North Central Research Station News

July/August/September 2001

A Day in the Life of an FIA Field Crew

In the News……

We often reveal the final results of a study with scant mention of the years of data collection that made it all possible. To set the record straight, we present a pictorial of one of the most data-intensive units at North Central—Forest Inventory and Analysis.

Quality is Job One

Research is about collecting data, and some of the most challenging data collection at the North Central Research Station goes on in Forest Inventory and Analysis (FIA). In heat and rain and through blizzards and insects, the FIA field crews measure the trees and record the data with a precision and accuracy that produces our best understanding of the current condition and likely trend of midwestern forests.

The volume of work is enormous. North Central's area of responsibility covers 11 States and 16,000 permanent plots—pieces of ground on which a variety of vegetative measurements are taken. Visiting the 20 percent of these plots that must be surveyed each year requires the equivalent of 22 two-person crews working year round. At the height of summer, as many as 104 people are conducting surveys. Covering the territory requires 16 field offices and a production pace of one completed plot per day per crew, regardless of the weather or remoteness of location.

It takes 3 to 6 hours to collect all the data at each plot, depending on the type of stand, according to Steve Metzner, a 3-year veteran of the Rhinelander, Wisconsin FIA crew. A balsam fir thicket may require measuring the height, diameter, and location of dozens of spindly trees growing inches apart. "The standard joke is 'We're in a nice stand. This can't be the right place,'" Metzner said.

Making Sure Mistakes Don't Multiply

The crews are committed to accurately measuring every one of the required trees. "Because of the way data are aggregated, mistakes are magnified thousands of times," Metzner said.

To maintain quality, crews go through annual training and re-certification. It takes 10 weeks of training to learn the plot design, tree identification, and standard measurement procedures. An additional 5 weeks are required to learn the skills needed for properly classifying tree defects and storing and editing information on the data recorder.

"Quality in, quality out," says Dennis May, FIA program manager. "Our customers are looking for solid answers and it all starts with quality data collected in the field. FIA field crews take on a challenging job under difficult circumstances and do it extremely well."

(*FIA continued on page 2*)

FOREST SERVICE USDA

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(FIA continued from page 1)

▲ *Steve (left) and Terry (right) contemplate the best route to today's destination. Using satellite images, hand-drawn maps from previous crews, topographic maps, and a good sense of direction, crews must track down a slim metal stake buried in the forest litter. Global positioning (GPS) equipment has been of assistance in the past 2 to 3 years, but the straight-line directions it provides are not always the best way through the woods.*

▲ *Terry finishes remarking the starting point, a landmark used by previous crews to navigate to the survey plot. The duplicate marking at the base of the tree will help future crews find the starting point even if the tree is harvested.*

Through a Day with FIA

What's it like doing forest inventory? It can be long hours bashing through thick brush and swamps. But every day also brings a treasure hunt, looking for that single stake that marks the start of today's survey. It takes persistence, "woods smarts," and an appreciation for the importance of the work. A sense of humor helps too. As an FIA veteran once said, "The pay's not great, but you get all the nuts and berries you can eat."

Steve Metzner and Terry Schreiber of the Rhinelander FIA field unit recently demonstrated (without hard hat for photo purposes) the hazards and highlights of survey work in Oneida County, Wisconsin. Steve is a Forest Service employee in his third year with the North Central Station. Terry started working on FIA this summer as an employee of the Lumberjack Resource Conservation and Development Council, the organization under contract with the Wisconsin Department of Natural Resources to conduct the forest inventory in Wisconsin. (Photos courtesy of Deb Dietzman)

▲ *Terry checks the compass bearing from the starting point to the center of the plot.*

▲ *The treasure has been found! A GPS unit updates the coordinates of the previous crew's stake, which marks the center of the survey plot, (see arrow, bottom left).*

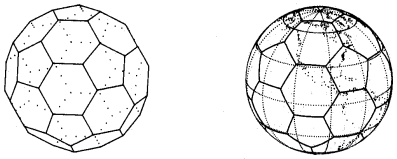
▲ *Each plot actually consists of four subplots. Here, Steve measures the distance of a maple tree from the center of the first subplot. Every tree greater than 4.9 inches in diameter is typed by species, measured for diameter and height, and assessed for damage.*

▼ *Terry measures the diameter while Steve records the condition of a sapling. These smaller trees are recorded as part of a "microplot" of each subplot, which identifies trees that will grow into the standard inventory plot in future years. Steve uses a data recorder to capture, edit, and store data for subsequent downloading to FIA headquarters in St. Paul.*

▲ *Terry uses an increment borer to determine the age of this tree. The tree's age, diameter, and height go into a formula that calculates site index, a numerical value that indicates how well trees should grow here.*

▲ *Can you find the FIA crew member? Measurements must be taken regardless of whether the designated point is in an open red pine plantation or deep in a boggy alder thicket.*

FIA Team Wins NC's Excellence in Technology Transfer Award



Truncated icosahedron

Thanks to this year's winners of the Excellence in Technology Transfer award, a new and cohesive sampling framework is in place to guide the collection of U.S. natural resource data. "This framework will influence the way Forest Inventory and Analysis (FIA) collects data for years to come," says Dennis May, FIA program manager. The winning team includes: FIA's Ron McRoberts, Gary Brand, Mark Nelson, Dan Wendt, Kevin Nimerfro, and Southern Research Station's William Smith.

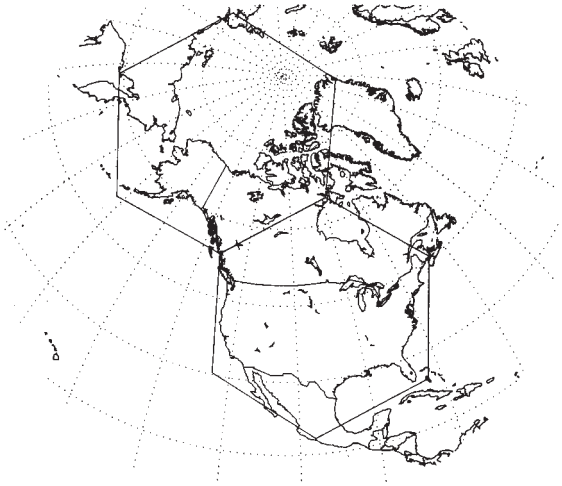
More Data Please, and Make Mine Fresh

The need for a new sampling design arose in 1998, when the Farm Bill called for *annual* FIA inventories, meaning 20 percent of a State's plots must be measured each year in a 5-year cycle. This was a switch from completing one State at a time and not returning until 6-18 years later. Another new wrinkle was to collect data across all forested lands, regardless of ownership or forest cover type. Finally, there was a mandate to merge the sampling aspects of the FIA program with those of another inventory program called Forest Health Monitoring (FHM).

Hexagons Nested in Hexagons

Early on, the NC team realized that the plots in this new sampling grid would have to be regularly spaced across the Nation. "The problem with most regularly spaced designs is that they fail to accommodate the curvature of the Earth," said Ron McRoberts, mathematical statistician. An interesting alternative was found in the soccer-ball pattern that mathematicians call a truncated icosahedron. A sampling design based on this concept was developed by the Environmental Monitoring and Assessment Program (EMAP) of the U.S. Environmental Protection Agency, and became the basis for the FHM sampling design.

FHM's grid was created by positioning a base hexagon over the lower 48 States and subdividing that into 28,000 hexagons (see figure). Each hexagon contains a sample plot and is assigned a "panel" number corresponding to the year it will be measured. The NC team expanded on this idea for the combined grid, creating a lattice of smaller hexagons, 1/27 the size of the FHM hexagons.



Hexagons of the truncated icosahedron covering North America.

The Plots Thicken

The next step was to choose or create plots in each of these hexagons. Priority one was to keep as many existing plots as possible for historical continuity.

Tough choices immediately presented themselves. When two or three existing plots fall in a hexagon, which do you choose? If no plots exist, where do you locate a new one? Since a hexagon can be assigned to only one State and county, what do you do when it straddles the line? And how do you assign a panel number when there's a cycle difference, e.g., FIA on a 5-year cycle, and FHM on a 4-year?

Obviously, a set of rules was needed to create State-to-State consistency. The team used Geographical Information System (GIS) techniques to come up with efficient solutions and then created a set of if-then rules to guide decisionmaking. They packaged these rules along with a GIS layer of the national grid, software, and documentation protocols, then put the whole thing on the Web. They also offered a hotline to help other FIA units troubleshoot problems.

It Takes a Team

"It was a great team effort," said McRoberts. "From the idea of basing the FIA design on the FHM system, to making it work in the real world, to bringing partners and advisors to the table, each team member worked on a piece of the puzzle. Once we were sure that all the specific requirements of the design were met, we were ready to help other regional teams make their transition to an annual cycle." As May noted, "By adopting this framework,other FIA groups can 'go annual' without duplicating our investment of time and money."

Not surprisingly, the team is also being nominated for a national Forest Service award in technology transfer. If technology transfer is the art of getting information into the hands of those who need it in a form they can use, this is likely to be the beginning of many celebrations.

For more information, contact Dennis May at 651-649-5132, or at dmay@fs.fed.us.

CASE Media Fellowship: Where Journalists Become Immersed in their Subject

We received this from journalist Kathleen Preece, who traveled to the Boundary Waters Canoe Area Wilderness this August during a journalism fellowship sponsored by North Central (NC) and the University of Minnesota's (U of M) College of Natural Resources. The program brought natural resource writers and researchers together in the BWCAW, where the 1999 Independence Day storm created a once-in-a-lifetime opportunity for research and reporting.

"Leave no trace." These were the first and last words we heard as we crossed the line marking the border between the communities of northern Minnesota and the territory known as the Boundary Waters Canoe Area Wilderness.

We were on an adventure. John Krist, senior reporter with the *Ventura County Star*, California; Carolyn Shea, senior editor with *Audubon* magazine, New York; Jesse Hardman, news reporter with WBEZ-FM, National Public Radio, Chicago; Christine Mlot, freelance science journalist, Madison, Wisconsin; Ashley Grant, environment/outdoors writer for Associated Press (AP), St. Paul; and me, Kathleen Preece, natural resource writer/publisher of *BetterFORESTS* magazine, Bemidji, Minnesota. At our sides were Sue Duffy, wilderness guide and Forest Service recreation management forester, Ely, Minnesota; Ann Heisenfelt, AP photographer, St. Paul, Minnesota; and Lee Frelich, University of Minnesota research scientist and our interpreter to-be of all things wild and boreal. For a week, we'd be away from our desks, steering canoes instead of cursors.

More Memorable than a Press Release

Our charge: To learn the face of the wilderness we so often write about, and to meet the researchers who study the science behind the news. Our sponsors, NC and U of M, planned this trip as part of their effort to disseminate information generated through their research. As Tim Swedberg, NC's information specialist put it, "We at NC try to provide credible information so that society can make educated and informed decisions about natural resources. We're hoping that you, as media specialists, can magnify the lessons you learn here, and take them to a wider audience."

Kathleen Preece

CASE media fellows at Split Rock on Lake Superior.

Lowdown on the Blowdown

This portion of the BWCAW was a rich environment for the inaugural CASE Wilderness Ecology and Economics Fellowship, accredited by the Council for the Advancement and Support of Education. In July 1999, intense winds had blown across that wilderness, uprooting and snapping off more than 30 million trees. The BWCAW became a giant laboratory without walls; one in which to study a recovering forest—from soils to canopy, tourism to recreation, water to wildlife, and landscape ecology to meteorology. And NC scientists have filled that lab.

William Mattson, NC entomologist, told us that the hypothetical frequency of such an event is every 1,000 years. Some of the questions he'd like to answer during this unique research opportunity: Can storm-damaged trees provide breeding materials for root pathogens and wood-boring insects? Might these increased populations spill into undamaged forests?

NC social scientist Susan Stewart ponders how tourists and an increasing number of residents will be affected by the storm and its aftermath: "Issues like fire management are a real concern to planners and public officials in counties experiencing rural sprawl," said Stewart.

The Rest of the Story

We came here as environmental journalists to learn—hands-on and forest-deep—the significance of the ecological changes on this land and the efforts being made to capture that change through careful research. At week's end, we found that traces, indeed, had been left—ones etched in our hearts and in our understanding of this land. Signatures of the BWCAW were indelibly written in our minds, your names are written in our Rolodexes, and our respect for all of you will serve as the foundation of our journalism efforts to come.

Contributed by KathleenPreece (second from right)

Face to Face at FACE


Deb Dietzman

RHINELANDER, WI—On July 24, North Central Research Station hosted a gathering of science collaborators at the Free Air Carbon Dioxide Enrichment (FACE) experiment to review progress on understanding global climate change. The FACE site is one of an international network of experimental sites assessing the impacts of elevated "greenhouse" gases such as carbon dioxide and ozone. The Rhinelander facility is the only one studying multiple gases at one time and one of just four looking at trees, in this case aspen, birch, and maple.

Researchers from Michigan Technological University, U.S. Department of Energy, Argonne National Laboratory, Brookhaven National Laboratory, University of Illinois, University of Minnesota, Canadian Forest Service, and international cooperators from Finland, Slovakia, and Estonia joined USDA Forest Service scientists to discuss their research on the effects of elevated carbon dioxide and ozone on carbon and nitrogen cycles and ecological interactions of forests. In just its third year, research at the FACE site has already revealed that:

- Forests may not grow as rapidly as has been forecast, due to increased ozone levels.
- A different array of insect pests will affect forest health, depending on the mix of greenhouse gases present.
- Global climate change is changing the biodiversity of plants in complex ways.

The Knowledge Store Opens at Our New Web Site

In August, North Central (NC) launched an updated version of its Web site (http://www.ncrs.fs.fed.us). A fresh, new look complements some of the new exciting features, most notably expanded access to Station publications. Some of the new features include:

- A database containing abstracts of every NC report published.
- Electronic access to full text of many NC titles: This feature offers publications dating from 1966 to 2001, with the option to order a publication if it is not in the database.
- Online databases: This feature offers links to databases that display a variety of data ranging from forest resource to wildlife data.
- Maps: This feature offers links to several maps with different factors, including ecological, social, economic conditions, and surface ozone concentration.
- Software: This feature helps forest managers predict forest behavior.

In addition to the different types of available publications, the new Web site has dynamic keyword and staff search features.

Deb Dietzman, NC communications director, says "A Web site should be easy to use and responsive to customer feedback…[and] we will be continually adding content and features to the North Central Web site to make it a richer, more useful resource for people."

Underlying the new features and appearance is the primary purpose of the NC Web site—to create an interactive site that informs different audiences about our research.

People familiar with the NC newsletter will recognize the design of the Web site. Sharon Hobrla, computer specialist and designer of the new site, says that she hopes "to promote a familiar and recognizable interface to our customers."

Visit the new Web site and send feedback!

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