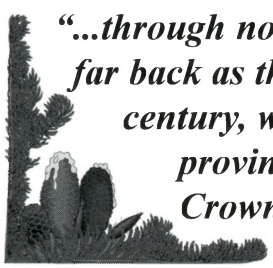
Back to the Future

By Mark Stabb, Reprinted from *Seasons*, Autumn 1996, with permission.

In a clearing in Ontario's primeval forest, man and horse toil on a fresh patch of ground. Massive stumps and towering trees loom to the side. A village nestles in a distant valley. Perched prominently in the foreground, as if watching the proceedings, is a pair of passenger pigeons, oblivious to their fate.

This image, one of the most poignant nature posters I have ever seen, was published not by naturalists but by a historical society. The caption reads "Extinct Society."

Historians have chronicled many tales about Ontario's pioneers and the history of the aboriginal people of the region. But there are few accounts of the natural history. We know little about those great forests that disappeared along with the passenger pigeon.



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Blurred by time and magnified by imagination, our view of the presettlement forest is often romanticized. We imagine a vast, soaring canopy of green, where a determined squirrel could travel from Lake St. Clair to the Ottawa River without touching the ground. The reality was something different. Huge forest tracts with mammoth trees did exist - photographs prove this - but they are only part of the picture. Wetlands, prairies and alvars also cloaked the land, and a mosaic of old and young, big and small trees made up the forest.

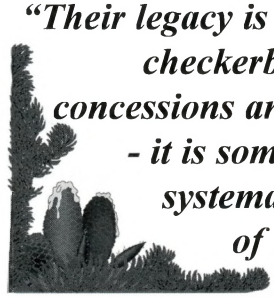
How do we know this? In part, through notes dating as far back as the early 19th century, written by the province's original Crown surveyors. And in part from a more recent source - the sleuthing of ecologists who take clues from the forest floor to reveal the true nature of our former woodlands.

This information is vital to anyone with an interest in forests. Naturalists can learn to look at woodlands with a new appreciation. Woodlot owners can discover what nature once produced on their land - and what it may produce again given the chance. Forest managers can use the data to "reconstruct" woodlands of the past. Under the new Crown Forest Sustainability Act as well as the terms of the Timber Class Environmental Assessment, the Ministry of Natural Resources is being directed to emulate natural processes in Crown forest management. Forest managers are turning to historical survey records and ecological detective work to help plan the future of our forests.

PAPER TRAILS

Early surveyors weren't the only ones to leave behind notes about our natural history. But while the journals of explorers and early settlers convey impressions, such as the cathedral-like quality of the early forests, few delve into habitat diversity or the natural disturbances that pervaded the woods.

Fortunately, the province's original Crown surveyors were more analytical. As they and their crews drove survey lines through the heart of Ontario's presettlement forests, parcelling up land, they also assessed timber, soils and the potential for farming and settlement. Their legacy is more than a checkerboard of lots, concessions and townships - it is some of the first systematic accounts of our forests.



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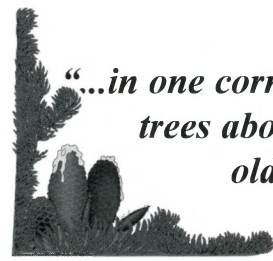
Look, for example, at the original survey records, from 1822, for a concession road now abutting Boyne Valley Provincial Park in Dufferin County. At a stream on Concession I-II, along Lot 3, surveyor Hugh Black made notes about two branches of the Nottawasaga River: " [T]he distance between them [was] full of beaver dams, cedar and fir" and "fine meadowland." On the next lot line he encountered "cedar, fir, elm and beech" and "maple, fir and basswood, highland to the west."



"...in one corner of the lot trees about 200 years old still stand."

In the still relatively natural Boyne Valley, the forest of today is similar to that of 1822. Logged, burned and partially cleared in the intervening 174 years, most of the land remains wooded. The tree species are primarily the same, although many individual trees dating from that time have been replaced by younger ones. Some old specimens do survive, however; in one corner of the lot trees about 200 years old still stand. Black's survey crew may have encountered these same specimens when trudging along the concession.

Survey notes for Centennial Lake Provincial Park, in southern Renfrew County, tell another story. On the rocky ridges, for example, the scraggly oak woodland that now appears was preceded by a pine forest, according to the original survey of 1871. The forest was cut and burned repeatedly, leaving the shrubs, lichens, hardy oak and charred pine stumps that remain today.

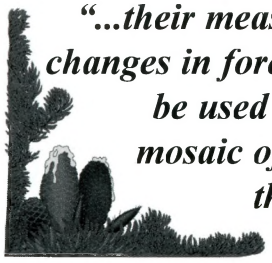
The surveys frequently tell of the aftermath of great fires and other disturbances such as windstorms. Surveyors traversed innumerable burns - then called burnt pineries or "brulirs"- throughout Ontario. While some fires were natural, many were caused or exacerbated by people. Surveyors also regularly had to haul themselves though tangles of "wind-throw," trees blown over by winter or summer storms.

Today, along lot and concession lines, skeletons of the forest past abound. Trees now dead were likely green at the

time of the surveys. A few American elms hang on in farm fields, where they best avoid the bark beetle that carries the Dutch elm disease fungus. The species is now practically an outsider, but surveys show that the stately elm once pervaded our woodlands.

Crown surveyors recorded the tree species appearing along survey lines, generally in order of abundance. Today, their measurements of changes in forest cover can be used to reveal the mosaic of forest types that existed at the time.

Ministry of Natural Resources staff and other ecologists have tested the technique in central and eastern Ontario over the last five years. They fed data from survey records for Algonquin Park and Renfrew County into a computer. Then they compared the preliminary findings with current records from Ontario's Forest Resource Inventory, which also measures tree species by abundance. The old surveys did not reveal many surprises, but they did help portray the magnitude of change in our forests over the past century.



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There has clearly been an ecosystem-jolting drop in the pine component of today's forests, compared with that shown in surveyors' reports. Foresters now grapple with a glut of second-growth poplar and birch that, not unexpectedly, grew up after the first cutting and subsequent fires. But oaks have also responded.

Original survey records for southern Renfrew County rarely identified oak as the primary tree species, whereas today oak stands can make up 5 % to 10% of the forest. Many of these oak are scraggly specimens perched on rocky hilltops, where pine removal and burning has given oak the chance to dominate the site.

Another change is the dramatic decline of eastern hemlock in parts of Renfrew County. Early in the century large tracts of hemlock were cut in central Ontario for projects such as the original Toronto subway system - to this day, many of the timbers still shore up the tunnels. Huge quantities of hemlock were harvested for the bark, which supported a thriving hide-tanning industry. Hemlock has not been able to recapture its former place in the forest because of the modern practice of suppressing ground fires and the voracious appetite of white-tailed deer, whose numbers now far exceed presettlement levels. But by looking at old surveys, foresters know where to concentrate their efforts to regenerate hemlock.

In Algonquin Park the researchers documented a decline in tamarack, or eastern larch, a species not normally targeted by loggers. The culprit causing the decline was apparently the larch sawfly, a native insect that infested the park early in the century. Tamarack has not recovered in Algonquin since then.

In 1993, ecologist Cathy Keddy examined survey records for the Eastern Ontario Model Forest, a project designed to apply cutting-edge science to forest management. The Model Forest covers wooded lands as well as active and abandoned farmland. By sampling survey records, she "recreated" a representative set of forest types and linked these data with the soils and landforms. The result is a summary of what a traveller might have expected to see in the forests of the 1800s. More importantly, the data can now be directly applied to help select the best tree species for forest restoration projects.

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While survey records may provide fuzzy snapshots of our former forests, they still represent some of the best portraits that exist and are helping managers improve forest planning. But for naturalists, there is a more intimate connection to the past forest ruins.

HISTORY IN RUINS

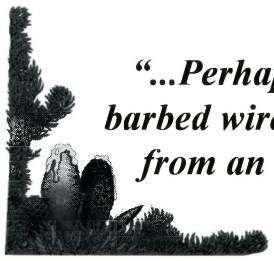
In every forest there is history... in ruins - the ruins and remains of former woodlands and ancient trees. Picture a hardwood forest. The standing trees might be 80 to 100 years old. Stumps spot the forest floor and the odd dead tree and log grace the woods.

On one of those rotten logs, a tiny hemlock seedling clings to the soggy, moss-coated surface. The log is a microcosm of plant and animal habitat - some say it is its own ecosystem. But it is also a time capsule of forest history, and we don't need a chisel to reveal its mysteries.

Take a good look at the seedling. Hemlock seeds are featherweights that normally fail to penetrate the thick, congealed leaf litter of hardwood forests. It takes a disturbance like a ground fire-rampant before the days of fire suppression to remove the barrier and help hemlock regenerate. In the absence of fire, stumps and logs give some seedlings a rare chance to germinate and grow. Hemlock, yellow birch, balsam fir and white birch often get a head start on these "nurse logs."

Logs are a good rooting medium but cannot provide all the moisture or nutrients needed. For a seedling to survive, the rootlets must reach the soil. As the nurse log decays and subsides, the successful tree may remain propped off the ground on the roots, as if on chair legs.

"Perched trees," as they are called, can indicate where a log or stump subsided. Traces of the former log or stump remain under most perched trees. It's possible to estimate the size of the original nurse log by examining the height at which the living trunk begins above the ground. It's also possible to estimate the minimum age of a nurse log - which hints at when it toppled to the ground - by the age of perched trees or saplings growing on top.



"...Perhaps that rusty barbed wire protruding from an old maple is the clue."

Now, where are the hemlock that produced the seed in the first place? Could

those stumps be hemlock? In this case a field guide to fungi helps, by identifying the shiny purplish varnish shelf fungus growing there. The fungus grows only on conifers and mainly on hemlock. The mature hemlock that once graced this forest were cleared sometime in the past. But why are there so few small to intermediate trees in this forest? Perhaps that rusty barbed wire protruding from an old maple is the clue. Yes - the woods were probably grazed in the past, which explains the lost generation of trees. Cattle grazing causes a significant loss of natural regeneration, not to mention a collapse in native wildflowers and other plants.

Next, try to ignore the forest vegetation - the trees, logs, stumps and litter - and look at the outline of the forest floor. Note the landscape of mounds and craters. Although rubble and bedrock contribute to some of these humps and hollows, much of this "microtopography' is made by the trees themselves.

Windfalls yank up earth, rocks and plant material and create small craters. These can be as wide as a bed or small room and as deep as a metre or more, depending on the size of tree that fell and the state of its roots. Bowl-shaped pits are caused by deep-rooted trees such as pine and hemlock. Large bowl-shaped pits in a young forest can be evidence of large pine, hemlock or hardwood forests of the past. Shallow pits, on the other hand, are created by shallow-rooting species such as spruce, fir and beech and are soon obliterated by plant growth and settling soil.

Trees rarely grow in the bottom of the pits as leaf litter that collects there may be too deep for small seedlings to penetrate. The edges and crests of mounds, on the other hand, are good rooting sites, and trees usually establish themselves there.

Second-growth forests and plantations on abandoned farmland may lack microtopography. The till and plow would have flattened and churned up the soil long ago. Managed forests may also have lost some of their natural microtopography through the action of heavy machinery used to prepare cutover areas for planting. But in old-growth forests, the footprints of past forest giants are everywhere. In fact, old growth is the best place to trace forest history. Old-growth forests are literally living museums that harbour a wealth of artifacts-clues and evidence of forests long past.

THE PAST LIVES ON

Unlike the unfortunate passenger pigeon, traces of our former forests live on, enriching forest life and helping us understand the woodlands of today. There are stories in the ruins, stories that help us look at forests - even ones we already know - through different eyes. A forest's ancestry teaches us something about forest ecology and a world where nature, not chainsaws, ruled, and where nature, not people, decided what was right for the land.

Mark Stabb, a biologist witb the Ministry of Natural Resources, has a keen interest in what be calls "forest geriatrics." His new book, Ontario's Old Growth: A Learner's Handbook, is available from the Canadian Nature Federation in Ottawa for $7.00 (including shipping and handling).