

## ALPHABETICAL LIST OF SPEAKERS WITH SHORT BIOGRAPHIES AND ABSTRACTS

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**Sarah Bean** has been a biologist at the New England Aquarium in the Rescue and Rehabilitation Department for five years responding to strandings and treating a variety of marine mammals and sea turtles in the Animal Care Center. Her primary focus is working with debilitated cold stunned sea turtles. Sarah is experienced in beach assessment and triage of marine mammals and sea turtles, as well as clinical care and post mortem exams. Sarah's future research interests include the application of stable isotope analysis to sea turtle trophic ecology.

### **Sea turtle rehabilitation: diagnosing and treating cold-stunned Cheloniidae**

When cold-stunned sea turtles arrive at the New England Aquarium after being rescued by the staff and volunteers of the Wellfleet Bay Wildlife Sanctuary, they arrive in a hypothermic, debilitated condition. The rehabilitation process can take weeks, months, or even years, employing a host of diagnostics from radiographs and blood analysis, to tracheal lavages and laproscopic procedures. Following rehabilitation, turtles are either transported to warmer waters off southern states such as Florida or released back into New England waters in late summer. Some turtles have a satellite tag applied to their carapace in order to monitor their post-release behavior and movement. Most of the turtles treated and released by the New England Aquarium are endangered Kemp's ridley (*Lepidochelys kempii*) sea turtles.

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**Barbara Brennessl**, Ph.D. is Goldberg Professor of Biology at Wheaton College in Norton, Massachusetts. Her recent research has focused on the Diamondback Terrapin (*Malaclemys terrapin*) and includes studies of nesting habitat and nest temperatures, studies of the "lost years" in the terrapin life cycle, pilot studies on headstarting and population genetic studies. She has traveled throughout the terrapin's range, met with researchers in terrapin habitats and written "Diamonds in the Marsh: A Natural History of the Diamondback Terrapin."

### **Diamondback Terrapin: Habitat, Conservation and Management**

The diamondback terrapin, *Malaclemys terrapin*, is the only known brackish water turtle in the United States. It can be found in warm, sheltered locations such as bays, sounds, estuaries, coastal rivers and mangrove swamps. Unlike other turtle species that are exclusively fresh water or marine, the diamondback terrapin prefers an environment with intermediate salinity. This medium-sized turtle can be found in coastal locations from Cape Cod, Massachusetts, the northernmost range of the species, to Corpus Christi, Texas. Mark/recapture studies, radio tagging, nest monitoring and other research has led to the identification of habitats that are required to support the life and activity stages of this salt marsh turtle. In addition to the marsh and coastal waters that are utilized by adult terrapins for foraging and mating, adult females require suitable upland habitat for nesting. Hatchling and juvenile terrapins remain in the salt marsh for several years under cover of *Spartina* and buried in the mud. The Northeast Diamondback Terrapin Working Group has identified threats to the species, including loss and/or degradation of coastal, marsh and nesting habitat, road mortality, drowning in crab pots and dredging activities. We have produced conservation guidelines that will be shared with town planners, conservation commissions and environmental groups to highlight some of the strategies that can be used to ensure the survival of this species.

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**Bradley W. Compton**, Research Associate, Department of Natural Resources Conservation, University of Massachusetts, Amherst, focuses on ecological modeling for conservation at landscape scales. His most recent publication is Compton, B. W., K. McGarigal, S. A. Cushman, and L. R. Gamble. In press. A resistant-kernel model of connectivity for amphibians that breed in vernal pools. *Conservation Biology*.

**Blanding’s Turtles in Sprawlville: Applied Modeling for Conservation**

Blanding’s turtles in the Northeast occur primarily in areas where suburban sprawl is rapidly changing the landscape. Increasing road densities and traffic rates associated with sprawl are continually increasing the probability that adult turtles, which move long distances among wetlands, will be killed by traffic. Road mortality is driving population declines across the eastern range. Given the large area requirements of Blanding’s turtles and the difficulty of detecting populations, traditional regulatory approaches which restrict or modify development projects near known species locations are insufficient. Such reactive approaches must be combined with strategic conservation efforts, which seek to proactively protect large blocks of habitat where populations are potentially viable. Population modeling can help us understand the effects of demographic changes (such as increased adult mortality) in hypothetical populations. In real populations, mortality is affected by spatial context—the configuration of wetlands and roads. Habitat models can identify areas where habitat is likely to support populations. Approaches that combine demographic models with models of habitat selection and movement patterns applied to GIS data (representing wetlands, land use and road traffic) can help focus conservation efforts in areas where populations are most likely to persist.

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**Lori Erb** works for the Massachusetts Natural Heritage & Endangered Species Program (NHESP) developing Turtle Conservation Strategies for the Spotted Turtle, Wood Turtle, Box Turtle, Diamondback Terrapin, and Blanding’s Turtle for the state of Massachusetts.

**NHESP Turtle Conservation in Massachusetts**

In Massachusetts, six of the ten native turtle species (excluding sea turtles) are state-listed and two of them are federally-listed. Turtles face many threats in Massachusetts, most importantly habitat loss, degradation, and fragmentation, road traffic, collection, and inflated levels of predation in suburban areas. The NHESP is working to minimize and, where possible, eliminate these threats. We are using UMass model results to identify focus areas for habitat protection and management. Turtle Habitat Management Guidelines are being developed and other educational materials have been created and are available for distribution. Through land protection, good local land use planning, innovative methods of habitat management, and education, we can improve the situation for turtles throughout the commonwealth.

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**Mark Grgurovic.** M.S. (February 2007) Department of Natural Resources Conservation, University of Massachusetts, Amherst. Blanding's turtle ecology and conservation in Eastern Massachusetts, examined home range, seasonal movement patterns, and within wetland habitat selection. In addition, from 2000-2006 Mark has been the lead Blanding's turtle survey coordinator for the Massachusetts Natural Heritage Endangered Species Program. Furthermore, Mark has been involved with a rare turtle nest protection program which incorporated a citizen science approach to protecting and monitoring turtle nests in central and eastern Massachusetts. Presenting with Susan Speak.

**Blanding's Turtle Research in Essex County, MA: Conservation and Citizen Science**

Analysis of aerial photographs and field surveys lead to the discovery of one of the largest population of Blanding's turtles in Massachusetts. A 1200-acre site in Essex County containing a diverse mosaic of wetlands including beaver impounded swamps, emergent marshes, streams, and over 70 vernal pools. Between 1999 and 2006, 54 adult Blanding's turtles have been individually marked. Ten of these turtles were tracked using radio telemetry over a 3-year period, revealing extensive use of the 1200-acre site. This information was compiled into a Tri-Town Blanding's Turtle Conservation Plan. This plan has helped the 3 towns target lands for acquisition, and to date over 300 acres have been protected. Radio telemetry data and fieldwork also revealed an important nesting area, situated at a high use soccer field. This area gave us a unique opportunity to incorporate local citizens with turtle conservation. Outreach to the community over the last four years has developed a loyal core of citizen scientists to help monitor the nesting behavior and hatching emergence of Blanding's, spotted, snapping, and painted turtles. During the last four years, over 100 volunteer citizen scientists have participated. Their participation has contributed to protecting over 200 individual turtle nests, resulting in over 500 hatchlings. Extensive dialogues and meetings continue with local officials, land managers and conservation groups to ameliorate the impacts of ATVs, mowing, poaching and a water construction projects. As the community awareness and participation grows, more people will become empowered to be stewards to their own environment.

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**Scott Jackson** has spent years investigating the impacts of roads, railroads, and highways on wildlife populations and ecosystems, as well as techniques for mitigating those impacts. He has been involved in the use of tunnels to facilitate amphibian and reptile movement across roads and development of more effective methods for evaluating the effectiveness of animal passage structures. He currently serves as Program Director for UMass Extension's Natural Resources and Environmental Conservation program and is based in the Department of Natural Resources Conservation.

**Addressing the Impact of Road Mortality on Turtle Populations**

Road mortality is one of the most serious threats to populations of turtles in Massachusetts. As long-lived animals with low reproductive potential the loss to road mortality of even a small number of adults can lead to population decline and eventual loss. Over the past 20 years interest in the use of tunnel systems to facilitate movement of reptiles and amphibians across roads has steadily increased. It is not known how many of these structures have been constructed but it appears that few, so far, have been monitored to evaluate their effectiveness. As a result there remain many outstanding questions and issues about the appropriate design and use of tunnels for turtles. It is important that we evaluate tunnel systems for a broad range of amphibians and reptiles in order to identify the most effective designs for multi-species projects.

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**Mike Jones** is a Ph.D. candidate in Organismic and Evolutionary Biology at the University of Massachusetts Amherst. With Dr. Paul R. Sievert, Mike is studying the ecology of wood turtles (*Glyptemys insculpta*) in central Massachusetts.

### **Ecology and Conservation of Wood Turtles in Massachusetts**

Wood turtles are a familiar, distinctive, and charismatic component of New England's stream and upland fauna. Concern over their apparent decline has gradually led to comprehensive state-level protection across the northeastern U.S. and Maritime Canada. In the interest of determining the extent and cause of regional wood turtle population decline, in 2004 UMass and the Massachusetts Natural Heritage and Endangered Species Program (NHESP) initiated a four-year study of wood turtles in the Connecticut Valley. 100 adult wood turtles in 10 streams were radiotracked for periods ranging from 1 - 3 years. Initial findings support the growing understanding that mowers, brush-clearing equipment, and agricultural machinery are a serious threat to long-term population viability. At some sites, including the largest known population in the state, mortality due to mowing exceeds 10% annually. Fatalities resulting from automobiles, floods, collection, and predators, also represent significant threats to wood turtles. This study took place in varied environments across three counties, which has allowed a finer understanding of how wood turtles utilize upland habitats. Modeling and field surveys are underway to improve the effectiveness of private conservation efforts and state regulation. Private landowners can assist wood turtle conservation efforts by identifying upland habitat and clearing fields while turtles are hibernating from November – April.

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**Don Lewis.** Cape Cod Consultants; Mass Audubon; Mass Marine Educators. Since the 90s, Don has led research, rescue and conservation of marine turtles. His focus is the diamondback terrapin and his forte has been creating networks of citizen volunteers. Publications: *Strandings*, F&J Journal, 2007; *Review of Cold Stun Strandings on Cape Cod from 1979 – 2003* (Dodge, Prescott, Lewis, Merigo), 2004; *Tangled Turtles Get Help from Shore*, Natural New England, 2002; *Diamondback Terrapin: Saving America's Turtle*, Coastal Currents, 2001; *Mysterious Terrapin Die-Off on Cape Cod*, Turtle and Tortoise Newsletter, 2000; *Northern Diamondback Terrapin: Conserving a Bellwether Species*, Conservation Perspectives, 2000; and *A Too Brief and Woefully Incomplete Terrapin Primer*, Turtle and Tortoise Newsletter, 2000.

### **Diamondback Terrapins at the Edge**

Once hunted to near extinction to satisfy an insatiable appetite for spicy stew, the iconic and elusive terrapin faces extinction today not because of malicious intent, but rather “due to unintended consequences.” As development pressures coastal ecosystems and wild marshlands transform into suburban lots, critical upland nesting habitat vanishes, estuarine water quality plummets and pocket after pocket of terrapins face extirpation, often before they are even known to exist. Don will take us into the field with the northernmost population of terrapins through original video clips and compelling photography to showcase their habitat and explain their natural history. He will contrast an isolated, healthy population with a system pressured to the brink of extirpation. Don will emphasize the power of citizen science as a critical factor in winning the battle against extinction.

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**Ken MacKenzie**, Wildlife Biologist, Massachusetts Division of Fisheries and Wildlife, currently coordinates the Landowner Incentive Program (LIP) for the state. With over 80% of Massachusetts in private ownership, restoring and maintaining wildlife habitat on private lands is essential to the rare species that depend upon them for survival. The MassWildlife Landowner Incentive Program is a partnership that provides private landowners interested in restoring, creating and maintaining wildlife habitat on their property with financial and technical assistance for on-the-ground habitat management. For more info visit: [http://www.mass.gov/dfwele/dfw/dfw\\_lip.htm](http://www.mass.gov/dfwele/dfw/dfw_lip.htm)

### **Implementing Turtle Conservation Management Practices on Private Lands**

An important threat for many turtle species in Massachusetts is the lack of suitable habitat. The good news is that habitat can be restored. The Massachusetts Division of Fisheries and Wildlife recognizes the need for private landowners to get involved in habitat management across the state. This presentation outlines what some private landowners have done to restore turtle habitat on their land and offers a resource for technical assistance to plan a project and financial aid to implement it.

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**Joan Milam** received her Masters in Wildlife Biology from the University of Massachusetts where she studied home range, habitat use, and conservation of spotted turtles in central Massachusetts. After graduation she worked as an Aquatic Ecologist for the Massachusetts Audubon Society's Center for Biological Conservation and later as a Conservation Scientist in Audubon's Conservation Science and Ecological Management Division. Since then, Joan has worked as a private consultant providing field sampling and laboratory identification of aquatic invertebrates. She also worked for the Environmental Law Institute developing a comprehensive review of the science for compensatory mitigation performance standards.

### **Spotted Turtle Seasonal Movement Patterns, Habitat Use, and Conservation in Massachusetts**

Spotted turtles were studied at two sites in central Massachusetts from 1993-1995. Twenty-six individual turtles were radio-tracked for periods of one to two years. Spotted turtles used a variety of wetland habitat types in addition to extended excursions into adjacent upland forests. Most turtles exhibited a seasonal pattern of emergence from overwintering sites, overland travel to seasonal pools, nesting excursions, overland travel to estivation sites, and return to overwintering sites. Use of seasonal pools was extensive: 25 of 26 turtles spent 20-150 cumulative days per year ( $x = 80$ ) in pools. Use of upland habitat was substantial with 20 of 26 turtles estivating for periods of 2-93 days per year ( $x = 30$ ) in upland habitats  $\leq 412$  m from permanent wetlands. Ten of 12 females nested in fields 75-312 m from permanent wetlands. Twenty-four of 26 turtles nested or estivated well outside the 30 and 60 m-wide wetland buffers protected under the Massachusetts Wetlands' Protection Act. Declines in spotted turtle populations are linked to habitat loss and degradation, habitat fragmentation, road mortality, mowing, predation, and collection. The challenge presented for the future conservation of the spotted turtle is the permanent protection of upland-wetland habitat mosaics to promote adult survival and successful reproduction.

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**Maureen Murray, D.V.M.**, is a Clinical Assistant Professor at Tufts University Cummings School of Veterinary Medicine Wildlife Clinic. She works with injured and sick wildlife of all species and has a special interest in turtle medicine.

### **Turtle Health and Conservation**

The main threats to turtle health in Massachusetts result from human activity. The most common injuries seen at Tufts Wildlife Clinic are caused by encounters with motor vehicles. Bite wounds from dogs and ingestion of fishing hooks are also frequently seen. Turtles are challenging patients, but successful treatment and release back to the wild is possible in many cases. Most turtles seen at Tufts Wildlife Clinic are reproductive-age adults, with a large proportion being gravid females. Restoring the health of these individuals is increasingly important as turtle populations face mounting challenges to their survival.

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**Holly Niederriter**, Non-game Wildlife Biologist, Delaware Natural Heritage and Endangered Species Program and currently co-chair of Northeast Partners in Amphibian and Reptile Conservation. She studied ecology of eastern box turtles in an isolated woodlot for her master's thesis at the University of Delaware. In addition to many non-turtle projects, she is currently responsible for bog turtle survey and protection efforts in Delaware, has been working to protect diamondback terrapins from road mortality and is preparing to initiate a herp atlas for the state of Delaware.

**Northeast Partners in Amphibian and Reptile Conservation's** (NEPARC) goal is to conserve amphibians, reptiles and their habitats as integral parts of our ecosystem and culture through proactive and coordinated public/private partnerships in the Northeast. The driving force of NEPARC is the working groups, which are formed to work on specific projects. This presentation will spotlight those working groups and products, especially those with ties to turtles, and provide information on how to get involved. <http://www.pwrc.usgs.gov/nepar/>

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**Bob Prescott** is the director of the Massachusetts Audubon Society's Wellfleet Bay Wildlife Sanctuary located on Cape Cod where he has been actively involved in coastal issues and research. Bob has a degree in Wildlife Biology from the University of Massachusetts. He is also the National Marine Fisheries Service Southeastern Massachusetts coordinator for the Northeast Sea Turtle Stranding Network.

### **Sea Turtles of Massachusetts**

This presentation will discuss the five species of sea turtles found in Massachusetts waters and the threats to each of them. Leatherbacks (*Dermochelys coriacea*) return to our area in late June or early July and depart by late September or October. Ship strikes, plastic ingestion, and buoy line entanglement are their greatest threats. Our only records for green sea turtles (*Chelonia mydas*) and hawksbill sea turtles (*Eretmochelys imbricate*) are from strandings, mostly annual cold stunning episodes, and all records are of juveniles. In recent years we have also recovered a number of stranded hybrid sea turtles. The loggerhead (*Caretta caretta*) is the second most common species of sea turtle to strand in Massachusetts. All, except one, have been juveniles or sub-adults. Loggerheads are thought to spend the summer in our bays and sounds feeding on crabs and shellfish. The Kemp's ridley (*Lepidochelys kemp*) is the most frequently stranded sea turtle in Massachusetts. An increasing number of these 2–6 year old turtles are recovered, alive and dead, during annual cold stunning episodes.

**Alan M. Richmond**, Ph.D., is a leading northeastern herpetologist. He has taught the upper-level Comparative Anatomy and Herpetology courses in the UMass Biology Department since 1992. His interests range from snapping turtles to foreign motorcycles. He is 56 but doesn't look a day over 50.

### **Snapping Turtles and Stinkpots: What do We Know About these “Common “Species?**

Ten species of freshwater turtle occur in Massachusetts, three of which are considered common. Painted, snapping, and musk turtles occur throughout Massachusetts and are not protected under the Massachusetts Endangered Species Act.

Snapping turtles are the largest of New England's freshwater turtles and perhaps the most distinctive. While there have been no thorough studies of snapping turtle ecology in Massachusetts, their habitat preferences are well understood. They are aquatic habitat generalists found in nearly every type of water body from vernal pools to large rivers to brackish water marshes. Females produce large numbers of eggs each year. Adult snapping turtles have few natural predators. In Massachusetts they are classified as varmints. No license is required to kill them, and there is neither a closed season nor bag limit. As with most New England turtles, there are no data detailing the historic demography of the species.

Stinkpots are more enigmatic. Nothing substantial has been published on Massachusetts' stinkpots. Stinkpots are entirely aquatic and inhabit a variety of wetlands. They are largely nocturnal but occasionally bask. Stinkpots mature at 2–7 years of age and may live over 50 years. Adults and juveniles are eaten a wide variety of predators. Stinkpots range from the Connecticut River east with a handful of records from south Berkshire County. Only anecdotal observations support the assertion that the species is common.

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**Scott Smyers** is a Field Biologist at Oxbow Associates, Inc. a wetlands and wildlife consulting company specializing in rare amphibian and reptile study and mitigation. He received his M.S. from the University of Louisiana and has studied the behavior and ecology of amphibian and reptile species native to the eastern United States for more than 12 years. He has conducted field research on five species of turtles in southern New England including radio-telemetry on four state-listed species of turtle in Massachusetts including the Blanding's turtle (*Emydoidea blandingii*), eastern box turtle (*Terrapene carolina carolina*), wood turtle (*Glyptemys insculpta*), and spotted turtle (*Clemmys guttata*: formerly listed). In addition, Mr. Smyers has assisted with amphibian and reptile studies on different state land managed by the Department of Conservation and Recreation, as well as land managed by private organizations such as The Nature Conservancy, and The Nantucket Conservation Foundation. Much of his research efforts have focused on Wachusett Mountain State Reservation where he works with volunteers from the Friends of Wachusett Mountain and students and faculty from University of Massachusetts at Lowell.

### **Nesting Activity Cycles and Embryonic Development of Blanding's Turtles, *Emydoidea blandingii*, Over Multiple Years of Monitoring from Central, Massachusetts**

We summarize population estimates and annual breeding cycles based on the results of monitoring several nesting sites located within a wetland habitat complex inhabited by one of the densest populations of Blanding's turtles, *Emydoidea blandingii*, in Massachusetts. One of us (BOB) has been marking turtles from this population for nearly 20 years. Between 2000 and 2006 we have been monitoring the nesting area and collecting standardized data, marking new turtles, measuring recaptured turtles, protecting nests with predator excluders, and evaluating hatchling characteristics. Upon emergence of hatchlings we record incubation period, survivorship, predation by non-

mammalian egg/neonate, measure and weigh hatchlings, and document shell abnormalities. Our results indicate that the population includes a minimum of 167 individual reproductive females, the number of females observed in nesting areas on a given year ranges between 46-77 animals, and protected nests range from 16-43 per year. We have also documented two invertebrate predators of eggs and neonates, including larval sarcophagus flies (Sarcophagidae) and unidentified ants of several species. Average incubation period varies from year to year and may affect malformations. In some comparisons, mean incubation period is significantly different between years, likely due to effective nest temperature. Our data suggests that shell malformations increase as incubation period decreases providing a link between temperature and moisture stresses during embryonic development and hatchling fitness, as some malformations may be severe. (Scott D. Smyers, Brian O. Butler, Christine G. Kavalauskas, and Brett A. Manson; Oxbow Associates, Inc., Acton, MA 01720)

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**Susan Speak** is an educator with the Ipswich Public Schools, in Ipswich, Massachusetts. For the past four years, she has worked both as a volunteer and then as the coordinator of the Blanding's Turtle Nest Monitoring Project in Georgetown, Massachusetts. Susan is a recipient of the Massachusetts Audubon's Conservation Teacher of the Year award. Presenting with Mark Grgurovic.

**Blanding's Turtle Research in Essex County, MA: Conservation and Citizen Science**

Analysis of aerial photographs and field surveys lead to the discovery of one of the largest population of Blanding's turtles in Massachusetts. A 1200-acre site in Essex County containing a diverse mosaic of wetlands including beaver impounded swamps, emergent marshes, streams, and over 70 vernal pools. Between 1999 and 2006, 54 adult Blanding's turtles have been individually marked. Ten of these turtles were tracked using radio telemetry over a 3-year period, revealing extensive use of the 1200-acre site. This information was compiled into a Tri-Town Blanding's Turtle Conservation Plan. This plan has helped the 3 towns target lands for acquisition, and to date over 300 acres have been protected. Radio telemetry data and fieldwork also revealed an important nesting area, situated at a high use soccer field. This area gave us a unique opportunity to incorporate local citizens with turtle conservation. Outreach to the community over the last four years has developed a loyal core of citizen scientists to help monitor the nesting behavior and hatching emergence of Blanding's, spotted, snapping, and painted turtles. During the last four years, over 100 volunteer citizen scientists have participated. Their participation has contributed to protecting over 200 individual turtle nests, resulting in over 500 hatchlings. Extensive dialogues and meetings continue with local officials, land managers and conservation groups to ameliorate the impacts of ATVs, mowing, poaching and a water construction projects. As the community awareness and participation grows, more people will become empowered to be stewards to their own environment.

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**Tom Tynning** is an Associate Professor of Environmental Science. Berkshire Community College in the Berkshires and has been collecting distributional data on regional amphibians and reptiles for nearly 30 years. His main research topic concerns the ecology and conservation of rare herps, particularly timber rattlesnakes in Western Massachusetts. Currently he has several students working on vernal pool projects and radiotelemetry studies with turtles. He wrote *A Guide to Amphibians and Reptiles* (Little, Brown and Co) for the Stokes Nature Guide series in 1990, accompanied by phenomenal drawings by local artist and naturalist, Andrew Magee.

### **An Overview of Turtle Studies**

Thirteen years ago a group of students, biologists, land managers, and citizens met at Worcester State College for the first time to consider the status of New England's turtle species. It seemed clear at that time, that some species were decidedly less common than early and historic reports suggested. In addition, there had been recent advancements in technology and new paradigms in the approach to chelonian research that had made detailed investigations of turtle life histories difficult at best previously. Several papers highlighted the use of radiotelemetry on various age groups of turtles while others featured results of long-term studies that required sophisticated analysis of population data. Still, one common concern voiced by many during that conference was the lack of current, detailed, and state-wide data that hampered management plans and other conservation needs for most species. Now, more than a decade later, we have before us a remarkable suite of studies and students, research and researchers, information and educators, who have taken to heart the essence of why we have gathered here today: a love for turtles and a desire to see all species continue to be vital parts of the Massachusetts landscape, from coastal estuaries to upland forests.

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**Alison L. Whitlock.** U.S. Fish & Wildlife Service, Hadley, MA.

Wildlife Research Specialist. Currently, Alison oversees grants to northeast states on amphibian, reptile, and endangered species projects. She is involved in regional working groups on bog and Blanding's turtle conservation, and is an adjunct faculty member at UMass Amherst. She developed predictive models for wetland-dependent turtles for her Masters thesis and studied bog turtle ecology for her Ph.D. Alison also has worked for non-profit groups such as TNC, as a private consultant, and as a 7<sup>th</sup>/9<sup>th</sup> grade teacher.

### **Federally Protected Turtles: Bog turtle and Northern red-bellied cooter**

Two of the eight species of freshwater turtles found in Massachusetts are federally protected by the Endangered Species Act. Bog turtles are the smallest and most endangered turtle in Massachusetts. Constrained by their specific habitat requirements and limited reproductive potential, bog turtles are further threatened by urban encroachment and poaching for the pet trade. Urban sprawl results in habitat fragmentation, increased road mortality, and altered hydrology and vegetation within their wetland habitats. An even more insidious conservation concern is that bog turtles are popular in the illegal pet trade in the U.S. as well as abroad. Basic ecology of this unique turtle will be presented, threats explained, and conservation actions will be discussed. The Northern red-bellied cooter, formally known as the Plymouth redbelly turtle, is found in only one county of the state although it is closely related to the red-bellied cooters commonly found from New Jersey to North Carolina. The natural history of, the threats to, and conservation actions taken for, the cooter will be presented, along with a discussion on the process of federal listing under ESA.

**Liz Willey** is a graduate student in Organismic and Evolutionary Biology at the University of Massachusetts, Amherst, and has completed her second of four field seasons studying box turtles in the Connecticut River Valley with Dr. Paul R. Sievert. Their team has marked and tracked turtles at seven sites, examining population characteristics, home range sizes, habitat use, and potential threats, in order to develop a conservation plan for the species in the region.

### **Conservation of Box turtles in the Connecticut Valley, Massachusetts**

Eastern box turtles (*Terrapene c. carolina*) are declining throughout their range as a result of habitat loss and fragmentation, road mortality, and collection for the pet trade. They are listed as a Species of Special Concern in Massachusetts where development pressures add to climatic stresses at their northern range limit. Results from mark-recapture and telemetry efforts throughout the Connecticut Valley over the past two years indicate that box turtles can move a straight line distance up to 2.2 km annually to access required habitats. Box turtles use deciduous and mixed forest types over the winter and heavily managed early successional habitats such as agricultural fields, backyards, powerline corridors, and abandoned gravel pits from May – September. Road and mowing mortality, collection, and disturbance of nest sites by ATVs could lead to population decline even at protected sites throughout the region. Appropriately timed management of habitats, education regarding collection, and human use restrictions on nest sites could help mitigate the continued loss of habitat across the state.

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**Leigh Youngblood**, Executive Director of Mount Grace Land Conservation Trust, has completed or supervised hundreds of land protection projects with landowners. Leigh's belief in the effectiveness of a cooperative approach to achieving Mount Grace's mission has led to many successful partnerships with land trusts of all sizes, state agencies, and multi-level collaboratives.

### **Land Protection for Turtle Habitats**

There are various methods of protecting designated habitats today and into the future. Conservation restrictions and transfers of land, gifts, sales, and bargain sales are options that provide differing values to wildlife and landowners. This brief introduction will point out key elements of each option and recommend follow-up steps for interested landowners.