
Abstracts

THE
NEW YORK

NATURAL HISTORY
C O N F E R E N C E V

OCTOBER 14 – OCTOBER 17, 1998

A FORUM FOR CURRENT RESEARCH

NEW YORK STATE MUSEUM

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The New York Natural History ConferenceV is a joint project of the New York State Museum, the New York State Museum Institute, and the New York State Biodiversity Research Institute.

Previous conference abstracts and future conference updates will be available from the Natural History Conference website:

<http://www.nysm.nysed.gov/nhc.html>

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Chair and Abstract Editor: Ronald Gill (N.Y.S. Biodiversity Research Institute)

Abstracts for Presentations

Adhya, Soumava (Department of Earth and Atmospheric Sciences, University at Albany, SUNY, Albany, NY 12222)

Geochemical Correlation of Ordovician K-Bentonites: Recent Developments in Stratigraphy.

Establishing the time equivalence of spatially separated stratigraphic units (correlation) has always been a challenge to the geologists. Data from various sources (e.g. fossils, radiometric dates, magnetic and seismic data, tectonic and metamorphic episodes, climatic events, and lithology) are integrated to define temporal relationships among rock units. Volcanic airfall deposits have long been identified as event-horizons, and ideal time marker because they are laterally extensive and geologically instantaneous. Each volcanic eruption generates glass (e.g. melt inclusions, glass shards) and phenocrysts (e.g. apatites, biotites) that can be “fingerprinted” using their chemical compositions. Recent advances in instrumentation and techniques in quantitative geochemical analysis have made “geochemical correlation” of volcanic ash horizons possible. High precision electron microprobe analysis techniques have been utilized to analyze glass and phenocryst phases to establish chemical fingerprints of Ordovician K-bentonites (altered equivalents of volcanic ash layers) of Eastern North America. An overview of these techniques will be presented along with examples of geochemical correlation and possible applications. Data obtained from ongoing research and recent developments validate the relatively new approach to establish the most nearly isochronous surfaces in stratigraphy.

Austin, Gregory T. (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

Spatial patterns of Aspen (*Populus tremuloides* and *P. grandidentata*) Invasion in the Albany Pine Bush.

Two species of Aspen trees (*P. tremuloides* and *P. grandidentata*) are present in the Pine Bush and exhibit the behavior of an “invasive species”. Both species form clones that grow vigorously after disturbance and their high numbers may be due to anthropogenic disturbances. The focus of this study is on the spatial dynamics of a woody plant invader in a pitch pine-scrub oak pine barren. If the aspen are indeed invading, what has caused this incursion? Specific questions are: is there a spatial pattern to the aspen spread? is there a pattern of age or species distribution? is there a relationship between land use history and presence of aspen? is this aspen activity unique to the Albany Pine Bush? A total of 140 aspen clones were mapped and measured across the Albany Pine Bush. Transects were run to determine the presence or absence of a “plow layer,” characterized by a thicker than normal soil A horizon. A global positioning receiver and *ArcView* GIS were used for spatial analysis of the aspen population. Field studies, land records and personal interviews were conducted to determine whether similar phenomenon have occurred in other New England pine barrens. Among my findings are: 1) this spread of aspen is unique to the

pine bush in comparison to other regional barrens; 2) the two species are equivalent in most respects, though *tremuloides* is more numerous; 3) older clones are located in the southern regions (C,E,G) of the preserve indicating a northward spread; 4) an apparent relationship between agricultural land use and presence of aspen (plow layer at 44% of transects with Aspen versus 28% without Aspen); 5) spatial distribution of clones is complex, related to slope, forest edge and other environmental factors.

Blossey, Bernd (Department of Natural Resources, Fernow Hall, Cornell University, Ithaca, NY 14853)

Biological Control of Purple Loosestrife.

Purple loosestrife (*Lythrum salicaria*) is an invasive non-indigenous species that has negatively affected temperate North American wetlands for decades. Chemical, mechanical or physical measures failed to provide long-term control. Current emphasis to control *L. salicaria* center around the introduction and distribution of host specific insect herbivores from the plant's native range. After the initial introduction of four beetle species attacking the roots, leaves, and flowers, mass production methods have been developed to increase the availability of these species for distribution. As of 1998 about 3 million leaf beetles and over 100,000 root feeding weevil eggs have been field released in >30 states and Canada. These species have been released in about 50–100 wetlands in New York State, are now well established and are commercially available. A standardized monitoring protocol has been developed to help evaluate the success of control agent releases over the next 10–20 years. Initial observations are very encouraging. At some of the earliest release sites purple loosestrife has been selectively controlled and its abundance reduced to less than 5% of its original level. The once monotypic stands of *L. salicaria* are being replaced by a diverse wetland plant community.

Both, Ernst E. (Division of Mycology, Buffalo Museum of Science, Buffalo, NY 14211)

Biodiversity at Home: Boletes Associated with Red Oak.

Many boletes (Fungi: Basidiomycetes: Boletales: Boletaceae *s.l.*) are known to form ectotrophic mycorrhizae with conifers, oaks, beeches and other deciduous trees. An extensive compilation of "fungus associates of ectotrophic mycorrhizae" does not list any boletes associated with oak. A study of ectomycorrhizae of the Boletaceae of Maine does include seven species of boletes occurring with *Quercus rubra* L. The current study identifies 29 species of boletes consistently found with red oak in Western New York, representing the genera *Aureoboletus* (2 species), *Boletellus* (2), *Boletinus* (1), *Boletus* (12), *Pulveroboletus* (1), *Strobilomyces* (2), *Tylopilus* (6), *Xanthoconium* (2), and *Xerocomus* (1). The study is based on extensive collections and field observations obtained over a period of 30 years (1968–1998). In general fruitings occur from early July to early September, peaking throughout August, although earlier and later isolated fruitings do occur. There is little difference in fruiting periods of species belonging to different genera. The fruitings seem to coincide with the period of growth and development of the acorns. This study found no indication of a shift in fruiting patterns that might be correlated with a change in climate or global warming. However, eight species, five of which described as new to science recently were only found within the last 10 years in areas that were visited frequently in the previous 20 years. Whether their arrival in Western New York may be an indication of climate change cannot be determined from the data at hand.

Bouton, David W. (Mountain Meadow, Box 158, Davenport, NY 13750)

Characteristics of Moth Attraction to Lights, and Theories Why.

The answer as to why moths (and other insects) come to lights at night is almost as elusive as to whether a falling tree, with no ear to hear, makes a noise. Common sense seems to say that there would be no genetic reason for this behavior as there were no artificial lights in the insect's evolution, and evolution is considerably conservative and editorial about retaining any vestigial genetic item, somatic or behavioral. Yet, the behavior is worldwide and has very specific parameters which are listed here. Occasionally a theory is published as to why this behavior takes place but rarely is there supporting data as behaviors can be easily charted but the "why" of them is buried in the synapses of the creature's nervous system. Many wonder, but only a few guess. Here presented are some of the published and unpublished theories for the reason for the somewhat phototropic nature of moths, each one of which calls to the insightful for data to prove or disprove it.

Bouton, David W. (Mountain Meadow, Box 158, Davenport, NY 13750)

Tectonics, the Next Great Meteor, a Mammoth Stood Right Here.

Every species alive today at one time in history wasn't. Every species alive today, at some eventual time to come will not be. You have seen the animation of one cell moving and changing through time into a water animal, ground animal, becoming upright, and then human. We wish to believe nothing else than it all will stop right here forever. You have seen the animation of Pangea breaking up and the continents migrating, of ice sheets pulsing from and to the poles, of meteors boring holes like in Arizona and that great one in the Gulf of Mexico. Yet we live and work today as if all this is confined only to history. It is also the future. North America is heading for China a centimeter a year, the North Pole is moving northwest at about an inch a year, this is an interglacial period and the next one is due in 33,000 A.D. One giant meteor came closer to us than the moon several years ago and another may strike us in 2028 A.D. Herein is a non-alarmist narrative glancing at the earth's biological/geological route to the next big bang, and what it might mean to our efforts now.

Bouton, David W. (Mountain Meadow, Box 158, Davenport, NY 13750)

Where Do Butterflies Sleep and How Do They Spend Winter.

Butterflies are generally perceived in a primarily aesthetic sense in their very brief "fly in the sun" flamboyant reproductive and species dispersal adult state. In most species in the northeastern USA most of the life of each one is actually spent otherwise particularly during the seven to ten month period of winter and cold. This summary presents a chart of known cold season stages and their placement, of the 133 species of butterflies which are found in New York State and in appropriate habitats throughout the northeast. Additionally, this reviews that which is known regarding adult butterfly warm weather night sleeping habits, and their resting habits on dark days and during storms.

Breisch, Alvin R. (New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, 108 Game Farm Road, Delmar, NY 12054), Kirstin L. **Breisch**, and Ariana N. **Breisch** (SUNY College of Agriculture and Technology, Cobleskill, NY 12043)

Long-Term Changes in the Old-Growth Forest of Dome Island, Lake George.

Dome Island, a 6-hectare island donated to The Nature Conservancy in 1956, is the least disturbed of the forested islands on Lake George. It lies about 1.7 km from the closest shoreline and rises more than 21 meters above the lake. Owned by Jim Apperson from 1917 to 1956, he managed it as an example of “uninterrupted natural processes,” a practice continued by TNC. Beginning in 1961, TNC initiated a series of studies to quantitatively describe the forest trees on the island. The first survey encompassed 28 tenth-acre quadrats, positioned in two perpendicular transects across the island. In 1973, a permanent grid of 0.1-acre quadrats was established on the island. All trees, 1.0" d.b.h. or greater, were measured and recorded for each of the 100 resulting quadrats. Twenty-six woody species were recorded with hemlock, beech and northern red oak comprising 80% of the forest trees. Hemlock is the most abundant tree whereas northern red oak has the largest individuals, the largest measuring more than 43" d.b.h. There was little change documented between 1961 and 1973. Since 1973 several significant changes have occurred. The overall density has decreased about 15% whereas the overall basal area has increased about 20%. Beech has declined significantly in number of trees due to beech scale disease. Basswood has also declined dramatically, possibly as a result of repeated sawfly defoliations that occurred in the mid 1970's. Both hemlock and northern red oak are increasing in basal area.

Broderick, Warren F. (NYS Archives & Records Administration (SARA), New York State Museum, Albany, NY 12230)

Stephen Van Rensselaer's Wilderness: A 200-Year-Old GIS.

In 1785, Stephen Van Rensselaer became the sixth “Patroon” of Rensselaerswyck, lord of the manor of a private land holding of over 850,000 acres granted 100 years before by the New York Colonial government, and comprising much of the present Albany and Rensselaer counties. The Patroon engaged two teams of surveyors to undertake the five-year-plus task of mapping and surveying his extensive land holdings, all of which he intended to lease to settlers in the feudal “manorial” system. In the process, detailed and highly accurate maps and surveys were drawn, and information on the land itself was collected for use by its owner. These maps and surveys survive today in the New York State Library. Sections of two of these maps were digitized, and information on corresponding survey lots was data-entered and mapped and analyzed in the GIS. The study area covers a mountainous region in central Rensselaer County which was largely unbroken virgin wilderness at the time the mapping and surveying was undertaken. As a result, information from 200 years ago on settlement, forest, soils, terrain and hydrology has been studied in conjunction with current GIS data layers. Comparisons between the region then and today have been made, and remarkable insights into this region's history are revealed through this unique GIS application.

Brown, Grant E., Erin **Smyth**, Heather **Leet** (Department of Biological Sciences, Union College, Schenectady, NY 12308), and James C. **Adrian** (Department of Chemistry, Union College, Schenectady, NY 12308)

Ostariophysan Alarm Pheromones: What are Minnows Responding To?

Ostariophysan fishes (i.e. minnows, dace, and shiners) possess specialized epidermal club cells which produce and store a chemical alarm signal (alarm pheromone). When released into the water column and detected by nearby conspecifics (and some heterospecifics) this alarm signal elicits an increase in species specific anti-predator behaviours. It has previously been suggested that hypoxanthine-3(N)-oxide (a heterocyclic purine skeleton with an N-oxide functional group at the 3' position) functions as the Ostariophysan alarm pheromone. In a series of laboratory and field experiments, we compared the anti-predator response of fathead minnows to natural alarm pheromones, hypoxanthine-3(N)-oxide and a suite of structurally similar compounds in order to determine if the purine skeleton, the N-oxide functional group, or both are critical for this compound to function as a chemical alarm signal. Both the laboratory and field experiments strongly suggest that the N-oxide functional group (and not the purine skeleton) act as the key recognition moiety in the Ostariophysan alarm pheromone system. These results have important biological and environmental implications.

Burchsted, Albert E. (Biology Department, College of Staten Island, Staten Island, NY 10314)

Derivation of and Change in Eastern House Finch Song Repertoires.

The release of House Finches in New York in the early 1940s initiated a natural experiment in cultural evolution of bird song. Colonizing finches could establish their song repertoires by either learning the songs of local birds of other species, by retaining songs learned before dispersal, or by improvising new song patterns. Learned song patterns, whether copied locally or learned before dispersal, could be faithful to or modifications of the original patterns available. Eastern House Finches sing two to five (mean 2.5) complexes of syllables that are organized into several song forms. I found some colonies on Cape Cod and Staten Island that acquired parts of syllable repertoires by adopting and modifying song patterns of species other than the House Finch. Other portions of these repertoires were derived from neighboring patterns so that patterns adopted from other species songs and patterns similar or identical to songs sung by other finches were mixed in the same song. In other colonies, entire repertoires were presumably derived from pre-dispersal patterns. In no cases were entire repertoires derived from other species songs. Although some syllables in all repertoires appeared to be improvised, no song repertoires were suggestive of complete improvisation after colonization. I reexamined the repertoires of seven Staten Island populations in spring 1998. There were no new song patterns, but all populations added syllables to, and subtracted syllables from 1985 repertoires. Changes also included altering the order of syllables in the songs, adding songs to and dropping songs from repertoires, and replacement of one or more songs with songs originally sung at other sites.

Carlson, Douglas M. (New York State Department Environmental Conservation, 317 Washington Street, Watertown, NY 13601)

New York Rivers Compared with Species Richness Metrics and Fish.

Change is a key feature of rivers, their quality and their inhabitants. Fish have adapted to the natural changes, but there have been many other profound and unnatural changes to our rivers. Fish records show this change, often by their species absences alone. Accordingly, a simplest index is species richness compared through these times of change. For this purpose, I assembled and examined available historic fish records for our major New York rivers for the 1930s, 1970s and 1990s. Meager and obscure as most of these records are, they clearly show which rivers have fared the best and worst. Additional metrics of species richness in these comparisons across time, include percent sensitive species, percent native species and percent riverine specialists.

Clemants, Steven E. (Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, NY 11225), and Andrew M. **Greller** (Department of Biology, Queens College, CUNY, Flushing, NY 11367)

Criteria for Determining if a Plant is Native or Not.

With the greater demand for native species in North American gardens and the growth in restoration ecology it is becoming increasingly difficult to determine whether a disjunct population of a plant is native or exotic. We have identified several criteria for determining whether disjunct populations are native or introduced. These criteria are: 1) history of the site, 2) is the plant commonly cultivated nearby, 3) what are the associated plants and the plant community, 4) is there a disjunction pattern that this species fits, 5) does the plant have a mechanism that easily allows for long distance dispersal, 6) are there characteristics of the species that suggest that it will not survive in the area without man's intervention (e.g.) lack of a pollinator, photoperiod, cold hardiness), 7) is the plant commercially available. We have used these criteria at a site on Long Island, NY to determine that 4 rare or new NY species were in fact planted over 50 years ago or were inadvertently introduced with these plantings. We conclude with recommendations to gardeners and restorationists.

Cordeiro, James (Department of Invertebrates, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024)

Depositing Vouchers, Steps Towards Responsible Research.

Voucher specimens may be defined as scientific specimens preserved and subsequently deposited into a research collection to support the results of a particular piece of research or analysis. Taxonomists are well aware of the importance of depositing voucher specimens into natural history collections. In disciplines of natural history other than taxonomy, voucher specimens are often not deposited and their benefits to the scientific community are overlooked. It is the role of taxonomists to stress the necessity of including voucher material in all studies of natural history involving any objects, living or dead. The importance of keeping voucher specimens is reviewed in the context of the state of New York's largest collection of invertebrates at the American Museum of Natural History (AMNH). Guidelines for preparation of vouchers for deposit are provided including nature of the voucher, minimum information to provide, and labeling. Curation processes for invertebrates vouchers at AMNH are described for the benefit of non-taxonomists with emphasis on the vouchers role in taxonomy. Consequences of not depositing vouchers are reviewed briefly.

Crabb, Beau Amadeus, and Robert S. **Fritz** (Department of Biology, Vassar College, Box 133, Poughkeepsie, NY 12604-0133)

Testing the Plant Vigor Hypothesis and Determining the Mechanism of Disruptive Selection on Sawfly Oviposition.

To test the Plant Vigor Hypothesis, we determined female oviposition preference of *Phyllocolpa leavittii* (Hymenoptera: Tenthredinidae) for shoot lengths on 20 clones of *Salix discolor* (Salicaceae) and examined larval performance by determining larval survival based on clone, shoot length, and leaf length for each *Phyllocolpa* gall observed. Sawfly galls were found on significantly longer shoots compared to shoots without galls, and shoots with 2, 3, 4 and 5 galls were successively longer than shoots with fewer galls. However, when shoot length was adjusted for number of leaves per shoot, the number of galls per leaf showed only a weak, positive relationship with shoot size. Using a logistic regression on survival of *Phyllocolpa* larvae, we detected highly significant effects of clone, shoot length, leaf length, and the square of leaf length on survival. Additionally, much higher sawfly survival on the long shoots of one clone caused a significant clone by shoot length interaction. Survival was positively correlated with shoot length, indicating directional selection, but shoot length explained only 11.8% of the variation in survival. The directional component of selection favored oviposition on smaller leaves as survival was inversely related to leaf length, however, disruptive selection for leaf length oviposition preference was also detected, with survival of *Phyllocolpa* galls lowest on intermediate leaf lengths. This study provides only weak evidence supporting the preference prediction of the Plant Vigor Hypothesis. Some evidence supported the performance prediction of the Plant Vigor Hypothesis, but most of the data contradicted the performance prediction.

Daly, Timothy M. (Water GIS Section, New York State Department of Environmental Conservation, 50 Wolf Road, Albany, NY 12233)

NYS-DEC Water GIS Hydrologic Database Production.

Two new statewide data production projects using the ARC/INFO GIS are currently in production phase in the NYS-DEC Water GIS program. The purpose of the projects is to create a database of hydrologic information which can be used for water pollution modeling, other hydrologic modeling, map production and query, and any other task requiring hydrologic data. Statewide watershed cataloging unit boundaries and sub-watershed boundaries are being produced from 1:24,000 source data. An ARC/INFO region structure is being used to avoid duplication of data and enhance functionality. There are 39 watershed cataloging units in New York State, each with several sub-watersheds. Also being produced is a "networked" hydrography data set by watershed cataloging unit. This data set is being produced by joining existing 1:24,000 hydrography data sets (in 7.5×7.5 minute quadrangle format) and cutting them to the cataloging unit outlines. The original hydrography attribute codes are retained on all hydrography. The resulting data sets are center-lined and checked for hydrologic connectivity and flow direction (from-to nodes) using ARC/INFO network functionality, and corrected as necessary. An ARC/INFO route system is added (currently only on major streams) with stream measures and stream names. Future plans include adding water quality class information and priority stream segments to the route system.

Daniels, Robert A. (Biological Survey, New York State Museum, Albany, NY 12230)

An Assessment of Stream Fish Assemblages in Allegany State Park.

The streams of Allegany State Park, Cattaraugus County, support a rich fish fauna with over forty species represented. The State Park encompasses land on the south side of the big bend in the Allegheny River. Western tributaries flow into the impounded portion of the River and eastern tributaries flow into Tunungwant Creek, a north flowing tributaries of the Allegheny River. Synoptic surveys were conducted in 1937, 1984–85 and 1998 and include samples from each of the major tributary systems. The largest streams, Redhouse Brook and Tunungwant Creek, show the greatest species richness (with 10–20 species per site) and diversity. Six to ten species were typical of smaller tributaries, like Wolf Run and Bay State Brook. Small brooks, like Bova Creek and Irish Brook, supported 2–6 species. Similar streams in other parts of New York rarely support such a rich fish fauna. Preliminary analysis indicates that most streams support the same number of species in 1998 as they did in 1984–85. The relative abundance of species has changed, however. There appears to be a decline in the number of the pool-dwelling fish inhabiting these streams. The reason for the decline in the catches of these species will be discussed.

Dirig, Robert (Bailey Hortorium Herbarium, 462 Mann Library, Cornell University, Ithaca, NY 14853)

A Gallery of Unusual and Interesting New York State Butterflies.

Outdoor photographs of several unusual and interesting New York State butterflies record their habitats, natural history, behavior, and new foodplants or localities. In the Finger Lakes: Larvae of the Silver-spotted Skipper feed on a new foodplant, False Indigo; adult Olive Hairstreaks and Bronze Coppers take nectar and bask; and Hackberry Emperors and Tawny Emperors patrol a Hackberry grove. At Limerick Cedars and Chaumont: caterpillars of the Columbine Duskywing live in shelters on Wild Columbine leaflets; while Olympian Marble adults and larvae are closely associated with Purple Rock Cress. In the Catskills: the ubiquitous European Skipper communally roosts at sunset in a hayfield; Arctic Skippers and Pepper-and-Salt Skippers take nectar and bask in a beaver meadow; and resplendent Prognos nectar and puddle along dirt roads. In the Adirondacks: adult Mustard Whites, Pink-edged Sulphurs, Jutta Arctics, and Mountain Silverspots take nectar in bogs and adjacent uplands; larvae of the rare, carnivorous Harvester feed on Woolly Alder Aphids in a wetland; and an Early Hairstreak hilltops, and Milbert's Tortoiseshells swarm over Alpine Goldenrods above tree line on Whiteface Mountain. The Atlantic coastal (Common Reed-associated) and inland (Lake Sedge-associated) forms of the Broad-winged Skipper are compared and contrasted as to habitats and behavior, and a recently established inland population of the coastal entity is reported from the Albany Pine Bush.

Dirig, Robert (Bailey Hortorium Herbarium, 462 Mann Library, Cornell University, Ithaca, NY 14853), and **Rachel Keats** (Cornell University Biological Field Station, 900 Shackelton Point Road, Bridgeport, New York 13030)

Revisiting the Mire: McLean Butterflies in the 1920s and 1990s.

At Cornell University's McLean Bogs Preserve (Tompkins County, New York), alkaline fen-meadows, shady stream corridors, and shrubby swamps are juxtaposed with acidic forested uplands, quaking bogs, and shrubby old fields. This large variety of habitats supports a rich biota that was first documented in

a biological survey in the 1920s. We re-surveyed the Preserve's butterflies in 1997 and spring 1998, and also compiled historical records of specimens and observations from the literature, Dirig's field notebooks (1973 ff.), and from the Cornell Insect Collection. Nearly daily fieldwork in 1997 also allowed documentation of the onset and finish of flight seasons for all species, and much life history information. W.T.M. Forbes found 41 butterflies at McLean in the 1920s. We recorded 19 additional species, but did not find nine others that were historically there, for a total of 51 species. Newly reported species include the Alfalfa Butterfly, European Skipper, Delaware Skipper, Inornate Ringlet, and Checkered Skipper, which have all expanded their ranges in the Northeast since the 1920s. The Dion Skipper, Mulberry Wing, West Virginia White, Bog Copper, Early Hairstreak, Harris' Checkerspot, and Appalachian Eyed Brown are among the butterfly treasures of this Preserve, where all biota is protected. The Harvester, Brown Elfin, Pepper-and-Salt Skipper, and Arctic Skipper were collected in the 1920s, but not found during our survey. Despite its largely wooded acreage, the McLean Bog Preserve remains one of the richest butterfly habitat systems in the Finger Lakes region.

Ellison, Walter G. (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

Population Structure of Bicknell's Thrush in New York and New England.

I examined sequence variation within the mitochondrial control region in Bicknell's Thrush and Veery to detect their population structure and measure gene flow among populations distributed among the major mountain ranges of New York State and New England. I sequenced a 400 base pair region at the 3' end of the control region. Bicknell's Thrush exhibits sufficient gene flow to maintain genetic contact among populations but also shows significant population structure as measured by analogues to F-statistics. The Veery, sampled over a geographically comparable array of sites, show no population structure and is effectively panmictic.

Fakundiny, Robert H. (Geological Survey, New York State Museum, Albany, NY 12230)

Central New York Rock-Block Slide: Unusual Geologic and Possibly Biologic Environment.

A stack of thin (<80 m), long (>1 km), Siluro-Devonian age blocks that lies high on the side of Bare Mountain, part of the west side of Tully Valley of southern Onondaga County, forms an unusual rock-block slide with 10 to 40 m of vertical displacement. The blocks' coherent, intact structure and geomorphic architecture indicate that downslope movement was slow and gentle. Timing of the movement is still unknown, but position of the blocks' toes beneath postglacial lake sediments suggests that displacements occurred in the late Pleistocene or earliest Holocene. One possible explanation for the formation of such a large rock-block slide, possibly the largest in the eastern United States, is that the blocks were let down into a collapsing salt cavity of the Salina Group evaporates as brine escaped. Recent rise of the water table in Tully Valley initiated a major mudslide at the base of the rock-block slide. Internal drainage in notches between blocks captures runoff from the slope and delivers it directly into a groundwater system that feeds saline artesian springs in the mudslide. The combination of locally dry surface conditions behind the blocks on the side of Bare Mountain and the saline conditions of surface waters at its base may provide an unusual biologic environment for this part of New York State.

Fetterman, Andrew R. (Biological Field Station, 5838 State Hwy. 80, Cooperstown, NY, 13326)

Preliminary Analyses of Surface and Sub-surface, Aqueous, Geochemical Inputs to Otsego Lake Basin, Otsego County, New York.

Otsego Lake occupies a glacially modified valley near the northern extent of the eastern Appalachian Plateau within Paleozoic bedrock. Recognized as a Pleistocene glacial through valley, Otsego Lake basin is a north to south trending, U-shaped valley underlain by gently southwest dipping Devonian limestones, siltstones, and shales. Preliminary geochemical analyses of surface and ground water in the northern lake basin indicate water rich in dissolved calcite, dolomite, and gypsum. Samples from tributaries including Cripple Creek, Hayden Creek, and Shadow Brook, were tested for dissolved ion concentrations, and mineral equilibria for common carbonate minerals (calcite, aragonite, dolomite, gypsum) were calculated. Local, high concentrations of SO_4 and calcium, and summer temperatures in the range of 10°C can be used as indicators for groundwater influx to surface streams. Point source, sulfate-rich springs, occur along Glacial Lake Cooperstown strandlines in Cripple Creek and Shadow Brook. Springs in Cripple Creek maintain a mean summer temperature of 9.6°C with SO_4 concentrations exceeding 370 mg/l, whereas upstream concentrations average only 15 mg/l. Lacustrine clay overlying glacial sediments and bedrock serve as confining layers which retard and control vertical migration of ground water. Aqueous geochemical modeling of selected samples indicates multiple bedrock sources for dissolved ions and a saline, complex, regional groundwater system driven by dissolved gypsum and carbonate bedrock. The process of dedolomitization is recognized and is a principal cause of solutional porosity in Karst systems where dissolved gypsum interacts with dolomite by *incongruent dissolution* and the *common ion effect*. Water supersaturated with respect to calcite and dolomite can continue to dissolve dolomite while precipitating calcite.

Finton, Andrew D., Troy W. Weldy, Paul G. Novak, and Kathryn J. Schneider (NY Natural Heritage Program, 700 Troy-Schenectady Road, Latham, NY 12110-2400)

Hudson River Biodiversity Inventory.

As a component of the Hudson River Estuary Management Plan, the NYS Department of Environmental Conservation has contracted with the NY Natural Heritage Program, through Cornell University, to conduct a biodiversity inventory of the Hudson Valley. The goal of the Hudson River Biodiversity Inventory is to document the elements of biodiversity within the non-tidal portions of the towns bordering the Hudson River, specifically the rare plant and animal species and the rare and exemplary occurrences of natural communities from the Troy Dam to the Verrazano Narrows Bridge. Survey sites are determined by reviewing existing data, reviewing literature, interviewing local naturalists and scientists, and analyzing aerial photography and geology and soil maps. The goal of the community inventory is to document "significant" community occurrences defined as occurrences of rare communities and the highest quality common communities. The aim of the rare plant and animal inventories of the Hudson River corridor is to update existing occurrences, search historical locations and identify "hot spots" where rare species are concentrated. The inventory has identified a wealth of biodiversity in the Hudson Valley. At least 60 of the 162 NYS natural community types and 242 rare plant species have been documented within the study area. A majority of the rare plants occur in the southern half of the Hudson Valley where many species reach their northern terminus. Thorough data collection has led to a greater understanding of the distribution of several important rare animal species. All significant elements identified will be mapped, digitized and entered into the Natural Heritage databases. A 1999 final report to the DEC and Cornell will describe significant biodiversity assets, list all rare and exemplary elements documented, identify protection priorities and include management recommendations for the most important biodiversity resources of the Hudson Valley.

Frank, Craig L., and John **McCool** (Louis Calder Center, Fordham University, P.O. Box K, Armonk, NY 10504)

The Effects of Lipid Composition on the Food Hoarding and Diet Selection Behaviors of Eastern Chipmunks.

Eastern chipmunks (*Tamias striatus*) survive winter by storing food (seeds and nuts) in their underground burrows, and entering torpor bouts that reduce food requirements. A high linoleic acid diet enhances torpor. Linoleic acid is a polyunsaturated fatty acid that cannot be synthesized by mammals, but it is produced by most plants. Seed and nut linoleic acid contents vary with both growing conditions and species. We predicted that *T. striatus* would prefer to: 1) store food items with relatively greater linoleic acid contents, and, 2) consume food items with higher linoleic acid contents prior to the onset of torpor. Our laboratory food selection/hoarding with these rodents demonstrated that: 1) a greater proportion of high linoleic acid items are stored during the fall, 2) food items with high linoleic acid contents are preferred during the feeding period just prior to torpor, and, 3) diet items with relatively lower linoleic acid contents are preferred during the spring and summer. These results demonstrate that eastern chipmunks have a seasonal shift in diet choice that enhances winter torpor.

Frank, Jennifer A. (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

Earthworms, Predation, and Detrital Systems.

Decomposition is essential to the function of an ecosystem. The complexity of detrital systems has made studying them difficult and interactions between members of the decomposer community are poorly understood. As ecosystems experience rapid environmental change the need to study detrital systems is becoming more urgent. The species composition of the decomposer community is being altered by the introduction of exotic species such as earthworms and by the loss of other organisms such as amphibians. Although studies have established that earthworms significantly contribute to the process of decomposition few have examined the relationships between earthworms and other organisms. The objective of this study is to increase our understanding of the structure and function of the detrital system by studying the relationship between earthworms and other members of the detrital community. Earthworm and *A. maculatum* populations were manipulated in field enclosures to determine if (1) the rates of decomposition differ significantly between sites with natural and reduced earthworm densities; (2) amphibian predators significantly decrease earthworm populations and indirectly effect the rate of litter decomposition. Earthworm densities were determined by hand-sorting subsamples of soil from the enclosures. The rate of litter decomposition was determined by measuring the loss of litter over time using mesh bags and CO² flux within closed chambers using a LICOR infrared gas analyzer. Preliminary results suggest that litter breakdown rates differ significantly between sites with earthworms and those without earthworms. The effects of predation on earthworms will also be presented.

Gall, Wayne K. (Division of Invertebrate Zoology, Buffalo Museum of Science, 1020 Humboldt Parkway, Buffalo, NY 14211-1293)

Life at the Bitter Edge: Winter-Active Insects of NYS.

A fascinating but little-known assemblage of insects is active during the coldest period of the year in New York State: snowfleas, winter stoneflies, snow scorpionflies, winter crane flies and several others. Slides will be presented to illustrate selected winter-active insects, and their natural history will be summarized. Discussion will include the adaptations that these species exhibit in coping with the unusual timing of their life cycle, and the advantages that may accrue to them as a result. A case study of a collection made in January in western New York will be presented not only to demonstrate the surprising diversity of winter-active insects (and spiders!) in our area, but how opportunities exist to make original contributions to scientific knowledge.

Gardner, Geoffrey, C. (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

Beech Scale Dynamics in an Aftermath Forest.

Pathogens and other pests are important mediators of ecological communities. The bark disease of American Beech (*Fagus grandifolia*) is an example of a disease invasion that has had a major impact on the forest community throughout New England in the past 50 years. The combined infestation of the European beech scale insect *Cryptococcus fagisuga* and the subsequent invasion of fungi (*Nectria* spp.), often kill more than 50% of beech trees > 10 inches in diameter in a forest. Because the scale must precede the fungus, it is the key component of disease spread. Despite this, there is very little work done in North America on its demography. I have examined the life cycle and population dynamics of the beech scale on beech populations in continuous forest inventory plots within the Edmund Niles Huyck Preserve. Results indicate the observed life cycle agrees with the European accounts, with variations that may reflect climate differences. Population growth rates, measured as the increase in density of scale colonies, indicate that (barring a massive genetic shift in beech populations) the disease will continue to strongly affect forests in Eastern NY.

Gifford, Neil A. (Albany Pine Bush Preserve, The Nature Conservancy, 108 Wade Road, Latham, NY 12110)

Impacts of Invasive Plants on the Ecology and Management of the Albany Pine Bush Preserve.

The New York State legislature created the Albany Pine Bush Preserve Commission in 1988 to protect the Albany Pine Bush and manage the Albany Pine Bush Preserve. The Preserve contains the best remaining example of the globally-rare inland pitch pine-scrub oak barrens, and is home to numerous rare plants and animal species, including the federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*). Several native and non-native invasive plants thrive in the Pine Bush as a result of landscape fragmentation and the exclusion of natural fire. Black locust (*Robinia pseudoacacia*) and aspen (*Populus tremuloides* and *P. grandidentata*) are three particularly aggressive tree species that readily out-compete many native plants, jeopardizing endangered species habitat and long-term ecosystem viability. The Nature Conservancy and other Commission partners have been investigating several methods of controlling invasive plants and restoring invaded areas of the Preserve. Preliminary data suggest that a combined strategy

of mechanical and chemical treatments may be successful in controlling these species. Understanding and reversing their affect on the microenvironment will be important to the successful restoration of native pine barren species to more than 700 acres currently dominated by invasive species.

Gill, Ronald J. (Biodiversity Research Institute, New York State Museum, Albany, NY 12230), and George R. **Robinson** (Department of Biological Sciences, University at Albany, SUNY, Albany NY 12222)

Black Locust Invasion in the Albany Pine Bush and its Effect on a Native Species.

Human activities have greatly accelerated the rate of spread of plants and animals beyond their native ranges. Once established, these invasive species can become nearly permanent components of ecosystems often with severe consequences for native species. Within the Albany Pine Bush, black locust (*Robinia pseudoacacia*) has spread from plantations to cover large areas of the preserve. To test the potential impact of this invasion on a native species, we transplanted pitch pine seedlings into sites dominated by black locust and sites dominated by typical Pine Barrens vegetation. After one growing season, we found higher mortality rates within the black locust sites (85% versus 30% in non-invaded areas). Furthermore, mycorrhizal species diversity and inoculation rates were significantly lower for seedlings growing within black locust stands. Black locust appears to be displacing a prominent native species of the Albany Pine Bush and it is likely that many other native species are also affected.

Gilman, Bruce (Department of Environmental Conservation/Outdoor Recreation, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, New York 14424-8395)

Pre-European Settlement Vegetation of Northern New York Alvar Landscapes.

Alvar landscapes occur north of the glacial boundary where horizontally bedded limestones/dolostones are covered by little or no soil. Alvares have scant but exceptionally diverse vegetation, and are home to many rare species. Research on regulating environmental conditions and local floristics have been undertaken to describe modern vegetational patterns but the importance of site history has been difficult to evaluate. Records of the original land surveyors (Macomb's Great Tract #4, 1796–1798) were used to assess pre-European settlement vegetation patterns. Data include surveyor comments on site quality, landscape openness, and witness trees for individual lots. Geographic comparison of these data to modern alvar occurrences supports a natural origin of northern New York alvar landscapes. In addition, post-European settlement records encountered while completing this research allowed the development of a list of probable, historic, anthropogenic impacts on alvar landscapes.

Glickman, Benarta (Biology Department, Monroe Community College, Rochester, NY 14623)

Re-Discovering an Educational Treasure: “Magic Lantern” Slides.

In the 1920's, under the directorship of geographer Alfred W. Abrams, the Visual Instruction Division of the New York State Education Department amassed a collection of some 17,000 glass lantern slides (now in the NYS Archives) on topics ranging from travel to the arts, agriculture, sciences and technologies, for loan to schools and educational groups. In addition, complete sets were given to each of the State Colleges.

Over 1,300 slides cover the Natural Sciences; 771 are of birds. During the summers of 1989 and 1991, MCC photographer Ray Treat and I photographed the slides onto 2×2" Ektachrome slides. (Lantern slides are about 3×4", 1/4" thick, and being glass, are heavy, bulky to carry about and subject to breakage.) These copies make up most of this program. As of 1991, I have copies of almost all of the bird slides, as well some of the geographical collection so that natural habitats can be shown. The bird slides are particularly well documented, usually giving the name of the photographer, location, common and scientific names, and the date the photo was taken. A book entitled *Study 29: Birds of New York State* was published in 1933 to accompany the bird slides, giving a description of each slide plus lecture outlines on a variety of topics. In the introduction to Study 29, Abrams specifically acknowledges two photographers who each contributed over 200 slides: Guy A Bailey (Geneseo Normal School, now SUNY Geneseo) and Dr. Arthur A. Allen (Cornell University). Some of the other photographers included Verdi Burtch and Clarence Stone of Branchport NY, Roland Beebe of Arcade NY, and ornithologist Frank Chapman. It is hoped that the entire collection will be made available on CD-ROM and the Internet because of the myriad applications to education and research in cultural history, natural history, ecology, anthropology, literature, etc.

Haines, John H. (Biological Survey, New York State Museum, Albany, NY 12230)

Airborne Fungus Spores and Public Safety in Commercial Composting.

The thermotolerant mold *Aspergillus fumigatus* (AF) proliferates during the self-heating process of composting. AF is also known to cause a wide variety of human health effects. Three composting facilities were studied using three different techniques by the author and others to measure AF growth and dispersal. A large, open-windrow, yard waste composting facility was monitored with impaction samplers in which all airborne particulates are captured on a tape for direct microscopic examination. This study demonstrated that AF is the major fungus spore given off from compost and that at this facility it averaged approximately 150 spore/m³ in air 540 m downwind from the facility as opposed to approximately 50 spores/m³ at a more remote site chosen as a control. Changes in fungal composition during the composting process were investigated in a small sewage sludge composting plant. By using dilution plate sampling, AF was found to be one of two fungi to survive at low levels when the compost reached the maximum temperatures around 60° C. The other mold, *Humicola lanuginosa*, has spores that are not readily airborne and do not constitute a potential health problem. During the first two weeks of cooling, AF becomes dominant and increases up to 5 orders of magnitude in recoverable particles, but as the compost cools to ambient temperatures other, non-thermotolerant molds out compete the thermotolerant ones. The air near the site of a large, new sewage sludge composting facility was monitored with live samplers for culturable AF. AF levels during the six months prior to the initiation of composting operations ranged from 6.15 CFU/m³ to 22.19 CFU/m³ at 8 sites. Monitoring will continue through the first two years of plant operation.

Harman, Willard, Matthew Albright, Paul Lord, and Darcy King (Biological Field Station, SUNY Oneonta, RD #2 box 1066, Cooperstown, NY 13326)

Plant Responses to Sonar Application and Milfoil Weevils in Moraine Lake, Madison Co., NY.

Moraine Lake is a 261-acre eutrophic waterbody located in Madison County, New York. Of the factors affecting lake use, excessive submerged aquatic macrophyte growth is considered to most impair recreation. Of particular concern is the non-native Eurasian milfoil (*Myriophyllum spicatum*) because of

its ability to form dense, monospecific beds reaching the surface while rooted in as much as 5 meters of water. Controlling this species is the primary objective of the Moraine Lake macrophyte management plan. Traditional methods of macrophyte control, including mechanical harvesting and the use of broad-spectrum herbicides, have had limited success and have raised environmental concerns. In an attempt to more specifically manage milfoil, Sonar was applied to much of the littoral area in June 1996. Following application, a sampling protocol was initiated to evaluate the effectiveness of this strategy. Three sites receiving Sonar, as well as one serving as a control, were monitored. In 1997 and 1998, the Biological Field Station continued monitoring. Plants at each site were identified and weighed on four dates each year. Evaluation of the empirical information collected during 1997 suggests that milfoil was impacted by Sonar, though anecdotal evidence raises some questions. In June 1998, 13,000 weevils (*Eurychiopsis lecontei*) were released into the north basin. This native insect has demonstrated the potential to control milfoil in other lakes. Sampling in three sites in the north basin and one, as a control, in the south basin was conducted to monitor weevil populations and to document their impact on milfoil.

Hawver, Christopher A. (Albany Pine Bush Preserve Commission, The Nature Conservancy, 108 Wade Road, Latham, NY 12110)

Management Challenges of a Rare Inland Pine Barrens in an Urban Setting.

New York State created the Albany Pine Bush Preserve Commission through legislative action in 1988. The Commission is required to coordinate management for the 2,350+/- acre Albany Pine Bush Preserve which harbors a globally rare inland pine barrens and the federally-endangered Karner blue butterfly. Based on the historic role of fire, the law called for prescribed burning as the primary tool to manage this best remaining inland pitch pine barrens in the world. Prior to this legislation, the use of fire in forested areas was prohibited in New York. Located within the city of Albany, fire management in the Pine Bush Preserve faces a variety of challenges. Urban infrastructure requires strict control of not only fire, but also smoke. Numerous housing developments, nursing homes, a methane-emitting landfill, a regional airport, two major highways and secondary roads border and dissect the Preserve. An extensive public notification program begins months before any burns. Nearly 600 acres have been prescribed burned since the fire management program began in 1991. Initial results have provided insight to the limitations of fire as the sole means of restoration, and supplemental management techniques are being investigated. Additional methods can expedite restoration efforts and better reach ecological goals, so fire may be reestablished as the primary process which maintains this unique ecosystem.

Hicks, Alan C. (New York State Department of Environmental Conservation, Wildlife Resources Center, Delmar, NY 12054)

Moose in New York; Trotting Down the Comeback Trail.

Moose (*Alces alces*) were extirpated from New York in 1861 and began to reoccupy the state on a continuous basis in 1980. From 1980 to 1997 DEC staff have been collecting reports of moose seen by the public as the primary means of monitoring the species status. We also investigate all reported mortalities and monitor radio collared animals. Nearly 2,500 observations reports are now on file, 34 dead moose have been recovered, and the activities of 16 radio collared moose have been monitored to varying degrees. Available information suggests that moose are secure in the state and the population is continuing to grow.

Hunsinger, Kimberley C. (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

A Herpetofaunal Survey of the Albany Pine Bush, New York State.

The Albany Pine Bush, located in the towns of Colonie, Guilderland and the city of Albany, New York, is a unique ecosystem characterized by sandy soils, vernal pools and pitch pine and scrub oak forests. Stewart and Rossi (1981) reported the presence of 30 species of amphibians and reptiles in the Albany Pine Bush. Since that time, there has been significant commercial and residential development in the area as well as many new roads. Field surveys were conducted from 1996 through 1998 with the goal of learning what species of amphibians and reptiles still occur in the Albany Pine Bush. In this survey, 25 of the 30 species found by Stewart and Rossi were found. One species, the musk turtle (*Sternotherus odoratus*), was found in the Pine Bush in 1995. Nine of the 29 sites originally surveyed have been destroyed.

Hunsinger, Todd (Biology Department, Hudson Valley Community College, Troy, NY 12810)

Human Influences on a Wood Turtle (*Clemmys insculpta*) Population in Eastern New York.

A comprehensive ecological study was initiated for a Wood turtle (*Clemmys insculpta*) population in May of 1997. Thirty-six turtles (11 adult males, 11 adult females, and 14 juveniles) have been identified and individually marked. Human influences that impact the population were examined. Aspects examined include (1) human induced mortality pressures, (2) water quality and parasite loads, (3) habitat suitability, restrictions and fragmentation, (4) reproductive success, and (5) individual range and movement of turtles using radiotelemetry. The age distribution of the population indicates reproductive success and juvenile recruitment. Degraded water quality in a section of the stream has led to increased parasitism of turtles by leeches. Interspecific competition with humans for suitable habitat has fragmented and restricted the wood turtle population. The range of individual turtles is consistent with other studies where human influences are a factor, but smaller than undisturbed populations.

Jenkins, Jerry C. (White Creek Field School and Wildlife Conservation Society, White Creek, NY 12057)

Widespread Sugar Maple Regeneration Failure in the Adirondacks.

Over large areas of the Adirondacks, hardwood stands whose canopies are dominated by or contain abundant mature sugar maple have almost no sugar maple saplings or seedlings in the understory. Coring shows that most (>80%) of these stands reproduced well in the first half of this century but have added few or no trees to the canopy or subcanopy since 1950. Such forests contrast sharply with maple stands elsewhere in the state and the northeast, which typically have a persistent bank of suppressed seedlings, abundant maple saplings in small gaps, and continuing recruitment of young maples to the canopy and subcanopy. Our research has been designed to assess the incidence, chronology, and ecological correlates of this problem. We find that sugar maple regeneration failure is a) widespread in the east Adirondacks and almost ubiquitous in the western Adirondacks; b) equally common in commercial, ex-commercial, and old-growth forests; c) characterized by the early death of seedlings and hence by sparse seedling banks; d) commonly associated with an abundance of young beech but not restricted to points at which beech is locally abundant;

e) found across a range of light levels and not restricted to extremely dark forests; and f) most likely to occur on soils with low (<300 ppm) amounts of exchangeable calcium and least likely to occur on soils with high (>700 ppm) amounts of exchangeable calcium. Our results are consistent with studies from Pennsylvania showing high sugar maple seedling mortality on soils with depleted calcium pools. We suggest that the remarkably uniform occurrence of regeneration failure is ecologically and economically alarming and that our results are consistent with, but do not establish, a central role for soil cation changes, possibly caused by acid rain.

Johnson, Elizabeth A. (Center for Biodiversity and Conservation, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024)

Center for Biodiversity and Conservation at the American Museum of Natural History.

The Center for Biodiversity and Conservation was established by the Museum in 1993. Drawing on the combined strengths of the Museum's scientific, education and exhibition departments, as well as its extensive collections and library, the Center strives to develop viable, science-based solutions to biodiversity conservation problems and to disseminate these findings widely. This is done through publications, symposia, graduate student programs, curator conservation grants, and international research. In addition to its international work, the Museum is committed to working locally, in the New York area to promote biodiversity conservation. The Center's Metropolitan program includes a number of initiatives such as workshops for land managers, symposia about New York Biodiversity and research projects.

Jordan, Marilyn (The Nature Conservancy, 250 Lawrence Hill Rd., Cold Spring Harbor, NY 11724), **Dale Schweitzer** (The Nature Conservancy, c/o Eastern Heritage Task Force, 1761 Main Street, Port Norris, NJ 08349), **Orland Blanchard** (Biology Department, CW Post College, Greenvale, NY 11548), and **Robert Zaremba** (The Nature Conservancy, NY Regional Office, 415 River Street, Troy, NY 12180)

Effects of Wildfire on Moths in Long Island Dwarf Pine Barrens.

The "Sunrise Wildfire" consumed 3,000 acres of pine barrens on Long Island, NY in August 1995, including 225 acres of the globally rare dwarf pine plains. The fire was unusually severe because of extreme drought and high natural fuel loads. Moths were captured by black light trapping at two control and two burned locations. Overall moth abundance and number of species were reduced in burned areas in 1996, but recovered to pre-fire levels by 1997. Species that had belowground life stages in August were equally abundant in control and burned areas in both years, with the exception of *Psectraglaea carnosa*, which was much more abundant at one of the control locations. At this same control location, total moth abundance was twice as great as at the other three trap locations.

Kallaji, Michael, and **John W. Ozard** (New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, Wildlife Resources Center, Delmar, NY 12054)

Long Island Tiger Salamander Breeding Pond Survey Project: 1994–1996.

In New York, distribution of the eastern tiger salamander (*Ambystoma tigrinum*) is currently restricted to eastern Long Island. Surveys conducted since 1981 have documented 106 occurrences of this

state-listed endangered species in Suffolk County and 4 more in Nassau County. Sixty-four of these tiger salamander populations were documented between 1981 and 1984. By 1993 the number of identified populations had grown to ninety-nine. In 1994, The Long Island Tiger Salamander Breeding Pond Survey Project was initiated in order to re-survey all 99 previously identified breeding ponds during the spring seasons of 1994, 1995 and 1996. The survey sought to reconfirm that individual populations remain extant, and to assess habitat conditions in and around salamander breeding ponds. By late spring of 1996, when the survey project concluded, ninety-two of the ninety-nine ponds had been re-surveyed, and an additional eleven (previously undocumented) populations had been newly documented. Overall, the project re-confirmed (or newly confirmed) tiger salamanders present at 61 of the 103 sites surveyed (59%). The breeding strategy of this species is such that a three-year sampling period is not adequate to determine that a population has been extirpated. Consequently, repeat surveys will be needed over a longer time period before we may conclude that a population has disappeared. The full findings of the survey project will be presented, along with some analysis of the information collected.

Krosnick, Shawn, and Robert **Dirig** (Bailey Hortorium Herbarium, 462 Mann Library, Cornell University, Ithaca, NY 14853)

Rich Shades of Green: The Cornell University Bryophyte Herbarium.

Cornell University's Bryophyte Herbarium, with more than 63,000 specimens, is a valuable botanical resource. Since its inception in 1869, the Bryophyte Herbarium has developed into a rich assemblage of worldwide mosses and hepatics with particular strengths in northeastern North American holdings. Both A. LeRoy Andrews, Honorary Bryophyte Curator, and Liberty Hyde Bailey, Hortorium founder, exchanged material with Elizabeth Britton of the New York Botanical Garden. This included isotypes from the William Mitten herbarium that were collected during the last century. Stewart H. Burnham contributed to the collection as well by donating his bryophyte vouchers for the Lake George flora. Several other important bryologists, among them Richard E. Andrus, Howard Crum, Norton G. Miller, and Lewis E. Anderson, have used the collection for nomenclatural reference, as primary data for taxonomic studies, or as a voucher depository. A preliminary study of one family, Sphagnaceae, revealed over 8,500 specimens, with 1,650 specimens from New York State alone. With Sphagnum holdings from 68 countries, including 46 U.S. states and 12 Canadian provinces, international representation proved significant as well. The collection is also supplemented by hundreds of exquisite, original pen and ink illustrations by Georg Roth (1842–1915), many drawn from European types that were later destroyed in WWI and WWII. An excellent juxtaposed botanical library enhances the value of the Hortorium's bryophyte holdings. Visitors and inquiries are always welcome.

Lamont, Eric E. (Biology Department, Riverhead High School, Riverhead, NY 11901)

Ecological Observations of the Grandifolia Sandhills, Long Island, New York.

The Grandifolia Sandhills consist of linear, parabolic, dome, and possibly star shaped dunes perched atop a high bluff fronting on the Long Island Sound, approximately 4 miles northwest of downtown Riverhead, Long Island, New York (Latitude 40°58'N, Longitude 72°44'W). The sediment that forms these dunes is derived from the bluff face and is carried to the top by the winds blowing landward across the Long Island Sound. The Grandifolia Sandhills, comprising approximately 250 acres, are thought to be the last example of a migrating dune system located on a coastal bluff in New York State. A dwarf form of American beech

(*Fagus grandifolia*) dominates portions of the enormous sand dunes towering 180 feet above sea level. Mature individuals are stunted (usually less than 12 feet tall), often multi-stemmed from the base, and extremely gnarled and contorted. One of the old dwarf beech trees has been recently determined to be 138 years old. This maritime dwarf beech forest is considered to be a globally rare ecological community by the New York Natural Heritage Program (NYNHP). At least five additional ecological communities occur at the Grandifolia Sandhills: coastal beech forest, pitch pine-oak duneland forest, maritime duneland, pitch pine-oak forest, and maritime shrubland. The first three communities are rare occurrences in New York according to NYNHP. Historically, seventeen rare plant species have been reported from the immediate vicinity of the Sandhills. Preliminary studies indicate that the Sandhills provide habitat for the largest concentration of nesting ruby-throated hummingbirds (*Archilochus colubris*) on Long Island. Current threats to the Grandifolia Sandhills include a development proposal to construct a golf resort, which would severely fragment the forest and irreversibly destroy a significant portion of the ecosystem.

Lamoureux, Victor S., and Dale M. **Madison** (Department of Biological Sciences, P.O. Box 6000, Binghamton, NY 13902-6000)

Overwintering Habitats of Radio-Implanted Green Frogs, *Rana clamitans*.

Winter's freezing temperatures exert a major selective force on temperate frogs and toads. The selection of an overwintering site that provides protection from freezing is critical for those species without freeze tolerance. Many freeze intolerant frogs, such as the green frog (*Rana clamitans*), are commonly assumed to overwinter at the bottom of shallow, eutrophic, breeding ponds. Although anurans overwintering in pond bottoms would avoid freezing, these environments are highly anoxic for the majority of winter. Since adult ranids cannot tolerate anoxia for even limited periods of time, it is unlikely that pond bottoms would be suitable anuran overwintering sites. It therefore might be necessary for anurans to undergo extensive movements prior to winter in search of overwintering sites that remain unfrozen and provide adequate oxygen for survival. We used radio implants to determine overwintering habitats of the green frog in southern New York State. In late fall, green frogs moved 80–480 m from their summer breeding ponds to streams and seeps that remained flowing and unfrozen throughout winter. We suggest that these sites are chosen not only because they remain unfrozen, but because they provide high oxygen concentrations. With the recent concern over potential worldwide amphibian declines, it is apparent that more information is needed on all aspects of amphibian biology and our data have important implications for both amphibian and wetland conservation.

Lawlor, Frances M. (Department of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210), and Dudley J. **Raynal** (Department of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210)

Control of the Spread of the Invasive Plant *Cynanchum rossicum*.

In recent decades, swallow-wort (*Cynanchum rossicum*), a twining cryptophytic vine of the family Asclepiadaceae, has become increasingly invasive in central New York State and the Great Lakes basin. Native to central Europe, it has been present in eastern North America since before 1889. Population increases are problematic in limestone derived soils of the Lower Great Lakes basin. Capable of forming dense monospecific stands in shrubby areas and in the understory of successional woodlands, swallow-wort outcompetes other successional plants to the detriment of native flora. Once established, it can move into

less disturbed natural areas. Knowledge of control is essential to provide a basis for conservation of biodiversity in areas where swallow-wort is spreading. We also need effective restoration techniques to discourage the establishment of other invasives and encourage the establishment of native species. Herbicide type, concentration and application method will be investigated. Herbicide trials will include spraying and cut stem applications of glyphosate and triclopyr. Cover crops, an important weed management tool in agricultural systems, can also be effective in natural areas. Sowing native grass cover crops could provide effective exclusion of broadleaf weed species. Post herbicide treatment seedings of *Elymus virginicus*, *E. villosus* and *E. hystrix*, native wild ryes, will be evaluated.

Leonardi, Lorinda, and John **Haines** (Biological Survey, New York State Museum, Albany, NY 12230)

The Mycological Work of Homer D. House.

Homer D. House (1878–1949) was the second State Botanist of New York and he held this position at the New York State Museum (NYS), Albany, New York from 1913 until 1948. Although best known for his work on the vascular plants, he made significant contributions to the field of mycology. Together with Canadian mycologist, John Dearness, Homer House co-authored a number of publications containing new taxa of fungi. Most of these appeared in New York State government publications that were not widely circulated in the mycological community and are still not easy to obtain. Therefore, an index of the fungus species and varieties described as new by House and Dearness and House is being compiled. Also included are their unpublished “herbarium names,” their published “new names,” and the new species described by Pier A. Saccardo of Padua based on collections made by House. Homer House concentrated on the leaf and stem fungi and the majority of the collections indexed are his. Other collections treated by House were the backlogged specimens of Charles H. Peck, the first New York State Botanist. The purpose of this list is to call attention to these seldom mentioned taxa and the type specimens at the New York State Herbarium (NYS).

Lewkiewicz, Debra A., and Robert S. **Fritz** (Department of Biology, Vassar College, Box 133, Poughkeepsie, NY 12604-0133)

Ontogeny of Chemical Defense in Willows and Herbivory by Slugs.

Previous research suggests that the ontogeny of chemical defense in the two willow species, *Salix sericea* and *S. eriocephala* differs. *S. sericea* produces phenolic glycosides early in development, and has an initial growth rate much less than that of *S. eriocephala*, whereas *S. eriocephala* grows rapidly but produces tannins much later in development. We attempted to determine the developmental patterns of defense for each taxon. Furthermore, we attempted to determine whether hybrid growth and development patterns were intermediate between the parents, resembled one of the parents, or showed hybrid vigor. From early June to mid-August, we ran preference trials, using the slug, *Arion fasciatus* both in petri dishes and in slug-dense areas in the field to determine the relative damage to each taxon due to slug herbivory over time. In these parallel experiments, slugs had the strongest preference for *S. eriocephala*, the weakest for *S. sericea*, and an intermediate preference for hybrids until the last few weeks of the study; at that time, relative preferences no longer differed greatly. These results indicate that during the late weeks of the summer plants from all taxa, including *S. eriocephala*, had produced enough chemical defense to prevent most slug herbivory. In addition, to relate the level of phenolic glycosides expressed in *S. sericea* during

trials to slug avoidance, we examined the degree to which phenolic glycosides deterred slug herbivory by painting solutions of varying concentrations onto leaves of lettuce and measuring the amount eaten by slugs.

LoGiudice, Kathleen M. (Program in Ecology and Evolution, Rutgers University, Nelson Biological Laboratories, Piscataway, NJ 08855)

The Effect of Natural Contamination with Raccoon Roundworm, *Baylisascaris procyonis*, on Experimental Populations of the Allegheny Woodrat, *Neotoma magister*.

Allegheny woodrat populations have been declining in the Northeast for at least 25 years, and the species is extirpated from New York State. A study conducted by the New York State Department of Environmental Conservation (DEC) in 1991–93 implicated raccoon roundworm as a potent source of mortality in this species. I will report the results of an experimental reintroduction conducted to test the findings of the DEC study and to determine the importance of this mortality source over a broader geographical area. Forty Allegheny woodrats were released in the fall of 1996 into four sites (two in the Shawangunk Mts. in southern New York and two in the Kittatinny Ridge in northern New Jersey), and their fates were followed for 18 months. Release sites were chosen to maximize the difference in exposure to raccoon roundworm eggs based on timed counts of raccoon latrines using a protocol developed by the DEC. Woodrats released into the low exposure sites survived longer than those released into the high exposure sites. This study confirms that raccoon roundworm is a significant mortality source which most likely contributed to the extirpation of the woodrat from New York State and continues to affect woodrat populations in the region.

López-Torrijos, Ricardo (New York State Department of Environmental Conservation, 50 Wolf Rd., Albany, NY 12233-3507).

A Multi Resolution Virtual Land Surface for New York State.

The Water GIS Section of the NYS DEC is developing a Multi-Resolution Virtual Land Surface (MRVLS) for the State. The first phase of this project, carried out in cooperation with the University at Albany, has been completed: 985 USGS detailed surface topography models covering the State of New York. In a second phase, aerial borne Laser Ranging and Detection (LIDAR) and boat carried sonar sensors are used to create a more detailed surface in those areas in which economic limitations allow and applications require the detail: floodplain management and river and lake sedimentation processes. The Digital Elevation Models (DEMs) have a minimum grid spacing of 5 m, a vertical resolution of 0.1 m and an accuracy that varies from ± 6.1 m to ± 0.15 m, depending on the data acquisition technology and conditions. Most of the DEMs were initially derived from 1:40,000 aerial photography pairs, through stereo photogrammetry methods. A wavelet-based process for compressed storage of the data and its extraction at chosen levels of horizontal resolution is being developed in cooperation with USGS. The elevation data available at the present moment, at a single resolution of one data point every 10 m, is available on-line, hosted by Cornell University's Mann Library (<http://gis.mannlib.cornell.edu/>), in 7.5'x7.5' quadrangle units. Higher resolution/accuracy data will be delivered as part of the MRVLS statewide database. The large area covered, the much-improved accuracy, the easy access and the high level of detail in the data is making possible novel approaches to old questions. An overview of the digitization process and of the resulting database will be presented.

Lord, Philip L., Jr. (Historical Survey, New York State Museum, Albany, NY 12230)

Proto-canals and Watershed Disruption in Eighteenth Century Oneida County.

During 1793 and 1794 the Western Inland Lock Navigation Company, a private canal company commissioned to improve the navigation route between Albany and the Great Lakes at Oswego, created thirteen meander neck cuts in the twisting channel of Wood Creek, Oneida County. This stream was the lynchpin in an international transport corridor that had served as a navigable waterway since prehistoric times. This dramatic project, which realigned the stream and shortened the 28-mile waterway by six miles, pre-dated the completion of the Erie Canal by over 30 years. Archeological survey has re-discovered the sites of nine of these 13 cuts; the others having been destroyed by the construction of the Barge Canal in the early 20th century. Documentary research has placed these sites in an historical context. Evidence gathered through remote sensing and on-site reconnaissance provides geomorphologic data on the channel of Wood Creek as it existed prior to the summer of 1793, and field evidence reveals how it has evolved from 1793 to present. This unique opportunity allows us to examine the destabilizing effects of these historic constructions, and what this might have meant for local habitat, within a very precise chronology. Details on the technology used to create these micro-canals will be presented, and the contrasting profiles found in pre- and post-1793 stream channels will be described, to provide a context for the environmental evidence that can be acquired from this watershed.

Marangelo, Paul, and Steve Fiske (Vermont Department of Environmental Conservation, Water Quality Division, 103 S. Main Street, Waterbury, VT 05671)

Regionally Rare Freshwater Mussels in Vermont's Missisquoi River: Population Status and the Potential for a Refugia from Zebra Mussel Impacts.

An extensive survey was conducted on the lower reaches of the Missisquoi River in northwestern Vermont in 1998 to assess the status of seven regionally rare freshwater mussel species and to evaluate the potential of the river to serve as a refugia for mussel species impacted by zebra mussels in Lake Champlain. The lower Missisquoi from Highgate Falls to the delta on Lake Champlain was surveyed with a two-phase stratified sampling approach: Qualitative surveys were conducted via SCUBA and snorkeling to identify habitat-species relationships and specific high-density reaches of targeted species. The river was then stratified into high and low density habitats, with subsequent quantitative sampling predominantly conducted in high-density strata. Quantitative sampling consisted of sampling from 0.25 m² quadrats deployed in a grid pattern at predetermined sites. Ten species were detected in the study area. Preliminary results indicate common to uncommon but seemingly healthy populations of *Lampsilis ovata* (pocketbook), *Anodontoides ferussacianus* (cylindrical papershell), *Pyganodon grandis* (giant floater), and *Leptodea fragilis* (fragile papershell) in the study area. In particular, of the three target species with significant Lake Champlain populations threatened by zebra mussels, two (*Pyganodon grandis* and *Leptodea fragilis*) were uncommon but widely distributed in the areas of the river near the delta. Conversely, the third (*Potamilus alatus*; pink heelsplitter) was not detected at all, despite historical occurrence records from the Missisquoi. This suggests that for at least the former two species, Missisquoi habitats may in part provide a refuge from zebra mussel impacts. In the upper study area, *Lasmigona costata* (fluted shell) was represented only by a dozen shells, and may already be extirpated from the Missisquoi. Only three live individuals of *Ligumia recta* (black sandshell) were found, suggesting that this species, while historically scarce in the river, is also in danger of local extirpation.

McDaniel, Stuart F. (Botany Department, Duke University, Durham NC 27708), and Norton G. **Miller** (Biological Survey, New York State Museum, Albany NY 12230)

Elevational Differences in Winter Dispersal of Bryophytes in the Adirondack Mountains, New York.

The Adirondack High Peaks harbor approximately 32 ha of alpine tundra, principally on the two highest peaks, Mt. Marcy and Mt. Algonquin, but to a lesser extent on a number of other summits. Adaptations for winter dispersal in low stature alpine tundra plants can allow diaspores to be blown a considerable distance, as snow, ice, and rock present relatively low friction surfaces to air flow. Bryophytes, important constituents of alpine habitats in both biomass and species richness, have been shown to produce viable vegetative fragments dispersed in this manner. We sampled snow from late spring snowbeds on Whiteface Mountain (1,478 m), Mt. Algonquin (1,553 m), and near the shore of Lake Colden in a low elevation (843 m), mixed coniferous-deciduous forest, to categorize the diversity of bryophyte diaspores dispersed during the previous winter. A total of 1,555 bryophyte fragments were found in nine samples of 0.5 m², each yielding approximately 4 liters of water. We found plant fragments of 25 species of bryophytes in our samples. All of the species are known to occur at or near the sampling localities from previous surveys of the flora. Stem tips were the most common type of fragment encountered (44%), and most fragments (64%) were between 0.5 and 1.5 mm long. Species frequently found include *Pohlia nutans*, a common cosmopolitan weed, *Andreaea rupestris*, a common colonist of exposed rock in boreal regions, and a number of representatives of the Polytrichaceae. An average of 221 fragments were found in each mountain top sample, but only six fragments were found in the two samples collected at the forested edge of Lake Colden. These results suggest that in the alpine zone bryophyte diaspores are dispersed in the winter by the predominantly westerly regional wind flow, whereas in lower elevation forested sites wind has at most only a modest role in the winter dispersal of bryophyte plant fragments.

McMahon, Ann M. (Department of Biology, University at Albany, SUNY, Albany, NY 12222)

Differences in Larval Growth Rates in Two Species of *Ambystoma*.

Ambystoma jeffersonianum-laterale and *Ambystoma maculatum* overlap in their breeding periods and utilize some of the same vernal pools for breeding activities and egg deposition in upstate New York and Vermont. In vernal pools that contain larvae of both species, *A. jeffersonianum-laterale* larvae are more numerous and larger than *A. maculatum* larvae. The present study determined whether differences in growth contribute to differences in body size and numbers of larvae of these species. Two egg masses of each species were collected from a vernal pool and reared in plastic tanks in the field. Hatchlings were segregated into groups of six individuals and they were set up in eight to nine two gallon buckets. *A. jeffersonianum-laterale* and *A. maculatum* larvae were reared in intraspecific and interspecific groups. Body size (total length, snout-vent length) was monitored every seven days. *A. jeffersonianum-laterale* hatched earlier and experienced faster growth rates than *A. maculatum* in both treatment groups. Results of this study demonstrate that there are intrinsic differences in growth between these species that may contribute to differences in body size and numbers of these species in the field.

Miller, Norton G. (Biological Survey, New York State Museum, Albany, NY 12230), and **Stuart F. McDaniel** (Department of Botany, Duke University, Durham, NC 27708)

Recent, Construction-mediated Establishment of Calcicole Mosses on Whiteface Mountain, New York.

The high elevation bryoflora of the Adirondack Mountains consists largely of species of mosses and liverworts of acidic habitats. The High Peak alpine summits are remote, accessible by trail, and lack permanent buildings or other structures. The only exception is Whiteface Mountain where a two-lane, paved highway was constructed on the north slope between 1931 and 1935. Other construction at the summit includes the Castle (a stone building at the end of the highway), and the Summit House, tunnel, and elevator, which were finished a few years later. Mortar, providing a locally exotic substratum rich in CaCO_3 , was used in the construction of highway guard walls, the Castle, the Stairway Ridge Trail between the Castle and the summit, and the Summit House. We inventoried bryophytes growing on mortar in walls along the highway at 834; 941; 1,068; 1,203; 1,322; 1,395 m, as well as at the Summit House (1,482 m) and the rock stairway leading to it. We also inventoried the bryophyte species growing on rock in a contrasting series of six 10-m-dia circular plots at the same elevations along a trail on the forested east slope of the mountain. No concrete or mortar construction was seen near the plots. Species of *Barbula*, *Bryoerythrophyllum*, *Didymodon*, *Distichium*, *Encalypta*, *Gymnostomum*, *Myurella*, *Schistidium*, *Tortella*, and *Tortula*, all calcicole mosses, were found in samples at study stations along the highway. In contrast, these species were not present in east-slope plots, where *Brotherella recurvans*, *Dicranum fuscescens*, *Paraleucobryum longifolium*, and other calciphobe bryophytes were encountered. Introduction on Whiteface of a new (65-year old) microhabitat (mortar) provided an opportunity for species to become established where they could not grow before. Some of the calcicoles are common lowland, possibly weedy species, but others (e.g., *Myurella julacea*) are rare in New York State. Our results document the substantial impact of the construction on the indigenous bryoflora of Whiteface Mountain and indicate greater dispersal mobility for mosses than is generally appreciated.

Mitchell, Richard S. (Biological Survey, New York State Museum, Albany, NY 12230)

Green Onslaught: The Invasion of New York by 1450 Aliens.

The mosaic of habitats that New York State has offered for invasion by non-native species is quite phenomenal. Widespread forest harvesting and varied farming and construction practices left a very open New York at the outset of the 20th century—a land that few remember, and one quite different from the forested State we inhabit today. Superimpose that scenario on our varied landscape, with habitats varying from coastal beaches to alpine peaks, and there is no reason to wonder why we are one of the top two states when it comes to the total percentage of the flora that is alien (Florida is the other). But, of what significance is this? How many of these “weeds” are noxious or bothersome in any way? I contend that the number is very small. Of nearly 1,500 species that have established in New York over the past four centuries, the troublesome ones can be counted on your fingers, but they are responsible for ongoing ecological disasters. Invasions continue from the south. I will speak of species that have gone from the endangered list to the invasive list. What of the mile-a-minute-weed—a tempest in a teapot? And how do you tell an alien from a native?—not easily.

Molloy, Daniel P. (Biological Survey, New York State Museum, Albany, NY 12230)

Natural Enemies of Zebra and Quagga Mussels.

This paper discusses the biology and ecology of organisms known to be involved in the predation, parasitism, and competitive exclusion of zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena bugensis*) in North America, with special emphasis on the Northeast. Research on natural enemies continues to focus on predators, particularly birds and fish. In contrast to the native European range, parasites have rarely been reported and those that have been are most likely species native to North America. A variety of invertebrates (e.g., mites, nematodes, chironomids, and oligochaetes) have been observed to be associated symbiotically within the mantle cavity, but with little to no adverse effect. Organisms reported capable of competitively displacing *Dreissena* from hard substrates include sponges and bryozoans. Intraspecific competition within each *Dreissena* sp. and the possibility of interspecific competition between these two *Dreissena* spp. will be discussed as they may be significant mechanisms affecting population dynamics. Although the vast majority of organisms that are natural enemies in Europe are not present in North America, ecologically similar species do exist on this continent, and zebra mussels represent a novel and abundant organism for these native predators, parasites, and ecological competitors—the new natural enemies of *Dreissena*. The idea that these organisms might eliminate zebra mussel populations, even in limited areas of North America, however, is far more hopeful than realistic. As in Europe, there will likely be isolated reports of major impacts by natural enemies, and on the whole we will likely see a cumulative effect of a suite of enemies having a constant, but limited, role in suppressing *Dreissena* populations.

Momen, Bahram, Jonathan P. **Zehr**, Charles W. **Boyle**n (Darrin Fresh Water Institute, Rensselaer Polytechnic Institute, Troy, NY 12180), and James W. **Sutherland** (New York State Department of Environmental Conservation, 50 Wolf Road, Albany, NY 12233-3505)

Factors related to summer nitrate concentrations in a set of Adirondack lakes, New York.

Following reductions in the emission and deposition of sulfur compounds in the past decade, atmospheric deposition of nitrogen has become a focus of concern. Identification of watershed characteristics that mediate the effect of atmospheric nitrogen deposition can help evaluate the sensitivity of lakes to chronic and episodic nitrogen addition. Twenty-five lakes in the southwestern portion of the Adirondack Park, NY, were classified into three N classes by cluster analysis of lakewater NO₃-N concentration during the summers of 1994–1996. The lakes clustered in three groups on the basis of epilimnetic nitrate concentrations: (1) low nitrate throughout the summer, (2) high nitrate in early summer, but decreasing to low concentrations in late-summer, and (3) high nitrate throughout the summer. The three lake-N classes were reconstructed perfectly by canonical discriminant analysis based mainly on lake average depth (AD), and lakewater concentrations of chlorophyll a [Chla] and SO₄-S [S] in mid-summer. Increases in AD and [S], but decrease in [Chla] corresponded with a transition from low- to high-N classes.

Munger, Krista, Chris **Harmon** (The Nature Conservancy, 41 S. Moger Avenue, Mt. Kisco, NY 10549), Alvin **Breisch** (New York State Department of Environmental Conservation, Endangered Species Unit, 108 Game Farm Road, Delmar, NY 12054)

Conservation of Blanding's Turtles at a Preserve in Dutchess County.

Overlook Wetland, located in the town of LaGrange, Dutchess County, New York, became a Nature Conservancy preserve after the discovery of Blanding's turtles (*Emydoidea blandingii*) there in 1985. Studies have since been conducted to determine the habitat preferences, nesting migrations, and population structure of this turtle population. A joint project of The Nature Conservancy, the NYS DEC Endangered Species Unit, and Cornell University College of Veterinary Medicine was initiated to "head-start" hatchling turtles to diversify the age structure and increase the size of the population. Since 1990, attempts have been made to improve nesting habitat, monitor nesting activities and trap and radio-track adult females to discover new nesting areas. The study objectives include: mark-release-recapture efforts to estimate the population size; determining age and sex structure of the population; searching for juvenile turtles; monitoring known or potential nesting areas and gravid females to find and protect nests; developing new areas on the preserve that are conducive to nesting by Blanding's turtles; reintroducing head-started hatchlings to the population and monitoring their movements. We will discuss our information to date, including our success in monitoring gravid females, finding and protecting nesting sites, establishing new nesting areas favorable for the Blanding's, and enhancing recruitment by reintroduction of head-started juveniles.

Nelson, Andrew P. and Peter A. **Rosenbaum** (Rice Creek Field Station, State University at Oswego, Oswego, NY 13126)

Floristic Evaluation of Known and Possible Bog Turtle Sites in Central New York.

Floristic surveys of sites in Seneca, Wayne, Northern Cayuga, and Oswego Counties have been conducted as part of ongoing studies of bog turtle (*Clemmys muhlenbergii*) populations and their habitats in central New York State. Our concept of bog turtle habitat in central New York is currently based on one site with an active population in Seneca County, one site with a questionable historic record in Wayne County, one inland site with an active population in western Oswego County, one Lake Ontario coastal site in Oswego County with an extant population inferred from a recent specimen, and one inland site in eastern Oswego County with a confirmed sighting within the last dozen years. The floristic composition of vegetation at these sites was compared with that of eleven other wetland sites in Wayne, northern Cayuga, and Oswego Counties and with literature descriptions of vegetation at bog turtle sites in the lower Hudson River Valley. The bog turtle sites in Seneca and Wayne Counties show recognizable floristic similarities with sites in the lower Hudson River Valley. The Oswego County bog turtle sites lack the floristic elements that connect the Seneca and Wayne County sites with those of southeastern New York. Based on a simple index of floristic similarity, the Oswego County bog turtle sites can be separated as a group from the Seneca and Wayne County sites. The floristic data that characterize the known Oswego County bog turtle sites may provide a means for evaluating other sites in eastern Lake Ontario counties as to their potential for supporting bog turtle populations.

O'Brien, Kathleen M. (New York State Department of Environmental Conservation Endangered Species Unit, 108 Game Farm Road, Delmar, NY 12054), and Ellis Q. **Margolis** (The Eastern New York Chapter of the Nature Conservancy, 200 Broadway, Troy, NY 12180)

Karner Blue Butterfly: Overview of Current Recovery Efforts in New York.

The Karner blue butterfly (*Lycaeides melissa samuelis*) is a state and federally endangered species that occurs in disturbance dependent barrens and savannah habitats; these ecosystems have experienced significant decline worldwide. Its present range includes Minnesota, Michigan, Wisconsin, New Hampshire, Indiana, and New York. Within New York, the sand deposits of historic Glacial Lake Albany remain as the last stronghold of the Karner blue in the East. Beginning with the drafting of a federal recovery plan, areas of remaining Karner blue populations range-wide were identified as Recovery Units. Glacial Lake Albany was identified as the recovery unit for New York along with two potential recovery units in western New York. A team comprised of New York State Department of Environmental Conservation (DEC), the Albany Pine Bush Preserve Commission (APBPC), the U. S. Fish & Wildlife Service (FWS), and The Nature Conservancy (TNC) has drafted a New York State recovery plan. This draft plan has identified state recovery units within Glacial Lake Albany and, using criteria adapted from the federal draft plan, describes the criteria under which the populations within the units will be considered "recovered." The draft will be finalized with input from local governments and groups to make a site-specific, workable document. When successfully implemented, the plan will guide research and recovery efforts for the Karner blue in New York State and will result in the de-listing of the species.

O'Connor, Christopher (NYS Department of Environmental Conservation: Water Division, 50 Wolf Rd., Albany, NY 12230)

Development of a Flood Model Based on a Geographic Information System.

Flooding, caused by both rivers and the sea, causes more damage and loss of life than any other natural hazard. New York State is not immune to this hazard. The January flood event of 1996 resulted in estimated damages of approximately \$110 million. For the past two years, the NYS Department of Environmental Conservation has been developing a new process for the assembly of a watershed-based flood model. At the core of this new process is the utilization of geographic information systems (GIS) in the creation, display, and usage of the flood model. An extensive list of data is being used to create the new model, including: land cover, soil types, digital elevation models, LIDAR technology, digital orthophoto quarter quads, weather data, climatological data, hydraulic data, land parcel data, and land survey data. With these and other data sets, county officials will be able to predict, with a high degree of accuracy, important information about future flood events and the effects of those events. The project is currently in its pilot stage, focusing on the Schoharie Creek Watershed. All of the non-hydraulic information has been assembled, and teams are currently completing the hydraulic and ground survey work. The DEC intends to 'package' this project and disperse it, providing training and equipment, to county officials for use. Through the use of existing data sets and creative agreements with federal agencies, the costs are less than those required for the production of FEMA's Flood Insurance Rate Maps (FIRMs), while at the same time increasing accuracy and functionality. In addition, the data being used to create the model will open the door to a wide variety of applications, including: environmental protection, natural resources management, economic development, master planning, and emergency response.

Otis, M. Pamela (Environmental Management, New York State Parks, Albany, NY 12238), **Robert Zaremba**, and **Cris Winters** (New York Regional Office, The Nature Conservancy, 415 River Street, Troy, NY 12180)

A Partnership for Managing Invasive Plants in New York State.

There is a growing concern in New York State over the possible adverse effects on biodiversity of invasive plants. In order to address this concern in a more comprehensive manner, an Ad Hoc Group for Invasive Plant Management was formed in 1994. This group includes representatives from the New York Natural Heritage Program, New York State Parks, New York State Department of Environmental Conservation, The Nature Conservancy (TNC), the Albany Pine Bush Preserve Commission, and the USDA Natural Resource Conservation Service, as well as other interested agencies, universities, private organizations and businesses. The Group developed a mission statement, created a glossary of terms relating to invasive species, and prepared an invasive plant species list, also identifying the top 20 most serious invasive plants in New York State. The Group has met in various locations across the state with invasive plant problems and organized a conference on invasive plants in the Hudson River Basin which included representatives of academic and scientific institutions and the nursery industry, as well as state and federal agencies. Through a new staff person presently employed by TNC, the Group is in the process of compiling available literature, exploring the establishment of an Exotic Pest Plant Council, and developing surveys of land managers, nurseries and landscapers. Information from the surveys will assist in identifying which species most threaten biodiversity, how invasive plant problems are currently being addressed, and how some of these species are used horticulturally. The survey results will also be utilized to develop an atlas showing the distribution of weedy plants. The Ad Hoc Group will continue to involve a broad range of participants and will be disseminating information more widely to nurseries, landscapers, and the general public through the development of pamphlets and articles.

Ozard, John W., and Alvin R. **Breisch** (New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, 108 Game Farm Road, Delmar, NY 12054)

Nighttime Amphibian Vocalization Surveys Using GIS and GNSS Technologies.

Conducting nighttime amphibian vocalization surveys in unfamiliar territory can be time consuming and/or unproductive without prior route planning during daylight hours. We developed a rapid survey method to locate breeding populations of frogs and toads in areas unfamiliar to the authors. A large number of potential breeding sites can be located in a single night by combining Geographic Information Systems (GIS) technology with Global Navigation Satellite Systems (GNSS) technology. Using a hand held global positioning system (GPS) receiver, a laptop computer, GIS software, satellite tracking software interfaced to the GIS and appropriate base map data layers (e.g., scanned images of quadrangles, county and town boundaries, species data files), we identify potential survey sites while the survey is underway. The vehicle's current location is plotted on the base map in the laptop computer using input from the GPS receiver. Existing species distribution information from the New York State Amphibian and Reptile Atlas database is added as another layer. We use this system to direct us to potential breeding locations by identifying and navigating to wetlands, ponds and streams depicted on the base map. Species heard calling are noted and location information, including county, town, quadrangle and road intersection are recorded. We estimate that our survey efficiency has increased fourfold using this method. We will show a prerecorded application of the technique during the presentation. The hardware and software components are readily available, off-the-shelf products.

Peterson, Allen M. (New York State Electric and Gas, Kirkwood Industrial Park, P.O. Box 5224, Binghamton, NY 13902)

Habitat Selection by the Long-tailed Salamander in Tioga Co., New York.

The long-tailed salamander (*Eurycea longicauda*) is New York's rarest amphibian, reported from only five sites during the NYS Reptile and Amphibian Atlas. A sixth site was recently discovered in Tioga County, New York. An investigation was conducted during the summer of 1998 to determine habitat characteristics of the site, use of the site by long-tailed salamanders, and possible reasons for their occurrence there. The site is a cold, spring-fed stream which flows for less than one mile from source spring to its union with the Owego Creek. The stream has many pool areas and small wetland zones surrounded by riparian forest near the source. July and August stream characteristics in this area are volume, 10cfs; temperature, 54 degrees; pH, 8.6 to 7.8; TDS, 13. The stream in this area contains no fish, although sizeable populations of predatory brook trout (*Salvelinus fontinalis*) and sculpins (*Cottus* sp.) exist immediately downstream. Adult long-tailed salamanders are the most commonly observed amphibian species in the riparian forest and wetland areas along the stream within 400 meters of the source spring. Larvae are common in the pool areas and transformed larvae are common at stream and pool margins. Lower reaches of the stream flow through old field. The species has not yet been observed there. The species has not yet been observed at Owego Creek, which flows less than 100 meters from the source spring. Possible reasons for the occurrence of long-tailed salamanders at the spring area include 1) high stream pH or TDS required by egg, larvae or adults, 2) low summer stream temperatures required by larvae, 3) high winter stream temperatures required by larvae or adults, and 4) the absence of predatory fish species.

Quenzer, Norbert, and Peter **Feinberg** (Bagdon Environmental, 3 Normanskill Boulevard, Delmar, New York 12054)

Biological Monitoring of Wetlands at the Mill Seat Landfill in Monroe County, New York.

The Mill Seat Landfill is a state-of-the-art facility constructed in 1991 and 1992. Three large state-regulated wetlands surround the landfill site. Due to the close proximity of the wetlands to the landfill, the NYSDEC required biological monitoring as a condition of the construction and operation permit. The primary goal of the monitoring is to assess changes in the flora and fauna of the wetlands so corrective actions can be taken if landfill associated impacts occur. Monitoring has been conducted each spring and summer since 1992. Biological monitoring at the site includes quantitative vegetation analysis using vegetation transects in each wetland. Qualitative analysis of vegetation is done during summer surveys. Large-scale aerial photos are taken annually and reviewed for changes in vegetation cover types, species composition and plant mortality. Wildlife is assessed qualitatively during spring and summer surveys. Surveys are conducted for macroinvertebrates, migratory and breeding birds, herps, and mammals. The survey results are correlated annually with landfill activities and concurrent monitoring of groundwater and surface water hydrology. Our findings show that some construction related impacts to wetlands have occurred. These impacts are the result of siltation to several wetland areas, as well as significant changes to the hydrology of one of the wetlands. Monitoring to-date indicates that long-term impacts may be occurring to portions of the wetlands due to the construction disturbances. The operation of the landfill has had relatively little effect on the wetland's flora and fauna. Monitoring will continue throughout the life of the landfill.

Robinson, George R. (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

Recent Advances in the Ecology of Plant Species Invasions.

Modern-day biological invasions are predominantly anthropogenic, occurring at rates well above estimated levels of previous natural species migrations. Invading plant species pose a major challenge to the preservation of natural communities throughout the world, but ecological generalizations that would aid in prevention and control of influential invaders have been elusive. However, several recent areas of inquiry appear promising, among them: (1) combinations of life history traits that differentiate invasive from non-invasive taxa; (2) a new genetic basis (genome size) for predicting invasive potential within taxonomic groups; (3) improved understanding of the substantial role played by humans in boosting potentially invasive species beyond threshold population sizes; (4) post-invasion genetic changes that may produce more invasive ecotypes; (5) a significant relationship between an invading plant species' capacity to form new mutualisms and its success as an invader. These new concepts have strong theoretical bases, and all have so far held up to independent empirical tests. However, a more comprehensive understanding of plant invasions will require integrating these and other line of research into more rigorous predictive tools. In New York State, we have a number of opportunities to broaden research on invading plants and to link ongoing studies with current advances in ecology.

Romack, Howard (Middle School Science Department, Cambridge Central School, Cambridge NY 12816)

Project Biosearch: A "Hands-On" Approach to Science Explorations in the Outdoors.

In 1990, Cambridge Central School launched the first phase of an innovative program designed to stimulate environmental awareness in middle-school students by augmenting the existing science curriculum with hands-on experiences that would help students to develop interest, skills, knowledge, and positive attitudes about science and their environment. Since its inception, Project Biosearch has hosted intensive after-school and summer workshops involving hands-on exploratory fieldwork at a variety of locations in Central New York and neighboring Vermont. In addition, Biosearch students on three occasions have traveled to Costa Rica to pursue topics in Central American Rainforest biology and ecology. Project Biosearch is designed to supplement and enrich the middle-school scientific curriculum by presenting a variety of activities that can be modified for use at various age, interest, and capability levels. Biosearch provides students with the opportunity to explore natural phenomena first hand—essential in most science lessons and absolutely critical to younger students who may have difficulty with the cold pages of an ordinary textbook. Now in its eighth year, Project Biosearch has worked to meet the challenge of making the best use of educational resources to provide students with a learning environment that uses the direct observation of natural phenomena to encourage the development of critical and ethical values, helping students to clarify their roles as global citizens. The program's emphasis on environmental awareness, critical assessment, problem-solving skills, as well as its interdisciplinary approach place it on the cutting-edge of curricular development as it advocates a closer integration of academic experience with life beyond the classroom. This presentation will include an overview of the history of Biosearch emphasizing both its design and implementation.

Romack, Howard (Middle School Science Department, Cambridge Central School, Cambridge NY 12816)

Project Silhouette: Exploring the School-to-Work Connection.

Increasingly, secondary schools across the country are implementing innovative programs to foster a closer integration of academic experience with the goals, standards, and conventions of professional life. Project Silhouette at Cambridge Central Middle School is designed to encourage cross-disciplinary approaches to research and “real-world” experiences by connecting students’ academic topics of inquiry to life beyond CCS. This program works to facilitate the development of networks between CCS and area businesses, museums, government agencies, as well as institutions of higher learning. In pairing students with area science specialists, it not only increases the opportunities CCS can offer its students but it strengthens the institution’s involvement in the community. Phase one of the program, implemented in the fall of 1998, brought 50 students to nearly two dozen area locations for intensive three-hour introductions to their operations. The second phase of this scientific enrichment program, scheduled for implementation this fall, will broaden the scope of Project Silhouette by extending the length of student internship and incorporating a research-project requirement. The proposed program, involves students, “in-house mentors” (teachers from CCS), and “area mentors” (representatives from scientific institutions and a variety of other scientific professions). Student interns will be required to establish a research problem in advance, be matched with an appropriate area mentor, and work with their mentors to develop this problem into a full-fledged project through academic research and hands-on exploration using the resources of the internship site. This presentation will include a brief overview of Project Silhouette, emphasizing its goals and logistics, and will spend the greater part of presentation time looking at the results of phase one of the program.

Russell, Emily W. B. (Department of Geological Sciences, Rutgers University, Newark, NJ 07102)

Vegetation and Land-use History of the Shawangunk Mountain Region.

The Shawangunk Mountains are a fairly continuous northeast/southwest trending ridge of highly resistant conglomerate rock which forms shallow, low-nutrient soils. Valleys to the east and west and some small valleys within the ridge are generally more fertile. The area supports 5 globally rare communities, including a large area of dwarf pitch pine barrens. Because of the unusual geology and vegetation, land-use over the last 3 centuries has been highly varied in time and space. I have used witness tree data from 18th and early 19th century land surveys as a clue to the precolonial forest cover in the region and various other historical records to trace uses and changes to the present day. The survey records indicate a general pattern of vegetation, with oak-chestnut forest dominant in the lowlands and pitch pine on the ridgetops, which is similar in overall aspect to current forests. Current vegetation, however, reflects intense use for such activities as logging, cordwood cutting, farming and subsequent farm abandonment, and management for blueberries. Fire has been a major factor in forest development. Because the current landscape reflects interactions of natural factors and changing human caused and natural disturbances, some of the rare communities may be dependent on continuing disturbances.

Rutkowski, Joseph, **Ryan Orton**, **Troy Hiltz**, **Cynthia Louie** (Department of Geography & Planning, University at Albany, SUNY, Albany, NY 12222), and **Soumava Adhya** (Department of Earth & Atmospheric Sciences, University at Albany, SUNY, Albany, NY 12222)

Some Ideas on Potential Applications of GIS in Earth Sciences.

Geographic Information System (GIS) is essentially a computer system designed to capture, store, update, manipulate, analyze, and display geographically referenced information. The use of GIS grew dramatically over the past decade paralleling advancements in technology. Some applications include high-quality cartography, land use planning, natural resource management, ecological research, environmental assessment and planning. The New York State Department of Environmental Conservation (NYS DEC) in collaboration with the University at Albany, State University of New York, has created Digital Elevation Models (DEM) which represent a high resolution virtual land surface of the entire New York state. Along with the detailed surface topography, a complete hydrographic network, water quality class, and stream hierarchy database is being compiled. Once completed these data can be easily accessed, quickly synthesized, displayed individually or in combination, and will require much less storage space and management than their paper predecessors. The virtual land surface along with the related data sets can be used as follows: (a) to model flood plains and drainage basins for the purpose of flood control, prediction of pollutant movement, pollution control and monitoring; (b) to predict slope stability in combination with soil quality data for land use planning; (c) to provide a realistic visualization of the land surface in 2-D and 3-D in the classrooms, and to render hands-on experience to students in collection and analysis of spatial data, for educational purpose.

Scheiber, Isabella B. R. (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

Mate Choice in the House Wren (*Troglodytes aedon*), a Monomorphic Passerine.

This study investigates mate-choice and the mating system in a population of house wrens in Rensselaerville, NY. I am interested which criteria, such as condition of males, age, arrival time, fluctuating asymmetry, song differences, UV coloration, and finally genetic composition, females use to evaluate their potential mates. I am especially interested in whether the polygynous males—males that attract more than one female in one breeding event—express one / some of these characters to a larger extent. My data suggest that females prefer older males, which are also the ones to arrive on the territories first, since these are the only ones that will become polygynous. There seem to be differences in the songs of males as well. My preliminary data suggest that some elements of the house wren's complex song are elongated in some males, and shortened in other males. I hope to be able to show that polygynous males have a more complex song. Finally, I will present life history data of the individuals of my population. I am interested in primary and secondary females of individual polygynous males. It has been shown in several other house wren populations that secondary females have a much lower fledging success, because they receive no paternal care in raising their offspring. My future goal is to answer the question why females engage in polygyny, since it has deleterious effects at least on some of their reproductive success. I hope to be able to show that polygynous females that are able to fledge their young, produce higher quality offspring.

Seischab, Franz K. (Rochester Institute of Technology, Rochester, NY 14623), and John M. **Bernard** (Ithaca College, Ithaca, NY 14850)

Revegetation Following Catastrophic Fire in Long Island Pine Barrens.

In an effort to monitor revegetation following a catastrophic 1995 fire in Long Island pine barrens communities, we established 35 10×10 m plots and 350 m² subplots in seven different burned communities. We found a great deal of variation in the performance of different species in the different communities. After three growing seasons an average of 75% ground cover has returned, over half of that being contributed by *Quercus ilicifolia*. Cover values of other species include *Vaccinium pallidum* (7.7%), *Gaylussacia baccata* (5.2%), *Arctostaphylos uva-ursi* (7.4%) and *Carex pensylvanica* (6.8%). There was a fourfold increase in above-ground biomass from the 1996 to the 1997 growing season. We will discuss increases in above-ground biomass of all major species, particularly that of *Quercus ilicifolia*.

Shaw, William H., **D. Sawyer**, (Sullivan County Community College, Loch Sheldrake, New York 12759), and Paul **Bukaveckas** (Biology Department, University of Louisville, Louisville, Kentucky 40208)

The Effects of the Absence of Fish on Zooplankton Species Richness and Community Composition.

Collections of *Chaoborus*, crustaceans and rotifers from 30 Adirondack lakes and ponds, varying in pH from 4.5 to 7.3, were evaluated to uncover the nature of the biological interactions that occur under acidic conditions. Crustacean and rotifer species richness was significantly and positively correlated with pH. We present evidence that species richness is significantly higher in water bodies with fish than in those without, indicating that altered predator-prey interactions is a component in the species richness-pH relationship. Plankton community composition of fishless water bodies differs from that found in bodies with fish. In fishless bodies, *Chaoborus punctipennis* is replaced by generally larger chaoborid species and *Bosmina longirostris* and *Leptodiatomus minutus* are often reduced or absent. Food web interactions may be responsible for both lower species richness and altered community composition. The altered predation regime that occurs with the disappearance of fish is discussed. The recovery of lakes and ponds from acidification may require the restoration of their natural fish communities.

Strayer, David L. (Institute of Ecosystem Studies, Millbrook, NY 12545)

Use of Flow Refuges by Unionid Mussels in Rivers.

Using movement of marked rocks to assess the stability of sediments in two small rivers in southeastern New York, I tested the hypothesis that unionid mussels occur on stable areas of the riverbed. Mussel beds were spatially coincident with stable areas of the riverbed, but not with other measured features of the habitat (water depth, current speed, shear stress, and sediment grain size) in both study sites. Use of flow refuges by unionids may partly explain the characteristic patchiness of unionid communities in rivers and contribute to the success of these long-lived, slow-moving animals in running waters.

Sutherland, James W. (Lake Services Section, New York State Department of Environmental Conservation, 50 Wolf Road, Albany, NY 12233-3508)

The Status of Nuisance Aquatic Plant Management in New York State.

Nuisance aquatic plants have become a serious problem for water resources throughout New York State during the past several decades. Large water bodies currently infected with nuisance aquatic plants include Lake Champlain, Lake George, and Saratoga Lake in eastern New York, and Cayuga, Canandaigua, Keuka, and Seneca Lakes in the Finger Lakes Region. Many of these water bodies are used extensively for recreation and are of significant value to the local economy. Three species of exotic plants, *Myriophyllum spicatum* (Eurasian Watermilfoil), *Trapa natans* (Water Chestnut), and *Potamogeton crispus* (Curlyleaf Pondweed), have reached nuisance levels in New York State. According to an updated inventory, over 150 lakes and ponds in over 40 counties across the state are infested with one or more nonindigenous plant species. In particular, the rapid growth and distribution of Eurasian watermilfoil in water bodies throughout New York and its effect on native plants has caused great concern and makes the management of nuisance aquatic plants a formidable statewide challenge during the remainder of the 1990s and into the next century. Presently, a variety of physical, chemical and biological methods are available to manage nuisance aquatic plants. However, for individual water bodies, the nuisance aquatic plant problem often escalates so rapidly that local property owner groups and lake associations are unable to finance and implement an effective program of plant management. In many cases, regulations and permit requirements limit the development of a comprehensive approach to plant management by restricting the use of herbicides to control the infestations of exotic plants that are too extensive to be managed by other means. Typically, the costs of physical plant control programs are prohibitive. This presentation will summarize plant management methods currently available and report on some of the case histories throughout New York State where sufficient documentation has occurred.

Valburg, Lisa K. (Department of Biology, Penn State University, Dunmore, PA 18512)

Effects of Insect Infestation on Aspects of Life Histories in Blueberries (*Vaccinium corymbosum*): Patterns in Genotype, Neighborhood, and Population.

The presence of pulp mining insect larvae within ripening fruits has been shown to have different effects on plants at the community and population level. Both positive effects (through increased rates of fruit removal and palatability signals) and negative effects (through fruit abortion or disperser avoidance) have been shown for various species. Here, I report on the first four years of a long-term study of two blueberry populations in Northeast Pennsylvania that I have studied at the genotype level. Most previous studies have considered the plant/insect/bird interaction at the level of the plant population, assuming uniformity of response to infesting insects. This study examines the effect of plant genotype on levels of pulp miner infestation. Pulp miners are of special interest in the ecological interaction because although they do consume pulp and damage some seeds, many seeds are left viable and germinable. Within the two distinct populations, I examined three different genotypes, and found patterns within populations, among genotypes, and between populations. Life history patterns in blueberries are far from static, as I show small scale evolutionary responses that correlate with microhabitat, genotype and phenotypic variability. Plants within the blueberry population may differ in their abilities to respond to different levels of larval infestation. I will report on genotypic responses to larval infestation through changes in rates of fruit abortion, phenology of ripening, crop size, and microhabitat site use.

Verschoor, Karin (NYS Department of Environmental Conservation, 50 Wolf Road, Albany NY 12233)

Use of High Resolution Digital Elevation Models for Landscape Visualization in the Natural Sciences.

High Resolution Digital Elevation Models (DEMs) are a powerful tool for depiction of landforms which can be used in analysis, mapping, and education in fields such as geology and ecology. Using ArcInfo and 10 meter DEMs, it is possible to create virtual land surfaces which show detailed topography and can be displayed in variety of formats, including shaded relief, perspective views, stereo pairs and color elevation shading which can be viewed in 3D using Chromatek (TM) glasses. Various aspects of a landscape can be enhanced by varying the viewing angle, the lighting angle and the vertical exaggeration. Other data layers such as digital imagery and polygon coverages can be draped over the DEMs to provide additional information. For example, stereopairs of aerial photographs are commonly used in geology to show geologic landforms and structures in 3D. Geologic information must either be read from a map or drawn directly on the photos. By producing stereopairs from DEMs which incorporate geologic coverages, it is possible to view the landform and the geology simultaneously in 3D, either by freeviewing or using a stereoviewer. Another example of the power of combining DEMs and polygon coverages is for forest cover type mapping. Forest ecosystems have horizontal components such as vegetation or soil types and vertical components such as elevation. By combining the coverages of horizontal components with a DEM, which provides the vertical component, the forest can be shown in three dimensions from a variety of angles. Landform parameters which directly influence plant growth, such as elevation, slope and aspect can be accurately derived from the DEM and provide a quantitative tool for analysis and modeling of ecosystems.

Warny, Peter R. (Science Museum of Long Island, Bridle Path East, Port Washington, NY 11050)

Comparative Herpetological Field Studies in New York and Other Mid-Atlantic States.

Herpetological travels throughout the east coast and mid-west has elucidated a variety of reptile and amphibian conservation projects and studies on similar or same species and habitats as studied in New York. Species that are rare in western New York tend to be more common in the mid-western states, (i.e. Softshell Turtles, Queen Snakes and Hellbenders). Coastal plain species rare in N.Y. on Long Island tend to be more widespread in New Jersey, Del-Mar-Va Peninsula and the Carolinas, (i.e. Tiger Salamander, Mud Turtle, Cricket Frog and Southern Leopard Frog as well as the Chorus frog—extirpated from Staten Island). Any state bounded by artificial boundaries has valuable ecological conservation information to be gained by sharing and comparing with nearby states to develop a regional or range wide perspective on the species or habitat of study. This slide-illustrated presentation will depict field studies on both common and rare species also found in New York in habitats similar to but outside of this state. Studies on the urban-rural continuum and suburban habitat fragmentation will be emphasized with examples such as Virginia's "UrbanCrescent" mosaic from Washington, D.C. to Richmond, Virginia and other metropolitan regions. Land habitat management and species population enhancement projects will also be discussed with examples of herpetological conservation projects and techniques at Patuxent National Wildlife Refuge, The Savannah River Ecological Laboratory and several university biological field stations. Various projects will be described as they pertain to similar situations in New York State. There appears to be an advantage to any herpetologist conducting fieldwork to consider a species habitats and range throughout various states. This applies especially to many common species being studied since the federal government is primarily interested in rare or declining species and habitats. Many species rare in New York are more common elsewhere.

Wells, Alan W. (Lawler, Matusky & Skelly Engineers LLP, Pearl River, NY 10965), and **Della M. Wells** (Tomkins Cove, NY 10986)

Fishes of Harriman and Bear Mountain State Parks.

Since 1994, one hundred and seventy-two stations within the Hudson River and upper Passaic River basins of Harriman and Bear Mountain State Parks of New York have been sampled for fish. Within the Hudson River basin major tributaries sampled include Tiorati Brook, Doodletown Brook, Miniscengo Brook, and Popolopen Brook. Within the Passaic basin, tributaries include the Mahwah River, Ramapo River and Stony Brook. Most stations were sampled using a backpack-mounted pulsed DC electroshocker. At each station, all fish are identified, enumerated, and measured. Physical characteristics of the site and the sample duration (electrical discharge in seconds) are recorded. Overall, 4,214 individuals representing 33 species were taken. Based on our electrofishing samples only, eastern blacknose dace (*Rhinichthys atratulus*) was the most abundant species, comprising 47.2% of the total catch. It was far more abundant in the Hudson River basin (64.3% of total) than in the Passaic basin (17.3%). Creek chub (*Semotilus atromaculatus*), tessellated darter (*Etheostoma olmstedi*), eastern mudminnow (*Umbra pygmaea*), cutlips minnow (*Exoglossum maxillingua*) are the next most abundant, comprising 11.9%, 6.0%, 3.7%, and 3.5% of the total, respectively. Comparison of our results to historic collections suggests recent changes in the fish fauna of the basins. Green sunfish, unreported in all prior surveys, are now common throughout the Ramapo and Mahwah Rivers. Slimy sculpin, previously unreported, are commonly found in Stony Brook and Torne Brook. Species such as creek chubsucker and *Enneacanthus* spp., once common, were rarely encountered. Bridle shiner and comely shiner were reported in surveys prior to 1962. They were not observed in our study.

Wells, Daniel B. (Department of Biological Sciences, University at Albany, Albany, NY 12222)

Effects of Soil Nitrogen on Plant Invasion and Community Composition in the Albany Pine Bush.

Studies have shown that invading plant species can increase soil nitrogen levels, giving themselves a competitive advantage over native plants. The unusual plant community of the Albany Pine Bush contains many slow-growing plants, such as pitch pine (*Pinus rigida*) and little bluestem (*Schizachyrium scoparium*), that specialize in low-nitrogen habitats. Invasion by less tolerant species would gradually exclude the native species, leading to a decrease in species diversity. In addition, invading species often reduce beta-diversity by monopolizing heterogeneous habitats. I am investigating these phenomena in the Albany Pine Bush. I sampled soils and measured vegetation cover by species along 14 transects, each 50 meters in length, located throughout the Pine Bush Preserve. Each transect ran from an uninvaded area into an adjacent invaded area dominated by either aspen (*Populus* spp.) or black locust (*Robinia pseudoacacia*). Preliminary results indicate dramatic changes in species composition along each transect as well as changes in soil litter profile.

Wells, Jeffrey V. (National Audubon Society, c/o Cornell Lab of Ornithology, 159 Sapsucker Road, Ithaca, NY 14850)

A Blueprint for Bird Conservation: The New York Important Bird Areas Program.

The concept of identifying and conserving sites that are especially important for birds through the use of objective criteria was the cornerstone of Birdlife International's Important Bird Areas (IBA) program, initiated in Europe in the 1980's. The program's success in protecting these sites led to the start of similar efforts in the Middle East, Africa, and the Americas. In the United States, a number of state IBA programs are underway. National Audubon's New York State IBA program used a committee of state bird experts to step-down international and national site criteria to the state level. These criteria were used by the committee to evaluate the approximately 250 sites that were nominated for consideration as IBAs within New York State. The 127 sites identified by the committee as meeting state-level IBA criteria are described in a recently published volume entitled "Important Bird Areas of New York State". These IBAs include the site of one of the largest gull concentrations in the world, one of North America's largest Roseate Tern colonies, a Bank Swallow colony of more than 3,000 pairs, and a hawkwatch that has one of the largest Golden Eagle tallies in the northeast U.S. More than 80% of the state's breeding Piping Plovers occur within IBAs, and at least 7% of IBAs support breeding Cerulean Warblers. New York's 127 IBAs will be further assessed for how well they represent important sites for federally and state endangered species and Watchlist species as well as important bird habitat communities. Conservation initiatives at IBAs and evaluation of conservation success will also be discussed.

Wolfe, James M. (Biology Department, Houghton College, Houghton, NY 14744) and **David C. Mahan** (AuSable Institute of Environmental Studies, 7526 Sunset Trail N.E., Mancelona, MI 49659)

Limnology of Five Hardwater Lakes in Kalkaska County, Michigan.

Five hardwater ($63\text{--}250\ \mu\text{S cm}^{-2}$) lakes in the headwaters of the Manistee River (Michigan) watershed were studied from 1984–1993. The lakes varied in size and density of shoreline human habitation. All five showed the presence of summer metalimnetic oxygen maxima, correlated with chlorophyll maxima ($4\text{--}31\ \mu\text{g L}^{-1}$) at the bottom of the metalimnion in these clear (Secchi depth = 5–7 m) lakes. Metalimnetic oxygen maxima were also correlated with maxima in alkalinity and pH. Phytoplankton samples from the water column showed the presence of blue-green algae and dinoflagellates in low concentrations. Total phosphorus levels in the water column were also low, ranging from 7.5 to 12 ppb. Four of the five lakes were characterized as oligotrophic-mesotrophic (indicated by Secchi depth, chlorophyll levels, and phosphorus concentrations) despite nutrient loading from lakefront cottages. This trophic status for two of the lakes was maintained over a nine-year period. Epilimnetic decalcification with subsequent calcium carbonate precipitation and nutrient lockup may play a significant role in the maintenance of the trophic status for these five lakes.

Woolbright, Lawrence L., Thomas J. **Brady**, Nancy B. **Elliott**, Douglas F. **Fraser** (Siena College, Loudonville, NY 12211), and David **McCullough** (Wartburg College, Waverly, IA 50677), Ronald **Dodson** (Audubon International, Selkirk, NY 12158), and Peter **Salinetti** (Schuyler Meadows Club, Loudonville, NY 12211)

The Schuyler Meadows Project: An Investigation of How Golf Courses Can Better Serve as Habitat to Support Native Biodiversity.

Golf courses are becoming increasingly important as part of the green space remaining in largely urban and suburban landscapes, and thus are potentially important as refuges for native wildlife in the middle of human-dominated ecosystems. Golfers have become more interested in environmental issues surrounding golf courses, and ecologists have begun to realize that they must pay more attention to managed ecosystems. Thus the time is right for a collaboration between ecologists and the golf industry, aimed at increasing the suitability of golf courses as habitat for wildlife. Such a partnership was formed in 1995 between the Science Division at Siena College and the Schuyler Meadows Club, a private golf club in suburban Albany, NY. Through this agreement, facilitated by Audubon International, Siena faculty and students conduct long term monitoring and research projects at Schuyler Meadows, and Schuyler Meadows, in turn, is using the results of the research to become a model for wildlife-sensitive management practices. Since 1995, Siena students have been involved in research projects, mapping and characterizing the forested patches on the course, monitoring its aquatic habitats, and doing baseline population studies on insects nesting birds and small mammals there. Initial results show that animal populations vary with the size of forested patches and the nature of the understorey. This suggests that the role of these patches as wildlife habitat can be further enhanced by simple measures such as establishing no-mow zones along selected edges, and we are currently conducting experiments to test this. As the project matures, we will continue experiments on management practices and standardize, our monitoring techniques. The results of these efforts will be applicable to other kinds of managed environments as well as golf courses.

Wright, Nicole D. (Department of Biology, University at Albany, SUNY, Albany, NY 12222)

Land-Use History, Population Structure and Small-Scale Spatial Pattern in Beech Bark Disease.

Previous land-use practices including cultivation and logging have influenced many present day forest communities. Disease ecology also influences forest dynamics. Beech bark disease (BBD), a complex syndrome involving a scale insect (*Cryptococcus fagisuga*) and an associated fungal pathogen (*Nectria* spp.) affects American beech (*Fagus grandifolia*), throughout eastern, New York. American Beech displays two modes of reproduction: sexual recruitment via seeds and clonal recruitment via root sprouts. Starch gel electrophoresis of bud isozymes was used to infer the spatial distribution of isozyme phenotypes within contrasting and replicable sites, to verify the effects of previous land-use on mode of recruitment in cultivated and logged terrain, within the Edmund Niles Huyck Preserve. The overlap in spatial distribution of disease symptomology and multilocus phenotypes was examined to verify the extent of genetic control influencing resistance to BBD. More clusters of trees sharing the same isozyme phenotype were found in logged (68.0% and 51.6%) as compared to cultivated areas (38.5% and 38.4%). This suggests the predominance of clonal propagation in logged areas. The distribution of phenotypes in cultivated areas was more random and attributed to recruitment from seed. Genetic variability was high in every plot (normalized Shannon-Wiener index ranged from 0.8963 to 0.9698). The genetic consequence of fragmentation due to land-use within the Preserve is well illustrated by the high proportion of multilocus phenotypes found to be

unique to each experimental area (61.5% to 79.4%). No significant correlation was found between land-use and the frequency of resistant trees (22.8% and 17.7% in logged versus 19.8% and 11.2% in cultivated areas). Resistant and susceptible trees were often found within the same genetic cluster, possibly because not all trees within a cluster were ramets of a single clone, or because complex genetic and environmental interactions control the response of trees to the agents involved in BBD.

Wyman, Richard L., Kelly MacWatters, and Cathy Casey (Edmund Niles Huyck Preserve & Biological Research Station, Rensselaerville, NY, 12147)

Effects of Salamander Predation on Detrital Invertebrates, Decomposition, and the Carbon Cycle of Beech Forests.

Experiments over the last six years will be described that tested the effects of salamander predation on the structure of the leaf litter invertebrate community, leaf fragmentation, soil chemistry, decomposition and carbon dioxide production. The experiment was conducted in beech forests on the Huyck Preserve in Rensselaerville, New York, from 1993 to 1998. Experiments in 1993 and 1994 manipulated salamander numbers in nine mesh screen enclosures (1.5m×2.5m) buried in the forest floor and in plots. In 1995 four plots and eight enclosures were located in three forests at the high and low ends of the soil catena normally found in northeastern U.S. forests (48 enclosures and 24 plots). In one half of the plots salamanders were removed and in the other half salamanders were searched for but were replaced when they were found. One half of the enclosures contained no salamander and one half contained three. Measurements of decomposition, soil and leaf chemistry, carbon dioxide production, degree of leaf litter fragmentation and the composition of the invertebrate community were made at the beginning and end of each year. Salamander predation significantly reduced the number of several taxa of leaf litter invertebrates, altered fragmentation patterns, altered carbon dioxide production, and affected soil chemistry (C/N ratio). It appears that predators of detrital food webs may alter carbon dynamics through a reduction in the numbers of leaf litter fragmenters.

Young, Stephen M. (New York Natural Heritage Program, Latham, NY 12110-2400), **John Ozard,** and **Scott Crocoll** (NY State DEC Bureau of Wildlife, Latham, NY 12110).

Five Years of Seabeach Amaranth (*Amaranthus pumilus*) Surveys with GPS Technology—Finding More Questions Than Answers.

Seabeach amaranth, a member of the amaranth family (Amaranthaceae) is federally-listed as threatened. It was historically known from barrier beaches along the Atlantic seaboard from Massachusetts to South Carolina but presently exists only in North and South Carolina, Maryland and Long Island, New York. This annual, fugitive plant grows in front of the foredune and above high tide line of barrier beaches but is often moved around by washovers from hurricanes and other large storms. On Long Island it is threatened by beach grooming and stabilization, foot and vehicle traffic. Using global positioning system (GPS) receivers to pinpoint locations on the beach, surveys have been conducted at eleven sites for the last five years. The surveys have been used primarily to compare plant locations from year to year with a high degree of accuracy. After five years of detailed observations many questions naturally arose about the natural history of the species which have not been explained. For example, how does beach renourishment affect regeneration? Why, in late August, do some beaches have many seedlings while others have only mature plants? How much does seed-banking play a part in its viability? Answers to these and other mysteries, essential to its preservation, need to be found.

Zander, Richard H. (Buffalo Museum of Science, 1020 Humboldt Parkway, Buffalo, NY 14211)

New Hope for Biodiversity Funding.

Proposals emphasizing phylogenetic reconstruction presently take 75% of systematics grants from NSF. This comes to nearly \$10 million each year from a \$14 million budget. Contrary to some criticisms, nature really is parsimonious, but not optimally so. Maximum parsimony and other optimality criteria (e.g., minimum falsifiability, maximum likelihood, maximum posterior probability) are commonly used in modern phylogenetic reconstruction that use either morphological or molecular characters, but introduce too much precision and too little accuracy by any reasonable measure appropriate for historical events. Although (1) accepted classifications, (2) cladistic branches with high Bremer support values, and (3) molecular trees with high posterior probability can be viewed as phylogenetic reconstructions of species or gene trees because there are no reasonable alternative trees, the problematic taxonomies that are commonly studied often have many reasonable alternatives. Some alternatives are quite unlike each other, and although the word “approximate” is often used, it is seldom defined probabilistically. An example is given using the analogy of deciding a court case about a past event, distinguishing maximum likelihood from actual probability. Given the preponderance of published results with no demonstrable probability of greater than 50% (or greater than 95% for results on which other studies are to be built), I argue that a redistribution of governmental funding away from support for phylogenetic reconstruction is warranted to address real concerns in the biological diversity crisis.

Zantopp, Krista, Suzanne M. **Hohn**, and Cris L. **Winters** (Biodiversity, Conservation, and Policy Program, University at Albany, Albany, NY 12222)

New York State Mammals—Extirpations and Restorations.

Many species of mammals roamed the forests of New York State 300 years ago, including wolf, moose, lynx, and fisher. Settlement of the state in the 1800's, with the accompanying clearing of forests for agriculture and timber sales, began a series of extirpations of these animals that peaked in the late 19th century. Restorations of several mammal species have been attempted since the early 20th century. Some of these have been extremely successful; others have failed. We will discuss the species that were extirpated, causes of the extirpations, and the change in attitudes toward restoration of mammals during the past few decades, using several species as examples.

Zaremba, Robert E. (The Nature Conservancy, New York Regional Office, 415 River Street, Troy, New York 12180)

Invasive Plants in Natural Area Conservation: Planning.

Effective invasive species management will play an important role in protecting biodiversity throughout New York. Over the past ten years, The Nature Conservancy has developed a planning process for sites to focus our work on species and natural community targets. Ecological models are developed for key species and communities that describe processes that maintain these targets as well as threats to their viability. Invasive species often pose the major threat at a site to both species and communities and are defined in the planning process as key features that need to be controlled if we are to be successful. TNC has also developed a site invasive species assessment procedure that provides a framework for action at sites. Not all invasive

species are a major concern requiring stewardship action. A site assessment (weed plan) differentiates between those species affecting biodiversity in direct ways and those species that although non-native do not pose a threat to target species and communities. The planning process and invasive species site plan will be reviewed using a New York example.

Zaremba, Robert E. (The Nature Conservancy, New York Regional Office, 415 River Street, Troy, New York 12180)*

Gifford, Neil (Albany Pine Bush Preserve, The Nature Conservancy, 108 Wade Road, Latham, NY 12110), **Jessica Gurevitch** (University at Stony Brook, Department of Ecology and Evolution, Stony Brook, NY 11794), and **Erik Kiviat** (Hudsonia, Bard College Field Station, Annandale-on-Hudson, NY 12504), and **George Robinson** (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)**

Research Needs on Invasive Species Issues in New York.

While it is acknowledged by most conservation land managers that invasive species pose significant threats to biodiversity in New York, there have been surprisingly few studies to define the critical issues in invasive species management and to develop field solutions. This panel discussion will highlight some of the research needed to understand and manage invasive plants in New York State. These research needs include documentation of regional effects of invasives and their impacts on biodiversity, development of effective control techniques and associated monitoring, and development of a network to exchange information on invasive species.

* Robert Zaremba is moderator of this panel discussion scheduled during the invasive plants session.

** Panel members

Zehr, Jonathan P., and **Barbara Methé** (Department of Biology, Rensselaer Polytechnic Institute, Troy, NY 12180-3590)

Bacterial Diversity in Adirondack Lakes.

Effects of acidification on many trophic levels are well documented, but technical limitations have historically restricted the analysis of bacterial population diversity. Bacterial communities of seven lakes in the Adirondack Mountains of New York State were characterized by amplification and sequencing of 16S rDNA. Analysis of over 200 partial sequences revealed a diverse collection of lineages, composed largely of the Proteobacteria (19% alpha-subdivision, 31% beta-subdivision, 9% gamma subdivision), Cytophaga-Bacteroides-Flavobacteria (15%), and Actinomycetales (18%). Additionally, a number of the sequences were similar to those of Verrucomicrobiales. However, few of the sequence types are closely related to those of previously characterized species. The relative contributions of the phylogenetic groups of sequences differed among the lakes, suggesting that there could be relationships between bacterial population diversity and water chemistry parameters.

Abstracts for Posters

Adams, David J. (New York State Department of Environmental Conservation, Bureau of Wildlife, Region 3, 21 S. Putt Corners Road, New Paltz, NY 12561)

Challenges in Implementing a Biological Control Program for Purple Loosestrife (*Lythrum salicaria*): A State Agency Perspective.

Purple loosestrife (*Lythrum salicaria*) is an exotic wetland perennial responsible for the degradation of many prime wetland habitats throughout New York State. Large, monotypic stands reduce the biotic diversity of wetland systems by replacing native plant species and thereby eliminating the natural foods and cover essential to many wildlife inhabitants. The biological control of purple loosestrife is intended to reverse the massive degradation of wetland habitats currently attributed to the expansion of this species. A reduction of purple loosestrife abundance to approximately 10% of its current level over approximately 90% of its range is predicted. Unfortunately, efficient implementation of this very promising biocontrol program has been hindered by a number of problems both internally and externally. Problems that have cropped up within the agency include a lack of dedicated and adequate funding, no dedicated staff, a lack of statewide coordination, no long-term goals, and poor public outreach and education. External barriers that have become apparent include resistance to classifying purple loosestrife as a noxious weed thereby prohibiting its sale, a poor understanding of the concepts of biological control and its past success by the general public, mistrust of state government, and general ignorance of the effect of purple loosestrife on the natural wetland communities of the State. These various hurdles could be removed by establishing a dedicated funding source, adequate staffing, a state-wide coordinator, and a set of short-term and long-term management goals. In addition, an aggressive public outreach program and increased coordination between state agencies and federal programs might greatly improve the public's understanding of the current problem and increase acceptance of this promising biological control program.

Barnes, Jeffrey K. (Biological Survey, New York State Museum, Albany, NY 12230)

Albany Pine Bush Field Guide Project.

The goal of this project is to provide concise and accurate information on the ecology, flora, and fauna of the Albany Pine Bush in one printed source so interested individuals can easily access and appreciate this example of a rare and globally imperiled natural community. The Pine Bush is a remnant of vast pitch pine-scrub oak barrens that developed on well-drained postglacial sand dunes. After more than three centuries of human disturbance, only about 4,000 acres of this ecosystem survive amidst a tangle of highways, shopping malls and industrial parks. The climate in the Pine Bush is warmer and drier than that of the surrounding higher elevations, and a unique assortment of plants and animals occurs here. Many species with typically more southern distributions are at their northern limits here, and populations of some warm-adapted species are relicts left over from past periods of more hospitable climates. The delicate balance of life in the Pine Bush has been maintained for thousands of years by periodic fires. The diverse assemblage of animals includes species that depend on the fire-adapted plant community for food or find the unusually warm and arid conditions favorable to their lifestyle. A visual identification guide to species of plants, animals, and

fungi, within the framework of a general information source book, will help to improve accessibility and public appreciation of this unusual natural habitat. The general reader and field naturalist will find the tools and information needed to understand and appreciate the uniqueness of the Albany Pine Bush, its geological development, flora and fauna, and human influences.

Batcher, Michael S. (1907 Buskirk-West Hoosick Road, Buskirk, NY 12028), **J. Thompson** (Mohonk Preserve, 1000 Mountain Rest Road, New Paltz, NY 12561), **K. Hubbs** (The Nature Conservancy, 415 River Street, 4th Floor, Troy, NY 12180), and **F. Biasi** (The Nature Conservancy, 201 Devonshire, 5th Floor Boston, MA 02110)

Influence of Historic Fires on Plant Community Composition and Structure in the Shawangunk Mountains.

Fire is a significant force in determining the composition and structure of plant communities. Fire history data can be used to determine how fire has affected community structure and composition. Such data often lack critical information on the area and location of historic fires. The Shawangunk Mountains in eastern New York have a high degree of plant community diversity due to variations in environmental gradients (soils, slope, aspect) and historic disturbance events (wildfire). Using landscape level analyses, historic weather data, and FARSITE, a spatial fire behavior model developed by Systems for Environmental Management in Missoula, MT, we simulated 14 of the 19 historic fires (> 40 ha) that occurred from 1864 to 1976 in the northern Shawangunks. We then assessed present day communities found in those areas. Large areas were subjected to more than one wildfire during this period. The largest, contiguous areas of pine barrens in the northern Shawangunks are found in areas where FARSITE simulations showed 12 of the 14 fires occurred. Five communities: the chestnut oak forest, red maple-hardwood-heath forest, dwarf pine ridge, pitch pine-oak-heath rocky summit and sparse pitch pine-oak-heath rocky summit communities dominate those areas subject to these historic wildfires. These communities have similar shrub layer compositions and, therefore, similar fuel characteristics but different canopy layers. Differences in seasonality and frequency of fire between communities were not significant. All communities were subjected to both spring and summer/fall fires. Based on drought indices, fire severity was probably high during these wildfire events. Similarities between these communities appear to be the result of similar fire histories, while differences are most likely due to other site factors that will require further investigation.

Blossey, Bernd (Department of Natural Resources, Fernow Hall, Cornell University, Ithaca, NY 14853)

Biological Control of Purple Loosestrife.

Purple loosestrife (*Lythrum salicaria*) is an invasive non-indigenous species that has negatively affected temperate North American wetlands for decades. Chemical, mechanical or physical measures failed to provide long-term control. Current emphasis to control *L. salicaria* center around the introduction and distribution of host specific insect herbivores from the plant's native range. After the initial introduction of four beetle species attacking the roots, leaves, and flowers, mass production methods have been developed to increase the availability of these species for distribution. As of 1998 about 3 million leaf beetles and over 100,000 root feeding weevil eggs have been field released in >30 states and Canada. These species have been released in about 50–100 wetlands in New York State, are now well established and are commercially available. A standardized monitoring protocol has been developed to help evaluate the success of control agent releases over the next 10–20 years. Initial observations are very encouraging. At some of

the earliest release sites purple loosestrife has been selectively controlled and its abundance reduced to less than 5% of its original level. The once monotypic stands of *L. salicaria* are being replaced by a diverse wetland plant community.

Brady, Thomas, and Kate Parker (Siena College, Loudonville, NY 12211)

A Preliminary Limnological Study of a Suburban Golf Course Pond.

Many golf courses are located in urban or suburban settings. Golf courses are managed to insure high quality “turf” for optimum playing conditions. Part of this management involves the use of fertilizers. Additionally, many courses have water flowing through their boundaries. During the spring and summer of 1998 several streams and a pond on the Schuyler Meadows golf course in Loudonville, New York were limnologically examined. The objective of the study was to assess the levels of nitrates entering the pond from the course streams as well as a stream originating off the course. It was found that the main stream draining more than half of the course had consistently low levels of nitrates (≈ 0.5 mg/L). However a smaller stream that may be spring fed had nitrate levels near 10mg/L. The largest input of nitrates to the pond came from a stream that originates to the west of the course from two springs. The pond had a “lush” grow of macrophytes as well as large phytoplankton community. Pond chlorophyll levels exceeded 20 μ g/L late in the summer.

Breisch, Alvin R., and John W. Ozard (New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, 108 Game Farm Road, Delmar, NY 12054)

Not Necessarily Calling Frog Surveys.

With increasing concern for declining amphibians worldwide, various research and monitoring protocols have been developed for testing standardized survey techniques to document changes in the size of anuran populations. Much effort has been focused on using call count surveys conducted during the frog’s breeding season. The New York Amphibian and Reptile Atlas Project has been collecting data for all species of amphibians and reptiles since 1990. In addition to using calling surveys, several other techniques have been used to document each species. In this paper we compare the number of records documented using frog vocalizations versus the number of records documented with other techniques. A total of 14 species of frogs and toads have been confirmed as occurring in the wild in New York. Approximately 41.5% of the 15,400 reports were confirmed using calling surveys. The majority of the reports used visual searches and/or capture techniques to confirm presence. At least one species of frog was confirmed in 932 survey blocks. Vocalization was used to confirm frogs in 858 blocks, whereas non-vocalization techniques were used to confirm frogs in 898 blocks. Northern cricket frogs, spring peepers, gray treefrogs and western chorus frogs were most frequently confirmed by calling surveys. American toads, Fowler’s toads, bullfrogs, green frogs, pickerel frogs, northern leopard frogs and wood frogs were documented more frequently using capture or visual surveys. Non-vocalization techniques allow for a longer period of survey effort each year and provide information not obtainable using only call counts.

Carlson, Douglas M. (New York State Department Environmental Conservation, 317 Washington Street, Watertown, NY 13601)

New York's Endangered Fish Project.

The purpose of the Endangered Fish Project is to protect several rare fishes and to restore their populations, when practical. A history of activities during the last 15 years includes 1) development of the state's list of 19 fish species, in 1983, 2) hosting a workshop to update the list, in 1993 and 3) coordinating a plan for management of the 19 listed species. The more recent accomplishments include 1) advances in the recovery of two of the priority species, lake sturgeon and round whitefish, 2) development of Species Accounts that provide updates on the current status of these and 13 other rare species and 3) bringing together, the available information about fish communities in areas inhabited by some of these rare fishes.

Corey, Catherine (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222), and David L. **Strayer** (Institute of Ecosystem Studies, Box AB, Millbrook, NY 12545)

Videotape of the Display Behavior of the Eastern Pondmussel.

Larvae of freshwater mussels, known as glochidia, are obligate parasites on fish or amphibians. Females of some mussel species have extraordinary morphological features or exhibit display behaviors to lure a potential host for their glochidia. It is generally thought that displays by gravid female mussels increase the potential for their glochidia to locate and attach to hosts. The eastern pondmussel, *Ligumia nasuta* Say (Bivalvia: Unionidae), is a member of the tribe Lampsilini, which contains many of the mussel species known to display. A displaying female *Ligumia nasuta* was observed in Lake Taghkanic, Columbia County, New York, and was collected live in July 1998. This mussel was housed with two non-displaying *Ligumia nasuta* at the Institute of Ecosystem Studies, Millbrook, New York, in a 38 liter aquarium containing filtered and aerated well water and 5 centimeters of mixed gravel and sand substrate. We videotaped the displaying mussel alone and in the presence of a suspected host fish *Lepomis macrochirus* Rafinesque. The Lake Taghkanic mussel displayed almost continuously in captivity until it expelled four packets of glochidia ("conglutinates") 23 days after capture. During the mussel's display, its valves gaped and a mottled mantle was exposed. White papillae rippled back and forth across the mantle in a motion we term "zippering." The host fish were added to the mussel's aquarium for two one-hour observation periods, during which one fish attacked the mussel's moving papillae. The *Ligumia nasuta* glochidia had no hooks, and were clumped in milky, oval conglutinates approximately 8 millimeters long.

Ducey, Peter K. (Department of Biological Sciences, SUNY at Cortland, Cortland, NY 13045), Alvin R. **Breisch**, and John W. **Ozard** (New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources, Delmar, NY 12054), and Jessica **Whitbeck** (Department of Biological Sciences, SUNY at Cortland, Cortland, NY 13045)

Density and Distribution of *Plethodon cinereus* in New York State.

In 1975 Burton and Likens proposed that the northern redback salamander, *Plethodon cinereus*, was so common that it may be the most abundant vertebrate in eastern mixed hardwood forests. Earlier, Bishop had suggested that in New York State, the red-spotted newt, *Notophthalmus v. viridescens*, was the most

commonly observed species and that the northern dusky salamander, *Desmognthus fuscus*, was “perhaps the commonest and most widely distributed” salamander. We investigated the current abundance of *P. cinereus* in New York at scales from 1 m² plots to entire counties. Data were obtained from field surveys using a variety of techniques, review of published accounts, and records in the NY Amphibian and Reptile Atlas. Numbers of salamanders in 1 m² plots ranged to 8 individuals/m², but average densities for forest stands were generally under 0.5 individuals/m². This species occurred in forests of all sizes and types, including small fragments <1 ha and busy parks in urban areas. Atlas records indicate that *P. cinereus* is the most widely reported salamander in the state.

Ducey, Peter K. and Stacey **Noce** (Department of Biological Sciences, SUNY at Cortland, Cortland, NY 13045)

Ecological Interactions and Distribution of the Invading Predatory Flatworm *Bipalium adventitium*.

Bipalium adventitium Hyman, a terrestrial planarian which is a predator on earthworms, was first identified in the United States about a half century ago and is believed to have been introduced from Asia. To better understand the threat posed by this species, we are investigating the extent of its distribution in New York State, aspects of its life history, and its ecological interactions with potential predators and prey. We found *B. adventitium* in 13 counties spanning the state. Its abundance in urban/suburban gardens and lawns suggests that dispersal may be primarily passive. In laboratory trials, *B. adventitium* attacked and ate members of all seven earthworm species offered, readily attacking prey more than ten times its own mass. None of the salamander, frog, or snake species tested as potential predators treated the flatworms as regular prey items. Additional predators are being tested. Its abundance of prey, dearth of predators, and rapid dispersal suggest that *B. adventitium* may become a significant threat to ecosystems in the Northeast.

Ducey, Peter K. (Department of Biological Sciences, SUNY at Cortland, Cortland, NY 13045), and Alvin R. **Breisch** (New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources, Delmar, NY 12054)

Increasing Public Participation in the NY State Amphibian and Reptile Atlas.

The New York State Department of Environmental Conservation has been directing the NY Amphibian and Reptile Atlas, a state-wide, ten-year survey of the herpetofaunal populations which relies heavily on volunteer participation. We initiated a project to increase the educational value of the Atlas for young people and to increase their participation as contributors. To encourage participation, biology teachers in over 70 high schools were contacted directly with information about the project. Other teachers were reached via a museum exhibit at SUNY Cortland and a web page. The web page (<http://www.cortland.edu/herp/>) contains identification keys and photographs of local species, information about the Atlas, and web resource links. Participating high school classes received educational packets containing frog call tapes, books to aid with field identifications, field survey tips, Atlas handbooks and newsletters, and information on herpetofaunal conservation. Students from across the state are now participating.

Dwyer, Jamie L., and Todd **Hunsinger** (Biology Department, Hudson Valley Community College, Vandenburg Avenue, Troy, NY 12810)

Homerange and Movement of Two Juvenile and One Subadult Wood Turtles (*Clemmys insculpta*).

From 15 May 1998 to 25 July 1998, three wood turtles in their 6th, 8th, and 11th year were tracked in a small stream in eastern New York. Radio telemetry equipment was used to determine the home-range and movement of each turtle. The eight-year-old relocated to the stream twice from the initial observation date to 28 May 1998. The six-year-old was found seven times in the stream and the eleven-year-old was located once further upstream. Both juvenile turtles have home-ranges close to the stream compared with the sub-adult. Also, the subadult used the largest habitat area of the three. The juvenile relocates more frequently to the water than the sub-adult.

Fang, Wei (Dept. of Ecology and Evolution, SUNY Stony Brook, Stony Brook, NY 11794-5245), Jessica **Kaplan** (SUNY Geneseo, Geneseo, NY 14454), Marilyn **Jordan** (The Nature Conservancy, Long Island Chapter, Cold Spring Harbor, NY 11724), and Jessica **Gurevitch** (SUNY Stony Brook, Stony Brook, NY 11794)

Field Experiments on Factors Limiting Pitch Pine Seedlings After Fire.

After 60 years without fire, the globally rare dwarf pine plains in the Long Island pine barrens experienced a severe wildfire in August 1995. Dwarf pitch pine (*Pinus rigida*) recruitment by seed occurs primarily after fire. A reciprocal transplant experiment was initiated on burned sites to test whether progeny of normal stature pines (NSP) differed in growth characteristics from those of dwarf pines (DP). We transplanted 1,120 pitch pine seedlings from two NSP and two DP populations into two NSP and two DP sites. Neither mortality nor growth (height) differed among populations, but dwarf transplant sites had higher mortality and shorter plants than NSP sites. We also tested whether competition with scrub oak (*Quercus ilicifolia*) restricted pine recruitment. Contrary to prediction, naturally recruited pine seedling survival was higher under scrub oak than with scrub oak clipped. Also, not only did seedlings transplanted under scrub oaks have much higher survival than seedlings in the open, but survival of transplants was higher in unburned than burned sites. Soil drying curves suggest the importance of water stress in the early stages of pitch pine recruitment after fire. Granivory had significant effects on seed density in all tested habitats. Seed predation is the most intense in lightly burned sites, followed by severely burned sites, and least in unburned sites. Herbivory also affected seedling survival in burned areas, but only reduced growth in some sites.

Fleming, Michael P. (New York Metropolitan Flora Project, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, NY 11225)

High School Apprenticeships with the New York Metropolitan Flora Project.

The Brooklyn Botanic Garden's (BBG) New York Metropolitan Flora Project (NYMF) has implemented a multi-faceted educational outreach program for Brooklyn-area high school students that offers intensive, hands-on experience working directly with BBG scientists on a long-term urban plant science and biodiversity research program. Students participate in herbarium and fieldwork, learn computer

technologies, and design, implement and complete an inquiry-based research project of their own design. Sixteen students per year may choose between summer or after-school sessions. The program is overseen by NYMF research staff and an education outreach coordinator. All apprenticeships are paid. At the end of its fourth session, the NYMF education outreach program has had a total of 20 student apprentices. Two-thirds of these participants were women and 83% were ethnic minorities. Students from 9th–12th grades ranging from 14–20 years of age have participated thus far. NYMF has undertaken an extensive evaluation effort as part of the program, conducting interviews and having participants complete an evaluation form before beginning the program, immediately after finishing the program, upon the student's graduation from high school, and two years after graduation (the latter component has yet to be undertaken). Preliminary results from evaluation data and student interviews before and after the program suggest that all participants greatly improve their writing and critical thinking skills, develop a more positive attitude toward and an increased desire to participate in science. Furthermore, over half of these students have indicated that they plan to major in environmental science or botany in college.

Frolich, Karen (Biodiversity, Conservation and Policy Program, University at Albany, SUNY, Albany, NY 12222)

The Odonata of Grafton Lakes State Park, Rensselaer County, New York.

The five ponds at Grafton Lakes State Park have never been surveyed for dragonflies and damselflies. As of 1992, there were only 3 reported odonates from Rensselaer County: the dragonflies *Boyeria vinosa* and *Stylurus spiniceps* and the damselfly *Enallagma hageni*. These did not include 1987 benthic macroinvertebrate (BMI) sampling of 24 ponds in Rensselaer County, including those at Grafton Lakes, by the Adirondack Lakes Survey Corporation (ALSC). This was part of a survey of more than 1,700 lakes around New York State. Odonate larvae were present in all of the samples and the specimens were identified in 1997. The ALSC collection has the potential to reveal information about the distribution of odonate larvae across the state, but each sample may not contain all the odonate species present, which affects the interpretation of my data. In July and August 1998, I attempted to determine if the single ALSC sampling event represented the entire odonate biodiversity for each body of water sampled by sampling the ponds at Grafton Lakes. To measure odonate biodiversity, I observed and collected adult males, collected exuviae and larvae. There were significantly more odonates sampled in 1998 than 1987 despite the fact that early spring species were not sampled in the 1998 survey. This limits the information I can obtain from the ALSC data, however, it will nonetheless provide invaluable information about the distribution of odonate larvae in the Eastern New York State.

Gifford, Stephanie B. (Shawangunk Ridge Biodiversity Partnership and Eastern New York Chapter, The Nature Conservancy, 200 Broadway, Third Floor, Troy, NY 12180)

Shawangunk Ridge Biodiversity Partnership: Four Years of Research in Review.

As home to the best known example of a ridgetop dwarf pine barrens in the world, the Shawangunk Mountains of eastern New York represent one of the most important sites for biodiversity protection in the northeastern United States. In 1994, 11 public and private partners who work collaboratively to protect the area's natural, cultural and recreational resources, formed the Shawangunk Ridge Biodiversity Partnership. The newly-formed Partnership launched a six-year ecosystem research program designed to identify species and natural communities of significance and to improve our understanding of the ecological processes

that shape and maintain the unique biological resources found in the northern Shawangunks. Through successful fundraising efforts, the 11-member public-private partnership has supported a number of inventory and research projects, including: 1) natural community classification and mapping, 2) rare plant and insect inventories, 2) development of the Biodiversity Management Program database, 3) creation of a Geographic Information System comprised of over 20 data layers (including physical, environmental and natural features of the northern Shawangunks), 4) development of an ecological model and 5) investigation of how historic events affect natural community boundaries, structure and composition. With many of the projects complete and others still in progress, the Partnership has begun to review and apply this and other available information to the development of a Shawangunk Ridge Conservation and Management Plan. The work of the Partnership represents the first time scientific information will be used for conservation planning on the landscape level in the northern Shawangunks. The plan will provide detail for a clear and common vision among the Partners for protection, management and resource sharing across the ridge and property boundaries.

Gilman, Bruce (Department of Environmental Conservation/Outdoor Recreation, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, NY 14424-8395)

Consequences of a Catastrophic Fire on Alvar Community Structure.

Alvar landscapes contain direct evidence of historic fires (e.g., burned stumps, charcoal in soil, external fire scars at living tree bases and internal fire scars detected in increment cores), but it is uncertain whether fires are an important component of natural disturbance regimes that may help maintain alvar plant communities. A releve of the Perch River Barrens, extensively burned about 50 years ago, had reduced species richness and lower total vegetative cover when compared to a control plot at the nearby Limerick Cedars. Non-native species comprised a nearly equal percentage (20%) of the flora at both locations. There was little vertical stratification (overlap among vegetative strata) at either site. Potential fire recovery indicator species were *Betula papyrifera* (paper birch), *Minuartia michauxii* (rock sandwort), *Solidago hispida* (goldenrod), *Trichostema brachiatum* (false pennyroyal) and several nonvascular species.

Hecht, Jack H. (Lawler, Matusky & Skelly Engineers LLP, Pearl River, NY 10965)

Status and Distribution of Red-shouldered Hawks in the Hudson Highlands.

Historical records (1878–1960) indicate that the red-shouldered hawk (RSH), a species listed as threatened in New York State, was once a locally common nesting raptor in the Hudson Highlands of Orange and Rockland counties. Nesting RSH have not been found in Rockland County or Orange County east of the New York State Thruway since 1977. Since 1991 RSH have been found nesting west of the New York State Thruway in Sterling Forest. Three to five pairs of RSH continued to use Sterling Forest through 1998; however, they were not found in similar habitats located east of the New York State Thruway. A preliminary study to determine the status and distribution of RSH in two areas (Sterling Forest and Harriman State Park) under different resource management plans is discussed. The 18,000 acres of Sterling Forest have been managed for permitted activities, including fishing, trapping, hunting, and logging. Non-consumptive recreation in Sterling Forest, including hiking, camping, and nature study, is controlled by a permit system. In contrast, the 46,000 acres of Harriman State Park are managed for unrestricted, non-consumptive recreation (hiking, camping, nature study, etc.). Consumptive activities, such as trapping, hunting, and logging, are prohibited in Harriman State Park. The working hypothesis for this continuing study is that different management plans have contributed to the differential usage of habitats observed in

Sterling Forest and Harriman State Park. Existing management plans may not directly affect RSH; however, indirect effects may favor competitors, reduce prey species, increase nest disturbance, and change vegetation. Preliminary information on habitats and distribution is discussed.

Hohn, Suzanne M. (Biology Department, University at Albany, SUNY, Albany, NY 12222)

Amphibian and Reptile Species of New York in New York Pet Stores.

Investigations into possible influences on amphibian and reptile species in New York can play a role in future decisions about which species to protect. A possible influence that has not been extensively studied is the New York commercial pet trade. To assess one aspect of this issue, I conducted a survey of randomly selected pet stores throughout New York. Pet stores were asked which native amphibian and reptile species they sold, how many individuals of each species they sold in one year, and what the sale price was for individual animals. More than 60% of native New York amphibian and reptile species were reported as being sold by pet stores. Numbers of animals sold and their prices varied widely between stores. Results were further analyzed using categories such as protected species and species of "special concern". To continue my examination of the pet trade, I would like to determine whether the animals reported as sold in New York pet stores come from wild populations in New York, and, if so, whether this presents a threat to native populations.

Hunsinger, Kimberley C. (New York Natural Heritage Program, 700 Troy-Schenectady Road, Latham, NY 12210)

A Radio Telemetry Study of an Eastern Hognose Snake (*Heterodon p. platirhinos*).

An adult female hognose snake (*Heterodon p. platirhinos*) was radio-tagged and its movements tracked from 15 June 1997 through early October 1998 in the Albany Pine Bush in eastern New York State. More than 100 observations were made of the snake during this period. Locations where the snake was found were mapped using GPS technology to determine the individual's use of the area. The snake used a 23 hectare area during the 1997 field season and a 26 hectare area from spring emergence through 10 July 1998. It was found that the snake did not move randomly through its home range, but made use of a particular area for a length of time before moving on to the next area.

Hunsinger, Todd (Biology Department, Hudson Valley Community College, Troy, NY 12810)

Growth Rates and Maximum Body Size in the Wood Turtle (*Clemmys insculpta*) in Eastern New York.

A study of the wood turtle (*Clemmys insculpta*) was initiated on 12 May 1997 in Rensselaer County, New York. A total of 22 adults (11 males, 11 females) and 14 juveniles were captured, measured and individually marked. Age at sexual maturity (11 years), maximum carapace length (195 mm males; 182 mm females), and average body size of mature males (184 mm) and females (169.1 mm) is consistent with other studies in the northeast. The maximum and average size of adults are smaller than populations in Virginia and the western extent of the species' range suggesting an east-west division in development and body size. Rapid juvenile growth rates recorded are consistent with other wood turtle studies.

Hurst, Jeremy E. (41 Cypress Drive, Leola, PA 17540), and James **Wolfe** (Houghton College, Houghton, NY 14744)

A Comparison of Small Mammal Communities from Two Successional Stages.

The impacts of vegetational succession on the composition of small mammal communities were examined by live-trapping small mammals in an old field and mature hemlock-beech-maple forest in Allegany County, New York. Five trap periods from May to November 1997, yielded a total of 1,397 trapsets and 284 small mammal captures. Seven species were represented, three of which were found on both plots. The species richness of the mature forest was four, while that of the old field was six. The small mammal species captured in descending order of total abundance were: *Microtus pennsylvanicus* (meadow vole, 43.1% of total individuals), *Peromyscus maniculatus* (deer mouse, 30.4%), *Blarina brevicauda* (short-tail shrew, 13.2%), *Sorex cinereus* (masked shrew, 3.9%), *Zapus hudsonius* (meadow-jumping mouse, 3.9%), *Tamias striatus* (Eastern chipmunk, 3.4%), and *Cryptotis parva* (least shrew, 1.9%). Mark-recapture techniques were used to assess demographic structure and population characteristics of the small mammal fauna. The two small mammal communities were found to be 21.46% similar according to the Jaccard coefficient, with other indices (Morisita's, Horn, Bray-Curtis) of community similarity also indicating slight community overlap. The Simpson and Shannon diversity indices both displayed greater small mammal diversity in the old field (0.558 and 1.704) than in the mature forest (0.401 and 1.096). Total species abundance of the small mammals was determined to be significantly dependent ($p < .05$) on the plot successional stage, with the most abundant species also demonstrating significant ($p < .05$) seasonality and clumped dispersion. The results of this study indicate significant differences in the structure of small mammal communities during early and late vegetational succession stages.

Isachsen, Yngvar (Geological Survey, New York State Museum, Albany, NY 12230)

Spherule and Microtektite Evidence for a Buried Impact Crater at the Boundary Between Lower and Upper Devonian, Catskill Mountains, New York.

Panther Mountain is a 101 km circular mass located immediately west of Phoenicia. The mountain is defined by an anomalous circular drainage pattern. High joint density was found to account for the greater erosion that produced the circular valley. Gravity mapping defined a crudely circular negative anomaly, which is most unexpected in an area of flat-lying rocks 3,000 meters thick. A gravity profile is satisfied by a computed profile of a shallowly-buried (~1 km) complex impact crater with a diameter of 10 km and a central uplift of brecciated and shattered rock ~1 km in thickness. The modeled crater, a syndepositional structure, would pass through the Middle and Lower Devonian section, site of several gas producing horizons in central and western New York. The relatively high joint density in the ring valley is attributed to the influence of the buried crater rim on the geometry of subsequent sedimentation, especially with respect to differential compaction and cementation. Direct access to subsurface information is provided by rock cuttings from the 2,000-meter deep Herdman gas test well located near the northern edge of Panther Mountain. All cuttings from the well were painstakingly searched for meteoritic spherules and microtektites, using a binocular microscope with zoom lens. Seven magnetic spherules, measuring 0.2–0.8 mm in diameter were found at the depth interval 573–578 m in the Herdman well. A pale brown microtektite with gas bubble hollows was identified at 627–630 m. In the Armstrong well, located 12 km to the west, three spherules with diameters of only 0.05 mm were found at 902–904 m depth. The magnetic spherules found in the Herdman and Armstrong wells fall in the same stratigraphic interval, which thus places the inferred crater at the Middle–Upper Devonian boundary. The microtektite could also have originated at this position

and become dislodged from the wall when the drill bit had reached the lower levels. Future work will include microprobe analyses of representative spherules. Further evidence of impact will be searched for in cuttings from several more distant deep gas test and field exposures of the Middle–Upper Devonian boundary.

Joachim, Andrew G. (Freelance Wildlife Ecologist, 37 Summit Road, Delmar, NY 12054)

Human Posture and the Flight Distance of Captive Wolves.

Examination of photographs of the interactions between the author and a pair of captive wolves (*Canis lupus*) indicated a strong correlation between the flight distance of the animals and the height of body posture of the human ($r = 0.94$). Distances between the author and the wolves were determined by applying a comparison between the length of known objects to the length of their image on the same planes in the photographs. The female was the dominant animal in this case, perhaps because she is part dog (*Canis familiaris*), and her flight distance was consistently lower than that of the male. Other quantitative observations from the photographs suggest that a person's proximity to vertical objects such as posts within the enclosure influence the flight distance in wolves.

Johnson, Anne, C. **Cady**, R. **LeClerc**, and J. **Rapant** (Environmental Division, Public Works, 85 First Street W, Fort Drum, NY 13602)

Preliminary Assessment of Ice Storm Damage at Fort Drum.

Fort Drum and surrounding areas were severely impacted by the January 1998 ice storm. Forested areas were heavily affected, with trees losing large portions of their twigs and branches. Land Condition Trend Analysis (LCTA) data were used to assess the impact of the storm on forested permanent plots established in 1991 and 1996. Data taken on 81 releve (10×10 meter) plots across the post compared to 1996 data show an estimated average 8% loss of vegetative cover in the upper canopy (greater than 20 meters) and a 12% loss in the 5 to 20 meter stratum. Losses ranged from 0–100% above 20 meters and from 0–90% in the 5 to 20 meter stratum. The area occupied by live trees (measured in square feet) dropped an estimated 21% per acre. There was an estimated 71% increase in the area occupied by snags between 1996 and 1998. Data taken on 45 line inventory (100 meter point intercept) plots compared to 1993 data show an average increase of 45 hits of tree litter and dead wood per plot. The majority of the new litter was found at levels under 2 meters, illustrating the decreased human accessibility and military maneuverability within forested areas. These preliminary data do not indicate that any particular forest type was affected more than another, although when the data collection and analysis has been completed trends may become apparent. Changes in species composition in the lower strata were not immediately noticeable, but may be detected during subsequent monitoring years.

Johnson, Elizabeth A., and Kefyn M. **Catley** (Center for Biodiversity and Conservation, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024), and Dennis **Burton** (Central Park Conservancy, The Arsenal, 830 5th Avenue, New York, NY 10020)

Leaf Litter Invertebrates of Central Park.

During the summer of 1997, the Center for Biodiversity and Conservation in collaboration with the Entomology Department at the Museum, and the Central Park Conservancy initiated a survey of the leaf litter invertebrates of the Park's woodlands. The purpose of this project is to develop a species list of litter invertebrates for the Park which will provide a baseline data set for woodland restoration projects. An understanding of forest processes and ecosystem components is critical to future restoration work. An equally important goal of this survey is to educate the general public about the value of soil organisms and their diversity in urban areas. Leaf litter samples have been collected from the three forested areas in Central Park: the North Woods, the Ramble, and Hallett Sanctuary. Samples have been sorted to order and are being identified to species. Preliminary results indicate that there is a diverse assemblage of leaf litter fauna with representatives of the major ecological group in the Park's woodlands.

Jordan, Marilyn (The Nature Conservancy, 250 Lawrence Hill Road, Cold Spring Harbor, NY 11724), Jessica **Gurevitch** (Department of Ecology and Evolution, SUNY, Stony Brook, NY 11794), and Wei **Fang** (Department of Ecology and Evolution, SUNY, Stony Brook, NY 11794)

Ecological Recovery of Long Island Pine Barrens Two Years After Wildfires.

Two unusually large, severe wildfires consumed nearly 5,000 acres of pine barrens in central Suffolk County, Long Island, New York in August 1995, including 225 acres of the globally rare dwarf pine plains. Most *Pinus rigida* were too old to resprout, and up to 98% of the dwarf pines died. Few pine seedlings were produced in crown fire areas since most cones and seeds were consumed by the flames. *Quercus ilicifolia* (scrub oak) resprouted vigorously and is now dominant. *Gaylussacia baccata*, *Vaccinium pallidum*, *Arctostaphylos uva-ursi* and *Gaultheria procumbens* were greatly reduced in abundance. Only *V. pallidum* is recovering quickly, probably because its deeper roots were less affected by the fire's heat. *Hudsonia ericoides*, sedges and grasses are growing abundantly in areas formerly dominated by *A. uva-ursi*. As a result of the wildfire, pitch pine forests and woodlands reverted to shrublands (<10% tree cover) over most of the burned area, reversing the successional trend towards forest. A reciprocal transplant experiment was begun in 1997, using pitch pine seedlings grown in the greenhouse from seeds collected from both tall and dwarf trees. Seedlings from both parental types were planted in burned dwarf pine plains and pine-oak forest sites. Seedling survival and growth rates were much greater in forest sites than in the dwarf pine plains, but to date parental types (dwarf vs. tall) do not differ in growth or survival rates. No differences in seedling growth form are yet apparent.

Klotz, R. Lawrence (Department of Biological Sciences, SUNY at Cortland, Cortland, NY 13045)

The Influence of Beaver on the Phosphorus Concentration of Streams.

The influence of beaver on the ecology of streams is an important research area because the natural character of streams in North America probably included beaver impoundments at most available sites. Five beaver impoundments in central New York were studied to determine their influence on stream water

phosphorus, the element which controls stream productivity. The beaver ponds differed in how they influenced soluble reactive phosphorus (SRP) concentration, an estimate of the P form directly available to organisms. Processes in three of the ponds increased SRP of the stream water during warmer months, and also dramatically increased SRP in one of these ponds (Black Warrior) during an extended period of ice cover. The remaining two ponds were consistent in reducing SRP in stream water at all times of the year. Total soluble phosphorus trends essentially followed those of SRP at each of the ponds, while total phosphorus differed from SRP at four of the sites. Microbial respiratory activities were 3.5- to 23.5-fold greater in beaver pond vs. stream sediments and created anaerobic conditions within the pond sediments which influenced biogeochemical cycling of P. My results showed that elevated levels of P may occur for only short distances downstream of ponds before aerobic equilibrium processes reduce the concentration. Beaver ponds may alter stream productivity by influencing P levels.

Lake, Thomas R. (Hudson River Almanac, Hudson River Estuary Management Program, New York State Department of Environmental Conservation, 3 Steinhaus Lane, Wappinger Falls, NY 12590-3927)

The Hudson River Almanac.

The *Hudson River Almanac* is a process that seeks to capture the spirit, the magic, and the science of the Hudson River Valley, from the High Peaks of the Adirondacks, 320 miles to the sea. Its annual journal, the *Hudson River Almanac*, is a compilation of citizen observations, from elementary school students to professionals, from poetry to scientific discoveries. The *Almanac* is a part of the New York State Department of Environmental Conservation's Hudson River Estuary Program, and is currently compiling its fifth annual volume. The *Almanac* is an annual journal of entries contributed by volunteers, both residents and visitors to the Hudson Valley. The process encourages people to look more carefully at the seasonal rounds of their remarkable river, one of the most beautiful and biologically productive rivers in the world. The *Almanac* captures, documents and analyzes some of the natural history of the flora and fauna that defines the Hudson River and its valley, as an interconnected yet single ecosystem. It encompasses four seasons (Vernal Equinox to Vernal Equinox), along a 320-mile course, from over a mile above sea level at its origin in the High Peaks of the Adirondack Mountains, to sea level at its confluence with the North Atlantic in the New York Bight. In capturing the aesthetics and the effects that seasonally define the Hudson River, the *Almanac* creates a Hudson River image, and provides those data by which succeeding seasons can be measured. It inspires residents and visitors to the Hudson Valley to care more about stewardship of these resources by providing opportunities for personal involvement.

Lindberg, Allan J. (Nassau County Department of Recreation and Parks, Division of Museum Services, Muttontown Preserve, Muttontown Lane, East Norwich, NY 11732)

Restoration of the Flagg Meadow at Tiffany Creek Preserve.

The Flagg Meadow at Tiffany Creek Preserve, Oyster Bay Cove, NY, is a high-quality example of a wet meadow community that has all but disappeared from Nassau County. Acquired by the County of Nassau with the assistance of the Long Island Chapter of The Nature Conservancy, the meadow community was rapidly being threatened by the processes of ecological succession, as woody shrubs and trees moved in. In addition, a rapidly expanding population of the common reed (*Phragmites australis*), and to a lesser degree, purple loosestrife (*Lythrum salicaria*), had invaded the meadow. In 1994, a habitat restoration and management program was put into place in an effort to reverse the succession process and to control the *Phragmites* and *Lythrum* populations. During this ongoing restoration, a number of management

techniques have been employed, the applications of which are discussed. Four years of management have resulted in the restoration of the meadow to its former six-acre size. Areas that had been lost to ecological succession are being recolonized by native wildflowers and ferns of the wet meadow plant community. The *Phragmites* population has decreased from 390 to 75 stems per square meter, and the *Lythrum* population is in check.

Loucks, Barbara Allen (New York State Department of Environmental Conservation, Endangered Species Unit, Wildlife Resources Center, Delmar, NY 12054), and Christopher A **Nadareski** (New York City Department of Environmental Protection, Wildlife Studies, 465 Columbus Avenue, Valhalla, NY 10595)

The Recovery of the Peregrine Falcon (*Falco peregrinus*) in New York State: 1983–1998.

Widespread pesticide use during the post-WWII era led to a dramatic decline in the peregrine falcon (*Falco peregrinus*) population in eastern North America and elsewhere. After an absence of nearly 30 years from New York State, peregrine falcon numbers have increased from two territorial pairs in 1983 to 38 pairs in 1998. This population increase is largely the result of captive breeding and hacking programs developed in the 1970's by the Peregrine Fund and subsequent nest site protection and management. While seasonal climbing restrictions aid in the prevention of undue disturbance at some Adirondack cliff eyries, more intensive nest protection and management strategies are necessary in urban locales. The New York City Department of Environmental Protection and the New York State Department of Environmental Conservation have developed and implemented a comprehensive urban nest site management program to help increase the success of breeding pairs in the New York City area, and these methods have also proved useful at other urban eyries upstate. From 1983 to 1998, a total of 463 young hatched, of which 438 were presumed fledged at 38 eyries throughout New York State. Of these 438 fledglings, 166 (38 percent) were raised at bridge sites, 114 (26 percent) were at building eyries, and 158 (36 percent) at cliff sites. The status of the federally-listed endangered peregrine falcon is currently under review for proposed delisting. Although many regional recovery goals have been met, peregrine nest sites remain vulnerable and their protection is essential for the continued success of the species in New York State. In particular, urban nest site stability remains largely dependent on quasi-official agreements with facilities that host the nests and the existing state endangered status adds impetus to these efforts.

MacDonald, Kristi (North America Program, Wildlife Conservation Society, Bronx, NY 10460)

An Information-based Approach to Conservation—Wildlife Conservation Society in New York.

The Wildlife Conservation Society (WCS), formerly the New York Zoological Society, North America Program is working in 16 states and neighboring provinces to bridge the gap between biological research and policy implementation in the conservation arena. The North America Program does this through an approach that is information-based, using applied research to advance our understanding of key issues; comprehensive, in its attention to socio-economic as well as bio-physical factors; and cooperative, in its willingness to work with a broad range of public and private interests. This conservation strategy is most developed in our home state of New York. In the Adirondack Park, WCS is working closely with private landowners, timber companies, local communities, NGO's, and government agencies to address the biological, social, and economic concerns that affect conservation. It is doing so through projects that include: a potential link between chronic acid deposition and widespread hardwood regeneration failure; a long-term study of logging impacts on wildlife; a comprehensive assessment of the potential for natural wolf recovery;

the keystone role of beaver; surveys for Canada Lynx; and, in partnership with the Adirondack Project and local communities, linking conservation and development concerns. In the lower Hudson Valley and surrounding Highlands, WCS's Metro New York Program is working closely with a wide range of constituencies from local decision-makers, developers, and planners to other conservation groups, government agencies, and public land managers to advise them on how biological information can be used to improve planning for both development and protection activities in order to prevent the loss of critical habitats and ecosystems.

Margolis, Ellis Q. (The Eastern New York Chapter of The Nature Conservancy, 200 Broadway, 3rd Floor, Troy, NY 12180), and Kathleen M. **O'Brien** (New York State Department of Environmental Conservation, Endangered Species Unit, 108 Game Farm Road, Delmar, NY 12054)

Status of the Karner Blue Butterfly in New York State.

Karner blue butterfly (*Lycaeides melissa samuelis*) numbers worldwide have declined drastically in the latter part of this century, particularly in the last twenty years. Listed in New York State as endangered in 1977, it was subsequently federally listed in 1992. The New York State Department of Environmental Conservation (DEC) has monitored the high priority Karner blue sites since its state listing. A recent combined effort by DEC, the Albany Pine Bush Preserve Commission (APBPC), Wilton Wildlife Preserve and Park (WWPP), and The Nature Conservancy (TNC) resulted in the annual monitoring of almost all known sites. Comparisons between an intensive 1990 study and 1994–1998 survey show much variation between sites and fluctuation within sites. While a few of the larger populations have remained moderately stable, Karner blues have continued to lose ground both in numbers of occupied sites and in numbers of butterflies at many sites. Some new sites have been discovered due to expanded monitoring efforts and there is evidence tentatively suggesting that habitat restoration efforts are having success. While there is legal protection of the Karner blue's habitat by virtue of its year-round occupation, natural succession has caused many sites to become unsuitable to sustain healthy populations. The monitoring data has been instrumental in guiding habitat management, restoration, recovery planning, and has spawned many research questions that should be addressed to further recovery efforts.

Messere, Michael T. (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

Effect of canopy gap size on the abundance of *Plethodon cinereus*.

Silvicultural systems ranging from selective cutting to clearcutting create gaps in forests that alter forest floor ecosystems in ways that can be detrimental to salamander populations. This experiment investigates the effect of forest canopy gap size on the abundance of northern redback salamanders, *Plethodon cinereus*, in selectively cut forests. Densities of *P. cinereus* were determined in three forest gap size categories (small, medium and large) and uncut areas. Salamander densities were determined by using searches through the leaf litter, surface debris, and cover objects in quadrats randomly distributed within each forest canopy gap and uncut area. The abundance of salamanders was significantly different among the three forest canopy gap sizes and uncut areas. Greater numbers of *P. cinereus* were found in uncut and small canopy gaps than in medium and large canopy gaps. These results suggest that selective cutting has a significant effect on the abundance of *P. cinereus* if canopy gap sizes exceed 800 square meters in area.

Morris, Stacey (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)

Diurnal Abundance of Litter Invertebrates Across Seasons and Among Different Temperate Forest Types.

Soil animals are an integral component of the decomposition process in most ecosystems. Seasonal and daily migration of these organisms in the soil profile is prevalent in climates with extreme daily temperature and moisture fluctuations but is less prevalent in more stable climates such as the tropics. However, it is unknown whether daily migration patterns occur in temperate forests. This knowledge is essential to understand the role that these organisms play in nutrient cycling. I hypothesized that the abundance and diversity of soil invertebrates in the litter layer would vary the most when the difference between day and night air and soil temperatures were greatest (presumably in the winter according to local climatological data). I also expected to find fewer organisms in the winter because some invertebrates over-winter as eggs, and those that over-winter as adults should avoid the frozen soil. I collected litter in four different temperate forest types at the E. N. Hyuck Preserve at noon and midnight across three seasons. Samples were placed in extractors for 24 hours, separated by size, and classified by taxonomic and functional groups (e.g. predators, herbivores, detritivores). Statistics were used to test for significant differences in invertebrate numbers between day and night. Interactions with season of collection and forest type were examined. For organisms > 2 mm, predators, herbivores and detritivores varied significantly across forest type and season but only predators varied significantly between day and night. They were more abundant during the day. Among individual taxonomic groups, beetle larvae and fly larvae did not vary significantly from day to night but springtails were more abundant at night. However, springtails < 2 mm were more abundant during the day. This study suggests that daytime sampling may bias abundance counts for some taxonomic groups of litter invertebrates.

Nadareski, Christopher A., and Michael L. **Usai** (New York City Department of Environmental Protection, Pathogen Program Wildlife Studies, 465 Columbus Avenue, Valhalla, NY 10595)

The Management of Waterfowl and Gull Populations on a New York City Reservoir.

The federal Surface Water Treatment Rule of the Safe Drinking Water Act placed stringent water quality regulations on New York City's (NYC) non-filtered surface drinking water supply, including limits on fecal coliform bacteria concentrations which cannot exceed 20 Colony Forming Units per 100 ml in more than 10% of samples for the previous six months. As a result, the New York City Department of Environmental Protection (DEP), the agency responsible for executing such mandates for NYC's drinking water supply, developed and implemented a comprehensive Watershed Protection Plan. An important component to this plan was the establishment of a Waterfowl and Gull Management Program which identified a relationship between increased numbers of birds roosting and elevated fecal coliform bacteria counts during the autumn and winter periods at Kensico Reservoir, Westchester County, New York. Waterfowl and gull population data confirmed a need for a bird control program to operate annually between 1 August and 31 March to deter all waterfowl and gull species from inhabiting the reservoir. The Waterfowl and Gull Management Program, implemented from 1993–1998, employed a variety of nonlethal bird deterrent techniques such as motorboats, hovercraft, noisemakers and bird distress calls to deter all roosting Canada geese (*Branta canadensis*), gulls (*Larus* spp.) and other waterfowl. In addition, egg-depredation was conducted to control local breeding populations of Canada geese at Kensico. As a result of DEP's bird abatement efforts, fecal coliform bacteria levels recorded at water intake structures were drastically lowered and Kensico Reservoir has remained in compliance with the Environmental Protection Agency limits.

Novak, Paul (New York Natural Heritage Program, 700 Troy-Schenectady Road, Latham, NY 12110), **Ken Soltesz** (PO Box 62, South Salem, NY, 10590), and **Bob Barber** (360 Port Elizabeth-Cumberland Road, Millville, NJ, 08332)

Surveys for the Extra-Striped Snaketail Dragonfly, *Ophiogomphus anomalus*, in New York State.

The New York Natural Heritage Program has conducted surveys on the Delaware River and the upper Hudson River for the Extra-striped snaketail dragonfly, *Ophiogomphus anomalus* (ranked G3 by the Natural Heritage network) from 1993–1997. In the upper Hudson, the population is continuous from approximately North Creek to just above Lake Luzerne; a stretch of approximately 32 river miles at the southeastern corner of the Adirondack Park. The population is least dense in the upper portion of this stretch, where the river is a turbulent white water river in spring, and most dense in the lower section of this stretch where the river is less turbulent and the substrate is dominated by extensive sand deposits, cobble and fewer boulders. On the Delaware River, which forms the boundary between New York and Pennsylvania in southeastern New York, *Ophiogomphus anomalus* appears to occupy two, or perhaps three, short stretches of river, although the very low population density and difficulty in accessing the river have an impact on our ability to define the occurrence in this river.

Nye, Peter E. (Division of Fish, Wildlife and Marine Resources, New York State Department of Environmental Conservation, Delmar, NY 12054)

Use of Satellites to Track Wintering Bald Eagles to and from New York State.

Over 200 bald eagles annually winter at various habitats in New York State which have been monitored and researched since 1976. Efforts have focused on live-capture and marking in order to define critical habitats, site-fidelity, behavior, local and long distance movements. Since 1978, more than 80 wintering eagles have been captured, banded and radio-tagged, mostly with conventional telemetry apparatus. Beginning in 1992, satellite-linked telemetry units or platform transmitter terminals (PTT's), began to be used on our wintering birds. In contrast to conventional telemetry units, PTT location information and other selected data (i.e. battery voltage, temperature, activity) is stored by two circum-polar orbiting NOAA satellites and data is accessed by desk-bound biologists via computer and modem. To date, 11 bald eagles have been tracked by PTT's revealing important information on migratory departure and arrival dates, pathways and origins of New York wintering eagles. Handling and quality of downloaded PTT/satellite data and mapping and analysis of data are discussed.

Odell, Zachary D. (Houghton College, CPO Box 1480, Houghton, NY 14744)

A Presentation of the Northern Montezuma Wetlands Project.

The Montezuma Wetlands Complex is the sight of a cooperative wetlands restoration effort of the New York State Department of Environmental Conservation (DEC), the U.S. Fish and Wildlife Service, and several private conservation organizations such as Ducks Unlimited, Pheasants Forever and The Nature Conservancy. Because of its significance to large numbers of migratory birds, it is a Focus Area of the North American Waterfowl Management Plan, and was designated by the Audubon Society as New York's first Important Bird Area. The Northern Montezuma Wetlands Project (project) is DEC's portion of the

complex, where it is concentrating efforts to purchase abandoned or “played-out” mucklands and restore them to emergent marshes. Some of the efforts are being funded with mitigation monies available from both DEC and U.S. Army Corps of Engineers wetland regulatory processes. Dikes are constructed, water control structures are built, and the hydrology is restored to create conditions favorable for the re-establishment of native wetlands flora and fauna. The site is rapidly becoming a focal point for research by several area colleges and universities. A significant effort is being made to document the successional changes and wildlife utilization of the restoration sites compared with natural wetlands in the area. A monitoring program has been utilized for the last three years post-restoration on several sites. Annual monitoring reports have been written and submitted to DEC to document results and guide future restoration attempts.

Thompson, John E. (Mohonk Preserve, 1000 Mountain Rest Road, New Paltz, NY 12561), and Michael S. **Batcher** (1907 Buskirk-West Hoosic Road, Buskirk, NY 12028)

Mapping of Vegetation Communities in the Shawangunk Mountains of New York.

The Shawangunk Mountains in eastern New York are one of the highest priorities for biodiversity conservation in the eastern United States. This area has a high degree of plant community diversity as well as variation in environmental gradients (e.g., soils, slope, elevation, aspect, etc.). Historic disturbance events have played an important role in shaping the present landscape. The Shawangunk Ridge Biodiversity Partnership, a consortium of organizations working to conserve this unique area, has implemented a six-year, coordinated research program, the basis of which is mapping natural communities and incorporating the data into a geographic information system. Natural communities were mapped and categorized using a hierarchical classification modified from Reschke (1990), organized by system, subsystem and community, defined by environmental conditions in which each occurs. Four systems (lacustrine, riverine, palustrine, and terrestrial) were subdivided into 33 natural communities and 9 cultural types. Color infrared (1:40,000) aerial photography was interpreted and community boundaries identified. Field verification was performed using Natural Heritage Program methodologies. Boundary information was transferred onto digital orthophotographs (1:12,000) and incorporated into a geographic information system. The resulting vegetation map, covering over 38,000 ha, is exhaustively tiled with non-overlapping polygons. This information is being used to assess the comparative influence of historic disturbance events (particularly wildfire) and environmental gradients, in determining variation within and between natural communities in the northern Shawangunks.

Vejvoda, Kathryn, Cassandra E. **Kifer**, Scott **Langevin**, Susan **Opar**, Katherine T. **Parker**, Sarah M. **Sossei**, and Nancy B. **Elliott** (Department of Biology, Siena College, Loudonville, NY 12211)

The Effects of Modified Mowing Practices on Arthropod Diversity in Forested Patches on Golf Courses.

Preliminary studies of insects, nesting birds and small mammals in forested patches at the Schuyler Meadows Club, a private golf club in suburban Albany, have shown that animal populations vary with the size of the patches and the nature of the understorey. This suggests that simple modifications in mowing practices adjacent to these areas could further enhance their role as wildlife habitats. Thus we began a three-year study on the effects of mowing on diversity; we chose to focus on arthropods because of their key role in trophic relationships. We established four study sites, two forested edges and two interior tree islands, at Schuyler Meadows. Each site was divided into four plots. The plots were mowed differently as

follows: mowed continuously, mowed once annually in the fall, mowed once annually in the spring, and unmowed for three years. Throughout the summer and fall, we took two sets of samples biweekly at each plot, one within 3 m of the inner wooded edge and the other 3 m from the outer mowed edge. Sampling was done by sweeping, by using sticky traps for flying insects, and by using berlese funnels to extract arthropods from cores taken at the soil-vegetation interface. Arthropods in the samples were sorted to order and counted for calculating diversity. Preliminary results from the first season of the study showed that continuously mowed edges had lower diversity than any of the other three kinds of plots in the edges, but there were no obvious trends for the tree islands. All the unmowed sites in edges showed higher diversities than corresponding plots in the tree islands. Diversity of flying insects from sticky trap samples was generally higher in the inner section of a plot than in the outer.

Wells, Aaron F. (Houghton College, CPO Box 1855, Houghton, NY 14744)

An Introduction to Some Common Sedges.

Sedges are a unique group of plants forming a large and diverse family, *Cyperaceae*, including 4,000 species in 102 genera worldwide. Sedges hold an important place in most ecosystems, but often they are overlooked due to the difficulty associated with field identification. This ambiguity became apparent to me while working with the USDA Forest Service, Forestry Sciences Laboratory in Irvine, PA. The laboratory classifies sedges under the general title of *Carex* species. Using the laboratory herbarium and various identification keys I identified some of the common sedges of the region, many of which are common throughout the Northeast. I prepared an illustrated guide to these 16 sedges. Pictures were also taken of many of the sedges. Some sedges can serve as indicators of wetland ecosystems (*Scirpus cyperinus*), others indicate nutrient rich soils (*C. plantaginea*), while others form dense mats which can deter forest tree regeneration (*C. debilis*). This makes sedges a very interesting and important group of plants worthy of identification to the species level. Many sedges that are not included in my guide are difficult to identify, requiring the skill of experts. However, through the use of this simple guide I hope to further the general understanding of grass and sedge anatomy, and provide a user-friendly key to 16 common sedges of the Northeast.

Whiffen, Helen (Department of Forestry, University of Georgia, Athens, GA 30602), **C. Cady, Anne Johnson, R. LeClerc, J. Rapant** (Environmental Division, Public Works, 85 First Street West, Fort Drum, NY 13602), and **Frank Kurczewski** (Department of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210)

200 Years of Landcover Change.

Land use on the current Fort Drum area historically included forest and agricultural management in addition to the current military management. An evaluation of the landcover alterations that have occurred under these different management strategies is of interest from both a vegetative and overall habitat perspective. Archival investigations uncovered landcover data for the late 1790s, 1908, and the 1940s. These data were digitized (ARC/INFO 7.11 on Sun Solaris 2.51), joined appropriately to attribute tables, GRIDed, and compared to each other and to current landcover data (from orthophotos) to determine changes in total acreage of specific landcover classes, and patterns of landcover change over portions of Fort Drum. The results of these analyses are presented in this poster.

Whitney, Philip R., Yngvar W. **Isachsen**, Robert H. **Fakundiny**, and Richard M. **Nyahay** (Geological Survey, New York State Museum, Albany, NY 12230)

Geologic Map of the West-Central Adirondack Highlands.

A 1:62,500 geologic map of six 15' quadrangles in the west-central Adirondack Highlands has been compiled from 1984–1996 mapping by the N.Y. State Geological Survey. The map area includes portions of Hamilton, Herkimer, and Lewis Counties, and the villages of Thendara, Old Forge, Big Moose, Inlet, and Raquette Lake. Middle Proterozoic (1.2–1.0 ga) charnockitic and granitic gneisses underlie at least 60% of the area. These mildly A-type granitoids intruded sedimentary and volcanic rocks that are now metamorphosed to biotite-quartz-feldspar gneiss, marble, calcsilicate rocks, quartzite, and leucogneiss. Anorthositic and jotunitic gneisses, probably coeval with the massif anorthosite of the High Peaks, occur as concordant stratiform bodies in the NW half of the region. The suite of igneous rocks is consistent with emplacement in an extensional tectonic setting. All have been affected by subsequent deformation and moderate-pressure granulite facies (700–800 C, 5–8 kbar) metamorphism during the Ottawan orogeny. Ottawan deformation produced large amplitude, upright to SE-verging, tight to isoclinal folds that trend NE to ENE; one or more earlier fold sets are also present. This structural trend, locally deflected by late gravity doming, causes the NE–SW orientation of most topographic features in the area. For example, the Fulton Chain Lakes are underlain by marble and calcsilicate rocks in the core of a complex synform. Preferential erosion of these relatively soft and soluble rocks produced the topographic lows now occupied by the lakes. The NNE orientation of North Lake is controlled by a major brittle fault or fracture zone which crosses the map area and extends northeastward beyond Long Lake. Glacial striae on rock surfaces indicate NE to SW movement of the Pleistocene continental glaciers; it is likely that the ice was “steered” by the structurally controlled topography.

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The Invasive Plants Problem in New York State.

Invasive plants are threatening natural communities in New York, as they are in every state and on every continent. The invasions are progressing at a rapid rate, exacerbated by human disturbance. Conservation values can be eroded by invasive plants as they displace native plant species, change soil chemistries, and eliminate habitat for native wildlife. Nearly all of the serious invaders are alien or non-native species, and New York State has the highest percentage of non-native plants in its flora in the United States—about 35%. We will show examples of some of the most serious invasive plants, as well as some of the work being conducted in New York to increase awareness of invasive plants and their effects.

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Notes



Addendum

Oral Presentation

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Spatio-Temporal Aspects of Timber Rattlesnake Mating Behavior.

The spatial distribution and timing of sexual receptivity of female snakes are important determinants of snake mating systems. We examined spatio-temporal aspects of timber rattlesnake reproduction through radiotelemetric monitoring of 5 mature females over two consecutive years. The onset of the mating season, indicated by the arrival of courting males, was in late July in both years. Most pairings (12 of 15) and all observed mating (n=4) occurred during a five week period from late July to late August. Females enhanced their spatial predictability by becoming attractive to males during shedding at discrete rock outcrops, and by moving between spatially distant outcrops when receptive. Our findings suggest female rattlesnakes increase male competition, and hence the quality of mates, through active advertisement of sexual receptivity at low personal cost.
