2023 Fish Creek Aquatic Invasive Species Management Project Report

Upper Saranac Foundation
It still is, and always will be, about Water Quality

Upper Saranac Foundation - Aquatic Invasive Divers

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Acknowledgements

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Table 1: Abbreviations List.

Abbreviation	Complete Text
AID	Aquatic Invasive Divers – USF Dive Crew
AIM	Aquatic Invasive Management, LLC
APIPP	Adirondack Park Invasive Plant Program
AWI	Paul Smith's College Adirondack Watershed Institute
EWM	Eurasian watermilfoil
FCAISMP	Fish Creek Aquatic Invasive Species Management Project
ISDC	Invasive Solutions Dive Company, LLC
NYSDEC	New York State Department of Environmental Conservation
Steward	Adirondack Watershed Institute Steward
USLA	Upper Saranac Lake Association
USF	Upper Saranac Foundation
VLM	Variable-leaf watermilfoil

Executive Summary

Aquatic invasive species (AIS) pose a significant threat to the Adirondack environment and economy. For more than a decade, the Upper Saranac Foundation (USF) has worked to address invasive species on Upper Saranac Lake (USL). The USF has had unprecedented success in managing AIS and could arguably be considered the leader in AIS management techniques.

The Fish Creek Aquatic Invasive Species Management Project (FCAISMP) is part of a larger watershed protection program, developed by the USF, that uses a combination of AIS prevention, monitoring, management, control activities and education to inhibit AIS spread. The USF is committed to the long-term success of maintaining the water quality of the Watershed.

The intent of this program is to combat invasive species to improve water quality and maintain native species in their natural habitats, ensuring the sustainability of our natural public resources for future generations. The program protects economic value through recreation, tourism, sportsmanship and second home ownership by providing clear waterways. Removal and control of AIS in the USL watershed at Fish Creek Campground protects downstream waters from infestation and helps prevent the export of AIS to non-infested waters. This report can be summarized in the following key points:

1. Two AIS found and targeted for removal in the waterbodies of the NYSDEC Fish Creek Campground is Eurasian watermilfoil (Myriophyllum spicatum) and Variable-leaf milfoil (Myriophyllum heterophyllum). NYS ranks Eurasian watermilfoil and Variable-leaf milfoil as the top AIS in the State based on their ecological impacts, biological characteristics, and distribution.

2. In 2016 USF developed a plan to manage AIS in Fish Creek Campground and seek funding to cover the estimated cost of the project. The goal was to restore the 108 acres of littoral campground waterfront, in addition, preventing AIS from infesting downstream and regional waters, and to prevent new AIS from establishing in the waters in the project area.

3. In 2016 the USF initiated a four-week pilot program to determine practicality and feasibility of the FCAISMP. The intent was to demonstrate the degree of the infestation and the viability of management to support prospective funding. The Pilot Program substantiated prior surveys, estimating a total cost of $160,000 for the initial intensive management period. Throughout the entirety of the initial intensive management program (2016-2019) a total of $165,720 was invested in 2,904 diver hours.

4. To begin the implementation of the FCAISMP, a fundraising campaign initiated by the USF raised over $60,000 in donations. Additional funding was awarded to the USF in the amount of $100,000 from the NYSDEC Invasive Species Rapid Response and Control Grant.

5. Three years of initial intensive management began in 2017 and concluded in 2019. 2023 was the fourth year of the maintenance phase of the FCAISMP. In past years, USF contracted independent dive companies for AIS management services. Beginning in 2022 the USF took over AIS operations by employing and supervising our own divers. The shift in administration reduced the expense to USF while providing a direct management approach that further increased efficiency.

6. A total $10,250 was invested into 205 diver work hours within the campground ponds (Upper Fish creek Pond and Square Pond) in 2023. The divers harvested 709 lbs. of milfoil (15Lbs. of EWM and 694Lbs. of VLM). The decrease in annual expenses from years prior to 2022 is attributed to the hiring of our own dive team.

7. 2022 was the first year we began tallying the number of plants harvested. Plant counts are a more accurate way of quantifying and assessing efficacy of management techniques overtime where density levels are low. A total of 7,791 plants were removed (292 EWM and 7,499 VLM) from the campground ponds.

8. With the assistance of a grant from the Parks &Trails New York in 2020 and 2021 the USF expanded the FCAISMP upstream of the campground bridge to the AIS containment booms. Beginning in 2022, AIS management for waters above the campground bridge up to the AIS booms has been funded by the USF. A total of $5,700 was invested in 114 diver work hours to remove 1,975 pounds of milfoil in 2023.

9. AWI, Watershed Stewards stationed at the Campground boat launch inspecting boats being retrieved have found significantly less AIS. Over a seven-year period, there has been an 94% reduction in AIS on watercraft being retrieved from the launch. Only two boats being removed at the campground launch were found to be carrying AIS in 2023.

10. The USF contracted Adirondack Watershed Institute (AWI) at Paul Smith's College to provide independent monitoring, evaluation and reporting of AIS control efforts in Fish Creek Campground. Plant surveys comparing AIS concentrations indicated an 92% average AIS stem density level decrease from 2017 through 2019.

11. In 2019, AIS containment booms were placed just upstream of the Fish Creek Campground boat launch to prevent fragmented invasive plants from floating downstream and being introduced into managed areas within the Campground and further downstream into Upper Saranac Lake. Since the booms were installed an estimated average of 3,000 pounds of milfoil has been removed annually.

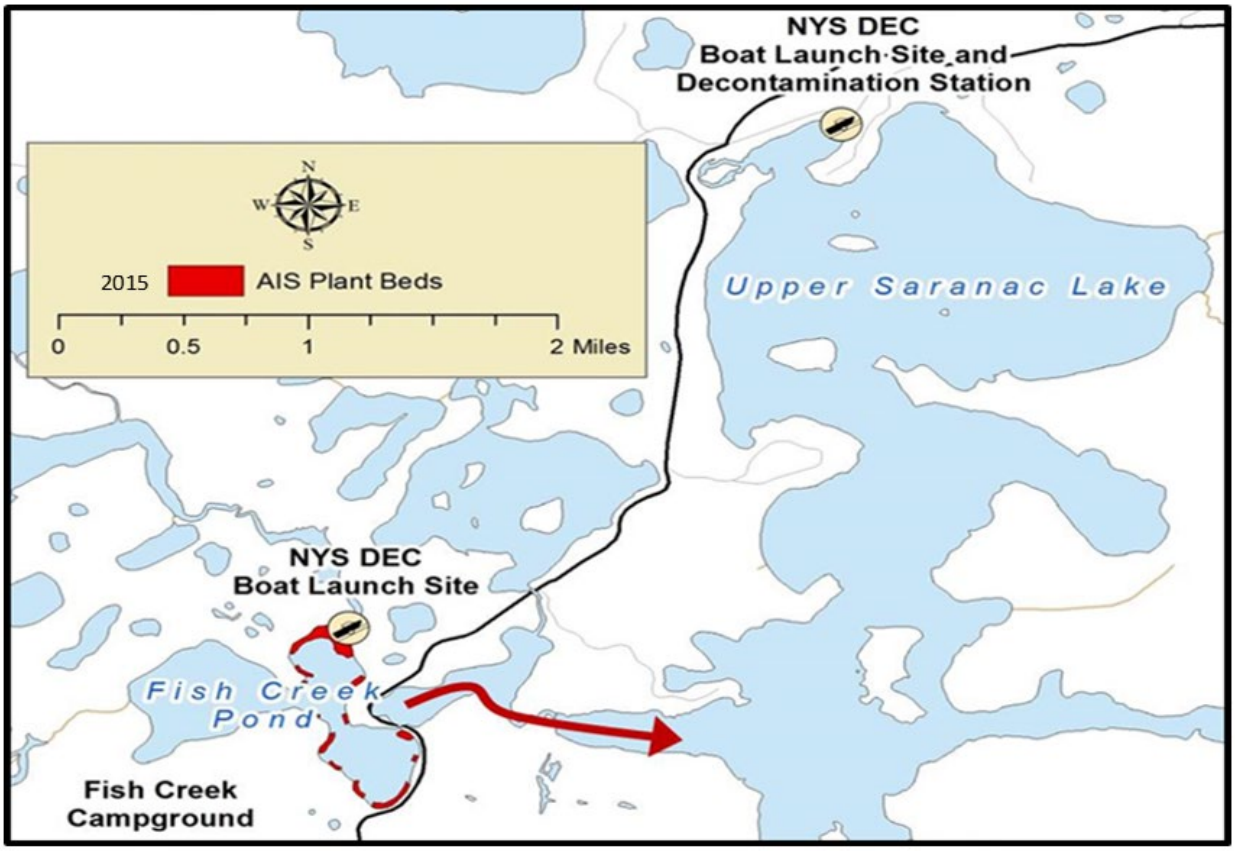
12. Since the inception of the FCAISMP, 49,862 lbs. of milfoil have been removed from the campground ponds (Upper Fish Creek and Square Ponds), another 15,525 pounds has been removed from its tributary in the creek, and approximately 15,000 lbs. of AIS has been removed from the containment booms. In total approximately 66,887 pounds (over 33 tons) of AIS have been removed from the campground and it tributary.

Introduction:

The Upper Saranac Foundation's mission is to preserve, enhance and protect the natural beauties, environmental quality and recreational enjoyment of the USL watershed. This goal is consistent with tasks delineated in the Fish Creek Aquatic Invasive Species Management Project (FCAISMP). The FCAISMP addresses the threat of AIS and protects citizens' investment in public owned lands by expanding USF's successful AIS hand harvesting program for the Saranac watershed into the NYSDEC campground at Fish Creek and upstream into the Saranac Lake Wild Forest.

Project Location

The NYSDEC Campground at Fish Creek has been a significant source for spreading AIS throughout the region. The Campground, with 355 campsites is the most used public campground in the State, averaging 120,000 annual visitors. The water bodies, Fish Creek and Square Ponds are located in the headwaters of the Saranac River watershed in the Adirondack Park of northern New York. The Saranac River is one of six major drainage basins in this region and is located within the greater Lake Champlain basin. With all campsites having direct water access, campers enjoy the opportunity for water-based recreation. Return visitation is predicated on weed-free thoroughfares. Fish Creek Pond Campground offers a natural pristine, sandy shoreline accessible to both motorized and non-motorized boats. From Square and Fish Creek Ponds, recreational users have direct access to miles of open water on Upper Saranac Lake. A trailered boat launch with a parking area is located within the Campground. Non-motorized boating opportunities are also accessible directly from the Campground.



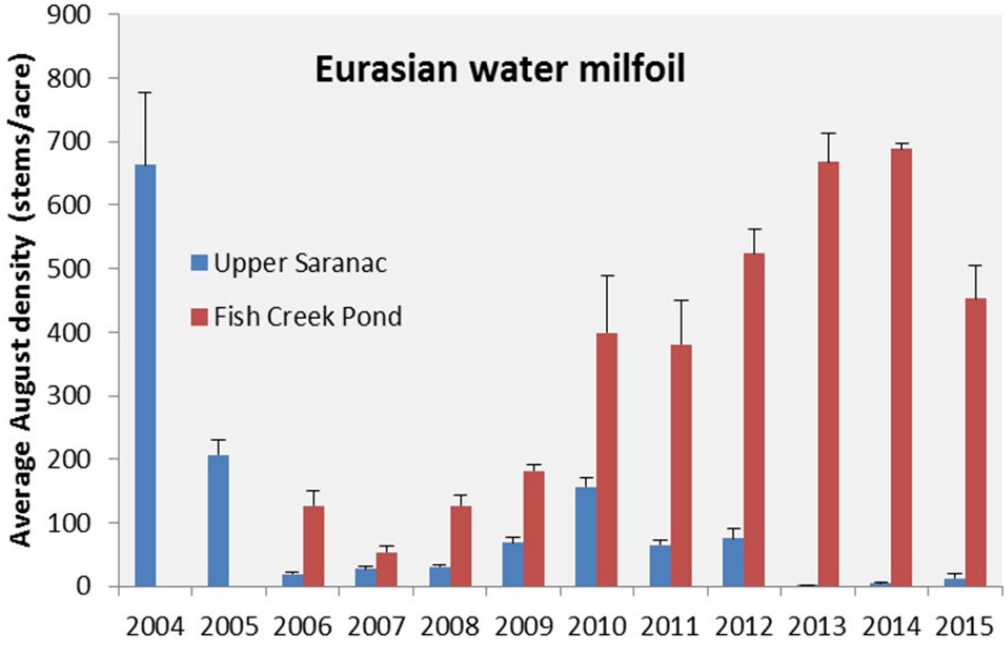
Map of project area showing location of NYS DEC boat launch sites, campground, and 2015 AIS plant beds in Fish Creek Pond. Red arrow shows direction of water flow. Channel between Fish Creek Pond and Upper Saranac Lake is navigable with large motorboats.

The Upper Saranac Foundation (USF) has been successfully managing aquatic invasive species (AIS) since 2004. The USF has reduced the once prevalent Eurasian watermilfoil, to now a rare plant on USL. Average August stem densities across all 16 Upper Saranac Lake transect sampling site locations and 588 segments in 2004 was 660 stems/acre. By 2017 the average stems/acre were 15, approximately 44 times lower than prior to initial management. By 2019, milfoil was not detected at any of the study sites. Through the efforts of hand harvesting by divers, the annual poundage of AIS removed from the Upper Saranac Lake 1,200-acre littoral zone has been reduced from 20 tons in 2004 to under 50 lbs. in 2023.

Plant Monitoring Program: A program funded by the USF was initiated in 2004 to monitor aquatic vegetation. The plant surveys are performed by the Adirondack Watershed Institute. This program was implemented to provide data on the efficacy of the Eurasian water milfoil management strategy being employed on Upper Saranac Lake. AWI established 588 underwater monitoring segments sites across USL in 2004, and 36 in Fish Creek Pond in 2006 to measure milfoil densities. At each site a transect line method was used to analyze current and historical native and invasive species plant growth. The unmanaged Fish Creek locations acted as a comparison to USL that is being managed for AIS's.

From 2006 - 2015 Eurasian watermilfoil in Fish Creek Campground had a significant increase in density in contrast to adjacent USL where hand harvesting AIS management methods were being deployed. Just prior to the initiation of management efforts in Fish Creek Camp Ground, the average Eurasian water-milfoil density was 517 stems/ acre.

Variable-leaf milfoil was first detected at the Fish Creek Pond transect locations in 2009. From that time, until the initiation of the FCAISMP, variable-leaf had exhibited a significant increase in its frequency of occurrence by approximately 4% per year (Laxson, 2016).



Density of EWM Comparison Between USL and Fish Creek USL Milfoil Monitoring Program: Project Update, Year 2015 Report, 4-15-2016, Corey L. Laxson and Daniel L. Kelting, Paul Smith's College Adirondack Watershed Institute:

Fish Creek Invasive Species Harvesting Feasibility Study: In 2015, two comprehensive surveys inventorying native and invasive plants were completed within the Campground. The first was completed by the APIPP's Adirondack Aquatic Regional Response Team. The other by Aquatic Invasive Management, LLC and the USF's Lake Manager. These surveys provided the data for a report that outlined the extent of the invasive infestation, and a cost estimate for harvesting. The reports determined there were a total of 108 littoral acres within the campground. Of this, 24 acres had substantial AIS growth, EWM and VLM of varying densities (7 acres in Square Pond and 17 acres in Upper Fish Creek Pond). The report also estimated it would take 18 weeks of hand harvesting by divers, over a three-year period, to bring the campground to a sustainable and maintainable level similar to the success the USF had on Upper Saranac Lake (Middleton, Lewis, 2015).

Consequently, the USF developed a plan for managing AIS in Fish Creek Campground. The intent was to mimic the Foundation's accomplishments on USL and seek funding to cover the estimated cost for 18

weeks of divers to hand harvest for an initial three to four-year intensive start-up. The USF, who is committed to the long-term sustainability of this project, would support AIS management efforts beyond the initial start-up period, ensuring prolonged results.

The long-term outcome for the FCAISMP is to restore the 108 acres of littoral campground waterfront, in addition to preventing AIS from infesting downstream and regional waters, and to prevent new AIS from establishing in the waters in the project area. These outcomes will be achieved through project activities such as removal of AIS, inspection and decontamination of boats, and public education leading to reduced spread of new AIS from boats. Acres harvested and pounds of AIS material removed will be tracked.

Success in the project period was defined by year-to-year decline in total acres and amount of plant material removed. Longer-term success will be defined as sustained low density and low harvest removals during the maintenance period. An annual report will be produced reporting plant density.

Pilot Program:

In early 2016, in preparation for implementation of the FCAISMP, permits were obtained from the NYSDEC and the Adirondack Park Agency to perform underwater hand harvesting of AIS. Later that fall, working in collaboration with AIM and the AWI, the USF initiated a four-week pilot program to determine practicality and feasibility of the FCAISMP. The intent was to demonstrate the degree of the infestation and the viability of management to support prospective funding. Funding for this Pilot Program was provided through the USF, USLA, APIPP and a Crowdfunding campaign sponsored by the Adirondack Foundation.

Prioritization of management areas for the Pilot Program focused on dense infestations and high traffic areas to reduce the likelihood that boaters would fragment and transport invasive material to non-invaded sections of the lake or surrounding waters. The management operation occurred mid-week, Monday – Thursday, with the majority after the busy summer season - post Labor Day. The total four-week operation yielded just under 9.5 tons (18,937.5 lbs.) from 6.13 acres of littoral zone.

To quantify the feasibility of the FCAISMP, data from the 2016 Pilot Program and the 2015 surveys were compared in relation to the overall estimated cost of harvesting, relative to time and acreage. The results were within a small margin of error. The expected initial cost for three years of intense management diver harvesting expense for the Fish Creek Campground project (Square Pond and Upper Fish Creek Pond) was estimated to be $160,000.

Knowing the potential outcome with unmanaged AIS, its economic and environmental impact and the potential to spread, as well as understanding the scope of the project, the USF was confident that harvesting AIS from Fish Creek Campground is not only practical but a necessary investment. Furthermore, the USF was confident that once the initial three-year harvesting project was complete upkeep would be sustainable through the USF's yearly maintenance program.

Implementation:

The FCAISMP developed a technique mimicking the success of the USL effort from a decade prior where a "front-load" method was utilized. Meaning, the majority of funding and effort will be used in the first two years of the project in order to suppress large, dense milfoil beds and bring them under control. In the third year of the project, the amount of diver time would be reduced. Management would focus on regrowth of areas already harvested. This would transition into the management phase of the project in year four. The results would be a reduction in expenses over time, bringing the treatment area into a more easily manageable task.

Funding: As a requirement to match grant funds, a fundraising campaign was initiated by the USF in 2016. Through support of the USLA and the Upper Saranac Lake Community, the USF raised over $60,000 in donations. Subsequently, funding was awarded to the USF in the amount of $100,000 from the NYSDEC Invasive Species Rapid Response and Control Grants. This grant was made possible through donations that required the Foundation to match 50% of the award. The USF has committed to the long-term sustainability of this project and will support ongoing AIS management efforts in Fish Creek past the initial intensive harvest management period. 2020 is the first year of this maintenance period.

Harvesting Methodology:

The harvesting project, similar to USL's, utilizes a Hookah Dive System. Each Hookah air compressor system allows two to three divers to hand harvest simultaneously. The invasive plants, both EWM and VLM were removed from the sediment by hand, including the root system and then bagged. An additional team member remained on the surface to retrieve plant fragments, notify boaters that divers are underwater and collect filled bags. Traditional "diver down" flags were deployed as well as additional safety navigation buoys which were strategically placed.

Diver locating and removing Eurasian watermilfoil plant– Photo: Meg Modley

Harvest periods are scheduled around the busy tourist season, traditionally prior to July 4th and following Labor Day. This reduced dangerous operating conditions due to high boater traffic. To reduce any user conflict issues with campers, the dive operation and use of the Hookah air compressor is focused in areas where campsites are unoccupied in the early morning hours.

USF monitors efficacy of our management by tracking poundage of plants removed each day, week and year. Beginning in 2022, in addition to recording pounds harvested the dive crew maintains data on the number of plants harvested. In areas of low AIS densities, such as USL, this is a more precise monitoring system.

The dive crew maps and documents plant locations via GPS waypoints. Plants weights are determined by filled bags. Each filled bag weighs 25 lbs. This weighing system is consistent with past practices and with most other AIS harvesting companies throughout the region.

Beginning in 2022 the USF took over AIS operations by employing our own dive team. The shift in administration significantly reduced the expense to the USF while provided a more direct management approach to further increases efficiency. Prior to 2022, the USF contracted independent companies for this management service from Invasive Solutions Dive Company (ISDC) and Aquatic Invasive Management (AIM). Also beginning in 2022 the USF expanded to, and contracting out our divers to other waterbodies outside the USL watershed further offsetting USF's cost.

Harvesting Summary

Fish Creek Campground (Square Pond and Upper Fish Creek Pond):

2017: AIS harvesting began shortly after the AWI transect survey in the fall of 2017. Efforts focused on revisiting known AIS sites that were harvested in the 2016 Pilot Program and expand harvesting to cover the entirety 60-acre littoral zone of Upper Fish Creek Pond. Divers from Aquatic Invasive Management (AIM), under the direction of the USF's Lake Manager, began their harvesting efforts September 11 and concluded October 13. A total of 984 hours of dive time was invested over a five-week period by AIM. At times there were as many 7 divers in the water with two top water personnel. The total investment for AIM divers in 2017 was $54,880. A total of 15,050lbs (7.5 tons) of EWM and VLM were removed from an approximate area of 60 acres of littoral zone in Upper Fish Creek Pond.

2018: In 2018 the USF hired a new invasive dive company, Invasive Solutions Dive Company (ISDC). Divers began hand harvesting following the Labor Day weekend on September 4th and concluded one month later on October 4th. A total of 840 diver hours were invested and 299 bags of invasive plants or 7477 lbs. (3.74 tons) were removed from both Square Pond and Upper Fish Creek Pond. 2018 was the first year of the FCAISMP that the entire littoral zone within the Campground was harvested. The USF invested $48,650 in direct diver expense in 2018.

2019: Divers began hand harvesting following the Labor Day weekend on September 9th and concluded on October 10th. A total of 600 diver hours were invested and 232 bags of invasive plants or 5806 lbs. (2.9 tons) were removed from both Square Pond and Upper Fish Creek Pond. 2019 was the second year of the FCAISMP that the entire littoral zone within the Campground was harvested. The USF invested $34,750 in direct diver expenses in 2019. Milfoil harvesting amounts increased in the fifth week of harvesting as the dive crews began efforts upstream of the Campgrounds Boat Launch into areas that have not been managed in previous years.

2020: 2020 initiated the first year of AIS harvesting maintenance period for the ponds of Fish Creek Campground (Upper Fish Creek and Square Pond). The management period was divided into an early (June) and late season harvest (September) to avoided camper user conflicts. Both the Lake Manager and dive crews marked AIS plants by surface spotting when calm water conditions prevailed. The entire littoral zone was also surveyed by underwater diving at least once throughout the season. A total of $17,375 was invested into 300 diver hours. The divers harvested 675lbs. of invasive milfoil over 10 days from within the campground's ponds

2021: 2021 was the second year of AIS harvesting maintenance funded solely by the USF. The management period occurred in September to avoided camper user conflicts. Harvesting methods were consistent to methods deployed on USL. Both the Lake Manager and dive crews marked AIS plants by surface spotting when calm water conditions prevailed. The entire littoral zone was also surveyed by underwater diving at least once throughout the season. A total of $12,162 was invested into 210 diver hours. The divers harvested 213lbs. of invasive milfoil over 7 days from within the campground's ponds.

2022: In 2022 the USF took over AIS operations by employing and supervising our own divers. The shift in administration reduced the expense to USF while providing a direct management approach that further increased efficiency. The 2022 management period was divided into an early (June) and late season harvest (September) to avoided camper user conflicts.

Management tactics also changed in 2022; a full littoral dive of the entire shoreline was replaced with littoral surface spotting and repeated harvesting of known infestation locations. The slight increase in total poundage removed can be attributed to the change in management techniques and the decrease in annual expenses is attributed to the hiring of our own dive team.

A total $10,026 was invested into 220 diver work hours. The divers harvested 994.5 lbs. of milfoil over eight days (33.25lbs. of EWM and 961.25 Lbs. of VLM). In addition, 2022 was the first year that number of plants harvested was also tallied. A total of 1203 EWM and 12,012 VLM plants were harvested.

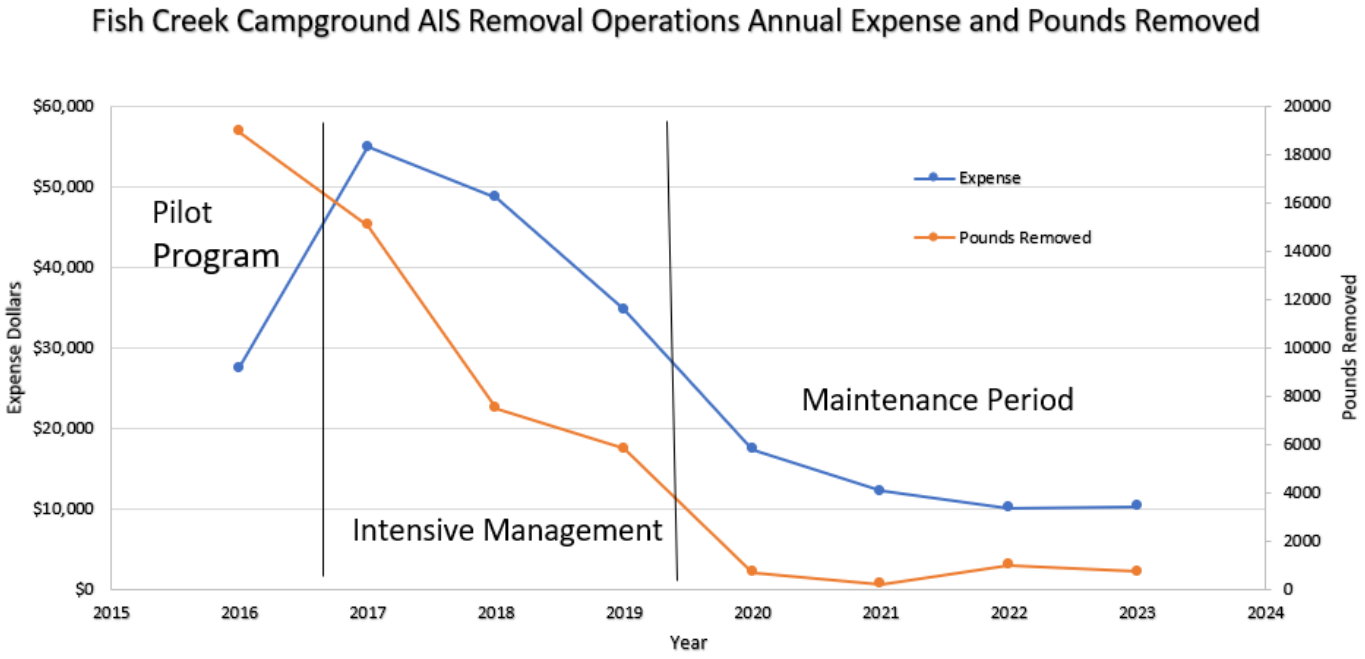
2023: The 2023 management periods were divided into an early (June) and a late season harvest (September). Initial management efforts removed AIS fragments that had wash up on the shores along downwind coves of the pond. This milfoil apparently is flushed downstream from the pond's tributary following ice out, and prior to the deployment of the AIS booms. 2023 fragment amounts were significantly greater than in previous years. The upsurge in plant fragmentation is likely an indication of increased upstream density levels and the expanding spread of AIS into Copperas and Little Square Ponds. The amounts or poundage of milfoil that the divers removed by pitch forking to shore was not measured in our data.

Areas of dense milfoil along the northern shore of Upper Fish Creek Pond, near the Fish Creek inlet was not harvest in the second management session due to the lack of available time. This area has been the most productive harvesting location since the initiation of the project. A second management session in this area would of undoubtably increased the amount of milfoil harvested significantly.

A total $10,250 was invested into 205 diver work hours. The divers harvested 709 lbs. of (15 Lbs. of EWM and 694 Lbs. of VLM). Over an eight-year period over 49,000 pounds (24.5 tons) of AIS has been removed from Fish Creek Campground at a cost of $215,533.

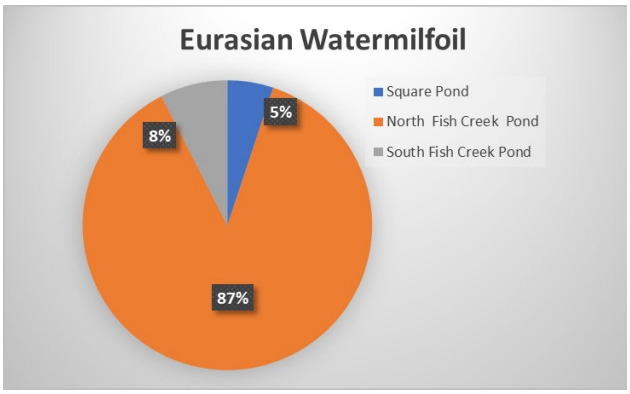
Yearly Cost and Harvesting Totals from Fish Creek Campground

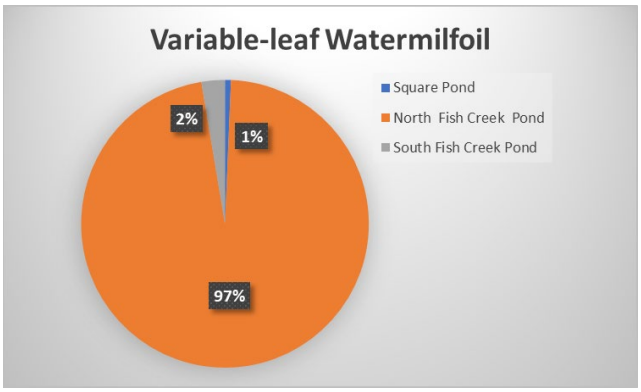
Fish Creek Campground Yearly AIS Harvesting Totals			
Year	**Dive Hours**	**Expense**	**Pounds Removed**
2016	480	$27,440	18937
2017	984	$54,880	15050
2018	840	$48,650	7477
2019	600	$34,750	5806
2020	300	$17,375	675
2021	210	$12,162	213
2022	220	$10,026	996
2023	205	$10,250	709
Total	3,839	$215,533	49,863



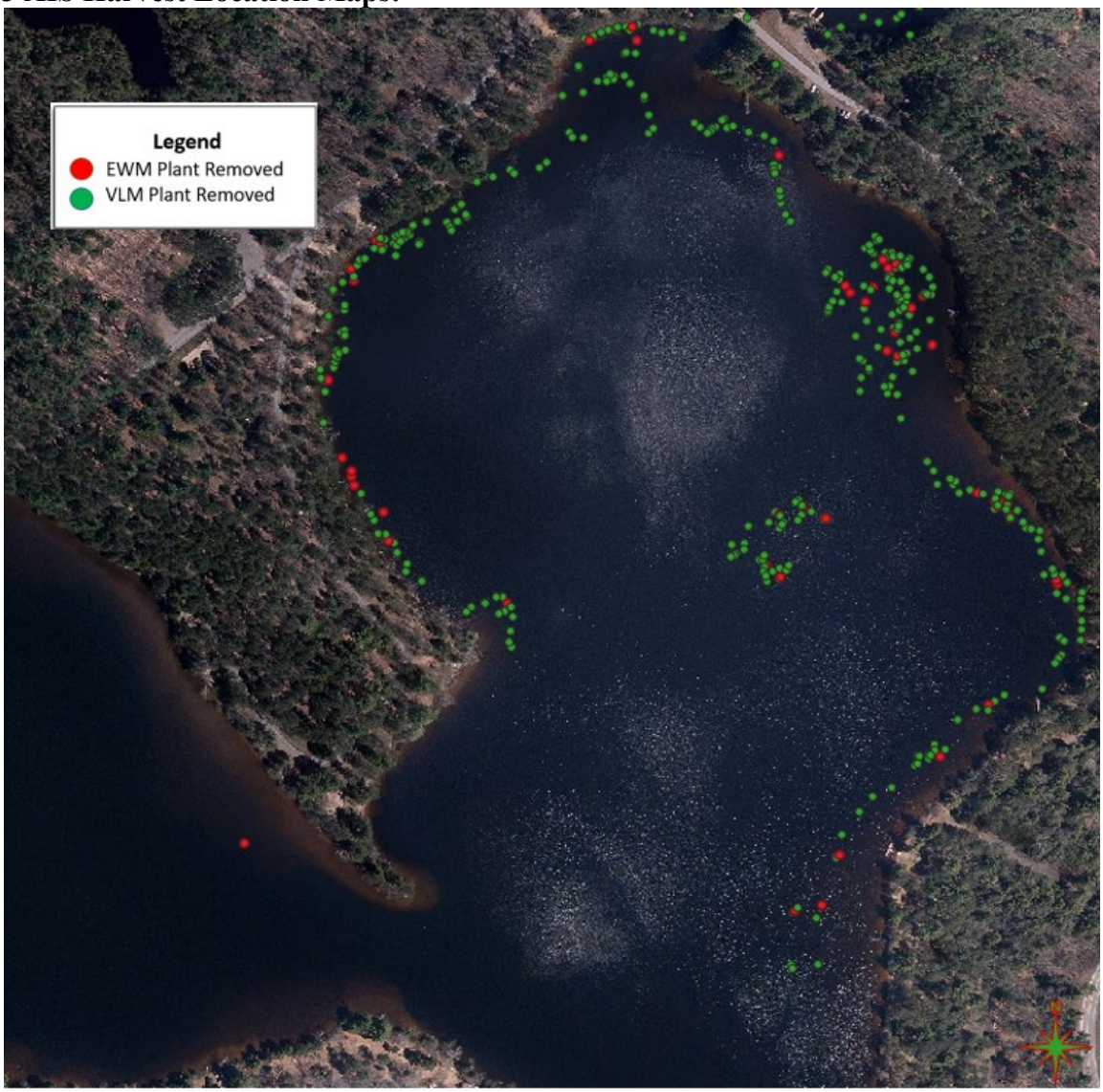
AIS Plant Counts: With density and poundage of milfoil harvested decreasing over time, beginning in 2022 divers began counting the number of plants and type of AIS being removed as well as their locations. Plant counts are a more accurate way of quantifying and assessing efficacy of management techniques overtime where density levels are low. A total of 7,791 plants were removed from the campground ponds in 2023 (292 EWM and 7,499 VLM). The vast majority of AIS found and removed came from the Northern basin of Upper Fish Creek Pond nearest the Fish Creek inlet.

2023 Plant Pounds Percentage Per Area

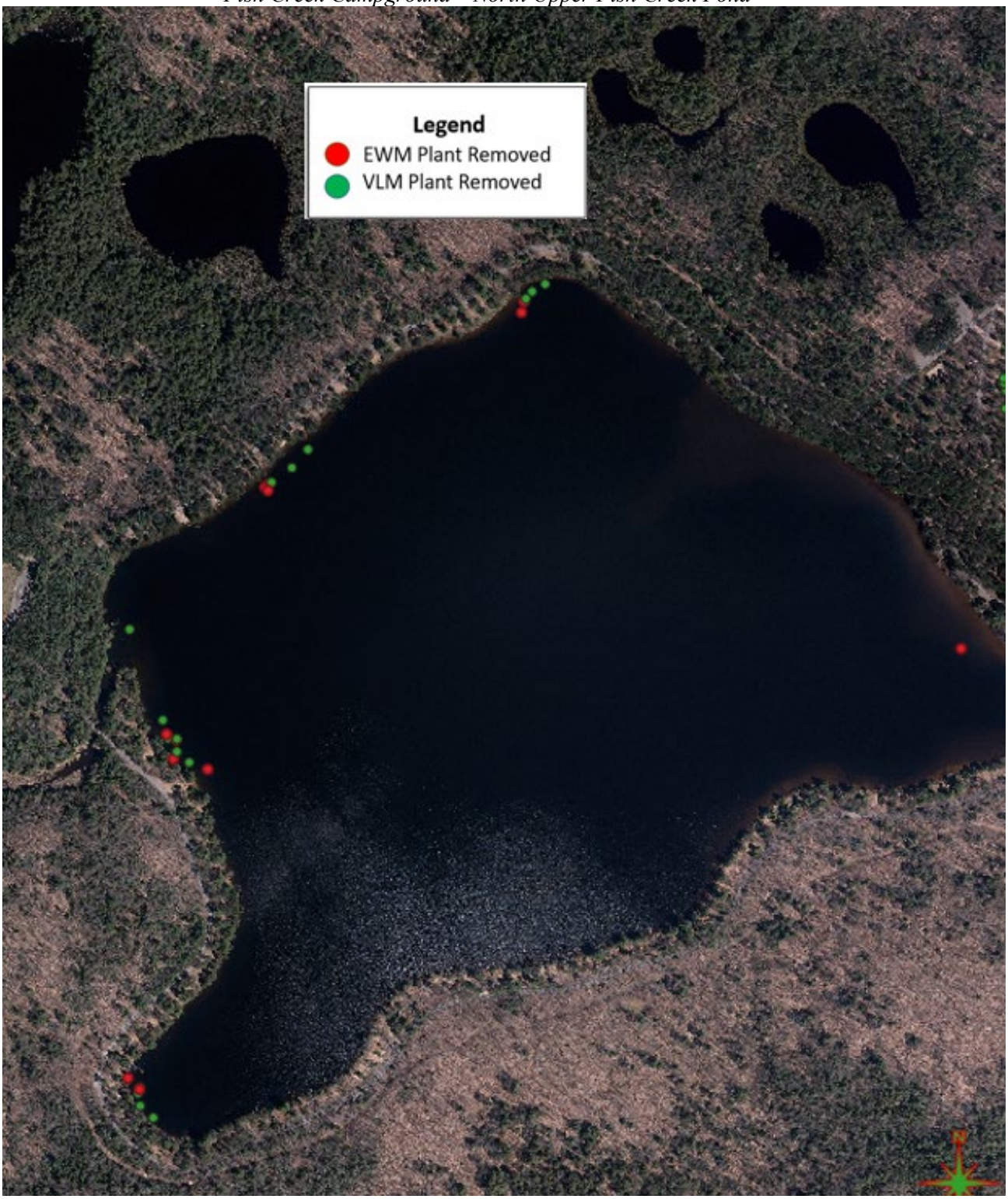




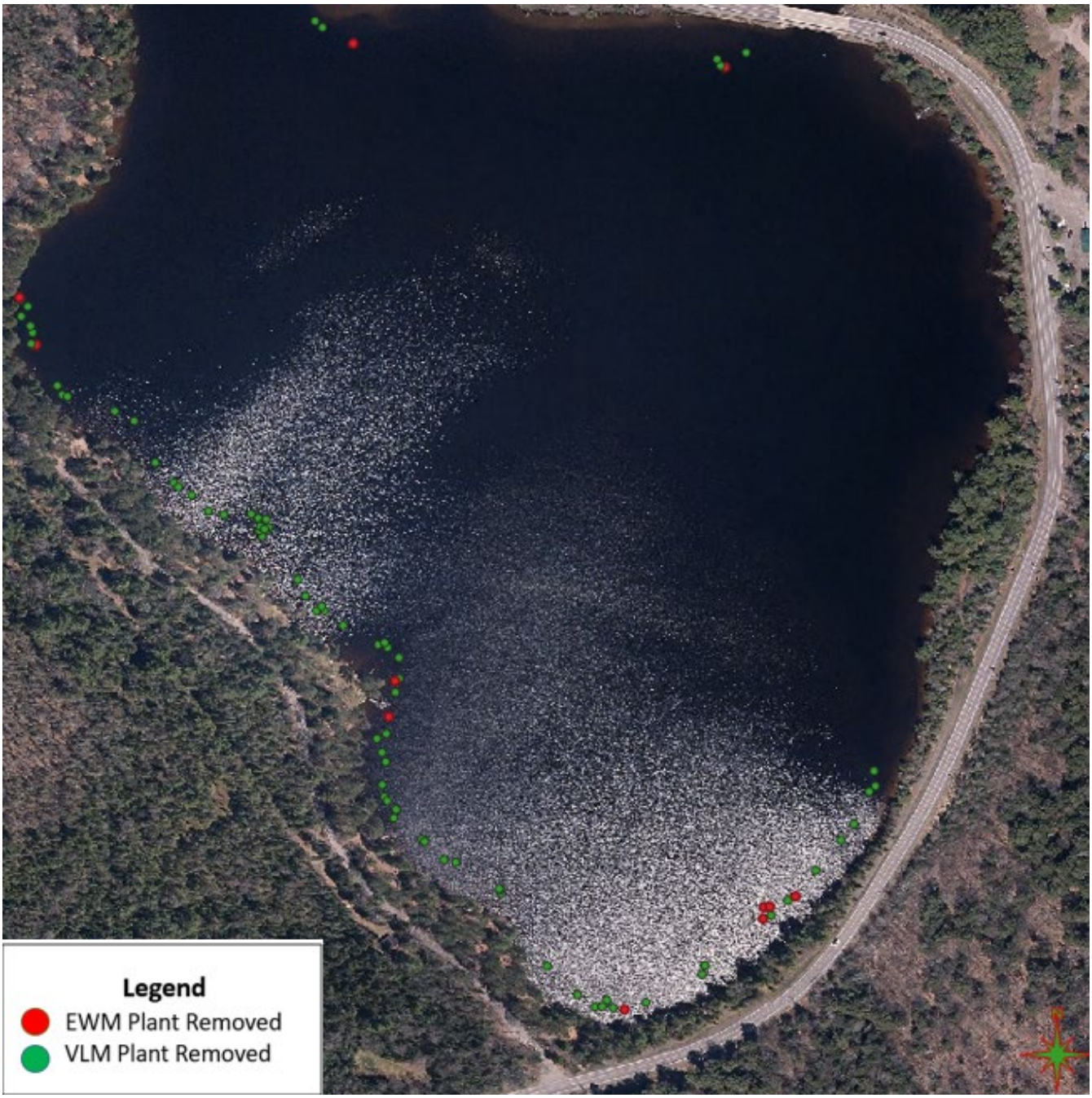
2023 AIS Harvest Location Maps:



Fish Creek Campground – North Upper Fish Creek Pond



Fish Creek Campground – Square Pond



Fish Creek Campground – South Upper Fish Creek Pond

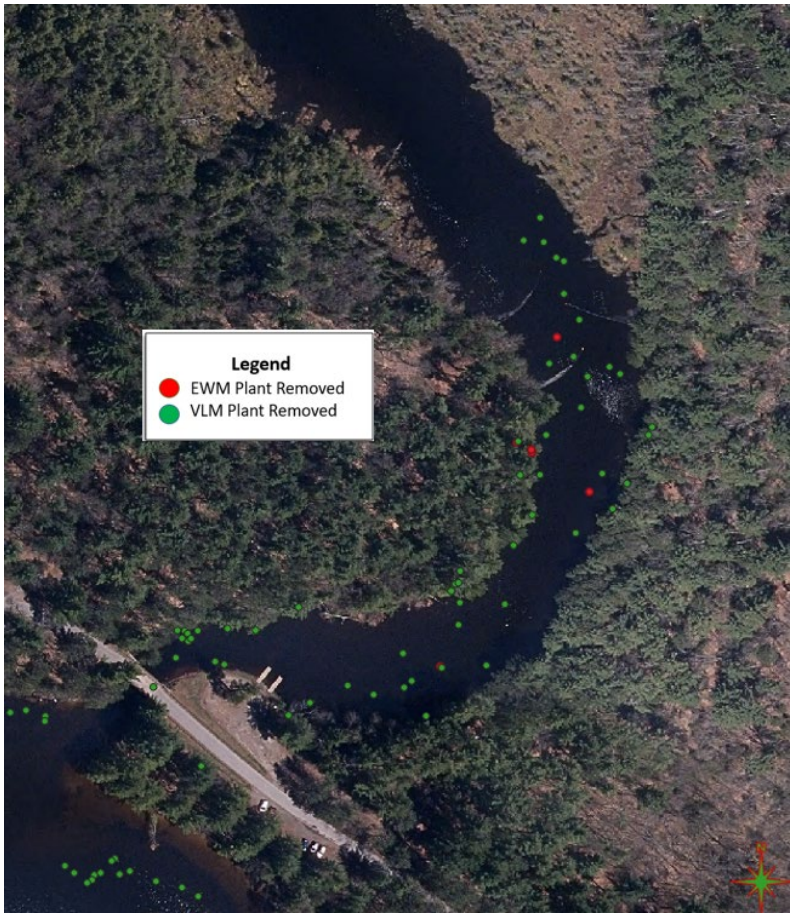
Fish Creek tributary (Upstream of the campground bridge):

With the assistance of a $19,000 grant from the Parks &Trails New York in 2020 and 2021 the USF expanded the FCAISMP upstream of the campground bridge to the AIS containment booms (Approximately 1,000 feet upstream of the bridge). Harvesting methods were consistent to methods deployed elsewhere by the USF. Management periods were divided into an early (June) and late season harvests (September) to avoided camper user conflicts. Variable-leaf milfoil is the prominent invasive plant found above the bridge. A total of $5,700 was invested in 114 diver work hours to remove 1,975 pounds of milfoil in 2023.

Over a four-year period, a total of $50,834 has been dedicated to 918 diver work hours to remove 15,525 pounds of milfoil from the Fish Creek tributary.

Yearly Dive Hours / Expense and Pounds Removed

Fish Creek "creek" Harvesting Amounts			
Year	**Diver Hours**	**Expense**	**Pounds Removed**
2020	240	$13,900	3,763
2021	330	$20,570	7,000
2022	234	$10,664	2,787
2023	114	$5,700	1,975
Total	918	$50,834	15,525



Fish Creek Tributary

Watershed Steward Data: As a result of managing AIS from Fish Creek Campground and the Fish Creek tributary, the amount of invasive species found on boats being retrieved from the Campground boat launch has been significantly reduced. Adirondack Watershed Institute, Watershed Stewards stationed at the launch inspect watercraft looking for AIS on boats being launched and retrieved. Over an eight-year period, there has been an 94% reduction in AIS on watercraft leaving the launch. This decrease is a strong indicator to the success of this project, reflecting the reduction of AIS in the management area and decreasing the likelihood of AIS being transported to regional uninfected waterbodies.

Occurrence of AIS on watercraft being retrieved from Fish Creek Campground Boat launch

Fish Creek Campground Boat Launch (Watercraft exiting the launch - Retrieval)								
Year	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Inspections Performed	403	914	822	1104	611	786	785	570
Boats Transporting AIS	29	56	11	12	7	5	4	2
% Boats Transporting AIS	7.2%	6.1%	1.3%	1.1%	1.1%	0.6%	0.5%	0.4%

AWI - Adirondack Watershed Steward at Fish Creek Campground Boat Launch Photo: Guy Middleton

Containment Booms: In order to achieve the FCAISMP long term goal of preventing new growth of AIS there was a need to limit new AIS introductions from the upstream Fish Creek tributary. Upstream waters above the campground boat launch has a high-density level of AIS.

In 2019, USF received funding from a Cloudsplitter Foundation grant for the purchase of AIS containment booms. The containment booms, placed just upstream of the Fish Creek Campground boat launch, prevent fragmented invasive plants from floating downstream, reducing the occurrences of introduction into managed areas within the campground and further downstream into Upper Saranac Lake. The series of three seasonally placed alternating booms extend from shore to just past the center of the channel. The booms allow non-motorized watercraft traffic to pass while plant fragments are stopped on the upstream side of each boom.

The booms are installed immediately after ice out and removed in the late fall. Since the booms were installed an average of 3,000 pounds of milfoil has been removed annually.

With milfoil propagating through fragmentation, each plant stopped by the booms is potentially one less infestation downstream in the watershed. The booms provide a needed advantage to AIS harvesting efforts within the campground. The majority of the plant fragments removed occurs when the currents were fastest. AIS yields decreased as the water dropped.

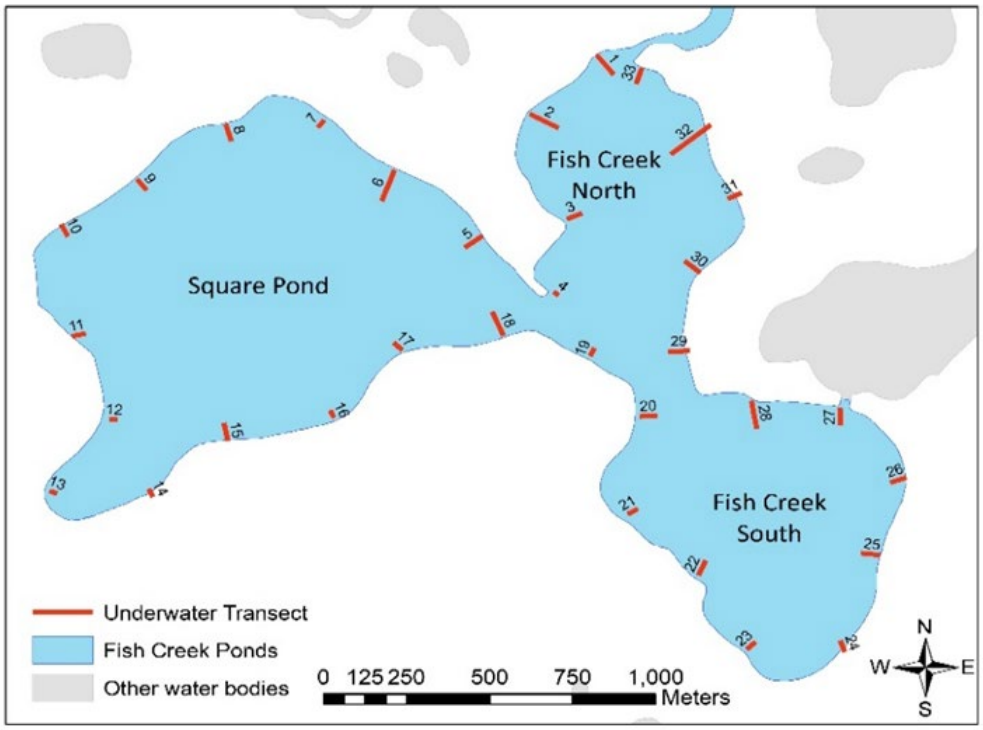
Invasive Species Containment Booms – Fish Creek Ponds tributary -Photo Guy Middleton

Independent Monitoring and Evaluation:

Throughout the initial intensive management period (2017-19), The Upper Saranac Foundation contracted AWI to provide independent monitoring, evaluation and reporting of AIS control efforts in Fish Creek Campground. In doing so the AWI established 33 underwater monitoring sites delineated by Global Positioning Systems (GPS).

The transect sites were surveyed by AWI divers prior to the initiation of the FCAISMP in August 2017. A second survey was completed following two years of the intensive harvesting in October of 2018.

A final survey was completed at the conclusion of the intensive harvesting period, in October of 2019. Data collected measured the abundance of aquatic vegetation and is used to assess and measure the effectiveness of control and eradication efforts for AIS, as well as monitoring restoration of native aquatic habitat. This method of monitoring concluded in 2019 following a significant decrease in plant density levels.

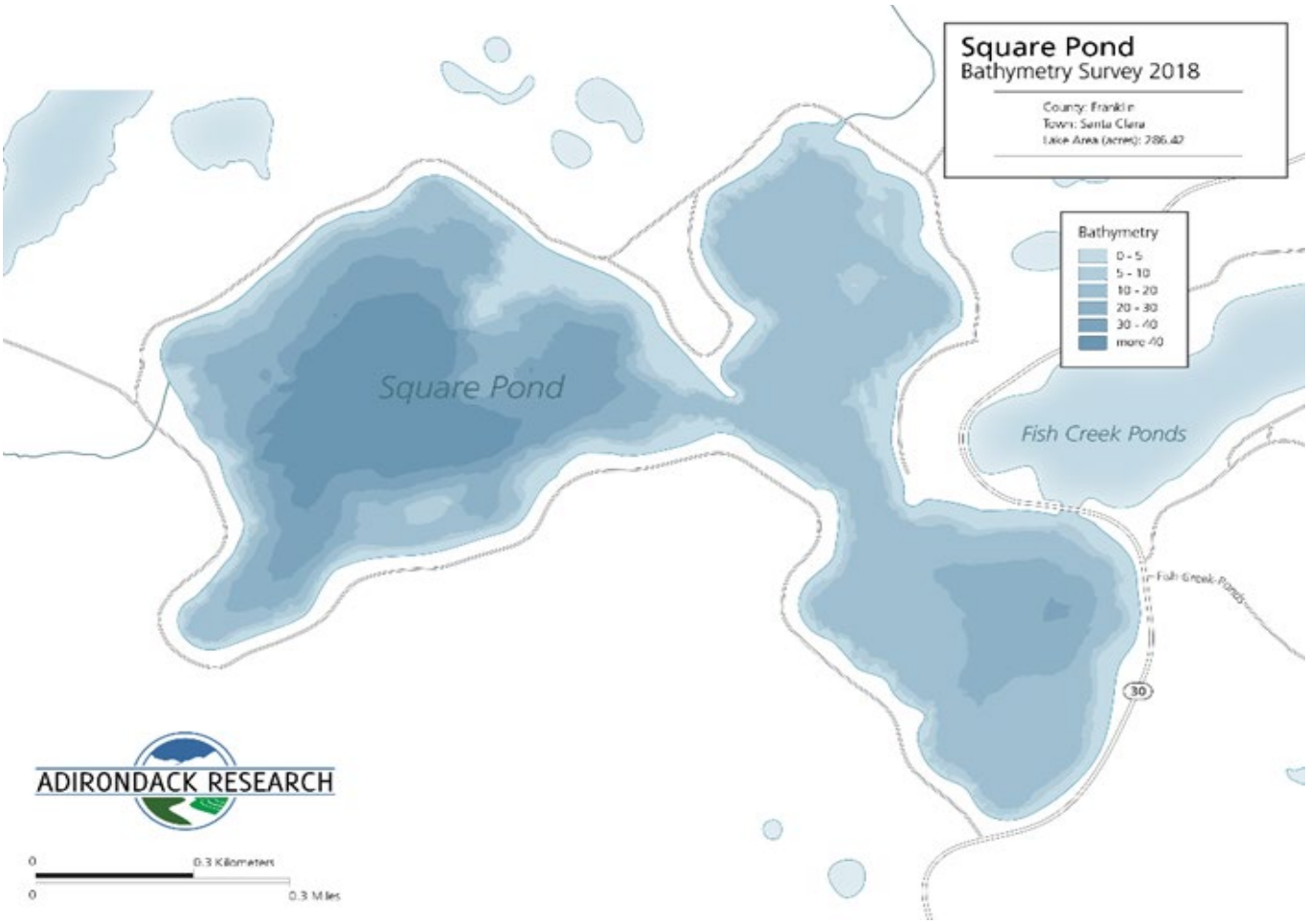


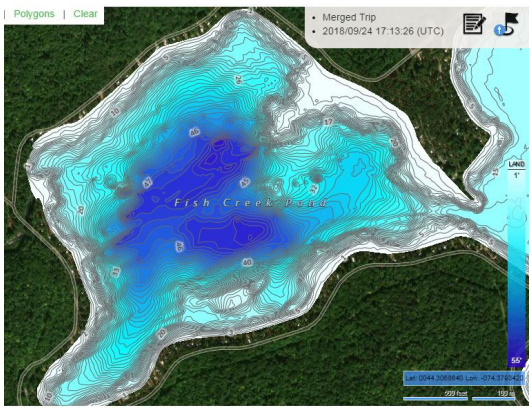
Adirondack Watershed Institute Fish Creek Campground Transect Survey Locations

The number of transects where Eurasian water milfoil was encountered did not vary significantly between 2017 and 2019; however, the stem density decreased by 98% in Fish Creek Pond North and by 72% in Fish Creek Pond South. AWI did not encounter any Eurasian water milfoil in Square Pond during any of the three surveys.

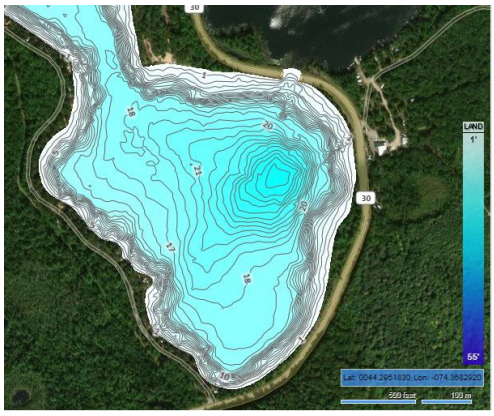
The number of transects with active Variable leaf milfoil infestations decreased in all three basins throughout the three-year survey period. In addition, the stem densities AWI encountered on active transects decreased by 97% at Fish Creek Pond North, and by 100% in both Fish Creek Pond South and Square Pond.

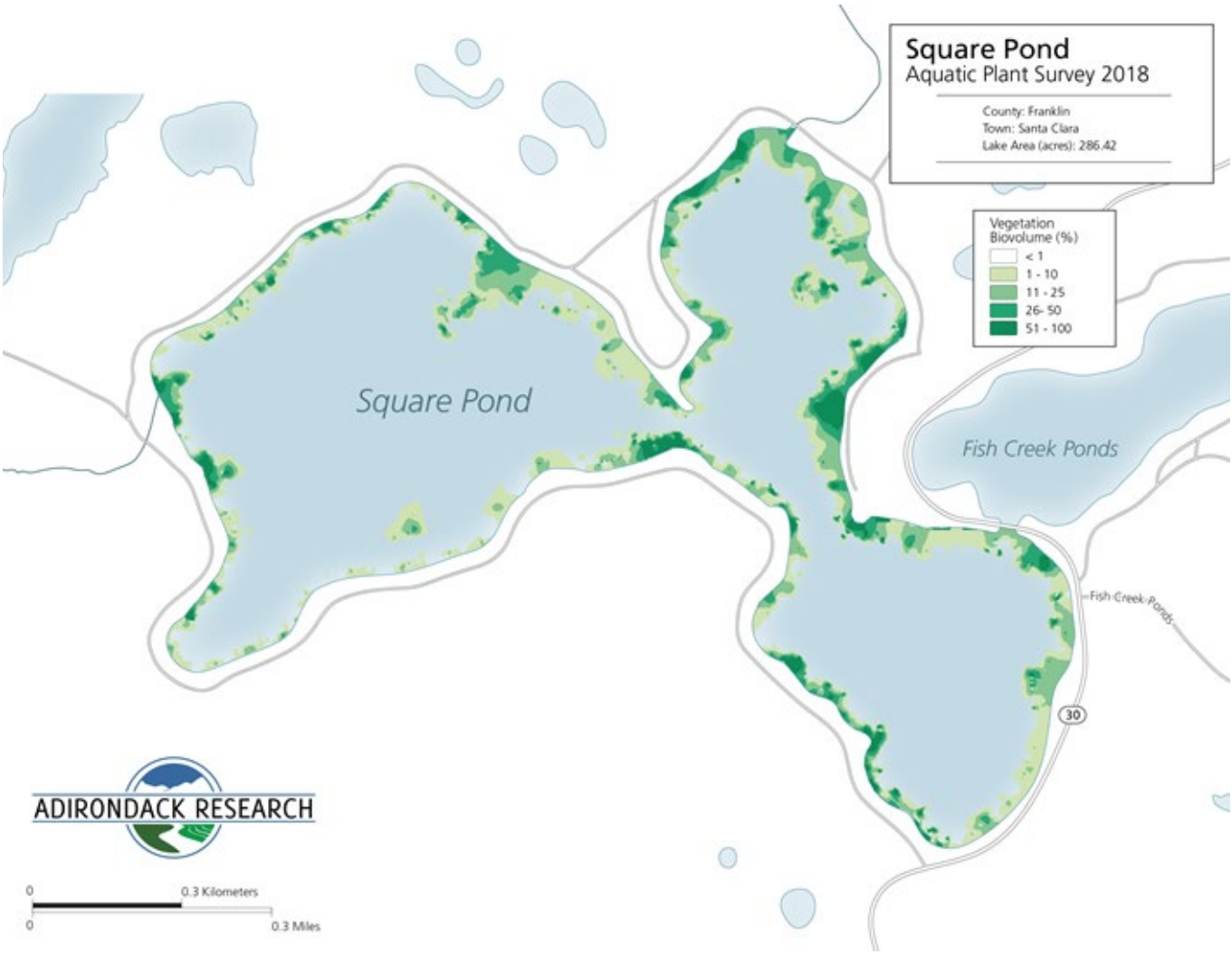
Lake Bottom Mapping: To get a better understanding of the characteristics of the bottom of Fish Creek and Square Ponds, the Upper Saranac Foundation utilized BioBase, an aquatic habitat sonar mapping technology. Data was compiled into bathymetric, aquatic vegetation and bottom hardness maps. This information developed a baseline for monitoring changes over time, measuring the waterbodies response to the FCAISMP.

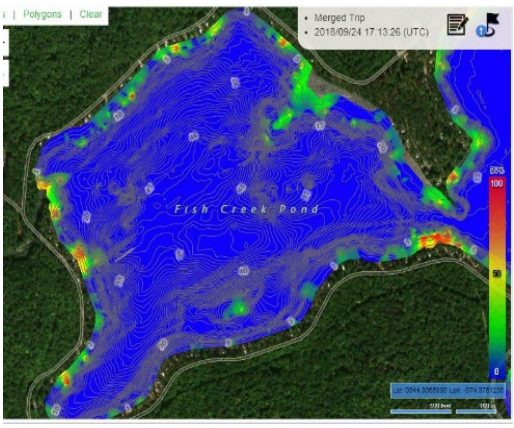

Square Pond
Bathymetry Survey 2018
County: Franklin
Town: Santa Clara
Lake Area (acres): 786.42
Bathymetry
0 - 5
5 - 10
10 - 20
20 - 30
30 - 40
more 40
Square Pond
Fish Creek Ponds
Fish Creek Ponds
30
ADIRONDACK RESEARCH
0
0.3 Kilometers
0
0.3 Miles

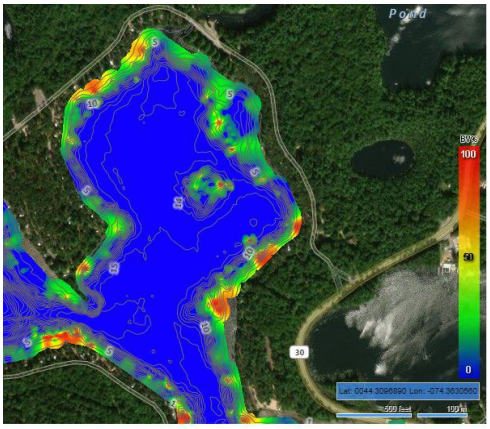

Polygons | Clear
Merged Trip
2018/09/24 17:13:26 (UTC)
Fish Creek Pond
LAND
55'

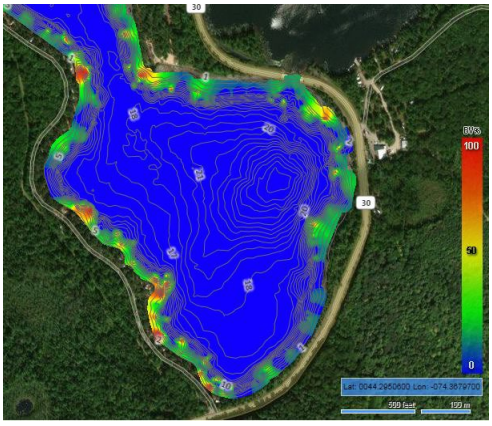
Pond
30
LAND
55'

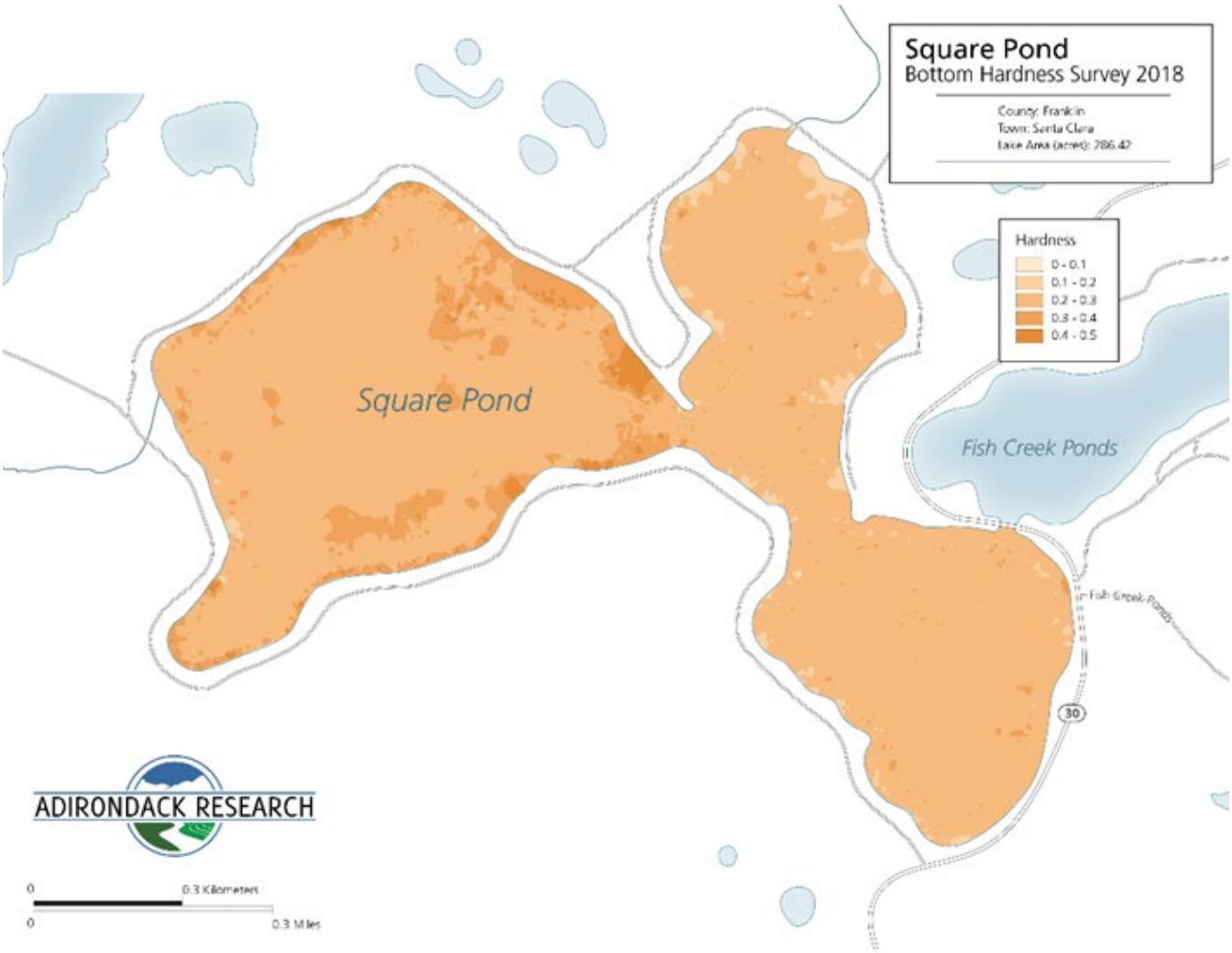

30
LAND
55'


Square Pond
Aquatic Plant Survey 2018
County: Franklin
Town: Santa Clara
Lake Area (acres): 286.42
Vegetation Biovolume (%)
< 1
1 - 10
11 - 25
26- 50
51 - 100
Square Pond
Fish Creek Ponds
Fish Creek Ponds
30
ADIRONDACK RESEARCH
0
0.3 Kilometers
0
0.3 Miles

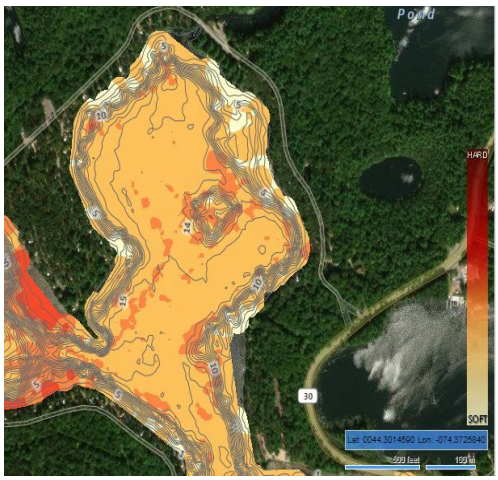

Merged Trip
2018/09/24 17:13:26 (UTC)
Fish Creek Pond
BVs
100
50
0

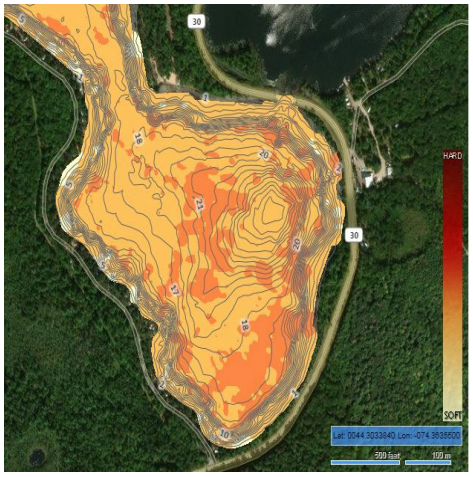

Pond
30
BVs
100
50
0


30
30
BVs
100
50
0


Square Pond
Bottom Hardness Survey 2018
County: Franklin
Town: Santa Clara
Lake Area (acres): 786.42
Hardness
0 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
Square Pond
Fish Creek Ponds
Fish Creek Ponds
30
ADIRONDACK RESEARCH
0
0.3 Kilometers
0
0.3 Miles

Polygons
Clear
Merged Trip
2018/09/24 17:13:26 (UTC)
HARD
SOFT


Pond
30
HARD
SOFT


30
30
HARD
SOFT

Conclusion:

The FCAISMP uses a combination of AIS prevention, monitoring, and control activities to inhibit further AIS from establishing and spreading in the Watershed. This conclusion summarizes the monitoring and control methods of managing AIS through hand harvesting within Fish Creek Campground (Upper Fish Creek Pond and Square Pond).

Sustained harvesting efforts transitioning from the initial intensive period into the maintenance phase continues to maintain the level of returning plant growth. In addition, AIS containment booms, placed just upstream of the Fish Creek Campground boat launch are aiding in preventing new invasive introductions flowing from the Fish Creek tributary.

Since the inception of the FCAISMP, 49,862 lbs. of milfoil have been removed from the campground ponds (Upper Fish Creek and Square Ponds), another 15,525 pounds has been removed from its tributary in the creek, and approximately 15,000 lbs. of AIS has been removed from the containment booms. All toll approximately 66,887 pounds (over 33 tons) of AIS have been removed from the campground and its tributary.

There is a strong indication that management efforts have been effective. First, by comments made from campers relative to the reduction of nuisance aquatic vegetation and recreation value. Secondly, by the amount of invasive plants found and removed each year.

There is approximately 13 acres of dense milfoil growth directly upstream of the containment booms. This area, that is increasing in size each year, is the feeder source for AIS propagation downstream into the campground through fragmentation. Unlike other contained waterbodies where eradication or reduction of the amount of yearly maintenance is possible, reoccurring rigorous management will be required in Fish Creek Campground to keep AIS growth at bay. As long as there is upstream unmanaged AIS, Fish Creek Campground will require at a higher level of maintenance than other waterbodies managed by the USF.

The Upper Saranac Foundation, who is committed to the long-term sustainability of this project, intends to continue to support the FCAISMP as long as financially feasible. The long-term outcome for the FCAISMP is to improve water quality and maintain native species in their natural habitats, ensuring the sustainability of our natural public resources for future generations. Current maintenance efforts that are entirely funded through the USF's annual budget, at some point will need to be augmented through outside funding sources in order to maintain the campgrounds public resources for future generations.

Literature Cited:

Laxson, C.L., Yerger, E.C., Regalado, S.A., and D.L. Kelting. 2017. Upper Saranac Lake: 2016 Watershed Report #: PSCAWI 2017-06.

Middleton, G, Lewis, A, 2015 Fish Creek Pond West and Square Pond Survey

In Memory of Steve Dvorak Photo: Guy Middleton