

U. S. Geological Survey

Massachusetts Cooperative Fish and Wildlife Research Unit

Biennial Report for 2012-2013



Amherst, Massachusetts

June 2013

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U. S. Geological Survey

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Robert Ryan, UMass
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Abbreviations Used in this Report

BOEM = Bureau of Ocean Energy Management
CRUP = Cooperative Research Unit Program
FSP = Fundamental Science Practices (USGS internal peer-review process)
HF = Harvard Forest
MassDOT = Massachusetts Department of Transportation
MDCR = Massachusetts Department of Conservation and Recreation
MDEP = Massachusetts Department of Environmental Protection
MDER = Massachusetts Division of Ecological Restoration
MDFW = Massachusetts Division of Fisheries and Wildlife
MDMF = Massachusetts Division of Marine Fisheries
NAS = National Audubon Society
NGS = National Geographic Society
NSF = National Science Foundation
UMass = University of Massachusetts-Amherst
USFS = U. S. Forest Service
USFWS = U. S. Fish and Wildlife Service
USGS = U. S. Geological Survey
YIO = Yamashina Institute for Ornithology

INTRODUCTION

This year's annual Unit Coordinating Committee (or Cooperators') Meeting was held at the U. S. Fish and Wildlife Service's Regional Headquarters in Hadley, Massachusetts. Since 1999, the Massachusetts Unit has held its annual Coordinating Committee Meeting on a rotating basis at the headquarters of each of its major Cooperators: the University of Massachusetts (Amherst), the Massachusetts Division of Marine Fisheries (Gloucester), the Massachusetts Division of Fisheries and Wildlife (Westborough), and the Northeast Region of the U. S. Fish and Wildlife Service (Hadley). We met in Amherst in 2010, Gloucester in 2011, Westborough in 2012, and Hadley in 2013. Next year's (2014) meeting will be held at UMass in Amherst.

The Coordinating Committee is comprised of representatives from each of the major Unit Cooperators. The Committee serves as the Unit's Board of Directors and oversees and approves the research and activities of the Unit's scientists. Our annual meeting is an opportunity for Unit personnel to update the Cooperators, discuss current research and activities, and set future directions.

In 2012, the Unit was fully staffed and working with a large number of graduate students and post-doctoral researchers. Our state and regional research projects continue to be the major portion of our graduate research efforts, thanks to the continued generous support of our Cooperators. We have also been working with Cooperators and colleagues on national and international-level projects and assignments.

The Unit continued work on its mission of research, education, and technical support, including completion of some projects and initiation of new projects. Unit researchers maintained a broad-based program of research on a wide variety of topics, particularly addressing important issues in the state. A large emphasis continues to be related to urban-suburban issues for both terrestrial and aquatic wildlife and habitats. Additional collaborative work has been conducted on human dimensions and human-wildlife relationships. Unit personnel participated in several meetings and symposia on a variety of issues, and also continued their teaching commitments to the graduate program at UMass.

This report outlines completed, on-going, and new projects through 2012 and into 2013. Also listed are Unit publications, courses taught, and other activities.

We welcome comments or suggestions and, as always, we appreciate your continued interest and support.



COOPERATOR SERVICE

- Admissions Committee, Organismic and Evolutionary Biology Graduate Program (Sievert)
- Associate Editor, Freshwater Science (Roy)
- Associate Editor, Wildlife Society Bulletin, The Wildlife Society (DeStefano)
- Graduate Committee member (DeStefano, Sievert, Roy)
- Institutional Animal Care and Use Committee (Sievert)
- Quantitative Sciences Group, Statistical advice for graduate students (Sievert)
- Scientific & Technical Advisory Committee, Division of Watershed Protection (DeStefano)
- Short-tailed Albatross Recovery Team member (Sievert)

GRADUATE COURSES TAUGHT

- Research Concepts (ECO 601: DeStefano and Roy)
- Applied Biostatistics for Natural Resources (ECO 697AB: Sievert)
- Aquatic Ecology (ECO 597AE: Roy – being developed for Fall 2014)
- Conservation in Practice (ECO 697CP: DeStefano with Organ et al. – for Fall 2013)

GRADUATE STUDENTS AND POSTDOCS (MAJOR PROFESSOR): 2012-PRESENTCompleted

Katherine Kauffman, M.S. (Sievert) – Population dynamics, chick diet, and foraging behavior of the razorbill (Aug. 2012)

Sarah M. Spencer, M.S. (Sievert) – Diving behavior and nest site characteristics of Atlantic puffins in Maine (Feb. 2012)

Jen Strules, MS (DeStefano) – Salt drive in the beaver: an experimental assessment with field feeding trials (Oct. 2012)

Current

Michael T. Jones, Post-doc (Sievert)

Susannah Lerman, Post-doc (DeStefano with Keith Nislow and Craig Nicholson)

Scott Schlossberg, Post-doc (DeStefano with Dave King)

Robert F. Smith, Post-doc (Roy with Elizabeth Brabec)

Lisabeth Willey, Post-doc (Sievert)

Dan Clark, Ph.D. (DeStefano)

Edward Faison, Ph.D. (DeStefano)

Laura Hajduk-Conlee, Ph.D. (DeStefano with Rob Deblinger)

Jennifer Higbie, Ph.D. (DeStefano with John McDonald)

Luanne Johnson, Ph.D. (DeStefano)

Pamela Loring, Ph.D. (Sievert with Curt Griffin)
Todd Richards, Ph.D. (Roy)
Anne G. Stengle, Ph.D. (Sievert)
Dave Wattles, Ph.D. (DeStefano)

Grace Barber, M.S. (Sievert with Aaron Ellison)
Michael Huegenin, M.S. (DeStefano with Rob Deblinger)
Kimberly M. Ogden, M.S. (Sievert)
Eric LeFlore, M.S. (DeStefano with Todd Fuller)
Wulan Pusparini, M.S. (Sievert with Todd Fuller)
Derek T. Yorks, M.S. (Sievert)

Jason Carmignani, Research Technician (Roy) – to convert to Ph.D in September 2013

UNIT AND RESEARCH HIGHLIGHTS

- Postdoctoral Fellows Mike Jones and Liz Willey published the book: Jones, M.T., and L.L. Willey. 2012. Eastern Alpine Guide: Natural History and Conservation of Mountain Tundra East of the Rockies. Beyond Ktaadn, Inc., 348 pp.
- Unit Ph.D. candidate Luanne Johnson was awarded the Massachusetts Association of Science Teachers Stanhope Distinguished Friend of Science Award for 2012. This award recognizes an individual who has made outstanding contributions to science education.
- The Unit's program to create graduate educational opportunities for working professionals is now fully underway. Currently there are 6 Ph.D. and 1 M.S. candidates who are working for MDFW, MDCR, and the Highstead Foundation who will be working on concurrent graduate degrees.
- Allison Roy and her students installed 10 pressure transducers and staff gages below reservoirs and in reference streams to investigate the effects of surface water withdrawals on stream flows. In 2013 we will install 5 more transducers and continue to develop stage-discharge rating curves at each site.
- GPS collars were being placed on denning black bears for the 5th winter-early summer; so far this year 4 new collars have been deployed, bringing the overall total to 30 GPS collars placed on 17 bears.
- Steve DeStefano was invited to present the keynote address at a workshop on "Wildlife Conservation in Cities and Towns" at the 78th North American Wildlife and Natural Resources Conference in Arlington, Virginia, 25-29 March.

- This year's North American Moose Conference will take place in New Hampshire; the Unit will be presenting several papers on the moose research that has been conducted in Massachusetts.
- Collaborators on the moose/deer experimental enclosure research will initiate a new project focused on growth of native and exotic herbaceous plants in browsed and unbrowsed plots this year.
- The short-tailed albatross translocation project finished its 5th and final year in 2012. To date, 59 chicks have been successfully reared and fledged from Mukojima (an extirpated colony site), with 17 of those already returning to the island, and in 2012 the first translocated bird nested on the island. This bodes well for re-establishing this historical colony that was extirpated by feather hunters in the early 1900s.
- Paul Sievert and his students and collaborators have collected tissue samples from over 100 timber rattlesnakes from across Massachusetts to evaluate the genetic uniqueness of the 4 populations remaining in the states. Microsatellite analyses are proceeding well and preliminary results should be available shortly.
- The turtle road passage study has completed its experiments evaluating the effectiveness of tunnel designs for Blanding's, spotted, and eastern box turtles in Massachusetts. Results will help guide the Massachusetts Department of Transportation in upgrading passage structures for turtles in the Commonwealth.
- The regional status assessment and conservation plans for Blanding's and wood turtles are underway with outstanding cooperation from all of the collaborating states (12 total). Project coordination and updates are provided through monthly conference calls.
- Ed Faison and Steve DeStefano attended a workshop on R and Mixed Effects Models, taught by Dr. Elizabeth Crone, at Harvard Forest in January 2013. They were able to analyze data from the experimental enclosure project during the workshop.
- DeStefano completed his assignment as a committee member for the Massachusetts Department of Conservation and Recreation's Scientific and Technical Advisory Committee, whose task was to evaluate DCR management plans in relation to water quality and forestry. The Committee, led by Dr. Paul Barten of the University of Massachusetts-Amherst, produced a 100+ page document that has received public review and is available online through the Mass DCR website.

A Brief History of the Massachusetts Cooperative Fish & Wildlife Research Unit

The Cooperative Research Unit Program (CRUP) was established in the 1930s to enhance graduate education in fisheries and wildlife sciences and to facilitate research between natural resource agencies and universities on topics of mutual concern. The catalyst for the idea of a cooperative program was the conservationist and political cartoonist, J. N. “Ding” Darling. Darling’s innovative thinking and push for conservation reforms in Iowa led to the first Unit, which was established between Iowa State College and the Iowa Fish and Game Commission in 1932. Paul Errington, a student of Aldo Leopold and a notable wildlife biologist, became the Iowa Unit’s first leader.

In 1935, Darling and others successfully established a national program for Cooperative Research Units, which involved a federal agency (the Bureau of Biological Survey, a precursor to today’s U. S. Fish and Wildlife Service) as well as a land-grant university and a state agency, and 9 Units were formed: Oregon, Utah, Texas, Iowa, Maine, Connecticut, Virginia, Alabama, and Ohio. The Connecticut Unit was only in operation from 1935-1937, and the Ohio Unit was closed in 1991.

The Massachusetts Unit was established in 1948 and was one of a second wave of new Units, which included Missouri, Pennsylvania, Colorado, Idaho, Oklahoma, Alaska, Arizona, and Montana. Originally, Cooperative Wildlife Research Units preceded Cooperative Fishery Research Units, and the two types of Units were separate entities. In 1963, the Massachusetts Fishery Unit was formed. In 1990 all Wildlife Units and Fish Units were combined, and the two Units at the University of Massachusetts became the combined Massachusetts Cooperative Fish and Wildlife Research Unit.

The CRUP was part of the U. S. Fish and Wildlife Service until the 1990s, when CRUP joined the U. S. Geological Survey. Today, there are 40 Cooperative Research Units in 38 states. Each Unit consists of 2-5 federal scientists and 1-2 administrative specialists, and each is a partnership among the U.S. Geological Survey, a state natural resource agency, a host university, the Wildlife Management Institute, and in many cases the U. S. Fish and Wildlife Service. A formal Cooperative Agreement specifies the responsibilities of each cooperator, and a Coordinating Committee meets annually and serves to advise and guide the Unit. Staffed by Federal personnel, Cooperative Research Units conduct research on applied conservation questions, participate in the education of graduate students, provide technical assistance and consultation on natural resource issues, and provide continuing education for natural resource professionals.

Throughout its history, the primary three-fold mission of the CRUP has remained the same: (1) Graduate Education, (2) Research, and (3) Technical Assistance in matters related to fish and wildlife populations and their habitats.

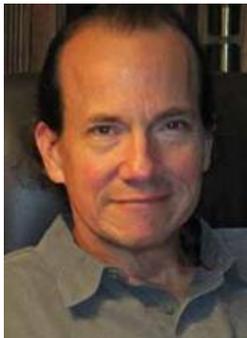
Background and Research Statements of Unit Scientists



Steve DeStefano

Stephen DeStefano, Leader (Wildlife) & Research Professor

I have worked on a variety of species and topics related to wildlife population dynamics, habitat relationships, and wildlife-human interactions, particularly within forested ecosystems and urban-suburban environments. I am particularly interested in the influence of anthropogenic factors (development, disturbance) on wildlife, how large animals that require large spatial scales use fragmented and human-dominated landscapes and the implications for land conservation, and the science and management of “overabundant” wildlife – what makes some species successful and how that influences human-wildlife interactions.



Paul Sievert

Paul R. Sievert, Asst. Leader (Wildlife) & Research Asso. Professor

My focus is on conservation biology, physiological ecology, and biostatistics. With my students, I have been studying populations of threatened and endangered species (freshwater turtles, salamanders, butterflies and moths, short-tailed albatross, Sumatran tigers) to better understand, and hopefully reverse, their declines. With respect to physiological ecology, I am interested in how energy and water balance influence the nesting ecology of marine birds, the estivation behavior of turtles, and the establishment of species range boundaries. My quantitative research focuses on methods for estimating survival rates, and the use of population viability analyses in conservation biology.



Allison Roy

Allison H Roy, Asst. Leader (Fisheries) & Research Asst. Professor

My research broadly revolves around characterizing anthropogenic impacts on aquatic ecosystems and identifying conservation strategies for effectively protecting and restoring watersheds. Understanding the mechanisms by which urbanization and its associated stressors result in degraded biotic assemblages is an overarching challenge of my research program. I am interested in examining effects of altered hydrology, temperature, habitat, water quality, and food resources on fishes and macro-invertebrates; quantifying sublethal (e.g., behavior, physiology) responses of fishes to urbanization; and assessing potential for management (e.g., forested riparian buffers, green infrastructure, reservoir management, dam removal) to restore fish assemblages.

Graduate Training for Working Professionals



Laura Conlee, PhD candidate, Furbearer Biologist, Massachusetts Division of Fisheries & Wildlife.



Dan Clark, PhD candidate, Director of Natural Resources, Massachusetts Department of Conservation & Recreation.



Todd Richards, PhD candidate, Fisheries Biologist, Massachusetts Division of Fisheries & Wildlife.

The Massachusetts Unit, in collaboration with the Department of Environmental Conservation at UMass-Amherst and our cooperating agencies, is providing graduate training opportunities for working professionals. This program requires some special flexibility because of the full-time responsibilities of these working professionals, but everyone in the program fulfills all graduate requirements of the Department and the University. A critical element for a successful program is that the graduate research project is directly related to the duties and responsibilities of the candidate in their full-time job.

Unit scientists work closely with the candidate and their supervisors to enhance the graduate-employment relationship, and with the graduate committee and graduate program director to ensure that all requirements are fulfilled. Currently we have 6 Ph.D. students and 1 M.S. student enrolled in this program who are employees of the Massachusetts Division of Fisheries and Wildlife, the Massachusetts Department of Conservation and Recreation, 2 non-governmental conservation organizations (the Highstead Foundation in Connecticut and BiodiversityWorks of Martha's Vineyard), and the Brookhaven Lab in Long Island, New York. Some of our current student-colleagues are pictured here.



Luanne Johnson, PhD candidate, Co-founder and Director, BiodiveristyWorks of Martha's Vineyard.



Mike Huguenin, MS candidate, Wildlife Biologist, Mass. Division of Fisheries & Wildlife.



Ed Faison, PhD candidate, Ecologist, Highstead.

Research Projects



Debby Kaspari

Research Projects – Fish and Aquatic Resources



Brook trout (Todd Richards)



Mayfly subimago. (Robert Smith)

Polarized light reflecting off of wet pavement, car hoods, glass buildings, and even gravestones may attract aquatic insects and discourage adult dispersal through urban areas.



Westboro Reservoir, a water supply reservoir in Westborough, MA. (Allison Roy)

TITLE: Stream biota in terrestrial urban landscapes

STUDENT: Robert F. Smith (Post-doc)

ADVISORS: Allison Roy and Elizabeth Brabec

FUNDING: NSF

This research examines terrestrial landscape-scale impacts of urbanization on aquatic biota, using a multidisciplinary approach to improve the sustainability of stream ecosystems. The main objectives are to examine: 1) how patterns of stream fish and insect community composition relate to surrounding land use at spatial scales and geographic patterns relevant for water quality and dispersal, and 2) how land-use development scenarios impact the suitability of land acquisition strategies for conserving stream fish and insect communities. We have begun collecting GIS and stream insect and fish community data for Massachusetts. Several undergraduates are currently working on an assessment of the accuracy of GIS stream-line data for performing fine scale analyses of land-use along potential dispersal pathways.

TITLE: Flow alteration from surface water withdrawals

STUDENT: Todd Richards (Ph.D.)

ADVISOR: Allison Roy

FUNDING: MDFW, USGS CRUP

The overall goal of this research is to examine patterns in stream flow and fish assemblages in small streams in Massachusetts with a variety of watershed characteristics. Fifteen sites have been selected: 5 downstream of water supply reservoirs, 5 downstream of non-supply reservoirs, and 5 at streams with little or no reservoir storage in their upstream watershed. In 2012, pressure transducers were installed at 10 sites to continuously measure stream stage, and the remaining sites will be gauged in 2013. We will compare year round flows among the treatments. We will also investigate relationships between flow alteration and fish assemblages to determine the relative importance of flow characteristics in various seasons on stream health.



Bridle shiners in the littoral zone of Upper Goose Pond. (Jason Carmignani)

Bridle shiner, a species of special concern in Massachusetts, is likely impacted by drawdowns due to dewatering and associated aquatic plant loss in the littoral zone of lakes.



Water harvesting using rain barrels is a tool for residential water conservation. (Allison Roy)

TITLE: Impacts of winter lake drawdowns on fish and wildlife

STUDENT: Jason Carmignani (Ph.D.)

ADVISOR: Allison Roy

FUNDING: MDFW, UMass

In Massachusetts, about 200 small reservoirs are drawn down in the fall and refilled in the spring as an approach to kill aquatic vegetation. Currently, an extensive literature review is underway to synthesize our understanding of potential effects of winter drawdown on flora and fauna communities. There are very few studies evaluating the effects of lake winter drawdowns on biota in the temperate zone, including New England, and the research is primarily on aquatic plants. However, studies on regulated water-level fluctuations on littoral ecology reveal variation in responses of biological communities based on lake morphometry, sediment, and other characteristics. We will be compiling information on drawdowns in Massachusetts to quantify the variation in lake characteristics and management approaches that may influence biotic responses to drawdowns.

TITLE: Outdoor residential water conservation

INVESTIGATORS: Robert Ryan (PI), Anita Milman, Colin Polsky, and Allison Roy

FUNDING: UMass Center for Agriculture

We are examining the influence of policy and outreach efforts on local residents' adoption of water conservation and stormwater strategies in the residential landscapes of suburban Boston. In 2012, we began compiling information on water use, water restrictions, water conservation efforts, and conservation financing from the 26 water providers in the Ipswich and Parker River watersheds. This year we will interview water providers, conservation groups, and members of the landscape industry to assess the impacts of institutional structures and outreach efforts on local water conservation programs and policies. We will subsequently survey residents about factors that influence their conservation behavior and calculate actual residential water quantity savings at household and watershed scales.



Drift nets in a stream in eastern Pennsylvania. (Allison Roy)

Aquatic insects drift downstream to escape predators or competitors, search for suitable resources, or avoid unfavorable conditions.



Staff gage at Brown's Brook. (Laila Parker)

TITLE: Effects of urbanization on insect drift

STUDENTS: Megan Grandinetti (B.S., Kutztown University), Cody LaPointe (B.S.), Alison Tenhulzen (B.S.), Allyson Yarra (B.S.)

ADVISOR: Allison Roy

FUNDING: Kutztown University

We examined drift rates in 15 small streams (catchment area 10.9 to 32.4 km²) in eastern Pennsylvania that ranged from 1.6% to 79.7% urban land cover. Preliminary results reveal that richness of insects and sensitive taxa in the drift declined with increased % urbanization, suggesting that drift diversity reflects benthic diversity and is a good indicator of stream health. There was no significant relationship between drift density and % urbanization; however, sites with <20% urban cover tended to have higher drift density than sites with >60% urban cover. Similarly, the proportion of insects drifting relative to the riffle insect density was higher in less disturbed sites. Macroinvertebrates may drift less in urban streams than forested streams, which is in contrast to insect responses to acute disturbances. Results will be presented at the 2013 Annual Meeting of the Society for Freshwater Science.

TITLE: Effects of climate change on streams

INVESTIGATORS: Britta Bierwagen, Michelle Craddock, Robert Nuzzo, Laila Parker, Allison Roy, Jen Stamp

FUNDING: USEPA

USEPA's Global Change Research Program and Tetra Tech, Inc. have been collaborating with states from various regions (northeast, southeast, mid-Atlantic) to develop regional reference/climate change monitoring networks that can detect small, progressive changes in stream communities. In Massachusetts, we sampled macroinvertebrates and installed gages to continuously measure air temperature, water temperature, and water levels for five forested, reference sites. We have also developed draft guidelines for continuous monitoring of temperature and flow in wadeable streams to guide other states in implementing the reference network.

Research Projects – Amphibians and Reptiles



Hognose snake (Derek Yorks)



Four-toed salamander. (R. D. Bartlett)

Four-toed salamanders are a cryptic species that moves toward breeding wetlands on rainy nights with little moonlight. Their upland requirements are virtually unknown.



Turtle tunnel laboratory. (Derek Yorks)

TITLE: Distribution and abundance of four-toed salamanders

STUDENT: Kimberly Ogden Vitale (M.S.)

ADVISOR: Paul Sievert

FUNDING: MDFW, UMass

The four-toed salamander is a cryptic species for which we lack basic ecological information. Using drift fences and pitfall traps we captured 553 animals, and used CART models to determine that movements to wetlands were best predicted by little moon light, and significant rainfalls. We also used MassWildlife element occurrence data, along with field surveys, to develop a model of habitat use for the species. We found that occupied wetlands tended to be small, surrounded by a large proportion of forest, and typically had at least one nearby vernal pool. Field surveys indicated our models were 80% correct in predicting the presence of four-toed salamanders in wetlands of eastern MA. Thesis defense is planned for June 2013.

TITLE: Road passages for freshwater turtles

STUDENT: Derek Yorks (M.S.)

ADVISORS: Paul Sievert

FUNDING: MassDOT, MDFW

We used an outdoor laboratory to test under-road passages and barriers using 886 painted turtles, 53 Blanding's turtles, and 50 spotted turtles. Turtles moved through tunnels more readily when overhead lighting increased, whether this was natural or artificial light. Animals also used passages more readily when they were not embedded, had larger cross-sectional openings, and were shorter in length. Turtles moved more rapidly along barriers that were opaque, while translucent barriers slowed their movements, apparently due to animals attempting to get through the barrier. These findings have important implications for future construction, or refurbishing, of road passage structures for freshwater turtles.



Mike Jones tracking wood turtles. (Mike Jones)

Wood turtle populations appear to be in decline throughout their range in the northeastern United States and adjacent Canada.



Black and yellow morphs of the timber rattlesnake in Massachusetts. (Anne Stengle)

STUDENT: Michael Jones (Post-doc)

ADVISOR: Paul Sievert

FUNDING: USFWS, MDFW

During 2012, we began coordinating a 12-state effort to develop a status assessment and conservation strategy for the wood turtle (*Glyptemys insculpta*) in the northeastern United States, from Maine to Virginia. Our primary objectives are to (A) gather all available occurrence and population data for this region, and undertake a series of spatial meta-analyses to evaluate region-wide trends in abundance, occupancy, historic habitat loss, threats, and data deficiencies, and (B) to make general and specific recommendations regarding the status and conservation of wood turtles in the Northeast region and at two finer scales. Through this process we will generate Best Management Practices for multiple land-use scenarios, and evaluate detection protocols.

TITLE: Conservation of timber rattlesnakes in Massachusetts

STUDENT: Anne Stengle (Ph.D.)

ADVISOR: Paul Sievert

FUNDING: MDFW, UMass, NGS

The 2012 field season was the 4th year of a 5-year study examining habitat selection, connectivity, and viability of timber rattlesnake populations in southwest Massachusetts, along with documenting the prevalence of lesions on individuals, and describing the genetic differentiation of populations across the state. To accomplish these goals we have been tracking the movements of snakes using radio telemetry, gathering data on microhabitat selection, identifying new hibernacula, collecting tissue samples for DNA analysis, and beginning to develop models of population viability. To date, we have tracked 15 snakes per year, collected tissue samples from over 100 individuals, and collaborated with Tufts University to identify the cause of lesions in diseased snakes.



Blanding's turtle. (Derek Yorks)

Wildlife biologists have expressed concern for the conservation status of Blanding's turtle and suggested that the species warrants federal listing.

TITLE: Conservation of Blanding's turtles in the Northeast

STUDENT: Lisabeth Willey (Post-doc)

ADVISOR: Paul Sievert

FUNDING: USFWS, MDFW

In 2012, we began a 5-state study with the following objectives: 1) Develop a conservation plan for Blanding's turtle and associated Species of Greatest Conservation Need in the Northeast, including identifying spatially explicit conservation priorities. 2) Engage key partners, including state and federal transportation agencies, natural resources agencies, land trusts, municipalities, landowners, and other local stakeholders to implement priorities identified in spatially-explicit management plans. 3) Develop standardized monitoring protocols for Blanding's turtle across the Northeast region. During the first field season of surveys, we have identified previously unknown populations of Blanding's turtles and sites in need of protection.

Research Projects – Birds



Common loon (fws.gov)



Razorbills on Matinicus Rock, ME.
(Katie Kauffman)

Understanding what limits a species' distribution is central to ecology, but rarely realized. Such is the case for razorbills.



Sarah Spencer with an Atlantic puffin. (Paul Sievert)

TITLE: Foraging behavior and population biology of razorbills

STUDENT: Katherine Kauffman (M.S.)

ADVISOR: Paul Sievert

FUNDING: USFWS, NAS, UMass

From 2007 to 2009 we studied a colony of razorbills on Matinicus Rock, ME, the southernmost breeding site for this species. Based on our demographic parameter estimates, we expected the population to be decreasing at 1.6% per year, but instead it was increasing at 12.9% per year, indicating that there was a significant amount of immigration from other colonies. To study foraging behavior of breeding birds, we attached dive recorders to 4 individuals. Results showed that individual birds made an average of 140 dives per day, reaching a maximum depth of 36 m. Dives only occurred during daylight hours, and were most common late in the day, perhaps because of increased prey availability at that time.

TITLE: Feeding behavior and nest attendance of Atlantic puffins

STUDENT: Sarah Spencer (M.S.)

ADVISOR: Paul Sievert

FUNDING: USFWS, USGS

We quantified the diving behavior of Atlantic puffins by attaching time-depth recorders to 18 breeding birds from Petit Manan Island, ME. Data successfully retrieved from 13 birds showed that on average individuals made 275 dives per day, 86% of the dives were less than 15 m, and the maximum dive depth was 40 m. The mean length of a foraging trip was 60 min, indicating that birds were likely feeding within 30 km of the nesting colony. In addition to feeding behavior, we attempted to relate physical characteristics of the nest site to reproductive success, but no variables were found to have significant explanatory power.



Short-tailed albatross. (Hiroshi Hasegawa)

Short-tailed albatross were once declared extinct, but a small group of birds survived at sea, and founded the recovering population we see today.



Pam Loring with an American oystercatcher. (Pam Loring)

TITLE: Short-tailed albatross ecology and conservation

STUDENT: None

ADVISOR: Paul Sievert

FUNDING: USFWS, YIO

From 2002 to 2012, we used satellite transmitters to follow the movements of 40 adults, and 59 juvenile short-tailed albatrosses as they travel the north Pacific Ocean. Birds were found to forage in the Sea of Okhotsk, Bering Sea, along the Aleutian Islands, and down the west coast of North America. From 2008 to 2012, we translocated 69 chicks from the main colony on Torishima, to the site of a former colony on Mukojima. Chicks were hand-reared and all successfully fledged. To date, 17 of the translocated chicks have returned to Mukojima, and in 2012 a translocated bird mated with an unbanded bird and laid the first egg at this site since the colony was extirpated in the early 1900s.

TITLE: Coastal & marine birds & offshore energy development

STUDENT: Pamela Loring (Ph.D.)

ADVISOR: Paul Sievert and Curt Griffin

FUNDING: NSF, USFWS, BOEM

During 2013 we plan to begin studying the movements of common terns and American oystercatchers relative to the proposed site of a proposed wind farm in Nantucket Sound, MA. Small 1 g VHF transmitters, known as NanoTags, will be attached to 50 common terns and 10 American oystercatchers and monitored using an array of 7 receiver stations strategically located around the perimeter of the region. Movements of birds will be monitored during the breeding period, and also during the pre-migratory staging period to identify possible overlaps with the footprint of the planned wind turbines. Pilot data were collected in 2012 to help inform the siting of receiving stations and to test the effectiveness of the tracking technology.



Wood thrush. (fws.gov)

Both early and late seral stage forest can be important for population viability of some forest birds.



American robin feeding on an urban lawn. (fws.gov)

Urban environments, particularly urban forests, provide habitat for a large array of birds.

TITLE: Wood thrush use of early and late seral forests

STUDENT: Scott Schlossberg (Post-doc)

ADVISOR: Steve DeStefano and David King

FUNDING: USFWS, USGS, USFS, UMass

Creation of early-successional habitat is controversial because of perceived conflicts with conservation of mature-forest birds. Nonetheless, many mature-forest birds, especially fledglings, use early-successional habitats during the post-breeding period. We examined landscape-scale effects of early-successional habitat created by logging on wood thrushes (*Hylocichla mustelina*) in western Massachusetts. We found no differences in nest success, fecundity, and post-fledging survival between the 2 types of landscapes. Abundance, however, was significantly greater on sites with early-successional habitat. We conclude that in forested landscapes, creation of early-successional habitat is compatible with viable and robust populations of wood thrushes.

TITLE: Urban forest bird communities in northeastern cities

STUDENT: Susannah Lerman (Post-doc)

ADVISOR: Steve DeStefano and Keith Nislow

FUNDING: USFS, NSF, USGS

Aspects of this study address urban forests and urban forest bird communities. Recently, we integrated wildlife suitability indices (SI) to an existing national urban forest assessment tool, i-Tree. Urban parks, vacant lots, and residential land uses had high SI scores for most of the species, and species of conservation concern in particular (e.g., scarlet tanagers, wood thrushes). This suggests that when managed for wildlife, these urban land uses have the potential to support rare species. Residential land uses had the highest SI score for Baltimore oriole and although this land use scored low for wood thrush, the patterns suggest the existence of potential habitat and the conservation value of residential areas. Results from this study will help guide and improve the suitability of urban forests for birds.



Ring-billed gull marked with a ptagial tag. (Mass DCR)

Gulls marked in Massachusetts have been seen from as far away as Florida, Manitoba, and the maritime provinces of Canada.

TITLE: Gulls use of municipal public water supplies

STUDENT: Dan Clark (Ph.D.)

ADVISOR: Steve DeStefano

FUNDING: MDCR

The Quabbin and Wachusett reservoirs are the largest bodies of freshwater in Massachusetts and attract thousands of migrating and resident water birds, including ring-billed and herring gulls. Because the reservoirs are unfiltered, protection is critical to maintaining clean water. We examined the inland ecology of gulls in relation to protecting source water quality; objectives were to identify roosting behavior, understand foraging ecology, and determine seasonal movements within Massachusetts and throughout the Northeast. Through both visual markers (wing-tags and leg bands) and satellite telemetry, we documented seasonal movements and foraging ecology of >1,500 birds. Information will be used to develop a comprehensive management strategy to minimize the presence of gulls on each reservoir.

Research Projects – Mammals



Black bear female and cubs (Dave Wattles)



Dave Wattles (on laptop) and his field assistant, Ken Berger (with antenna) remotely download location data from GPS collars on moose. (Tom Wattles)

Moose populations along the southern edge of the range throughout North America are declining dramatically; southern New England appears to be different.



A moose browses vegetation in a control plot at one of 15 sites with experimental exclosures located throughout central Massachusetts and northern Connecticut. (Ed Faison)

TITLE: Moose ecology and landscape use in Massachusetts

STUDENT: Dave Wattles (Ph.D.)

ADVISOR: Steve DeStefano

FUNDING: MDFW

Analysis of GPS data from about 30-35 moose and about 130,000 locations has been progressing and is focused on habitat use, home range, movements, and thermoregulatory behavior. Moose are using a wide variety of forested and wetland cover, particularly early successional forest. Daily movements have averaged about 2,000 m per day, and up to 8 km during the rut (with a longest recorded distance of 26 km). Moose are making use of thermal cover, such as wooded wetlands, conifer stands, and other wetlands, to limit their exposure to heat stress during spring-fall. Completion is anticipated during fall-winter 2013-2014.

TITLE: Effect of moose and deer browsing on forests

STUDENT: Ed Faison (Ph.D.)

ADVISORS: Steve DeStefano and David Foster

FUNDING: MDCR, MDFW, HF, Highstead, UMass, USFS

Since 2007 we have monitored up to 15 sets of experimental exclosures in central Massachusetts and northern Connecticut. This year 5 sites had 4-5 growing seasons and data were analyzed for effects of moose and deer browsing. Tree density and species richness in woody species >3 m were reduced by moose and deer browsing, but density and richness of stems <3m were not. Moose and deer reduced the proportion of early pioneer woody species and increased the proportion of mid-successional trees >3 m in height, altering community composition and increasing the rate of succession from pioneer to mature forest species. Relatively low densities of moose and deer altered forest dynamics beyond what would be predicted from their individual densities alone; however, they did not prevent regeneration or eliminate tree species from these developing stands.



Laura Conlee, Dave Fuller, and crew place a GPS collar on another black bear. (Dave Wattles)

The black bear population in Massachusetts has been growing in both numbers and distribution during the past few decades.



A striped skunk travels down a human footpath to the beach on Martha's Vineyard. (Luanne Johnson)

TITLE: Bear demography and habitat use in Massachusetts

STUDENT: Laura Conlee (Ph.D.)

CO-ADVISORS: Steve DeStefano and Rob Deblinger

FUNDING: MDFW

The current phase of the black bear project is in its 5th winter. This year 4 new GPS collars have been placed on denning females, bringing the total to 30 GPS collars placed on 17 bears. GPS data has revealed the wide use of urban habitats by bears in communities like Northampton. This includes visitations to anthropogenic food sources like backyard bird feeders. The Division and some towns are working to limit feeding of bears, and we are exploring the possibility of using stable isotope techniques to study bear diet in both urban and rural settings. Completion date is planned for 2015.

TITLE: Skunks and beach-nesting birds on Martha's Vineyard

STUDENT: Luanne Johnson (Ph.D.)

ADVISOR: Steve DeStefano

FUNDING: Antioch College, MDFW, various NGOs and grants

Data on population characteristics of the island skunks was summarized and compiled for 138 skunks, 50 of them with telemetry collars. Over 80% of captures were at a resource-rich beach site closest to development; estimated spring density was 8-10 skunks/km². An increase in female activity and occurrence of juveniles at this site coincided with the arrival of summer and anthropogenic subsidies on the beach. Human-related causes were responsible for 50% of mortality in our radio-collared sample of skunks and disease killed another 29%. Data on winter den site use is currently being analyzed. Initial findings indicate that skunks use den site habitat in proportion to its availability, which underscores the wide habitat breath of this species. Analysis of predation impacts on beach-nesting birds will take place this year. Completion is schedule for fall-winter 2013-2014.



A red fox gets its picture taken at a remote camera. (Mike Jones)

Bobcat populations have increased throughout much of their geographic range; in Massachusetts numbers have recently expanded to an estimated 1,200-1,300.

TITLE: Distribution of mesocarnivores in rural-urban areas

STUDENT: Eric LeFlore (M.S.)

ADVISOR: Steve DeStefano and Todd Fuller

FUNDING: UMass., USFWS

Camera traps (28-83) were placed in rural and suburban landscapes in the Pioneer Valley of central Massachusetts during fall 2011 and summer and fall 2012. Across the 3 seasons photographs from >3,000 trap nights were recorded. Of >1,100 positive photos (i.e., those that recorded a mammal), opossums were the most common (45%), followed by raccoons (23%), gray foxes (12%), coyotes (11%), red foxes (7%), bobcats (1.5%), and black bears (0.5%). Data are currently being compiled and analyzed.

Research Projects – Invertebrates



Green darner dragonflies (fws: J.N. Stuart/Creative Commons)



**Rare pine barrens ant species.
(Grace Barber)**

Most sand plain conservation has focused on charismatic species such as birds and butterflies, but overlooked the ant community which plays a foundational role in these systems.



Malaise trap used to capture emerging aquatic insects over a headwater stream. (Robert Smith)

TITLE: Ant diversity in barrens habitats of the Northeast

STUDENT: Grace Barber (M.S.)

ADVISORS: Paul Sievert and Aaron Ellison

FUNDING: HF, UMass

Inland pine barrens and sand plains are globally rare ecosystems that harbor unusual assemblages of organisms due to their well-drained sandy soils. Ants play an important ecological role in these systems as decomposers, soil mixers, seed dispersers, herbivores, predators, and prey. We conducted preliminary surveys of ant diversity at three pine barrens in 2012 and found 20-30 species present per site with some species being rare and others being obligate pine barrens species. This work will be expanded in 2013, and we will investigate the use of ants as an indicator of management and restoration success in these ecosystems.

TITLE: Spatial variation of stream insect emergence

STUDENT: Kristin Cheney (B.S.)

ADVISORS: Allison Roy and Robert Smith

FUNDING: Jane Hallenbeck Bemis Endowment for Research in Natural History

This study will examine spatial patterns of aquatic insect emergence within forested headwater streams in Massachusetts. The overall goals of the project are 1) to investigate timing and spatial distribution of aquatic insect emergence, and 2) to further characterize the biodiversity of headwater streams. In spring and summer 2013, adult aquatic insects will be collected from emergent structures, open water, and other substrates within the streams. We will compare 1) emergence density between locations within the stream, and 2) timing of emergence among species. The data will be used to inform the larger River's Calendar project, a citizen science project led by the UMass Water Resource Research Center in which anglers are gathering data on insect phenology as an indicator of climate change.

Research Projects – Human Dimensions



Teaching telemetry (Luanne Johnson)



Solar arrays, which look like bodies of water from the air, covering 81 ha on the Brookhaven National Laboratory. (Jennifer Higbie)

Coyote was the species reported most often by members of the public who called MassWildlife for information or assistance.



Coyote. (fws.gov)

TITLE: Wildlife Use of a Solar Array Farm

STUDENT: Jennifer Higbie (Ph.D.)

ADVISOR: Steve DeStefano and John McDonald

FUNDING: Brookhaven National Laboratory

Little is known about the impacts to wildlife of solar facilities. In 2010-2011, a 32 MW photovoltaic facility was built on 81 ha of cleared forest and old field habitat on Long Island. We propose to quantify wildlife use, calculate diversity indexes, and quantify usage of wildlife friendly fences, comparing data from habitats inside and outside the solar farm during the first 4 years post construction. Survey techniques include trail cameras, box traps, egg mass surveys, frog call surveys, bird point count transects, radio telemetry on box turtles, and vegetation transects. It is expected that species diversity inside the solar facility will be lower than outside, but will increase as vegetation becomes established. Understanding impacts to wildlife will help determine future best management practices to minimize impacts at future sites while creating suitable habitat for at least some wildlife species.

TITLE: Human-wildlife interactions in Massachusetts

STUDENT: Michael Huguenin (M.S.)

ADVISOR: Steve DeStefano and Rob Deblinger

FUNDING: MDFW

Interactions between humans and wildlife occur in various forms throughout the world. Interactions range from positive and gratifying to completely negative, which are alternatively referred to as conflicts. The goal of this study is to analyze wildlife report data generated through unsolicited telephone calls and electronic mail (email) received from the public. Analysis of wildlife report data will produce information that can be used to develop proactive management strategies effective at resolving human-wildlife conflicts. To date >3,000 reports have been compiled. Reports of carnivores were most common, followed by species involved in property damage (deer, beavers). Analysis of the data set is currently underway.

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Timber rattlesnake (Ann Stengle)