

NC NEWS

NORTH CENTRAL FOREST EXPERIMENT STATION

February/March 2000



Aliens Within: Preventing Pest Invasions *Within* U.S. Borders

Kudzu, purple loosestrife, Dutch elm disease fungus, zebra mussel...The list of costly, alien invaders is proof that organisms carried into the U.S. can sometimes get carried away. But can the same kind of epidemics happen *within our borders*, when organisms are carried from one region of the U.S. to another?

Meet the “aliens within”—pests that are well-established in one part of our country, but that could cause epidemics if transported to another. Researchers at NC’s Forest Diseases project are determined to raise the profile of this under-reported threat, and to prevent this kind of epidemic through research. “We study several pathogens from the Eastern U.S. that could be damaging in the West—every bit as damaging as pathogens from another country,” Project Leader Jenny Juzwik said. “We need to be vigilant at domestic borders, not just foreign ones.”

Mighty Oaks at Risk



Both landscapes and livelihoods can be threatened when pathogens enter new parts of the U.S. “Anytime you place an organism where it hasn’t evolved, it can trigger unintended ecological consequences. When agriculture or forestry are affected, the economy can take a hit along with the ecology,” said NC Research Pathologist Mike Ostry.

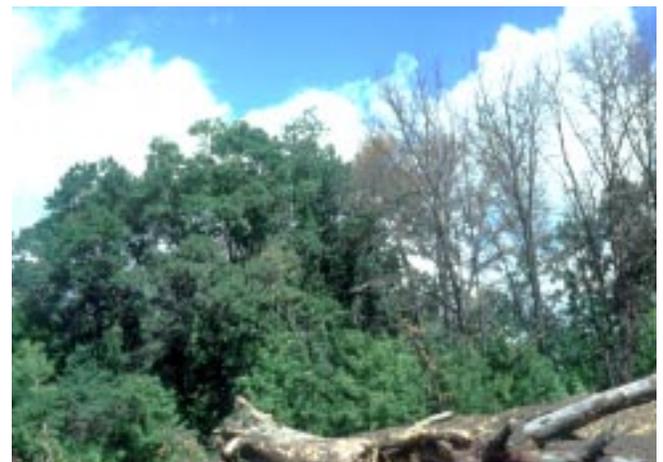
Oak wilt fungus (*Ceratocystis fagacearum*) is a case in point. “Valuable oaks in the red oak group [black oak, scarlet, blackjack, and northern red] are extremely susceptible to infection, often dying within weeks of the first visual symptoms,” said Juzwik. In the Upper Midwest, annual tree deaths from oak wilt number in the thousands, while in

Texas, the oak wilt problem is both extensive and expensive, killing shade trees (live oaks) that add as much as 19 percent to the value of homes in Austin.

But what if the fungus, already in 22 States, were to invade an oak stronghold such as California? After inoculating 15 species of California oak seedlings with the fungus, David Appel of Texas A&M University found that the California oaks show no resistance or immunity to the oak wilt pathogen. “If the oak wilt fungus were to enter certain California woodlands, it would likely lead to significant losses, especially in areas where deciduous red oaks are intermixed with live oaks,” he reported.

Juzwik, who has studied the overland avenues of disease spread on eastern oaks, believes the stage is set for possible insect transmission in California: “Here in Minnesota, we’ve narrowed the list of principal sap beetle vectors of oak wilt to a few species. Close relatives of these species live in California, and we know they are already

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Oak wilt damage.

Jennifer Juzwik

In the News

Battling Aliens Within

New Riparian Book Published

Hayes Tower RNA

Reforestation China

People on the Move



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involved in spreading two other fungi related to the oak wilt fungus. If the oak wilt fungus were to make its way west, these insects would be well-positioned to assume the role of vector.” (Insect “vectors” feed on fungal mats and carry disease spores to healthy trees.)

Even more threatening is the possible introduction of a more efficient vector from outside the U.S. “The European oak bark beetle, which wounds the tree and is oak-specific, has the potential to be a much more effective vector of oak wilt than our native insect vectors,” states Bob Haack, Project Leader with NC’s Forest Insects unit. “An invasion of this insect could lead to expansion of the oak wilt range in the U.S.” Juzwik would like to study this potential in cooperation with European and U.S. entomologists. She and University of Minnesota colleague Steve Seybold are also interested in developing an insect-chemical-based monitoring tool that would help inspectors detect the European bark beetle, which has already been intercepted at least 12 times at U.S. ports of entry.

According to Dave Appel, “Jenny has made great inroads into understanding the details of oak wilt vectoring. She’s the only one doing this work, and her research is meticulous. The oak wilt problem in Texas is quite serious and we count on her to help us understand how the disease spreads, so we can prevent it.”

Poplars Are Popular With Fungi

Hybrid poplar (intensively grown for fiber and energy generation) could also be damaged by an “alien within.” The fungus *Septoria musiva*, which at this point is only found in the Northeastern and North-central U.S., causes lethal stem cankers and a leaf spot disease. If it were to spread to the Pacific Northwest, says Mike Ostry, it could be extremely damaging to most plantation-grown hybrids, as well as to native poplar stands. “Pest control in a plantation can be expensive enough, but when the disease spreads to native stands, it can become impractical, if not impossible,” Ostry said.

Ostry’s warnings convinced poplar growers to stop transporting plant material from east to west. He has also warned that *Septoria* could travel via “land bridges,” linked corridors of poplar plantations that form an Oregon Trail of sorts for the fungus. In search of roadblocks, Ostry and technician Kathy Ward are researching *Septoria* biology and conducting selection and field trials to identify disease-resistant poplar clones.

His advice to growers is to practice prevention. “The proper siting of plantations is key,” advises Ostry. “Locations to avoid include those in close proximity to native larch and conifer species that are alternate hosts for leaf rust. Planting a mosaic of different blocks of clones—to keep the pests guessing—is a natural way to guard against pest buildup.”

Wanted: Healthy Butternuts

The fungus that causes butternut canker is a third potential “alien within.” Butternut, also called white walnut, has been diminishing in eastern forests for the last three decades. Its wood is of great value (second in price now only to black cherry) and its large nut is a caloric bonus for mast eaters such as squirrels, deer, and turkeys.

Contributing to butternut’s decline is a canker-causing fungus (*Sirococcus clavignenti-juglandacearum*) identified only 30 years ago. It has invaded every part of the butternut’s range, killing up to 80 percent of the trees in some States and threatening butternut’s survival as a viable species. “During my career, I’ve seen a tree species nearly disappear from the landscape,” Ostry said. “What can we learn from this to keep us from losing others?”

To learn whether this fungus could be an “alien within,” Ostry injected fungal material into hardwood relatives from other parts of the country. Disturbingly, he found the Persian walnut to be especially susceptible to the canker. Persian is the mainstay of the multi-million dollar California walnut industry. Ostry warned walnut growers about butternut canker several years ago, prompting them to stop shipping plant material east to west.

Meanwhile Ostry, along with technician Earline Holmes and other members of his team, are working to conserve a viable gene pool for butternut. He and colleagues started a “Wanted Poster” campaign that urged landowners to send in samples from healthy, and therefore possibly resistant, butternuts. They have grafted hundreds of these twigs onto black walnut rootstocks and outplanted them in a variety of “clonal banks” for future research and possible reintroduction of trees to the wild.

Research Physiologist Paula Pijut has attempted to propagate the butternut via advanced tissue culture techniques. “At this point, resistant trees are our best hope,” Ostry said.

No News is Good News

By the time most pest epidemics hit the news, the damage is done and the moment for prevention is long past. Determined to shift that paradigm, NC researchers are keeping their sights on one goal: To make the invasion of “aliens within” a story that *doesn’t* happen, thanks to foresight, imaginative studies, and the spreading of research results rather than spores.



Butternut canker.

Mike Ostry



Sap beetles.



New Book on Managing Riparian Forests

Here in the well-watered East, riparian forests (lands that border water) are literally around each bend. In fact, our bioregion contains only a third of the country's national forest land, yet it boasts a full *half* of all its water.

When they're healthy, riparian forests are vital connectors between land and water—filters for high-quality drinking water, and reservoirs of species diversity. But as any land manager in the continental eastern U.S. will tell you: riparian health is not a given, and making riparian-related decisions is rarely straightforward.

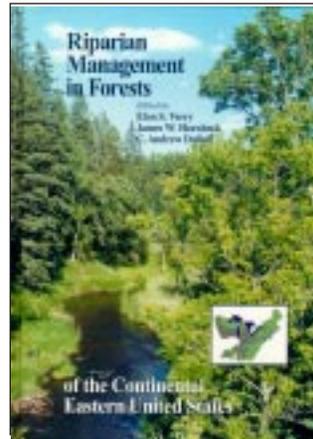
According to Sandy Verry, Research Forest Hydrologist with NC's Ecology and Management of Riparian and Aquatic Ecosystems unit, "Riparian prescriptions for other regions don't apply here. We have a different climate, a different riparian ecology, and a different history. Our current reality—fragmented ecosystems, fragmented ownerships, and diverse interest groups—is also unique." Until now, solid information about riparian management in *this* environment has been hard to find.

Long-awaited Desktop Reference

Thanks to the 402-page *Riparian Management in Forests of the Continental Eastern United States*, edited by Forest Service scientists Elon S. (Sandy) Verry, James W. Hornbeck, and C. Andrew Dolloff, that information can now reside on your desktop. The book's 48 authors describe state-of-the-art procedures for managing forested riparian areas. While they stay away from cookie-cutter approaches, they provide managers and policymakers with tools to develop site-specific guidelines. They cover not just ecological and economic issues, but social ones as well.

What's Known Now

Assembling the known universe of eastern riparian management between two covers was a huge task, admit the editors. After "naively agreeing" to write a summary publication at the request of the Eastern Region of the USDA Forest Service, the trio decided to convene 48 expert authors and more than 250 reviewer-participants at a conference titled "Riparian Management in Forests of the Continental Eastern U.S." in Columbus, Ohio, in March 1998. The authors include scientists and managers from the Forest Service, State Departments of Natural Resources, State universities, the Natural Resources Conservation Service, the



"I recommend it to all who would seek a greater understanding of riparian forest management. By spanning the range between policy-making and management, this book will hold and focus your vision of managing at the water's edge."

— Warren Archey,
President of the Northeastern
Area Association of State
Foresters

Environmental Protection Agency, forest industry, and large metropolitan areas in the Eastern United States.

A Look Inside

Some "need to know" topics covered in the book:

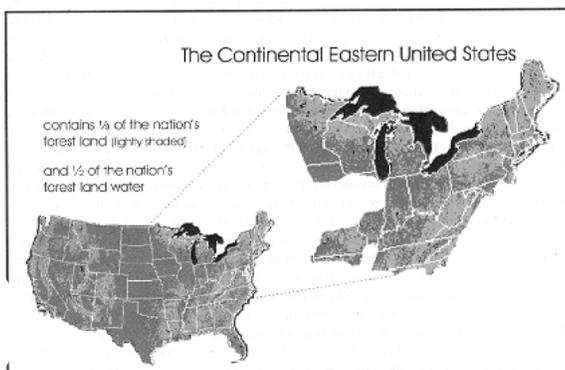
- How to define riparian areas
- How to assess the impacts that may have accumulated within a watershed
- What silviculture is appropriate for riparian forests
- How does forest and water management influence animal populations
- How to balance and sustain agriculture, forestry, recreation, and urban land uses
- How to recognize and evaluate a healthy functioning condition of riparian areas
- How to plan for desired future conditions
- What techniques can we use to restore riparian ecosystems
- How we can enhance natural processes to manage the routing of water and sediment.

Among the most helpful features is the last chapter which summarizes, in bullet form, the recommendations of each chapter. Here are a few from a chapter on diversity co-authored by NC Research Ecologist, Tom Crow.

- Maintain or restore the physical processes that regulate riparian ecosystems
- Put on your landscape glasses if you really want to understand and manage riparian areas
- Manage for timber when and where appropriate
- Buffer width depends on landscape context
- Favor native species.

You can order the book (\$54.95) via the Internet at Lewis Press, a division of CRC Press, <http://www.crcpress.com/>. Enter the catalog number L1501 or search on the word "riparian." Or, you can order through the mail:

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RESEARCH NATURAL AREAS

Hayes Tower RNA Reflects History as Well as Research Potential

Research Natural Areas (RNA's) are areas of National Forest protected and maintained in a natural condition, providing controls against which researchers and managers can measure change. The conventional wisdom is that RNA's are pristine and undisturbed when they are chosen. But this isn't always the case. Consider the history of the recently designated Hayes Tower RNA on the east side of the Huron-Manistee National Forest. Nearly 90 acres were clearcut for aspen in the mid-1970's. Logging salvaged some of the red oak, red maple, and red pines damaged by a tornado's path through 150 acres in 1976. All stands were impacted when *Ribes* (gooseberry), the alternate host plant for white pine blister rust, was removed from the understory in 1964. So, if RNA's are thought to be pristine, why was Hayes Tower chosen?

In many cases, it's difficult or impossible to find ecosystem examples needed for the system of RNA's that haven't had some sort of human manipulation—logging, trail building, fire suppression, salvage, pest control, and so on. While the intent is to provide sites that are relatively unmodified by human activity, the Forest Service Manual allows for some flexibility in choosing RNA sites: "When candidate areas in a pristine condition are unavailable, then areas that reflect the pristine condition as closely as possible may be selected."

The 388-acre Hayes Tower comes "close to pristine" thanks to the 150-acre portion of the RNA that has not been disturbed. According to Huron-Manistee Ecologist Alix Cleveland, "This 150-acre portion is one of few examples of high-quality pine-oak forest remaining in northern lower Michigan. The glacially influenced landforms (known as dry sandy ice-contact hills) that supported native pine-oak ecosystems are abundant in that part of the State. Yet logging and subsequent fires around 1900 altered the systems to such a degree that even a small remnant like Hayes Tower is a rare find."

The parts of Hayes Tower that are not pristine are equally valuable, however. As a total package, the combined parcels represent a landscape of vegetated hills rather than just a few stands of trees. This provides a better baseline for understanding the landtype association and the ecological functions that may work at a landscape scale. Over time, as the disturbed portions of Hayes Tower regain a large degree of naturalness, they will offer a chance to follow the pathways of succession after a clearcut and tornado. Researchers and managers can compare conditions in the recovering area with (1) conditions in the relatively pristine portion of Hayes Tower, and (2) conditions on nearby sites of that same landtype association that are being managed for timber production.

Despite conventional wisdom, Hayes Tower shows that RNA's need not be untouched to be valuable. Those with a partial history of human disturbance can also teach us about change, recovery, and our part in creating future forests. And those lessons, by any definition, are what RNA's are all about.



Photo and article contributed by Lucy Tyrrell

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Jerry Van Sambeek Helps China Replant After Floods

After a decade of costly flooding along Asia's largest rivers, the Chinese government is converting steep farmlands to forests as a way to halt erosion, prevent human misery, and provide income for farmers. Part of their plan includes consulting with tree improvement experts like Jerry Van Sambeek, a Research Plant Physiologist with NC's Central Hardwoods research unit in Columbia, Missouri. Van Sambeek has taken two trips to China, and his experiences show how cross-pollination among researchers can help create a more sustainable world.

The first advisory team was organized through the Forest Service's International Programs office. Van Sambeek was chosen because of his 20-year experience in the propagation, care, and management of black walnut. (By law, farms in China with slopes greater than 25 percent must now be reforested, and the "economic trees" being planted are walnut



Jerry Van Sambeek

Tissue culture specialist transfers Persian walnut microshoots to a new culture medium.

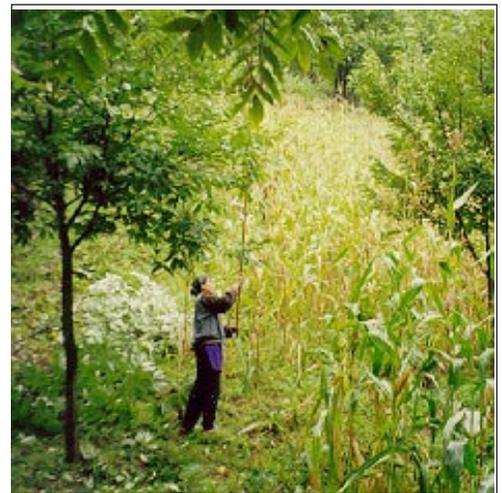
and chestnut.) His first trip, this last fall, was to the rugged, mountainous Yunnan province of southwest China. The species of choice here is Persian walnut, also grown in California for the walnuts we see on our grocery shelves. "This tree was probably carried to China during the silk trade," Van Sambeek noted. Some of the nuts will be used for food, but most will be processed into walnut oil.

On his second trip, organized through the Henan Bureau of Foreign Experts, Van Sambeek traveled to Beijing Province in Northeast China and Henan Province in central China, where black walnut is being grown for its timber and nuts. Black walnut was introduced not by silk traders, but by Professor Xi Sheng Ke, a horticulturist from the Chinese Academy of Science who did her graduate work on walnut in the United States.

Xi was quite interested in Van Sambeek's latest work on black walnut micropropagation, a lab technique in which large numbers of superior walnut specimens can potentially be created from the tissues of one tree's meristem (growth zone at the tip of a twig). They also shared information about traditional forms of propagation, e.g., grafting of scions, bud grafting, and root grafting. In these methods, a portion of a high-quality, nut-producing tree is attached to the rootstock of another, as a way of multiplying the superior specimen. The Chinese need fast, reliable ways to propagate hundreds of thousands of walnuts to distribute to farmers.

"They are very serious about this reforestation effort," Van Sambeek said. "In fact, if a farmer receives trees that don't survive, the forestry technicians can lose their jobs." Naturally, he had a very attentive audience at the two 1 1/2-day workshops he conducted on how to propagate, plant, and care for black walnut. "It was a culmination of everything I had read or learned during my research career," Van Sambeek said. "Distilling all that and passing it on was a challenge I enjoyed."

Van Sambeek also traveled to several nurseries and field plantings, offering advice on pest problems, propagation, and more. At the Friendship Nursery near Xian in Henan Province, he examined grafts made from scionwood he had collected for the Chinese at NC's Tree Improvement Center in Carbondale, Illinois.



Jerry Van Sambeek

Chinese farmers harvest Persian walnut and Chinese chestnut using long bamboo poles to knock nuts from the trees.

At the tissue culture lab in Beijing, Van Sambeek learned that Professor Xi is having English walnut propagation problems similar to those he has encountered with black walnut. The two discussed the possibility of bringing Chinese researchers to NC or to the University of Missouri Center for Agroforestry to work on both species.

Van Sambeek also inspected some 3-year-old walnuts planted along terraced slopes, with and without corn as a nurse crop. "Interestingly, the trees growing in the corn rows were nearly twice as tall as the trees in the open bare fields without any type of ground cover," he said. "The Chinese are way ahead of us in the cultivation of trees with ground covers, something I'd like to learn more about." Future collaborations may include sending more walnut scionwood and seeds to China, hosting visiting scientists, and providing tours of black walnut plantings in Missouri and Illinois for two Chinese delegations expected to visit the U.S. this summer.

All in all, it sounds like the reforestation of China's high country may already be paying dividends—in the exchange of good will and good ideas, and ultimately, in the shared creation of sustainable economies and ecosystems.

From the Director

An article in the December 1999/January 2000 issue of NC News contained several errors. The article “North Central Cosigns Tribal Gathering Rights Agreement” should have said:

- The title of the final signed agreement is Memorandum of Understanding Regarding Tribal—USDA-Forest Service Relations on National Forest Lands Within the Territories Ceded in Treaties of 1836, 1837, and 1842.
- In the treaties of 1836, 1837, and 1842, the tribes of northern Wisconsin *retained* their long-standing gathering and harvesting rights and their authority for self-regulation of those rights.

- The accompanying photograph shows both black ash and birch bark baskets.

We apologize for these errors. I want to thank members of the Great Lakes Indian Fish and Wildlife Commission for bringing these errors to our attention and engaging us in a dialogue on how these errors affected the Ojibwe community. I see a better understanding of tribal sovereignty coming out of that dialogue and look forward to a continuing and meaningful relationship.

People on the Move. . .

Congratulations!



Sue Barro, *Evanston*, received an award for her outstanding leadership and creativity in developing an integrated research effort to identify likely public responses to possible strategies for the Asian Longhorned Beetle.

Deb Dietzman, *St. Paul*, received an award from the Washington Office for her extraordinary accomplishments and personal effort in support of the National Leadership Conference.

John Elioff, **Ryan Ackerman**, and **Adam Wiese**, all of *Grand Rapids*, received awards for their work on the windstorm recovery project on the Superior National Forest. The work was successfully and safely completed under extremely hazardous conditions.

Nancy Freeman, *St. Paul*, received an award for her excellent work with the INFRA Program.

Laura Hutchinson, *St. Paul*, received an award for outstanding customer service in the Station’s library.

Gary Inhelder, *Aurora*; **Therese Poland**, *East Lansing*; **Richard Robinson**, *Salem*; and **Gary Stachowicz**, *Brownstown*, were promoted.

Pam Jakes, *St. Paul*, received an award for excellent supervisory skills as a Project Leader and for organizing an important workshop dealing with global change and its relationship to the social sciences.

Adelle Jorgenson, *St. Paul*, received an award for exceptional service to the Station in her role as implementation lead for the conversion to the new Foundation Financial Information System (FFIS).

Jennifer Juzwik, *St. Paul*, received an award for her excellent management of the Forest Diseases project during her first year as Project Leader.

Robin Klarenbeek, *St. Paul*, received an award for providing excellent customer service while Management Systems was very short-staffed for an extended period of time. She was also acting group leader during absences.

Earl Leatherberry, *St. Paul*, received an award for his outstanding work as African American Special Emphasis Program Manager.

Sue Lietz, *Rhineland*, received an award for her diligence and excellence in geo-referencing 14,383 FIA plot locations to support landscape ecological research.

Mark Nelson and **Lucy Burde**, *St. Paul*, received an award for their outstanding coordination and leadership during the Station’s Combined Federal Campaign for FY99.

Gerhard Raile, *St. Paul*, received an award for his excellent customer service while detailed to Management Systems during FY98.

Don Riemenschneider, *Rhineland*, received an award for his contributions to the Millennium Tree Project.

Marcia Schardin, **Lolita Coleman**, **Wanda Adams**, **Barb Peyla**, **Rachel Campbell**, and **Paul Reitzel**, *St. Paul*, received an award for their outstanding efforts in implementing the new Foundation Financial Information System (FFIS).

Gail Sindt, *St. Paul*, received an award for her perseverance and dedication in keeping the IBM system at the Station running, even during times of serious staff shortages.

Tim Swedberg, *St. Paul*, and **Marcia Larsen**, *East Lansing*, received an award for their coordination of the Station’s Customer Service Program.

Tim Swedberg, *St. Paul*, received an award for his outstanding work in coordinating the Millennium Tree Project for the North Central Station.

Sandy Verry, *Grand Rapids*, received an award from the Washington Office for contributions as a researcher and author to a General Technical Report that reviews and synthesizes the science concerning the effects of land management on drinking water quality.

Bob Wareham, *Houghton*, received an award for providing excellent customer service while detailed to Management Systems in October and November, 1998.

Larry Warn, *St. Paul*, received an award for his outstanding efforts to carry out a high-level maintenance program at the headquarters office.

Dale Weigel, *Bedford*, received an award from the Hoosier National Forest for developing and maintaining a website that links to common-use sites needed by the Hoosier NF employees.

Kate Weinke, *St. Paul*, received an award in recognition for her extra efforts in preparing for supervisory reviews of the Social and Economic Dimensions of Ecosystem Management project and the Forest Diseases project.

