

Pressurized Timber: The Policy and Political Economy of Stress as an Occupational Health and Safety Issue for Woodworkers in the Boreal Forest.¹

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Abstract:

Throughout northern forests of the industrialized world, woodworkers experience their daily working lives as a continual negotiation with multiple hazards to their health and safety. The physical dangers of felling timber rapidly in a rugged, remote, and kaleidoscopic environment through the use of complex and heavy machinery are multiple. In some general ways, these dangers are self-evident to both the workers and the academic community, even as they are in rapid transformation because of technological and other change. But these physical dangers, often portrayed as irreducible, must be analyzed in relationship to the peculiar pressures placed upon these workers by the changing political-economic realities of their industry, and by the shifting institutional configurations affecting forestry in the political jurisdictions in which they work. Expressed as work-place stress, these additional pressures condition the physical dangers of woods work in ways that suggest both ergonomic and policy interventions. This paper reviews and analyzes the English- and French-language literature on these occupational health and safety policy issues from a political economy perspective, making specific reference to boreal and cool-temperate woods operations in advanced industrialized societies. Centred on these dangers as policy problems – indeed, as political problems -- the paper emphasizes the varieties of institutional form that condition both the problems and the solutions in occupational health and safety for the industry. It marks an extension of the existing forest industry research interests of the author through the specific focus on issues of occupational health and safety.

Introduction

Threats to occupational health and safety have always been recognizable, even exceptional features of timber felling and extraction, both in Canada and abroad. Even today, throughout northern forests of the industrialized world, woodworkers experience their daily working lives as a continual negotiation of threats to their health and safety. The dangers are multiple. To some degree, they are inherent to the task: cutting down and extracting heavy timber from a rugged, remote, and kaleidoscopic environment, by means of powerful machinery.² But as this paper will show, the forces conditioning that task in different contexts also ensure a decisive degree of variability. This background paper is an entrée into the practical, conceptual, and methodological problems associated with studying health and safety issues in an extremely small workforce operating in a unique sectoral context. Discoveries about health and safety problems and prevention in the woods may be more commonly made in the larger, institutionally more developed forest jurisdictions, but successful translation and transmission of that knowledge demands a detailed comparative awareness of the specific contexts and character of the work.

With this in mind, this paper reviews and analyzes some of the literature on occupational health and safety issues in woods work. It does so from a political economy perspective, making specific reference to boreal woods operations in advanced industrialized

² Esther Cloutier, "Analyse Comparative Des Accidents Forestiers Survenus Au Québec Et En Suède," (Montréal: Institut de recherche en santé et en sécurité du travail du Québec (IRSST), 1988). Jean-Bernard Carrière and Jacqueline Dionne-Proulx, "Strategic Management of New Technologies and Prevention of Industrial Accidents: Theoretical Framework and Empirical Analyses," *Human Factors and Ergonomics in Manufacturing* 8, no. 1 (1998).. To these workers may be added the growing cohort of silvicultural workers, who run significant risks that resemble the risks that harvesters incur in many respects.

societies. It seeks to work at the point of intersection between the “bottom-up” approach of the work-process political-economy pioneered by such figures as Michael Braverman in the 1970s,³ and in its attention to the “institutional forms” shaping the industry, the “top-down” approach favoured by many policy-makers and intellectually by the work of the Paris régulation school.⁴

The high per capita costs of compensating injured and disabled workers in forest harvesting and secondary processing have been targeted by a more pro-active, preventative policy trend in workers compensation boards in both BC and earlier, in Québec. This policy trend has been driven in part by a neo-liberal trend towards the containment and reduction of public-sector costs, and towards the early re-insertion of injured workers into the labour market,⁵ but also by the perception that injury and disease prevention and genuine restoration to working life constituted genuine gains for the workers affected.

In the paper, the relatively small industry of Newfoundland and Labrador will be given particular emphasis. While this choice may seem odd in the wider Canadian context, it informs a wider CIHR-funded research pilot project that focuses on OHS issues in woods

³ Harry Braverman, "Scientific Management," in *Labour and Monopoly Capitalism: The Degradation of Work in the Twentieth Century* (New York: Monthly Review, 1974).

⁴ Michel Aglietta, *A Theory of Capitalist Regulation: The Us Experience* (London: New Left Books, 1979).; Robert Boyer, *The Regulation School: A Critical Introduction*, trans. Craig Charney (New York: Columbia University Press, 1990).; Joachim Hirsch, "Fordism and Post-Fordism: The Present Social Crisis and Its Consequences," in *Post-Fordism and Social Form: A Marxist Debate on the Post-Fordist State*, ed. Werner Bonefeld and John Holloway (Houndmills: Macmillan Academic and Professional Ltd., 1991).; Alain Lipietz, "From Althusserianism to 'Regulation Theory'," in *The Althusserian Legacy*, ed. A. Kaplan and M. Sprinker (London: Verso, 1993).; International Labour Organization, "Ilo Code of Practice: Safety and Health in Forest Work," (Geneva: ILO, 1998).

⁵ R. Bronsard, "Vers Un Nouvel État-Providence: L'expérience De La Commission De La Santé Et De La Sécurité Du Travail Du Québec," *Canadian Public Administration/Administration publique du Canada* 41, no. 1 (1998).

work there.⁶ Second, because the province of Newfoundland and Labrador exhibits a unique sociological and institutional context for these issues in the industry, it should expose more generally some of the benefits and limits to knowledge transferability with respect to occupational health and safety studies conducted in larger jurisdictions, such as in this case the path-breaking work of Québec's Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST).

In the competitive, increasingly mechanized harvesting process, this paper suggests that workplace stress may be an increasingly useful focus for OHS research in the sector, and needs to be more thoroughly integrated into policy treatments of the sector. Potentially, the contribution of workplace stress to increased levels of industrial injury and disease links 1) the political-economic, institutionalized characteristics of an extractive industry, to 2) the concrete operations of the workplace on worker health and safety. Because this political-economic backdrop is highly variable, workplace stress has both qualitative and quantifiable aspects that have a bearing on health. The distinct social and institutional driving factors for workplace stresses need to be identified, in order to both explain and address the sector's evolving health and safety agenda in a practical way. Existing data banks tend to stress acute injuries for the purposes of compensation, and will increasingly have to be both sensitive to these new realities, and decentred (though not side-lined) as an adequate source of information about health and safety issues in this sector.

⁶ This Forestry Pilot Project is part of the larger SafetyNet study of health and safety issues in resource industries in Newfoundland and Labrador, and includes an ICE grant as part of the Eastern Canada Consortium on Workplace Health and Safety to increase expertise in these areas within the province. The author thanks Drs. Barbara Neis of SafetyNet and Stephen Bornstein of the Centre for Applied Health Research at Memorial University, as well as Dr. Jeremy Rickards (UNB-Fredericton) and the other members of the pilot project.

Finally, the dangers of bush-work, including those of workplace stress, are often portrayed as apolitical problems. This paper comes out of an emerging interdisciplinary context that recognizes the technical complexity of these dangers. But it defends the place of political-scientific and policy research in the mix: treatments of such problems that factor out the causal role of power, governance mechanisms, and policy are liable to sub-optimal results.

The paper begins, then, with a discussion of the variability of the elements of the harvesting work process, and accordingly the variability in the sources of workplace health and safety problems. A preliminary point to consider is how variability in these elements corresponds to conventional units of analysis in use in comparative research.

Variation and change in the hazards of woodwork

If danger is an inherent aspect of woodwork in general, more specific dangers may readily be linked to more specific work contexts in the woods. To describe such dangers and to seek explanations for them are already first steps towards diagnosis and prevention, though these steps are not in themselves sufficient. Variations and changes in the hazards of woodwork in the institutional inheritance and “policy style”⁷ may correspond (in space) to clearly bounded, non-overlapping regions, such as the political jurisdictions of states, or (in time) to sharply distinguishable eras, such as those corresponding to the terms of successive sitting governments or the launch of major policy cycles within a sector. Environmentalist critics of the industry have heightened

⁷ Michael Howlett and M. Ramesh, *Studying Public Policy: Policy Cycles and Policy Subsystems*, 2nd ed. (Toronto: Oxford University Press, 2003).

attention within the sector to the desirability of a bio-regional approach, that is, a greater correspondence between the spaces of governance mechanisms and major ecological regions.⁸

However, the relevant variations and changes are not necessarily tidy ones. Ever since Harold Innis, scholars associated with the debate about staples, communications, and empire have stressed the boundary-crossing spaces associated with the export supply-chain, societal networks, and more recently, globalized production systems.⁹ New thinking about ecological dynamics in space also forces one to be attentive to boundary-crossing dynamics.

Hence, for example, a change in firm ownership can mean the gain or loss of work to another supply region: a change in jurisdiction for the firm. Resource-dependent communities in high-unemployment areas are especially vulnerable to such a straightforward spatial shift. But a change in ownership can also mean the re-orientation of an existing processing plant and its ancillary woodworkers into a new boundary-trespassing market network, all without relocation between jurisdictions. Woodwork

⁸ Herb Hammond, "Community Forest Boards: Gaining Control of Our Forests," in *Putting Power in Its Place: Create Community Control*, ed. Christopher Plant and Judith Plant (Philadelphia, PA-Gabriola Island, BC: New Society Publishers, 1992), Michael M'Gonigle and Ben Parfitt, *Forestopia: A Practical Guide to the New Forest Economy* (Madeira Park: Harbour Publishing, 1994).

⁹ Erika N. Sasser, "Gaining Leverage: Ngo Influence on Certification Institutions in the Forest Products Sector" (paper presented at the Global Initiatives and Public Policies: First International Conference on Private Forestry in the 21st Century, Atlanta, GA, March 25- 27, 2001 2001). A.R.M. Lower, *The North American Assault on the Canadian Forest: A History of the Lumber Trade between Canada and the United States*, ed. H.A. Innis (Toronto: Ryerson Press, 1938).

can be radically altered to conform with a new corporate strategy that conforms to the new market space.¹⁰

With respect to variability over periods of time, woodwork has survived, for instance in the twentieth century, virtually unchanged through some periods during which technology and work process were changing much more radically in secondary manufacturing of wood and pulp and paper products.¹¹ At other times, it seems possible to show that broader transformations in the field of work in general have been played out rather clearly in the sector.¹² As scholars as diverse as the Annales School and Michel Foucault have suggested, one must therefore attend to the subtle and uneven continuities and ruptures of more specific genealogies of power over time.¹³ Both these complexities and the complexities of variation in space may not have been fully explored and synthesized in the literature to date. But the potential for this degree of complexity to be analytically relevant should be in our minds when seeking points of departure from the basis of that literature.

¹⁰ Glen Norcliffe and Judy Bates, "Implementing Lean Production in an Old Industrial Space: Restructuring at Corner Brook, Newfoundland, 1984-1994," *Canadian Geographer* 41, no. 1 (1997).. On the varying spatial implications of "market", see Robert Boyer, "State and Market: A New Engagement for the Twenty-First Century?," in *States against Markets: The Limits of Globalization*, ed. Robert Boyer and Daniel Drache (London: Routledge, 1996).

¹¹ Ian Radforth, *Bushworkers and Bosses: Logging in Northern Ontario, 1900-1980* (Toronto: University of Toronto Press, 1987).

¹² See, for instance, the recent work on flexible accumulation tendencies in the forest industry Roger Hayter, *Flexible Crossroads: The Restructuring of British Columbia's Forest Economy* (Vancouver: University of British Columbia, 2000), Norcliffe and Bates, "Implementing Lean Production."

¹³ Fernand Braudel, *On History*, trans. Sarah Matthews (Chicago: University of Chicago Press, 1980), Michel Foucault, *Power/Knowledge: Selected Interviews and Other Writings, 1972-1977*, ed. Colin Gordon, trans. Colin Gordon, et al. (1980).

Ecological variation in woodwork hazards

A first explanatory venture for any observable differences in workplace health and safety would point to ecological differences in forest workplaces. Broadly speaking, these differences alter primarily the “object of production” in harvesting operations, and also the broader conditions under which production is undertaken.¹⁴ With respect to health and safety, some specific dangers such as the frequency of crushing injuries turn on the purely physical forces involved in felling trees of certain average size in certain landscapes. Thus, for example, workers in the temperate rainforests of coastal British Columbia (BC) face dangers that are unique in kind and in frequency, in the first place because of the mountainous terrain and the physical scale of the trees they fell.¹⁵

Workers in all parts of the vast boreal forest, which covers most of Canadian Shield, face a distinct range of dangers, not merely fewer dangers, in part because of the direct and indirect impacts of ecological differences.¹⁶ For instance, workers in the boreal do little helicopter-based or cable-facilitated (“yarding”) extraction. Part of the reason seems to be that few boreal forestlands are as rugged as those of the BC coast while also offering the large tree sizes that would make the investment viable. On the other hand, relatively

¹⁴ I am drawing here on language drawn from the concept of abstract labour in the tradition of critical political economy Karl Marx, *Capital: A Critique of Political Economy*, trans. Edward Aveling Samuel Moore, vol. 1 (Moscow: Progress Publishers, [1912, 1978] 1986).. In the 1990s, Ted Benton offered a controversial modification of the concept to account for distinctive features of extractive and “eco-regulatory” (cultivation) labour Ted Benton, “Marxism and Natural Limits: An Ecological Critique and Reconstruction,” in *The Greening of Marxism*, ed. Ted Benton (New York: Guilford Press, 1996)..

¹⁵ Echoing Radforth’s arguments respecting northern Ontario (see Radforth, *Bushworkers and Bosses: Logging in Northern Ontario, 1900-1980.*), Rajala has argued that the emergence of these capital-intensive technologies in BC cannot be fully explained physically and ecologically, but must also be related to the power relations of the workplace. Richard A. Rajala, *Clearcutting the Pacific Rainforest: Production, Science, and Regulation* (Vancouver: University of British Columbia Press, 1998). This is not an either-or proposition.

¹⁶ Cloutier, “Analyse Comparative Québec/Suède.” The history of BC coastal exceptionalism in working conditions dates at least to the early twentieth century Dufferin Sutherland, “the Men Went to Work by the Stars and Returned by Them’: The Experience of Work in the Newfoundland Woods During the 1930s,” *Newfoundland Studies* 7, no. 2 (1991): passim..

rugged conditions even in the boreal tend to impede integrated mechanization of the actual cutting process, and coastal BC has remained exceptionally dependent for virtually all of its cutting operations on the decisively more dangerous manual felling.¹⁷ On average, most of the boreal also consists of smaller trees than found in the coastal BC rain forests, and this alters the physical context of harvesting work.

Technological Change and Variation in Boreal Logging

Technological change is a second factor that has altered both the frequency and kind of occupational health and safety risks in the industry; considerable variation is evident across jurisdictions straddled by the boreal forest. In broad terms, these are the means (and methods) of production. In the boreal, there have been more recent, rapid, and interlocking changes and variations in extractive technologies and work-processes.¹⁸

These may be summarized as follows 1) variability in mechanization and capital-intensity; 2) variability in logging system (the sequencing and linkage of the basic stages of logging and extraction); 3) variability in the cutting prescription (the percentage and pattern of trees extracted from a given parcel of land).

First, greater mechanization of cutting has meant exponential improvements in overall safety rates, at least as recognized by health and safety compensation regimes.¹⁹

Twentieth century manual harvesting has relied primarily on individual workers on foot,

¹⁷ Radforth, *Bushworkers and Bosses: Logging in Northern Ontario, 1900-1980.*; Eric M. Young, "The Implications of Mechanical Harvesting in Newfoundland," *FEIS Information Report 22* (1998): 1.

¹⁸ Radforth, *Bushworkers and Bosses: Logging in Northern Ontario, 1900-1980.*; Roger Hayter, *Technology and the Canadian Forest-Product Industries*, vol. 54, *Background Study* (Ottawa: Science Council of Canada, 1987).; Ontario. Industry Trade and Technology, "An Ontario Survey: Forest Industry Automation," (Toronto: Queen's Printer, 1985).

¹⁹ But note the problems of underreporting lesser or chronic injuries. Harry S. Shannon and Graham S. Lowe, "How Many Injured Workers Do Not File Claims for Workers' Compensation Benefits?," *American Journal of Industrial Medicine* 42 (2002).

using chainsaws for felling and often also delimiting; skidder or more recently forwarding machines transport the wood out of the forest. Mechanized harvesting relies on complex heavy machinery, and generally integrates some or all of the felling, initial delimiting, and transportation processes.

Mechanization has become widespread at different times in different jurisdictions. While clearly the dominant technological paradigm elsewhere since the 1960s and 1970s, mechanization make up something less than half of the cut in Newfoundland and Labrador and is primarily a phenomenon of the 1990s.²⁰ In general, mechanization has sharply reduced the workforce directly deployed in harvesting (replacement ratios used in Newfoundland and Labrador calculations are commonly 1:7 to 1:12)²¹ The remaining core workers are in much more protected work environments, the cabins of heavy machinery. A new contingent of mechanics, maintenance personnel, and truckers also become necessary; those new positions put workers at risk for new types of injury and occupational disease, such as injuries incurred when entering and exiting the machines, as well as during repair and maintenance. In Québec, only 12% of work-place injuries in the late 1990s were specific to mechanized harvesting, which generated about 79-82% of the total harvest. (For manual felling, the percentage of attributable workplace injuries was 47%.)²² In Newfoundland and Labrador, mechanical harvesting reportedly contributed 43% to total production in 1998. Only 2 of the 23 lost-time injuries on CBPP

²⁰ Young, "Implications of Mechanical Harvesting," 4.

²¹ The later is of importance to understanding the mixed feelings about mechanization that commonly prevail amongst workers in the sector. But it is also important, especially in single-industry regions, because of the severe offsetting health consequences of unemployment for workers.

²² François Hébert et al., "Les Accidents De Travail En Forêt: Analyse De Scénarios D'accidents Survenus Entre Le 1er Juin 1997 Et Le 31 Mai 1998," (Montréal: Institut de recherche en santé et en sécurité du travail du Québec (IRSST), 2000), 14, 19.

lands in 1997 could be traced to mechanical cutting; 12 could be traced to conventional cutting, and 8 to silviculture.²³

Given these changes, it is unsurprising that mechanized harvesting problems are substantially different *types* of danger:

[H]arvester operators are not free from injury in that eye strain, muscle and joint fatigue as well as other ailments have been experienced in those working long shifts. These problems are compounded during the night.²⁴

To anticipate somewhat, intensified competitive pressures commonly play an aggravating role, in part because capital-intensification has combined with outsourcing of harvesting work to create a severe debt regime for many in this business.

The term “mechanization” is rather broad. In previous generations, the same term could be applied to the vast job-shedding trend arising from the introduction of chainsaws and the displacement of horse-drawn transportation.²⁵ A second variation in the work process depends on the portion of the tree that is normally transported from the stump. In principle, any logging system is compatible with manual or mechanized felling, but a development in one may be clearly characterized by a parallel trend in the other. In Newfoundland and Labrador, for example, recent mechanization trends have seen

²³ These figures include silviculture, and conventional-cut injuries. Trucking injuries in the subsector saw no injuries on CBPP lands Young, "Implications of Mechanical Harvesting," 7.. In previous years in this short series, conventional-cut injuries totalled as much as 30 of 34 injuries in total (1995), which clearly attests to the secular decline in the importance of conventional cut over the decade, as much as to any improvement in conventional-cut safety practices.

²⁴ Ibid.

²⁵ Radforth, *Bushworkers and Bosses: Logging in Northern Ontario, 1900-1980*. During the post-war period, a rapid decline occurred from the roughly 9000 Newfoundlanders employed in logging operations in 1945. Since 1990, there have only been between 1000 and 2000 workers in the logging and forestry services of Newfoundland and Labrador. Elizabeth May, *At the Cutting Edge: The Crisis in Canada's Forests* (Toronto: Key Porter, 1998), 68.; Canadian Council of Forest Ministers. Compendium of Forestry Statistics. *Newfoundland and Labrador, 8.2 Economic Profile of the Forest Sector, 1990-2002* Available at: http://nfdp.ccfm.org/framescontents_e.htm . Last accessed May 7, 2004.

relatively flexible and adaptable “cut-to-length” or “shortwood” logging systems prevail over some early experiments with “tree-length” and “full-tree” systems. Elsewhere in the boreal, it is the latter two (the latter recently tending to succeed the former) that have tended to prevail.²⁶

The logging system deployed determines where delimiting and initial cutting into section (“slashing”) are done: at the stump, at the point of transportation out of the bush (forwarding), or at the road-side.²⁷ This has direct implications for environmental policy issues and forest regeneration, in no small part because the distribution of tree waste (slash) and the intensity of traffic and access routes strongly determine levels of soil degradation and damage to residual vegetation in its wake.²⁸

Finally, arguably the most politicized of the factors to consider here is cutting prescription. In principle, twentieth-century forestry has increasingly sought to make cutting prescriptions dependent on the silvicultural judgement of professional forest managers, at least to ensure sustained yields of timber over time. In practice, the silvicultural arguments for the dominance of clearcutting in Canada have been strenuously contested in recent decades: one of the reasons for doubting this was the rationale for clearcutting dominance is the proven efficiency of clearcutting for conducting mechanized operations. Clearcutting also has certain aspects that ensure

²⁶ Reino Pulkki, "Minimizing Negative Environmental Impacts of Forest Harvesting Operations," in *Towards Sustainable Management of the Boreal Forest*, ed. Philip J. Burton, et al. (Ottawa: NRC Research Press, 2003), 611.

²⁷ Eric Young, "Newfoundland Timber Harvesting Logging Systems in Use Today," in *FPD Internal Report* (Corner Brook: Newfoundland, Forest Service, Forest Products & Development Division, 1994).

²⁸ Pulkki, "Minimizing Negative Environmental Impacts," 612.

greater safety for workers: dead trees or snags as well as unstable or caught trees are typically removed along with the merchantable timber. In short, the workplace is relatively clear of dangerous complexities.

Clearcutting (technically an extreme variant of the family of even-aged prescriptions) arose as a central strategic target of environmentalist interventions in the sector in the 1980s and 1990s. It is compared by some as a technique that mimics natural wildfire disturbances, and by others as a commonly catastrophic and irreversible transformation of remaining “old-growth” forests, particularly in rugged terrain. The boreal shows some characteristics that in principle might seem more compatible with profitable and sustainable clearcutting, including a mosaic pattern of even-aged single-species stands. Central to the comparison with partial and selection cuts has been a complex set of ecological and silvicultural questions that tend to bring the “old-growth” debates of coastal BC into a much more complex policy environment: the varying regeneration requirements of shade-tolerant and shade-intolerant boreal species, the nutrient requirements for repeated successful regeneration, and the place of fire in the renewal of key boreal species.²⁹

The current wave of mechanization could be presented as a trend that is potentially universal, befitting an emerging period of flexible specialization. Yet the pace and extent of mechanization has differed sharply amongst Canadian jurisdictions to date, and may be associated with different logging systems. The less rugged portions of the boreal

²⁹ Old Growth Policy Advisory Committee, "What Is Old Growth?," *Discussion Paper* (1992).; The Faculty of Forestry and the School of Continuing Studies (University of Toronto) -- FOF-SCS, ed., *Old Growth Forests: What Are They? How Do They Work?* (Toronto: Canadian Scholars' Press Inc., 1990).

generally permit much more mechanized harvesting, such that it is difficult to separate out the health and safety impact of mechanization from that of even terrain.³⁰

Variation and change in power relations and institutional structures

As thinkers as diverse as Gramsci, McLuhan, and Haraway have suggested, humanity is a social species, and hence a political one. We are the “subjects of production” when at work, to be sure, but there as elsewhere, we must be understood in the plural, in ecological context, and in radical interdependence with the institutions and technologies that mediate our relationships.³¹ Political, policy, and political-economic factors are key contributing factors to the dangers of woodwork, by sheer virtue of the social character of work.

Proceeding “top-down” from governance mechanisms to the work-site can demonstrate this point very clearly: the presence or absence of regulations governing the workplace and workplace relations, implementation mechanisms, and their qualitative effects are clearly vital factors governing the safety of the workplace. The following section demonstrates this clearly. This section notes a complementary “bottom-up” approach to power in the work-place in the political-scientific investigation of health and safety problems.

First, an important OHS tradition that draws attention to the centrality of power relations at work in determining overall levels of health and safety in the general population. This

³⁰ Radforth, *Bushworkers and Bosses: Logging in Northern Ontario, 1900-1980*.

³¹ Antonio Gramsci, *Selections from the Prison Notebooks*, trans. Geoffrey Nowell Smith Quintin Hoare (New York: International Publishers, 1971).; Marshall McLuhan, *Understanding Media*; Donna Haraway, [*Simians, Cyborgs...*]

approach factors in the physiological impact of social status and social control through the contributions of these pressures on psychological strain.³² It is certain that timber harvesting, like farming, is an occupation fraught with psychological stress. It is physically demanding; it is exceptionally dangerous -- many workers carry with them the memories of harrowing incidents and the distinct possibility of more such incidents in the future; and much of the work is necessarily done in profound isolation from workers' ordinary social networks.

A purely psychological and individualized approach to the analysis of stress, however, would paint an inadequate portrait of the problem. Status, control, and resulting strain must in turn be analyzed in relationship to the shifting economic and institutional pressures affecting the industry. To take but the most immediate example, the accumulation strategies of wood products and pulp and paper mills vary over time and space, and one of the institutional structures affected is their relationship with harvesting operations. A variety of institutionalized relationships with the direct harvesters emerge from these strategies: they have included variations of vertical integration within a firm, and contracting out or outsourcing.

Institutionalized sources of stress and fatigue

Stress and fatigue, of course, are important health risks in themselves. At timber harvesting work in the forest workplace, they may generate additional indirect risks.

³² Peggy McDonough, "Work and Health in the Global Economy," in *Unhealthy Times: Political Economy Perspectives on Health and Care*, ed. Pat Armstrong, Hugh Armstrong, and David Coburn (Toronto: Oxford University Press, 2001).; Robert G. Evans, Morris L. Barer, and Theodore R. Marmor, *Why Are Some People Healthy and Others Not? The Determinants of Health of Populations* (New York: de Gruyter, 1994).

They may also be intensified or reduced by the variation in a variety of wider environmental factors. Despite advancing mechanization, this is also very heavy work, rapidly depleting human energy and the condition of machinery over the course of the day.³³

1) Payment by Wood Processed

Above all, the terms of volume contracts and piecework payment systems have meant that the growing ranks of owner-operators typically face demanding levels of production consistency and stomach-wrenching variation in payment rates. The just-in-time trends sweeping the subsector have tended to reinforce these pressures.

Owner-operators also face (often from the same sources) equally inflexible debt payment schedules on the heavy equipment they “own”. Outsourcing has made sense to large vertically integrated firms as a mechanism for spreading risk during a period of rapid capital-intensification (mechanization) in harvesting.

Whether small operators are in debt to the bank, or (as is common in early stages) to the company doing the outsourcing, this process intensifies the incentives to rush work to achieve wage goals and meet credit payments for loans on heavy equipment. These factors tend to weigh more heavily on small operators than on vertically integrated firms, because the latter have multiple potential bases for improving profitability. They also virtually compel work during night shift, long shifts at peak performance, and incentives to improvise or skimp on machine repairs and maintenance. Like piece-work itself, contract work set at maximum capacity is

³³ IRSST find source

insensitive to the kaleidoscopic changes in the working environment, and can encourage dangerous behaviour during foul weather.

Piece-work is a central motivational institution in harvesting. Many have historically taken pride in this link between effort and take-home pay, and many may insist on piece-work for economic reasons. Piece-work encourages workers to produce in the bush at rates: that is its principle virtue from the standpoint of management. From the standpoint of health and safety, piece-work rates may touch, or arguably even exceed the limits of their long-term capacities. IRSST research correlated some factors such as work early in a new shift schedule, or late in the day, with elevated accident rates: some such conditions might be taken as indicators of stress and fatigue.

The impact of piece-work in felling and silvicultural injuries is one of the most important and potentially controversial areas of OHS research in this field. This drew the attention of the IRSST researchers,³⁴ and the link with higher accident rates was apparently confirmed both elsewhere³⁵ and in the perceptions of interviewed workers.³⁶

2) Payments insensitive to climate and terrain

³⁴ Hébert et al., "Les Accidents De Travail En Forêt."

³⁵ Mark Shrimpton, Keith Storey, and Wiking Husberg, "Workers in Remote Areas: Case-Studies on the Petroleum, Mining and Forestry Industries," (Geneva: International Labour Office, 1998).

³⁶ Hébert et al., "Les Accidents De Travail En Forêt," iii, 15-16.; see detailed discussion of indicators for the terrain associated with accidents in the sector in Esther Cloutier and Lucie Laflamme, "Profils D'accidents En Forêt: Rapport Abrégé De Recherche Sur 89 Accidents Du Travail Survenus En Forêt," (Montréal: Institut de recherche en santé et en sécurité du travail du Québec (IRSST), 1985), 47-55.

Piece-work in many jurisdictions is insensitive to work-slowness variations in terrain or weather. In research on injuries sustained in 1997-8, the IRSST research team repeatedly heard workers suggest bonuses or sliding piece-work rates to account for rugged work sites or dangerous weather conditions, in the name of improving health and safety.³⁷

Worse than inflexible rates from the viewpoint of stress are rates that do shift rapidly, for reasons quite unrelated to working conditions, over the course of a season.

Confronted with an unexpected alteration in the piece-work rate well into a working season, workers face sudden shifts in anticipated earnings. Perhaps unsurprisingly, certain injuries are correlated with the third or fourth month in the season.³⁸

3) Imperfect Routinization

Rushing woodwork is doubly dangerous because the work environment is dangerously kaleidoscopic, and hence so is the work. Basic task elements such as felling, delimiting, and forwarding are repeated, but each with constant minor variations that must be identified rapidly. (For example, each tree is situated slightly differently in relationship to the terrain and the surrounding trees.) While being held to a very high, sustained rate of performance, as in a factory, the worker must be constantly alert to minor adjustments with important consequences. Some accident scenarios in the IRSST studies also associate injury with alterations in activity or shift. Work never truly becomes routine, but is paced at a factory rate.

³⁷ Hébert et al., "Les Accidents De Travail En Forêt."

³⁸ Ibid., 23-5.

4) Financing Pressures

While increased mechanization reduces overall workplace injury, there are reasons to think that it increases the proportional role of stress in OHS issues for harvesters.

Investments in heavy machinery facilitate year-round, round-the-clock deployment: night-time lighting makes continuous harvesting possible. But such investments also make night work necessary, if loan payment schedules are to be met.³⁹ From an OHS viewpoint, night-time lighting does not fully compensate for the lack of daylight; second, even workers habituated to night shifts work against biologically imprinted circadian rhythms, and are less alert in the early morning.

5) Outsourcing Risk

Outsourcing has been a critical institutional complement of much of the recent technological change, as part of a wider tendency towards “flexible” or lean production systems.⁴⁰ One might argue that the formal break-away of harvesting activities from large, vertically-integrated firms should allow more people in the industry to “be their own men”, and therefore to diminish the social subordination that some have linked to general reductions in health. But in fact, there are a number of reasons to think that outsourcing has not had this effect in this subsector, and that outsourcing accelerates tendencies that are associated with negative effects on health and safety.

³⁹ Pulkki, "Minimizing Negative Environmental Impacts."

⁴⁰ Norcliffe and Bates, "Implementing Lean Production."

Outsourcing intensifies the foregoing pressures on small, non-unionized owner-operators. These operators may be under greater financial pressure to make extra efforts than larger firms would be; fewer institutional limitations constrain them from making the most extreme of those efforts. These workplaces have excellent reasons to offer fewer resources to dedicate to health and safety monitoring or education.⁴¹ In certain operations, the intimate connections between owner-operators and the rest of these operations' workforce (often friends or relatives) can create additional incentives for all involved to extend work hours, to cut corners in maintenance and repairs, and to clear obstacles and to mount and dismount machinery in the fastest manner, rather than in the safest one.⁴²

6) High Stakes for Competitive Failures

Areas of high single-industry dependency and high unemployment increase the stakes for those harvesters who are operating under narrow profit margins.

7) Intense Global Competition Mediated by Oligopsonic Mills

Pulp and paper plants dominate high-volume demand in many boreal jurisdictions. The competitive pressures for individual workers and owner-operators in boreal jurisdictions have recently increased in international commodity markets: temperate and semi-tropical producers with shorter growing intervals and plantation forests have become more important pulp producers because of technological change in the paper-

⁴¹ Danièle Champoux, "Safety Checklists: Ohs Management Adapted for Small-Size Enterprises and Isolated Milieux" (paper presented at the SafetyNet Conference 2003, St. John's, NL, October 30-31 2003).

⁴² This is not a general statement about laxity amongst such owner-operator firms, but rather a characterization of how the greater informality and intimacy of the work relationship can take a high-risk sub-section of such firms.

making process now can use a wider variety of species. These pressures are mediated provincially by many smaller, non-unionized logging operations supply a highly concentrated buyers' market for logs. As a partial consequence, many harvesting operators experience a working day of potentially dangerous length and intensity.

8) Competition with Poor Ecological Endowments

It is also possible to lay out the kind of harvest that is necessary for specific equipment investments to form the basis of a small business. For shortwood logging systems that use single-grip harvesters, for instance, Pulkki has calculated that operations will cease to be viable if harvesting volumes per hectare fall below 50 m³, and less than 30,000 m³ per year are harvested (at a minimum). Costs rise if the area is not clearcut, and other conditions like double shifts and good equipment prices must apply.⁴³ This harvesting system, of course, is the combination that predominates in low-productivity⁴⁴ Newfoundland forests.

Québec research to prevent health and safety in the boreal forest industry

In this section, I turn back to a “top-down” discussion of power in the institutionalized context surrounding this dangerous line of work. I focus on an innovative programme of research into health and safety issues for boreal woodworkers, designed deliberately with the intent of restructuring the government, corporate, and union policy frameworks surrounding timber harvesting, and thereby reducing the rates of injury in the sector. The Institut de recherche Robert-Sauvé en santé et en sécurité du travail du Québec (IRSST)

⁴³ Pulkki, "Minimizing Negative Environmental Impacts."

⁴⁴ Canada. Natural Resources. Canadian Forest Service, "Map: Timber Productive Forest/Forêts Productives De Bois Marchand," (Petawawa: Petawawa National Forest Institute, 1991).

was launched as part of a vigorous policy initiative on the part of government, industry management, and organized labour. A recently reorganized parity council on worker's health and safety served to provide the framework for the Institute's work: the Commission de la santé et de la sécurité du travail du Québec (CSST) had as its wider goal the reduction of both injuries and compensation costs, through the science-based re-organization of the work-process and other preventative measures.⁴⁵

Beginning in the early 1980s, the IRSST launched a research and science-based prevention programme on workplace disease and injury in woods work. Researchers Esther Cloutier and Lucie Laflamme targeted the industry's woodworkers in Québec an early study population, the province's most at-risk workforce.⁴⁶ The project is both an example of the innovative "top-down" deployment of scientific research as a policy instrument in altering health and safety in the work process, and (as a consequence) a lens of rare clarity in exposing certain realities of woods-work from the bottom-up.

At the time, the principal job categories analyzed were manual fellers (*abatteurs manuels*: those who personally cut down a tree with a chain-saw), silvicultural workers such as tree planters, and heavy machine operators (operators of skidders, feller-bunchers, etc.). Other jobs that gained attention in the course of the subsequent sectoral research included such ancillary positions as mechanics, heavy machinery operators, and truckers.

⁴⁵ Bronsard, "Vers Un Nouvel État-Providence: L'expérience De La Commission De La Santé Et De La Sécurité Du Travail Du Québec."

⁴⁶ See for example, Esther Cloutier and Lucie Laflamme, "Organisation Du Travail Et Sécurité Des Opérations Forestières," (Montréal: Institut de recherche en santé et en sécurité du travail du Québec (IRSST), 1985), 9.

Injuries common to all these job positions included 1) arm injuries incurred while assuming an awkward and inhabitual posture at work; 2) back injuries due to excess lifting, pushing or pulling effort; injuries due to falling trees or snags; 3) and injuries to the eyes, head, or arms due to flying wood or metal. The research team also demonstrated that each job category was also subject to specific risks, and experienced injuries at a specific rate.⁴⁷ On the one hand, a mechanized cutting process was more often associated with certain injuries: 1) injuries to various employees incurred amidst maintenance and repair of heavy machinery, and 2) various injuries to skidder operators, such as back injuries while attempting to shift logs in an awkward or inhabitual posture, often under severe time pressures; 3) falls experienced while mounting or dismounting a machine. Manual felling and delimiting injured workers far more often, but also exposed them to distinct accident types, such as 1) being struck by falling timber or 2) being cut by their mechanical saws. Mechanization in Québec was clearly resulting in a substantial overall decrease in the rate of workplace accidents.⁴⁸

The team conducted a quantitative analysis of data submitted in workers' compensation claims, but in the context of a tri-partite commitment to injury reduction, they were able to couple this government data with supplemental details gathered from injured workers, their foremen, and employers.⁴⁹ Individual variables from these reports were then

⁴⁷ Notably fellers are associated with conventional (manual) felling; machine operators are associated with the initial extraction of manually cut timber, and potentially the entire felling, limbing, and extraction process under mechanized harvesting. Cloutier and Laflamme, "Profils D'accidents En Forêt," 21-29, 40.

⁴⁸ Lucie Laflamme, "Mécanisation Des Opérations Forestières Et Sécurité Du Travail," (Montréal: Institut de recherche en santé et en sécurité du travail du Québec (IRSST), 1987), 6-7.

⁴⁹ Hébert et al., "Les Accidents De Travail En Forêt," iii.

correlated to generate five principal accident types, which could be distinguished by reliable patterns amongst seven distinct descriptors.⁵⁰ Later, comparisons were made with Swedish findings and records held by Québec employers. The overall result was a short list of scientifically demonstrable profiles for typical accidents, as well as inter-jurisdictional variations in occurrence rates:⁵¹

1) Struck by a falling object or otherwise hit by an object

Bruising, crushing, or fracture of any body part, or also specifically back pain, as the result of a tree, snag, or log falling on a feller during the felling process. Typically, a tree has recoiled, or the worker has shifted position at the time of the injury.

2) Contact with an machine in operation

Cuts to the legs, hands or fingers from a mechanical saw or other tools, incurred during the delimiting or felling process. Typically, the worker had poor control of the saw, slipped, or lost good footing, or the tree recoiled at the time of the injury.

3) Excess effort

Back pains, sprains or wrenches to the back, caused by lifting or pushing a tree or log; these accidents occur either during felling, or during the clearance of scrub (*dragage/chaining*).

4) Fall or [involuntary] physical reaction

Injuries incurred by any point of the body as the result of a fall or a sudden, ungainly movement. Obstacles on the ground or poor surface conditions are typically involved. The worker may have been on the move; or in the course of delimiting, pulling or pushing, or scrub clearance (*dragage/chaining*).

5) Struck by a flying object, or chafed

This type of accident refers to a variety of injuries, external or internal, to the eyes or head that may be caused by flying wood fragments, wood particles, or parts of a mechanical saw. Typically this occurs in the course of felling or delimiting, and is associated with a saw.

⁵⁰ One of these descriptors concerns time off before a return to work, which is used as an indicator of the seriousness of the injury, but which is left off below, on the grounds that the time off is strongly conditioned by institutional arrangements in the compensation system.

⁵¹ Cloutier, "Analyse Comparative Québec/Suède," 7.

Comparative Assessment

The work provided the scientific basis for subsequent reforms to the work-process and worker preparation in Québec's harvesting activities, and was a model for the IRSST research in other workplaces. But the data was collected in a structured collective collaboration between government, industry, and organized labour, in a provincial industry with a history of sectoral corporatist negotiation and collaboration.⁵² Unions, government, and industry each had an interest in reducing workplace injury, and to an unusual degree made information available or made research surveys easier to conduct. It is difficult currently to imagine the development of such exceptionally rich data sets under other conditions.⁵³ Even in Québec, since legislative reforms in 1987, industry outsourcing may have made the fundamental conditions for such tripartite collaboration difficult to replicate or extend: much of Québec's harvesting activity has now gone to relatively small operators with low unionization rates.⁵⁴

Second, the focus of the data was on accident rates, not a comprehensive portrait of workplace injury and disease. First, as the research team itself noted, this limited the study as a comprehensive survey. The conditions surrounding the accidents could not be compared with normal conditions.⁵⁵ But second, in potentially important ways, the research strategy reflects certain framing assumptions of the prevailing policy agenda.

⁵² William D. Coleman, *Business and Politics: A Study of Collective Action* (Kingston: McGill-Queen's University Press, 1988), 146-50.

⁵³ Cloutier, "Analyse Comparative Québec/Suède," 2.

⁵⁴ Hébert et al., "Les Accidents De Travail En Forêt."; Luc Bouthillier, "Quebec: Consolidation and the Movement Towards Sustainability," in *Canadian Forest Policy: Adapting to Change*, ed. Michael Howlett (Toronto: University of Toronto Press, 2001), 258-62.. Similar trends have emerged in Newfoundland and Labrador, marked most clearly by the Forestry Act of 1990, and by the modernization plans Kruger employed at Corner Brook. Newfoundland and Labrador Forestry Act; Norcliffe and Bates, "Implementing Lean Production," 55.

⁵⁵ Cloutier and Laflamme, "Profils D'accidents En Forêt," 6.

This was not some transparent effort to restrict access to compensation, and it did proceed by the specific means of science-based accident reduction or prevention rather than simply cutting back payments. But it was one in which unions, government, and industry were conceiving of the problem as one of high total compensation costs.

Potentially left out of this picture, then, are issues undetected, normalized, or tolerated as unavoidable; issues recognized but routinely addressed outside the workers' compensation process; and potentially, categories of cases where decision-making officials do not award compensation.⁵⁶ This, then, would include pervasive, chronic, or gradually debilitating industrial diseases; or environmentally triggered problems arising from settings that many woods workers could also be encounter in their daily lives. It is worth pointing to some of these.

Asthma, dermatological irritations, and other allergic reactions are all potentially beyond the parameters of the IRSST studies to date.⁵⁷ Research into asthma surrounding crab processing plants emphasizes that early detection and protection may be medically essential to avoid permanent disability.⁵⁸ Sensitization to fungi in bark and stored woodchips has been reported in Canadian debarking and wood-waste operations.⁵⁹

⁵⁶ Thanks are due to Barbara Neis, Sean Cadigan, and Peter Sinclair for alerting me to the potential importance of such considerations in the general context of high unemployment resource-dependent communities.

⁵⁷ Björn Hausen, *Woods Injurious to Human Health* (Berlin: de Gruyter, 1981). R.J. Schmidt, "Forestry Workers," in *Handbook of Occupational Dermatology*, ed. L. Kanerva, et al. (Berlin: Springer, 2000).

⁵⁸ André Cartier et al., "High Prevalence of Sensitization and Symptoms of Occupational Asthma in Snow-Crab Processing Workers of Newfoundland and Labrador" (paper presented at the SafetyNet Conference 2003, St. John's, NL, October 30-31 2003).

⁵⁹ Jeremy Rickards, personal communication, winter 2004.

Repetitive stress injuries vary for obvious reasons according to the work process. Years of manual cutting with a chainsaw may lock the joints of trigger fingers into a hooked position.⁶⁰ Mechanized cutting is associated with back and other injuries, particularly from extended jostling and shaking of the operator in the cabin. A lively literature concerns the reengineering of the operator chair, cabin, and suspension on heavy machinery.⁶¹

The Newfoundland and Labrador forest sector

Newfoundland and Labrador's forest products régime is unique

In the reception of current policy ideas, both in worker health and safety and in forest practices, Newfoundland and Labrador has arguably done more than keep pace with advanced thinking at work across the country. Though in comparison with many other Canadian provinces, St. John's could still be argued to have extremely rudimentary institutional machinery in forest management and forest policy, the 1990 Forestry Act⁶² and related initiatives committed the province, at least on paper, to advance towards the most advanced thinking in sustainable forest management. Worker health and safety policy under the Worker Health, Safety, and Compensation Commission is moving from

⁶⁰ Peter Sinclair, personal communication

⁶¹ Paul-Émile Boileau and Henri Scory, "L'exposition Des Opérateurs De Débusqueuses À Des Vibrations Globales Du Corps," (Montréal: Institut de recherche en santé et en sécurité du travail du Québec (IRSST), 1986), Paul-Émile Boileau, Denis Turcot, and Henry Scory, "Évaluation De Sièges Suspendus Adaptés Au Problème Des Vibrations Dans Les Débusqueuses," (Montréal: Institut de recherche en santé et en sécurité du travail du Québec (IRSST), 1990), Seshadri Sankar, Subhash Rakheja, and Gérard J. Gouw, "Evaluation De Systèmes De Suspension Verticale Et Latérale Pour Les Véhicules Forestiers," (Montréal: Institut de recherche en santé et en sécurité du travail du Québec (IRSST), 1989).

⁶² *The Forestry Act*. For forest policy to the end of the postwar period, see Canada. Atlantic Development Board, *Forestry in the Atlantic Provinces* (Ottawa: Atlantic Development Board, 1968), 4.1-4.40, Newfoundland Federal-Provincial Task Force on Forestry, "Report of the Newfoundland Federal-Provincial Task Force on Forestry," (St. John's: 1973).

a strategy of simple compensation to a strategy of active prevention and early and safe return-to-work, much in the same vein as Québec and British Columbia.⁶³

In many respects, such as the predominance of short-wood harvesting systems and the high level of rural unemployment, Newfoundland and Labrador fits into the same category as the three Maritime provinces of Canada. The association is certainly common in the literature.⁶⁴ But this is a matter of geographic tidiness: a number of other ecological characteristics and institutional arrangements set Newfoundland and Labrador squarely amongst Canada's boreal jurisdictions such as Québec and Ontario. The combination makes the conditions for the forest industry in Newfoundland and Labrador unique.

“Boreal” Features

1) Boreal Ecology

While the cool-temperate Maritime forest ecosystem is complex, boreal terrain clearly dominates both Newfoundland and Labrador.⁶⁵ Of vital importance to the profitability of the industry, the island's forest (unlike many other parts of the boreal across Canada) is also relatively low-density and low-productivity. Although Labrador's forests are

⁶³ Newfoundland and Labrador, Worker Health, Safety and Compensation Commission, *Changing the Mindset -- Strategic Plan, 2002-2006: Focus on Prevention and Early and Safe Return-to-Work* (St. John's: WHSCC, 2001).

⁶⁴ Peter Clancy, "Atlantic Canada: The Politics of Private and Public Forestry," in *Canadian Forest Policy: Adapting to Change*, ed. Michael Howlett (Toronto: University of Toronto Press, 2001), May, *At the Cutting Edge: The Crisis in Canada's Forests*, 66-114.; Canada. Atlantic Development Board, *Forestry in the Atlantic Provinces*.

⁶⁵ Clancy, "Atlantic Canada," 205, J. David Henry, *Canada's Boreal Forest* (Washington: Smithsonian Institution Press, 2002). J.H. McAndrews and G.C. Manville, "Plate 17 -- Ecological Regions, Ca Ad 1500," in *Historical Atlas of Canada, Vol. 1*, ed. R. Cole Harris and Geoffrey J. Matthews (Toronto: University of Toronto Press, 1987). Northern Forest Lands Council, *Finding Common Ground: Conserving the Northern Forest* (Concord, NH: Northern Forest Lands Council, 1994).

potentially much more productive, commercial use is disadvantaged (as in many parts of the island) because of distance from market and lack of road access.⁶⁶

2) Public Forests with Highly-Concentrated, Long-Term Private Tenures

Newfoundland and Labrador forests are overwhelmingly in public hands, more pervasively so than many larger boreal jurisdictions such as Ontario or Québec.⁶⁷ (See discussion of agriculture below) However, given the specific tenure conditions on the island (by one measure, Kruger holds 38%, and Abitibi-Consolidated 23% of the total productive forestlands⁶⁸), the province's two major pulp and paper interests have a unique market presence with respect to fibre (i.e., wood) purchases from outsourced harvesting operators. (See discussion below.)

3) The Fisheries Instead of an Agricultural Sector in Labour and Land Markets

A related differentiating feature in Newfoundland and Labrador is the historical absence of commercial (and in most places, also subsistence) agriculture. In the Maritimes, southern Québec, and southern Ontario, relatively small, privately held woodlots play a vital supply role in the industry, and income from winter bush work, often deep into the

⁶⁶ Canada. Natural Resources. Canadian Forest Service, "Map: Access/accès," (Petawawa: Petawawa National Forest Institute, 1991), Canada. Natural Resources. Canadian Forest Service, "Timber Productive Forest.", Canada. Natural Resources. Canadian Forest Service, "Map: Volume of All Species/Volume De Toutes Les Essences," (Petawawa: Petawawa National Forest Institute, 1991). Available at http://nfdp.ccfm.org/framescontents_e.htm. Last accessed on May 8, 2004.

⁶⁷ CCFM Compendium of Canadian Forestry Statistics, available at: http://nfdp.ccfm.org/framescontents_e.htm; last accessed on May 7, 2004.

⁶⁸ Glen Norcliffe, "John Cabot's Legacy in Newfoundland: Resource Depletion and the Resource Cycle," *Geography* 84, no. 2 (1999): 105.. That said, Norcliffe notes a sharp disparity in the federal and provincial figures, because of a high degree of fragmentation involving almost half of the upper estimates of the productive forest acreage.

boreal, has historically been an integral component of small working farms.⁶⁹ Most of Newfoundland, by contrast, lacks the soil or climate for commercial European agriculture. While much the same is true for northern Manitoba, Ontario, and Québec, those provinces have large, vibrant, and distinct agricultural regions that shade into the productive forestlands.

As Cadigan has argued,⁷⁰ this difference historically blocked an avenue of economic diversification from mercantile economic relations on the Island's coast; Newfoundland's interior was not a significant area of settlement or of forest exploitation until near the turn of the twentieth century. When the area did open up, the forest industry faced very limited competing uses for forestlands. Instead of a farming population, the fisheries were historically twinned to the forest sector. In some respects the relationship was strikingly similar: during the twentieth century, the bush offered winter wages to supplement the small commodity producers in fisheries, just as it did for those in agriculture elsewhere. But surplus fisheries labour played an especially important role, a powerful electoral incentive for the state to support new mill projects and tenures, notwithstanding very high failure rates. In the 1890s to the 1920s, when the industry was established through highly speculative tenure grants, railway licenses and outright land sales,⁷¹ it is not at all clear that private companies primarily focused on market signals instead of government incentives when they were building up the sector.⁷²

⁶⁹ Thomas R. Roach, "Farm Woodlots and Pulpwood Exports from Eastern Canada, 1900-1930," in *History of Sustained Yield Forestry: A Symposium*, ed. Harold K. Steen (Portland, Oregon: Forest History Society, 1984).

⁷⁰ Sean Cadigan, *Hope and Deception in Conception Bay*, Chapter 1.

⁷¹ Valerie Summers, *Regime Change in a Resource Economy* (St. John's, NF: Breakwater Books, 1994), 52-54.

⁷² Norcliffe, "John Cabot's Legacy," 103.

In the 1930s, genuine state-led forestry initiatives were launched, but their purposes were explicitly driven by unemployment relief and job-creation, and the commitment to the forest management component was driven by the British Commission government: colonial motivations were still heavily committed to the desperate employment conditions.⁷³ Under such political conditions, it is not surprising that there were very few initiatives before the 1970s to introduce provincial forest management.⁷⁴ The overall focus of Newfoundland-led governments, whether before or after Commission government, was overwhelmingly on providing business attractive conditions for investment, and creating jobs.

A second point in relation to the fisheries is that coastal forests were set aside for fuel, housing, and non-timber supplies to coastal communities. The so-called Three-Mile Limit ensured that these forest uses did not compete directly with the forest industry for forestlands. And unlike farmers elsewhere, fishers of course did not depend on forestlands for the cultivation or extraction of their industry's target resource. The fisheries and the forest industry were in non-competitive positions with respect to one another, both for the core resources and for backward linkages. While a prevailing argument has been that the forest resource in Newfoundland was too poor and remote to justify stumpage fees, the general lack of alternate uses for forestlands also has important

⁷³ Melvin Baker and Janet Miller Pitt, *By Wise and Prudent Measures: The Development of Forestry on the Salmonier Line* (St. John's, NL: Newfoundland and Labrador Department of Forest Resources and Agrifoods, 1998).

⁷⁴ Clancy, "Atlantic Canada," 207.

consequences for the ground rent available to sectoral interests and to government in stumpage fees.⁷⁵

4) Recent Political Controversies and Innovative Developments with Aboriginal Communities in Labrador

In Labrador, conditions respecting the aboriginal land question are radically different from the exceptional conditions on the Island (see below). No treaties were initially reached with either the Inuit of the coastal north or the Innu of the Labrador interior; federal funds elsewhere allocated to aboriginal programmes were instead allocated to general Labrador development, under the terms of the 1949 Union with Canada. In recent years, the handling of the aboriginal land question has seemed to converge more closely to the patterns evident in other provincial Norths. The militancy of the Innu Nation communities of Natuashish (formerly inhabitants of Davis Inlet/Utshimassits/'Place of the Boss') and especially Sheshatshiu have led to the negotiation of interim forest co-management and impact benefit agreements in Forest District #19.⁷⁶ The wider conduct of land settlement talks, though delayed relative to the successful conclusion of a federal-provincial agreement with the Labrador Inuit Association, could involve important new allocations of resource revenues to Innu rather than provincial (or possibly federal) coffers.

⁷⁵ This point derives from the treatment of economic rent in David Harvey, *The Limits to Capital* (Chicago: University of Chicago Press, 1982).

⁷⁶ CBC News, *Labrador Innu Sign Forest Management Plan with Province* [webpage] (CBC News, February 1 2001 [cited November 1 2002]); available from <http://cbc.ca/cgi-bin/templates/view.cgi?news/2001/01/31/innuforests010131>, Innu Nation, *Forestry in Nitassinan -- an Introduction* [html website] (Innu Nation, No Date [cited Sept. 12 2002]); available from <http://www.innu.ca/forest.html>.

“Atlantic” or “Newfoundland” Features

The forest policy environment for this peripheral province can therefore be viewed in many respects as “boreal” rather than “Atlantic”. But other characteristics of the province’s forest sector institutions also tend to differentiate the province’s arrangements from elsewhere in the boreal.

1) Emergence of a Highly Consolidated Pulp and Paper Industry, with Private Tenures on Public Land

The Reid interests gained outright ownership of nearly 4000 square miles of forest lands at points near the cross-island railway they constructed in the 1890s. But between 1900 and 1915, much more land was leased. The governments of the time let virtually all the long-term timber leases licenses that are in force today (at the time set between 21 and 99 years in duration). By the 1960s, all these lands – some 61% of the productive forest -- were consolidated under the island’s two pulp and paper plants: the original Anglo-Newfoundland Development Co. plant at Grand Falls (1909 –held since 1965 by Abitibi-Consolidated) and Corner Brook Pulp and Paper at Corner Brook (1925 – after an initial owner sold the property in the 1920s, it was acquired from International Paper Company by Bowater in 1938 and held since 1984 by Kruger).⁷⁷ Amidst many other failed attempts by the provincial state to develop pulp and paper manufacturing by licensing forestlands, an abortive attempt to diversify the sector saw a failed liner-board plant built in Stephenville in 1978-9. This plant was rapidly converted to pulp and paper and passed to Abitibi.⁷⁸

⁷⁷ Norcliffe and Bates, "Implementing Lean Production," 47.; Norcliffe, "John Cabot's Legacy," 103-5.

⁷⁸ John Alexander Munro, "Public Timber Allocation Policy in Newfoundland" (PhD, University of British Columbia, 1978), 76-108, 64-8.

2) Historical Common-Property Régime on Coast

The so-called Three-Mile limit around the Newfoundland coast (the implied area in the title should not be taken literally) has historically been treated as a common-property resource, with any substantial permitting system arising only in very recent times. This common-property régime was of particular important for small local mills and individual harvesters drawing on the wood supply, supplemental to the traditional fishery and to the needs of fishing communities. With the exception of a few grants made in the 1920s, the coastal areas were considered off-limits to major licensing; from 1930 on, this customary reservation was translated into law.⁷⁹ Some of the now-iconic barrens of the Newfoundland coasts were certainly human creations in this zone. There is, however, a debate about the extent of such degradation, and whether some communities were able to manage their forest resource more sustainably.

3) Low or absent stumpage fees; long pulp and paper tenure agreements in the interior

Tenures on public land in Newfoundland have been characterized by the general absence of stumpage fees, by highly concentrated tenure ownership, and by exceptionally long, non-standardized, and renewable tenure agreements. Although official figures show 9 pulp and paper companies in 2001 in the province,⁸⁰ two pulp and paper companies (Kruger and Abitibi-Consolidated) hold the overwhelming share of the long-term tenures for the entire island.⁸¹ Much of the land has been held for much of the twentieth century

⁷⁹ Ibid., 70-2.

⁸⁰ Canadian Council of Forest Ministers. *Compendium of Forestry Statistics. Newfoundland and Labrador, 8.2 Economic Profile of the Forest Sector, 1990-2002* Available at: http://nfdp.ccfm.org/framescontents_e.htm . Last accessed May 7, 2004.

⁸¹ Munro, "Public Timber Allocation".

under 49-year or 99-year leases; the leases now held by Abitibi-Consolidated are due to be reviewed in 2010.

These conditions have been explained in different ways. The first, which conforms to widely held public opinion in resource politics more generally, is that desperation in trying to stimulate economic diversification and/or more venal concerns having to do with rewarding political friends led provincial leaders to agree to a resource give-away. The historical record of the conditions under which the agreements were reached has often been read to confirm this view.⁸² A second explanation has dominated much official opinion since John Munro's influential 1978 thesis on provincial tenure arrangements.⁸³ It is that exceptionally poor growing conditions and high transportation costs constitute marginal or sub-marginal market conditions for the province's dominant forest products. In the latter view, the province's inability to negotiate any fees initially, the repeated resale of the tenures and mills, and the increased concentration of the market for forest tenures subsequently have tended to serve as confirmation. Policy prescriptions clearly follow from this second, official position. Political pressure clearly exists to maintain the existing tenure agreements in the name of existing employment in the three pulp and paper mills in the province. But this pressure should be balanced against the search for novel or niche secondary markets, other than dimension lumber and pulp and

⁸² Summers, *Regime Change in a Resource Economy*.; James Overton, "Towards a Critical Analysis of Neo-Nationalism in Newfoundland," in *Underdevelopment and Social Movements in Atlantic Canada*, ed. Robert J. Brym and R. James Sacouman (Toronto: New Hogtown Press, 1979).

⁸³ Munro, "Public Timber Allocation".

paper, in which the tough, narrow-diameter, long-fibred, slow-growing conifers of the island can command special economic rents.⁸⁴

These debates affect the contemporary question of whether southern Labrador (including the innovative developments in District #19) can provide the Island's three mills with supplementary fibre on a sustained basis, let alone on an environmentally sustainable one. It is not at all clear that Labrador's forest resource is even commercially viable, and therefore able to command any kind of economic rent that either provincial government or Innu Nation could collect. This question has been central to aboriginal and non-aboriginal Labradorian hopes for some kind of secondary processing in Labrador itself for the industry, and to the controversies surrounding the construction project to complete and upgrade a Trans-Labrador highway.⁸⁵

4) Private Property in the Trees of the Interior Themselves, and Protection from US Countervail and Anti-Dumping Initiatives

On much of the public lands, the absence of stumpage fees is associated with the fact that the firms legally hold title to the trees themselves for the duration of their lease of Crown land, even while the timber is on the stump. The latter is a further deviation from general Canadian practice, and has been viewed as an impediment to some of the regulatory limitations on harvesting practices that have commonly been put in place in other provinces.

⁸⁴ John Munro, *Pitprops and Pulpwood: A History of Export Wood Operations in Newfoundland and Labrador, 1898-1992* (St. John's: Newfoundland Department of Forest Resources and Agrifoods, 2001).[guitars]

⁸⁵ Newfoundland and Labrador Executive Council, *Red Bay to Cartwright Highway Announced* [html website/news release] (Government of Newfoundland, April 26 1999 [cited Sept. 12 2002]); available from http://www.innu.ca/tlh_announced.html.

A second implication of this situation is that like the Maritimes, Newfoundland and Labrador has frequently been exempt from the US penalties levied against Canadian softwood lumber, since the general American claim that Canadian provinces subsidize their timber producers through administrated stumpage fees on publicly-held trees, fees that are allegedly kept below market value. During the 1990s, softwood lumber exports from the province rose from a tiny figure of about \$120 thousand in 1995 to about \$28 million in 2002.

5) Overwhelming Dominance of Pulp and Paper Sub-sector in Secondary Processing

In no year in the decade from 1992 to 2002 did newsprint constitute less than 95% of total exports from the province.⁸⁶ Pulp and paper companies are much more highly concentrated than sawmilling companies, and the two pulp and paper interests dominate the private forest tenures held on public land in the province. Short wood harvesting systems, which are more appropriate for pulp and paper production, also constitute 94% of the province's total volume harvested in 1994, a figure notably disconnected from the choice of manual or mechanized technologies.⁸⁷

Sawmilling, whose vigorous pine operations greatly transformed the Newfoundland forest from 1875 to 1925, was rapidly marginalized in the 20th century.⁸⁸ Export figures are somewhat misleading indicators of the importance of this subsector. Most sawmill

⁸⁶ Newfoundland and Labrador, Department of Forests and Agrifoods, [complete]

⁸⁷ Young, "Implications of Mechanical Harvesting," 4.

⁸⁸ May, *At the Cutting Edge: The Crisis in Canada's Forests*, 70.; Newfoundland and Labrador, Department of Forests and Agrifoods, [complete]

operations are very small in relation to the two pulp and paper operators; furthermore most serve a primarily domestic market, and are tied to the coastal regions, whose forests have historically been open-access. Sawmill employment, while still small (about 1,000 people earning a total of about \$33-\$34 million) in absolute terms, is far more important in relative terms than the export figures would suggest. Employment in this subsector appears to have held its own during the 1990s. (By 2002, by contrast, pulp and paper employment had experienced a decline to 3,000 employed from about 6,000 in 1990.⁸⁹)

6) No Major Aboriginal Claims to Working Forestland on the Island

Apart from the Mi'kmaw band at Conne River, there has been no significant aboriginal presence on the Island of Newfoundland for nearly two centuries. Just as competitive claims to the forestlands of the island interior are absent from farmers, therefore, so too are major competitive claims based on aboriginal title.

7) Late transition to mechanized harvesting, shortwood systems, and use of forwarders

The transition to more mechanized harvesting has only really been evident in the 1990s, driven by the two pulp and paper companies on their licensed and leased lands. The dominant equipment used is the single-grip harvester in shortwood harvesting systems. Such systems tend to favour small, semi-skilled harvesting operations based on manual or chainsaw-based felling, making a mechanization relatively easily at limited cost. They are often more logical complements to pulp and paper milling or to relatively short

⁸⁹ Canadian Council of Forest Ministers. Compendium of Forestry Statistics. *Newfoundland and Labrador*, 8.2 *Economic Profile of the Forest Sector, 1990-2002* Available at: http://nfdp.ccfm.org/framescontents_e.htm . Last accessed May 7, 2004.

northern timber, where wood dimensions do not contribute to product quality.

Shortwood, single-grip harvester systems are highly adaptable to different silvicultural systems, including the increasingly demanded uneven-aged harvesting, and unlike tree-length systems can be used in ways that limit ecological damage.⁹⁰

The transformation has been rapid, and the driving factors complex. Abitibi had taken some early steps to mechanize in the late 1980s. This early mechanization was a response to the scale of salvage cuts after spruce budworm losses. Eric Young reports that with much higher proportions of deadwood, the risk to manual fellers had risen sharply during the salvage cuts, and mechanization also permitted double shifts and higher hourly production to clear the timber more rapidly. Corner Brook Pulp and Paper followed Abitibi's mechanization lead, in part to allow its new owner, Kruger, to implement a just-in-time delivery system for fibre at its mill based on mechanized cuts and truck-based hauling rather than river driving. Previously, manual cutting had been impossible during much of the winter, and mechanized cutting year-round provided year-round supply and a potentially higher paper quality.⁹¹

At this point, CBPP experimented with a few full-tree logging systems. But ultimately, both major companies placed more emphasis on shortwood systems. While already dominant in the early 1990s (69% in 1994), shortwood work-processes had not been so overwhelmingly important. (The province also saw increased use of forwarders in the transportation of delimbed timber from the stump to the roadside.) By 1998, mechanized

⁹⁰ Pulkki, "Minimizing Negative Environmental Impacts," 612-13.

⁹¹ Norcliffe and Bates, "Implementing Lean Production," 48.

shortwood harvesting techniques had become central and growing components of the harvesting repertoire. In Newfoundland and Labrador, mechanical harvesting still reportedly contributed only 43% of the total production in 1998,⁹² the second-lowest level of mechanization in Canada. (The rugged BC coast, at only 10% mechanized, once again the clear and uncontested national exception.⁹³) But the Newfoundland figures were almost double those recorded in 1994.

Initially at least, mechanization did not come with outsourcing. In other jurisdictions, large sawmills and pulp and paper interests have devolved much of their woods operations – and the financial risks associated with such major capital investments – to small operators.⁹⁴ But in the 1990s, Kruger outsourced aggressively both harvesting and an expanded road hauling system, particularly to non-union owner-operators. Kruger provided loans to the larger operators for start-up financing for the equipment.⁹⁵ A second possible implication concerns the source and condition of the “new” equipment. A late shift to a mechanized cut *may* mean that the Newfoundland context is one in which more advanced machinery can be deployed in the first rounds of mechanization, rather than in subsequent rounds. But it *may* also open up opportunities to acquire the expensive machinery second-hand, the inherent health and safety risks of which are connected with the higher wear-and-tear such machines have already endured. Older

⁹² Young, "Timber Harvesting Logging Systems," 4, 8-9, Young, "Implications of Mechanical Harvesting," 2.

⁹³ Young, "Implications of Mechanical Harvesting," Tables on pages 3-4.

⁹⁴ Young, "Timber Harvesting Logging Systems.", Young, "Implications of Mechanical Harvesting."

⁹⁵ Norcliffe and Bates, "Implementing Lean Production," 55.

machinery typically requires more frequent maintenance and repair, a work-process associated elsewhere with a distinct set of accident scenarios.⁹⁶

8) Island status and the progressive exhaustion of merchantable timber

Despite the limited settlement and minimal agriculture on the island of Newfoundland, a relatively small portion (just over 50%) of the island is actually forested, and the commercially viable portion of that figure is much less. Island mills are currently sourcing a substantial portion of their fibre from off-island, and many indications seem to point towards a declining stock of merchantable timber in the short- to medium-term. Economically viable access to Labrador timber is therefore a matter of considerable importance to Island-based forest interests, at the same time as it tends to confirm tensions over the site of secondary processing for Labrador resources that tend to create tensions between Labradorians and Newfoundlanders.

9) Associational Fragmentation

Setting aside for a moment the important problems of scale and institutional capacity, Québec-style centralized collaborative relations between labour, government, and management do not generally apply in Newfoundland and Labrador. Though possessed of one of the country's most unionized workforces, the province has a deep history of adverse employment conditions, punctuated by periods of sharp, intense conflict.⁹⁷

⁹⁶ Cloutier and Laflamme, "Profils D'accidents En Forêt," 42.

⁹⁷ H. Landon Ladd, "The Newfoundland Loggers' Strike of 1959," in *Lectures in Canadian Labour and Working-Class History*, ed. W.J.C. Cherwinski and Gregory S. Kealey (Toronto/St. John's: New Hogtown Press/Committee on Canadian Labour History, 1985).

In conclusion, these characteristics of the Newfoundland and Labrador setting would suggest that relatively high levels of injury might be associated with the industry in this province, and that stress and strain from the institutionalized position of workers in the sector would be both a direct contributing factor to industrial disease, and an indirect contributor to higher rates of other kinds of injury. Future research into health and safety patterns in the province may find particular attention to stress-related health problems may be particularly revealing. I wish now to turn in lieu of a conclusion to the question of whether health and safety problems need to be more thoroughly integrated into the policy debate in the forestry policy community. I take as my example evidence of overlap between environmental and health policy: equally important linkages deserve to be explored with respect to the aboriginal land and self-government questions.

An Introduction in Lieu of Conclusion: Integrating Health and Safety Issues in Newfoundland and Labrador

Implications for the sector

The forest workplace has been sharply contested in recent decades in a variety of issue areas and at the behest of often radically different constituencies. This contestation centres on the forest policy community, notably with respect to aboriginal resource rights, subsidization allegations in international trade, and the internationalized debate over environmental sustainability.⁹⁸ The debates of the forest policy community, typically posed in terms of (say) jobs *versus* the environment, or the spatial *distribution* of investment and hence jobs in the sector, have perhaps spent less time on issues that go to

⁹⁸ Steven Bernstein and Benjamin Cashore, "Globalization, Four Paths of Internationalization and Domestic Policy Change: The Case of Ecoforestry in British Columbia, Canada," *Canadian Journal of Political Science* 33, no. 1 (March 2000), Benjamin Cashore, "Flights of the Phoenix: Explaining the Durability of the Canada-US Softwood Lumber Dispute," *Canadian-American Public Policy* 32 December (1997), Russell S. Uhler, ed., *Canada-United States Trade in Forest Products* (Vancouver: University of British Columbia Press, 1991).

the heart of the *kind* of jobs that exist in the sector.⁹⁹ The analysis of health and safety issues in woodwork, especially one that is more oriented to questions of the power, politics, and policy that contribute to the stresses and strains contributing to these risks, may therefore be an important area to development. At the very least, an understanding of what is happening to woodworkers when at work may shed an important interpretive light on their interventions in these other debates.

This is a point about where OHS issues are debated as much as it is about whether they are. Limited airing in the forest policy community has consequences, even if these issues are being discussed elsewhere (e.g., as labour and health issues). The debate over the other consequences (environmental, aboriginal) of woodwork is being impoverished and fragmented. Through separate policy processes, for instance, both environmental and OHS considerations are now generating reform pressures on work processes in woodwork: the interplay deserves to be discussed more creatively and in tandem. As early as 1998, the ILO called upon member organization and countries to integrate health and safety practices into national forest-practices codes more generally.¹⁰⁰ Given what has been said in the foregoing sections of the paper, it is worth casting a brief glance at the environmental impact of some of the elements of woodwork we have been discussing in terms of OHS.

Mechanization and Worker Attitudes to Forest Preservation

⁹⁹ M.K. Luckert and F.J. Salkie, "Forestry in Canada: Transitions and Emerging Policy Issues," *Canadian Public Policy* 24, no. Supplement 2 (1998), Peter N. Nemetz, ed., *Emerging Issues in Forest Policy* (Vancouver: U.B.C. Press, 1992). Michael Howlett, ed., *Canadian Forest Policy: Regimes, Policy Dynamics and Institutional Adaptations* (Toronto: University of Toronto Press, 2001).

¹⁰⁰ International Labour Organization, "Safety and Health in Forest Work," VIII.

In general, mechanized shortwood harvesting has been characterized by provincial government analysts as limited in negative environmental impacts because slash is left in the woods and cushions the heavy machinery;¹⁰¹ it is also said to reduce wood “waste” left behind – wood that could have been used for human purposes.¹⁰² From an environmental viewpoint, of course, slash and “waste” left in the woods are both biomass left in the ecosystem, and also fuel for intensified future forest fires.

Mechanization is currently distributed unevenly in space, in part because of ecological constraints. Manual harvesting continues in remote, rugged locations, while more convenient and less rugged locations are typically first exploited, and first mechanized – and typically they are therefore the first cut-over as a consequence. Regeneration of a harvestable boreal forest is the work of centuries, well beyond real business plans: for practical business purposes, boreal forestry is a non-renewable resource, and silviculture is a cost rather than an investment. Mechanization in itself is substantially safer for the workers involved, but since resource depletion drives harvesting further into marginal and more rugged forestlands where only manual felling is feasible, it may therefore be correlated in complex ways with higher-risk manual felling.

Thus, mechanization has meant significant productivity gains for forest operations, and health and safety gains for remaining workers.¹⁰³ But the often-acute “wars in the woods” are fuelled in part by the third consequence of mechanization, namely deep job-shedding. A given market requires a certain, relatively fixed volume of timber, for which

¹⁰¹ Young, "Implications of Mechanical Harvesting," 5.

¹⁰² *Ibid.*: 4-5.

¹⁰³ Young, "Timber Harvesting Logging Systems," 5, Young, "Implications of Mechanical Harvesting," 6.

fewer workers are needed; in remote and marginally productive settings like Newfoundland and Labrador, alternate markets for the same high-volume production are difficult to access. With many thickets of small timber, profit margins are even thinner. Despite the fact that there would be clear natural limits to rapid increase in annual volumes, a setting like this with simple single-industry local economies, high unemployment rates, and a fixed hinterland from which to harvest, employees and employers alike would have clear, powerful incentives to support stable or increased harvests, and to oppose significant land set-asides for wilderness preservation.

Finally, the limits of transportation infrastructure contribute to the continued challenges of the industry as it stands, key health and safety problems for workers at remote harvesting sites, and the de facto environmental preservation of large portions of the boreal (including much of Labrador). Not only do logging operators gain access with new roads, but as has been well documented by environmental groups, a multiplicity of other users including wilderness tours, sports hunters, anglers, and prospectors gain access to the forestlands as well.

Resource Exhaustion, Managerial Surveillance and Emergency Response

By contrast, the mechanization of felling and delimiting necessitates being able to work in environmental conditions that are relatively favourable for the size, reduced mobility, and weight of the machines. Since these criteria also enter into the choice to mechanize, one might expect that conventional cutting practices will occur often, if not exclusively, on rougher or more damaged cutting areas. That said, the clearly greater risk of injury incurred by the workers of the latter type of cut could probably be increased by the more punishing conditions for performing the work.¹⁰⁴

¹⁰⁴ “Par contre, la mécanisation de l’abattage et de l’ébranchage nécessite la possibilité de travailler dans des conditions environnementales relativement plus favorables du fait de la dimension des machines, de

A second point to consider is that risks in resource-extractive injuries may be worsened by dispersion of operations, isolation, and remoteness from emergency medical services, risks accelerated by the spatial implications of resource exhaustion.¹⁰⁵ In the analysis of worker control strategies in more traditional factory settings, the implications of piece-work, direct managerial supervision, and the machine-driven pacing typical of assembly-line may be compared as techniques that from management's standpoint are relatively substitutable.¹⁰⁶ But as bushwork becomes increasingly remote, piece-work increasingly stand in more and more as a motivational force setting the pace of work: direct surveillance becomes technically difficult and expensive. The virtual absence of supervisory gaze in this job may be valued by some fellers, and rugged conditions in the bush have been identified as the basis for high residual levels of worker control over the work process.¹⁰⁷ But many prevention techniques in improving OHS also depend on the supervisory gaze, and the constraints on close or regular supervision leaves an injured worker more vulnerable to complications due to late discovery, transportation, and treatment. The piece-work system encourages self-disciplining bushworkers to cut

leur mobilité réduite et de leur poids. Ces critères entrant aussi [sic] dans le choix de mécaniser, on peut s'attendre à ce que la coupe conventionnelle se déroule souvent, bien que non exclusivement, sur des territoires de coupe relativement plus accidentés ou plus endommagés. Ce faisant, le risque de lésion certainement plus important encouru par les travailleurs de ce dernier type de coupe pourrait vraisemblablement être accru par des conditions d'exécution du travail plus pénalisantes." Translation by present author Laflamme, "Mécanisation," 6.

¹⁰⁵ Shrimpton, Storey, and Husberg, "Workers in Remote Areas." Under Drs. Lan Gien and Maureen Laryea, this correlation is currently the subject of intensive investigation at Memorial University's Nursing School with specific reference to public health and the collapse of the Newfoundland fisheries Sharon Gray, "International Project Tackles Resource Depletion and Health," *Gazette (Memorial University of Newfoundland)*, November 27 2003.. Nancy Leawood has conducted interviews with injured fishers that draw out the role of resource exhaustion in that industry. Fishers are encouraged to take small, in-shore vessels further out to sea and into major shipping lanes Nancy Leawood, "'Preventable Hazards' or 'Just Part of the Job': Perceptions of Risk in the Fishing Industry" (paper presented at the SafetyNet Conference 2003 (Poster series), St. John's, NL, October 30-31 2003)..

¹⁰⁶ Braverman, "Scientific Management."

¹⁰⁷ Radforth, *Bushworkers and Bosses: Logging in Northern Ontario, 1900-1980*. [get page reference]

corners. The dangers of working in close proximity and noise levels tend to intensify the isolation.

Unsafe working conditions in this respect, too, overlap strongly with conditions that are less compatible with mechanized cuts. Where this means moving into areas where average trees are also smaller and less valuable, profit margins from mechanization should decline in parallel, and productivity pressures on the firm and the piece-rate worker should both increase accordingly. One might anticipate management would deploy cheaper, higher-maintenance second-hand equipment.¹⁰⁸ Where mechanization is deployed in remote areas, and where either outside or company maintenance and repair staff have long journeys to reach the worksite, workers may improvise dangerously on maintenance problems.¹⁰⁹

The causal arrows linking adverse environmental conditions, manual felling and occupational injury are therefore complex. Though the present paper can but mention the lessons for a scenario in which stress and strain are more directly targeted in OHS prevention in the sector, it is worthy to note that the remoteness of emergency services pale in comparison with the remoteness and difficulty of providing the social and psychiatric services that would be desirable to address the mental health risks (and

¹⁰⁸ Norcliffe and Bates, "Implementing Lean Production," 55.

¹⁰⁹ Ontario. Industry Trade and Technology, "Forest Industry Automation," 7/1-7/2. My thanks to Barbara Neis for drawing my attention to the possibility of second-hand equipment in the Newfoundland and Labrador context, and the implications

indirectly also the future physical risks) of this work for woodworkers, as well as their family and friends.¹¹⁰

Cutting Regimes

A third environmental relationship in which health and safety concerns appear to work against environmental relationships concerns the cutting regimes employed. The heavy toll of injuries incurred by the unexpected collapse of dead trees, or snags, has led the Québec team to recommend a policy of paying workers to fell this commercially worthless (and therefore unrewarded in piece-work pay schemes) standing timber.¹¹¹ More generally, clearcuts are not only a preferred cut from the standpoint of optimizing the economic efficiency of an investment in heavy equipment, they would appear to be substantially safer (because less physically complex) work environments. From an environmental perspective, however, the preservation of snags and (more controversially, especially in the boreal) the preferential use of selection or partial cuts in general have been identified as important steps in managing a forest for wilderness characteristics and for certain indicator species for mature forests.

In conclusion, future occupational health and safety (OHS) issues in a more mechanized workplace may turn more on occupational disease, less as immediate workplace injury.

They may need to place greater emphasis on attenuating intense and escalating occupational stress and strain, and build prevention strategies to account for that degree

¹¹⁰ The severe limitations of psychiatric service to all but the major urban centres of Canada has been driven home by personal communication with Dr. David Kreindler.

¹¹¹ « Recommandation 5: Qu'une attention particulière soit apportée au respect de règlements concernant les chicots, en envisageant la possibilité que les travailleurs soient dédommagés pour les abattre. » Cloutier and Laflamme, "Profils D'accidents En Forêt," 41.

of workplace stress that remains irreducible. If such trends are confirmed by empirical research, compensation agencies and other government bodies will have to review how to identify and handle resulting cases of temporary or permanent debility. Such issues risk being recognized less readily by, particularly with respect to a regional industry like Newfoundland and Labrador's that is small enough to impede statistical analysis.

In quite concrete terms, the foregoing analysis suggests a policy area that cannot be satisfactorily disentangled from the admittedly crowded agenda of the forest policy community. This is not to dismiss the policy achievements in occupational health and safety that have taken place in the workers health and safety policy networks of some provinces. Indeed, these provinces now set a standard that in the future will have to serve as a minimum point of departure for the difficulties ahead. But more than before workers' health and safety seem intertwined with politics and power, and are matters that now must be clearly defined as matters of *forest* policy.

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