

# NEW YORK COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT 2007-2008 BIENNIAL REPORT



**Front cover:** Graduate student, Angel Knox, tracking a snapping turtle with radio telemetry at Montezuma National Wildlife Refuge, Seneca Falls, NY. See page 16 for project details. (Photograph provided by Stephen Morreale.)

# **BIENNIAL REPORT**

**2007-2008**

## **NEW YORK COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT**

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N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
U.S. GEOLOGICAL SURVEY  
U.S. FISH AND WILDLIFE SERVICE  
WILDLIFE MANAGEMENT INSTITUTE**

**1 January 2007 – 31 December 2008**

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**Comments are welcome.**



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# INTRODUCTION AND OVERVIEW

## **New York Cooperative Fish and Wildlife Research Unit**

*A Cooperative Research and Education Program of the  
New York State Department of Environmental Conservation,  
Cornell University, the U.S. Geological Survey,  
the U.S. Fish and Wildlife Service,  
and the Wildlife Management Institute.*

**The Cooperative Fish and Wildlife Research Units Program** has been in existence for over 70 years. It began with the U.S. Fish and Wildlife Service in response to a recognized need for trained biologists and scientific information in the field of fish and wildlife management. The resulting unique partnership, which developed among federal and state resource agencies, the Land Grant university, and private entities, has evolved into a nationwide program. This key program operated as part of the U.S. Fish and Wildlife Service until November 1993, when the entire program was moved into the National Biological Survey established by a Secretarial Order under the FY 1994 Interior Appropriations Act. In October 1996, the Cooperative Research Units program was moved into the U.S. Geological Survey, where it now resides in the Biological Resources Discipline.

**The New York Cooperative Fish and Wildlife Research Unit** has been active in Cornell's Department of Natural Resources since 1961. The Department and Agricultural College benefit by gaining three faculty research positions, increased exposure to state and federal agency needs, student and professional development, and a partnership that serves all cooperators. New York State's Department of Environmental Conservation receives research capability, technical assistance from fish and wildlife scientists, a direct link to federal agency managers, and graduates for agency staffing. Through the Cooperative Unit, the U.S. Department of Interior gains ready access to the research capability of Cornell University, links federal efforts with those of New York State, and maintains research staff in a productive scientific environment.

**The New York Research Unit effectively leverages for Cornell** 3 research faculty, 3-6 research associates, 14-18 graduate students, 10-12 research specialists, and 12-15 undergraduate research interns. Current value of salaries and research contracts channeled through the Unit to Cornell investigators is approximately 2 million dollars annually.

**A major role of the Unit in conservation and management of fish and wildlife** for diverse public uses is to foster a cooperative and coordinated approach among state, federal, and academic interests. Notable public and resource benefits have resulted from projects that have merged the interests and resources of the three public organizations through the Cooperative Unit.

# COOPERATORS AND PERSONNEL

## Coordinating Committee

Patty Riexinger	Director, New York State Department of Environmental Conservation, Albany
Rich Bennett	Regional Scientist, U.S. Fish and Wildlife Service, Region 5, Hadley, MA
Marianne Krasny	Chair, Department of Natural Resources, New York State College of Agriculture and Life Sciences, Cornell University, Ithaca
Mike Tome	Supervisor, Cooperative Research Units, USGS, Kearneysville, WV
Scot Williamson	Northeast Regional Representative and Vice-President, Wildlife Management Institute, Washington, D.C.

## Unit Staff

William Fisher	Unit Leader, Fisheries
Angela Fuller	Assistant Unit Leader, Wildlife (hired)
Melinda Von Gordon	Administrative Assistant
Vacant	Assistant Unit Leader, Fisheries (vacant)
Milo Richmond	Unit Leader, Ecologist (retired, September 2008)
Richard Malecki	Research Scientist, Wildlife (retired, January 2008)
Ellen Harris	Administrative Assistant (transferred, September 2007)

## Research, Communication, and Planning Cooperators

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**Undergraduate Student Interns**

Jared Grummer

## **PROGRAM DIRECTION STATEMENT**

The **New York Cooperative Fish and Wildlife Research Unit**, one of 40 in a National Cooperative Units program, is established for the purpose of enhancing the management of this nation's renewable natural resources. Basic support for the Unit program comes from four primary cooperating agencies: Biological Resources Division of the U.S. Geological Survey, New York State Department of Environmental Conservation, New York State College of Agriculture and Life Sciences at Cornell University, and The Wildlife Management Institute. Led by three research scientists working closely with a Coordinating Committee, consisting of one member from each of the cooperating agencies, priorities and opportunities are developed for programs that address **fisheries and aquatics resources, waterfowl and wetland resources,** and **wildlife ecology and management.** These subject areas are further unified by location of the Unit in Cornell's Department of Natural Resources. The department provides an academic setting for enhanced educational and employment opportunities for students, while facilitating collaboration with other colleges, institutes, and agencies. In accomplishing our goals, we are aided by a select, highly motivated group of graduate students and research affiliates who understand scientific research and the need for application that will enhance the impact of research results.

Unique partnerships fostered by the Unit create strategic alliances between state and federal agencies, encourage research and management teamwork within agencies, and allow benchmark research among scientists. As leaders of the program, Unit personnel support well-integrated organization with broad representation that promotes creativity, full development of ideas, and a collaborative approach. Our ideas and research achievements are shared with colleagues, graduate students and undergraduates through publication, formal teaching, seminars, lectures and mentoring of students who seek out Unit personnel and projects to enhance their education.

Particular attention is given to the resource problems and issues of the northeastern states, with New York as the focal point. Current themes in **fisheries and aquatic resources** focus on better understanding the dynamics of watersheds and large aquatic systems in the context of active human land use and development. On the Hudson River, research to address ecosystem processes increase knowledge of the estuary biota and food web and emphasize long-term and large-scale management of water resources to benefit fish and aquatic communities. Modeling techniques are being developed that integrate environmental quality, socioeconomic values, and water management. Program themes in **waterfowl and wetland research** address the ecology and management of continental populations of waterfowl, with emphasis on Canada geese, tundra swans, mallards, and pintails. Studies are being enhanced by telemetry using satellite tracking technology that provides needed information on migration movements, the chronology of movements, and mortality. Computer assisted modeling of population dynamics facilitates development of adaptive harvest management strategies designed to optimize both protection and utilization of important waterfowl resources throughout North America. The Research Unit continues involvement in **wildlife ecology and management** as we collaborate on studies of wildlife species that exceed population levels deemed acceptable or compatible with human activities. Studies of Laughing Gulls, Double-Crested Cormorants and other problem species are underway. The white-tailed deer, raccoon, gray squirrel, beaver, and other species found in urban and suburban habitats are likewise subjects for study where we seek feasible alternatives to

conventional harvest practices for managing these abundant species. Concerns for wildlife populations that are habitat limited or otherwise less viable have directed this Unit to embrace issues of biodiversity, population viability, and landscape level resource inventory using a myriad of computer-assisted technologies. Application of geographic information systems (GIS) technology allows investigation and improved understanding of biological contaminant issues, land cover and land use trends, biodiversity issues, and other non-traditional wildlife related concerns. These cutting-edge issues are readily addressed by the Research Unit and we continue to focus on them to meet State and Federal Cooperator needs. The presence of an innovative Human Dimensions Research Unit within the same Department of Natural Resources offers numerous partnering opportunities for integration of human elements of resource management with the biological dimensions. Research that combines expertise of these two units serves to expand graduate education opportunities, increase staff flexibility, and enhance planning and leadership opportunities while offering more integrated, user-oriented management and research findings. Such leadership, integration, and planning with cooperators are key to the quality research and service-oriented program that we strive to maintain.

**Approved: May 3, 2000**

## **FISHERIES/AQUATIC RESOURCES**

**COMPLETED PROJECTS – None**

### **ONGOING PROJECTS**

#### **Evaluating the Influence of Recreational Flow Releases on the Availability of Thermal Refuge Habitat and the Behavior and Persistence of Brown Trout in the Indian and Hudson Rivers**

Investigators: Barry Baldigo and Anne Gallagher-Ernst, (USGS)  
Clifford Kraft (Cornell)  
Milo Richmond and William Fisher (NYCFWRU)  
Richard Preall and Richard Fenton (NYSDEC)

Student: Bethany Boisvert, M.S. (Cornell)

Funding: U. S. Geological Survey  
New York State Department of Environmental Conservation  
Kieckhefer Adirondack Fellowship

Expected Completion: September 30, 2009

A cooperative study by the NYSDEC, the USGS, and Cornell was initiated in Summer 2005 to assess the effects of recreational flow releases from Lake Abanakee on the quantity of thermal refuge habitat and the behavior and persistence of brown trout in the lower Indian River and the Hudson River Gorge Primitive Area. River temperature and stage were monitored continuously at eight locations throughout the study area during the summers of 2005 and 2006. In 2005, remotely sensed thermal image data from the study reach was acquired by the Rochester Institute of Technology through the USGS/BRD—State Partnership Program to further characterize the extent and number of thermal refuges during base and release flows. Radio telemetry with temperature sensitive transmitters was used to monitor persistence, movement and use of thermal refugia by 2-year-old stocked brown trout within the Indian and Hudson Rivers during the summers of 2005 and 2006. Additionally a reference reach in the unregulated Cedar River was monitored with 4 temperature loggers and trout telemetry during 2006.

Ambient river temperature was not substantially altered by the recreational releases, but regularly exceeded stressful levels for brown trout. Releases increased discharge by an order of magnitude. Thermal remote sensing identified five potential thermal refuges, all at tributary confluences within the Hudson River between the Boreas River and the town of North River; no thermal refuges were identified in the Indian River. During releases, the refuge area for four of

the five identified tributary confluences were reduced by 100%, the fifth was reduced by 50%. Telemetry results showed that trout within these refuge areas, as well as others not identified by remote sensing, were sometimes (up to 30% of the time) observed at temperatures lower than ambient mainstem river temperatures. For those trout using thermal refugia, impacts of recreational releases on the ability of a fish to remain at cooler temperatures were found in both the Indian and Hudson Rivers; thermoregulation was disrupted in some trout, while others were able to avoid the release effects by moving into or holding within tributaries. Daily movements by trout in the Hudson River were significantly greater than in either the Indian River or the Cedar River. Recreational releases were not found to influence daily movement in either the Indian or Hudson Rivers. Trout persisted significantly longer in the Cedar River than in either the Indian or Hudson Rivers; most trout had died or exited the release-affected reaches by mid-August during both summers.

# WILDLIFE/TERRESTRIAL-WETLAND RESOURCES

## COMPLETED PROJECTS

### **Movement and Overwintering of Snapping Turtles in Response to a Wetland Drawdown**

Investigators: Richard Malecki (NYCFWRU)  
Steve Morreale and Kristi Sullivan (Cornell)

Funding: New York State Department of Environmental Conservation  
New York Cooperative Fish & Wildlife Research Unit

Completed: August 2008

Drawdown and reflooding of wetland impoundments is a common management technique used to mimic the periodic fluctuations of water levels in natural systems. Drawdowns can control nuisance plants, aerate the soil, and allow germination of moist soil species. They also serve to prevent monotypes and promote habitat diversity, which in turn increases species diversity of waterfowl. Snapping turtles (*Chelydra serpentina*) are an important component of wetland communities throughout their range; however, few studies have been performed on how turtles are affected by, or behave in response to, wetland drawdowns. Preliminary research was conducted in the Main Pool at the Montezuma National Wildlife Refuge in central New York during summer 2005 to develop trapping, tagging and tracking methods for snapping turtles. From May to June, 2006, 17 turtles, ranging in weight from 17.5 to 55 kg, were marked with vhf transmitters with an expected battery life of 2.5 years. Turtles were tracked through fall to their overwinter sites, where site conditions such as water and substrate depth, snow and ice cover, waterflow, and temperature were monitored. In spring 2007, following an expected drawdown, turtle movements and overwinter sites were monitored for comparison with data collected in 2006.

## **Status and Ecology of Mute Swans (*Cygnus olor*) in New York State**

Investigators: Richard Malecki (NYCFWRU)  
Bryan Swift and Elizabeth Cooper (NYSDEC)

Funding: New York State Department of Environmental Conservation

Completed: March 2008

Most field activities were completed in 2006 and work in 2007 was further limited due to departure of the project coordinator (Kevin Clarke) to an unrelated position in DEC. During 2007, the principal activities were continued collection of citizen reports of neck-banded swans, re-deployment of six satellite radio-transmitters, and initial drafting of the final report for this study. Approximately 50 sightings of neck-banded birds were reported during 2007, raising the total to more than 350 since summer 2004. Collar observations are the primary data used to estimate survival rates in this study. DEC, in collaboration with the Wildlife Trust and others (e.g., New York City DEP, U.S. Fish and Wildlife Service, National Park Service), captured and neck-banded 8 swans during late August 2007, primarily to attach satellite transmitters on a sample of swans to further document seasonal movements and winter dependence on supplemental feeding. Molting swans were captured using long-handled nets after being chased by staff on foot or by boat. All swans were marked with plastic neck collars (white with black alphanumeric codes) and aluminum federal leg bands and released on site. Satellite transmitters had been recovered from swans previously marked by DEC or the Wildlife Trust, and were re-fitted with new shock cord attachments. Radios were deployed (# of radios in parentheses) at the following locations: Rockland Lake State Park (1), Muscoot Reservoir (2), Wertheim National Wildlife Refuge (1), and western Peconic Bay (3). The radio put out at Wertheim failed soon after release and was recovered a few weeks later. All others have provided some location data, but exhibited very little movement between August and January 2008. We began preparation of the final report during fall 2007, and have drafted sections on distribution and abundance, legal status, movements, interactions with other wildlife, conflicts with human interests, and management actions. Population management (nest and egg treatment and removal of adult swans) was continued by DEC in 2007 but was not conducted as part of the study. Additional data analysis and report preparation are ongoing.

## **The Behavior and Feeding Ecology of Double-Crested Cormorants (*Phalacrocorax auritus*) Breeding on Oneida Lake, New York**

Investigators: Milo E. Richmond (NYCFWRU)

Student: Jeremy T. H. Coleman, Ph.D. (Cornell)

Funding: U.S. Geological Survey  
Cornell University  
New York State Department of Environmental Conservation

Completed: December 2007

Double-crested cormorants (*Phalacrocorax auritus*) have been studied intensively on Oneida Lake, NY, from 1994-2005. Starting in the early 1980s, cormorant populations on Oneida Lake, and throughout the Northeast, increased rapidly. The rapid growth observed in the region was likely due to decreasing contaminant loads in fish in the Great Lakes region; the increasing abundance of prey at wintering locations, provided mostly by the growing aquaculture industry; and the addition of cormorants to the Migratory Bird Treaty Act in 1972, which afforded them the same protection as other non-game birds. Cormorants were first recorded nesting on Oneida Lake in 1984, and by 2000, 365 pairs were nesting there. By 2003 the breeding population had declined slightly to 286 nesting pairs from the 300 pairs of 2002. Declines from the peak breeding population of 2000 may have be due to a number of factors, ranging from bad weather and high water events in 2000 and 2002, to various management programs employed since 1998. The number of cormorants that attempted to visit Oneida Lake during migration was affected very little by decreased breeding effort in those years. A migrant hazing program enacted by New York State's Department of Environmental Conservation from 1998 to 2003 proved to be very effective in reducing fall cormorant numbers on the lake. A new management plan was initiated in 2004 to further reduce numbers of resident and migrant cormorants on Oneida Lake through the entire season using nest control and hazing techniques. During the mid 1990s, prior to initiation of the hazing program, cormorant numbers would swell to about 2000 cormorants by the end of August. The migrants would stop over and feed on Oneida Lake, and nearby Onondaga Lake, until mid-October each year, when the 400 or so remaining birds departed for the south. Cormorant feeding habits on Oneida Lake are of utmost concern to anglers and fishery managers, and have been the focus of several research projects since 1988. Cormorants are opportunistic fish predators, typically consuming whatever species are most available. Yellow perch and walleye are the most abundant fish in Oneida Lake, and therefore, the diet of cormorants on the lake is primarily composed of these two species. Estimates from stomachs of collected birds indicate that they consume an average of 456 g of fish per day, with prey length averaging 124 mm. In addition to yellow perch and walleye, twenty-three other species of fish have been recorded in the cormorant diet on Oneida Lake, as well as mudpuppies (*Necturus maculosus*) and crayfish.

Cormorants are the only species of colonial waterbirds on Oneida Lake that have the potential to affect the fish population of the lake. Cormorants appear to be an intermediate fish predator on Oneida Lake, where walleye consume small forage fish, cormorants eat small and midsize fish,

and anglers take midsize and larger fish. The evaluation of their part in the food web of Oneida Lake is complex, and continued research will help to further describe and understand the effect of this predator on the Oneida Lake food web. A two-year telemetry study, conducted in 1999 and 2000, has helped reveal primary and secondary feeding areas, as well as the characteristics of preferred foraging locations, and the range and fidelity of these birds to foraging sites. Continuing studies are underway to investigate the foraging efforts and behavior of Double-crested Cormorants using electronic time-depth recorders; to evaluate ongoing management strategies employed on Oneida Lake and elsewhere, especially with regard to direct impacts on fish stock recovery; and to examine spatial and temporal distribution of cormorants and fish. These studies will serve to further our understanding of the complex predator-prey interactions at work on Oneida Lake, and to aid in the implementation of effective management strategies for both cormorants and fish stocks.

## **Aversive Conditioning and Population Dynamics of Black Bears (*Ursus americanus*) at Fort Drum Military Reservation in New York**

Investigators: Paul Curtis (Cornell)  
Milo Richmond (NYCFWRU)  
Evan Cooch (Cornell)

Student: Mike Wegan, M.S. (Cornell)

Funding: U.S. Geological Survey  
Department of Defense, Fort Drum Military Reservation

Completed: Spring 2007

In 2002 and 2003, black bears (*Ursus americanus*) were interfering with military training on Fort Drum Military Installation in northern New York. As little information was known about life history of black bears in this geographic area, a collaborative research project with Fort Drum Military Installation, the New York State Department of Environmental Conservation, and Cornell University was initiated to investigate black bear ecology and evaluate ways to reduce bear-military/human conflicts. I developed a new delivery method for thiabendazole, a conditioned taste aversion agent, and tested the efficacy of it for creating conditioned taste and site aversions in free-ranging black bears. I saw little evidence of a conditioned taste aversion when comparing bears treated ( $n = 4$ ) with thiabendazole to untreated bears ( $n = 2$ ). Determining whether thiabendazole created a site aversion was difficult and results inconclusive. I also generated estimates of population size using mark-recapture via genetic analysis of hair samples ( $n = 397$ ), and occupancy models based on bear visitation to hair traps ( $n = 38$ ). The mark-recapture estimate of abundance was 57 bears (95% CI = 49-96 bears), and the occupancy model predicted 69 bears (95% CI = 43-109 bears). These estimates were not significantly different, and I concluded that the occupancy model can produce reliable abundance estimates under the conditions of this study. Further refinement of occupancy models could improve population estimation, and additional study is warranted. Finally, I recorded radio-telemetry locations and calculated 95% fixed kernel and minimum convex polygon home ranges for 5 adult female black bears. I used a distance-based approach to determine habitat preference within the 95% fixed kernel home range estimates. Wetlands, especially palustrine wetland types, were selected more than expected based on availability, and preferred over every habitat type other than forests. I recommend that palustrine wetland habitat should be conserved for long-term viability of the black bear population on Fort Drum Military Installation. The findings of this inquiry may help wildlife managers better understand the implications of management decisions and action.

# FISH AND WILDLIFE BIODIVERSITY ANALYSIS

## COMPLETED PROJECTS

### New York State Breeding Bird Atlas Project

Investigators: Kevin J. McGowan (Cornell)  
Kimberley Corwin and John W. Ozard (NYSDEC)  
Milo E. Richmond (NYCFWRU)  
Charles R. Smith (Cornell)

Funding: New York State Ornithological Association,  
New York State Department of Environmental Conservation—Return A  
Gift to Wildlife, State Wildlife Grants  
Cornell University, Department of Natural Resources  
New York Cooperative Fish and Wildlife Research Unit  
Cornell Laboratory of Ornithology  
National Audubon Society of New York

Completed: March 2009

Co-edited by Kevin McGowan and Kimberley Corwin, *The Second Atlas of Breeding Birds in New York State* was published in late 2008. Both an indispensable scientific work and a beautiful collection of art, the book documents and illustrates the current distribution of breeding birds within the state and the significant change in bird distribution that has occurred since the publication of *The Atlas of Breeding Birds in New York State*, edited by Robert F. Andrie and Janet R. Carroll, in 1988. Each species account features a black-and-white illustration of the bird, color maps of the current (2000-2005) breeding distribution and of the twenty-year change in distribution, and an overview of the species' breeding range, habitat preferences, history in the state, trends in distribution, and conservation implications. The book not only chronicles shifts in bird distribution but also celebrates the 244 species that breed within the state's borders by showcasing majestic landscape paintings of family groups and original artwork of each species.

Long-term changes in the distribution of bird populations can be driven by habitat alteration caused by development, deforestation, and climate change, but significant change also occurs in the short term. Based on comprehensive, statewide research efforts conducted from 2000 to 2005, this landmark volume shows the surprising amount of change in the distribution of breeding birds in New York that has taken place in the last twenty years: a few species no longer breed in the state (e.g., Loggerhead Shrike), a few breeding species were gained (e.g., Merlin and Black Vulture), and over half of the species changed their distribution in the state, some dramatically. The consistency of survey methods in the two atlas efforts, including census of the same 5,333 survey blocks, allows for statistically significant comparisons.

In all, 1,187 volunteers spent 140,000 hours in the field, making this a substantive work of citizen science with broad applications for bird research and environmental management. In addition to the species accounts, there are chapters on methodology, results, habitats, land use, history of New York birding and ornithology, conservation, and appendixes of rare breeders as well as an updated table of the seasonal timing of breeding that completes this monumental work. The documented changes in bird distributions and land use in this stunning celebration of New York's birds will be of critical interest to both birders and conservationists.

## **Hudson River Valley Public Lands and Biodiversity Assessment**

Investigators: Leslie Zucker, Stephen Smith, Elizabeth Hill, Magdeline Laba (Cornell)  
Milo Richmond (NYCFWRU)

Funding: New York State Department of Environmental Conservation, Hudson  
River Estuary Program  
New York Cooperative Fish and Wildlife Research Unit  
Cornell Institute for Resource Information Sciences (IRIS)

Completed: March 2008

Sound management of state-owned public lands is a key component of conserving biodiversity and meeting regional conservation goals in the Hudson River Valley (HRV). Many public lands overlap with important areas of biodiversity in the HRV. Each parcel of New York State public land has a different mandate and capacity for protecting sensitive species and habitat. This project seeks to develop science-based recommendations for protection of biodiversity on public lands, while accounting for unique mandates. Specific objectives of the state lands assessment were to: 1) assess the diversity of common and rare biological resources observed in and near management units in the HRV; 2) determine the contribution of each state-owned land unit to the biodiversity of the region; and 3) assess actual and potential threats to biodiversity on these lands, both internal and from external sources (i.e., adjacent lands).

We examined public land holdings from the standpoint of their biological diversity and their contribution to overall species richness in the region. Together, these public lands (404,386 acres) total 10% of all the land in the lower Hudson River Valley. We identify potential threats to these lands from human development and needs, invasive or overabundant species, and other possible threats. The major focus of our project is the development of a public lands digital database for use in land management. Compiling and delivering this information in a form that is easily understood and permits manipulation to address new issues is being accomplished via an ArcView interface. ArcView-based tools will assist land managers in resource assessment of public lands including: species composition; identification of threatened, endangered, or species of special concern; land cover type and fragmentation of the vegetative cover; proximity to other public lands and important biodiversity areas; and human population density of adjacent lands.

## ONGOING PROJECTS

### GIS Support Services for the Hudson River Estuary Program

Investigators: Leslie Zucker, Stephen Smith, Elizabeth Hill, Magdeline Laba (Cornell)  
Milo Richmond (NYCFWRU)

Funding: New York State Department of Environmental Conservation, Hudson  
River Estuary Program  
New York Cooperative Fish and Wildlife Research Unit  
Cornell Institute for Resource Information Sciences (IRIS)

Expected Completion: March 2010 (Transferred to Pat Sullivan)

The Hudson River Estuary Program, established with funding by New York State, in 1996, offers a comprehensive plan to recognize, conserve, and protect a wide range of biological and cultural values found throughout the Hudson River Valley. A key component to meeting the goals of this comprehensive plan is the provision of detailed, accurate analysis of natural resources data to the appropriate decision makers in a timely manner. In addition to providing a sound knowledge base for decision making, it is often necessary to educate and thereby engage the public in the efforts being undertaken to manage the State's natural resources. The NYSDEC Hudson River Estuary Program (HREP) has enlisted the assistance of Cornell to provide the necessary spatial analysis and presentation of the results required to support the completion of the tasks identified by HREP.

Several key biodiversity projects were completed by researchers at Cornell and the data and data products generated by these projects are stored and managed by Cornell IRIS. In support of the continuing working relationship between Cornell University and the DEC Hudson River Estuary Program, the staff of the Institute for Resource Information Sciences (IRIS) is available to support the activities of the Biodiversity Project coordinators with access to data products and to information about use of biodiversity information in a GIS framework. Support may include hardcopy map preparation, digital data set compilation, individual GIS training and/or assistance, and workshops. The specific items are being identified by the Biodiversity Outreach Coordinator and the Biodiversity Project Coordinator.

For the current reporting period, IRIS 1) assisted in developing a riparian land cover assessment research proposal, and 2) offered two workshops in June and July for 23 NYS-DEC staff and NGO volunteers. Subject matter covered in the workshops included: discussion of software/hardware requirements for handling spatially explicit data, manipulation of spatial data in a GIS format, and accuracy assessment procedures for land cover/land use data.

## **Hudson River Estuary Biodiversity and Terrestrial Habitat Program**

Investigators: Leslie Zucker, Laura Heady, Karen Strong, Ted Kerpez and Fran Dunwell (Cornell)  
Milo Richmond (NYCFWRU)

Funding: New York State Department of Environmental Conservation, Hudson River Estuary Program  
New York Cooperative Fish and Wildlife Research Unit

Expected Completion: March 2010 (Transferred to Pat Sullivan)

The Hudson River Estuary Biodiversity Program is a major initiative of the New York State Department of Environmental Conservation (NYSDEC) Hudson River Estuary Program. This program is working to protect, restore, and enhance the productivity and diversity of the estuary's natural resources. The New York Cooperative Fish and Wildlife Research Unit has several ongoing projects supporting the Hudson River Biodiversity Program within five broad program areas: 1) biodiversity inventory and monitoring, 2) invasive species management, 3) contaminant burden studies on semi-aquatic mammals, 4) habitat assessment, and 5) outreach efforts to Hudson River Valley communities.

A Biodiversity Conservation Framework was developed that serves as a foundation for current and future conservation efforts. Over the past year, implementation of the Conservation Framework moved forward with the completion of several major projects, and the beginning of new projects that will continue to address the key threat of habitat loss and fragmentation, and new threats such as climate change.

A significant project with the NY Natural Heritage Program was completed to develop interpreted maps for local land-use decisionmakers that go beyond point occurrences of significant biodiversity elements. Custom models and computer programs were used to identify the "Important Areas" surrounding biodiversity element occurrences for all 10 counties of the Hudson Valley. Both hardcopy maps and GIS layers for "Important Areas" are now available to outreach staff for distribution to municipalities, counties, and local planning groups. A companion project to develop conservation guides for the species and communities found within Important Areas is nearly complete. Conservation guides can be viewed at [www.acris.nynhp.org](http://www.acris.nynhp.org). In addition, a partnership project with the NYSDEC Endangered Species Unit successfully converted Hudson Valley amphibian and reptile field observations recorded on paper for the NYS Herp Atlas to a GIS point location database. The GIS database is essential for local conservation of herps and has inspired plans to convert Herp Atlas records statewide.

Several new survey and research projects are moving forward with the NY Natural Heritage Program. The first is to develop efficient methods for targeting and survey of Heritage element occurrences in under-surveyed areas of the Hudson Valley. Heritage will use remote sensing to assess the habitat quality and predicted occurrences of rare animals, rare vascular plants, and significant natural communities within Orange and Ulster Counties. Field survey results will confirm predictions and help to refine models used to rank areas for further survey.

A second project developed by the Biodiversity Program and the NY Natural Heritage Program was awarded funding by the NY State Wildlife Grants program. The project will determine present-day habitat connectivity for focal taxa, and predict habitat connectivity for future climate scenarios. The analysis will identify priority landscape connectivity stepping-stones, key linkages, and key patches. A final report will identify and prioritize local and regional-scale wildlife habitat corridors. The project is planned for the next two years.

We completed a second year of field surveys to implement a Wildlife Habitat Monitoring Plan for the Hudson Valley. The monitoring program is assessing the status and distribution of wildlife communities and habitats on a continual basis, beginning with breeding birds and their habitats. In addition, the monitoring program coordinated with USGS to begin NAAMP surveys for freshwater wetland anurans next year. A concurrent research study is linking monitoring results for breeding birds to changes in land cover and land use patterns between 1985 and 2005 to better understand the regional threat of habitat fragmentation. The results will be used to alert policy makers and managers to changes that require action.

We continue to provide leadership and coordination of outreach and technical assistance to enhance biodiversity conservation in the HRV. This program is increasingly recognized within NYSDEC as a model conservation approach. Outreach efforts include regular contact with local governments interested in planning and managing for biodiversity conservation, and coordination with local land trust organizations. Since its inception in 2001, the outreach program has helped 66 Hudson Valley municipalities through technical assistance partnerships and grants. Outreach efforts focus on the transfer and interpretation of inventory and monitoring results in the forms of maps, presentations, databases, reports, and geographic information system (GIS) data layers. Two ongoing training programs include: a workshop on the use of spatial data in GIS format, and guidance to communities and private conservation organizations on how to conduct local biodiversity assessments using the Biodiversity Assessment Manual (the Manual became available in early 2002).

The outreach program has provided coordination, technical support, and funding for a number of regional conservation planning initiatives, including work with the Greene County Grassland Habitat Protection Program, and the Green Assets project of the Shawangunk Ridge Biodiversity Partnership (SRBP). Outreach staff partnered with the SRBP and the New York Planning Federation to develop and offer training to planning board members in towns and villages in Ulster County. The workshop, "Protecting Nature in Your Community: How to Use SEQRA to Conserve Habitat," was attended by over 20 participants representing town planning boards. The outreach program and Hudsonia Ltd. co-organized the 3<sup>rd</sup> annual Hudson River Estuary Biodiversity Conservation Roundtable, attended by over 25 past-year training graduates representing 11 municipalities in 6 counties, as well as members of watershed groups, conservation partners, and environmental consultants.

The biodiversity outreach program is developing several new directions. A Woodland Pool Conservation Program went through the initial scoping and briefing process, and is moving toward implementation. Outreach Coordinator Laura Heady is leading an effort to collect existing known location of woodland (vernal) pools and is coordinating the modeling, mapping,

and identification of conservation priorities on behalf of the Division of Fish, Wildlife and Marine Resources. An ongoing collaboration with Cornell Cooperative Extension to deliver biodiversity education in the Hudson Estuary region will compliment the Woodland Pool Program. In 2007, Cornell Extension completed two successful workshops to engage local landowners in woodland pool habitat conservation and train natural resource professionals that interact with landowners.

The outreach program is also developing a new conservation tool, the Local Government Conservation Handbook, written and edited by Outreach Coordinator Karen Strong. The Handbook will help communities identify and protect their natural areas and wildlife, using planning tools that emphasis smart growth to balance conservation with future development. The Handbook is in the final stages of production and should be released in 2008.

The Biodiversity and Terrestrial Habitat Project is conducted and managed by the principal investigators in concert with goals and objectives that are set by an advisory committee comprised of a wide range of professionals and stakeholders within the Hudson River Valley.

## **Hudson River Estuary Wildlife Monitoring**

Investigators: Amielle DeWan (Cornell)  
Milo Richmond (NYCFWRU)

Funding: New York State Department of Environmental Conservation, Hudson River Estuary Program  
Cornell University, Department of Natural Resources  
New York Cooperative Fish and Wildlife Research Unit

Expected Completion: March 2010 (Transferred to Pat Sullivan)

Human activities on the landscape are having a profound influence on biological systems. According to a new report by the National Wildlife Federation, the next 25 years of population growth in the United States could result in a loss of up to 60 percent of the remaining non-federal land in the nation's fastest growing large metropolitan areas. As the third most populous state in the country, New York's ecological communities will be particularly impacted by population growth and urbanization. Therefore, understanding and quantifying the influence of land-use change on birds has been a subject of increasing concern.

The New York Breeding Bird Atlas (BBA) is a volunteer-based, presence/absence survey that is conducted every twenty years, on 5km<sup>2</sup> blocks across the state. The atlas was created to provide baseline data for detecting possible changes in bird distributions over time, and to establish their distribution throughout the state. With the completion of the second BBA 20 years after the first BBA, we have a unique opportunity to explore how changes in land-use and anthropogenic disturbances have influenced the presence/absence of breeding birds in New York State. We developed and classified Thematic Mapper imagery for the two BBA time periods (1985/2005). We will use these data to model both the response of breeding birds to land-use for each time period, as well as identify those species that are particularly sensitive to both anthropogenic disturbance (road density, suburban/urban cover) as well as changes in habitat cover and configuration. In addition, we will evaluate patterns of species associations to identify those species that have potential value as surrogates of other co-occurring birds, or "indicator species". If successful, this work will allow us to identify: 1) a suite of sensitive avian indicators of land-use change, 2) determine a threshold level of disturbance where urban sensitive species are lost and urban tolerant species dominate, and 3) Identify areas in New York of greatest conservation need.

In a previous study, we explored how land-use changes are influencing breeding birds on a regional scale. However, local conservation organizations need finer-scale data to identify high quality habitats for birds. In the second part of our study, we used a stratified random sampling design, coupled with advances in modeling techniques, to create spatially explicit predictive maps of habitat occupancy for interior-forest birds. We were able to not only identify the deleterious effects of urbanization and fragmentation, but also distinguish areas that have a high predicted species richness of forest-interior birds. These models not only accounted for habitat area, but also important landscape patterns that influence the quality of remaining forest

fragments. Thus, our predictive maps can provide an important “first-cut” for prioritizing outreach and conservation planning in this urbanized region.

## **Cornell Cooperative Extension Biodiversity Program Work Team**

Investigators: Gary Goff, Kristi Sullivan, Marilyn Wyman, Leslie Zucker, Laura Heady, and Karen Strong (Cornell)  
Milo Richmond (NYCFWRU)

Funding: New York State Department of Environmental Conservation, Hudson River Estuary Program  
Cornell Cooperative Extension  
New York Cooperative Fish and Wildlife Research Unit

Expected Completion: March 2010 (Transferred to Pat Sullivan)

The Biodiversity Program Work Team (PWT) continued its successful funding and programming partnership with the Hudson River Estuary Program, coordinated by NYSDEC ([www.dec.state.ny.us/website/hudson/hrep.html](http://www.dec.state.ny.us/website/hudson/hrep.html)). As a member of the Terrestrial Biodiversity Sub-committee, the PWT works directly with the Biodiversity Outreach and Technical Assistance Program. Our PWT's program objectives are to develop and deliver educational programs for private landowners, land managers, land trust personnel, and natural resource professionals in the Hudson River Valley. To accomplish this, we rely on participation of the 10 Cornell Cooperative Extension County Associations, partner agencies (NYS DEC, Town planning boards, County EMCs, Town CACs), organizations (Land Trusts), and private industry (timber, private environmental consultants) in the Hudson River Valley.

### **2007 Program Year Report for HREP Funding**

#### *Woodland Pool Workshops*

The PWT co-sponsored two workshops on vernal pool conservation and management. The first, targeting landowners, land managers, and educators, was held in Dutchess Co. on March 31, 2007. Topics included: recognizing vernal pools and their value to wildlife, recognizing some of the animals that depend on them, protecting and enhancing pools, learning GPS basics, and becoming a certified Woodland Pool Steward. Seventy-five people attended that workshop, representing a collective total of nearly 14,000 acres with 140 known vernal pools. The attendees indicated that they planned to visit 119 owners and hoped to document 123 vernal pools, as part of their woodland pool steward commitment. Only two attendees have followed through with reporting visits at this time. In an effort to bolster the activity and reporting rate, we will be expanding the field training portion of the workshops scheduled for 2008.

The second workshop was for foresters, loggers, and other natural resources professionals and was held in Greene Co. on April 16, 2007. Continuing education credits were approved for the 40 attendees. The focus of that workshop was to learn about the value of vernal pools for wildlife and Forestry Best Management Practices (BMPs) to protect the pools. Forty people attended that workshop, representing nearly 210,000 acres. Those professionals on average reported interacting with nearly 550 forest owners annually.

Attendees from both workshops evaluated the workshop content and delivery very highly (rated a 4.5 on a 5-pt. scale) and reported that they learned a lot about the value of vernal pools to forest ecosystems and will use the information to improve their management of forests that harbor woodland pools.

Plans for 2008 include hosting another woodland pool workshop for landowners, in Orange County, followed by a half-day field exercise where attendees can practice skills necessary to enable them to be more responsive woodland pool stewards. We will also host a workshop for planners and developers in Greene County. In addition, we will survey foresters who participated in last year's workshop to find out how many incorporated woodland pool protection into stewardship plans they wrote for landowners.

### **2008 Program Year Report for HREP Funding**

#### *Woodland Pool Workshops*

The PWT co-sponsored two workshops and a field-based “woodland pool blitz” to advance woodland pool conservation and management efforts in the region. The first, entitled “Water, Woods, and Wildlife”, targeted landowners, land managers, county EMC members and town CAC members, and was held in Orange County on April 5, 2008. Topics included: recognizing vernal pools and their value to wildlife, recognizing some of the animals that depend on them, protecting and enhancing pools, learning GPS basics, and becoming a certified Woodland Pool Steward. Twenty people from three different counties attended the workshop, representing a collective total of nearly 941 acres with 27 known vernal pools. The attendees indicated that they planned to visit and collect data on 52 parcels of land, totaling 3,493 acres and an estimated 55 woodland pools. Overall, participants’ knowledge of the ecology and management of woodland pools increased from an average of 2.35 (out of 5) to 3.45 as a result of the workshop. Attendees also rated their ability to determine some specific activities that they can take to protect woodland pools as 3.83 (out of 5) following the workshop.

The second workshop, held in cooperation with Greene County Cooperative Extension, was held on May 5, 2008, at the Agroforestry Resource Center. This workshop was designed to aid planners, environmental consultants, and developers in designing residential and commercial developments that minimize disturbance to vernal pools. Participants learned how to recognize vernal pool habitats, assess the quality of individual pools, and incorporate specific design features and pre- and post-construction activities that minimize impacts to vernal pool habitats and associated wildlife. Incorporating these features into developments can minimize impacts to wildlife and serve as an eco-friendly marketing tool for businesses. Fifteen people participated in the workshop which included topics like recognizing woodland pools, understanding the life history of animals that depend upon them, assessing the quality of individual pools, specific planning and design considerations for incorporation into development plans, a hands-on “subdivision design activity”, and a field trip to visit nearby woodland pools. The participants reported that, as a result of attending the workshop, their knowledge of the ecology and management of woodland pools increased on average from 2.73 to 3.36 (out of 5). The program led to a moderate improvement (3.29 out of 5) in participants’ ability to recognize and appreciate

the value of woodland pools, a moderate change (3.21) in their knowledge of the status of woodland pools and related amphibians and reptiles, and a moderate increase (3.5) in their ability to determine specific activities that can be taken to protect woodland pools and wildlife that depend on them. Those attending also reported being better prepared (3.5 of 5) to more effectively and efficiently incorporate appropriate management suggestions and activities to protect woodland pools and the wildlife that depend on them. Fourteen of 15 people said that they would manage, plan, or make stewardship suggestions regarding construction and development projects and woodland pools differently because of attending this program.

### *Woodland Pool Blitz*

In cooperation with Orange County Cooperative Extension, we organized and conducted a “woodland pool blitz”. Individuals who participated in the 2007 or 2008 “Water, Woods and Wildlife” workshops were invited to join this event to document woodland pool locations at Highland Lakes State Park. Following an overview of how to locate and document woodland pools via the Woodland Pools Steward protocol, participants were grouped into three teams and each team surveyed a different portion of Highland Lakes State Park. The teams located pools, recorded the GPS location of the pools, and documented species information and pool characteristics. Following the field event, teams worked together to map the data they collected and share information and experiences. In all, 15 participants documented and described 7 wetlands and seasonal woodland pools and the species using them. Species found included the spotted salamander, wood frog, four-toed salamander, eastern newt, fairy shrimp, spring peeper, spotted turtle, and a water strider. As of 6 months after the blitz, 3 participants had reported approximately 22 additional pools in the Hudson Valley Region.

### *Woodland Pool Stewardship Follow-Up Survey for Foresters*

We conducted a follow-up survey of the 40 people who attended the “Best Management Practices for Woodland Pools” 2007 workshop in Greene County. Our intent was to find out how participants had used the information gained through the workshop during their day to day work in the year following the event. In all, a total of 10 respondents reported that they had encountered 69 pools during the year (Table 1). Collectively, these individuals wrote 82 stewardship or management plans, and 9% of those plans included prescriptions to protect woodland pools. In all, 17 pools were included in the plans that were written. The plans included recommendations to leave buffers, extend light harvest areas, avoid draining or filling, avoid disturbance, maintain existing hydrology and water quality, and leave woody material on the forest floor. One participant who encountered a great deal of pools and writes many plans annually, reported that filling out the survey made him think about the topic more and that he will be more sensitive to these issues on the ground in the future. Another participant noted that, because of the workshop, she was able to connect with the U. S. Fish and Wildlife Service, who had since installed two vernal pools on her property. Others noted that they had been able to influence their local planning board or educate others as a result of the new knowledge they had gained.

*CCE County Association Biodiversity Programming Survey*

We conducted an email survey of educators from Cornell Cooperative Extension Associations in the 10 counties of the Hudson Valley. The purpose of the survey was to ascertain the interest in biodiversity programs by new and existing educators. We received responses from two educators in Rennsalaer and Rockland counties, neither of whom we had worked with previously on biodiversity issues.

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Sousa, C. M., R. A. Malecki, A. J. Lembo Jr., and L. J. Hindman. 2008. Monitoring Habitat Use by Male Mute Swans in the Chesapeake Bay. Proc. Annu. Conf. S.E. Assoc. Fish & Wildlife Agencies 62: 8-93.

### **Technical and Semi-Technical Papers**

Clarke, K., Swift, B., and Cooper, E. 2007. Status and Ecology of Mute Swans in New York State. Final Report. New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources and Bureau of Wildlife

Heady, L. 2007. Local Conservation Strategies for Hudson Valley Communities: How a Conservation Advisory Council Becomes a Board. (3-page pamphlet; now featured on NYS Association of Conservation Commissions' website <http://www.nysaccny.org/>)

McGowan, K.J. 2007. Digiscoping revisited. Living Bird 26(2): 24-31.

McGowan, K.J. 2007. Regional summaries of the 107<sup>th</sup> Christmas Bird Count: New York. American Birds 61: 57-59.

McGowan, K.J. 2007. In Memoriam: Kenneth Carroll Parkes. Living Bird 26(4): 6.

Roberts, N. M. 2008. Bobcat distribution, population status, and monitoring in the United States. Association of Fish and Wildlife Agencies CITES Working Group. Washington, D.C.

Shwiff, S. A., K. N. Kirkpatrick, T. L. DeVault, A. J. VanDeValk, J. T. H. Coleman, and J. R. J. Jackson. 2008. Methodology to quantify the economic impact of the double-crested cormorant (*Phalacrocorax auritus*) to the Oneida Lake Region, New York. Proceedings of the Twenty-Third Vertebrate Pest Conference, March 2008. The University of California, Davis, CA.

Smith, C.R. 2007. Book review: Guide to the Plant Communities of the Central Finger Lakes Region. Cornell Plantations Magazine 62(1):24-25.

Smith, C.R., D. de Alwis, S.D. DeGloria, and M.E. Richmond. 2008. Improving Resolution and Accuracy of Vegetation Classification to Refine Habitat Characteristics Associated with Distributions and Abundances of Breeding Birds: A Science-based Approach to Informing Bird Conservation Policy. Final Report, NY Cooperative Fish and Wildlife Research Unit, Cornell University, Ithaca, NY. 100 pp.

Vispo, C. and C. Knab-Vispo. 2007. Ponds of Columbia County: Patterns in their Biodiversity, Thoughts on their Management. Farmscape Ecology Report. 64pp.

Vispo, C. and C. Knab-Vispo. 2007. Ecological Habitat Map for Art Omi. (Work commissioned to map and describe basic cover types of this public sculpture park.)

### **Papers Presented**

Boisvert, B., Ernst, A.G., and Baldigo, B.P. 2008. Using thermal remote sensing to quantify thermal refuge for trout in a regulated river. New York Chapter American Fisheries Society Annual Meeting, February 6-8, 2008, West Henrietta, NY

Boisvert B.A., Baldigo, B.P., and Ernst, A.G. 2008. Effects of recreational-flow releases on thermal refuges and their use by brown trout in two Adirondack rivers of northern New York, USA. American Fisheries Society 138<sup>th</sup> Annual Meeting, August, 17-21, 2008. Ottawa, Canada.

Boisvert, B.A., C.E. Kraft, and B.P. Baldigo. 2008. Effects of recreational flow releases on brown trout. 64<sup>th</sup> Annual Northeast Fish and Wildlife Conference, April 27-30, 2008. Atlantic City, NJ.

Boisvert B.A., Baldigo, B.P. and Ernst, A.G. 2008. The use remote imaging to quantify thermal refuges and the effects of recreational releases on trout thermoregulation in the Indian and Hudson Rivers. U.S. Geological Survey and Cornell University Adirondack Research Forum, March 5-6, 2008, Old Forge, NY.

Coleman, J.T.H., L.G. Rudstam, M.E. Richmond, J.R. Jackson, A.J. VanDeValk, R.B. Chipman, and B.J. Irwin. May 2007. If you build it, will they come back? - the response of walleye and yellow perch populations to cormorant management on Oneida Lake, New York. 50<sup>th</sup> Annual Conference of the International Association for Great Lakes Research. State College, Pennsylvania.

Coleman, J.T.H., M.E. Richmond, L.G. Rudstam, and H. Mills. May 2007. Diving behavior and foraging effort of Double-crested Cormorants at three New York colonies. 50<sup>th</sup> Annual Conference of the International Association for Great Lakes Research. State College, Pennsylvania.

Coleman, J.T.H., J. Pawlicki, and M.E. Richmond. October 16, 2007. Oneida Lake, NY – observations 2006. Great Lakes Area Working Group for Colonial Waterbirds. Mallorytown, Ontario.

Malecki, R.A. and S.Sheaffer. July 2007. Management of Atlantic Population Canada geese: Cause for concern. Atlantic Flyway Waterfowl Council and Technical Section meeting, Portsmouth, New Hampshire.

McGowan, K.J. and K. Corwin. August 2007. Results from the Second New Breeding Bird Atlas. American Ornithologists' Union Annual Meeting, Laramie, WY.

Roberts, N. M. November 10, 2008. Trapping in the 21<sup>st</sup> Century, Organized symposium at The Wildlife Society conference, Miami, FL.

Roberts, N. M. November 2008. The role of trapping in wildlife reintroductions. Annual Wildlife Society Conference, Miami, FL.

Sousa, C. M., R. A. Malecki, A. J. Lembo, Jr., and Hindman, L.J. October 23, 2007. Monitoring Habitat Use by Mute Swans with GPS Satellite Telemetry. Southeastern Association of Fish and Wildlife Agencies Wildlife Technical Sessions, Corpus Christi, TX.

### **Posters Presented**

Boisvert, B., Baldigo, B., and Ernst, A.G. 2008. Impacts of recreational flow releases on thermal refuges and their use by brown trout." Poster at American Fisheries Society Annual Meeting. Ottawa, Canada

Coleman, J. T. H., C. M. Adams, M. Kandel, and M. E. Richmond. May, 2007. Eating the invaders: the prevalence of round goby in the diet of Double-crested Cormorants in the Niagara River. 50th Annual Conference of the International Association for Great Lakes Research. State College, Pennsylvania.

Coleman, J. T. H., M. E. Richmond, L. G. Rudstam, and H. Mills. November, 2008. Double-crested Cormorant diving behavior and foraging effort at three New York colonies. 32<sup>nd</sup> Annual Meeting of the Waterbird Society. South Padre Island, Texas.

Corwin, K. and K.J. McGowin. October, 2007. The Second Atlas of Breeding Birds in New York State: 2000-2005. New York State Ornithological Association Annual Meeting. Batavia, NY.

Duerr, A.E., and J. T. H. Coleman. May, 2007. Morphometrics and sex differentiation of Double-crested Cormorants from the Lower Great Lakes region. 50th Annual Conference of the International Association for Great Lakes Research. State College, Pennsylvania.

Peterson, M.C., G.R. Robinson, C.R. Smith, and M. Calef. August, 2007. Twenty-year Trends in Avian Biodiversity in the Hudson River Valley Ecozone, Annual Meeting of the Ecological Society of America, San Jose, California.

Wegan, Michael T. April 2007. A comparison of occupancy model and mark-recapture abundance estimates for black bears on Fort Drum Military Installation, N.Y. Eastern Black Bear Workshop.

## **Thesis and Dissertations**

Boisvert, B. 2008. The effect of pulsed discharge events on thermal refugia use by brown trout in thermally marginal streams. Masters Thesis. Cornell University, Ithaca, NY. 93 pp. [C. E. Kraft student]

Coleman, J. T. H. January 2009. Diving behavior, predator-prey dynamics, and management efficacy of Double-crested Cormorants in New York State. Dissertation. Cornell University, Ithaca, NY. 204 pp. [M.E. Richmond student]

DeWan, Amielle A. 2008. Monitoring biodiversity in our urban world: Challenges, threats, and a plan for the future. Dissertation. Cornell University, Ithaca, NY. 134 pp. [M. E. Richmond student]

Mobley, Renata Santoro de Sousa Lima. 2007. Acoustic Ecology of Humpback Whales (*Megaptera Novaeangliae*) in the Abrolhos National Marine Park, Brazil. 179 pp. [M.E. Richmond student]

Wegan, Michael. 2008. Aversive conditioning, population estimation, and habitat preference of black bears (*Ursus Americanus*) on Fort Drum military installation in Northern New York. M.S. Thesis, Dept. of Natural Resources, Cornell University, Ithaca, NY. [P. Curtis student]

## **Undergraduate Honors Thesis Program**

Grummer, Jared. 2007. Why do eggs of the second clutch following a late-season flooding event weigh significantly less than the eggs of a first clutch in the common tern (*Sterna hirundo*)? A multi-hypothesis approach. Honors Thesis Presented to the College of Agriculture and Life Sciences, Ecology & Evolutionary Biology of Cornell University In Partial Fulfillment of the Requirements for the Research Honors Program. 35 pp. [M.E. Richmond student]

## **Workshops/Short Courses Organized or Attended**

Heady, L. 2007. Introduction to the Hudson River Estuary Program. Hudsonia Biodiversity Assessment Short Course, Millbrook, NY. May 24. (16 in attendance)

Heady, L. 2007. Introduction to the Hudson River Estuary Program. Hudsonia Biodiversity Assessment Short Course, Millbrook, NY. Aug. 9. (16 in attendance)

Heady, L. 2007. Biodiversity Conservation and Local Planning. Protecting Nature in Your Community: How to use SEQR to Conserve Habitat. Training for Planning Boards in Ulster County, New Paltz, NY. Nov. 17. (20 in attendance)

Richmond, M.E. 2007. Participated in one-day, team taught, safety and security workshop addressing a variety of Aquatic and field safety issues at the Cornell Biological Field Station. June. (16 in attendance)

Roberts, Nathan M. 2007. "Training the Trainer" Workshop for trapper education instructors from New York and Connecticut. Demonstration of Best Management Practices techniques for trapping furbearers with foothold traps. Warrenburg, NY. June.

Roberts, Nathan M. 2007. "Wild Canines of New York". Presentation to 4-H members. Ithaca, NY. May. (approx. 30 in attendance)

Roberts, Nathan M. 2007. "Furry New York". This presentation described the furbearers of New York to school-aged children and provided a variety of hands-on activities involving tracks, pelts, and skulls. Sciencenter. Ithaca, NY. May 5. (approx. 30 in attendance)

Roberts, N.M. 2007. Organized and facilitated a symposium entitled "Furbearer Management" at the annual Wildlife Society meeting. Tucson, AZ September.

Roberts, N.M. 2007. Attended North American Fish and Wildlife Conference in Portland, OR: Met with AFWA International Affairs Committee to discuss international fur trade issues.

Roberts, N. M. 2008. "Why are you asking me that?" *The Trapper and Predator Caller* magazine.

Roberts, N. M. 2008. Instructed 'Trapping Matters' Workshop at the Wildlife Society Conference in Miami, Florida. This is a workshop that instructs professionals on the basics of furbearer management and communicating with the public about controversial issues. (15 in attendance)

Roberts, N. M. 2008. Presented 'From Fins to Feathers to Fur: Adaptive Harvest Management for Furbearers' at the annual meeting of the Northeast Fur Resources Technical Committee. Adirondack Ecological Center, New York. September 24.

Roberts, N. M. 2008. Conducted furbearer necropsy demonstrations for the Wisconsin Department of Natural Resources, Madison, WI. (35-40 participants)

Smith, C.R. 2007. Texas West of the Pecos (Davis Mountains State Park and Big Bend National Park), Cornell Adult University Study Tour, May 19-25. (25 participants)

Smith, C.R. 2007. On Keeping a Field Notebook, Cornell Plantations Workshop for Summer Interns, June 4. (15 attendees)

Smith, C.R. 2007. Talk to Master Forest Owners (Cornell Cooperative Extension), Attracting Wild Birds with Food and Water – Keeping It Simple and Safe, Arnot Teaching and Research Forest, September 22. (15 attendees)

Smith, C. R. 2008. "Attracting Wild Birds with Food and Water – the KISS Approach," Cornell Cooperative Extension Master Forest Owners Program, Arnot Forest, September 18. (25 participants)

Vispo, C. and C.Knab-Vispo. 2007. Twelve public walks detailing various aspects of county ecology. One series on winter ecology, and another on Spring flora. (total attendance of roughly 50 people, average group size around 8)

### **Public Lectures, Seminars, and Class Lectures**

Breisch, K.L. 2007. Spring Amphibian Walk for the Albany Pine Bush Commission Discovery Center. April 14. (approx. 10 attending)

Coleman, J.T.H. 2007. Out of sight but not out of mind: foraging and diving behavior of cormorants in New York. Cornell University Biological Field Station Summer Seminar. Bridgeport, NY. July 19. (approx. 25 attending)

Coleman, J.T.H. 2007. Colonial waterbird populations and research on Oneida Lake. Public presentation for the Cornell University Biological Field Station Open House. July 16.

Corwin, K. 2007. NYS Breeding Bird Atlas. Paul Smiths College. April 6. (25 students)

Corwin, K. 2007. NYS Breeding Bird Atlas. High Peaks Audubon Society. April 7. (approx. 12 in attendance)

Corwin, K. 2007. The Second Atlas of Breeding Birds in New York State. Meeting of the Audubon Society of the Capital District. October 11. (10 attending)

Corwin, K. 2007. The Second Atlas of Breeding Birds in New York State. Rockland County Community College. November 1. (60 attending)

Corwin, K. 2007. The Second Atlas Breeding Birds in New York State. Meeting of the Nature Club Central New York. December 9. (20 attending)

Corwin, K. 2008. All lectures listed below were titled, "New York's Second Breeding Bird Atlas: 20 years of change."

February 15<sup>th</sup> : Delaware – Otsego Audubon Society, Oneonta (15 people)

February 26<sup>th</sup> : Linnaean Society meeting, New York City (40 people)

March 12<sup>th</sup> : North Country Bird Club meeting, Watertown (15 people)

October 15<sup>th</sup> : Onondaga Audubon Society, Baldwinsville (18 people)

October 16<sup>th</sup> : Great South Bay Audubon Society, Oakdale (40 people)

October 18<sup>th</sup> : St. Lawrence Conference on the Environment, Potsdam (40 people)

October 23<sup>rd</sup> : Catskill Environment Day, Belleayre Mountain (120 people)

October 28<sup>th</sup> : North Shore Audubon Society, Manhasset (30 people)

November 3<sup>rd</sup> : Eastern Long Island Audubon, Quogue (25 people)

November 7<sup>th</sup> : Rockland Audubon Society, Congers (35 people)

November 17<sup>th</sup> : Lake Erie Bird Club, Fredonia (40 people)

Dewan, A.A. and M.E. Richmond. 2007. "Are two heads better than one? The costs and benefits of using multiple-observer surveys for monitoring birds". Presentation: 63<sup>rd</sup> Annual Northeast Fish and Wildlife Conference, Mystic, CT. April.

DeWan, A. A. 2008. Monitoring biodiversity in our urban world: challenges, threats, and a plan for the future systems. Department of Natural Resources, Cornell University. April 29.

Heady, L., L. Zucker, and Ken Grieser. 2007. Habitat and Wildlife of the Rondout Creek Watershed. Roundout Creek Watershed Council Watershed Training, Stone Ridge, NY. May 18. (40 attending)

Heady, L. 2007. Biodiversity Conservation and Open Space Planning. Town of Saugerties CAC Meeting, Saugerties, NY. June 21. (8 attending)

Heady, L., and C.Bowser. 2007. The Mouth of the Moodna. Orange County Water Authority's Moodna Creek Paddle, New Windsor, NY. Aug. 9. (25 attended)

Heady, L. 2007. Woodland Pool Conservation Program. Hudson River Estuary Program Biodiversity Committee, Albany, NY. Nov. 29. (20 attended)

Heady, L. 2007. Update on Biodiversity Outreach Program. Hudson River Estuary Program Biodiversity Committee, Albany, NY. Nov. 29. (20 attended)

Heady, L. 2007. Woodland Pool Conservation Program. NYDEC Executive Staff Briefing, Albany, NY. Dec. 19. (20 attended)

Heady, L. 2008. Woodland Pool Conservation Program. New York Vernal Pool Working Group, Albany, NY. January 17. (30 attended)

Heady, L. 2008. Introduction to the Hudson River Estuary Program. Hudsonia Biodiversity Assessment Training Workshop #1, New Paltz, NY. January 26. (10 attended)

Heady, L. 2008. Introduction to the Hudson River Estuary Program. Hudsonia Biodiversity Assessment Training Workshop #1, Hyde Park, NY. February 2. (10 attended)

Heady, L. 2008. Recognizing Vernal Pools. CCE Woodland Pool Workshop, Middletown, NY. April 5.

Heady, L. 2008. Biodiversity Conservation and Local Planning. Pace Land Use Leadership Alliance Training, Newburgh, NY. April 18. (35 attended)

Heady, L. 2008. Tools for Protecting Nature in Your Community. Hudson Alley Smart Growth Conference "Planning for Biodiversity: Strategies for Developers and Municipalities," Marist College, Poughkeepsie, NY. April 29. (150 attended)

McGowan, K.J. 2007. The Uncommon Crow: the hidden life of a familiar bird. Crowfest Terre Haute, Indiana State University, Terre Haute, IN. January. (100 attending)

McGowan, K.J. 2007. The Natural History and Behavior of American Crows. Southern Finger Lakes Forest Owner Winter Seminar, Spencer, NY. February. (50 attending)

McGowan, K.J. 2007. Bird nests and eggs. Spring Field Ornithology, Cornell Lab of Ornithology, Ithaca, NY. May. (80 attending)

Pawlicki, James. 2007. Nesting success and population monitoring of Common Terns on Oneida Lake. Cornell Biological Field Station Summer Seminar Series. Bridgeport, NY. August 9.

Richmond, M.E. 2007. A synopsis of success or failure of the Nature Conservancy in establishing targets and addressing threats to valued resources in the Lower Hudson River Valley. TNC Planning and Action Committee Meeting, Norrie Point, NY. September

Richmond, M.E. 2007. Field demonstration and lecture on types and use of capture equipment for wildlife field studies. October. (45 students)

Roberts, N.M. 2007. Warrensburg, New York: “*Training the Trainer*” workshop for trapper education instructors from New York and Connecticut. Demonstration of Best Management Practices techniques for trapping furbearers with foothold traps. June.

Roberts, N.M. 2007. -May, 2007: Ithaca, New York: Presentation to 4-H members. “*Wild Canines of New York*”. May. (~ 30 in attendance)

Roberts, N.M. 2007. -May, 2007: Ithaca, New York: Presentation at the Ithaca Science Center. “*Furry New York*”. This presentation was described the furbearers of New York to school-aged children and provided a variety of hands-on activities involving tracks, pelts, and skulls. May. (~ 30 in attendance)

Roberts, N.M. 2007. Ithaca, New York. Guest lecture at Cornell University. “*Ethics of the Consumptive use of Wildlife.*” February. (~ 50 students)

Roberts, N.M. 2007. Minnowbrook, New York. “*You Don’t Have to See It to Believe It? Occupancy modeling and imperfect detection probability; application for elusive furbearers.*” February. (~ 15 biologist)

Roberts, N. M. 2008. Madison, WI. Invited lectures to the Wisconsin Department of Natural Resources and Great Lakes Indian Fish and Wildlife Commission. Adaptive Harvest Management for Furbearers and The Ethics of the Consumptive Use of Wildlife.

Roberts, N. M. 2008. Syracuse, New York. Presented at the New York State Farm Show. Wild Canines of New York. April.

Smith, C.R. 2007. Birds of the Mundy Wildflower Garden, Cornell Plantations Lecture, March 22. (15 attendees)

Smith, C.R. 2007. Field Trip: The Natural and Cultural History of Beebe Lake, Cornell Plantations, April 19. (20 attendees)

Smith, C.R. 2007. Field Ornithology Course, Cornell Adult University, July 9-13. (12 attendees)

Smith, C.R. 2007. Field Trip: Natural and Cultural History of Beebe Lake, Cornell Adult University, July, 19. (20 attendees)

Smith, C.R. 2007. Field Trip: Natural and Cultural History of Beebe Lake, Cornell Adult University, July 26. (15 attendees)

Smith, C.R. 2007. Field Trip: Natural and Cultural History of Beebe Lake, Cornell Adult University, August 2. (12 attendees)

Smith, C.R. 2007. Field Trip: Don't Forget the Little Critters: An Introduction to Dragonflies, Damselflies, and Butterflies, Cornell Plantations, September 22. (10 attendees)

Smith, C.R. 2007. 12 Class Lectures for Introductory Field Biology (Natural Resources 210), Fall. 25 students (lecture topics and outlines available upon request)

Smith, C. R. 2008. "Gap Analysis: A Method for Inventorying Biodiversity for conservation Planning," Entomology 3440 (Insect Conservation), Cornell University, February 14. (20 students)

Smith, C. R. 2008. "Ding Darling and the American Conservation Movement," Cornell's Adult University, February 26. (30 participants)

Smith, C. R. 2008. "Wading Bird Ecology" Cornell's Adult University, February 27. (30 participants)

Smith, C. R. 2008. "Keeping Field Notes and the Naturalist's Field Journal," Cornell Plantations Interns, June 2. (15 participants)

Smith, C. R. 2008. "Using Taxonomic Keys and Field Guides," Cornell's Adult University, July 7. (15 participants)

Smith, C. R. 2008. "Identification Techniques for Trees and Wildflowers," Cornell's Adult University, July 7. (15 participants)

Smith, C. R. 2008. "Attracting Wild Birds with Food and Water," Cornell's Adult University, July 8. (15 participants)

Smith, C. R. 2008. "Royalty Among Butterflies: The Magnificent Monarch," Cornell's Adult University, October 11. (35 participants)

Strong, K. 2007. Natural Resource Inventories. Sustainable Development Conference. Schenectady, NY. February 2. (25 attending)

Strong, K. 2007. Regional Biodiversity Planning and Conservation. Capital District Planners Association. Troy, NY. March 21. (12 attending)

Strong, K. 2007. Involving Local Communities in Conservation: The Hudson River Valley Experience. NYS DEC 2007 Bureau of Wildlife Annual Meeting. Hamilton, NY. March 28. (130 attending)

Strong, K. 2007. Working with Municipalities to protect NY's Species of Greatest Conservation Need. NYS DEC State Wildlife Grants Kickoff meeting for the Delaware Watershed. Livingston Manor. June 11. (34 attending)

Strong, K. 2007. Using the Comprehensive Plan to Balance Development and Natural Areas. Session of Best Practices in Comprehensive Planning. NY Planning Federation Annual Conference. Saratoga Springs, NY. October. (60 attending)

Wang, S. 2008. Understanding ecological relationships between tigers, ungulates and farmers: Resolving human wildlife conflicts in Bhutan's Jigme Singye Wangchuck National Park. Department of Natural Resources, Cornell University. April 15.

Wegan, Michael T. 2007. Insights from the Fort Drum Bear Project: Population, Estimation, Habitat Preference, and Aversive Conditioning. Department of Natural Resources. April 24.

Vispo, C. and C.Knab-Vispo. 2007. Openland Ponds of Columbia County: Their Biodiversity and Management. Institute of Ecosystem Studies. June. (15 attending)