

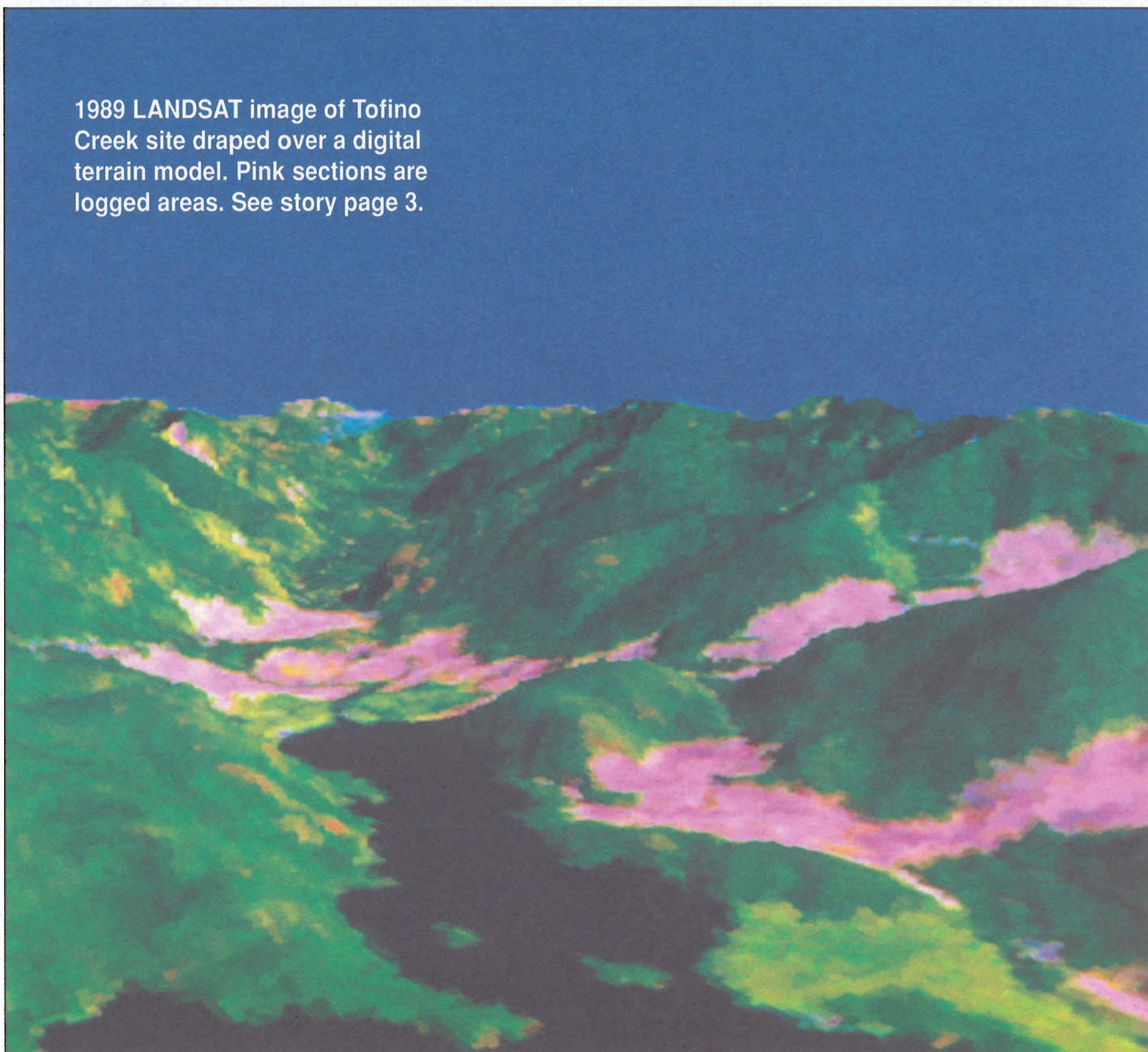


JULY 1993

INFORMATION FORESTRY

Pacific & Yukon Region

1989 LANDSAT image of Tofino Creek site draped over a digital terrain model. Pink sections are logged areas. See story page 3.



The secret life of stumps

Stumps may well act as refuges against environmental disturbances.

Stumps are an integral part of almost any managed forest landscape, but only recently have researchers taken a closer look to see what is going on at a microscopic level as the stump slowly decomposes.

One of those researchers, Dr Heikki Setälä of the University of Jyväskylä in Finland, specializes in soil animals and their function in forest soils. Heikki was visiting his local library in Finland, when he found a brochure describing the work being done at the Pacific Forestry Centre. He contacted Dr. Val Marshall, and was invited to Forestry Canada's Pacific and Yukon Region as a visiting scientist.

The two researchers embarked on a two-year study in conjunction with the Forest Ecosystem Dynamics Program, to sample Douglas-

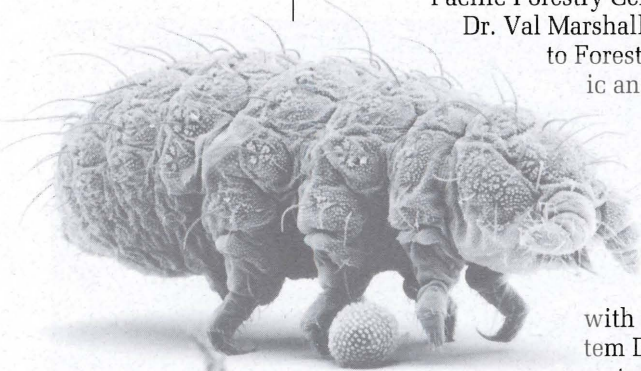
fir stumps in different states of decay. Stumps from several forest stands of different ages on Vancouver Island were sampled periodically during the year. The stumps were sampled by taking cores from the top, middle and base. The three cores were pooled and sorted in the lab, to get numbers and species occurring within each stump.

Decaying stumps were found to harbour a multitude of organisms, including predators, microbial and detrital feeders, and herbivores. The high numbers and species diversity found indicates that stumps provide a better habitat than logs, though the reasons for this are not clear at present. It may be

that stumps weather more quickly, and organisms can gain access through the softened wood at the top of a stump as well as through the roots at the bottom of the stump. A downed log stays protected by its bark for a much longer period. Stumps may well act as refuges against environmental disturbances.

Heikki found that stumps harboured large numbers of soil collembolas or springtails — small wingless, primitive insects which feed on a variety of food items, including microbes and decaying wood. Seventy-two different species have been found in the stump samples and identified to date. Numbers of Collembola and their species richness were considerably reduced in stumps on clearcut areas. This may be due to physical changes caused by cutting — increased light and heat, and decreased moisture. Samples from regenerating stands confirmed that this reduction in numbers of Collembola lasts for several decades. The role played by Collembola in decomposition and nutrient release in decaying wood is unknown at this time.

Future studies will include looking at the biodiversity of other fauna in the stumps. The researchers will also try to relate species presence or absence to particular environmental changes caused by different forest management practices.



A denizen of the stumps, this species of collembola appears enormous beside a grain of pollen but is all but invisible to the human eye.



Heikki Setälä ponders the minute metropolis housed in forest stumps.

Managing forest information — expertly

“Through the satellite technology of the 90s, you could arrange to have a steady flow of data, equivalent to one set of encyclopedia, delivered to your location every 25 seconds.”

It seems the more we know about our forests, the more questions there are. How fast is the forest growing? What are the current timber volumes? What insects or diseases have affected new areas and how fast is the destruction spreading? Are the trees suffering from environmental stresses?

This summer, a major milestone will be reached in an Advanced Forest Technology project at the Pacific Forestry Centre that will bring the solutions to these and other tough environmental forest management systems one step closer to reality.

In April 1991, the **System of Experts for Intelligent Data Management** project (SEIDAM), became one of 22 proposals selected from the 350 submitted to NASA's Applied Information Systems Research Program from around the world. The project, developed through a collaboration of North American and European partners that includes Forestry Canada, is the only non-U.S. led project. Dr. David Goodenough, head of Forestry Canada's Advanced Forest Technology Program, is the project's Chief Investigator.

The goal of SEIDAM is to develop a system that will not only integrate remote sensing data with geographic information systems but also manage the massive amount of information.

As Dr. Goodenough points out, the problem is not availability of information, but the means to manage it. "Through the satellite technology of the 90s, you could arrange to have a steady flow of data, equivalent to one set of encyclopedia, delivered to your location every 25 seconds." But could you imagine an assistant arriving at your door that often, to deposit a new stack of data on your desk? What would you do with it? How would you organize it and where would you start to

look for the answers to your questions?

"That's where the expert systems come into play," says Dr. Goodenough. "They give us an opportunity not only to ask a question but have the system dynamically choose the necessary data to provide an accurate answer."

This is also when the intelligent system must create and adjust plans to integrate and analyze the data to answer the user's question.

All systems go

The human experts are in place, computer resources are coming together and the information from LANDSAT satellites is already flowing. Now, with NASA and CCRS flights planned for July, all eyes will focus on three B.C. locations: the Greater Victoria watershed and Tofino Creek on Vancouver Island, and Parsons, B.C. in the southern interior. Six Canadian and American aircraft, equipped with state-of-the-art radars, will fly at various elevations ranging from the 60,000 foot altitude of a U-2 to the treetop levels of an ultra-light.

For Dr. Goodenough, the timing must be just right. "This is an expensive operation, and the partners need

the best possible images from it," he says. "For example, we don't want the radar flights during or just after a rain storm or the optical flights on a cloudy day." Given the weather on the west coast of Vancouver Island, this in itself can cause a major headache.

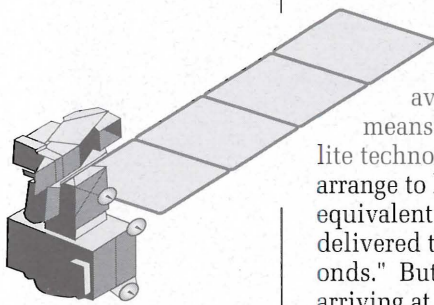
When conditions are ideal, as the aircraft gather the radar data and the satellite images are transmitted, helicopters guided by the satellite based Global Positioning System will move to gather samples from specific points in the three sites.

So what's next? This additional data will likely start a flood of information and the interpretation process will begin. All the while, the clock continues to tick. The project window (and funding) closes March 31, 1995 and the partners will want as much information as possible in their hands by that time. The SEIDAM "air force" will be out to gather the data this summer.

Partners in SEIDAM

The SEIDAM project involves eight partners. Dr. David Goodenough, Head of Forestry Canada's Advanced Forest Technologies Program is the project's Principal Investigator. Co-investigators include:

- Dr. Alan Thomson
Forestry Canada
- Ko Fung, Dr. Karl Staenz
Energy, Mines and Resources'
Canada Centre for Remote Sensing (CCRS), Ottawa
- John Wakelin
B.C. Ministry of Forests
- Roger Balser
B.C. Ministry of Environment, Lands and Parks
- Dr. Kenneth Torlegard, Hans Hauska
Royal Institute of Technology, Sweden
- Dr. Alois Sieber
European Economic Community's
Joint Research Centre, Ispra, Italy
- Dr. Glenn Mucklow
NASA Program Manager,
Washington, D.C.
- Industry, Science and Technology Canada



LANDSAT 6

McGregor Forest joins national network

The Network of Model Forests is also about to go international with the possibility of three model forests in other countries

After 18 months of hard work, on April 2nd the McGregor Model Forest contribution agreement was signed in Prince George, committing the federal government to providing \$5 million over the next 5 years to this ambitious Green Plan project.

This is the first of two model forest projects in B.C. for Bryan Wallis, Model Forest co-ordinator for the Pacific and Yukon Region. With the McGregor signing completed, he is now working to reach agreement on the Long Beach Model Forest. Discussions with the partners and the B.C. Ministry of Forests are continuing in the hopes that the recent land use decision regarding

Clayoquot Sound may pave the way for an agreement.

A recent CORE (Commission on Resources and Environment) report also recommends that the provincial government support the establishment of a federal model forest in Clayoquot Sound.

The Network of Model Forests is also about to go international with the possibility of three model forests in other countries, as promised by the Prime Minister at the recent UNCED conference in Rio. Discussions are underway which may see a model forest created in Russia and another in Mexico. The third location is not known at this time.



Seated: Hon. F. Oberle, former Minister of Forestry. Standing left to right: Bryan Wallis, coordinator, Model Forest Program; Hon. Dan Miller, B.C. Minister of Forests; C.T. Hazelwood, President & C.E.O. Northwood Pulp and Timber; Jim Burbee, President of McGregor Model Forest Association; Dr. T. John Drew, Regional Director General, Pacific and Yukon Region, Forestry Canada.

Literature review addresses B.t.k concerns

Recent public concerns regarding use of *Bacillus thuringiensis* var. *kurstaki* (B.t.k.) to control insect pests have prompted a pair of scientists from Forestry Canada and the B.C. Ministry of Forests to conduct a scientific literature review of the safety of the naturally-occurring soil bacterium.

Forestry Canada's Imre Otvos and the B.C. Ministry of Forests' Sandy Vanderveen have reviewed papers spanning decades concerning various aspects of B.t.k. The researchers have objectively synthesized this information and compiled it into a report titled "Environmental report and current status of *Bacillus thuringiensis* use for control of forest and agricultural insect pests". To learn more about this newly released report, please write Dr. Imre Otvos at Forestry Canada, Pacific and Yukon Region, 506 West Burnside Road, Victoria, B.C., V8Z 1M5.

Fungi fight forest foes

Rising opposition to chemical sprays has created a need for alternative methods of control that the Pacific Forestry Centre's Biocontrol of Forest Weeds Group is trying to fill.



Charles Dorworth examines a young Douglas-fir that has survived competition by alder

On newly reforested lands in British Columbia, tiny trees are easy prey for rambling weeds eager for space and light. Grasses like *Calamagrostis* and hardwood shrubs such as red alder, maple and salal hamper the growth of seedlings and, in some cases, choke them out entirely.

Control of these unwanted plants presents a number of problems. B.C.'s steep terrain effectively prevents large machinery from taming the competitors, while manual pruning is often thwarted by the nature of the plants themselves. Cutting hardwood shrubs, for instance, usually only causes new growth to flourish. To curb these unruly mobs of undesirable plants many foresters rely on chemical herbicides.

However, increased sensitivity to the well-being of the environment is sparking debate over the use of such chemical products. Rising opposition to chemical sprays has created a need for alternative methods of control that the Pacific Forestry Centre's Biocontrol of Forest Weeds Group is trying to fill.

This group of research scientists, led by Dr. Charles Dorworth, is dedicated to finding biological alternatives to chemical herbicides.

The project began in 1986, recalls Dorworth, with nothing more than himself, a desk and a pencil. The PFC biocontrol group is now believed to be the largest group in the world experimenting with microbes specifically for the control of forest weeds. Members of the team are Drs. Ronald E. Wall, Raj Prasad, Simon Shamoun, Ms Donna Macey, visiting Fellow Dr. Richard Winder and technician Ms Elaine Sela.

While studies involving bacteria controls are also underway, the group's research with fungi shows particular promise. Dorworth, Dr. Wall and Dr. Winder have isolated three strains of fungi and proved them useful in suppressing weeds. The scientists are currently readying their finds for patenting and registration.

The fungi were isolated from native strains adapted to each specific weed. The use of native strains has numerous environmental benefits. Unlike other control agents which might endanger other plants surrounding a seedling, the indigenous strains often attack only the chosen weeds. Since the fungi have

evolved with the target system, they are safely absorbed back into the environment when the treatment is complete.

The researchers selected many different strains from within the same species to develop reliably strong fungi. Despite their strength, the native fungi tend to act more slowly than most chemical herbicides, a factor that may also have environmental benefits. To be effective, fungi need not kill the weeds but merely suppress their growth or numbers until the young tree is large enough to win the race for survival. Although curbed by the biocontrol agents, the weeds survive to fulfill their role as members of the ecosystem.

"Weed," after all, is a term arbitrarily designated by humans; one person's weed can be another's rose. The same fireweed that is the bane of foresters because it smothers seedlings in the wintertime is relished by hungry deer and valued by beekeepers as a part of honey production.

Of course, no matter how environmentally sound it might be, a product that is hard to use or expensive is unlikely to become a forester's weed control of choice. The practicality of any new development is therefore a priority of the Biocontrol of Forest Weeds group who, when confronted with implementation problems, have sometimes resorted to very creative solutions.

One such solution the group is now in the process of patenting is an apparatus aptly titled the "PFC-ALDERWAK." This device, resembling a modified sledgehammer, implants a charge of wood mixed with biological agents into red alder stems. Another idea which merits further research is that of placing biocontrol agents in the soil plugs of seedlings to make sure that weed control goes wherever the small trees do.

As for the future of biocontrol, while Dorworth acknowledges that biological agents might possibly replace chemical procedures, he sees the group's work as fitting within a larger whole. According to the research team's philosophy, biocontrol is only one part of vegetation management and should be complementary to other chemical and manual practices. "There are no magic bullets" says Dr. Winder, agreeing that there are no simple solutions to the complex workings of forest ecosystems. However, when balancing the needs of the forest industry and the integrity of the environment, there is little doubt that the Biological Control of Forest Weeds group is part of a solution whose time has come.

Jump-start for Yukon Forestry

The agreement represents a fully cooperative step towards resource renewal, human resource development and sound forestry practices within an ecological framework.

Until now, forestry in the Yukon Territory has been limited to harvesting, fuel-wood production and cone collection. The concepts of sustainable forest development and resource renewal are new to the Yukon. The Canada-Yukon Cooperation Agreement on Forest Development (CAFD - 1991 to 1996) will inject a \$2.7-million boost to stimulate the Yukon and its people to meet their forest management objectives.

This five-year agreement will fund a series of programs designed to foster the sustainable development of the Yukon's forests, from planning to integrated resource management. Forestry Canada is financing 70% of these forestry development projects, while the remaining 30% is provided by the Yukon Government.

Forestry Canada Cooperative Programs Officer, Dean Mills, is excited about the opportunities to jump-start sustainable forestry development in the Yukon.

"The agreement represents a fully cooperative step towards resource renewal, human resource development and sound forestry practices within an ecological framework for the Yukon. Sustainable development of forest resources is in its infancy – the challenges complex, new and broad. Just getting basics started takes a great deal of thought, initiative and energy," comments Mills.

This July, basic reforestation will be at the forefront in Watson Lake as a major project will see the planting of approximately 250,000 seedlings on unproductive, harvested sites. The project has multiple aims. Not only will it see the replanting of not-satisfactorily-restocked land, it will also be important for training local people and a catalyst for devel-

oping local forest management expertise.

The people of the Yukon and their unique relationship with their forests are at the root of this agreement, and any projects it initiates. But one thing is for certain – the results of any



Debra Wortley taking an increment boring of a spruce to determine its growth and age.

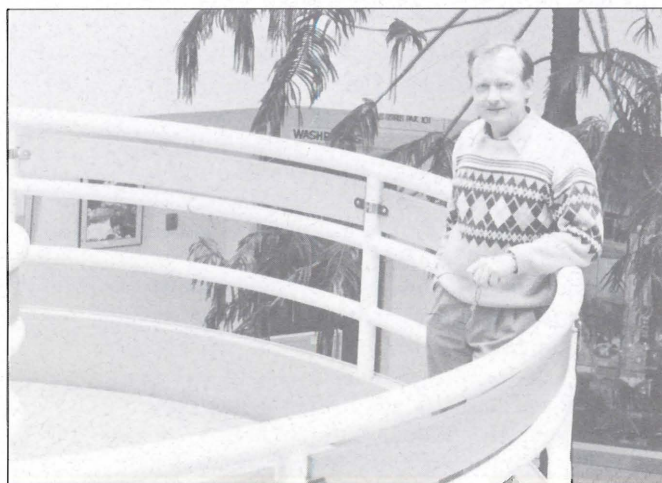
forest resource development and planning will be tailored to the Yukon people and their objectives.

Debra Wortley-Forestry Canada's Yukon Forestry Officer

Debra Wortley, Forestry Canada's first Forestry Officer for the Yukon and long-time Yukon resident, is also excited about the opportunities the new Canada/Yukon Forest Agreement will bring to the territory. Deb is particularly enthusiastic about the reforestation project set to begin in Watson Lake this month. "This is the first large-scale planting ever done in the Yukon," says Deb. "Our goal is to plant close to 900 000 trees from Watson Lake, along the Alcan Highway to Beaver Creek, virtually the entire width of the territory, within three years."

Deb, who holds a Bachelor of Science degree in Forestry from the University of Alberta, is looking forward to meeting and working with the various proponents of the Agreement. Deb can be contacted at Suite 1A, 300 Main Street, Whitehorse, Yukon, Y1A 2B5 or call her at 403-668-4467.

Dean Mills



Just the facts...

One call for the Compendium of Forestry Statistics can do it all.

How many calls have you had to make just to get what you hoped was accurate, concise and timely data on Canada's forests? Too many? Now it is getting easier with a new project initiated by the Council of Canadian Forest Ministers (C.C.F.M.)

The National Forestry Database Program is meeting the need for up-to-date statistics on forests and forestry in Canada. The first Forest Accord and the National Forest Strategy set this as a priority.

The database is designed to make information on the state of

forests in different parts of Canada more consistent. While it has started with data on commercial forestry, future reports will see the database broadened to include the measurement of non-timber values such as recreation and wildlife.

Finally, facts and figures on many things from annual cuts and fires to insects and forest products are now available to the serious forest watcher.

For copies of the Compendium of Canadian Forestry Statistics contact Forestry Canada, 351 St. Joseph Blvd., Hull, Quebec, K1A 1G5

Paprican and Federal Government sign MOU

Phase II of a Memorandum of Understanding between the Pulp and Paper Research Institute of Canada (PAPRICAN) and the federal government, represented by Industry, Science and Technology and Forestry Canada, will enable PAPRICAN to undertake an expanded program of R&D aimed at finding technological solutions to priority environmental challenges.

The three-year, \$8 million expansion of the agreement builds upon the first successful phase which supported some 25 environmental R&D projects, resulting in

several major technological breakthroughs. The agreement is also expected to lever an additional \$14 million in investments from PAPRICAN's 43 member companies and other interested supplier firms and organizations.

The Phase II research program will focus on such areas as: non-chlorine bleaching processes, closed cycle paper mill operation, investigation of the chronic effects from effluents and emission, mill effluent reduction and treatment, paper recycling, de-inking and sludge disposal.

Information Survey

Thanks to our readers for your overwhelming response to our recent mailing list update and interest survey. Your response far exceeded our expectations. According to your comments, Information Forestry is successfully fulfilling its purpose in providing information to our clients on the wide variety of activities conducted by Forestry Canada in the Pacific and Yukon region. We received many helpful suggestions regarding particular topics you would like to read about in this publication which we will endeavour to include in upcoming issues. The November issue will feature a summary of your responses.

Recent Publications

The State of Canada's Forests

The third annual report to parliament on the State of Canada's Forests highlights the achievements, challenges and changes experienced in the forest community in 1992 and contains recent forest statistics.

Forestry Canada Pacific and Yukon Region Annual Review 1992-1993

A summary of the objectives, goals and progress of Forestry Canada's Pacific and Yukon Region for the year in review.

Reports and Publications-Forestry Canada Pacific and Yukon Region 1992.

A listing of the reports and publications authored by staff of Forestry Canada's Pacific and Yukon Region during 1992. BC-X-341



Forests touch the lives of all Canadians

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1992 LANDSAT satellite image of Greater Victoria Watershed and surrounding region. Pink sections are logged areas. See story page 3.

