the long term and by-and-large the more important still to be resolved are some of the more philosophical ones. Fittingly enough as a conclusion to this paper they involve what we believe to be misconceptions.

Before it can be managed it is necessary to recognize just what the budworm problem really is. The conventional impression is that it is basically a problem of dealing with a forest insect threatening a forest resource. The first corollary to that is that its solution is a matter of controlling the insect. The second is that it is primarily a job for entomologists. We disagree and will argue that the best and most logical management strategy cannot be devised on that philosophical approach. We believe it to be a mind-set that has historically misdirected responsibility and accountability for the problem's management, certainly in New Brunswick.

Our postulate is that the essence of the problem is how to maintain a healthy, productive forest in the face of an insect pest threat. The bottom line to budworm spraying is the control of insect damage, not of insects, of maintaining a healthy forest, not of destroying a pest.

Historically, the emphasis has tended to go in the reverse direction: that the pre-occupation should first be with controlling the insect and that tree protection would follow in a logical sequence of events. By and large entomologists have tended to accept this reasoning and the challenge it represented. By and large silviculturists and other management-oriented foresters have been overly content with this rationalization and the notion of a disciplinary mystique about the budworm that would best be left with entomologists. The result has produced a large imbalance of knowledge and competence among the broad disciplinary areas that must become involved in protection by spraying. While the entomology of the budworm is far from completely understood probably more is known about it than any other forest pest. Acceptable methodologies for studying its population dynamics and predicting next year's infestation levels have been in place for many years. Although presently somewhat in limbo a good start has been made in recent years at predictive modelling of longer-term New Brunswick budworm/forest/applied protection interactions. Sprayers have historically demonstrated a capability to produce a reasonably effective result at an acceptable cost albeit without understanding quite why and how to achieve greater efficiency, efficacy and environmental safety. Somewhat neglected in the past, R&D in spray technology emission behavior and drift modelling is now receiving greater impetus through such thrusts as the New Brunswick Spray Efficacy Research Group (NBSERG) designed to coordinate the input of the requisite physical sciences — engineering, physics, chemistry, meteorology etc. with the work of the biological scientists. Recent activity in this area in particular is teaching the clear lesson that the development of ultimately effective budworm management hangs heavily upon multi-

faceted inter-disciplinary R&D in which attention from the physical sciences can sometimes become as much or more in demand as that from the biological side.

But the area in which budworm spraying decisions still rely most heavily upon intuition and empiricism is in diagnosing the health of the patient itself and evaluating the point at which treatment need to be applied be it to prevent death or preserve growth capacity. This despite the fact that the empirical models used for a quarter of a century to estimate composite hazard, i.e. infestation combined with tree conditions, recognize the latter as substantially the more vital parameters. Less well organized at this point, R&D thrusts in this area likewise require clearly focussed interdisciplinary attention, but here predominantly from the biological sciences: mensurationists working with tree physiologists, soil and site specialists, forest meteorologists etc. Recent analyses of the New Brunswick situation reveal the urgency of better progress in this area; three decades of persistent budworm pressure on the forest, erratic protection standards, strategies and budgets, combined with extensive, largely salvage-oriented harvest management have produced a budworm-management puzzle far more complex than it was in 1952.

If the thrust of this paper has left an impression that forest sprayers in New Brunswick like the insecticide approach any more than most, that too would be a misconception. As the world has unfolded, a career in it can be a singularly unrewarding, distrusted occupation. We, at least, have confidence that, on the balance, the New Brunswick spray program has accomplished results that are substantially more in the public interest than against it and deserves reasonable public and intellectual support because of this. By the same token, no spray-involved person of our acquaintance considers conventional budworm spraying alone to be anything like a satisfactory and ultimately tolerable way of managing the problem. It is simply too blunt-edged and environmentally insensitive. Except for the term itself, Integrated Pest Management is anything but a new concept in North American forestry and does not strike us as offering much enlightenment to those, e.g., who have been wrestling hand to hand and intellectually with the New Brunswick budworm dilemma for these 30-odd years. But if dusting it off will help keep others less close to the subject aware that there should be more enlightened approaches and that these should be kept in the investigative shopping basket, we are all for it.

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W.G. #7. Silviculture and Forest Tree Management

Reforestation and Stand-tending Summary — Prairie Provinces 1980/81

Site preparation was carried out on 29 068 ha of cutover — 552 ha treated chemically, 217 burned, 28 299 mechanically. Equipment used include Bracke cultivator, the Leno, C&H plow, chain drags and barrels.

Bare-root stock was planted on 6 157 ha and container stock on 12 556 ha. Direct seeding was used only on 6 635 ha in Alberta.

Regeneration surveys were run on 65 810 ha. Data show that 74% of the area surveyed in Alberta and Saskatchewan was adequately stocked.

110 000 ha were reconnoitred in Alberta under the "Maintain our Forests" program to locate treatable areas of brush. 6 720 ha of brush were cleared for afforestation. 14 330 hectolitres of cones were collected, most (83%) in Alberta.

Logging was carried out over 22 000 ha in Alberta, 23 009 in Saskatchewan and some 25 000 in Manitoba.

Only 887 ha were thinned and no fertilizing or draining was carried out.

These data are summarized in the accompanying table.

Dr. A.K. Kellum, University of Alberta, Alberta Energy and Natural Resources, Saskatchewan Dept. of Tourism and Renewable Resources and Manitoba Dept. of Natural Resources.

Reports are invited from Ontario, Quebec, Maritimes and Newfoundland.

R.M. Strang

Reforestation and Stand Tending Summary Prairies Region of Canada — 1980/81

Reforestation	Alberta		Saskatchewan (ha)		Manitoba	
	Industry	Government			Government (ha)	Industry (ha)
		Licences & Backlog (ha)	Maintain Our Forests (ha)			
Scarification					2 992	(dragged)
— mechanical	6 484	6 102	3 001	7 018	2 702	—
— chemical	—	52	—	—	—	500
— burning	—	217	—	—	—	—
Seeding (direct)	1 948	4 687	50	—	—	
Planting						
— bare root no.	30 250	769 200	3 400	9 424 090	1 108 300	—
— area.	23	501	2	5 005	(626)	—
— containers no.	6 773 830	3 753 887	3 656 553	1 245 261	250 000	900 000
— area.	5 695	3 032	2 302	786	(141)	(600)
Regen. surveys						
— reconnaissance	—	—	110 327	—	—	—
— intensive (SR)	17 238	8 322	18 162	3 072	—	—
— intensive (NSR)	6 084	1 614	—	2 168	9 150	—
Cone collection (hL)	4 899	6 945	9	1 750	724	—
Stand tending: (ha)						
Thinning	216	—	63	—	608	—
Fertilizing	—	—	—	—	—	—
Drainage	—	—	—	—	—	—
Cutover (ha)	11 747	10 589	6 720*	23 009	?	25 000 ?

* land clearing for reforestation

Change of Address

Date _____ Section _____

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Surname first — no titles

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