Kemp's Point

A newsletter of the Kemp Natural Resources Station

Volume 5, Number 1 - Summer 2004

Kemp Research Report: Growing Old with Science

What comes to mind when you hear the phrase "old-growth?" Grandpa's whiskers? Or maybe the mold on that long forgotten chunk of cheese in the back of the fridge. I'm guessing you think of forests; more specifically, forests composed of big, towering trees that whisper of days long ago. Old-growth forests are natural forests that have developed over a long period of time, generally at least 120 years, without experiencing significant human disturbance such as logging, road construction, and other development. Today, only about 5% of United States' forests may be classified as old-growth. Despite this relatively small area, there is a great deal of interest in this increasingly uncommon forest habitat, both among the public and scientists.

Since May 2003, Tom Hayes, a Research Associate at the University of Wisconsin-Madison, has been part of a large research project examining the structural characteristics of old-growth forests. Tom explains that many species of plants and animals are dependent on old-growth forests and the conditions they provide. This forest type contributes to increased plant biodiversity and provides valuable habitat to wildlife that need the deep forest to thrive. In addition, old-growth structural features function as savings accounts for the forest, since many nutrients are processed and stored there for future use.

In the late 1990s, a comprehensive study compared old-growth stands in Minnesota and the Upper Peninsula of Michigan to second-growth stands in northern Wisconsin. Two major differences were found. First, individual gaps in the canopy were twice as big in old-growth stands. Second, old-growth forests contain more and larger (by about 70%) fallen timber and snags than second-growth stands. Knowing this, scientists wondered if there is a way to modify common forest management practices so that second-growth stands could develop the structural features found in old-growth stands without having to wait 150 years.

Project Director Dr. David Mladenoff and others in UW-

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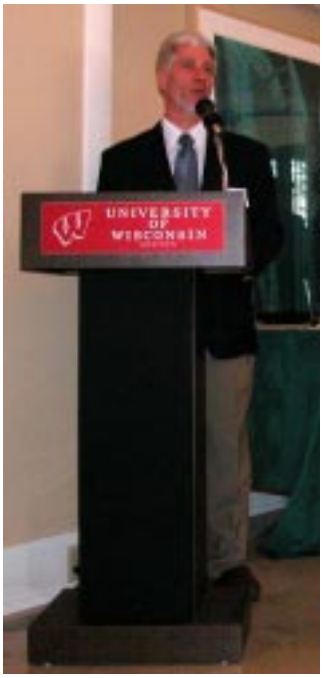
Kemp Station was pleased to offer a public outreach session about dragonflies on June 14. Wisconsin DNR Ecologist Bob Dubois gave a presentation about the ecology of dragonflies and damselflies before leading the group of 30 on an exploration of the bog surrounding Jyme (pronounced "jimmy") Lake. Participants exhibited superb bog-walking and dragonfly netting skills and with Bob's help, identified numerous species, including the elfin skimmer, the smallest dragonfly in North America.

Kemp Station Staff Receive University Awards

Two Kemp Station staff won outstanding service awards earlier this spring. First, **Karla Ortman** won a 2004 College of Agricultural & Life Sciences Classified Staff Recognition Award for her job dedication and high quality work. Karla provides vital administrative support for all of Kemp Station's research, instruction, and outreach programs. She is often the first point of contact for the hundreds of people who come to Kemp each year, and she goes out of her way to ensure that everyone's Kemp experience is a positive one. In addition to writing and serving as editor of *Kemp's Point*, Karla designed and maintains the Station's website; she organizes and implements the Station's summer outreach series; and she handles all of the financial and clerical tasks associated with a busy field station.

Kemp's second award winner is **Gary Kellner**. Gary, a craftsworker at Kemp, was one of five UW-Madison Classified Staff Award recipients. These campus-wide awards recognize individuals who go above and beyond the call of duty. Gary is responsible for the maintenance and upkeep of Kemp Station's historical and intensely-used buildings and grounds. In addition to general Station maintenance, he assists researchers on a variety of projects, helping them install everything from deer exclosures that examine the impact of deer on forest development to soil pits that provide a look at the subterranean world. Gary is also known for the active role he plays in conducting maple syrup-making workshops, one of Kemp Station's most popular outreach programs.



There are several things that make Kemp Station a special place, and one of the most important is the dedicated and talented people who work there. I'm most fortunate to work with such outstanding people. It is their hard work that makes Kemp Station succeed. *- Tom Steele*

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In Memoriam – Mrs. Ruth H. Wright

Kemp Station is sad to report the recent passing of Mrs. Ruth H. Wright of Middleton, WI. Mrs. Wright was a longtime friend and generous supporter of Kemp Station. Her affiliation with Kemp dated back to the 1960s when her late husband George L. Wright was instrumental incorporating Kemp Station into the UW-Madison's network of Agricultural Research Stations (then called the University Experimental Farms). Over the years, Mrs. Wright made numerous visits to Kemp Station. She loved the outdoors and she firmly believed in Kemp Station's mission of natural resources research, instruction, and public education. Trained as a journalist, she saw Kemp Station as a source of wonderful stories about the natural world and she encouraged us to produce a Station newsletter. Indeed, it was her generous financial support that led to the creation of *Kemp's Point*. Dear friend and colleague, Mrs. Wright will be missed.

Research: Growing Old *(From Page 1)*

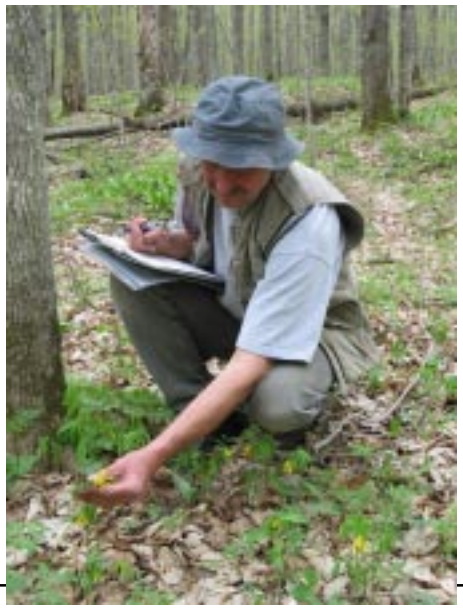
Madison's Department of Forest Ecology and Management devised a unique research project to examine this question. The uniqueness lies in the scope and duration of the study. While many studies examine just one feature found in a forest, this study looks at nearly all of them. And this investigation will continue for the next 50 years! In order to make such a study possible, twelve hundred acres of second-growth forest in the Flambeau River State Forest have been set aside to serve as the research area.

At the core of the study is carbon, which is the fuel for all processes. Whether it's providing food to microbes or enabling more water and nutrient storage, carbon enhances a forest's sustainability. Canopy gaps (openings among the tree tops), and coarse woody debris (fallen logs, snags, other dead wood), will be experimentally manipulated to determine how these two structural components impact forest carbon cycling. From that, researchers will determine how forest management practices alter long-term forest productivity and biodiversity. The results of the study will help guide harvest methods, in order to permit or accelerate the development of old-growth structural features in young, second-growth stands.

Last year, Tom Hayes was hired to install the huge experiment. Since then, his crew of college students and volunteer interns has been busy establishing research plots within the study area where different treatments manipulating canopy gap size and coarse woody debris will be applied. Scientists will monitor the influence of these manipulations on multiple forest components. These components include plants, insects, earthworms, fungi, and bacteria.

Plants

A suite of environmental variables, such as light, soil nutrients, and soil moisture, determines the plant composition of a forest. Extensive vegetation surveys have already been completed in each study plot and are being repeated this spring and summer. These surveys involve identifying each plant and determining the percent of cover for each species. Trees in each plot will be counted and identified, with sizes and crown-condition or decay state recorded. Fallen wood will be tagged and tallied too. Annual surveys will monitor changes in plant composition and track growth rates, both before and after experimental treatments.



Field Assistants, Doug Fields and Lynette Potvin (upper right), perform spring vegetation surveys. Many spring ephemerals, including trillium and trout lily, grow within the treatment areas.

Insects

Typically, insects are the first organisms to move into dead wood. They start the physical breakdown of the wood and introduce microbial decomposers, thus increasing soil organic matter. To identify the abundance, composition and diversity of insects, scientists will use three sampling methods. Funnel traps baited with ethanol will attract those flying insects typically drawn to living trees. Special trap logs will be placed within the identified plots and the adults that emerge from the log will be identified and counted. Finally, naturally occurring logs within plots will be analyzed for holes, boring dust and frass (i.e., insect dung).

Earthworms

Different groups of earthworms live and work in different types of soils. Species that make a living in the organic forest floor are important during the

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Wild Wonders

My first wood tick-related memory is vague. It involves what seemed to be a major surgical procedure performed by my mom as she removed an embedded wood tick from the back of my head. Obviously it wasn't that major of an event, but at my very young age, it was life altering. Visits to my grandparents often included fishing or blueberry picking trips to the more remote areas surrounding Tomah, so it wasn't unusual to pick up a tick. Wood ticks horrified me. As a kid I was also scared of spiders, but could be in the same room with one as long as I could keep an eye on it at all times. It was their disappearance that made me nervous! But with ticks, they had to be eliminated — put to death. I'm certain this next memory is skewed as well, but during one blueberry picking adventure, we drove the car into the woods. It didn't take long for a kid to tire of berry picking, so I returned to the car to find something else to do but instead found the car completely infested with ticks! Maybe there were only five or six, but I seem to recall hundreds.

Most people have some kind of creature that makes them squirm, shudder, or run away screaming. As I've learned more about spiders I've been able to greatly reduce my fear of them, even to the point of being able to handle some bare handed! Shows that knowledge and understanding are powerful tools. But I don't know if I'll ever get over ticks. It's not that they scare me, but I struggle with building any kind of appreciation for the little beasts. So, what better way to work on that than to do a little research?

Ticks belong to the Class Arachnida, which also includes spiders, scorpions and harvestmen. Ticks are mites, in fact the largest mite in the Order Acarina. Like spiders, they are not insects because they have 8 legs and less than 3 body parts. There are over 800 species of ticks worldwide and between 12 and 15 known species in Wisconsin. According to UW-Extension Entomologist, Phil Pellitteri, most of these are host specific ticks. That means a given tick only feeds on one animal, for example, a raccoon or rabbit. Therefore, we humans rarely, if ever, see most of the tick species found in our state. Instead, we are most familiar with the wood tick and deer tick because both feed on a number of different hosts, including us, during its lifetime.

The life cycle of these ticks include egg, larva, nymph and adult. As the tick advances from one stage to the next, it changes host. The larvae, often called seed ticks, have only six legs. These larvae must find and attach themselves to a host in order to get a blood meal. The host at this stage is often a small critter, like a mouse or squirrel. After obtaining a blood meal the larvae usually drop to the ground, shed their skin and emerge as 8-legged nymphs. The nymph must also obtain a blood meal, often from a larger host like a rabbit, in order to molt and become an adult. As an adult, the tick feeds one last time. Mating usually takes place on the body of the host animal. Male ticks die after mating. The female, once engorged with her final meal, drops from the host, rests as eggs develop, lays as many as 2,000-5,000 eggs, and then dies. The thousands of eggs typically hatch in three to four weeks. Of her offspring, maybe three or four will survive to adulthood.

Perhaps what's most fascinating about ticks (okay, I'm already gaining respect for them), is how they get to their hosts to feed. Ticks can't hop, fly, run or move quickly. Instead, they "quest." Questing involves climbing to the top of a plant or other object to wait for an appropriate host to come by. The larvae might wait on a sprig of grass, the nymph on a plant a bit taller, and the adult on an even taller plant. Ticks can detect an approaching host through vibrations, carbon dioxide and shadows cast by the host. The tick will hold onto its perch with its rear legs, while stretching out with the others. If the host brushes by, the tick grabs on. Falling from the perch is another option.

Once on the host, the tick attaches, which can take 5-6 hours before firmly attached. Two things help the tick stay firmly attached during its bloodmeal, which can last up to 10 days. First, they secrete a cement-like substance from their salivary glands,

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gluing them in place. This substance dissolves after feeding is complete. The second thing that helps them stay put is one of their three mouthparts. Called the hypostome, this central mouthpart is shaped like a rod and has backward facing projections along its sides. These projections prevent easy removal of the tick.

If you haven't already picked up on it, there's nothing quick about a tick. Besides the way it moves, the time spent progressing through its life cycle is long. It can take a while for a proper host to come along for a tick to latch onto. Therefore, each life stage, larvae, nymph and adult can go for long periods, months, without feeding. As a result, from egg to adult, as much as three years can pass. Climatic factors impact the length of the life cycle and in some extreme conditions, the tick will go into diapause, which is sort of like hibernation, to survive.

To contrast the deer and wood ticks way of living, there is the winter tick. Also found in Wisconsin, the winter tick is a one-host tick, meaning that it goes through all of its life cycles while on a single host. After hatching from the egg, larvae attach to a host, feed and detach, but stay on the animal. Then they molt to the nymphal stage, feed and detach again. After they develop into adults and feed once more, they drop to the ground, lay eggs, and the cycle begins again. Common hosts for winter ticks are deer and horses. They're named winter ticks because they are active all winter, living the life on their host.

So I guess when you take a good look at ticks, they do deserve their props. They are patient little critters, waiting for a proper host to pass by. Getting a good meal is no easy task for them. And once they've done what they need to do to propagate their species, they die, no empty nest, retirement life for them. Ticks have never seemed very edible to me, so I was glad to learn that ticks are eaten by a number of other animals, including foraging birds, ground beetles and wasp parasites. Knowing ticks are food to many other critters in the web of life makes them even more tolerable. Surely, the next time I meet up with a tick, I'll be a little less disgusted and a good deal more in awe. *-K.O.*

Jack is back!

Last summer I was surprised and thrilled to discover a Jack-in-the-Pulpit growing near the parking area at Kemp Station. And recently I noted that the plant is alive and well this year too. Regular readers of *Kemp's Point* may recall a story discussing the lack of wildflowers on Station property, suspected to be due to a high deer population. I'm not sure what it means that this particular wild wonder was able to escape the browse of the deer, but it's sure neat to see.

Family: Araceae
Taxon: *Arisaema triphyllum* (L.) Schott *subsp. triphyllum*
Common name: Indian turnip, Jack-in-the-pulpit
US Nativity: Native
Duration: Perennial; Blooms: April - June
Plant height: 1' to 3'
Fruit: A cluster of bright red shiny berries.
Habitat: Rich moist woods.
Historical Lore: Calcium oxalate crystals present in the entire plant will cause a powerful burning sensation if eaten raw. Properly drying or cooking removes this effect and the Native Americans used the root as a vegetable. There is one account stating that the Meskwaki Indians would put finely chopped root into meat they would leave for their enemies to find, principally the Sioux. The meat was flavorful and would be consumed, but, in a few hours these enemies would be in so much pain they would die! It is reported that they also used it diagnostically by dropping a seed in a cup of water and if the seed went around four times clockwise the patient would recover and if less the patient would die.

Research: Growing Old *(Cont'd from Page 3)*

early stages of wood decay. Earthworms that live below the floor layer further process the organic matter passed down from their upstairs neighbors. The researchers will survey how earthworm populations respond to the different gap and woody debris treatments. This is an interesting process that involves driving a metal box-frame into the soil and applying a mustard solution. This causes the worms to wriggle to the surface for counting and identification.

Field assistant Brad Herrick wires a datalogger affixed to a tower that will monitor above-canopy conditions (left). And later installs a below ground sensor (below).

Fungi & Bacteria

Fungi and bacteria take over where the insects and earthworms leave off. Both perform essentially the same primary function: decomposing organic matter. However, each group's abundance can be impacted by soil temperature and moisture. For example, fungi are less affected by the cold while bacteria are more tolerant of warmer temperatures. To determine the biomass of each type of decomposer within each plot, soil samples will be collected from various depths and analyzed at the Kemp lab. Researchers expect to see a short-term increase in bacterial biomass relative to fungi where canopy gaps are present.

Detailed, small-scale weather data are also being collected at the sites to assess the impacts of canopy gap and woody debris on environmental conditions. Below the forest canopy, sensors continuously record air and soil temperature, soil temperature, vapor pressure, and sunlight. To provide comparative above-canopy data, additional sensors atop a tower measure air temperature, precipitation, vapor pressure, and sunlight.

The only pieces of the old-growth forest puzzle not being surveyed by Tom Hayes and his crew are the bird and mammal populations. A larger-scale companion study coordinated by the Wisconsin Department of Natural Resources will evaluate various forestry treatments on these populations.

Over the long term, the data generated by this study will help scientists determine if new forestry treatments can facilitate old-growth structure and processes, in order to achieve long-term sustainability.

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Kemp Station Goes Wireless

Ankur Desai, Ph.D. candidate from Penn State University, checks his email via Kemp Station's wireless network. The new network provides scientists and students convenient, high speed Internet connectivity without wires in all Station buildings and surrounding grounds. Now researchers can access library resources, log on to campus mainframes, or email Mom from virtually anywhere on the Station. Users can bring their own laptops to Kemp or sign out one of several computers and wireless cards the Station has available for loan.

Research: Growing Old *(Cont'd from Page 6)*

Results of the project will help resource managers develop prescriptions that guide the transition from relatively simple even-aged forests to more complex multi-aged stands that dominated the Northwoods prior to European settlement. Perhaps one day, thanks to research, we'll be able to take a walk back through time. *-K.O.*

Tom Hayes was born in California but moved to Arkansas at the age of 10. He completed his undergraduate degree at Rice University in Houston, Texas, and went on to earn a Masters in Forest Science at the Yale School of Forestry in New Haven, Conneticut. Tom returned to Texas where he was employed as a consulting plant ecologist for 6 years. He then worked as a state biologist for the Texas Parks & Wildlife Department before joining the Nature Conservancy as a state stewardship ecologist. Tom then completed a Ph.D. in Forest Biogeochemistry at the University of California, Berkley, before joining the Department of Forest Ecology & Management at UW-Madison as a Research Associate.

Wildlife encounters at field sites are not unusual. Tom had a neat one recently: "We had purchased new safety gear, including single-rope equipment, harnesses, and helmets, for climbing the canopy tower and maintaining its microclimate sensors. While alone attaching the automatic tipping-bucket rain gauge at the very top of the 15-foot triangular steel mast, which is the uppermost portion of the 100-foot tower, a male ruby-throated hummingbird began to persistently pester me. Sounding and looking much like a motorized dart hovering at my ears 15-20 feet above the tree tops, I helplessly clinched the mast with both hands as the small but pointy beast first probed the air-holes on one side of my bright red helmet before noisily swooping over to the holes on the other side. Luckily, no actual physical damage ensued, since the bird's tongue sifting through my hair was reassuringly gentle."

Join us for an Outreach Session!

To register, contact Karla at 715-358-5667 or kemp@calshp.cals.wisc.edu. Advance registration is required.

July 30 (Friday) 7:00 pm
A Close-up Look at Bats!
Session Leaders: Rebecca Christoffel and Ken & Barb Bowman, Bat Conservation of Wisconsin

Be prepared for a close encounter of the "winged hand" kind at this program. Included will be advice on the construction and placement of bat houses, identification of Wisconsin's bats, and a walk to observe some of Kemp's bats and their insect-eating ways. Several live bats will be presented and information on bat rescues and rehabilitation work will be shared.

July 31 (Saturday) 6:30 pm
Kemp's "Cold-blooded" Critters! Eeek!
Session Leader: Rebecca Christoffel, MSU Doctoral Student

Prepare yourself for an evening of herpetology, the study of creeping and crawling creatures! We'll explore the world of frogs, salamanders, turtles and snakes found in the Kemp area through an interactive slide presentation and live animals, and then take a night hike to find some on the Station and talk about land management activities to provide habitat for these groups.

August 12 (Thursday) 11:00 am
Aquatic Plants
Session Leader: Susan Knight, Assistant Scientist, Trout Lake Station

Dive into the world of aquatic plants in this two-part workshop! You will learn to identify the most common aquatic plants in the lakes around our area, including exotic plants such as Eurasian Water-milfoil and Curly-leaf Pondweed. The first part of the workshop will cover plant habitats and which plants often occur together or look alike. Then learn how underwater plants differ from land plants and how plants can spread from one lake to another. There will be an excellent and inexpensive book on aquatic plants, "Through the Looking Glass," available for purchase. After a short break, you will have the option to snorkel in a shallow bay of beautiful Lake Tomahawk, not far from Kemp Station, to hone your new plant identification skills. This bay is home to a wide variety of aquatic plants in a spectacular underwater garden setting. Enjoy these plants in their natural habitat and learn to appreciate their diversity and quiet beauty. (Those who wish to participate in the snorkeling part of the session should bring swim and snorkel gear. Life vests will be available for use. Participants may want to bring a snack and beverage as well.) Rain date: Friday, August 13, 11:00 am

August 31 (Tuesday) 1:00 - 4:00 pm
Mammals of Wisconsin
Session Leader: Scott Craven, UW-Extension Wildlife Specialist

You know your bear, deer and wolves, but do you know your shrews and weasels? Learn to identify the mammals of Wisconsin with the use of specimens and furs. Mammal diversity and management will be discussed. Capture techniques will be demonstrated and tips on how to cope with mammal problems will be given.

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