Kemp's Point

A newsletter of the Kemp Natural Resources Station

Volume 4, Number 1 - Spring 2003

Kemp Research Report: Tracking Change in the Northwoods

Today, Wisconsin's forests are much different from those that existed only 150 years ago. I like to imagine what northern Wisconsin was like then, so wild with only the sounds and smells of nature. The mid-1800's saw the beginning of the "Cut Over Era," when early settlers and loggers harvested timber across the northern part of the state, leaving little forested land behind.

The state leaders of the time saw the cleared land as an opportunity to expand agriculture in the north, and many settlers inundated the area. The poor soils and short growing season caused many farms to fail and ultimately the land was abandoned. In the 1920's, reforestation and wildfire suppression occurred, again changing the landscape. Today there are other, different changes to Wisconsin's forests—those resulting from increased development.

The relatively recent influx of new residents to Wisconsin's Northwoods has raised concern about the potential impacts on sustainable resource use. Such concern often spawns research, and an example of this are two projects out of the Department of Forest Ecology and Management at the University of Wisconsin-Madison. The projects examine forest fragmentation resulting from road and housing construction.

The projects are led by Assistant Professor, Dr. Volker Radeloff, a specialist in forest biometry. Forest biometry is the application of statistics to examine forestry and natural resource issues. Working with Dr. Radeloff are two graduate students, Todd Hawbaker who is studying roads, and Charlotte Gonzalez-Abraham, who is examining housing change.

Previous studies have investigated the potential impacts of roads and buildings on surrounding ecosystems. Road impacts include destruction of vegetation and habitat loss, soil disturbance and erosion, exotic species and pathogen spread, species mortality and, behavioral change in animals. Similarly, houses can cause erosion, destroy natural vegetation, introduce exotic species, and

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The Sweet Taste of Spring

On Saturday, March 22, Kemp Station hosted its first 2003 outreach session. The topic: maple syrup. UW-Madison's Matt Thomas shared numerous photos and stories illustrating the historical and cultural aspects of maple sugaring in northern Wisconsin. Matt's presentation was loaded with interesting facts and was enjoyed by all.

A volunteer demonstrates the use of a bit and brace as Matt Thomas (far right in cap) and other participants look on.

After Matt's talk, the group headed outside for a tree tapping demonstration. Then it was into the kitchen where Kemp's "sugar meister," Gary Kellner, was busy boiling down sap to make syrup. Gary shared his techniques and experience with the group and others shared theirs as well. It was truly an informational sharing opportunity. Hot beverages and treats made with real maple syrup were on hand to stave off any hunger pangs.

Improved Internet Access brings the World to Kemp (and Vice-versa)

The research and teaching capacity of Kemp Station took a big step forward in March with the installation of a new T1 Internet connection. Previously, the Station used a shared telephone line and modem to connect to the Internet. The results were painfully slow transmission speeds, frequently dropped connections, and plenty of frustration.

Throughout academia, students and researchers have become dependent on the Internet for checking email, accessing on-line databases, and connecting to computer resources back at their home campus. This is particularly true for the scientists and students who make extended field trips to the Northwoods. While they enjoy Kemp's rustic setting and historical log buildings, our dated and unreliable Internet service had begun to compromise their ability to do research and teaching at the Station.

To address this need, Kemp installed a high-speed Internet connection. Now multiple users can log on at speeds 70 to 100 times faster than the old phone line & modem set-up. So far only the Laboratory has improved Internet access. But the plan is to distribute this enhanced connectivity to the Lodge, Cabin, and Classroom via a wireless network later this spring. Once installed, users will be able to turn on their notebook computer and access Internet resources whether they are working in the Lab, in their room, in the forest, or even on the lake.

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Down the road, we will connect the Station's automated weather station and lake monitoring station to the wireless network. Then it will be possible for researchers and students to track the environmental conditions at Kemp from anywhere in the world.

Funding for this project was provided in part by the College of Agricultural & Life Sciences Research Division, the School of Natural Resources, and the Office of Academic & Student Affairs.

Kemp On The Web

Earlier this spring, Kemp Station launched it's new website, www.kemp.wisc.edu. Now you can take a virtual tour of Kemp and learn about the Station's history, mission and facilities. The site is designed to have a little something for everyone. **Scientists and instructors** can check lodging availability and make on-line reservation requests. **Visitors** can browse Kemp's outreach program schedule.

Planned additions include:

- Information about research projects supported by Kemp Station, including links to individual research web sites
- Real-time and historical weather and lake data
- Kemp's biannual newsletter, *Kemp's Point*
- An archive of "Outdoors," Tom Steele's WXPR radio commentaries, for reading or listening
- A searchable publications database

So the next time you are surfing, check us out. And as always, your suggestions are most welcome.

influence wildlife movement.

The UW-Madison studies hope to expand this body of knowledge by examining the historical changes in road and housing density and patterns in Wisconsin from the 1930's to the 1990's.

A Look At Roads

Todd's research began by comparing current U.S. Geological Survey road data with roads visible in aerial photographs. He has found that many roads shown in aerial photos do not appear in the official road database. This is believed to be due to the rapid pace of development and the fact that unimproved roads—such as gravel or dirt roads—are generally not recognized in official records. Yet for Todd's study, *all* roads should be tallied since every road potentially contributes to forest fragmentation.

The second goal of Todd's research is to understand current patterns of forest fragmentation caused by roads. Using accumulated road data, Todd can generate maps showing the amount of edge created by roads and the undisturbed interior forest patches that remain.

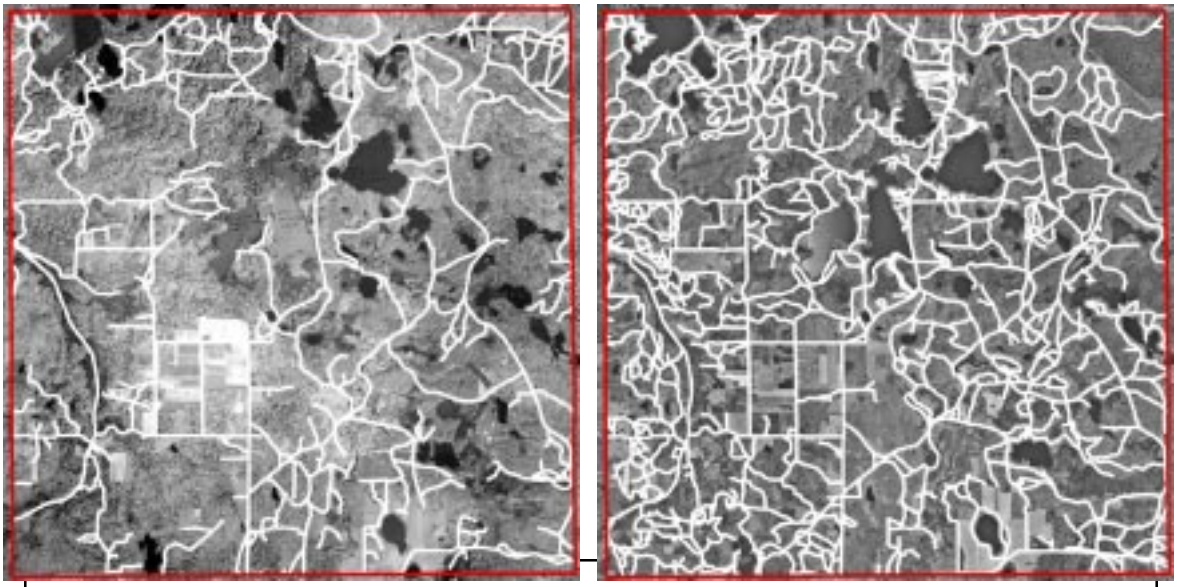
Fragmentation poses real challenges for resource managers. The box at lower left highlights a home's foundation -- all that remains after a wildfire.

Once soil, landownership and housing density data are gathered, he can look for relationships between these factors and road development. He will be able to determine if soil substrate has played a role in road location and answer questions, such as, "are roads more abundant in areas with well-drained soils?" and "how exactly does human population density contribute to road density?"

Finally, Todd will measure the rate of forest fragmentation between 1938 and 1998. He will run statistical analyses to evaluate whether housing density has increased in areas with easy access (high road density), or whether road density is affected by different land management practices inferred by land ownership.

A Look at Homes

Like Todd, Charlotte will also estimate forest fragmentation, but due to changes in home construction over time. Previous studies of housing and forest fragmentation focused only on housing density. Charlotte explains that a single house built in the forest may have little impact on the landscape.



Aerial photos show the increase in road density, from 1938 (left) to 1998 (right), near Harshaw, Wisconsin (Township 37N, Range 7E).

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Wild Wonders

Living on the Fly

I grew up in an older neighborhood on the west side of Madison. In the summer, neighbor friends, my sister and I played outdoors until we spotted bats flying about. We did not want a bat to fly into our hair and become tangled! That was before I knew better. Now I know that bats have amazing echolocation systems that allow them to find the mosquitoes and other insects they eat. Obviously they would not choose to fly into a child's head!

Prior to the bats coming out, there were other silhouettes flitting about against the dusk sky. I thought these were bats too, until my mother told me they were swifts – chimney swifts – birds, not bats. Didn't have to worry about any hair-entangling there!

I recall seeing swifts at my grandparent's farm too, the birds flitting about overhead, chattering. My mother and grandparents enjoy birds. Since childhood I've been exposed to the common birds, their songs and their habits. My family's interest led me to watch and listen to birds in the yard, in trees and the sky, at nest boxes and at feeders. It wasn't until recently that I realized I'd never seen a chimney swift anywhere but in the sky. A chattering, fast moving silhouette was the only image my mind could conjure up.

After moving to northern Wisconsin I had the opportunity to volunteer at the Northwoods Wildlife Center in Minocqua, a wildlife education and rehabilitation facility. It was there I saw my first chimney swifts up close. A clutch of baby swifts had come in. These little birds were noisy – their raucous chatter almost made you wish they were back in a chimney somewhere! And they were difficult to feed – their own mother would have done a much better job than any human could. Because of this, the chance of the babies surviving to an age where they could be released in the wild was not the best. Naturally, the staff at the Center would do the best they could.

Stretching from eye to eye, a swift uses its mouth like a basket, scooping insects from the air during flight.

So this mystery bird that I'd known a good share of my life now had a face. Its bill is tiny, but its mouth is not. Stretching from eye to eye, a swift uses its mouth like a basket, scooping insects from the air during flight. In fact, they do just about everything while in flight – feeding, drinking, bathing, courting, twig collection for nesting and even mating. They do not perch horizontally like other birds, but use their small legs and feet to hook onto rough vertical surfaces. This characteristic is what makes chimneys excellent nesting sites.

As it turns out, chimney swifts have a number of interesting ways about them. Besides living on the wing, they have a unique way of building a nest. Swifts use their saliva, which dries hard like glue, to attach small twigs to a vertical surface like the inside of a chimney. They continue to add small twigs until the nest protrudes from the wall about 2-3 inches, in a half saucer design.

Clutch size can range from 3-6, which is fairly common. However, these babies spend much more time in the nest than other birds of similar size. First, in the egg, it takes about 19 days before hatch and then another 14 days before the babies' eyes open. Add another 5 days before the young birds will venture from the nest to hang on the chimney walls. They are very vocal beggars when the adults

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come to the nest site. Once the young birds are 28-30 days old, they will leave the nest site to fly about with the rest of their swift family.

The way young chimney swifts are fed is also unique. As the parents collect insects, they store them in a special pouch located in their throat, forming a wad of insects. This insect ball can contain hundreds of bugs. When they return to the nest site, the entire ball is regurgitated to feed one young bird. By gorging each baby bird a few times each day, the parents avoid the continuous feeding most other bird parents must do. This unique feeding method is one reason why it is difficult for humans to successfully raise swift babies.

Unfortunately, like many other wild species, chimney swifts are losing nesting sites. Originally, swifts used old, hollow trees and snags for nesting. As old-growth forests were harvested in the 1800's and early 1900's, these trees disappeared and so did their nest sites. The swifts adapted by using chimneys, which were then increasing in number.

More recently chimneys are being capped to keep unwanted animals from entering and with most modern heating methods, chimneys are not required. Chimneys that are built are lined with metal, but swifts cannot grip onto a slick metal surface. Such a chimney could become a death trap for a swift and it's suggested that it be capped to prevent such an event. Had I known all this when my parents switched from oil to natural gas heat and my father decided to remove the chimney, he would have had some resistance from his daughter!

If you would like to read more about this somewhat mysterious wild wonder, check out these websites:

http://birds.cornell.edu/BOW/CHISWI/

http://www.tpwd.state.tx.us/nature/birding/chimneyswift/chimneyswift-index.htm

http://www.americanartifacts.com/smma/per/b10.htm

Sneaky Spiders

If you've ever spent time admiring flowers in your yard, at a park or along the roadside, there's a good chance you've seen a flower spider. Looking much like a tiny crab, flower spiders sit on flowers waiting for an unsuspecting insect to come along to grab and eat. The spider injects venom into the insect, turning the bug's insides to liquid, which the spider sucks out like a milkshake. All the while, the flower spider holds the prey such that a larger predator, like a bird, sees only the insect prey sitting on the flower, not the spider holding on. Clever technique — the flower spider hides from predators behind its meal and can scamper to safety should a predator move in!

The insect that becomes dinner is unsuspecting because the flower spider is usually the same color as the flower. To some degree, female flower spiders can change color to match the flower. In fact, the flower spider you spy camped out on a flower is most likely a female since males, who are about half the size of the 10 millimeter long female, spend most of their time foraging for food on the ground. Males usually show up on flowers only for mating. The spider may also hunker down in the flower parts, even further disguising themselves.

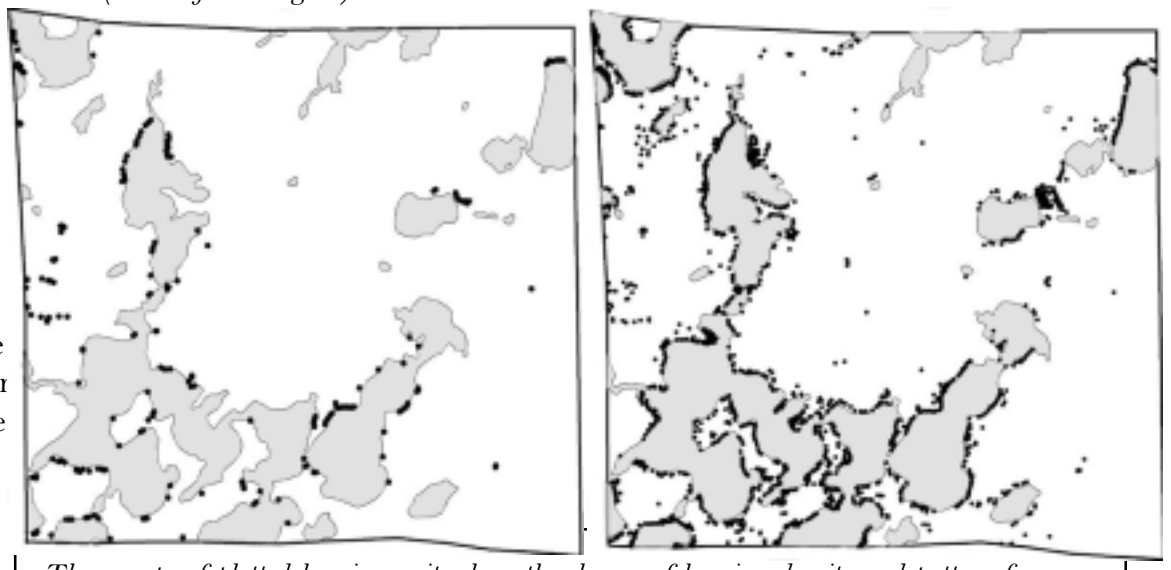
I've encountered flower spiders in our yard, the most memorable being a bright yellow one. At that time, I didn't exactly know what it was, but I had fun watching it move about. Besides looking a bit like a crab, a flower spider also moves like one, sideways and backwards. If disturbed while atop a flower, the spider will disappear below until the danger is gone. Most flower spiders are white or yellow and tend to select flowers that match their body color. They also prefer ray-type flowers, making black-eyed Susan's and daisies great spots to look for these tiny wild wonders.

For a look at flower spiders, check out:
http://www.uwgb.edu/biodiversity/biota/arthropods/Spiders/spidermain.htm

-K.O.

However, the combined effect of many housing units distributed across the landscape could add up to a major impact.

To address this issue, she will first investigate the relationship between housing density and the spatial pattern of housing units. Using U.S. Census data and aerial photographs, housing density and patterns can be determined. House locations are digitized into a computer database from aerial photos. To confirm the data are accurate, a visit to each study area must be done to match the house identified in the photo with the actual structure. Given the nature of development in northern Wisconsin, this must be done both by land and water.



These maps of plotted housing units show the change of housing density and pattern from 1938 (left) to 1998 (right) in the Three Lakes, Wisconsin area. (Township 39N, Range 11E)

Charlotte will also identify differences in forest fragmentation due to differences in the spatial pattern of housing units. To do this, study areas with the same housing density will be compared. If the *pattern* of housing is different, there may be different amounts of forest fragmentation.

Riparian zones are popular development sites. Over time, the size of homes and surrounding yards has grown.

Next changes in the spatial pattern of housing units will be investigated. Preliminary studies show that housing units initially are aggregated, occurring in a clustered pattern. However, this appears to change with new housing units developed away from housing clusters, resulting in a more dispersed pattern.

Finally, Charlotte will estimate the changing rate of forest fragmentation due to housing. Similar to an edge effect buffer Todd applied to roads, Charlotte will apply a range of "disturbance zone" buffers to all housing units. These buffers will simulate the avoidance response of different animal species to areas of human activity. Maps of remaining forest fragments will then be generated from the housing data and buffer zones.

I asked Charlotte and Todd what has surprised them most in their research. Todd says, "The amount of small logging or woods roads is astonishing, much greater than I ever expected. The increase in the total road mileage is just as surprising too. Given the intensive management history of our forests, I would have expected much of the road network to already be in place. Our results suggest that the landscape in northern Wisconsin is much more fragmented by roads than currently thought."

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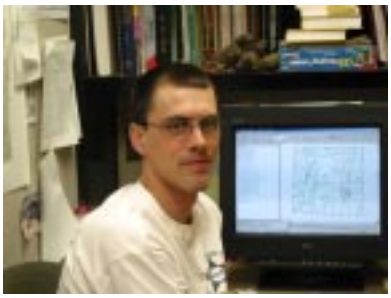
Charlotte has been struck by how quickly lakeshores have become crowded by houses. Also of great interest to her are how humans modify the landscape, how they look at their surroundings, and how their perspective of being in the landscape has changed. She explains that from photos taken in 1938, it was difficult to locate houses in the forest and the houses were small. But in the 1980's the trend was toward big houses, surrounded by large lawns.

Forest fragmentation is on the rise in northern Wisconsin and some of its effects may not become known for some time yet. Todd and Charlotte hope that combined, their research will contribute to a better understanding of road density and housing impacts across landscapes. Perhaps understanding where we came from will provide a better understanding of where we're going. *-K.O.*

Charlotte Gonzalez-Abraham is from Mexico City where she earned her Bachelor's degree in Biology at the National University of Mexico. She plans to complete her master's research by May 2004 and will remain at UW-Madison to pursue a PhD in Forestry under the guidance of Dr. Radeloff. Afterward, she would like to return to Mexico.



Todd Hawbaker is from Ames, Iowa and earned his Bachelor's degree in Animal Ecology at Iowa State. He plans to complete his master's work this August and will continue his education, pursuing a PhD. He hopes to continue studying interactions between human development and landscape pattern, either as a university professor or with a state or federal agency.

For more information about the changing landscape of the midwest, visit these links:

http://www.ncrs.fs.fed.us/IntegratedPrograms/lc/pop/hd/title.htm

http://www.ncrs.fs.fed.us/4153/deltawest/

Kemp Station recently received a generous donation of Ecology journals from Dr. Jim Fralish and the Fralish Family Foundation. The journals date back to 1935 and provide a valuable resource to the scientists and students who work at the Station. The journals are housed in a bookcase once located in King Hall, on the Madison campus, during the 1920's. It was restored by Gary Kellner, craftsworker at Kemp Station. At left, Dr. Volker Radeloff from UW-Madison's Department of Forest Ecology & Management tracks down a key research article.

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