

# Lake Champlain Sea Grant

**Briefing Book**  
Sea Grant Site Review 10-11 June 2015



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# Program Management and Organization

## Program Leadership

The Lake Champlain Sea Grant (LCSG) program is a collaboration between the University of Vermont (UVM) and the State University of New York at Plattsburgh (SUNY-Plattsburgh). UVM is the lead organization and hosts the LCSG Director who is a faculty member of the Rubenstein School of Environment and Natural Resources (RSENR, Rubenstein School). SUNY-Plattsburgh co-leads and hosts the LCSG Co-Director who is a faculty member of the College of Arts and Sciences. The Sea Grant Extension activities of the LCSG program are lead and coordinated by an Extension Leader who is a faculty member of the Rubenstein School. Four full time staff facilitate programming across the Lake Champlain Basin, developing relationships with partners and stakeholders to empower communities, businesses and other stakeholders to make informed decisions regarding the management, conservation, utilization and restoration of their aquatic resources for long-term environmental health and sustainable economic development. LCSG program staff collaborate to review progress, plan strategies, and develop or respond to new initiatives.

## Program Advisory Committee

The Program Advisory Committee (PAC) provides regular public input and guidance to the LCSG program. The PAC members represent stakeholder groups from New York and Vermont, including business, agriculture, watershed organizations, state and federal government, research, and education.

The PAC helps to ensure that LCSG extension, outreach and education programs address the needs and priorities of basin communities, businesses, and policymakers in the Lake Champlain Basin of Vermont and

New York. Committee members meet at least bi-annually to help set program priorities, review activities and accomplishments and to advise on program development and review. LCSG staff maintain ongoing relationships with PAC members who work in their focus area of interest.

## Board of Directors

In recognition of the bi-state partnership that defines the LCSG program a Board of Directors (BoD) has been established that includes the Vice President for Research at the University of Vermont (Dr. Richard Galbraith), the Dean of Extension at the University of Vermont (Dr. Doug Lantagne), and the Provost at SUNY-Plattsburgh (Dr. James Liszka). Director Bowden maintains personal contact with each of these Board members and convenes them as needed to address higher level program guidance and support.

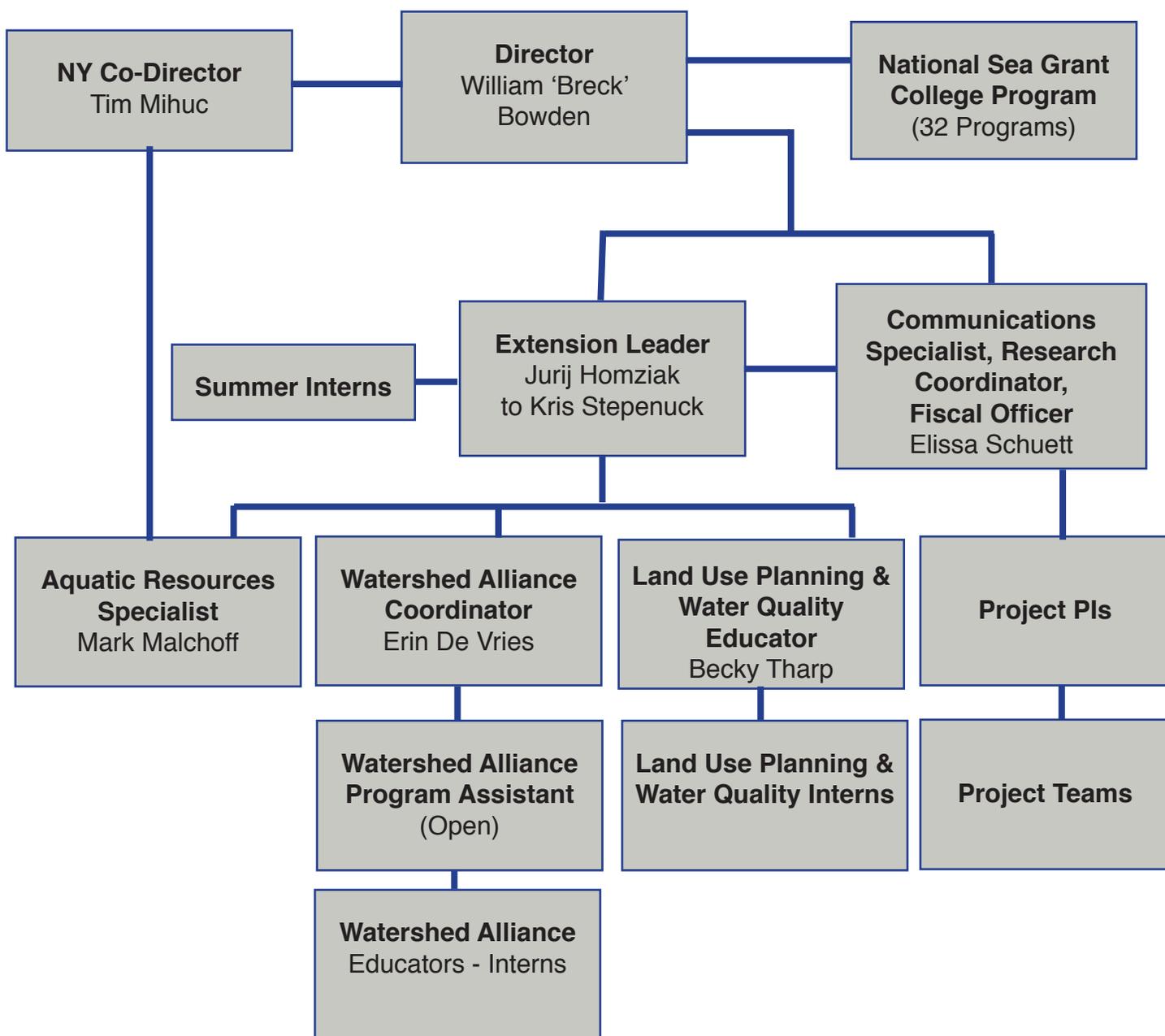
<b>LCSG Program Advisory Committee Members</b>	
Dan Albrecht	Chittenden County Regional Planning Commission
Jill Arace	Vermont Association of Conservation Districts
Tom Berry	Senator Patrick Leahy Agriculture, Conservation, Energy and Natural Resources Policy Adviser
George Burrill	Retired expert in international rural development
Kari Dolan	Vermont Department of Environmental Conservation
Fred Dunlap	New York Department of Environmental Conservation
Phelan Fretz	ECHO Lake Aquatium and Science Center
Craig Heindel	Waite-Heindel Environmental Management
Bill Howland	Lake Champlain Basin Program
Jim Jutras	Village of Essex Water Quality Superintendent
Doug Lantagne	UVM Extension
Crea Lintilhac	Lintilhac Foundation
Mickey Maynard	Lake Champlain Angler Fishing Charters
Brian Slopey	U-32 High School
Eric Smeltzer	Vermont Department of Environmental Conservation
Ruth Wallman	Champlain Islands Chamber of Commerce
Lindsay Wieland	Vermont EPSCoR
Mike Winslow	Lake Champlain Committee

## Program Setting within the University

The Lake Champlain Sea Grant program is hosted by the Rubenstein School which is one of nine degree-granting units within the University of Vermont. The mission of the Rubenstein School is to understand, nurture, and enrich the interdependence of humanity with healthy ecological systems. As members of the faculty of the Rubenstein School, Director Bowden and Extension Leader Stepenuck (formerly Homziak) answer directly to the Dean of the Rubenstein School (Dr. Nancy Mathews). However, with the understanding of the Dean, Director Bowden is free to communicate directly with the higher levels of the administrations in UVM,

SUNY-Plattsburgh, and the leadership of relevant state agencies in both states served by the LCSG program (Vermont and New York). For example, Director Bowden meets regularly with the Provost (Rosowsky) and the Executive leadership of key state agencies (e.g. Dave Mears, Commissioner, VT Department of Environmental Conservation).

The LCSG program receives substantial support from the University of Vermont Extension program. Specifically, UVM Extension provides a major portion of the support for the Extension Leader Position and all of the support for the Watershed Alliance Coordinator position (De Vries). This support accounts for an important component of the matching commitment necessary to operate the LCSG program.



## **LCSG Staff and Responsibilities**

The Director of Lake Champlain Sea Grant is Dr. William B. Bowden. Dr. Bowden, Professor and Patrick Chair of Watershed Science and Planning in the Rubenstein School of Environment and Natural Resources. Dr. Bowden also directs the Vermont Water Resources and Lake Studies Center (funded by the U.S. Geological Survey) and the Northeastern States Research Cooperative (funded by the USDA Forest Service).



Erin De Vries is the UVM Watershed Alliance Outreach and Education Coordinator and an Aquatic Science Literacy Educator for Lake Champlain Sea Grant. She coordinates youth and public environmental education programs, creates curricula, designs teacher trainings, supervises student interns, advises on senior theses, and works with statewide place-based education initiatives on professional development opportunities for teachers.



Dr. Jurij Homziak, until his recent retirement, was the Extension Program Leader, overseeing extension and education activities to enhance awareness and understanding of coastal development, water quality, aquatic resources, land use and watershed management issues for the Lake Champlain Basin. He also conducted research in community-based watershed management and water quality protection.



Mark Malchoff, Aquatic Resources Specialist, represents Lake Champlain Sea Grant in regional and national fisheries and aquatic habitat initiatives. He leads all activities associated with fisheries extension and aquatic invasive species, and he contributes to lake based sustainable communities and economic development.



Dr. Timothy (Tim) Mihuc oversees Lake Champlain Sea Grant's SUNY Plattsburgh operations and serves as the coordinator of the Lake Champlain Research Institute at SUNY Plattsburgh. Tim's professional areas of interest include aquatic food webs, fish population dynamics, ecological integrity and aquatic biodiversity.



Elissa Schuett is the Research Coordinator, Communications Specialist, and Fiscal Officer. As the Research Coordinator, Elissa manages annual research requests for proposals, including the review process, and award notifications. As Fiscal Officer, Elissa works to maintain the current status of budgets and produce budget projections. In the role of Communications Specialist, Elissa submits news items and reports, and manages our web, social media, and special communications initiatives (e.g., ecoNEWS VT).



Dr. Kristine Stepenuck will begin on July 1, 2015 as the new Extension Program Leader and Extension Assistant Professor in the Rubenstein School. Dr. Stepenuck will oversee the extension and education activities of LCSG and will lead her own extension research program. Dr. Stepenuck's background is citizen science and water quality monitoring.



Rebecca Tharp, Land-Use Planning and Water Quality Educator, focuses her efforts on the stormwater impacts to surface waters in the Lake Champlain Basin. She develops several short-courses and workshops for professional groups, property owners, municipal employees, and watershed organization boards to deepen their understanding of development's impact on aquatic ecosystems and the services they provide. Rebecca is also involved in the statewide Green Infrastructure Roundtable and ensures Sea Grant participation as Vermont plans to adapt to more likely flooding, a changing climate, and increasing pressures of development.



# Recruiting Talent

## **RFP Process**

The LCSG program supports research, funding projects that address a variety of topics pertinent to Lake Champlain Basin issues. The bi-annual RFP is developed with the guidance of the Program Advisory Committee, identifying topics that are within the goals of the program and needed in the Basin. Research proposals must include an outreach component, which can be developed solely by the principal investigators or in concert with Lake Champlain Sea Grant staff.

Each RFP is advertised via email list serves to attract researchers from a broad suite of academic, government, and non-governmental organizations.

## **Review Process and Review Panels**

External topical experts review all proposals. A subset of the Program Advisory Committee discusses and reviews each proposal, and ultimately recommends those to be funded.

The last research RFP that was released in 2013 as part of the Omnibus proposal. Future small RFPs for graduate student support will be held in 2015-16. Achieving Institute status within the National Sea Grant College Program will enable LCSG to rebalance its research portfolio, which has been reduced by inflation over the past several years. However, the LCSG program has been able to maintain a robust research presence by teaming with the Vermont Water Resources and Lake Studies Center (USGS funded) and the Northeastern States Research Program (USDA Forest Service funded). In this team approach we have offered at least two annual RFPs, largely for research and exclusively focused on the aquatic resources of the Lake Champlain basin and the Northern Forest communities in which the vast majority of the basin is situated. Based on our experience running these leveraged programs (see table on the following page) we think we have demonstrated the the intellectual and matching fund capacity to support a much larger research program than is currently possible.

## **Institutes Represented Throughout the RFP Process**

In previous RFPs the LCSG program has received proposals that included PIs from a wide variety of departments within the University of Vermont, including in the Plant and Soil Sciences Department of the College of Agriculture and Life Sciences, the Rubenstein School of Environment and Natural Resources, and the Department of Geology in the College of Arts and Sciences. The University of Vermont is the only Ph.D. granting institute of higher education in the Lake Champlain Basin and so it is not surprising that most research proposals arise from UVM and most PIs have been associated with UVM in one way or another. If granted Institute status, a goal of the LCSG program is to encourage participation in the RFP process by a broader group of higher educational institutions within the Basin.

<b>Additional Degree Granting Institutes in the Lake Champlain Basin</b>	<b>Degree Offered</b>
Castleton State College	B.S., M.A.
Champlain College	B.S., M.S.
Goddard College	B.A., M.A.
Green Mountain State College	B.S., M.S.
Johnson State College	B.S., M.A.
Middlebury College	B.S.
Norwich University	B.S., M.A.
Paul Smith's College	B.S.
St. Michael's College	B.S., M.A.
Sterling College	B.A.
Vermont Law School	J.D.

## **New vs. Continuing Projects and PIs**

Projects are typically funded on a two-year cycle pending a review by a sub-committee of the Program Advisory Committee on progress after year 1. PIs completing existing two-year projects may request further support for one or two years via the standard competitive review process outlined above.

**Research Proposals Submitted to LCSG RFPs 2011-2013**

<b>Year</b>	<b>Proposal Title</b>	<b>PI</b>	<b>Institute</b>	<b>Federal \$</b>	<b>Match \$</b>	<b># of years</b>	<b>Fund- ed?</b>
2011	Non-native alewife and native rainbow smelt in Lake Champlain: a modeling approach to describe interactions and system-wide consequences	Donna Parrish	UVM RSENR, U.S. Fish and Wildlife Cooperative Unit	\$91,178	\$45,590	2	yes
2011	Evaluation of the Champlain Canal as a current vector for invasive species	Ellen Marsden	UVM RSENR	\$101,574	\$52,924	3	yes
2011	Strategies to Increase Cover Cropping and Improve Water Quality	Heather Darby	UVM Extension	\$107,080	\$68,455	3	yes
2011	In situ sediment redox conditions to evaluate and monitor the impact of internal phosphorus loading on cyanobacterial blooms	Greg Druschel	UVM Geology Department	\$92,448	\$51,996	2	no
2011	Climate change and Lake Champlain: Planning for Impacts of Seasonal and Average Fluctuation on Shoreline and Wetland Habitats	Dirk Bryant	The Nature Conservancy - Adirondack Chapter	\$67,964	\$37,579	1	no
2011	Adapting to climate change with low-impact development (LID) stormwater management in the Lake Champlain Basin	Stephanie Hurley	UVM Plant and Soil Sciences	\$112,754	\$108,863	2	yes
2013	Analysis of sediments, nutrients, and greenhouse gases associated with green stormwater infrastructure	Stephanie Hurley	UVM Plant and Soil Science	\$110,142	\$89,005	2	yes
2013	An acoustic telemetry array for Lake Champlain: Investigating effects of aquatic habitat fragmentation on lake whitefish and habitat use by lake trout	Ellen Marsden	UVM RSENR	\$118,210	\$60,881	2	no
2013	Understanding invasion pathways of <i>Bryotryphes longimanus</i> with a hydrodynamic 3-D model of Lake Champlain	Jason Stockwell	UVM RSENR	\$118,714	\$59,357	2	no

# Stakeholder Engagement

## *Leadership by Staff on Committees and Boards*

Adirondack Park Invasive Plant Program, Malcoff  
Burlington Board of Health Citizen Advisory Group, Homziak  
Burlington Board of Health, Healthy Lawns, Healthy Lakes committee, Homziak  
Champlain Basin Education Initiative (CBEI), De Vries  
Connecting the Drops, Tharp  
Consortium of Universities for the Advancement of Hydrological Sciences UVM Representative, Bowden  
EPSCoR RACC Senior Science Advisor, Bowden  
ECHO/Leahy Center 2015 Environmental Summit Advisory Committee, Bowden  
Fisheries Technical Committee, Malchoff  
Franklin County Water Quality Committee, Tharp  
Great Lakes Sea Grant Network Directors, Bowden  
Great Lakes Sea Grant Educator Network, De Vries  
Great Lakes Sea Grant Network Conference Planning Committee, De Vries, Homziak, Schuett  
Great Lakes Sea Grant Network Program Leaders group, Homziak  
Green Infrastructure Roundtable, Tharp  
Green Lawn Coalition (VT) steering committee, Homziak  
Lake Champlain Basin Program steering committee, Bowden  
Lake Champlain Basin Program Technical Advisory Committee, Malchoff  
Lake Champlain Federal Partners Board, Homziak  
Northeast Aquatic Nuisance Species Panel, Malchoff  
Northeast Sea Grant Directors Group, Bowden  
Northeast Water Center Directors group, Bowden  
Northeastern States Research Cooperative Executive Committee, Bowden  
RSENR Extension Professor/LCSG Program Leader Search Committee, Schuett  
Sea Grant Communicators Network, Schuett  
UVM Curricular Affairs Committee, Computer Sciences APR Review subcommittee, Homziak  
UVM Curricular Affairs Committee, Animal Sciences APR Review subcommittee, Homziak  
Vermont State-Wide Environmental Education Programs (VT SWEEP), De Vries  
Vermont Water Resources and Lake Studies Center Director, Bowden  
Water Quality Advisory Board, Vermont DEC, Bowden  
Watersheds United Vermont network, De Vries

## *Key Partnerships, Stakeholder Involvement, and Network Collaborations*

Strong working relationships with key partners is essential to the work of Lake Champlain Sea Grant. By working with communities and organizations, Lake Champlain Sea Grant is able to support the needs of the community and accomplish the goals of the strategic plan. Collaboration and partnerships are not restricted to the Lake Champlain Basin, but include working with groups in the Great Lakes as many problems are similar throughout the region.

The strategic plans and omnibus proposals were used to guide our efforts to work with communities and to develop partnerships. Implementation of a new strategic plan began in 2014, but has similar goals and strategies to the 2010-2013 plan. During the development of the new strategic plan, it was decided that our strengths lay in three of the four focus areas developed by the National Sea Grant program and would be included in the Lake Champlain Sea Grant strategic plan: Healthy Coastal Ecosystems, Resilient Communities and Economies, and Environmental Literacy and Workforce Development. In the following sections we describe some of the highlights of our work in these three Focus Areas.

## *Healthy Coastal Ecosystems*

*Goal 1: 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.*

Several research projects have been funded as part of the *Healthy Coastal Ecosystems* Focus Area. The research has been extended as part of outreach efforts by LCSG staff. The following section outlines our contribution to fulfill National Sea Grant objectives.

## Non-native alewife and native rainbow smelt in Lake Champlain: a modeling approach to describe interactions and system-wide consequences

Rainbow smelt and alewife are likely to coexist in Lake Champlain because of current differences in their spatial distributions, and both are now important components of salmonid and walleye diets. In the past, rainbow smelt were the main fish supporting salmonid and walleye sport fisheries in Lake Champlain. However, alewife became established in the lake over the past decade, so there was a need to understand the effect of alewife on native rainbow smelt survival and on native salmonid and walleye diets. We determined where rainbow smelt and alewife are in Lake Champlain during diel and seasonal cycles, and calculated survival of larval and juvenile individuals of these species based on their distributions. We also collected tissue samples from rainbow smelt, alewife, salmonids, and walleye to determine the relative importance of these forage fish species in sport fish diets.

**Researcher:** Donna Parrish, UVM RSEN, VT Cooperative Fish and Wildlife Research Unit

**Partners:** Cornell University, UVM RSEN, VT Cooperative Fish and Wildlife Research Unit, Vermont Department of Fish and Wildlife

## Adapting to Climate Change with Low Impact Development Stormwater Management in the Lake Champlain Basin

Stormwater runoff from impervious surfaces is a significant contributor to water quality degradation in the Lake Champlain Basin. A variety of options are being assessed to ameliorate the stormwater runoff problem, including the use of green stormwater infrastructure (GSI) practices. One of the most promising practices is the use of “bioretention” stormwater treatment systems to treat the runoff from roads and parking lots via a combination of biological, chemical, and physical processes that take place in the soil and vegetation of bioretention cells. Lake Champlain Sea Grant funded researchers in the Bioretention Laboratory at the University of Vermont to conduct an experimental study on the UVM campus to compare rain garden variables used for urban stormwater management. Treatments include plant species mixes, alternative soil media, and altered hydrologic regimes. Stormwater



from parking lots flows into the rain gardens. Water samples collected from the influent and effluent were analyzed for total suspended solids, nutrient retention, and greenhouse gas emissions to compare across treatments. Results indicate that bioretention performance is very high for runoff volume and TSS reduction but water quality results indicate that there has been phosphorus leaching. Compost applied when the system was built is the likely source of leaching phosphorus. Data from the second growing season are indicating less phosphorus leaching than the first year of plant establishment. Denitrification may be occurring between individual storm events, as shown by a decreased concentration of nitrate. Emissions from bioretention cells are not a concern in contributing to climate change, supported by preliminary data. The findings from this research are being used to advise in the rewriting of the State of Vermont Stormwater Manual, including changing specifications to reduce overapplication of nutrient-rich compost in bioretention designs. The research has also led to an additional study evaluating nutrient leaching from a variety of compost samples.

**Researchers:** Stephanie Hurley, UVM Plant and Soil Sciences and Carol Adair, UVM RSEN

**Partners:** UVM RSEN, UVM Plant and Soil Sciences, Lintilhac Foundation

**Outcomes:** Advising in the rewriting of the State of Vermont Stormwater Manual

## Goal 2: Protect and restore coastal and aquatic ecosystems in the Lake Champlain Basin.

### Evaluation of the Champlain Canal as a Vector for Invasive Species

Efforts to minimize aquatic invasive species from entering Lake Champlain and management of species already present has been ongoing for several years by Lake Champlain Sea Grant researchers and staff. Researchers were funded to document the range and abundance of invasive taxa that are present in the Lake Champlain Canal, where more than 40% of the 50 invasive species are believed to have entered Lake Champlain. The sampling documented a wide range of taxa in the canal (25 plant, 21 mollusc, 40 fish, 3 crayfish plus unidentified sponges). The research has been used to develop outreach and monitoring programs to inform users of threats to Lake Champlain and actions to be taken to minimize these threats.



**Researchers:** Ellen Marsden, UVM RSENR

**Partners:** UVM RSENR, New York State Canal Corporation, Vermont Department of Fish and Wildlife

**Outcomes:** Identification of potential invasive species that may enter Lake Champlain via the Champlain Canal and development of BMPs to reduce the risk of AIS introductions

LCSG has been involved in many outreach programs to work towards minimizing aquatic invasive species introduction, informing boaters and other users of Lake Champlain, and working with local governments and panels to devise best management practices. Partnerships and collaboration have included working with

other Great Lakes Sea Grant programs, the Lake Champlain Basin Program, the Northeast Aquatic Nuisance Species Panel, the Adirondack Park Invasive Plant Program (APIPP) and angling tournament organizers to leverage and accelerate the work of disseminating information to boaters and anglers.

### Preventing the Spread of Aquatic Invasive Species by Engaging with Fishing Tournament Organizers and Professional Anglers

State DNR agencies across the eastern U.S. were surveyed to gather regulatory views on aquatic invasive species issues. The results underscored the perception that agency staff: 1) view the issue of AIS as important; and 2) recognize that there is room for improvement in legislation, funding, and agency regulatory responses. In addition, most agencies responded that education is key, but that other strategies are also important, and acknowledged that evidence of AIS introduction as a function of tournament activity is lacking. Finally, the respondents were in general agreement that the onus is on tournament organizers/anglers to combat AIS introductions from fishing tournaments.

An unplanned yet important project component was a meeting with the staff of the largest bass tournament event organizer in the U.S. (FLW Outdoors) at their headquarters in Benton, KY. FLW Outdoors organizes tournaments and conducts hundreds of weigh-in events annually throughout the U.S. At the meeting, a review of the current “state of knowledge” about AIS transfer and important next steps that could be taken by the tournament industry was presented. It was later learned that immediately after leaving the FLW Outdoors office, FLW Outdoors staff inspected and cleaned their tanks, tubs, pumps, etc. FLW Outdoors instituted a new cleaning protocol for their weigh-in equipment as a consequence of the visit with Sea Grant staff.

**Stakeholders:** DNR agencies, fishing tournament organizers, professional anglers

**Partners:** Great Lakes Sea Grant programs

**Outcomes:** A change in cleaning protocol for weigh-in equipment by major fishing tournament organizer (FLW Outdoors)

**Staff lead:** Malchoff

## Northeast Nuisance Species

The Northeast Aquatic Nuisance Species Panel (NEANS) is devoted to protecting the marine and freshwater resources of the Northeast from invasive aquatic species impacts. Much of their effort is directed at spread prevention, such as encouraging boaters to inspect their boating and fishing gear for hitchhiking plants and animals. LCSG is active with the NEANS spread prevention work group, including assisting with the distribution of 10,000 key chain floats with the Stop Aquatic Hitchhikers logo and a URL address directing boaters to a list of spread prevention practices. Recommended prevention practices include “clean, drain, dry” advice along with specific advice for small-bodied or microscopic organisms. The page also includes a short survey instrument developed by Malchoff to measure adoption of spread prevention practices. Survey results-to-date are very encouraging. Responses from 20 boaters in Maine, New York, Rhode Island, and Vermont have been entered in the electronic survey. When asked if the “likelihood of increasing their spread prevention actions increased as a result of their receiving this key chain float 57% responded “definitely,” 22% responded likely, and 7% responded “not at all.” The work group is exploring the purchase and distribution of additional key chain floats and the 2014 distribution effort should generate a survey response commensurate with the number of floats distributed in the seven Northeast states.

**Stakeholders:** Boaters and anglers from the seven Northeast states

**Partners:** Northeast Aquatic Nuisance Species Panel

**Outcomes:** Of 20 respondents to survey, 57% indicated that they would definitely increase their spread prevention actions

**Staff lead:** Malchoff

## New York Council to Protect State Waters from Invasive Species

To address the need for improvements to legislation, an advisory council ( of which LCSG Aquatic Resources Specialist Malchoff was a member) was formed in 2010 in New York. The goal of this council was to create and submit to the legislature and governor a recommenda-



tion for a four-tier system for nonnative animal and plant species. Each work group developed an assessment protocol to determine the “invasiveness rank” of organisms (especially trade organisms) predicted to be introduced to NY water in the future. The report was used as the basis for an invasive species bill in 2012 in New York calling for DEC and Department of Agriculture and Markets to develop a joint list of non-native species that are prohibited or regulated and to promulgate the regulations beginning in 2013.

**Stakeholders:** New York residents, state Legislature, Governor Cuomo

**Partners:** New York Department of Environmental Conservation

**Outcomes:** Report providing guidelines for development of law to prohibit or regulate non-native species

**Staff lead:** Malchoff

## Development of Best Management Strategies for Crude Oil Transport

Lake Champlain Sea Grant is taking part in a new collaborative effort with the Great Lakes Sea Grant Network and the Council of the Great Lakes Region to develop a bi-national network of experts to examine the issues associated with the movement of crude oil and petroleum products within the Great Lakes Basin. The collaborative network is coalescing around a mission to create an integrated, science-based dialogue about crude oils passing through the Great Lakes Basin so that decisions and policies will reflect best-practice management strategies that support economic development in

a competitive global economy while safeguarding Great Lakes communities and ecosystems. A workshop, *Exploring and Visualizing the Issues Involved in Crude Oil Movements in the Great Lakes*, was recently held and educational materials were provided with info on the environmental, social, financial, and legal issues related to crude oil movements by rail, ship and pipeline in the Great Lakes and Champlain Basins.

**Stakeholders:** Communities near crude oil transport

**Partners:** Great Lakes Sea Grant Network, Council of the Great Lakes Region

**Outcomes:** Workshop and educational materials created

**Staff lead:** Malchoff

## **Resilient Communities and Economies**

*Goal 3: Development of vibrant and resilient coastal economies.*

### **Mercury Level Education to Community Food Shelf**

LCSG contributes to the development of vibrant and resilient coastal economies in the basin by providing information to at risk communities about mercury in seafood. Education of food pantry staff and the development of multi-lingual/pictorial brochures and stickers for low income and immigrant users of food pantries helped inform about mercury exposure risks associated with excess consumption of lake fish and canned tuna. The program meets a need for simple-to-read-and-understand fact sheets for a diverse community.

**Stakeholders:** Low income and immigrant users of food pantries

**Partners:** VT Department of Health, VT Community Food Shelf

**Outcomes:** Multi-lingual fact sheet and stickers for food pantries

**Staff lead:** Homziak

## **Agriculturally Productive Buffer Program Promotes River Conservation**

Development of an Agriculturally Productive Buffer program has led to farmers implementation of riparian buffers consisting of fruit, nuts, and forestry crops rather than standard crops that may lead to streambank instability and erosion. These buffers serve to both protect water quality and provide economic value to farmers from otherwise marginal land. In partnership with the Vermont River Conservancy, Lake Champlain Sea Grant demonstrated the technical and financial feasibility of Agriculturally Productive Buffers (APB). Current state and federal buffer programs do not appeal to some landowners because the contracts are restrictive and for some small farms, the loss of income producing property is too great. The demonstration and associated outreach and education program led to the adoption of APB by 11 riparian landowners in Vermont in 2014. The program has been taken on and expanded by UVM Extension, The River Conservancy, and the National Organic Farmers Association.



**Stakeholders:** Farmers

**Partners:** Vermont River Conservancy, UVM Extension, National Organic Farmers Association

**Outcomes:** 11 landowners adopting the Agriculturally Productive Buffer program, expansion of program by UVM Extension and The River Conservancy

**Staff lead:** Homziak

## Clean Boating and Clean Marinas

Lake Champlain Sea Grant has used many approaches with a wide variety of stakeholders towards achieving the goal of improved cleanliness of boating and marinas. Lake Champlain and the surrounding watershed's waterbodies benefit from LCSG's focus in this area. LCSG educated marina users and employees on clean boating practices as part of a program collaborating with the VT Business Environmental Partnership's Vermont Clean Marinas, with VT Department of Environmental Conservation and VT Marine Trade. Bi-lingual fact sheets were developed and available for distribution and boater education sessions providing information about fueling, pump out, maintenance and other boating practices were offered to marina users. Model contract language for marinas to require clean boating commitments from customers was also created. Local marinas benefit from the practice of clean boating by maintaining a clean lake and a vibrant boating community.

**Stakeholders:** Anglers, boaters

**Partners:** VT Business Environmental Partnership's Vermont Clean Marinas, VT DEC, VT Marine Trade, Lake Champlain Committee, Vermont Marina & Boat Association

**Outcomes:** Bi-lingual fact sheets about clean boating

**Staff lead:** Homziak

## Bass Tournament Biological Impacts

Bass tournaments are popular events in Lake Champlain - drawing throughsands of visitors each year. Over 70 club, amateur, and professional level tournaments are held on the lake each year, drawing competitive anglers from throughout North America. Despite the positive economic impacts, stakeholders have expressed concerns over fish kills and sub-lethal effects (i.e. dislocation of trophy fish) of this activity. Research co-led by LCSG tracked approximately 2400 live-released fish from 13 tournaments. A stress index was developed for use by anglers and tournament officials. Technical and outreach publications were provided as part of the extension effort, reaching audiences including the Adirondack Coast Visitor's Center, the City of Plattsburgh administration, local environmental

groups, professional bass tournament anglers, and national tournament organizers. The sustainability of these tournaments was documented and is of use by local decision makers, including the City of Plattsburgh. The city and the Adirondack Coast Visitor's Bureau have used the results to develop a bass conservation plan to guide tournament frequency and scheduling. The results are noteworthy given that these tournaments now generate over \$1.1 million in direct annual expenditures and over \$2.7 million on total annual economic output. A sustainable fishery, through responsible tournament administration, will benefit the communities well into the future.



D. Garneau, SUNY Plattsburgh

**Stakeholders:** Anglers, boaters, tourists, fishing tournament organizers, tourism industry

**Partners:** Adirondack Coast Visitor's Center, City of Plattsburgh, Lake Champlain Basin Program, Lake Champlain Research Institute

**Outcomes:** Adoption of a Recreational Tournament Fishery Conservation Plan by the City of Plattsburgh

**Staff lead:** Malchoff

**Goal 4: Reduced stormwater and NPS pollutant loads improve quality of water resources in the basin.**

Reduction of stormwater and non-point source pollutant loads has been targeted by several programs led by Lake Champlain Sea Grant as part of our *Resilient Communities and Economies* focus area.

**Let It Rain Stormwater Management Program**

Educating the public about the importance of stormwater management is an ongoing effort of Lake Champlain Sea Grant. In 2010, LCSG partnered with the Winooski Natural Resources Conservation District to create the Let It Rain stormwater program. This effort provides education, demonstration, and financial incentives for the implementation of green stormwater infrastructure practices. To date, the program has provided funds to mitigate over 80,000 square feet of impervious surfaces in Vermont’s Lake Champlain Basin. The program has received over \$55,000 in grants and sponsorships to continue the work. Notably, Let it Rain developed a popular yearly public art and education exhibit called Connecting the Drops. The display includes professionally painted rain barrels installed in prominent public areas and topped with an originally-written illustrated stormwater story. In 2013 the display was on Burlington’s shopping street, Church Street, and continued down to the lake waterfront. In 2014 new rain barrels were installed in Essex Junction, VT and in 2015 Williston will host the barrel exhibit. At the end of each season, the barrels are raffled off to homeowners who will install them at their homes to capture roof runoff. Connecting with the art community to bring information about stormwater to the public has been a very effective way to draw attention to the issue in an engaging and memorable way. More information about that program can be found at [letitrainvt.org](http://letitrainvt.org).



**Lawn to Lake Program: Lawn Tips for Green Lawns *Not* Green Lakes**

The Green Lawn Coalition’s “Don’t P on your Lawn” program was an effective campaign to reduce phosphorus fertilizer pollution. Phosphorus from lawn fertilizer is a leading contributor to eutrophication of Lake Champlain. In 1996 VT was one of 3 states with >30% non-farm phosphate use; in 2003 60% of lawns tested statewide (76% in its most urban county) had excess phosphorus. LCSG helped found the Green Lawn Coalition to address the problem. It’s “Don’t P on your Lawn” campaign first identified key “drivers of change” for DIY lawn care, then enabled local groups to do outreach and education, trained garden retailer sales staff in no phosphorus lawn care, and increased public awareness through a social marketing ad campaigns. In 2012, New York and Vermont each passed laws restricting the use of phosphorus fertilizer on lawns.

**Stakeholders:** Urban and suburban homeowners

**Partners:** Winooski Natural Resources Conservation District, Regional Stormwater Education Program

**Outcomes:** 65 applications for home stormwater management assistance, 19 awarded funds for implementation

**Staff lead:** Tharp

**Stakeholders:** Homeowners

**Partners:** IL-IN SG, Green Lawn Coalition

**Outcomes:** New York and Vermont laws restricting use of phosphorus fertilizers

**Staff lead:** Homziak

## Healthy Lawns, Healthy Lives

In partnership with the Burlington Board of Health, lawn care firms, institutional property managers, and others, Lake Champlain Sea Grant has led a project seeking to reduce the misuse/overuse of lawn and garden pesticides, especially “weed and feed.” Since 2010 22 residential property owners and 3 institutional properties voluntarily participate in public demonstrations to document and measure no-pesticide lawn care outcomes. The project has also provided no-pesticide BMP awareness and training for service providers as part of applicator re-certification training. On-going efforts aim to increase public awareness of human and environmental health effects of pesticide lawn treatments via public events and local media. We are also in the process of developing a no-pesticide lawn care fact sheet, conducting a financial analysis that compares local cost of conventional versus no-pesticide practices for industry, and an outreach effort focusing on condo associations and residents, apartment managers and business property managers.

**Stakeholders:** Residential and institutional property owners

**Partners:** Burlington Board of Health, lawn care companies

**Outcomes:** 22 residential and 3 institutional property owners participating in no-pesticide demonstrations

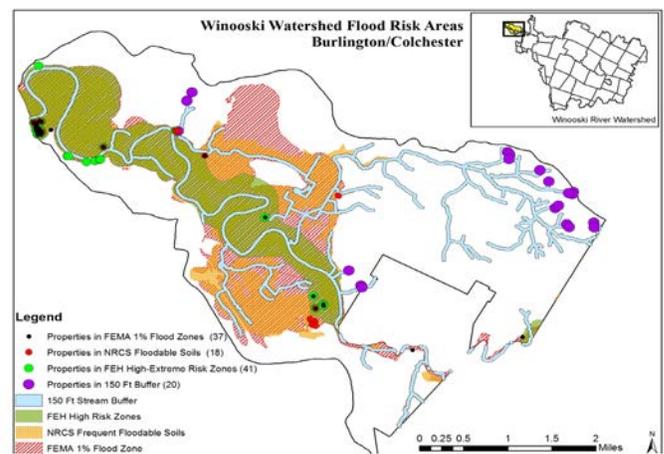
**Staff lead:** Homziak

*Goal 5: Lake Champlain Basin communities plan for and adopt practices that mitigate the impacts of climate change and weather related hazards.*

Working with communities to help them become resilient has been a major effort of Lake Champlain Sea Grant in recent years, highlighted by three current programs.

## Evaluating Flood Hazard Identification Tools in Two Lake Champlain Basin Sub-Watersheds

A project funded by the Ohio Sea Grant College Program through NOAA's Coastal Storms Program mapped flood resiliency in two Lake Champlain sub-watersheds. The project seeks to highlight communities that are at increased risk of incurring flood damage due to natural conditions as well as zoning regulation failures. Gathered information will be shared directly with towns through community meetings and shared access to the mapping documents. VT Department of Environmental Conservation Rivers Program is working closely with LCSG staff to ensure synergy with their outreach efforts.



**Stakeholders:** Towns in Franklin and Grand Isle Counties, Shelburne, Charlotte, Hineburg, towns within the Poultney-Mettowee watershed

**Partners:** VT DEC Rivers Program, VT League of Cities and Towns, Chittenden County Regional Planning Commission, NRCS

**Outcomes:** The Winooski River watershed is mapped for flooding hazards, inclusive of 11 towns

**Staff lead:** Tharp

## Resilience Residency: Building Climate Change Planning Capacity in Lake Champlain Basin Towns

The NOAA Coastal Storms Program also funded a project to target at-risk watershed in Vermont with concentrated Sea Grant (and partner) programming and support to respond to climate change threats. By working alongside communities as they develop resiliency strategies, LCSG staff are more readily able to forge deep relationships with local and regional partners and offer programming in a concentrated format that will translate into measurable impacts in a shorter time-frame. In the fall of 2014, LCSG joined with the ECHO Lake Aquarium and Science Center in Burlington, Vermont as they planned the Leahy Center Environmental Summit. This summit invited communities from around the state to form into regional teams comprised of diverse members to discuss, problem solve and plan to become “Climate Change Resilient, Floodwater Smart.” LCSG worked directly and closely with three regional teams as they prepared for the Summit, facilitating their preparation meetings, suggesting additional resources to aid in the development of their projects, and reporting progress to the Summit planning team. When the regional teams gathered on the shores of Lake Champlain on March 20-21 2015 for the Environmental Summit, LCSG continued the service of facilitating the group conversations of the three teams and identified several

opportunities where existing LCSG programming would be particularly helpful in meeting the needs of a community. Sea Grant staff are continuing to work with Summit attendee groups as they further develop their regional resiliency strategies and will begin targeted programming in the summer of 2015.

**Stakeholders:** Communities at increased risk of flooding

**Partners:** ECHO Lake Aquarium and Science Center

**Outcomes:** Relationships with local and regional partners and communities in need of flood resilience training

**Staff lead:** Tharp

## Real Estate Professional Short-Courses

LCSG staff developed two short courses for Realtors to provide resiliency education related to land use, shoreline stabilization, natural resource protections, flood resiliency, and impacts of development on water quality. Two courses: *Water Resources for Realtors* and *Web-based Mapping for Real Estate Professionals* have been held six and five times respectively, reaching over 150 Real Estate professionals. Course evaluations indicate increased understanding of state regulations protecting water bodies, improved awareness of mitigation strategies to reduce development’s impact on water quality, and proficiency with the use of existing tools to identify sensitive areas.

**Stakeholders:** Real Estate Professionals

**Partners:** Vermont Real Estate Commission, Lake Champlain Basin Program, VT DEC

**Outcomes:** 150 Real Estate professionals have taken courses and earned Continuing Education credits

**Staff lead:** Tharp



## Environmental Literacy and Workforce Development

*Goal 6: Effective education programs in place for lifelong learners on water quality, water resources and watershed issues important to sustainable use and management of Lake Champlain and its basin.*

Lake Champlain Sea Grant offers numerous educational opportunities through the Watershed Alliance program, which aims to increase awareness and knowledge of watershed issues in Vermont youth. Watershed Alliance is also working with state agencies, nonprofit organizations, watershed groups and business associations to build environmental literacy for all Vermont citizens. The primary stakeholders are K-12 students, with special focus on middle and high school education. Secondary stakeholders include: formal and non-formal educators, school administration, and student interns. Watershed Alliance has consistently supported undergraduate education and professional experience by hiring interns (internal and external to UVM) to work as watershed educators with teachers and students. Recently, adult public education has become a focus of Watershed Alliance programming with life-long learners as another stakeholder.

The students who participate are engaged in one or more of three established education programs. These programs are classroom and field-based and incorporate basic watershed science and the scientific method as well as water quality assessments, lake ecology, food-web dynamics, aquatic invasive species awareness, and watershed stewardship. Secondary stakeholders, mainly

adults, receive their knowledge about the same topics as youth through direct participation with their students, teacher trainings and workshops, and finally through sharing or program highlights in a letter or presentation by the school class.

**Stakeholders:** K-12, mainly middle and high school students, teachers, school administration, student interns

**Partners:** Vermont Public and Private Schools, Lake Champlain Basin Program, Champlain Basin Education Initiative, Watersheds United Vermont, Rubenstein Ecosystem Science Laboratory, UVM RSEN

**Outcomes:** 1500 students participate in Watershed Alliance programs each year; an average of 30 schools return and 5 new schools a year; 3 teacher trainings held since September 2014; development of riparian corridor and buffer curriculum, activities and teacher trainings via sub-contract

**Staff lead:** De Vries

### Upward Bound

In 2012, Watershed Alliance developed a program as part of the Upward Bound Summer College Program to teach high school juniors and seniors about watersheds, stream monitoring, and watershed stewardship. The participants learned about the history of local watersheds, challenges in watershed management, and restoration efforts during a 5-week course. Students also learned about and helped remove Eurasian frogbit, an aquatic invasive species in the Lake Champlain Basin, from kayaks and canoes.

**Stakeholders:** Upward Bound Summer College Program, high school juniors and seniors

**Partners:** UVM Upward Bound, Lewis Creek Association

**Outcomes:** 5-week summer course, 25 students removed Eurasian frogbit

**Staff lead:** De Vries



## Life at the Marina

Lake Champlain Sea Grant Watershed Alliance program developed a new partnership with Vermont Boat and Marine Association and the City of Burlington Parks and Recreation Department to organize a water education lesson for summer campers visiting the Burlington waterfront. Watershed Alliance educators helped the young campers explore life in the marina and the history of the Burlington waterfront. The campers used a hand-built fyke net, discovery scopes, small dip nets, and identification keys to determine what lives in the marina. These students also viewed historic topographic and city maps as well as archival images and discussed the different commercial, industrial and recreational uses of Perkins Pier. Clean boating practices were taught and the Coast Guard presented boating safety training at the Burlington Boathouse. In 2014, Watershed Alliance partnered with the Lake Champlain Maritime Museum (LCMM) to offer their Shipwrecks program in addition to Life at the Marina. Champ Campers range in age from kindergarten to fifth grade, reside in Burlington and are low-income students and/or refugee children.

**Stakeholders:** Kindergarten-fifth grade Burlington low-income/refugee children

**Partners:** Vermont Boat and Marina Association, City of Burlington Parks and Recreation Department, U.S. Coast Guard, Lake Champlain Maritime Museum

**Outcomes:** 300 youth participated in the programs, a 6 weeks program in 2013, and a 4 week program in 2014 running two programs per week, 20 youth per program

**Staff lead:** De Vries

## Champlain Basin Education Initiative

The Champlain Basin Education Initiative (CBEI) is a consortium of environmental and place-based education groups throughout the Lake Champlain Basin. CBEI holds workshops on teaching about the Lake Champlain Basin for K-12 educators, and interested citizens. The year-long professional development course for teachers, Watershed for Every Classroom, offers presentations by local experts on many topics including climate change, water quality, cultural heritage, and nat-

ural resources. Since 1992, more than 650 educators have participated in CBEI workshops and forums. In May 2013 CBEI graduated 11 participants. Watershed Alliance leads the aquatic science lessons and coordinates the activities, readings, guest speakers, and resources for the teacher participants.



**Stakeholders:** K-12 educators from the Lake Champlain Basin

**Partners:** Champlain Basin Education Initiative: Lake Champlain Committee, Shelburne Farms, Curriculum Matters, Lake Champlain Basin Program, Vermont Agency of Natural Resources Lakes and Ponds Program

**Outcomes:** 650 educators reached: 2013 - 11 graduates, 2015 - 19 graduates of Watershed for Every Classroom

**Staff lead:** De Vries

## Vermont 4-H2O

Lake Champlain Sea Grant Watershed Alliance is taking a new approach to expand water quality education to traditional 4-H audience. A needs assessment and pilot project called Vermont 4-H2O were developed with funds secured for outreach and education. The goal is to establish a needs-based, youth science education program that builds on the successful 4-H model of agricultural education and integrates youth and family programming related to local water stewardship. A Vermont 4-H2O program fills the need in the Lake Champlain Basin communities to educate youth and adults on local water quality, water conservation, and watershed issues. Water science education is not currently being offered by Vermont 4-H. The curriculum and activities of a 4-H2O program would enhance Ver-

mont 4-H Science focus and hands-on learning and STEM education to prepare the next generation of leaders. This program contributes to a 4-H National goal of developing one million new scientists. Meetings have commenced with Vermont 4-H State Coordinator and 4-H educators to discuss the potential of using 4-H after school groups, clubs, and teen programs as pilot groups for this project. UVM Extension 4-H supports this project idea and has committed to three 4-H groups testing out the developed lessons. Watershed Alliance is working with the ECHO Lake Aquarium and Science Center in Burlington, Vermont to hold trainings and highlight Vermont 4-H2O lessons once they are developed.

**Stakeholders:** Vermont 4-H members

**Partners:** ECHO Lake Aquarium and Science Center, UVM Extension 4-H program

**Outcomes:** 3 4-H groups participated in the pilot project

**Staff lead:** De Vries

### Lake Education Action Program (LEAP)

To reach a broader region, Lake Champlain Sea Grant supports the Poultney-Mettowee Natural Resource Conservation District (PMNRCD) as Watershed Alliance's South Lake partner. Since 2008 PMNRCD has been leading WA watershed education programs, mainly the Stream Monitoring & Stewardship Program (SMSP), and organizing the Eco-Exposition, a day of environmental educational learning and activities for regional schools. The Conservation District Manager also receives support from Lake Champlain Sea Grant to implement the Lake Education Awareness Program (LEAP) that trains high school students to educate lake associations and lakeshore property owners on land use issues that may be impacting their lake and properties. PMNRCD and Watershed Alliance have a working relationship with Green Mountain College. The college provides space for the conservation district as well as interns to educate school groups in the watershed. Watershed Alliance South educates over 200 students a year through the SMSP, Eco Exposition, and LEAP.

**Stakeholders:** Regional schools and students in southern Vermont

**Partners:** Poultney-Mettowee Natural Resources Conservation District

**Outcomes:** 200+ students reached each year

**Staff lead:** De Vries

### ecoNEWS VT

In addition to informing students and teachers to develop an environmentally literate community, efforts are made to bridge the gap between research scientists and practitioners, policy-makers and other individuals interested in the ecology of Vermont. Numerous organizations and programs conduct ecological research across Vermont. The results of research are often not readily disseminated outside of the research community. Connecting users with relevant research can be valuable to management and policy, as well as to provide feedback to researchers about needs of the user community. Lake Champlain Sea Grant partnered with other research, academic and governmental organizations to develop an on-line portal for ecological research and monitoring conducted in Vermont. Published research is distilled into articles that are accessible to people who have a basic understanding of ecological concepts. The website provides a single point of entry to the latest science elucidating our current understanding of the state and function of Vermont's ecosystems. A quarterly email is distributed to subscribers with featured findings and links to more information.

**Stakeholders:** Policy-makers, practitioners, interested public

**Partners:** Vermont Monitoring Cooperative, Vermont Water Resources and Lake Studies Center, Northeastern States Research Cooperative, Rubenstein Ecosystem Science Laboratory, Rubenstein School of Environment and Natural Resources, Vermont Cooperative Fish and Wildlife Research Unit

**Outcomes:** 200 subscribers to quarterly e-newsletter

**Staff lead:** Schuett

# Collaborative Network/NOAA Activities

LCSG is an active member of the Great Lakes Sea Grant Network, collaborating with other programs on extension and outreach projects, participating on boards, and attending network meetings. LCSG will be hosting the 2015 Great Lakes Network Meeting in September 2015 and staff regularly attend the annual meetings and sponsor relevant meetings such as the Lake Champlain Research Conference and the upcoming International Association of Great Lakes Research conference.

Several projects in collaboration with other Great Lakes Sea Grant programs have been the result of these relationships. LCSG has been able to provide expertise and has also learned from the other programs. Recent projects include: *Healthy Lawns, Healthy Lakes* project with IL-IN SG, *Fishing Tournament Organizers and Professional Anglers: Preventing the Spread of AIS by Extending AIS-HACCP and the Stop Aquatic Hitchhikers Campaign in the Great Lakes* with all eight Great Lakes Sea Grant programs. Currently, a collaboration with all eight Great Lakes Sea Grant programs exists to develop best management strategies for crude-oil transport.

Watershed Alliance is a member of the NOAA Climate Stewards Education Project (CSEP). The project provides formal and informal educators working with elementary through university age students with sustained professional development, collaborative tools, and support to build a climate-literate public that is actively engaged in climate stewardship. Watershed Alliance is also a member of the Great Lakes Sea Grant Educator Network.

In addition to the direct collaborations with other Sea Grant programs, LCSG has also successfully applied for additional grant funding through NOAA and the Coastal Storms Program: *Flood Resiliency: Evaluating Flood Hazard Identification Tools in Two Lake Champlain Sub-Watersheds* and *Resilience Residency: Building Climate Change Capacity in Lake Champlain Basin Towns* were funded in 2014.

LCSG also has relationships and receives leveraged funds from other local, regional, and federal agencies, as can be seen in the table on the following page. These are important partnerships that help LCSG reach their goals and meet the needs of the communities they serve. In the previous four years, LCSG has leveraged approximately \$3.3 million with an additional \$500,000 in pending proposals.

Of note are the relationship of LCSG with the Vermont Water Resources and Lake Studies Center (VWRLSC, USGS funded program) and the Northeastern States Research Cooperative (NSRC, USDA Forest Service program). Each of these programs is also directed by Dr. Bowden and hosted by the Rubenstein School. The programs focus on applied research, funding projects annually through an RFP process.

Additionally, the VWRLSC and LCSG recently merged their advisory committees to better leverage the strengths of each program. The VWRLSC annually funds two to three research projects, but has limited capability to provide outreach from the research. By working more closely with LCSG, research extension is enhanced. LCSG is not the only program to have this relationship with their state Water Center and the national offices for the USGS and NOAA have held preliminary discussions on how best to capitalize on the mutual and different strengths of these organizations.

## Leveraged Funding from Federal, Regional, and State Sources

Year	Project Title	PI	Institution	Source	Source\$	Match\$	# Years
Annually	Vermont Water Resources and Lake Studies Center	Bowden	UVM	USGS	\$369,340	\$738,680	Last 4
Annually	Northeastern States Research Cooperative - Theme 1	Bowden	UVM	USDA Forest Service	\$1,713,952	~25%	Last 4
Annually	Lake Champlain Long-Term Water Quality and Biological Monitoring Project	Mihuc	SUNY/LCRI	NYDEC, U.S.EPA	\$800,000	NA	Last 5
2011	Calibration of a New Acoustic Doppler Current Profiler on the Rock River near Highgate, VT	Bowden	UVM	VT DEC	\$24,398	NA	2
2011	Fishing Tournament Organizers and Professional Anglers: Preventing the Spread of AIS by Extending AIS-HACCP and the Stop Aquatic Hitchhikers Campaign in the Great Lakes	Moy (WISG), eight others including Malchoff	Univ. of Wisconsin	NOAA/NSGO	\$29,359* *=\$383,818 total for all eight GLSG programs	\$15,362	2
2011	Impact of Fishing Tournaments on Bass Populations	Mihuc, Malchoff, Garneau	SUNY/LCRI	Sportfish Restoration, NYDEC	\$45,000	\$22,500	1
2011	Healthy Lanws, Healthy Lakes (sub-award from IL-IN-SG)	Homziak	UVM	U.S. EPA	\$108,000		
2012	Post Tournament Dispersal of Black Bass in Lake Champlain Following Professional Catch and Release Tournaments	Mihuc, Malchoff, Loukmas, Schoch, Zollweg, Garneau	SUNY/LCRI	LCBP	\$67,496	\$33,748	1
2014	Ecosystem Restoration Program: FY 2013 Water Center Support	Bowden	UVM	VT DEC	\$30,000	NA	1
2014	Flood Resiliency: Evaluating Flood Hazard Identification Tools in Two Lake Champlain Sub-Watersheds	Tharp (with Bowden)	UVM	NOAA (Ohio State University)	\$50,000	NA	2
2014	Resiliency Residency (Coastal Storms Project)	Tharp (with Bowden)	UVM	NOAA/NSGO	\$80,000	NA	2
2014	Watershed Wise: Watershed Alliance Teacher Training (pending)	De Vries	UVM	NEIWPCC via LCBP	\$6,000	NA	1
2014	Watershed Wise: River Dynamics and Restoration for Vermont Youth (pending)	De Vries (with Bowden)	UVM	NOAA New England BWET	\$218,000	NA	3
2015	Watershed Strong Project (pending)	De Vries (with Bowden)	UVM, ECHO Lake Aquarium and Science Center	NOAA Office of Education	\$142,000	NA	4
2015	New York Champlain Watershed Alliance Stream Ecology and Stewardship Program (pending)	Mihuc, Malchoff, De Vries	SUNY Plattsburgh	EPA	\$91,000	\$56,864	1
2015	Riparian Corridor and Buffer Curriculum and Training (subcontract)	De Vries	UVM from Lake Champlain Maritime Museum	NOAA New England B-WET	\$5,500	NA	1
2015	Evaluating Stormwater Pond Performance and Opportunities for Improvement:	Tharp	South Burlington Public Works	LCBP	\$20,000	\$6,000	2

# Evolution and Future of the LCSG Program

Outside of the Great Lakes, Lake Champlain is one of the largest freshwater bodies in the United States and is a highly valued international resource. As reported in the *National Sea Grant College Program Policy for the Allocation of Funds, FY 2014 and Beyond* (September 23, 2014) the Vermont and New York portions of the Lake Champlain basin are home to nearly 500,000 people (putting it ahead of NH, MN, and Guam). If the population of our key partners to the north in Quebec is included, then the basin population exceeds 600,000 people ([EPA](#), putting it ahead of AK and GA and on par with OR). At least 35% of this population relies directly on the lake for drinking water ([LCBP Basin Facts](#)). The shoreline of Lake Champlain is 587 miles long (greater than RI, DE, OH, MN, PA, NH, Guam and, IL/IN). Many people who live in the basin are dependent on the lake for jobs, recreation and overall quality of life. People from around the world visit the lake and basin to enjoy its cultural and military history, abundant biological resources, and opportunities for recreation and renewal.

Most, if not all, of the environmental concerns as well as social and economic conditions within the Lake Champlain Basin are closely related to those in the Great Lakes region. The Lake Champlain Special Designation Act, part of the Great Lakes Critical Programs Act of 1990, led New York Sea Grant (NYSG) Extension to offer limited outreach support and education programming to residents of the Lake Champlain Basin. The 1998 Sea Grant Reauthorization Act provided the opportunity to create a Lake Champlain Sea Grant Project. So, the LCSG Project is built on a 15-year history in which the NYSG Extension provided a foundation for a solid, proactive outreach program in the region.

The LCSG Project began under the auspices of NYSG with funding from 1999 to 2002. Since 2002, the project has been managed by the University of Vermont (UVM) in collaboration with the State University of New York (SUNY) at Plattsburgh. Both institutions provide matching funds and make resources available to

support the LCSG. UVM and SUNY have made major commitments over the past decade to provide support and leadership for economic development and environmental protection within the Lake Champlain Basin and their respective states. In 2011 the LCSG Project sought recognition as a Coherent Area Program (CAP) in the National Sea Grant College Program, which was granted in 2012.

LCSG supports and offers education, outreach and applied research activities to enhance the sustainable use, restoration, and development of the Lake Champlain ecosystem. Maintaining and improving the economic and environmental vitality of the Lake Champlain Basin by building stronger partnerships with communities, businesses and schools has been a focus of LCSG since its inception. LCSG activities inform and educate the watershed's inhabitants and visitors about actions needed to protect the quality of Lake Champlain waters, the basin's coastal region, and other natural and cultural resources. LCSG also offers research-based education and outreach programs for sustainable business development, which generates income and support for important resource protection goals.

We think that the LCSG Program is well-poised to move to Institute Status in the National Sea Grant College Program (NSGCP). We have satisfied our "time in grade" requirement as a CAP program. The two key criteria (basin population and shoreline miles) that quantify "need" within the NSGCP place us at or above the same criteria for larger programs. More importantly, however, we have demonstrated the ability to identify needs, work with partners, develop projects, run RFPs, seek matching funds, and deliver products that have meaningful outcomes for our partners and stakeholders – as summarized in this report. We believe that we have been good stewards of the funds that have been entrusted to us and have proven our ability to grow the LCSG Program to Institute status. Our plan for the components of an Institute proposal builds on our strengths, is responsive to stakeholders' needs, and has the strong backing of our partners. We recognize that this site review is only a first step along this path and look forward to the recommendations and guidance from the Site Review Committee.

## Landforms of the Basin

