

# NEW YORK COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT



2011

Annual Report

The New York Cooperative Fish and Wildlife Research Unit is embarking on a new era. Our staff is growing and research is expanding into new areas. We continue forming new relationships with our cooperators and planning research to address natural resource issues in New York State and beyond.

Front cover photo: Assistant Unit Leader, Mitch Eaton, with an African dwarf crocodile.  
(Photo: J. Thorbjarnarson)

# New York Cooperative Fish and Wildlife Research Unit

2011 ANNUAL REPORT

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Cooperators:

U. S. Geological Survey  
Cornell University  
New York State Department of Environmental Conservation  
U. S. Fish and Wildlife Service  
Wildlife Management Institute

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## INTRODUCTION

The Cooperative Research Units (CRU) program was established in 1935 as a cooperative partnership between the Federal and State biological resource agencies and Land Grant universities to conduct research on managing wildlife populations and habitats, train wildlife managers, and disseminate information to management agencies. Seventy-five years later, the mission of the program remains unchanged. Now with 40 Units in 38 states, the CRU program employs over 100 scientists that conduct research on natural resource issues of importance to State and Federal agencies and other organizations, teach graduate-level courses at their host universities, and conduct workshops and short courses for their cooperators and other partners. Over the past five years, 564 Coop Unit students have graduated from their host institutions, and together with Unit scientists and postdocs, they have produced 1845 peer-reviewed publications and made 3465 presentations at scientific meetings.

The New York Cooperative Fish and Wildlife Research Unit was established in 1961 under the leadership of Dr. Daniel Thompson. Originally established as a separate wildlife unit, the fishery unit was added in 1963 and led by Dr. Alfred Eipper. In 1984, the units were combined and led thereafter by Dr. Milo Richmond. Over its 50-year history, the New York Coop Unit has had five wildlife scientists and seven fishery scientists who have conducted research on a diversity of natural resource issues ranging most recently from assessing vertebrate biodiversity in New York State to evaluating immunocontraception of white-tailed deer to studying the ecology of Atlantic and shortnose sturgeon in the Hudson River.

We celebrated the 50<sup>th</sup> Anniversary of the New York Coop Unit in 2011. On July 28 and 29, 2011, current and former Unit students, leaders, and state, federal and university cooperators and their families came to the Cornell campus and Ithaca to help celebrate our anniversary. Our annual Coordinating Committee meeting was held on July 28 with a business session in the morning and student project presentations in the evening. The celebration continued on July 29 with a 50<sup>th</sup> anniversary program in the morning and picnic in the afternoon. The theme of the morning program was “The Unit: Past, Present, and Future”. A total of 53 people attended the anniversary celebrations over the two days. It was a privilege to interact with so many former and current Unit students, staff members, collaborators and friends.

The New York Coop Unit has undergone a complete change in personnel. Dr. William Fisher assumed the Unit Leader position in 2008 after serving nearly 18 years as Assistant Unit Leader-Fisheries for the Oklahoma Cooperative Fish and Wildlife Research Unit. In 2009, Dr. Angela Fuller became the new Assistant Unit Leader-Wildlife, coming to CRU and the New York Coop Unit from the University of Maine where she was a postdoc studying the effects of forest fragmentation on mammals. In 2011, Dr. Mitchell Eaton was hired to fill the third position as Assistant Unit Leader-Ecology. Mitch came to the New York Coop Unit from Patuxent Wildlife Research Center where he completed a three-year postdoc developing methods in and applying structured decision making and adaptive management to natural resource problems.

With our Unit fully staffed, we look forward to embarking on new research directions in cooperation with our partners at Cornell University, the New York State Department of Environmental Conservation, U. S. Geological Survey, U. S. Fish and Wildlife Service, Wildlife Management Institute, and other organizations. We see a bright future for the newly re-formed New York Coop Unit.

*The Scientists and Staff of the  
New York Cooperative Fish and Wildlife Research Unit*

## PROGRAM DIRECTION STATEMENT

*(NOTE: This statement was developed by the previous New York Coop Unit scientists and reflects their expertise, research directions, and accomplishments. A revised statement has been developed by the current Unit scientists and will be presented at the Unit's Coordinating Committee meeting in September 2012 for approval)*

The New York Cooperative Fish and Wildlife Research Unit, one of 40 in a national Cooperative Research 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 three primary cooperating agencies: Biological Resources Discipline of the U.S. Geological Survey, New York State Department of Environmental Conservation, and the New York State College of Agriculture and Life Sciences at Cornell University. Other cooperators include The Wildlife Management Institute, and the U.S. Fish and Wildlife Service. Designed to be 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 aquatic resources, wildlife and terrestrial/wetland resources, and fish and wildlife biodiversity assessment 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/universities, 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. Socioeconomic studies focus on the interplay of harbor management, navigation needs, and water levels. On the Hudson River, research focuses on ecosystem processes to 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. Additional attention to pressing fisheries management challenges is desired. Program themes in wildlife and terrestrial/wetland resources have addressed the ecology and management of continental populations of waterfowl, with emphasis on Canada geese, cormorants, common terns, tundra swans, mute swans, mallards, widgeon, and pintails. Studies were enhanced by telemetry using satellite-tracking technology that provided 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 wildlife resources throughout North America. Research included a focus on the ecology and management needs of other native species, such as snapping turtles and black bear. Inquiry includes

attention to studies of wildlife species that exceed population levels deemed acceptable or compatible with human activities, including developing feasible alternatives to conventional harvest practices for managing these abundant species. The Research Unit continues involvement in fish and wildlife biodiversity assessment and management, responding to concerns regarding wildlife populations that are habitat-limited or otherwise less viable. Research focuses on issues of maintaining or enhancing 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, 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 17, 2006 (Minor corrections made: June 15, 2010)

## COOPERATORS AND PERSONNEL

### COORDINATING COMMITTEE

#### **United States Geological Survey**

MIKE TOME, Eastern Supervisor, Cooperative Research Units, Leetown Science Center, 11649 Leetown Road, Kearneysville, WV 25430

#### **New York State Department of Environmental Conservation**

PATTY RIEXINGER, Director, Division of Fish, Wildlife, and Marine Resources, 625 Broadway, Albany, NY 12233

#### **Cornell University**

MARIANNE KRASNY, Chair, Department of Natural Resources, Bruckner Hall, Cornell University, Ithaca, NY 14853

MAX PFEFFER, Senior Associate Dean, College of Agriculture and Life Sciences, Roberts Hall, Cornell University, Ithaca, NY 14853

#### **United States Fish and Wildlife Service**

RICHARD O. BENNETT, Regional Scientist, U.S. Fish and Wildlife Service, Northeast Regional Office, 300 Westgate Center Dr., Hadley, MA 01035

DAVID STILWELL, Field Supervisor, U.S. Fish and Wildlife Service, New York Field Office, 3817 Luker Rd., Cortland, NY 13045

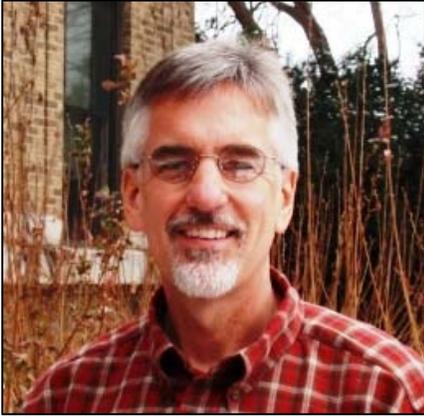
#### **Wildlife Management Institute**

SCOT WILLIAMSON, Northeast Regional Representative and Vice-President, Wildlife Management Institute, 69 Clinton Avenue, St. Johnsbury, VT 05819

## UNIT PERSONNEL

### Scientists

WILLIAM L. FISHER, Unit Leader-Fisheries, USGS, and Courtesy Associate Professor, Department of Natural Resources



ANGELA K. FULLER, Assistant Unit Leader-Wildlife, USGS, and Courtesy Assistant Professor, Department of Natural Resources



MITCHELL J. EATON, Assistant Unit Leader-Ecology, USGS, and Courtesy Assistant Professor, Department of Natural Resources



**Staff**

MELANIE MOSS & ELLEN HARRIS, Administrative Assistants

KIMBERLEY CORWIN, Research Support Specialist

**Postdoctoral Research Associates**

JASON TAYLOR, Department of Natural Resources



BÉNÉDICTE MADON, Department of Natural Resources



## COLLABORATORS

BARRY BALDIGO, U. S. Geological Survey, New York Water Science Center

GORDON BATCHELLER, New York State Department of Environmental Conservation

TOM BAUDANZA, New York City Department of Environmental Protection

DANIEL DECKER, Cornell University

MIKE FLAHERTY, New York State Department of Environmental Conservation

JIM DALEY, New York State Department of Environmental Conservation

MATTHEW HARE, Cornell University

RANDY JACKSON, Cornell University

KATHRYN JAHN, U.S. Fish and Wildlife Service

FRED HENSEN, New York State Department of Environmental Conservation

PHIL HULBERT, New York State Department of Environmental Conservation

JEREMY HURST, New York State Department of Environmental Conservation

CLIFFORD KRAFT, Cornell University

JEFF LOUKMAS, New York State Department of Environmental Conservation

SEAN MADDEN, New York State Department of Environmental Conservation

JOHN OZARD, New York State Department of Environmental Conservation

DANIEL ROSENBLATT, New York State Department of Environmental Conservation

J. ANDREW ROYLE, Patuxent Wildlife Research Center

LARS RUDSTAM, Cornell University

MARK WOYTHAL, New York State Department of Environmental Conservation

## GRADUATE EDUCATION

### CURRENT STUDENTS

MATTHEW ADAMS, M. S., Natural Resources,  
Wildlife Conservation (Advisor: Fuller)



TYLER J. ROSS, M. S., Natural Resources, Fishery and  
Aquatic Science (Advisor: Fisher)



CHRIS NADEAU, M. S., Natural Resources,  
Conservation Biology/Quantitative Ecology  
(Advisor: Fuller)



CATHERINE SUN, M. S., Natural Resources,  
Conservation Biology/Quantitative Ecology  
(Advisor: Fuller)



ALEX ALEXIADES, Ph.D., Natural Resources, Fishery  
and Aquatic Science (Advisor: Fisher)



CHRISTIAN PERRY, Ph.D., Natural Resources, Fishery and Aquatic Science (Advisor: Fisher)



MAYA WELTMAN-FAHS, Ph.D., Natural Resources, Fishery and Aquatic Science (Advisor: Fisher)



## RECENT GRADUATES

None.

## COURSES TAUGHT

Spatial Analysis and Modeling (January 25, 2011 - May 20, 2011; 3 hrs) – Fisher

Structured Decision Making for Natural Resource Management (January 27, 2011 - May 9, 2011; 2 hrs) – Fuller

Graduate Independent Study in Natural Resources (August 24, 2011 - December 16, 2011; 1 hrs) – Fisher

Individual Study in Applied Ecology and Conservation Biology (August 24, 2011 - December 16, 2011; 3 hrs) – Fisher

## RESEARCH – FISHERIES AND AQUATIC

### COMPLETED PROJECTS

#### **Biological Assessment of Environmental Flows for Oklahoma**

INVESTIGATORS: William Fisher (NYCFWRU)

STAFF: Jason Taylor, Postdoctoral Associate (NYCFWRU)  
Titus Seilheimer, former Postdoctoral Associate (currently USDA Forest Service)

SPONSORS: U. S. Geological Survey

STARTED: August 2009

COMPLETED: September 2011

Large-scale patterns in fish assemblage structure and functional groups are influenced by alterations in streamflow regime. In this study, we defined an objective threshold for alteration for Oklahoma streams using a combination of the expected range of 27 flow indices and a discriminant analysis to predict flow regime group. We found that fish functional groups in reference flow conditions had species that were more intolerant to flow alterations and preferences for stream habitat and faster flowing water. In contrast, altered sites had more tolerant species that preferred lentic habitat and slower water velocity. Ordination graphs of the presence and functional groups of species revealed an underlying geographical pattern roughly conforming to ecoregions, although there was separation between reference and altered sites within the larger geographical framework.

Additionally, we found that reservoir construction and operation significantly altered fish assemblages in two different systems, Bird Creek in central Oklahoma and the Kiamichi River in southeastern Oklahoma. The Bird Creek flow regime shifted from a historically intermittent stream to one with stable perennial flows, and changes in fish assemblage structure covaried with changes in all five components of the flow regime. In contrast, the Kiamichi River flow regime did not change significantly for most flow components despite shifts in fish assemblage structure; however, most of the species associated with shifts in assemblage structure in the Kiamichi River system were characteristic of lentic environments and were likely related more to proximity of reservoirs in the drainage system than changes in flow. The spatial patterns in fish assemblage response to flow alteration, combined with different temporal responses of hydrology and fish assemblage structure at sites downstream of reservoirs, indicate that interactions between flow regime and aquatic biota vary depending on ecological setting. This supports the notion that regional variation in natural flow regimes could affect the development of flow recommendations.

## Biomonitoring of Lower Trophic Levels in Lake Ontario

INVESTIGATORS: Lars Rudstam (Cornell)  
William Fisher (NYCFWRU)

STUDENTS: Kristen Holeck, M.S.  
Jim Watkins, Ph.D.

SPONSORS: U. S. Fish and Wildlife Service Cornell University  
U. S. Geological Survey, Lake Ontario Biological Station  
New York State Department of Environmental Conservation

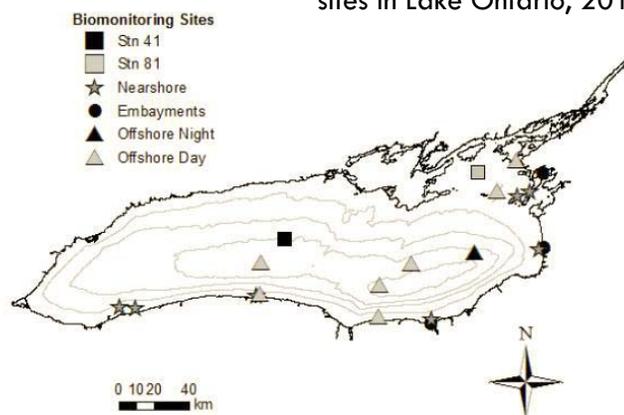
STARTED: April 2010

COMPLETED: September 2011

Lake Ontario is undergoing ecological change that is affecting the food web structure and therefore the ability of the lake to support different fish species, including native species such as lake trout, Atlantic salmon, deep water and shallow water coregonids, slimy sculpin, deepwater sculpin and lake sturgeon. The objectives of this study were to: 1) process samples of lower trophic levels (zooplankton, chlorophyll) and nutrients (phosphorus) collected by state and federal agencies during 2010 in Lake Ontario, 2) evaluate the state of the lower trophic levels and nutrients in 2010 and trends that have occurred since 1995, and 3) compile data collected since 1995 into a relational database from which data could be queried and posted to an online repository.

Zooplankton, chlorophyll, and phosphorus samples collected as part of the New York State Department of Environmental Conservation, U. S. Geological Survey, U. S. Fish and Wildlife Service and Cornell University's biomonitoring program for lower trophic levels in Lake Ontario were analyzed. An in-depth analysis of the status of Lake Ontario in 2010, including an analysis of time trends using data collected through this program since 1995, was completed. Data were compiled and are stored in The Knowledge Network for Biocomplexity.

Map of biomonitoring program sites in Lake Ontario, 2010.



## CURRENT PROJECTS

### Use of Telemetry to Assess Potential Effects of Schoharie Reservoir Waters on Trout Populations in the Upper Esopus Creek

**INVESTIGATORS:** Barry Baldigo, (USGS)  
William Fisher (NYCFWRU)  
Tom Baudanza (NYCDEP)  
Mike Flaherty (NYSDEC)  
Clifford Kraft (Cornell)

**STUDENTS:** Tyler J. Ross, M.S.  
Alex Koeberle and Collin Ferrell,  
Student Technicians

**SPONSORS:** U. S. Geological Survey  
New York State Department of  
Environmental Conservation  
New York City Department of  
Environmental Protection  
Cornell University Cooperative Extension

**STARTED:** August 2009



T. J. ROSS TRACKING FISH IN ESOPUS CREEK

The New York City (NYC) Watershed Protection Management Plan identified the potential adverse effects of turbid Schoharie Reservoir water discharged through the Shandaken Portal on trout populations in the upper Esopus Creek as a priority concern. We conducted a study to evaluate impacts of releases on trout behavior, growth, survival, and use of thermal refuges in the upper Esopus Creek. We assessed differences in trout 1) behavior (rates of movement and utilization of thermal refuges), 2) apparent survival, and 3) measured and modeled growth in the Esopus Creek using radio-frequency telemetry on tagged trout released upstream and downstream of the Shandaken Portal. Trout location and temperatures were related to stream turbidity, flow, habitat, and temperature data that are being gathered in a companion study to quantify potential positive and negative effects that releases may have on physical habitat, individual trout, and their populations. Trout above, at and below the portal in upper Esopus Creek showed signs of stress in 2010 and 2011; however, those fish immediately downstream from the portal lost less mass and were in better physiological condition than fish upstream or further downstream. These findings provide information for water management in Schoharie Reservoir to minimize turbidity and fisheries management to concentrate fish stocking immediately below the portal where cool water provides a thermal refuge for stocked fish.

## Fate of Stocked Trout and an Evaluation of Trout Stocking in New York State

INVESTIGATORS: William Fisher (NYCFWRU)  
Pat Sullivan (Cornell)  
Fred Henson (NYSDEC)

STUDENT: Alex Alexiades, Ph.D.

SPONSORS: New York State Department of  
Environmental Conservation

STARTED: April 2011



ALEX ALEXIADES HANDLING AN EEL WHILE SAMPLING FOR TROUT IN THE CARMENS RIVER, NY

Each year hundreds of thousands of hatchery reared trout are stocked into the state's streams and rivers according to statewide policies (Catch Rate Oriented Trout Stocking, or "CROTS"). Most stockings are designed to provide average angler catch rates of 0.5 fish per hour (or greater) for part of or all of a fishing season. Recent creel surveys indicate that in some circumstances the stocked trout are only briefly providing target catch rates, and survival within stocked reaches is lower than expected. Prior radio telemetry studies conducted in Catskill Mountain waters by regional DEC staff indicated widespread movements of hatchery fish out of stocked reaches was not occurring, thus would not account for the apparent disappearance of stocked fish. Applied research to better document the fate of stocked trout, with an eventual goal of identifying important factors bearing on the fate of trout that are not caught and harvested by anglers, is needed to improve the effectiveness of this important and costly fishery management program.

## An Assessment of Black Bass Populations in New York State

INVESTIGATORS: William Fisher (NYCFWRU)  
Randy Jackson (Cornell)  
Jeff Loukmas (NYSDEC)

STUDENT: P. Christian Perry, Ph.D.

SPONSORS: New York State Department of  
Environmental Conservation

STARTED: April 2011



**CHRISTIAN PERRY STABILIZING THE TRAWLER AT  
CORNELL BIOLOGICAL FIELD STATION**

To properly manage largemouth bass and smallmouth bass (black bass) populations, in New York State, the New York State Department of Environmental Conservation, Bureau of Fisheries requires up to date knowledge of population parameters and fishery characteristics. However, it has been nearly 30 years since the last comprehensive statewide black bass investigation and building a foundation of new information is necessary for future management. For this study, we are consolidating data from various sources, including the Fisheries Statewide Database, Lake Erie and Lake Ontario, and other sources, to develop a baseline assessment of current conditions of the black bass populations. Appropriate population and fish community metrics (e.g., relative abundance, relative weights, length indices, etc.) are being determined for largemouth bass and smallmouth bass. Environmental characteristics, such as water chemistry and physical parameters are being incorporated into the assessment. Black bass population and lake environmental data will be compared among water body types, geographic areas, and over time. This assessment will provide information for the establishment of a comprehensive, long-term monitoring program aimed at documenting black bass population and fishery status in a variety of water body types throughout the New York State.

## Sustainable Flows for Rivers in the Great Lakes of New York and Pennsylvania

INVESTIGATORS: William Fisher (NYCFWRU)  
David Klein (TNC)  
Mark Woythal (NYSDEC)

STAFF: Jason M. Taylor, Postdoctoral Associate

SPONSORS: Northeast Regional Conservation  
Needs Grant  
The Nature Conservancy



JASON TAYLOR WITH LARGEMOUTH BASS CAUGHT FLY FISHING

STARTED: June 2011

This project is focused on developing information to inform river flow recommendations for Great Lake tributary streams within NY and PA. The Great Lakes Compact protects the waters of the basin from diversion, and also places obligations on the states for water management. Each state is committed to creating a management program for new or increased withdrawals and consumptive uses beyond current uses, which are the Compact baseline, within five years of the effective date of the Compact, December 2008. Such water management programs should prevent “significant individual or cumulative adverse impacts to the quantity or quality of the Waters and Water-Dependent Natural Resources” of the Basin from further water withdrawals or consumption. The goal of this project is to provide the NYSDEC with the scientific foundation to work with stakeholders in defining such standards and fulfilling one of the state’s major obligations under the Compact.

We have identified target fish species and their flow needs, and we have added information for freshwater mussel and macroinvertebrate targets. This information will be used to conceptual models of how their life histories interact with natural flow regimes to our initial literature review on flow targets. We have been working on a stream classification for the region that will be used to stratify flow-ecology relationships and flow recommendations across similar stream types. This work combined with target flow needs information will be used to drive the discussion for a workshop focused on generating flow-ecology hypotheses. The workshop will include conservation and freshwater ecology staff from The Nature Conservancy as well as a technical working group made up of biologists from federal and state agencies, and universities.

## RESEARCH – WILDLIFE AND TERESSTRIAL

### CURRENT PROJECTS

#### **Spatial Ecology and Movements of Black Bears in New York State**

**INVESTIGATORS:** Angela Fuller (NYCFWRU)  
Gordon Batcheller (NYSDEC)  
Jeremy Hurst (NYSDEC)

**STUDENTS:** Matthew Adams, M.S.  
Amber Garcia, Kevin McAllister, Christie Robinson, Student Technicians

**SPONSOR:** New York State Department of Environmental Conservation

**STARTED:** August 2010



**MATT ADAMS WITH A RADIOCOLLARED BLACK BEAR**

Within the last two decades, black bears in southern New York have continued to increase in abundance, which has caused an expansion of their range northward. This range expansion has resulted in increased utilization of areas with higher human densities, and landscapes with a greater proportion of agriculture. Landscapes with high proportions of developed areas and open agricultural lands have potential to increase home range size of bears and may influence the movement patterns of bears, given the lower overall habitat quality on the landscape. We are investigating how an anthropogenically fragmented landscape influences the spatial ecology, movements, and habitat selection of black bears in New York. Data from GPS-collared bears will be used to determine how movements are defining home ranges in both the core and the recently expanded populations in the southern range, and how natural fragmentation (e.g., patch type, patch size, patch distribution, road density) influences movements of bears. Additionally, we will evaluate habitat selection and temporal variation in space use between bears in the core and in the expansion areas. This research will provide an understanding of how black bears move through landscapes to help in predicting where human-bear interactions may occur in the future.

## Estimating Black Bear Density Using Genetic Approaches

INVESTIGATORS: Angela Fuller (NYCFWRU)  
Matthew Hare (Cornell)  
Gordon Batcheller (NYSDEC)  
Jeremy Hurst (NYSDEC)

STUDENTS: Catherine Sun, M.S.  
Thomas Connor, Kadeem Gilbert,  
Shona Ort, Student Technicians

SPONSORS: New York State Department of  
Environmental Conservation

STARTED: August 2010



CAT SUN APPLYING SCENT ATTRACTANT TO A STUDY PLOT  
WITH A BARBED WIRE HAIR CORRAL FOR BLACK BEARS

Recently, black bears in New York have expanded in range, merging into two large populations from three formerly distinct geographic populations (i.e., Adirondack, Catskills, Allegany populations). The Adirondack and Allegany ranges, now jointly referred to as the Southern black bear population, have been expanding into areas with agriculture and greater human densities. However, a rigorous density estimate of this expanding population does not exist. Characteristic low densities and extensive ranges of black bears make population estimates difficult, but developments in mark-recapture methods (i.e., spatially explicit capture-recapture models) enable greater accuracy and precision in estimating density. To estimate black bear density, we are conducting a non-invasive genetic mark-recapture study to collect black bear hair samples from barbed-wire snares. Individual bears are identified using 7 microsatellite markers. These data will inform a spatially-explicit capture-recapture model to estimate population density of black bears. We will incorporate data from multiple sources (e.g., live captures, harvested dead-recoveries) and include habitat covariates at multiple spatial scales. Additionally, this study will analyze landscape genetics, potentially identifying landscape features facilitating and/or inhibiting gene flow in black bears. This small-region study will be conducted in west-central New York, and will help direct future larger-scale designs. Additionally, the research will provide information on black bear populations that will assist the New York State Department of Environmental Conservation in developing effective management strategies.

## Climate Change Vulnerability Assessments

INVESTIGATORS: Angela Fuller (NYCFWRU)  
Daniel Rosenblatt (NYSDEC)

STUDENT: Christopher Nadeau, M.S.

SPONSORS: New York State Department of  
Environmental Conservation

STARTED: April 2011



**Chris Nadeau, M.S. Student**

The northeastern United States is expected to get approximately 10°F hotter, receive 30% more winter precipitation, experience stronger rain events, and experience annual late-summer droughts due to climate change. These climatic changes are expected to cause large-scale ecological change that could dramatically affect wildlife, especially those species already in danger of extinction from other factors (e.g., small population size, habitat degradation). It is logistically impossible for wildlife management agencies, tasked with managing numerous species, to conduct the studies necessary to accurately predict the persistence of each species in a changing climate. For this reason, rapid assessment tools are needed to determine which species and areas of the landscape should receive the most resources. Some rapid assessment tools already exist (e.g., Nature Serve’s Climate Change Vulnerability Index), but these tools are not spatial and therefore cannot determine which parts of the landscape should receive increased attention. Moreover, these tools require information about each species (e.g., genetic diversity, dispersal ability, and climatic tolerances) that are often unavailable.

We are working with the New York State Department of Environmental Conservation (NYSDEC) to develop a rapid assessment tool to: 1) rank the relative vulnerability of Species of Greatest Conservation Need in New York, and 2) identify locations in New York and the Northeast that are most vulnerable to climate change. The tool we develop will be spatially explicit and will limit the need for information and assumptions about species’ traits. We will evaluate the vulnerability of species to climate change throughout the northeastern United States to determine how New York fits into the larger spatial context.

## Spatial Capture-Recapture Models for Carnivores

INVESTIGATORS: Angela Fuller (NYCFWRU)  
J. Andrew Royle – USGS, Patuxent Wildlife Research Center  
Sean Madden – New York State Department of Environmental Conservation  
Kathryn Jahn – U.S. Fish and Wildlife Service



**Bénédicte Madon**  
**Postdoctoral Research Associate**

STAFF: Bénédicte Madon, Postdoctoral Research Associate

SPONSORS: U.S. Fish and Wildlife Service  
New York State Department of Environmental Conservation

STARTED: June 2011

It is difficult to estimate abundance and density of carnivores due to their elusive nature, often low densities at landscape-scales, and the expense of methods that rely on capturing individuals. We are developing a model that incorporates multiple data sources to evaluate abundance and density of elusive carnivores using non-invasive survey methods. We are using a combination of hair collection methods and scats that are collected using scat detection dogs. To estimate the abundance and density, we are extending traditional spatial capture-recapture (SCR) models and using non-invasive genetic methods (scat and hair collection). In particular, for species known to use river and stream corridors, the Euclidian assumption for the distance from trap to activity center in traditional SCR models may not be appropriate. Therefore, we developed a non-Euclidian metric based on a shortest path approach using a cost function. The new methods that we are developing will be applicable to a wide array of elusive carnivore species and particularly those that have a tendency to travel along linear features (e.g., valley bottoms, roads, streams, transmission lines, ridges).

## RESEARCH – ECOLOGY AND LANDSCAPES

### CURRENT PROJECTS

#### **Revision of the New York State Endangered Species and Species of Greatest Conservation Need Lists**

**INVESTIGATORS:** Angela Fuller (NYCFWRU)  
Bill Fisher (NYCFWRU)  
John Ozard (NYSDEC)  
Dan Rosenblatt (NYSDEC)

**STAFF:** Kimberley Corwin, Research Support Specialist

**SPONSORS:** New York State Department of  
Environmental Conservation

**STARTED:** January 2010



**Kim Corwin,  
Research Support Specialist**

New York State’s official list of endangered species was promulgated in 1971 and threatened species authorization was added in 1981. Over 10 years have passed since the last major review and revision of these lists. New information has been developed from the listing of Species of Greatest Conservation Need (SGCN) through the Comprehensive Wildlife Conservation Strategy. This project is providing supporting documentation for making recommendations on the status of species to enable the NYSDEC to amend the New York list of Endangered, Threatened, and Special Concern species with an emphasis on prioritizing and updating the New York SGCN list.

Species assessments are being written in the first phase of the project to update the state's list of SGCN. Kim Corwin, stationed at NYSDEC headquarters in Albany, has worked with NYSDEC and Coop Unit staff to carefully revise the species assessment form to include all elements that will be needed in the decision-making step of the project. The species assessments will provide a summary of the current status, distribution, threats, and population trend for each of the 537 SGCN currently included in the State Wildlife Action Plan.

## PUBLICATIONS AND PRESENTATIONS

### JOURNAL ARTICLES

- Pease, A. A., J. M. Taylor, K. O. Winemiller, and R. S. King. 2011. Multiscale environmental influences on fish assemblage structure in central Texas streams. *Transactions of the American Fisheries Society* 140:1409-1427.
- Eaton, M. J., P. T. Hughes, J. D. Nichols, A. Morkill, and C. Anderson. 2011. Spatial patch occupancy patterns of the Lower Keys marsh rabbit. *Journal of Wildlife Management* 75(5):1186-1193.

### TECHNICAL REPORTS

- Fuller, A. K., and D. J. Harrison. 2011. A landscape planning initiative for northern Maine using area-sensitive umbrella species. Final report to the Maine Chapter of The Nature Conservancy. 133 pp. July 20, 2011.
- Swift, B., G. S. Boomer, A.K. Fuller, K. Clarke, J. Farquhar, S. Joule, A. Kirsch, and D. Decker. 2011. Developing Objective Criteria for the Implementation of Strategies to Reduce Yearling Buck Harvest in New York. Final report of the Structured Decision Making Workshop, September 12 - 16, 2011, National Conservation Training Center, Shepherdstown, WV, USA. 7pp.

### THESES AND DISSERTATIONS

None.

### PRESENTATIONS AND SEMINARS

- Adams, M. C., and A. K. Fuller. 2011. Habitat and Spatial Ecology of Black Bears in New York. Invited presentation to the Steuben County Honey Bee Association. 13 June 2011.
- Adams, M. C., C. S. Sun, and A. K. Fuller. 2011. Black Bears in New York. Invited presentation to the Finger Lakes Region of the New York State Parks. Watkins Glen, NY. 20 October 2011.
- Alexiades, A.V. 2011. The Fate of Stocked Trout in New York Streams. NYSDEC Fisheries Bureau Management Team Meeting, Hamilton, NY. 12 October 2011
- Farrell, C.J., T.J. Ross, W.L. Fisher. 2011. Temporal effects of Schoharie Reservoir waters on physiological condition of upper Esopus Creek trout populations, Cornell Office of Undergraduate Biology SILS Undergraduate Research Symposium, Ithaca, NY. August 2011.
- Fisher, W. L. 2011. GIS in Fisheries: Why Place Matters. Invited presentation at Cornell Biological Field Station, Bridgeport, NY. 24 June 2011.

- Fisher, W. L. 2011. Environmental Flows Project Methods. New York Sustainable Flows Project Workshop, Skaneateles, NY. 29 June 2011.
- Fisher, W. L. 2011. Integrating GIS across disciplines: how the intersection of biology and geography has influenced fisheries GIS. 5th International Symposium on GIS/Spatial Analyses in Fishery and Aquatic Sciences. Wellington, New Zealand. 22 August 2011
- Fisher, W. L. 2011. The American Fisheries Society: A Professional Organization for Students. AFS Cornell Student Subunit Meeting, Ithaca, NY. 2 November 2011.
- Fisher, W. L. 2011. The importance of strategic direction in AFS. American Fisheries Society Leadership Workshop. Seattle, WA. 4 September 2011.
- Fuller, A. K. 2011. Structured Decision Making in the NY Cooperative Fish and Wildlife Research Unit. Invited presentation at the New York State Department of Environmental Conservation, Bureau of Wildlife Management Team Meeting, Hamilton, NY. 6 January 2011.
- Fuller, A. K. 2011. Biodiversity conservation in multiple-use landscapes. Invited talk, New York Chapter of the Wildlife Society Annual Meeting, Utica, NY. 5 March 2011.
- Fuller, A. K. 2011. Interview Skills. Invited presentation for the Northeast Association of Fish and Wildlife Professionals Student Professional Development Workshop, 67th Annual Northeast Fish and Wildlife Conference, Manchester, New Hampshire. 18 April 2011.
- Fuller, A. K. 2011. Improving the Connection of Science and Management: Structured Decision Making and Adaptive Management in the Cooperative Research Unit Program. Adaptive Management Conference Series, Auburn, AL. 31 August 2011.
- Fuller, A.K. and D. J. Harrison. 2011. The role of ecological reserves to maintain American marten and Canada lynx in a working forest landscape. Poster presentation at the 18th Annual Wildlife Society Conference, Waikola, Hawaii. 9 November 2011.
- Fuller, A.K., and D. J. Harrison. 2011. Trade-offs among forest management objectives, focal wildlife species, and ecological reserves: implications for future biodiversity and timber harvests. Poster presentation and moderated discussion at the Society of American Foresters National Convention, Honolulu, Hawaii. 4 November 2011.
- Harrison, D., E. Simons, A. Fuller and W. Krohn. Trends in habitat for forest wildlife in Maine's Great North Woods: The need for landscape planning. Invited presentation at U.S. Fish and Wildlife Service Northeast Region Biologists Conference, Baltimore, Maryland. 14 February 2011.
- Koeberle, A.K., T.J. Ross, W.L. Fisher. 2011. The use of radio-telemetry to evaluate Behavior, movement and habitat selection of brown trout in the upper Esopus Creek, New York. Cornell Office of Undergraduate Biology SILS Undergraduate Research Symposium, Ithaca, NY, August 2011.
- Perry, P. C. 2011. Research Report: Black Bass Project. DEC Bureau Meeting. NYSDEC Fisheries Bureau Management Team Meeting, Hamilton, NY. 12 October 2011.
- Perry, P. C. 2011. Status of the Statewide Bass Study. Black Bass Management Team Meeting. Cornell Biological Field Station, Bridgeport, NY. 13 December 2011.

- Ross, T. J., B. Fisher, B. Baldigo, T. Baudanza, and M. Flaherty. 2011. Behavioral and Physiological Responses of Stream-dwelling Trout to Altered Hydrology, Turbidity and Temperature Regimes. Annual Meeting, New York Chapter of the American Fisheries Society, Canandaigua, NY. 4 February 2011.
- Ross, T.J., B. Fisher, B. Baldigo, T. Baudanza, and M. Flaherty. 2011. Effects of Anthropogenic Stream Alteration on Brown Trout Behavior and Physiology: A Multifaceted Approach. 141st Annual Meeting of the American Fisheries Society, Seattle, WA. 8 September 2011.
- Sun, C. S., and Fuller, A. K. 2011. Non-invasive genetic methods for estimating density of black bears in New York. NYSDEC Bureau of Wildlife Management Meeting. Blue Mountain Lake, NY. 12 October 2011.
- Sun, C. S., M. C. Adams, and A. K. Fuller. 2011. Black Bear Research in New York. Invited poster to the New York State Department of Environmental Conservation Region 8 National Hunting and Fishing Days. Avon, NY. 24-25 September 2011.
- Sun, C. S., A. K. Fuller, and M.P. Hare. 2011. Estimating black bear abundance in New York using non-invasive genetic approaches. Invited presentation to the Steuben County Honey Bee Association. 13 June 2011.

## ACTIVITIES

### TECHNICAL ASSISTANCE

Fisher, W. L., and A. K. Fuller. Structured Decision Making and Adaptive Management for Mute Swans in New York. 2.5-day workshop for the New York State Department of Environmental Conservation. March 22-24, 2011.

Fuller, A. K. Developing Objective Criteria for Reducing Harvest of Yearling White-Tailed Deer. Structured Decision Making Workshop with the New York State Department of Environmental Conservation. National Conservation Training Center, Shepherdstown, WV. September 12-16, 2011.

### TRAINING

Fisher, W. L. Instructor, Motorboat Operator's Certification Course (MOCC), U.S. Department of the Interior, Oneida Lake, NY. 16-17 May 2011.

Fuller, A. K. Instructor, Introduction to Structured Decision Making. National Conservation Training Center, Shepherdstown, WV. 10-14 January 2011.

Fuller, A.K., and W.L. Fisher. Introduction to Structured Decision Making. Web broadcast short-course to the New York State Department of Environmental Conservation. March 21, 2011.

### MEETINGS ATTENDED

Fisher, W. L. NYSDEC Trout Team Meeting, Cortland, NY. January 24, 2011.

Fisher, W. L. Annual Meeting, New York Chapter of the American Fisheries Society, Canandaigua, NY. February 4, 2011.

Fisher, W. L., and A. K. Fuller. Northeast Fish and Wildlife Conference. Manchester, NH. April 17-19, 2011.

Fisher, W. L., and Weltman-Fahs, M.. 2011. Marcellus Shale Multi-State Academic Research Conference, Altoona, PA. May 10-11, 2011.

Fisher, W. L. NYSDEC Fisheries Bureau Team Meeting. Albany, NY. June 23, 2011

Fisher, W. L. USGS/NYSDEC Great Lakes Fisheries Meeting. Cortland, NY. July 7, 2011.

Fisher, W. L. Natural Resource Education and Employment Conference. Denver, CO. September 19-21, 2011.

Fisher, W. L. NYSDEC Bureau of Fisheries Management Meeting. Hamilton, NY. October 12, 2011.

Fisher, W. L. NYSDEC Trout Team Meeting. Hamilton, NY. December 8, 2011.

Fisher, W. L. NYSDEC Black Bass Team Meeting. Hamilton, NY. December 13, 2011.

Fuller, A. K. Bureau of Wildlife Management Team Meeting, New York State Department of Environmental Conservation. Hamilton, New York. January 5-6, 2011.

Fuller, A. K. New York Chapter of the Wildlife Society Annual Meeting, Utica, NY. March 5, 2011.

Fuller, A. K., and C. S. Sun. 20th Eastern Black Bear Workshop. Hendersonville, North Carolina. May 1-4, 2011.

Fuller, A. K. NYSDEC Bureau of Wildlife Meeting. Ithaca, New York. June 22, 2011.

Fuller, A. K. 20th International Conference on Bear Research and Management. Ottawa, Ontario. July 20-22, 2011.

Fuller, A. K. NYSDEC Big Game Team Meeting, Ithaca, NY. August 16, 2011.

Fuller, A. K. NYSDEC Recovery Planning Meeting. Albany, NY. August 23, 2011.

Fuller, A. K., and Nadeau, C. P. Climate Change and NY Ecosystems: Where do we go from here? Ithaca, NY. December 5, 2011.

Fuller, A. K., and Sun, C. S. NYSDEC Bureau of Wildlife Management Meeting. Blue Mountain Lake, NY. October 12-13, 2011.

## SERVICE

### **Mitch Eaton:**

Member, Biometrics Working Group, The Wildlife Society, October 2010 – Present

### **Bill Fisher:**

President, American Fisheries Society, September 2011 - Present

Faculty Advisor, Cornell Student Subunit, American Fisheries Society, March 2010 - Present

Member, Management Committee, American Fisheries Society, September 2007 - Present

Member, Governing Board, American Fisheries Society, August 2006 - Present

Member, New York Chapter, American Fisheries Society, American Fisheries Society, January 2009 – Present

Member, Steering Committee, New York State Water Resources Institute, January 2011 - Present

Member, Advisory Committee, Cornell Biological Field Station, January 2009 - Present

### **Angela Fuller:**

Appointed Member, The Wildlife Society Ad-hoc Certification Review Committee, November 2009 - Present

Member, Oversight Committee for the Cornell Center for Wildlife Conservation, September 2010 - Present

Member, Northeast Section of The Wildlife Society, ad-hoc student affairs committee, October 2009 - Present

Member, The Wildlife Society Leadership Institute Committee, December 2008 - Present

Member, College and University Education Working Group, The Wildlife Society, November 2008 - Present

Member, Biometrics Working Group, The Wildlife Society, November 2010 - Present

Member, Spatial Ecology and Telemetry Working Group, The Wildlife Society, November 2010 – Present