

TIMBER

NO. 5 WINTER 1987-88

NORTHERN FORESTRY CENTRE

EDMONTON, ALBERTA

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Cover: Infrared photo shows wetland drainage network in Alberta. Story on page 4.



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VERSATILE PERFORMER GETS GREAT REVIEWS

Last year at this time in **TIMBERLINES**, readers were introduced to two of forestry's silvicultural workhorses, the Donaren 180 Powerhead Disc Trencher and TTS Delta Disc Trencher. For the benefit of those new to forestry, trenchers are one category of scarifiers, the name for various pieces of heavy equipment used to break up the debris left from harvesting, and prepare the seedbed for natural regeneration, seeding or for planting seedlings.

This past summer, our mechanized silviculture crew brought over another brawny metal workhorse from Sweden, the Silva Wadell Scarifier. The Wadell was evaluated on the leaseholds of seven forest companies across Alberta, Saskatchewan and Manitoba, and on provincial Crown land in Saskatchewan and Manitoba.

The Wadell has a lighter touch than the Donaren and Delta, which are designed primarily to excavate trenches for planting. The Wadell created flat furrows about 2 feet wide, making the area easy to walk on. This in itself is an attractive economic feature, because by making it easier to get around, the contract price for tree planters should be lower. In addition, the Wadell has the flexibility to perform more specialized jobs. It can meet the needs of planters faced with wet sites, or prepare very dry sites in a way in which the chances of natural regeneration are improved.

The field trials also showed that the Wadell and its prime mover, a John Deere 740A skidder, made good headway on the kinds of sites that are usually workable only in the winter. (A reminder here again for new readers—a prime



Silva Wadell Scarifier at work.

mover is a machine that plays much the same role as a tractor in agriculture, either dragging or pushing the scarification equipment.) The sheer bulk of most prime movers, plus the added weight of the scarifiers, means preparation of boggy sites usually has to wait until there's enough frost in the ground to support the machines. However, with the aid of flotation tires on the prime mover, wet and boggy areas were prepared during the summer months more efficiently and economically than would have been possible under frozen conditions.

In short, the Wadell proved its worth this summer, preparing an

average of 1.5 hectares per hour (3.8 acres) on the forest company leaseholds and Crown land. These field trials, as with those for the Donaren and Delta, were funded in part by the federal-provincial forestry agreements in Alberta, Saskatchewan and Manitoba. They are the latest in a long line of such tests sponsored by the Canadian Forestry Service to evaluate and develop scarification equipment suited to the boreal forest. Considering that a single scarifier can run into the hundreds of thousands of dollars, this "test drive" approach has shown itself to be very popular among industry and provincial government silviculturalists across our region. ♪



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AN EXPERT WITH A DIFFERENCE

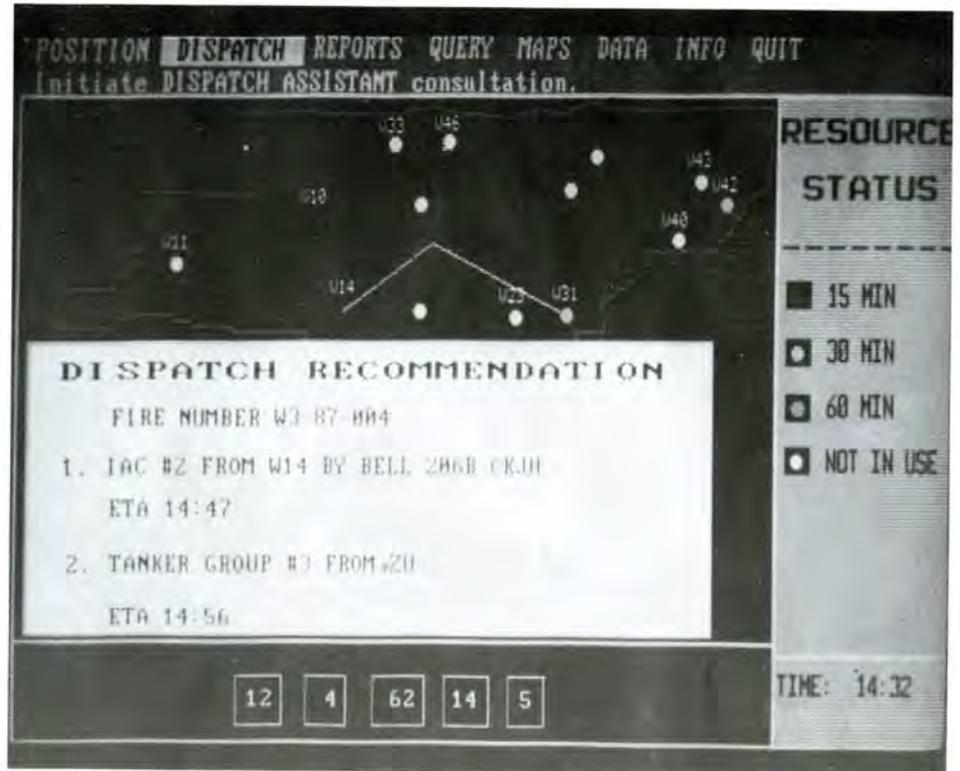
A lightning strike has been recorded about 65 kilometres northeast of the Whitecourt Forest Headquarters. Smoke in the area has been spotted, and now the fire dispatcher must process an avalanche of data that's pouring in—fuels maps, predicted fire behavior, forest inventory information, locations of gas plants, parks or towns in the area—and in 3 minutes recommend what forces should be marshalled to fight the fire. A complex task, and a tremendous responsibility.

However, this particular dispatcher has an assistant, an expert system computer program. This expert system is designed to process information quickly and accurately, to come up with the correct numbers—essentially, to respond as we expect traditional quantitative computer programs to do. But an expert system goes much further than merely processing data. It tries to approximate human thinking processes and problem solving techniques. It can do that because the program is built on artificial intelligence, or symbolic representations of knowledge. That's very similar to human thought processes. We think in terms of chunks of information and relate one thing to another, processing knowledge rather than data. Expert systems, like people, can make inferences from incomplete data, and can incorporate and deal with uncertainty or imprecise information.

The scenario described above is not that far from becoming a reality. Fire Research Officer Bryan Lee, of the Northern Forestry Centre, is programming just such an expert system for fire dispatch purposes. He expects a prototype to be ready this spring, with operational trials anticipated for the summer. Mr. Lee stresses that expert systems are an emerging technology that go hand in hand with quantitative systems. "What I'm doing is encoding an additional level of information, or knowledge, into a computer program," he says.

NOTE

The exclusion of certain manufactured products or company names does not necessarily imply disapproval, nor does the mention of other products or company names necessarily imply endorsement by the Canadian Forestry Service.



Expert system computer program adds a new dimension to fire dispatch.

The program uses the Canadian Forest Fire Weather Index System and the Canadian Forest Fire Behavior Prediction System in conjunction with a number of fire environment data bases. Mr. Lee is presently encoding the so-called "rules of thumb", combinations of experience and intuition that human experts have developed over many years. "An expert system," he says, "weighs many sources of data, knowledge, expertise and experience, and, by using artificial intelligence, gets around some of the current knowledge gaps in fire research data to make recommendations."

The expert system Mr. Lee is developing is designed to make recommendations for initial attack; that is, to recommend what combination of suppression crews, helicopters, air tankers and ground equipment might be sent out first to halt the progress of a fire. This prototype is being developed for the particular needs and resources of the Whitecourt Forest in Alberta, but Mr. Lee plans to develop similar systems for forest regions in Saskatchewan and Manitoba.

When technology on the scale of expert systems becomes available, the

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question of ethics inevitably comes up. "A number of people are afraid that expert systems are going to replace human beings," notes Mr. Lee. "That's just not true. An expert system is a tool—an extremely sophisticated and useful tool, but it's still only a tool. And, like any tool it doesn't have a life of its own, but it can make life better." ☺

EXPLORING THE POTENTIAL OF PEATLANDS



withdrawn for other uses, the possibilities of wetlands are worth investigating.

FINNISH SUCCESS BECKONS

Draining wetlands to boost tree growth is not a new concept. The Finns, who lead the world in drainage technology, were excavating ditch networks by hand at the turn of the century. They knew that when ditches are constructed, the water table in the area is lowered. When this happens, aeration of the soil is improved, in turn increasing the ability of tree roots to absorb essential gases and nutrients. It's critical, however, that the water table not be lowered so far as to dry the soil out. As the accompanying photo shows, there can be a big increase in wood volume once an area is drained.

Before and after wetland drainage.

There are three ways to look at the Canada-Alberta Wetland Drainage Project near Wolf Creek, about 30 kilometres southeast of Edson, Alberta. One is the ant's-eye view, slogging through the fen from ditch to ditch, barely clearing each ditch when jumping across it. Another is the bird's-eye view, showing an orderly ditch network similar to a spine joining many pairs of evenly-spaced ribs along its length. The third is the research scientist's view, which assimilates both. That's the view of Dr. Graham Hillman of the Northern Forestry Centre. Dr. Hillman heads the Canada-Alberta Wetland Drainage Project, aimed at determining what effect draining forested wetlands in Alberta will have on individual tree and stand growth.

The site at Wolf Creek is one third of the drainage project funded, in part, by the Canada-Alberta Forest Resource Development Agreement.

The NORTHERN FORESTRY CENTRE, located in Edmonton, Alberta is the western and northern regional establishment of the Canadian Forestry Service. District offices are located in Prince Albert, Saskatchewan and Winnipeg, Manitoba. The Northern Forestry Centre coordinates all federal forestry research and development activities throughout Alberta, Saskatchewan, Manitoba and the Northwest Territories.



Lannen S10 Ditcher, manufactured in Finland, carved out ditch networks at all three drainage sites in Alberta.

Drainage networks have also been established at Goose River, 35 kilometres southeast of Valleyview, Alberta and at a site 15 kilometres north of McLennan, Alberta. Alberta has nearly 13 million hectares of peatlands. About 4 million have the potential, when drained, to become productive forests. As more productive forest land is

In Canada, Quebec is considered the frontrunner in forest drainage, the initiative coming largely from an organization of private woodlot owners financially assisted by the Canada-Quebec forestry agreement. Each owner pays part of the ditching costs, and the drainage network crosses many property boundaries. In Alberta,

EXPLORING THE POTENTIAL OF PEATLANDS

the Canada-Alberta project is predated by a number of forest drainage projects. Data are available from two of them, one near Fort McMurray, and the other in the Sauleaux River area near Slave Lake. The Canada-Alberta project, however, is the first in the province to set up drainage networks in three different kinds of wetlands, each with its unique challenges and potential.

In Finland, where forests are intensively managed, drainage is often combined with other silvicultural treatments, resulting in even more pronounced growth. This approach is being tried at the Goose River site, where drainage of the black spruce stands is being combined with thinning and fertilization. Part of the Goose River site has also been set aside to test ditch-mounding, in which mounds of soil are created from the ditching process. Black spruce, white spruce and

lodgepole pine seedlings will be planted in these mounds this spring, and their progress will be monitored closely.

DITCH SPACING CRITICAL

Work on the Canada-Alberta drainage project began in 1985. The Alberta Forest Service (AFS) takes care of the operational aspects, and has been responsible for conducting the topographical surveys, marking out the ditch network, clearing rights of way for the ditches and supervising their construction. The AFS also set up the fertilization, thinning and ditch mounding studies. The Canadian Forestry Service (CFS) is pursuing the research aspects of the project, testing different ditch spacings (i.e. ditches 30, 40 and 50 metres apart), to find which spacing lowers the water table just the right amount to maximize tree growth. The CFS researchers are also monitoring how the ditching affects water quality and ground vegetation near the ditches, and also how lowering the water table affects ground temperature,

because ground temperature plays a critical role in seedling survival and tree growth. The two agencies will work together to measure and record tree growth on a regular basis.

The bulk of the operational and research activities will wrap up in 1990. At that time, preliminary recommendations and guidelines for operational forest drainage in Alberta, Saskatchewan and Manitoba will be released. Will wetland drainage pay for itself in day to day forest management operations? A preliminary cost-benefit analysis of the procedure on an operational scale in Alberta should be ready by 1991. Finally, in 1993 Dr. Hillman expects to publish a complete set of recommendations and guidelines for operational forest drainage in the region.

In the meantime, Dr. Hillman and his Northern Forestry Centre colleagues, Derek Johnson and Bruce Robson, have at least two more field seasons of hipwaders and mosquitoes to look forward to ...



Ditch-mounding results in unusual topography.

GRADING FOR TRADING



Wood frame houses like this one, using Alberta softwood lumber, are becoming more common in Japan.

An inquiry from a Japanese housebuilding firm has opened up export opportunities for some Alberta lumber producers.

Housebuilders in Japan are now putting up 2X4 wood frame homes, common in North America but a fairly recent development in Japan. Builders there are looking for well-finished

lumber from white woods like spruce and pine. One company, Sanwa Homes, contacted the Alberta Department of Economic Development and the Alberta Forest Service's Forest Industry Development Division for assistance.

With funding from Alberta Economic Development and the

Canada-Alberta Forest Resource Development Agreement, a project was set up through the Alberta Forest Products Association to smooth the way for export. It was known that Sanwa found lumber grades as set up for the North American market to be incompatible with their expectations. As the first step toward resolving this concern, the AFPA invited a quality control representative from Sanwa Homes to go through several Alberta sawmills and pick out those grades that would be acceptable to the company. Next, inspectors from the AFPA toured several mills in an effort to grade lumber according to Sanwa standards. After crosschecking its results with Sanwa, the AFPA compiled "Grade Rules for Sanwa Homes" for the benefit of its members.

At least one Alberta company has taken the 2X4 and run with it. Erith Tie Co. Ltd. near Edson is now exporting 2X4's and 2X8's produced in its own mill, and by other manufacturers, to Sanwa. Although developing the Japanese market will take time, it appears the grading project has given Alberta lumber producers a board-foot in the door. ♣



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TROUBLESHOOTING "TENT-CATS"

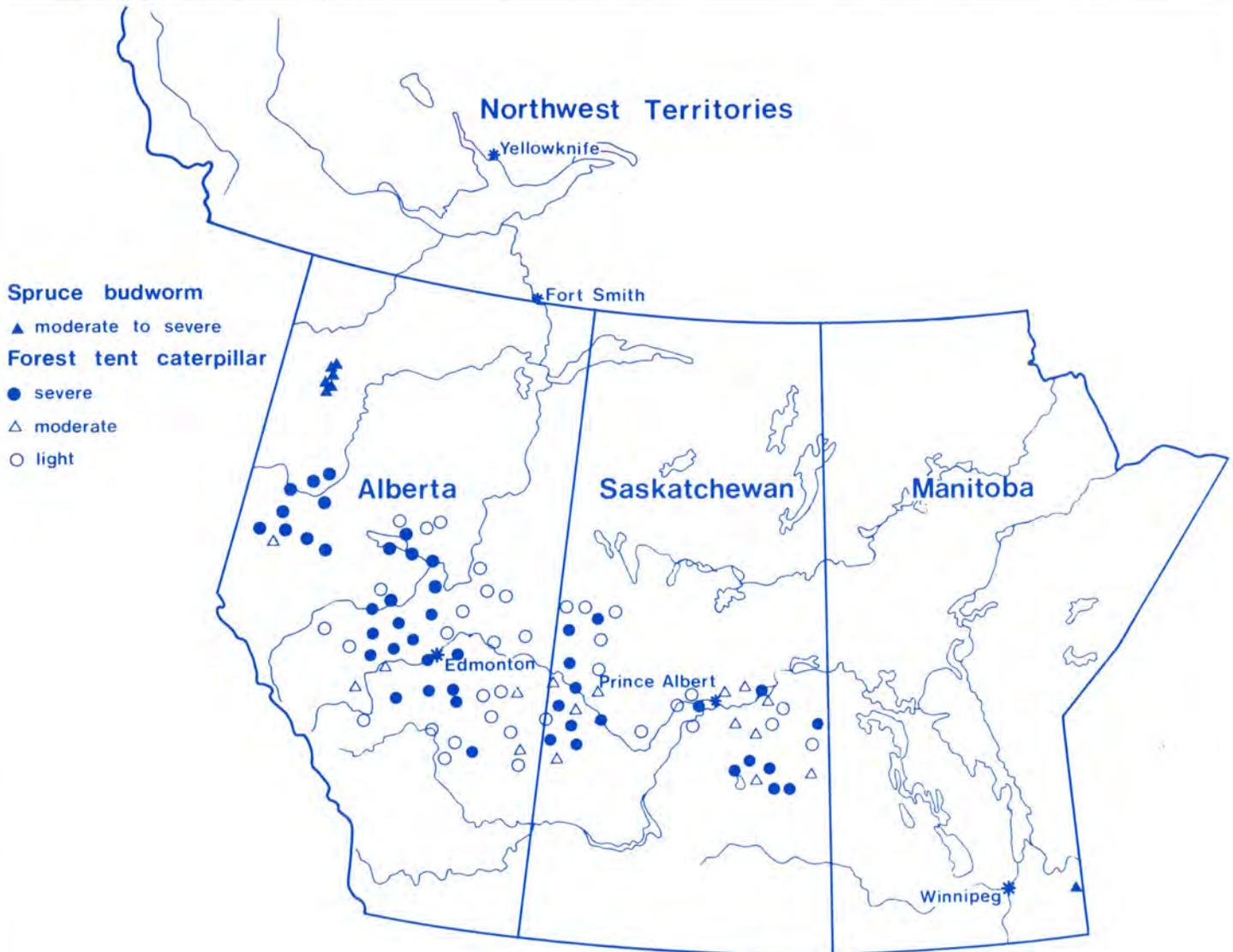
Last spring in parts of Alberta and Saskatchewan, the onslaught of tent caterpillars was relentless ... and it might be even worse this spring in those areas. Foliage samples were taken from aspen trees, the pests' favorite fodder, last July. Researchers with the Northern Forestry Centre's Forest Insect and Disease Survey (FIDS) have been analyzing the samples for eggband density, and have made some preliminary predictions of "tent-cat" populations for the upcoming season.

Eggband surveys are a useful indicator, but many things can happen between July of one year and May of the next, when the larvae usually hatch.

The eggs may fall prey to parasites or a virus. Or, the larvae, once hatched, may be killed off by a late spring frost. Because last year's outbreak was so bad, with another anticipated this year, a post-hatch survey will be conducted in May to verify whether or not the predictions are on target. This survey will be conducted at spot locations where the eggbands were sampled last year. The FIDS field staff will look at the numbers of eggbands left, see if the larvae look healthy, and determine if the timing of the hatch is normal. The larvae usually come out at the same time aspen leaves bud out, and if these two events aren't synchronized, it may mean bad news for the "tent-cats"—but good news for the trees.

Tent caterpillars, as mentioned, favor aspen, but when that supply runs out, they turn their voracious appetites to almost anything deciduous. For urban homeowners, that means their cotoneasters, crabapple and mayday trees, and other ornamentals are vulnerable. Landowners with woodlots or shelterbelts on their properties, and forest industries using aspen are also becoming more wary of caterpillar infestations, and are investigating ways of protecting their investments. Dr. Herb Cerezke, who heads the Forest Insect and Disease Survey, says a biological insecticide named Dipel has proven effective in controlling tent caterpillar outbreaks.

"TENT-CATS" continues on page 8.



Map shows locations of anticipated troublespots across the region this spring.



Ron Gorman, of the Northern Forestry Centre, discusses mechanized site preparation procedures with a delegation from Hebei Province, People's Republic of China. The delegation of four represented forest management and research agencies in Hebei. While at the Centre last October, the group also learned of our work in nursery management and tree improvement, and of accomplishments in forest product development under the Canada-Alberta Forest Resource Development Agreement.

"TENT-CATS" continued from page 7.

The other major problem in the region this summer is likely to be the spruce budworm. A couple of pockets in northwestern Alberta that started gaining strength last summer will be monitored. Troublespots in south-central Alberta, east-central Saskatchewan, southeastern Manitoba and in the Northwest Territories will also be watched closely. In Saskatchewan, a lot of the damaged stands have been removed through salvage logging. The Alberta Forest Service is concerned about developments in the northwestern part of that province, and salvage may be appropriate if defoliation continues and becomes severe enough.

The good news across the region this year is that jack pine budworm populations have declined markedly or collapsed completely. After several years of battling those tenacious insects, forest management agencies across the region can—for now, at least—breathe a sigh of relief. ♻️



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- WHERE?** Chateau Lacombe, Edmonton, Alberta.
- WHEN?** April 11-14, 1988.

Please indicate the likelihood of your attendance by calling or writing to:

Steve Price Northern Forestry Centre
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TIMBERLINES is written and edited by A. Ascher
Graphic design by D. Lee

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T6H 3S5

Minister of Supply and Services Canada 1988
ISSN 0833-0689