously visited waterways: 76**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Lake Flower	780	89	4	141	165	1	2	16	0	1198
percentage of total boats	65%	7%	0%	12%	14%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Lake Flower	2284	49	158	141	997	14%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Lake Flower	620	304	323	203	14	24	4	183	89	935
percentage of total # groups asked	66%	33%	35%	22%	1%	3%	0%	20%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Lake Flower	17	0	1	5	51	3	13	9	34	0	0	0	0	42	25	7	14	1%
percentage of organisms removed	8%	0%	0%	2%	25%	1%	6%	4%	16%	0%	0%	0%	0%	20%	12%	3%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Lake Flower: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	0	N/A	5	Lake Flower (4), Second Pond (1)
Variable-leaf milfoil	1	Lake Flower (1)	8	Lake Flower (6), None (1), Did not ask (1)
Totals	**1**		**13**	

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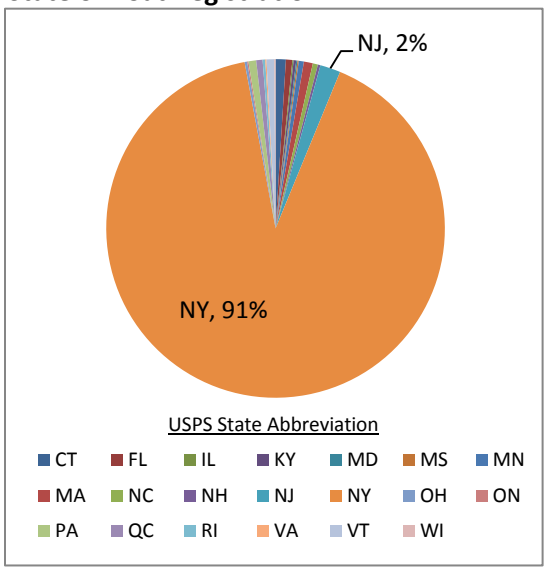
Lake Flower: Previous waterways visited, 2014	# visits
Lake Flower	461
None	163
Did not ask	88
Lake Placid	44
Lower Saranac Lake	31
Upper Saranac Lake	28
Rental	19
Lake Champlain	16
Second Pond	15
Chateaugay Lake	12
Saranac Lake Chain	12
Hudson River	7
Middle Saranac Lake	6
Upper St Regis Lake	6
Lake Kushaqua	5
Fish Creek Ponds	4
Lake George	4
Long Lake	4
Meacham Lake	4
Osgood pond	4
Tupper Lake	4
Unknown Lake	4
Buck Pond	3
Cranberry Lake	3
Franklin Falls Flow	3
Hoel Pond	3
Lake Colby	3

Lake Flower: Previous waterways visited, 2014	# visits
Lake Dunmore, VT	3
Raquette River	3
Schroon Lake	3
Atlantic Ocean	2
Ausable River	2
Fern Lake	2
Horseshoe Pond	2
Kiawassa Lake	2
Lake Erie	2
Mirror Lake	2
Raquette Lake	2
Rollins Pond	2
Silver Lake	2
Ballston Lake	1
Black Lake	1
Blue Marsh Lake, PA	1
Cuba Lake, NY	1
Deer River Flow	1
Fall Stream	1
Finger Lakes	1
Forked Lake	1
Fourth Lake	1
Great Sacandaga Lake	1
Hatch Lake	1
Lake Everest	1
Lake of Two Mountains, Montreal	1
Lake Ontario	1

Lake Flower: Previous waterways visited, 2014	# visits
Lake Ozonia	1
Lake Winnipesaukee, NH	1
Lincoln Pond	1
Little York Lake	1
Long Pond	1
Merrel Creek	1
Moose River	1
New Jersey	1
Niagara River	1
Oneida Lake	1
Paradox Lake	1
Peck Lake	1
Sacandaga Lake	1
Saratoga Lake	1
Seventh Lake	1
Silver Lake, NH	1
Skaneateles Lake	1
Soft Maple Reservoir	1
Spitfire Lake	1
St. Lawrence River	1
Susquehanna River	1
Taylor Pond	1
Thirteenth Lake	1
Thousand Islands	1
Turtle Pond	1
Winnisquam Lake, NH	1
Total	**1025**

State of Boat Registration



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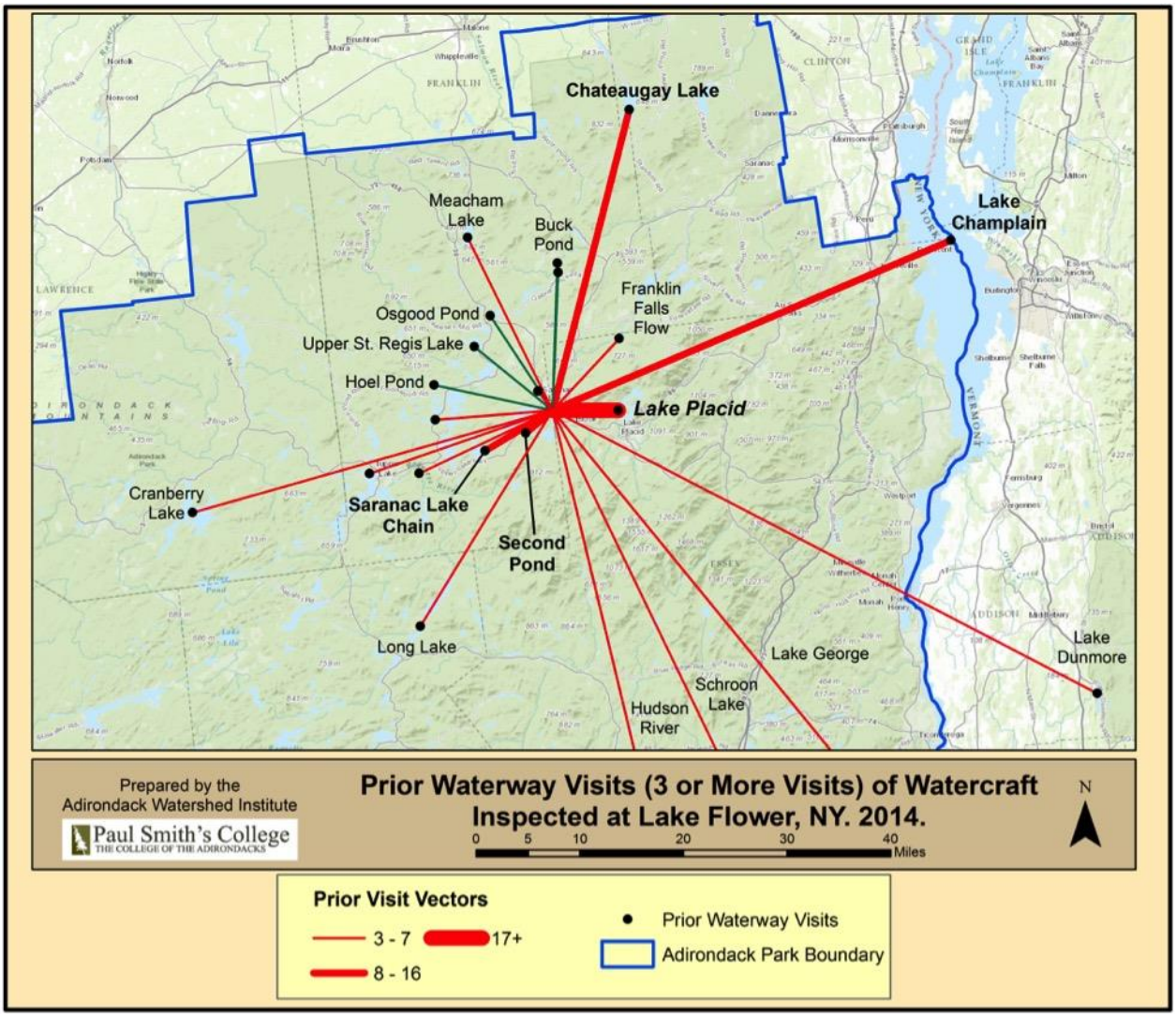

Waterways visited in previous 2 weeks by incoming vessels to Lake Flower. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Lake Placid

Boats inspected: 2,533 **% of visitors taking spread prevention measures: 57%**
AIS intercepted: 1 **% inspected boats with organisms: 3%**
 # visitors: 4,899 **# of previously visited waterways: 98**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Lake Placid	1371	12	14	244	800	1	13	78	0	2533
percentage of total boats	54%	0%	1%	10%	32%	0%	1%	3%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Lake Placid	4899	38	30	53	2006	3%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Lake Placid	1072	384	667	250	9	16	1	300	185	1887
percentage of total # groups asked	57%	20%	35%	13%	0%	1%	0%	16%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Lake Placid	3	0	1	1	20	0	3	0	25	0	0	0	0	3	0	12	1	0.05%
percentage of organisms removed	4%	0%	1%	1%	29%	0%	4%	0%	37%	0%	0%	0%	0%	4%	0%	18%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Lake Placid: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	1	DeRuyter Lake (1)	0	N/A
Totals	**1**		**0**	

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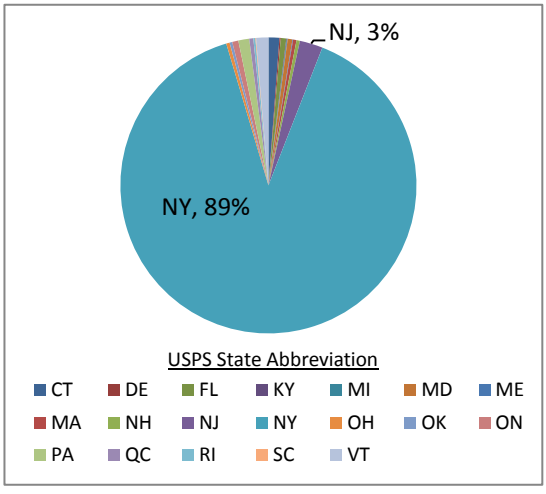
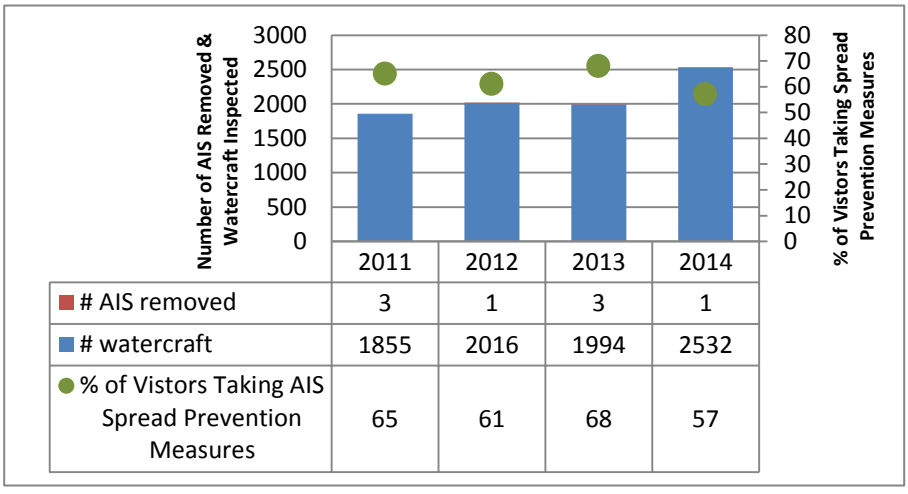
Lake Placid: Previous waterways visited, 2014	# visits
Lake Placid	896
Rental	330
None	241
Did not ask	169
Mirror Lake	44
Lake Champlain	33
Lake Flower	33
Lower Saranac Lake	31
Saranac Lake Chain	23
Upper Saranac Lake	19
Lake George	15
Unknown Lake	14
Hudson River	9
Atlantic Ocean	8
Fish Creek Ponds	8
Taylor Pond	8
Rainbow Lake	7
Sacandaga Lake	7
New Jersey	6
St. Lawrence River	6
Second Pond	5
Ausable River	4
Chazy Lake	4
Chesapeake Bay, Atlantic Ocean	4
Chubb River	4
Connecticut River	4
Niagara River	4
Upper St Regis Lake	4
Canandaigua Lake	3
Cascade Lake	3
Chateaugay Lake	3
Grafton Lakes	3
Long Island Sound	3
Loon lake	3
Paradox Lake	3

Lake Placid: Previous waterways visited, 2014	# visits
Saratoga Lake	3
Tupper Lake	3
Ballston Lake	2
Cayuga Lake	2
Delaware River, PA	2
Franklin Falls Flow	2
Fulton Chain of Lakes	2
Gennesse River	2
Green Pond, NJ	2
Henderson Lake	2
Kiawassa Lake	2
Lake Erie	2
Lake Ontario	2
Lincoln Pond	2
Lower St. Regis Lake	2
Massachusetts	2
Meacham Lake	2
Oneida Lake	2
Schroon Lake	2
Stillwater Reservoir	2
Susquehanna River	2
West Pond	2
Anacostia River, Maryland	1
Black Pond	1
Blue Mountain Lake	1
Brant Lake	1
Buck Lake, ON	1
Copake Lake	1
Cranberry Lake	1
Deleware County	1
Delta Lake	1
DeRuyter Lake	1
Grand River, ON	1
Hannawa Falls	1
Kayuta Lake	1

Lake Placid: Previous waterways visited, 2014	# visits
Keuka Lake	1
Lake Clear	1
Lake Colby	1
Lake Galena	1
Lake Kushaqua	1
Lake Pontoosuc, MA	1
Lake Titus	1
Lewey Lake	1
Little Tupper Lake	1
Long Lake	1
Long Pond	1
Long Pond, Cape Cod	1
Middle Saranac Lake	1
Mohawk River	1
Mountain View Lake	1
Northwood Lake, NH	1
Norwood Lake	1
Oswego River	1
Peace Valley Reservoir	1
Pennsylvania	1
Poconos. PA	1
Putnam Pond	1
Quebec, Canada	1
Rollins Pond	1
Round Valley Reservoir, NJ	1
Shenandoah River	1
Silver Lake	1
Somerset Reservoir, VT	1
The Mollika, New Jersey	1
Vancouver, British Columbia	1
West Canada Lake	1
Yellowstone and Grand Teton National Parks	1
Total	**2052**

State of Boat Registration





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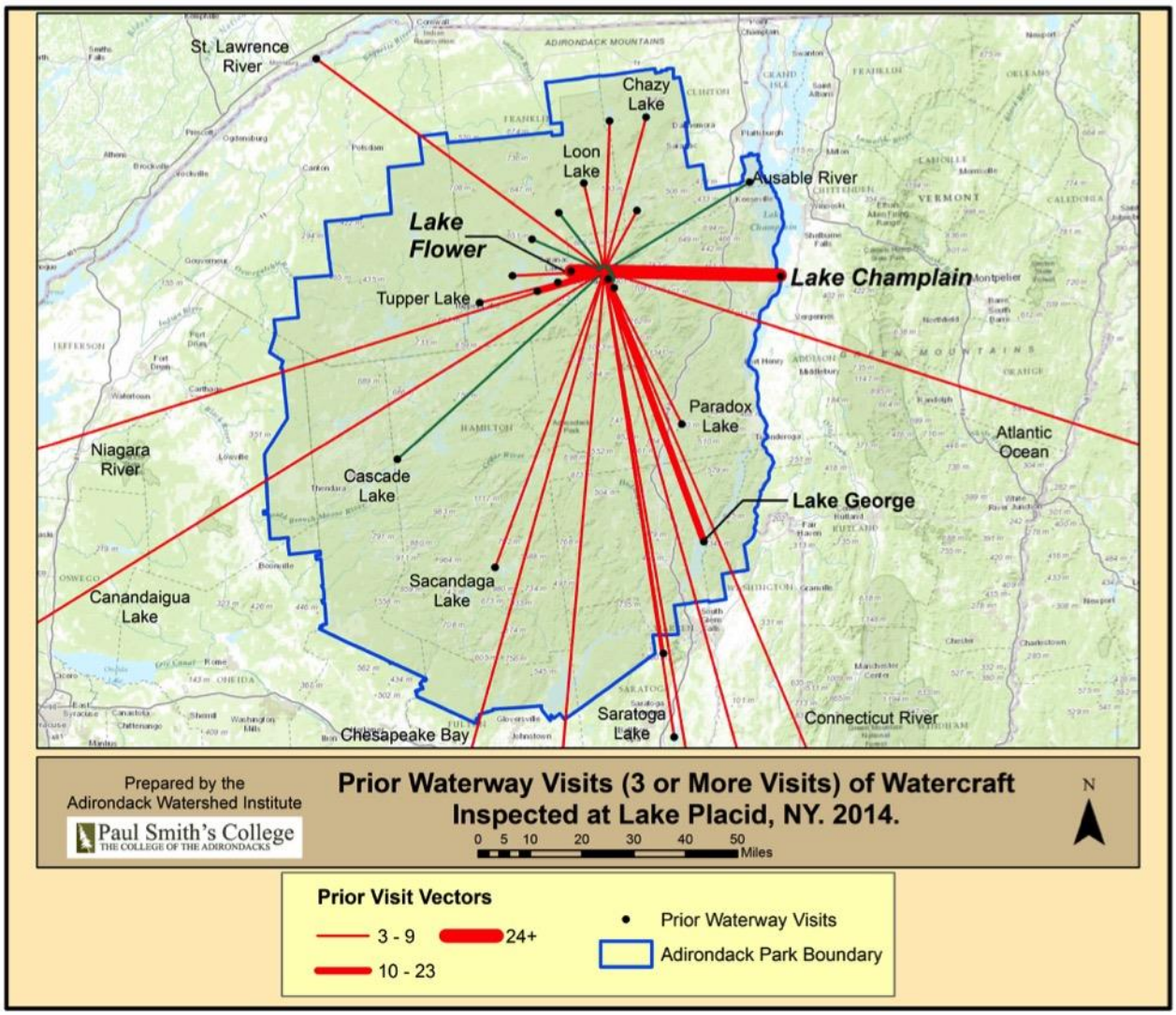

Waterways visited in previous 2 weeks by incoming vessels to Lake Placid. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Long Lake

Boats inspected: 2,266 **% of visitors taking spread prevention measures: 70%**
AIS intercepted: 3 **% inspected boats with organisms: 1%**
 # visitors: 4,826 **# of previously visited waterways: 95**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Long Lake	1277	85	12	596	271	1	5	2	17	2266
percentage of total boats	56%	4%	1%	26%	12%	0%	0%	0%	1%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Long Lake	4826	4	6	10	1726	1%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Long Lake	1203	676	1026	164	19	36	18	998	23	1728
percentage of total # groups asked	70%	39%	59%	9%	1%	2%	1%	58%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Long Lake	1	0	0	1	1	0	1	2	0	0	0	0	0	2	1	1	3	0%
percentage of organisms removed	10%	0%	0%	10%	10%	0%	10%	20%	0%	0%	0%	0%	0%	20%	10%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Long Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	1	Seneca Lake (1)	0	N/A
Variable-leaf milfoil	1	Lake Durant (1)	1	Raquette Lake (1)
Totals	**2**		**1**	

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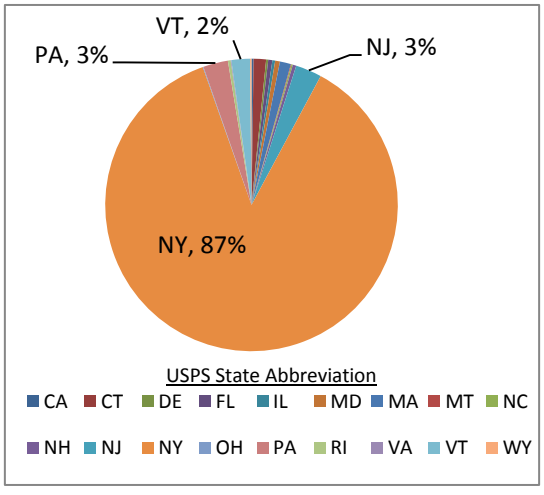
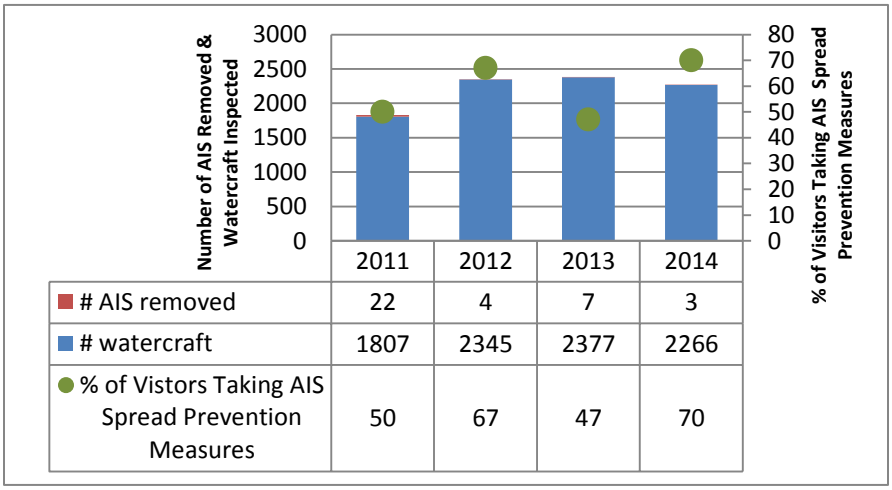
Long Lake: Previous waterways visited, 2014	# visits
None	750
Long Lake	536
Rental	96
Raquette Lake	41
Tupper Lake	33
Did not ask	25
Sacandaga Lake	19
Forked Lake	17
Lake Eaton	14
Hudson River	12
Lake George	11
Raquette River	11
Saranac Lake Chain	10
Schroon Lake	10
Fourth Lake	6
Lake Champlain	6
Lake Ontario	6
Mohawk River	6
Fulton Chain of Lakes	5
Great Sacandaga Lake	5
Indian Lake	5
Lake Flower	5
Harris Lake	5
Seneca Lake	5
Connecticut River	4
Lake Pleasant	4
Lower Saranac Lake	4
Oneida Lake	4
St. Lawrence River	4
Stillwater Reservoir	4
Upper St Regis Lake	4
Big Moose Lake	3
Blue Mountain Lake	3
Harris Lake	3

Long Lake: Previous waterways visited, 2014	# visits
Saratoga Lake	3
Atlantic Ocean	2
Brant Lake	2
Cazenovia Lake	2
Cranberry Lake	2
Delta Lake	2
Long Pond, Acadia, Maine	2
New York	2
Paradox Lake	2
Salmon River Reservoir	2
Seventh Lake	2
Skaneateles Lake	2
Spruce Run Reservoir, NJ	2
Stewarts Pond	2
Upper Saranac Lake	2
Augur Lake	1
Ausable River	1
Bantam Lake, CT	1
Bog River Flow	1
Buck Pond	1
Canal of Rome	1
Canandaigua Lake	1
Cascade Pond	1
Cayuga Lake	1
Cedar River Flow	1
Concord, NH	1
Conesus Lake	1
Coonamessett Pond, MA	1
Delaware River, PA	1
Fish Creek Ponds	1
Gennesse River	1
Green River Reservoir, VT	1
Greenwood lake	1
Harvey Lake, VT	1

Long Lake: Previous waterways visited, 2014	# visits
Higley Flow	1
Honeoye Lake	1
Horseshoe Lake	1
Lake Abanakee	1
Lake Adirondack	1
Lake Durant	1
Lake Moraine	1
Lake Placid	1
Lake Winnipeg, NH	1
Lincoln Pond	1
Little Clear Pond	1
Little Tupper Lake	1
Lows Lake	1
Mad River, Camden, NY	1
Mirror Lake	1
Niagara River	1
Nick's Lake	1
North Lake	1
Orange Lake	1
Otisco Lake	1
Piseco Lake	1
Prompton Lake	1
Rainbow Lake	1
Round Lake	1
Second Pond	1
Silver Lake	1
Spy Lake	1
Squam Lake, NH	1
Susquehanna River, PA	1
West Canada Lake	1
Whitney Point Reservoir	1
Total	**1757**

State of Boat Registration





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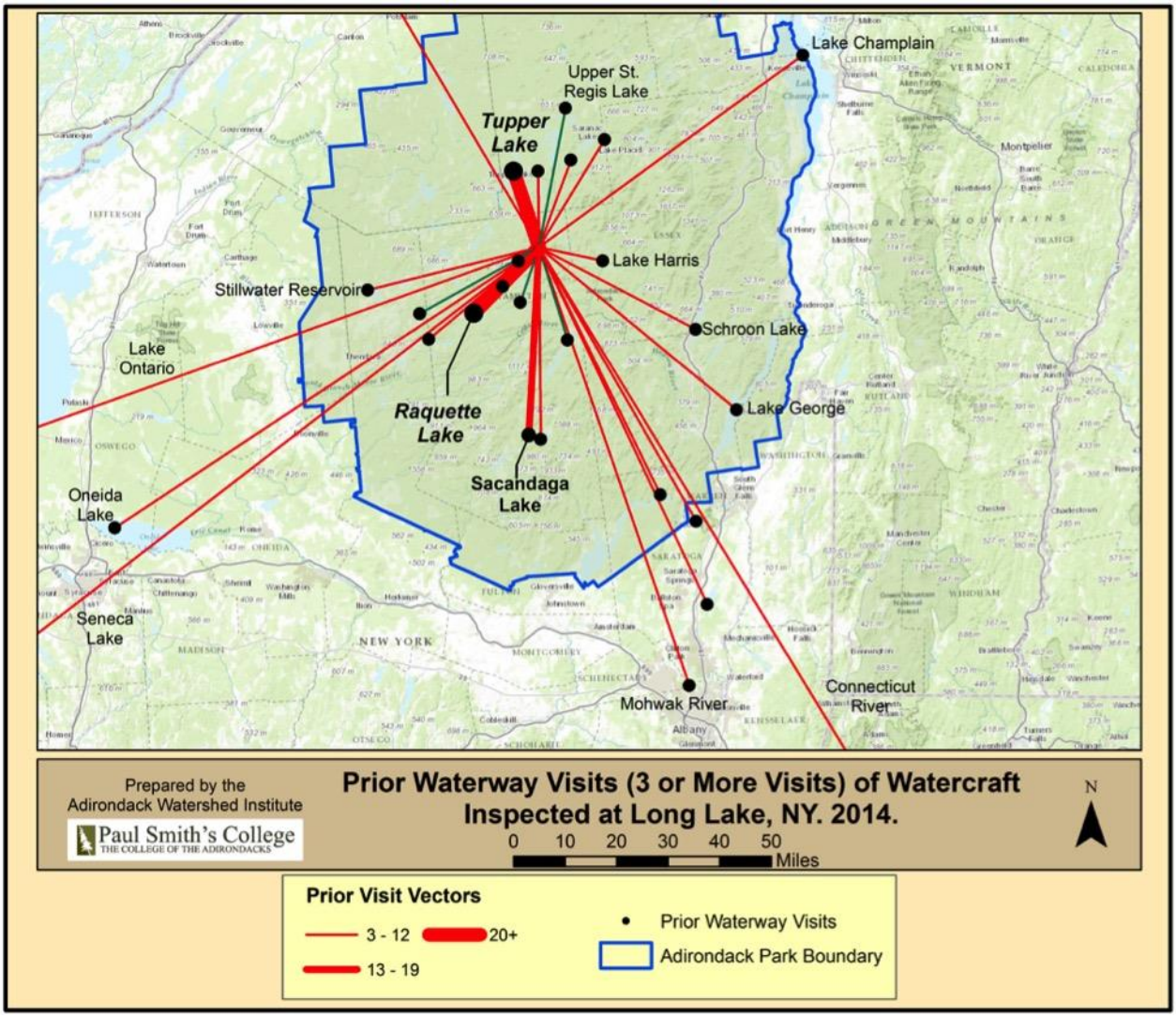

Waterways visited in previous 2 weeks by incoming vessels to Long Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Steward Alex Wall at the Long Lake boat launch.

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Rainbow Lake

Boats inspected: 607 **% of visitors taking spread prevention measures: 68%**
AIS intercepted: 0 **% inspected boats with organisms: 25%**
 # visitors: 1,218 **# of previously visited waterways: 55**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Rainbow Lake	246	11	0	125	214	0	3	8	0	607
percentage of total boats	41%	2%	0%	21%	35%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Rainbow Lake	1218	70	98	117	462	25%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked	# groups using boat wash
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask		
Rainbow Lake	314	187	229	155	1	6	0	207	7	460	36
percentage of total # groups asked	68%	41%	50%	34%	0%	1%	0%	45%	NA		8%

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Rainbow Lake	9	0	0	0	27	0	0	0	87	0	0	0	0	35	3	7	0	0%
percentage of organisms removed	5%	0%	0%	0%	16%	0%	0%	0%	52%	0%	0%	0%	0%	21%	2%	4%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

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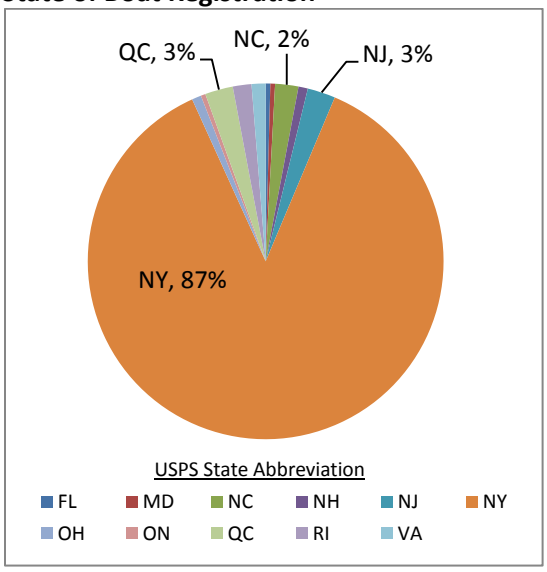
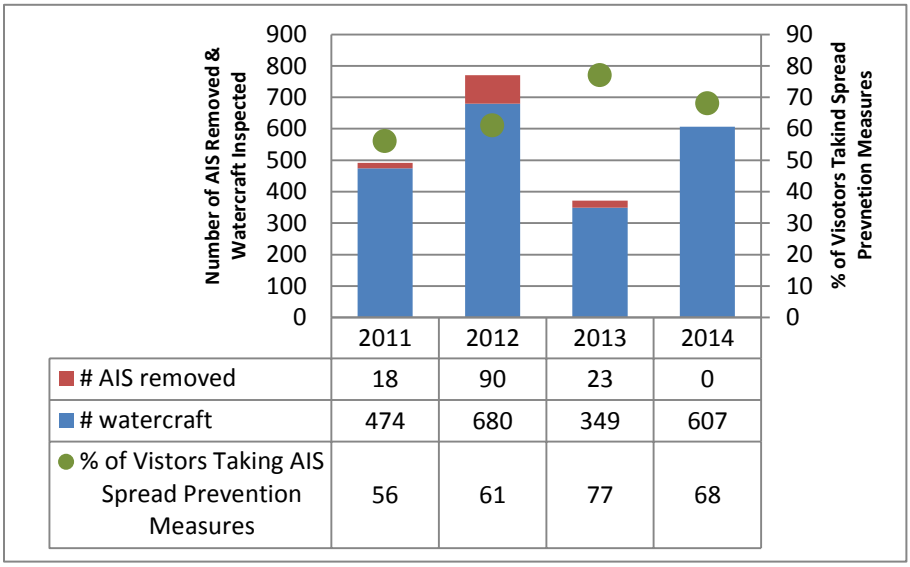
Rainbow Lake: Previous waterways visited, 2014	# visits
None	131
Lake Kushaqua	102
Buck Pond	45
Rainbow Lake	33
Lake Champlain	12
Osgood pond	12
Rental	11
Did not ask	10
Upper St Regis Lake	10
St. Lawrence River	8
Chateaugay Lake	6
Ausable River	4
Fern Lake	4
Lake Flower	4
Saranac Lake Chain	4
Saranac River	4
Fish Creek Ponds	3
Lower Saranac Lake	3
Bog River Flow	2
Chazy Lake	2

Rainbow Lake: Previous waterways visited, 2014	# visits
Cranberry Lake	2
Debar Pond	2
Franklin Falls Flow	2
Kiamika Lake, Quebec	2
Lake Lila	2
Lake Madawaska, Ontario	2
Lake of Two Mountains, Montreal	2
Lake Placid	2
Lincoln Pond	2
Little Black Pond	2
Meacham Lake	2
Private Pond	2
Rainbow Falls Reservoir	2
Rollins Pond	2
Simon Pond	2
Taylor Pond	2
Unknown Lake	2
Upper Saranac Lake	2
Blue Mountain Lake	1
Buck Pond	1

Rainbow Lake: Previous waterways visited, 2014	# visits
Chesapeake Bay, Atlantic Ocean	1
Connecticut River	1
Dead Creek, Addison VT	1
Hudson River	1
Hyde Lake, Jefferson County	1
Jones Pond	1
Lake Tiorati	1
Lake Winnipesaukee, NH	1
Moose Pond	1
Ohio	1
Oneida Lake	1
Oregon Pond, Onchiota NY	1
Oswegatchie River	1
Otisco Lake	1
Raquette Lake	1
Rat Pond	1
Sacandaga Lake	1
Schroon Lake	1
Sullivan, Ohio	1
Total	**467**

State of Boat Registration





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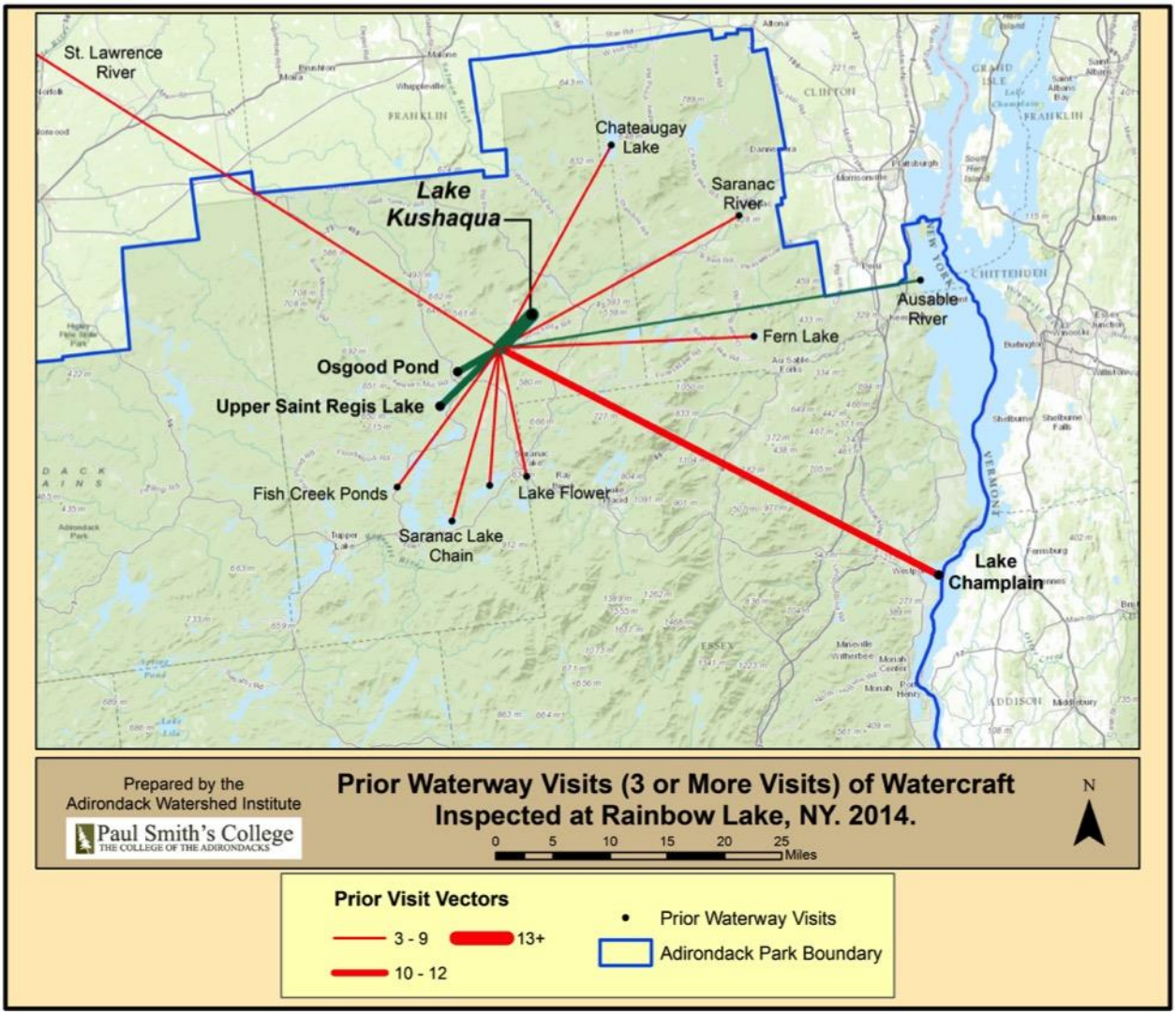

Waterways visited in previous 2 weeks by incoming vessels to Rainbow Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Raquette Lake

Boats inspected: 972 **% of visitors taking spread prevention measures: 79%**
AIS intercepted: 15 **% inspected boats with organisms: 9%**
 # visitors: 2,089 **# of previously visited waterways: 70**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Raquette Lake	657	18	7	165	121	0	0	4	0	972
percentage of total boats	68%	2%	1%	17%	12%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Raquette Lake	2089	24	61	75	840	9%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Raquette Lake	656	337	561	184	11	20	12	205	9	835
percentage of total # groups asked	79%	40%	67%	22%	1%	2%	1%	25%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Raquette Lake	6	0	1	2	43	1	7	13	2	0	0	0	0	0	6	4	15	2%
percentage of organisms removed	7%	0%	1%	2%	51%	1%	8%	15%	2%	0%	0%	0%	0%	0%	7%	5%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Raquette Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	2	Lake Ontario (1), Long Lake (1)	0	N/A
Variable-leaf milfoil	2	Indian Lake (1), Raquette Lake (1)	11	None (4), Fourth Lake (3), Raquette Lake (2), Did not ask (2)
Totals	**4**		**11**	

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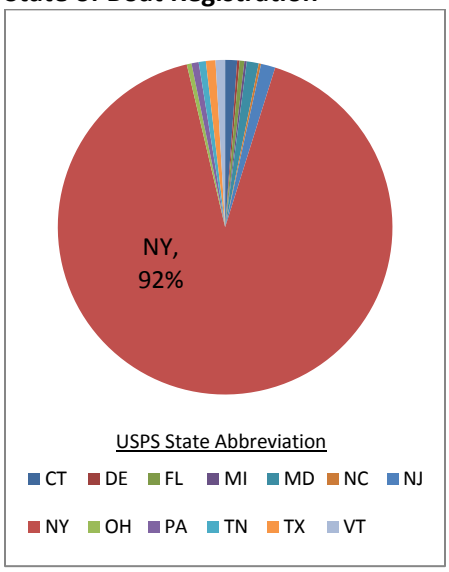
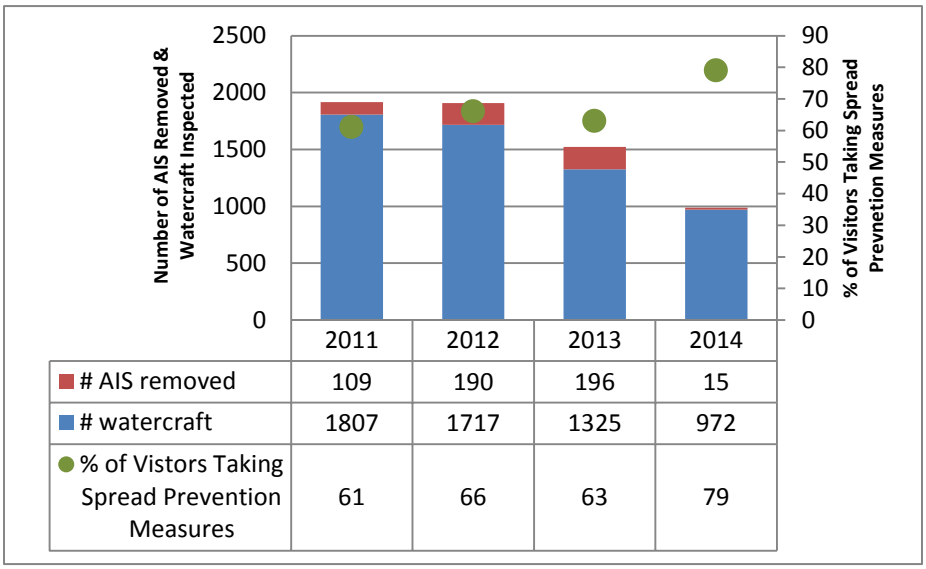
Raquette Lake: Previous waterways visited, 2014	# visits
None	469
Raquette Lake	124
Fourth Lake	27
Seventh Lake	22
Did not ask	17
Long Lake	15
Fulton Chain of Lakes	13
Lake Ontario	10
Saratoga Lake	9
Delta Lake	8
Big Moose Lake	7
Rental	7
Browns Tract Pond	6
Blue Mountain Lake	4
Canandaigua Lake	4
Cranberry Lake	4
Indian Lake	4
Lake George	4
Limekiln Lake	4
Oneida Lake	4
Canadarago Lake	3
Cayuga Lake	3
Forked Lake	3
Lake Bonaparte	3
Lake Champlain	3

Raquette Lake: Previous waterways visited, 2014	# visits
Lake Flower	3
Otsego Lake	3
Cazenovia Lake	2
Chateaugay Lake	2
Hudson River	2
Rollins Pond	2
Sacandaga Lake	2
Skaneateles Lake	2
St. Lawrence River	2
Stillwater Reservoir	2
Tupper Lake	2
Upper St Regis Lake	2
Ballston Lake	1
Black River	1
Conesus Lake	1
Connecticut River	1
Copake Lake, Columbia County	1
Cross Lake	1
Erie Canal	1
Grasse River	1
Great Sacandaga Lake	1
Hickory Lake, Macomb NY	1
Jamesville Reservoir	1
Kayuta Lake	1
Lake Abanakee	1

Raquette Lake: Previous waterways visited, 2014	# visits
Lake Adirondack	1
Lake Clear	1
Lake Durant	1
Lake Hoptacong, NJ	1
Lake Moraine	1
Lake Placid	1
Lake Snow	1
Lake Winnipesaukee, NH	1
Lower Saranac Lake	1
Maine	1
Mirror Lake	1
Montgomery County	1
Moose River	1
Niagara River	1
Oquaga Lake	1
Osgood pond	1
Otisco Lake	1
Round Lake	1
Saranac River	1
Schoharie Creek	1
Second Pond	1
Upper Saranac Lake	1
White Lake	1
White Lake, Sullivan County	1
Total	**840**

State of Boat Registration





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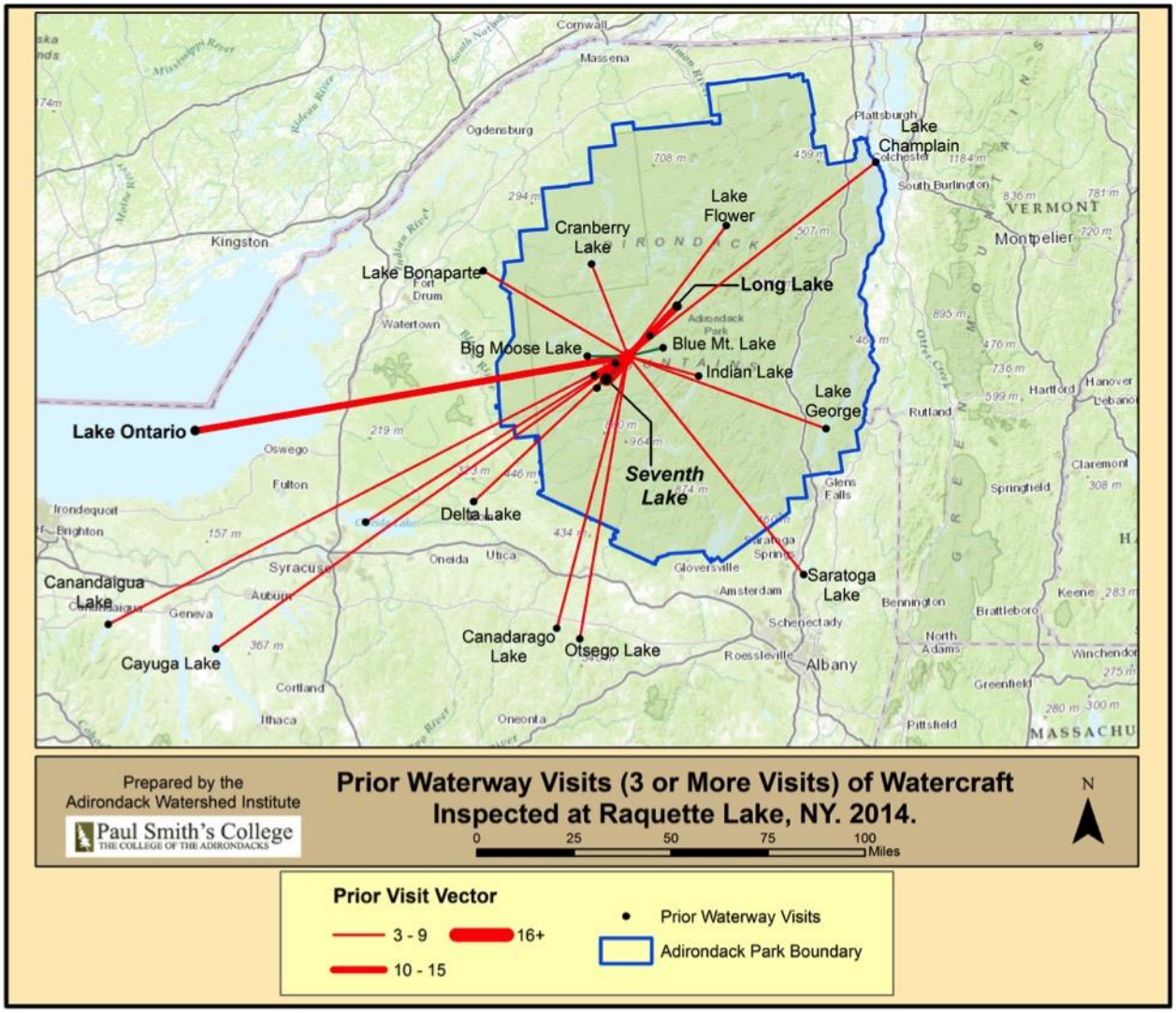

Waterways visited in previous 2 weeks by incoming vessels to Raquette Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Saratoga Lake

Boats inspected: 4,046 **% of visitors taking spread prevention measures: 79%**
AIS intercepted: 547 **% inspected boats with organisms: 21%**
 # visitors: 9,292 **# of previously visited waterways: 81**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Saratoga Lake	3854	107	33	7	39	0	4	2	0	4046
percentage of total boats	95%	3%	1%	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, 2014	total #	organisms found		# boats	# of	% of inspected
Waterbody	people	entering	leaving	dirty	inspections	boats dirty
Saratoga Lake	9292	473	618	774	3717	21%

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

WSP Data Summary, 2014	# groups taking AIS spread prevention measures									# groups asked
Waterbody	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Saratoga Lake	2507	1169	1873	183	31	190	22	155	851	3158
percentage of total # groups asked	79%	37%	59%	6%	1%	6%	1%	5%	NA	

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, 2014	Organism Type																total	% of inspected
Waterbody	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other	AIS	boats with AIS
Saratoga Lake	0	189	6	311	284	1	85	1	18	0	13	0	33	125	0	25	547	15%
percentage of organisms removed	0%	17%	1%	29%	26%	0%	8%	0%	2%	0%	1%	0%	3%	11%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Saratoga Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Top 5 Previous Waterway	# found on boats retrieving	Top 5 Previous Waterway
Curly-leaf pondweed	49	Saratoga Lake (44), Did not ask (3), Ballston Lake (2), Battenkill River, VT (1)	140	Saratoga Lake (63), Did not ask (55), None (13), Mohawk River (2), Oneida Lake (1)
Eurasian water milfoil	158	Saratoga Lake (116), Ballston Lake (6), Round Lake (5), Did not ask (5), Lake Champlain (4)	153	Saratoga Lake (92), Did not ask (42), None (10), Hudson River (2), Mohawk River (2), Brant Lake (1)
Water chestnut	11	Saratoga Lake (6), Mohawk River (3), Lake Champlain (1), None (1)	2	Did not ask(1), None (1)
Zebra mussel	12	Saratoga Lake (11), None (1)	21	Saratoga Lake (12), Did not ask (6), None (2), Brant Lake (1)
Variable-leaf milfoil	0	N/A	1	Saratoga Lake (1)
Totals	**230**		**317**	

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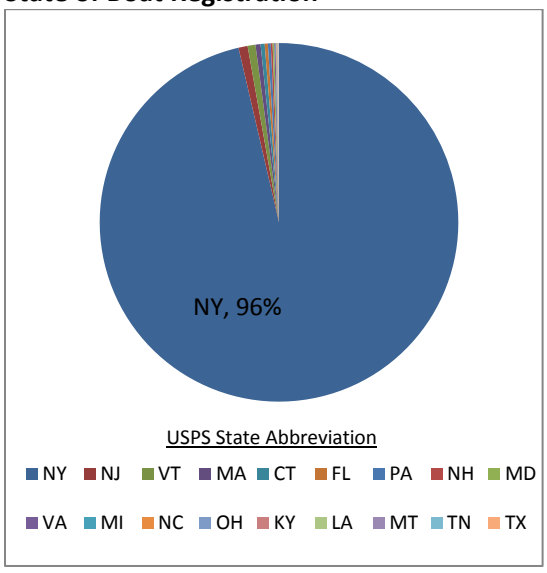
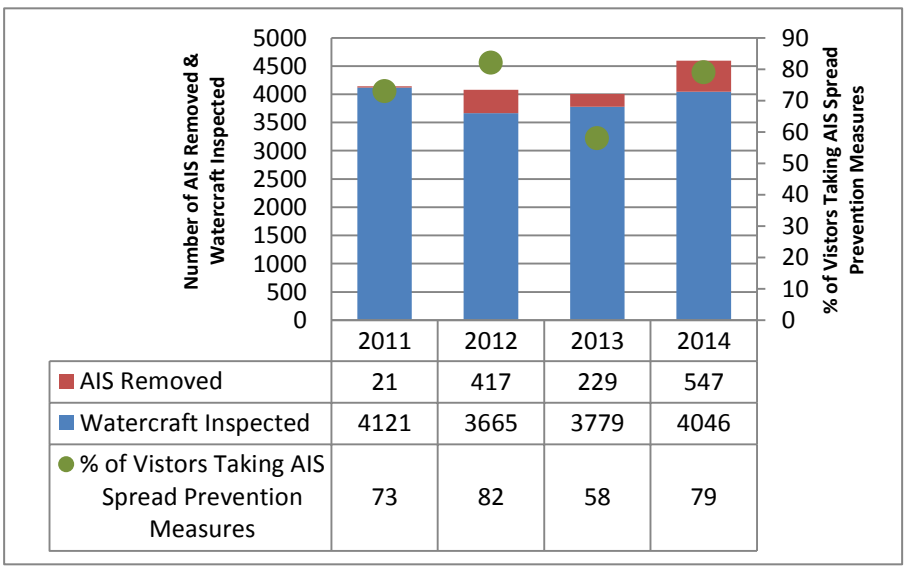
Saratoga Lake: Previous waterways visited, 2014	# visits
Saratoga Lake	2357
None	661
Did not ask	374
Hudson River	106
Lake George	79
Mohawk River	62
Great Sacandaga Lake	56
Sacandaga Lake	43
Round Lake	38
Lake Champlain	37
Schroon Lake	25
Ballston Lake	14
Cossayuna Lake	13
Unknown Lake	11
Brant Lake	10
Lake Lonely	8
Oneida Lake	7
Stewarts Pond	6
Canandaigua Lake	5
Lake Ontario	4
Paradox Lake	4
Rental	4
St. Lawrence River	4
Candlewood Lake, CT	3
Kinderhook Lake	3
Thompsons Lake	3
Atlantic Ocean	2
Chateaugay Lake	2
Indian Lake	2

Saratoga Lake: Previous waterways visited, 2014	# visits
Lake Lonely	2
Lake Luzerne	2
Lower Saranac Lake	2
Otsego Lake	2
Piseco Lake	2
Pleasant lake	2
Round Lake	2
Saranac Lake Chain	2
Thousand Islands	2
Warner Lake	2
Alpine Lake	1
Ashmere Lake, MA	1
Ballson Lake	1
Battenkill River, VT	1
Black Lake	1
Blue Mountain Lake	1
Burden Lake	1
Butterfield Lake	1
Cayuga Lake	1
Chautauqua Lake	1
Connecticut River	1
Cranberry Lake	1
Delta Lake	1
Fish Creek Ponds	1
Fourth Lake	1
Granite Lake	1
Hoel Pond	1
Hoosic River	1
Lake Bomoseen	1

Saratoga Lake: Previous waterways visited, 2014	# visits
Lake Calabogie, Canada	1
Lake Durant	1
Lake Geneva, WI	1
Lake Kushaqua	1
Lake Pleasant	1
Lake St. Catherine	1
Lake St. Francis, Quebec	1
Lincoln Pond	1
Long Island Sound	1
Long Lake	1
Loon lake	1
Mooselookmeguntic Lake, ME	1
Moreau Lake	1
New York	1
Niagara River	1
Onota Lake, MA	1
Orange Lake	1
Oswego Lake	1
Oxbow Lake	1
Rainbow Lake	1
Snyder Lake	1
Stillwater Reservoir	1
Sylvan Lake, PA	1
Tasawasa Lake	1
Tupper Lake	1
West Lake	1
White Lake	1
Total	**4009**

State of Boat Registration





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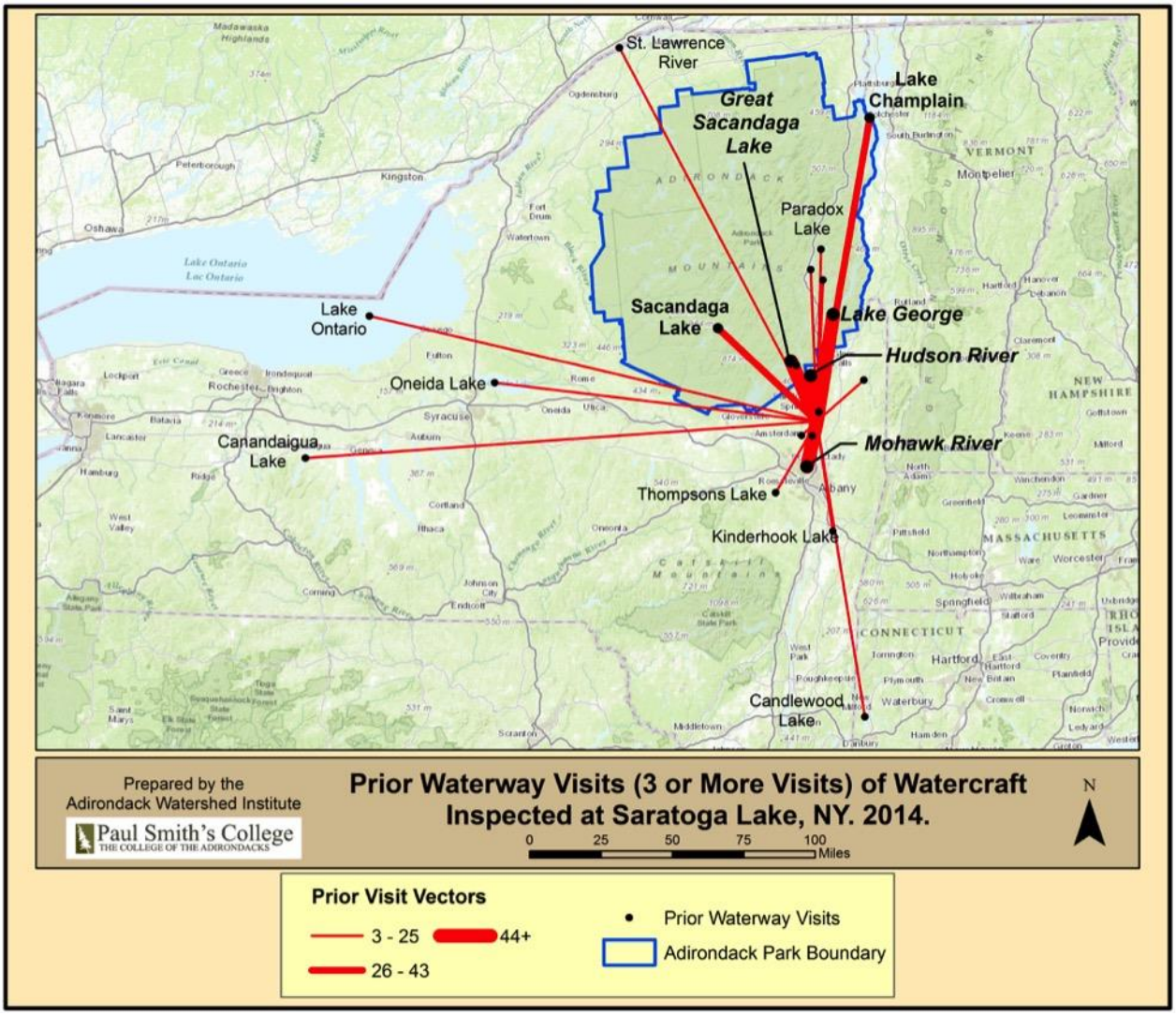

Waterways visited in previous 2 weeks by incoming vessels to Saratoga Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

A zebra mussel encrusted fishing pole retrieved from Saratoga Lake.

Second Pond

Boats inspected: 2,604 **% of visitors taking spread prevention measures: 67%**
AIS intercepted: 13 **% inspected boats with organisms: 5%**
 # visitors: 4,701 **# of previously visited waterways: 148**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Second Pond	816	51	0	708	975	1	9	44	0	2604
percentage of total boats	31%	2%	0%	27%	37%	0%	0%	2%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Second Pond	4701	53	53	89	1679	5%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Second Pond	1117	622	570	476	5	30	2	341	29	1674
percentage of total # groups asked	67%	37%	34%	28%	0%	2%	0%	20%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Second Pond	2	0	2	10	12	0	1	3	51	0	0	0	0	20	1	4	13	1%
percentage of organisms removed	2%	0%	2%	9%	11%	0%	1%	3%	48%	0%	0%	0%	0%	19%	1%	4%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Second Pond: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Top 5 Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	9	Second Pond (3), Lake Champlain (1), Saratoga Lake (1), Cranberry Lake (1), Tupper Lake (1)	1	Deleware River, PA (1)
Variable-leaf milfoil	1	Canadaigua (1)	2	New Jersey (1), Fish Creek Ponds (1)
Totals	**10**		**3**	

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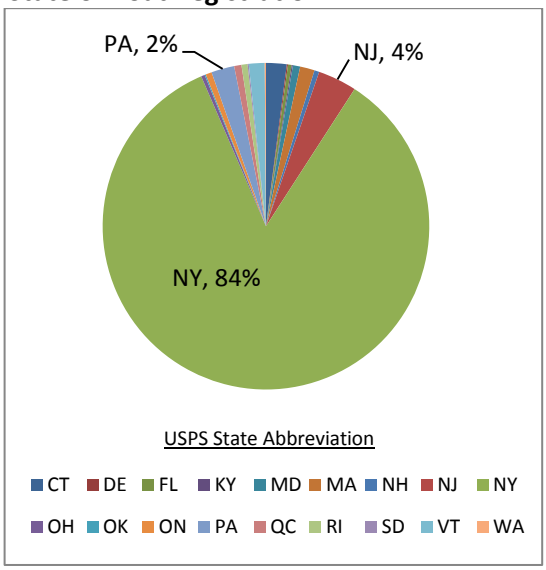
Second Pond: Previous waterways visited, 2014	# visits
Second Pond	470
None	331
Rental	206
Lake Flower	65
Lake Placid	55
Did not ask	53
Upper Saranac Lake	40
Lake Champlain	31
Tupper Lake	27
Lower Saranac Lake	26
Saranac Lake Chain	23
Fish Creek Ponds	17
Unknown Lake	15
Lake Ontario	14
Upper St Regis Lake	12
Canandaigua Lake	11
Raquette River	11
Mirror Lake	10
Cranberry Lake	9
Middle Saranac Lake	9
Atlantic Ocean	7
Lake Colby	7
Osgood pond	7
Chateaugay Lake	6
Hudson River	6
Lake Kushaqua	6
Meacham Lake	6
Black River	5
Long Island Sound	5
New Jersey	5
St. Lawrence River	5
West Canada Lake	5
Follensby Clear Pond	4
Lake George	4
Long Lake	4
Lower St. Regis Lake	4
Moose Pond	4
Raquette Lake	4

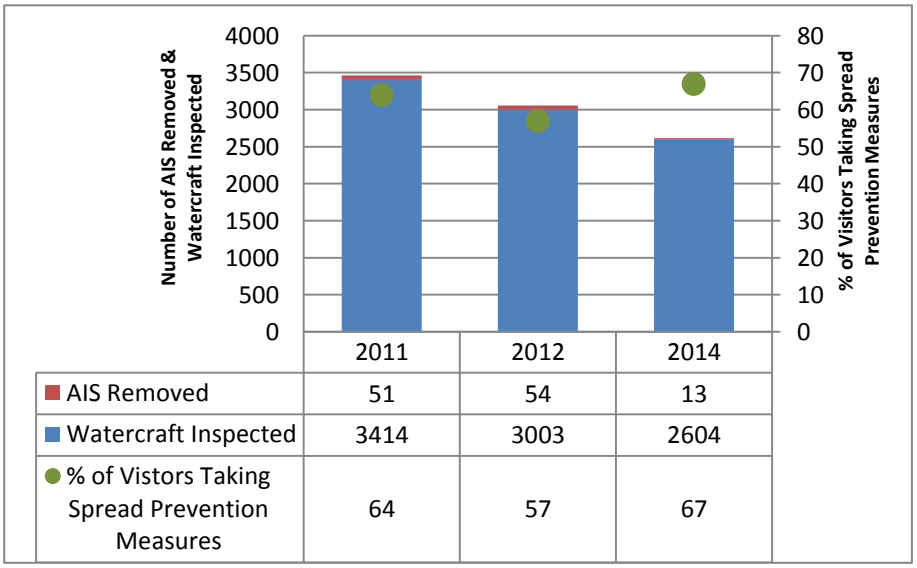
Second Pond: Previous waterways visited, 2014	# visits
Saranac River	4
Saratoga Lake	4
Union Falls Flow	4
Brant Lake	3
Buck Pond	3
Cayuga Lake	3
Fern Lake	3
Fulton Chain of Lakes	3
Green River Reservoir, VT	3
Indian Lake	3
Jones Pond	3
Lake Everest	3
Little Wolf Pond	3
Mohawk River	3
Rainbow Lake	3
Rollins Pond	3
Skaneateles Lake	3
Ausable River	2
Beach Pond, RI	2
Cedar River Flow	2
Conesus Lake	2
Eagle Lake	2
Fish Creek River	2
Franklin Falls Flow	2
Goodnow Flow	2
Greenwood lake	2
Hemlock Lake, NY	2
Hoel Pond	2
Lake Clear	2
Lake Erie, PA	2
Harris Lake	2
Lincoln Pond	2
Little Clear Pond	2
Loch Raven Reservoir, Maryland	2
Maryland	2
Monksville Reservoir, NJ	2
Moose River	2
Niagara River	2

Second Pond: Previous waterways visited, 2014	# visits
Otsego Lake	2
Sacandaga Lake	2
Allagash River, ME	1
Allegheny River	1
Ashland Reservoir, MA	1
Bantam Lake, CT	1
Blue Mountain Lake	1
Brown Lake	1
Cabonga Reservoir, Quebec	1
Canobie Lake, NH	1
Cheshire Lake, MA	1
Chubb River	1
Clear Pond	1
Connecticut River	1
Deer River Flow	1
Delaware River, PA	1
Dorchester, NH	1
Erie Canal	1
Farmington Lake, NJ	1
Flat Rock Reservoir	1
Floodwood Pond	1
Forked Lake	1
Friend Lake	1
Genegantslet Creek, Binghamton	1
Glen Lake	1
Great South Bay, Long Island	1
Hemlock Lake, CT	1
Hemlock Pond	1
Hinckley Reservoir	1
Horseshoe Lake	1
Hunt Lake	1
Ipswich River, MA	1
Irondequoit Creek	1
Kayuta Lake	1
Kiawassa Lake	1
Lake Bonaparte	1
Lake Ozonia	1
Lake St. Francis	1

Second Pond: Previous waterways visited, 2014	# visits
Lebanon, PA	1
Little Green Pond	1
Little Long Lake	1
Little River	1
Long Pond	1
Loon lake	1
May Pond, Barton VT	1
Metcalf Pond, VT	1
Middle Branch St. Regis River	1
Middle Saranac River	1
Moody Pond	1
Mountain View Lake	1
New Hampshire	1
New York	1
North Carolina	1
Oneida Lake	1
Ottawa River	1
Owasco Lake	1
Pepacton Reservoir	1
Private Lake	1
Quebec, Canada	1
Queechy Lake	1
Red River, Quebec	1
Salmon River	1
Salmon River Reservoir	1
Sandy creek	1
Schroon Lake	1
St. Regis Ponds	1
Star Lake	1
Susquehanna River	1
Thirteenth Lake	1
Trout Lake, St. Lawrence County	1
Ulster County, NY	1
Wakefield Pond, RI	1
Wallkill River	1
Well River, Ontario, Canada	1
Winding Hills Park Pond	1
York River	1
Total	**1703**

State of Boat Registration





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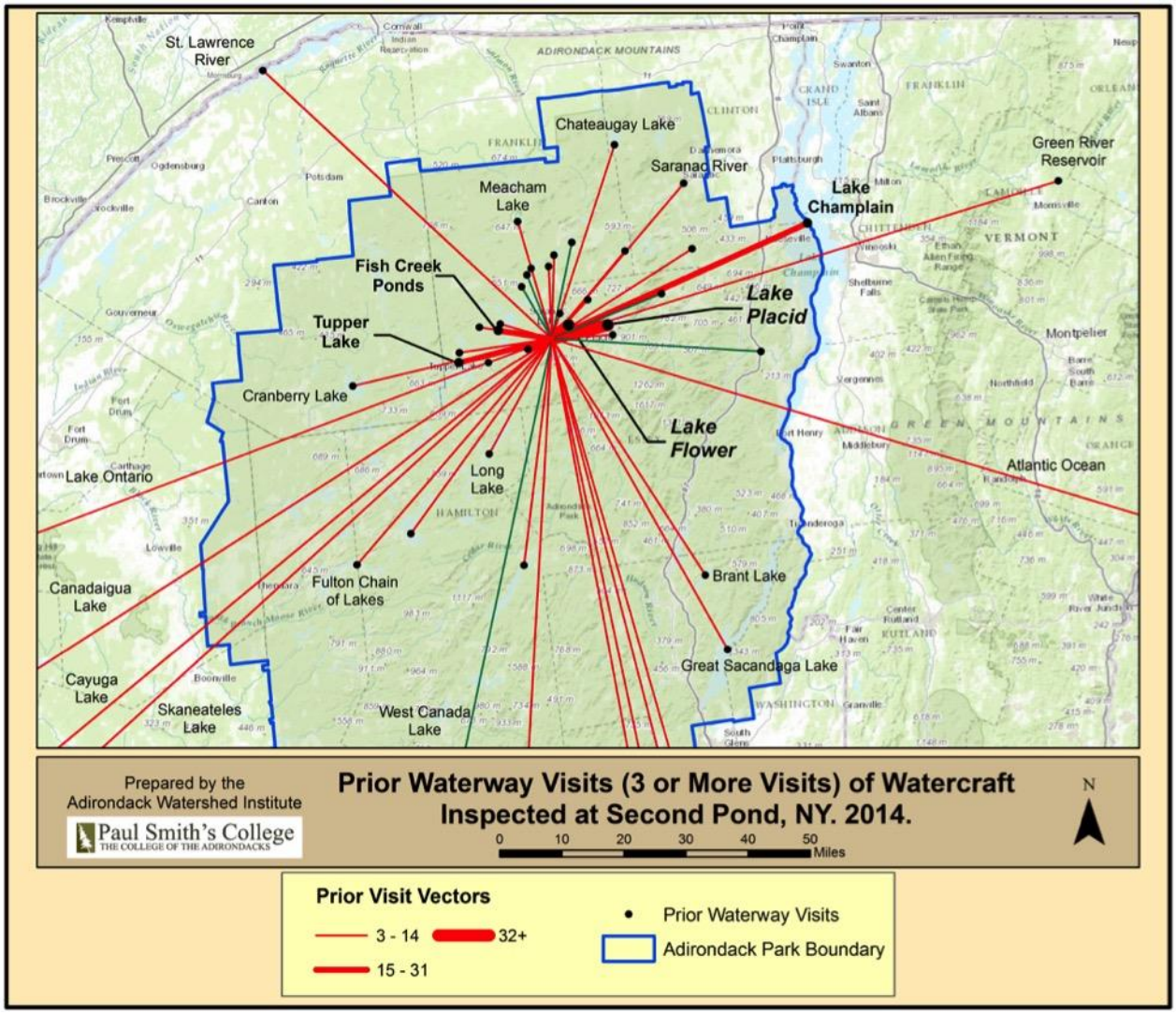

Waterways visited in previous 2 weeks by incoming vessels to Second Pond. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Stillwater Reservoir

Boats inspected: 1,646 **% of visitors taking spread prevention measures: 84%**
AIS intercepted: 6 **% inspected boats with organisms: 3%**
 # visitors: 3,617 **# of previously visited waterways: 102**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Stillwater Reservoir	1066	26	2	213	326	0	7	6	0	1646
percentage of total boats	65%	2%	0%	13%	20%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Stillwater Reservoir	3617	37	11	44	1323	3%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Stillwater Reservoir	1065	586	774	619	7	31	12	871	92	1275
percentage of total # groups asked	84%	46%	61%	49%	1%	2%	1%	68%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Stillwater Reservoir	0	0	0	4	16	0	4	1	14	0	1	0	0	1	0	7	6	0.5%
percentage of organisms removed	0%	0%	0%	8%	33%	0%	8%	2%	29%	0%	2%	0%	0%	2%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Stillwater Reservoir: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	4	Lake Bonaparte (2), Saratoga Lake (1), Seneca Lake (1)	0	N/A
Variable-leaf milfoil	1	Raquette Lake (1)	0	N/A
Water chestnut	1	Stillwater Reservoir (1)	0	N/A
Totals	**6**		**0**	

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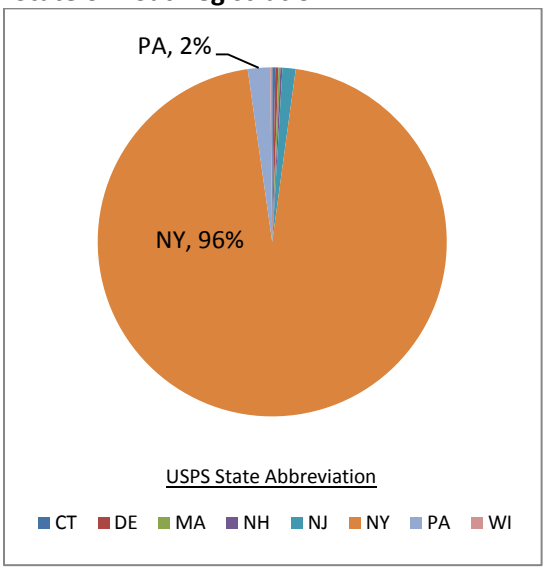
Stillwater Reservoir: Previous waterways visited, 2014	# visits
Stillwater Reservoir	676
None	284
Did not ask	42
Black River	33
Lake Ontario	30
Rental	21
Lake Bonaparte	17
Canandaigua Lake	11
Cranberry Lake	11
Oneida Lake	11
Kayuta Lake	10
Big Moose Lake	9
Delta Lake	9
Raquette Lake	8
Soft Maple Reservoir	8
Unknown Lake	8
Fourth Lake	7
Seneca Lake	7
Beaver River Flow	6
Fulton Chain of Lakes	6
Skaneateles Lake	6
Brantingham Lake	5
Cayuga Lake	5
Conesus Lake	5
Erie Canal	4
Hinckley Reservoir	4
Keuka Lake	4

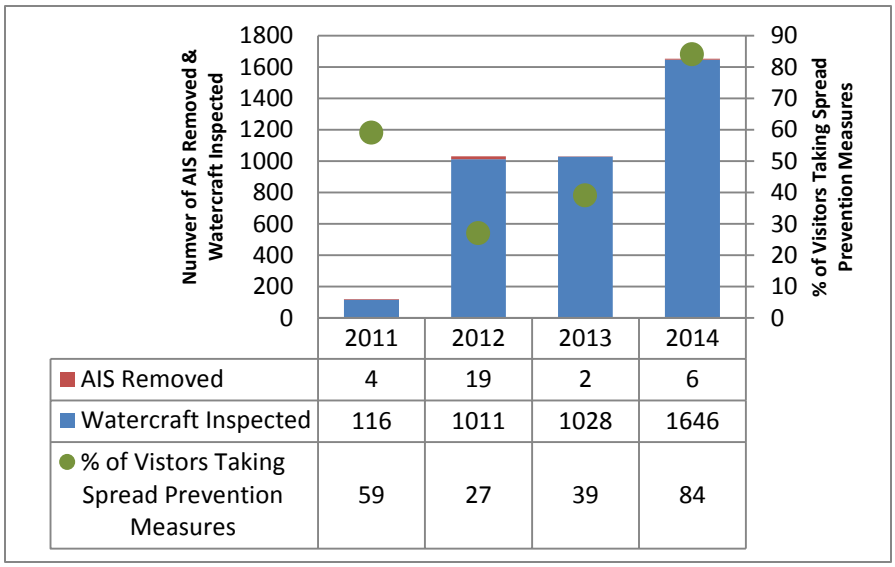
Stillwater Reservoir: Previous waterways visited, 2014	# visits
Long Lake	4
Owasco Lake	4
Private Lake	4
Saranac Lake Chain	4
St. Lawrence River	4
West Canada Lake	4
Lake Erie	3
Lake Placid	3
Saratoga Lake	3
Whitney Point Reservoir	3
Allegheny Reservoir, PA	2
Black River Flow	2
Cazenovia Lake	2
Chittenden Reservoir, VT	2
Effley Falls Reservoir	2
Francis Lake	2
Gennesse River	2
Lake Flower	2
Leland Pond	2
Limekiln Lake	2
Moose River	2
Niagara River	2
Otisco Lake	2
Raquette River	2
Spruce Run Reservoir, NJ	2
Black Lake	1
Blue Mountain Lake	1

Stillwater Reservoir: Previous waterways visited, 2014	# visits
Butterfield Lake	1
Canadarago Lake	1
Canadice Lake	1
Candlewood Lake, CT	1
Chubb Lake	1
Delaware Bay, DE	1
Deleware River	1
DeRuyter Lake	1
Dorchester, NH	1
Dutchess County	1
Fish Creek Ponds	1
Florida	1
Follensby Clear Pond	1
Forked Lake	1
Goodyear Lake	1
Goose Pond, MA	1
Grasse River	1
Great Sacandaga Lake	1
Hemlock Pond	1
Honeoye Lake	1
Hudson River	1
Indian Lake	1
Irondequoit Creek, NY	1
Jennings Pond	1
Kasoag Lake	1
Kiawassa Lake	1
Lackawanna Lake, Scranton, PA	1

Stillwater Reservoir: Previous waterways visited, 2014	# visits
Lake Moraine	1
Lake Pleasant	1
Lake Welch	1
Lewis Creek, VT	1
Mississippi	1
Mississippi River	1
Mohawk River	1
Neversink Reservoir	1
Otsego Lake	1
Paradox Lake	1
Piercefield Flow	1
Polliwog Pond	1
Port Bay Wilcott NY	1
Sacandaga Lake	1
Sandy Creek	1
Sandy Pond, Pulaski area	1
Seneca River	1
Seventh Lake	1
Susquehanna River, PA	1
Swinging Bridge Reservoir	1
Tionesta Lake	1
Twitchell Creek	1
Watertown, NY	1
West Lake	1
Yellow Lake	1
Total	**1290**

State of Boat Registration





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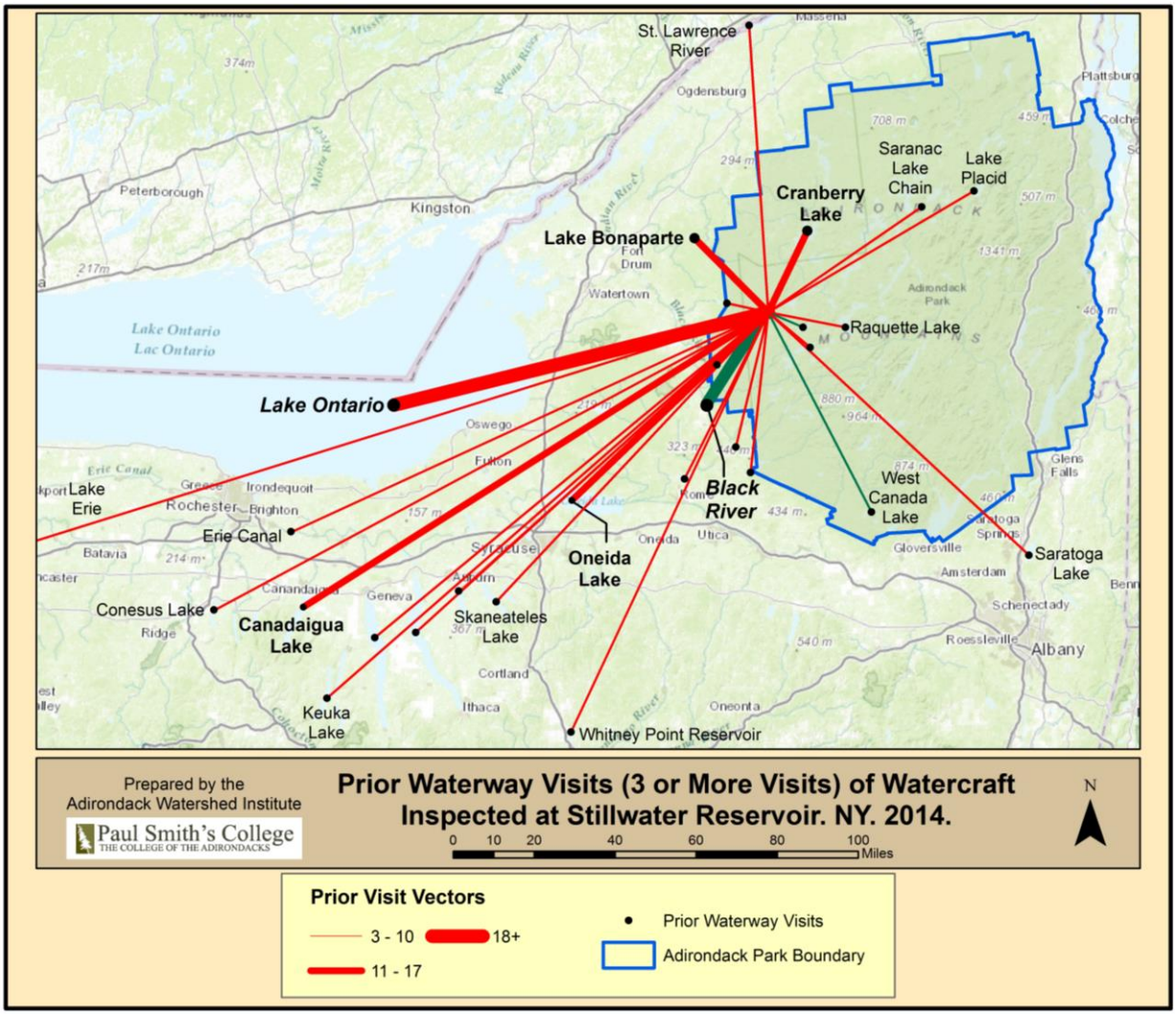
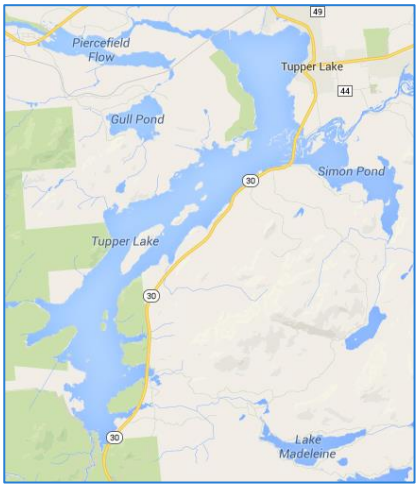


Waterways visited in previous 2 weeks by incoming vessels to Stillwater Reservoir. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Tupper Lake

Boats inspected: 1,951 **% of visitors taking spread prevention measures: 64%**
AIS intercepted: 6 **% inspected boats with organisms: 6%**
 # visitors: 3,906 **# of previously visited waterways: 83**



Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Tupper Lake	1394	58	6	271	211	4	3	2	2	1951
percentage of total boats	71%	3%	0%	14%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Tupper Lake	3906	12	98	102	1654	6%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Tupper Lake	1043	422	588	106	1	22	7	346	56	1625
percentage of total # groups asked	64%	26%	36%	7%	0%	1%	0%	21%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Tupper Lake	2	1	1	2	75	2	1	0	0	0	2	0	1	7	10	6	6	0.4%
percentage of organisms removed	2%	1%	1%	2%	68%	2%	1%	0%	0%	0%	2%	0%	1%	6%	9%	5%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Tupper Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Curly-leaf pondweed	1	None (1)	0	N/A
Eurasian water milfoil	2	Oneida Lake (1), Tupper Lake (1)	0	N/A
Water chestnut	2	None (2)	0	N/A
Zebra mussel	0	N/A	1	None (1)
Totals	**5**		**1**	

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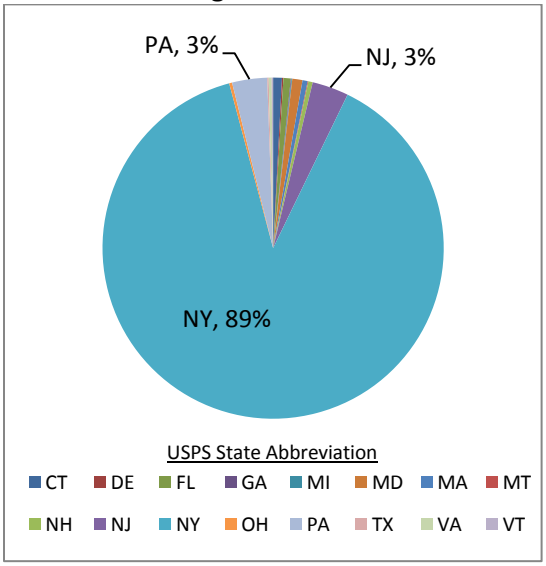
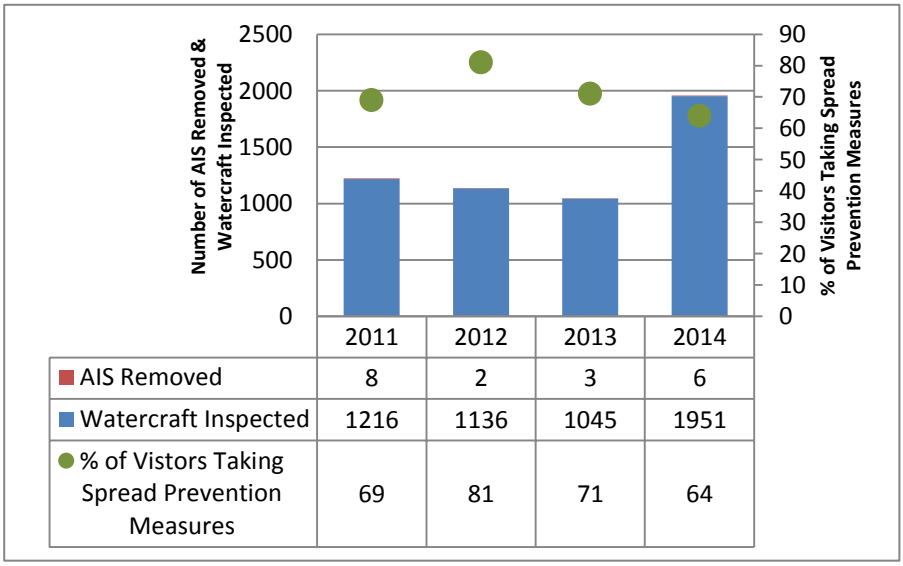
Tupper Lake: Previous waterways visited, 2014	# visits
Tupper Lake	772
None	495
Did not ask	52
Long Lake	50
Raquette River	40
Rental	26
Upper Saranac Lake	23
Lake Flower	17
Cranberry Lake	15
Lake Placid	14
Saranac Lake Chain	9
Lake George	8
Blue Mountain Lake	7
Lower Saranac Lake	7
St. Lawrence River	7
Follensby Clear Pond	6
Hudson River	6
Raquette Lake	6
Fish Creek Ponds	5
Lake Ontario	5
Canandaigua Lake	4
Chateaugay Lake	4
Mohawk River	4
Oneida Lake	4
Schroon Lake	4
Atlantic Ocean	3
Indian Lake	3
Lake Champlain	3
Lake Moraine	3
Middle Saranac Lake	3

Tupper Lake: Previous waterways visited, 2014	# visits
Spitfire Lake	3
Chesapeake Bay, Atlantic Ocean	2
Conesus Lake	2
Genesee River	2
Great Sacandaga Lake	2
Honeoye Lake	2
Lake Adirondack	2
Lake Durant	2
Lake Eaton	2
Harris Lake	2
Lehigh River	2
Little Wolf Pond	2
Piercefield Flow	2
Sacandaga Lake	2
Saratoga Lake	2
Stillwater Reservoir	2
Stony Brook	2
Unknown Lake	2
West Canada Lake	2
Bantam Lake, CT	1
Black River	1
Butterfield Lake	1
Canada	1
Carry Falls Reservoir	1
Cascade Lake	1
Cayuga Lake	1
Chazy Lake	1
Eagle Crag Lake	1
Erie Canal	1
Essex Chain of Lakes	1

Tupper Lake: Previous waterways visited, 2014	# visits
Floodwood Pond	1
Horseshoe Pond	1
Lake Erie	1
Lake Lonely	1
Lake Pleasant	1
Lake Zoar, CT	1
Little Clear Pond	1
Little Wolf Lake	1
Little York Lake	1
Moose River	1
Mountain View Lake	1
Nabnasett Lake, Massachusetts	1
Pleasant lake	1
Polliwog Pond	1
Raquette Pond	1
Rollins Pond	1
Round Lake	1
Seneca River	1
Shcroon River	1
Silvia Lake	1
Silvia Lake, Edwards, NY	1
Skaneateles Lake	1
Stony Creek Ponds	1
Sylvan Lake, PA	1
Umbagog Lake, NH	1
Union Falls Flow	1
Upper St Regis Lake	1
Total	**1682**

State of Boat Registration





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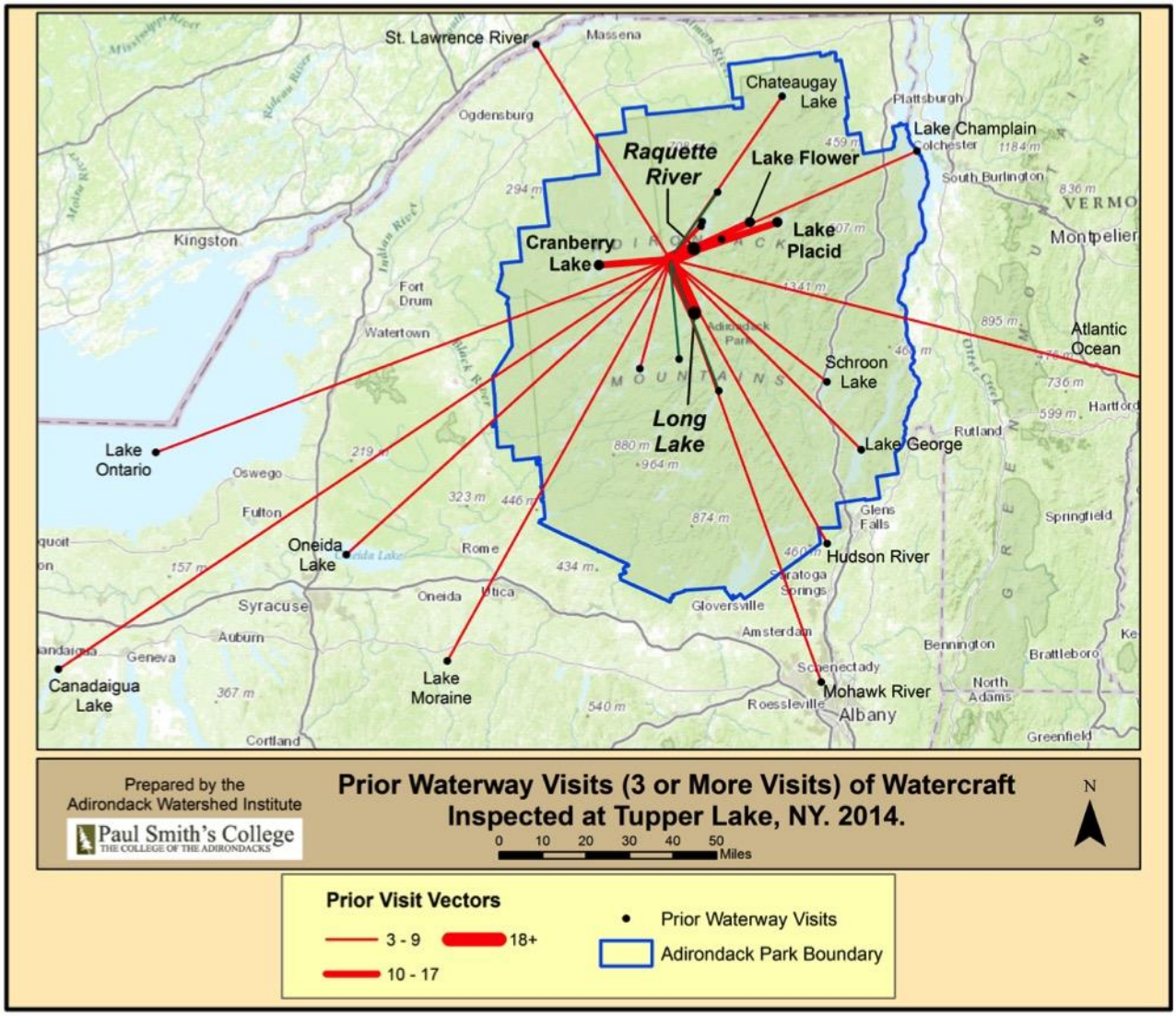


Waterways visited in previous 2 weeks by incoming vessels to Tupper Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Upper St. Regis Lake

Boats inspected: 790 **% of visitors taking spread prevention measures: 69%**
AIS intercepted: 0 **% inspected boats with organisms: 10%**
 # visitors: 1,303 **# of previously visited waterways: 93**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Upper St. Regis Lake	266	1	3	252	259	3	6	0	0	790
percentage of total boats	34%	0%	0%	32%	33%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Upper St. Regis Lake	1303	39	34	57	559	10%

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

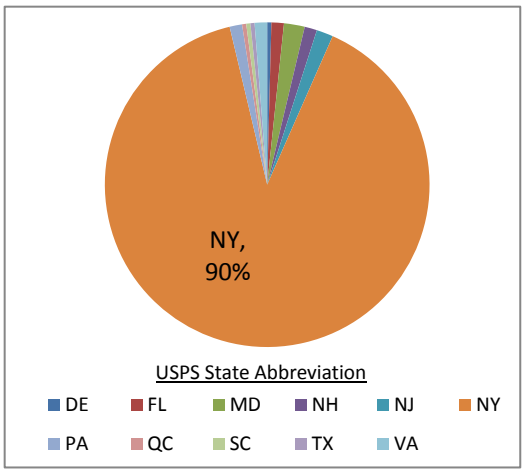
Waterbody	# groups taking AIS spread prevention measures									# groups asked	# groups using boat wash
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask		
Upper St. Regis Lake	377	140	273	87	1	3	0	100	32	546	130
percentage of total # groups asked	69%	26%	50%	16%	0%	1%	0%	18%	NA		24%

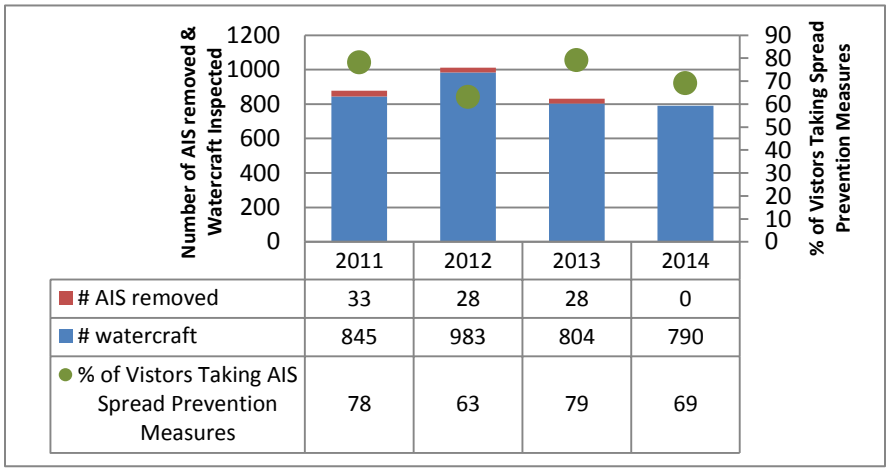
Yes = took one or more AIS spread prevention measures; I = inspected boat; WB = washed boat; DB = drained bilge; BB = emptied bait bucket; LW = drained livewell; Dis = disposed of unused bait; Dry = dried boat.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Upper St. Regis Lake	6	0	1	0	18	0	3	0	22	0	0	0	0	6	2	15	0	0%
percentage of organisms removed	8%	0%	1%	0%	25%	0%	4%	0%	30%	0%	0%	0%	0%	8%	3%	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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

State of Boat Registration





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Upper St. Regis: Previous waterways visited, 2014	# visits
Upper St Regis Lake	166
None	103
Did not ask	35
Lake Flower	17
Rental	16
Osgood pond	14
Upper Saranac Lake	14
Tupper Lake	12
Lake Champlain	10
Rollins Pond	10
Saranac Lake Chain	10
Unknown Lake	9
Lake Clear	6
Little Clear Pond	6
Follensby Clear Pond	5
Lake Colby	5
Long Lake	5
Lower Saranac Lake	5
Franklin Falls Flow	4
Lake Placid	4
Meacham Lake	4
Raquette River	4
Black Pond	3
Chateaugay Lake	3
Chazy Lake	3
Cranberry Lake	3
Moose Pond	3
Mountain View Lake	3
Saranac River	3
Schroon Lake	3
Second Pond	3
St. Lawrence River	3
Atlantic Ocean	2
Buck Pond	2
East Branch St. Regis River	2
Fish Creek Ponds	2
Forked Lake	2
Green Pond, NJ	2
Hoosic River	2
Horseshoe Lake	2
Lake Erie	2
Lake Kushaqua	2
Loon lake	2
Lower St. Regis Lake	2
Middle Saranac Lake	2
Mirror Lake	2
Oneida Lake	2
Rainbow Lake	2
Rat Pond	2

Upper St. Regis: Previous waterways visited, 2014	# visits
Sumner Brook	2
Albany, NY	1
Ausable River	1
Barnum Pond	1
Bog Pond	1
Canandaigua Lake	1
Cazenovia Lake	1
Charles River, MA	1
Chubb River	1
Church Pond	1
Clear Pond	1
Finger Lakes	1
Floodwood Pond	1
Grass Pond	1
Great Sacandaga Lake	1
Hoel Pond	1
Horseshoe Pond	1
Indian Lake	1
Jones Pond	1
Lake Everest	1
Lake George	1
Lake Ontario	1
Lake Wentworth	1
Lens Lake	1
Long Lake (near Tupper)	1
Long Pond	1
Manatee River, Bradenton Fl.	1
Mill Pond	1
Mohawk River	1
Moody Pond	1
Moon Lake	1
Nanticoke Lake	1
Navesink River, NJ	1
North Branch Saranac River	1
Otsego Lake	1
Polliwog Pond	1
Potomac River, Virginia	1
Quebec, Canada	1
Raquette Lake	1
Ray Brook	1
Richville Pond, VT	1
Round Lake	1
Silvia Lake	1
St. Regis River	1
Vermont	1
Waterbury Reservoir, Vermont	1
Wickham Lake	1
Total	**578**

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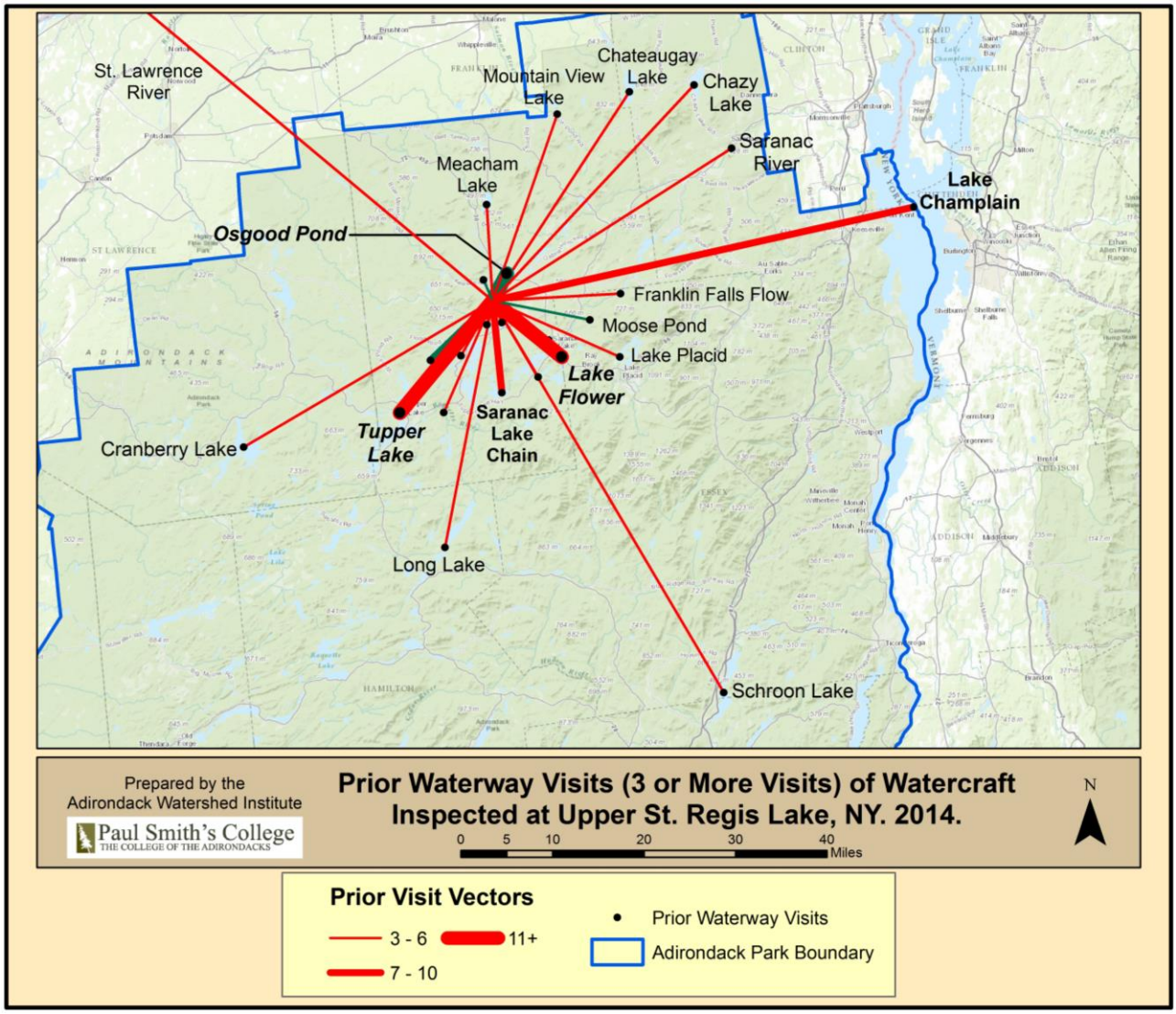
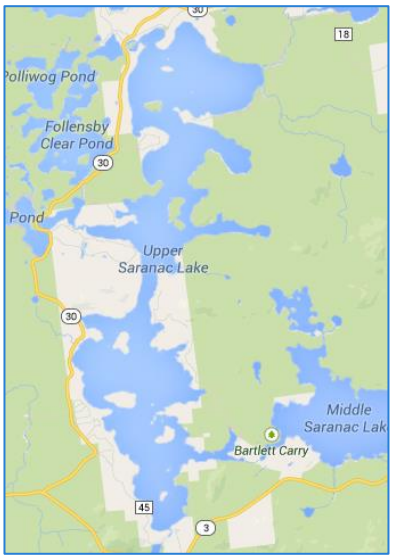


Waterways visited in previous 2 weeks by incoming vessels to Upper St. Regis Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

Upper Saranac Lake

Boats inspected: 955 **% of visitors taking spread prevention measures: 76%**
AIS intercepted: 0 **% inspected boats with organisms: 4%**
 # visitors: 2,403 **# of previously visited waterways: 52**



Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
Upper Saranac Lake	723	60	17	77	74	0	0	4	0	955
percentage of total boats	76%	6%	2%	8%	8%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
Upper Saranac Lake	2403	16	24	35	819	4%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
Upper Saranac Lake	628	363	356	111	0	20	2	189	43	827
percentage of total # groups asked	76%	44%	43%	13%	0%	2%	0%	23%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
Upper Saranac Lake	1	0	0	0	9	3	0	0	9	0	0	0	0	9	1	8	0	0%
percentage of organisms removed	3%	0%	0%	0%	23%	8%	0%	0%	23%	0%	0%	0%	0%	23%	3%	20%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

Upper Saranac Lake: Previous waterways visited, 2014	# visits
Upper Saranac Lake	309
None	223
Did not ask	44
Lake Flower	31
Lake Placid	31
Lower Saranac Lake	26
Rental	22
Tupper Lake	21
Lake Champlain	20
Fish Creek Ponds	14
Upper St Regis Lake	12
Chateaugay Lake	11
Lake Ontario	9
Long Lake	8

Upper Saranac Lake: Previous waterways visited, 2014	# visits
Rainbow Lake	7
Lake Clear	6
St. Lawrence River	6
Hoel Pond	4
Hudson River	4
Middle Saranac Lake	4
Atlantic Ocean	3
Cayuga Lake	3
Church Pond	3
Loon Lake	3
Lower St. Regis Lake	3
Mohawk River	3
Big Moose Lake	2
Lac-Brome, Quebec	2

Upper Saranac Lake: Previous waterways visited, 2014	# visits
Lake Colby	2
Lake Erie	2
Lake George	2
Osgood pond	2
Round Pond	2
Saranac Lake Chain	2
Seventh Lake	2
Sunday Pond	2
Unknown Lake	2
Candlewood Lake, CT	1
Chazy Lake	1
Chesapeake Bay, Atlantic Ocean	1
Erie Canal	1
Follensby Clear Pond	1

Upper Saranac Lake: Previous waterways visited, 2014	# visits
Great Sacandaga Lake	1
Hinckley Reservoir	1
Jones Pond	1
Meacham Lake	1
Mirror Lake	1
Oneida Lake	1
Owasco Lake	1
Raquette River	1
Sacandaga Lake	1
Saratoga Lake	1
Silver Lake, Perry, NY	1
Stony Creek Ponds	1
Taylor Pond	1
Total	**870**

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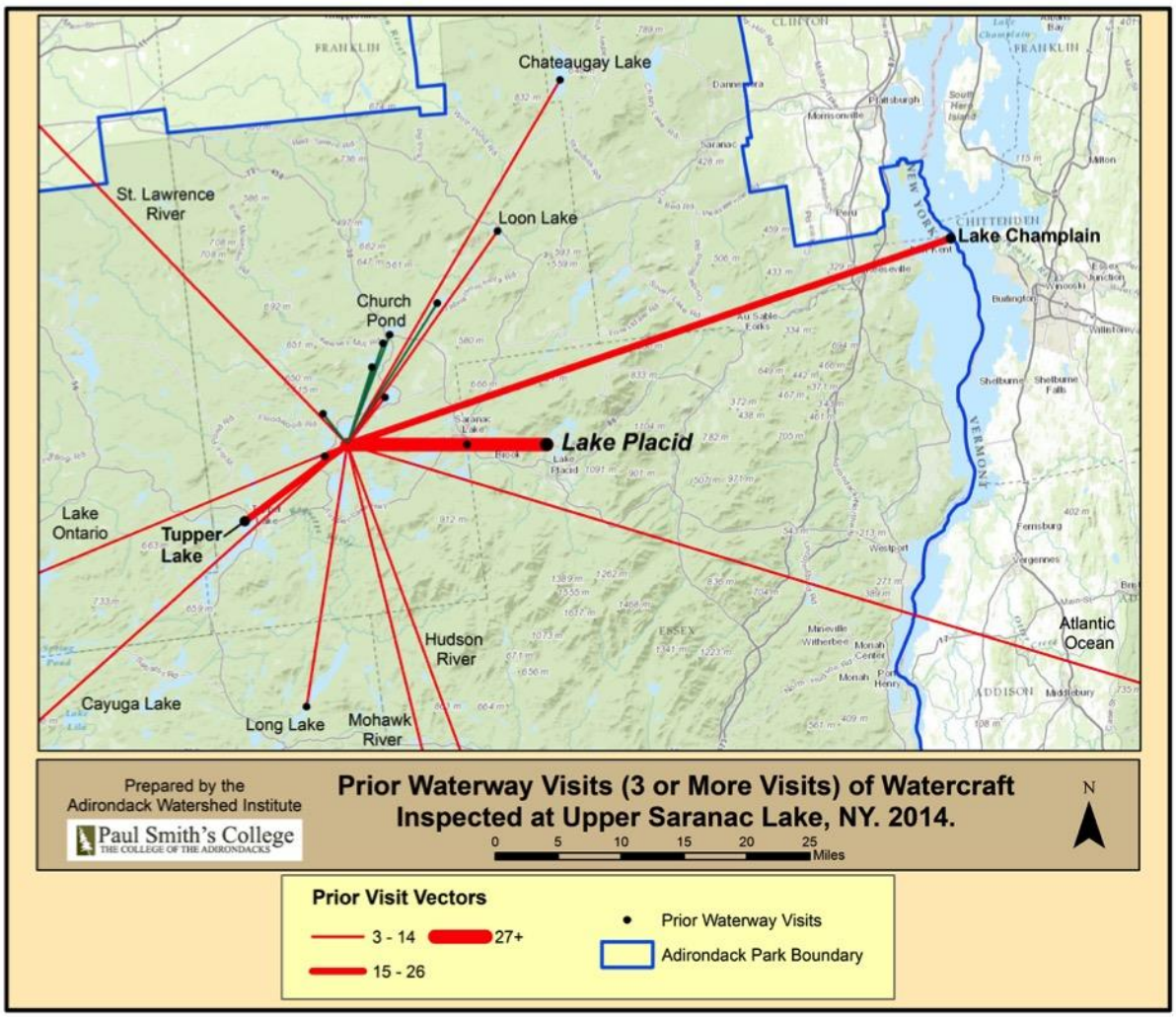
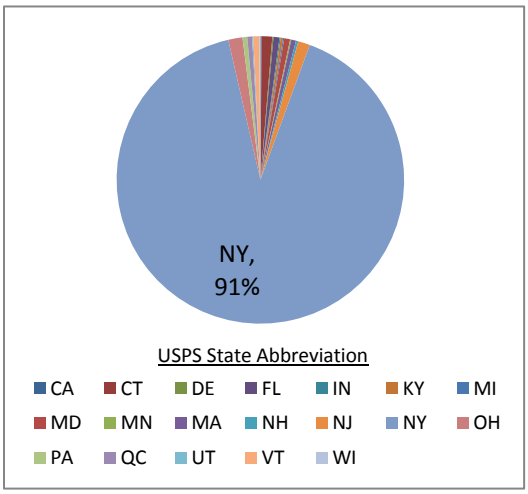


Waterways visited in previous 2 weeks by incoming vessels to Upper Saranac Lake. Vectors weighted to denote quantity of visits to previous waterbodies. Green vectors indicate visit to waterbodies uninfected with AIS; red vectors indicate previous visit to waterbodies with one or more AIS present.

State of Boat Registration



White Lake

Boats inspected: 462 **% of visitors taking spread prevention measures: 39%**
AIS intercepted: 1 **% inspected boats with organisms: 1%**
 # visitors: 968 **# of previously visited waterways: 20**

Waterbody	Boat Type									total # boats
	M	PWC	S	C	K	B	R	SUP	Docks	
White Lake	246	84	7	108	8	0	3	6	0	462
percentage of total boats	53%	18%	2%	23%	2%	0%	1%	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

Waterbody	total # people	organisms found		# boats dirty	# of inspections	% of inspected boats dirty
		entering	leaving			
White Lake	968	2	0	2	396	1%

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

Waterbody	# groups taking AIS spread prevention measures									# groups asked
	yes	I	WB	DB	BB	LW	Dis	Dry	didn't ask	
White Lake	155	39	38	3	0	0	0	123	1	395
percentage of total # groups asked	39%	10%	10%	1%	0%	0%	0%	31%	NA	

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.

Waterbody	Organism Type																total AIS	% of inspected boats with AIS
	BW	CLP*	ELO	EWM*	GRS	NM	UM	VLM*	PN	SWF*	WC*	H*	ZM*	NP	WL	other		
White Lake	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3%
percentage of organisms removed	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%		

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; H= Hydrilla; ZM = Zebra mussel; NP= native pondweed; WL= water lily; */AIS = aquatic invasive species.

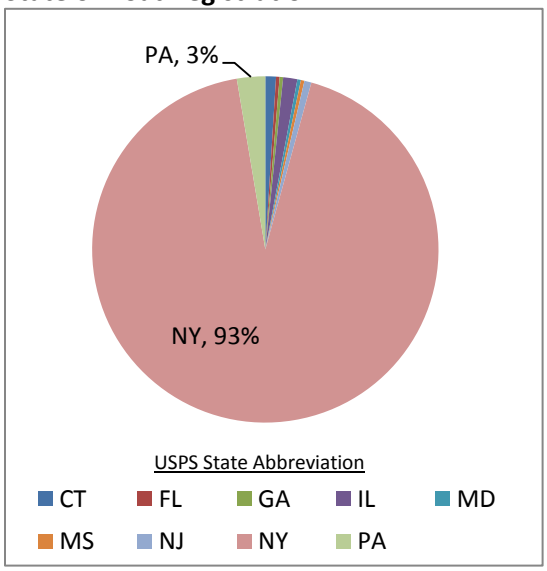
White Lake: Aquatic Invasive Species Intercepted by Stewards, 2014	# found on boats launching	Previous Waterway	# found on boats retrieving	Previous Waterway
Eurasian water milfoil	1	Oneida Lake (1)	0	N/A

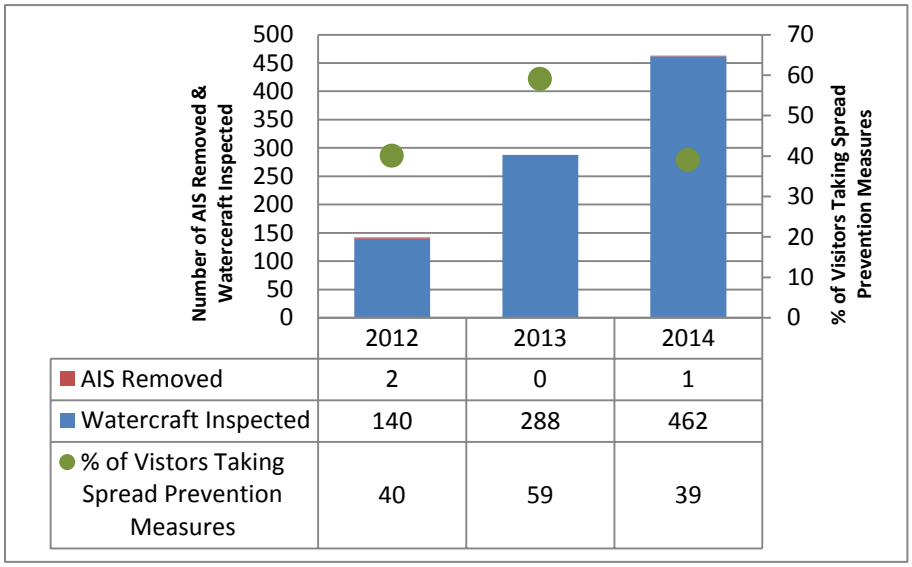
Adirondack Watershed Institute Stewardship Program
Dr. Eric Holmlund, Director. P.O. Box 265, Paul Smiths NY, 12970
Telephone: (518) 327-6341. Email: eholmlund@paulsmiths.edu

White Lake: Previous waterways visited, 2014	# visits
None	346
White Lake	9
Did not ask	8
Big Moose Lake	4
Fulton Chain of Lakes	4
Oneida Lake	3
Delta Lake	2
Hinckley Reservoir	2
Kayuta Lake	2
Mirror Lake	2
Otter Lake	2
Bear Creek	1

White Lake: Previous waterways visited, 2014	# visits
Canandaigua Lake	1
Cazenovia Lake	1
Conesus Lake	1
Dalhousie Lake, Ontario	1
Lake Pleasant	1
Long Lake	1
Otisco Lake	1
Raquette Lake	1
Seventh Lake	1
Stillwater Reservoir	1
West Canada Creek	1
Total	**396**

State of Boat Registration





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Paul Smith's College
THE COLLEGE OF THE ADIRONDACKS

Appendices

	Sam Durfey is a senior at the University of Alabama majoring in Microbiology. She is a returning steward from Tupper Lake, where she worked for most of the summer. She also worked as a technician on the tick sampling research project overseen by Paul Smith's professors Dr. Lee Ann Sporn and Dr. Dave Patrick in collaboration with the NYS Department of Health and Trudeau Institute.
	Sue O'Reilly is a native of Saranac Inn, NY. She is a U.S. Air Force Veteran who earned her biology degree from the University of New Orleans in 2009. After many seasons spent on American research stations in Antarctica, she is very happy to be home and working to preserve the beautiful environment of the Adirondacks.
	Alex Wall is from Williamsburg, Virginia. He attends Longwood University in Farmville, Virginia with a major in Environmental Science and a minor in Theatre. Being a Watershed steward seemed like the perfect experience to Alex; learning and spreading awareness about an important topic that affects all of us. He switched majors several times before figuring out he wanted to become an active part in helping our planet. He also enjoys cycling, canoeing, and any other outdoor activity he can find time for!

	Brendan Tully is from Carmel, NY. He is a graduate of Carmel High School and a senior pursuing a degree in Natural Resource Management and Policy at PSC. Brendan was excited to be a part of the Watershed Stewardship Program this summer and prevent the spread of AIS. Many of the waterways near his home in the Lower Hudson Valley have been overrun with invasive species. He found it exciting to take part in a program that aims to prevent this from happening to the water bodies in the Adirondacks.
	Eric Swiecki grew up in the small town of Boonville, NY. He is currently pursuing a degree in Biology with minors in Chemistry and Geographic Information Systems at PSC. He enjoys spending time with friends and being outdoors. When asked why he wanted to be a watershed steward, Eric said "The position with the Watershed Institute interested me because I believe the fight against invasive species is a very important one. We need to preserve our native species so that future generations can enjoy the gorgeous wilderness that we all know and love."
	Kathleen Pearson hails from Potsdam, NY where she studies Community Health and Fitness at the State University. She has been forming a lifelong respect and relationship with the environment and the Adirondacks, partaking in sports popular in the park such as whitewater rafting, kayaking/canoeing, road biking, skiing, and more. Having previously attended a semester abroad focusing on zero-waste sustainability, aquatic invasive species research, and community outreach; being a steward in the Adirondacks seemed to fill an optimal niche.

	Zack Floss grew up in Honeoye Falls, NY. He studied Political Science and Philosophy at SUNY Geneseo and graduated in 2011. He is presently pursuing a BA in Environmental Studies. His interests include backpacking, paddling, and a variety of other outdoor activities. He joined the AWISP from a desire to protect the Adirondack lakes and forests that he loves.
	Agnes Link-Harrington is from Brooklyn, New York. She is pursuing a degree in Geology with a minor in Math at SUNY Geneseo. Her interests include hiking, kayaking and going on adventures. She is involved with the founding of Geneseo's first housing and food cooperative. She also led SUNY Geneseo's CSA program and Geology Club. She is glad to be a part of the AWISP because she has been coming to the Adirondacks her entire life and stewarding gives her the opportunity to help preserve the beautiful area that she loves!
	Matt Koester grew up in Califon, NJ. He is a double major in Economics and Environmental Studies at Denison University in Ohio. His interests include cycling, climate change, and traveling. Matt became a steward for the opportunity to live in the Adirondacks for a summer.

	Lizzie Myers is a senior at PSC where she's studying Natural Resource Management and Policy. Her love for the outdoors was her motivation for joining the AWISP. She believes it's important to maintain clean, invasive free waters so people can continue to enjoy the recreational activities they provide. In her free time she enjoys hiking and camping.
	Josh Howard is from Hampstead, NH. He is a fresh graduate of PSC with a Bachelors in Recreation, Adventure Travel, and Ecotourism. He spends most of his time hiking, reading, biking, and rock climbing. He loves exploring the Adirondacks and he feels compelled to help protect it.
	Kristel Guimara hails from Saranac Lake, New York. She has a Bachelor's degree in Biology with a concentration in Environmental Science from PSC. She has a Master's Degree in Conservation Biology from Green Mountain College located in Poultney, Vermont. Currently, Kristel is an adjunct instructor at North Country Community College where she hopes to instill a sense of place that goes beyond literature, research and endless days on top of a mountain.

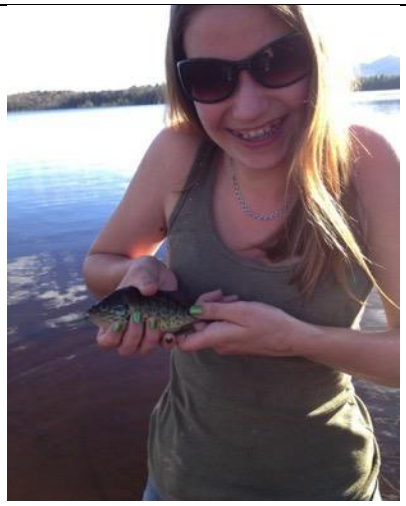
	Jake Sporn is a recent graduate of PSC with a Bachelors of Arts in Business and a minor in Natural Resource Sustainability. He became a steward to help preserve the many waterways in which he grew up using. He enjoys biking, skiing, hiking and pretty much anything else that involves being outside. He's also a professional photographer and beekeeper.
	Teresa Troy (aka: Tree) is a Paul Smith's College alum. She graduated in 2008 with a Bachelor's in Fish and Wildlife Science. Since then she has worked on Alaskan fishing boats, hiked the Pacific Crest Trail, and beaten leukemia (Two years in remission. Woohoo!!). Her dream is to live and work in the Adirondack Park.
	Megan Johnson just finished her second year at SUNY New Paltz as a Geology major. Megan is a hard worker and spends her free time with family and friends and enjoys the outdoors. She came across this job from her academic advisor at school and found it to be the perfect fit. It provided the opportunity to increase her knowledge of the subject while also making a difference in her home area during the summer.

	Jorge Velazquez is from North Caldwell, NJ. He majors in Biology at PSC. Jorge stewarded at Second Pond, Lake Flower, Lake Placid, and Upper St. Regis. One fun fact about Jorge is he is the President of the Veterans Association of PSC.
	Susan Cragg attended PSC before transferring to Iowa State University where she presently studies Biology and Genetics. Susan was a steward in the Tri-Lakes region for the 2014 field season.
	Dan Johnson is from Sayville, NY. He graduated from SUNY Potsdam with a degree in Environmental Studies and a minor in Biology. Dan's interests include fly fishing, bow hunting, skiing and camping. He is a returning steward from last season and worked primarily at Raquette Lake.

	Ashley Loggins was born and raised in Albany, NY and is entering her junior year at Clarkson University in Potsdam. She is a double major in Chemistry and Biomolecular Science. She is a member of the Clarkson Women's Basketball Team, and she enjoys hiking and any type of outdoor or physical activities. Ashley decided to work for the AWISP because she has grown to appreciate nature and the environment, specifically the Adirondacks, and she wants to help protect our watersheds. She was located at the Saratoga Lake State Boat Launch this summer.
	Paul Garrison is in his senior year at PSC, where he is pursuing a degree in Environmental Studies. Paul is originally from Albany, NY but moved to Petersburg, NY a few years ago. His family owns a summer home on Fourth Lake that he visits frequently throughout the summer. His favorite outdoor activities include fishing, kayaking, and water skiing. Paul chose to be a steward because he wanted to protect the lakes that he has grown up on and loves so much. He is a returning steward from 2013.
	Nick Georgelas is a sophomore at PSC pursuing a degree in Natural Resource Management & Policy. He became a steward because he wants to help protect the Adirondack lakes and ponds that he grew up on and hopes to inspire others to do the same.

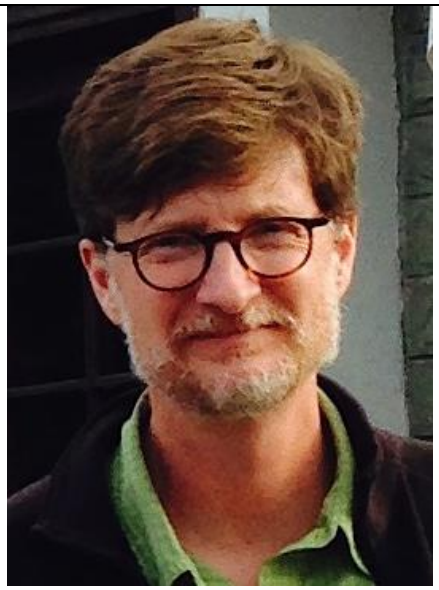
	Christiaan King is originally from Allegany, NY and earned his B.S. in Biology from PSC in 2011. When asked why he wanted to be a steward, Christaan said, “Here in the Adirondacks we are fortunate to have such abundance in freshwater supplies, maintaining the health of our aquatic ecosystems is fundamental for our continued enjoyment of these waterways!” In his spare time Christiaan likes to vegetable garden and is actively involved in tick ecology research.
	Deanna Pfau is a recent graduate of PSC. She was a returning steward this summer, and worked at the Lake Placid Boat Launch a few days per week. Deanna has spent most of her life in the Adirondacks and continues to enjoy living and working in a place so special to her.
	Tyrah Pollack graduated in May 2014 from the SUNY-ESF Ranger School in Wanakena with an A.A.S. in Forest Technology. She is currently pursuing her Bachelors at SUNY-ESF in Syracuse with an interest in entomology. She has always been interested in the way the environment works, why certain things die, and how they can be prevented. She chose to become a steward because it fits in perfectly with what made her choose this degree in the first place, and it allows her to help spread awareness.

	Shayne Pendergast is from Saratoga Springs, NY and is a sophomore at Clarkson University where he studies Chemical Engineering. When Shayne isn't stationed at the boat launch or out in the field doing research, he is out fishing and enjoying the fresh air. Shayne was stationed at Chateaugay Lake and was excited to be able to protect the lake against AIS because his family has owned a house on the lake for 11 years. When he saw there was an opportunity to protect the lake he grew up on, he took it.
	Heather Reilly is a senior at PSC pursuing a degree in Environmental Studies. She is an avid kayaker who loves to fish from her boat. Preventing the spread of AIS is extremely important to her because without clean waters these activities would be next to impossible to enjoy. In the future, Heather plans to keep working to protect the natural environment.
	Jesse Smith is a senior at PSC pursuing a B.S. in Fisheries and Wildlife Sciences with a concentration in Fisheries, as well as a minor in Geographic Information Systems. Along with his interest in fisheries, he has a growing curiosity about invasion ecology. He believes that his native state, New Jersey, would benefit from the public education regarding invasive species that the AWI and other similar organizations provide in NY. Jesse has previously worked at Resica Falls Scout Reservation in the Pocono Mountains, PA, and at the Charles O. Hayford State Fish Hatchery in Hackettstown, NJ. He enjoys fishing, fly fishing, hiking, mountain biking, playing guitar, and listening to music.

	Margaret Empsall is from Chateaugay, NY 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 AWI as a returning steward.
	Nathan Boyer-Rechlin has ties to the Adirondacks with a family home on Osgood Pond. He graduated from Principia College in 2014 and served as the AWISP weekend supervisor in the Tri-Lakes. He now works as a whitewater rafting guide in Nepal.
	Sarah Lanthier is a recent graduate from PSC where she studied Biology. She's from Uxbridge Massachusetts and is excited to remain in the Adirondacks for another year. She became a steward for the summer to help protect the Adirondacks she now calls home. Her passion is horses and she plans on attending vet school for large animal medicine in September of 2015.

	Philip Dumais was born and raised in the small town of Perth, NY and went to high school in the Broadalbin Perth School District. He is currently enrolled at PSC as a Fisheries and Wildlife major and hopes to become a DEC Environmental Conservation Officer. Philip's interests include anything that involves being in the great outdoors. He became a steward because he felt it would be a great way to interact with and educate the public about the current issues in the Adirondacks related to invasive species. He split his time working at Great Sacandaga Lake and Saratoga Lake.
	Nathan Piché is currently a student of Ecological Forest Management at PSC. He is from Hoosick Falls NY and graduated from Hoosick Falls Central High School in 2011. It was in that rural small town where he developed strong interests in agriculture, forests and water resources which inspired him to pursue a degree in natural resource management, specifically forestry. Through his formal education at Paul Smith's and love for the outdoors, he is learning to be a steward of our essential natural resources.
	Jacqueline McCabe was the Regional Supervisor for the Tupper Lake Region. She worked for the AWISP as a steward in 2013 and continued employment in the spring of 2014 as Communications Assistant. She graduated from Paul Smith's College in 2013 with a Bachelor's in Environmental Studies and is pursuing a Master's Degree in Environmental Interpretation at SUNY-ESF.

	Zachary Simek was the Regional Supervisor for the west-central Adirondack region. He is a 2013 graduate of Paul Smith's College with a Bachelors of Science in Natural Resource Management and Policy and a minor in Geographic Information Systems. He is a returning staff member, having served as a steward in 2013. He enjoys hiking, fishing, hunting, and a variety of other outdoor pursuits.
	Dr. David Patrick was the 2014 AWISP Science Director. He is a conservation biologist with a particular interest in the effects of climate change and habitat alteration on the distribution and abundance of biodiversity. He holds a BSc in Zoology and Animal Ecology from the University of Wales, Bangor; an MSc in Conservation Biology from the Durrell Institute of Conservation and Ecology; and a Ph.D. in Wildlife Ecology from the University of Maine, Orono. His career has included work in the northeastern United States, Tanzania, Nepal, Ireland, and the United Kingdom. His favorite pastime is exploring the Adirondacks with his wife Elizabeth and their two daughters, Rose and Iris.
	AWISP Assistant Director Kathleen Wiley is working with the AWISP for the fourth 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.



Dr. Eric Holmlund is Interim Dean of Commercial, Applied and Liberal Arts at Paul Smith's College as well as the Director of the AWISP. 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.

Appendix B: 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 (AWISP) 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 AWISP 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 AWISP 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 AWISP 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. AWISP 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)

Appendix C: Quality Assurance Project Plan, Lake Champlain Basin Boat Launch Steward Programs

BOAT LAUNCH STEWARD PROGRAM INFORMATION

Program name: Lake Flower Boat Launch Steward

Organization name: Adirondack Watershed Institute Stewardship Program, Paul Smith's College

Program Manager: Eric Holmlund, Director, AWISP, Paul Smith's College, Box 265, Paul Smiths, NY 12970. 518-327-6341

Program QA Officer: Eric Holmlund, Director, AWISP, Paul Smith's College, Box 265, Paul Smiths, NY 12970. 518-327-6341

Date submitted: 4/7/14

Steward Program start date: 5/19/14

Steward Program end date: 9/1/14

Steward Program location(s): Lake Flower State Boat Launch, Saranac Lake, NY. (44.323280, -74.125614)
Number of stewards managed: 1
Anticipated number of hours and days per week of work: 40 hrs/5 days

Problem

Definition/Background:

The LCBP AIS Spread Prevention Grant would help underwrite the full cost of the Watershed Stewardship Program's watercraft inspection and AIS monitoring efforts at locations in the headwaters of the Lake Champlain Basin, specifically Lake Flower. Stewards prevent the spread of AIS by performing careful inspections of all watercraft launched and retrieved at 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. In 2012, our steward at Lake Flower removed vegetation on 267 boats (8% of boats launching, 36% of boats retrieving) including 36 instances of Eurasian watermilfoil (*Myriophyllum spicatum*) while inspecting 1,498 boats and educating 2,995 users.

The AWISP is designed to address the threat of nonnative aquatic nuisance species as called for by the *Opportunities for Action* report. The Saranac Lake area has documented infestations of Eurasian watermilfoil, variable leaf milfoil, curly-leaf pondweed, purple loosestrife and Japanese knotweed. Stewards posted at Lake Placid and Second Pond in the past have intercepted dozens of plant fragments that would otherwise have entered these waterways. The watershed stewards for 2014 will inform thousands of visitors about these issues. By assessing the health of shoreline habitat for purple loosestrife, the watershed steward will also work to restore native species in wetlands, another *Opportunities for Action* priority.

APPROVALS

The generic Quality Assurance Project Plan – to which this page is an amendment – was first prepared by the LCBP in 2011 and revised in 2014 for use by NEIWPCC-funded boat launch steward programs within the Lake Champlain Basin. By signing this page, the Boat Launch Steward Program Manager and QA Officer agree that they have read and will adhere to the requirements of this QAPP. If deviations from the plan are necessary, a memo explaining the changes must be reviewed and approved by the signees of the generic QAPP.