

AMERICAN TURTLE OBSERVATORY

2015 YEAR-END REPORT



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Liz Willey, Ph.D.* (President & Secretary) serves on the faculty in the Environmental Studies Department at Antioch University New England in Keene, New Hampshire. Liz has worked with over a dozen species of freshwater turtle in eastern North America.

Mike Jones, Ph.D.* (Executive Director & Treasurer) is a biologist in the Department of Environmental Conservation at the University of Massachusetts in Amherst, Massachusetts. Mike has coordinated studies of turtles in Mexico and the USA. Mike was the lead author and co-editor of *Eastern Alpine Guide* and lead author of *Status & Conservation of the Wood Turtle in the Northeast*.

Marlissa Briggett has been practicing law since 1991, and has been actively involved in city government in Cambridge and Arlington, Massachusetts. Marlissa has served as an attorney-advisor to the United States Commission on Human Rights.

Tom Akre, Ph.D.* is an ecologist with the Smithsonian Conservation Biology Institute in Front Royal, Virginia, where he is the director of Virginia Working Landscapes. Tom has coordinated studies of freshwater turtles in the United States, Mexico, and Venezuela.

Jonathan Mays* is a research biologist with the Florida Fish and Wildlife Conservation Commission in Gainesville, Florida, where he studies spotted turtles, Barbour’s map turtles, alligator snapping turtles, and Keys striped mud turtles. Jonathan is a partner on box turtle studies in Florida. Previously, Jonathan was the herpetologist for the Maine Department of Inland Fisheries and Wildlife.

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Scott Angus* is a biologist with diverse experience studying birds, snakes, and turtles in the mid-Atlantic region. Scott served as the co-chair of NEPARC from 2011 to 2013.

David M. Carroll is an artist and naturalist from Warner, New Hampshire, and is the author of four nationally-acclaimed natural history books on wetland ecology and conservation including *The Year of the Turtle*, in which he captures the annual cycles of the spotted turtle.

Noah Charney, Ph.D.* is a wildlife biologist and landscape ecologist at Bryn Mawr University in Bryn Mawr, Pennsylvania. Noah applies novel analytical methods to large ecological datasets to describe trends.

Phillip deMaynadier, Ph.D. is a biologist for the Maine Department of Inland Fisheries and Wildlife in Bangor, Maine, where he serves as leader for the Reptile, Amphibian, and Invertebrate Group.

Lori Erb* is a bog turtle program manager for the Mid-Atlantic Center for Herpetology and Conservation; previously, she was the Turtle Conservation Biologist for MassWildlife.

Luis Diaz Gamboa teaches herpetology at the *Universidad Autonoma de Yucatán* (UADY) in Merida, Yucatán. He coordinates field studies of freshwater turtles on the Yucatán Peninsula.

Erika Gonzalez is a botanist and ecologist with the Smithsonian Conservation Biology Institute.

Mark Grgurovic is a biologist in Massachusetts with >15 years experience studying Blanding’s turtles and other species.

Charles Innis, VMD, DAVBP(RA) is the lead veterinarian for the New England Aquarium and has extensive experience with freshwater and marine turtle conservation. In 2015, Charlie co-led efforts to provide veterinary care to 4,000 confiscated Palawan forest turtles.

Glenn Johnson, Ph.D. is the Chair of the Biology Department at the State University of New York in Potsdam, New York. Glenn coordinates turtle studies throughout northern New York.

Mckenzie Jones is the sustainability specialist for the city of Flagstaff, Arizona’s, where she works on land conservation projects.

John D. (JD) Kleopfer* is a herpetologist with the Virginia Department of Game and Inland Fisheries (DGIF) in Charles City, Virginia.

Betty Mobbs* supervises a sixteen-year study of eastern painted turtle in eastern Massachusetts.

Dr. Rodrigo Macip Ríos* is an Assistant Professor at the *Universidad Nacional Autónoma de México* (UNAM); in Morelia, Michoacan, México, where he studies the ecology of Kinosternid (mud) turtles.

Alan M. Richmond, Ph.D. teaches herpetology, comparative vertebrate anatomy, and marine vertebrates at the University of Massachusetts, and edits the “Geographic Distribution” section of *Herpetological Review*.

Peter A. Rosenbaum, Ph.D. is a Professor of Biological Sciences at the State University of New York at Oswego where he coordinates long term studies of bog and spotted turtles, and teaches evolutionary biology, environmental issues classes, and genetics.

Angelena Ross is a wildlife biologist with the New York State Department of Environmental Conservation, where she leads conservation programs for Blanding’s turtle.

Will Selman, Ph.D.* is a wildlife biologist for the Louisiana Department of Wildlife and Fisheries, and the research coordinator for the Rockefeller Wildlife Refuge. Will has published numerous papers on the ecology of freshwater turtles, including sawbacks and terrapins.

Paul Sievert, Ph.D. is a Research Professor with the Department of Environmental Conservation, where he also served as the Assistant Unit Leader for the USGS Cooperative Fish & Wildlife Research Unit.

Ed Thompson is a biologist for the Maryland Department of Natural Resources. He leads studies of hellbenders, wood turtles, and other species.

Andrew Whiteley, Ph.D. is a conservation geneticist at the University of Massachusetts Amherst, where he is the principal investigator of a region-wide wood turtle genetics study.

Derek Yorks* is a wildlife biologist with the Maine Department of Inland Fisheries and Wildlife in Bangor, Maine, where he coordinates field studies of rare turtles, snakes, and invertebrates.

Brian Zarate is a biologist with the New Jersey Division of Fish and Wildlife’s Endangered and Nongame Species Program.

* = ATO grants committee

On the cover: Female Florida box turtles (*Terrapene bauri*) at Rookery Bay National Estuarine Research Reserve, Florida—one of ATO’s long term study locations. Photo © M.T. Jones / ATO





For updates on conservation planning efforts for wood and Blanding’s turtles in the Northeastern USA, see p. 5–6.

In this Report

Our first annual report outlines many of the projects ATO and partners have been working on throughout North America, from wood turtles in the northeastern streams to box turtles in Yucatan’s dry forests.

The report is broken into several sections: (1) an **overview** of the new organization; (2) an update on **collaborative regional conservation projects** for wood and Blanding’s turtles (both widespread, threatened species); (3) spotted turtle project updates from Maine to Florida and an update on regional conservation planning; (4) an overview of ATO’s growing network of **box turtle observatories**; (5) highlights from **partner projects** in Yucatán, the Florida Keys, and Oaxaca; and (6) a brief spotlight on six exciting projects that ATO is supporting in its first round of **grants** for North American freshwater

turtle conservation. Our initial round of grants included projects in Baja California, the southeastern USA, Nevada, Michigan, Ontario, and New York.

American Turtle Observatory, together with parters and collaborators, accomplished a lot in 2015, thanks to the generous support of partners, supporters, and advisors! We hope you find information of interest in this report. If you’re not familiar with freshwater turtles, we hope you’re inspired by the photos. Every photo in this issue was taken in the turtle’s natural habitat.

For more information on projects not addressed in this report, visit <http://americanturtles.org>.



For photos and updates from spotted turtle projects from Maine to Florida: pp. 7–10.



For photos and updates from ATO partners, see pp. 14–17.



For an update on ATO’s first small grants awards, see p. 18.



AMERICAN TURTLE OBSERVATORY



Wood turtle, *Glyptemys insculpta*. Hatchling in Maine.
Photo: M.T. Jones / ATO

Launch of American Turtle Observatory: Our Mission & Vision

WOW!! WHAT A YEAR. IN 2015, American Turtle Observatory launched with a clear mission to *identify and conserve North America's most important habitats for freshwater turtles*. We have an exceptional founding advisory board and board of directors, a strong network of partners, and an a number of strong programs underway (which are highlighted in this report). At the end of 2015, four distinct trends give cause both for concern and optimism.

On the discouraging side, (1) **North American freshwater turtles are bearing the brunt of an illicit, increasing wildlife trade**. Numerous confiscations at Asian ports, and many domestic arrests, demonstrate that wildlife traffickers continue to operate largely under the radar in North America, removing native turtles from natural landscapes for profit. This is unfortunate (to say the least) at a point when many remaining populations of wood, box, bog, Blanding's, spotted, and other turtle species perch on the edge of viability in fragmented and degraded landscapes. Further, (2) many populations **North American turtles are threatened by an increasingly erratic and changing climate**, resulting in rapid environmental change, from drought and massive fires in California, to seawater intrusion in southern Florida, to destructive overwash and flooding in the Northeast. Despite turtles' extreme adaptability over evolutionary time scales, we see evidence that some important populations may not survive the synergistic effects of habitat fragmentation and climate change.

But on a positive note, (3) we **understand freshwater turtles better than ever**. Refined molecular techniques now allow scientists to identify distinct and significant lineages and estimate divergence times. Improved mapping tools and computing power allow researchers to model current and projected habitats and distribution.

Along these lines, (4) we see clear signs of increasing collaboration and cooperation across state and national boundaries to maximize our collective effectiveness when identifying priority habitats, quantifying trends, and prioritizing limited resources. As examples: the Northeast Wood Turtle Working Group is in its 7th year (p. 5), and the Northeast Blanding's Turtle Working Group is now in its 12th year working together to conserve important habitats (p. 6). Partners from Maine to Florida are beginning to coordinate survey and conservation efforts for spotted turtles (p. 7–10), and ATO has developed a network of box turtle observatories spanning from Yucatán, to Everglades, to New England (p. 11–14).

We believe that our emphasis on **functional landscapes** and **functional populations** is unique. To be successful, we'll need your support in order to reach diverse audiences and constituencies and to build successful, long-term partnerships for conservation. Consider joining a regional conservation team or working group (learn more in the following pages). Please keep sending turtle data to your state natural heritage programs and herp atlas programs. Stay informed about important policy decisions that affect land conservation, or those that affect turtles in need of conservation. **2016 will be a critical year for ATO**, as we refine our long-term strategic objectives, launch new priority projects, and push forward on conservation actions identified through cooperative planning and intensive field surveys.

Thanks for your support and partnership!


Mike Jones
Executive Director


Liz Willey
Board President



Where We Work: Focal Landscapes

ATO FORMED IN THE NORTHEASTERN USA and is strongly invested in the region from Maine to Virginia. In addition, we strategically pursue long-term research, landscape protection, and policy review in landscapes supporting high species richness/diversity and those that support range-restricted turtles of conservation concern. To delineate new focal landscapes, we conducted a preliminary quantitative analysis, described below.

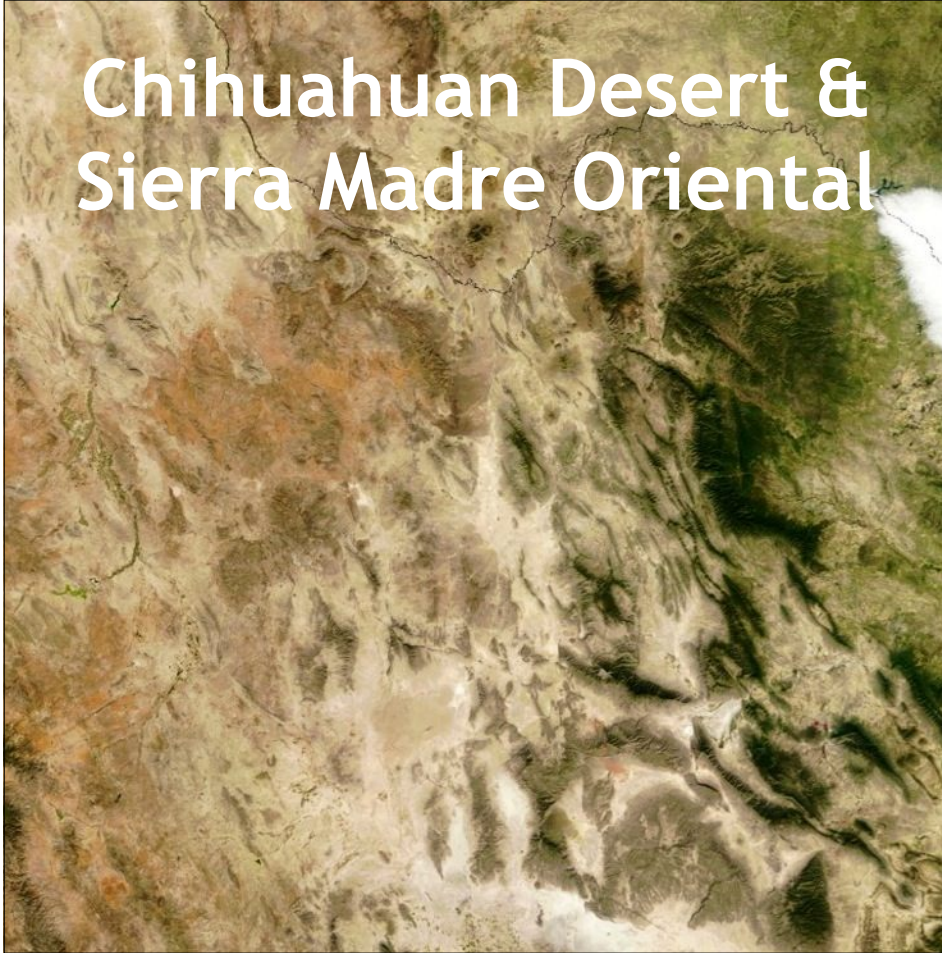
To develop a network of **focal landscapes based on species richness** (the number of species present in a given ecoregion), we built range maps for 137 North American taxa (species, subspecies, and evolutionarily significant lineages) using published range maps, available museum data, and published occurrence data. The most species-rich ecoregion (Southern Coastal Plain; identified by Kurt Buhlmann and colleagues as a global turtle hotspot) was identified as a Focal Landscape; subsequent Focal Landscapes were identified based on their contribution to the overall turtle fauna covered. We identified a total of four Focal Landscapes, which, together the Northeast USA, support 74 taxa or 54% of North American turtles. Seven additional ecoregions were identified as secondary priorities for the conservation of freshwater turtle diversity (more info is on our website).

Southern Coastal Plain, including the Suwannee, Apalachicola, Escambia, and Pearl Rivers in FL, GA, AL, MS, and LA, supports ~46 turtle taxa—31% of the continental fauna—including the highest species richness of mud turtles, map turtles, river turtles, snapping turtles, and softshells.

Chihuahuan Desert ecoregion in Texas, Coahuila, Chihuahua, and Durango, supports 15 turtle taxa, 11% of the continental fauna. This region supports the endemic Bolsón tortoise and Coahuilan box turtle.

Sonoran Desert and northern **Sierra Madre Occidental**, including the Madrean Sky Islands of Sonora, AZ, and NM support 15 turtle taxa—11% of the continental fauna. This focal region supports desert tortoise, Yaqui slider, spotted box turtle, desert box turtle, and Sonora mud turtle.

Yucatán Peninsula-Gulf Coastal Plain in Campeche, and Gulf regions of Tabasco and Chiapas support 14 turtle taxa—10% of the continental turtle fauna. This focal region supports the Central American river turtle, furrowed wood turtle, Yucatán box turtle, Creaser's mud turtle, and other species from eight major lineages of freshwater turtle.



Wood turtles, *Glyptemys insculpta*. At right: Capsized mated pair detected during a standardized survey. Photo: Derek Yorks / Maine IF&W. At page bottom: Male #103 photographed in 2004, 2006, and 2013 during long-term studies in Massachusetts. Photos: M.T. Jones / ATO.



Wood Turtle Conservation Planning from Maine to Virginia

Michael Jones (mtjones@bio.umass.edu) and **Thomas Akre**, co-chairs, Northeast Wood Turtle Working Group

SINCE 2009, wood turtle specialists from Maine to Virginia have coordinated survey and conservation efforts to better understand the distribution and status of the wood turtles—formerly, an extremely abundant species in the coldwater streams of the Northeast. The Northeast Wood Turtle Working Group (NEWTWG) was convened by biologists through Northeast Partners for Amphibian and Reptile Conservation (NEPARC). Today, the NEWTWG includes representatives of the U.S. Fish and Wildlife Service, the U.S. Geological Survey, Smithsonian Conservation Biology Institute, state wildlife agencies from Maine to Virginia, and several state universities.

In 2015, the NEWTWG and the Northeast Association of Fish and Wildlife Agencies published *Status and Conservation of the Wood Turtle in the Northeastern United States*, which used quantitative analyses to estimate the extent of recent range contraction (the status assessment is available at rcngrants.org and at americanturtles.org/wood-turtle).

Using standardized stream surveys and GIS-based landscape analysis, we estimated that over 50% of

potential stream habitat in the Northeast Region may have been impaired by urbanization and deforestation to a level that negatively influences wood turtle abundance. Further, our results strongly suggest that wood turtle abundance is influenced by urbanization and deforestation at relatively large scales, larger than the annual home ranges of wood turtles and protections that are in place for them. Of the Northeastern States, New Jersey and Maryland appear to be the most potentially impaired states in the Northeast Region, with over 80% of SDM stream habitat having similar urbanization and deforestation characteristics as survey sites with negative survey results. Maine, West Virginia, and New Hampshire have the largest proportion of non-impaired habitats.

In 2015, ATO continued to monitor a network of 18 rivers from **Northern Maine** to **western Massachusetts** as a complement to ongoing regional coordination. Within this region, we have marked over 1700 wild wood turtles since 2004. In November, the WTWG provided formal comment to the U.S. Fish and Wildlife Service on their consideration of the wood turtle as a federally threatened species.




2004



2006



2013



Blanding's turtle, *Emydoidea blandingii*. At right: Adult female from a priority conservation area in Maine. Photo: M.T. Jones / ATO

A Conservation Plan for Blanding's Turtles in the Northeastern USA

Lisabeth Willey (lwilley@antioch.edu) and **Michael Marchand**, co-chairs, Northeast Blanding's Turtle Working Group

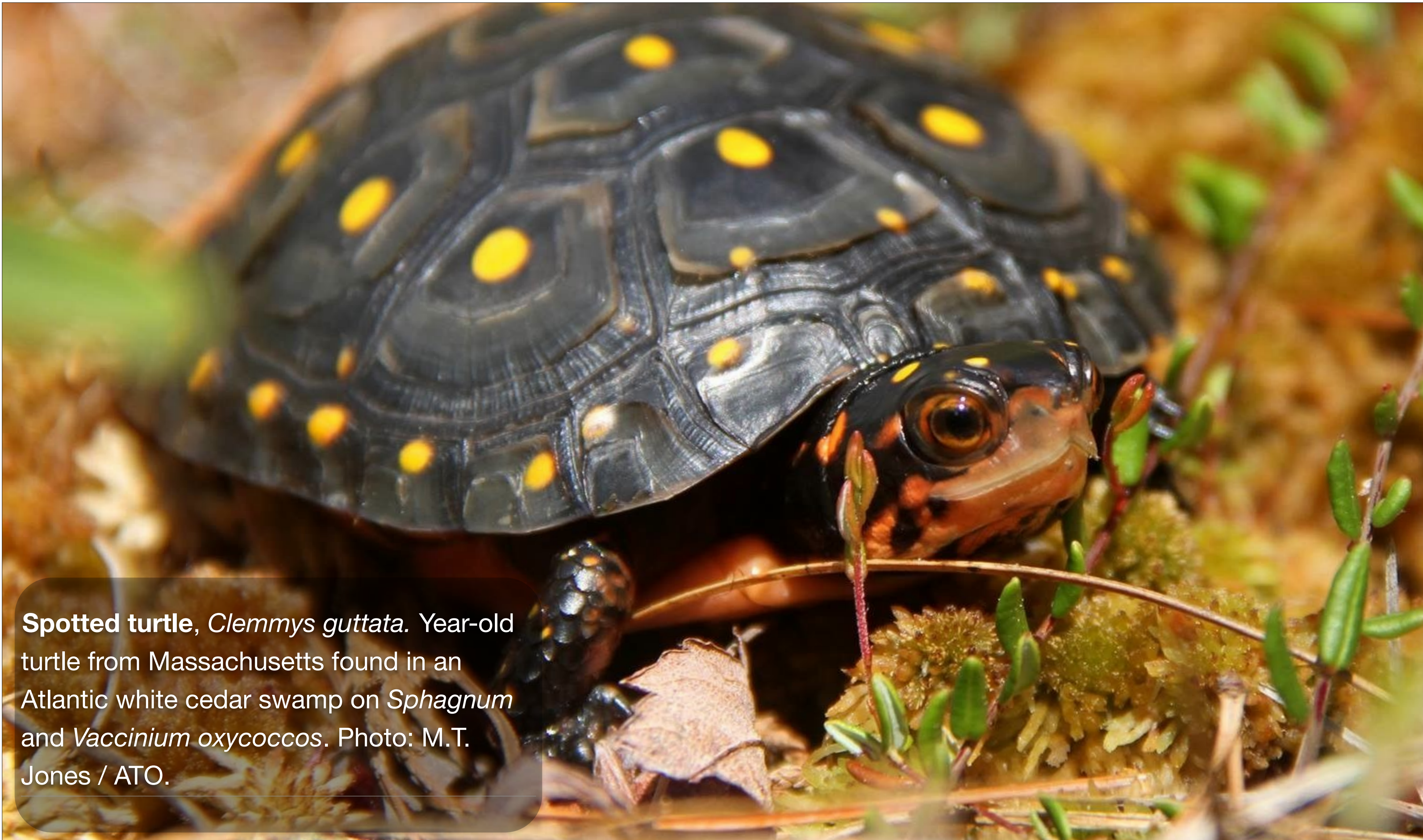
BLANDING'S TURTLE (*Emydoidea blandingii*), with its characteristic yellow throat and high-domed shell, is a mid-sized Emydine species found primarily in the Great Lakes region with several disjunct populations in the northeastern temperate forest of the U.S. and Canada. It occupies herbaceous and scrub-shrub freshwater wetlands and vernal pools, but it makes long overland movements, frequently more than a kilometer at a time, in order to access other wetland or nesting features. If not killed on a road during one of its upland forays, this turtle can likely live for 70 years or more. This turtle's mild manner and seemingly perpetual grin belie the fact that it is declining throughout its range due to habitat loss and fragmentation, roadkill, and other anthropogenic factors. As a result, Blanding's turtles are listed as Endangered by the IUCN, are a "species of greatest conservation need [SGCN]" in every state in which they occur, and are currently under consideration by the U.S. Fish and Wildlife Service for "Threatened" listing.

Since 2004, partners in the northeastern U.S. have been working together to conserve this species. In 2014, ATO, as a member of the Northeast Blanding's Turtle Working

Group, together with partners from Maine, Massachusetts, New Hampshire, New York, and Pennsylvania, completed a *Conservation Plan for Blanding's Turtle and Associated Wetlands Dependent Species of Greatest Conservation Need in the Northeast*. The Plan identified the 36 highest priority landscapes for Blanding's turtles in the Northeast based on habitat suitability, landscape integrity, and results from standardized field-sampling conducted by regional partners. For each of the high priority sites, we designated site leaders and for half of them, we developed site-specific management plans that identified specific actions to protect the population and associated habitat.

We are currently working to secure funds to implement the important actions identified in the Plan, from completing management plans for the remaining high priority sites, to nest site creation and population augmentation through head-starting efforts, to additional surveys and radio-telemetry work to understand habitat use. For more information or to get involved in this effort, visit: <http://blandingsturtle.org> and reach out to the agency coordinator for your state.





Spotted turtle, *Clemmys guttata*. Year-old turtle from Massachusetts found in an Atlantic white cedar swamp on *Sphagnum* and *Vaccinium oxycoccos*. Photo: M.T. Jones / ATO.

Regional Conservation Planning for the Spotted Turtle (*Clemmys guttata*) in the Eastern USA

Partners: Lisabeth Willey, Michael Jones, Jonathan Mays, J.D. Kleopfer, Thomas Akre, Derek Yorks, Trevor Persons, Lori Erb, Charles Innis, Dirk Stevenson, Danielle O'Dell, Scott Angus

IN THE NORTHEAST, spotted turtles are silent harbingers of spring: As the snow melts in February, March, and April, wood frogs, spring peepers, and chorus frogs may steal the show with boisterous calls, but the spotted turtle offers a more subtle and graceful signal that the icy grip of winter has given way. Unlike the amphibians, in most areas, you can't simply drive along the road or stand in your backyard to observe spotted turtles. It takes some work to see their brilliant yellow spots, stark against a black carapace, as they bask atop a tussock or cruise along the bottom of a seasonal pool.

According to several 19th century naturalists, it wasn't always difficult to catch a glimpse of these elusive turtles: spotted turtles were apparently abundant in Massachusetts and New York. But as their preferred seasonal wetlands were filled, and habitats fragmented,

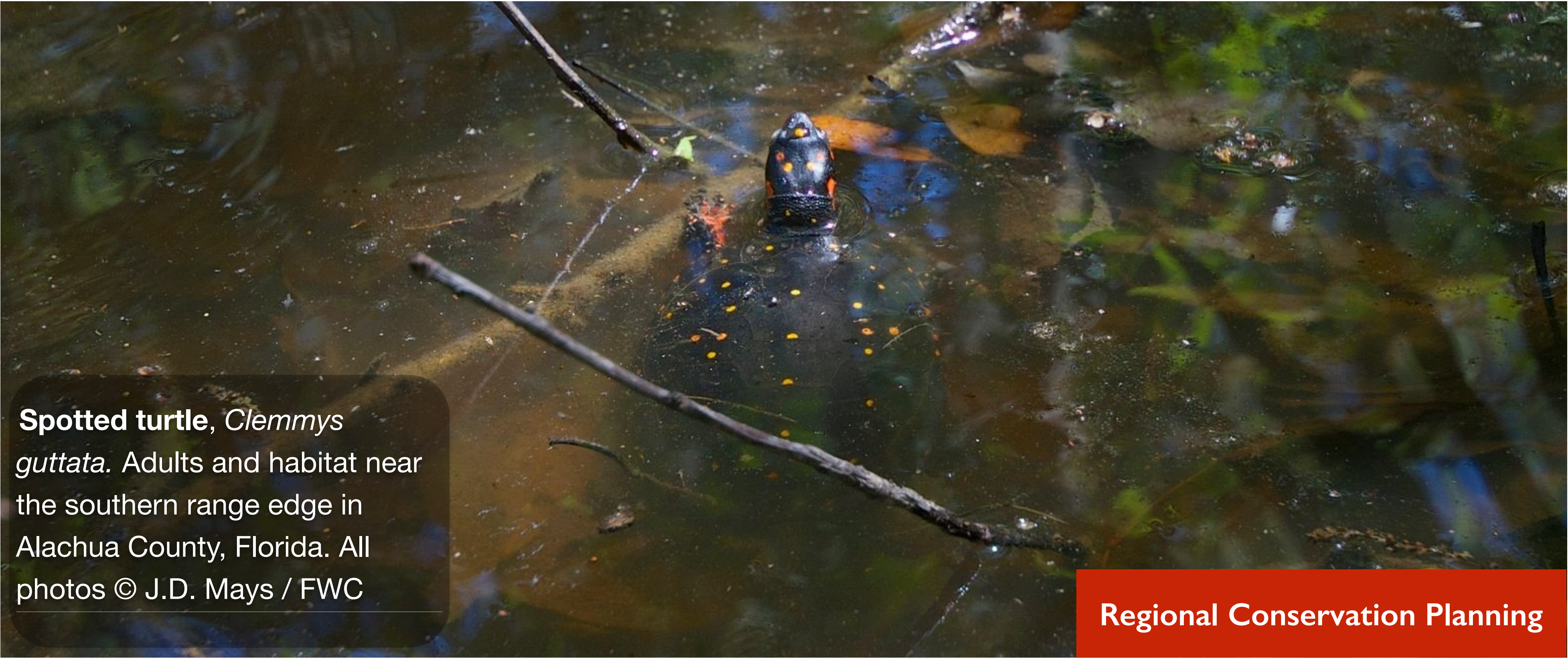
their numbers have clearly declined. They are now considered Endangered by the IUCN, and, along with the wood and Blanding's turtle, they are under consideration for federal listing as "Threatened" by the U.S. Fish and Wildlife Service. In response, a growing team of scientists throughout the spotted turtle's range is working to better understand and conserve them. The next pages highlight some of the exciting work that ATO's partners are currently undertaking around the species range: from the northern extent in Maine, to the southern edge of the range in Florida. Over the next year, partners from Maine, Massachusetts, Virginia, Georgia, Florida, and elsewhere will coordinate efforts to secure funds for a collaborative, highly quantitative, empirical, range-wide status assessment and conservation plan, a similar model to that developed for wood and Blanding's turtles (pp. 5–6).



Spotted turtle, *Clemmys guttata*. Adult male #2 from Franklin County, Massachusetts was first marked in 1993 by Joan Milam. Photo: M.T. Jones / ATO.

Distribution and Status of the Spotted Turtle at the Southern Edge of its Range in Florida: Photo Update

Jonathan Mays (jonathan.mays@myfwc.com)
Fish and Wildlife Research Institute, Florida Fish & Wildlife Conservation Commission, Gainesville, FL



Spotted turtle, *Clemmys guttata*. Adults and habitat near the southern range edge in Alachua County, Florida. All photos © J.D. Mays / FWC

Distribution and Status of the Spotted Turtle at the Northern Edge of its Range in Maine

Trevor Persons (trevor.persons@nau.edu) and **Derek Yorks** (derek.yorks@maine.gov)
Department of Inland Fisheries and Wildlife, Bangor, Maine

SPOTTED TURTLES (*Clemmys guttata*) have been intensively surveyed for and studied in York County, Maine’s southernmost county. The spotted turtle is listed as Threatened under Maine's Endangered Species Act and as a Species of Greatest Conservation Need [SGCN] in Maine’s comprehensive State Wildlife Action Plan. Their distribution and status in extreme southern Maine is fairly well understood, and this region appears to be a stronghold for the species within the state. However, through 2014 spotted turtles had also been reported outside of York County, from 26 townships in 12 additional counties throughout the southern half of Maine. Most of these reports are of single individual turtles, and most are not accompanied by photographic or specimen evidence. The distribution and status of these apparently disjunct populations across a relatively vast swath of the state is largely unknown.

In 2015, the Maine Department of Inland Fisheries and Wildlife initiated a two-year survey for spotted turtles throughout the southern half of Maine excluding York County. We used a combination of visual and trapping surveys to search for turtles at locations of previous reports as well as new sites containing promising habitat. Many of the previous reports were of animals found crossing roads, and a major focus of our surveys was to locate additional turtles and identify wetlands they use in the areas of these reports, as identifying specific wetlands is a critical component in the protection of habitat for the species. We were pleased to find spotted turtles at nine sites in five townships, all well north of York County. On the mid-coast Phippsburg peninsula we identified multiple natural wetlands used by spotted turtles, in an

area of two previous road crossing-only reports. We reconfirmed their presence on the adjacent Georgetown peninsula, and also found them on the nearby Westport Island peninsula, a previously unreported location. The most exciting result of the 2015 field season was the discovery of an apparently healthy, widespread population in Knox County (eight turtles found at three sites, plus reliable reports from residents at two additional sites). Although likely isolated on an offshore island for millennia, the only previous report was not made until 2007. Interestingly, an adjacent island contains an archaeological site that has yielded ca. 4,000 year old remains of Blanding's turtle (*Emydoidea blandingii*), a species not now known north of extreme southern Maine save for an isolated, relictual population in Nova Scotia. Finally, a well-timed 2015 report of a road-killed specimen in the central Maine town of Knox was the second from the town (the first in 1993), and we subsequently found a spotted turtle in a wetland about a mile away, the first identified wetland for this population, which is likely near the northern distributional limit for the species in the state.

Of course, as expected when surveying for a rare species, most field days did not yield positive results, including at multiple sites with reliable recent reports, but this makes the discovery of each turtle an even more exciting event! In 2016, we will continue to survey both new sites and those represented by previous reports, focusing especially on the most northerly and easterly sites in an attempt to more precisely delineate the overall range of the species in the state.



Spotted turtle, *Clemmys guttata*.
Adult female #506, from the species’ northeastern range limit in Knox County, Maine. Photo © T. Persons / ME IFW



Spotted turtle, *Clemmys guttata*. Habitat, Knox County, Maine. Photo © T. Persons / ME IFW



Spotted turtle, *Clemmys guttata*. Left: Adult female #505, Knox County, Maine. Right: Habitat, Knox County, Maine. Photo © T. Persons / ME IFW



Four-toed salamander, *Hemidactylium scutatum*. Female with eggs, Knox County, Maine. Four-toed salamanders frequently co-occur with spotted turtles in New England. Photo © T. Persons / ME IFW

A Network of Box Turtle Observatories in the USA and Mexico

Partners: Mike Jones, Liz Willey, Tom Akre, Erika Gonzalez, Rodrigo Macip Rios, Derek Yorks, Noah Charney, Ross Kiester

OUR MOST WIDESPREAD TERRESTRIAL GENUS, *Terrapene*, inhabits an impressive range of habitats: the eastern temperate forests, the central grasslands, the deserts and mountain foothills of western Mexico and the USA, and the dry tropical forests of the Yucatán Peninsula. Box turtles, which comprise a distinct lineage within the emydine (pond, box, and marsh turtle) clade, live a very long time; evidence suggests that some individuals live well beyond 100 years. That they can survive the variability of by a century of winters and summers is impressive, but as North American landscapes become increasingly fragmented, the likelihood of their survival continues to decrease in many areas.

Though formerly abundant across the prairies and forests of central and eastern North America, populations of box turtles have declined throughout the United States and

Mexico as a result of habitat fragmentation, deforestation, increased roadkill, and collection for pet markets. Large and robust populations, comprising dozens or hundreds of adults and all age classes, are increasingly rare on the fragmented American landscape, and many of these populations are threatened by new infrastructure projects or land management and development.

To understand and conserve box turtle populations in functional landscapes, ATO works with public and private partners to identify, monitor, study, manage, and protect significant populations of box turtles in New England, Florida, and southeastern Mexico. Some of these projects involve long-term population ecology studies, and some are just getting under way. Others have been underway for a decade or more. In the pages that follow, we highlight a few of these efforts!



At right: Box turtle habitat in southern Florida. Below, variability in male head pattern across four lineages of eastern box turtle. All photos © M.T. Jones / ATO



Eastern box turtle, *Terrapene carolina carolina*



Florida box turtle, *Terrapene bauri*



Gulf Coast box turtle, *Terrapene carolina major*



Yucatán box turtle, *Terrapene yucatana*

Box Turtles

Florida Box Turtles (*Terrapene bauri*) in the Ten Thousand Islands, Florida: a Ten-Year Study

Partners: Liz Willey, Mike Jones, Noah Charney, Derek Yorks, Jonathan Mays, Ashlee O'Connor



COASTAL HABITATS OF FLORIDA are likely to be negatively influenced by the one- to four-foot sea level rise expected by 2100, which will alter or restrict habitat availability, change plant community structure, reduce freshwater availability, and isolate nearshore habitats (in addition to creating social unrest and unpredictable chaos). Sea level rise will result in a loss of dry land in many regions of southern Florida, threatening coastal ecosystems. In 2006, we began a long-term study of Florida box turtles (*Terrapene bauri*) in Collier and Monroe Counties, Florida, part of the largest mangrove estuary in the USA and one of the best remaining examples of red and black mangrove forests. We are studying *T. bauri* in varied habitats on a series of ancient, anthropogenic shellwork islands built by the Calusa Indians about 2000 years ago. Our research has demonstrated significant differences in demography, density, and body size between island populations. Our initial paper from this study, on population status, demography and detection rates, is now in press in the *Journal of Herpetology*.

Gulf Coast Box Turtles (*Terrapene carolina major*): Ecology of a Living Fossil

Partners: Mike Jones, Liz Willey, Ross Kiester, Jonathan Mays, Bradley Smith

DURING THE PLEISTOCENE ICE AGES, “giant” box turtles ranged the Gulf of Mexico coast. Over the past several decades, authors have speculated that descendants of the giant box turtles — known to science as *Terrapene carolina putnami* — persist today, influencing the body size and ecology of box turtles from the Florida Panhandle to the Mississippi Delta. However, the taxonomy of Gulf Coast box turtles (some populations of which share several ancestral characters with *putnami*) has not been clear, apparently because of ongoing introgression with other lineages of box turtles. Recent molecular analyses by Butler et al. (2011) indicated that while the Gulf Coast box turtle is not a distinct evolutionary lineage, the distribution of mitochondrial haplotypes in the Florida Panhandle supports the hypothesis that living box turtles in this area owe some part of their ancestry to *T. c. putnami*. Interestingly, box turtles in this area (in addition to exhibiting unusual shell and head coloration when mature) are also highly aquatic. For example, our preliminary research has indicated that some very large Panhandle box turtles will swim long distances under several feet of water. In 2013, we initiated a partnership with the Florida Fish and Wildlife Conservation Commission, U.S. Fish and Wildlife Service, and Turtle Conservancy to investigate the population structure, habitat use, home range, and seasonal ecology of this fascinating box turtle lineage. We have marked over 150 adult turtles at five long-term study sites in northwestern Florida, including mainland and island sites, and plan to initiate radiotelemetry studies in 2016.



Gulf Coast box turtle,
Terrapene carolina major.
Adult male from Franklin
County, Florida. Photo ©
M.T. Jones / ATO

Box Turtles

Conservation of the Yucatán Box Turtle

Eddie Nahuat (enahuat@americanturtles.org)
American Turtle Observatory, Yucatán, Mexico

MY PARTNERS AND I HAVE SPENT THREE YEARS developing a long-term study of the Yucatán box turtle (*Terrapene yucatana*), the first major ecological study of this unique species endemic to the Yucatán Peninsula of southeastern México. In the Maya language, the name for the box turtle is “*Coc Ac*,” which means “*tortuga sorda*” or “deaf turtle.”

Today, climate change, excessive logging, and poaching are negatively affecting the Yucatán box turtle. It is clear that Yucatán box turtles live naturally for many decades (as do box turtles in the USA). Some of the box turtles in our study have survived on this earth for decades, endured many disasters, and still managed to survive. These older turtles command a great respect and admiration.

Our study aims to help the species exist long into the future. Each week, we locate sixteen wild, adult box turtles using radiotelemetry. At every location, we record information about habitat, food, and behavior. We now know the dominant plants and habitat associations, the

soils in which they hide. The habitat and behavior of this species was a mystery prior to this study. Our study is providing basic information on habitat requirements, which will inform forest management practices in this part of Yucatán state. We also are now confirming their seasonal behavior, including mating (fall), nesting (summer), and dormancy (winter).

I am surprised every day to witness the interactions of the turtles with their environment and with each other. I am frequently surprised by their movements across the landscape.

In the course of our study, we have only been able to document four dozen box turtles in their natural habitat. The majority of box turtles that we encounter are kept as pets. Convincing people to allow the turtles to persist in their habitat is no easy task, but we hope to achieve this the next coming years. Our project is still at an early stage, and there is much yet to do. In 2016, we hope to expand the number of study sites and develop our studies of other turtle species that co-occur with box turtles.



Yucatán box turtle,
Terrapene yucatana. Adult female #7 feeding on fruits of *Hylocereus* (top). Photo: E. Nahuat / ATO. Bottom: Adult male #15. Photo © M.T. Jones / ATO

Box Turtles



Yucatán Amphibian and Reptile Conservation Network: An Environmental Education Strategy for the Peninsula

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THE HERPETOFAUNA OF THE YUCATÁN PENINSULA is composed of 188 species (44 amphibians and 144 reptiles). Compared with other tropical regions, Yucatán has low species richness, possibly because the peninsular region has relatively homogeneous topography, resulting in a relatively low diversity of habitats. Despite this, there is a high endemism rate (about 14% of all species). In the northernmost state of Yucatán there are 18 species of amphibians and 87 species of reptiles, of which 11% and 22% are endemic, respectively. These groups face considerable threats such as the loss of natural habitat, pollution, climate change, illegal trafficking of species, and a general “bad reputation” in many villages of Yucatán state. In 2015, we formed a new Conservation Network called *Red para la conservación de los anfibios y reptiles de Yucatán* (RCARY). We have designed a digital

platform, which links residents with scientific specialists from environmental education institutions, for the development of local conservation activities. With regional and international partners, such as ATO, we have been actively involved in developing and offering courses and workshops in indigenous communities, with the result of engaging the citizens of Yucatán State in the conservation of their native reptile and amphibian fauna.



**RED PARA LA CONSERVACIÓN
DE LOS ANFIBIOS Y REPTILES
DE YUCATÁN**





The southern Everglades, Florida Bay, and Florida Keys. The Lower Keys are pictured at lower left. © NASA

Rare Reptiles of the Lower Keys—Targeting the Keys Mud Turtle

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The Florida Keys are a 210-km island chain comprised of mangrove swamps, tropical hammocks, and pine rocklands. The area south of the Seven Mile Bridge (from Big Pine Key to Key West) is of biological interest due to the expanse of salt water separating this land mass. Most of the Lower Keys are only 1–2 m (<6 ft) above sea level, and thus prone to seawater intrusion during tropical storm events. This isolation, coupled with a paucity of available fresh water, has hampered or prohibited colonization by a number of mainland reptiles. Many of the species that have successfully settled in the Lower Keys are now isolated from their mainland congeners. Florida's Fish and Wildlife Conservation Commission (FWC) lists seven reptile taxa from the Lower Keys as state threatened: five species of snakes, one lizard, and the striped mud turtle (*Kinosternon baurii*). The red rat snake, peninsula ribbon snake, and mud turtle are scheduled to be delisted once state management plans are approved.

This July, FWC's Fish and Wildlife Research Institute initiated a project targeting listed reptiles in the lower keys to garner more information on their distribution, rarity, and effective techniques for detection. Various sampling methodologies are being incorporated.

The Keys mud turtle is a small semi-aquatic turtle, oval in shape with a dark brown to black carapace and rust colored plastron. The three stripes along the carapace that give mainland individuals their common name are often muted or lacking in Lower Keys specimens. Keys mud turtles have large heads with two small, yellow stripes per side. The Keys mud turtle was already known from multiple sites among 11 different keys, and can be effectively detected by using baited (e.g., sardines) minnow traps.

In an attempt to learn more about mud turtle population size, survival, and detectability in the Lower Keys, we've partnered with U.S. Fish and Wildlife staff from the National Key Deer Refuge to incorporate a standardized

trapping effort using mark-recapture techniques. During our first 5 months of survey we tallied 171 trap nights and 63 turtles: 40 initial captures and 14 recaptures, plus 9 turtles found dead-on-road. In addition to recording location and sex/age/shell measurements, we're also taking a tissue sample for genetic analysis. Surveys will continue through June 2016.

Previous research suggested little genetic variation between the Keys mud turtle and its mainland counterparts, but the population in the Lower Keys remains cut-off and may represent a terminal taxon recently diverged from the mainland. Mud turtles in the Keys face many of the same threats as do mainland turtle populations: habitat degradation, road mortality, pollution, and egg predation by subsidized predators. However, unlike most mainland populations, freshwater wetlands are limited in the Lower Keys and are increasingly affected by over-withdrawal by humans and saltwater intrusion. The increase and frequency in large storms has already raised salinity of many Lower Keys ponds, making them unsuitable habitat for mud turtles.

Regardless of its genetic distinctiveness, the dependence of mud turtles on waters low in salinity and numerous threats to this habitat make this turtle extremely vulnerable to decline or extirpation in the Lower Keys.

Lower Keys striped mud turtle, *Kinosternon baurii*.

Photo: J.D. Mays / FWC





Lower Keys striped mud turtles, *Kinosternon baurii*, and black mangrove mosquito ditch habitats. Photos © J.D. Mays / FWC and M.T. Jones / ATO (top photo)

Ecology and Demography of Mexican Mud Turtles

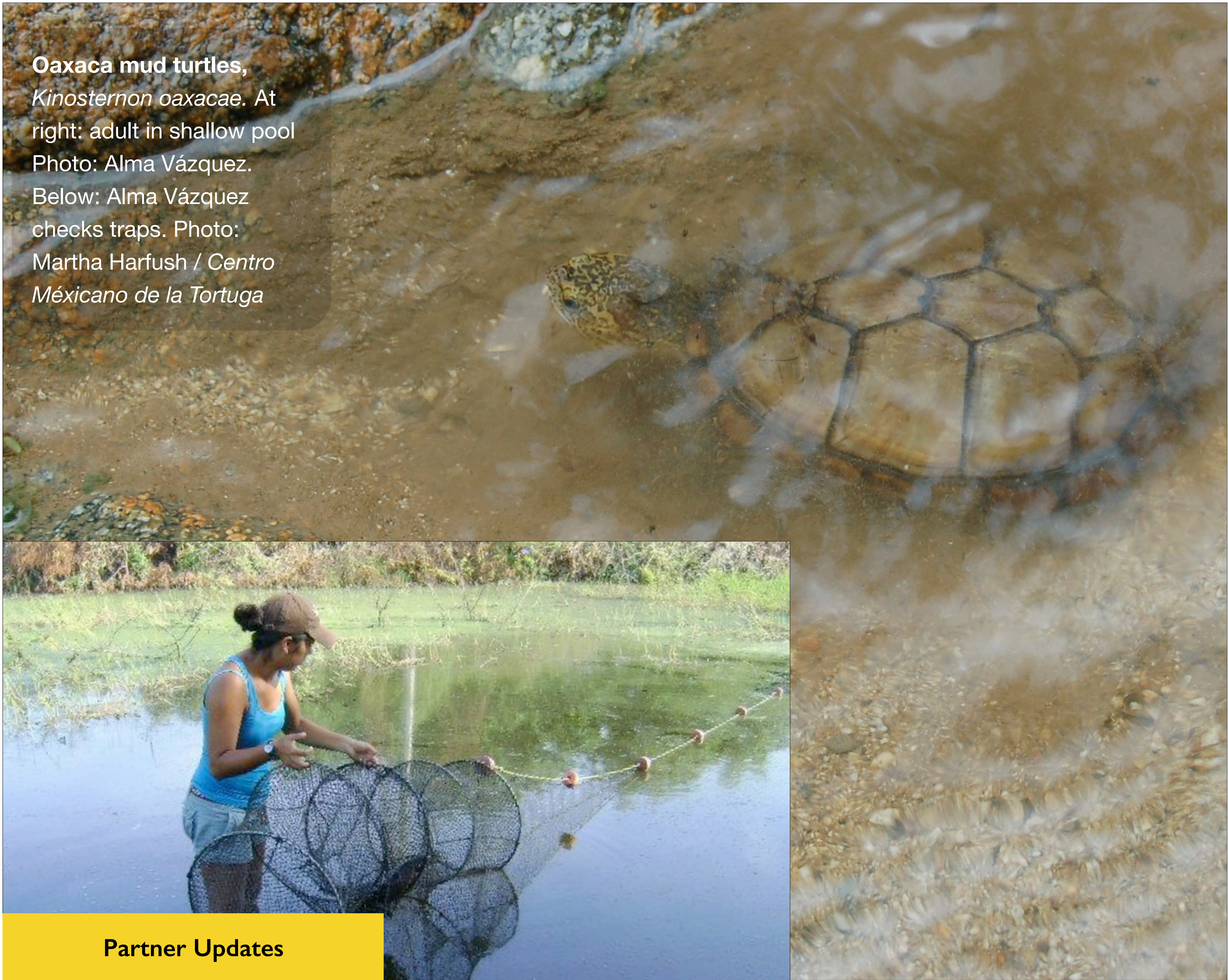
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During the past five years, I have studied the reproductive ecology and demography of Mexican mud turtles (*Kinosternon* spp.). My research interests focus on understanding the evolution of life-history traits in the dry tropics. I have gathered capture-mark-recapture information from three populations of *Kinosternon* *oaxacae* on the coast of Oaxaca in southwestern México, part of a collaboration with Martha Harfush (*Centro Mexicano de la Tortuga*; Mexican Turtle Center) and undergraduate students of *Benemérita Universidad Autónoma de Puebla*. Our *K. oxacae* data illustrated interesting patterns: the populations more closely resemble dry tropical species than wet tropical species. However, we shall continue to gather data order to establish the first long-term study of Oaxaca mud turtle demographics in México.

Recently, I moved to Michoacán from Puebla for a new job as an assistant professor in the *Universidad Nacional Autónoma de México* (UNAM) at Morelia, which is an interdisciplinary campus of liberal arts and sciences. I teach courses in population ecology, mathematical models in ecology, and evolutionary ecology in two programs: ecology (research oriented) and environmental sciences. My new job has given me the opportunity to start a project on the comparative demography of two

mud turtle species in the inner lake region of Michoacán. The project focuses on understanding the life-history traits related with colonization of the inner lakes of the Mexican Transvolcanic belt. There are two species occurring in the lake region: *Kinosternon integrum*, a widely-distributed species in México known to be a rapid colonizer, and *K. hirtipes*, a fully aquatic mud turtle with great taxonomic variation in the region. Five subspecies of *hirtipes* are present in the inner lake region of Michoacán: *K. h. chapalense*, *K. h. tarascense*, *K. h. murrayi* (the Big Bend mud turtle, which ranges into Texas), *K. h. hirtipes*, and *K. h. magdalense*. At least three of these subspecies are micro-endemic from Chapala Lake, Patzcuaro Lake, and San Juanico Lake. This provides a very interesting and important system to examine, since *K. integrum* is also found throughout. Other side projects such as population genetics, molecular variation, and speciation are suitable to investigate.

I also study the conservation biology of other Mexican turtles, and I collaborate with American Turtle Observatory on studies of Creaser’s mud turtle (*Kinosternon creaseri*) and Yucatán box turtle (*Terrapene yucatana*) on the Yucatán Peninsula in southeastern Mexico.



ATO 2015 Small Grants

IN THE FALL OF 2015, ATO launched its first call for small grant applications to researchers and conservationists working in Canada, the USA, and Mexico. This pilot program is meant to support effective conservation projects within ATO's mission to identify and conserve North America's most important landscapes for freshwater turtles. We also hope to diversify our partner network in the USA, Mexico, and Canada and, where appropriate, to encourage greater regional cooperation. Learn more about ATO's small grants

program and watch for updates at <http://americanturtles.org/grants>.

We received 43 excellent applications from 24 states, two provinces, and Baja California, addressing the conservation needs of 15 species. We hope to actively fundraise in 2016 so that ATO's small grants program becomes an annual tradition, and continues to grow both in scope as well as the amount offered and the number of awards. We awarded \$3,500 in small grants in 2015:



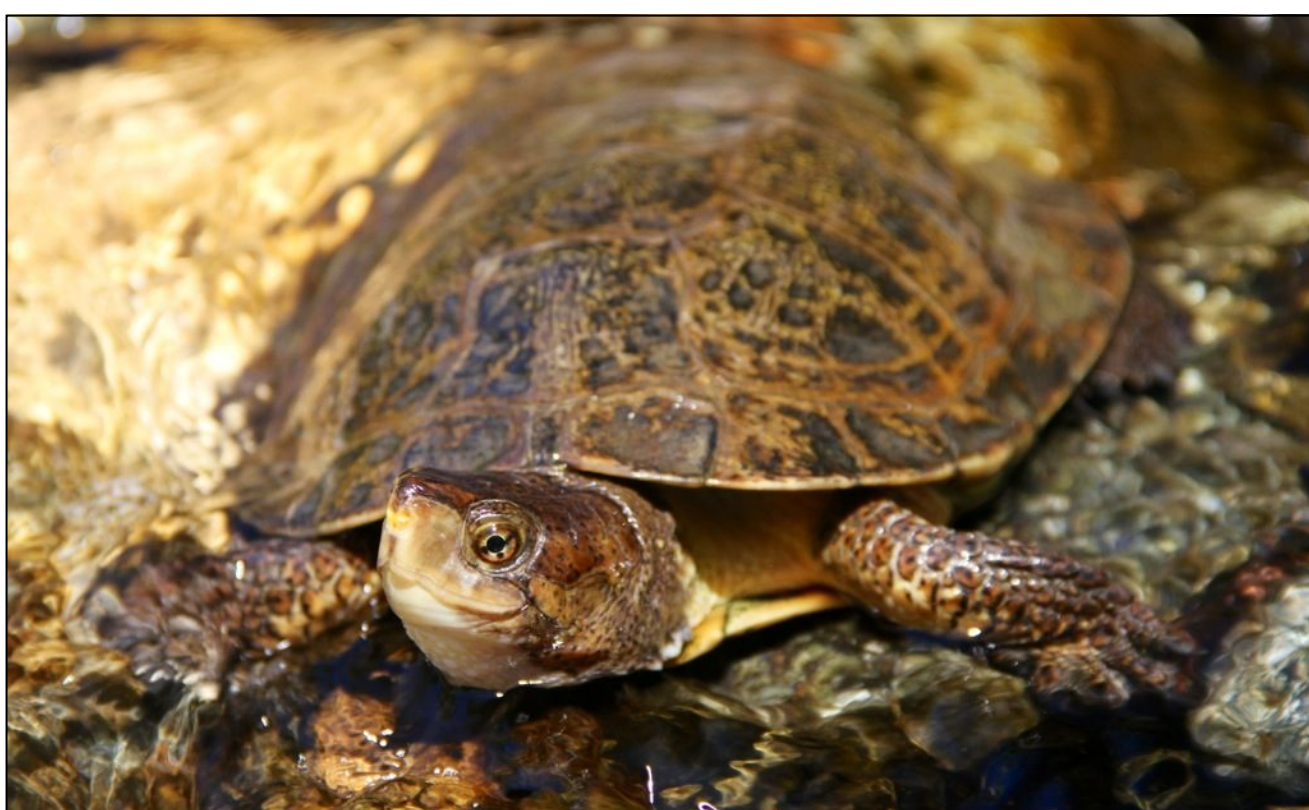
I. Conservation of the Southwestern Pond Turtle in Baja California

Anny Peralta Garcia and **Jorge Valdez Villavicencio** will use a small grant from ATO to support their efforts to assess the status of southwestern pond turtles (*Actinemys pallida*) in Baja California, where a lineage distinct from populations in the United States is poorly known. Already, they have visited 45% of historical locations and conducted visual assessments to determine presence and relative abundance of *A. pallida*. Their project provides valuable information to inform conservation actions for Mexican populations, if needed.



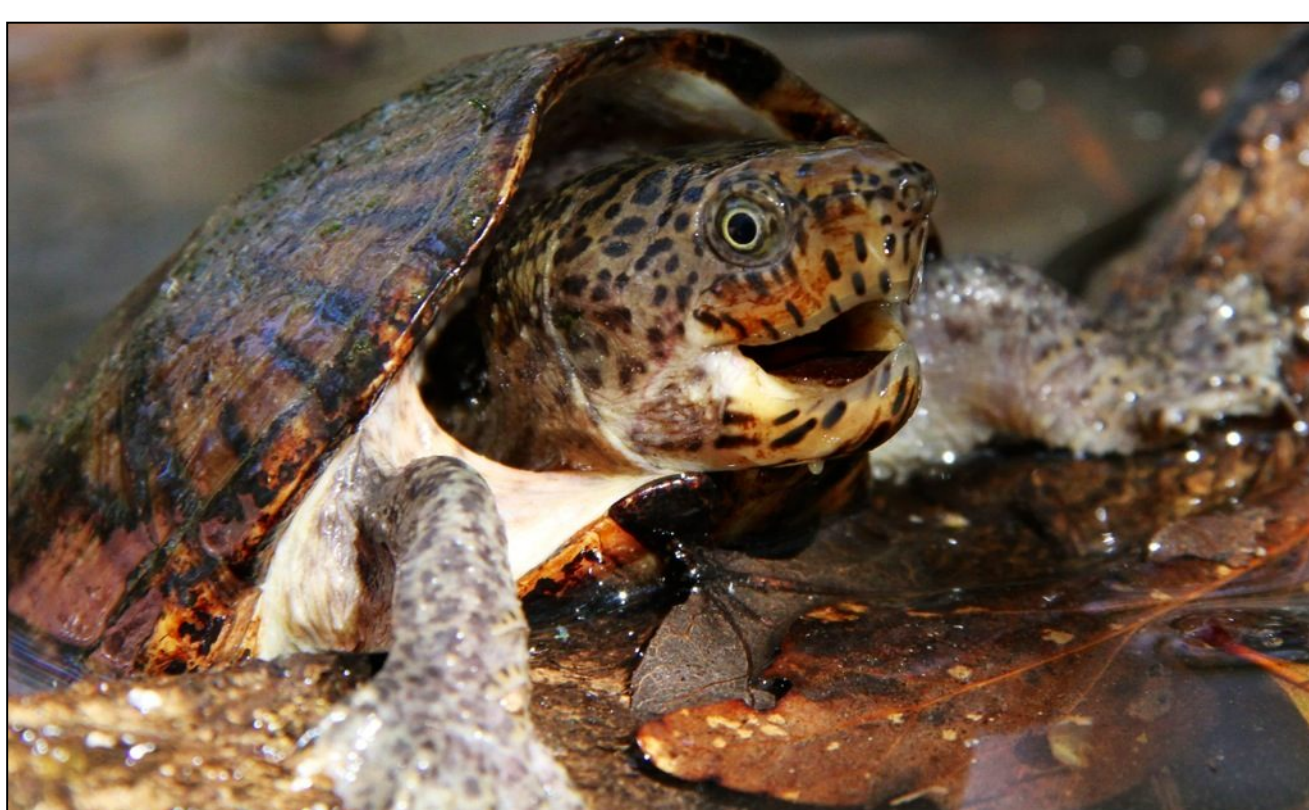
II. Conservation of the Wood Turtle in Michigan's Upper Peninsula

Gary Casper and colleagues will use a small grant from ATO to help support the eleventh year of their monitoring program for wood turtles (*Glyptemys insculpta*) in the western Upper Peninsula of Michigan, which encompasses some of the most robust remaining populations of this species. This region is experiencing increasing pressure from climate change, nest predators, recreation, and resource extraction. This study helps to document long-term population dynamics, and informs National Forest land management practices.



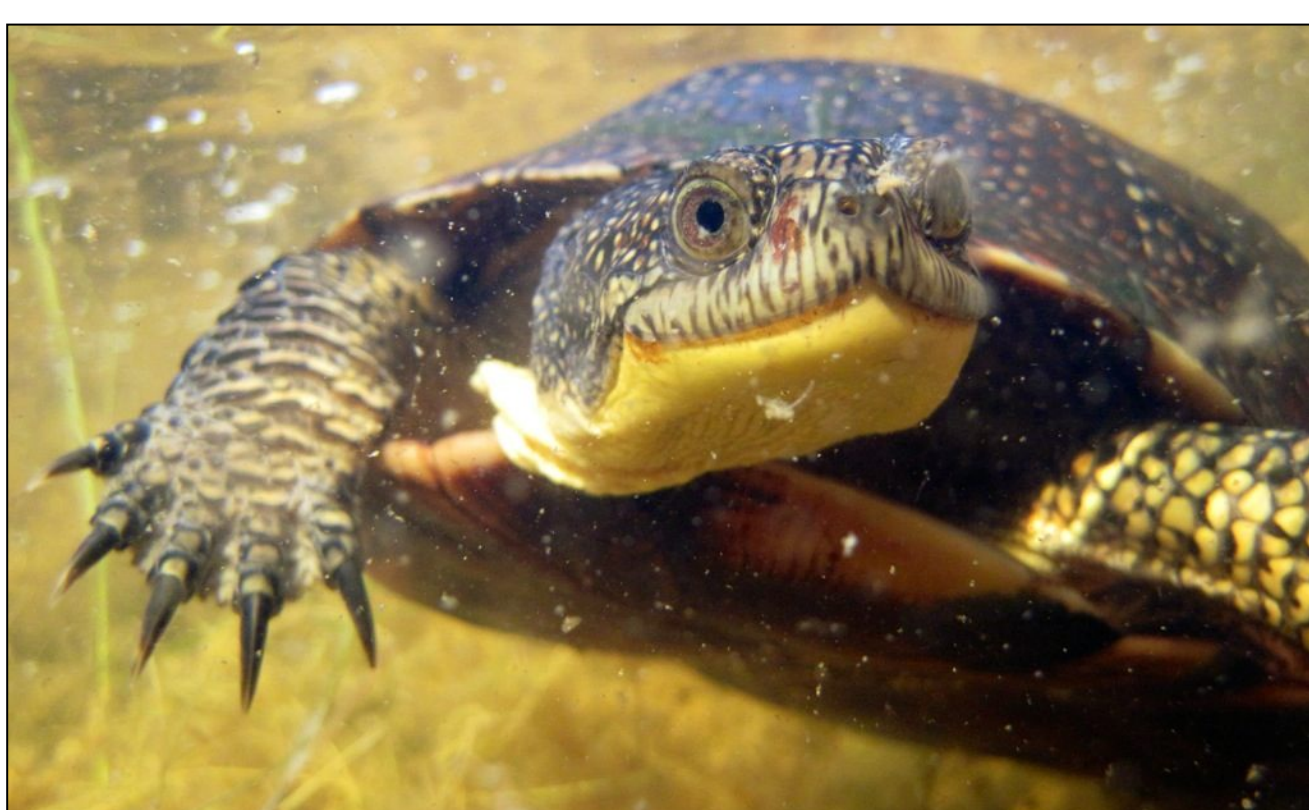
III. Ecology of the Northwestern Pond Turtle in Nevada

Mark Enders and colleagues will use a small grant from ATO as a catalyst to begin studying a geographically isolated population of northwestern pond turtle (*Actinemys marmorata*) in Nevada through standardized inventory and monitoring techniques, radio telemetry, and genetic analyses; a collaborative effort between NDOW and TNC. Mark and partners expect the products from this project to improve the understanding of pond turtles' distribution patterns and abundance at an important site in Nevada.



IV. Conservation Genetics of Musk Turtles in the Southeast

Grover Brown and colleagues are using microsatellite loci to evaluate the population structure and evolutionary history of the razorback musk turtle (*Sternotherus carinatus*) and stripe-necked musk turtle (*S. minor*) in the Southern Gulf Coast focal area. Population structure within watershed basins may even warrant taxonomic recognition, as was the case for other turtles from the region. Reportedly, thousands of musk turtles are now exported annually to Asian markets, which is a cause for concern.



V. Nesting Ecology of Blanding's Turtles along the Lake Erie Shore

Will Miller and the **Seneca Nation of Indians'** Department of Conservation have been working with regional partners to preserve a small population of Blanding's turtles (*Emydoidea blandingii*) on the shore of Lake Erie, the only Erie population known in New York. A small grant from ATO will help purchase radio telemetry equipment to monitor adult female turtles that make their way to the lakeshore to nest. There is a multi-state effort currently working on conservation efforts specifically for Blanding's turtles (see p. 6).

Acknowledgments.—In addition to our advisors, directors, and supporters (p. 1), we'd like to acknowledge our **key partners** and others who have provided support as we launched ATO: Lori Johnson, Jeff Dragon, Lorien Lemmon, Jay Drasher, Mike Marchand, Nicole Cardona, Derek Moore, Ashlee O'Connor, Wade Gurley, Loren Valliere, Nik Gualco, Mark Danaher, Bradley Smith, Eddie Nahuat, James Callaghan, Jon Regosin, Jake Kubel, Brendan Clifford, Josh Megyesy, Brad Compton, Steve Johnson, Joan Milam, Steph Koch, Dee Blanton, Tony Tur, Kathy Gipe, Chris Urban, Ellery Ruther, Tom French, and Steve DeStefano, as well as the Turtle Conservation Fund, Turtle Conservancy, Conservation International, Andrew Sabin Family Foundation, the Massachusetts Cooperative Wildlife Research Unit, N.A. Box Turtle Conservation Committee, the U.S. Fish and Wildlife Service, and the Northeast Association of Fish & Wildlife Agencies. Special thanks to Jeffrey Lovich, John Iverson, Ross Kiester, Ray Saumure, Dale Jackson, Kurt Buhlmann, and Jim Buskirk.

AMERICAN TURTLE OBSERVATORY

www.americanturtles.org

How you can help:

Spread the Word

ATO is a new organization with a growing base of support. To become as effective as possible, we hope to engage diverse audiences in the challenge of protecting North America's most important landscapes for turtles. Consider sharing a copy of our annual report, or sending our website to friends. We're also eager to hear creative ideas about how to reach new audiences. Connect with us on Facebook at facebook.com/americanturtles.

Support Turtle Conservation

ATO is committed to identifying and conserving North America's most important habitats for freshwater turtles, but it's clear that many successful land conservation projects happen at the local level. Learn more about local turtle conservation efforts at americanturtles.org/local (contact us to let us know about other groups!). Consider supporting these groups, as well as international conservation organizations that protect large landscapes, such as the Nature Conservancy. Stay tuned on Facebook for regional updates on conservation policy and land conservation opportunities.

Help Keep Turtles in the Wild

Many people have owned a turtle at some point in their lives — but the stakes are now too high for many populations of once-common turtles. Please try to avoid the temptation to bring turtles home (or to buy them). In many cases, possessing a rare turtle is illegal, and is detrimental to the source population. Moving turtles can also put them at risk, because they become disoriented when moved from their familiar habitats, and may expose new populations to diseases.

Donate to ATO!

Every dollar received is spent directly on conservation efforts for North American turtles. Even a small amount helps. Your donation supports field studies of at-risk turtles and surveys to locate large populations, ATO's small grants program, conservation planning, and conservation action.

To donate, visit americanturtles.org/donate OR use the enclosed envelope to send a check to:

American Turtle Observatory
90 Whitaker Road
New Salem, MA 01355 USA



ATO advisors and partners meeting in Concord, Massachusetts, June 2015.

**Thank you for
your support!**