

Abstracts

THE NORTHEAST



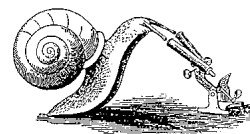
NATURAL HISTORY CONFERENCE VIII

MAY 19 – MAY 22, 2004

A FORUM FOR CURRENT RESEARCH



The *Northeastern*



Naturalist

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The University of the State of New York
THE STATE EDUCATION DEPARTMENT
ALBANY, NY 12230

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The Northeast Natural History Conference VIII* is a joint project of the New York State Museum, the New York State Biodiversity Research Institute, the New York State Museum Institute, and the Northeastern Naturalist. The conference is held biennially at the New York State Museum. Previous conference abstracts and conference updates are available from the Natural History Conference website:

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

Conference Organizers

Ronald J. Gill (New York State Biodiversity Research Institute)
Mary Beth Kolozsvary (New York State Biodiversity Research Institute)

*The Northeast Natural History Conference is self-supporting through registration fees and/or private fund donations. No public funding is provided.

Conference Highlights

Focus on Nature VIII — Opening Reception

A Natural History Art Exhibit at the New York State Museum

Thursday, May 20, 2004

5:30 p.m. – 6:30 p.m.

Exhibition Gallery, New York State Museum

(Reception open to all conference participants.)

The Exhibition: *Focus on Nature* is a biennial exhibit of scientific, natural and cultural history illustration that began in 1990 in conjunction with the Natural History Conference. Each year, the geographical representation, breadth of subject matter, and quality has increased, and it is now an exhibit of high standard and international participation. For the purposes of this exhibition, the definition of natural and cultural history illustration is the depiction of subjects (archeological, biological, geological, astronomical, etc., excluding medical illustration or photography) that are either scientifically measured or intended to accurately represent organisms or research results and processes. The purchase prize money will be \$5,000.00 and is awarded on the basis of high quality, scientific accuracy, and aesthetic achievement. The artwork will be accessioned into the permanent collection of the New York State Museum. This collection includes approximately 6,000 illustrations primarily created for museum publications, by such artists as Louis Agassiz Fuertes, George Barkentin, Ernest Thompson Seton, Mary Banning, and numerous excellent contemporary artists. *Focus on Nature VIII* will be exhibited from April 24, 2004 to September 12, 2004.

Keynote Address

Dr. Richard B. Primack, Professor of Biology, Boston University

Thursday, May 20, 2004

8:00 p.m. – 9:30 p.m.

Clark Auditorium, New York State Museum

Primack, Richard B. and Abraham J. Miller-Rushing. (Boston University, Biology Department, Boston, MA 02215)

TIMING OF FLOWERING AND BIRD MIGRATION AS INDICATORS OF GLOBAL CLIMATE CHANGE

Biological communities are already showing the impacts of global climate change. Among the most sensitive indicators are plant flowering times and migratory bird arrival times. However, relatively few studies have examined the impact of climate change on these phenomena, and issues of using certain types of historical records have not been examined carefully. A large potential source of data on the biological response to climate change is the unpublished records of research stations, naturalist clubs and individual naturalists. One example is the records of the Manomet Bird Observatory, which is located south of Boston; there birds are arriving earlier in the spring, with the mean arrival time of birds being a better indicator of earlier arrival times than the more commonly used first date of arrival. Another example is herbarium specimens from the Arnold Arboretum, which demonstrate that plants now flower 8 days earlier than 100 years ago. And finally, historical observations of flowering in Concord, Massachusetts, recorded by Henry David Thoreau and other naturalists, combined with current observations demonstrate that spring flowering plants are the most sensitive to temperature and are the best indicators of climate change. These field observations are being tested experimentally by exposing plants to a range of temperatures under controlled conditions, which will confirm which species are most responsive. The results of this research will be published in scientific journals, and will also be presented to the general public to make people aware of the current and future impacts of climate change.

**Northeast Natural History Conference VIII
May 19 – 22, 2004**

Overview of Conference Sessions

THURSDAY – May 20, 2004			
Meeting Room 1	Meeting Room 2	Meeting Room 3	Meeting Room 4
Amphibians and Reptiles 8:40 a.m. – 10:00 a.m.	Human Disturbance and Wildlife 9:00 a.m. – 10:00 a.m.	Poster Set-up 7:30 a.m. – 12:00 p.m.	
Rattlesnake Symposium 10:20 a.m. – 12:00 p.m.	Odonates and Lepidopterans 10:20 a.m. – 12:00 p.m.		Fish Ecology and Taxonomy 10:20 a.m. – 12:00 p.m.
		Poster Session 1:20 p.m. – 3:20 p.m.	
Diamondback Terrapins and Tiger Salamanders 3:20 p.m. – 5:00 p.m.	Invasive Species 3:20 p.m. – 5:00 p.m.		Plant Biology and Community Ecology 3:00 p.m. – 5:00 p.m.
Reception for <i>Focus on Nature VIII</i> 5:30 p.m. – 6:30 p.m.			
Dinner Banquet 6:30 p.m. – 8:00 p.m.			
Keynote Address – Dr. Richard B. Primack, Boston University <i>Timing of Flowering and Bird Migration as Indicators of Global Climate Change</i> 8:00 p.m. – 9:00 p.m.			

FRIDAY – May 21, 2004			
Meeting Room 1	Meeting Room 2	Meeting Room 3	Meeting Room 4
Landscape Ecology of Amphibians and Reptiles 8:40 a.m. – 10:00 a.m.	Aquatic Ecology 8:40 a.m. – 10:00 a.m.		
Distribution and Ecology of Amphibians 10:20 a.m. – 12:00 p.m.	Inventory and Status of Plants and Wetlands 10:20 a.m. – 12:00 p.m.		Mammals 10:20 a.m. – 12:00 p.m.
Turtle Biology and Conservation 1:20 p.m. – 2:40 p.m.	Monitoring and Conservation of Invertebrates 1:20 p.m. – 2:40 p.m.	Take Down Posters 12:00 p.m. – 2:40 p.m.	Distribution and Conservation of Birds 1:20 p.m. – 2:40 p.m.

Oral Presentations Schedule

Meeting Room 1

Thursday, May 20, 2004

Amphibians and Reptiles

Moderator: *Alvin R. Breisch, New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, Albany, NY*

- 8:40** ***Feinberg, Jeremy A. and Timothy M. Green***
PLAYING DEAD OR A REAL DISAPPEARING ACT? THE STATUS AND ECOLOGY OF EASTERN HOGNOSE SNAKES (*HETERODON PLATIRHINOS*) AT THE BROOKHAVEN NATIONAL LABORATORY
- 9:00** ***Breisch, Alvin R., John W. Ozard, Ariana N. Breisch, and Kirstin L. Breisch***
ANALYSIS OF MORTALITY REPORTED TO THE NEW YORK AMPHIBIAN AND REPTILE ATLAS
- 9:20** ***Rosenbaum, Peter A., Jeanne M. Robertson, and Kelly R. Zamudio***
RANGE-WIDE GENETIC UNIFORMITY AMONG POPULATIONS OF THE BOG TURTLE (*GLYPTEMYS = CLEMMYS MUHLENBERGII*)
- 9:40** ***Paul, Eric A., David A. Gapp, and Howard A. Simonin***
TOXICITY OF TWO AQUATIC HERBICIDES TO EASTERN SPINY SOFTSHELL TURTLES (*APALONE S. SPINIFERA*)
- 10:00** **Coffee Break**

Rattlesnake Symposium

Moderator: *Edwin M. McGowan, New York–New Jersey Trail Conference, Mahwah, NJ*

- 10:20** ***Johnson, Glenn***
EASTERN MASSASAUGA RATTLESNAKES IN NEW YORK STATE: PAST, PRESENT AND FUTURE
- 10:40** ***Boder, Stanley J. and Thomas C. LaDuke***
HABITAT VARIATION BETWEEN POLYMORPHIC TIMBER RATTLESNAKES (*CROTALUS HORRIDUS*) OF PENNSYLVANIA'S POCONO PLATEAU
- 11:00** ***McGowan, Edwin M. and Dale M. Madison***
SPATIAL ECOLOGY AND CONSERVATION OF THE TIMBER RATTLESNAKE, *CROTALUS HORRIDUS*, IN SOUTHEASTERN NEW YORK
- 11:20** ***Tear, Timothy, H., Alvin R. Breisch, and Randy Stechert***
DO RATTLESNAKE EXCLUSION FENCES REALLY WORK? A CASE STUDY FROM NEW YORK
- 11:40** ***Clark, Rulon W.***
KIN RECOGNITION IN TIMBER RATTLESNAKES
- 12:00** **Lunch Break**

Meeting Room 1
Thursday, May 20, 2004

Diamondback Terrapins and Tiger Salamanders

Moderator: *Russell L. Burke, Hofstra University, Department of Biology, Hempstead, NY*

- 3:20** *Burke, Russell L.*
THE IMPACT OF RACCOONS ON TERRAPIN NESTS AT JAMAICA BAY WILDLIFE REFUGE
- 3:40** *Draud, Matthew J., Marc Bossert, and Sara Zimnavoda*
PREDATION OF YOUNG DIAMONDBACK TERRAPINS BY THE NORWAY RAT
- 4:00** *Argyriou, Antigone, Maureen Krause, and Russell L. Burke*
MULTIPLE PATERNITY IN DIAMONDBACK TERRAPINS AT JAMAICA BAY WILDLIFE REFUGE
- 4:20** *Brennessel, Barbara, Joseph Chadwick, Caitlin Stewart-Swift, and Nicholas Warren*
THE IMPORTANCE OF THE SALT MARSH AS A NURSERY FOR DIAMONDBACK TERRAPINS
- 4:40** *Green, Timothy M. and Jeremy A. Feinberg*
A COMPARATIVE STUDY OF VERNAL POOLS AND BREEDING POPULATIONS OF EASTERN TIGER
SALAMANDERS (*AMBYSTOMA TIGRINUM*) AT THE BROOKHAVEN NATIONAL LABORATORY
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Meeting Room 2
Thursday, May 20, 2004

Human Disturbance and Wildlife

Moderator: Michael S. Fishman, Stearns & Wheeler, LLC, Environmental Engineers & Scientists, Cazenovia, NY

- 9:00** *Vispo, Conrad*
 AGRICULTURE AND CONSERVATION: THEIR ECOLOGICAL AND SOCIOLOGICAL INTERACTIONS IN COLUMBIA COUNTY, NY
- 9:20** *Fishman, Michael S.*
 INVENTORYING AND PROTECTING AN ACCIDENTAL URBAN WILDLIFE OASIS
- 9:40** *Drummond, Cori L.*
 ECOLOGICAL IMPACTS OF HABITAT FRAGMENTATION ON *Ixodes scapularis* AND LYME DISEASE
- 10:00** **Coffee Break**

Odonates and Lepidopterans

Moderator: Paul Novak, New York Natural Heritage Program, Albany, NY

- 10:20** *Brown, Virginia A. and Nina Briggs*
 THE RHODE ISLAND ODONATA ATLAS: LESSONS FROM A SMALL STATE
- 10:40** *Novak, Paul*
 THE STATUS OF DRAGONFLIES AND DAMSELFLIES IN NEW YORK: PAST, PRESENT, AND FUTURE
- 11:00** *Dirig, Robert*
 BUTTERFLIES OF THE QUEEN CATHARINE BASIN, SCHUYLER COUNTY, NEW YORK
- 11:20** *LeBlanc, Thomas P. and Ichiro Nakamura*
 CHANGING BUTTERFLY FAUNA IN ALLEGANY STATE PARK, NY: A PRELIMINARY REPORT
- 11:40** *Selfridge, Jennifer A. and Dylan Parry*
 EFFECTS OF HABITAT STRUCTURE ON PARASITISM OF BARRENS BUCK MOTH
- 12:00** **Lunch Break**

Invasive Species

Moderator: Daniel P. Molloy, New York State Museum, Research and Collections, Albany, NY

- 3:20** *Molloy, Daniel P.*
 IMPACT OF INFECTIOUS DISEASES ON ZEBRA MUSSEL POPULATIONS
- 3:40** *Brooks, Meriel J.*
 DISTRIBUTION, ABUNDANCE, AND ESCAPEMENT OF LARVAL ALEWIFE (*Alosa pseudoharengas*) IN LAKE ST. CATHERINE: AN ASSESSMENT OF INVASION POTENTIAL
- 4:00** *Murray, Joseph R.*
 THE ROLE OF SCIENCE AND POLICY IN THE CONTROL OF INVASIVE SPECIES IN SHIPS' BALLAST WATER
- 4:20** *McCay, Timothy S., Deanna H. McCay, Anthony V. Caragiulo, and Toby L. Mandel*
 ECOLOGY OF INVASION BY EUROPEAN BUCKTHORN IN COMMON ECOSYSTEMS OF NEW YORK
- 4:40** *Ducey, Peter K., Gina Shaw, Jamie Tull, and Cara Fiore*
 REPRODUCTIVE ECOLOGY OF THE INVASIVE PLANARIAN, *Bipalium adventitium*, A PREDATOR OF EARTHWORMS

Meeting Room 4
Thursday, May 20, 2004

Fish Ecology and Taxonomy

Moderator: Robert E. Schmidt, Hudsonia Limited, Bard College, Annandale, NY

- 10:20** *Schmidt, Robert E. and Thomas R. Lake*
TEMPORAL AND SPATIAL PATTERNS OF YOUNG-OF-YEAR AMERICAN EEL (*ANGUILLA ROSTRATA*)
IMMIGRATION IN TRIBUTARIES TO THE TIDAL HUDSON RIVER
- 10:40** *Machut, Leonard S. and Karin Limburg*
FEEDING SELECTIVITY OF AMERICAN EEL (*ANGUILLA ROSTRATA*) IN HUDSON RIVER TRIBUTARIES, NY
- 11:00** *Morse, Richard S. and Robert A. Daniels*
A TAXONOMIC REEVALUATION OF THE JUNE SUCKER
- 11:20** *Tibbits, Wesley T.*
NATURAL REPRODUCTION BY STOCKED LAKE TROUT (*SALVELINUS NAMAYCUSH*) ON MARGINAL
SPAWNING HABITAT IN OTSEGO LAKE, NY
- 11:40** *Harrison, James P. and Charles W. Boylen*
HYPOXIC INCURSIONS AS A FORAGING STRATEGY BY FISH WITHIN A PELAGIC FRESHWATER
ASSEMBLAGE
- 12:00** **Lunch Break**

Plant Biology and Community Ecology

Moderator: Donna W. Vogler, SUNY Oneonta, Biology Department, Oneonta, NY

- 3:00** *Griffin, Jacob M., Gary M. Lovett, George R. Robinson, Mary A. Arthur, Kathleen C. Weathers, and Michael Kudish*
SUGAR MAPLE AND BEECH DYNAMICS IN BEECH BARK DISEASE AFTERMATH FORESTS OF THE
CATSKILL MOUNTAINS, NY
- 3:20** *Tessier, Jack T.*
USING UNDERSTORY PLANTS TO TEST THE UNIFIED NEUTRAL THEORY OF BIODIVERSITY
- 3:40** *Forrester, Jodi A., Donald J. Leopold, and Henry W. Art*
MORTALITY AND REPLACEMENT PATTERNS IN TWO MARITIME HOLLY FORESTS
- 4:00** *Pederson, Neil, Edward R. Cook, and Gordon C. Jacoby*
THE GEOGRAPHIC INFLUENCE OF WINTER TEMPERATURES ON OAK AND HICKORY SPECIES
- 4:20** *Ganger, Mike T.*
FACTORS INFLUENCING FLOWERING SHOOT RECRUITMENT AND REPRODUCTIVE SUCCESS IN A
CLONAL HERB
- 4:40** *Vogler, Donna W., Susan Kalisz, and Kristen Hanley*
A FIELD TEST OF THE REPRODUCTIVE ASSURANCE HYPOTHESIS WITH *COLLINSIA VERNA*
(SCROPHULARIACEAE)

Meeting Room 1
Friday, May 21, 2004

Landscape Ecology of Amphibians and Reptiles

Moderator: David E. Karrmann, American Museum of Natural History, Education Department, New York, NY

- 8:40** *Karrmann, David E., William C. Cerbone, Adela Effendy, Kathyann Doobar, Amy Lee, and Sara Elsayd*
STRUCTURE AND DYNAMICS OF A *CHRYSEMYS PICTA* METAPOPULATION (INTEGRATING SCIENCE AND EDUCATION)
- 9:00** *Sievert, Paul R., Mark Grgurovic, and Bradley W. Compton*
CONSERVING BLANDING'S TURTLES (*EMYDOIDEA BLANDINGII*) AMID SUBURBAN SPRAWL IN EASTERN MASSACHUSETTS
- 9:20** *Utter, James, Jamie Balleau, Beverly Leon, Cheryl Ryder, and Walter Soto*
HABITAT USE BY BOG AND SPOTTED TURTLES IN TWO CONTRASTING WETLAND LANDSCAPES
- 9:40** *Wells, Alan W., Della M. Wells, Jack Focht, Barbara Thomas, Jennifer A. Verstraete, and Nancy McTamane*
ASSESSING THE IMPACT OF ROADKILL ON AMPHIBIAN POPULATIONS IN HARRIMAN STATE PARK
- 10:00** **Coffee Break**

Distribution and Ecology of Amphibians

Moderator: Mary Beth Kolozsvary, New York State Biodiversity Research Institute, New York State Museum, Albany, NY

- 10:20** *Lendrum, Jared M. and Lawrence L. Woolbright*
THE IMPORTANCE OF WETLAND BUFFERS: HABITAT USAGE BY THE WOOD FROG
- 10:40** *Kolozsvary, Mary Beth, Aram J.K. Calhoun, and Malcolm L. Hunter, Jr.*
CONSTRAINTS OF FLOOD DURATION OF WETLANDS ON REPRODUCTION IN WOOD FROGS AND SPOTTED SALAMANDERS
- 11:00** *Buchanan, Bryant W. and Sharon E. Wise*
ARTIFICIAL NIGHT LIGHTING ALTERS EMERGENCE TIME IN NOCTURNALLY ACTIVE TERRESTRIAL SALAMANDERS
- 11:20** *Whiteleather, K. Kristian*
DISTRIBUTION OF STREAMSIDE SALAMANDERS (AMPHIBIA: CAUDATA: PLETHODONTIDAE) IN ACID MINE DRAINAGE STREAMS OF WEST VIRGINIA
- 11:40** *Hunsinger, Todd W.*
CURRENT AND HISTORIC DISTRIBUTION OF THE RED SALAMANDER (*PSEUDOTRITON RUBER*) IN NEW YORK
- 12:00** **Lunch Break**

Meeting Room 1
Friday, May 21, 2004

Turtle Biology and Conservation

Moderator: Rulon W. Clark, Cornell University, Department of Neurobiology and Behavior, Ithaca, NY

- 1:20** *Hunsinger, Todd W.*
WITHER THE WOOD TURTLE?
- 1:40** *Garber, Steven Daniel and Beth Herr*
ACCURATE TURTLE AGING METHOD FOR ALL AGE CLASSES
- 2:00** *Michell, Kathy and Robert G. Michell*
HEADSTARTING, REHABILITATION AND TRANSLOCATION OF WOOD TURTLES IN NEW YORK STATE
- 2:20** *Herr, Beth and Steven Daniel Garber*
TURTLE MANAGEMENT PLAN IN WESTCHESTER COUNTY'S PARKS
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-

Meeting Room 2

Oral Presentation Schedule – Friday, May 21, 2004

Aquatic Ecology

Moderator: Clifford A. Siegfried, New York State Museum, Albany, NY

- 8:40** *Shaw, William H., Paul A. Bukaveckas, James W. Sutherland, Charles W. Boylen, and Sandra A. Nierzwicki-Bauer*
EVIDENCE FOR ZOOPLANKTON RECOVERY IN CHEMICALLY RECOVERING ADIRONDACK LAKES
- 9:00** *Siegfried, Clifford A.*
THE PELAGIC ZOOPLANKTON COMMUNITY OF AN ACIDIC, LOW DOC LAKE IN THE ADIRONDACKS OF NEW YORK STATE
- 9:20** *Albright, Matthew F.*
WATER QUALITY CHANGES IN AN URBAN STREAM AFTER USING ORGANICALLY DERIVED DEICERS
- 9:40** *Folsom, Mark L.*
PALEONTOLOGY AND GEOMORPHOLOGY-FOSSILIFEROUS CAVE; ULSTER COUNTY, NYS
- 10:00** **Coffee Break**

Inventory and Status of Plants and Wetlands

Moderator: Stephen Young, New York Natural Heritage Program, Albany, NY

- 10:20** *Spada, Daniel M., Sunita K. Halasz, and Leslie Karasin*
DATABASE OF CHARISMATIC MEGA-WETLANDS IN THE ADIRONDACK PARK
- 10:40** *Buff, Matthew F., and Donald J. Leopold*
PREDICTING RARE PLANT HABITAT ON NEW YORK STATE FORESTS
- 11:00** *Lamont, Eric E.*
STATUS OF CARNIVOROUS PLANTS ON LONG ISLAND, NEW YORK
- 11:20** *Eldblom, Nancy C. and Anne M. Johnson*
VASCULAR FLORA EXPLORATIONS IN ST. LAWRENCE CO., N.Y., PAST AND PRESENT
- 11:40** *Schmid, James A.*
PATTERNS IN THE FLORA OF THE MID-ATLANTIC STATES
- 12:00** **Lunch Break**

Monitoring and Conservation of Invertebrates

Moderator: Neil A. Gifford, Albany Pine Bush Preserve Commission, Latham, NY

- 1:20** *Breisch, Alvin R., James P. Gibbs, James Arrigoni, and K. Kristian Whiteleather*
A SURVEY PROTOCOL FOR ESTIMATING POPULATION SIZE OF AN ENDANGERED, TERRESTRIAL SNAIL
- 1:40** *Hotopp, Kenneth P.*
EMERGING ISSUES IN LAND SNAIL CONSERVATION
- 2:00** *Romey, William L. and Melissa Yanek*
IMPACTS OF LOGGING ON BEE DIVERSITY IN THE ADIRONDACK MOUNTAINS
- 2:20** *Gifford, Neil A. and Timothy H. Tear*
MONITORING RECOVERY FOR THE ENDANGERED KARNER BLUE BUTTERFLY (*LYCAEIDES MELISSA SAMUELIS*) IN NEW YORK STATE
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Meeting Room 4
Friday, May 21, 2004

Mammals

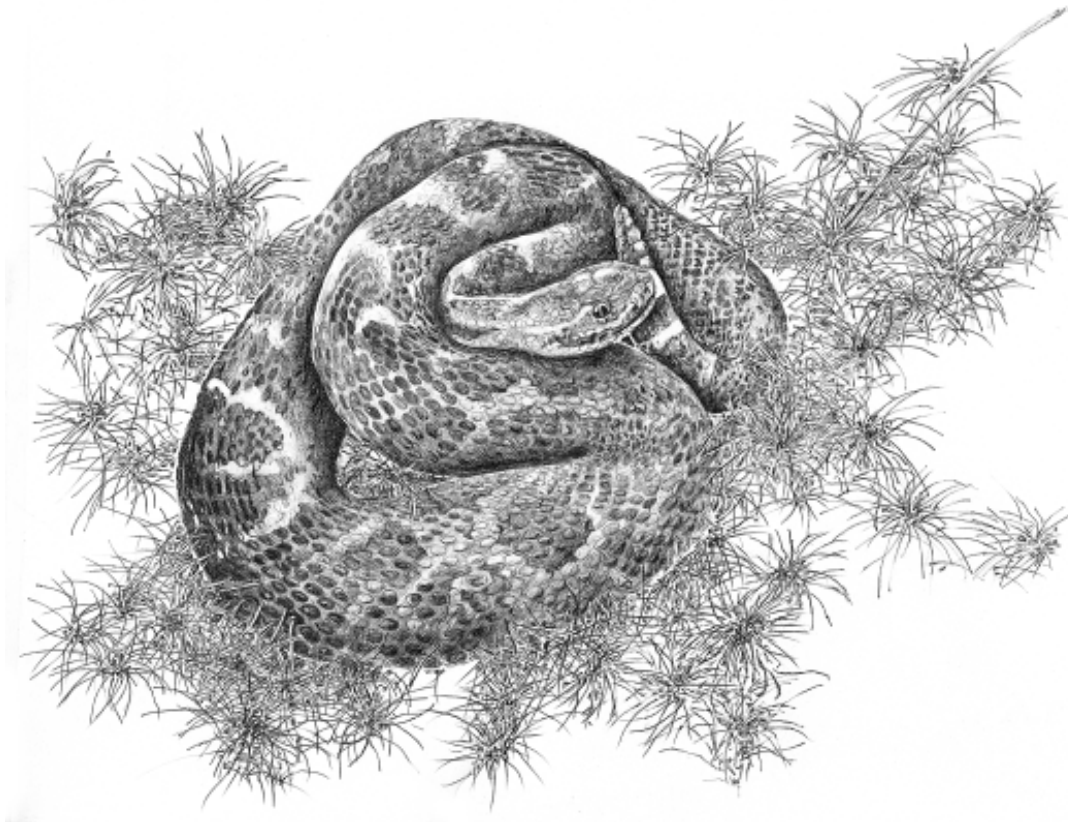
Moderator: Alan C. Hicks, New York State Department of Environmental Conservation, Albany, NY

- 10:20** ***Bogan, Daniel A., Roland W. Kays, and George R. Robinson***
EASTERN COYOTE HABITAT USE AND SURVIVAL IN THE ALBANY PINE BUSH LANDSCAPE
- 10:40** ***Clark, Michael D. and Michael S. Cooper***
STATUS AND DISTRIBUTION OF THE NEW ENGLAND COTTONTAIL (*SYLVILAGUS TRANSITIONALIS*)
IN NEW YORK STATE
- 11:00** ***Hicks, Alan C., Nancy Heaslip, Susanna Von Oettingen, and Scott Darling***
TRACKING MIGRATING INDIANA BATS FROM WINTER TO SUMMER RANGE
- 11:20** ***Cooper, Michael S., Alan C. Hicks, and Michael D. Clark***
WINTER ROOST TEMPERATURES AND STATUS OF THE INDIANA BAT IN NEW YORK
- 11:40** ***Frank, Craig L. and Wendy R. Hood***
THE INFLUENCE OF RECENT CLIMATE CHANGE ON EASTERN CHIPMUNK (*TAMIAS STRIATUS*)
HIBERNATION
- 12:00** **Lunch Break**

Distribution and Conservation of Birds

Moderator: Glenn Johnson, SUNY Potsdam, Department of Biology, Potsdam, NY

- 1:20** ***Ross, Angelena M. and Glenn Johnson***
DISTRIBUTION AND HABITAT OF SPRUCE GROUSE NEAR THE EDGE OF THEIR RANGE
- 1:40** ***Corwin, Kimberley J. and Valerie M. Freer***
NEW YORK STATE'S SECOND BREEDING BIRD ATLAS
- 2:00** ***Liner, Jillian M., Michael Burger, and Jamie Halperin***
IDENTIFICATION OF AVIAN CONSERVATION FOCUS AREAS IN NEW YORK
- 2:20** ***Roblee, Kenneth, Ward Stone, and David Adams***
TYPE E BOTULISM CAUSED WATERBIRD MORTALITY IN LAKE ERIE AND LAKE ONTARIO
-
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EASTERN MASSASAUGA RATTLESNAKE (*SISTRURUS CATENATUS*)

GRAPHITE DRAWING BY PATRICIA KERNAN

Abstracts for Oral Presentations

Albright, Matthew F. (State University of New York at Oneonta, Biological Field Station, Cooperstown, NY 13326)

WATER QUALITY CHANGES IN AN URBAN STREAM AFTER USING ORGANICALLY DERIVED DEICERS

Willow Brook receives runoff from Cooperstown, NY and flows into Otsego Lake, a phosphorus limited, mesotrophic waterbody. Between 1992 and 1998, the Village of Cooperstown's winter road management policy included plowing and applying abrasives (particulate material intended to increase traction) mixed with enough salt to minimize clumping. Between 1998 and 2002, Ice Ban Magic™ and Magic Minus Zero™, both organic deicers mixed with magnesium chloride, were applied experimentally in conjunction with abrasives and salt. During the winter of 2002/2003, road treatment consisted solely of applications of salt which had been treated with Magic Minus Zero™. Precipitation-based monitoring on Willow Brook conducted between 1991 and 2003 revealed significant declines in the export of total phosphorus (despite elevated phosphorus levels in Ice Ban Magic™ and Magic Minus Zero™) and suspended sediment as the volume of abrasives applied to roads was reduced. Chloride levels are increasing, however. The implicit trade-offs between potential pollutants and the cost of road management in cold climates are acknowledged for management of transportation safety.

Argyriou, Antigone, Maureen Krause, and Russell L. Burke. (Hofstra University, Biology Department, Hempstead, NY 11549)

MULTIPLE PATERNITY IN DIAMONDBACK TERRAPINS AT JAMAICA BAY WILDLIFE REFUGE

Multiple paternity within a single clutch of eggs has been documented in several turtle species, and appears to be common in reptiles generally. This finding has implications for both studies of male–male contests through sperm competition, and for estimating the number of breeding males in a population. Diamondback terrapins are known to store sperm for several years, allowing extensive opportunity for sperm competition. In addition, it is relatively easy to gather information on females and their clutches, but difficult to count males. We collected tissue samples from 10 nesting females and their hatchlings from Jamaica Bay, New York. We amplified three microsatellite loci by PCR and gel electrophoresis, and found evidence that the number of fathers per clutch is variable. This species has extensive courtship before mating, sometimes with multiple males courting the same female. Because of sperm storage and multiple paternity, we speculate that male–male contests may continue within the oviduct over years after successful copulation. In addition, with this information we can estimate the number of breeding males in Jamaica Bay, and document changes over time.

Boder, Stanley J. and Thomas C. LaDuke. (East Stroudsburg University, Department of Biological Sciences, East Stroudsburg, PA 18301)

HABITAT VARIATION BETWEEN POLYMORPHIC TIMBER RATTLESNAKES (*CROTALUS HORRIDUS*) OF PENNSYLVANIA'S POCONO PLATEAU

Radiotelemetry was used to compare habitat selection by dark and light morph timber rattlesnakes (*Crotalus horridus*) at a site on the Pocono Plateau of northeast Pennsylvania during the active season of 2003. Six adult dark morph male *C. horridus* and 3 adult light morph male *C. horridus* were monitored with temperature-sensitive radio transmitters for periods varying from a minimum of 1.25 months to a maximum of 5 months. The monitoring resulted in 154 dark morph observations and 93 light morph observations. Habitat was quantified through the analysis of 16 structural features of the forest floor and canopy and 6 climatic environmental factors. Data was analyzed with MANOVA techniques as well as nonparametric statistical methods. Both morphs regularly used sites with dense forest floor vegetation; however, light morphs occasionally used sites with heavy leaf litter cover and sparse vegetation, while dark morphs avoided such habitats. Dark morphs showed a greater preference for mature forest stands with heavy blueberry (*Vaccinium* sp.) cover.

Bogan¹, Daniel A., Roland W. Kays¹, and George R. Robinson². (¹New York State Museum, Research and Collections, Albany, NY 12230; ²University at Albany, Department of Biological Sciences, Albany, NY 12222)

EASTERN COYOTE HABITAT USE AND SURVIVAL IN THE ALBANY PINE BUSH LANDSCAPE

In northeastern USA, wolves and mountain lions have been extirpated through anthropogenic pressure while eastern coyotes (*Canis latrans*) have typically flourished. Following increases in population numbers and geographic range, coyotes are the most widely distributed large carnivore in this region. We studied coyote ecology using live-trapping, radiotracking (n = 19 individuals), and diet analysis in the fragmented Albany Pine Bush (APB) and its surrounding suburban landscape (total area = 114.75 Km²). Analysis of annual 95% fixed kernel home-ranges (mean = 6.47 Km²) revealed that resident coyotes (n = 14) live primarily in natural areas. Of 1781 radiolocations, 73% were measured in natural forested areas, the remainder in agricultural, residential, and commercial zones. Diet analyses of 426 fecal samples show that coyotes predominately forage for natural foods: 32% cottontail rabbit, 30% deer, 16% small mammals, and 11% fruits and vegetation. Garbage (<1%) and domestic cat (<1%) were rarely found in scats. Despite the predominant use of natural lands and natural food sources, resident coyotes experience high mortality from anthropogenic sources, with seven lost to road kill, six shot, one poisoned. Only one died from apparent natural causes, and one juvenile male dispersed out of the APB. We hypothesize that the low survival rate (21% annually) is in part due to landscape characteristics, in particular high road density (4.15 Km/Km²) and high interspersions of residential and natural areas.

Breisch¹, Alvin R., John W. Ozard¹, Ariana N. Breisch², and Kirstin L. Breisch³. (¹New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, Albany, NY 12233; ²New York Cooperative Fish and Wildlife Research Unit, Cornell University, Ithaca, NY 14853; ³SUNY College of Environmental Sciences and Forestry, Department of Environmental and Forest Biology, Syracuse, NY 13210)

ANALYSIS OF MORTALITY REPORTED TO THE NEW YORK AMPHIBIAN AND REPTILE ATLAS

The New York Amphibian and Reptile Atlas Project collected data on the distribution of all species of herpetofauna (herps) found in the wild in New York during the period 1990 to 1999. These reports required “verification codes” that indicated the type of evidence used to document a report. This type of evidence included reports of dead specimens verified by finding identifiable bones, an empty shell of a turtle, or a carcass of an animal. Out of 59,000 species reports submitted nearly 6.5% of the reports (approximately 12% of the reptiles and 4 % of the amphibians reported) were of herps found dead. These reports included 59 of the 71 species reported during the Atlas period. Nearly 84% of the dead herps were species reported as roadkills. Of the 50 species reported as roadkills, the common garter snake was the most frequently reported followed by snapping turtle, painted turtle, spotted salamander, American toad and milk snake. As a group, these six species accounted for 41% of the roadkills. Dead herps were found every month of the year with the peak occurring from April to June and a second peak in September. The first peak was associated with breeding or nesting activity. Dead herps were reported in 78% of the Atlas blocks but surprisingly the lowest rate of reporting dead herps was in New York City and Long Island.

Breisch¹, Alvin R., James P. Gibbs², James Arrigoni², and K. Kristian Whiteleather³. (¹New York State Department of Environmental Conservation, Division of Fish, Wildlife & Marine Resources, Endangered Species Unit, Albany, NY 12233-4754; ²SUNY College of Environmental Science and Forestry, Environmental and Forest Biology, Syracuse, NY, 13210; ³SUNY College of Environmental Science and Forestry, Environmental and Forest Biology, Geneva, NY 14456)

A SURVEY PROTOCOL FOR ESTIMATING POPULATION SIZE OF AN ENDANGERED, TERRESTRIAL SNAIL

The second year of a mark-release-recapture study of the endangered Chittenango ovate amber snail (COAS) (*Novisuccinea chittenangoensis* Pilsbry) was conducted at Chittenango Falls State Park, New York over a twenty-week period between June and October of 2003. This study was a continuation of the work performed in 2002 with the

objective of developing and testing a survey protocol for estimating the size of the COAS population. Changes in protocol were made in 2003 to minimize effort, minimize negative impact on habitat, and maintain strength of the population estimate. Results from both years were similar with regard to capture rates and estimated population size. The similar results were obtained with 40% fewer site visits, which translates into a substantial decrease in habitat disruption. Fewer site visits also meant reduced chance of crushing of these cryptically colored animals, and less stress from handling as we process captured individuals. A new tagging procedure in 2003 allowed for an evaluation of growth rate and movement of individual animals. There was no indication that marking techniques used in either year affected snail survival. In 2003, COAS were found to occupy a section of habitat 9 m wide, compared to a section only 4 m wide in 2002.

Brennessel, Barbara, Joseph Chadwick, Caitlin Stewart-Swift, and Nicholas Warren. (*Wheaton College, Department of Biology, Norton, MA, 02766*)

THE IMPORTANCE OF THE SALT MARSH AS A NURSERY FOR DIAMONDBACK TERRAPINS

The diamondback terrapin (*Malaclemys terrapin*), is the only brackish water turtle in the U.S. It is found in creeks, coves, and mangrove swamps along the Atlantic and Gulf coasts. It is listed as a “threatened” species in Massachusetts. In partnership with the Wellfleet Bay Wildlife Sanctuary, we are studying a subpopulation that inhabits Wellfleet Harbor. In June and July, female terrapins dig nests in uplands surrounding salt marshes. After hatchlings emerge, they are not usually found until they are more than 4 years old. The purpose of our investigation was to determine how and where terrapins spend their first years. We headstarted hatchlings until they were large enough for attachment of radio transmitters. After their release in June, we tracked the hatchlings throughout the summer. Our findings suggest that hatchlings remain in their natal marshes and seek protection under thick mats of *Spartina*. Their diet consists of small invertebrates such as insects and salt marsh snails. Hatchling movement is often linked to tidal flow. The salt marsh is thus an important staging area for diamondback terrapin hatchlings.

Brooks, Meriel J. (*Green Mountain College, Department of Natural Sciences & Mathematics, Poultney, VT 05764*)

DISTRIBUTION, ABUNDANCE, AND ESCAPEMENT OF LARVAL ALEWIFE (*ALOSA PSEUDHARINGAS*) IN LAKE ST. CATHERINE: AN ASSESSMENT OF INVASION POTENTIAL

Invasive aquatic species have become household names over the last few decades as introductions have increased in frequency. These range from plants introduced as ornamentals to fish species introduced as forage for game fishes. The alewife, *Alosa pseudoharingas*, is an example of the latter. This fish was illegally or accidentally introduced to Lake St. Catherine sometime within the last several years, and now poses a threat to both the planktonic and the nektonic communities of the lake. In other drainages alewives have negatively affected established fish populations, have foiled attempts at native species restoration, and have shifted community composition of zooplankton, consequently changing food web dynamics. Because Lake St. Catherine is in the Champlain drainage, and connects to Lake Champlain through Mill Brook, alewives could invade Lake Champlain and associated rivers by transport of larvae or juveniles downstream. In this talk I will discuss the results of my study of the invasion potential of these fish. However, I believe the alewife to be but one symptom of a larger management problem. I will argue that until the management paradigm for aquatic systems changes, invasive aquatic species will continue to be problems we are unable to prevent.

Brown, Virginia A. and Nina Briggs. (*Rhode Island Natural History Survey, Ecological Inventory, Monitoring, and Stewardship Program, Kingston, RI 02881*)

THE RHODE ISLAND ODONATA ATLAS: LESSONS FROM A SMALL STATE

The Rhode Island Odonata Atlas, a volunteer based inventory of dragonflies and damselflies, which began in 1998, has just completed its sixth and final field season. Fifty-five volunteers participated in the project, donating thousands of hours to fieldwork, data entry and analysis, collection management, and publicity. 135 species of dragonflies and damselflies are recorded from the state, twenty-two of which were discovered during the Atlas period. Included in the additions to the list are species of local and regional conservation interest, such as *Somatochlora georgiana* and

Enallagma weewa. Township diversity ranges from a low of 12 species to a high of 107 species, and two of Rhode Island's five counties rank among the most diverse in the country, with 125 species each. Several ponds and river systems contain more than half of the species reported from the state, and local diversity "hot spots" tend to be where large areas of protected and/or undeveloped landscapes exist. An analysis of the 40 river and stream species, with further examination of eight pollution sensitive species, may be useful in assessing the health of the states watersheds. Rhode Island's diversity and abundance of aquatic habitats yield a correspondingly high diversity of odonate species for such a small state. Furthermore, its small land area and large areas of public open space allow for manageable and scientifically productive statewide faunal inventories.

Buchanan, Bryant W. and Sharon E. Wise. (Utica College, Department of Biology, Utica, NY 13502)

ARTIFICIAL NIGHT LIGHTING ALTERS EMERGENCE TIME IN NOCTURNALLY ACTIVE TERRESTRIAL SALAMANDERS

Activity patterns of amphibians are frequently regulated by natural light cycles. Artificial night lighting from anthropogenic sources has the potential to disrupt activity patterns in nocturnally active amphibians. The red-backed salamander, *Plethodon cinereus*, emerges from underground refugia approximately one hour after sunset on moist nights. We examined the effect of artificial night lighting on timing of emergence in *P. cinereus* using a short-term transect study. Experimental (with artificial lighting at night, 10^{-2} lx) and control (no artificial lighting, 10^{-4} lx) transects (16 m) were established in a woodland in July 2002. Salamander activity was monitored in transects during peak activity periods (2200–2400 h) using visual encounter surveys. Salamanders emerged significantly later in lighted transects than in unlighted transects. Thus, normal, nocturnal activity can be disrupted even by small increases in ambient illumination over natural levels.

Buff, Matthew F., and Donald J. Leopold. (SUNY College of Environmental Science and Forestry, Syracuse, NY 13210)

PREDICTING RARE PLANT HABITAT ON NEW YORK STATE FORESTS

We present a GIS model designed to predict suitable habitat for selected rare plant species in State Forests of New York. The project will aid forest management decisions and facilitate more efficient searches for rare plants in State Forests. The model is based on New York Natural Heritage Program (NHP) data of known locations of rare plant species. We have selected six plant species and one plant community for habitat modeling and prediction. Known sites of each species were visited and location data were acquired using GPS equipment. Location data were combined with a large number (>10,000) of randomly located points that represent the absence of each species. A geographic information system (GIS) was used to populate the combined presence-absence points with over 100 environmental variables that represented site conditions with respect to topography, geology, soils, climate, and land cover. We performed a logistic regression to describe the relationship of the occurrence of each species to the environmental variables. The regression equation was applied in a GIS to produce a probability map of predicted habitat. The models completed to date have eliminated between 99.88% and 99.97% of the state as unsuitable habitat for the modeled species, thereby demonstrating their potential for guiding efficient field searches for new locations of rare plants. Field evaluation of the models on state land has resulted in the discovery of two previously unknown populations of *Jeffersonia diphylla*. An additional product of this research is a framework for habitat modeling that can be applied to other rare plant species and communities.

Burke, Russell L. (Hofstra University, Department of Biology, Hempstead, NY, 11549)

THE IMPACT OF RACCOONS ON TERRAPIN NESTS AT JAMAICA BAY WILDLIFE REFUGE

In the early 1980s, there were no raccoons on Ruler's Bar Hassock, an island in Jamaica Bay Wildlife Refuge. Survivorship of diamondback terrapin (*Malaclemys terrapin*) nests was close to 100%. Currently over 300 raccoons inhabit the island, and terrapin nest survivorship is <5%. Most nests are predated by raccoons within one or two nights after oviposition. Raccoons use both sight and smell to locate nests, and are not assisted by vinyl flags used by researchers to mark nests. Measuring the impact of this increase in predation on recruitment into the adult population is complicated by several factors. The number of terrapin nests laid, ca. 2010 each year, seems to have been fairly constant since

1998. However, this estimate may be affected by a regular shift in raccoon predation behavior in the middle of each terrapin nesting season. This shift may reduce the accuracy of nest counts. In addition, underground predation by plant roots may destroy up to 30% of eggs not taken by raccoons. Hatchlings apparently overwinter in nests, and there may be significant freeze mortality in cold years. Only long term data can demonstrate whether or not raccoons are having an important impact on terrapin recruitment.

Clark, Michael D. and Michael S. Cooper. (New York State Department of Environmental Conservation, Albany, NY 12233)

STATUS AND DISTRIBUTION OF THE NEW ENGLAND COTTONTAIL (*SYLVILAGUS TRANSITIONALIS*) IN NEW YORK STATE

The New England cottontail, *Sylvilagus transitionalis*, (NEC) has been in decline throughout New England and New York for many decades and is currently under consideration for inclusion on the federal endangered species list. During the winters of 2002 to 2004 DEC staff conducted surveys within its historical range in New York to better understand its current distribution. We sampled east of the Hudson River from Rensselaer to Westchester County. During the first two winters we live-trapped and collected fecal samples for genetic analysis at four likely habitats in each quarter of the 7.5 minute USGS quadrangle maps that we surveyed. During the last year, we collected only fecal samples and only at 8 potential habitats per 7.5 minute quad. Live-trapped animals believed to be New England cottontails based on pelage, ear length, and mass, were further tested through genetic analysis of tissue samples. During 2002, we surveyed 70 sites and captured 99 cottontails in 586 trap nights of effort. In 2003, we surveyed 69 sites and captured 58 cottontails in 1270 trap nights. Of these 157 cottontails, only 5 were NEC and they were caught in just four of 23 quads. During 2004, we collected 151 fecal pellets samples that have yet to be analyzed.

Clark, Rulon W. (Cornell University, Department of Neurobiology and Behavior, Ithaca, NY 14853)

KIN RECOGNITION IN TIMBER RATTLESNAKES

Although snakes have been viewed as predominantly solitary species in the past, recent studies have revealed a surprising degree of social complexity. In this study, I examine the ability of captive-raised timber rattlesnakes (*Crotalus horridus*) to recognize siblings. The results show that female siblings associate more closely with each other than non-sibling pairs, indicating that they do have the ability to recognize kin. Previous studies have shown that timber rattlesnakes occupying the same hibernacula have higher relatedness than snakes using neighboring hibernacula. Furthermore, timber rattlesnakes have been frequently observed to aggregate in the field while gravid or before undergoing ecdysis. Other rattlesnake species also exhibit characteristics consistent with advanced sociality, including group defense, conspecific alarm signals, and maternal defense of young. These findings indicate that social behavior may be more important in the life history of many pitviper species than previously realized.

Cooper, Michael S., Alan C. Hicks, and Michael D. Clark. (New York State Department of Environmental Conservation, Albany, NY 12233)

WINTER ROOST TEMPERATURES AND STATUS OF THE INDIANA BAT IN NEW YORK

As part of a range-wide study to document winter roost temperatures and their relationship to the success of the wintering (*Myotis sodalis*) populations, 32 temperature and humidity probes have been installed in 9 *M. sodalis* hibernacula from summer 2001 to the present. Probes are located adjacent to *M. sodalis* roosts, adjacent to historic roosts, in selected areas containing no *M. sodalis*, and outside the hibernacula as well. Ideal roost conditions are assumed as having a mean mid-winter (Dec.1 to Feb. 28) temperature range of 3.0° to 7.2°C with a minimum of fluctuation in response to outside temperature changes. However, population trends at New York sites were not consistent with what would be expected if “ideal” hibernacula temperatures were the only predictor of population success. The *sodalis* roost of the Main Graphite Mine, with a stagnant population of only 80 *M. sodalis* was the most favorable site in the state by the assumed standards (mid winter mean of 5.4°C with an annual fluctuation of +/-0.5°C), while the Williams Hotel Mine (8,000 *M. sodalis*) had a mid-winter mean of 2.63°C with an annual fluctuation of 2.5°C. Thirteen of the 15 *M. sodalis* locations (74% of population) had mid winter mean temperatures within the assumed ideal range. However, this number declined to 6 out of 15 when the model was applied to March and April temperatures.

Corwin¹, Kimberley J. and Valerie M. **Freer²**. (¹New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources, Albany, NY 12233-4754; ²686 Cape Road, Ellenville, NY 12428)

NEW YORK STATE'S SECOND BREEDING BIRD ATLAS

New York State's second breeding bird atlas project is in its final field season. More than 1,000 volunteers are working to attain 100% coverage of the 5,334 25-square kilometer survey blocks. About 370,000 records of 251 breeding species have been scanned into the database from the first four years of fieldwork. Field protocols for the current atlas are the same as those used during the first Atlas, allowing for comparison between the new dataset and that of the first Atlas project, which was conducted in 1980–85. Data submitted by volunteers are checked by Regional Coordinators before being entered into the database using new scanning technology. Interim distribution maps and species lists from the current Atlas are available on the website, as are the final distribution maps and species lists from the first Atlas. Using preliminary data, we illustrate expansion in the distribution of some species and contraction in others. Several new species have been added to the state's avifauna while others reported during the first Atlas have not yet been recorded in the current Atlas.

Dirig, Robert. (*Bailey Hortorium Herbarium, Dept. of Plant Biology, Cornell University, Ithaca, NY 14853*)

BUTTERFLIES OF THE QUEEN CATHARINE BASIN, SCHUYLER COUNTY, NEW YORK

The extensive Queen Catharine Marsh (QCM) wetland complex occupies a wide valley between Montour Falls and Watkins Glen, south of Seneca Lake in Schuyler County, New York. This 890-acre cattail marsh is bordered on the east side by Rock Cabin Road (RCR), a 3-mile-long unpaved track at the base of calcareous ledges and steep wooded slopes. Resulting habitat diversity supports many unusual plants, birds, and insects. Fifty-five species of butterflies were found in the QCM/RCR basin between 1993 and 2003. Local rarities include Delaware skipper, dion skipper, broad-winged skipper, bronze copper, Milbert's tortoiseshell, and Acadian hairstreak in the marsh; and olive hairstreak, eastern pine elfin, gray comma, and northern pearly eye along RCR. Large groves of common hackberry also support thriving populations of the hackberry and tawny emperors, and an intermittent breeding colony of American snout near its northern limit in the Northeast. Daily field lists of 20–26 species in July point to the richness of the butterfly fauna. This is fostered by larval host presence, and abundant nectar sources and puddles along RCR that facilitate adult feeding. The warm west-facing exposure of RCR also makes the valley an important spring and autumn migratory corridor for butterflies. Much of the marsh is protected as a DEC Fish and Wildlife Management Area, but important peripheral habitats are not. QCM/RCR is one of the most important inland butterfly habitat systems in New York. Presence of rare flora, butterflies, and marsh birds hints at further, unexplored biotic richness in this valley.

Draud, Matthew J., Marc Bossert, and Sara Zimnavoda. (*C.W. Post – Long Island University, Department of Biology, Brookville, NY 11548*)

PREDATION OF YOUNG DIAMONDBACK TERRAPINS BY THE NORWAY RAT

Rats (*Rattus norvegicus*) were a major predator of hatchling and juvenile diamondback terrapins (*Malaclemys terrapin*) in a New York population during three consecutive years. As is typical of other small mammal predators of chelonian hatchlings, rats killed young terrapins by evisceration through the plastron or carapace. Rat predation occurred nocturnally only, and during two distinct time periods: 1) fall nest emergence in August and September, and 2) spring hibernation emergence in April. We recovered a total of 150 carcasses of newly emerged hatchlings during three fall field seasons and 68 carcasses of 2nd year juveniles recently emerged from hibernation during two spring field seasons. In the fall, hatchlings were mainly predated within intertidal high marsh vegetation, where hatchlings normally reside soon after emerging from nests. We found no evidence of rats predated eggs or hatchlings within nests. Rat predation in the spring also happened within the intertidal high marsh vegetation, but rats also hunted and killed terrapin juveniles in adjacent terrestrial habitats, apparently taking them just after they reached the surface after emerging from hibernacula. We used data from a telemetry study of 24 wild hatchlings to estimate rat predation rates. Sixteen of 24 hatchlings tracked between 13 September and 22 October 2003, were killed by rats (67% total predation rate). Predation rates were higher during peak nest emergence, subsiding later in the season. Observations suggest that rats searched randomly within the intertidal marsh vegetation for terrapins, typically around high tide, and were most successful when terrapin density was highest.

Drummond, Cori L. (University at Albany, Biodiversity, Conservation and Policy Program, Albany, NY 12222)

ECOLOGICAL IMPACTS OF HABITAT FRAGMENTATION ON IXODES SCAPULARIS AND LYME DISEASE

Habitat fragmentation can influence interspecific interactions across multiple trophic levels. We examined impacts of habitat fragmentation and edge effects on populations of *Ixodes scapularis* (deer ticks) and Lyme disease infection rates in the Albany Pine Bush. The “dilution hypothesis” suggests that, because larger habitat fragments contain more small mammal species, ticks are less likely to feed on *Peromyscus*, the primary mammalian host for the Lyme disease spirochete. Ticks were collected from 27 sites within fragments ranging in size from 0.57 to 427 hectares, in 2002 and 2003. Variation in tick density is best explained by habitat variables rather than fragment size or host densities. Infection rates in nymphs (23% overall) are also correlated with habitat variables, as well as densities of *Peromyscus*. Infection rates in adults (52% overall) and nymphs tend to vary with fragment size, but this tendency appears to be due to correlations between forest understory structure and fragment area.

Ducey, Peter K., Gina Shaw, Jamie Tull, and Cara Fiore. (SUNY Cortland, Department of Biological Sciences, Cortland, NY 13045)

REPRODUCTIVE ECOLOGY OF THE INVASIVE PLANARIAN, *BIPALIUM ADVENTITIUM*, A PREDATOR OF EARTHWORMS

The invasive terrestrial planarian, *Bipalium adventitium*, is now widely distributed across temperate North America. These broadhead planarians, as predators of earthworms, could potentially have significant ecological impacts on forest, field, and anthropogenic habitats. The success of its continued invasion and the degree of its ecological impact will depend in part on the reproductive ecology and evolution of the species in this country. Through field and laboratory observations and experiments, we examined the reproductive parameters and their variability for four populations of *B. adventitium* from across its geographic range. Individuals are hermaphroditic, do not appear to self-fertilize, and are able to store sperm for months following mating. Like other terrestrial planarians, *B. adventitium* produces multiple, large egg capsules (13–30% of parental mass) containing small numbers of offspring (1–6 / capsule). Although there is considerable intraspecific variation in reproductive traits, most of this variation is within populations rather than between them, and does not appear to represent recent adaptation to local environments.

Eldblom¹, Nancy C. and Anne M. Johnson². (¹14 Grant Street, Potsdam, NY 13676; ²1080 CR 31, Lisbon, NY 13658)

VASCULAR FLORA EXPLORATIONS IN ST. LAWRENCE CO., N.Y., PAST AND PRESENT

The authors will discuss past and present botanical exploration in St. Lawrence County, N.Y. St. Lawrence County covers 2,840 square miles in northern New York State and includes at least three distinct phytogeographical regions: the Adirondack Foothills, the limestone belt region in the western portion of the county, and the St. Lawrence River valley. Plant communities range from the typical species poor vegetation of the Adirondacks to the very rich communities in the rocky woods of the limestone region. The county has a low human population and is primarily agricultural, with many wetlands and four major rivers that flow into the St. Lawrence. Voucher specimens for the county began to appear in the early 1900s, collected mostly by Orra Parker Phelps, 1867–1950 (mother of Orra A. Phelps, M.D. and Adirondack naturalist, 1895–1986), and continued only sporadically until the mid-1980s. Nancy Eldblom and Anne Johnson have botanized the county for the past twenty years and have submitted voucher specimens to various herbaria. They hope to write a St. Lawrence County Flora to document the vascular plants and plant distributions of this little known county and to provide a starting point for future St. Lawrence County botanists.

Feinberg¹, Jeremy A. and Timothy M. Green². (¹U.S. Fish & Wildlife Service, Upton Ecological and Research Reserve, Upton, NY 11973; ²Brookhaven National Laboratory, Environmental Services and Waste Management Division, Upton, NY 11973)

PLAYING DEAD OR A REAL DISAPPEARING ACT? THE STATUS AND ECOLOGY OF EASTERN HOGNOSE SNAKES (*HETERODON PLATIRHINOS*) AT THE BROOKHAVEN NATIONAL LABORATORY

Historic records indicate that the eastern hognose snake (*Heterodon platirhinos*) was once one of the most abundant and widespread snake species on Long Island, with robust populations documented from Brooklyn to Montauk. However, the situation changed dramatically over the past century as the influence of anthropogenic activity spread throughout much of the island, incurring massive impacts upon the species. Factors including development, habitat loss, succession, and fragmentation, food-source declines, hunting, and collection all appear to have contributed to severe declines and extirpations of most of the island's populations. By the end of the twentieth century, many local and regional biologists had arrived at the unsettling conclusion that hognose snakes were all but extirpated from Long Island. Additionally, reports of declines from other parts of their range made the situation even more alarming. In 2002, five observations of hognose snakes were made at the Brookhaven National Laboratory (BNL), a 2,130-ha facility located on the western extreme of the Central Pine Barrens. Spurred by these developments biologists from BNL and the U.S. Fish & Wildlife initiated an extensive program aimed at studying the ecology and habitat use of hognose snakes. Seventeen snakes were located in 2003 and BNL employees reported five additional observations. Five snakes were fitted with radio transmitters and followed from June to the present. Two snakes were lost early on but the remaining snakes were found to have relatively large home ranges, travel long distances (up to 3 km), and spent significant time foraging and aestivating in pine-oak forests.

Fishman, Michael S. (*Stearns & Wheeler, LLC, Environmental Engineers & Scientists, Cazenovia, NY 13035*)

INVENTORYING AND PROTECTING AN ACCIDENTAL URBAN WILDLIFE OASIS

We conducted a year-long natural resources inventory of the Arverne Urban Renewal Area (AURA) as part of the preparation of an environmental impact statement for proposed redevelopment there. The AURA is a 308-acre section of the Rockaway Peninsula within New York City that was once a beachfront bungalow colony, but was condemned in the late 1960s and cleared for an urban renewal project that never materialized. Over the next 30 years, the site grew into valuable wildlife habitat, developed freshwater wetlands from leaking fire hydrants, and became a home or migratory stopover point for 17 rare, threatened, or endangered species, as well as a pack of wild dogs and a self-sustaining population of ring-necked pheasants (*Phasianus colchicus*). Now facing development, city, state, and federal agencies as well as private interests have collaborated on a development plan that will protect valuable habitat structure and species while allowing for sustainable human use.

Folsom, Mark L. (*State University of New York at Ulster, Geographic Information System Program, Stone Ridge, NY 12484*)

PALEONTOLOGY AND GEOMORPHOLOGY-FOSSILIFEROUS CAVE; ULSTER COUNTY, NYS

Fossiliferous Cave is a unique natural resource, located in the hamlet of Kyserike, Ulster Co. NY, very near the longest cave in the County (Pompey's Cave System). This small cave (approx. 120 feet) contains prolific fossil deposits that have weathered out of chert bearing limestone. Seasonal allogenic floodwaters enter the cave through solutionally enlarged bedding planes and the enlarged vertical entrance joint washing debris through the cave. During the wet season, a small stream can be heard through an unenterable opening that drains the cave. Even in the dry autumn months, water seeps through vertical fractures that control passage development. Cave development is primarily vadose in nature, having formed above the water table. Water resurges through the well-developed Pompey's master resurgence spring 350 meters to the east. This report documents the geology and speleogenesis of the cave system as well as discussion of the hydrological workings of the drainage basin. In addition, index fossils and local limestone stratigraphy are identified. Comparisons to nearby Pompey's Cave based on lithology and topographic setting, are also addressed. Study findings are presented in an Arc GIS (version 8.2) layout incorporating aerial photos, and topographic maps, overlain with important karst features, topographic contours and personal field study findings. Physical features are documented

with the use of an E-Trex GPS receiver. Fossil and stratigraphic conclusions will be based on research of existing karst reports, geologic maps and interviews.

Forrester¹, Jodi A., Donald J. Leopold¹, and Henry W. Art². (¹SUNY College of Environmental Science and Forestry, Environmental and Forest Biology, Syracuse, NY 13210; ²Williams College, Department of Biology, Williamstown, MA, 01267)

MORTALITY AND REPLACEMENT PATTERNS IN TWO MARITIME HOLLY FORESTS

The maritime holly forest is a globally imperiled plant community found only on barrier islands in New York and New Jersey. An understanding of the replacement patterns within this unusual plant community is critical for its conservation. Within the Sunken Forest, Fire Island National Seashore, NY, *Ilex opaca* shares canopy dominance with *Amelanchier canadensis* and *Sassafras albidum*. At Sandy Hook, Gateway National Recreation Area, NJ, *I. opaca* is the only canopy dominant. Mortality and replacement patterns of this forest type were investigated by resampling permanent vegetation plots established 14+ yrs ago. Growth and release patterns measured in ring-widths of canopy and understory individuals were examined to determine the method of establishment. Analysis of permanent plots in the Sunken Forest indicates the overstory structure and composition has not changed, but the understory (shrubs and herbs) is decreasing in cover and diversity. Patterns differ at Sandy Hook with ingrowth of *I. opaca* evident in permanent plots and little change in the forest understory. Both forests are uneven-aged, with decline and release patterns revealing responses to a variety of events including hurricanes, tropical storms and nor'easters. The overall lack of establishment of any species since the 1970s within the Sunken Forest, coincides with the irruption of the *Odocoileus virginianus* population at this location. The current high level of herbivory at the Sunken Forest is disrupting the short-term regeneration patterns and long-term patterns of species in the forest canopy in this maritime holly forest.

Frank¹, Craig L. and Wendy R. Hood². (¹Fordham University, Department of Biological Sciences, Armonk, NY 10504; ²Coastal Carolina University, Department of Biology, Conway, SC 29528)

THE INFLUENCE OF RECENT CLIMATE CHANGE ON EASTERN CHIPMUNK (*TAMIAS STRIATUS*) HIBERNATION

Mean annual air temperatures have increased in North America for the past 100 years, and are predicted to increase 4–8 °C further within 70 years. Few studies have examined the effects of recent climate change on mammals. A group of mammals that may be particularly sensitive to climate change are those that hibernate during winter since body temperatures during torpor are influenced by ambient temperature. Eastern chipmunks (*Tamias striatus*) store seeds in underground burrows for use during winter, and they reduce their rate of energy (food) consumption with long torpor bouts. We conducted a study on the relationship between ambient (air/soil) temperature and the torpor patterns of free-ranging *T. striatus* in New York State to determine the effects of recent climate change on hibernation. Free-ranging *T. striatus* were continuously monitored using temperature sensitive radiocollars from November through February during 2000–1, 2001–2, and 2002–3. Ambient temperatures were also measured. Mean air temperatures during the Nov–Feb period of 2001–2 were 2.7–7.3 °C greater than those observed during the same periods of 2000–1 and 2002–3. Mean air temperature for December 2001 was the greatest December mean for New York State since 1895. Consequently *T. striatus* during the November/February period of 2001–2 had: a) fewer individuals using torpor, b) reduced the proportion of time spent in torpor by 96%, and, c) increased energy expenditure by 200% when compared to the torpor patterns displayed by the same population during the colder winters of 2000–1 and 2002–3.

Ganger, Mike T. (Department of Biology, MCLA, North Adams, MA 01247)

FACTORS INFLUENCING FLOWERING SHOOT RECRUITMENT AND REPRODUCTIVE SUCCESS IN A CLONAL HERB

Canada mayflower (*Maianthemum canadense*) is a rhizomatous, perennial herb common to the understory of northeastern forests. Mayflower genets are composed of ramets that in a given year may exist as either flowering shoots (stem, 2–3 leaves, and a terminal inflorescence consisting of 4–35 perfect flowers) or vegetative shoots (1 aerial leaf). Experiments over the past ten years have focused on factors influencing flowering shoot recruitment and the reproductive success of these flowering shoots. A flowering shoot is first produced when ramets are 5.8 years old, on average. The likelihood that a ramet will flower is also related to the identity of the ramets immediately adjacent, both

basipetal and acropetal, on the same rhizome system. Flowering shoots are more likely to be produced by ramets that are not connected to other ramets and less likely to be produced by ramets that are connected to a ramet both basipetal and acropetal. The production and maturation of seeds by Canada mayflower is influenced by several factors. Mayflower is self-incompatible and has been shown to be pollen limited. There is no difference in the number of seeds matured by ramets flowering for the first time versus ramets flowering for the second time. Flowering shoots that are not connected to other ramets are able to mature comparable numbers of seeds to flowering shoots that are connected to other ramets under “normal” levels of pollen. However, when pollen levels are increased, only flowering shoots connected to other ramets are able to augment seed maturation.

Garber, Steven Daniel and Beth Herr. (*Westchester County Department of Parks, Recreation, and Conservation, Mt. Kisco, NY 10549*)

ACCURATE TURTLE AGING METHOD FOR ALL AGE CLASSES

Most long-term turtle population studies benefit from not only accurate population estimates, but also knowing the numbers of turtles in all the age classes. This has become especially important because due to predation and other reasons turtle eggs and young are not coming to full term or reaching maturity in sufficient numbers to sustain the populations. Because turtle aging methods are often inaccurate, and vary from one study to the next, we propose the easiest, best, fastest, and most inexpensive method to age all age classes of wood turtles accurately.

Gifford¹, Neil A. and Timothy H. Tear². (¹*The Nature Conservancy – Albany Pine Bush Preserve, Latham, NY 12110*; ²*The Nature Conservancy, Troy, NY 12180*)

MONITORING RECOVERY FOR THE ENDANGERED KARNER BLUE BUTTERFLY (*LYCAEIDES MELISSA SAMUELIS*) IN NEW YORK STATE

The federal recovery plan (FRP) for the endangered Karner blue butterfly (Kbb) identifies minimum viability criteria for the recovery of viable metapopulations of the species in 14 recovery units within the species’ historical range. The New York State recovery unit currently represents the best chance for the species on the eastern edge of its range. A system for measuring the current status of remnant metapopulations and evaluating recovery effort success in this recovery unit is lacking. We used The Nature Conservancy’s Measures of Success Framework (Parrish et al. 2003) and anchored it to the FRP minimum viability criteria to establish multiple, definable indicators of the species and its habitat. A monitoring protocol has been developed for testing in the summer of 2004. Restoration of previously degraded habitat has been very successful within the inland pine barrens of the Albany Pine Bush Preserve. Since successful recovery will depend on the restoration of hundreds of acres of suitable habitat, metrics to measure habitat viability are critical to gauging recovery success. The incorporation of this new framework into New York State Kbb Recovery planning has advanced the adoptability of this concept throughout New York State, and is likely applicable across the entire global range of the species. We propose that the Measures of Success framework may provide a valuable tool for enhancing other Federally listed species recovery planning goals in order to more effectively track short-term progress and the long-term success of recovery efforts.

Green¹, Timothy M. and Jeremy A. Feinberg². (¹*Brookhaven National Laboratory, Environmental Services and Waste Management Division, Upton, NY 11973*; ²*U.S. Fish & Wildlife Service, Upton Ecological and Research Reserve, Upton, NY 11973*)

A COMPARATIVE STUDY OF VERNAL POOLS AND BREEDING POPULATIONS OF EASTERN TIGER SALAMANDERS (*AMBYSTOMA TIGRINUM*) AT THE BROOKHAVEN NATIONAL LABORATORY

In 2003, biologists from the Brookhaven National Laboratory (BNL) and the U.S Fish & Wildlife Service began monitoring the herpetological assemblages of two vernal pools at BNL, with special focus given to state-endangered eastern tiger salamanders (*Ambystoma tigrinum*). Drift fence arrays were established around both ponds in an effort to develop a better understanding of the breeding success, annual activity cycles, inter-specific competition, and environmental influences affecting tiger salamanders. The ponds were geographically isolated from one another and are dramatically different in composition. Pond 1 (P1) has been heavily altered by human activity, is located adjacent to a

roadway, has little aquatic structure, and has a significantly open canopy. Pond 2 (P2) is natural, contains significant aquatic structure, and is located within a heavily forested area where a canopy of pitch pines (*Pinus rigida*) and oaks (*Quercus* spp.) surrounds its entire periphery. Egg-mass surveys prior to establishment of the drift fence arrays indicated that 40 egg masses were deposited in P1 and 75 egg masses deposited in P2. Success was significantly higher in P1. These results may be due to canopy differences and inter-specific competition. Overall herpetological diversity was lower at P1 and no other *Ambystoma* species were captured there. Herpetological diversity was higher at P2 and included marbled salamanders (*Ambystoma opacum*), which may compete with developing tiger salamander larvae. Other noteworthy discoveries include several tiger salamander “cannibal morphs” (which have not been previously reported on Long Island) and terrestrial encounters of tiger salamanders at significant distances from known water bodies.

Griffin^{1,2}, Jacob M., Gary M. **Lovett**¹, George R. **Robinson**², Mary A. **Arthur**³, Kathleen C. **Weathers**¹, and Michael **Kudish**⁴. (¹Institute of Ecosystem Studies, Millbrook, NY 12545; ²University at Albany, Biology Department, Albany, NY 12222; ³University of Kentucky, Department of Forestry, Lexington, KY 40546; ⁴Paul Smith's College, Department of Forestry, Paul Smith's, NY 12970)

SUGAR MAPLE AND BEECH DYNAMICS IN BEECH BARK DISEASE AFTERMATH FORESTS OF THE CATSKILL MOUNTAINS, NY

Beech bark disease (BBD) has been present in forests of the Catskill Mountains since the mid 1940's, and currently these forests are in the aftermath stage of disease progression. Previous work has shown that BBD in these aftermath forests is most severe in both elevation bands and watersheds that have the highest basal area of beech. In this study we examined 30 years of stand-level change (1970–2000) in BBD-affected Catskill forests to determine if effects of the disease during this period match the elevational distribution of disease severity. Beech basal area and density declined in mid-elevation aftermath stands, but increased in high and low-elevation aftermath stands. Changes in sugar maple basal area and density mirrored changes in beech; sugar maple basal area and density increased in mid elevation aftermath stands and decreased or remained constant in high and low-elevation aftermath stands. The effects of BBD on community structure in aftermath forests paralleled the distribution of disease severity across elevation found in previous studies. In BBD aftermath forests of the Catskills, the overall abundance of beech and sugar maple has not changed dramatically during the aftermath period. However, BBD has altered the elevational distribution of these two major co-dominant forest species.

Harrison, James P. and Charles W. **Boylan**. (Darrin Fresh Water Institute, Rensselaer Polytechnic Institute, Troy, NY 12180)

HYPOXIC INCURSIONS AS A FORAGING STRATEGY BY FISH WITHIN A PELAGIC FRESHWATER ASSEMBLAGE

The utilization of hypoxic environments by fish species has been thought to be sporadic at best. The majority of incursions into these waters are believed to result from predator avoidance, and in some limited cases, foraging for a select few adaptive species. This study details and investigates the use of hypoxic water habitat by *Oncorhynchus mykiss* (rainbow trout), *Perca flavescens* (yellow perch), and *Ictalurus nebulosus* (brown bullhead). Utilization occurred during late fall months across four study years. The major forage target species are *Chaoborus flavicans* and *Chaoborus punctipennis*, which both show large upswings in biomass just prior to incursion occurrence. It is believed that the fish transfer efforts from foraging on metalimnetic daphnid species, *Daphnia pulex* and *Daphnia pulicaria*, as their populations rapidly decline due to heavy predation and habitat limitation brought on by increases in hypolimnetic hypoxia. This study presents four years of data detailing the frequency and timing of hypoxic incursions based on hydroacoustic profiling, and examines the drivers for such based on nettings and stomach content analysis as correlated to the basic abiotics of the system (temperature, bathymetry, limnology, dissolved oxygen) and integrated biotic dynamics (zooplankton, *Chaoborus*, Chl a). Key findings include participation by 27% to 42% of the pelagic fish community, forage target shift as a potential driver, distinct seasonality, participation by adult fish, and positive corroboration of incursions at least 5 m below waters bearing less than 1m/L.

Herr, Beth and Steven Daniel Garber. (Westchester County Department of Parks, Recreation, and Conservation, Mt. Kisco, NY 10549)

TURTLE MANAGEMENT PLAN IN WESTCHESTER COUNTY'S PARKS

With mixed use patterns in Westchester's Parks, many of the species we have a mandate to protect are still declining in number. Included among the species that have been faring poorly are wood turtles, spotted turtles, and copperhead snakes. We propose a long-term plan to monitor and manage the raccoon and skunk populations in conjunction with the wood turtle populations at Ward Pound Ridge Reservation. Among our goals, we hope to determine if it's possible to reduce turtle egg and juvenile predation sufficiently that we can get young age classes to rejoin the population. If this succeeds, then the methods will be used elsewhere in the County Parks.

Hicks¹, Alan C., Nancy Heaslip², Susanna Von Oettingen³, and Scott Darling⁴. (¹New York State Department of Environmental Conservation, Albany, NY 12233; ²New York State Department of Environmental Conservation, Schenectady, NY 12306; ³US Fish and Wildlife Service, Concord, NH 03301; ⁴Vermont Fish and Wildlife, Pittsfield, VT 05763)

TRACKING MIGRATING INDIANA BATS FROM WINTER TO SUMMER RANGE

Declining counts of the federally endangered Indiana bat (*Myotis sodalis*) in southern hibernacula have more than offset increases in northern sites, including NY, despite extensive searches for new hibernacula across the range. New York harbors roughly 33,000 wintering individuals, fourth largest of any state, yet no summer colony had ever been located in New York or New England. If northern and southern wintering populations share the same summer range, then the causative agent of the decline has to be winter related. If, however, they are separate during both seasons, then the causative agent could be associated with either. To narrow investigations into the causes of the decline, we seek to determine the summer distribution of Indiana bats that winter in NY. Thus far we have attached radio transmitters to five (3 females, 2 males) as they emerged from hibernation at an Essex county hibernacula during April 2001, and 19 (all females) in April 2002. Staff determined the initial direction of travel at the time of release and conducted subsequent daytime searches with aircraft, coupled with ground searches to locate specific roosts. We were able to locate at least one-day roost for 19 of 24 bats. All were females and all were detected in the Champlain valley in roosts similar to those reported elsewhere in the species range. Follow-up surveys at selected sites confirmed the presence of maternity colonies. We expect to repeat this effort at the four remaining major Indiana bat hibernacula in New York. The tracking of migrants may well prove to be a less biased and less costly means of locating summer maternity colonies across large areas of land than standard mist net surveys.

Hotopp, Kenneth P. (Appalachian Conservation Biology, Frostburg, MD 21532)

EMERGING ISSUES IN LAND SNAIL CONSERVATION

Eastern North America is home to more than 500 native land snail species, including many physiographic endemics and habitat specialists. These snails are interesting for their diversity and evolutionary history, and more broadly important for their ecosystem roles. Land snails may be critical in moving calcium to higher trophic levels and are sensitive indicators of soil calcium in Eastern forests. A wide variety of potential threats to land snails, collectively as well as to certain guilds or species, can be extrapolated from limited field studies. Possible population-level threats range from straightforward trampling or habitat loss, to complex soil chemistry, plant community, and microclimate changes. Observed changes to the habitat of the federally-listed Cheat threetooth (*Triodopsis platysayoides*) can be used to illustrate some possible threat mechanisms. Studying the potential threats to land snails, and avoiding or mitigating threats when appropriate, is expected to enhance conservation of a wide variety of other taxa and ecosystem functions.

Hunsinger, Todd W. (New York State Museum, Research and Collections, Albany, NY 12230)

CURRENT AND HISTORIC DISTRIBUTION OF THE RED SALAMANDER (*PSEUDOTRITON RUBER*) IN NEW YORK

The Red Salamander (*Pseudotriton ruber*) reaches the northern extent of its range in New York State. It is present in three major river drainage systems in New York, the Allegheny, Hudson, and Susquehanna. Based on the historical literature and museum specimens the Red Salamander has declined in all three watersheds. A recent population discovery in the Susquehanna drainage may provide proof of a much larger current and historic range for the species in the state than heretofore reported. Historic, current and potential ranges, as well as causes for declines throughout the state will be discussed.

Hunsinger, Todd W. (New York State Museum, Research and Collections, Albany, NY 12230)

WITHER THE WOOD TURTLE?

A long-term study of the demography and reproductive ecology of a Hudson Valley Wood Turtle population was initiated in 1997. Data on the reproductive ecology of the population has been gathered since 2000. The mean clutch size of 7.52 (n=27) is the smallest reported for the species. Egg fertility for the population is 36.1% (n=111), resulting a tertiary clutch size of 2.7 eggs. Fertility rates vary by age. Individuals with 16 or more annuli have a 51.2% fertility rate. Individuals with 15 or fewer annuli have a 25.5% fertility rate. Fertility rates in this population are far below the 80 to 90% rates found in other studies. Possible causes of this high infertility and consequences to the population will be discussed.

Johnson, Glenn. (SUNY Potsdam, Department of Biology, Potsdam, NY 13676)

EASTERN MASSASAUGA RATTLESNAKES IN NEW YORK STATE: PAST, PRESENT AND FUTURE

The spatial and habitat ecology of the massasauga, *Sistrurus catenatus*, were investigated using radiotelemetry in a large wetland near Syracuse, New York, which contains a 37 ha transitional peatland critically important for overwintering. Habitat preference models, partitioned by sex and reproductive condition, of massasaugas were developed using multivariate analysis of habitat features measured at snake and random locations in this peatland. Gravid females in the peatland showed the greatest selection within the array of available habitat and were distinguished by preference for areas with lower stem density of short woody plants and reduced canopy coverage. Management practices that focused on gravid massasauga preference models were implemented in 1991 and 1992, including cutting, burning, and herbicide application. The incidence of massasauga use of cleared areas in 1992 was inconclusive, however 10.1% distinct aboveground peatland radiolocations occurred in or around cleared areas (2.5% of the total area), indicating disproportionate use. These cleared areas were evaluated in 1998 to determine how closely they match gravid female habitat models and results will be presented here. The eastern massasauga has been recently designated as a candidate species for federal listing and a review of developments leading to this decision will be presented.

Karrmann¹, David E., William C. Cerbone², Adela Effendy³, Kathyann Doobar⁴, Amy Lee⁵, and Sara Elsayd⁶. (¹American Museum of Natural History, Education Department, New York, NY 10024-5192; ²Fordham Preparatory School, Bronx, NY 10458; ³Health Professions and Human Services High School, New York, NY 10003; ⁴Francis Lewis High School, Flushing, NY 11345; ⁵Brooklyn Technical High School, Brooklyn, NY 11217; ⁶Life Sciences Secondary School, New York, NY 10128)

STRUCTURE AND DYNAMICS OF A *CHRYSEMYS PICTA* METAPOPOPULATION (INTEGRATING SCIENCE AND EDUCATION)

Black Rock Forest (BRF), Orange County, NY, a 3785-acre preserve dedicated to scientific research, education, and conservation, provides multiple opportunities to conduct fieldwork, and to involve students in original research. AMNH staff and interns are conducting a comprehensive census of a *Chrysemys picta* (painted turtle) metapopulation in BRF. The metapopulation consists of a core of six discrete demes (separate ponds), with up to another 6 outlying sub-populations. Educationally, the project aims to teach basic field research skills and advanced biological concepts to individual students and classes, and to foster independent research and publication by student interns. To this end, several interns have addressed specific aspects of the population to conduct independent investigations, though each integrates neatly into the greater whole. The scientific goal is a thorough census; profiling the population (individually, by

deme, and by metapopulation) morphologically, demographically, behaviorally, and genetically. Through both active (hand, dip-net, diving) and passive (hoop & basking traps) sampling, 189 individual adult (113 female, 75 male) *Chrysemys* have been identified by PIT (Passive Integrated Transponder) tagging. Morphological data for each is nearly complete. Digital images of carapaces and plastrons have been recorded for 93, and tissue samples for 98 are in frozen storage for genetic analysis. Environmental temperature is being correlated with seasonal feeding and basking behavior. Intergradation of subspecies and dispersal between demes is being examined. Sampling will continue until over 90% of the adult population is PIT tagged, and each individual has a complete morphological (measurements and images) and genetic profile.

Kolozsvary¹, Mary Beth, **Aram J. K. Calhoun²**, and **Malcolm L. Hunter³**, Jr. (¹New York State Biodiversity Research Institute, New York State Museum, Albany, NY 12230, ²University of Maine, Department of Plant, Soil, and Environmental Sciences, Orono, ME 04469, ³University of Maine, Department of Wildlife Ecology, Orono, ME 04469)

CONSTRAINTS OF FLOOD DURATION OF WETLANDS ON REPRODUCTION IN WOOD FROGS AND SPOTTED SALAMANDERS

Many amphibians rely on wetlands for reproduction and the differential distribution of amphibian species along a gradient of wetland permanence is striking, yet not absolute. In recent years, conservationists have become concerned about declines in populations of wood frogs (*Rana sylvatica*) and spotted salamanders (*Ambystoma maculatum*) over much of their range. These species are thought to rely on seasonal wetlands for greatest breeding success, but there is little documentation of their reliance on these habitats. Our objective was to determine what pool hydroperiod provides the best conditions for successful reproduction of these species. We documented reproductive effort for wood frogs and spotted salamanders in 72 wetlands in Acadia National Park, Maine in 2000 and 2001. We also examined egg and larval mortality patterns, density of invertebrate predators, and reproductive success in a subset of these wetlands that represent a hydrologic gradient from seasonal to permanently flooded sites. Our results indicate that wood frogs have greatest reproductive effort and success in wetlands of short flood duration whereas spotted salamanders have greatest reproductive effort in seasonal wetlands of long flood duration and some permanently flooded sites. Wood frogs have higher mortality in wetlands of long flood duration whereas spotted salamanders have higher mortality in wetlands of short flood duration. Density of invertebrate predators increases with increasing flood duration and larval mortality of wood frogs is significantly correlated with density of invertebrate predators, thus indicating that the vulnerability of wood frog larvae to predation may limit their reproductive success at wetlands of long flood duration.

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

STATUS OF CARNIVOROUS PLANTS ON LONG ISLAND, NEW YORK

Historically, 16 species of carnivorous plants have been documented with herbarium specimens from Long Island, New York, including one species of pitcher plant (*Sarracenia*), three species of sundews (*Drosera*), and 12 species of bladderworts (*Utricularia*). Currently, only four populations of *Sarracenia purpurea* are known from Long Island, all concentrated in eastern Suffolk County in the vicinity of Riverhead. In New York State, *Drosera filiformis* is only known from Suffolk County, and is included in the rare plant Watch List by New York Natural Heritage Program (NYNHP). Populations of *Drosera intermedia* and *D. rotundifolia* have declined during the past 100 years. The historical status of species of *Utricularia* is somewhat unclear due in part to poor collections of voucher specimens. *Utricularia geminiscapa*, *U. juncea*, *U. minor*, *U. radiata*, *U. subulata*, and *U. striata* (= *U. fibrosa*) are all listed as rare in New York by NYNHP. Populations of *U. cornuta*, *U. gibba* (including *U. biflora*), *U. intermedia*, *U. macrorhiza* (= *U. vulgaris* subsp. *macrorhiza*), *U. purpurea*, and *U. resupinata* have all declined during the past 100 years. The status of *U. inflata* on Long Island is unclear at this time.

LeBlanc¹, Thomas P. and **Ichiro Nakamura²**. (¹NY State Office of Parks and Recreation, Allegany Region, Salamanca, NY 14779; ²41 Sunrise Blvd, Williamsville, NY 14221)

CHANGING BUTTERFLY FAUNA IN ALLEGANY STATE PARK, NY: A PRELIMINARY REPORT

Allegany State Park in Cattaraugus County, Southwestern NY, covers 65,000 acres of largely forested upland, an area unique in the State for having been ice-free during the Pleistocene glaciation. Extensive studies were conducted in 1920s and 30s on its fauna and flora, including butterflies (Saunders, A. A., 1932, N. Y. State Museum Handbook 13:1-270). Over the last 70 years, however, the Park underwent substantial changes in the land use patterns, forest compo-

sitions and other environmental conditions, yet few studies document corresponding changes in the fauna and flora, with a notable exception of the avifauna in a section of the Park (Baird, T. H., 1990). We report here preliminary results of an on-going survey initiated in 2001 to create a database on the Park's butterfly fauna and to assess possible changes since the last survey. Several species recognized earlier have been split or lumped in the meantime, and the status of univoltine spring species remained undocumented because the earlier survey was conducted only in summer. Nonetheless, Saunders' record included 52 species as residents in the Park. Thus far, our provisional list contains 58 resident species, including 14 not recorded by Saunders. Of these, 6 occur in the spring, 3 were unrecognized in his days, and 3 had expanded their ranges in the Northeast only in the last few decades. Eight of Saunders' resident species, including 3 species described as "common", are yet to be confirmed. These data indicate changing species compositions accompanied by virtual disappearances of a substantial number of species.

Lendrum, Jared M. and Lawrence L. Woolbright. (Siena College, Environmental Studies Program, Loudonville, NY 12211)

THE IMPORTANCE OF WETLAND BUFFERS: HABITAT USAGE BY THE WOOD FROG

Many amphibians depend on both wetlands and adjacent uplands to complete their life cycle. Failure to provide sufficient upland habitat contiguous with wetlands in a developing landscape can contribute to the continuing worldwide decline of amphibian populations. Although wetlands generally have some degree of protection from development in the United States today, protection of associated uplands is less common. We studied movement patterns of the woodfrog, *Rana sylvatica*, during its annual spring breeding migration. The woodfrog lives primarily in forested habitats but travels to vernal pools in the spring to lay eggs that hatch into aquatic larvae. Specifically we asked how far woodfrogs move between their two habitats and whether vegetative cover influences their choice of travel routes. Results showed that woodfrogs moved at least 360 feet between breeding and foraging locations and that they preferred travel paths through woodlands over fields. These results suggest that buffers are an important component of wetlands intended to provide habitat for amphibians and that care should be taken to avoid disturbance of buffer areas. Insufficient or inappropriate wetland buffers could negatively affect the persistence of this species in a developing landscape.

Liner, Jillian M., Michael Burger, and Jamie Halperin. (Audubon New York, Ithaca, NY 14850)

IDENTIFICATION OF AVIAN CONSERVATION FOCUS AREAS IN NEW YORK

The goal of Audubon New York's Important Bird Areas (IBA) program is to identify sites within the state that are most important to birds and to protect and promote proper management of those sites for the long-term conservation of birds, other wildlife, and their habitats. Audubon New York embarked on a second round of IBA identifications in Fall 2002. The second round of IBA identifications has been an opportunity to identify sites that might have been missed in the first round and to build on the considerable developments in bird conservation that have occurred since 1997. Revisions have been made to New York's IBA criteria to include the identification of sites for WatchList species and for priority habitat-species assemblages identified in Partners in Flight and other bird conservation plans. A spatial analysis was also performed that targeted both habitat and distribution of species assemblages for which New York has a high conservation responsibility. The spatial analysis identified the largest, least fragmented patches of habitat supporting the highest richness of species, with the greatest chance of long-term protection. The analysis resulted in the identification of 50 potential IBAs, 35 of which are existing IBAs and 15 are new sites. The refined identification approach and network of sites will ensure that IBAs in New York State include the priority sites for bird conservation.

Machut, Leonard S. and Karin Limburg. (SUNY College of Environmental Science and Forestry, Dept. of Environmental and Forest Biology, Syracuse, NY 13210)

FEEDING SELECTIVITY OF AMERICAN EEL (*ANGUILLA ROSTRATA*) IN HUDSON RIVER TRIBUTARIES, NY

We collected American Eels, *Anguilla rostrata*, in tributaries of the tidal reach of the Hudson River, NY, and examined size selective predation for several key prey items. Stomach contents were analyzed for 156 eels and significance values of dietary items were calculated. Seventy-six percent of the eels with food in their guts (N = 90) ate insects, 13% ate crayfish, and 4% consumed fish. Chironomidae (midge) larvae are dominant prey items for smaller size classes, while Cambaridae (crayfish) increase in significance as prey for larger size classes. These data will be discussed in relation to morphometrics of eels, particularly head morphometry.

McCay¹, Timothy S., Deanna H. **McCay²**, Anthony V. **Caragiulo³**, and Toby L. **Mandel³**. (¹Colgate University, Department of Biology, Hamilton, NY 13346; ²Colgate University, Department of Geography, Hamilton, NY 13346; ³Colgate University, Department of Biology, Hamilton, NY 13346)

ECOLOGY OF INVASION BY EUROPEAN BUCKTHORN IN COMMON ECOSYSTEMS OF NEW YORK

European buckthorn (*Rhamnus cathartica*), which is native to Eurasia, has invaded many natural environments of the Northeast. We studied the invasion of three common environments—successional old fields, conifer plantations, and sugar maple forests—by European buckthorn. Four plots were established in each type of ecosystem, and all buckthorn individuals > 1 year were mapped and measured for basal diameter. Conifer plantations (larch or spruce-pine) had the highest density of individuals (0.80 m⁻²) followed by old fields (0.59 m⁻²) and maple forests (0.01 m⁻²). Diameter distributions at all sites were skewed toward young individuals; however, old fields and maple forests had populations consisting almost exclusively of seedlings, perhaps reflecting high early mortality rates. Individuals at all plots exhibited a pattern of positive spatial association at a range of scales between 1 and 15 m. *Rhamnus* at plantations were the least strongly clumped in space, and clumping was approximately the same across all spatial scales. Individuals in old fields were most strongly clumped at relatively small spatial scales (1–5 m), reflecting the concentration of seedlings near mature plants. At maple forests, individuals were most strongly clumped at scales between 4 and 12 m, possibly reflecting the influence of canopy gaps. Invasion of maple stands by *Rhamnus* is restricted to disturbed areas and is limited by poor survival under the forest canopy. In old fields *Rhamnus* only rarely become established away from the canopies of mature plants. Invasion of conifer plantations is extensive and not limited strongly by within-stand environmental variation.

McGowan¹, Edwin M. and Dale M. **Madison²**. (¹New York–New Jersey Trail Conference, Mahwah, NJ 07430; ²Binghamton University, Department of Biological Sciences, Binghamton, NY 13902)

SPATIAL ECOLOGY AND CONSERVATION OF THE TIMBER RATTLESNAKE, *CROTALUS HORRIDUS*, IN SOUTHEASTERN NEW YORK

The timber rattlesnake (*Crotalus horridus*), a species of conservation concern in much of the northeastern United States, faces continuing habitat loss from development of private forestlands. This oak forest species may be especially vulnerable to habitat fragmentation because it: (1) shows strong fidelity to specific communal overwintering sites (“dens”) and hence has a low capacity for colonizing new habitats; (2) requires large areas for seasonal activities; and (3) already has a patchy distribution due to the historic extirpation of numerous den sites. Conservation efforts have traditionally focused on protecting den habitats but are now increasingly concerned with protecting summer range and multi-den metapopulations. To evaluate spatial requirements of this species in southeastern New York, we radiotracked a total of 20 adult timber rattlesnakes (13F:7M) at two sites during 1997–2001. Male and nongravid female snakes used habitats greater than 0.8 km from their den of origin extensively for foraging, mating, and skin-shedding and spent relatively little time near dens outside of hibernation. Moreover, mating activity was concentrated near the periphery of seasonal activity areas, which suggests that these locations are important for genetic exchange within metapopulations. Our results challenge a common assumption implicit in the design of protected areas around core habitats, such as hibernacula; namely that the value of habitat to the organism will decline with increasing distance from the core. Efforts aimed at protecting *C. horridus* metapopulations need to assess the importance of habitats distant from dens when designing site-specific conservation plans.

Michell¹, Kathy and Robert G. **Michell²**. (¹New York Center for Turtle Rehabilitation and Conservation, Inc., Narrowsburg, NY 12764; ²Dartmouth University, Physics Department, Hanover, NH 03755)

HEADSTARTING, REHABILITATION AND TRANSLOCATION OF WOOD TURTLES IN NEW YORK STATE

A ten year mark and recapture study of a wood turtle (*Clemmys insculpta*) population in New York State has provided baseline data on movements and behavior of the native population. Wood turtle eggs were salvaged from disturbances at this study stream and a nearby stream. Four hatchlings were headstarted for one year, attaining weights of over 130g and released with transmitters. Three hatchlings were released as two-year olds, weighing between 270–370g. All were tracked for two years, grew significantly and sustained no mortality. Regardless of release locations and

age, all eventually migrated to a meadow with thick alder and winterberry growth along the part of the stream known to be used by native juveniles. Rehabilitation techniques refined by the authors have resulted in the recovery of a number of seriously injured adult wood turtles. Eight rehabilitated adult turtles whose original locales were unknown have been translocated into this study population. Telemetry was used to follow their movements. Data will be presented to show that some adult turtles adapted readily to translocation, others did not adapt initially but were successfully relocated through intervention. Preliminary results show that the time of year of release may affect the success of translocation. Wood turtles acclimated in outdoor enclosures, released just prior to hibernation may adapt most successfully. The techniques of headstarting, rehabilitation and translocation can be used successfully in wood turtles.

Molloy, Daniel P. (New York State Museum, Research and Collections, Albany, NY 12230)

IMPACT OF INFECTIOUS DISEASES ON ZEBRA MUSSEL POPULATIONS

The invasion and spread of zebra mussels (*Dreissena polymorpha*) throughout North American freshwaters has resulted in significant adverse economic and ecological impacts. Although there is a wide diversity of parasitic organisms in zebra mussel populations throughout their native European range, these parasites have not yet been observed in North American populations, suggesting that these parasites did not accompany their host mussels during their transatlantic passage. Lethal parasites observed in European zebra mussels include the digenean trematode *Phyllodistomum folium*, an undescribed haplosporidian species, and an undescribed ciliate in the genus *Ophryoglena*. Although infection is not apparently lethal, the digenetic trematode *Bucephalus polymorphus* does cause castration. The absence of such debilitating and lethal diseases that exist in European zebra mussel populations has likely contributed to the rapid population growth of these mussels in North America, but to what extent is open to debate. This latter question is the primary focus of this presentation. Our European field data suggest that parasites generally play only a minor role in limiting zebra mussel populations, and, therefore, that the absence of such parasites in North American populations has probably not had a major impact on their population dynamics on this continent.

Morse^{1,2}, Richard S. and Robert A. Daniels¹. (¹New York State Museum, Research and Collections, Albany, NY 12230; ²SUNY College of Environmental Science and Forestry, Syracuse, NY 13210)

A TAXONOMIC REEVALUATION OF THE JUNE SUCKER

An isolated population of suckers (*Catostomus* sp.) in the Adirondack Park was studied on account of morphometric and life history differences observed during a routine survey. These fish spawned much later and were much smaller in size than *Catostomus commersonii*, the white sucker. Initial observations suggested that these organisms might belong to a species described by Fred Mather in the late 19th century. However, the species described by Mather has been synonymized with *Catostomus commersonii* during the last half of the 20th century. The authors found this isolated population of fish to be different enough to warrant further investigation. Techniques, including truss analyses, meristics and genetic sequencing of mtDNA, were performed to help assess these organisms' taxonomic status. Life history observations coupled with preliminary results of laboratory work suggest that these organisms deserve separate taxonomic status.

Murray, Joseph R. (University at Albany, Biodiversity, Conservation, & Policy, Albany, NY 12222)

THE ROLE OF SCIENCE AND POLICY IN THE CONTROL OF INVASIVE SPECIES IN SHIPS' BALLAST WATER

The exchange of ballast water by transoceanic ships continues to be an important pathway for the establishment of aquatic invasive species. Ballast water provides the ship with stability and is thusly a necessary component of shipping activities. Since 1970, shipping activities likely caused 77% of biological invasions in the Great Lakes. Approximately 7,000 aquatic species gain access to new ecosystems via the intake and discharge of ballast water each day. The shipping industry is responsible for transporting 80% of the world's commodities. The growth of international trade has increased the rate of invasion, as well as creating new trade routes giving some species the opportunity of invasion where previously they had none. Science has done a sufficient job of defining the problem and suggesting appropriate policy alternatives. But, the debate has shifted from "what is the problem" to "what to do about the problem". Questions of "what to do" are political; therefore, management and control of aquatic invasive species via ballast water will have

both a science and political component. Currently under the National Invasive Species Act of 1996 (NISA), only ships entering ports in the Great Lakes are required to exchange ballast water in the open ocean. The National Aquatic Invasive Species Act (NAISA), a bill currently before Congress, aims to make open-ocean exchange mandatory for all ports as well as moving towards treatment technologies designed to sterilize ballast tanks. NAISA has been crafted based upon the best possible science with the aide of scientists, environmental groups, and decision-makers.

Novak, Paul. (New York Natural Heritage Program, Albany, NY 12233-4757)

THE STATUS OF DRAGONFLIES AND DAMSELFLIES IN NEW YORK: PAST, PRESENT, AND FUTURE

The dragonflies and damselflies of New York have been studied with varying degrees of intensity since the mid 1880s. The first comprehensive state list was a New York Entomological Society publication by Calvert in 1895. Needham published a comprehensive state list in 1928. This list included 150 species now recognized as valid. Needham's list remained the most current account of the state's odonate fauna until Nick Donnelly's landmark initial volume of the Bulletin of American Odonatology in 1992. Donnelly's list included 177 species. About the time of Donnelly's 1992 publication, the number of amateur naturalists in New York with an interest in odonates was beginning to grow, and with the development of the Donnelly list and the assistance of Ken Soltesz, the New York Natural Heritage Program (NYNHP) began tracking locations for approximately 60 species of odonates in NY. The New York State Department of Environmental Conservation afforded state threatened status to its first odonates in 1999 as part of an official revision of the state endangered/threatened/special concern lists. Twelve new taxa have been added to the state since 1992 (Donnelly 1999) as the interest in this group has continued to grow, and new records for species tracked by NYNHP have been added on an annual basis. We are poised to make the next big jump in our understanding of the distribution and conservation status of this popular and fascinating group of insects as we prepare to embark on a three year New York Odonate Inventory project.

Paul¹, Eric A., David A. Gapp², and Howard A. Simonin¹. (¹New York State Department of Environmental Conservation, Rome Field Station, Rome, NY 13440; ²Hamilton College, Biology Department, Clinton, NY 13323)

TOXICITY OF TWO AQUATIC HERBICIDES TO EASTERN SPINY SOFTSHELL TURTLES (*APALONE S. SPINIFERA*)

Monitoring of eastern spiny softshell turtles (*Apalone s. spinifera*) in Sodus Bay on Lake Ontario, Wayne County, New York has shown a decrease in the number of hatchling turtles present in the bay. Some people have associated this decline with the use of aquatic herbicides in Sodus Bay. Information on the toxicity of these herbicides to turtles is not available in the literature. Toxicity tests for reptiles are not required for the registration of pesticides, and there has been little interest in testing turtles with aquatic herbicides. Aquatic turtles may be an exception. Softshell turtles have skin which has a greater level of water exchange compared to other reptiles. They also flush water into and out of their mouths to obtain oxygen from the water. This provides possible routes of exposure, which are not found in other reptiles. The two aquatic herbicides selected for testing were diquat (Reward™) and the potassium salt of endothal (Aquathol K™). These are the aquatic herbicides most commonly used in New York and Sodus Bay. We exposed hatchling softshell turtles for 96 hours in static laboratory toxicity tests to concentrations up to 25 times the maximum application rates. Turtles were monitored for five weeks following exposure. At no time did the turtles show signs of ill effects from these exposures. It is unlikely that softshell turtles are experiencing direct toxic effects from herbicide use. The use of herbicides may make young turtles more vulnerable to predation through habitat alteration. Other causes, unrelated to herbicide use, may also be affecting turtle survival.

Pederson, Neil, Edward R. Cook, and Gordon C. Jacoby. (Tree-ring Lab., L-DEO, Columbia University, Palisades, NY 10964)

THE GEOGRAPHIC INFLUENCE OF WINTER TEMPERATURES ON OAK AND HICKORY SPECIES

Temperature has a strong influence on altitudinal and latitudinal treeline ecosystems. Little is known, however, of its influence on temperate ecosystems. The goal of this research is to explore the importance of temperature on temperate ecosystems. We focus on northern range margin species (NRM) since they offer the best opportunity to determine the influence of temperature because they represent a treeline, albeit a "species treeline." Four species (*Carya glabra*, *Quercus alba*, *Q. prinus* and *Q. rubra*) are studied covering the Hudson River Valley lowland (HRV) in eastern New York State. Three tree-ring growth chronologies per species are developed and correlated to average monthly minimum and maximum temperatures from 1897–1994. Of the temperature response, winter temperatures are found to be most important factor of growth. *Q. alba* and *Q. prinus* are more sensitive to winter temperatures than *C. glabra* and *Q. rubra*. The dominant mode of growth of the oak-hickory ecosystem across the HRV and the northern and southern HRV is extracted using principal component analysis. These dominant modes of growth are correlated to the same climatic variables as the species' populations. Cold January temperatures limit growth of the oak hickory ecosystem across the study region. Unexpectedly, cold January temperatures most strongly limit growth in the southern HRV. It is hypothesized that an interaction between snow cover and fine root mortality may be the primary factors of this geographic pattern. These results suggest that temperature at species and ecosystem levels may influence radial growth differently at varying geographic scales.

Primack, Richard B. and Abraham J. Miller-Rushing. (Boston University, Biology Department, Boston, MA 02215)

TIMING OF FLOWERING AND BIRD MIGRATION AS INDICATORS OF GLOBAL CLIMATE CHANGE (KEYNOTE ADDRESS)

Biological communities are already showing the impacts of global climate change. Among the most sensitive indicators are plant flowering times and migratory bird arrival times. However, relatively few studies have examined the impact of climate change on these phenomena, and issues of using certain types of historical records have not been examined carefully. A large potential source of data on the biological response to climate change is the unpublished records of research stations, naturalist clubs and individual naturalists. One example is the records of the Manomet Bird Observatory, which is located south of Boston; there birds are arriving earlier in the spring, with the mean arrival time of birds being a better indicator of earlier arrival times than the more commonly used first date of arrival. Another example is herbarium specimens from the Arnold Arboretum, which demonstrate that plants now flower 8 days earlier than 100 years ago. And finally, historical observations of flowering in Concord, Massachusetts, recorded by Henry David Thoreau and other naturalists, combined with current observations demonstrate that spring flowering plants are the most sensitive to temperature and are the best indicators of climate change. These field observations are being tested experimentally by exposing plants to a range of temperatures under controlled conditions, which will confirm which species are most responsive. The results of this research will be published in scientific journals, and will also be presented to the general public to make people aware of the current and future impacts of climate change.

Roblee¹, Kenneth, Ward Stone², and David Adams³. (¹New York State Department of Environmental Conservation, Bureau of Wildlife, Buffalo, NY 14203; ²New York State Department of Environmental Conservation, Wildlife Pathology Unit, Delmar, NY 12054; ³New York State Department of Environmental Conservation, Nongame and Habitat Unit, Albany, NY 12233)

TYPE E BOTULISM CAUSED WATERBIRD MORTALITY IN LAKE ERIE AND LAKE ONTARIO

Department of Environmental Conservation (DEC) staff are familiar with outbreaks of type C botulism, which periodically cause heavy mortality. Type E botulism, and its devastating effect on migrating waterbirds, is a new phenomenon. The first observed outbreak in the eastern basin of Lake Erie occurred November 2000. To monitor and evaluate the impact of type E botulism on waterbirds, thirteen 500-meter transects were surveyed along the Lake Erie shoreline. This survey was replicated during fall 2001, 2002 and 2003. During 2002 and 2003, surveys were also conducted along the Lake Ontario shoreline. Forty-seven transects were monitored during the peak of Common Loon

migration, 16 October to 14 November. Predicted mortality for the entire New York State Lake Erie shoreline was calculated. During 2000 an estimated 5,415 waterbirds died from type E botulism, while during 2001, 2,862 waterbirds were impacted. Waterbird mortality continued on Lake Erie during 2002 and was documented on Lake Ontario for the first time. Total predicted waterbird mortality for 2002 was estimated to be 18,292 and for 2003 4,610. The single waterbird species with the greatest mortality differed each year. Red-breasted Merganser had a predicted mortality of 2,479 in 2000; Common Loon 1,149 during 2001; Long-tailed Duck 13,219 in 2002; and in 2003 Common Loon predicted mortality was 2,101. Similar mortality is expected again in fall 2004. Survey efforts will be replicated.

Romey¹, William L. and Melissa Yanek². (¹SUNY Potsdam, Department of Biology, Potsdam NY 13676; ²Binghamton University, Department of Biology, Binghamton NY 13902)

IMPACTS OF LOGGING ON BEE DIVERSITY IN THE ADIRONDACK MOUNTAINS

Little is known about the diversity of pollinators in the Adirondack Mountains of New York. There are few baseline surveys of native bees anywhere in the United States. Also, the impacts of road-building, logging, and acid rain on pollinators is not known. In Europe studies have shown a decrease in native pollinators, which would, in turn, impact native flowers and other parts of the ecosystem. We surveyed the diversity and color preferences of bees (Apoidea) in four experimental logging plots near Saranac Lake New York (Franklin County). Pan trap surveys (blue, white, and yellow) were conducted weekly during the middle of the summer for two years. Forty-five species of bees were identified in 12 Genera and five families. Few bees were collected in the unlogged control plot and in the Single-Tree removal area. Overall, the greatest bee diversity and abundance were found in the clearcut plot, but some families (Halictidae) were found significantly more in the Shelterwood plots. There were significant differences in color choices of the bees, some of which varied with the logging treatment. The ten species of *Lasioglossum* preferred white traps significantly. The family Apidae (which includes the bumblebees, *Bombus*) avoided yellow traps. As well as providing critical data on the impacts of logging practices on bee diversity and natural history data on color choices in bees, this study provides a baseline level of Apoidea diversity with which to compare to future studies to determine if overall bee diversity is decreasing.

Rosenbaum¹, Peter A., Jeanne M. Robertson², and Kelly R. Zamudio². (¹SUNY Oswego, Department of Biology, Oswego, NY 13126; ²Cornell University, Department of Ecology and Evolutionary Biology, Ithaca, NY 14850)

RANGE-WIDE GENETIC UNIFORMITY AMONG POPULATIONS OF THE BOG TURTLE (*GLYPTEMYS* = *CLEMMYS MUHLENBERGII*)

We used mitochondrial DNA sequence comparisons to assess range-wide population structure and historical patterns of differentiation among populations of the bog turtle (*Glyptemys* = *Clemmys muhlenbergii*), a New York State endangered and a federally threatened species. The bog turtle is one of North America's smallest and most endangered turtle species. Currently, the bog turtle has a discontinuous distribution in twelve eastern U.S. states comprising well-separated northern and southern populations with additional disjunct populations in New York and Pennsylvania. Portions of the northern range were glaciated. We surveyed 2763 bases pairs of mtDNA spanning three gene combinations (cyt b, ND4, and D-loop) in 41 individuals from 17 populations throughout most of the bog turtle's distribution. We found surprisingly low levels of divergence among populations, even in southern populations that presumably acted as refugia during times of climatic change. Despite these low levels of polymorphism, we do find a signal of bottleneck, followed by post-Pleistocene expansion into northern segments of the range. Aside from the historical changes in habitat availability and climate that may have influenced the historical deployment of lineages in this species, we discuss possible life history traits and habitat dynamics that might also contribute to this species range-wide genetic uniformity as well as the implications of our data for conservation.

Ross¹, Angelena M. and Glenn Johnson². (¹SUNY College of Environmental Science and Forestry, Department of Environmental and Forest Biology, Syracuse, NY 13120; ²SUNY College at Potsdam, Department of Biology, Potsdam, NY 13676)

DISTRIBUTION AND HABITAT OF SPRUCE GROUSE NEAR THE EDGE OF THEIR RANGE.

Spruce grouse (*Falcipectes canadensis*) occur in a broad band that generally conforms to the boreal forest biome. In New York, this species is endangered and occurs exclusively in small isolated populations in the northwestern Adirondack Mountains. Populations have been declining in New York since the late 1800s, probably as a result of loss and fragmentation of habitat due to extensive softwood logging, tree disease, and increasing development. With the aid of conspecific playback recordings, we surveyed 33 sites between 2000 and 2003 for the presence of individuals or sign (i.e., scat or feathers), including 26 sites that were occupied during earlier surveys (between 1976 and 1985) and seven sites that were not visited during earlier surveys. Spruce grouse or sign were found in 18 sites: 12 of 26 historically occupied sites and six of seven sites not previously surveyed. We hypothesize that recent local population extirpations are a result of metapopulation dynamics in a highly fragmented landscape or succession of coniferous forests to older aged stands. Preliminary analysis of occupied and unoccupied habitat indicates live foliar cover in the 1.0–2.0 m stratum was significantly higher in occupied sites than in unoccupied sites and there was no significant difference in tree age between occupied and unoccupied sites ($p < 0.05$). In addition, occupied sites also had a greater percentage of tamarack (*Larix laricina*) in the canopy layer. Results from this study will provide information for the development of a recovery plan for spruce grouse in New York.

Schmid, James A. (*Schmid & Company, Inc., Consulting Ecologists, Media, PA 19063*)

PATTERNS IN THE FLORA OF THE MID-ATLANTIC STATES

New Statewide checklists that provide a common nomenclature and comparable habitat information make possible a comparison of the assemblage of vascular plants found in New York, Pennsylvania, Maryland, New Jersey, and Delaware. When combined with available data based on the generalized mapping of wetlands and on the distribution of individual species, the floristic data can be interpreted to make clear both similarities and differences among these political units that encompass diverse biogeographical regions.

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TEMPORAL AND SPATIAL PATTERNS OF YOUNG-OF-YEAR AMERICAN EEL (*ANGUILLA ROSTRATA*) IMMIGRATION IN TRIBUTARIES TO THE TIDAL HUDSON RIVER

We sampled immigrating young-of-year American eels in two Hudson River tributaries (Hunters Brook, Wappingers Falls and the Saw Kill, Annandale) for two years. Counts of eels collected in small Sheldon eel fykes were taken daily. A sample of eels was measured, weighed, and staged (pigment distribution) twice a week. Immigration to the tributaries begins in early April and newly arrived (pigmentless glass eels) individuals are found into early May. The peak of immigration occurs around the New Moon. There is a trend of decreasing size and increasing pigmentation over time. Crude estimates indicate that 2,000–10,000 eels enter each tributary each year.

Selfridge, Jennifer A. and Dylan Parry. (*SUNY College of Environmental Science and Forestry, Department of Environmental and Forest Biology, Syracuse, NY 13213*)

EFFECTS OF HABITAT STRUCTURE ON PARASITISM OF BARRENS BUCK MOTH

Barrens buck moth (*Hemileuca maia*) is a species of special concern in Massachusetts. It reaches the northern limit of its range on Cape Cod, where it is restricted to open, early-successional areas within the pine forest matrix. It appears to be particularly abundant along powerline right-of-ways, and it is rarely, if ever, found beneath the forest canopy, despite the fact that its host plant, scrub oak (*Quercus ilicifolia*) occurs frequently in these areas. Our study sought to determine if the restriction of buck moth to open habitats is driven by interaction with parasitoids. Special attention was paid to the mortality inflicted by the invasive tachinid fly *Compsilura concinnata*. We deployed *H. maia* larvae in plots

along powerline right-of-ways and within the closed-canopy forest. We compared larval mortality between the two habitats for three instars in 2002 and all six instars in 2003. Four parasitoid species were recorded in both years. In 2002, we detected minor differences in larval mortality between the two habitats. No differences in larval mortality were evident in 2003. Parasitism rates in 2003 were significantly lower than in 2002. *C. concinnata* issued almost exclusively from larvae deployed in forest plots, but in insignificant numbers. Significant effects of parasitoids on *H. maia* distribution were not evident. We speculate that factors such as host plant quality and microclimate are more important influences on this species' distribution, but caution that parasitism varies dramatically among years, and thus may still play a role in structuring the spatial distribution of *H. maia*.

Shaw¹, William H., Paul A. Bukaveckas², James W. Sutherland³, Charles W. Boylen¹, and Sandra A. Nierzwicki-Bauer¹. (¹Darrin Freshwater Institute, Bolton Landing, NY 12814; ²University of Louisville, Department of Water Resources, Louisville, KY 40208; ³New York State Department of Environmental Conservation, Bolton Landing, NY 12814)

EVIDENCE FOR ZOOPLANKTON RECOVERY IN CHEMICALLY RECOVERING ADIRONDACK LAKES

In a study of 30 Adirondack lakes varying in pH from 4.5 to 7.1 in 1994, 19 lakes displayed a rise in pH of 0.5 to 1 unit and 23 lakes a decrease in 50% to 95% monomeric aluminum levels by the year 2002. We used regression analysis to detect evidence of biotic recovery reflective of changes in acid chemistry. In biotic recovery, zooplankton species richness must increase and community composition should return to something resembling that of circumneutral reference lakes. The species richness and percent composition by large cladocerans in the crustacean community and the percent composition of a group of rotifers (*Kellicottia* spp., *Keratella crassa* and *Conochilus unicornis*) commonly found in the reference lakes was compared to changes in pH and monomeric aluminum during the 9-year period. There were statistically significant improvements in crustacean species richness in 3 lakes and in community composition in 3 other lakes and significant improvements in rotifer species richness in 3 lakes and community composition in 4 lakes. Only 1 lake showed improvements in both parameters. There was an apparent negative interaction between an increase in abundance of large cladocerans and the rotifer reference community composition in two lakes. While it is clear that some biotic recovery is occurring, the response to date appears to be insufficient to overcome individual lake variability in zooplankton species richness and community composition and the annual variation in weather and local ecological conditions.

Siegfried, Clifford A. (New York State Museum, Albany, NY, 12230)

THE PELAGIC ZOOPLANKTON COMMUNITY OF AN ACIDIC, LOW DOC LAKE IN THE ADIRONDACKS OF NEW YORK STATE

The pelagic zooplankton community (rotifers and crustaceans) of Silver Lake, an acidic (pH < 5.0) low DOC (annual mean = 0.78 mg/l – 1.93 mg/l) Adirondack lake, was studied during the open water seasons of 1988 through 1996. Rotifer species richness (species = 41) for this “dead lake” through the study period was comparable to that reported for many of the circumneutral lakes of the region. Crustacean species richness (species = 12), especially among the cladocera was considerably lower than in that of non-acidic lakes of the Adirondacks. *Keratella taurocephala*, with water-column mean peak abundance ranging from 100/l to 700/l, was the most abundant rotifer in all years of the study. *Polyarthra vulgaris* and *Gastropus styifer* were seasonal dominants in some years, when peak mean water column abundance exceeded 200/l and 350/l respectively. *Leptodiptomus minutus* was the numerical and standing crop crustacean dominant in all years of study except for three years in which *Daphnia catawba* dominated standing crop. *Daphnia catawba* significantly effected the dynamics of *K. taurocephala*. Exploitative competition by daphnids when abundant curtailed and shifted peak *K. taurocephala* abundance— rather than a mid-summer peak the peak abundance occurred in the early spring or fall. Low DOC concentrations in acidic lakes can be accompanied by 1% attenuation depth of UV-B radiation that exceed 10 meters. Annual variation in DOC concentrations was significant; epilimnetic concentrations < 0.50 mg/l were recorded in 1988 and 1994 but were generally > 1.5 mg/l in the other years of study. DOC generally increased with depth with highest water column values recorded below the thermocline. The dominant zooplankton of Silver Lake are capable of photoenzymatic repair are among the most tolerant to UV radiation. Zooplankton abundance was also generally low in the epilimnion and high within and below the thermocline where UV attenuation is greatest.

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CONSERVING BLANDING'S TURTLES (*EMYDOIDEA BLANDINGII*) AMID SUBURBAN SPRAWL IN EASTERN MASSACHUSETTS

Blanding's turtles (*Emydoidea blandingii*) are threatened throughout their eastern range. Massachusetts has the most extensive eastern populations, but they are threatened by a dense road network and ongoing suburban development. From 2001–2002, we conducted a radio telemetry study to examine home range and seasonal movement patterns of Blanding's turtles. Turtle locations were recorded 2–3 times a week throughout the active period (March–October). Home range lengths ranged from 256 m to 3203 m, based on 2776 locations from 48 turtles. In 2001, we examined 5 of our 8 study sites and found that home range length varied seasonally, ranging from 36 m to 2993 m (mean = 281 m, n = 48), with the longest movements occurring between April and May (mean = 511 m, n = 30). Turtles made long overland treks between wetlands, often crossing roads in the process. As a long-lived iteroparous species, populations are sensitive to anthropogenic adult mortality, such as roadkills. A conservation strategy for Blanding's turtles must include identification and protection of habitat where animals can move normally without crossing roads. We used photo-interpreted wetlands (including vernal pools) and roads across the 7000 km² range of Blanding's turtles in Massachusetts in a GIS to model the percentage of turtles with a home range centered in each wetland that would never cross a road, thereby identifying wetland complexes with a low risk of roadkill. Results across the landscape identify Blanding's 'hot spots' where viable populations may exist, helping to focus conservation efforts and target surveys.

Spada¹, Daniel M., Sunita K. Halasz¹, and Leslie Karasin². (¹New York State Adirondack Park Agency, Ray Brook, NY 12977; ²Wildlife Conservation Society, Saranac Lake, NY 12983)

DATABASE OF CHARISMATIC MEGA-WETLANDS IN THE ADIRONDACK PARK

Approximately 14% of New York State's 6 million acre (2.4million ha) Adirondack Park is covered by wetlands. The Park is the home of the vast majority of peatland acreage in New York State and the eastern United States outside of Maine. It also includes massive riparian floodplain wetlands. This study attempted to locate and quantify the large wetland systems, including peatlands, within the Park for which digital mapping is available. Our interest in large wetlands stems from their recognized importance in nutrient cycling, carbon sequestration, biodiversity, hydrologic stabilization and rare species ecology functions. Using a GIS wetlands database for most of the Park that was assembled during EPA-funded wetlands protection projects, airphoto interpretation using the Cowardin classification system, and named wetland systems on USGS topographic maps, we identified large wetlands determining their spatial extent and cover types. We identified the large wetlands' surrounding land classifications and determined which ecologically-significant wetlands are contained in State Land units. In the area of this study (the Oswegatchie/Black, Greater Upper Hudson and St. Lawrence River watersheds, approximately 75% of the total Park acreage) we identified 93 large wetlands ranging in size from 72 acres (29ha) to 3882 acres (1571ha) with an average size of 760 acres (308ha). The data has the potential to be used in habitat identification, watershed and wetland protection efforts, and State land unit management planning.

Tear¹, Timothy, H., Alvin R. Breisch², and Randy Stechert³. (¹The Nature Conservancy – Eastern New York Chapter, Troy, NY, 12180; ²New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, Albany, NY 12233; ³Consultant, Narrowsburg, NY 12764)

DO RATTLESNAKE EXCLUSION FENCES REALLY WORK? A CASE STUDY FROM NEW YORK

The seemingly unrelenting tide of commercial and residential development has increased human-wildlife interactions. Such interactions evoke heightened concern when human mortality is at stake, as is the case with the timber rattlesnake (*Crotalus horridus*). The construction of exclusion fences has been proposed as a solution to limit human/rattlesnake interactions. We report on a three-year study that illuminates many of the problems with this approach. Based on the recommendations of a three-year pilot study, a 4 ft high exclusion fence constructed with ½ in hardware cloth approximately 8000 feet long was completed in 2000. The fence was positioned to minimize the possibility that

rattlesnakes emerging from their den sites would enter a subdivision under construction. Between 2001–2003, six timber rattlesnakes were tracked using implanted radio transmitters. By the end of 2002, all six rattlesnakes had entered the subdivision, having successfully migrated from the nearby den area. In 2003, when five of the radio-tagged snakes returned to the subdivision, they were captured and returned to three preselected areas up slope from the fence. Sixteen translocations were performed on five snakes resulting in four of the snakes returning to the subdivision. Based on movement patterns, snakes moved through the fence on many occasions, as well as around both ends of the fence. Breaches in the integrity of the fence appeared to be a function of both poor installation and lack of sufficient maintenance. Fourteen other rattlesnakes were also found within the subdivision during the study. Two rattlesnakes died during this study, possibly killed by humans. We conclude that the snake fence had limited value and did not achieve the objective of minimizing human/snake conflicts.

Tessier, Jack T. (Central Connecticut State University, Department of Biological Sciences, New Britain, CT 06053)

USING UNDERSTORY PLANTS TO TEST THE UNIFIED NEUTRAL THEORY OF BIODIVERSITY

The unified neutral theory of biodiversity and biogeography predicts that when ecological space is created in a plant community, that space will be filled by the surrounding species in proportion to their availability in the resultant community. To test this prediction, I removed all above- and belowground understory plant material from one-meter square plots during three consecutive springs in a northern hardwood forest of the Catskill Mountains, NY and resampled the plots to compare regrowth among species in the new plant communities. Species differed in regrowth cover and distance of dispersal into the plots. Cover and establishment distance into the plots were correlated with cover in adjacent plots for each species. Percent recovery within the disturbed plots and the ratio of cover within the disturbed plots to cover in adjacent plots differed significantly among species. These results do not support the unified neutral theory, since the species in the new plant communities were not established in proportion to their presence in the surrounding community. Future studies should examine long-term responses in the plant community and consider additional species and ecosystem types.

Tibbits, Wesley T. (Biological Field Station, SUNY Oneonta, Cooperstown, NY 13326)

NATURAL REPRODUCTION BY STOCKED LAKE TROUT (*SALVELINUS NAMAYCUSH*) ON MARGINAL SPAWNING HABITAT IN OTSEGO LAKE, NY

Lake trout spawning habitat in Lake Ontario, Lake Michigan and Lake Champlain consist of interstitially spaced large cobble substrate with little to no organic or silt debris in 4-6 meters depth. Successful spawning habitat within Otsego Lake however, consists primarily of coarse gravel substrate in less than 1 meter of water. The average catch of fry per m² per trap day in Otsego Lake (0.94 fry/m²/trap day) was higher than that reported from lake Michigan (0.51) and Lake Superior (0.88) but lower than the average catch per effort in m² per trap day reported from Lake Champlain (1.92). Preliminary SCUBA surveys conducted in Otsego Lake found marginal substrate in only small, localized sites. Recruitment at these sites may indicate an adaptation by Otsego lake trout to successfully spawn on relatively smaller substrate in shallower water than generally recognized as being suitable spawning habitat.

Utter, James, Jamie Balleau, Beverly Leon, Cheryl Ryder, and Walter Soto. (Purchase College, SUNY, Environmental Science Program, Purchase, NY 10577)

HABITAT USE BY BOG AND SPOTTED TURTLES IN TWO CONTRASTING WETLAND LANDSCAPES

Sound understanding of habitat use is critical for managing rare species since errors in habitat management can doom a small population. We have monitored individuals in two small populations of bog turtle (*Clemmys muhlenbergii*) and spotted turtle (*Clemmys guttata*) in the Great Swamp (eastern Dutchess and Putnam Counties) for four years using visual searches, traps and radio-tracking. The landscape at Site 1 is primarily wet meadow, while the Site 2 landscape is based on an extensive sweet flag – purple loosestrife marsh. Each site has a small patch of harsh and sedge fen where bog turtle nesting attempts occurred. No hatchling bog turtles have been found at either site, but hatchling spotted turtles were seen at each site all four years. Spotted turtles moved more frequently and had larger home ranges than bog turtles; they also utilized a wider variety of habitats and showed a preference for wetter habitats than the bog turtles. However,

there was great variation in movement patterns among individuals within species. Two environmental “extremes” that occurred unexpectedly during the study provided insight into habitat use. In August 2001 at Site 1, the fen and adjacent habitat was brush-hogged and part of the wet meadow was plowed. Turtles did not use the fen in 2002. The unusually wet spring and summer of 2003, increased the availability of ephemeral pools at Site 1 and marsh water depth at Site 2. In each case the movement and habitat use patterns of the turtles changed, yielding insight into some management options.

Vispo, Conrad (*Farmscape Ecology Program, Hawthorne Valley Farm, Ghent NY 12075*)

AGRICULTURE AND CONSERVATION: THEIR ECOLOGICAL AND SOCIOLOGICAL INTERACTIONS
IN COLUMBIA COUNTY, NY.

Columbia County shares a 250 year boom/bust agricultural history with most of the Northeast. Currently, agricultural uses are increasingly competing with housing development. This is driven in part by a post 9/11 exodus from New York City and facilitated by the at-home business possibilities of the Internet. The result has been not only a juxtaposition of land uses but also, to some extent, of cultures. Based on our experiences establishing The Farmscape Ecology Program at Hawthorne Valley Farm, this talk discusses the differing land relations of farmers and recently settled non-farmers. Summaries of the distinct motives for and effects of land use by each group are presented in relation to conservation. While farming can result in intensive land use, it also involves a close interaction with the landscape and produces our needed food. Country estates (which can dominate a landscape in area if not in number) may have a more passive interaction, with fewer immediate impacts, but they demand less understanding of the land and are supported by the "export" of agricultural environmental costs to other regions. Participatory research, such as that proposed by the Land Stewardship Project, is suggested as a way to help farmers appreciate and document the non-utilitarian aspects of their stewardship. At the same time, a program defining good food by more than just its gustatory appeal is suggested as a way of helping newcomers understand the value of sustainable, local agriculture.

Vogler¹, Donna W., Susan Kalisz², and Kristen Hanley². (¹*SUNY Oneonta, Biology Department, Oneonta, NY 13820*; ²*University of Pittsburgh, Biological Sciences, Pittsburgh, PA 15260*)

A FIELD TEST OF THE REPRODUCTIVE ASSURANCE HYPOTHESIS WITH *COLLINSIA VERNA* (SCROPHULARIACEAE)

The evolution of self-fertilization in hermaphroditic plants is opposed by genetic costs that discount selfed progeny's value relative to outcrossed progeny. However in plant populations, self-fertilization is common and up to a third of the species tested have outcrossing rates intermediate between pure selfing and pure outcrossing. Darwin first hypothesized an adaptive benefit of self-pollination in assuring reproduction when outcrossing is impossible, but positive empirical support for the RA hypothesis under lesser degrees of pollinator failure has been lacking. We suggest that to demonstrate adaptive reproductive assurance, three conditions must be operating: 1) scarce pollinators or mates limit seed set, 2) autonomous selfing boosts seed set and, 3) low genetic costs of selfing. Here we present field data and marker-based estimates of selfing rate and show that these conditions exist in three Pennsylvania populations of *Collinsia verna*. Moreover, we show that population estimates of selfing rates increase proportionally with the level of pollinator failure ($R^2 = .62$, $p < .05$). Our results provide the first complete empirical support of the RA hypothesis and the first mechanistic link between reproductive assurance selfing and adaptive mixed mating.

Wells¹, Alan W., Della M. Wells¹, Jack Focht², Barbara Thomas², Jennifer A. Verstraete², and Nancy McTamane². (¹*League of Naturalists, Trailside Museums, Bear Mountain State Park, Bear Mountain, NY 10911*; ²*Palisades Interstate Park Commission, Trailside Museums, Bear Mountain State Park, Bear Mountain, NY 10911*)

ASSESSING THE IMPACT OF ROADKILL ON AMPHIBIAN POPULATIONS IN HARRIMAN STATE PARK

Harriman and Bear Mountain State Parks host some of the most scenic roads in New York. Unfortunately, each spring significant numbers of frogs, toads, and salamanders are killed as they migrate across these roads to their breeding sites. In 2003, we began a formal program documenting the types and numbers of amphibians killed, locating primary migratory pathways, and describing traffic patterns relative to periods of movement. This information is a

prelude to a more detailed assessment of traffic impacts and recommendations on how to reduce these losses. Two roads in particular, Tiorati Brook Road and Lake Welch Drive, were selected for detailed examination. To date, fifteen species have been recorded. Movement occurs predominately during rainy nights, particularly when air temperatures exceed 50°F. Greatest numbers of amphibians on roads occur adjacent to known wetlands and streams. Among the earliest species to appear are spotted salamander, eastern wood frog, and spring peeper (first week of March). The migration is over by the end of May. Traffic counters indicate an average weekday usage of approximately 140–160 vehicles per day on Tiorati Brook Drive and 190–210 per day on Lake Welch Drive. Most weekday usage occurs between 9AM and 9 PM. Usage is higher on weekends. During nighttime periods, usage is generally less than 4 vehicles per hour. Population modeling will be used to assess the impact of this mortality on population viability and to examine the effect of road closures of various durations.

Whiteleather, K. Kristian. (SUNY College of Environmental Science and Forestry, Syracuse, NY 13210)

DISTRIBUTION OF STREAMSIDE SALAMANDERS (AMPHIBIA: CAUDATA: PLETHODONTIDAE) IN ACID MINE DRAINAGE STREAMS OF WEST VIRGINIA

A multivariate analysis of salamander abundance, community composition and diversity was undertaken to determine if significant variation occurred between four treatments of acid mine drainage-affected streams in West Virginia. The use of these differences to monitor recovery of affected streams was evaluated. Data were collected within a time-constraint search over three years at established sites. Plethodontid salamanders were chosen as the target community because of their close association with affected headwater streams, high densities, and natural histories. Results showed two groups based on the presence or absence of AMD (primary treatment level). The addition of calcium sand (fines) (secondary treatment level) to both affected and unaffected streams produced no statistically significant changes in the distribution of the species found. However, clear biological differences were evident in remediated streams, suggesting that salamanders may have much to offer as bioindicators of improvement or continued degradation of these aquatic habitats.

Abstracts for Poster Presentations

Adams¹, David J. and Irene M. Mazzocchi². (¹New York State Department of Environmental Conservation, Nongame and Habitat Unit, Albany, NY 12233; ²New York State Department of Environmental Conservation, Bureau of Wildlife, Watertown, NY 13601)

ASSESSMENT OF BLACK TERN HABITAT ALONG EASTERN LAKE ONTARIO: PRELIMINARY FINDINGS

Six statewide censuses of historical and potential Black Tern (*Chlidonias niger*) breeding sites in New York State were conducted between 1989 and 2001. Results from these surveys revealed a decline in the number of active breeding sites from a high of 28 in 1989 to 14 in 2001. During the 2002 field season, habitat assessments were conducted at sites in which the greatest decline in Black Tern nesting pairs occurred. For comparison, several sites exhibiting relatively stable populations throughout the six census periods were sampled. Habitat assessment parameters were documented for 15 sites, within 12 m and 4 m plots, at 112 points, along transects bisecting the wetland impoundments. Data were analyzed for differences between recently active and historic sites. Sites which had maintained a stable Black Tern breeding population contained more plots with vegetation less than 50 cm in height ($t=-2.06$, $p<0.1$); more plots with moderate dense vegetation ($t=.017$, $p<0.1$) and fewer plots with very dense vegetation ($t=1.81$, $p<0.1$); more core plots with 3 m diameter pools ($t=-2.18$, $p<0.1$); and more plots with muskrat activity ($t=-2.45$, $p<0.1$) than did declining sites. Management recommendations were formulated for each site. A statewide management strategy for the maintenance and enhancement of Black Tern breeding habitat will be developed.

Adams¹, David, Kevin Kenow² and Robert Kratt², David Evers³, Nina Schoch⁴, Kate Taylor⁵, and Andrew Major⁶. (¹New York State Department of Environmental Conservation, 625 Broadway, Albany, New York 12233; ²United States Geological Service, La Crosse, WI 54603; ³BioDiversity Research Institute, Gorham, ME 04038; ⁴Adirondack Cooperative Loon Program, Ray Brook, NY 12977; ⁵Loon Preservation Committee, Moultonborough, NH 03254; ⁶United States Fish and Wildlife Service, Concord, NH 03301)

MIGRATION PATTERNS AND WINTERING RANGE OF COMMON LOONS: PRELIMINARY FINDINGS

The Common Loon, *Gavia immer*, is found breeding throughout the northeastern United States. Several surveys have been undertaken to assess the abundance and distribution of summering loons. However, timing, patterns of migration, and wintering range of this breeding population have not been adequately documented. During the summer of 2003 four Common Loons, three adults and one juvenile, were tagged using implantable satellite transmitters. The transmitters were surgically inserted subcutaneously on the backs of the birds and configured to transmit on a schedule based on the anticipated pattern of biological activities of Common Loons. During the breeding season the duty cycle was configured to 8 hours on: 72 hours off, while during migration, the cycle was 8 hours on: 48 hours off. On the wintering area, the duty cycle was set to 6 hours on: 96 hours off. Data were received electronically for each transmitter within 24 hours of active data acquisition. During late-August 2003 through mid-March 2004, we obtained 787 high quality locations (Argos Location Class 1–3), accurate to <1000 m, from a total of 1990 location determinations (40 %). The initiation date of migration, number of stopover locations utilized, and total migration-days recorded during fall migration differed significantly between the adult loons and the juvenile bird. The adult birds wintered along the Atlantic coast of Maine and southern New Jersey, while the juvenile bird utilized Long Island Sound. We plan to tag and monitor additional loons during the 2004 field season. For location updates see: http://www.umesc.usgs.gov/terrestrial/migratory_birds/loons/migrations.html.

Adickes¹, Dawn, Paul Preuss¹, and John Thompson². (¹SUNY at Ulster, Geographic Information Systems Program; ²Mohonk Preserve Daniel Smiley Research Center)

GIS ASSESSMENT AND STUDY OF RARE AND THREATENED AVIAN SPECIES LIVING IN THE SHAWANGUNK MOUNTAINS IN SOUTHEASTERN NYS

The Shawangunk Mountains in Ulster County, New York provide an important forest habitat for many protected avian species. There are several preserved lands in this area such as the Mohonk Preserve, Minnewaska State Park Preserve, and Sam's Point Dwarf Pine Ridge Preserve. Many recognize the importance of keeping this forest contiguous as it supports endangered and threatened birds such as the Peregrine Falcon and Northern Harrier. The NYS Natural Heritage Program has named the Shawangunks as a "significant biodiversity area." Many birds require a specific type and size of habitat to breed and sustain a stable population. We have chosen birds that NYS has designated Endangered, Threatened, Protected-Special Concern, as well as common birds to complete a habitat assessment of this area. GIS technology was used to analyze potential impacts of habitat fragmentation and visually portray the potential effects on populations of protected bird species. NYS DEC Breeding Bird Atlas records and breeding bird census data from the Mohonk Preserve were used to do an assessment of the birds sighted in this area. The current extent of habitat fragmentation was evaluated using the USGS classification of land use from the NLCD. High-resolution photos from NYSDOS were downloaded and analyzed to complete land use studies showing forest types, present extent of forest fragmentation, wetlands, and developed areas. In an effort to promote the preservation of threatened and protected species of special concern, critical environmental areas such as the Shawangunk Ridge need to be recognized.

Bartkowski¹, Jeffrey S., James P. Harrison², Mark S. Swinton¹, and Charles W. Boylen¹. (¹Darrin Fresh Water Institute and Department of Biology, Rensselaer Polytechnic Institute, Troy, NY 12180; ²Darrin Fresh Water Institute, Rensselaer Polytechnic Institute, Troy, NY 12180)

ESTABLISHMENT OF EURASIAN WATERMILFOIL IN AN OLIGOTROPHIC LAKE: EFFECTS ON LITTORAL ZONE STRUCTURE

The invasion of Eurasian watermilfoil into North American lakes has been rapid and extensive allowing little opportunity for detailed studies of the ecological sequence of trophic change associated with such invasions. Because of its oligotrophic nature, the spread of milfoil in Lake George has been sufficiently slow enough to study the changes in structure and function of the littoral zone associated with watermilfoil establishment. In 2003, four well-developed milfoil beds were selected for study: two small and secluded beds and two larger open-water beds. Submerged aquatic vegetation (SAV) biomass, height, and density, as well as, transition zones and native communities were analyzed for each site. Epiphytes, phytoplankton and zooplankton were sampled to evaluate the effect of canopy structure on the littoral zone food web. Within the beds, milfoil dominance was near 100% while the native communities consisted of 5–6 species. Plant height and density were 3 and 4 times that of the native communities, respectively. Phosphorus and nitrogen were always higher within the beds, and the center of the beds had chlorophyll-a readings 2–4 times that of the natives. Phytoplankton were found to have the greatest biomass within the large beds as compared to the native communities, yet a greater biomass outside the smaller beds than within. When analyzing epiphytes, Chlorophyta dominated the larger beds and Chrysophyta dominated the smaller beds. This study has begun to show the magnitude of impact of milfoil on the immediate surrounding waters and its subsequent influence on various components of the littoral food web.

Batcher, Michael S. (*Consulting Ecologist and Environmental Planner, 1907 Buskirk-West Hoosick Rd., Buskirk, NY 12028*)

CHANGES IN DISTRIBUTION OF PHRAGMITES AUSTRALIS AT WERTHEIM NATIONAL WILDLIFE REFUGE, NY

Historic aerial photographs were evaluated for use in mapping changes in the spatial distribution of *Phragmites australis* at Wertheim National Wildlife Refuge, on Long Island, New York. The most appropriate aerial photographs were growing season aerials taken by the New York State Department of Environmental Conservation in 1974 and 1989. These were compared with the boundaries of *Phragmites australis* mapped in 2000 by the Conservation Management Institute, which were slightly adjusted based on a review of aerial photographs and an aerial video taken in 2000 of the Refuge by NYSDEC. In 1974, *Phragmites australis* covered approximately 155 acres. This increased to 245 acres by

1989 and 335 acres by 2000. There were 128 patches in 1974, decreasing to 81 in 1989 and 51 in 2000 as patches coalesced. In the north portion of the Refuge, shorelines and islands within the main river have become dominated by *Phragmites australis*; while in the southern part of the Refuge, expansion has occurred on shorelines and ditches. From 1974 to 1989 the area covered by *Phragmites australis* increased approximately six (6.0) acres per year (2.5 ha/year). This rate increased to 8.2 acres per year (3.4 ha/year) from 1989 to 2000. The expansion has been rapid, but comparable to other sites where similar studies have been completed. Further work should be done to address the relationship of *Phragmites australis* distribution and expansion to salinity levels and disturbance in the Refuge.

Bauer, Barbara A. and Matthew J. Draud. (Long Island University, C.W. Post Campus, Biology Department, Brookville, NY 11548)

EFFECT OF SYZYGY ON NESTING BIORHYTHMS OF AN ESTUARINE TURTLE, *MALACLEMYS TERRAPIN*

Behaviors of animals in estuarine ecosystems are influenced by tidal cycles. The estuarine emydid diamondback terrapin, *Malaclemys terrapin*, utilizes the intertidal zone for behaviors such as courting, mating, feeding, and emergence into nesting habitat. The importance of tidal cycles on nesting behavior has rarely been analyzed in previous nesting studies. The nesting patterns of diamondbacks in Long Island's Oyster Bay Harbour have been studied for three consecutive years. This population of terrapins exhibits both diurnal and nocturnal nesting activity, high site fidelity, and deposition of multiple clutches each season. Autocorrelations show nesting periodicity within a season to be about 13 - 15 days. This nesting activity is concentrated around the lunar phase, an environmental stimulus, which has been ignored in previous terrapin studies. Increased gravitational force during syzygies results in the highest and lowest tides of the month (spring tides). Significant increases in distribution of nesting activity around moon illuminations of 100 % (full moon) and 0% (new moon) were observed in the populations here, as well as populations described in published literature. The daily nesting patterns at these times of the month are concentrated around both semidiurnal high tides. It is hypothesized that the reason for emergence during high spring tides decreases distance traveled on land and the likelihood of nest inundation by tidal flow.

Berkowitz¹, Annie, Kathleen LoGiudice¹, and Richard S. Ostfeld². (¹Union College, Department of Biological Sciences, Schenectady, NY 12308; ²Institute of Ecosystem Studies, Millbrook, NY 12454)

HOST DIVERSITY AND LYME DISEASE RISK: A TEST OF THE DILUTION EFFECT HYPOTHESIS

Lyme disease is the most common tick-borne illness in North America with over 16,000 cases reported per year. This experiment is designed to test the Dilution Effect Hypothesis, which predicts that infection prevalence in the tick population is inversely related to the diversity of the host community upon which the ticks feed. This is because the white-footed mouse, the most competent disease reservoir, is believed to reach higher densities in low diversity communities. Habitats that become degraded by fragmentation are predicted to have high Lyme disease risk, as they support high populations of mice but few other hosts. We determined mammalian host diversity via trapping and remotely triggered wildlife cameras in eight forest fragments and four sites in a continuous forest in Dutchess County, New York. Results indicate that species richness and densities vary considerably among sites. Drag sampling was used to collect nymphal ticks in each site, and nymphs were screened for presence of *Borrelia burgdorferi* (the Lyme disease spirochete) using Polymerase Chain Reaction. Preliminary results indicate that high mouse density is correlated with high nymphal infection prevalence. A finding of higher nymphal infection prevalence in fragments with lower host diversity would support the Dilution Effect Hypothesis.

Beucke¹, Kyle, Sacha Spector¹, Elizabeth Johnson¹, Eric Sanderson², and Greg Edinger³. (American Museum of Natural History, Center for Biodiversity and Conservation, New York, NY, 10024-5192; ²Wildlife Conservation Society, Bronx, NY, 10460; ³New York Natural Heritage Program, Albany, NY 12233)

RECONSTRUCTING THE INVERTEBRATE FAUNA OF MANNAHATTA ISLAND, SEPTEMBER 12, 1609

As part of a larger effort to understand the historical ecology of Manhattan Island at the time of Hudson's Journey in 1609, we studied selected invertebrate groups to reconstruct their historical distributions. Using maps of Manhattan from the 18th century, lists of species known or thought to have inhabited the island, suggested communities that might

once have occurred on the island (using the New York Natural Heritage Program's ecological community classification) and GIS techniques, we are developing models of pre-European biodiversity and landscape patterns. The invertebrate portion of this study focused on the following focal taxa: tiger beetles (Coleoptera: Cicindelidae), swallowtail butterflies (Lepidoptera: Papilionidae), harvesters, coppers, blues and hairstreaks (Lepidoptera: Lycaenidae), freshwater mussels (Unionoida) and freshwater crayfish (Decapoda: Cambaridae). Lists of all focal taxa species that probably occurred in the New York City region were compiled from regional checklists, limited historical records (~100 years ago) and input from taxonomic experts. Distribution of individual species on Manhattan will be based on their primary habitat preferences. Ecological communities were based on the current distribution of communities within 50 miles of New York City and a historical plant list. The Mannahatta Project will be a powerful tool for local environmental education and for developing an understanding of the relationship between urbanization and the persistence of nature. The project also explores the development of baseline targets for restoration in long-modified habitats.

Brown¹, Michelle L., Bradford Stratton¹, Timothy H. Tear¹, and Kirstin Seleen². (¹*The Nature Conservancy, Eastern New York Chapter, Troy, NY 12180*; ²*The Nature Conservancy, Central/Western New York Chapter, Rochester, NY 14604*)

EVALUATING CONNECTIVITY BETWEEN LANDSCAPES THROUGH THE EYES OF WIDE-RANGING MAMMALS

The importance of connectivity between large, unfragmented forested areas across northeastern landscapes is a central question in the conservation community. Specifically, the successful conservation of many wide-ranging species depends on their ability to disperse and genetically interact with other populations. Assuming the unfragmented forested areas are functioning as source breeding areas, dispersal movement outward often forces individuals into low quality habitat. We present a case study of The Nature Conservancy's Southern Lake Champlain Valley program (SLCV), and demonstrate that through examining species specific connectivity models we can direct conservation efforts at a landscape-scale relative to wide-ranging mammal needs. The SLCV landscape occurs between three mountainous regions: the Adirondacks, NY, the Greens, VT, and the Taconics, VT and MA. Three wide-ranging species, fisher (*Martes pennanti*), bobcat (*Lynx rufus*), and black bear (*Ursus americanus*) were studied to identify high priority areas within the SLCV landscape that serve as connecting areas between the mountainous regions. We utilized species specific life history and habitat needs, barriers to movement, and remotely sensed land cover data to create species connectivity models. Through cost distance weighting in a Geographic Information Systems (GIS) we created a range of potential movement corridors for each species. The highest priority areas for conservation were identified as the places where the probability for multiple species use was greatest. In addition to guiding on-the-ground conservation efforts pertaining to connectivity for wide-ranging mammals, our process also begins to answer the over-arching question of how to prioritize effective strategies for conservation between unfragmented forested areas.

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

PRAISE TO THE KEEPERS OF NEW YORK FISH RECORDS

What constitutes a record of a fish capture? If you're from Missouri, the Show-Me-State, or from the "Valley of Doubters", then you probably want to "see the scales". Identification is all-too-often recorded only as determined at the time of capture, and we may need someone to confirm it later. Thankfully, we have that opportunity, in a storehouse of knowledge provided by ichthyologists who, over the years, properly preserved and stored thousands of fish samples from New York. These efforts have given us an excellent record of our inland fishes, held in jars, that allow us to reaffirm which species at-one-time lived in those waters. Four museums in New York hold most of the fish specimens. The "keeping of the fish records" has been maintained because of the efforts of those who initially caught and preserved the fish, and the energies of the curators who cared for them. Compliments to these men and women, we have an excellent historical fish record to help us appreciate our diversity of waters and to protect what remains today. Important people and places are Seth Meek, Thomas Hankinson, Emmeline Moore, John Greeley, Edward Raney, Wayne Hadley, Steven Eaton, C. Lavette Smith, New York State Museum, Cornell University Vertebrate Museum, American Museum Natural History and Roosevelt Wildlife Collection at the Environmental Sciences and Forestry School, SUNY, Syracuse. Some photographs and descriptive listings are provided in the poster. New voucher specimens are the life blood of these resources, and young scientists, like you, must provide them.

Cerbone¹, William C. and David E. Karrmann². (¹Fordham Preparatory School, Bronx, NY 10458; ²American Museum of Natural History, Education Department, New York, NY 10024-5192)

MORPHOLOGICAL INTERGRADATION OF TWO SUBSPECIES OF *CHRYSEMYS PICTA* WITHIN A DISCRETE METAPOPOPULATION

Chrysemys picta is a complex of four subspecies, two have ranges including New York State. *C. p. picta* (eastern painted turtle) is morphologically distinguishable from *C. p. marginata* (Midland painted turtle). The costal scutes of *C. p. marginata* are disaligned, while the scutes of *C. p. picta* are not. The plastron of *C. p. marginata* bears a distinct central melanistic figure that covers approximately 40% of the plastral surface area. *C. p. picta* typically has no plastral figure. Intergrades typically display intermediate characteristics and are thus also readily distinguishable from 'pure' individuals of either subspecies. From April to November 2003, five demes of the metapopulation in Black Rock Forest, Orange County, New York, were sampled and digital images were taken of each plastron and carapace. These images were examined to determine the frequency of the expression of each characteristic. Significant disalignment (indicative of an intergrade) was seen in 46% of the population with a mean disalignment of 29%. Significant plastral blotching occurred in 28% of the population, with 66% of individuals showing no marking. Of the one third of the population expressing any plastral marking, the mark averaged less than 20% of the plastral area. The frequency of costal scute disalignment (35%–60%) and plastral marking (9%–53%) varied greatly between subpopulations. Profiling the metapopulation did not accurately model subpopulation profiles, nor did subpopulation profiles accurately model the metapopulation. Contrary to historically accepted descriptions, the population appeared to be a predominantly *C. p. picta* population. Neither trait appeared dimorphic.

Cooper¹, Erika T., Mylinh T. Nguyen², and Sharon E. Wise³. (¹2888 Southside Rd., Frankfort, NY 13340; ²2209 Walnut St., Philadelphia, PA 19103; ³Utica College, Department of Biology, Utica, NY 13502)

VARIATION IN TERRITORIAL BEHAVIOR OF RED-BACKED SALAMANDERS FROM VIRGINIA AND NEW YORK

The terrestrial red-backed salamander, *Plethodon cinereus*, is territorial in portions of its range, using threat displays and overt aggression for defense. However, the widespread distribution of this species throughout eastern forests of North America and previous studies suggest that salamanders from different populations may vary in territorial behavior. We compared the territorial behavior of salamanders from Giles County, Virginia and Herkimer County, New York. Within each population, the aggressive and exploratory behavior of resident/intruder pairs (matched for size) were observed in staged territorial contests in the laboratory. Because salamanders were significantly larger from the Virginia population than from the New York population and size may influence aggressive behavior, we analyzed our data in two ways: (1) we retained the size disparity between populations, and (2) we removed the largest pairs from the Virginia population, eliminating the size difference between populations. Salamanders from the Virginia population exhibited significantly more aggression and exploratory behavior than salamanders from the New York population, even when the size disparity was removed. We hypothesize that (1) environmental and/or genetic differences in these two populations influenced behavior, resulting in less territorial defense in the salamanders from the New York population, or (2) salamanders from the New York population were territorial, but used fewer visual displays in territorial defense than salamanders from the Virginia population. We found weak evidence supporting the second hypothesis; only salamanders from the New York population bit opponents, indicating that these salamanders may have been more overtly aggressive in territorial contests.

Cunningham¹, Tim, Dennis Davidson¹, John Hurl¹, Paul A. Rubin¹, and Philip Ehrenschaft². (¹SUNY at Ulster, Geographical Information System Program, Stone Ridge, NY 12484; Metro Countryside Research Group, Pine Bush, NY 12566)

USING GIS TECHNOLOGY TO PROJECT VARIOUS LAND-USE AND ECONOMIC SCENARIOS FOR THE NORTHERN SHAWANGUNK RIDGE AREA; SOUTHEASTERN NYS

GIS technology provides valuable land use analysis tools for professional, academic and municipal users. This poster presentation describes the use of ESRI's GIS software to analyze and map possible land use patterns adjacent to Sam's Point Dwarf Pine Ridge Preserve and the Minnewaska State Park Preserve in Ulster County, New York. We created a database incorporating Ulster County real property parcel data, current town zoning maps, and actual land use

patterns derived from the New York State GIS Clearinghouse high-resolution orthoimagery. Using the ArcMap component to display the information from our database we explored the following scenarios: construction of a full build-out analysis; plotting large tracks suitable for residential development; and identification of obvious parcels for open space preservation. We applied selected criteria in searching the database in order to identify the specific information desired. The use of database technology provides for quick and easy modification of such search criteria. This makes it possible to compare results and to produce a variety of customized maps for presentation purposes. In addition, these analyses provided the background information needed as the basis of a socio-economic impact analysis. Deep and wide-ranging socio-economic and fiscal impacts for the communities adjacent to the Shawangunk Ridge would be generated if the full build-out indicated by GIS mapping comes to fruition. Empirical social science and planning studies of the impacts of parallel build-outs were reviewed in order to apply reasonable assumptions for generating a range of estimates for probable impacts—or outright transformation—of the economic, social, and fiscal organization of the region's communities.

Dirig¹, Robert and Heather T. Root². (¹*Bailey Hortorium Herbarium, Cornell University, Dept. of Plant Biology, Ithaca, NY 14853;* ²*145 Browns River Rd., Essex Junction, VT 05452*)

LICHENS OF THE McLEAN BOGS BASIN NEAR ITHACA, NEW YORK

Cornell University's 40-ha McLean Bogs Preserve in Tompkins County, New York, was given to the University by Curtis G. Lloyd ca. 80 years ago. McLean's biotic richness is well known, based on a thorough biological survey published in 1926. Its calcareous lowlands are juxtaposed with acidic quaking bogs and steep upland forest, providing a wide variety of wetland habitats. Since lichens were not included in the 1926 report, we surveyed them at the Preserve in 2002. After finding 36 historical lichen vouchers in the Cornell University and Ohio State University herbaria (collected 1944-1989), we searched each habitat type, prepared specimens of all macrolichens and some crustose species encountered, and compiled a specimen database. We recorded 66 primarily corticolous and lignicolous species, 51 new in 2002. This is the first extensive lichen list for any locality in the Finger Lakes Region of central New York, and includes brief notes on microhabitats, substrates, and identifying characteristics.

Dittbrenner¹, Benjamin J. and Gary S. Kleppel². (¹*University at Albany, Biodiversity, Conservation and Policy, Albany, NY 12222;* ²*University at Albany, Department of Biological Sciences, Albany, NY 12222*)

REMOTE SENSING AND GROUND-BASED APPROACHES FOR DESCRIBING FORESTED WETLANDS

The Hudson River Valley of eastern New York State has rich cultural and natural histories. Over the past three centuries land use has altered the landscape considerably. Among the most substantially effected ecological community types are forested wetlands. We are developing techniques to document the conditions of forested wetlands in New York State and test the efficacy of hyperspectral remote sensing for this purpose. Two 120 km² study sites located in Saratoga and Orange County were selected for their high occurrence of forested wetland. Twenty forested wetlands were chosen from each of the two study sites. At each site 9 10×10m plots were examined using a suite of sampling methods including the collection of basin topology, soil identification, biomass collection, biological inventory and water quality data. High resolution (1m²), 37-channel hyperspectral imagery was acquired from an aircraft mounted instrument flown over both sites in August 2003. Biological inventories provided insight into prevalence and types of forested wetland communities along geographic gradients within the Hudson River Valley basin. Individual communities were examined to identify features associated with the persistence of that community type. Wetland attributes derived from hyperspectral data and from ground-based sampling were compared to determine the effectiveness of hyperspectral remote sensing as a forested wetlands monitoring and assessment tool.

Doobar¹, Kathyann and David E. Karrmann². (¹Francis Lewis High School, Flushing, NY 11345; ²American Museum of Natural History, Education Department, New York, NY 10024-5192)

CORRELATION OF TURTLE (*CHRYSEMYS PICTA*) FEEDING AND THERMOREGULATORY BEHAVIOR AND ENVIRONMENTAL TEMPERATURE

As part of the ongoing census of the *Chrysemys picta* metapopulation in Black Rock Forest, Orange County, NY, turtles were collected both actively (by hand, dip net, and snorkeling), and passively, using basking traps (indicating turtles thermoregulating upwards) and hoop traps (indicating feeding), from 26 April to 1 November 2003. Trap records were compared to environmental (water) temperature at the time of capture to determine any correlation with turtle behavior (as measured by trapping success and trap type). The expectation that basking traps would be more successful early in the season due to the cold temperature, and the anticipated need of the turtles to up-regulate, was not supported by the data. Hoop trap success occurred for two weeks prior to basking trap success. Two thirds of all captures occurred within a range of 9–18°C. Trap success of either type was reduced during the warmest (20–27°C) period of the season (3rd week of June–3rd week of August) except for a two-week period of increased feeding behavior following cessation of oviposition. At the end of summer when water temperature decreased rapidly, and fell below 18°C again, there was a significant increase in trap success of both kinds. Feeding behavior remained at a high rate until the end of September and water temperature fell below 6°C. Unexpectedly, hoop captures continued into the first week of November indicating feeding behavior continued, though at minimal levels, until traps were removed after the average water temperature stayed below 3°C for two weeks.

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DIMORPHISMS IN SHELL MORPHOLOGY OF A *CHRYSEMYS PICTA* METAPOPULATION

As part of the ongoing census of the *Chrysemys picta* metapopulation in Black Rock Forest, New York, adult individuals were PIT tagged for permanent and individual identification. Sex was determined using tail length/cloacal extension and fore-claw length. Body mass, maximum carapace length, width, and height, and plastron length were measured. A direct comparison of absolute size (carapace-length and mass), and calculations of three ratios (carapace-width/carapace-length, carapace-height/carapace-length, and plastron-length/carapace-length) were made to determine whether or not these dimensions correlated to the sex of the turtle. The expectation that adult females would be larger than adult males in overall size and have a proportionally higher, or more domed, carapace is strongly supported ($p = 0.05$) by the data. Females averaged 12% longer in carapace-length and 50% greater in mass. The hypothesis that females would have a wider carapace-width /carapace-length ratio was also supported ($p = 0.05$). Females averaged 12% greater in carapace-height. The data also indicated that there was a dimorphic sorting ($p = 0.05$) of relative plastron/carapace-lengths with females having the proportionally longer plastron. When examined by subpopulation, the data for each pond's population of males matched the distribution, range, and trendline of the male metapopulation in all respects. The female subpopulation for one pond also matched the female metapopulation, however in two of the ponds the female population was heavily skewed to the upper half of the range (133–160mm, whereas the female metapopulation range was 103–160mm), indicating an unexpected and disproportionate concentration of much older females.

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DO SOIL CHARACTERISTICS AFFECT LYME DISEASE RISK?

Lyme disease, an increasingly important health risk in Northeastern North America, is transmitted by the bite of blacklegged tick, *Ixodes scapularis*. The incidence of Lyme disease is directly related to tick density, so decreasing the tick density should reduce number of Lyme disease cases. Many biotic and abiotic factors are likely to influence tick density. This study investigates the relationship between abiotic soil conditions and larval tick density. We measured leaf litter depth, soil temperature, soil water holding capacity, soil texture, and soil pH in 29 deciduous forest fragments in Connecticut and New York. The larval tick density in each fragment was determined by drag sampling. Preliminary analysis (linear regression) showed soil water holding capacity and tick

density to be positively related ($p= 0.009$; $r^2= 0.11$). An understanding of the soil conditions important to tick survival may lead to tick reduction techniques and a decrease in Lyme disease incidence.

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REMARKABLE MID-DEVONIAN INARTICULATA POPULATION DISTRIBUTION AND PEDICLE VALVE ORIENTATION, SOUTH-EASTERN NEW YORK

A medial Devonian in situ community of the inarticulate brachiopod *Orbiculoidea randalli* is located in upper Mount Marion nearshore strata (Marcellus Formation, Hamilton Group). The fossils are located 2 m below Ashokan sandstones in Ulster County (lat. 41° 55' 22" N and long. 74° 08' 11" W). *Orbiculoidea randalli* comprises a dominant fauna represented by pedicle valves only. Twenty-three valves were observed in growth position imbedded in the surface of a 4.0 x 6.5 m bedding plane formed on laminated intertidal subgraywackes. Most valves were preserved as original material or as external molds ranging from 3.2 to 9.6 cm (mode 4.6 cm) in diameter. Most were grouped into three elongate clusters comprised of 5 to 11 individuals. Cluster dimensions varied from 1.6 to 3.5 m in length and 0.3 to 1.2 m in width. Within clusters, nearest neighbor spacing ranged from 6.4 to 91.5 cm. The alignments of cluster long axes varied from 300° to 310° az. Directions of pedicle slits (center to exterior) varied greatly but predominantly exhibited eastern azimuths (14 east to 5 west) with 8 concentrated between 0° and 45° az. Orientations of cluster axes and pedicle slit alignments may be related to wave or current directions as further study of associated ripple marks may attest.

Hannam, Kristina and Kana Teratani. (SUNY-College at Geneseo, Department of Biology, Geneseo, NY 14414)

HOUSE WREN (*TROGLODYTES AEDON*) BEGGING VOCALIZATIONS: DO BROODMATES HAVE A VOCAL SIGNATURE?

Individual differences in species, sex, age and condition can often be recognized through vocal differences in birds. The altricial nestlings of passerine birds require parental care while in the nest, and typically receive continued care during a post-fledging period lasting four weeks or longer. Vocal differences among offspring in a nest or during the post-fledging period could be an important cue used by parent birds to determine how to allocate limited resources. It may be important, for example, for parents to be able to distinguish between related and unrelated nestlings and fledglings when allocating food resources. If genetically related offspring share a vocal "signature", they might be more easily recognizable by parents, particularly during the post-fledging period when they are potentially mixing with newly fledged nestlings from other broods in the local area. We report preliminary results from a study of nestling House Wren (*Troglodytes aedon*) begging vocalizations. We are testing the hypothesis that broodmates will have more similar vocalizations (a "signature") than individuals from different broods. We tape recorded the begging vocalizations of individual House Wren nestlings on nestling day 10. Begging calls were analyzed using the Canary sound analysis program. We measured the duration of the call, range of frequencies, the average intensity, and the peak frequency on sonograms of 10 calls from each individual. We report results of comparisons of individual nestling vocalizations within and between broods.

Holzworth¹, Casey L., Roland Kays², George Robinson¹, Gary Kleppel¹, and Colleen Tripp³. (¹University at Albany, Biodiversity, Conservation, and Policy Program, Albany, NY 12222; ²New York State Museum, Albany, NY 12230; ³University at Albany, Biology Department, Albany, NY 12222)

AN ANALYSIS OF ANIMAL MOVEMENT THROUGH LINEAR LANDSCAPE FEATURES IN AND SURROUNDING THE ALBANY PINE BUSH

The term wildlife corridor is used to denote a linear landscape feature that connects two or more larger areas of suitable, yet isolated habitat. Much research has gone into describing how, and why wildlife corridors promote animal movement. Although much of the results of this research are ambiguous, conservationists have been championing the use of wildlife corridors as a means of mitigating the well-documented effects of habitat fragmentation. However, in most cases where wildlife corridors are either conserved or constructed, the physical dimensions of the corridor are

determined without scientific basis. The aim of this study was to determine if, and to what extent, the attributes of wildlife corridors are correlated with within-corridor animal movement. In this study, proposed wildlife corridors, naturally occurring linear landscape features, varying in length, width, cover, and size of connected fragments were monitored using motion sensing camera traps set-up in a unique camera trap array. This technique allowed for the complete monitoring of all animals traveling along the length of the corridor. Preliminary results show that species richness (R) in a short, wide corridor (width = 425', length = 25') was greater than species richness in either of two longer, thinner corridors (mean width = 50', mean length = 1000') (R = 13 and R = 5 and 2 respectively). There were also roughly 8 times as many carnivore passes in the wide corridor compared to the narrow corridors, however, there were only roughly 2 times as many deer observed.

Jackson, Eric F., Bryant W. Buchanan, and Sharon E. Wise. (*Utica College, Department of Biology, Utica, NY 13502*)

ILLUMINATION LEVELS PRESENT IN THE LEAF LITTER HABITAT OF A TERRESTRIAL SALAMANDER

The forest floor habitat of terrestrial and fossorial animals consists largely of woody debris and leaf litter. Nocturnal vertebrates, such as the red-backed salamander, *Plethodon cinereus*, forage under the leaf-litter during the day and on the surface of the leaf litter at night during moist conditions. These salamanders are capable of using both visual and chemical information during foraging and communication (e.g. territorial defense), using chemical information at low light levels when vision cannot be used. It is unknown whether or not there is enough light present under the leaf litter to allow the salamanders to use vision for foraging and communication. We evaluated the effect of litter depth (2, 4, or 6 cm), above-litter illuminations (1×10^{-3} , 1×10^{-1} , or 1×10^1 lx), and litter moisture content (dried or soaked for 15 min) on illumination levels present below the leaf litter. Both the depth of leaf litter and above-litter illuminations affected the amount of light that is able to pass through the leaves, whereas moisture content had no significant effect on the amount of light penetrating the leaf litter. Based on the light levels at which individuals of *P. cinereus* are capable of using vision (1×10^{-4} lx), our data indicate that individuals of *P. cinereus* would be able to use vision in foraging and communication at a variety of leaf litter depths at diurnal or twilight above-litter illuminations. Under nocturnal conditions, however, vision may be possible only in the shallowest layers of litter.

Johnson, Elizabeth A. and Cal Snyder. (*Center for Biodiversity and Conservation, American Museum of Natural History, New York, New York, 10024*)

TOOLS FOR INVERTEBRATE CONSERVATION IN THE NEW YORK METROPOLITAN REGION

Invertebrates comprise over 95 percent of all animal life, are integral to processes such as pollination, nutrient cycling and soil formation and are key components of food webs. Yet aside from a few well-known groups (e.g. butterflies, dragonflies and damselflies, and freshwater mussels) most invertebrates are overlooked in conservation planning, land management, and habitat restoration. Agency biologists, land managers, conservation professionals, naturalists and consultants are interested in doing more to include invertebrates in their work but face some basic challenges. These include the absence of readily available, regionally-focused aids to invertebrate identification and the need for guidance about how to use information effectively once gathered. In addition, there is rarely a mandate to work on species that are not listed as endangered or threatened, making it difficult to focus efforts on invertebrate conservation, planning, and management more broadly. To address some of these needs, the Center for Biodiversity and Conservation at the American Museum of Natural History has developed a number of regionally focused, invertebrate field-identification tools including web-based keys and annotated species lists and regularly offers workshops and internships. Better tools and training will enable us to strengthen our knowledge base of invertebrate distribution and ecology, leading to more accurate status determinations of rarity or endangerment. Future efforts will focus on the development and distribution of tools for a broader range of taxa and on additional resource materials about invertebrates and conservation.

Kalina, Christine, Peter K. Ducey, Jamie Cerqua, Cara Fiore, Jamie Tull, and Monica Warner. (SUNY Cortland, Department of Biological Sciences, Cortland, NY 13045)

PREDATORY BEHAVIOR OF THE INVASIVE PLANARIAN, *BIPALIUM ADVENTITIUM*, A PREDATOR OF EARTHWORMS

The wandering broadhead planarian, *Bipalium adventitium*, is now widespread and locally abundant in North America. The ecological impact of these exotic planarians will be determined in part by their predatory behavior and interactions with potential prey (earthworms). The many species earthworms currently found in the Northeast differ in microhabitat use and in morphological and behavioral defenses. Using laboratory chambers, we investigated whether the flatworms could track and subdue a variety of earthworm species above and below ground and whether some earthworms had effective defenses against the planarians. We found that *B. adventitium* detected and followed chemical trails of earthworms and possessed the behavioral repertoire needed to subdue the prey in a range of microhabitats. They attacked and ate earthworms from all species tested, although the ability to escape varied among earthworm species. Defensive secretions gave *Eisenia fetida* some protection from *Bipalium*, and the antipredator behaviors of *Amyntas* sp. gave this earthworm species the highest rates of escape among those tested.

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STRUCTURE AND DYNAMICS OF A *CHRYSEMYS PICTA* METAPOPOPULATION (INTEGRATING SCIENCE AND EDUCATION)

Black Rock Forest (BRF), Orange County, NY, a 3785-acre preserve dedicated to scientific research, education, and conservation, provides multiple opportunities to conduct fieldwork, and to involve students in original research. AMNH staff and interns are conducting a comprehensive census of a *Chrysemys picta* (painted turtle) metapopulation in BRF. The metapopulation consists of a core of six discrete demes (separate ponds), with up to another 6 outlying sub-populations. Educationally, the project aims to teach basic field research skills and advanced biological concepts to individual students and classes, and to foster independent research and publication by student interns. To this end, several interns have addressed specific aspects of the population to conduct independent investigations, though each integrates neatly into the greater whole. The scientific goal is a thorough census; profiling the population (individually, by deme, and by metapopulation) morphologically, demographically, behaviorally, and genetically. Through both active (hand, dip-net, diving) and passive (hoop & basking traps) sampling, 189 individual adult (113 female, 75 male) *Chrysemys* have been identified by PIT (Passive Integrated Transponder) tagging. Morphological data for each is nearly complete. Digital images of carapaces and plastrons have been recorded for 93, and tissue samples for 98 are in frozen storage for genetic analysis. Environmental temperature is being correlated with seasonal feeding and basking behavior. Intergradation of subspecies and dispersal between demes is being examined. Sampling will continue until over 90% of the adult population is PIT tagged, and each individual has a complete morphological (measurements and images) and genetic profile.

Kenny, Tammy L., Sharon E. Wise, and Bryant W. Buchanan. (Utica College, Department of Biology, Utica, NY 13502)

SOUND PRODUCTION DURING SOCIAL INTERACTIONS IN THE RED-BACKED SALAMANDER

Sound production has been documented in salamanders, but the function of these sounds is unknown. The sound produced by the red-backed salamander, *Plethodon cinereus*, is a low intensity "click". We investigated the relationship between sound production and social interaction in *P. cinereus* by testing the hypothesis that clicking may be associated with visual or chemical signals from other salamanders during social interactions. We tested this hypothesis using residents (salamanders that had established territories in laboratory test chambers) and intruders (salamanders that were introduced into the test chambers of residents or into empty test chambers) under the following test conditions: (1) a resident tested alone in a small test chamber, (2) an intruder tested alone (placed into a small empty test chamber), (3) a resident tested with an intruder in a small test chamber, (4) two intruders tested together (both placed into a blank test

chamber) in a large test chamber (twice the size of the small chambers to control for density and probability of touching each other), and (5) a resident and intruder tested together in a large test chamber. We predicted that salamanders would show more aggression in contests between two individuals than when tested alone, regardless of the size of the test chambers. We also predicted that salamanders would click more often in the presence of other salamanders than when alone if clicking is associated with social interactions. Preliminary analyses support these predictions, indicating that the sound production by salamanders may be associated with intraspecific social interactions.

Kiyan, James Ryo, George G. Washington, and Paul A. Rubin. (*SUNY at Ulster, Geographic Information Systems Program, Stone Ridge, NY 12484*)

GIS VISUAL IMPACT ANALYSIS OF A PROPOSED HOUSING DEVELOPMENT BELOW MINNEWASKA STATE PARK PRESERVE IN THE SHAWANGUNK MOUNTAINS OF THE MID-HUDSON VALLEY IN NEW YORK STATE

The proposed development, located between New York City and Albany, would consist of 349 houses in an area roughly 4 miles wide. The visual impact of the development is of concern to local citizens, environmental groups and park visitors. Using Digital Elevation Model (DEM) data, we have produced conventional 2D viewshed maps, 3D models and animation to realistically display different vantages and conditions that would usually require weeks of effort on foot and in moving vehicles to fully grasp. Based on the developer's plans, we have digitized key features of the proposed project so we can portray them as if they already exist. 3D panoramas portray views of the completed development from local observation points. Animations simulate what a hiker might see from popular trails on nearby escarpments and what a driver might see during a drive along Ulster County Route 7 through the adjacent farmland and residential areas. 3D animation and GIS technology also provide the means to demonstrate the nighttime dimension of the proposed project. Artificial lighting could affect the natural cycles of wildlife in the area, as well as evening views afforded to residents and visitors. Finally, the extent of the proposed development is put into physical perspective by an animation in which a scale representation of JFK International Airport is picked up and flown into and draped over the project area.

Koontz, Fred W., Susan B. Elbin, and Scott H. Newman. (*Wildlife Trust, Palisades, NY 10964*)

THE NEW YORK BIOSCAPE INITIATIVE: A COLLABORATIVE STUDY OF ECOLOGY AND HEALTH

In the New York City Metropolitan Region, sprawl and development are eroding the ecological foundation necessary for biodiversity and health. Despite the well-intentioned efforts of many conservationists, increasing numbers of plants and animals are at risk, and human health seems increasingly to be in jeopardy from environmental causes. To reverse these unhealthy trends, we believe that ultimately a practice of sustainable living that protects both biodiversity and human health must be adopted and embraced by area residents. We suggest that a key step toward this end is for regional scientists, health professionals, resource managers, and citizens to better understand together the connections between biodiversity, health, and natural resource management. In 2002, Wildlife Trust launched a collaborative program in the New York City Metropolitan Region: The New York Bioscape Initiative. In May 2004, the group included 36 individuals from 16 regional institutions. The Initiative's objectives are to: (1) assemble a transdisciplinary team to study ecology and health; (2) bring the new discipline of Conservation Medicine to the area; (3) demonstrate links between human-induced environmental change, biodiversity, and the health of all living things; (4) help conserve biodiversity and habitats; and (5) influence environmental policy, ecosystem management, and citizen behavior. It is also our intent to strengthen regional conservation thinking by offering a people-oriented, health approach that unites biodiversity, health, sustainability, and sense of place. Objectives will be realized through a series of interrelated projects and synergistic activities conducted by the team.

Kratt, Robert J. and Kevin P. Kenow. (U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603)

ILLUSTRATING BIRD MIGRATION STUDIES ON THE WEB USING MACROMEDIA FLASH

The USGS Upper Midwest Environmental Sciences Center has collaborated on efforts to radiomark and track migratory movements of Common Loons (*Gavia immer*) in the northcentral and northeastern United States. Animated graphics of these loon migration studies have been developed using Macromedia Flash, and the presentation is served on our Center website (http://www.umesc.usgs.gov/terrestrial/migratory_birds/loons/migrations.html). The site features loon migration paths, current locations of loons, and the science behind the project. This provides a means to share loon movement data with project cooperators and the general public in a timely manner. Installed on 98% of all web browsers, Flash is a cross-platform tool that enables developers to create high-quality animations and seamless transitions between sections of content. As a streaming vector-based technology, Flash animations are efficient and lightweight, allowing developers to achieve rich graphical presentations with manageable file sizes.

Kumiga, Bryan and Matt Draud. (C.W. Post – Long Island University, Department of Biology, Brookville, NY 11548)

TIDAL AND SEASONAL MOVEMENTS OF THE DIAMONDBACK TERRAPIN, *MALACLEMYS TERRAPIN*

The diamondback terrapin (*Malaclemys terrapin*) is a unique estuarine species whose movements are not well understood. This is the first study to employ ultrasonic telemetry as a means of investigating their diel and seasonal movements. We have found a strong tidal effect on terrapin movements as they exploited larger home ranges at high tides than at low. Furthermore, terrapins explored widening ranges as the season progressed until hibernation when ranges sharply declined. Distribution patterns also demonstrated increased areas as terrapins dispersed throughout season. Similarly, these areas of distribution fell off as terrapins were found to aggregate in the same small area to hibernate. We attribute differences in terrapin movements largely to foraging activities. In the short term, as a response to fluctuating resource availability, and in a larger time scale as a response to resource abundance. The length of the intertidal zone was an important factor in determining terrapin home ranges.

Lawlor, Frances and Sandra Bonanno. (The Nature Conservancy, Pulaski, NY 13142)

SWALLOW-WORT MANAGEMENT MONITORING—AN EVOLVING PROCESS

The Nature Conservancy continues to explore effective methods to monitor success of our swallow-wort management program. Area photos give a coarse overview of control, but little information about recovery. Photo plots as practiced to date have limited usefulness for evaluating control and recovery unless combined with vegetation sampling. We have a working hypothesis for improving monitoring of treatment effectiveness: Application records of herbicide quantity used combined with time spent spraying versus time spent searching per patch give a baseline measure of success. The more herbicide used per time spent, the greater the cover of swallow-wort during the early treatment phase. A decrease in herbicide quantity used and an increase time spent applying to a defined patch will reflect diminished swallow-wort cover. Finally, time spent searching versus time spent spraying fine tunes the success. As time spent searching rather than spraying a defined area increases, target species cover should be dramatically reduced. Ultimately time will be spent on searching rather than herbicide application. Observer bias due to different work styles must be accounted for. Monitoring recovery will require multiple years. We will gather annual vegetation data on a few, easily identified target species in two categories, weedy vs. desired, by cover class. This simplified method will provide cost effective continuity while compensating for annually changing seasonal observers to provide cost effective continuity while adjusting for observer bias.

Lee¹, Amy and David E. Karrmann². (¹Brooklyn Technical High School, Brooklyn, NY 11217; ²American Museum of Natural History, Education Department, New York, NY 10024-5192)

RE-CATCHABILITY OF A PIT TAGGED *CHRYSEMYS PICTA* METAPOPULATION

Adult individuals of the *Chrysemys picta* metapopulation in Black Rock Forest, NY, have been PIT (Passive Integrated Transponder) tagged for identification since 1997 (to date 188 individuals have been tagged, 75 male, 113 female). Recatchability is the measure of how frequently individuals are captured after initial tagging. Census records were examined to determine recatchability patterns correlated to sex, the number of years an individual had been tagged, and what pond (discrete subpopulation, or deme) an individual was tagged in. Within the same season of being tagged, 12% were recaptured. Within one year of being tagged, the overall recatchability rate was 15%; falling within two years to 4%. The third year the rate was 10%; year four 15%; year five 25%; and year six 38%. Fifteen percent of individuals were recaptured once, 8% were recaptured twice, and 10% were recaptured 3 or more times. Within the same season of being PIT tagged, twice as many males were recaptured as females. For the first four years following tagging, the recapture rate between males and females were approximately the same. Beginning the fifth year post-tagging, female recapture rates increased beyond that of the male. After six years, recatchability rates were; males 31%, females 35%, metapopulation 34%. Of six demes evaluated, the number of individuals tagged in each pond ranged from 12 to 95, with an average of 31. Individual pond recapture rates ranged from 8% to 44%, with each pond contributing from 3% to 66% of total metapopulation recaptures.

Madden¹, Sean S., Laura C. Audette¹, George R. Robinson¹, and John G. Arnason². (¹University at Albany, Biodiversity, Conservation and Policy, Albany, NY 12222; ²University at Albany, Department of Earth and Atmospheric Sciences, Albany, NY 12222)

A COMPARISON OF WATER QUALITY BETWEEN AN URBAN AND A FORESTED STREAM

The rural Tenmile Creek watershed in Rensselaerville, New York, was selected as a reference stream for an ongoing water quality and restoration project on the urban Patroon Creek watershed, Albany, New York. Both watersheds drain into the Hudson River, Patroon Creek directly and Tenmile Creek after joining Catskill Creek. Monthly water samples from both creeks were analyzed for major dissolved ions using an ion chromatograph. Macroinvertebrate samples were compared to previous samples taken by the New York Department of Environmental Conservation (DEC) on both creeks. The null hypothesis is that water quality, measured using dissolved ions and macroinvertebrates, does not vary along Tenmile Creek; the alternative hypothesis is that measured variables fluctuate downstream of impoundments and the Hamlet of Rensselaerville. Preliminary results indicate that the two watersheds are very different systems, with most differences in measured variables attributable to differing land use. Mean ion concentrations for Na⁺ and Cl⁻ were an order of magnitude larger in Patroon Creek. Biotic indicators rank Patroon Creek as having poor water quality and Tenmile Creek as nearly pristine. However, even with its well-forested riparian buffer, it appears that a 44 ha impoundment (Lake Myosotis) and the Hamlet of Rensselaerville may affect the water quality of Tenmile Creek.

Mickelson, Jr., John G. (CIESIN, Palisades, NY 10964)

INITIATION AND DEVELOPMENT OF A USGS NATIONAL BIOLOGICAL INFORMATION INFRASTRUCTURE (NBII) NODE FOR THE NORTHEASTERN U.S.

The National Biological Information Infrastructure (NBII) (<http://www.nbio.gov>) is a broad, collaborative program sponsored by the United States Geological Survey (USGS) designed to increase access to data and information on the nation's biological resources. The NBII links diverse, high-quality biological databases, information products, and analytical tools and also works on developing new standards, tools, and technologies that make it easier to find, integrate, and apply biological resources information. In partnership with the USGS, the Center for International Earth Science Information Network (CIESIN) at the Lamont-Doherty Earth Observatory of Columbia University will create regional on-line data and information services initially focused on: the Hudson River Corridor, New England's Northeastern forest regions, the New York City Metropolitan Area and the Hackensack River Watershed. Primary topic foci for this stage of the project will include Invasive Species, Wildlife Disease & Human Health, and Sustainable Forest Management. The web-based portal and Internet Map Services will provide information about urban impacts on environment and health and on natural resources in the surrounding regions.

Miller¹, Norton G. and Carol B. Griggs². (New York State Museum¹, Biological Survey, Albany NY 12230-0001; Cornell University², Geological and Atmospheric Sciences, Ithaca, NY 14853)

YOUNGER DRYAS PEAT AND WOOD FROM NEAR THE COHOES MASTODON SITE, ALBANY COUNTY, NEW YORK

Bones of a mastodon (radiocarbon age: $11,070 \pm 60$ yr B.P.) were obtained from two adjacent potholes during construction of Harmony Mill No. 3 near the Mohawk River in Cohoes in 1866. While fossil wood and other plant remains were found with the bones, no effort was made at the time to study or archive the plant fossils. Therefore, the paleoenvironment of the mastodon has remained uncertain. In 2002, construction of a new water main in front of Mill No. 3 near the potholes exposed logs and peat resting on shale bedrock. Radiocarbon ages of wood, balsam fir and spruce, were $10,340 \pm 130$ and $10,490 \pm 80$; peat was $10,640 \pm 80$, and a white spruce cone in it was $10,465 \pm 35$ yr B.P. The fossils represent plant debris that had accumulated in a major late Pleistocene drainage channel during the Younger Dryas temperature reversal ($\sim 11,000$ – $10,000$ yr B.P.). Pollen and plant macrofossils in the peat were mainly white spruce, balsam fir, and tamarack, with pollen of jack pine also present, establishing the existence of boreal-type conifer forest in region during the Younger Dryas, just after the Cohoes mastodon died. Comparisons between tamarack, spruce, and balsam fir needle and pollen numbers indicate differential preservation. The larger wood samples contained up to 90 annual rings. A consistent, sudden (5–10 yr) narrowing of the annual increments, then sustained narrow ring growth for up to 20 yr, suggests a period of cooler temperature. Balsam fir and spruce wood with beaver (*Castor canadensis*) tooth marks shows that they utilized conifers during the Younger Dryas.

Owens, Theresa M. and Bryant W. Buchanan. (Utica College, Department of Biology, Utica, NY 13502)

ULTRAVIOLET VISUAL CAPABILITIES OF THE RED-BACKED SALAMANDER, *PLETHODON CINEREUS*

Ultraviolet vision is used in mate choice, foraging, and social behavior in many vertebrates. Electroretinographic studies have suggested that salamanders may be able to detect ultraviolet light but it is unknown whether or not amphibians use ultraviolet light in vision. We performed a laboratory experiment to determine whether or not individuals of *Plethodon cinereus* can use ultraviolet light in visually-mediated prey detection. In a repeated-measures design, we observed individual salamander's visual responses to moving artificial prey items presented under three lighting treatments: total darkness (dark control), ultraviolet light only (UV), and white light (white, at the same irradiance as the UV treatment). We compared time to orient toward prey for salamanders in each treatment. Salamanders responded to prey significantly sooner in the UV and white light treatments than in the total darkness control treatment demonstrating that salamanders can see prey using either UV or white light. Salamanders responded more quickly to prey in the white light treatment than in the UV treatment suggesting that the salamanders may be less sensitive to UV light than to broad-spectrum white light. Our data represent the first demonstration of UV vision in a caudate amphibian; the ecological significance of this finding remains unknown.

Pitt, Priscilla E. and Donna W. Vogler. (State University of New York, Biology Department, Oneonta, NY, 13820)

A NATURAL HISTORY OF UNREPORTED DATA: THE FLORA OF OTSEGO COUNTY, NY

Statewide biodiversity initiatives depend heavily on local floristic information, which is in turn dependent on the quality and effort of local investigators. When local information is not reported to statewide databases, those regions may be falsely considered to be less diverse than in areas with better reporting. An example of an underreported county flora is Otsego Co., NY, whose known flora is listed as 488 vascular plant species (as reported by the NY Flora Association from specimens in the State Museum). Using a simple Species richness- Area curve we show that Otsego, and nine other counties have floras that are below what is predicted from the relationship for counties of that size. Here we report on investigations of specimens in the SUNY Oneonta herbarium. Of the 687 Otsego Co. specimens in the SUNY-Oneonta herbarium, 491 were unreported to the State. Interestingly, many of the 196 species reported to the State and documented in the local herbarium collection were of the difficult-to-identify groups such as grasses and sedges. On the other hand some of the most common plant species (e.g., maples and oaks) and invasive species (e.g. purple loosestrife, black swallowwort) were not reported to the state database. Improvements in our underreported NY county databases may provide useful for documenting the spread of exotic species, or in future monitoring of range expansions.

Plassmann, Colette M. and Russell H. Waines. (SUNY New Paltz, Department of Geological Sciences, New Paltz, NY 12561)

LATE WISCONSINAN DEGLACIATION, ULSTER COUNTY SOILS MAP 97, SOUTHEASTERN NEW YORK

In the 8.5 square mile map area centered on lat. 41° 47' 40" N and long. 74° 05' 24" W bottom lands (el. 200–175 feet) of the north-south trending Wallkill River lie between the Shawangunk Mountains (el. 1294–200 feet) on the west and less prominent high grounds to the east (el. 420–200 feet). Most soils above 200 feet developed on thin till and bedrock and lesser areas of thick till and comprise 55.2 percent of the map area. Most soils below 200 feet developed on ice-related stratified drift, which formed under, in and on a shrinking Wallkill Valley ice lobe. 'Varved clays' (12.0 percent), silts (5.4 percent) and gravels and sands (5.2 percent) appear ice-related. Soils of superposed and entrenched alluvial sediments comprise 12.0 percent. In the eastern 'high grounds' 'varved clays' line several elongate north-south trending depressions up to elevations of 280 feet. Base level control points determining ice-related sedimentation levels appear to have been situated outside the map area. Between 300 and 200 feet elevations pockets of soil seem developed on loess-related silts (4.7 percent). Additionally, in the same interval (300–200 feet) two north-south trending rock-covered drumlins are located near the center of the map area. Regardless of elevation, organic mucks and made lands occupy less than 1 percent each while open water is estimated as 2.2 percent.

Post, Timothy J. (New York State Department of Environmental Conservation, Bureau of Wildlife, Albany NY 12233)

ANALYSIS OF BREEDING BIRD SURVEY TRENDS BY SPECIES SUITE (HABITAT), AND NESTING LOCATION

Bird species were separated into 4 general habitat categories based on habitat preferences. These habitats included grasslands, early successional shrub/forest, mature forest, and general/intermediate forest. BBS trend data for 1966–2002 were then tabulated for each species suite. The number of declining species was compared to the total number of species for each species suite to determine the percent of species for each suite that were in decline. The percent species in decline was analyzed for 3 geographic areas; New York, USFWS Region 5, and survey-wide. Nest types/locations were also analyzed in a similar manner. The grassland species suite was in 100% decline across all 3 geographic areas. The early successional species suite showed declines in 93% (NY) to 82% (surveywide). The mature forest species suite showed declines in 28% (surveywide) to 33% (NY). The general forest group showed declines in 21% (NY) to 35% (USFWS R5). Percent declining species for ground nesters was 73–77% (not including grassland species); Shrub nesters 50–67%, tree nesters 39–47%, cavity nesters 11–17%; depending on geographic area. Landbird conservation efforts need to focus more effort on grassland and early successional forest/shrub species.

Prusinski¹, Melissa A., Robert G. Means², Sarah J. Kogut¹, and Dennis J. White^{1,3}. (¹New York State Department of Health, Arthropod-Borne Disease Program, Troy, NY 12180; ²New York State Department of Health, Arthropod-Borne Disease Program: Retired, Niskayuna, NY 12309; ³University at Albany, School of Public Health, Rensselaer, NY, USA 12144)

TICK SPECIES OF MEDICAL AND VETERINARY IMPORTANCE IN NEW YORK STATE

In 1991, the New York State Department of Health (NYSDOH) initiated a passive tick surveillance program in the form of a Tick Identification Service (TIS). This statewide service, provided free of charge, to physicians, hospitals, veterinarians, and the general public, encourages submitters to send tick (or other arthropod) specimens to the NYSDOH for identification. The data generated from TIS submissions have enabled NYSDOH researchers to document the geographic distribution of medically important ticks in New York State, and to detect changes in the distribution of these species temporally. Since its initiation, the service has received 26,674 specimens for identification. Of these, 19,969 are ticks obtained from humans or domesticated animals with no record of recent travel history outside of New York State. A total of 15 species from six genera have been documented, while two additional genera and eight species are recorded as being imported into New York State from other localities. Additionally, 13,759 *Ixodes scapularis* (black-legged ticks) were submitted for identification from 1991–2003, more than all other species combined. As a result of the data obtained from the TIS, the known distribution of *I. scapularis* in New York State has expanded from just six counties in 1986, to 61 (of 62) counties in 2003.

Submissions to the TIS have provided a comprehensive picture of the distribution of numerous medically significant tick species in New York State that may prove to be a useful supplement in generating a predictive model of tick-borne disease.

Rachlin¹, Joseph W., Barbara E. Warkentine², and Antonios Pappantoniou¹. (¹Lehman College, Dept. Biological Sciences, Bronx, NY 10468-1589; ²SUNY Maritime College, Science Dept., Bronx, NY 10465-4198)

ICHTHYOFAUNAL SURVEY OF THE BRONX RIVER, PAST AND PRESENT

Ichthyofaunal data for the Bronx River, derived from the Historic Distribution of Inland Fishes of New York State (NYSDEC, Doug Carlson, 2001), was compared with the current survey being conducted as part of a faunal study of the Bronx River by Lehman College's Laboratory for Marine and Estuarine Studies (La MER). The historic database containing records from 1936, 1954, 1957, 1986, 1987 and 1998 lists a total of 22 species from the freshwater reaches of the river (river mile 5.6–19.3). In the current study of the ichthyofauna of the Bronx River, begun in 2001 and ongoing, we covered the same freshwater reach of the river as in the earlier studies, and extended our survey down to the river's mouth. Almost all species listed in the earlier surveys still have active populations in the river. The exceptions are the bitterling and brown trout. Loss of bitterling may be due to habitat change, while the absence of current stocking coupled with the failure of the initial stocked fish to establish stable populations in the river accounts for brown trout loss. We have, however, found populations of the fourspine stickleback from the lower end of the freshwater section of the river (approximately river mile 4.0) but still above the first dam separating the freshwater from the tidally influenced portion of the river. This study has added an extensive list of marine and estuarine fish, including the naked and seaboard goby, representing a first report of these species in the Bronx River.

Rana, Mohammad A., Paul Jackqueline, Michael Baba, and Jorge Mosquera. (St. Joseph's College, Dept. Biology, Patchogue, NY 11772)

DECLINE OF EELGRASS (*ZOSTRA MARINA*) IN THE SOUTH SHORE BAYS OF LONG ISLAND

A major part of the Long Island South Shore is protected from the ocean by barrier islands, between the South Shore and barrier islands are the bays which are connected to the ocean via inlets. These closed bays of Long Island were highly productive in the past, the major factor contributing to this productivity probably was the presence of eelgrass, *Zostera marina*, on the floor of the bay. Our studies indicate that the size and abundance of eelgrass has been declining. In fact, some western bays (Jamaica Bay) the eelgrass has completely vanished. The eelgrass provides food and shelter to a large number of bay organisms such as: shellfish (oysters, clams and mussels). The shellfish industry has also reported a decline in these bays. In order to revive the shellfish industry, we believe that eelgrass has to be restored. Although transplanting eelgrass in Jamaica Bay was proven not successful, qualitative analysis of the bay sediments collected at 12 inches deep in Jamaica Bay indicated the presence of chemical pollutants (such as PCB, DDT, DDE, 2-4D, Pb, and Hg). In the Great South Bay (eastern bay), the presence of eelgrass negatively concurred with the presence of 2-4D. We believe that removal of these sediment contaminants should play a vital role in the revival of eelgrass. The closure of many inlets of barrier islands, due to the action of longshore current, is possible blocking the flushing of these contaminants. Therefore, it is suggested that some of the closed inlets be opened.

Rubin, Paul A., Dawn M. Adickes, Tim Cunningham, Dennis Davidson, John Hurld, James Ryo Kiyon, Mary McNamara, Paul Preuss, William Ramsay, Bertram Schultz, and George Washington. (SUNY at Ulster; Geographic Information System Program, Stone Ridge, NY 12484)

APPLICATION OF GIS TECHNOLOGY TO ASSESS VISUAL IMPACTS OF DEVELOPMENT: SHAWANGUNK RIDGE CASE STUDY, SOUTHEASTERN NYS

SUNY Ulster students used technology to analyze and graphically portray visual impacts of a large-scale development project along a steep flank of the Shawangunk Ridge – the Awosting Reserve Project. A viewshed refers to the land area that is visible from one or more observation points. Viewshed analysis is critical in the assessment of how visible objects (e.g., houses, cell towers, mines, sewer plants) might look from roads, trails, lookout points, tourist destinations, etc. Reasons why people are concerned about alteration of the Awosting Reserve viewshed include potential

decrease in value of homes situated on nearby lands, loss of ecotourism related dollars, and aesthetic degradation of State owned lands purchased via taxpayer dollars. Viewshed analyses were completed for major areas of visual concern, including 1) distant points below the ridge, 2) observation points relatively close the ridge, 3) points within the project itself, 4) observation points along the Hamilton Point and Castle Point carriageways, 5) observation points on and near Murray Hill, and 6) observation points along the Gertrude's Nose trail. Project completion required students to 1) develop large databases, 2) mosaic DEM data with ArcMap, 3) use DRG's, 4) use high resolution photo imagery, 5) interpret stereo aerial photography, 6) use ArcGIS technology to calculate viewsheds, 7) use Spatial and 3D Analyst GIS extensions, 8) use GPS receivers, 9) digitize and georeference project features, 10) select target observation points, 11) design presentation quality graphics for portraying viewsheds, and 12) work as a project team.

Rubin, Paul A. and George Washington. (*SUNY at Ulster; Geographic Information System Program, Stone Ridge, NY 12484*)

WATER QUANTITY AND QUALITY CONSIDERATIONS SPECIFIC TO DEVELOPMENT ON THE FLANK OF THE SHAWANGUNK MOUNTAIN RIDGE, SOUTHEASTERN NYS

Large-scale development on the eastern flank of the Shawangunk Mountain ridge poses potential hydrologic impacts that require analysis of surface and groundwater resources. A gated community, the Awosting Reserve, proposes to build some 349 houses and a golf course atop the Martinsburg Shale. Streams and wetlands in the project area were mapped using high resolution photo imagery. Based on these analyses, GIS techniques were then used to model and delineate fourteen sub-basins that transect the project area, many of which have intermittent flow. The construction of in-ground septic systems in clay-rich soils poses a non-point pollution threat to stream and wetland receptors. To evaluate this risk, existing soil maps were digitized, brought into a GIS database, graphically portrayed, and analyzed. Large-scale development on low permeability fractured bedrock aquifers 1) can lower the groundwater table which may result in a significant reduction in surface stream flow, and 2) may result in overlapping cones of depression from the pumping of multiple wells simultaneously. In turn, homeowners may not have sufficient water quantity. As an example, a well test was conducted to evaluate the potential impacts of groundwater pumping of a well situated in the Martinsburg Shale along the same ridge. State-of-the-art downhole monitoring technology was used, complete with a down hole pressure transducer and datalogger. Analysis of drawdown and recovery data revealed that the aquifer was readily dewatered and slow to recover once the pump was turned off. These results accent the need to conduct comprehensive aquifer testing as part of project SEQRA review.

Sarro¹, Thomas J. and John E. Thompson². (*¹Mount Saint Mary College, Newburgh, NY 12550; ²The Mohonk Preserve, Daniel Smiley Research Center, New Paltz, NY 12561*)

FROM DUCK HAWKS TO PEREGRINES: PEREGRINE FALCON RESEARCH IN THE SHAWANGUNK MOUNTAINS

Peregrine Falcons have been studied in the Shawangunk Mountains since 1926. Falcons were extirpated from the Shawangunks in the 1950's due to the insecticide DDT. Hacking of captive raised falcons took place during the years 1975–1979 with none of these birds taking up residence on the Shawangunk cliffs. In 1998, for the first time in over 40 years, a pair of falcons nested in the Shawangunks. Although this breeding attempt was unsuccessful, a pair of falcons has returned to the same cliff to breed every year since 1998. This past year, 2003, the pair produced three young (the most since the 1950s). As the number of Peregrine Falcons increases, in the Hudson Valley and surrounding areas, it is anticipated that the number of nesting Shawangunk pairs will increase. A concerted effort is being made to solicit volunteers in an attempt to locate and document the arrival and breeding of new pairs. The Shawangunk cliffs themselves have changed since falcons declined in the 1950s. The Mohonk Preserve offers some of the best rock climbing in the northeastern US. Recreational use of the cliffs (i.e. rock climbing and hiking) is higher now than it was prior to the peregrine disappearance, with over 150,000 visitors/year at the Preserve. This increase in recreationists, parallel with a potential increase in breeding falcons may create a conflict that will require vigilant monitoring and informed land management decisions to protect each eyrie.

Scanga, Sara E. and Donald J. Leopold. (SUNY College of Environmental Science and Forestry, Department of Environmental and Forest Biology, Syracuse, NY 13210)

MANAGEMENT AT THE CROSSROADS: A FOUR-WAY APPROACH TO CONSERVING A WETLAND WILDFLOWER

Critically imperiled (S1) in four of the five states in which it occurs, *Trollius laxus*, a spring-blooming perennial herb, is considered vulnerable (S3) in New York State (NYS). *Trollius laxus* is associated with rich fens, minerotrophic wetlands that are often hotspots of biodiversity, and that are critically imperiled in NYS. Observations indicate that *T. laxus* is extirpated with the increased shading that is a result of succession from an open fen to a forested fen, but studies examining the effect of canopy cover and light levels on *T. laxus* vigor have shown conflicting results. This research uses a four-way approach to determine a management strategy for the conservation of *T. laxus*, based on its light requirements. We investigate 1) historical canopy gap formation over extant *T. laxus* patches, through analysis of tree ring widths; 2) the relationship between canopy openness and *T. laxus* vigor; 3) the vigor, over a three year period, of *T. laxus* under created canopy gaps in a forested fen; and 4) the interactive effects of light and water table level on *T. laxus* vigor, using a greenhouse experiment. By considering the intersecting results of the four investigations—the crossroads of the research—we will develop a management strategy for *T. laxus* that is based on historical, observational, and experimental data from both the field and the greenhouse.

Schoch¹, Nina, Valerie Trudeau², Michale Glennon³, David Adams⁴, David Evers⁵, and Fred Realbuto⁶. (¹Adirondack Cooperative Loon Program, Ray Brook, NY 12977; ²Natural History Museum of the Adirondacks, Tupper Lake, NY 12986; ³Wildlife Conservation Society, Saranac Lake, NY 12983; ⁴New York State Dept. of Environmental Conservation, Bureau of Wildlife, Albany, NY 12233; ⁵BioDiversity Research Institute, Gorham, ME 04038; ⁶Audubon Society of New York State, Selkirk, NY 12158)

COMMON LOONS AS A TOOL FOR ENVIRONMENTAL EDUCATION

The Adirondack Cooperative Loon Program (ACLP) utilizes a variety of high-quality educational techniques to teach the public about environmental factors impacting aquatic ecosystems in eastern North America using the Common Loon (*Gavia immer*) as an educational tool. Long-lived and at the top of the food chain, this species is indicative of ecological health, reflecting such environmental concerns as mercury pollution. Educational delivery methods include an interactive website, www.adkscience.org/loons; public presentations; curricula about loon natural history, loon migration, and environmental impacts on loon populations; teacher training programs; and printed materials including biannual newsletters, fact sheets, brochures, and posters. The widespread appeal of this charismatic species enables the ACLP to intrigue the public to learn about loon natural history and conservation issues affecting the aquatic environments the birds inhabit, as well as to readily communicate the results of our research to the public. This knowledge will allow students and the general public to make sound decisions about their use of environmental resources and how people can affect the environment and its wild inhabitants on a local, regional, and national scale. The ACLP successfully merges the worlds of public participation, outreach, and education with its research on the Adirondack loon population.

Shirer, Rebecca and Gary Kleppel. (University at Albany, Department of Biology, Albany, NY 12222)

THE EFFECTS OF LANDSCAPE DISTURBANCE ON FRESHWATER EMERGENT WETLANDS

The protection of wetland ecosystems requires an understanding of the effects of anthropogenic disturbance in the landscape on wetland habitat structure and function. This study seeks to document and quantify some of those impacts. Freshwater wetlands in two regions of the Hudson River valley (Saratoga County and Orange County) were chosen to represent a wide range of landscape settings. Indicators of wetland condition were measured to detect effects on water quality and plant community structure. These were tested for correlation with land-use attributes data derived from digitized orthophotos. Initial results suggest that the impacts of human disturbance may be influenced by the distance between the disturbed landscape and the wetland and by the presence of intervening vegetated buffer zones.

Smith, Wendy (*Brushfire Studio, Science Illustration, Los Angeles, CA, 90068*)

DIGITIZING THE TRADITIONAL: A GALLERY OF TRADITIONAL AND DIGITAL SCIENCE ILLUSTRATIONS

The advent and availability of digital imaging technology revolutionized the publishing industry and necessitated a paradigm shift in the approach to contemporary scientific illustration. While there are still many opportunities for the natural science illustrator to employ traditional mediums in rendering artwork, science illustrators find it advantageous if not necessary to use digital technology in part or all stages of an illustration project. The ease with which computer generated images can be created, copied, moved and modified has led to major changes in the way illustrators may work today and to many creative ways of incorporating this technology into the work method. The proposed poster will explore some ways in which traditional skills can be used within the context of digital image rendering and inversely, how digital technology can enhance the traditional rendering process. The poster will also showcase a gallery of digital, digitally-enhanced and traditionally rendered natural science illustrations as examples of some of the approaches employed by illustrators today. Brief informative descriptions of rendering methods and the software used will accompany the images. While the methodology of science illustration has been evolving under the influence of imaging technology, traditional skills can be combined with computer technology to enhance both approaches.

Tibbits¹, Wesley T. and Nancy J. Bachman². (¹*Biological Field Station, SUNY Oneonta, Cooperstown, NY 13326*; ²*Department of Biology, SUNY Oneonta, Earth Science Building, Oneonta, NY 13820*)

RAPD ANALYSIS OF LAKE TROUT DNA FROM OTSEGO LAKE, NY

Stocking of juvenile lake trout reared in hatcheries is one of several management plans used to restore self-sustaining populations of lake trout, *Salvelinus namaycush*, in Otsego Lake. The State began stocking the lake in 1892 when 100,000 lake trout of unknown strain and size were introduced. Regular stocking of the lake by the State began in 1922 with Adirondack and Finger Lakes (Seneca and Cayuga) lake trout strains. Due to the superior growth of Finger Lakes strain, the stocking of Adirondack strain lake trout was discontinued after 1974. Natural reproduction within Otsego Lake has occurred since the early 1950s. In this study genetic and morphological characteristics were used to describe the population of lake trout within Otsego Lake. DNA was isolated from fish collections and stocked samples. Trout DNAs were analyzed using Random Amplified Polymorphic DNA (RAPD), a DNA "fingerprinting" method. Distinct nuclear markers were identified that were polymorphic among some Otsego Lake trout samples.

Trevett, Julie B. and Walter J. Conley. (*SUNY Potsdam, Department of Biology, Potsdam, NY 13676*)

DIETARY ANALYSIS OF THREE COPEPODS FROM CLEAR POND, NY

Crustacean zooplankton, primarily copepods and cladocerans, are important links in the transfer of energy from photosynthetic organisms to larger animals such as fishes. They are critical in the survival of fish larvae. However, little is known regarding the diet of crustacean zooplankton of the lakes and ponds of northern New York. Direct observation of diet items through the examination of fecal pellet contents has provided a wealth of information on the feeding ecology of marine copepods. The technique has not been used with lacustrine species. Using scanning electron microscopy, we successfully identified the contents of the fecal pellets of three abundant species of copepods. The diet of calanoid copepods, *Epischura lacustris* and *Leptodiaptomus minutus* were dominated by the centric diatom *Stephanodiscus* sp. The fecal pellets of the cyclopoid copepod, *Tropocyclops prasinus mexicanus*, were dominated by naviculoid diatoms.

Warkentine¹, Barbara E., Joseph W. Rachlin², and Antonios Pappantoniou². (¹SUNY Maritime College, Science Department, Bronx, NY 10465; ²Lehman College of CUNY, Biology Department, Bronx, NY 10468)

ASSESSMENT OF THE PLANKTONIC COMMUNITIES OF AN URBAN ESTUARINE SYSTEM

The southern end of the Bronx River is a highly industrialized urban estuarine system. Public perception of this system is that it is stressed to the point that it is unlikely to support viable migratory and/or resident fish populations, and the planktonic dietary resources that they would need. However, since no plankton surveys had been conducted for this section of the river, this assumption had no real basis. In order to assess the plankton community of the estuarine section of the Bronx River a series of plankton tows were conducted during the spring of 2002 and 2003. Data generated from these samples were used to determine plankton abundance, or lack thereof, and diversity of this aquatic community. Plankton samples were taken from both shallow shoreline and mid-channel environments. Analysis of these samples yielded the following results: In May and June 2002 the shallow shoreline environment supported 18 to 28 taxa of plankton with overall abundance levels ranging from 1.3×10^4 to 1.3×10^5 plankton/m³. The major taxonomic group was diatoms. In March and April 2003 the mid-channel environment supported 3 to 6 taxa with overall abundance levels ranging from 1.5×10^3 to 3.3×10^3 plankton/m³. The major taxonomic group was copepods. Our data clearly show that the Bronx River, despite its status as a highly industrialized estuarine system, has a plankton community, which is sufficient to support migratory and resident fish populations.

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TREE REMOVAL FOR EXPANSION OF HABITAT FOR LUPINE AND FROSTED ELFIN BUTTERFLY

The decline of the frosted elfin butterfly, *Callophrys irus* (Godart), a threatened species in New York state, is directly related to loss of habitat of its host plant, wild lupine, *Lupinus perennis* L. Lupines are decreasing in the Rome Sand Plains of central New York, particularly as white pines invade the open sandy habitats where lupines grow, but a frosted elfin population remains where lupines are the densest. We tested the hypotheses that tree canopy hinders lupine growth and alters elfin behavior. In May 2002, we quantified the lupine in 40m² plots surrounding the base of 18 white pines. We also marked locations of all butterfly activity. During January 2003, nine randomly selected trees were cut and removed, and we repeated the lupine and elfin surveys the following summer. Here we report three results. First of all, there were no differences in lupine abundance between cut and control plots in this first year. There were differences, however, between years, likely due to weather, since we found significantly greater lupine cover and more flowering stems per plot in 2003 than in 2002. Finally, we found a rapid response of the butterflies to the altered conditions of the site. Males established mating territories primarily in the newly cleared areas rather than along trails, as had been the case in 2002. In future studies we expect to find enhanced lupine growth where the canopy has been thinned and to see changed flight paths of the butterflies.

Wojakowski¹, Maria and Russell Burke². (¹Townsend Harris High School, Flushing, NY 11367; ²Hofstra University, Department of Biology, Hempstead, NY 11549-1140)

NEST SITE CHOICE OF *MALACLEMYS TERRAPIN*

Diamondback terrapins, *Malaclemys terrapin*, are small saltwater turtles that live in marshes and nest on land during June through early August. The purpose of this study was to determine whether the *Malaclemys terrapin* chooses her nest sites randomly or selectively and to analyze nest environment and surrounding vegetation to identify trends by examining the habitats and vegetation around predated nests. It was hypothesized that the *Malaclemys terrapin* purposefully chooses her nest site. For each predated nest identified, densiometer readings and vegetation estimates were recorded. Random points were identified and the same data was recorded for each. Results show that terrapins non-randomly chose sites that were open, with little overhead canopy. There was also a significant difference between nest locations and random point locations. This was significant not only because it supports the hypothesis that terrapins choose their nest sites, but also because it offers insight into the reasoning behind this choice.

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