HURON MOUNTAIN WILDLIFE
FOUNDATION

Summer 2013
Newsletter

The Versatile Victors: White-Tailed Deer in the North Woods

By Jill Riddell

Dr. Don Waller, shown here on a recent research trip to Guatamala. Overabundant herbivores are a problem in many parts of the globe. Currently, Waller is advising Australia on what to do about 800,000 feral camels. ***Photo by Caitilyn Allen.***

Donald Waller, a Huron Mountain Wildlife Foundation researcher and Professor and Chair of botany at the University of Wisconsin in Madison, is four years into a comprehensive study of the effects deer have on forests in northern Wisconsin and the Upper Peninsula of Michigan. For many years now, ecologists have recognized that the growing population of deer in America—500,000 in 1900, 30 million today—has had major consequences for plants and other animals. Various studies are underway across the country to quantify that impact.

"We have a research plot in the Huron Mountains that's part of a broader network of plots," says Waller. "We hope to answer the question of whether white tailed deer are eating themselves out of house and home. Is it possible that deer are unwittingly curtailing the very type of forest they prefer for success?"

Waller's study also examines whether deer browse is having an impact on birds and other animals living in northern forests. "Part of the big decline in migrant songbird populations may be due in part to deer," says Waller. "Deer easily eliminate the shrub layers that some bird species use for nesting."

TOOLS AND METHODS

The Waller study makes use of an exclosure, a structure whose purpose is the reverse of an enclosure. Basically, an exclosure is a fence put up to prevent something—deer, in this case—from getting inside. The one in the Huron Mountains is located east of Trout Lake. Erected in 2010, it's made out of black polypropylene netting, a fencing material designed to be hard to see. ("It's marketed as the 'invisible fence,'" says Waller.) The exclosure is square-shaped, runs 160 meters on each side, and inside its confines are five acres of good quality, old-growth northern forest.

"The size was chosen to provide us with a sufficient sample of forest so we can see where regeneration of plant and animal life might be occurring," says Waller. "We're working with Dave Ewert, an ornithologist from The Nature Conservancy, who advised us that we'd need exclosures that include five acres or more to monitor effects on bird population."

continued on page 2

OBSERVING DEER AT THE HURON MOUNTAINS

Though deer aren't as abundant in the Huron Moutains as they are in the southern U.P., there are still plenty. "In winter, deer congregate along Lake Superior," says Waller. "There's conifer cover that's important to them because it offers some protection from the snow. Plus, in the spring and the fall, the lake moderates the weather. In fall, deer need to put on fat for the rut and for fawning and for surviving."

As for what time of day is best for deer observation, Waller says, "Any time of day. In our trail cameras, we see the most activity in the morning and in the evening. Deer tend to be crepuscular, meaning they prefer dawn and dusk." But, he adds, "It's the bane of deer hunters that when under pressure, they can also turn nocturnal."

The east end of the U.P. has been hit hard by deer. On Drummond Island, Haley Hodgson, the daughter of a summer resident, walks in front of cedar trees decimated by the deers' relentless browsing. *Photo by Donald Waller.*

WHAT DEER WANT

Although anyone who's had a garden decimated by deer may find it hard to believe, deer actually are selective feeders, according to Waller. "They're particularly found of succulent plants, like orchids and lilies, during the growing season. In winter, they prefer northern white cedar, eastern hemlock, and Canada yew," he says. "Yew is like ice cream to deer; they will gobble it up."

The problem is, deer are capable of devouring such enormous quantities of their favorites that the plants can't regenerate. "Deer can completely curtail the growth of the northern hardwood/hemlock forest," Waller says. "In Delta County, Michigan, the Department of Natural Resources planted tens of thousands of hemlock and white pine seedlings from 2004 to 2010 and that effort was almost a complete bust. If you were out there today, you'd have to look very hard to find even one."

The hemlock and hardwood forest types that dominate much of the property in the Huron Mountains have become scarce elsewhere. According to Waller, the highest impacts of deer on this forest type are occurring in the southern U.P., in Menominee and Delta County. He says, "Marquette County is one of the areas least impacted by deer, so the exclosure by Trout Lake provides a critical control for us."

BIG PICTURE AND A LONG VIEW

Waller's research team has set up two exclosures in the eastern Upper Peninsula, in the Les Cheneaux region, and five exclosures in the forests of Lower Peninsula of Michigan and Northern Wisconsin. Periodic surveys conducted during the growing season compare what's living inside each exclosure to what lives outside; mounted cameras photograph deer and other wildlife coming and going. It takes a minimum of five years worth of growth to discern a substantial difference between one side of the fence and the other. "After 10 years, it's even more interesting," says Waller. "Plants in the shade grow slowly, so it takes about that long to yield information."

Over time, Waller's research will be applied to tackling some interesting questions about how timber harvesting and climate change combine and interact to affect deer number and impacts in the Great Lakes region. This could help agencies, businesses and individuals who own large tracts of forest plot appropriate courses of management moving forward.

"In so many other places, we're looking at tiny fragments of what once was," Waller says. "The Huron Mountain Club [which owns the land available to Foundation researchers] has a distinguished record of wise stewardship of resources. We're pleased to be able to work in an area with old growth woods and where natural processes still prevail."

At the Foundation annual meeting on August 13th, you can learn more about what Waller and his team are discovering at the Huron Mountains and elsewhere.

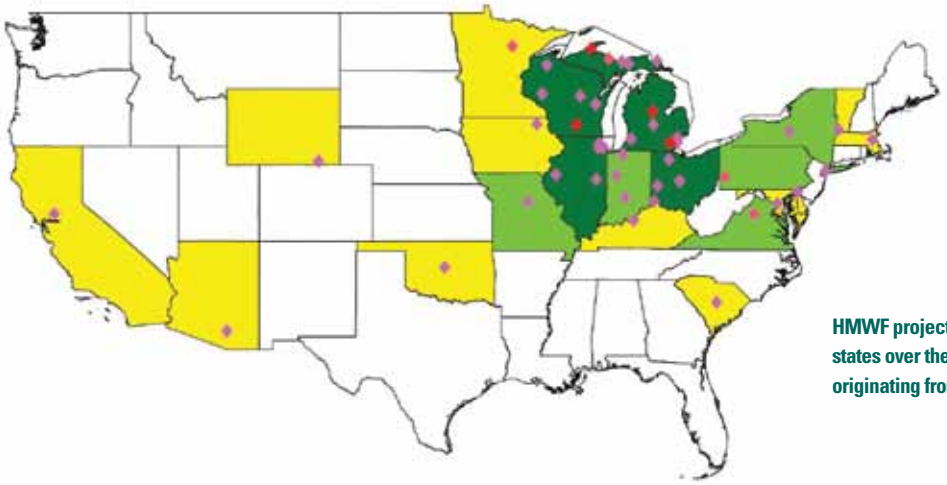
A white-tailed deer stands outside the exclosure. Over time, plant life inside the fence will be different from what is outside because of the exclusion of deer. *Photo by Donald Waller.*

Welcome to a New Season

Dear Friends,

The 2013 season is in full swing and the newly renovated research facilities at Ives Lake are brimming with projects. New this year are studies on plant-fungus symbioses, bird communities in the fire-dependent jack pines, and lightning ecology.

While most of the twenty-two projects underway this year have been initiated from Great Lakes states, eleven states are represented in this years' roster.



HMWF projects have originated from twenty states over the last five years, with researchers originating from eleven different states this year.

This is a testament to the value of the Huron Mountains as an important reference ecosystem and the national recognition of the Ives Lake research facility.

Please join us at the Foundation's annual meeting on August 13th. The focus this year is on the white tail deer study that has been underway since 2010, with a presentation from Donald Waller.

We hope our researchers enjoy their time at Ives Lake, and that friends of the Foundation have a wonderful summer that will be made even better if some it takes place in the Huron Mountains. Stop by the Stonehouse to meet our researchers in residence.

Thanks to all of you for your participation and support.

Sincerely,
Tim Brown
President

PLEASE COME TO THE ANNUAL MEETING AUGUST 13

Huron Mountain Wildlife Foundation
Annual Meeting & Special Events
Tuesday, August 13 at 4:00 p.m.
The Playhouse

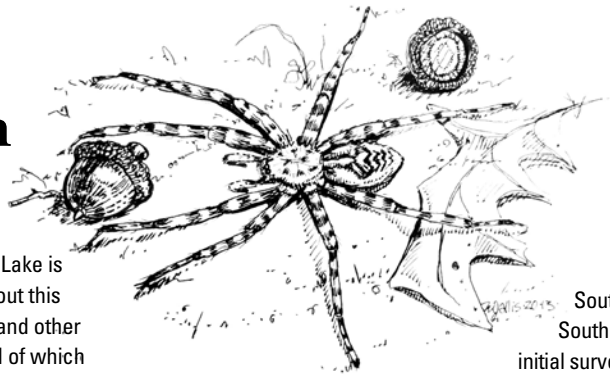
Speaker: Dr. Donald Waller
"Ecological Effects of White Tailed Deer in Huron Mountains"

The annual meeting is a lively gathering of scientists, board members, donors to the foundation, and people curious about the natural wonders of the Upper Peninsula. This year's featured speaker will be Donald Waller, the John T. Curtis Professor of Botany and the Chair of the Department of Botany at the University of Wisconsin in Madison. Dr. Waller's contributions to ecological science are diverse and distinguished. His many publications include important papers addressing the structuring of biological diversity, the ecology of plant invasions, long-term ecological change in Wisconsin, and the ecological effects of deer browsing.

Dr. Waller's current research with the Foundation is part of a region-wide experimental study focusing on deer browse. Recent research from across the eastern U.S. has made it increasingly clear that white-tail deer browsing is dramatically restructuring forest communities, and Dr. Waller's talk will fill us in on this interesting and important issue.

2013 Research Program

By Kerry Woods, Director of Research



Fishing spiders are semi-aquatic and can grow to be quite large. This year's survey of spiders will be a first for the Huron Mountains. ***Illustration by Lynda Wallis.***

The Huron Mountain Wildlife Foundation's research station at Ives Lake is hosting a healthy flow of scientists and graduate students throughout this field season. Researchers come to us from universities, museums and other institutions to work on twenty-two different initiatives, about a third of which are new for the Foundation this year. The research covers a full range of field-based natural science, from taxonomy to ecosystem ecology, geology to atmospheric science, fungi to birds, and aquatic to terrestrial habitats.

The 2013 research program continues the dynamic trends of recent years. This year's request for proposals drew a record number of responses, which allowed us to be increasingly selective about the projects we host.

Brand New

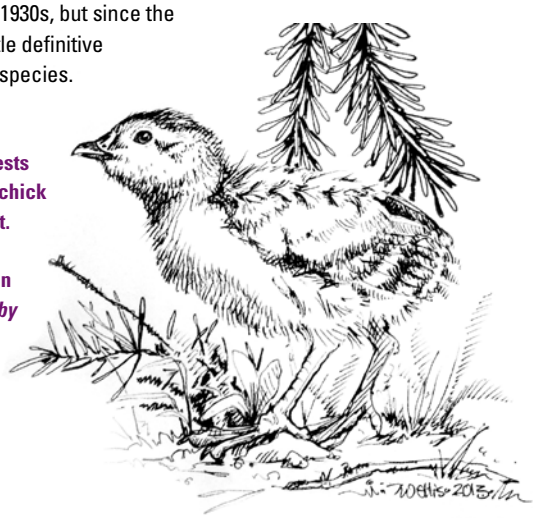
The projects that are completely new this field season range from work at the exploratory frontiers of science to classical natural history:

Dr. Elizabeth Arnold at the University of Arizona heads a major center for the study of the ecology and evolution of plant-fungus symbioses. These relationships are poorly understood and often cryptic, but their importance is increasingly evident. Dr. Arnold will be documenting the diversity of "endophytic symbionts"–fungi that live entirely within the tissues of living plants – whose existence has only recently been discovered. Her work at the Huron Mountains will be complementary to a global analysis of endosymbiotic fungi of boreal forests, which receives major support from the National Science Foundation.

Dr. Steve Yanoviak from the University of Louisville in Kentucky is collaborating with **Dr. Walter Carson** from the University of Pittsburgh in Pennsylvania to conduct an exploratory study of lightning ecology. This project uses fixed cameras and novel lightning monitoring devices to assess the frequency and effects of non-lethal lightning strikes on trees.

Dr. Greg Corace, from the U.S. Fish and Wildlife Service at the Seney National Wildlife Refuge in Seney, Michigan, will lead a project to establish a quantitative baseline survey of bird communities in the fire-dependent jack pine-red pine forests of the Pine River area.

Dr. Patrick Brown and graduate student **Laurel Hill** from Northern Michigan University are assessing spruce grouse habitat and populations on the Yellow Dog Plains and in the Huron Mountains. This northern grouse species was confirmed on Huron Mountain Club properties in the 1930s, but since the 1960s, there's been little definitive documentation of the species.



Spruce grouse build nests on the ground. Here, a chick ventures out of the nest. The spruce grouse is a northern species rare in Michigan. ***Illustration by Lynda Wallis.***

Dr. Robert Wolff of South University in Columbia, South Carolina, is undertaking an initial survey of spiders in the Huron Mountains. His findings on spider diversity and communities will provide a substantial contribution to the "All-Taxa Biodiversity Inventory," the listing on the Foundation website. This is the first official study of spiders at the Huron Mountains. The order spiders belong to, Araneae, is possibly our least documented major group of organisms.

Springboard projects

Some projects that are new this year emerged out of work previously sponsored by the Foundation. The results of good scientific research can help frame new questions. We place the highest priority for Foundation support on projects that promise to be fertile in this way. Here are the projects that are outgrowths of previous effort:

Dr. Oliver Gailing from Michigan Technological University in Houghton recently completed an analysis of genetic relationships between northern red oak and putative Hill's oak. This year he begins a study focusing on comparisons of population genetics of northern red oak between old-growth and secondary forests. One of the questions to be explored is whether old-growth communities function as reservoirs of distinctive genetic variation.

John Willis, a graduate student of Dr. Michael Walters from Michigan State University in Lansing, is following up on a project completed by Laura Marx, a former graduate student of Dr. Walter's. A decade ago, Marx discovered that hemlock and yellow birch seedlings show different growth rates on rotting logs of different species. Willis hopes to determine whether the differences in growth are due to nutritional factors or to biological interactions with parasites or mutualists associated with the decaying wood.

Dr. Casey Huckins and **Dr. Amy Marcarelli** from Michigan Technological University on Houghton will following up previous studies of the Salmon Trout River by examining other streams in the Huron Mountains. They'll be conducting a comparative study of fish communities and ecosystem properties across several of the ecologically diverse streams found in the area.

Dr. Harry Jol from the University of Wisconsin–Eau Claire was part of a research team last year that used ground-penetrating radar and other analyses to determine the ages of ancient sand dunes near Ives Lake. This year, he returns to use the same technologies to assess the ages of sandy deposits along the Lake Superior shoreline. This work will provide a clearer picture of the history of changing lake levels and the effects of ancient climates.

Dr. Robert Fahey from the Morton Arboretum in Lisle, Illinois did much of the field work for his dissertation at the Huron Mountains. That work studied the population dynamics of white pine. This summer, he begins a broader study of canopy structure of old-growth forests using ground-based LIDAR, an innovative approach using laser imaging technology.

Dr. Peter Curtis and graduate student **Alex Fotis** from The Ohio State University are examining the ecophysiology of canopy foliage to gain insight into the relationships between canopy structure and rates of photosynthesis and nutrient cycling. Together, the Curtis and Fotis study and the Fahey study could make important contributions to our understanding of how old-growth forests differ from younger forests in rates of carbon capture and sequestration.

Continuing projects

As a place-based research organization, the Foundation emphasizes long-term research. Multi-year studies are of critical value in understanding environmental processes and change, but are not generally well-supported by mainstream research agencies. Our 2013 program includes several continuing and long-term projects:

Dr. James Bockheim of the University of Wisconsin–Madison continues his mapping of soil types and glacial geomorphology. Some readers had the opportunity to join his field trip last summer and observed first-hand the dramatic artifacts of massive glacial floods. Within the next two years, Bockheim will be producing a series of maps of such features.

Dr. Fritz Nelson at the University of Wisconsin–Milwaukee and **Dr. Kenneth Hinkel** of the University of Cincinnati in Ohio will continue their long-term monitoring of microclimatic patterns across the complex terrain of the Huron Mountains. A publication from this work received the 2012 Manierre Award. This year, they expand the study to incorporate snow-pack analysis and heat budgets of the interior lakes.

David Costello, a graduate student at the University of Michigan in Ann Arbor and his advisor, **Dr. Allen Burton,** enter the third and final year of a project assessing effects of sediment chemistry on stream microbiota and their contribution to ecosystem function.

Dr. Scott Tiegs from Oakland University in Michigan and **Donna Kashian** from Wayne State University in Michigan continue to expand on long-term studies of the effects of watershed properties on stream processes as they monitor macroinvertebrate and decomposer communities in streams.

Dr. Donald Waller from the University of Wisconsin-Madison will be assessing effects of the large deer exclosure constructed in 2010 near Fisher Creek. The Waller lab is known nationally for its extensive work on the effects of environmental change, including increasing deer herds, on forest structure and dynamics. Waller will be the featured speaker at the Foundation's annual meeting in August.

Dr. Rose-Marie Muzika from University of Missouri in Columbia and **Dr. Walter Carson** from Pittsburgh University in Pennsylvania will be following up on a preliminary survey from last year. They examine topographic refuges from deer browsing, such as off-shore islands or inaccessible rock outcroppings and large boulder-tops. Since deer can't reach these areas, they can be used to retrospectively assess the long-term effects of intensive deer browsing.

Dr. Dennis Riege from the University of Maryland continues his long-term studies of old-growth white pine-hardwood forests, focusing on large permanent study plots near Fisher Creek. These plots serve as controls for the Waller deer exclosure, and the two studies complement one another. This year, some beaver flooding of one of the stands adds a new variable.

Dr. Jalene LaMontagne from DePaul University in Chicago returns for the third year of her study of seed production dynamics in white spruce near the southern edge of its continental distribution.

Dr. Mark Wetzel from the Illinois Natural History Survey in Champaign continues surveys of annelid worms; this year, he moves from aquatic to terrestrial habitats.

Dr. Dana Richter from Michigan Technological University in Houghton maintains a long-term survey of fungus diversity in red pine forests.

Dr. Evelyn Williams from the Chicago Botanic Garden in Glencoe, Illinois, continues the studies of population dynamics and genetic diversity of *Botrychium* ferns that she began as part of her doctoral research.

RECENT PUBLICATIONS

Investigators publish and present results of the work conducted during their time at the Huron Mountains in a wide range of forums. Here is a collection of recent publications from Foundation scientists that we've learned about since the last issue. Stay tuned for presentations at this summer's conferences and a substantial list of manuscripts now in process—we'll print those in our fall issue.

PEER-REVIEWED JOURNAL ARTICLES

Baldwin, B. G., S. Kalisz, and W. S. Armbruster. 2011. Phylogenetic perspectives on diversification, biogeography, and floral evolution of *Collinsia* and *Tonella* (Plantaginaceae). American Journal of Botany 98:731–753.

Fahey, R. T., and C. G. Lorimer. 2013. Persistence of pine species in late-successional forests: evidence from habitat-related variation in stand age structure. Journal of Vegetation Science:published on-line, May 2013.

Kalisz, S., A. Randle, D. Chaiffetz, M. Faigeles, A. Butera, and C. Beight. 2011. Dichogamy correlates with outcrossing rate and defines the selfing syndrome in the mixed-mating genus *Collinsia*. Annals of Botany 109:571–582.

Lind, J. F., and O. Gailing. 2013. Genetic structure of *Quercus rubra* L. and *Quercus ellipsoidalis* E. J. Hill populations at gene-based EST-SSR and nuclear SSR markers. Tree Genetics & Genomes 9:707–722.

Richter, D. L. 2012. The sugar maple sapstreak fungus (*Ceratocystis virescens* (Davidson) Moreau, Ascomycota) in the Huron Mountains, Marquette County, Michigan. The Michigan Botanist 51:73–81.

Shartell, L. M., E. A. Lilleskov, and A. J. Storer. 2013. Predicting exotic earthworm distribution in the northern Great Lakes region. Biological Invasions 16:1665-1675.

Sullivan, A. R., J. F. Lind, T. S. McCleary, J. Romero-Severson, and O. Gailing. 2013. Development and Characterization of Genomic and Gene-Based Microsatellite Markers in North American Red Oak Species. Plant Molecular Biology Reporter 31:231–239.

Tiegs, S. D., J. E. Clapcott, N. A. Griffiths, and A. J. Boulton. 2013. A standardized cotton-strip assay for measuring organic-matter decomposition in streams. Ecological Indicators 32:131–139.

THESES

Fahey, Robert T. 2011. Establishment and persistence of early successional pine species in late-successional landscapes of the Great Lakes region. Ph.D. Thesis, University of Wisconsin-Madison.

CONFERENCE PRESENTATIONS

Wetzel, M.J., and M.A.P. Morgan. 2012. "Annelidically Speaking: The aquatic oligochaetes (Annelida, Clitellata) of the Huron Mountain Club area, upper peninsula Michigan, USA, Year Two and beyond." Invited oral presentation at the 26th annual meeting of the Florida Association of Benthologists.

Research Results Are Now Available

For the past fifty-eight years, the Foundation has accepted the reports and results of its investigators, and up until a decade ago, all were on paper. These documents lived in file boxes, in the office of the Foundation's director. Having a collection of reports that existed only on paper made it tough for researchers and the public to identify, locate and utilize them. "Gray literature" is the phrase that academics use for such hard-to-find, unpublished reports.

At the Foundation, we're pleased to announce that scanned versions of previously unpublished reports are on our website, at www.hmwf.org. And with the creation of the new library at the Stone House, these valuable documents are also available in a physical form to researchers and visitors. The first binders of peer-reviewed publications and unpublished reports not available elsewhere were shelved at the Stone House in May. The collection presents an impressive body of work conducted by many men and women over the decades. Feel free to browse when visiting Ives Lake.

Photo by Wayne Thorpe.

Above: Dr. Elizabeth Arnold from the University of Arizona made use of the Stone House's library during her stay in June. Publications and reports from previous researchers are now available to Foundation scientists. The library was funded by gifts made in memory of Dr. William and Anne Manierre.

About the Huron Mountain Wildlife Foundation:
Since 1955, the Huron Mountain Wildlife Foundation has supported original research in a wide variety of scientific fields. The research takes place in the Upper Peninsula of Michigan. More information on the Foundation can be found at: **www.hmwf.org**

We welcome comments and suggestions on this newsletter. Please send them to:

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