

Network News



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A New Study of Nitrogen and Phosphorus Inputs to Cayuga Lake

Douglas A. Haith, Professor of Biological and Environmental Engineering, Cornell University

To view this important new report in full, go to our Website at www.cayugalake.org

The Finger Lakes region in Central New York is one of the State's prime environmental resources. The long, deep lakes provide a nearly endless number of recreational opportunities and support a rich ecology of plant and animal life. This bounty cannot be taken for granted, however, because it depends on the quality of lake waters, and that quality is easily damaged by human and animal wastes, chemicals, and non-native species. Although the quality of Cayuga Lake water is relatively high, earlier studies have suggested that sediment and nutrient inputs are potential long-term threats. Actually, potential threats are fast becoming real ones, as evidenced by New York State Department of Environmental Conservation's 2008 classification of the southern end of Cayuga Lake as an 'Impaired Segment' requiring the management of phosphorus, sediment and pathogens.

In response to these water quality concerns, the Watershed Network and Cornell's Department of Biological and Environmental

Engineering undertook, and recently completed a 3-year study of the nitrogen, phosphorus, and sediment inputs to Cayuga Lake. The project, which was supported largely through USDA Federal Formula Funds administered through the Cornell University Agricultural Experiment Station, examined nutrient and sediment sources in the 1870 km² (722 mi²) watershed surrounding the lake. These included point sources, such as sewage treatment plants, as well as nonpoint sources associated with drainage from land surfaces such as farm fields, construction sites, and roads and parking lots. In the first phase of the work, a GIS database of land uses and cover, soils data, topography, and other geographic information was constructed. In the second phase, the watershed was broken down into the 34 subwatersheds shown in Figure 1, and the database was manipulated to describe the many nutrient sources in each subwatershed. This information was in turn used to calculate nutrient and sediment loads for each subwatershed using the GWLF Watershed Model. This model, which was developed by Cornell engineers in

...potential threats are fast becoming real ones, as evidenced by New York State Department of Environmental Conservation's 2008 classification of the southern end of Cayuga Lake as an 'Impaired Segment'...

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Network Staff Gains Momentum from National Environmental Conference

On May 23rd 2009 Wells College graduated 100 or so seniors, and I, Rachel Singley, was one of them. As I walked down the stairs from the graduation stage gripping my new diploma, I thought of all the exciting projects I will begin to work on as the new office manager at the Network office. One of the many eye-opening opportunities that working for the Network has provided me came in the first week after graduation: On May 29th my new director Dr. Hilary Lambert, took me to the 2009 River Rally held this year in Baltimore, MD. The River Rally is an annual event with the purpose of gathering folks (almost 500 this year) who work on environmental issues from almost every watershed in America. The River Rally brings us together in one place for a weekend of lectures, conferences and brain-storming sessions. The rally is organized by the amazing people at the River Network, located in Portland OR. The River Network works to empower and inspire grassroots leaders all across America to create strong and effective organizations that protect national rivers.

Each day of the rally was filled from breakfast to dinner with a wide variety of lecture topics including advocate issues with headings like "Health and Justice" or "Stormwater Management" to administrative topics such as "Nonprofit Management" or "Monitor, Restore and Protect". I came away feeling highly motivated to pursue collaborations, develop new projects and strive to work harder to protect the health of Cayuga Lake. The conferences gave our staff a huge amount of information, lots of project ideas and the connections to resources that will help us build on the Network's strong foundation.

More information on River Network:
<http://www.rivernetwork.org/about-us> 🐦



Rachel and Hilary at River Rally 2009, Baltimore MD.

The Network's New Steward *Hilary Lambert*

Beginning in February, Hilary Lambert took on the role as the Network's new Steward. Fall Creek is the watershed she grew up in (not to mention the creek she played in!). Hilary is a geographer by training, and spent the past several decades teaching geography and natural resource use and politics courses at Rutgers, Miami of Ohio, and the University of Kentucky; edited the American Geographical Society's FOCUS magazine for many years; and for the past 16 years while residing in Kentucky worked as an environmental advocate and community organizer on the many contentious environmental issues there. She has a special love for karst (caves and their cave rivers). Until late 2008, Hilary worked for five years for the Kentucky Waterways Alliance as Associate Director and Staff, experience she brings to her wonderful new job as Steward for the Network. Hilary is also mom to Peggy and Oliver. Thanks to Sharon Anderson, Diane Emmons, Daniel Carrión, Bill Shaw and others for what you have done for the Network over the past decade, and thanks to Rachel and Jade for being there now to help. There is a lot to do, and not a minute to waste. 🐦

Cayuga Lake Watershed Network

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10am - 5pm
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Marcellus Shale Drilling and Blasting

A threat to the water resources of the Cayuga Lake watershed?

By John Mawdsley, Watershed Network Board of Directors Chair

The quick answer is yes, at least a potential threat. But of course, as is usually the case, the scale of the threat depends on many factors most of which are out of our control.

The Marcellus Shale (MS) has been known about as a potential source of gas for some time but until fairly recently it was not thought to be an economic source. What has changed in the last few years are two things – the price of gas has risen substantially (although fallen again very recently) and a hydraulic fracturing technique has been developed that allows much more of the gas to be recovered. It is largely this fracturing technique (often referred to as hydro fracking) that poses the main threat to the water resources of the watershed.

The MS extends under five states in the northeastern US with 28 counties in NY State, including the Cayuga watershed. The shales are deep under the ground, of the order of 6000', and this MS gas field is the largest in the US and the one of the largest in the world. This makes it a very valuable resource for the US, especially as it is close to the large demand centers of the northeast. One must anticipate much pressure to develop the field in the future.

The fluid that is used to fracture the shale to allow more gas to be recovered is largely water with sand added but also a number of chemicals are added that are toxic and may pose health hazards. A large volume of fluid is used (typically 3-9 million gallons per well) which is injected at high pressure to fracture the shales. Most of the water is returned to the surface, perhaps with additional chemicals leached from the shales, and needs to be collected in catch pits and treated. The rest of the fluid remains in the ground and may migrate over time into other strata. The fluid in the catch pits is carted away periodically in trucks for treatment.

The chemicals in the returned fluid are not known in detail as the companies that use the fluid see it as a trade secret. The fluid is normally trucked to local waste water treatment works for treatment and ultimate disposal, which in our watershed means it ends up in Cayuga Lake. Without knowledge of the chemicals it is possible that some of the toxic chemicals will pass through the works largely unchanged. The large volumes of water required have to be extracted from surface or groundwater sources. If not well regulated, this too can pose a threat to the watershed even though lack of water is not normally a problem here.

Other threats can occur from accidents or failures of procedures. For example, it is possible that the high pressure forces the fluid into higher strata that are aquifers



Photo of a typical drilling-fracking site.

despite the attempts to seal the well and to protect these strata; the surface catch pits may leak; or there are spills that allow the untreated fluid to enter surface waters.

The Department of Environmental Conservation (DEC) is the New York State government agency that regulates the drilling to ensure that procedures are followed, but they are under resourced and often can not give the tight supervision that would make mistakes a rare occurrence. In addition it is the division of Mineral Resources that regulates the process and at present the division of Water is not involved. We think this should be changed and regulation of the process tightened up. The DEC has held hearings on improved environmental appraisals including a GEIS (General Environmental Impact Statement) and the new regulations are awaited.

These are some of our concerns that we are aware of at present. We will be considering the issue more in the future. More information is available at many web sites.

Two to start with are:

<http://geology.com/articles/marcellus-shale.shtml>

<http://www.dec.ny.gov/energy/46288.html> 

A New Study of Nitrogen and Phosphorus... *continued from cover*

the 1990s, has been used in similar lake studies throughout the U.S.

Based on these model runs, we are able for the first time to determine the contributions of individual subwatersheds and sources to the overall Cayuga Lake nitrogen and phosphorus budgets. For example, Figure 2 shows the relative phosphorus inputs from the five largest and other Cayuga Lake subwatersheds. Fall Creek is the largest

By far the largest component is groundwater discharge to the streams draining into the lake...

source, followed closely by Cayuga Inlet and Six Mile Creek, all of which empty into the southern portion of the Lake. We were also able to determine the relative scales of the various sources of nutrients to the lake. Figure 3 shows relative nitrogen sources. By far the largest component is groundwater discharge to the streams draining into the lake, although sewage treatment plants, septic systems and agricultural runoff all contribute significant nitrogen loads. The relative sources of phosphorus, as shown in Figure 4, are much different, with nearly 50% of the phosphorus coming from agricultural runoff, followed by groundwater and urban runoff. Sewage, both from treatment plants and septic systems is a relatively minor source of lake phospho-

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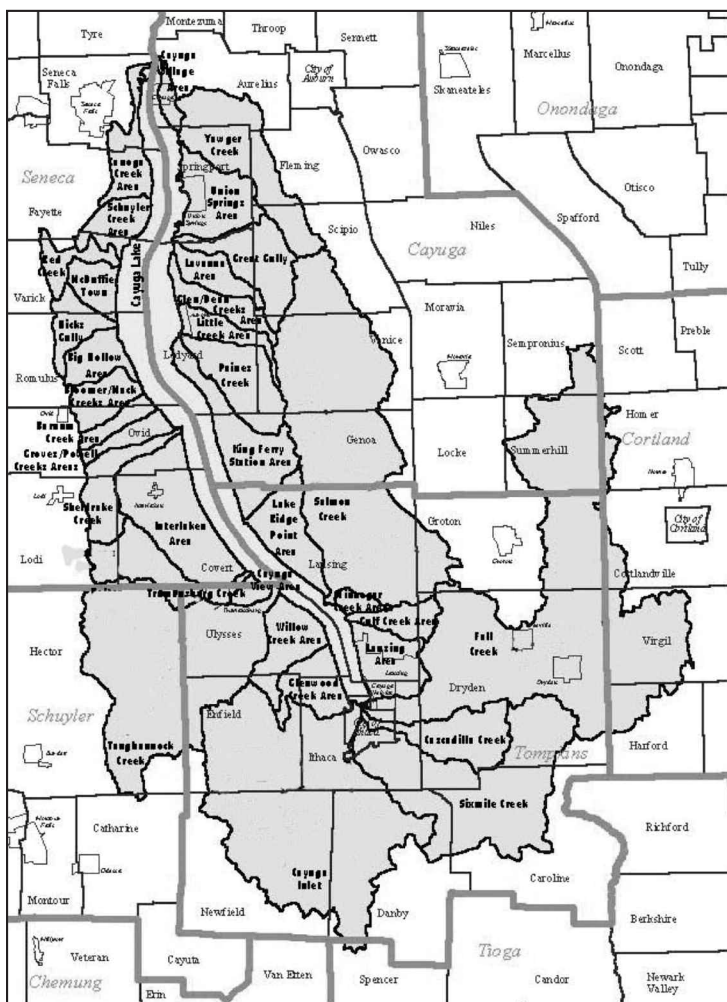


Figure 1. Cayuga Lake Subwatersheds.

Subwatershed Sources of Phosphorus to Cayuga Lake

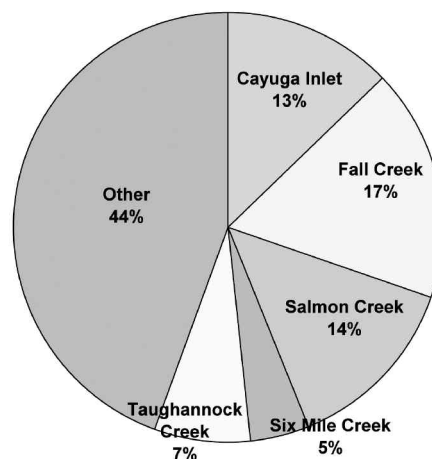


Figure 2. Subwatershed Sources of Phosphorus to Cayuga Lake.

Relative Sources of Nitrogen to Cayuga Lake

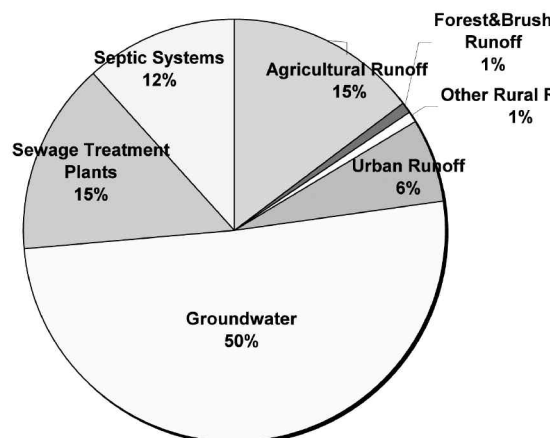


Figure 3. Relative Sources of Nitrogen to Cayuga Lake.

Honor Someone Who Has Made a Lasting Difference in the Watershed

*We are now accepting
nominations for the
Morehouse Award*

The Morehouse Award honors the memory of David Morehouse who exemplified dedication to leadership in watershed solutions throughout his life. Each year his numerous contributions are remembered through this award sponsored by the Cayuga Lake Watershed Network and the Intermunicipal Organization, two organizations that Morehouse helped found.

This award recognizes a person or organization whose efforts have made a positive difference in the protection of the Cayuga Lake Watershed. Nominees must have taken an active role in the protection of Cayuga Lake watershed over a minimum of five years, and their actions must have had a lasting impact in current and future watershed protection. Nominees do not need to live in the watershed.

The David Morehouse Award recipient will be awarded at Sunset on Cayuga, our annual fundraising dinner, with live music and silent auction on September 26th, 2009 at Lakewatch Inn, 1636 Lakeshore Drive, Ithaca NY

Nominations must be submitted to the Cayuga Lake Watershed Network by **Saturday, September 1st, 2009**. Electronic submissions are preferred. Send all nominations to us at: manager@cayugalake.org or Cayuga Lake Watershed Network Morehouse Award, P.O. Box 348 Aurora NY 13026 🐾

The Cayuga Lake Watershed Network invites you to join us for Sunset on Cayuga

**THE LAKEWATCH INN
1636 LAKESHORE DRIVE, ITHACA
SEPTEMBER 26, 2009, 5:00 TO 9:00 P.M.**

\$45 PER PERSON; \$80 PER COUPLE.
EACH TICKET INCLUDES TWO DRINK VOUCHERS.

SPECIAL TABLES FOR 8
\$500 FOR SMALL MOUTH BASS
\$750 FOR LARGE MOUTH BASS
SPECIAL RECOGNITION OF AND TREATS FOR THE TABLES.

DINNER AND DESSERT

SILENT AUCTION AND RAFFLE

MUSIC AND DANCING
THE BOTTOMFEEDERS AND BACK TALK

ENVIRONMENTAL STEWARDSHIP AWARDS
LAKE FRIENDLY FARMS
DAVID MOREHOUSE MEMORIAL AWARD

TICKETS AND INFORMATION
CALL THE NETWORK'S OFFICE 315 364-2991
VISIT OUR WEBSITE WWW.CAYUGALAKE.ORG

UPCOMING EVENTS in the Watershed!

Below is a sampling of upcoming events in the Cayuga Lake watershed, sponsored both by the Network and other organizations. Please send suggestions to include, to: manager@cayugalake.org

Floating Classroom Eco-Cruise

on Cayuga Lake

Ongoing throughout the summer

*BoatWorks Dock,
(Old Taughannock Blvd.)*

For more information go to <http://floatingclassroom.blogspot.com> or call (607) 216-2238

➤ The Floating Classroom is an ongoing project that takes 5th -9th grade classes from our watershed out on Cayuga Lake and instructs them on how to become citizen scientists using scientific equipment to monitor the health of the lake. The kids learn about the lake's ecosystem, what they can do to protect water quality – and have fun! The Eco-Cruises use the same scientific equipment for citizen data collection but provide information and instruction on an adult level. Whole families are encouraged to attend – there is something for all ages and physical abilities!

Aurorafest

Saturday, July 11, all day

*Main Street (State Route 90) in
Aurora NY*

➤ Aurorafest is a celebration of the village of Aurora! The fun on Saturday morning begins with races at 9:00am; fun swim race at 10:15 am; blessing of the boats at 11:00; taste of Aurora at 12:00; kids games at 1:30-3:30; parade at 4:00; jousting at 5:00 on the Wells College front lawn and ongoing live music, beer and then fireworks from dusk-11:00!

Network Summer Open House

Saturday, July 11, 5:00 to 8:00 pm

Our Network office on the Wells College campus in Aurora NY

➤ Our summer open house a time when the public is invited to take a tour of our offices. You can view and comment on our project displays and talk one-on-one with our staff and some members of our board about environmental issues that concern you. This year we are combining the fun by holding our event on the evening of Aurorafest. There are interactive displays for the kids and informative conversation for the grown-ups! We encourage all ages to attend!



Rachel and Jade at work in the Network offices at Wells College, Aurora NY.

The Ups and Downs of Cayuga Lake

Thursday, August 27, 6:00 to 8:00 pm

(doors open at 5:30 pm)

*The History Center,
401 East State Street, Ithaca NY*

➤ Bill Kappel, a hydrologist with the U.S. Geological Survey, will discuss the ever-changing water levels of Cayuga Lake. The presentation is in conjunction with The History Center's current exhibit, Out Upon Cayuga's Waters: 100 Years of Life on the Lake (on view June 16th through October, 2009).

Family Event: Enviroscape!

Saturday, August 29,

12:30 to 3:30 pm

*The History Center,
401 East State Street, Ithaca NY*

➤ The Network will bring its Enviroscape to this fun family event, to demonstrate how Cayuga Lake can become polluted – and how to keep it clean. This is aimed at kids, but everybody learns!

The Network Annual Fundraising Event:

"Sunset on Cayuga"

Saturday, September 26,

5:00 to 9:00 pm

*The Lakewatch Inn,
1636 Lake Shore Drive, Ithaca NY*

➤ Sunset on Cayuga is our annual fundraising dinner! This dinner will take the place of our annual Lakefest. There will be two live bands (Back Talk and The Bottom Feeders) playing both inside and outside, full dinner, silent auction and raffle! We will also be presenting the annual Lake Friendly Farm award, and the David Morehouse Memorial award. In all, this event promises to be a night of fun, friends, good food and best of all, watching the Sunset on Cayuga! Cost: \$45.00 per person, or \$80.00 for a couple, and each ticket includes two free drinks. We have special rates for parties of 8 or more. Please call our office at (315) 364 2992 for more details.

A few things you can do this month to help Cayuga Lake stay healthy!

1 Pick up litter. This simple practice can have a much larger impact on the lake's health than you may think, and it's easy! Walking the dog? Carry an extra bag for litter along the way; taking an afternoon hike? Take a bag for litter when you go, and leave the trail just a little bit cleaner than when you came in! Please note—use a tissue to pick up litter and be sure to wash your hands when you get home.

2 Choose low-phosphate laundry detergent. Phosphorus is a major pollutant that threatens the health of the lake. Phosphates are commonly used in soaps and detergents. Phosphorus can enter our lake in storm drain runoff (which goes untreated into the lake) and can have disastrous effects such as creating “dead-zones” in the lake which have little or no oxygen. Search on Google, using key words like “non-phosphate detergent” and see what products you can find!

3 Handle and dispose of chemicals the right way. This summer, as you take on the challenges of making your yard beautiful or fixing machinery, remember to use good judgment when pouring and disposing of chemicals. Use tarps and drip pans to minimize leakage onto your driveway or lawn. If you do spill harmful chemicals, stop the spill from entering the storm drain by covering it with sawdust, kitty litter, or sand. To dispose of the contaminated material, put it into a doubled trash bag and tie it closed and dispose of it with your regular trash.



You can take actions today that protect water flowing to the lake, seen here at Great Gully Waterfall in Cayuga County.

4 Do not over-fertilize your lawn. Don't saturate your lawn and garden with chemicals—apply these as needed only, and in the lowest possible amount. Do not use lawn applications with rain in the forecast, or just before you water your lawn—remember—everything that flows off your lawn into the sewage drain goes into the lake unfiltered. The responsible way to apply fertilizers is to take a sample of your soil and get it tested at the local Soil and Water Conservation District (607) 257- 2340 or on the web at <http://www.tcsgcd.org/>. This way you know exactly what your soil needs. There is a \$20.00 fee for the test, but knowing what to use is well worth it!

LOOK for us online

Our Website and Blogspot!

The Network's Web site is online at www.cayugalake.org. You can join the Network online via a PayPal payment, or write to us at manager@cayugalake.org or call us at 315 364-2991 for a membership flyer. A membership form is provided for your convenience on the inside back cover of this issue.

Visit our blog at <http://cayugalakeblog.blogspot.com>! Make a comment – join the online conversation!

Facebook

If you are a Facebook member, become a fan of the Cayuga Lake Watershed Network! Look us up, or write to us at manager@cayugalake.org for an email invitation.

We're on the map!

The Sustainable Tompkins map provides a link to the Network, just one click away, at <http://maps.sustainabletompkins.org/> — click on 'Natural resources' or the waterfall icon.



Hemlock pest hits the watershed

By Ruth Richardson

When you think of your favorite local gorge (especially in winter), your scene probably contains hemlocks. These soft-needled evergreens grow on gorge slopes that are uninhabitable by most other trees. Their natural beauty is rivaled by their importance to the watershed. Hemlocks stabilize the steep gorge banks (preventing rapid erosion) and create habitat for both land animals and shady-water loving fish – making these native evergreens an important species for watershed quality.

While sheer cliffs are not a challenge for our hemlocks, a tiny aphid-like insect known as the hemlock wooly adelgid (HWA) is. The HWA (*Adelges tsugae*) has an appetite for both the western and eastern hemlocks – embedding themselves at the base of needles and sucking sap for sustenance. HWA is an invasive brought over to the US from Asia.

For years now, researchers and foresters have been watching HWA infestations in the western and southeastern US. In some southeast locations, tree death occurs in as short as three years and whole stands of forest have perished. In the west, the related but distinct western hemlock has not experienced the same devastation. This is due to a

combination of innate resistance of the western hemlock species and the presence of a native insect (*Laricobius migrinus*) that preys on HWA.

Given the potential devastation caused by the pest, researchers have been on the lookout for the emergence of the HWA in our watershed. This winter, researchers at the Cornell Plantations made the first sighting in the forests around Beebe Lake. Winter and early spring are the best times to spot infections, because that is when the waxy, wooly-looking egg sacks can be found at the base of hemlock needles. In the late spring eggs hatch and tiny crawlers emerge to take hold.

The bug is spread by a variety of mechanisms, many of them involving hitchhiking on another organism: birds, humans, and other mammals. However, another significant mechanism is through the transport of firewood. Wood from infected trees, when moved to a new location, can be the source of infestation in a new area.

Upon the discovery of the HWA in our watershed, Todd Bittner (of Cornell Plantations) and Professor Mark Whitmore (of Cornell University's Department of Natural Resources) coordinated a team of HWA hunters. After educating local citizens about how to spot the HWA, teams dispersed around the watershed in order to document the extent of the infestation. While most sub-watersheds had no marks of infestation, a few locales did. In addition to Beebe Lake, sightings were made around the shoreline of Cayuga Lake and in Treman State Park. A full map of the survey effort is being compiled and will be posted online to nyshwa.info.

What's next? Professor Whitmore explains that there are still many things we don't know yet about how much devastation might come and how quickly it might play out. He points out that while trees in Georgia were killed within three years, collaborators in Amherst, MA, have been watching stable infestations there for 17 years. Questions that remain at the forefront are: how quickly is the organism being dispersed locally? Will there be an emergence of cold-tolerant HWA strains? Do our local hemlocks have any innate resistance? Once an infestation has occurred, can biological treatments by the introduction of natural predators be effective in saving the trees? It will take time and effort to answer these questions and the most important task is the ongoing (year after year) surveying of the local hemlock forests.

If you think HWA is bad: While the HWA presents a concern for our beloved hemlock species, two other invasive insects have the authorities even more scared: the ash borer and the Asian longhorned beetle. Infestations with these pests have proved even more devastating and the



Hilary Lambert

Threatened by the wooly adelgid, hemlock trees are essential to keeping lake tributaries healthy. Upper Buttermilk State Park.

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Weeds and Aquatic Plants:

The Good, the Bad, and the Ugly

Presentation for the public held on March 28

By Rebecca Ruggles

On a beautiful early spring afternoon, over 60 people crowded the Red Jacket Fire House in Seneca Falls to listen to experts on aquatic plants and weeds. Their time was well spent, as three speakers described the range of aquatic plants in Cayuga Lake, the history of their growth over the past two to three decades, and experience to date in removing and controlling their growth. A panel of a dozen scientists, local and state officials, and advocates wrapped up the afternoon with a lively question-and-answer session.

“One person’s aquatic plant is another person’s weed,” said Bob Johnson from Cornell Research Ponds at the outset of the program. Scientists view native versus non-native plants differently, in terms of tracking their patterns of invasion and growth. But many non-native plants look similar to the ones that have been around for generations. To the average Cayuga Lake resident, the question is: How do aquatic plants interfere with the many ways in which we enjoy our lake, and how can we manage them?

In his talk, Bob Johnson described how Tropical Storm Agnes in 1972 stirred up the lake, triggering growth of Eurasian water milfoil. The most effective control strategy has been provided by Mother Nature, not by humans, in the form of the caterpillar of the Aquatic moth.

Research Scientist Bin Zhu, from the Finger Lakes Institute at Hobart & William Smith Colleges, described experiments in removing Eurasian water milfoil using harvesters and divers. His data also illustrated how different the dominant plant species are between the southern and northern ends of Cayuga Lake.

Marion Balyszak, Director of the Finger Lakes Institute, reminded the audience that “healthy bodies of water need plants”. She explained that plants grow out of control when the water is unnaturally enriched. Although

it may sound benign, the process of nutrient enrichment of the lake is not natural. It is the result of land development and uncontrolled run-off, visible in the form of brown sediment plumes at the mouths of streams and creeks after a rainfall. “Our problems with aquatic plants have been years in the making,” she pointed out. To keep aquatic plant life in balance, we need to advocate for and support enforcement of construction silt fence requirements, tertiary treatment processes at our municipal wastewater plants, and lake-friendly use of phosphorus free soaps and fertilizers.

The Fingerlakes PRISM project is working to manage invasive species and prevent further introduction of non-native plants. A demonstration model of a benthic barrier was displayed to the audience during the break, and Scott Kishbaugh from the Department of Environmental Conservation explained the types of permits required for various forms of weed control. A lively dialogue between audience members and panelists ended the afternoon.

A giant thanks goes to Judy Pipher and other leaders of the Network for their hard work in assembling this great array of speakers and experts in front of a very interested audience at a great location. You can click on links to all the presentations at our Web site, www.cayugalake.org. A new aquatic weeds management booklet, “Aquatic Weeds: Nuisance and Necessity,” has just been published by the Network, and is a click away at www.cayugalake.org. If you would like us to send you a copy by mail, please contact the office.

CLWN is interested in hearing your concerns and questions about the lake, and your ideas for future programs. Please email us with your suggestions at steward@cayugalake.org. 🐦

Hemlock pest hits the watershed

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affected species list is long and includes ashes, maples, and sycamores.

What can be done by YOU? There are two main ways that you can help combat the spread of HWA. First and foremost, do NOT transport firewood. This seemingly harmless act can rapidly spread the pests (which are clinging to the firewood) into new locations. While state regulations say that firewood movement within 50 miles of

harvest site is allowed, limiting wood movement even more can help slow the spread. When camping rely on firewood obtained near your campsite rather than bringing your own with you. In addition to avoiding firewood transport, the other main thing you can do is to join in on the hunt next winter. See nyshwa.info for more information and to join the search team. 🐦

A New Study of Nitrogen and Phosphorus... *continued from page 4*

rus, accounting for less than 10% of the total load. Figure 5 shows that most to the 47% contribution of phosphorus in agricultural runoff comes from corn, hay and small grains.

The relatively large nitrogen and phosphorus loads in agricultural runoff are not particularly surprising, given that the Cayuga Lake Watershed is overwhelmingly rural. Only a little over 12% of its land surface can be considered urban. Agriculture is the predominant land use, comprising over 52% of the total land. Most of this agricultural land (49% out of the 52%) is devoted to field crops (alfalfa, corn, hay, small grains, soybeans) and pasture. The other major land uses are forest and brush, at over 33% of watershed area. Examination of unit loads (kg/ha), as

shown in Figure 6, which are just the mass loads divided by the associated areas, indicates little difference between agricultural and urban land as per hectare generators of phosphorus loads; a ha of agricultural land provides the same phosphorus load as a ha of urban land – 0.5 kg/ha-yr. In the case of nitrogen unit loads, urban sources are substantially larger than agricultural ones.

The information provided in this article is a very brief sampling of the material presented in the complete report, which contains detailed breakdown of nutrient and sediment sources for each sub-watershed, as well as comparisons with previous studies. The report can be downloaded from the Network’s web site, at www.cayugalake.org. 🐦

Relative Sources of Phosphorus to Cayuga Lake

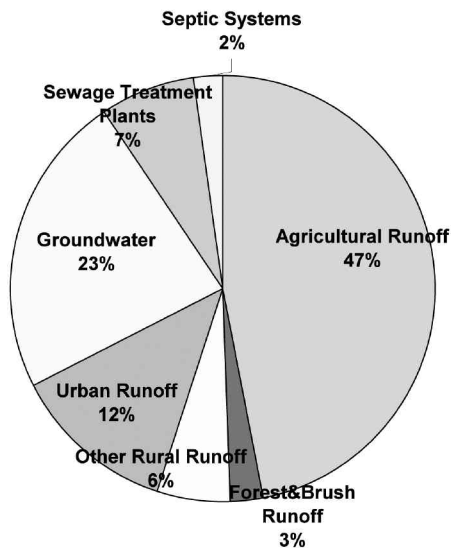


Figure 4. Relative Sources of Phosphorus to Cayuga Lake.

Intensity of Nutrient Runoff Sources

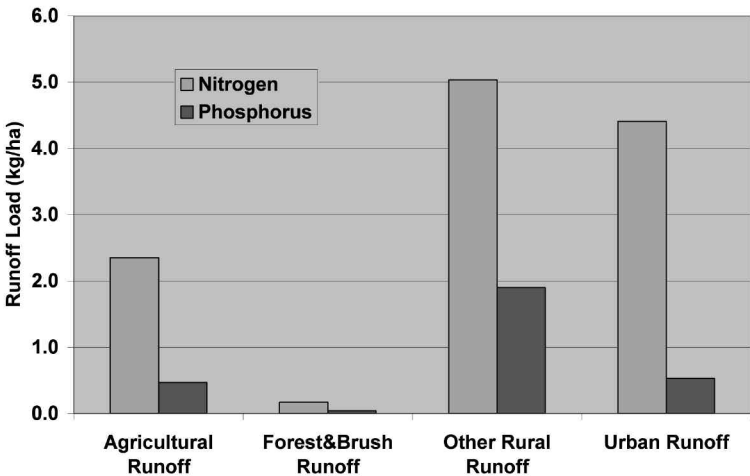


Figure 6. Intensity of Nutrient Runoff Sources.

Major Agricultural Runoff Sources of Phosphorus
(% of Lake Total)

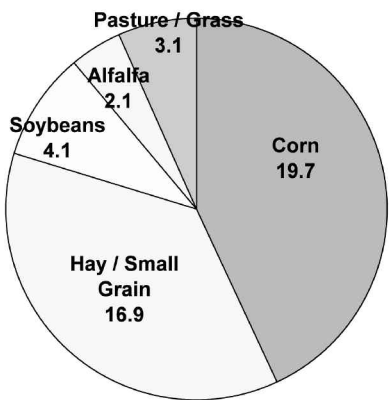


Figure 5. Major Agricultural Runoff Sources of Phosphorus.

The Cayuga Lake Watershed Network Education, Communication, and Leadership



Join the Network!!

The Cayuga Lake Watershed Network's projects and events are made possible by foundation grants and support from individuals, organizations and businesses who are concerned about the health of Cayuga Lake and its watershed.

Please consider joining and supporting our network to help restore and protect the vitality of our watershed. Becoming a member of the network is easy to do!

MAIL: Fill out the information below, select a donation level, and mail the form with your check to Cayuga Lake Watershed Network, P.O. Box 348, Aurora, NY 13026

PAYPAL: Join via your PayPal account or credit card online at www.cayugalake.org.

***As a member,** you will receive a subscription to Network News, our quarterly newsletter, discounts on educational programs, invitations to events – and best of all you will show how much you appreciate the natural beauty of Cayuga Lake and its watershed by taking an active role in protecting these natural resources.*

- ☐ I am joining the Cayuga Lake Watershed Network for the first time with my enclosed contribution.
- ☐ I am renewing my annual membership to the Cayuga Lake Watershed Network with my enclosed contribution.

Name _____

Address _____

County _____ Phone (____) _____ Email _____

Please Select the Support Level You Prefer:

- | | |
|--|---|
| <input type="checkbox"/> \$500 Watershed Benefactor | <input type="checkbox"/> \$250 Lake Sponsor |
| <input type="checkbox"/> \$100 Headwater Donor | <input type="checkbox"/> \$50 Farm/Small Business |
| <input type="checkbox"/> \$50 Organization or Agency | <input type="checkbox"/> \$35 Family |
| <input type="checkbox"/> \$25 Individual | <input type="checkbox"/> \$10 Student/Senior |
| <input type="checkbox"/> Other _____ | |

Thank you for your support!!!

Your Contributions to the Cayuga Lake Watershed Network are tax deductible.

Cayuga Lake and its many tributary streams and creeks are a natural wonder. Help us keep the whole watershed healthy and beautiful!



Hilary Lambert

A good day at Upper Buttermilk State Park, spring 2009.



Hilary Lambert

Looking north along Cayuga Lake from the shoreline in Lansing, early spring 2009.

The Mission... *The Cayuga Lake Watershed Network seeks to protect and improve the ecological health, economic vitality and overall beauty of the watershed through education, communication and leadership.*



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✎ Education
✎ Communication
✎ Leadership