

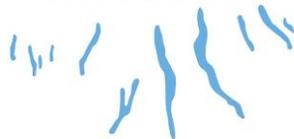


Finger Lakes Research Conference

2013

Hosted by the Finger Lakes Institute | November 15, 2013

FINGER LAKES
INSTITUTE



HOBART AND WILLIAM SMITH COLLEGES

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Agenda

11:00 am Registration, Participant Set Up

11:45 - 12:30 pm Welcome, Lunch

- **John Halfman, Ph.D.**, Hobart and William Smith Colleges

12:30 - 1:00 pm Keynote Speaker

- **Dr. Katherine Bunting-Howarth, J.D. Ph.D.**, NY Sea Grant and Cornell Cooperative Extension
 - Introduced by Dr. Lisa Cleckner, Finger Lakes Institute

1:00 - 2:00 pm Panel Discussion - Land Use

Moderator: **Edith Davey**, Ontario County Soil and Water Conservation District

Panelists:

- **Kristen Brubaker, Ph.D.**, Hobart and William Smith Colleges, Assistant Professor of Environmental Studies
- **Bob Brower**, Institute for the Application of Geospatial Technology, Chairman, CEO and Treasurer
- **Kevin Olvany**, Canandaigua Lake Watershed Council, Watershed Program Manager

2:00 - 2:30 pm Break/ Poster Session

2:30 - 3:30 pm Panel Discussion – Nutrient Management

Moderator: **John Halfman, Ph.D.**, Hobart and William Smith Colleges, Professor of Geoscience

Panelists:

- **Dave Matthews, Ph.D.**, Upstate Freshwater Institute, Technical Director, Senior Research Scientist
- **John Fraser**, Cayuga County Soil and Water Conservation District, Nutrient Management Specialist
- **John Santos**, Hazlitt 1852 Vineyards, Vineyard Manager

3:30 - 4:00 pm Break/ Poster Session

4:00 - 5:00 pm Panel Discussion - Invasive Species

Moderator: **Bruce Gilman, Ph.D.**, Finger Lakes Community College, Professor of Environmental Conservation

Panelists:

- **Richard Morse, Ph.D.**, New York State Museum, Collections Manager of Ichthyology and Decapod Collection
- **James Balyszak**, Hydrilla Task Force of the Cayuga Lake Watershed, Hydrilla Program Manager
- **Nicole Landers**, Yates County Cornell Cooperative Extension, Executive Director

5:00 pm Closing Remarks

- **Lisa Cleckner, Ph.D.**, Finger Lakes Institute

Keynote Speaker: Katherine Bunting-Howarth, J.D., Ph.D.



Katherine E. Bunting-Howarth became the Associate Director for New York Sea Grant and an Assistant Director for Cornell Cooperative Extension in April of 2011. There she leads ten talented Extension Associates located in five offices along the many diverse coastal areas of New York State. She is also a member of the New York Sea Grant Institute's management team where she assists in developing policy direction for the organization's communication, extension and research programs. She provides national leadership in Sea Grant as an elected member of the Assembly of Sea Grant Program Leader's Board. In New York, she serves on the Faculty Steering Committees for the New York Water Resource Institutes and the Cornell Biological Field Station as well as an *Ex Officio* member of the Great Lakes Basin Advisory Council. Most recently, she was appointed a Faculty Fellow for the Atkinson Center for a Sustainable Future at Cornell University. Kathy's interests include coastal policy and integrating social science in coastal research and extension efforts.

Prior to joining New York Sea Grant, Kathy was Director of the Division of Water Resources in the Delaware Department of Natural Resources and Environmental Control. As Director, she oversaw multiple federal Clean Water Act programs and State water quality programs. Kathy also served as an alternate Commissioner, and Chair, of the Delaware River Basin Commission, a member of the Executive Implementation Council of the Partnership for the Delaware Estuary, a Board alternate for the Center for the Inland Bays, a member of the Principal Staff Committee of the Chesapeake Bay Program, and Chair of the Water Supply Coordinating Council. In addition, she served as the Region 3 representative on the Board of the Association of State and Interstate Water Pollution Control Administrators.

Kathy's Ph.D. is in Marine Policy from the University of Delaware's Graduate College of Marine Studies; she holds a Juris Doctorate with a Certificate in Environmental and Natural Resource Law from the University of Oregon School of Law; and has a Bachelor of Arts Degree in Biology and International Relations from the University of Delaware. Kathy and her husband, David, have two sons, Davin and Aidan, and reside in Ithaca, NY.

Land Use Panel

Question: What considerations should be taken as multiple communities and agencies within a watershed come together to prescribe management practices with consideration for ecological services, economics, development, and diminishing water quality?

Moderator:

Edith Davey, Ontario County Soil and Water Conservation District

Panelists:

- *Kristen Brubaker, Hobart and William Smith Colleges, Assistant Professor of Environmental Studies*
- *Bob Brower, Institute for the Application of Geospatial Technology, Chairman, CEO and Treasurer*
- *Kevin Olvany, Canandaigua Lake Watershed Council, Watershed Program Manager*

EDITH DAVEY, MODERATOR



In addition to being the Environmental Educator for Ontario County Soil and Water Conservation District, Edith is currently engaged in educational programs for the Seneca Lake Area Partners in 5 Counties, the Honeoye Lake Watershed Task Force and the Ontario-Wayne Stormwater Coalition. Edith organizes and conducts water quality and environmental education programs and trainings for municipal boards, schools, civic clubs and other public groups. She has been honored as a NYS Woman of Distinction and received a Commendation Award from the NYS Soil and Water Association of Conservation Districts for creating original educational programs.

KRISTEN BRUBAKER, PH.D.



Kristen Brubaker is currently an Assistant Professor of Environmental Studies at Hobart and William Smith Colleges. She received her Bachelor of Science in Earth and Space Science Education from Penn State University, and her Master of Science in Geosciences from Mississippi State University. She earned her PhD in Forest Science from Penn State University, with a research focus in using spatial information and LiDAR (Light Detection And Ranging) to understand the relationship between terrain, water, and forest communities in Central Pennsylvania. Her current research interests focus on using remote sensing data to predict landscape scale biomass, impacts of land use on water resources, and understanding the relationship between forest structure, terrain, and wildlife.

Abstract: As agencies and municipalities struggle with the challenges associated with the sometimes opposing goals of preserving ecological services along with encouraging economic development, it is important to utilize research on best management practices. With the increasing availability of high resolution, GIS data, agencies can work together to develop prioritization schemes that provide maximum watershed protection with minimal economic impacts. By targeting the high priority areas first and collaborating to focus potentially limited resources, municipalities and agencies can receive the maximum benefit for their investment of time and resources.

ROBERT BROWER

Mr. Brower is the founder and Chair of the Institute for the Application of Geospatial Technology at Cayuga Community College Inc., also known as IAGT as well as a Managing Director of the Regional Application Center for the Northeast (RACNE). He is responsible at IAGT for all program development and support, organizational and technological capacity building, management, and overall coordination and leadership. His work at IAGT has included programs and projects for a number of governmental, NGO's, Academic and institutional entities at International, National, Regional, State, and local levels. IAGT clients include NASA, USAID, USGS, NYSDEC, Division of Water, and the New York City Department of Environmental Protection, Water Resource Division. IAGT has received research grants from the National Science Foundation, NYSERDA, and a host of National and State entities. IAGT has undertaken significant collaborative projects including but not limited to those with Cornell University, The Rochester Institute of Technology, the Finger Lakes Lake Ontario Watershed Protection Alliance, (FOLLOWPA) and the Finger Lakes Institute at Hobart William Smith College. His experience includes 30 years in the public sector, serving as an Environmental Planner, as Director of Planning and Economic Development and as Director of Information Management for Cayuga County. He has spent the last decade developing the capacities of IAGT. He was a founding member of the Board of the New York State GIS Association and recently completed his final term as the Vice President of that Association.

Abstract: As the result of a unique, on-going research collaboration focused on the Cayuga County portion of the watershed of Owasco Lake, students from SUNY Cortland, SUNY Oswego, and Cayuga Community College have created a very surprising series of "land value maps". The students were participating in the newly developed "Community Mapping Program" at IAGT exploring the analytical power of geographic information technology (GIT). They were at the same time working "in-service" to the sponsoring organization, the Owasco Watershed Lake Association (OWLA). What emerged as the result of these initial efforts is the beginning of a newly crystalized understanding of the scale of impact from existing land-based tax policy in a single county on part of a large rural Finger Lakes Watershed.

The tax base of multiple communities is a critical component of collaborative watershed management efforts. It is a fundamental source of revenue to support efforts to maintain ecological systems, mitigate development

impacts, and reverse diminishing water quality. As land is exempted from taxation, the burden of cost associated with prescribed management practices is shifted to remaining parcels. Further, the sources of various water quality problems are now better understood than ever. What will be the economic basis of inter-municipal cooperation if tax exemptions correlate with the parcels creating the problem? Aside from issues of fairness, what if the current scale of exemption is already so large that meaningful management practices simply cannot be undertaken, let alone sustained? The presentation will include a very brief description of the data and the process used by the students, and a presentation of the initial maps. Conference reaction is expected to help guide future research efforts.

KEVIN OLVANY



Kevin Olvany is the Watershed Program Manager for the Canandaigua Lake Watershed Council. The Watershed Council consists of publicly elected officials in all fourteen municipalities within the 174 sq. mile Canandaigua Lake Watershed. Kevin has worked for the Watershed Council since 1998 to implement a comprehensive watershed protection program. Kevin received a Masters' degree in Water Resources Management from SUNY-ESF and an MBA from Syracuse University along with a Bachelor's degree in Political Science from Siena College. He has also been an adjunct instructor in Conservation Law and Environmental Planning at Finger Lakes Community College since 2001.

Abstract: The Canandaigua Lake Watershed Council is now in its 14th year of existence in implementing the comprehensive watershed protection program. The Watershed Council consists of the fourteen watershed and water purveying municipalities (Towns of Canandaigua, Bristol, South Bristol, Potter, Naples, Gorham, Italy, Middlesex and Hopewell, Villages of Newark, Palmyra, Naples and Rushville and the City of Canandaigua), with each municipality typically sending their chief elected official or other elected municipal board member to Watershed Council meetings. The Watershed Manager, who is overseen by the Council, is responsible for implementing management decisions and coordinating with all the various partners.

The Watershed Council provides a base level of funding to support the program through a fair share formula that equitably divides the costs of the program among the fourteen municipalities. The Watershed Council and its member municipalities have been successful in obtaining over one-million dollars in state grant funding to help implement many priority actions that will be highlighted throughout this Plan update. The intermunicipal agreement that brings the municipalities together has been reaffirmed every five years since 2000. The Watershed Council has won the NYS- DEC Environmental Excellence Award and the EPA Clean Water Partner for the 21st Century Award based on the intermunicipal success of the program.

The existing plan and the comprehensive update embody the principles of integrated watershed management and adaptive management, focusing on multiple aspects to protect not only the lake, but also all of the tributaries and lands within the watershed that contribute to overall lake health. Key to implementing the plan is collaboration, partnership and stakeholder involvement from existing agencies, organizations and individuals from within the watershed community. The plan seeks to protect, improve, and sustain the environmental resources and all of the important services these ecosystems provide, while continuing to provide high quality drinking water and recreation for the surround communities.

Water quality protection in the Canandaigua Lake Watershed is achieved by the following management approaches:

- *Research* - A comprehensive monitoring program documents the health of the lake and its tributaries and helps to identify sources of pollution. It also helps measure the success of management.
- *Education* - Empowering citizens to be stewards of the watershed is essential, as approximately 90% of the watershed is privately owned. Education prevents seemingly insignificant actions of an individual from accumulating across the watershed into a larger problem, thus tackling non-point source pollution. Also, citizen involvement and investment in the watershed bolsters support for management.
- *Restoration/Remediation*- The most efficient management is pollution-prevention of existing resources. However, restoration and remediation are essential tools to reverse past damage and to mitigate the impact from new impacts. This category includes stream stabilization projects, wetland creation projects, stormwater retrofits, and other approaches to provide tangible water quality improvements.
- *Protection* - Permanent protection of sensitive areas can provide critical water quality protection and can be achieved through partnerships with land owners, land trusts and local/state agencies. The Finger Lakes Land Trust Plays a critical role in protecting open space in the watershed. They have made numerous land acquisitions and easements throughout the watershed. They have developed an open space strategy entitled: "A Vision for the Canandaigua Lake Watershed" to help guide and prioritize their land protection efforts.
- *Regulation* - Zoning, building codes, stormwater management, wastewater and land use regulations are just a few ways municipalities can ensure development and human activity do not impact the lake. These regulations are particularly important for reducing non-point source pollution.

Nutrient Management Panel

Question: Scientists and third parties can sometimes provide supportive analysis for and contribute to the development and establishment of TMDLs (Total Maximum Daily Load), while land managers and management programs promote and utilize best management practices. What are the greatest challenges and benefits for each of the parties involved – scientists, agencies, and land managers?

Moderator:

John Halfman, Ph.D., Hobart and William Smith Colleges, Professor of Geoscience

Panelists:

- *Dave Matthews, Ph.D., Upstate Freshwater Institute, Technical Director, Senior Research Scientist*
- *John Fraser, Cayuga County Soil and Water Conservation District, Nutrient Management Specialist*
- *John Santos, Hazlitt 1852 Vineyards, Vineyard Manager*

JOHN HALFMAN, PH.D., MODERATOR



Professor Geoscience, Chair Environmental Studies Program, Finger Lakes Institute Endowed Chair of Environmental Science.

PhD in Geology from Duke University, MS in Geology and Geophysics from U Minnesota, BS in Geology from U Miami, FL.

Dr. Halfman's topics of current and proposed research interests include the limnology, hydrogeochemistry and sedimentology of lakes through the collection and analysis of limnological and hydrogeochemical data from lakes and streams, CTD water column profiles, sediment cores and high-resolution (1-kHz) seismic profiles. Current projects focus on the hydrogeochemical impact of zebra and quagga mussels, watershed/lake major ion hydrogeochemistry, and the impact of nutrient loading from the watershed on the Finger Lakes of central and western New York.

Most recently, Halfman has been a major player in the initiation and continuation of the Finger Lakes Institute at Hobart and William Smith Colleges. His contribution currently involved the monthly monitoring of the eight easternmost Finger Lakes, from Honeoye to Otisco, at two deep water sites in each lake starting in 2005. The analysis investigates CTD profiles, secchi disk depths, plankton tows, and surface and bottom water samples for total and dissolved phosphates, nitrates, silica, chlorophyll, total suspended solids and major ions. He has also maintained monitoring efforts at the major tributaries to Seneca and Owasco Lakes.

DAVE MATTHEWS, PH.D.



Dave Matthews serves as Technical Director of the Upstate Freshwater Institute, a not-for-profit organization located in Syracuse, NY that is devoted to freshwater research and education. The Institute's mission is to provide the scientific basis for the protection of the freshwater resources of New York State. Dave has conducted fundamental and applied research on over 40 lakes, reservoirs, and rivers in New York. His research interests include nutrient loading and cycling in lakes, the eutrophication and recovery of lakes, mercury cycling, ammonia toxicity, and the influence of sediment processes on water quality. Dave has co-authored over 50 peer-reviewed journal articles on these topics. Dave received his Ph.D. in Water Resources Engineering from the State University of New York College of Environmental Science and Forestry. He and his wife Carol live in Pennellville, NY, where they enjoy fishing, hiking, and lake-effect snow.

Abstract: Despite major advancements in the removal of phosphorus at wastewater treatment plants and control of non-point sources over the past several decades, numerous water bodies continue to experience water quality impacts of cultural eutrophication driven by excessive phosphorus loading. Common symptoms of eutrophication include nuisance algal blooms, low water clarity, and depletion of dissolved oxygen. Effective integration of scientific information into regulatory initiatives is important in developing and executing strategies to rehabilitate impacted lakes and rivers. A primary vehicle for this integration is the "total maximum daily load" (TMDL) process, which has been established by the US Environmental Protection Agency as a quantitative regulatory framework to guide rehabilitation efforts in water bodies described as "water quality limited". The TMDL is defined as the pollutant loading rate that will result in water quality standards being met.

Our understanding of phosphorus cycling in lakes has advanced considerably, and this new information is increasingly being integrated into water quality models used to guide TMDL analyses. Historically, phosphorus loading was represented in terms of annual total phosphorus loading. It's now widely acknowledged that levels of phosphorus and algae in lakes depend importantly on the forms, fate, transport, and seasonality of phosphorus inputs. For example, a substantial fraction of the total phosphorus in New York State lakes is present in particulate inorganic forms that don't support algal growth. Algal bioavailability assays, individual particle analyses, and measurements of various forms of phosphorus were included in the development of a phosphorus TMDL for Onondaga Lake. Similar measurements have been included in the ongoing monitoring program to support the development of a TMDL for phosphorus in the southern end of Cayuga Lake. Integration of robust scientific information into TMDLs will support identification of the most critical phosphorus inputs, which is expected to result in more efficient and effective water quality management programs.

JOHN FRASER



Currently an employee at the Soil and Water Conservation District for 11 years as a Nutrient Management Specialist. Major duties surround being a Certified Agricultural Environmental Planner a Certified Professional in Erosion and Sediment Control. A degree in Environmental and Forest Biology was obtained at SUNY College of Environmental Science and Forestry. Being an avid outdoorsman and having three sons increases the desire to protect our natural resources for future generations.

Abstract: As an Agricultural Environmental Planner:

- Assessing farming operations and identifying potential sources of nutrient and sediment loading.
- Recommendations are made from current soil samples to apply nutrients (manure and fertilizer) at agronomic rates.
- Prescribe best management practices (BMP's) that will minimize the loss of nutrients and sediment into the environment.

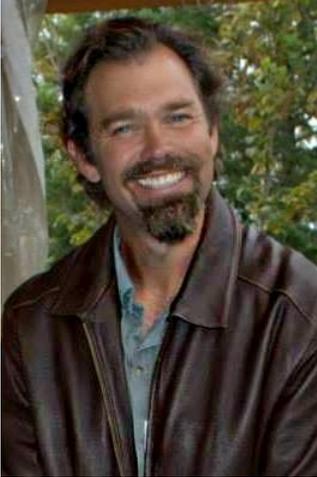
The Certified Professional in Erosion and Sediment Control

- Works with landowners, contractors, and engineers to minimize the loss of sediment and pollutants from construction sites.
- Inspects construction sites in order to identify areas of concern.
- Provides mandatory training for contractors to familiarize them with the stormwater permit and the BMP's necessary to prevent soil erosion.

As a Soil and Water District Employee:

- Assist with the survey, design, and installation of BMP's to improve water quality;
- Assist in locating funds to offset the cost of BMP's;
- Work with local municipalities on erosion control concerns;
- Assist DEC with agricultural complaints; and
- Coordinate wildlife seedings with USDA program.

JOHN SANTOS



In December of 1989 John graduated from Cornell University with a degree in Natural Resources. He worked as an assistant wine maker at Herman J. Wiemer Vineyards during that winter. In August of 1990 he was hired by Hazlitt 1852 Vineyards where he worked in the cellar, tasting room, and vineyards until after the 1992 harvest. His next place of employment was Knapp Vineyards where he was employed in the vineyards. During this time he wrote several articles for Vineyard and Winery Management Magazine. He also worked for the magazine at trade shows and seminars. In 1994 John returned to Hazlitt 1852 Vineyards to become their Vineyard Manager. He converted non shoot positioned canopies to shoot positioned canopies. He then began the conversion of VSP to Scott Henry. He continues to enjoy the challenges of managing Hazlitt's vineyards to this day.

Abstract: I will be discussing the ways in which we manage soil fertility to grow premium vinifera grapes in Hector. The discussion will include soil organic matter and ways we increase it with compost, mulching, and permanent sod cover crops.

Invasive Species Panel

Question: Due to the social impacts that invasive species have on our communities, how can research scientists, citizen scientists, and individuals utilize science and policy to prevent spread, and increase knowledge and understanding so that behaviors are changed?

Moderator:

Bruce Gilman, Ph.D., Finger Lakes Community College, Professor of Environmental Conservation

Panelists:

- Richard Morse, Ph.D., New York State Museum, Collections Manager of Ichthyology and Decapod Collection
- James Balyszak, Hydrilla Task Force of the Cayuga Lake Watershed, Hydrilla Program Manager
- Nicole Landers, Yates County Cornell Cooperative Extension, Executive Director

BRUCE GILMAN, PH.D., MODERATOR



Dr. Gilman has taught in the Department of Environmental Conservation and Horticulture at Finger Lakes Community College for the past 38 years. His teaching expertise includes aquatic ecology, field botany, glacial geology and environmental chemistry. He curates the Finger Lakes Herbarium, a collection of over 13,000 sheets containing plants representative of western New York, and is author of the Ontario County Flora. His wealth of botanical knowledge is regularly shared with general public through walks and lectures sponsored by The Nature Conservancy, The Finger Lakes Land Trust, the Canandaigua Botanical Society, Ontario Pathways, the Rochester Academy of Science and the college. He also serves as the Director of the Environmental Studies Program at FLCC as well as Director of the college's Muller Field Station located in the southern Honeoye Valley. Dr. Gilman received his PhD in Ecology from the College of Environmental Science and Forestry, Syracuse NY.

While completing his MS degree in the mid-1970s, Dr. Gilman conducted extensive research in wetland communities along the eastern shoreline of Lake Ontario. This SEAGRANT sponsored project involved aquatic macrophyte mapping, biomass sampling, water analyses and sediment characterization. He has completed and published similar work in the aquatic macrophyte communities in Honeoye Lake (1984, 1994 and 2004), and assessed fish utilization of the littoral zone. Recently, Honeoye Lake sediment was collected by core sampling and its potential role in the phosphorus dynamics of the lake was determined. In 1988, Dr. Gilman completed an inventory of the macrophyte communities in the three major Wayne County Bays of Lake Ontario. Since 1990, he has been a principal investigator in limnological studies monitoring the health of Canandaigua Lake and sampling the quality of its tributary streams. Lake water is monitored monthly with a Yellow Springs Instrument Company water quality probe and tested for chlorophyll a abundance. Following storm events, streams are sampled for sediment loads, nutrient levels and bacterial contamination. In 2006, he teamed with researchers from the Finger Lakes Institute and helped conduct a comprehensive study of Owasco Lake. Of regional significance, he completed research and published A History of Aquatic Plant

Distribution in Upstate New York (1992) for the New York State Federation of Lake Associations, Inc., and sponsored by the Environmental Protection Agency. The occurrence of 78 taxa in 70 water bodies was examined. Dr. Gilman serves as a scientific advisor to the Honeoye Lake Watershed Taskforce, as a long time trustee on the Central and Western New York Chapter of The Nature Conservancy, and on two Ontario County Boards, the Water Resources Council (the County's water quality coordinating committee) and the Intermunicipal GIS Coordinating Committee.

Dr. Gilman has authored 19 technical reports that include taxonomically broad natural resource inventories and planning recommendations. Of interest is work conducted in old growth forests of this region, an international conservation initiative to conserve globally rare alvar communities in the Great Lakes Ecoregion, and an ongoing compilation of all organisms living in the southern Honeoye Valley. These reports demonstrate his ability to complete biodiversity research while providing information that is critical to the environmental decision-making process of management groups.

Dr. Gilman has received the Friend of the Lake award for his research in Canandaigua Lake, the Friend of the Land award for his volunteer efforts with The Nature Conservancy, and the Lake Tear of the Clouds award to recognize all of his studies in New York State lakes.

RICHARD MORSE, PH.D.



Richard S. Morse started volunteering for the New York State Museum in 1998 while doing undergraduate work at the University at Albany. He is now employed there as the collection manager for the state's fish and decapod collection. This position allows him extensive involvement in research relating to New York State fishes as well as development of policy and research direction for a variety of federal, state and collegiate entities. He is an original member of the New York State Species of Greatest Need and Concern Task Force which is responsible for the listing of rare and endangered fish species by the NYS Department of Environmental Conservation.

Rick's recent endeavors include researching the microhabitat preferences of rare fishes of New York State, untangling the taxonomy of Adirondack fishes, and studying the ecological impact of the invasive zooplankton *Hemimysis anomala*, the Bloody Red Shrimp. He redescribed a new species of fish found only in the Adirondacks as part of his dissertation, and has recently discovered another potential endemic fish species in New York State.

Rick's Ph.D. is in Ecology from the College of Environmental Science and Forestry and Syracuse University in Syracuse. He earned his B.S. in Biology from the University at Albany. Rick and his wife Margaret reside in Geneva, NY with their two children Olivia and Henry.

Abstract: The appearance of invasive species in New York State can almost always be traced to human-based activities. This is certainly true in regards to aquatic introductions. Exotic aquatic species have been introduced in ways that range from the intentional release of unwanted aquarium organisms, to the unintentional release of hitchhikers in recreational boating and commercial shipping. An educated public is the best defense against the spread of invasives. Increased public awareness of the impacts of an exotic introduction along with provision of tools for identification of exotic species can be important steps towards stopping the spread of many invasive organisms. While control is crucial, perhaps even more important is the ability to detect the presence of an invasive species as quickly as possible after their introduction. Unfortunately, exotic species are often discovered well after they have become established. Detection is usually by accident and occurs as a

result of unrelated fieldwork by aquatic professionals or by the sharp eyes of naturalists. What is sorely needed is a comprehensive survey program that focuses on the identification of potential invasives. I argue that regular surveys of area waters will not only lead to early detection of invasive species, but also allow for the monitoring of changes in fish assemblages, habitat quality and changes in the range of known exotics. A survey program should include aquatic science professionals and volunteers from the community. This collaboration will increase public awareness and foster good stewardship.

JAMES BALYSZAK



*James Balyszak is the Hydrilla Program Manager for the Hydrilla Task Force of the Cayuga Lake Watershed. He has five years of direct, in-field experience managing and controlling aquatic and terrestrial invasive plant species in South Florida, among which Hydrilla (*Hydrilla verticillata*) was a primary management target. He has an additional two years of experience working for the Monroe County Soil & Water Conservation District; implementing in-field environmental conservation and management projects (primarily through grant funding).*

Abstract: The Cayuga Inlet Hydrilla Eradication Project has been implemented to actively address the Hydrilla infestation in the Cayuga Inlet (Ithaca, NY), which was discovered in August of 2011. Through the collaborative efforts of stakeholders and volunteers, the project has implemented Hydrilla eradication treatments (herbicide treatment) in 2011, 2012, and 2013, with positive results. In conjunction with in-field eradication treatments, extensive plant community and water monitoring/sampling has been conducted. Plant community monitoring is crucial to track treatment efficacy, potential Hydrilla spread, and overall health of the ecosystem.

This project requires working and coordinating directly with local, regional, and statewide stakeholders, from a wide variety of backgrounds and expertises. Over a dozen different stakeholders have been involved to date, and more collaborative efforts are constantly being built. Stakeholders include: NYS Department of Environmental Conservation, U.S. Fish & Wildlife Service, New York State Parks, Tompkins County Soil & Water Conservation District, Tompkins County Health Department, City of Ithaca, Cornell Cooperative Extension, Cayuga Lake Watershed Network, Cayuga Lake Floating Classroom, Racine-Johnson Aquatic Ecologists, national experts & peer reviewers, Coast Guard Auxiliary, Lakeshore Homeowners Associations, Hydrilla Hunter volunteers.

The environmental and economic impacts of invasive species, especially one as insidious as Hydrilla, are well known in many parts of the country. Unfortunately, New York State is seeing these detrimental effects firsthand with greater frequency and increasing magnitude.

To offset these negative social impacts, and hopefully prevent further introduction and spread of invasive species in New York, greater legislative, scientific, and public understanding and collaboration will be needed moving forward. These items will be discussed in greater detail by the panel.

NICOLE LANDERS



Nicole is the Executive Director of Cornell Cooperative Extension (CCE) of Yates County. She has a background in Plant Pathology and Ecology with an interest in invasive species. She conducted agricultural and ecological research in upstate New York for 10 years. As a NSF GK-12 Fellow, Nicole taught inquiry-based lessons to advanced high school students in central New York, the Adirondacks and New York City. Her interest in supporting the local community and economy led her to co-found and manage the Branchport Farmers' Market in addition to providing educational programs on invasive species for the Finger Lakes Museum. She worked at the Cornell New York State Agricultural Experiment Station and SUNY-ESF in Syracuse, NY before taking the position at CCE in 2012.

Nicole is currently strengthening the invasive species outreach and education program of Yates County with plans to involve citizens in a project aimed at aquatic invasive species. Nicole has a M.S. in Botany and Plant Pathology from Michigan State University and M.P.S. in Ecology from SUNY-ESF, Syracuse, NY.

Abstract: *Natural resource educators as social scientists.* Yates County is a rural county which relies upon agriculture and tourism as its main sources of revenue. The spread and introduction of invasive species impacts both of these sectors. Social impacts include, but are not limited to loss of revenue from crops, reduced recreational boating, swimming and fishing, and the degradation of the aesthetics of water bodies, forests and landscapes. Traditional classroom education is for the sole purpose of increasing knowledge, yet if behavior change is the intended outcome, research indicates that the educator must expand from just providing knowledge to also providing awareness and intrinsic motivations of the participants.¹ Researchers, citizen scientists and individuals can all play a part in creating environmental behavior change. Researchers can act as mentors for students, advisors to community groups, and provide education through schools and cooperative extension. Citizen scientists can provide good role models for the general public and specific target groups to increase awareness and promote behavior change. Individuals can voice their opinions based on knowledge they gain from environmental education to policy makers and provide the motivation for change. Behavior change takes time and not every individual will make behavior changes at the same rate, therefore, it is important for programs to sustain themselves to reach a good number of people at multiple times. In addition, educators should include social science tactics when educating about invasive species when a behavior change is a desired outcome.²

1. Shaw, B., Dalrymple, K.E. and Brossard, D. 2012. Factors Associated with Behavioral Compliance to Prevent the Spread of Viral Hemorrhagic Septicemia. *Journal of Extension* [On-line]. 50(2). Article 2FEA9. Available at: <http://www.joe.org/joe/2012april/a9.php>

Shaw, B. (2010). Integrating temporally oriented social science models and audience segmentation to influence environmental behaviors. In L. Kahlor & P. Stout (Eds.), *New agendas in science communication*. Mahwah, NJ: Lawrence Erlbaum Associates.

Posters

ENTESAR AL ABDULAL, GRADUATE STUDENT

Entesar Al Abdulal is an international student at Rochester Institute of Technology (R.I.T.). She is a second year student in the Masters program of Material Science and Engineering. She received her Bachelor degree in Chemistry from King Saud University, Riyadh, Saudi Arabia in 2007. Currently, she is a one of Professor Takacs' students in the plasma lab. She has started working on her project since last Spring 2013. Her project mainly focuses on the modification surfaces of some materials, like polystyrene (PS) and poly (ethylene 2,6-naphthalate) (PEN), which are often found in landfill sites, with ozone and UV-photo-oxidation. Entesar is very interested in working to improve the properties and characteristics of materials. You can reach her at eha6955@rit.edu.

Abstract:

Reaction of Ozone with the Landfill Waste Polystyrene

Entesar Al Abdulal,¹ Ameya Khot,¹ Alla Bailey,¹ Michael Mehan,² Thomas Debies,² Gerald A. Takacs¹

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Polystyrene (PS) is one of the most widely used thermoplastic polymers and is often not recycled because of its light weight and low scrap value. The discarded PS in landfill sites has limited capacity for water adsorption, and physical and chemical properties that make it relatively inert and virtually unaffected by naturally occurring degrading agents and sources.

Pretreatment of the surface of PS to increase its wettability and introduce reactive functional groups may make the waste more susceptible to degradation and useful for technological applications [1].

PS was treated at room temperature with ozone produced from the UV photo-dissociation of oxygen. X-ray photoelectron spectroscopy (XPS) was used to detect the increase of the oxygen content on the PS surface and formation of functional groups as a function of treatment time. Advancing contact angle measurements provided information about the increase in hydrophilicity with treatment time.

[1] A. Khot, A. Bailey, T. Debies and G. A. Takacs, "XPS Studies of Poly(acrylic acid) Grafted onto UV Photo-oxidized Polystyrene Surfaces", *J. Adhesion Sci. Technol.* (2012), DOI:10.1080/01694243.2012.691037.

SHANNON BESTON, UNDERGRADUATE STUDENT

I am a senior at William Smith College and have spent the past two summers studying the fish communities in the Seneca Lake tributaries. This past summer, I completed my fieldwork for my Honors project, *The Ecological Effects of Black Spot Disease in the Seneca Lake Watershed*. My research involves the digenetic trematode *Uvulifer ambloplitis* and how this parasite impacts blacknose dace and creek chub on the individual, population, and ecosystem levels. Currently, my interests include fish condition in relation to parasitism, behavioral modifications induced by parasites in their host organisms, as well as parasites as biotic indicators.

Abstract:

A Two Year Study on Black Spot Disease Prevalence, Abundance, and Population Dynamics in the Seneca Lake Watershed

Shannon Beston and Susan F. Cushman, Ph.D.
Hobart and William Smith Colleges

Five of the 18 major tributaries found in the Seneca Lake watershed: Reeder Creek, Mill Creek, Rock Stream, Big Stream, and Kashong Creek have been displaying an elevated abundance of infection by the digenetic trematode *Uvulifer ambloplitis*. This parasite severely infects *Semotilus atromaculatus* creek chub and *Rhinichthys atratulus* blacknose dace that inhabit these five streams. In 2011, the infection was observed in Rock Stream and Big Stream and in 2012, three more streams had infected fish: Kashong Creek, Reeder Creek,

and Mill Creek. In this study, we use length as a way to determine how populations of infected fish have changed between 2012 and 2013. Our results indicate an overall increase in infection prevalence and a change in population structure within some of the streams.

SUSAN CUSHMAN, PH.D.

Susan F. Cushman is the Director of Introductory Biology Laboratories. She received her Ph.D. in Fisheries Science from the University of Maryland Center for Environmental Science in 2006, M.S. in Environmental Science from the Johns Hopkins University in 2001, and B.S. in Biology from William Smith College in 1998. Since coming to Hobart and William Smith Colleges in 2007, she served on the faculty as Visiting Assistant Professor of Biology for three years. Susan also serves as the Research Scientist at the Finger Lakes Institute at Hobart and William Smith Colleges, where her research interests include stream and water quality restoration, effects of land use on water quality, benthic macroinvertebrate communities, and fish populations in tributaries of the Finger Lakes region including the Finger Lakes National Forest. She has long term monitoring programs on Cold Brook (Hammondsport, NY) and Castle Creek (Geneva, NY).

Abstract:

Composition of Stream Fish Communities in Seneca Lake Tributaries

Susan F. Cushman^{1,2}, Ph.D., Shannon Beston^{1,2}, Elijah T. Gleason³ and Matthew Paufve^{1,2}
Finger Lakes Institute¹, Hobart and William Smith Colleges², Vermont Law School³

The Seneca Lake watershed is large (~194, 250 ha) and is composed of primarily agricultural (39%) and forested (41%) land use activities, with lesser amounts of idle (12%), and developed land (8%). Sensitive fish species are influenced by degraded water and habitat quality associated with certain land uses. Although many water quality surveys have been performed in the Seneca Lake watershed in the past, a survey of biological stream communities was conducted to learn more about the patterns of species distribution and impacts of environmental stressors within each watershed. Stream surveys were carried out at sites in 15 major subwatersheds (western shore = 6, eastern shore = 8, southern inlet = 1) in June 2011 and 2012. Fish were captured using double-pass backpack electrofishing (Smith-Root LR-20B) in a 75 m stream reach isolated with blocknets. Fish species richness and abundance were recorded. Fish species richness varied across stream sites with highest fish species richness found in Wilson Creek (9) and lowest in Plum Creek (2; mean = 5.4). Fish abundance followed different trends, with highest abundance in Glen Eldridge (635) and lowest in Wilson Creek (84). The typical fish assemblage of these streams included *Rhinichthys atratulus* Blacknose dace, *Semotilus atromaculatus* Creek chub, *Campostoma anomalum* Central stoneroller and *Catostomus commersoni* White sucker. The most common species of fish, blacknose dace, varied in abundance (mean = 198), composing between 22 -100% of the community sample. The only game fish species were found in Catharine's Creek (*Oncorhynchus mykiss* Rainbow trout and *Micropterus salmonoides* Largemouth bass), Kendaia Creek (*Oncorhynchus mykiss* Rainbow trout) and Hector Falls (*Salmo trutta* Brown trout). Interestingly, fish communities were not always predictable indicators of stream health, however they don't always respond to environmental stressors in the same way benthic macroinvertebrate communities do. Fish communities may also be driven by local geology and therefore barriers to colonization from the lake due to large changes in elevation (primarily waterfalls). This study was instrumental in gaining an understanding of the stream fish community composition in subwatersheds that have a variety of potential water quality impacts.

SARAH DEPILLO, UNDERGRADUATE STUDENT

Sarah DePillo is a senior at William Smith College. A native of Waterloo, NY, she has worked as a summer research intern at the Finger Lakes Institute for two summers on the watercraft steward program. Working with the FLI on the watercraft steward program has helped her to narrow and further identify professional goals.

After graduating with an Environmental studies major, she intends to pursue a career framed in environmental policy work.

Abstract:

Finger Lakes Institute Watercraft Steward Program: Survey 2013

Sarah DePillo¹, Lisa Cleckner¹, Ryan Sharp²

¹Hobart and William Smith Colleges, ²Eastern Kentucky University

Aquatic invasive species have recently received much attention in the Finger Lakes and Great Lakes. There are many issues that are associated with invasive species. Not only can they disrupt ecosystems by affecting population dynamics of native species, they also have the potential to disrupt various recreational and land uses which can significantly harm the associated economy. Additional economic issues caused by invasive species include costs of managing and eradicating them once they become established. In the New York State Invasive Species Management Plan, the strategy to deal with invasive species begins first with preparation, which is comprised of research and public outreach and education. Next, prevention is emphasized which is defined in terms of "early detection and rapid response." In an effort to accomplish both of these essential first strategic steps, the Finger Lakes Institute at Hobart and William Smith Colleges (FLI) launched a Watercraft Steward Program in the summer of 2012. This program placed trained stewards at boat launches throughout the Finger Lakes Region and on Lake Ontario. These locations are a focal point because invasive species can be spread "through recreational uses such as hunting, fishing and recreational boating" (White House Council on Environmental Quality, 2010.) As part of the 2013 FLI Watercraft Steward Program, additional research was initiated to better understand some of the social aspects of invasive species issues such as public perceptions, attitudes towards, and knowledge of invasive species, as well as amenability and support for various management techniques and policy approaches that can be used to deal with aquatic invasive species issues. Preliminary results of 400 surveys administered at Finger Lakes boat launches during the summer of 2013 are presented.

HILARY GOVE, UNDERGRADUATE STUDENT

Hilary Gove is a senior at William Smith College majoring in Public Policy. Hilary grew up on a lake in Maine and she has always been committed to preserving the natural beauty of the lakes.

Abstract:

Finger Lakes Institute Watercraft Steward Program 2013

Hilary Gove, Lisa Cleckner, Ph.D., Kirsten Goranowski, and Sarah Meyer
Finger Lakes Institute, Hobart and William Smith Colleges

As part of the Southern Lake Ontario and Finger Lakes Region Aquatic Invertebrate Assessment and Invasive Species Prevention Program, the Finger Lakes Institute at Hobart and William Smith Colleges (FLI) has launched the second year of an initiative to prevent the spread of invasive species into the Finger Lakes and to/from the southern shore of Lake Ontario. Through this program, watercraft stewards surveyed and educated boaters at 23 launches in the Finger Lakes and at southern Lake Ontario sites in Monroe County to help reduce the spread of invasive species via recreational boating. The stewards typically worked forty hours a week, and covered the weekends when the launches are busiest. Preliminary data analysis is presented on the number of boats and boaters encountered at the launches and what their purpose was. Other data is presented regarding the last waterbody visited, as this information is critical for helping determine the risk of the types of invasive species entering from other aquatic ecosystems. Since education is the first step in preventing the spread of invasive species, the work of the stewards is vital for providing information to users of boat launches about the impact of invasive species and steps that can be taken to prevent and reduce their spread throughout the Finger Lakes and Great Lakes watersheds.

PATRICK GUNN

A recent 2013 Hobart graduate with a major in Geoscience and a minor in Environmental Studies, Patrick has been working for the Finger Lakes Institute since the Fall '12 monitoring mercury levels in tributary fish and updating the analytical equipment and protocols at use in the Finger Lakes Institute's trace metal laboratory. Concurrently, he has been continuing work on several other studies, one involving identifying isotopic signatures present in modern Seneca Lake sediments, along with another focused on characterizing historic trends in mercury observed since the industrial revolution using sediment cores from several of the Finger Lakes.

Abstract:

Mercury levels in small fish from Seneca Lake tributaries

Patrick J. Gunn and Lisa B. Cleckner, Ph.D.
Finger Lakes Institute, Hobart and William Smith Colleges

Mercury (Hg) is a common pollutant that bioaccumulates in aquatic systems, an issue of significant importance since the ingestion of fish with high methyl mercury (MeHg) levels can result in a number of deleterious health effects in humans and other organisms. These include, but are not limited to, toxicological effects such as diminished neurological performance (US EPA 2010). Determining mercury levels of fish in streams, as well as in lakes, is important since both tributaries and watersheds are known locations of methyl mercury production and bioaccumulation (Hurley et al. 1995; Cleckner et al. 2003). This study seeks to identify variations in total mercury (Hg(T)) concentrations in blacknose dace (BND), a small ubiquitous omnivorous fish, found throughout Seneca Lake tributaries (Kraft et al. 2006). Nearly all of the mercury present in blacknose dace is in methylated (MeHg) form (Jardine et al. 2013), increasing its risk associated with biomagnification. Large differences in Blacknose dace Hg(T) concentrations were observed among the sampled Seneca Lake watershed tributaries, however, mercury levels in tributary blacknose dace are on average below those reported for the yellow perch, smallmouth bass, and lake trout sampled from Seneca Lake (NYS DEC 2008.) This is expected since the blacknose dace are present at lower trophic levels than the NYS DEC-sampled fish. Though most tributary samples indicate fairly steady Hg fluxes, fish sampled from Hector Falls Creek subwatershed have shown a marked increase in Hg(T) concentrations from 2011 to 2013. Also, elevated mercury concentrations are observed in fish from Castle Creek and Reeder Creek, subwatersheds with high proportions of urban land use. Based on our preliminary analyses, it appears that the blacknose dace is an excellent indicator species for observing temporal and spatial mercury trends since they are found at every sampled site, have a small home range, show significant differences in Hg(T) concentrations among sites, and are eaten by larger predatory fish such as trout (Kraft et al. 2006). Findings from this work will contribute to long-term assessment of the health of Finger Lakes ecosystems and aid in the identification of major contributing sources of mercury to Seneca Lake.

SAMUEL KNOPKA, UNDERGRADUATE STUDENT

Currently a senior at Hobart and William Smith Colleges, I am double majoring in Biology and Environmental Studies. I have always loved being outside, which has led me to pursue jobs and degrees in fields which allow me to continue this passion. I have field experience with Audubon's Project Puffin and in the Finger Lakes National Forest. Upon graduation, I intend to pursue field-based wildlife research and conservation positions.

Abstract:

Spatial distribution of red-backed salamanders (*Plethodon cinereus*) along a forest fragmentation gradient at Finger Lakes National Forest

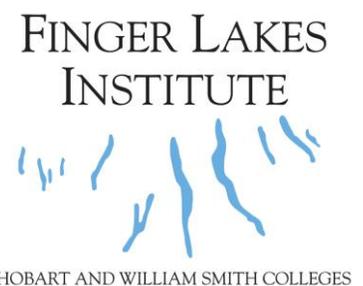
Samuel Knopka and Brad Cosentino, Ph.D.
Hobart and William Smith Colleges

Forest habitat fragmentation can have negative impacts on habitat quality for wildlife. In the Finger Lakes National Forest (FLNF), there is a North-South gradient of forest cover due to agriculture in the North. The objective of this study was to determine the effect of forest fragmentation on red-backed salamander (*Plethodon cinereus*) occupancy. It was hypothesized that occupancy would follow the forest fragmentation

gradient. Areas with high adjacent forest cover, high leaf litter depth, and many cover objects were predicted to have the greatest occupancy. One-hundred plots (10mx10m) were randomly created within the FLNF boundary. Each site was sampled 3 times for *P. cinereus* occupancy by searching all moveable cover objects. Weather data were collected during each sampling, while leaf litter depth and canopy cover was collected at each site. Adjacent forest cover was analyzed using ArcIS. A single-season, likelihood-based model which accounted for imperfect detection was used to estimate site occupancy probability. Two model sets (detection and occupancy) were created in the Program PRESENCE, which were ranked based on Akaike Information Criterion value. Model sets included both site-level and landscape-level factors. The best supported model for occupancy included the percentage of closed canopy at each site, average leaf litter depth, and amount of adjacent forest cover. Occupancy was positively related to leaf litter depth and adjacent forest cover. As predicted, occupancy did follow the forest fragmentation gradient. These results indicate that both site level and landscape level factors are important for terrestrial salamander populations. Site level factors influence habitat quality, while landscape factors influence connectivity and dispersal ability of a population.

About the Finger Lakes Institute

The Finger Lakes Institute (FLI) is dedicated to the promotion of environmental research and education about the Finger Lakes and surrounding environments. In collaboration with regional environmental partners and state and local government offices, the Institute fosters environmentally-sound development practices throughout the region, and disseminates accumulated knowledge to the public.



The goals of the FLI are to:

- Advance, coordinate, and disseminate scientific understanding about the Finger Lakes environment;
- Provide interdisciplinary training for the next generation of environmental researchers, educators, and policy makers;
- Serve as a clearinghouse for environmental information about the region;
- Enhance understanding of environmental issues by regional policy makers and the public;
- Promote models that integrate economic, environmental, and social impacts of specific economic development strategies; and
- Create and disseminate educational resources and opportunities at all levels.

These goals are accomplished through four primary program areas:

Research projects carried out by FLI faculty and collaborators are often interdisciplinary and primarily focused on water quality and other issues relevant to the Finger Lakes region. Research projects provide background information and insights about the local environment and systems.

Education is focused on developing curricular materials and resources that support and extend middle school and high school inquiry-based environmental education. The FLI creates, disseminates, and coordinates a variety of educational initiatives in the Finger Lakes region including the Science on Seneca and Stream Monitoring programs.

Community Outreach promotes knowledge, resources, and life experiences leading to stewardship of the Finger Lakes. Programming is targeted to a variety of learners and ages to inspire participants to become active and knowledgeable citizens of the Finger Lakes.

Economic Development and environmental quality are inextricably linked in the Finger Lakes region. Comprehensive land use planning, policy development, and sustainable enterprise can help to simultaneously support and promote economic vitality and environmental protection in the region.

Learn more about the Finger Lakes Institute at <http://www.hws.edu/fli/>