



Olive Natural Heritage Society Newsletter

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Thank You Ann!



What is it about founding members? For one thing they have a clear view of our mission. They remember what it was that drew us together in the first place. They have shared the inevitable evolution of the organization as it matured. We trust them because long experience has proven their steadfastness. They have supported us with their enthusiasm and good cheer. Most of all they cared. We thank our founding member **Ann Crawford** for caring the most!!

You all know by now that Ann has handed over the day-to-day duties of Treasurer to Aaron Bennett. Of course, that doesn't mean she and Vance are excused from regular meetings. We'll still turn to them for advice on the big issues.

Catskill Environmental Forum

The original mission statement of the Olive Natural Heritage Society included a reference to informing the public about environmental issues. It was assumed that individuals would be better able to make their individual decisions if they had accurate up-to-date scientific information. Unfortunately there are few sources where this information is available. In fact in most cases the results of important environmental studies done in the Catskills are not disseminated at all. To rectify this situation we have invited scientists to our regular meetings to present the results of their work. The secretary takes careful minutes that are distributed to the active membership but are not widely available. Starting with this issue of the Newsletter we will include summaries of the most recent presentations. When our website is up and running they will also be available on the Internet. As this is the first installment of the *Catskill Environmental Forum* there is already a backlog of important material.

This is undoubtedly a lot of information to digest at one sitting but the task is important. We hope readers of this newsletter will work their way through its contents. Don't weaken, there's more to come!

An Integrative Approach to Water Quality Monitoring in the New York City Water Supply Area

Charlie Dow, Stroud Water Research Center, Philadelphia, PA

This is a large-scale project that is funded by EPA and DEC, and which was earmarked in the 1997 NYC Watershed Agreement. Stroud, founded in 1967 and working on water quality projects both in the USA and abroad, was selected by Riverkeeper as the research organization to carry out the three year advanced monitoring program. There are five staff/technicians dedicated full time to the work. The first year of field work in the NYC Watershed began in the summer of 2000, and the results of that first year of testing are outlined in a report available from Stroud.

The main focus of the Stroud water quality study is to collect baseline water quality data for both the East-of-Hudson (EOH) and West-of-Hudson (WOH) watersheds at a host of sites, as well as relating water quality variables to land use/land cover variables and assessment of contaminant sources and ecosystem function. Stroud's research is independent of that done by NYCDEP or NYSDEC, but it can be related and compared to other data in the future. There are 60 sample sites in the EOH and WOH

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watersheds, 'integrated sites' WOH, plus four microbial sampling sites concurrent with DEP sampling sites, where various water sources are integrated.

There are nine main components to Stroud's sampling and research regime.

1) Nutrients and Ions

Involves routine measurements of calcium, magnesium, sodium, potassium, nitrogen, phosphorus, sulfate, chloride, alkalinity, conductivity, pH, and temperature. This sampling is done at all 60 sites during summer base flow conditions.

2) Molecular Tracers

This is a sophisticated approach to linking various types of contaminants to their sources. Caffeine and fragrances, for example, can be isolated and are indicators of waste water treatment plant effluent. Polycyclic aromatic hydrocarbons created by fossil fuel combustion can also be detected and are typical pollutants associated with urban/suburban areas. This sampling is done at all 60 sites during summer base flow conditions.

3) Microbial Source Tracking

The genetic-typing, or 'ribo-typing' species-specific E. Coli to assess sources of fecal pollution. This can differentiate between different animal types, such as avian, farm animals, domestic pets, various wildlife, humans, etc. Pathogens arising from fecal sources can also be detected. This sampling is done at the four DEP pathogen monitoring sites.

4) Macro-Invertebrate Community Structure and Function

Insects and worms living on the stream bottom are sampled and identified because they are 'integrators of their environment', and the various species presence, absence, abundance, diversity, etc. give an idea of the water quality condition of the stream. Samples are taken from riffle sections, and are collected in May when insects are at the end of their life cycle. This involves much post-sampling work, identifying and counting organisms collected.

5) Organic Particle Dynamics

Measurement of suspended solids; at all 60 sampling sites.

6) Dissolved Organic Carbon (DOC) and Biodegradable Fraction of DOC (BDOC)

7) Nitrogen-Phosphorous-DOC Spiraling

Measures the streams process of recycling nutrients as they move downstream. An assessment of how well a stream can process the nutrients traveling within it. An 'injectate' solution is added to the stream and sampled at various intervals downstream. Involves intensive field work at the six sampling locations

8) Net Stream Metabolism

Measures primary productivity and respiration of algal/plant/heterotrophic organism biomass at the six integrated sampling sites.

9) Reservoir Primary Productivity

Measured in all six WOH reservoirs and two EOH reservoirs.

Charlie showed some graphs and maps depicting some of the preliminary results from the first year of sampling. WOH there were molecular tracer 'hits' relating to agriculture mostly in the Cannonsville/Pepacton watersheds, fragrance/caffeine hits, and one or two polycyclic aromatic hydrocarbon hits (including an unexpected one below Frost Valley YMCA). This was different than EOH, where there were more polycyclic aromatic hydrocarbon hits and fewer agricultural hits. Birds appear to be contributing the most fecal coliform of any animal group, including livestock and humans (presumably attributable to geese on the reservoirs). Wildlife was a bigger contributor of fecal coliform EOH than WOH (presumably from the large, more concentrated deer herd EOH). Conductivity, which gives a general idea of how much ions/chemicals/nutrients is dissolved in a stream, was generally lower WOH than EOH, which seems to be related to amount of impervious area in the watersheds. WOH sites seem to have higher numbers of pollution-intolerant macro-invertebrates (and better matrix/index scores) on average, than EOH. Except for the Schoharie, WOH rivers seem to have a very low gross primary productivity (Schoharie values could be influenced by suspended solids, or by heavy cloud cover on the sampling day). The Neversink, Rondout, Pepacton, and Schoharie Reservoirs had less biological activity than other reservoirs. There are general relationships between the chemical/biological data and landscape data (such as agricultural and forest types, location of waste water treatment plants, and impervious surface area). Charlie expects that the results from the 2001 sampling season will be available late in the spring of 2002. Stroud hopes to find funding for a Phase II of the project, which would add new sample sites and further refinement of contaminant sources.

Atmospheric Transport and Deposition of Pollutants in the Catskills

Kim Couchot and Paul Bartlett, Center for Biology of Natural Systems (CBNS), Queens College, Jamaica, NY

Barry Commoner (founder of CBNS) did early work on DDT used during World War II and radioactive fallout, the unintended consequences of our nation's early embrace with chemicals and nuclear devices. The CBNS continues Dr. Commoner's legacy by conducting scientific studies on behalf of the environmental community. They have done work on the link between free radicals and cancer, study of possible carcinogens in hamburger, and other controversial and groundbreaking research. The CBNS studies are more environmental than ecological, and they are moving more toward studies that can aid in prevention of negative environmental situations.

Paul began his work in the mid-1990's looking at sources of airborne dioxin contaminating the Great Lakes. This work led to policy recommendations for reducing dioxin. CBNS is now looking at dioxin transport and accumulation in the Arctic. The dioxin studies led to studies of other chemical pollutants, specifically pesticides such as Atrazine. Paul went into much detail about his study-in-progress of Atrazine and PCB volatilization, air transport, and deposition across North America and beyond. They use sophisticated computer models that take into account all kinds of application, meteorological, and substrate variables to estimate pollutant ground emissions and model atmospheric transport. He showed a map depicting the high application of Atrazine in the U.S mid-west, where it is commonly used as an agricultural herbicide. There is also a hot-spot of use in central Florida, where the chemical is suspected in alligator endocrine disorders. In the Catskill region, Otsego, Schoharie, and Delaware Counties have the most Atrazine use. Testing for chemicals such as Atrazine is much more comprehensive and thorough in the NYC Watershed than elsewhere in the country. Mobility of the pollutants varies depending on different chemical configurations or 'phases'; pollutants can be carried very long distances in the atmosphere, however local deposition is the most significant.

In the NYC Watershed, Atrazine deposition (from the air, not from stream inflow) is highest in the Cannonsville Reservoir, then Schoharie, Ashokan, Pepacton, Neversink, and Rondout. The Catskill/Delaware reservoirs receive more atmospheric Atrazine on average than the East-of-Hudson reservoirs. The collecting reservoirs, that receive water from other reservoirs, have

the highest amounts of total Atrazine (from all sources, aerial and water transported). It is estimated that 60-85% of the airborne Atrazine originates from counties in New York, mostly locally and further west to the Finger Lakes region. High application rates of counties further away may contribute more than counties that are closer but have lower usage.

CBNS's work in Atrazine modeling led to its current study of Hudson River PCB's. Millions of dollars went into modeling PCB deposition and transport in the Hudson River from a hydrologic standpoint, but little thought was given to volatilization of PCB's from the river in to the atmosphere, and subsequent transport and deposition. Paul and Kim began testing and modeling Hudson River PCB transport in 1999. Only about 1.5% of the PCB's that are emitted from the Hudson River are deposited back on the river; most are transported to adjacent land areas. Most PCB's volatilize from the Troy vicinity, where PCB concentrations are highest, and in the Tappan Zee area, where the river is widest (most air-water contact). There are 209 different forms of PCB's (depending primarily on the number and formation of chlorine molecules), 130 of which can be tested for, and eight of which were modeled by CNBS. Certain types of PCB's are transported more easily in the atmosphere than others, and air temperature has an influence as well. PCB's can re-volatilize and be re-transported multiple times. One way PCB's were tested was by collecting bark samples from maple trees in east-west transects extending from the Hudson River and across the two portions of the NYC Watershed. The hypothesis was that trees closer to the river would have higher PCB concentrations than trees further away. Maples were used because a good variety of tree ages could be obtained across the region. PCB's enter trees less through the roots, and more by adsorbing to the surface of trees from the air, then being absorbed into the tree; highest levels are found in the bark as opposed to other parts of the tree. The CBNS models predicted 10-20 times higher deposition East-of-Hudson than West-of-Hudson, but that was not what was found after testing, and there was approximately 90% more deposition West-of-Hudson than was predicted. Since PCB use is not inventoried in the U.S. (as is Atrazine), it is difficult to predict other sources besides the Hudson River. PCB's in reservoir sediments was highest in the Croton and Kensico reservoirs (basins receiving water from other reservoirs). Dredging is expected to ultimately reduce the PCB source pool and result in lower levels volatilizing from the river.

Influence of Site and Soil Characteristics on ‘Invasibility’ of Forest Communities

Tim Howard, NY Natural Heritage Program, Albany, NY

Tim has studied the dynamics of alien plant invasions and plant community susceptibility to such invasions, addressing the question of why some plant communities are more easily invaded by exotics than others. His research took place on 44 sites on Long Island and in Westchester County in both ‘rich’ hardwood and pine barren communities.

The Long Island forest communities in the study suffer from invasive species such as Autumn olive and multiflora rose. An early question Tim asked was whether or not a more diverse forest community has fewer invaders. Counter-intuitively, he found that more aliens occurred where there was a higher, diverse number of natives present (not necessarily so in other community types such as aquatic or wetland areas where monocultures may take over). The rich mesic hardwood sites were more invaded than the less diverse pine barren sites. So Tim used ordination statistics to assess the similarity of species abundance and soil types between sites. It was surprising to find that the pine barren sites were not all sandy soils, but also had mixtures of silts and clays, as in the mesic forest sites. Sites with more nitrogen tended to have more invasive species, as did sites with more calcium. Experiments were conducted to try and separate the affects of soil characteristics from other general site conditions and history, and it did seem to point to the fact that soil is an important factor to forest invasiveness regardless of other site characteristics. Invasive species tended to perform proportionately better than natives on richer soils and in higher light environments; they have an advantage over natives because they tend to leaf-out earlier and keep leaves longer. Tim concluded that if soil nitrogen increases in the pine barrens from acid deposition and nitrogen fixation, the soils may become more susceptible to invasive species. More work is still needed to investigate why invasives perform better than natives; how they use nutrients more efficiently. Statistics about invasive species can be found at the following website: www.invasivespecies.gov

Tim also talked about more recent work in the Hudson Valley and Catskills at his current position with the NY Natural Heritage Program, doing biological inventory work under the Hudson River Biodiversity Inventory Project. Research initially was focused within the towns bordering the Hudson River, then it was expanded to the bordering counties, and now it is focused in several ‘Significant Biodiversity Areas’ of which the Catskills is one. Several species have been studied, including

ONHS Mission

The mission of the Olive natural Heritage Society is to conduct scientific studies and disseminate information concerning the natural heritage of the Catskill region of New York State. Our work is done without political aim or affiliation.

Bicknell’s thrush, bog turtles, the Indiana bat (a huge new site was discovered in Ulster County), and two species that were previously not thought to occur in NY anymore, and which are endemic to NY, the basil mountain mint and Hudson River water nymph. They are also looking at species at the margins of their ranges, as well as larger ‘matrix forests’. The Hudson River is unique because it has many freshwater tributaries and marshes that are tidal all the way up to Troy. Throughout the greater Hudson River corridor, the river and the Shawangunks have the most unique or endangered species and communities listed, but that is partially because those are the areas where the sampling has been focused; other areas remain under-sampled.



Catskill Projects of the Audubon Society of NY

Graham Cox, Audubon Society of NY, Albany, NY

The first project detailed by Graham was Audubon's publication, "Important Bird Areas of New York", which lists 125 sites across the State that are critical bird habitat areas, including the Catskill high peaks and the NYC reservoirs. Audubon hopes to revise this initial study, conduct more detailed mapping, and work on conservation of the important habitat areas.

One project Audubon is conducting here in the Catskills, with the help of The Catskill Center, is trying to use GIS and landowner contacts to identify important conservation priority areas in the Beaverkill Valley.

Audubon is also looking at how forest management practices in the Catskills and other parts of the State affect the presence and abundance birds, mammals, and other wildlife groups (especially non-game species) by setting up research plots on the land of volunteer landowners who know their history of forest management. Nearly 40 plots were inventoried in the Catskills, mostly in the Frost Valley area, and the results will be available soon. This project reflects Audubon's realization of the importance of reaching out to, and understanding the effects of, private forest landowners since New York State is two thirds forested and contains almost 2.5 million private forest landowners. Audubon hopes to work with foresters who in turn work with landowners, educating them and encouraging them to promote multiple forestry objectives that include the enhancement of wildlife habitat. This of course will have to be a long term effort.

Graham talked about the importance of community conservation. He pointed to the all-taxa inventory of the Great Smokey Mountains as an example of citizen science. He talked of Audubon's preserves and how they can be better developed as centers for nature education, and the importance of private and university research to make up for the inability of the State to adequately study and manage ecosystems and important habitat areas.

There was also a detailed explanation of the complex organizational structure of Audubon, with the international, national, state, and local organizations each being separate non-profit organizations, but related to one another in various ways. There are about 30 local chapters in New York, including Sullivan County, Northern Catskills, Delaware-Otsego, and Capital Region chapters in the greater Catskill region.

Graham hopes Audubon can work in partnership with other like-minded organizations on important conservation and education initiatives.

Interconnections among members of the Forest Floor Food Web

Dr. John Mearz, Research Associate, Department of Natural Resources, Cornell University, Ithaca, NY

Are introductions of non-native species affecting woodland salamanders? There is documentation that some salamanders of forested habitats, including the slimy salamander, are in decline. The much-publicized amphibian decline is not limited to pond dwelling species. Terrestrial salamanders are however, buffered from many of the factors that are usually monitored. We should not assume that woodland species are buffered from all of the environmental factors causing amphibian declines.

Red-backed salamanders are the most abundant vertebrates in Catskill forests both in terms of number of organisms and biomass. They respond at many levels to the availability and abundance of food. What role do these abundant organisms play in the forest? By studying the salamander diet, we can also study how human activity is affecting changes in salamander populations.

Dr. Maerz studied the red-backed salamander at the Huyck Preserve near Albany. The red-backed salamander is the only *Plethodon* species left at the Huyck Preserve. The Slimy Salamander, the large *Plethodon* species, went extinct locally in the 1950's. Red-backs however are very abundant, having on average, four individuals per square meter. Red-backed salamanders are thought to regulate invertebrate populations in the leaf litter. They slow down leaf litter degradation, which results in an increase in carbon storage. They are also important conduits to bigger things.

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Who We Are

The Olive Natural Heritage Society, Inc. is a not-for-profit educational and scientific organization. Membership is open to anyone who supports our mission. There are no membership fees. Our work is supported by foundation grants and individual donations. All donations are tax deductible.

Salamander populations in the leaf litter are remarkably stable compared to other vertebrates e.g. rodents. Abundance and biomass may be stable over decades. This stability is very important to organisms at higher trophic levels such as predatory birds. For example, salamanders may make up 25% of the diet of nesting Screech Owls in Adirondacks and Catskills.

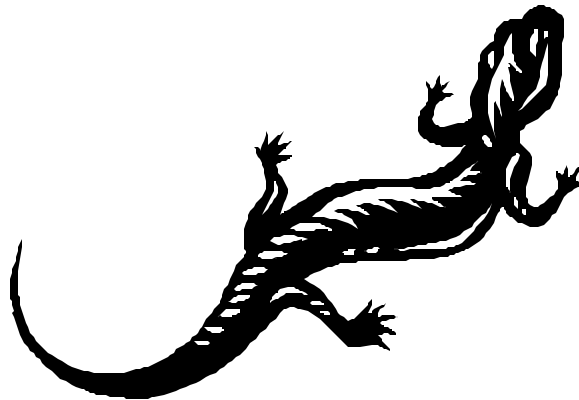
What influences terrestrial salamander foraging behavior? The major factor is moisture. Other factors include soil pH and temperature. As pH goes down salamanders have trouble maintaining body moisture. As temperature goes up they lose moisture to the atmosphere. So these things are important but only as they relate to moisture. Woodland salamanders (Plethodontidae) are lungless and require moist skin to breath. They are very energy efficient. Many species have 80-95% efficiency meaning that they convert 80-95% of what they eat into energy. They can go for over a year with no food and still lay eggs, but they are very susceptible to drying conditions.

As the environment gets drier the foraging time goes down. Under usual conditions, when an animal is active it can be forage for a much shorter time than when it is just sitting waiting for prey to pass within reach. Even on a really wet night the salamanders have only one to three hours during which they can be actively finding food. The rest of the time they must be inactive or they will lose too much moisture. On a rainy night, 80 – 90% of salamanders will go out foraging. There is about a 72-hour window for feeding after a rain. They usually only go out to feed for about one hour. In that 72-hour period they do different things. During the rainy period they go out into the environment and catch large caterpillars and earthworms. They will even climb Blueberry plants up to a meter and a half searching for large soft caterpillars. On subsequent nights they no longer go out actively searching for food. It's getting too dry. They only lay in wait at entrance to burrow or rock for some small mobile food items such as mites and springtails to walk within range. Therefore, moisture determines not only the food items a salamander will eat but also the effect they will have on invertebrate populations.

Other things besides moisture can determine whether an individual will go out and forage. Snake odors, for example, will inhibit foraging for a couple of hours. The salamanders' natural rhythms are tuned to photoperiod.

They are most active in the first couple of hours after dusk then activity slows down. Therefore if snake odor is in the vicinity there will be less salamander activity. Another factor important to the red-backed salamander is what other species are present in the habitat. When the slimy salamander is absent they will have a different range of pray than when a competitor is present. In the Allegheny Mountains of Pennsylvania there is another small species that causes a tremendous shift in pray range. Its role in the system may change. The Slimy is going extinct rapidly in the eastern NY including the Catskills. Dr. Maerz would like to study how this will affect the red-backed prey range.

Reproduction is another factor. Male salamanders do different things than female salamanders. The female red-backed (50-60% of population) lays eggs in mid-June and stays in physical contact with eggs until mid-August. For the entire summer ½ the salamander population is not eating. The female's attention is very important to the survival of the eggs and young. The female herself depends on reserves to survive and take care of young.



Social structure may influence red-backed salamanders role in the ecological community. Diet is determined by rank or position in population. Some populations are territorial, while other populations are not. Salamanders at the Huyck Preserve in the higher dry oak

forests are territorial but 100 meters lower in the beech maple forest they are not. Females are very interested in fecal pellets. They squash them and roll them around. Are they accessing mate quality or competitors in the same territory? However, females in nonterritorial areas are especially interested in female pellets so mate selection is probably not important. Females are especially interested in fecal pellets when they are hungry or have had a long period of time since it was able to forage. They appeared to be interested in what food is available, and they may shift their diet depending on what other individuals are eating. Apparently some learning going on.

None of our northeastern earthworms are native. Most are of European origin although some are Asian. Native earthworms were extirpated during the last glaciation and either never recolonized our area or were competitively excluded by introduced species. Introduced species thrive mostly in wet mesic forests. Salamanders' high-energy efficiency is an adaptation to exploit tiny insects, however they love small earthworms. If an organism that

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doesn't need a lot of food is given the opportunity to feed on a large prey item readily available on a nightly basis there will almost certainly be immense effects on the ecosystem.

In 1996, the wettest year on record, Dr. Maerz studied the largest item of food in a large sample of salamanders. One study site was in Pennsylvania where earthworms had come up streams but had not invaded the adjoining forest. Another site was in a mesic forest with lots of earthworms in the forest litter layer. This presented an unnaturally large prey item that was not normally encountered.

The focus of Dr. Maerz's work in the future will be to determine if the presence of introduced earthworms in an undisturbed forest make the soil more susceptible to the establishment of invasive plants.



Hudson River Estuary Action Plan Biodiversity and Terrestrial Habitat Project

Karen Frolich, Hudson River Estuary Biodiversity and Terrestrial Habitat Project, New Paltz, NY

The Biodiversity and Terrestrial Habitat Project was guided and completed by a large, well-represented steering committee. The project included many biological inventories conducted by partnering organizations, and also GAP Analysis work conducted by Cornell University. The initial outcome is a document called 'Hudson Valley Estuary Wildlife and Habitat Conservation: A Framework and Approach for Conserving Biodiversity in the Hudson Valley Corridor'. The Hudson Valley Corridor includes all of Ulster and Greene Counties, which of course is part of the Catskills where ONHS operates. The document identifies important biodiversity areas, of which the Catskills are one. It also talks about threats to diversity areas, including invasive species, and strategies for addressing those threats.

The DEC hopes that the information will be used by stakeholders to try and protect valuable biological resources; they promote the idea that healthy ecosystems can coexist with a healthy economy. Assistance can be

provided in the form of workshops, GIS assistance, master planning input, and Biodiversity Assessment Training. Karen works with town and county governments, land trusts, and community groups to help them use the Hudson River Estuary Action Plan's biodiversity information to make sound land use and planning decisions. Part of Karen's Outreach Plan includes a 'Habitat Key System' developed by Hudsonia, whereby communities can do a preliminary assessment and evaluation of the habitats in their area of interest. She also discussed efforts by the Metropolitan Conservation Alliance to identify lands with critical biodiversity value for conservation in certain areas of the lower estuary. For more information, or biodiversity outreach assistance, Karen can be reached at the NYSDEC by phone (845-256-3061), or e-mail (klfrolic@gw.dec.state.ny.us).

Restoration of Neversink River Dwarf Wedge Mussel

Colin Apse, the Nature Conservancy, Neversink River Program, Cuddebackville, NY.

Colin distributed the *Guide to the Neversink Preserve* that TNC developed for its preserve (which includes a wildflower guide). TNC is an international environmental group focused on biodiversity, conservation, and land and water protection. They have accomplished this mainly through purchasing land, however the new president, Steve McCormick, has stressed using a planning approach - developing strategies, implementing them, and measuring their success (consequently not so much land acquisition).

The 'Catskill Region' is included in the High Allegheny Plateau Ecoregion, within which TNC divides the Catskills into three areas: Catskills, Neversink, and Upper Delaware.

In 1989, the dwarf wedge mussel, a federally listed species, was discovered in the lower Neversink River (northern Orange County in Cuddebackville). The dwarf wedge mussel lives in a habitat where the substrate is composed of both stony and fine-sand areas. They also prefer large, non-flashy rivers, and are intolerant to pH extremes. In the northeast, the mussels are also found in North Carolina, New Hampshire, and Maine.

In general, mussels like the dwarf wedge mussel, use host fish for distribution - helping it complete its life cycle.

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Their larvae are attached to fish gills and/or fins and drop-off in a suitable habitat (usually upstream) where they mature. In the Neversink, darters are the host fish, and impoundments such as concrete dams or those caused by siltation pose a threat to the dwarf wedge mussel (and another of the 6 total mussel species in the river). Zebra mussels coincidentally are an exception; they do not use host fish.

TNC is trying to remove two small dams on the lower Neversink that threaten the existence of the mussel. One dam, the Cuddlebackville Dam was built in 1915 for a mill. It is located on Orange County property, and the TNC is in the midst of having it removed, they just need to go through the permit system – the county is receptive to the idea because TNC will pay for its removal. The other dam is on a run that feeds the D&H Canal and will be much more difficult to remove – a lot of politics will be involved.

TNC and USGS have been gathering much data about the watercourse (including fish and benthic macroinvertebrates) over the last few years and are convinced that by moving the dam, the mussel will have suitable habitat. They also determined that the sediment impounded by the dam has no harmful chemicals present; sediment (and chemicals present) would become dislodged if the dam was removed. The TNC and USGS will collect and compare ‘pre-dam removal’ data with ‘post-dam removal’ data and look at things like the relationship of mussel populations to macrohabitat characteristics, geomorphologic stream assessments, nutrient dynamics, and changes in hydrology and fisheries.

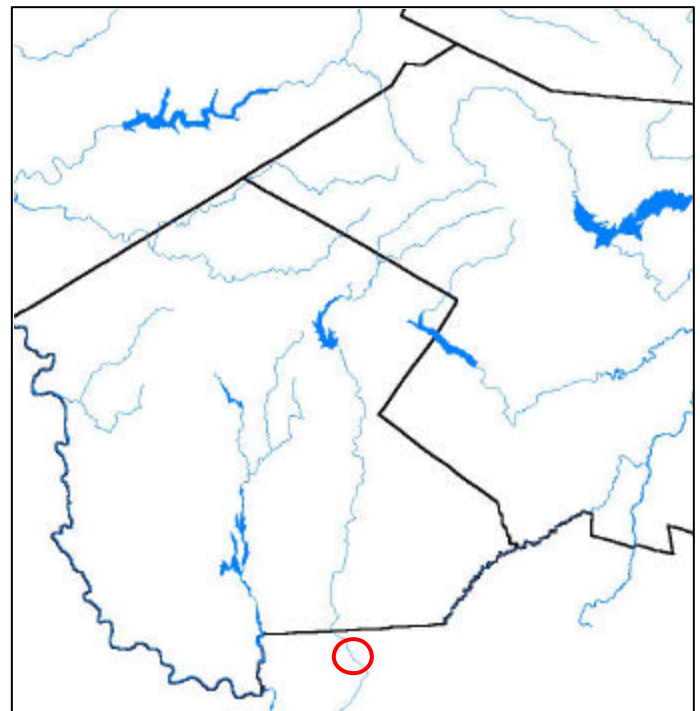
Because of TNC’s involvement on the Neversink, they have become very aware of how the Neversink Dam (on NYC’s Neversink Reservoir) is a detriment to aquatic life downstream of the massive impoundment. TNC is beginning to look at what Colin termed the ‘Water Management of Reservoir Releases’. In essence, the NYCDEP’s current water release regime turns the middle portion of the Neversink River into a headwater stream system for fish and aquatic life because the water is so cold (taken from the bottom of the reservoir). One benefit of the reservoir is that the pH is considerably higher (more conducive to aquatic life) below the dam. The upper branches (especially the West) are well known for their low pH levels (often reaching the low 4s).

Colin showed graphs of the flow data on the Neversink River of pre and post-dam construction. The natural fluctuations throughout the year are completely wiped-out with the current mandated release regime. TNC has

also noticed the same pattern with the flows pre and post construction of the Cannonsville and Pepacton Reservoirs on the West and East Branches of the Delaware River. TNC would like to find a way to work with the various groups and agencies to restore some of the natural fluctuations in these rivers.

The Neversink area was designated as one of the “last great places” by TNC in 1992. Once that happened, Colin said, money becomes available. Colin said that because of its designation, TNC was able to hire George Schuler (Colin’s boss and the only other staff member on the project) and get work going in the Neversink area. TNC has done some targeted land acquisition, a 2,500-acre plot that they put in a bid on, but never went through. They also have a purchase pending in the lower Neversink, but nothing in the middle reaches near the NYSDEC’s Neversink Gorge Unique Area.

Colin also stated that they want to raise money, along with awareness, among local people and second homeowners that love the area, thus furthering their work and the protection of the watershed. TNC will likely begin publishing some of their work on the Neversink in conjunction with the USGS.



Site of TNC’s Dwarf Wedge Mussel Project

From the Herbarium

Field botany is resurgent in the Catskills over the last decade due largely to the efforts of the Catskill Flora Project [CFP] and the NYS Natural Heritage Program. Numerous plant species are being reported for the first time in decades. This interest is timely considering the perception that these are times of declining biodiversity and significant increase in invasive species. In an effort to monitor changes in the regional flora the Catskill Flora Project has established an annotated catalogue of the flora based on historical and recent records. We will report noteworthy plant records that come to our attention in this newsletter.

By tradition the areal extent of a survey or “range” is defined by and named after a sponsoring group. Thus we can compare plant occurrences over space and time in the **Olive Range**. Historically, the Catskills were defined arbitrarily by a line drawn loosely around the central Catskills and including parts of Delaware, Greene, Ulster and Sullivan counties. We have however elected to adopt four of the ecological zones proposed in 1979 by Nathaniel R. Dickinson and published by the NYS DEC (Figure 2). These four sub-zones of the APPALACHIAN PLATEAU delineate the Catskill region based on specific criteria. Landform was selected as the primary character for definition because of its permanency and general correlation with geologic history, soil, climate, vegetation and land use.

Catskill Peaks

On the east face along the Hudson Valley elevations begin at 500 or 600 feet above sea level. On the west the starting point is near 2,000 feet. Maximum local elevations are well over 2,000 feet. Many of the peaks exceed 3,000 feet with the highest elevation near 4,200 feet. The Catskill Peaks involve 630 square miles.

Erosion resistant sandstones are responsible for holding the peaks above the rest of the Appalachian Plateau. Valleys are relatively few and there is a paucity of streams, thought to be due to the permeability of the sandstone. Much of the sub-zone has a growing season of less than 120 days. The average town is about ninety percent forested with the rugged slopes and high ridges completely forested. The northern hardwood forest type is most common. Spruce and fir are found on some of the higher elevations. The area is devoted largely to recreation.

Delaware Hills

Excluding the lower valleys, elevation in this sub-zone of approximately 670 square miles begin at 1,200 feet on the northern and western edge and 900 feet at the

Delaware River. Much of the Delaware Hills sub-zone is situated above 1,000 feet. Maximum local elevations of 2,500 feet or above are common, with a number of peak elevations over 2,900 and up to 3,000 feet.

The growing season in much of the sub-zone is less than 120 days. The average town is 77 percent wooded.

The forests are mainly even-aged hardwoods. Extensive solid blocks of woodlands are the rule with agriculture restricted to the valleys.

Schoharie Hills

The area of this sub-zone is approximately 750 square miles. Elevations start at 90-0 feet above sea level with maximum local elevations in most sections above 2,000 feet. Hill top elevations of 3,000 feet or over are common, and some peaks reach 4,000 feet.

The sub-zone is characterized by heavily rolling uplands slashed by deep ravines. The average growing season is less than 140 days. The average town is 47 percent wooded. Oak and pine forests are common on rocky, steep slopes with hemlock and mixtures of northern hardwoods on other sites. Red cedar is found on pastured slopes. The major agricultural activity is dairying.

Neversink Highlands

This sub-zone contains approximately 620 square miles. Elevations start at 600 feet on the east side and 800 feet near the Delaware River. Most of the Highlands are above 1,200 feet. Maximum local elevations are mostly in the range from 1,500 to 2000feet. A few elevations exceed 2000 feet. Relief is low in relation to sub-zones to the north.

The average town is 55 percent wooded. The forests consist of northern hardwoods with substantial amounts of black cherry and ash. Hemlock and white pine are found in ravines. The Highlands were previously famous for resorts and some farming persists.

Noteworthy Plants reported from the Olive Range 2001

Galium labradoricum (Wiegand) Wiegand Labrador bedstraw Rubiaceae (Madder Family)

The CFP discovered this diminutive bedstraw at Emmon's Pond Preserve in Delaware County. This is the first Catskill record for the species, which is more often found in central New York.

Huperzia appalachiana Appalachian fir-clubmoss
Lycopodiaceae (Clubmoss Family)

This species was historically collected in Wildcat Ravine but repeated searches have been unsuccessful in relocating the colony. We feel there is a probability that the species is locally extinct in the Catskills.

Acontium columbianum subsp. ***viviparum*** Monkshood
Ranunculaceae (Buttercup Family)

This is the only federally listed endangered species in the Catskills. We monitor several disjunct relict populations. All are heavily impacted by deer browse however the total number of stems remains relatively constant from year to year. In the most recent taxonomic treatment of the species the New York populations were placed in the subspecies *columbianum* as it was thought that bulbils were absent from leaf axils. However Bonnie Ferrell carefully examined late season stems in plants in two populations and discovered abundant bulbils.

Platanthera orbiculata Persh Round-leaved orchid
Orchidaceae (Orchid Family)

This spectacular orchid was located on two field trips for the first time in recent history. The first three specimens were discovered by Brooks Baum and Sam Adams on the Panther Mountain trail as it descended to the Panther Mountain Lean-too. The next weekend Sam and Steve Parisio were bushwhacking to Wildcat Mountain and came upon several dozen specimens in prime bloom along an un-named tributary of the West Branch of the Neversink. Apparently 2001 had optimum conditions for a spectacular bloom of the orchid.

Asplenium rhizophyllum Linnaeus Walking fern
Aspleniaceae (Spleenwort Family)

In the Catskills the only previously known colony of Walking Fern was in the Town of Olive. This year Troy Weldy of the NYS Natural Heritage Program discovered a new colony as he bushwhacked from the parking area at the end of Peck Hollow Road on his way to Black Dome. There were 400 – 500 individual plants on three large glacial erratic boulders at approximately 1700 feet.

Triphora trianthophora (Swartz) Rydberg Three-bird's
Orchid (Orchidaceae)

Many of our native orchids flower at irregular intervals and this year was it for our Society symbol. The West Shokan colony flowered abundantly in two pulses. This is the only known state station for this beautiful little orchid. It's always rewarding to see it blooming late in the summer among the fallen beech

leaves that have accumulated among the pits and mounds on the forest floor.

Bartonia virginica (Linnaeus) Britton, Sterns & Poggenburg (Gentianaceae)

Bartonia is a widespread but seldom seen species of sphagnum bogs. The inconspicuous leaves are so reduced as to be almost invisible. The thin stalks of the Pacama Vly colony are scattered on hummocks of sphagnum.

Desmodium glutinosum (Muhlenberg) A. Wood
Cluster-leaved tick-trefoil Fabaceae (Pea Family)

This species was not reported from the Catskills by Karl Brooks on his unpublished 1954 plant list. We discovered a few stems in the VerNooy Kill trail while surveying the area of a large forest fire.

Arctostaphylos uva-ursi (Linnaeus) Sprengel Bearberry
Ericaceae (Heath Family)

Historically, Bearberry was known in the Catskills only from a persistent colony on Little High Point in the Town of Olive. Last fall Francis Groaters discovered another station for this boreal zone species. He was hiking the Escarpment Trail along Platte Clove below North Lake Campground looking for seeds of native plants suitable for his nursery. We will attempt to relocate the plant to obtain precise GPS coordinates.



Steve Parisio with ***Round-leaved orchid***

Community-Based Monitoring in the Catskills

[The following is a summary of a presentation Dr. Adams made at the Hemlock Woolly Adelgid Symposium, February 5-7, 2002, East Brunswick, NJ. The USDA Forest Service and Rutgers University sponsored the conference. We reported the results of a survey of HWA infestation in the Esopus watershed completed by Dina Terzilla and Brooks S. Baum ONHG summer 2001 interns.]

Prior to European settlement of the Catskills, in the seventeenth and eighteenth centuries, the Eastern Hemlock was a common species of the lowland forest. Hemlock forests never dominated the slopes above 3000 feet, which for the most part were covered with a northern hardwood forest of sugar maple, red maple, beech, yellow birch and black cherry. In the Catskills today, nearly pure stands of hemlock are mainly restricted to gorges, ravines, and swamps where the shade tolerant hemlock grows best. Hemlock forests growing on well-drained uplands with flat or moderate slope were cleared for cultivation or pastures. Since the abandonment of many of these old farms in the early twentieth century mixed hardwood conifer secondary forest has returned.

The destruction of the hemlock forest in the Catskills by bark peelers is legendary. It is said that the region's famous trout streams ran red with sediment and were totally dead. The Catskills was the center of an international industry of tanning animal hides after the War of 1812. The industry peaked in the mid-1800's and was gone by the turn of the 20th century. Hides came mainly from Argentina via the West Indies by boat up the Hudson River to docks at Rondout and Catskill. Hemlock bark was the foundation of the industry until chemical tanning eliminated the need for bark after 1900. In the tannery, tannins were leached from ground bark. Hides were softened in water and pounded. Hair and fat were removed by hand before the hides were immersed in tanning solution for six weeks. The tanning industry removed much of the first growth hemlock stands but some remnants remain. Professor Michael Kudish has identified at least sixteen groves of first growth eastern hemlock in the Catskills. Most first growth forests are at high elevation in sites remote from historical tanneries.

The Hemlock Woolly Adelgid [HWA] entered the Hudson Valley in the 1980's and the leading edge of the infestation has moved northward at approximately 12 miles a year. The leading edge presently cuts through the Catskill counties of Ulster, Sullivan, Greene, and most recently Delaware. Initially the infestation seemed to be

confined to the lower valleys but has invaded headwater forests in recent years. Although it is assumed that infested trees will die within ten years there is hope that the remnant first growth groves may be spared by their isolation and the colder conditions at their high elevation sites. The HWA is known to be spread by wind, birds and mammals and by human activity as our survey results demonstrate.

The ONHS involvement in monitoring the spread of the HWA infestation began in 1998 when we hosted a forum to discuss forest management problems in the New York City Catskill watershed. At this meeting, representatives of the USDA Forest Service (USDA-FS), New York City Department of Environmental Protection and the New York State Department of Environmental Conservation (NYS DEC), joined local forestry and environmental groups. Out of the discussions came the recognition that the eastern hemlock was a keystone species important to the functional integrity of headwater streams in the watershed. It was apparent that the HWA was becoming a serious threat to the regional forest health. As a follow up to that meeting, Michael Birmingham, NYS DEC forest entomologist, conducted a workshop for forest landowners at the ONHS laboratory. He provided training in recognition and quantification of HWA infestation and encouraged the ONHS to develop a community-based program to focus attention on the importance and threats to the hemlock in the Catskills. He also found funding for two summer interns. In the summer of 2000 they made a preliminary assessment of the HWA presence in the Esopus watershed and developed detailed subbasin maps in our Geographic Information System (GIS).

In the summer of 2001 we completed a detailed survey of HWA activity in the Esopus watershed above the Ashokan Reservoir. Student interns drove slowly along all roads in each sub basin. Access to forests immediately surrounding the reservoir is restricted. At one-quarter mile intervals they stopped to obtain a GPS reading and to record the following data: Presence/Absence Hemlock and Adelgid Density coded [green = no adelgid activity, yellow = light infestation, brown = Moderate infestation, red = severe infection, and black = tree dead or dying]. Two observers confirmed all data and several routes were resurveyed for quality control purposes. All data and metadata were entered into Arc View 8.0 GIS.

See Adelgid Map Insert

continued page 11

A close look at selected sub basins allows us to examine the HWA infestation at different stages. In the Esopus Headwaters low density Adelgid (early infestation) is present in only two sites. Both however are significant due to the presence of unusual human activity. One is at the driveway to a resort and restaurant and the other is at the entrance to a populated area. Along this segment of the stream there are few other concentrations of human activity. Most of the land bordering the stream is in the Catskill Forest Preserve. There are no nearby HWA infestations and we observed no bird feeder activity at any of the seasonal cabins along the road. At least in the Catskills it appears that human activity is closely associated with early infestation distant from other infestations.

In Woodland Valley, a populated tributary of the Esopus, the infestation is advanced. We know from earlier surveys that early infestation was present three years previously. Woodland Valley is the site of a public campground and at that site we could find no hemlock that were not severely infested or dead. There was another nexus of severe infestation on one of the spur roads. This site is somewhat built up with year around residences. The core of the valley has an early infestation, which may have spread from either or both of the severe infestations by wind dispersion or from birds visiting feeding stations. Here a combination of human activity and natural dispersal may account for the observed conditions.

Finally along the Esopus Main Stem the density of hemlock is very low and although there is intense human activity the hemlock trees are widely dispersed and apparently isolated trees are not yet infested. However we found several severely impacted or dead trees that would indicate that the infestation had been present for at least three or four years and perhaps longer.

During the surveys interested landowners who inquired about the survey and were eager to learn what was happening to their hemlocks frequently approached the students. They identified themselves as students at the local community college who were doing a summer internship with a local environmental organization. They took the opportunity to demonstrate the pest and explain homeowner options for treatment of specimen trees on their property. The students also instructed the homeowners to contact Cornell Cooperative Extension offices for more information.

In summary, we hope we have demonstrated that community monitoring can be an important component in planning and implementation of a response to the HWA infestation.

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Upcoming ONHS Events...

Spring:

Launch of new ONHS website:
www.olivenaturalheritage.org

Summer:

Northern monkshood symposium to discuss
maintenance of relic populations.

Initiate an Ulster County Fourth-of-July
butterfly count, with the Xerces Society.

Appalachian Weekend - meeting and
outings with a similar community-oriented
natural history organization in the
Appalachian region, to plan joint projects
addressing phenological response to global
warming, and invasive species.

Fall:

"What Is Nature Trying to Tell Us?"
an ONHS gallery exhibit highlighting
scientific and artistic impressions from the
Parcel 21 Project.

Grad Student Weekend - outstanding young
researchers invited to present at a meeting
and demonstrate advanced techniques in
mycology.