

LAKE CHAMPLAIN SEA GRANT 2013-2017 Alignment Plan

Introduction

Lake Champlain shares a similar natural history and faces many of the same environmental problems as the Great Lakes, including nonpoint source pollution, eutrophication and occasional toxic algae blooms; the invasion of nonnative and nuisance aquatic species; and habitat alterations resulting from erosion and sedimentation. These environmental challenges are likely to be exacerbated by climate change, which is increasing the frequency and intensity of precipitation events, changing the balance of rain and snow in precipitation events, and increasing the mean air and water temperature¹.

Mission and Goals

To address these and other priority issues, Lake Champlain Sea Grant's (LCSG) mission is to develop and support research, education and extension programs to empower communities, businesses and other stakeholders in the Lake Champlain Basin to make informed decisions regarding the management, conservation, utilization and restoration of their aquatic resources for long-term environmental health and sustainable economic development. Our goals and objectives support ecosystem-based approaches to planning and management that consider the lake and its entire drainage basin as a whole interconnected, complex system that is changing over time. Our approach reflects the ecosystems approach of the NOAA Sea Grant Strategic Plan and the Lake Champlain Basin management plan².

Lake Champlain Sea Grant has goals and objectives in all four of the NOAA Sea Grant Strategic Plan Focus Areas: Healthy Coastal Ecosystems (HCE), Sustainable Fisheries and Aquaculture (SFA), Resilient Communities and Economies (RCE), and Environmental Literacy and Workforce Development (ELWD). LCSG staff effort (a total of 5.3 FTE (including full time, interns, and temporary/part time staff) is not evenly distributed among these focus areas. The greater proportion of LCSG effort (74%) is concentrated in two areas: Resilient Communities and Economies (2.15 FTE), and Environmental Literacy and Workforce Development (1.75 FTE). This strategic weighting of effort allows us to both build on our strengths and invest in new initiatives as we grow into the institutional status over the course of this planning period.

The following implementation plans are based on a 4-year planning cycle (assume 2013-2017) and are intended to show significant and measurable progress towards reaching objectives, and producing the described outcomes (as measured by indicators) within 1-4 years. Implicit in the plans is that LCSG will not be acting alone but in concert with partners and collaborators to achieve outcomes and both short/medium and long term objectives.

Interim Strategy and Future Initiatives

Lake Champlain Sea Grant recently gained Coherent Area Program (CAP) status. This change in status requires LCSG to develop a strategic plan. Once national guidelines for strategic planning that are currently in development are finalized and resources are available, LCSG will develop a formal Strategic Plan, with full participation by partners and stakeholders. In the interim, LCSG will follow the strategies,

¹ Stager, C. and M. Thill. 2010. Climate Change in Champlain Basin. The Nature Conservancy. http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/vermont/howwework/champlain_climate_report_5_2010-2.pdf.

² <http://www.lcbp.org/impofa.htm>

goals and objectives outlined in our Coherent Area Program proposal. In this document we identify how our CAP goals and objectives align with the NOAA Sea Grant Strategic Plan and how they will guide LCSG Extension activities for the near (2-3 year) future.

Full details of our Interim Strategic Plan are available in our CAP Proposal.

Focus Area: Healthy Coastal Ecosystems

Science-based information increases awareness among basin residents of priority coastal, aquatic and watershed resource issues, and to improve their capacity to protect and restore basin resources. Improved understanding about basin ecosystem processes, and the relationships between environmental stressors and long-term human and ecosystem health is essential for decision-makers, planners, and managers. Stressors of concern in the basin include non-point source pollution and water quality degradation (phosphorus, toxins, and other contaminants), harmful algal blooms, invasive species, and the impacts of hazardous events (flooding, erosion, sedimentation, river channel changes). Effective management of Lake Champlain requires an active role by Sea Grant: applied research to improve understanding, use and management of basin waters and watersheds, assistance to decision-makers, planners, and managers to apply knowledge of basin ecosystem processes, work with local partners to implement findings/recommendations of applied research that support ecosystem-based management, and promotion of the use of data and indicators for decision analysis modeling, management plans and strategic planning.

Local residents and communities (including youth) need to act to protect and restore coastal, aquatic and watershed resources in the basin. There is a need to support participation by increasing awareness among communities of threats from NPS pollution (including phosphorus, toxins and bacteria), invasive species, and other water-related human health hazards. Partners need support in efforts to improve the capacity of basin residents to participate effectively in coastal, aquatic and watershed resource management issues. Grass roots effort require technical support and assistance (including demonstration projects) that help residents, local governments, volunteer organizations and others to implement low impact development, low input grounds care and other best management practices. It is important to note that Much of what is planned under this focus area overlaps significantly with activities and programs in RCE and ELWD.

Ecosystem protection and restoration include activities to prevent the spread of aquatic invasive species (AIS) and mitigate their impacts. Nearly four dozen non-native species have been introduced into waters of the Lake Champlain Basin. While these numbers are low relative to the Great Lakes, many of these species have dispersed and are at nuisance levels, causing substantial environmental and economic impacts. Other AIS are expanding their ranges in adjacent regions and threaten to enter the basin. In particular, Lake Champlain faces invasives threats entering via the Champlain Canal, which connects Lake Champlain to the Hudson River and, via the Erie Canal, to the Great Lakes.

1. Goal: Ecosystem services are improved by enhanced health, diversity and abundance of fish, wildlife and plants.

2. Goal: Ecosystem-based approaches are used to manage land, water and living resources.

LCSG Goal. (Incorporates NSGO Goals 1 and 2) - Ecosystem-based approaches used to promote a healthy and diverse ecosystem and provide for sustainable human use and enjoyment of Lake Champlain, the basin and surrounding waters.

Learning Outcomes

2.1. (NSGO 2.2). Applied research provides baseline data and indicators to stakeholders and decision makers for key issues affecting ecosystems and watersheds in the basin.

- By 2017 baseline data sets available for 4 stressors to Lake Champlain: atmospheric deposition of mercury, double-crested cormorant populations on Lake Champlain, rainbow smelt population dynamics, invasive species in the Champlain Canal system.

2.2. (NSGO 2.3). Applied research contributes to improved understanding, use and management of Lake Champlain and the basin's inland waters.

- Support at least 4 research projects that address stressors and ecosystem processes to improve understanding and management of the basin and resources.

Action Outcomes

2.3. (NSGO 2.6). Decision-makers, planners, and managers apply knowledge of basin ecosystem processes to reduce the effects of environmental stressors and long-term human and ecosystem health.

- LCSG supported research results or recommendations included in or cited by at least five planning, regulatory and/or action documents by 2017.

3. Goal: Ecosystems and their habitats are protected, enhanced or restored. (AIS)

LCSG Goal – Protect and restore coastal and aquatic ecosystems in the Lake Champlain basin.

Learning Outcomes

3.1. (NSGO 3.1). Residents, resource managers and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.

- Annually, 20 lakeshore property owners understand the importance of preserving the riparian and aquatic ecosystems of Lakes St Catherine's, Carmi, Hortonia through LEAP youth watershed team outreach and education activities.

3.2. (NSGO 3.2). Key constituencies within the basin (boating community, anglers, bass tournament organizers) aware of specific AIS threats and AIS spread prevention techniques.

- Annually 30 individuals among key constituencies within the basin (boating community, anglers) increase knowledge about specific AIS threats and AIS spread prevention techniques.

Action Outcomes

3.3. (NSGO 3.4). LC bass tournament organizers adopt aquatic invasive species (AIS) spread prevention BMP/HACCP tournament protocols.

- 3 Lake Champlain bass tournament organizers adopt aquatic invasive species (AIS) spread prevention BMP/HACCP tournament protocols by 2017.

3.4. (NSGO 3.5). Sports fishing angler organizations actively involved in sports fisheries protection, enhancement and habitat conservation efforts.

- Annually members of 2 sports fishing angler organization participate actively in annual sports fisheries protection, enhancement and habitat conservation efforts

3.5. (NSGO 3.5). Lake Champlain basin communities replant or maintain native shoreline, riparian and littoral vegetation.

- 700 feet of shoreline/bank vegetation replanted or native vegetation maintained annually.
- 14 volunteer days annually committed by local organizations to watershed/lake restoration and monitoring activities.

3.6. (NSGO 3.5). Youth action teams (LEAP) assist lakeshore property owners with pollution prevention projects.

- Annually 2 LEAP youth watershed teams annually assist 10 lakeshore property owners to implement NPS pollution prevention projects.

Consequence Outcomes

3.7. (NSGO 3.6). Introduction of new aquatic invasive species (AIS) into Lake Champlain or the basin prevented or slowed.

- No new AIS species recorded from Lake Champlain basin

3.8. (NSGO 3.7). Impacts of AIS in basin waters mitigated to restore ecosystem function and productivity.

- Basin stakeholders and managers use invasive smelt and other AIS research results to manage sports fisheries (up to 10 users).

Healthy Coastal Ecosystems Performance Measures

1. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management.

- LCSG supported research results or recommendations included in or cited by at least five planning, regulatory and/or action documents by 2017.
- 20 Adirondack towns using AIS management plans developed with LCSG support.

2. Number of acres of coastal habitat protected, enhanced or restored as a result of Sea Grant activities.

- 2800 feet of shoreline/bank vegetation replanted or native vegetation maintained annually.

Focus Area: Sustainable Sports Fisheries and Aquaculture

Priority recreational fisheries issues in Lake Champlain are closely linked to invasive species. Major threats/issues facing the lake's native landlocked Atlantic salmon and lake trout fisheries are: 1) potential food web disruption by invasive zooplankton, 2) trout/salmon early mortality syndrome threats posed by non-native alewife, and 3) threats to salmonid hatcheries from VHS.

The VT-upstate NY region has a strong demand for locally produced food, including fish, but fish production remains undeveloped. The region requires an assessment of constraints to development and a coordinated plan to assist the industry to realize the commercial potential of small scale production of trout. In addition, assistance in assessing technical and financial feasibility is essential to aid entrepreneurs in exploring small scale fish production.

Several communities in NY and VT are vulnerable to potential toxic effects of mercury via consumption of fish containing mercury. These include subsistence anglers, recent immigrants, and pregnant and nursing women. Exposure risks are via consumption of locally caught fish that are included in fish advisories, and consumption of canned fish and fish products with high mercury content. To ensure consumers are aware of both the nutritional benefits and of the risks associated with wild fish consumption, we will be initiating a mercury education and fish consumption advisory outreach program.

4. Goal: A safe, secure and sustainable supply of seafood to meet public demand.

LCSG Goal. A sustainable supply of safe local seafood to meet public demand

Learning Outcomes

4.1. (NSGO 4.1). Fishery managers and fishermen aware of sports fishery sustainability issues in Lake Champlain, including interactions between native smelt and introduced alewife.

- 50 members of key constituencies within the basin (boating community, anglers) increase in knowledge about fisheries sustainability each year.

4.2. (NSGO 4.2). Fish culture facilities in NY and VT are knowledgeable about NRAC recommended biosecurity BMP practices.

- 2 fish culture facilities in NY and VT are aware of NRAC recommended biosecurity BMP practices each year.

4.3. (NSGO 4.2). Prospective and existing small scale aquaculture producers have information on appropriate technology, practices and regulations.

- 5 annual technical assistance requests filled each year for small scale and hobby/pilot aquaculture operations.

4.4. (NSGO 4.3). Recreational fishermen are knowledgeable about stopping AIS threats and other responsible fishing techniques.

- 30 angler association members annually increase knowledge about specific AIS threats and how human actions promote invasion and spread of AIS.

Action Outcomes

4.5. (NSGO 4.8). Fish culture facilities in NY and VT are using NRAC recommended biosecurity BMP practices.

- 2 fish culture facilities annually in NY and VT adopt NRAC recommended biosecurity BMP practices.

5. Goal: Informed consumers who understand the health benefits of seafood consumption and how to evaluate the safety and sustainability of the seafood they buy.

LCSG Goal. Local communities are aware of state fish advisories and of the risk to household health posed by mercury in fish.

Learning Outcomes

5.1. (NSGO 5.4). Households in target communities increase awareness of fish consumption advisories.

- 30 households annually increase awareness of fish consumption advisories.

Action Outcomes

5.2. (NSGO 5.7). Households in target communities reduce consumption of fish identified in VT and NY fish advisories.

- 15 households annually reduce consumption of fish or fish products with high mercury content.

Sustainable Fisheries and Aquaculture Performance Measures

4. Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities.

- By 2017 8 fish culture facilities in NY and VT use NRAC recommended biosecurity BMP practices learned from LCSG.

5. Number of seafood consumers who modify their purchases using knowledge gained in fisheries sustainability, seafood safety and the health benefits of seafood as a result of Sea Grant activities.

- By 2017 at least 60 households (~240 ind.) reduce consumption of fish or fish products with high mercury content.

Focus Area: Resilient Basin Communities and Economies

Tourism and recreation are central to the economic wellbeing of coastal communities in the basin. However, these communities must be able to identify and pursue sustainable economic development policies and programs. They also need access to information and training in the use of tools that help them realize the economic potential of sustainable development of tourism and recreation and to help balance business development and resource protection.

Marina operators and boaters are an important stakeholder group involved in Lake Champlain management and protection. Nationwide, Sea Grant led efforts have engaged these groups in effective pollution prevention, boater safety and cleanup efforts. A Clean Marinas program in the region will engage these stakeholders in pollution prevention, including a voluntary marina BMP program, clean boating and AIS spread prevention education programs, using existing Sea Grant and Marina Net resources.

A second concern is that climate change models predict that Lake Champlain basin will become wetter, with an increase in the severity of rainfall events. Municipalities are struggling with limited budgets to plan for and address the costly impacts of increased rainfall and flash flooding. Helping towns take steps to prepare for and mitigate future climate change related flooding events is a great need. Technical support, training and coordination among the various stakeholders are essential for the development of local vulnerability assessments, a regional case study as a reference for future flood resiliency efforts, and use of geomorphic assessments for climate adaptation planning and implementation. Using these tools, local officials, from regional planning commissions to town leaders, will be better able to proactively mitigate future flooding impacts and reduce infrastructure damage and cost to basin communities.

In addition, to prepare our region for a changing climate, there is a need to evaluate the interactions between changes in climate and changes in land-use. Research that addresses local priority information needs is essential, such as building ecosystem models that consider climate change in efforts to improve management of stormwater runoff, manage fisheries and understand food web dynamics.

A third concern is that Lake Champlain is under a phosphorous TMDL. Phosphorous is the most serious problem facing Vermont's lakes and ponds by accelerating eutrophication and by stimulating algal blooms that are sometimes dominated by toxin producing species. An estimated 46% of the nonpoint source phosphorus load to Lake Champlain is from urban land uses, which account for only 3% of the basin area. Urban NPS pollutants originate from decisions by individuals on how they manage their property, be it residential, commercial or municipal property. Generating the will to change practices by these individuals depends on building an aware and engaged community through education, outreach and technology transfer.

While advances have been made in methods of treating stormwater pollution, it still remains the fastest growing threat to basin water quality. Intensive land development, urbanization and intensification of agriculture produce stormwater runoff that degrades many Vermont streams and watersheds. For example, there are 15 lakes and ponds and 98 state stream and river waters that do not meet Vermont Water Quality Standards.

A fourth concern is that erosion and sedimentation cause significant water quality problems in Vermont. Shoreline property owners inadvertently promote shoreline erosion, sedimentation and phosphorous input by clearing natural vegetation and modifying stream banks or shoreline for views or recreation, but also promoting shoreline erosion and sediment impairment. As erosion occurs, landowners often use engineered approaches to slow or stop erosion. While these methods are necessary in certain situations, most shoreline erosion problems can be corrected using non-structural (bioengineering) techniques.

Finally, Lake Champlain supports a diverse sport fishery with cold, cool and warm water components characterized by trout and salmon, walleye, and black bass fisheries. Since the mid 1970's (and especially since the early 1990's) fishery management efforts have focused largely on the restoration of previously extirpated lake trout and landlocked Atlantic salmon (*Salmo salar*), control of nuisance sea lamprey (*Petromyzon marinus*) and double crested cormorant (*Phalacrocorax auritus*) populations. The lake's bass fishery (*Micropterus dolomieu*, smallmouth, and *M. salmoides*, largemouth) has historically received less attention by local stakeholders, including anglers, managers, and researchers.

Lake Champlain contains abundant habitat for both smallmouth and largemouth bass and hosts numerous yearly bass tournaments, bringing substantial economic benefits to the local communities along Lake Champlain. Within-basin business and municipal government groups have directed much effort toward the operation of bass tournaments, ranging in scale from local-amateur to national-professional events, many of which are televised globally. Competitive fishing can have important local economic benefits that must be weighed against management of a sustainable fishery. Despite the growing number and importance of these tournaments, little data are available to properly manage and assure the sustainability of the black bass fishery in Lake Champlain. Research to fill these gaps is essential.

6. Goal: Development of vibrant and resilient coastal economies.

LCSG Goal. Lake based tourism and recreation grows and strengthens the economic base of basin communities.

Learning Outcomes

6.1. (NSGO 6.2). Operators of Lake Champlain marinas and boat yards are aware of Clean Marinas and Clean Boating programs and recommendations.

- 15 VT and NY marina operators and employees aware of sustainable marina operations each year.
- 200 boaters aware of low impact boating guidelines.

6.2. (NSGO 6.2). Sport fishing tournament stakeholders are aware of fisheries sustainability issues and potential impacts of tournament angling.

- 4 boating and angling organizations aware of and support research project on post tournament release movements of black bass in Lake Champlain.

Action Outcomes

6.3. (NSGO 6.7). Lake Champlain marinas and boat yards use Clean/Green Marina program guidelines and recommendations.

- 2 marinas become part of Clean Marinas and/or Clean Boating programs each year.

6.4. (NSGO 6.2). Marina users adopt Clean Boating program recommendations.

- 20 marina users join their marina's Clean Boating program each year.

6.5. (NSGO 6.2). Communities develop conservation plans to support tourism and recreation.

- Black bass conservation plan developed for City/Town of Plattsburgh, NY

7. Goal: Communities use comprehensive planning to make informed strategic decisions.

LCSG Goal. Basin communities have the information and tools to realize the economic potential of lake based tourism and recreation.

Action Outcomes

7.1. (NSGO 7.3). Town plans include ordinances, polices, or other support for sustainable coastal development.

- 2 Town plans annually include ordinances, polices, or other support for sustainable coastal development.

8. Goal: Improvements in coastal water resources sustain human health and ecosystem services.

LCSG Goal. Reduced NPS pollution (especially phosphorus, lawn chemical, coliform bacteria) improves quality of water resources in the basin.

Learning Outcomes

8.1. (NSGO 8.1). Planners, local officials and others are aware of how land use changes can affect water quality and aquatic ecosystems.

- 120 community leaders, officials and others each year aware of the role of Low Impact Development in supporting sustainable tourism and recreation.

8.2. (NSGO 8.2). Residents, local governments and businesses are aware of current information and methods for protection of watersheds and water quality.

- 45 participants from lawn care and landscaper businesses take part in formal and informal pesticide application and safety training or continuing education.

Action Outcomes

8.3. (NSGO 8.4). Communities use Green Infrastructure and Low Impact Development strategies to protect water quality and aquatic ecosystems from impacts of land use changes.

- 2 municipalities annually implement green infrastructure and Low Impact Development (LID) strategies.

8.4. (NSGO 8.5). Communities adopt local best management practices, policies and ordinances to protect local water quality.

- 8 commercial properties in targeted impaired watersheds use low input grounds care each year.

- 5000 gallons of storm water prevented from reaching local water bodies each year.

9. Goal: Resilient coastal communities adapt to the impacts of hazards and climate change.

LCSG Goal. Lake Champlain Basin communities plan for and adopt practices that mitigate the impacts of climate change and weather related hazards.

Learning Outcomes

9.1. (NSGO 9.1). Climate change adaptation education and outreach increases awareness by residents and decision-makers of climate change related hazards and how to plan for them.

- 5 local officials each year have increased awareness of the potential impacts of climate change on coastal and river communities.

9.2. (NSGO 9.2). Local leaders, officials and planners aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.

- 10 local LCSG trained officials and planners each year engage in climate change adaptation and community resiliency activities.

9.3. (NSGO 9.3). Communities have access to and use data, tools and techniques to reduce or avoid the effects of weather and climate related hazard events.

- 20 community leaders aware of LCSG-supported research on “Geomorphic Principals in Project Design” to prepare for extreme flood events.
- 2 communities annually use local research outcomes in community climate change adaptation planning.

Action Outcomes

9.4. (NSGO 9.5). Basin communities plan for and adopt practices that mitigate the impact of climate change.

- 4 local officials/leaders annually request input and information on flood resiliency planning.
- 2 municipalities annually with new or updated shoreline/riparian vegetation protection or restoration ordinances.

9.5. (NSGO 9.7). Municipalities apply BMP for climate change related shoreline erosion and bank stabilization.

- 2 basin municipalities annually apply BMP for climate change related shoreline erosion and bank stabilization.
- Bioengineering plan adopted for planned Burlington bike path restoration.

Resilient Communities and Economies Performance Measures

6. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, and green infrastructure) as a result of Sea Grant activities.

- By 2017, at least 8 basin marinas certified as Clean Marinas as a result of LC Sea Grant activities.
- By 2017 30 commercial properties in basin use low input grounds care practices as a result of LC Sea Grant activities.
- By 2017 20,000 gallons of storm water prevented from reaching local water bodies as a result of LC Sea Grant activities.
- By 2017 8 municipalities have shoreline/riparian vegetation protection or restoration ordinances as a result of LC Sea Grant activities.

7. Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Sea Grant activities.

- By 2017 8 basin municipalities adopt BMP for climate change related shoreline erosion and bank stabilization as a result of LCSG activities.
- 1 LCSG supported bioengineering plan adopted for restoration planned Burlington bike path restoration.

Focus Area: Environmental Literacy

Environmental Literacy is essential to have an informed public and to prepare them to make often difficult decisions to protect and restore watersheds, water quality and the basin environment. But knowledge about the condition of our environment, including water resources, is constantly changing, as are the landscapes in which we live. The result is variability over time and among programs engaged in relevant water resource education in the basin. Further, many science educators do not have the current knowledge, resources or support to integrate appropriate watershed education into their curricula, particularly related to climate change effects and our evolving knowledge of ecosystems and processes in the basin.

The University of Vermont Watershed Alliance (WA), a Sea Grant managed program, fills this critical need for environmental education in the basin by making hands-on, up-to-date, inquiry-based, scientific watershed and water quality education available to Vermonters including educators, students, and the general public. UVM WA provides equipment, curricula, technical support and human resources for those participating in our programs. The Watershed Alliance provides life-long learning programs for people of all ages that enhance understanding of coastal, ocean and Great Lakes environments and promote stewardship of healthy ecosystems. The education program supports goals in the other LCSG focus areas by promoting education, public awareness and community action by residents, businesses and local governments needed to protect and restore coastal, aquatic and watershed resources in the basin.

10. Goal: An environmentally literate public supported and informed by a continuum of lifelong formal and informal engagement opportunities.

LCSG Goal: Effective education programs inform an environmentally literate public about water quality, water resources and watershed issues important to sustainable use and management of Lake Champlain and its basin.

Learning Outcomes

10.1. (NSGO 10.1). Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.

- 25 science educators annually participate in Poultney Mettowee Watershed Expo training activities.
- 20 science educators increasing knowledge of watersheds and new teaching tools and techniques.

10.2. (NSGO 10.3). Lifelong learners with increased knowledge of watersheds, water quality and their role as watershed stewards.

- 1200 middle and high school youth annually increase in knowledge of watersheds and their role as watershed stewards.
- 12 undergraduate students annually increase in knowledge of watershed education and water quality monitoring through employee training and hands-on teaching opportunities.

Action Outcomes

10.3. (NSGO 10.9). Lifelong learners (youth, young adults, adults) use information delivered by Watershed Alliance or other programs in watershed/lake protection and restoration activities.

- 20 participants annually in student-led program to educate and assist lakeside property owners to implement pollution prevention and watershed/lake restoration activities for Lakes St Catherine's, Carmi, Hortonia.
- 30 Lifelong learners (non-youth) engaged annually in watershed/lake restoration activities.
- 2 high school or undergraduate college students conducting or participating in watershed stewardship projects.

Environmental Literacy and Workforce Development Performance Measures

8. Number of Sea Grant facilitated curricula adopted by formal and informal educators.

- 17 schools using Watershed Alliance curriculum equal to or above long term (5 year) average, number predicted each year is 4 schools.

CROSS-CUTTING PERFORMANCE MEASURES

Number of peer-reviewed publications produced by the Sea Grant network, and number of times each peer reviewed publication is cited.

- 4 peer-reviewed publications produced by LCSG-supported research activities.