

Spring 2020 Sustainability Grant Proposal

Project Title:

Lower St. Regis Lake Shoreline Restoration Demonstration on Paul Smith's College

Project Leader:

Craig Milewski, PhD, MFA

Co-participants:

Co-Planners: Ryan Novak, Julie Capito, Joshua Young, Patrick Mullen Mechtly, Jason Messenger, Matthew Merritt

Other participants will include students in the Ecological Restoration program, the Student Association for the Society for Ecological Restoration, and students from related programs, and others who have interests.

Total Amount of Money Requested: \$5,360.35



Project Summary

Goals

The overarching goal of the project:

Create a shoreline restoration demonstration site that is educationally engaging, ecologically functional, aesthetically pleasing to the public; and in alignment with the mission of the college, the academic programs, and the faculty statement on our identity.

The specific objectives are:

1. Remove the failing break wall, grade the slope to 30%, and restore natural vegetation at water's edge.
2. Create a meadow/pollinator plot between the shoreline and the sidewalk.
3. Prevent geese use of the shoreline and the unhealthy accumulation of their fecal matter.
4. Create an attractive pathway along the shore through the re-established natural vegetation and install 5 benches for shoreline visitors.
5. Post educational signage that describes the ecological, social-cultural and economic benefits of a functional shoreline.
6. Increase visitation and use of the shoreline by visitors and prospective students.
7. Reduce lawn related labor, maintenance cost, and use of fossil fuels.

Project Justification and Relevance

The need for this project is justified for 4 integral reasons:

1. Human Health and Geese.-The shoreline break wall is currently serving one primary purpose: an access point for the resident geese to the lawn, a staging ground where their accumulation of fecal matter is excessive and a potential health hazard, and thus, the creation of a shoreline that is unusable. Two surveys by students in the Ecological Restoration program strongly indicate that the shore is not used due to geese fecal matter. Additionally, the break wall is in disrepair and each year comes closer to its inevitable collapse.

2. Attractive, Inviting, and Educational.-Restoring the shore and making it attractive, inviting, and educational to all who visit will serve to demonstrate our commitment to the college mission: “to develop career-ready graduates through hands-on, personalized education; to educate research and advocate on issues to improve our plant and the lives of the people that inhabit it; and to help the Adirondack region be ecological and economically sustainable.” Two recent surveys (2014 and 2018) clearly show that faculty and students overwhelmingly prefer a more natural shoreline free of geese fecal matter, and offering places to sit and relax (Figures 1 and 2).

3. Academic Programs and Our Climate Commitment.-The relevance of this project to our academic programs and student education, and to our climate commitment, cannot be understated. In particular, the Ecological Restoration, BS program and its interdisciplinary

distinctions has had far-reaching and positive impact on student education (>250 students) in many programs and courses (Table 1) since fall semester of 2014 through 2019.

Ecological restoration fits with a global effort as the United Nations has declared the decade 2021-2030 as the Decade of Ecosystem Restoration (<https://www.decadeonrestoration.org>) with vegetation restoration as a means to capture carbon. Though the shoreline restoration may seem insubstantial, it does align with other efforts on campus to reduce mowing and to restore more natural vegetation. This sends a message that creating no-mow zones can have a cumulative impact on the reduction of fossil fuel, fertilizer, water, and herbicides so prevalently used in urban and suburban areas (<https://www.audubon.org/news/your-yard-stealthy-fossil-fuel-guzzler-give-it-climate-makeover>); and a positive impact on pollinators.

No mow zones are currently being implemented on other campuses such as Middlebury College (<http://sites.middlebury.edu/middland/2009/07/27/no-mow/>) and the University of Vermont (<https://pss.uvm.edu/ppp/articles/fuels.html>) for ecological, social, and economic reasons. One case study shows how a Midwestern college, Calvin College, Grand Rapids Michigan has restored lawn to natural vegetation as a way to gain scientific knowledge and increase public awareness of the benefits of restoring lawns to natural vegetation (DeJong et al. 2017).

4. *Ethics.*-As the shoreline exists it sends a message of apathy and is antithetical to the faculty statement which states that our way of teaching and learning is informed by the real work of humanity – to be environmentally and socially responsible stewards of the planet and its people. As a demonstration of our identity, this project shows that *“We strive to preserve our way and our values to be a universal example that connections of people with people and of people with environments is at the heart of education.”*

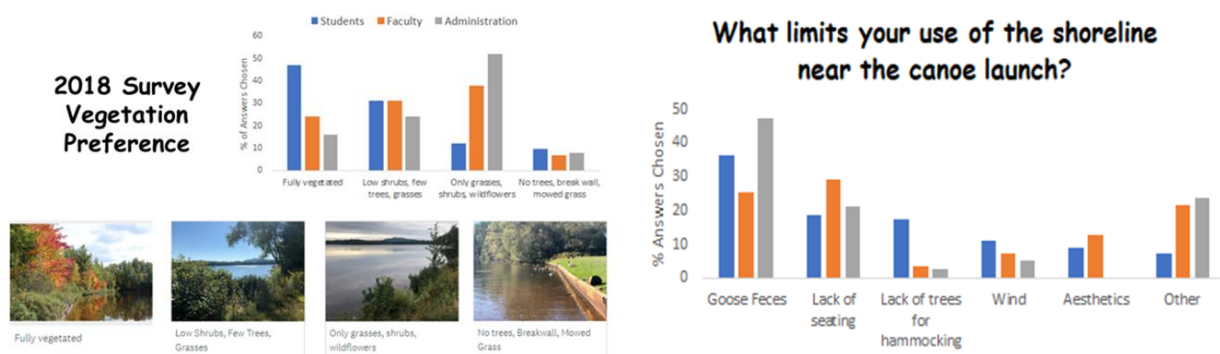


Figure 1 and 2. Vegetation preferences by students, faculty and administration; and limiting factors to use of shoreline. These are 2018 survey results.

Table 1. Academic programs and academic courses, and capstone projects involved in shoreline restoration assessments, surveys and studies of biological, physical and social-cultural conditions.

Academic Programs & Courses	Capstone Project Topics
Programs:	
<ul style="list-style-type: none"> • Ecological Restoration • Environmental Science • Environmental Studies • Fisheries • Wildlife • Forestry • Nat. Res. Mgmt & Policy • Nat. Res. Conservation & Mgmt • Integrative Studies • Surveying 	<ul style="list-style-type: none"> • Tree and Understory Vegetation • Shoreline Woody Structure • Leaf Litter Input • Coarse and Fine Organic Matter near shore retention • Soil Characteristics • Aquatic invertebrates on submersed wood • Aquatic invertebrates in nearshore substrates • Terrestrial Invertebrates • Fish use of shoreline resources (habitat & food) • Winter use by wildlife • Wind velocity and shoreline vegetation • Aesthetic preferences • Ethical Considerations • Ecological reflections on our conscience
Courses	
<ul style="list-style-type: none"> • Ecological Restoration • Foundations of Environmental Science • Integrated Natural Resource Mgt • Individual Capstones • Fisheries Techniques • Stirring of an Ecological Conscience • Surveying 	

Methods

A. Implementation Plan – see appendix for site planform and profiles

Year 1 – Immediate actions.

1. Removal of break-wall and bank sloping to 30% grade.
2. Place erosion control matting on disturbed soil and stake down.
3. Manually plant of shrub buffer on toe of bank slope along entire shore.
4. Scarify topsoil via harrow rake or bobcat implement before seeding of plant mixes.
5. Broadcast seed mix throughout planned area. Wetland mix gets dispersed 10ft from edge of shore. As well as small shrubs planted in determined locations.
6. Fire pit moved east from current location with a 10ft radius gravel buffer from center of pit.
7. Place wood chips in 2.5ft wide paths on designated path locations. The wood chip paths should connect to the fire pit.
8. Placement of Leopold benches (5).
9. Entire planned area should be roped off in year-1 to prevent disturbance. Foot path restructure to wood chip paths and benches.

Permits - Permitting requirements for removing the break-wall were obtained through verbal conversations over the phone with the Adirondack Park Agency (APA) and NYSDEC. The following findings were results of these conversations:

- No permit required from APA
- No permit required from NYSDEC

It was advised to obtain written confirmation for permission to remove the break-wall. However, a signature of the person with the property rights to PSC is required as per a conversation with a representative of the APA.

Student and Faculty participation - The Paul Smith's College Student Chapter for Society of Ecological Restoration (SER) will be active in the planting of the restoration site. They will be involved in transplanting shrubs and preparing the site for pollinator species planting. Students in the Ecological Restoration B.S. program, along with other students and community members may also volunteer their time to help with plan implementation. Professors may use this as an opportunity for future projects

B. Management Plan

Early Maintenance - Fencing will temporarily be put in place with signage to inform the community of the restoration project and will temporarily mitigate foot traffic on the site. If the fencing doesn't get implemented, compaction and degradation on the site may be detrimental to the establishment of vegetation. This will also help with the Canada Geese issue on campus. The walkways will be strategically located to avoid compaction and erosion during the initial restoration. Leopold benches will be placed in specified locations in accordance with the design plan upon implementation of the restoration. These benches will be made by SER.

Periodic Maintenance - As native meadow-like species are incorporated into the restoration, facilitates will need to mow the area once every other year. This will be done after the first hard frost in the fall of the second year with a Brush Hog. The vegetation should not be mowed lower than 8-12 inches. Based on future monitoring assessments, the mowing regime may be altered.

Human Use - As the restoration is completed, it will become a source for education purposes for both students and public community members. This would be an opportunity for these groups as potential capstone projects, class discussion topics, or points of general interest. An informative sign will be implemented on the edge of the site, describing the project and its ecological benefit as well as its contribution to the PSC's community.

Accountability - To maintain the quality and productivity, the restoration site will need to be managed. This management will be performed by students involved in the original restoration, future students in the Ecological Restoration class and others, as well as any volunteers willing to aid in the restoration process. The monitoring and management will be incorporated into future capstone projects as well as any ongoing research projects for the SER and the American Fisheries Society.

C. Monitoring Plan

Management Units - Three management unit were established in order to identify and prioritize restoration needs. Several factors were used to group these three units into upland, riparian and aquatic zones. Each unit will have a different composition of vegetation, thus requiring them to be monitored differently. The initial restoration will be hands off until after it is established.

Monitoring research will be done by students and faculty in the natural science programs via the same methods used in previous studies (Table 2).

Table 2. Frequency of monitoring as part of the long-term ecological study of the shoreline restoration project.

Type	Studies	Frequency
Aquatic	Fish use of shoreline resources	Every 1-4 years
	Aquatic invertebrates in the near-shore substrate	
	Aquatic invertebrates on submersed wood	
	Shoreline woody structure	
	Coarse and fine organic matter near shore retention	
	Leaf litter input	
Terrestrial	Tree and understory vegetation	Every 1-4 years
	Soil characteristics	
	Terrestrial invertebrates	
	Winter use by wildlife	
	Wind velocity and shoreline vegetation	
Human	Aesthetic properties	Every 4 years
	Ethical considerations	
	Ecological reflections on our conscience	

Project Budget and Timeline

Budget Table

Activity, Supplies and Materials	Unit costs	Costs
Break Wall Removal -College Horses	In-kind	\$0.00
Slope - Campus skidder	In-kind	\$0.00
Biomat - coco fiber roll - 40 mats at 3'x20'	65.00	\$2600.00
Seed, regionally appropriate	723.95/25#	\$723.95
Wood chips - Saw Mill	In-kind	\$0.00
Signage - Interpretative	Per one interpretive sign	\$600.00
Signage Construction - site informational	Temporary signage	\$100.00
Rope - Roping off site		\$200.00
Benches (5)	70.00/bench	\$350.00
	Shipping (est)	\$300.00
	Total	\$4873.95
	+10%	\$487.40
	Grand Total	\$5360.35

Budget Justification

This budget represents a low-budget project due to the use of student help and readily available campus resources. The cost for supplies and materials are those required to ensure the project reaches its goals with little outside disturbance and with the physical and biological assistance afforded signage, bio-matting, and seeds. It serves to demonstrate how minimal small projects such as these actually cost.

Timeline

This work is expected to commence and be mostly completed by a large crew of students and volunteers over the course of one weekend, prior to the closing of the semester. Once the proposal is approved, plans will be set into place to obtain the supplies and materials and to gather volunteers. Close observations, watering and protection of seeded areas will be made through the spring and summer to ensure the vegetation efforts are successful. Remedial seeding and transplanting of shoreline vegetation where assistance in plant recovery is needed.

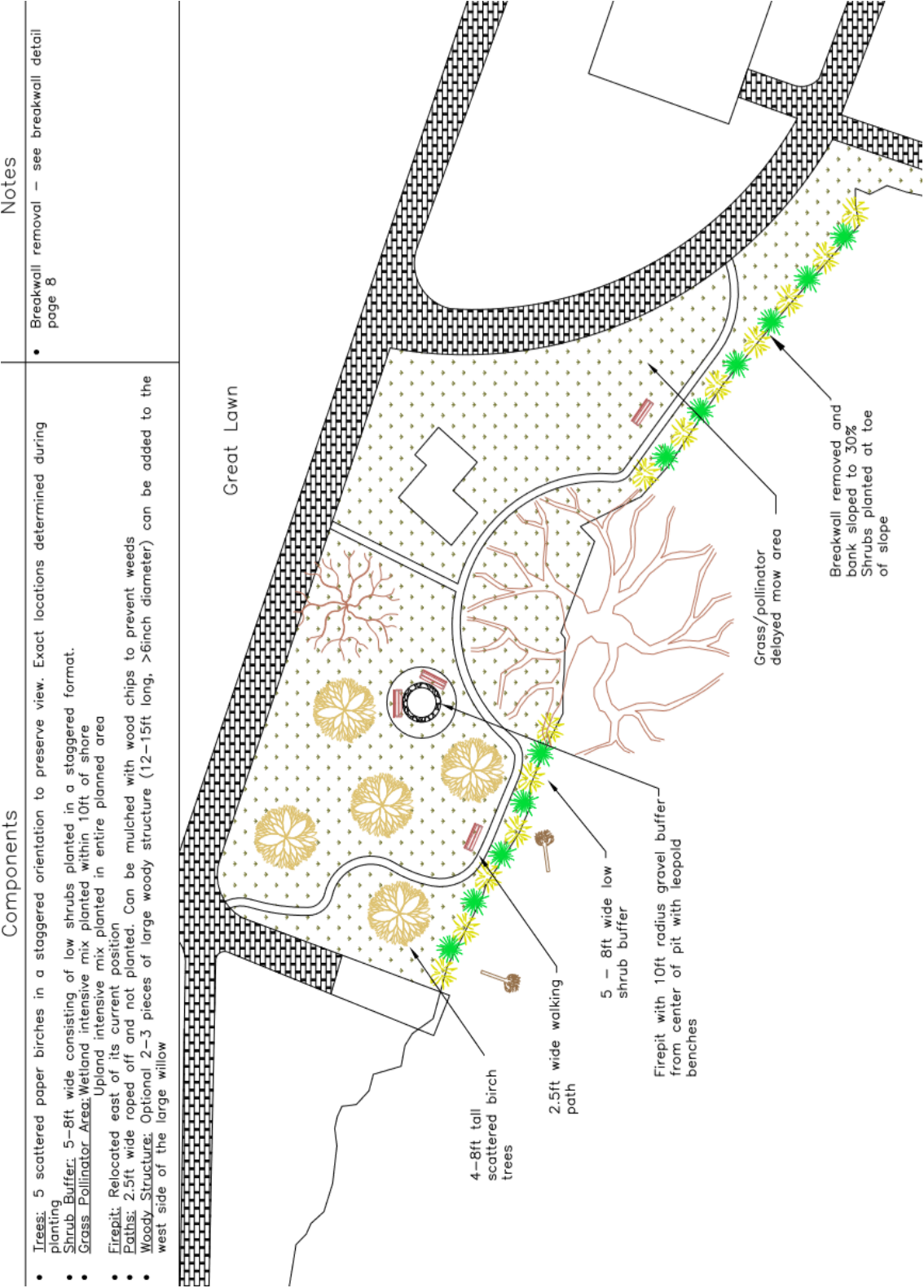
Supporting Documentation

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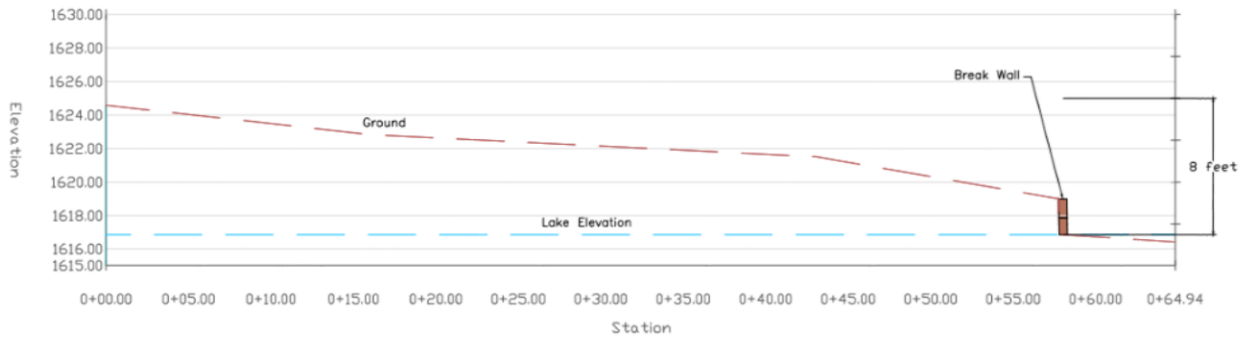
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Restoration Site, Planform

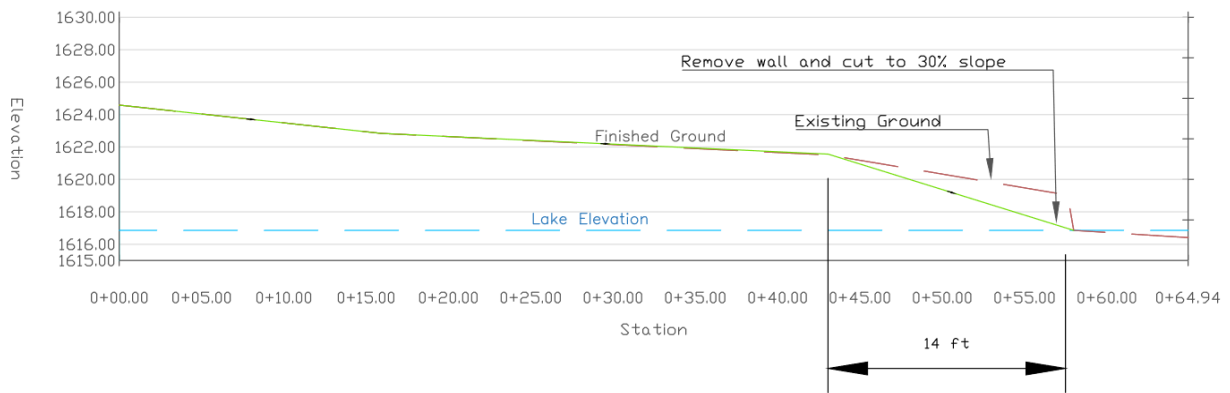


Restoration Site, Profiles

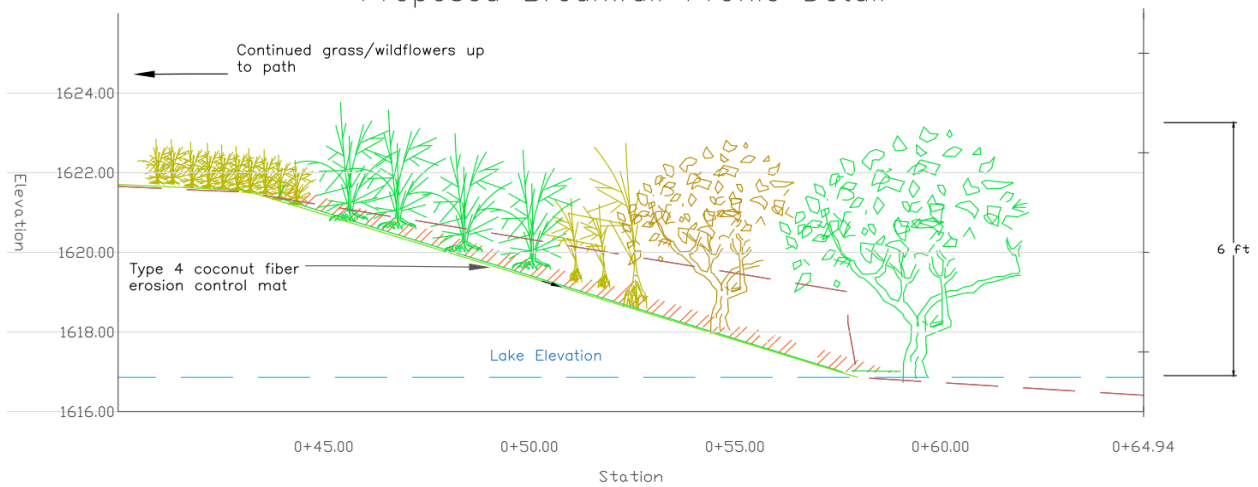
Existing Ground Conditions – Breakwall Area



Proposed Breakwall Profile



Proposed Breakwall Profile Detail



List of plant species to be implemented for the plan during phase one.

Common Name	Scientific Name	Indicator Status	Native /non	Form	Shade tolerance	Height
Eastern Purple Coneflower	<i>Echinacea purpurea</i>	FACU	Native	Pollinator/ Mix 1	Intolerant	2-4ft
Wild Bergamot	<i>Monarda fistulosa</i>	FACU	Native	Pollinator/ Mix 1	Intolerant	1-6ft
Blackeyed Susan	<i>Rudbeckia hirta</i>	FACU	Native	Pollinator/ Mix 1	Intolerant	1-3ft
Golden Alexanders	<i>Zizia aurea</i>	FAC	Native	Pollinator/ Mix 1	Intolerant	1-3ft
Lance-leaf Coreopsis	<i>Coreopsis lanceolata</i>	FACU	Native	Pollinator/ Mix 1	Tolerant/ Intolerant	1ft
Blanket flower	<i>Gaillardia aristata</i>	FACU	Native	Pollinator/ Mix 1	Intolerant	10-12in
New England Aster	<i>Symphyotrichum novae-angliae</i>	FACW	Native	Pollinator/ Mix 2	Intolerant	18in
Spotted Joe Pye Weed	<i>Eupatoriadelphus maculatus</i>	OBL	Native	Pollinator/ Mix 2	Intolerant	4-6ft
Common Boneset	<i>Eupatorium perfoliatum</i>	FACW	Native	Pollinator/ Mix 2	Intolerant	3-6ft
Blue Vervain	<i>Verbena hastata</i>	FACW	Native	Pollinator/ Mix 2	Intolerant	2-5ft
Wingstem	<i>Verbesina alternifolia</i>	FACW	Native	Pollinator/ Mix 2	Intolerant	4-8ft
New York Ironweed	<i>Vernonia noveboracensis</i>	FACW	Native	Pollinator/ Mix 2	Intolerant	3-6ft
Leatherleaf	<i>Chamaedaphne calyculata</i>	OBL	Native	Shrub	Tolerant	3ft
American Wintergreen	<i>Gaultheria procumbens</i>	FACU	Native	Shrub	Tolerant/ Intolerant	6in
Bog Laurel	<i>Kalmia polifolia</i>	OBL	Native	Shrub	Tolerant/ Intolerant	1-3ft
Labrador Tea	<i>Ledum groenlandicum</i>	OBL	Native	Shrub	Tolerant/ Intolerant	1-3ft
Lowbush blueberry	<i>Vaccinium angustifolium</i>	FACU	Native	Shrub	Tolerant	6in-2ft
Hobblebush	<i>Viburnum lantanoides</i>	FACU	Native	Shrub	Tolerant	3-6ft

Site History

This section is provided for historical context, which is relevant to Paul Smith's College and its roots to our suite of environmental programs.

In order to understand the cultural implications and features involved with the restoration of the shoreline, it is necessary to understand the restoration site both spatially and temporally. That is, to understand the environmental memory of the site just as much as the cultural legacy of the site and how they have both evolved over time through various uses and perceptions of the site.

The Lower St. Regis lake, as it has come to be known, was known as the *Pokuizasne*, an Abenaki version of the Mohawk name Akwesasne (where the partridge drums), according to an interview with the son of Peter Sabattis in 1900. Sabattis was an Abenaki veteran of the war of 1812 who made camp along the *Pokuizasne*. This interview, along with many artifacts found around the St. Regis area lend evidence to a much deeper and richer history of the region. One in which various Mohawk and Iroquois tribes utilized the region to subsist. Currently, the St. Regis Band of Mohawk Indians are the federally recognized Native American tribe of the Adirondack region, however, there are artifacts which date habitation within the region dating back 11,000 years.

The known alterations of the St. Regis Shore lake began with a dam constructed by the Keese brothers to facilitate logging and mill operations in the region. The damming in turn raised the level of the lake to what is currently known as the shoreline. Around 1948, Apollo Smith came to the Adirondacks, like many other Americans of the time, seeking opportunity to extract wealth or cut out opportunities from the region. In 1859, he established "The Saint Regis House" along the shore of the lake. In 1891, with a purchase of 13000 acres of heavily logged, highly impacted land, began both the recovery and severe degradation of the St. Regis ecological landscape. The hotel, "The Saint Regis House" evolved to become a prestigious resort. In 1930, after the hotel burned down, Phelps Smith, Apollo's son, willed a fortune to establish a college in his father's name. Paul Smith's college has been a part of the Lower St. Regis Shoreline since 1946.

While in operation, the hotel and college were both a pollution point source. Effluent generated from the hotel and colleges operations were expelled into the Lower St. Regis lake up until 1974, when year-round effluent was diverted into a sand bed 250 meters from the lake. As a result, the lake was subject to severe eutrophication, "as indicated by summer long intense blue-green algal blooms caused by phosphate discharges from a point source contributing $0.8\text{g P}/(\text{m}^2 \times \text{yr})$." Algal blooms were first documented in 1955 and since 1963 appeared earlier. Since 1968, they appeared more persistent. Between 1972-1974, in an EPA restoration of Lower St. Regis Lake occurred. Immediate seasonal chemical removal of sewage phosphorus was conducted through the addition of Ferric Chloride to act as a chemical precipitant and eventually diversion of effluent all together resulted in an 80% reduction of phosphate and then 100% reduction of input. Recovery of the lake was then aided by the morphometry and chemistry of the lake basin. (Fuhs, 1977)

Since 1972, the Lower St. Regis Shoreline has been a source of education, research, and monitoring for Paul Smith's College. It has included work from eight different programs, nine classes, multiple capstone projects, and the participation from hundreds of students.