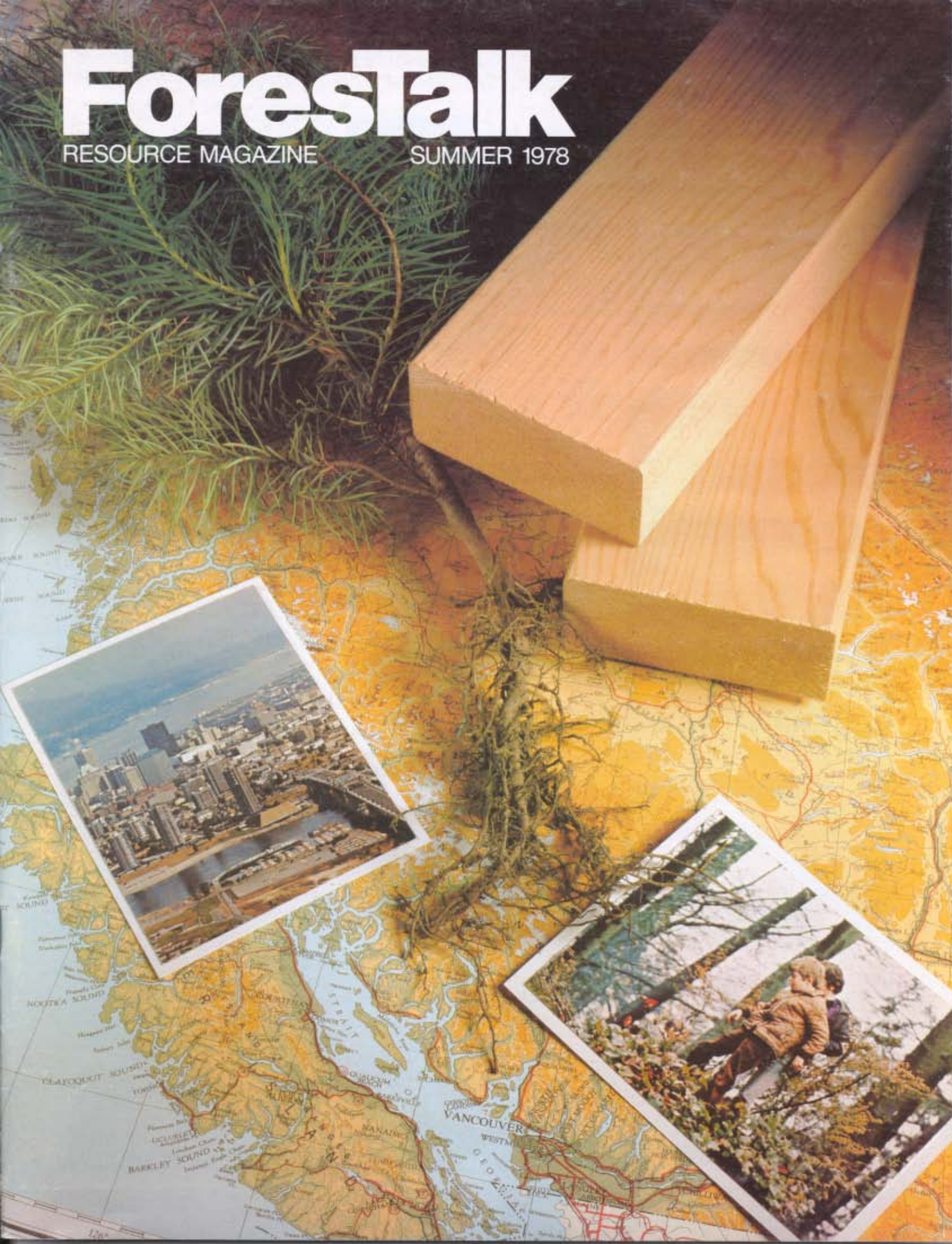
ForesTalk

RESOURCE MAGAZINE SUMMER 1978



ForesTalk

RESOURCE MAGAZINE SUMMER 1978

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Assistant Editor: **Cameron Young**
Design: **Ken Seabrook**

ForesTalk Resource Magazine is published quarterly by the Province of British Columbia, Ministry of Forests, Forest Service Information Division, 1450 Government Street, Victoria, B.C. V8W 3E7. Telephone (604) 387-5985. Designed to encourage interest, discussion and understanding of British Columbia's forest resources, ForesTalk is available free on request. Any material reprinted must give credit to the magazine. Second class mailing registration No. 3863. International Standard Serial Number ISSN 0700-1770. ForesTalk welcomes contributions from writers and photographers on themes related to the B.C. forests and their uses. Address enquiries to the assistant editor.

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T.M. Apsey
Forester-in-charge, Information Division:
E.H. Lyons

Minister's Message

Our forests have helped provide British Columbians with one of the world's highest standards of living. Our forests also have provided us with unparalleled opportunities for recreational enjoyment.

Today, as we move into a new era of harvesting second-growth forests, the timber production from this land must improve, but not at the expense of other forest uses.

The new forest and range legislation, the most progressive of its kind in North America for public forests and range lands, will ensure continued and full multiple-use of our forest and range resources.

Tom Waterland

Hon. Tom Waterland, *Minister of Forests*

Volume 2 Number 2

The cover composition photographed by Ray Webber symbolizes the economic and social importance of British Columbia's forest resource, and the need to manage this resource effectively for future generations. These are the underlying factors behind the new forest legislation and the Ministry's increased commitment to intensive forest management.

FEATURES

Chewers Of Wood The mountain pine beetle is not exactly eating us out of house and home, but its appetite for mature lodgepole pine makes it one of B.C.'s most destructive insects.
by Tony Gregson *3*

Intensive Forest Management: Its Time Has Come Managing second-growth timber is a lifetime job — for the lifetime of the trees, that is. More intensive forest management of second-growth timber is required to offset a projected decline in B.C.'s timber supply.
by Cameron Young *10*

A Perspective on Forest Policy Part II of this article looks at the new forest and range legislation intended to strengthen B.C.'s forest economy and to improve multiple-use forest management.
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The Original Paper Makers Wasps were the first, and are possibly still the best paper makers in the world.
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10 Steps Of Intensive Forest Management Forest management is not as simple as one, two, three, but the 10 steps highlight the main components of intensive forestry. *15*

Seeing Through The Trees A group called WEDGE is promoting an innovative approach to forest education.
by Mack Pudgio *25*

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Each year British Columbia's forests lose an estimated 566 million cubic feet of timber to disease and insects. This is equivalent to the volume of wood required to build approximately 333,000 houses. Insects alone account for the destruction of 33,000 of these potential homes. One particular bark beetle — the mountain pine beetle — is among the worst of the offenders.

Chewers of Wood

by **Tony Gregson**

Through the viewing port of the helicopter, the Klinaklini River valley rises from the twisting rush of water through steep, tree-clad flanks, to dark meadows and rocky summits. In the crisp October sun the aspen and willow in the sloughs along the river are a brilliant, shimmering yellow. Here and there a squatter's cabin is barely visible beneath the pines. The helicopter veers sharply and chutters down to settle on a rough heliport hacked out of the forest. The silence is deep and refreshing.

The Klinaklini River connects the coast with the Chilcotin plateau. The Klinaklini is an Indian name meaning that-which-turns-back-on-itself. It rises on the interior side of the coastal mountains and flows east, before doubling back, to snake through an ever-steepening valley to the head of Knight Inlet. Nestled in the upper 48 kilometers (30 miles) of this valley is a vast stand of mature lodgepole pine. This is a forest without a future. Almost all of the trees have been killed off, victims of the mountain pine beetle — and this is not an isolated case. It is just one tragic example of the serious insect problem that has plagued B.C.'s forest landscape for the past decade. There are a number of foliage eaters and beetles responsible for these damaging infestations, but the mountain pine beetle is one of the most destructive.

While the spruce bark beetle usually infests trees blown over by wind, and the Douglas-fir beetle attacks

The Klinaklini River valley is an extreme example of how serious the mountain pine beetle problem can become. The rust-topped lodgepole pines lining the valley are heavily infested with this species of bark beetle. The area is too remote for salvage logging, and the valley faces the threat of a major fire spreading through the dying, dried-out forest.

PHOTO H.S. WHITNEY

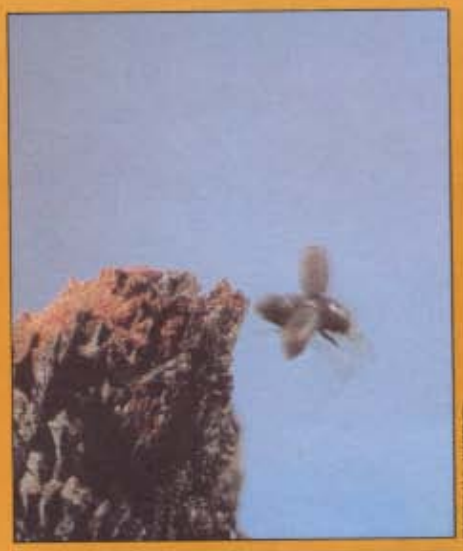

PHOTO H.S. WHITNEY

A mountain pine beetle in flight.

either fallen or over-mature timber, the mountain pine beetle concentrates on mature, healthy, lodgepole pine. This is a tree species currently valued highly by the forest industry. When the beetles attack, the economic value of the forest is in immediate jeopardy. Sometimes, if mature pine is scarce, the beetle will threaten future timber harvests by settling into immature pine forests.

These insects are actually an integral part of the balance of nature; their role is to hasten the renewal of the forests. But as man intervened in this cycle, he inadvertently created the conditions for a massive increase in mountain pine beetle populations.

Between 80 and 100 years ago, trappers, settlers, and railroad builders set huge fires in the interior to clear the land. As well, the forests fell victim to uncontrolled wildfires, and to fires set deliberately to encourage the appearance of game populations. Many of the burned-out areas have since regenerated largely to lodgepole pine, and today, throughout the interior, there are a great number of pine stands approaching maturity. These stands are ripe for beetle attacks, and aided by the warmer winters of the past few years, the mountain pine beetle has already infested hundreds of thousands of hectares of potentially valuable timber.

The beetles spread and kill with terrible speed: up to 2,000 female beetles can attack a tree at once. The females arrive first and burrow into the bark. As they mine out their egg galleries they produce a sexual attractant which permits the males to find them. Following the mating period, the larvae hatch out after two weeks and chew more galleries in the inner bark. Here they spend the winter, developing into pupae in the spring.

The beetles emerge as adults between mid-July and mid-August, and begin swarming to neighbouring trees every two or three weeks. They often cover distances of only a few hundred yards, but they can also disperse widely as they swarm, or be blown long distances in the wind.

The girdling action of the larvae as they chew their galleries damages the life sustaining cambium layer and helps kill the tree. But it is the blue-staining fungi introduced by the invading adult which does the most damage. The fungi kill the living cells of the cambium layer by cutting off the flow of sap. The pines react to an attack by excreting pitch to drive the beetles out, but unless the beetles are overwhelmed within three weeks, the tree is doomed.

The destructive effects of the beetle might not pose a problem if British Columbia had a limitless supply of wood. The infested forests could simply be left alone to regenerate naturally. But B.C.'s timber supplies are not so plentiful that valuable infested forests can be ignored.

Detection and Control

The process of controlling beetle attacks begins with detection. The most telltale signs of attack are red-tops — these are pines that have been dead for at least a year, and their needles have turned a rust colour. By the time these red-tops appear, the beetles have already flown from the dead trees. It is then necessary to locate the 'green-attack' trees — those that are infested but are still green. This is done by running ground surveys to check for beetles in the timber surrounding the red-tops.

Once detected, the beetles then have to be treated. Aerial spraying is ineffective, as the tree bark protects the beetles from the chemicals. A method of using sex-attractants on poisoned bait trees can attract up to 10,000 beetles per tree, but this is a costly practice.

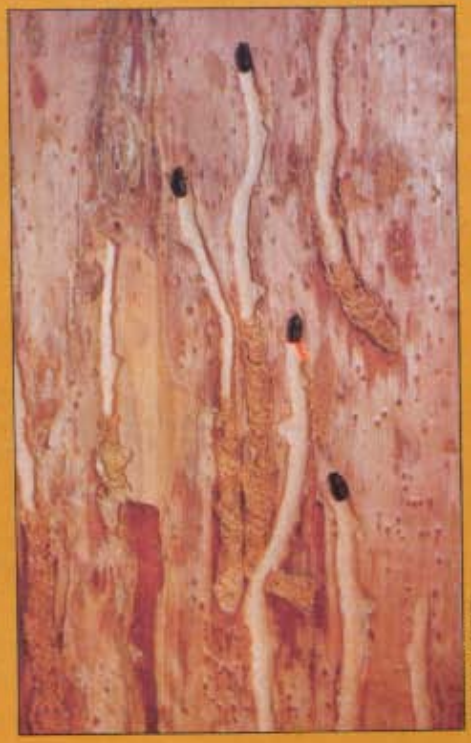

PHOTO H.S. WHITNEY

Vertical beetle galleries in the tree's inner bark are usually a foot long and contain eggs in niches along the sides.

PHOTO P. ROBIN

Lodgepole pine reacts to mountain pine beetle attacks by producing a resin which will sometimes "pitch out" and kill the beetles.

The most common method of dealing with the mountain pine beetle is to log the infested trees. Depending on the extent of the beetle infestations, the Ministry of Forests employs various types of logging controls to cope with the problem.

Wherever possible, the Ministry attempts to eliminate the infestation through a regular tree harvesting operation. A normal logging schedule is followed, with the timber being processed for timber or pulp. The infested or dead trees should be salvaged within two years, as the wood quickly develops checks or cracks, making it unusable for anything but pulp. Even trees felled soon after an outbreak begins can be rejected for use in lumber because of the blue stain. Although this stain does not af-

Mountain Pine Beetle
(Dendroctonus ponderosae)

fect the strength of the wood, customers are reluctant to accept it simply because it looks defective. Control salvage logging of this type can be very effective, and it has worked well in the Houston-Smithers-Burns Lake area, where small infestations have been controlled.

A second insect logging control method is known as sanitation salvage. It is applied in situations where beetle infestations are extensive, but where at least some of the trees are still commercially valuable. The main purpose of sanitation salvage is to rid the forests of the beetles by removing all infested trees. This is the case in the Elk Creek valley near Invermere, where the infested trees have been cut down and as much usable timber as possible has been extracted.

Small patches of beetle infested trees are best felled and burned. This is a costly process, and the trees provide no monetary return. However, if the beetle attack is arrested, the area involved is preserved to be developed later according to an orderly logging operation.

The success of these different control methods varies from region to region in the province. In the Houston-Smithers-Burns Lake area, over 2,400 hectares (6,000 acres) were cut under a control salvage operation, and the situation there is now considered to be stable. In the Nelson Forest District, 12 per cent of the 96,000 square kilometers (37,000 square miles) consists of pine and is susceptible to attack. Here, salvage logging operations are just barely keeping up with the problem. In this district alone, 20,000 truck loads of beetle-infested timber were salvaged in 1977.

One thing is certain. The sooner beetle infestations are attacked, the easier they are to control. The principle is much the same as the "quick attack" method used to fight fires.

Economic Impact

The economic impact of the pine beetles on the forest industry is so far unmeasured. It has brought prosperity to some regions, but could spell disaster in others. However, industry has not always been happy to log beetle-infested sites, although these are usually the best and largest pine stands in the forest. In the Houston area, 100 men were kept busy chipping 'beetle wood' at Barrett Siding. Sawmills at Midway, Invermere, Revelstoke, Radium, Cranbrook, Elko, and Grand Forks have been kept unusually active by the high pine cut. On the other hand, one company operating in the Okanagan area refused to log beetle timber because its customer in Italy would not accept wood stained by the fungi.

Nature's Control Methods

Nature has its own ways of dealing with the mountain pine beetle. One of these is climate. Beetle populations are normally restricted to dry, hot locations with mild winters. How-

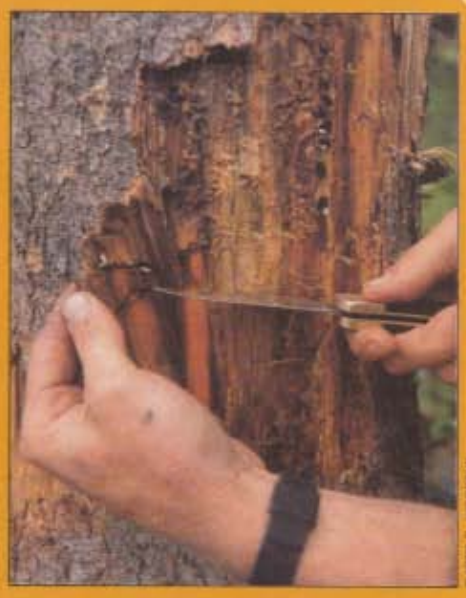

PHOTO D. WOODSIDE

Pulling away the bark from an infested lodgepole pine reveals the canals in the bark created when the female beetles bore into the tree.

ever, extreme temperatures in either summer or winter can threaten the beetles' survival.

Fire is another means of natural beetle control, and the insects bring this one on themselves. The dead trees left behind by a beetle infestation dry out and become tinder for wildfires. As a fire spreads through these vulnerable stands, both trees and beetles are destroyed.

This is the situation now threatening the Klinaklini valley. The dead pines, turned rusty red or grey, are a tinderbox of dried foliage and trunks, while the forest floor is heavily littered with fallen branches. Fueled by so much dried wood, a fire could well be huge and uncontrollable, especially if it is driven through the tops of the trees by coastal winds. The blaze could then burn out the full 48 kilometers (30 miles) of pine forests in the valley.

The results could be devastating. The thin, sandy soil might be severely damaged by the intense heat, exposing it to serious erosion problems on the steep slopes. The forest would then regenerate only very slowly.

The situation in the Klinaklini is really beyond repair. The valley is remote from any logging operations, and its inaccessibility makes a major fire prevention effort difficult and very costly. The Ministry of Forests, according to Don Grant, Assistant District Forester for the Cariboo Forest District, has more or less "written the Klina off". The most the Ministry can do is construct a fire line across the head of the valley to prevent a holocaust from spreading beyond.

The Klinaklini is perhaps an extreme example. It illustrates just how severe the bark beetle problem can become. Throughout B.C., the Ministry of Forests is doing all it can to minimize the damage beetles cause, and more research into the problem is being carried out constantly. However, the struggle to contain the pine beetle is far from over. ◘

PHOTO P. ROBIN

PHOTO L.P. GRICE

(top) Salvage logging operations near Elk Creek are literally chasing the beetle-infested trees up the mountain side. Trees such as these can still be commercially valuable if they are harvested within a year or two after becoming infested.

(right) The blue stain ringing the felled pine indicates a heavy mountain pine beetle infestation. This stain is caused by tree-killing fungi brought into the tree by the beetle. The fungi do not weaken the wood, but some customers reject this wood because of the colour.

Letters to the Editor

Tsitika Misdemeanors

Regarding your article, "Decision on the Tsitika", in the Spring issue of ForesTalk: Having accompanied Mr. Jim Challenger on his photographic expedition to the Tsitika, I feel obligated to point out two errors in your use of his excellent work.

First, your title page illustrates what is, according to your caption on the following page, the Tsitika Estuary. This was so obviously not an estuary that I consulted my maps and aerial photos to confirm that this photograph is, in fact, the bog on the south end of Tsitika Lake some 19 kilometers inland of the estuary and over 900 meters in elevation.

The second error I found quite amusing, as on the opposite page in the same position was an item titled "The Big Tree Hoax", where the Carey Fir was later identified as a California redwood. Perhaps ForesTalk is trying something similar as the photo on page 24 is captioned "This large stand of Douglas-fir . . ." I regret that there is not a Douglas-fir in the photo. In fact that species is rather rare in the Tsitika, comprising only a fraction of one per cent of the timber volume of the watershed.

D.F. Bendickson, R.P.F.
Divisional Engineer
MacMillan Bloedel Industries Limited
Eve River Division

A photograph of the Tsitika Estuary appears on page 9 of this issue. Our caption writer has been issued with a new copy of the Ministry's tree identification book which he claims was lost during our move to new quarters.
Editor

Some Hard Questions

I received my Winter, 1977, issue of ForesTalk and must congratulate you on a slick, smooth, articulate public relations magazine which seems to elucidate that all is well and prosperous in our forests.

Professor John Walters of the U.B.C. Faculty of Forestry seems to be at odds with your optimistic publication. In a Vancouver Sun article, January 3, 1978, professor Walters states: "Forestry is in serious trouble across Canada. In Coastal B.C. 50 per cent of the timber reserves upon which we are relying to fulfill logging quotas are now not profitable to log. In the southern interior 20 per cent is non-profitable. It is quite likely that some substantial reductions in allowable cuts will be announced due to a combination of environmental pressures and a more realistic view of logging costs.

Seventy years of gross mismanagement and neglect by provincial governments has gutted large areas of B.C.'s forests, and we now find that economic inaccessibility has wiped out half our reserves.

The 1975 B.C. Forest Service annual report shows we had 4.8 million acres of productive forest land, supposedly managed by the government on sustained yield, which need planting. The simple fact is that B.C. doesn't spend enough on its forests to know how much land we need to plant. We spend only 13 cents per acre for reforestation. After 70 years of lip service, after 70 years of exploitative forestry, after 70 years of royal commissions and investigations, nothing has changed.

Renewing the forests we are logging today is a long term commitment, a commitment by the government to put something back into the forests on which B.C. depends."

The above comments by a professor in forest research are quite alarming. Perhaps professor Walters has succeeded in his shock tactics, but I do not get the same feeling of urgency in your complacent articles in regard to the condition of our forest resource.

I should like to hear your comments regarding professor Walters' quotes. Is everything really alright up there?

B.R. Smith
Canoe, B.C.

Professor Walters' figures on B.C.'s timber reserves are taken from the report, Forest Management in Canada, Volume 1, *by F.L.C. Reed and Associates. Its full title reads: "A study to improve the basis for policy formulation, planning and practice in intensive forest management." Both the report and professor Walters' comments indicate clearly enough that better forest management practices are required if B.C. is to maintain its current timber supply levels in light of diminishing stocks of accessible, high-quality, old growth timber. B.C. has lots of wood, but it is not always of the right kind in the right place.*

In response to this situation the Ministry of Forests is in the process of instituting a program of intensive forest management, in co-operation with the forest industry, which will substantially offset projected declines in the province's available, harvestable timber supply. Intensive forest management and its implications for the province is the subject of a special article in this issue of ForesTalk.

To keep pace with changing forest supply and demand trends, the new Forest Act calls for regular Forest Service assessments of B.C.'s forests and for the implementation of forest management programs based on these assessments. Some reductions in Allowable Annual Cuts may occur for environmental, economic or social reasons, but any necessary reductions will be phased in over a period of time. As much as possible, the AAC will take into account immediate economic and social needs while adhering to the long-range principle of sustained yield. The main components of the Forest Act are discussed in this issue of ForesTalk.

The reference to the 4.8 million acres of productive forest land "which need planting" is not quite accurate. The 1975 Forest Service annual report shows that these 4.8 million acres were classified as "not satisfactorily restocked or non-commercial". However, not all of the acreage will have to be planted. In fact, regeneration surveys conducted every year indicate that, on the average, better than 60 per cent of the logged or burned areas restock naturally.

During the past five years approximately 1,195,965 acres were clear cut on Public Sustained Yield Units. During the same period approximately 441,410 acres were planted, which is equivalent to 37 per cent of the acreage logged. Long range plans for an expanded reforestation program have been developed, and the Ministry allocated an additional $10 million for reforestation and stand tending programs for this year alone.

ForesTalk attempts to provide information and encourage discussion on all aspects of forest land use. This is a complex area which doesn't lend itself to easy solutions. ForesTalk tries to address these questions and indicate where and how solutions are being sought in forest policy and practice. It is not our intention to appear complacent about the condition of B.C.'s forest resource. If everything were perfectly alright up there, we would have very little to write about.
Editor

Stalking The Giant Cedar

Reading "The Big Tree Hoax" in the Spring issue of ForesTalk reminded me of a story I read in 1924 or 1925 in a magazine entitled "The B.C. Lumberman" about a large tree cut at about that time at Rivers Inlet. This tree, a cedar, if my memory serves me correctly, was felled by side-notching three feet deep on each side. It was eighteen feet in diameter at the saw cut which made a total

diameter of 24 feet.

With best wishes for your interesting and informative magazine.

H.J. Goad
Parksville, B.C.

Unfortunately, so far we have been unable to trace the reference to this giant cedar. Perhaps one of our readers can help us out. The Collections section of ForesTalk is interested in hearing from readers on any interesting or unusual topic related to the forests.
Editor

Informed and Stimulated

A scientific friend has accorded me the privilege of reading ForesTalk. It has informed and stimulated. I seek to become added to your mailing list for the Spring 1978 issue and its successors.

I am a senior, having studied forestry at two universities and although retired, guide tours in parks and wilderness places, something I enjoy immensely.

Congratulations and good wishes for further successes.

W. Russ Leslie, F.A.I.C.
Victoria, B.C.

Work Horses of The Air

There is one very important job in this province that does not get the recognition it deserves. Here in British Columbia, where half of our economy depends on the forests, how many times have you heard of the Forest Service's fire fighters being commended for keeping forest fire losses to a minimum, or for long hours of hot sweaty work through long summer week-ends?

And then there is that special group of fire fighters — the ones that fly those water bombers and bird dog planes directing the bombers from the air. Just to see one of those old Avengers flying over is amazing enough, but when it flies into the smoke up the side of a heavily wooded ravine at tree top level — that is really asking the impossible. And then there are the other, larger planes these flying firemen use — the converted four motor passenger planes and huge flying tankers.

We turn out by the thousands to marvel at the military air shows — the Red Knight of the past and the Snow Birds of the present — but somewhere along the line we should recognize these work horses of the air who go through many of the fancy manoeuvres of an air show all in a day's work, with smoke obscuring their visibility and flames licking their wing tips.

It's the season right now when these forest fire fighters do their big job, and I think we all owe them some special recognition. So, on behalf of all British Columbians who never meet you but know you're doing a tremendous job for everyone, let me say how much we appreciate your outstanding performance each season.

Ralph Robinson
CKIQ Radio
Kelowna, B.C.

All fire fighting aircraft in B.C. are privately owned and contracted by the Forest Service on a seasonal basis. The largest single provider of these aircraft is Conair. Its president and general manager, Les Kerr, is the subject of this issue's People section.
Editor

How A Child Grows

I would like to express my appreciation for the articles contained in your magazine which I have been reading now regularly for several years. I really do enjoy hearing about the forest resource and how it is being used, particularly the ideas of co-use.

The article "How a Tree Grows" in the Spring issue produced a good laugh for my wife and myself, primarily because of a memory which it brought back to us and which I thought you might also enjoy.

When our older daughter was four years of age she was continually being given fairly detailed explanations about the how and why of things, sometimes in response to her questions, but sometimes simply because the numerous adults around her seemed to think she ought to know. At one point, however, she rebelled at being only the receiver of information and proceeded to give us some of her own. She informed her mother that "straight perdocity is a strelling in the ground and makes the trees grow taller".

Thanks again for the magazine.

R.G. MacLachlan, M.D.
Richmond, B.C.

A Contented Collector

I have all copies of ForesTalk and really think this is one of the best little information books B.C. has published for people interested in finding out about our province's forest wealth and beauty.

D.H. Williams
Hope, B.C.

Kind Words

Having just completed a first reading of the Spring issue of your excellent little magazine, I am inspired to write you a few lines of simple, honest praise.

At a casual glance ForesTalk might seem like a very slight publication, but perusal of its contents reveals a truly surprising amount of intensely interesting (and no doubt factual) information, all very attractively presented.

Best wishes for your continued success with ForesTalk.

Stanley P. MacKenzie
Vancouver, B.C.

I feel your choice for the name of your magazine is excellent. Whoever's idea it was, deserves "E" for effort.

Can my name possibly be added to your mailing list? (I can't find any subscription rates).

I still retain a love for the woods where I spent 30 years of the best years of my life amongst a great 'bunch' of fellows.

E. H. Eirikson
Victoria, B.C.

There was once talk of calling the magazine Woodswords, but a book by that title beat us to it. Contrary to persistent rumours, there was never any talk of calling it either TreeSpeak or BuSHout.

Subscriptions to ForesTalk are available free on request.
Editor

Letters to the editor provide an opportunity for our readers to discuss topics arising out of ForesTalk. Letters for publication must carry the sender's name and address. Views published are not necessarily endorsed editorially. ForesTalk reserves the right to edit for publication.

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When is a Lake an Estuary?

In the Spring issue of ForesTalk we featured an article on the debate over resource use for an area of Vancouver Island's north coast known as the Tsitika-Schoen. The Tsitika-Schoen comprises almost 50,000 hectares of previously undisturbed forests, alpine lands, lakes and marsh. One area of considerable environmental concern is the biologically rich estuary of the Tsitika River. This estuary is one of seven ecological reserves proposed for the area. A two-page, full-colour photograph of the estuary was to accompany the ForesTalk article, but we flubbed it. Instead, we printed a photograph of Tsitika Lake. But we called it the estuary. It was a fine photograph, but the lake just isn't an estuary, as many readers were quick to point out. Pictured below is the Tsitika River estuary.

The Tsitika River estuary is an important recreational area and supports considerable salmon and waterfowl populations. This is one of the reasons it is proposed as an ecological reserve. The main purpose of each reserve is to preserve large, representative areas of natural ecosystems. These are intended to act as comparisons with man-disturbed areas, as well as to provide genetic banks of plant and animal material. Tsitika Lake is also proposed as an ecological reserve. It serves as a representative example of undisturbed alpine and subalpine vegetation.

For our part, ForesTalk will attempt to preserve the photographs of the lake and the estuary in our appropriate photographic reserve files.

PHOTO R. J. CHALLENGER

photography by Peter Robin

INTENSIVE FOREST MANAGEMENT

The modest little signs tacked to the Douglas-fir trees are written in a simple code. On one side of the path they read T2F2; on the other T0F0. Spoken aloud the symbols sound a little like the names of the robots in *Star Wars*, but this is no exercise in science fiction. A walk between T0F0 and T2F2 is to experience a living example of the benefits of intensive forest management.

Its Time Has Come

by **Cameron Young**

The two plots form part of a study in tree growth by the Canadian Forest Service in the Shawnigan Lake area north of Victoria. The differences between the plots are remarkable. The T2F2 trees are taller, their trunks are thicker, and their foliage is fuller and bushier. Sunlight streams among the well-spaced trees highlighting the lush vegetation on the forest floor. In contrast, the T0F0 trees are cramped, spindly and shorter. A tangle of skinny branches blocks out the sun's rays.

Only six years earlier the two plots had been part of the same dense 23-year-old stand. The T2F2 plot was then radically thinned; only one quarter of the original trees were left standing. At the same time as the inferior trees were cut down, a nitrogen-based fertilizer was added to the soil. Nothing at all was done to the T0F0 stand.

During their remaining years of rapid growth the well-spaced trees in T2F2 will provide a pleasant environment for people to visit, and the forest floor will provide wildlife with a good source of food. The dense, slower-growing T0F0 will be of little value for recreation or animal use.

Historically, our forest industry and forest-dependent communities have prospered on the basis of readily accessible, high quality virgin timber, a product highly regarded in markets around the world. Soon, most of the remaining stands of this kind will be gone. The future of our forest industry will depend on how well the province's second-growth timber can compete in the international market place with the standards of quality established by the virgin trees.

It won't be easy. Improvements in forest technologies, in harvesting techniques, in wood processing, and in developing better forms of finished products will all have to play a part, and the forests will have to be well managed. Today, the Ministry of Forests has begun to intensify its forestry program to meet this challenge.

Without more intensive forest management, the B.C. forest industry faces the serious difficulty of a declining supply of available harvestable timber. Part of this decline is a result of good forest land being set aside for parks, hydro-electric installations, agricultural land, settlements, roads, and a number of other uses. Also, much of the virgin forest still standing today is out of industry's reach economically. It is in remote or rugged locations, the species are less desirable, and the quality of timber is poor.

More important still is the decline in the province's timber supply that will result when harvesting operations shift from old growth to second-growth stands. Usually, the ideal time to harvest any stand is at its culmination age — when its aver-

(far left) This particular thinned and fertilized T2F2 plot was also cleared of all underbrush. (left) An untreated T0F0 plot.

A HARD BUSINESS

Wayne Coombs is Divisional Forester for the Port Renfrew Division of British Columbia Forest Products (BCFP). One part of his job is to oversee proper harvesting practices; the other part is to ensure that all logged areas are properly regenerated. His company is one of several in the province which responded to the Ministry of Forests' incentive program to practise intensive forestry on land that industry manages directly. Coombs has been involved in such a program for over eight years now, and he's proud of the results.

"Our objective is to produce the maximum amount of usable wood fibre in the shortest period of time," he explains. "And we are able to show that money spent on silviculture is a good investment. We expect to improve our yields by 25 per cent to 35 per cent, and possibly more."

At the BCFP head office in Vancouver, Jack Toovey, the company's

(above) An earlier Douglas-fir plantation in this fertile valley bottom was smothered by fast-growing wild alder. The site was later replanted with Ministry of Forests' "jumbo" seedlings following a mechanical site preparation program. Alder growth has been arrested through the use of herbicides, and this six-year-old tree is now growing three to four feet annually.

age yearly growth rate reaches a peak. Beyond that point growth rates fall off. However, when second-growth stands are harvested at culmination, they are much younger and yield smaller timber volumes per acre than did the virgin forests, which had been growing slowly for centuries. The difference in volume will cause a decline in the long-term wood supply by as much as 30 per cent in some areas of the province.

Intensive forest management can have a dramatic effect on making up this deficit. Today, the average unmanaged second-growth forest will reach culmination age at 100 years. However, most foresters are optimistic that many intensively managed forests could be ready for harvest in only half that time. This would double the timber producing capacity of forest land under intensive management.

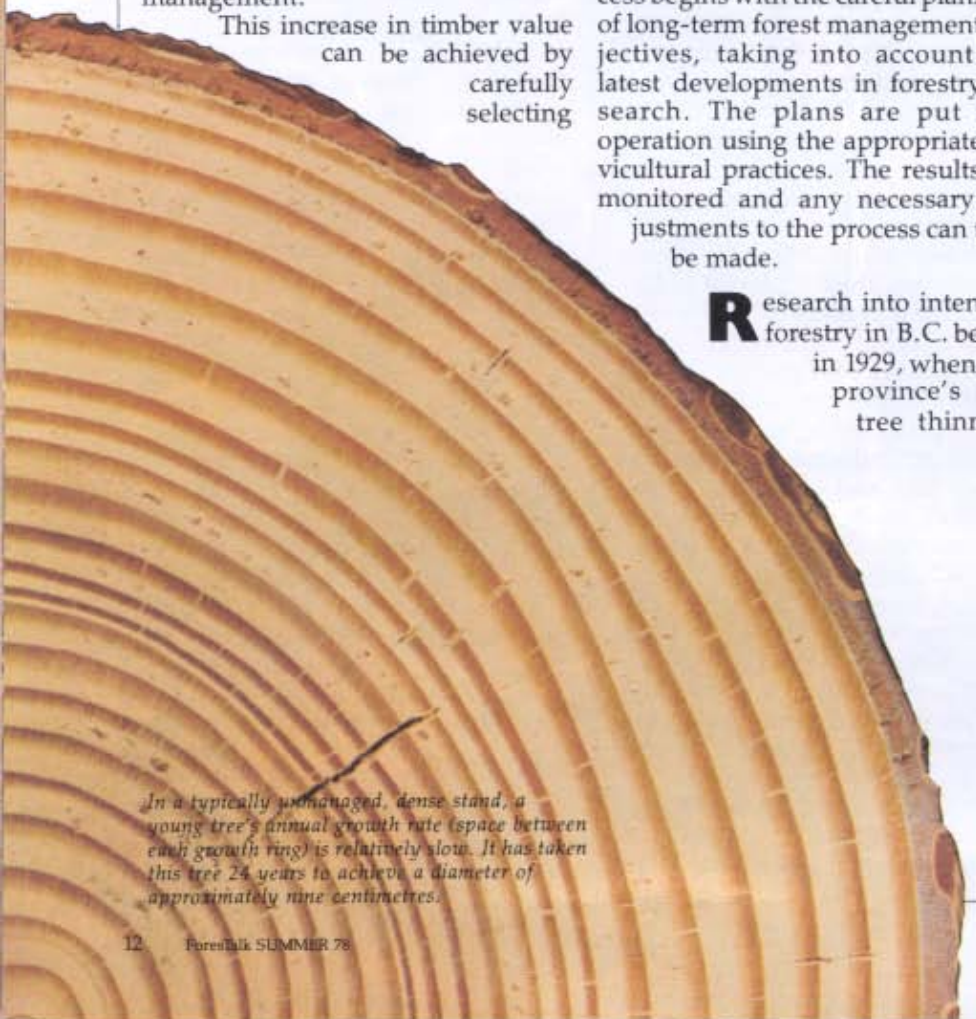
But increased rate of timber growth is not the only benefit from managing a forest. Timber value can be increased as well, and in the long run this may prove to be the more important aspect of intensive forest management.

This increase in timber value can be achieved by carefully selecting tree species which grow well on a given site and which are suited to long-range timber marketing objectives. Timber value can also be increased by managing stands for uniformity in tree size. This facilitates efficient and economic tree harvesting and milling procedures, producing higher grades of lumber from a greater portion of each tree harvested.

Intensive forest management is not a new idea. An early form of it originated in Germany and France over 200 years ago, and countries such as Sweden and New Zealand have been practising it for much of the 20th century. The Ministry of Forests' approach to intensive forestry will be structured to meet British Columbia's particular timber supply needs and complex timber management requirements.

The key to intensive forest management is the degree of influence people can have over a growing forest. This influence is achieved when there is close coordination of all aspects of silviculture, which is the forester's art and science of growing and tending trees. The process begins with the careful planning of long-term forest management objectives, taking into account the latest developments in forestry research. The plans are put into operation using the appropriate silvicultural practices. The results are monitored and any necessary adjustments to the process can then be made.

Research into intensive forestry in B.C. began in 1929, when the province's first tree thinning



In a typically unmanaged, dense stand, a young tree's annual growth rate (space between each growth ring) is relatively slow. It has taken this tree 24 years to achieve a diameter of approximately nine centimetres.

Chief Forester, is on the phone: "Forestry is a hard business," he says, referring to the fact that under the incentive program an increase in the annual growth rate of young forests allows his company to increase its yearly harvest rates of old growth. "We aren't practising silviculture exclusively for the future. We look on it as a workhorse. Silviculture practised today pays off today."

Back in Port Renfrew, Wayne Coombs is very conscious of the hard business of forest management. In a forest management unit of 64,000 hectares (160,000 acres), he's working to bring 22,000 hectares under intensive forest management. The rest of the unit is mature timber or non-productive sites. He has a permanent forestry crew to help him get the job done, one of the few such crews in the province. Their attention is divided between managing new plantations from scratch, and treating previously unmanaged second-growth stands.

Coombs explains that they prepare each new site for planting within one year of logging, and they are being provided with good quality seedlings from the Ministry of Forests' nurseries. Bigger seedlings are needed to help stay ahead of the fast-growing brush on fertile bottom land. Preventing alder, maple and

Three years ago this 25-year-old stand at Lens Flat was thinned from over 3,000 trees per acre to less than 300. This is an example of how previously unmanaged, dense stands with greatly suppressed tree growth can be rehabilitated.

trials were carried out by the Ministry's Research Division at its experiment station near Cowichan Lake on Vancouver Island. Through the years the division pioneered research into such areas as the spacing of trees, tree breeding (genetics), and identifying which species grow best under various environmental conditions. Ecological research has shown that selecting a species which is biologically suited to a specific forest site is fundamental to successful forest planning.

In addition to its research programs, the Ministry's protection and reforestation programs are also well established. Good site preparation techniques are common practice by both industry and government, and a number of thinning operations, along with some fertilizing, have already been carried out by government and industry in certain coastal areas.

Efforts to coordinate these elements into a full intensive forest management program began in 1971, with the establishment of the Ministry's special Forest Productivity Committee. Since then, the committee has been assembling background information required to initiate such a program, as well as supporting silvicultural research. In addition, the committee provided a program of incentives to encourage industry to initiate its own intensive forest management practices. Although there are still many aspects which require further study, the benefits to be derived from intensive forest management in B.C. are now well established.

In most cases, intensive forestry will provide its most significant results when applied to the province's most productive forest land, land which is more likely to respond readily to silvicultural treatments. The Ministry's program will concentrate on these good sites; less productive areas will receive a lower level of management. The implementation of intensive forest management will be a shared responsibility between government and industry. Forest companies will carry out government-approved silvicultural work on Crown land where they hold timber harvesting rights, while areas of the province with little industrial activity will be managed directly by the Forest Service.

Of the various government-managed forests expected to come under intensive forest management, one of the first will be the Sayward Forest near Campbell River on Vancouver Island. The Ministry of Forests' Special Studies Division recently prepared a 140 page report, Management Opportunities on the Sayward Forest, spelling out in detail how intensive forest management can be applied there on a cost-effective basis.

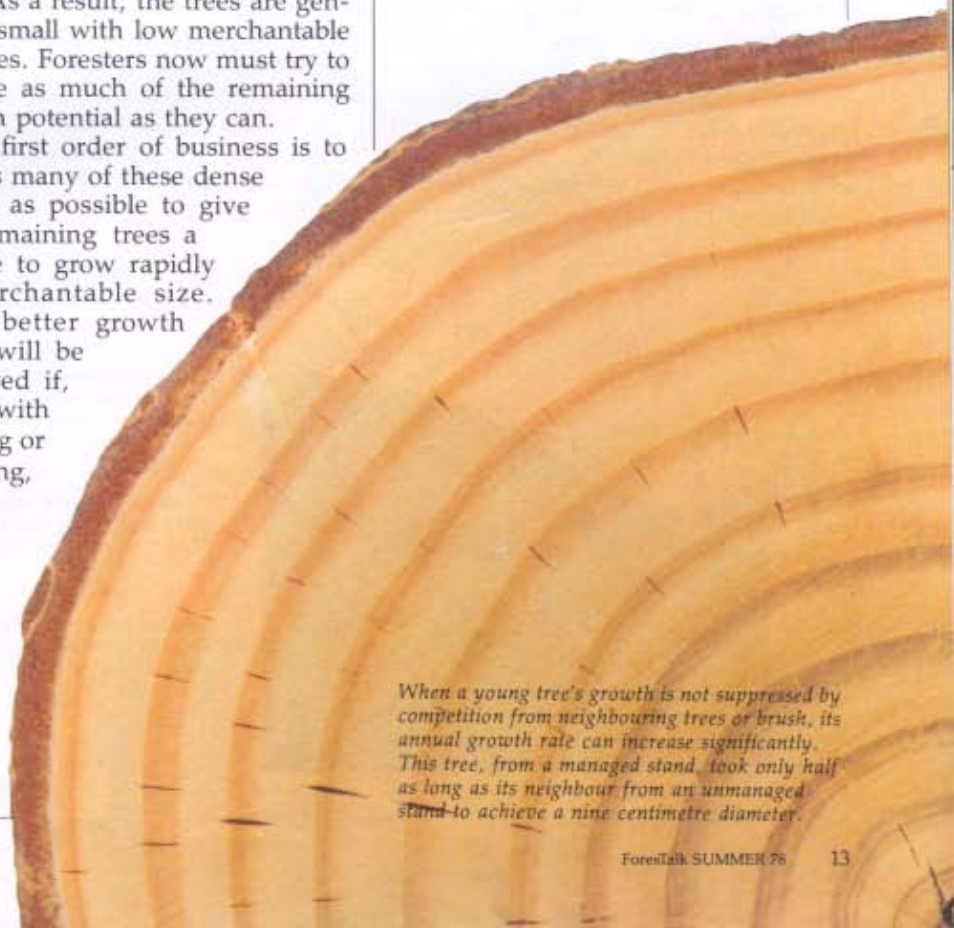
This proposal illustrates how potentially valuable forest land can be effectively rehabilitated. Rehabilitation projects of this type will be an important first step in many intensive management programs across B.C.

The first large-scale tree planting operation in the province was undertaken in the Sayward after the devastating fire of 1938. In these early reforestation programs, 1,200 seedlings were planted per acre — about two to three times the current norm. Subsequently, the stands were neither juvenile-spaced at age 10 to 15 years, nor were they commercially thinned another 15 years later. As a result, the trees are generally small with low merchantable volumes. Foresters now must try to salvage as much of the remaining growth potential as they can.

The first order of business is to thin as many of these dense stands as possible to give the remaining trees a chance to grow rapidly to merchantable size. Even better growth rates will be achieved if, along with spacing or thinning, salmonberry brush from suppressing the growth of young forests is one of Coombs' biggest concerns. The 'hack and squirt' method of applying herbicides directly to each undesirable tree species is his most effective method of brush control.

Once the well-spaced seedlings are established, and any that have died are replaced with new ones,

Because of favourable growing conditions this second growth stand has reached a harvestable state in less than 60 years. If it had received appropriate silvicultural treatments during its high growth period it would have been ready for harvesting 10 to 15 years sooner.



When a young tree's growth is not suppressed by competition from neighbouring trees or brush, its annual growth rate can increase significantly. This tree, from a managed stand, took only half as long as its neighbour from an unmanaged stand to achieve a nine centimetre diameter.

INTENSIVE FOREST MANAGEMENT

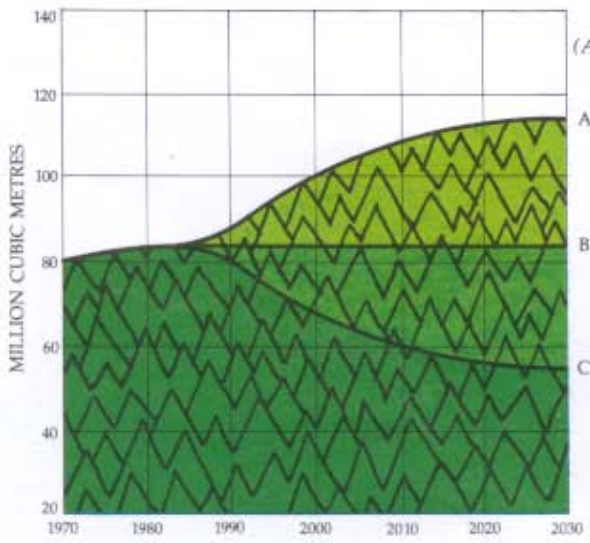
Tree growth is best observed in a tree's crown, which is where a tree does its growing. All trees pictured here are from the same Douglas-fir stand under study by the Canadian Forestry Service. (left) Being too close together, the trees are suppressing each other's growth by competing for available sunlight, water and nutrients. (centre) Following a thinning operation the remaining trees are well-spaced and can grow at their optimum rate. (right) As a result of combined thinning and fertilizing treatments these trees have grown more vigorously and become bushier than their neighbours. Because of this accelerated growth they should soon be ready for the next step in intensive forest management — commercial thinning.

fertilizer is applied to the soil. As these stands reach culmination age and are harvested, the trees replacing them will be intensively managed from the start. At that point, the full productive potential of the Sayward will be realized.

This intensive forest management program can also be effectively integrated with fish and wildlife and recreation management programs to improve the Sayward's overall attractiveness and usefulness. Through careful planning, the thinning and spacing operations can open up large areas of the Sayward Forest to deer and elk, providing them with access to forage and shelter from the elements. Blue grouse will again breed in areas that were abandoned when the young forest became too dense. The recreational fishing opportunities will multiply accordingly with the improvement of fish populations in the numerous lakes and streams. Hunting, fishing, hiking, rock climbing, camping, berry-picking, bird watching, or simply getting away from it all, are just some of the recreational pastimes the Sayward will be providing more of in the future.

Intensive forest management is similar to farming. Like fruit growers in the Okanagan or prairie wheat farmers, forest managers will have to tend their crops from the time the seeds are planted until the final product is harvested. They will have to maintain a good soil base, perhaps experiment with different crops for different purposes, and generally do all that has to be done to ensure the long-term productivity of the land.

Of course, B.C.'s future forests will not resemble a row of carrots, or even a fruit orchard. But the new forests will be a product of human design as much as they are a product of nature.



B.C. TIMBER SUPPLY
(Approved Allowable Annual Cut)

A: *A full commitment to intensive forest management could increase future timber supplies.*

B: *Moderate levels of intensive forest management could sustain the current timber supply level.*

C: *At present levels of forest management timber supplies will be reduced by up to 30 per cent in some areas.*

Coombs usually doesn't treat the trees again, except for brush control, until it's time for a juvenile spacing program. As an example, he points out a stand of Douglas-fir that looks like a grove of tall Christmas trees. "We spaced this stand just at the right time," he explains. "About 400 trees per acre were planted here in 1963, although now we plant less than 300 per acre. However, with natural seeding, the stand thickened to 900 trees per acre. Before they could begin competing with each other for available sunlight and nutrients, we cut the number back to around 250 per acre. There's no chance now of any growth suppression from overcrowding."

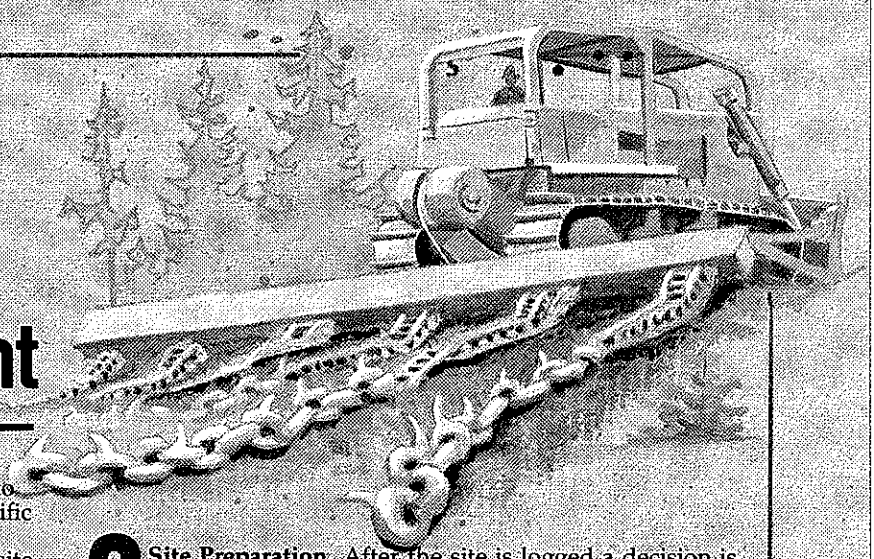
At a place called Lens Flat, Coombs points out the problems of trying to manage a previously unmanaged second-growth forest. Three years ago, his crew thinned out this 25-year-old plot, reducing the number of trees per acre from over 3,000 to less than 300. But there were up to six feet of debris lying on the ground. This has since reduced itself to three or four feet. "Once we finish thinning the backlog of these kinds of stands, we won't have such a pile of slash on our hands," Coombs comments.

To prove that point, he shows a stand at Bear Creek where a similar thinning program had been carried out 15 years earlier. The forest floor looks as clean as any other, and it is an attractive spot to roam about in. Coombs has a fistful of figures indicating how these thinning operations greatly accelerate the growth rate of the remaining trees.

Coombs says his next big step in silviculture will be to increase the rate of fertilizing. He has fertilized 500 acres over the last three years. Although it is costly, he has decided the young trees, especially those on the hillside, can benefit from a nitrogen boost.

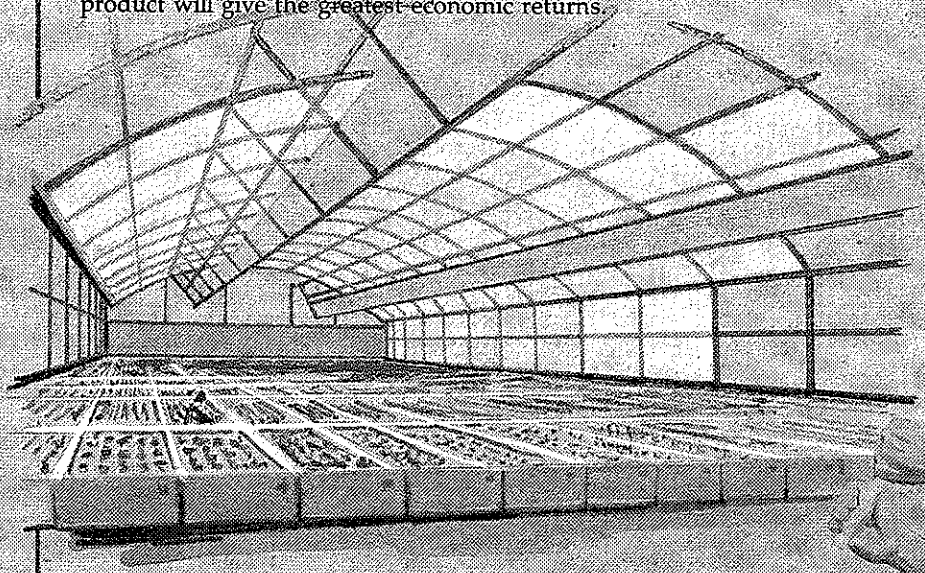
The manager of the BCFP operation at Port Renfrew is Bob Beard. It is up to him to summarize his company's attitude towards intensive forest practices. "We'll continue to become more intensive, and more proficient, learning what is required to do a good job. We intend to be here for a long time; we don't intend to cut out and get out."

10 Steps of Intensive Forest Management



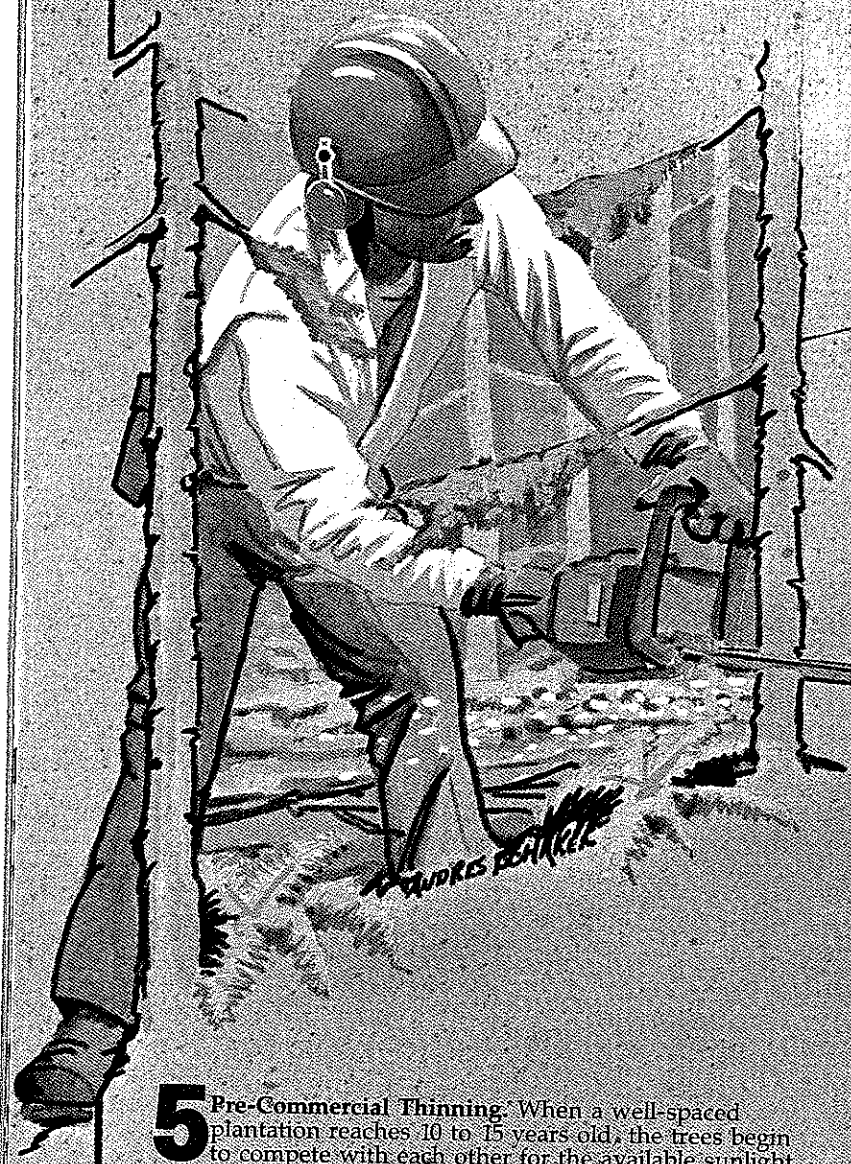
1 Pre-Harvest Planning. The long-term objective is to select the best forest management option for a specific site in order to maximize yields of uniformly high quality trees. Ideally, planning should begin before the site is logged of its old growth. The ecological classification (soil, vegetation, climate) of the site will help managers plan logging operations which don't damage the soil for the subsequent crop. It helps them to decide whether to plant or manage for natural regeneration, and whether fertilizing is likely to be effective. The decision on which species to grow depends both on the limitations of the site and what product will give the greatest economic returns.

2 Site Preparation. After the site is logged a decision is made as to whether site preparation techniques will be necessary for either planting or natural regeneration. The ecological classification of each site results in the appropriate site preparation prescription. This may involve reducing the residue from logging by burning or using bulldozers to clear it away, or deciding not to disturb a fragile soil base.



3 Reforestation. The Reforestation Division's tree nurseries are providing B.C. with close to 100 million seedlings annually. Its seed orchard program will eventually provide seeds for even better quality planting stock. Seedlings are planted as soon as possible after a site has been logged. They are well-spaced, ranging from 300 to perhaps 600 trees per acre. Spacing depends on the species used, the characteristics of the planting site, and long-range timber harvesting objectives. Good spacing accelerates tree growth. Naturally regenerated stands require similar spacing for their best growth.

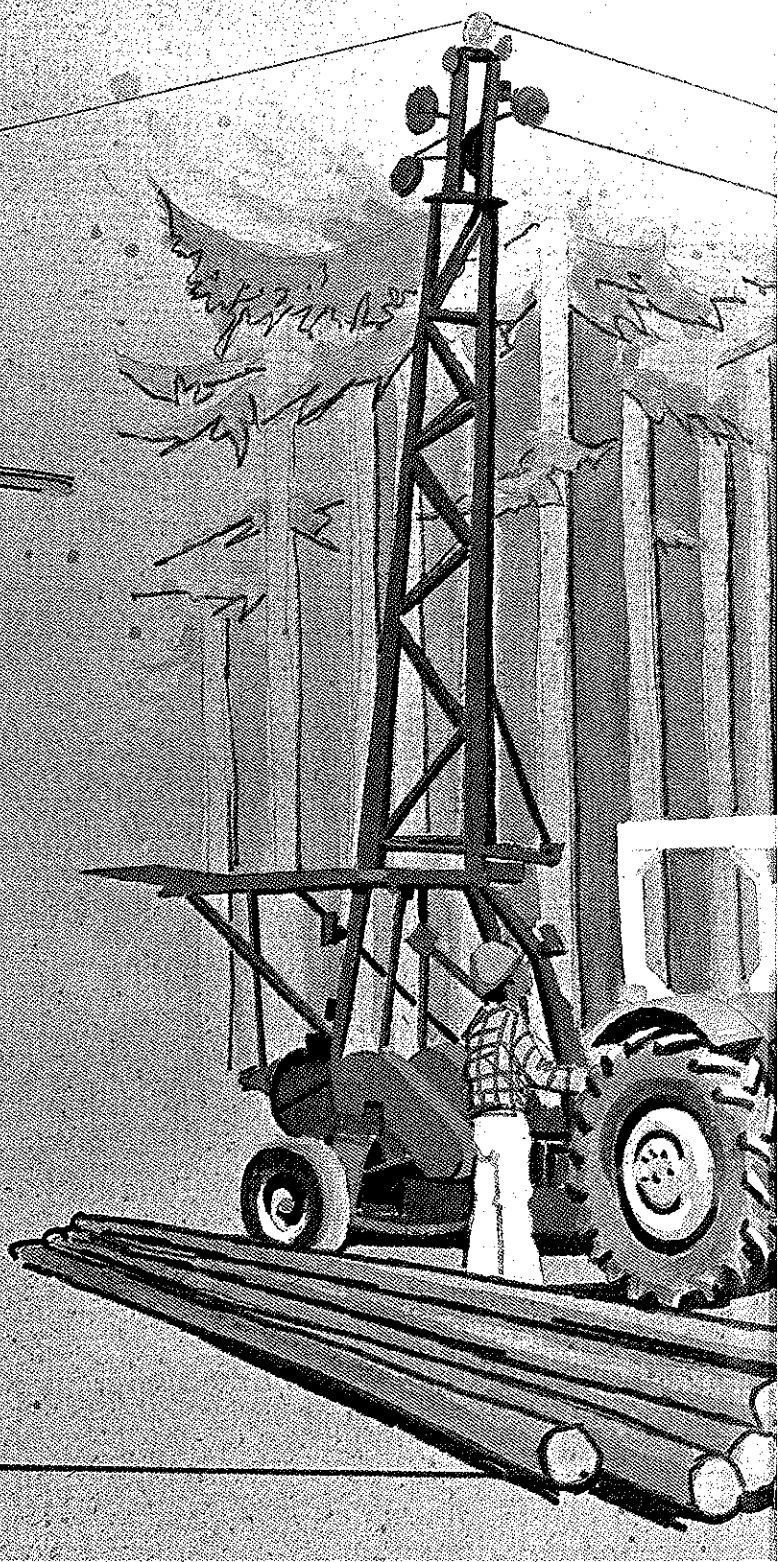
4 Brush Control. Newly regenerated areas have to be carefully monitored. In fertile, low-lying areas, the desirable coniferous species cannot compete with dense vegetation such as alder and salmonberry. This vegetation must be cut down, or treated with herbicides to prevent suppression of the coniferous trees. Once established, the trees will begin to outgrow the brush.



5 Pre-Commercial Thinning. When a well-spaced plantation reaches 10 to 15 years old, the trees begin to compete with each other for the available sunlight, nutrients, and water. The inferior trees are then cut down, releasing the remaining trees to continue growing at their optimum rate. Some stands might now contain as few as 200 trees per acre; others will have considerably more. This process is often referred to as juvenile spacing.

Previously unmanaged second-growth forests under 30 or so years of age can also benefit from thinning. Usually, these stands are overstocked, their growth rate severely retarded, and many trees are too small for commercial use. A major waste thinning operation is carried out so the remaining trees can get full access to sunlight, nutrients and water. They will then grow vigorously and reach maturity sooner.

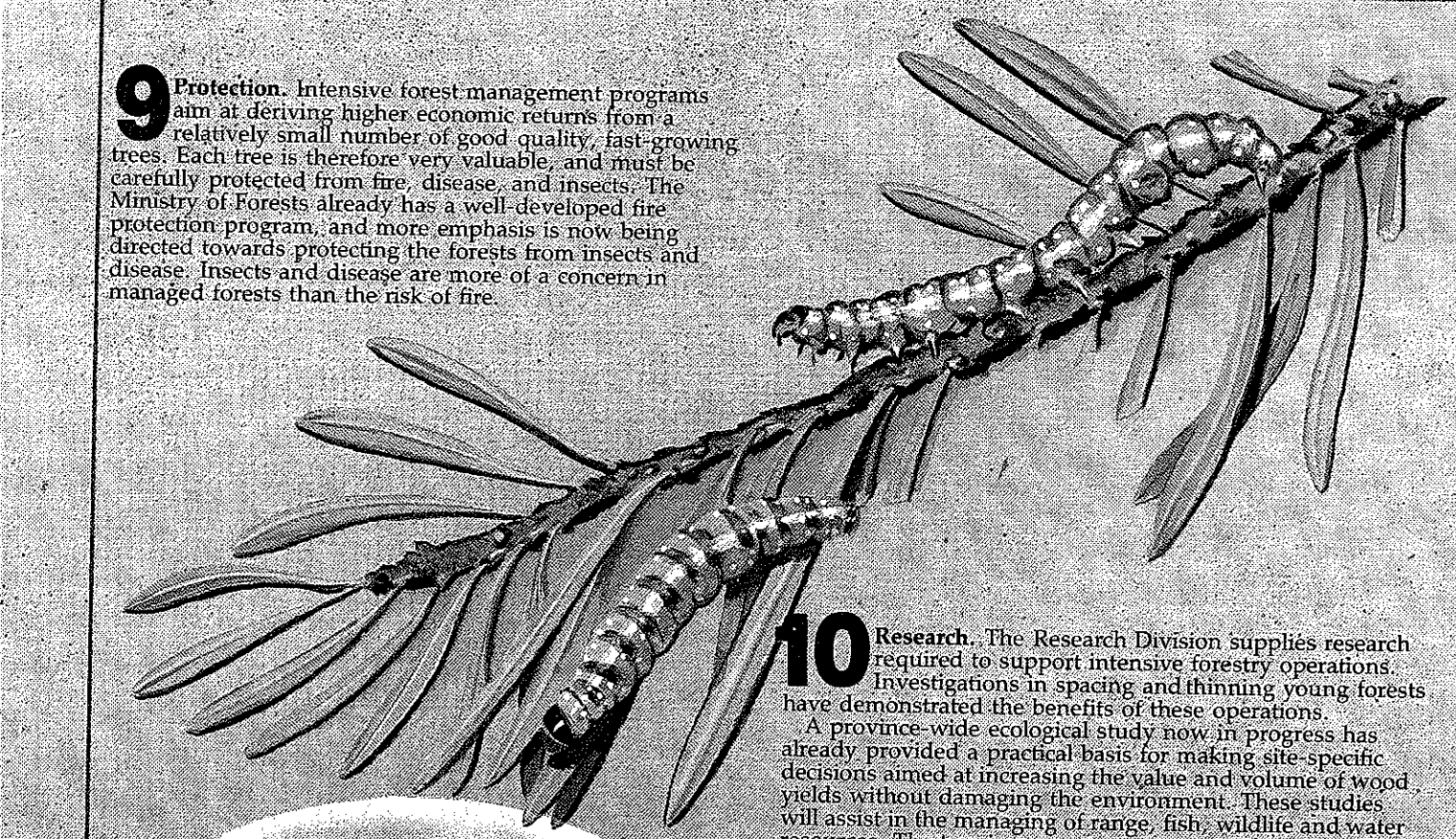
6 Commercial Thinning. Commercial thinning is applied to older second-growth stands where overcrowding is suppressing individual tree growth. Trees which otherwise would die are harvested and utilized economically, increasing the site's overall productivity. Some forest managers prefer to by-pass this step. In this case, they make sure that stands are very widely spaced during pre-commercial thinning operations.



7 Fertilizing. Much of B.C.'s forest land is deficient in nitrogen. Experiments have shown that an application of a nitrogen-based fertilizer, in conjunction with juvenile spacing or thinning, can be very effective in stimulating tree growth in certain forest sites.

8 Pruning. Cutting off the lower branches of fast-growing, widely spaced trees increases wood quality by eliminating knots. The cost of pruning will only be justified when there is a premium price for clear lumber from second-growth trees. This is a mangement alternative not yet widely applied.

9 Protection. Intensive forest management programs aim at deriving higher economic returns from a relatively small number of good quality, fast-growing trees. Each tree is therefore very valuable, and must be carefully protected from fire, disease, and insects. The Ministry of Forests already has a well-developed fire protection program, and more emphasis is now being directed towards protecting the forests from insects and disease. Insects and disease are more of a concern in managed forests than the risk of fire.



10 Research. The Research Division supplies research required to support intensive forestry operations. Investigations in spacing and thinning young forests have demonstrated the benefits of these operations.

A province-wide ecological study now in progress has already provided a practical basis for making site-specific decisions aimed at increasing the value and volume of wood yields without damaging the environment. These studies will assist in the managing of range, fish, wildlife and water resources. The tree improvement program which started in the 1950's eventually will produce strains of trees with greatly improved growth characteristics.

COLLECTIONS

Edited by Michael Gregson

Have an Apple . . .

Bite into an apple and you're biting into the most commercially important fruit in the world's temperate zones. Cultivated since ancient times, apples come in over 7,000 varieties, 50 of which are big business for the farmers who grow them.

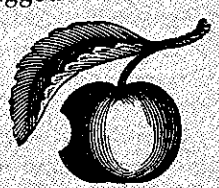
A member of the rose family, the apple tree is easy to cultivate, lives a long time, and can survive at higher altitudes than any other fruit tree.

Canada takes pride in its own crunchy wonder, the famous McIntosh apple (commonly known as the Macintosh apple). It is now cultivated extensively across the country, including British Columbia's Okanagan Valley. Named after the Ontario farmer John McIntosh, the parent tree was originally found by him on a patch of wild bushy ground he was clearing in 1811. As apples then were important to a farmer's diet, McIntosh transplanted this single tree with its delicious fruit to a spot close to his house. From there, the fruit proceeded to become locally famous. But McIntosh was unable to reproduce the tree for neighbours, until a farm hand showed him how to graft twigs from the parent tree to other host apple trees. By this means, the McIntosh apple spread throughout the Dundas, Ontario, neighbourhood of McIntosh's farm. They haven't stopped spreading since.

The original McIntosh apple tree continued to bear fruit until 1906. This means it had nearly 90 years of productive life.

The McIntosh isn't the only great apple success story. Near Yakima, Washington, a single Starkspur Golden Delicious apple tree was sold for $51,000 — a record price paid for a single tree.

North America grows more apples than any other part of the world. This is partly due to the legendary Johnny Appleseed. Don't smile — he really existed. He was John Chapman (1774-1847), a Massachussetts man who spent a lifetime obsessively sowing apple seed in the wilds of Illinois, Ohio, and Indiana. A ragged eccentric, Johnny Appleseed tended all the orchards he planted and aided farmers in the cultivation of his favourite tree.



FAO PHOTO BY P. A. PITTET

Elephants and Logging

We don't hear Elephant Bill stories anymore, but elephants are still logging in Southeast Asia. Able to haul two tons of wood over long distances, the elephant remains in use because modern machinery and suitably trained manpower are not easily available in such countries as India, Burma, and Sri Lanka (Ceylon).

Acting as a loader and skidder, the elephant is useful in tropical forests which often grow stands of very mixed species. Woodcutters take only a few trees from a stand. The elephant is well suited to maneouvering among standing trees as it hauls away these heavy logs. It can also help load logs onto waiting trucks.

Although modern methods of logging are on the increase in Southeast Asia, the elephants are holding their own. In fact, in many areas, they are not more widely used simply because of their scarcity.

The Vanishing Forests of China

Ancient China possessed forests of greater variety and richness than any other area of the world. Almost every type of conifer, hardwood, and fruit tree could be found there.

Forty centuries of intensive farming, however, have almost destroyed those old forests, and only about 10 per cent of China is forested today. Of those 100 million hectares of remaining forest land, about 50 per cent is considered to be of low productivity or inaccessible. China is now forced to import wood, mainly logs, from Southeast Asia.

One of the trees supposed to have perished in the great deforestation of China was the Ginkgo, considered to be the oldest form of tree in the world. Western visitors to China in the eighteenth century, however, rediscovered this supposedly extinct species with its small fan shaped leaves and foul-smelling fruit. Today the Ginkgo is widespread in temperate zones as an ornamental tree. It grows well in the milder parts of British Columbia.

Early Equipment: Hardhats and Tinpants

Although the hardhat is now a common piece of safety equipment in B.C. forests, it is not clear as to who first thought of wearing it. However, as far back as 1939, hardhats were being worn by falling crews in the Port Alberni area of Vancouver Island. They were apparently made of fibreboard and were fairly light.

Non-ripping rainpants made of rubber and other synthetic materials first came into use in British Columbia about 1946. But it was raining before then — so what did the loggers wear? The answer is 'tinpants', a slang term for describing heavy work clothes made of canvas which were usually covered with a water proofing agent, such as wax. Another name for the material of these coats and trousers was raintest.

Not a Thing Wasted

We shouldn't feel sorry for that castaway sitting on a sandy little island with only Coco palms for company — he's sitting beneath the most useful tree in the world.

With a little activity he could make a meal out of the fruit, make rope out of the fibres of the coconut, use the trunk for lumber and thatch the resulting hut with the leaves.

He could also make door mats, baskets, and other household necessities from the husk, and then burn the rest of the husk for fire. And that isn't the end of the Coco palm's blessings. Our castaway could use it to make a raft, complete with sails, and then relax with an alcoholic drink made from the flower buds. In fact, he'd find every part of the tree usable.

About the only problem the palm can't solve is the erosion which might result from its removal.

Punks!

It seems that the current Punk Rock trend has found a natural equivalent in the Melaleuaca tree, now known by irritated residents of Florida as the Punk tree. Imported from Australia in 1906 to help protect the Lake Okeechobee levee system from high waves, the Punk tree has since gained in status as a public nuisance. Among its unpleasant qualities:

- **It grows so quickly that it chokes out the more likable native vegetation.**
- **Growing equally well in swampy or very dry ground it has spread to areas where it is not wanted.**
- **Two to five times a year, it flowers with heavy pollinations, causing allergies in humans.**
- **Short of sawing through its tangle of stems, the tree resists all attempts to eradicate it.**
- **Meanwhile, it is drinking dry Lake Okeechobee levee system which it was imported to protect.**

PHOTO PETER ROBIN

Logger Sports

A man has climbed up and down a 100 foot spar tree in 31 seconds. He wasn't at work; he was in a competition called Speed Climbing, one of 26 logger sports listed by the Canadian Loggers Sports Association (CANLOG).

First organized in the 1930s, logger sports have grown to international competitions with professional contestants. The champions change, the events don't. Some of them preserve old logging skills, such as birling (from the days of river drives) and crosscut saw work. Others involve modern tools such as the power saw. And some sports, such as jousting from rafts, are just plain fun.

The first event listed in the CANLOG rule book is Tree Topping. This event involves sprinting your way up a spar tree and then sawing a two inch thick slab off the top. The contest is timed from the moment the competitor leaves the earth to the instant his cut touches ground. It sounds simple, but this event preserves the hair-raising skills of the old high rigger. Contestants must be in excellent physical condition just to make the climb. Then comes dexterity with a saw and a good nerve for heights. To be able to do all that takes practice — and not on the local telephone poles.

Bamboo

Oriental societies literally could not do without it. From beautifying the garden to building parts of the house, from umbrellas to water ladles, bamboo serves in countless ways as articles of daily life.

Ships are built of it, modern skyscrapers have their windows cleaned by men working on many-storied bamboo scaffoldings.

Yet, despite bamboo's ancient and universal use, botanists still argue about the classification of bamboo among plants. Some say it is a form of grass, others that it is a kind of rice. General consensus, however, is moving towards considering bamboo as a unique family of plants — *Bambusaceae*.

But bamboo has a negative side to it — when it flowers, it dies. And it flowers very rarely — for some types, perhaps once every 60 to 120 years.

Recently, in Japan, a popular type of bamboo flowered. That meant many gardens and forest areas would suddenly be without this form of bamboo until new plants established themselves.

And there is another, darker side to the flowering. The last time this bamboo had flowered in 1853, Commodore Matthew Perry arrived with his squadron of American warships to break Japan's isolation from the world. What was the bamboo foretelling?

No Japanese would have missed that blooming, for even if he had only a sprig of it in a vase in his home, that sprig would have flowered along with all other members of its kind.

At up to 40 pounds, the fruit of the Double Coconut, or Coco De Mer, is the largest fruit in the world. The tree grows only in the Seychelle Islands of the Indian Ocean.

CONTRIBUTIONS?

Do you know any interesting facts about forests? Don't hold them back — Collections deals with anything from machinery to forest products and uses, from unusual facts and interesting people to forest legends. We invite you to contribute. Mail submissions to:

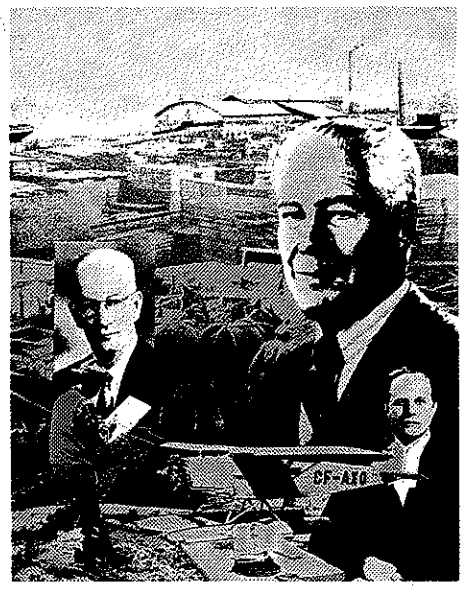
ForesTalk — Collections, Information Division, Ministry of Forests, 1450 Government St., Victoria, B.C. V8W 3E7.

Information should be brief, accurate, and sources included where possible.

A PERSPECTIVE ON FOREST POLICY

by **Jean Sorensen**

PART 2: THE NEW LEGISLATION



In Part I of this article in the Spring 1978 issue of ForesTalk, Jean Sorensen traced the growth of the B.C. forest industry to 1977, and the struggle of government forest management policy and practices to keep pace with the escalating demands being placed on our forest resource.

By the mid-1970s the forest industry felt that rising labour costs, costly upgrading programs, environmental guidelines, high equipment costs, and lower grades of lumber combined to threaten its competitive position in the international market.

Sorensen concluded her article by saying: Could the environmentalist live side by side with the logger? Was there a role for the small logger? Could we guarantee the future growth of resource-oriented communities? What of forest policy?

Never in the province's history had so many depended so much on the forest industry, and moving into the 1980s never had the challenge against such stiff competition been so great.

While a provincial government cannot control international pricing set through competition, it can ensure that the operating rules it sets down for its home industries ensure a chance of survival.

On June 12, 1975, the provincial government announced a long overdue review of its forests and industries. Dr. Peter Pearse, a University of British Columbia economist, was appointed as the sole commissioner.

Before Pearse would finish his enquiry, the transcript of testimony from hearings would cover more than 10,000 pages, and his final report would number more than 400 pages.

Ed.

On May 12, 1978, the Minister of Forests; Tom Waterland, stood before the British Columbia legislature and presented three important pieces of legislation. The proceedings took only moments, but the new Forest Act, the Range Act, and the Ministry of Forests Act will shape the direction of forest and range management in this province for decades to come.

PARTNERSHIP IN MANAGEMENT

Most importantly, the new legislation ensures the public's ownership of the forests while giving industry secure forest tenure. Ownership of 95 per cent of the forest land still remains with the province, but as long as industry harvests and manages this land according to new government standards, industry can expect long-term forest operating privileges. This will allow for long-term planning and encourage greater capital expenditures.

The basic question of who should have control over the forests has been probed since the turn of the century. It was a question that Pearse's Royal Commission on Forest Resources faced again. In his findings, Pearse outlined the pros and cons of both private and public ownership.

In a number of forestry-oriented countries, private ownership forms the basis of a highly competitive forest industry. However, when a government gives to industry the right to own the forest land, it loses its most powerful means of shaping the pattern and pace of economic development. In B.C. that concession would be a major one, since the economy here historically has been firmly rooted in our forest lands.

Taking both points under consideration, the new legislation finally reaffirms B.C.'s unique philosophy of government and industry partnership in forest management. On the one

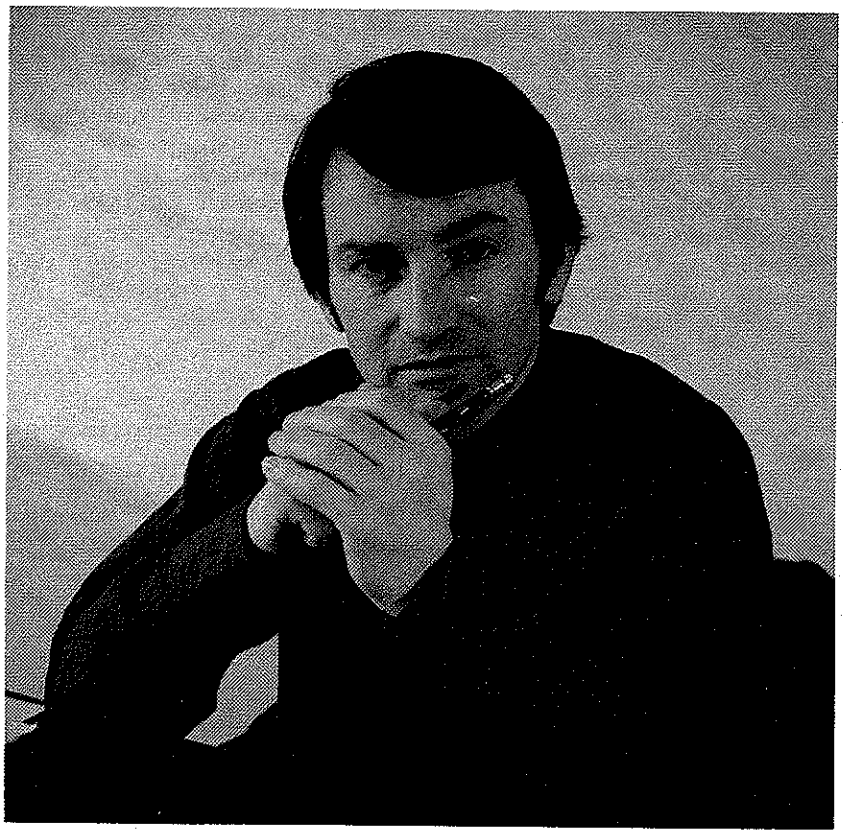


PHOTO BARBARA DAVIES

U.B.C. economist Peter Pearse's Royal Commission on Forest Resources provided hundreds of recommendations for revising forest policy in B.C.

(right) Improved forest management policy and practices will ensure a continued export market for B.C. forest products, and a strong provincial economy.

hand, industry is provided with new and revised forest tenure agreements. On the other, the Forest Service is committed to regular assessments of forest and range policy and practices and to preparing management programs in light of these assessments. Both the assessments and programs are to be developed in cooperation with other resource agencies and the public, and are intended to provide the much needed framework for overall forest planning as recommended by Pearse. Specific tenure agreements must undergo similar periodic assessments.

Although Pearse recommended that companies should enter competing bids for access to Crown land, the forest legislation is based on a different assumption. It assumes that the benefits from open bidding for timber would be more than offset by the unpredictable dislocations this might have for the economy and for forest-dependent communities. However, the forest industry's secure access to Crown land is dependent upon its ability to manage that land responsibly.

As forests minister Tom Waterland says, the companies are expected to "use it, manage it, or lose it."

A NEW LOOK AT SUSTAINED YIELD

The overall forest management objectives of the legislation are reflected most clearly in the section covering the Allowable Annual Cut (AAC). The AAC is the rate of timber harvesting which the Forest Service calculates a forest management unit can sustain each year. This will now take into account the rate of tree growth in the unit, the rate at which harvested areas are reforested, the predicted improvements in tree volume and value through the practice of intensive forestry, the efficient utilization of timber harvested, and the economic and social needs of forest-dependent communities.

In effect, changes in economic, social, and forest management conditions can affect yearly harvest schedules, giving forest managers more flexibility to respond to immediate needs. However, over the long term, harvesting schedules will be adjusted to ensure that each forest management unit produces a perpetual yield of harvestable timber. This sustained yield principle will still be biologically based; harvesting schedules will continue to reflect the yearly growth rate of trees in each unit.

PREPARING THE WAY

The revisions in forest tenures and the hundreds of other elements making up the new legislation, only came about after considerable discussion and deliberation. For over a year Pearse held extensive hearings around the province. He heard presentations from other resource agencies, industry, environmentalists, foresters, consultants, and concerned citizens. Every aspect of forestry from recreation to taxation was included in his final recommendations.

To evaluate the impact of making these recommendations into law, the government appointed the Forest Policy Advisory Committee (FPAC) in January, 1977. Headed by well-known forestry consultant Robert Wood, FPAC's first move was to invite all participants of the royal commission to appear before it to comment on Pearse's recommendations.

The purpose of FPAC was not to make "sweeping changes" for the sake of change, Wood explains. He believes the forestry principles that form the foundation of B.C.'s forest management program are some of the finest and most advanced in North America. The changes advocated in the FPAC proposals are improvements on that foundation.

"We have crossed the threshold," Wood says.

BETTER FOREST MANAGEMENT

The Forest Act makes it obligatory that all harvested lands be reforested by licence holders. If they go on to practise more intensive forest management, they will be rewarded with increased allowable annual cuts. Poor

PHOTO L.P. GRICE

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PHOTO B. J. CHALLENGER

Working from Pearse's report, the Forest Policy Advisory Committee, headed by Robert Wood (seated) advised Minister of Forests Tom Waterland (second from the right) in the preparation of the province's new forest legislation.

management practices will be penalized with a lowering of the AAC. In areas set aside for small operators, and in locations where there is little active industry, government will assume direct forest management responsibilities. It is hoped that intensive forestry will make up for the inevitable drop in total timber yields that otherwise would occur as harvesting operations move from virgin timber to second-growth stands.

Reflecting this concern for better forest management is the government's recent announcement of a major silvicultural program for the province. This will put extra emphasis on restocking forest land and on stand-tending activities to improve existing second-growth forests.

An important contribution to better forest management is found in the Forest Act's creation of a research council to coordinate forest research in the province. Research groups from the provincial and federal governments, from industry and universities, will now come under the umbrella of the new council.

The Forest Act reconfirms the philosophy of multiple-use of forest land. It provides for Forest Service consultation with other agencies so that forest management decisions reflect the needs of other forest land users. Multiple-use is complementary to, and not a substitute for, the established park system in the province.

There are provisions for withdrawing forest land from production for other uses, such as roads or recreation, when a need to do so can be demonstrated. There are also provisions to compensate any companies affected by such withdrawals.

As is customary with any legislation, the three acts do not spell out the policies and procedures required to implement them. These will come later. In particular, the Ministry's Resource Planning Division is currently preparing a special Forest Planning Handbook to help forest managers prepare forest plans for their areas. In this handbook, participation by the public is identified as a necessary part of the planning process. Questions over local issues such as recreation land, access to woodlots, harvesting policies, or any other related topic can be addressed by the public through this planning mechanism.

SOME ADDITIONAL FEATURES

Where circumstances warrant it, and where the land is available, a certain percentage of the allowable cut on government lands will be set aside for the small logging operator who wants to start in industry without excessive overhead. The Crown will provide access, planning, and forest management. As a further incentive to small business, it is intended that 50 per cent of the volume of trees harvested in company-run tenures known as Tree Farm licences be conducted by private contractors.

Also intended as a boon to the small businessman is the creation of woodlot licences which allow Indian bands, societies, and individuals with no investment in a large manufacturing plant to get into the logging business. Woodlots are really mini-tree farm lots where people have the opportunity to practise perpetual yield forestry on a smaller scale.

Decentralization is occurring in the Forest Service and much of the decision-making power in Victoria will move into the field. This reorganization will be the responsibility of the new Deputy Minister, Mike Apsey, who says, "We will be moving people closer to where the decisions need to be made."

Part of this reorganization involves establishing regional managers who will be responsible and accountable for forest management decisions for their areas.

Many of the same principles found in the Forest Act are also embodied in the Range Act. In return for enhancing grazing lands with proper grazing management and reseeding, ranchers are offered licences for terms of 10 years.

The Range Act also provides compensation for livestock reductions necessary to accommodate uses incompatible with grazing or hay production. As in the Forest Act, the Range Act has provisions for appealing Forest Service decisions.

The new legislation, as it evolved from Pearse's royal commission and made its way through the rewriting and editing stages of FPAC, provides a basis from which forest and range managers in British Columbia can practise the most advanced forms of forest management.

In essence, it is legislation that attempts to ensure that our forest and range resources are utilized efficiently and economically to guarantee a productive, competitive forest industry and a growing labour market for decades to come. It is time now for people to put these high principles into practice.

These acts will not in themselves create additional wood. They only allow for the creation of it. ◻

Seeing Through The Trees

by **Mack Pudgio**

Harvesting timber is not a game, but a game can be a good way to learn about timber harvesting. This fall, students in B.C. schools will have a chance to find out when they get to play Timber — The Forest Land Use Game.

As the players make their way along the board, they are confronted with the challenges involved in harvesting a multiple-use forest. They have to make allowances for recreation areas and wildlife reserves. They may find their way blocked by fire closures or heavy snow; they have to bid for timber rights, and they will find themselves playing with concepts and making decisions which simulate the real world of forest land use.

Timber — The Forest Land Use Game, is one of 52 curriculum aids developed over the past six years by the Western Education Development Group (WEDGE) of the Faculty of Education at the University of British Columbia. If any teacher in B.C. feels he or she has an interesting way to teach a certain topic, WEDGE will help that teacher transform the idea into a fully developed curriculum package. This may be a game, a pupil booklet, a teacher's guide, or any other type of instructional material. WEDGE provides the teacher with a wide range of support services to help put the study unit into production. WEDGE also arranges for a substitute so the teacher can concentrate solely on developing the new study materials.

These materials focus on developing student appreciation and awareness of their immediate environment. This is why some of the first projects developed in 1972 included the Vancouver and Victoria bus games and a study of neighbourhoods.

The forest studies program got underway that same year. This has since become WEDGE's most highly developed theme. It began with a primary level teacher's guide appropriately called Forest Appreciation. This was followed shortly by more guides, including the Stump Book and There's Dirt in the Forest.

By 1974, forestry projects were being prepared in close cooperation with the Forest Service, and this led to a new unit on forest nursery studies and another on measuring the forest. This unit attempts to apply mathematics learned at the junior secondary level to tree measurement. From simple measuring techniques to calculating the volume of wood on an acre of land, the process challenges students to understand some of the complexities of forest inventory, while making practical use of their mathematical skills.

The forestry program also includes a teacher's guide called Seeing Through The Trees. The guide lists 34 activities ranging from root studies to the investigation of dead or dying trees.

Currently, a writing team to produce additional forestry materials for secondary schools is being set up in Prince George. This event marks the opening of WEDGE's first satellite centre, and the team will operate in cooperation with the Prince George school district. The team's main objective is to prepare a complete curriculum program on intensive forest management.

One of the most interesting teacher's guides in the WEDGE program was developed by a committee of teachers from Duncan on Vancouver Island, which just happens to be the site of the British Columbia Forest Museum. This unit provides an excellent set of activities to be carried out at the museum itself. These include sawing and rolling logs, splitting shakes, using a springboard, and riding a steam engine.

An important function of WEDGE is to fill the gaps in curriculum materials currently available to teachers. Whether it is creating a unit on the ecology of the Nanaimo River estuary, or preparing a study on the geology of the lower Fraser River valley, concerned teachers throughout B.C. are taking advantage of the opportunity provided by WEDGE to produce additional, locally based study materials.

WEDGE materials have received wide distribution in British Columbia schools through the B.C. Teachers Federation. Recently, these materials have been made available across Canada through a Toronto publishers' cooperative. Interestingly, in the past year, large orders for WEDGE materials have been received from Australia, an indication that WEDGE is established internationally.

Educational institutions aren't WEDGE's only customers. Many youth organizations, day care centres, and parents looking for new summer experiences for their children are making good use of what WEDGE has to offer.

If you would like more information about WEDGE, please contact:

Dr. C. J. Anastasiou
Western Education Development Group
Faculty of Education
University of British Columbia
Vancouver, B.C.
V6T 1W6
Phone: 228-5385

People

PHOTO R. J. CHALLENGER

Les Kerr

by **Ray Wormald**

One of the largest private air forces in North America is located at the Abbotsford airport, just a 60 minute drive from downtown Vancouver. There are some 35 aircraft in the fleet, and they have a tremendous strike potential.

The commander of this unique fighting force is husky, 50-year-old Leslie G. Kerr — President and General Manager of Conair Aviation Ltd. Every summer he and his men have a war to fight. Their enemy is forest fires.

The basic ingredients in any battle plan, Les Kerr explains, is communication and speed. As an example, he describes a typical operation in the Kamloops district at the height of a bad fire season.

"At the Ministry of Forests tanker base there," he explains, "we'll have five or six aircraft in position. The pilots are in a shack less than 50 feet away. Everything is at the ready. If necessary, the number of aircraft can be doubled in about half an hour."

Fast and dramatic action in a 'red alert' situation is triggered with a 'hot line' telephone call to the tanker base from the forest district's duty protection officer. Pilots hastily don their helmets and run to their tankers; the bird dog officer and his pilot race to their smaller plane. These bird dogs fly over the fire and guide the tankers to their targets.

Every second is precious. While the tankers are being readied for takeoff, ground crew personnel pump fire retardant into the tankers' large holding tanks. At the same time the bird dog officer is advised by radio of the target location. He learns the distance to the fire, size of the blaze, wind conditions in the target area, the speed with which the fire is spreading, and other vital information.

Within several minutes the tankers are up and away. Once in the battle area they will fly 50 feet above the

"I'd fly over the fire and literally dive-bomb the thing. When I was about 150 feet above the tree tops . . . heading almost straight down . . . one hand would pull back on the stick and get the plane heading the right way again – which was up! The other hand would simultaneously tug on a handle which released the water."

tree tops as they make their strikes.

These are dangerous missions. Invariably there is blinding smoke, and extreme rising heat can play havoc with air currents.

"And although it doesn't happen too often," says Kerr, "there are still occasional instances when other aircraft, usually 'goofers', wander into the fire area."

Les Kerr's love for planes developed at an early age. As a youth, his first job was with his father's trucking business in Langley. World War II was underway, and gasoline deliveries took the young man to the Langley airport where the RCAF held pilot training programs.

"I guess that's where my interest in planes and flying got started," Les recalls. "Even after work I'd go there and spend hours talking with the pilots . . . and would-be flyers."

In those days Art Seller was operating a two-man outfit at Langley called Skyway Air Services, handling a flying training school and crop spraying operation. Les took flying lessons from Art in a little Tiger Moth and earned his private licence in 1947.

"I did the flying bit for recreation . . . just a fun thing at the time," he remembers. But the 'fun' aspect later

PHOTO R. WORMALD

gave way to serious interest in the flying business. In 1952, Art Seller encouraged Kerr to get his commercial flying licence. He then got his first taste of aerial spraying, dropping 30 gallon loads to wipe out mosquitoes in the Kitimat region. Later, he went on forest spraying missions in eastern Canada.

"The aerial spraying business was in its infancy in those days," Les says, "and it was a pretty clumsy operation compared to today's sophisticated equipment and systems."

From the 1950s to around 1960 he spent his summers operating out of Creston, handling farm spray operations in the interior. Winters saw him flying light, ski-equipped aircraft in search of lost cattle throughout the southern interior.

The Skyway firm got deeply involved with fighting forest fires in 1958, using converted Boeing Stearman planes (formerly USAF trainers) to dump 120 gallon loads of water on burning timber in the Bear Creek and Harrison Lake areas.

Les Kerr remembers those early fire attacks very vividly. "It was a hair-raising experience . . . a two-handed operation. I'd fly over the fire and literally dive-bomb the thing. When I was about 150 feet above the tree tops . . . heading almost straight down . . . one hand would pull back on the stick to get the plane heading the right way again, which was up! The other hand would simultaneously tug on a handle which released the water."

"In those days we used straight water. Actually it wasn't all that effective . . . a lot of it just evaporated long before it had a chance to hit the fire."

"But it was a start . . . that's how it all began."

As the business of fighting forest fires from the air grew, so did Skyway. In 1965 the firm moved from Langley and established new headquarters at the Abbotsford airport. Three years later Skyway reorganized and Les became part owner and top man in a new company. It was Conair Aviation Ltd. Few people use the full name. To everyone it's just Conair.

And what is the significance of the name? Les Kerr was asked.

"Control by air," Les replied, seemingly surprised that anyone wouldn't know.

Today, Conair operates a fleet of 35 aircraft. They include Douglas DC-6Bs which have an 118-foot wingspread; smaller Douglas A-26s, and about a dozen light planes used for bird dog missions. All together the air tankers can carry some 30,000 gallons of fire retardant.

There are also two Firecats — formerly known as Trackers, and more technically as Grumman S2Fs. They have been used extensively by the Canadian navy since the early 1960s and are regarded as one of the world's toughest and most dependable flying machines.

"To this day," Les observes, "many people still refer to the larger planes as water bombers. That's not really an accurate description. They don't carry just water any more. They load up with a chemical retardant and the main objective is to contain the fire . . . stop it from spreading . . . that's what the chemical mix does. Today those planes are known as air tankers."

The chemical mix is coloured, usually a reddish brown, allowing the pilots and others to know the areas which have already been attacked.

"These air tanker pilots have to be a special breed of firecat," Les continued, "and quite frankly I'm not really interested in any flyer who hasn't at least 3,000 hours of operational flying to his credit."

What about the hazards?

"Of course it's a risky business," he concurs, "but most of our pilots feel a lot safer making a fire fighting run than walking across some of those downtown Vancouver streets at the height of a rush hour."

PHOTO R. WORMALD

More seriously, he admits 1974 was a bad year. Four pilots and one crewman lost their lives in three separate crashes. Les doesn't like to talk about that; all the lost men were close personal friends.

Conair's largest customer by far is the Ministry of Forests. It operates six primary air tanker bases (where aircraft are stationed from May to October) and 15 secondary bases throughout the province. The primary ones are located at Kamloops, Abbotsford, Castlegar, Smithers, Williams Lake, and Prince George.

Forest protection people point out that although the cost of fire fighting seems to be high, actually it's reasonable insurance. One bad forest fire, left unchecked, can quickly destroy many millions of dollars worth of timber and related resource values.

"One last question, Les . . . do any of your staff have 'Prevent Forest Fires' stickers on their cars?"

It was an unexpected inquiry.

"Well . . . I suppose a few of them do . . . I think so."

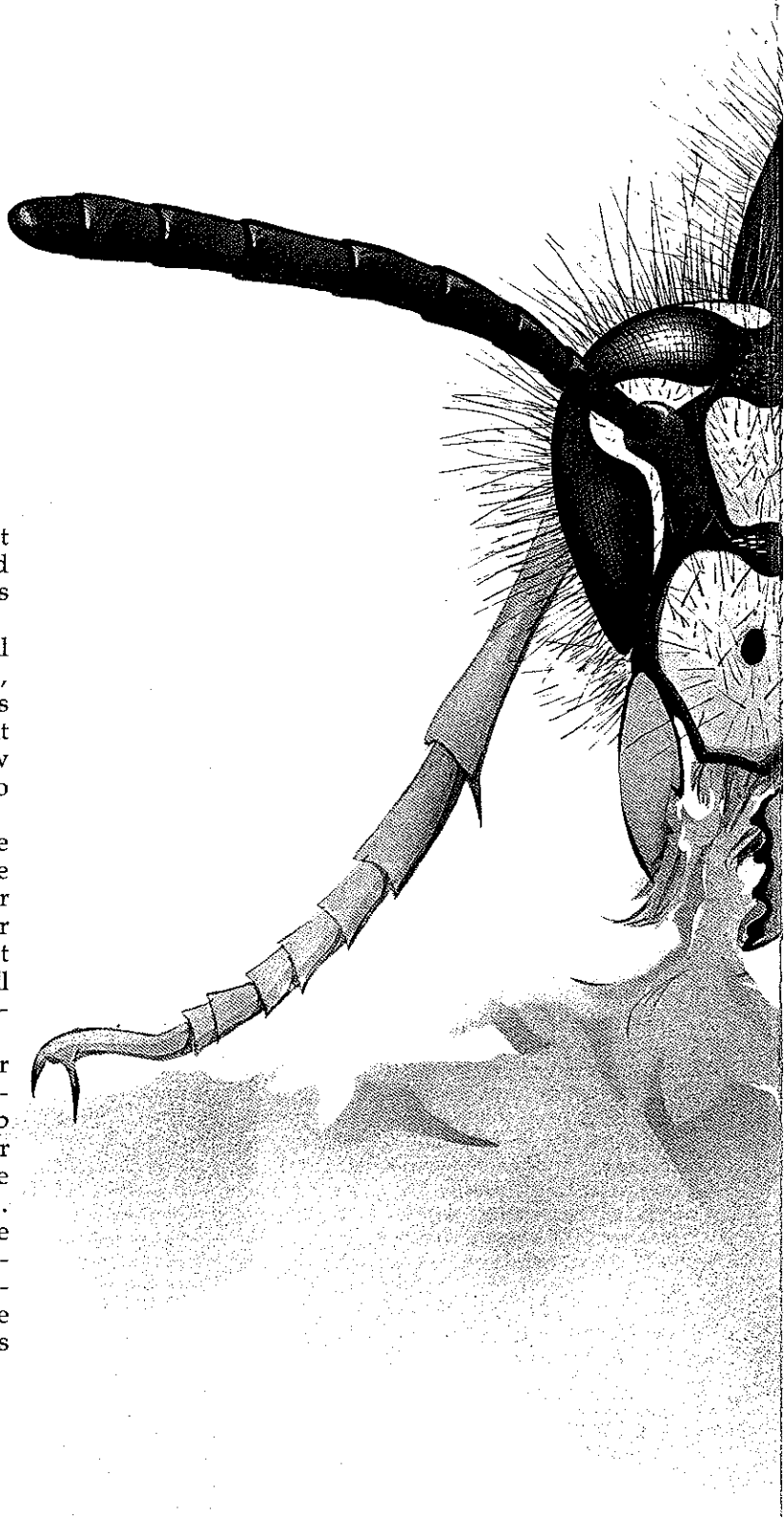
It wasn't a good question to throw at British Columbia's number one forest fire fighter.

During a demonstration flight over Castlegar in late July, Conair's one operational Firecat inexplicably crashed, killing the pilot. It was a tragedy felt deeply by fire-fighters across the province.

Editor

THE ORIGINAL PAPER MAKERS

by **Enid K. Lemon**

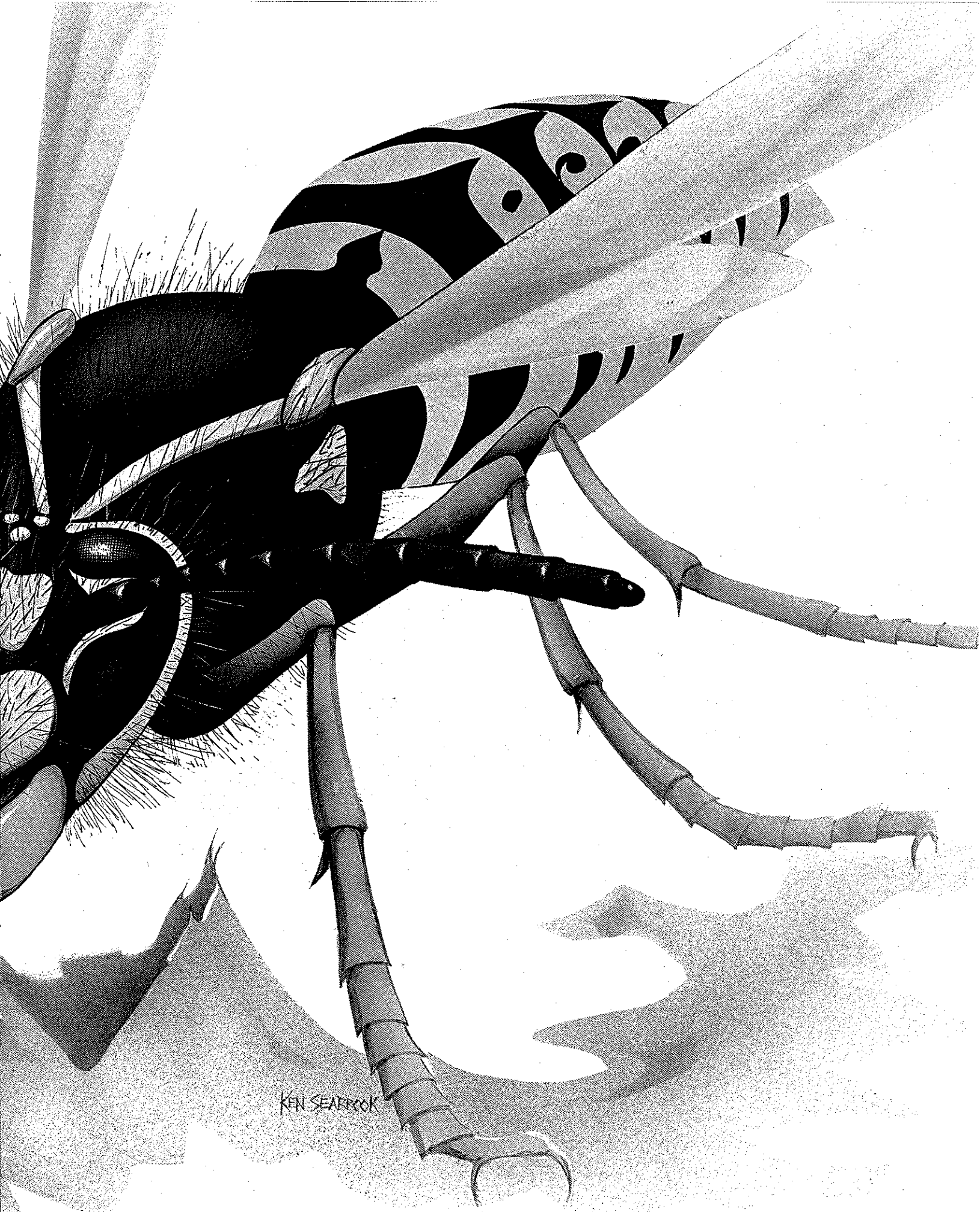


Indispensable as paper is to modern man, it was not invented by him. The wasps hold that patent, and they have been building their paper nests for millions of years.

Along with bees and ants, wasps are classified as social insects under the order *Hymenoptera* (membrane-winged), an order encompassing over 110,000 species. Social insects live in colonies with a well organized division of labour. Ant colonies are permanent installations, while wasps renew their nests each year with only the fertilized queens living to see the spring.

The three species most common to our temperate zone are the *Polistes* wasp, the familiar yellow jacket, and the bald-faced hornet (hornets are merely large wasps). Their numbers vary from small colonies of some 50 individuals for the *Polistes* wasp to 3,000 or more for the bald-faced hornet whose large paper cities look so deceptively fragile. All three species make paper, and they make it very well indeed.

The different wasp species have different styles of paper architecture, but they collect and apply the building materials in much the same way. The process starts with a wasp locating a source of wood fibre. This might be rotting or weathered trees, stumps, fences, or even man-made cardboard cartons (man didn't invent recycling either). Tearing off a piece of fibre with its sharp mandibles, the wasp forms it into a tiny ball, chewing away until the interaction with its saliva brings the fibre to the proper consistency. Back at the nest site the wasp gradually spreads the material over the required area in a tiny sheet. While this hardens the wasp goes to collect another batch.


KEN SEABROOK

The type of paper produced varies from species to species, and from a tough cardboard to thin, translucent skins. Even some of the finest paper can be typed or written upon, and yet is so sturdy it was once used as gun wadding in muzzle-loaders.

Normally the nest's colour is grey, but many nests are also multi-hued. Presumably, this is because of the variety of colours in the wood fibre available, including fibres which had once been painted. Due to these colour variations some nests are so well camouflaged that it is debatable whether these varying shades are accidental.

From the lone queen applying the first daub of paper to the last male perishing in an autumn chill, in one brief summer the wasp nest witnesses the rise and fall of a civilization. The *Polistes* queen, for example, seeks out an overhanging eave on a house or shed in the early spring. She then forms a short vertical stem, or pedicel, and proceeds to build her colony of paper makers from a small horizontal layer of cells.

The prize for architecture in paper, however, must go to the bald-faced hornet. This large, globular nest with its various types of paper, double walls for insulation, and accommodation for thousands is a masterpiece of construction. It begins to take shape once the queen has completed the first cells of the nest and begins laying eggs. As the eggs become larvae, she feeds them with the macerated flesh of insects. The larvae, in turn, become small females who then do most of the construction work. The queen can now retire to become purely an egg-laying machine.

For reasons not fully understood the queen is able to produce offspring of the required sex at the time they are needed. Once the females are hatched and are out working, the drones are born. They also do some work, but not for long. Their major task is to fertilize the new large females who are the last to emerge. The queen then expires, as do most of her progeny. But enough potential queens, wings folded beneath them, will spend the winter in some tiny niche until they can begin the cycle again.

The yellow jacket either builds underground or in an enclosed space such as an attic or a hollow tree. When building underground, the yellow jacket has to be both carpenter and excavator; as the nest expands, the soil must be removed pellet by pellet. These subterranean dwellings literally become a hive of activity in July and August. At this time, it is the busy yellow jacket who makes itself so unwelcome at the picnic table.

Nearly two thousand years ago the Chinese became the first people to make paper. They learned to use bamboo and rags to manufacture what was then a valuable commodity. For centuries before that, the Egyptians had used papyrus to write on, but since the

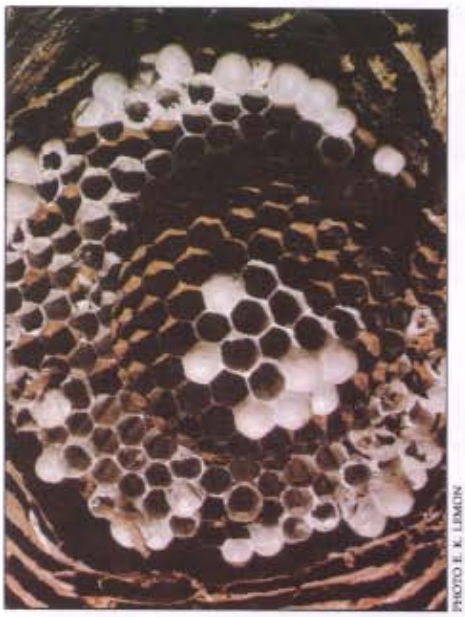


PHOTO E. K. LEMON

PHOTO R. McHAFFIE-GOW

PHOTO R. McHAFFIE-GOW

PHOTO E. K. LEMON

(far left) This cross section of a bald-faced hornet's nest shows the cells closed over with a silk which contains the pupae.

(left) Bald-faced hornets surrounding the entrance to their nest.

(bottom) A bald-faced hornet just emerging from its cell.

(below) A completed nest of bald-faced hornets.

papyrus fibre was not beaten into separate filaments, it can't be classified as true paper.

Today the finest quality, most expensive paper is still made from rags, a product held in high regard for use in water colour painting. But the demise of this specialized industry is almost at hand, much to the dismay of artists the world over. No one any longer seems willing to undergo the arduous, 15-year apprenticeship necessary to mastering the trade.

Ironically, the only remaining source for paper made from rags is France. It was also in France that the idea of making paper from wood pulp originated. An 18th century naturalist by the name of Réaumur, reflecting on the habits of wasps, realized that their nests, made from wood fibre, were really a form of paper. It then took another century before experiments to develop wood grinding machines led to the first full-scale pulp and paper mill in Germany in 1847. The first person in North America to make wood fibre into paper was a Nova Scotian by the name of Charles Fenerty, who, operating independently from the Europeans, began work in 1838 on a process of grinding wood for newsprint.

The demand for plentiful supplies of paper had become acute since the invention of the printing press in the 15th century, but paper didn't become readily available until Réaumur's observations developed into today's modern pulp and paper industry.

Man now uses paper to record his knowledge of paper making for future generations, but wasps store their knowledge through a winter's sleep. When the season changes, and without the aid of blueprints or manuals, the wasps' paper making machinery springs into action. Now, if man could just figure out how they do that . . . .

PHOTO E. K. LEMON

Like so many of nature's creatures, we view wasps as friend or foe, depending on the circumstance. In most instances they make allowances for us, as we should for them. Unlike a bee, a wasp can sting repeatedly, and a weak solution of vinegar or lemon juice is helpful when applied to the affected area. Meat tenderizer dissolved in water or saliva also helps to reduce pain or swelling. Only the females sting, and they do so defensively, but "mad as a hornet" is a phrase not to be taken lightly. We are wise to be wary of wasps, but that should not stop us from watching with enjoyment the world's first paper makers at work.

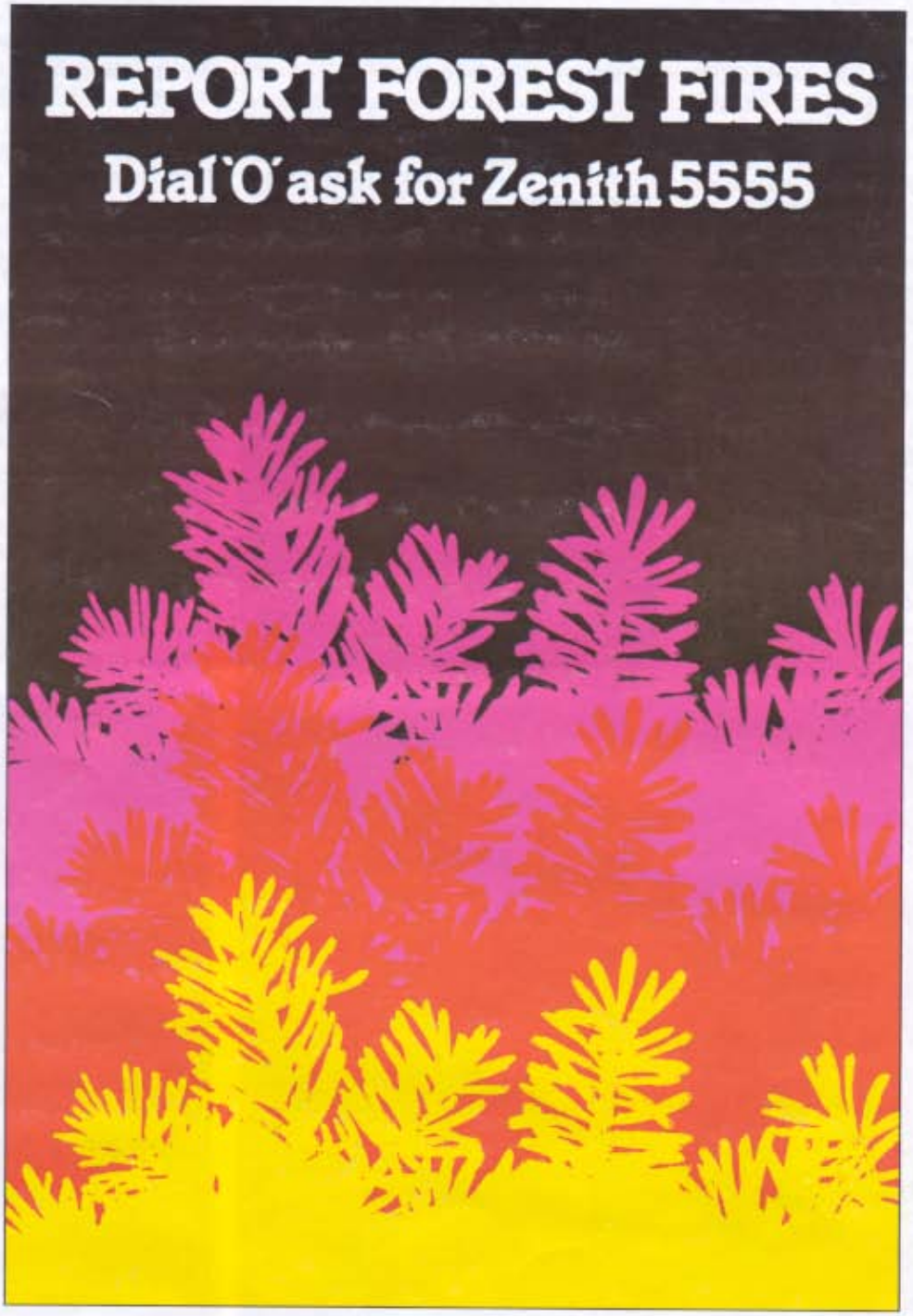
(below) A close-up of paper made by bald-faced hornets.

(right) The inside of this bald-faced hornet's nest was built in a highrise fashion, probably due to the hawthorne branch growing through the middle of it.

(far right) The docile* Polistes *wasp.

PHOTO E. K. LEMON

PHOTO E. K. LEMON



Province of British Columbia
Ministry of Forests
HONOURABLE TOM WATERLAND, MINISTER

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