THE EFFLUENT SOCIETY: WATER POLLUTION AND ENVIRONMENTAL POLITICS IN BRITISH COLUMBIA, 1889-1980

by

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Abstract

British Columbia's rapid urbanization and industrialization in the twentieth century created extensive water pollution problems. Before the 1970s, many in industry and government considered waste disposal as a legitimate use of natural waterways, so long as it did not impair their usefulness for other purposes. However, social and political debates emerged over both the perception of pollution and its solution. By the late 1960s, public health advocates, sportsmen and commercial fisheries advocates had come to regard water pollution as a crisis, and demanded government action to protect the environment. This study shows how political conflicts in B.C. over water pollution echoed national and continental trends in environmental management and environmental values during the twentieth century. However, these debates were also shaped by particular geographical and environmental conditions in B.C., as well as social, political and economic aspects of provincial society.

Through case studies of domestic and industrial pollution control, this study traces conflicts created by the use of water for waste disposal. Many in government and industry regarded the ability of water to dilute, disperse and absorb wastes as "assimilative capacity," a resource that could be managed and exploited. This dictum guided planning for sewage disposal in Greater Vancouver, as well as waste-disposal practices in the mining and pulp and paper industries. Provincial pollution and water law reflected the pro-development orientation of successive B.C. governments: the B.C. Pollution Control Board sanctioned the exploitation of assimilative capacity. This practice became controversial as water-quality problems arose throughout the province. Efforts to control and regulate water pollution from cities and industry reflected local geographical conditions, as well as changing scientific perceptions of pollution. Environmental change and social attitudes toward pollution also influenced reforms to pollution-

control policies.

The history of water pollution in B.C. sheds new light on the province's social, economic and environmental history. Pollution problems illustrate the social and environmental impacts of urban and industrial growth in the twentieth century. Conflicts over pollution provide insight into changing environmental values and the emergence of the province's vital environmental movement. Finally, pollution-control debates decisively influenced the regime of environmental governance in the province.

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One might regard graduate study as a move from the amateur to the semi-pro ranks of academics. Like semi-pro athletes, you ride a lot of busses and are poorly paid. I was fortunate in that my PhD studies and research were supported by a four-year doctoral fellowship from the Social Sciences and Humanities Research Council of Canada.

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When you're a kid, you don't dream of writing a PhD thesis. It aint' the Cup. But it'll do.

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Introduction

Since time immemorial, people have employed water as a convenient medium for the disposal of wastes. In doing so, they have sometimes created pollution, either by spreading disease pathogens or degrading environmental conditions. One of humanity's most vexing problems has been how to balance the need to dispose of domestic and industrial wastes with the need for a clean environment. When settlements and industrial activities were modest in scale, they generally exerted minimal, localized environmental impacts. As population and industries have grown, however, their wastes have presented potentially devastating health, aesthetic and environmental problems. In the twentieth century, the pace and scale of this growth quickened, increasing the volume of wastes. New industrial processes such as chemical pulp and paper production and mineral smelting fouled waters with toxic wastes that decimated fish populations and made water unfit for drinking or other uses. Pollution is now a global problem that threatens the integrity of the most essential element of human life, clean water.[1]

In spite of the ubiquity of water quality problems, pollution is neither experienced nor understood in the same way at all times and places. It not only implies environmental deterioration, but also encompasses disputed technical, social, moral and legal issues. Historian Joel Tarr describes pollution as "the product of the interaction among technology, scientific knowledge, human culture and values, and the environment. Environmental policy and control technology are further elements..."[2] Divergent and changing definitions of what constitutes

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[1] Vandana Shiva, *Water Wars: Privatization, pollution, and profit* (Cambridge, Mass.: South End Press, 2002); John McNeill, *Something New Under the Sun: An environmental history of the twentieth-century world* (New York: W.W. Norton, 2000), chap. 5.

[2] Joel A. Tarr, "The Search for the Ultimate Sink: Urban Air, Land, and Water Pollution in Historical Perspective," *The Search for the Ultimate Sink: Urban pollution in historical perspective* (Akron: University of Akron Press, 1996), 7.

pollution have been fundamental to the political and scientific debates surrounding its control. Environmental conditions are interpreted differently by different observers, whether biologists or engineers, housewives or politicians, industrialists or workers. Environmental philosopher Neil Evernden contends that how pollution is perceived, and the meanings attached to it, are crucial to understanding its political dimensions. "Pollution is simultaneously ... an act of defilement, a means of moral coercion, and an indicator of underlying disagreements about societal goals," he writes.[3] Political, social, economic and environmental conditions shape the perception of pollution at different times and in different places. Historical struggles over the perception and control of pollution reveal conflicts over environmental values and the authority to control and use nature.

This dissertation explores the environmental history of twentieth-century British Columbia through the issue of water pollution. At the turn of the twentieth century, water quality was virtually unregulated in B.C. By the end of the 1970s, however, water was governed by a welter of anti-pollution regulations and authorities designed to safeguard public health, other water users and environmental quality. The move from lesser to greater regulation in B.C. echoed developments across North America in the twentieth century. Governments at every level across the continent created an array of regulatory mechanisms — laws, regulations, schedules, penalties and incentives — that directly challenged the indiscriminate use of the environment for waste dumping. Like forests, minerals and other resources, pollution became the object of bureaucratic management, expert planning and scientific investigations. But the history of pollution control is not a straightforward story of ever-improving methods of environmental management. Rather, government regulation of water quality developed out of changing and contested definitions of

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[3] Neil Evernden, "Pollution," in Robert Paehlke, ed., *Conservation and Environmentalism: An encyclopaedia* (New York: Garland, 1995), 525.

pollution problems and intense political debates over their solution.

Pollution problems arose as a result of the rapid urbanization and industrialization of B.C. in the twentieth century. However, social and political debates emerged over the perception of pollution and its solution. Up to the 1970s, many in industry and government regarded waste disposal as a legitimate use of natural waterways, so long as it did not impair their usefulness for other purposes. As pollution threats mounted in the province, public health advocates, sportsmen and commercial fisheries advocates began to question this philosophy. In the 1960s, many people in B.C. came to regard water pollution as a crisis, which led to demands for government action to protect the environment. They argued that cities and industries should be responsible for treating their wastes, even in the absence of scientifically proven environmental impacts. Political conflicts in B.C. over water pollution echoed national and continental trends in environmental management and environmental values during the twentieth century. However, these debates were also moulded by particular geographical and environmental circumstances in B.C., as well as the social, political and economic conditions of provincial society.

While uniquely shaped by place and environment, B.C.'s experience also provides an important and instructive example of the history of environmental regulation. The abundance of water in the province's rivers, lakes and shorelines contributed to the notion that pollution could be controlled with proper planning and management. However, as British Columbians quickly discovered, local geographical and hydrological conditions presented problems for waste-disposal planning, industrial location and conflicting uses of the environment. Their responses to these local problems refracted larger trends in environmental science and governance through intensely local water-pollution conflicts. Whether beach pollution in Vancouver, fouled creeks in the Kootenays, or fish kills in coastal inlets, local pollution problems framed how larger policy questions were understood. Pollution policy was also shaped by questions of political authority over nature. The macro-scale politics of regulation reflected in most histories of environmental policy and governance fail to reflect how pollution problems and solutions are shaped by particular historical-geographical settings and environmental problems.

In Canada, the provinces provide a logical unit for the study of environmental regulation. Under the country's constitutional division of powers, provincial governments hold authority over most Crown land and natural resources, with some limited exceptions. This arrangement has historically limited the importance of the federal government in environmental and resource administration to key federal spheres of authority, such as commercial fisheries. Water quality was also subject to local regulation by civic bylaws and metropolitan authorities. Focussing on water pollution, this study explores how the changing scale of environmental problems and environmental governance shaped pollution control problems and solutions. From metropolitan attempts to co-ordinate sewage disposal to provincial and federal efforts to control industrial pollution, state pollution-control activities developed in relation to intricate inter-jurisdictional politics as well as in response to particular environmental conditions. The B.C. experience indicates that there is no "natural" scale for confronting pollution and environmental problems; rather, environmental governance initiatives are a product of place and history.

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Boasting nearly one-third of Canada's precipitation runoff, British Columbia does not want for water. Along with an extensive ocean shoreline, B.C. contains thousands of freshwater lakes and several high-volume rivers. Water resources play a critical role in provincial economy and society, supplying irrigation, hydroelectricity, fisheries resources, industrial uses and domestic water needs. However, as geographer Sandra Smith points out, "water tends to be rather uneven in its spatial distribution and it varies considerably in its availability over time."[4] Precipitation falls disproportionately on coastal areas, and there is great seasonal variation in stream flows due to the entrainment of much winter precipitation in mountain snowpacks. Both water's relative abundance and its uneven geographical and temporal distribution have been major factors in water-quality management.

Water quality problems emerged in B.C. around the turn of the twentieth century in connection with urban domestic-waste disposal. The first section of this dissertation examines attempts by engineers, planners and municipal authorities to confront sewage pollution in the waters around Vancouver. Like many other cities, Vancouver relied on surrounding ocean and river waters to dilute and disperse its wastes. Beginning in 1913, the city's efforts to manage wastes through the creation of large-scale technological networks transformed urban space and nature. However, these and subsequent sewerage plans were undermined by intermunicipal rivalry, the cost of infrastructure improvements and the natural limits to the region's waste sinks. As a result, pollution from sewage contamination continued to threaten city beaches and waterways. These problems brought the province into the field of environmental governance, through the creation of a Pollution Control Board in 1956 to protect water quality in the Greater Vancouver region. By the late 1960s, public concerns over sewage pollution reached a fever pitch due to changing views of urban nature and the failure of public agencies to control persistent pollution problems. The resulting political conflicts over domestic waste treatment and disposal to the Fraser River reshaped regional and provincial approaches to pollution control in the 1970s.

Industrial pollution problems in B.C. arose chiefly in hinterland areas, where the

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[4] Sandra Smith, "Water Resources," in *British Columbia, The Pacific Province: Geographical Essays*, Colin J.B. Wood, ed. (Victoria: Western Geographical Press, 2001), 65.

province's dominant industries, mining and forestry, were mainly located. The second section of this study traces the conflicts over water pollution from mines and pulp and paper mills, and the impact of these conflicts on environmental regulation. Early in the century, few questioned the right of these industries to use waterways to dispose of mine tailings or pulp mill effluent. Because of their remote locations, industrial concerns regarded pollution abatement as an unnecessary cost, since pollution was unlikely to affect public health. Indeed, the province's rivers, lakes and tidewaters provided an important waste-disposal service for these industries. Resource-dependent communities and a development-oriented provincial government generally tolerated the degradation of streams, lakes and shorewaters as an inevitable part of industrial activity. However, pollution created conflicts between industrial waste disposal and recreational and commercial fisheries interests. This attracted regulatory concern and activity from federal and provincial fisheries officials. As Chapter 3 shows, because mining generally affected interior sport fisheries, provincial officials took the lead in confronting mining impacts on water quality. The potential impact of the pulp and paper industry on commercial fisheries, which attracted regulatory and scientific concern from federal officials, is discussed in Chapter 4. As the scale and impact of industrial pollution increased after the Second World War, these officials engaged in a variety of efforts to study the impact of waste discharges, to negotiate improvements to waste disposal practices and to restrict pollution. In doing so, they encountered problems of political authority over the environment, scientific uncertainty around pollution and industrial resistance to pollution controls. As public concern mounted over environmental damage in the late 1960s, mining and pulp mill pollution became the subject of intense political debates in B.C. Several high-profile pollution disputes triggered significant reforms to the practices of environmental governance at both the provincial and federal levels.

The final section examines in greater detail the political and regulatory effects of shifting social perceptions of pollution in the late 1960s. High-profile pollution incidents around the world and changing public perceptions of the environment fuelled fears of an "environmental crisis." In B.C., these fears, along with simmering discontent over the environmental management practices of the provincial government, stimulated a wave of environmental activism. Pollution was at the forefront of public environmental concerns during what has been called "the environmental era."[5] Led by the B.C. Wildlife Federation, sportsmen's organizations adopted a strident critique of pollution and resource exploitation policy informed by conservation ideology, sporting ethics and ecological ideas. Sportsmen were joined by a variety of environmental advocacy groups that emerged in the late 1960s. Among these groups, the Society for Pollution and Environmental Control, or SPEC, embodied the vagaries of pollution politics in the turbulent period of the late 1960s and early 1970s. The organization's initial dramatic growth, widespread activities, and subsequent precipitous decline illustrated the deep connections between the international environmental movement and particular local issues and conditions. Woven through the first two sections is an account of the activities of the Pollution Control Board, the provincial body charged with regulating water quality in B.C. In the 1970s, the board held a series of public inquiries held which dramatized the contested politics of pollution in B.C. Aimed at generating technical information for the creation of pollution-control standards, the hearings became a highly charged forum for disparate views on waste disposal, pollution and environmental protection. In particular, industry and environmental advocates clashed over the science and philosophy of pollution regulation. The published pollution-control objectives that emerged from this process were

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[5] Samuel P. Hays, *Beauty, Health, Permanence: Environmental politics in the United States, 1955-1985* (New York: Cambridge University Press, 1987).

attacked on all sides as the government struggled to find a regulatory approach that would satisfy both environmentalists and waste dischargers.

Several interrelated themes in the history and politics of pollution control emerge from this account. First, pollution controls and environmental governance were expressions of the rise of the regulatory state in the twentieth century.[6] "Environmental governance" is a term used by environmental economists and political scientists to refer to the formal and informal institutions developed to regulate access to resources or mediate environmental conflicts. As Jouni Paavola notes, environmental governance institutions reflect the historical, social and environmental context in which they are developed.[7] In B.C., the overall trend towards greater regulation obscures considerable complexity. Since pollution controls were resisted by industries (and sometimes municipalities), governments proved reluctant to create or enforce them. When environmental damage or public pressure forced governments to act, they often enacted deliberately weak policies in order to limit the impact of regulation on waste dischargers.

Environmental problems also produced clashes over the legal and political authority over nature. These clashes included jurisdictional disputes between governments at various levels, but also revealed contradictory impulses within governments. For instance, the provincial Fish and Wildlife Branch acted as an important check on pollution from within the pro-development provincial administration. As environmental concern mounted in the 1960s, governments were subject to often contradictory pressures from the public. On the one hand, the public demanded that

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[6] Peter Gossage, *Water in Canadian History: An overview*, Inquiry on Federal Water Policy Research Paper 11 (Victoria: University of Victoria Department of Geography, March 1985), highlights the development of state management and control of water resources in the twentieth century.

[7] Jouni Paavola, "Water Quality as Property: Industrial water pollution and common law in the nineteenth century United States," *Environment and History* 8 (2002), 295-318.

governments intervene to regulate pollution; on the other, the public showed increasing distrust of public officials and of the bureaucratic management of the environment. The long-standing controversy surrounding the policies of the provincial Pollution Control Board exemplified the politicization of government environmental policy in the 1960s.

The politics of science also shaped and constrained efforts at pollution control regulation. Scientific claims were critical to the definition of pollution problems, whether in terms of public-health problems, resource-conservation issues or ecological impacts. Technical knowledge changed significantly during the century, expanding the number of environmental parameters by which to measure pollution. By contesting the relevance or technical measurement of various parameters, or advancing others, various groups in society sought to constrain (or expand) how pollution was defined and regulated. Disputes over the meaning and measurement of coliform bacteria, trace heavy metals or the laboratory response of fish to pollutants formed a critical aspect of the politics of regulation. Science brought into view certain pollutants or environmental effects, but these measures became sites of political struggle over pollution policy. Different sources of expert authority, such as biology or engineering, justified various approaches to waste disposal and its regulation.

Pollution conflicts also reflected changing, divergent perceptions of environment and risk. Sanitary and industrial engineers in government and industry approached pollution as a technical and economic problem. They regarded the use of water for waste disposal to be a legitimate, even desirable, activity so long as other water uses were not harmed. The waste-diluting capacity of water was, in this view, a resource to be efficiently managed and rationally exploited for economic benefit. Many members of the general public shared this faith in technical expertise and bureaucratic management of resources. However, they were quick to question this approach when pollution problems arose. Sewage pollution, for instance, played upon the health fears of the public even when experts assured people that domestic wastes posed no disease threat. Moral and aesthetic sentiments against pollution also influenced the public perception of the hazards posed by waste disposal. By the mid-1960s, the increasing climate of public distrust of government and expertise, combined with growing ecological awareness, stimulated public reactions against the practice of exploiting the environment's assimilative capacity. The gulf in environmental perception between pollution "experts" and the public was illustrated time and again in conflicts over industrial and domestic waste disposal plans in the late 1960s and early 1970s.

The themes and issues emerging from this account of the history of pollution in B.C. indicate the salience of regarding pollution in terms of resource history. Since the waste-assimilative capacity of provincial waters was regarded by many as a resource, its control and administration were framed in terms which reflected the distributive functions of natural-resource management. Resource development has been a central theme in B.C. history. Historians and geographers have recounted the development of legal and political structures designed to facilitate the large-scale exploitation of fisheries, minerals and forests.[8] B.C. history has often been described in terms of the political and social conflicts surrounding the rapid expansion of these activities into the provincial hinterland. Many have drawn out the social implications of this history through the experiences of workers and other social groups on the industrial resource

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[8] Robert E. Cail, *Land, Man, and the Law: The disposal of Crown lands in British Columbia, 1871-1913* (Vancouver: University of British Columbia Press, 1974); Anthony H.J. Dorsey, "The Management of Super, Natural British Columbia," *BC Studies* 73 (Spring 1987), 14-32; Tina Loo, *Making Law, Order, and Authority in British Columbia, 1821-1871* (Toronto: University of Toronto Press, 1994); Dianne Newell, *Tangled Webs of History: Indians and the law in Canada's Pacific coast fisheries* (Toronto: University of Toronto Press, 1993); Jeremy Wilson, "Forest Conservation in British Columbia, 1935-1985: Reflections on a Barren Debate," *BC Studies* 76 (Winter 1987/88), 3-30; Douglas Harris, *Fish, Law, and Colonialism: The legal capture of salmon in British Columbia* (Toronto: University of Toronto Press, 2001). For general accounts of the history and geography of resource development in B.C., see essays in Hugh J.M. Johnston, ed., *The Pacific Province: A history of British Columbia* (Vancouver: Douglas and McIntyre, 1996); Colin J.B. Wood, ed., *British Columbia, The Pacific Province: Geographical Essays* (Victoria: Western Geographical Press, 2001).

frontier.[9] Less frequently have the environmental impacts of these processes been drawn out. Clear exceptions to this trend are the works of Richard Rajala and Jeremy Wilson on forestry and environmental politics in British Columbia, which include a consideration — if not a thoroughgoing analysis — of the influence of non-human nature on the political and economic history of B.C.[10] Industrial resource exploitation has been documented through the production of commodities — the "rush for spoils" of provincial nature — but little attention has been paid to the environmental damage wrought in the form of pollution. Explorations by James Allum and John Wirth of the international dispute in the 1920s and 1930s over air pollution from the smelter at Trail, B.C., provide a tantalizing introduction to the larger question of the industrial abuse of nature.[11] As their studies have indicated, the problem of pollution is important because it reveals how our society has valued (or abused) common environmental resources such as air, water, and soil. Their work also points to the geographical factors affecting pollution politics, including the mobility of pollutants, jurisdictional authority and conflict over the environment, and (to a lesser extent) the effects of uneven environmental impacts and conditions on the perception of pollution.

As a kind of resource commons, water illustrates important aspects of changing regimes of environmental governance. When the Crown Colony of British Columbia was formed, water use was virtually unregulated. Access to water was governed by the bundle of English common-law

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[9] Newell, *Tangled Webs of History*; Patricia Marchak, *Green Gold: The forestry industry in British Columbia* (Vancouver: University of British Columbia Press, 1983); Rennie Warburton and David Coburn, eds., *Workers, Capital, and the State in British Columbia* (Vancouver: University of British Columbia Press, 1998); R. Cole Harris, "Industry and the Good Life around Idaho Peak" and "Making an Immigrant Society" in *The Resettlement of British Columbia: Essays on colonialism and geographical change* (Vancouver: University of British Columbia Press, 1996).

[10] Richard Rajala, *Clearcutting the Pacific Raincoast: Production, science and regulation* (Vancouver: University of British Columbia Press, 1998); Jeremy Wilson, *Talk and Log: Wilderness politics in British Columbia, 1965-1996* (Vancouver: University of British Columbia Press, 1998).

[11] James Robert Allum, "Smoke Across the Border: The environmental politics of the Trail smelter investigation" (PhD diss., Queen's University, 1995); John D. Wirth, *Smelter Smoke in North America: The politics of transborder pollution* (Lawrence, Kan.: University of Press of Kansas, 2000).

rights and obligations known as the riparian doctrine; water itself was not considered property. In the opinion of eighteenth-century jurist William Blackstone, water "is a moveable, wandering thing, and must of necessity continue common by the law of nature; so that I can only have a temporary, transient, usufructary property therein."[12] The control of water and rights of access to it extended from ownership of adjoining land. Downstream users of water were protected from the upstream appropriation or pollution of streams by the principle that riparian-rights holders were entitled to flows undiminished in quantity or quality. In B.C., as elsewhere in North America, changes to water law and administration in the late-nineteenth and early-twentieth centuries instigated a regime of state ownership, control and distribution of water rights.[13] Through a kind of "enclosure" of water, the riparian doctrine was legally constrained (though not totally eliminated) in favour of the management of water resources for the purposes of economic development. The changing pattern of water law and regulation was a key aspect of the development of B.C.'s natural resources, including fisheries and forestry.[14] I argue that new approaches to water, particularly the role of the state in securing ownership and distributing the benefits of water use, crucially shaped provincial water-pollution policy. The use of the environment for waste disposal also came to be viewed as a state-controlled resource that was made available for the use of cities and industries.

Unlike many resource histories, however, this study attempts to account for geographical conditions and environmental change. These factors are the hallmark of environmental history, an

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[12] Cited in Theodore Steinberg, *Nature Incorporated: Industrialization and the waters of New England* (Cambridge: Cambridge University Press, 1991), 14.

[13] Ludwik A. Teclaff, *Water Law in Historical Perspective* (Buffalo: William S. Hein Co., 1985), chap. 1.

[14] Cail, *Land, Man, and the Law*; Harris, *Fish, Law, and Colonialism.*

approach to human-nature interactions still in its infancy in Canada.[15] Environmental history may be distinguished from resource history by its particular attention to the role of environmental forces in the history of human encounters with non-human nature.[16] Human impacts on landscape change have long been the province of historical geographers, who have contributed important concepts and insights into the historic interactions of people and place. In particular, geographers draw attention to critical questions of scale, location and mobility that influenced past perceptions and interactions with natural landscapes.[17] In drawing from both the historical-geographical and environmental-history traditions, I employ a case-study approach to exploring the environmental changes wrought by waste disposal on the "waterscapes" of B.C. Environmental variability and the geographical problems of scale and location were significant factors in determining whether pollution occurred, how severe were its impacts and what policies were recommended for its abatement. To be sure, the analysis of geographical factors and environmental change has been challenging in some cases due to the difficulties of using historical sources to track environmental changes. However, this account suggests that an environmental-historical geography approach to pollution problems provides an important method of integrating social, environmental and

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[15] Ramsay Cook, "Cabbages Not Kings: Towards an ecological interpretation of early Canadian history," *Journal of Canadian Studies* 25, 4 (Winter 1990-91), 5-16; Alan MacEachern, "Voices Crying in the Wilderness: Recent works in Canadian environmental history," *Acadiensis* 31, 2 (Spring 2002), 215-226; Graeme Wynn, *Remaking the Land God Gave to Cain: A brief environmental history of Canada* (London: Canada House, 1998).

[16] The literature on environmental history is vast, varied, and growing. Useful introductions to the field may be gleaned from three separate special editions of journals featuring literature surveys and methodological meditations: *Journal of American History* 76, 4 (March 1990); *Pacific Historical Review* 70, 1 (2001); and *History and Theory*, Theme Issue 42 (December 2003).

[17] Compared with studies of "landscape" (which supplies many useful concepts and approaches), the historical geography of the environment is a relatively undeveloped field. But see Lary Dilsaver and Craig E. Colten, eds., *The American Environment: Interpretations of past geographies* (Lanham, Md: Rowman and Littlefield, 1992); Graeme Wynn, *Timber Colony: A historical geography of early nineteenth century New Brunswick* (Toronto: University of Toronto Press, 1981); Michael Williams, "The Relations of Environmental History and Historical Geography," *Journal of Historical Geography* 20, 1 (1994), 3-21; J.M. Powell, "Historical Geography and Environmental History: An Australian interface," *Journal of Historical Geography* 22, 3; J.M. Powell, "Historical Geographies of the Environment," in Brian Graham and Catherine Nash, eds., *Modern Historical Geographies*, (Essex: Pearson Education Ltd., 2000); J.G. Nelson, "Man and Landscape in the Western Plains of Canada," *Canadian Geographer* 11, 4 (1967), 251-264; J.G. Nelson, *Man's Impact on the Western Canadian Landscape* (Toronto: McClelland and Stewart, 1976).

geographical accounts of past environmental problems and conflicts.

Like other resource and environmental histories, pollution history encompasses technological change, changing values and views of nature, the economics and geography of resource development, and the contradictory role of the state as promoter of industrial development and steward of the public interest. The phenomenon of water pollution differs from, for instance, forestry or mining development, because of the nature of water as a mobile resource governed by peculiar institutions of property, and the nature of pollution, which is not a productive activity in itself but rather what economists call a "negative externality," or byproduct of industrial production. Regarding pollution in terms of regimes of resource management and environmental governance, however, opens up important insights into the changing and contested views of pollution during the course of the twentieth century. It connects pollution-control administration with the pro-development policies of provincial governments, in particular the frenzied expansion of industrial resource-extractive activities after the Second World War. These policies, and the pollution that they created, became a significant source of social and political controversy by the 1960s. Pollution problems formed a major aspect of the intense environmental politics that developed in B.C. around questions of resource development and the abuse of nature.

Although focussed on the history and environment of B.C., this account contributes to the growing literature on pollution and environmental conflict in twentieth-century North America. It will also be of interest to those who study urban environmental history and geography, the history of the mining and pulp and paper industries, and historians of environmentalism. Foremost, however, this story hopes to contribute to a deeper understanding of society and environment in British Columbia. It was the vitality and stridency of environmental politics in B.C. that led me to the question of pollution in the first place. The province is well-known as the home of Greenpeace, the Western Canada Wilderness Committee and dozens of other vocal and active environmental groups, campaigning mainly on resource-conservation and wildlife/wilderness-protection issues. To my surprise, initial research revealed the salience of pollution as a catalytic issue for early B.C. environmental groups in the late 1960s and early 1970s. This account provides insights into the history of the conservation and environmental movements in B.C., and reflections on the politics of nature in the province. As an issue, pollution mobilized British Columbians in surprising and compelling ways, combining local and national issues and problems with the dramatic international rise in ecological consciousness during this period. In particular, water quality emerged as a formative problem for both pollution policy and environmentalist mobilization. While air pollution and solid waste have been important issues, neither exhibited the political salience of water pollution in this period.

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Efforts to solve waste disposal problems and control water pollution are as old as the problem itself. Archaeological evidence indicates that some provision for sewage disposal was made in ancient Indus Valley, Incan and Roman cities.[18] For millennia, however, waste disposal systems were designed to simply remove sewage and other wastes to the nearest waterway. This practice continued with little modification as urban settlements grew, crowding together larger numbers of people, animals and their diseases. In addition to domestic sewage, industrial effluent containing noxious chemicals, animal offal and solid constituents flowed into waters surrounding cities. These wastes contributed to the persistent water-quality problems and intermittent plagues that made cities what historians John and William McNeill have called "demographic black holes"

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[18] William A. James, "A Historical Perspective on the Development of Urban Water Systems," lecture notes, www.eos.uguelph.ca/webfiles/james, accessed December 2003.

until the 1850s.[19] Before this time, the connection between water pollution and public health was poorly understood; many considered filthy water an aesthetic nuisance, not a health threat.[20]

Urban and industrial pollution problems followed the expansion of European society to North America. European settlers also brought with them the long-held notion that the "self-purifying agencies" of flowing water could safely dilute and disperse wastes. As industry and population expanded in the latter half of the nineteenth century, pollution problems became acute, particularly in eastern North America. Changing scientific theories of disease pathology linked water pollution from domestic wastes to epidemic diseases such as cholera, dysentery, yellow fever and typhoid. Manufacturing activity created vast amounts of wastes that polluted waterways with organic constituents and toxic chemicals. Still, pollution of local waters was often tolerated as an inevitable concomitant of industrial development and social progress.[21]

Mounting water-quality problems and changing social attitudes towards pollution prompted a variety of social, political and scientific responses beginning in the mid-nineteenth century. Urban residents and water users downstream from major pollution sources challenged the unchecked disposal of wastes through the courts and through political demands to halt pollution. In the early twentieth century, governments around North America took halting steps towards the direct regulation of water quality by limiting industrial or domestic discharges, or setting baseline

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[19] J.R. McNeill and William H. McNeill, *The Human Web: A bird's-eye view of world history* (New York: W.W. Norton, 2003), 266.

[20] For a provocative account of this shifting perception of water and pollution, see Jean-Pierre Goubert, *The Conquest of Water: The advent of health in the industrial age* (Oxford: Polity Press, 1989).

[21] John T. Cumbler, *Reasonable Use: The people, the environment, and the state, New England 1790-1930* (Oxford: Oxford University Press, 2001); Charles E. Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago: University of Chicago Press, 1962); Steinberg, *Nature Incorporated.*

environmental quality standards.[22] Pollution was increasingly viewed as a symptom of industrial and civic inefficiency. A body of experts called sanitary engineers emerged to confront the technical problems of industrial and domestic waste disposal and treatment.[23] In many cases, however, cities continued to rely on water-purification technologies to ensure safe drinking-water supplies, rather than develop expensive waste-treatment and disposal technologies.

Urban planners, sanitary engineers and industries regarded the ability of water to disperse, dilute and absorb domestic and industrial pollutants as a resource to be rationally exploited, so long as it did not impair other uses of water. Rooted in earlier notions of water's "self-purifying agencies," the "assimilative capacity" of the environment emerged as a key technical concept used in waste-disposal planning in the twentieth century. According to the doctrine of assimilative capacity, the natural biophysical processes and properties of water could be measured, managed and rationally utilized as a "sink" to avoid the costly treatment of domestic and industrial wastes. This approach was advocated by the sanitary engineering profession, which exercised considerable influence in water pollution control policy by the early twentieth century.[24] As historians Terence Kehoe and Joel Tarr note, sanitary engineers embraced the principles of economic efficiency and expert planning in resource utilization characteristic of the Progressive-

[22] Christine Meisner Rosen, "'Knowing' Industrial Pollution: Nuisance law and the power of tradition in a time of rapid economic change, 1840-1864," *Environmental History* 8, 4 (October 2003), 565-597; Joel A. Tarr, "Industrial Wastes, Water Pollution, and Public Health, 1876-1962," in *The Search for the Ultimate Sink: Urban pollution in historical perspective*, (Akron: University of Akron Press, 1996); .Martin V. Melosi, *The Sanitary City: Urban infrastructure in America from colonial times to the present* (Baltimore: Johns Hopkins University Press, 2000).

[23] Martin V. Melosi, "Sanitary Engineers in American Cities: Changing roles from the Age of Miasmas to the Age of Ecology," in *Effluent America: Cities, industry, energy, and the environment* (Pittsburgh: University of Pittsburgh Press, 2001).

[24] Ibid.; Tarr, "The Search for the Ultimate Sink"; Joel A. Tarr, "Water and Wastes: A retrospective assessment of wastewater technology in the United States, 1800-1932," in *The Search for the Ultimate Sink.*

era conservation movement in North America.[25] Conservation was an approach to resource management that sought to rationalize and improve the benefits to society from the capitalist exploitation of resources. It envisioned an important role for the state as a regulator, to prevent waste and inefficiency, and as a promoter, to ensure maximum development potential was reached. It advocated the application of scientific expertise to problems of resource development and management in both the public and private sectors. Conservation ideology promised that better understanding of natural resource systems, better harvesting and processing technologies, and better management of economic systems would ensure "the greatest good for the greatest number over the longest time."[26] Varieties of this philosophy influenced resource-development planning throughout North America. For instance, the Canadian Commission of Conservation was founded on the principles of utilitarian conservation in 1909. These ideas also stimulated scientific management initiatives in fields as diverse as agriculture, game management, forestry and water basin development well into the 1960s.[27]

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[25] Ibid.; Terence Kehoe, *Cleaning Up the Great Lakes: From cooperation to confrontation* (DeKalb, Ill.: Northern Illinois University Press, 1997), 22-23. The principle of efficiency guiding pollution control and resource conservation is explored in connection with the petroleum industry in Hugh S. Gorman, *Redefining Efficiency: Pollution concerns, regulatory mechanisms, and technological change in the U.S. petroleum industry* (Akron, OH: University of Akron Press, 2001).

[26] Key discussions of Progressive conservation ideology include Samuel P. Hays, *Conservation and the Gospel of Efficiency* (Cambridge, Mass: Harvard University Press, 1958); Clayton R. Koppes, "Efficiency, Equity, Esthetics: Shifting themes in American conservation," in Donald Worster, ed., *The Ends of the Earth: Perspectives on modern environmental history*, (New York: Cambridge University Press, 1988); Stephen Fox, *John Muir and His Legacy: The American conservation movement* (Toronto: Little, Brown and Co., 1981); Roderick Nash, ed., *The American Environment: Readings in the history of conservation* (Reading, Mass.: Addison-Wesley, 1968).

[27] Alan F.J. and Gibert A. Stelter Artibise, "Conservation Planning and Urban Planning: The Canadian Commission of Conservation in historical perspective," in *Consuming Canada: Readings in environmental history*, Chad Gaffield and Pam Gaffield, eds (Toronto: Copp Clark, 1995); Michel Girard, *L'écologisme Retrouvé: Essor et déclin de la Commission de la Conservation du Canada* (Ottawa: University of Ottawa Press, 1996). Canadian aspects of the Progressive conservation impulse are discussed in R.P. Gillis and T.R. Roach, *Lost Initiatives: Canada's forest industries, forest policy and forest conservation* (New York: Greenwood Press, 1986); Tina Loo, "Making a Modern Wilderness: Conserving wildlife in twentieth-century Canada," *Canadian Historical Review* 82, 1 (March 2001), 92-121; H.V. Nelles, *The Politics of Development: Forests, mines and hydro-electric power in Ontario, 1849-1941* (Toronto: University of Toronto Press, 1974); Jeremy Wilson, "Forest Conservation in British Columbia, 1935-1985: Reflections on a barren debate," *BC Studies* 76 (Winter 1987/88), 3-30.

This philosophy deeply influenced water management and pollution control policy in B.C. Water resource management in B.C. favoured an interpretation of conservation as the promotion of "beneficial use" and the "full utilization" of provincial water resources.[28] This policy included the use of waters for waste disposal. Sanitary engineers, politicians and industrialists often cited the vast waste-assimilative capacity of B.C. waters as a justification for untreated waste disposal. They expressed confidence that through proper planning, pollution problems seen in eastern North America and elsewhere could be avoided. An expert panel convened in 1952 to consider pollution policy in B.C. asserted that "pollution is an aspect of proper resource use."[29] The challenge for water resource managers and pollution control engineers was to develop scientific measures of assimilative capacity to facilitate its exploitation. Protecting water quality was viewed as important only in relation to downstream uses of water. As the following account reveals, these concepts informed the mandate and policies of the provincial Pollution Control Board.

Sportsmen, environmentalists, fishers and community groups in B.C. disputed this utilitarian view of water. In part, opposition to the use of water as a waste disposal medium reflected long-standing moral notions of water as a symbol of purity and health. As anthropologist Mary Douglas has suggested, the notion of pollution is rooted in ideas about defilement and the perception of dirt as "matter out of place."[30] Water-quality proponents regarded the dumping of

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[28] H. D. DeBeck, Comptroller of Water Rights, "Present Use of British Columbia's Water," in *Transaction of Seventeenth British Columbia Natural Resources Conference* (Victoria, BCNRC, 1967), 39. See also BCARS, GR-1006 Water Rights Branch, Box 1 file 24, "Water Conservation Practices and Problems in B.C." paper prepared by the WRB, January 1959, for a national conference on conservation. See also Richard S. Campbell, Peter Pearse and Anthony Scott, "Water Allocation in British Columbia: An economic assessment of public policy," *U.B.C. Law Review* 7 (1972), 247-292.

[29] *Transactions of the Sixth Resources Conference* (Victoria: BCNRC, 1952), 161-199. See also pollution panel planning meeting minutes in University of British Columbia Special Collections and University Archives Division, Roderick Haig-Brown papers, Box 119, file 5.

[30] Mary Douglas, *Purity and Danger: An analysis of concepts of pollution and taboo* (New York: Frederick A. Praeger, 1966).

untreated domestic and industrial wastes as a fundamentally inappropriate use of water. They advanced the idea of clean water as a public amenity, valuable for its recreational uses and its quality of "naturalness." The amenity values of water, including recreational fisheries, were increasingly couched in utilitarian conservation terms after the Second World War, and pollution was described as an infringement on the economic resources of fisheries and tourism. Defenders of environmental quality also adopted technical discourses of water quality to challenge the science of assimilative capacity. Environmentalists and biologists used ecological measures of environmental quality and the impact of pollution to challenge the engineering view of water as a kind of organic machine for waste disposal. These various opponents of pollution articulated views of water and nature that reasserted common rights and public control over nature, against what they regarded as the private appropriation of waterways as waste receptacles.

In building a modern society on the Pacific Coast, British Columbians have been forced to reckon with the "effluence of affluence" and to make decisions about their priorities for economic development, social well-being and environmental quality. Notably, one of the earliest anti-pollution groups in B.C. called itself "Effluent Society." This name punned economist J.K. Galbraith's book *The Affluent Society*, but also demonstrated the links pollution critics increasingly made in the 1960s between industrial and urban development, prosperity and environmental degradation. It also suggested that British Columbia was an "effluent society" shaped by its attitudes towards and practices of waste disposal. It is a truism that some of the most revealing insights about a society are gleaned from its garbage. The following narrative suggests that the same may be said of how society confronts the problem of pollution.

Section 1
"A Giant Flushing Machine":
Sewage pollution and the construction of assimilative capacity in Greater Vancouver

Water pollution is commonly categorized by its provenance, whether domestic or industrial. While this conflates many similarities in the constituents and impacts of these wastes, the designation is useful because the two types of wastes are often products of very different historical, political and environmental circumstances. This opening section explores the control of pollution from domestic wastes in B.C. It uses the enduring problem of sewage pollution in twentieth-century Vancouver as a case study. Like most other modernizing urban centres, the expanding city confronted the ever-growing problem of liquid waste disposal by constructing piped sewerage and drainage systems. The first chapter examines how this method of sanitary waste disposal resulted in the reorganization of urban space and nature. Early civic leaders extolled the virtues of planned, public utilities to avoid the problems of pollution, disease and environmental danger that plagued older cities. But the ongoing contamination of local waters by sewage well into the latter half of the twentieth century revealed the shortcomings of the city's pollution-control technologies and strategies. The second chapter focuses on the mounting scientific, regulatory and public concern over the pollution of the Fraser River and its estuary by domestic waste streams. As a multi-use urban waterway, the Fraser was a symbolically and materially important river for Vancouverites. The exploitation of its high-volume waters was also a key component of the region's evolving wastewater disposal strategies. As pollution fears increased beginning in the 1960s, environmental groups and fisheries advocates challenged the authority of government regulators and technocratic managers, and advanced an alternative vision of regional waters based on ecological principles.

Human waste disposal, water supply and sanitation have posed basic challenges to urban development throughout human history. Historian Dale Porter has written that "sewers and sewage have become such an integral part of modern urban infrastructures that it is difficult to imagine alternative ways of thinking about the disposal of excrement, industrial waste, and rainwater runoff."[1] Yet, as late as the mid-eighteenth century, most urban dwellers in Europe and North America used rainwater and local streams to flush human excreta and other waste from streets, lanes and cesspools. At best, tile- or earth-lined privy closets cleaned by "night-soil men" provided some containment of wastes. As urban populations grew, the problems associated with these practices became more acute. Crowd diseases such as cholera, typhoid and yellow fever flourished in these conditions, occasionally (and, to contemporaries, inexplicably) winnowing populations in episodic visitations.[2]

John and William McNeill recount how the "sanitary revolution" that confronted these problems in the nineteenth century changed cities from "demographic black holes" to places where birth rates exceeded death rates.[3] Historians have documented how the waves of cholera that ravaged mid-late nineteenth-century European and eastern North American cities stimulated scientific debates and innovations that led to the identification of polluted water as a vector of disease. Yet as Christopher Hamelin perceptively points out, urban sanitary reform was not a coherent, progressive social enterprise, but rather a contested enterprise "forged from a peculiar

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[1] Dale H. Porter, *The Thames Embankment: Environment, technology, and society in Victorian London* (Akron: University of Akron Press, 1998), 50.

[2] William H. McNeill, *Plagues and Peoples* (New York: Doubleday, 1976); Charles E. Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago: University of Chicago Press, 1962); Geoffrey Bilson, *A Darkened House: Cholera in nineteenth century Canada* (Toronto: University of Toronto Press, 1980); Bruce Curtis, "Social Investment in Medical Forms: The 1866 cholera scare and beyond," *Canadian Historical Review* 81, 3 (2000), 347-79.

[3] J.R. McNeill and William H. McNeill, *The Human Web: A bird's-eye view of world history* (New York: W.W. Norton, 2003), 266.

assortment of ideology, institutions, political circumstance, and perceptions of nature."[4] Throughout the nineteenth century, debates swirled around the role of contaminated water in the spread of disease. Scientific theories of disease causation were influenced by conflicting moral, environmental, economic and political ideas, as well as by the competing expert communities of engineers, medical professionals and sanitary reformers. While some experts believed diseases were caused by "miasmas," or foul airs released by putrescent organic matter, others suggested diseases were caused by organisms living in contaminated water. While the solutions derived from these theories differed in emphasis, the public-health reform programs of John Snow and Edwin Chadwick in London, and the flamboyant George E. Waring in the U.S., linked disease control with the maintenance of urban environmental quality. By the 1890s, as the bacteriological theory gained acceptance, clean water and efficient waste disposal became recognized as the key to healthful and efficient modern cities.[5]

The subsequent development of centralized municipal water supplies and sewerage and drainage networks entailed the large-scale transformation of nature and the built environment in cities. The growing popularity of water-carriage technology and indoor plumbing overwhelmed the localized land-disposal methods of cesspools and privies, and threatened urban waterways with ever-greater volumes of wastes. In North America, the maintenance of urban order and cleanliness became a major Progressive-era project that encouraged municipal enterprise in the

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[4] Christopher Hamlin, *A Science of Impurity: Water analysis in nineteenth-century Britain* (Berkeley: University of California Press, 1990), 4.

[5] In addition to Rosenberg, Porter, and Hamlin, see Martin V. Melosi, *The Sanitary City: Urban infrastructure in America from colonial times to the present* (Baltimore: Johns Hopkins University Press, 2000); Bill Luckin, *Pollution and Control: A social history of the Thames in the nineteenth century* (Bristol: Adam Hilger, 1986); Joel A. Tarr, "Decisions About Wastewater Technology, 1850-1932," in *The Search for the Ultimate Sink: Urban pollution in historical perspective*, (Akron: University of Akron Press, 1996); Suellen Hoy, *Chasing Dirt: The American pursuit of cleanliness* (New York: Oxford University Press, 1995), 61-80; John T. Cumbler, *Reasonable Use: The people, the environment, and the state, New England 1790-1930* (Oxford: Oxford University Press, 2001), 149-150.

provision of civic services, with the resulting expansion of government power and influence.[6] Cities turned to an emerging cadre of scientific experts, from medical health professionals to sanitary engineers, to design and implement public health regulations and technological networks for the control of the urban environment.[7] As historian Stanley K. Schultz notes, "Not only did [engineering] offer solutions to such physical problems as water and sewer supply, it also contributed comprehensive planning schemes that illustrated the interaction of technology with the social, economic, and political structure of cities."[8] Pollution problems transgressed pre-existing political boundaries and imagined geographies, forcing city leaders to re-conceptualize their territories as both natural and political. This entailed the development of new structures of urban governance. Sanitary engineers were at the forefront of urban planning and regional governance initiatives that reshaped the spaces of the city as they sought to control a recalcitrant urban nature. Nevertheless, disputes raged over the definition of and responsibility for water pollution, the appropriate technologies of waste disposal and treatment, the design and cost of capital-intensive drainage networks, and the provision of services to different areas of the city.

Environmental problems and their technological solutions reworked urban social and

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[6] On Progressive-era environmental reform in cities, see Christine Meisner Rosen, *The Limits of Power: Great fires and the process of city growth in America* (Cambridge: Cambridge University Press, 1986); Craig E. Colten, "Basin Street Blues: Drainage and environmental equity in New Orleans, 1890-1930," *Journal of Historical Geography* 28, 2 (2002), 237-57; Sarah S. Elkind, *Bay Cities and Water Politics: The battle for resources in Boston and Oakland* (Lawrence, Kan.: University Press of Kansas, 1998); Adam W. Rome, "Coming to Terms with Pollution: The language of environmental reform, 1865-1915," *Environmental History* 1, 3 (July 1996), 6-28; Douglas Stradling, *Smokestacks and Progressives: Environmentalists, engineers, and air quality in America, 1881-1951* (Baltimore: Johns Hopkins University Press, 1999).

[7] On the growth of engineering expertise in the U.S., see Hoy, *Chasing Dirt*; Martin V. Melosi, "Sanitary Engineers in American Cities: Changing roles from the Age of Miasmas to the Age of Ecology," in *Effluent America: Cities, industry, energy, and the environment* (Pittsburgh: University of Pittsburgh Press, 2001); and especially Stanley K. Schultz, *Constructing Urban Culture: American cities and city planning, 1800-1920* (Philadelphia: Temple University Press, 1989), part 4. On nineteenth-century sanitary engineers in Canada, see Douglas Baldwin, "Sewerage," in Norman R. Ball, ed., *Building Canada: A history of public works* (Toronto: University of Toronto Press, 1988); and B. Sinclair and N.R. Ball and J.O. Petersen, *Let Us Be Honest and Modest: Technology and society in Canadian history* (Toronto: Oxford University Press, 1974), 244-249.

[8] Schultz, *Constructing Urban Culture*, 190.

environmental geographies. Both physical and discursive constructions of nature are implicated in the modernization and rationalization of space in the city through technological networks.[9] Dubbed by some geographers "cyborg urbanization," this process of spatial reorganization is seen to produce a peculiarly "metropolitan nature" out of historical interactions between non-human nature and the built environment. In this view, both nature and society are transformed into novel forms through the symbolic and physical intermingling of natural and social forces in the city. These perspectives usefully illuminate the ideological aspects of urban environmental projects, and highlight the transformative impact of urban infrastructure. Jean-Pierre Goubert, for instance, has provocatively described the changing scientific views of water and disease, and the spatial segregation of water in the nineteenth-century city:

> Science had identified the boundary between pure and impure water; as a consequence, water was now controlled and entrusted with the task of carrying away waste and excrement through underground pipes... [T]hose whose role it was to manage and manipulate space—architects, town planners, sanitary engineers, hygienists, chemists and engineers—created new objects and sculpted new structures, concealed the hydraulic systems and took water underground in order to protect it and to protect man from it...[10]

The scientific and technological "conquest of water" traced by Goubert entailed a simultaneous re-organization of society and nature, as well as affecting attitudes towards hygiene, sanitation, water and waste. In order to facilitate its management as an urban resource, a new scientific view of water emerged that emphasized quantitative representations of natural processes

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[9] Matthew Gandy, "The Paris Sewers and the Rationalization of Urban Space," *Transactions of the Institute of British Geographers, New Series* 24, 1 (1999), 23-44; Matthew Gandy, *Concrete and Clay: Reworking nature in New York City* (Cambridge, Mass: The MIT Press, 2002); Maria Kaika and Erik Swyngedouw, "Fetishizing the Modern City: The phantasmagoria of urban technological networks," *International Journal of Urban and Regional Research* 24, 1 (March 2000), 120-38; Erik Swyngedouw, "The City as Hybrid: On nature, society and cyborg urbanization," *Culture, Nature and Society* 7, 2 (June 1996), 65-80.

[10] Jean-Pierre Goubert, *The Conquest of Water: The advent of health in the Industrial Age* (Oxford: Polity Press, 1989), 253.

and properties. In *Seeing Like a State*, James C. Scott describes how planners and governments use statistical and representational abstractions to "simplify" nature (and society), rendering it "legible" and allowing it to be reordered for the purposes of human exploitation.[11] Scott's emphasis on simplification and legibility is key to understanding how water came to be seen as a bundle of biochemical and physical properties that rendered certain environmental services. This view shaped the development of urban infrastructure and the structures of urban governance deployed to co-ordinate the exploitation of waste sinks at various spatial scales. Engineers and planners sought to quantify the ability of surrounding waters to safely absorb wastes in order to rationalize their use. They also created cartographic representations of urban space and nature to underwrite their visions of local hydrology and urban infrastructure development.[12] The creation of urban infrastructure networks, then, may be seen as a product of divergent perceptions of pollution, the environment and urban space among various experts, planners, municipal leaders and urbanites.

Drawing from these insights, this section explores how changing ideas of pollution and nature licensed certain approaches to waste disposal in Vancouver. Definitions of pollution, while referring to environmental conditions, are suffused with social concepts such as purity and risk, and are constructed through historical, anthropocentric and socially created measures of

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[11] James C. Scott, *Seeing Like a State: How certain schemes to improve the human condition have failed* (New Haven: Yale University Press, 1998), especially Chapter 1. Scott's emphasis on the construction of nature through scientific perceptions and instrumentation, and quantitative representations of natural processes is echoed in Theodore M. Porter, *Trust in Numbers: The pursuit of objectivity in science and public life* (Princeton: Princeton University Press, 1995); David Demeritt, "The Construction of Global Warming and the Politics of Science," *Annals of the Association of American Geographers* 91, 2 (2001), 307-337; and Jan Golinski, *Making Natural Knowledge: Constructivism and the history of science* (Cambridge: Cambridge University Press, 1998), chaps. 3 and 5.

[12] On similar representational strategies in forest conservation, see D. Demeritt, "Scientific Forest Conservation and the Statistical Picturing of Nature's Limits in the Progressive-era United States," *Environment and Planning D: Society and Space* 19, 4 (2001), 431-459.

environmental quality.[13] According to anthropologist Mary Douglas, the idea of pollution may be understood as "the by-product of a systematic ordering and classification of matter, in so far as ordering involves rejecting inappropriate elements."[14] Pollution control also involved the systematic ordering and classification of Vancouver's urban space and nature. By designating certain spaces and waters as "pure" or "polluted," planners incorporated the region's natural waterways into their networks, creating a rationalized hydrology to banish wastewater and stormwater to the edges of urban space. In the nineteenth and early twentieth centuries, the dumping of wastes into nearby waters was justified by the long-held, but vague notion that running water "purified itself" every few miles.[15] Similarly, the use of the waterways as "sinks" for the absorption of wastes gained scientific credibility and popular acceptance in the twentieth century through the concept of water's "assimilative capacity," or its ability, through chemical and biological processes, to neutralize harmful pollutants. Many sanitary engineers asserted that this assimilative capacity could be quantitatively measured and rationally exploited to ensure the efficient disposal of domestic wastes. Imbued with Progressive-era conservation ideals, they regarded assimilative capacity as a kind of resource to be wisely exploited.[16] Regional waters

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[13] Rome, "Coming to Terms with Pollution"; Ulrich Beck, *Risk Society: Towards a new modernity*, Mark Ritter, trans. (London: Sage, 1992), especially Chapter 2; Mary Douglas, *Purity and Danger: An analysis of concepts of pollution and taboo* (New York: Frederick A. Praeger, 1966); Mary Douglas and Aaron Wildavsky, *Risk and Culture: An essay on the selection of technical and environmental dangers* (Berkeley: University of California Press, 1982); Neil Evernden, "Pollution," in Robert Paehlke, ed., *Conservation and Environmentalism: An encyclopaedia* (New York: Garland, 1995), 525.

[14] Mary Douglas, *Purity and Danger*, 35.

[15] Theodore Steinberg, *Nature Incorporated: Industrialization and the waters of New England* (Cambridge: Cambridge University Press, 1991), 206-207; Cumbler, *Reasonable Use*, 108-109.

[16] As Scott Dewey and Douglas Stradling note, pollution issues often defied the categories of conservation and environmentalism portrayed in many historical treatments of the twentieth-century environmental movement. But certainly for engineers, planners, and urban reformers, the managerial ethos of Progressive conservation ideology was central to their view of pollution and its control. See Stradling, *Smokestacks and Progressives*; Scott Hamilton Dewey, *Don't Breathe the Air: Air pollution and U.S. environmental politics, 1945-1970* (College Station, Tex., Texas A&M University Press, 2000); Terence Kehoe, *Cleaning Up the Great Lakes: From cooperation to confrontation* (DeKalb, Ill: Northern Illinois University Press, 1997), chap. 1; Robert Gottlieb, *Forcing the Spring: The transformation of the American environmental movement* (Covelo, Calif:

were thereby transformed into a kind of "organic machine" for the processing of human waste.[17] In this representation, complex ecological or biophysical factors were ignored or elided, subordinated to the rational calculus of human utility.

Thus, the phenomenon of polluted waters and beaches came to be defined in terms of water's social utility as a medium of waste disposal. Recurring environmental problems, however, indicated the limits to this representation and modification of nature. The unintended consequences of design choices, the failure to account for natural variability and the contingencies of historical events undermined the attempt by engineers to construct Vancouver waters as a sink for wastes. Ultimately, too, the emergence of alternative visions of water and wastes challenged the doctrine of assimilative capacity and the bureaucratic systems of environmental technocracy erected to exploit it. Changing environmental values and perceptions of nature questioned the authority of sanitary experts. Political struggles over pollution control and sewage disposal deeply influenced environmental governance and politics in B.C., from the establishment and evolution of the provincial Pollution Control Board to the founding of the province's earliest and most successful environmental groups.

Island Press, 1993), 55-59; and Martin V. Melosi, "Environmental Reform in the Industrial Cities," in *Effluent America*. On Progressive conservation, see Michel Girard, *L'écologisme Retrouvé: Essor et déclin de la Commission de la Conservation du Canada* (Ottawa: University of Ottawa Press, 1996); Samuel P. Hays, *Conservation and the Gospel of Efficiency* (Cambridge, Mass: Harvard University Press, 1958).

[17] The concept of water as an organic machine comes from Richard White, *The Organic Machine: The remaking of the Columbia River* (New York: Hill & Wang, 1995).

Chapter 1
Constructing a Modern Sink for Wastes: Pollution and the sewerage of Vancouver, 1889-1960

Watching the lycra-clad joggers and bobbing houseboats along the False Creek waterfront, it is hard now to picture the squalid conditions of Vancouver shorelines a century ago. The construction and extension of the city's sewerage system around the turn of the twentieth century had resulted in an increasing volume of sewage flowing to False Creek and other surrounding waters. Crude septic tanks located near sewer outfalls only exacerbated the problems: "When the tide is at ebb, the gases and odours from the tank are discharged with the outflow, but then the tide backs up the contents, there is no escape for the gases save through the manholes into the open air."[1] Worse still, the receding tide exposed extensive mud flats coated in human sewage, garbage, manure, and sawmill wastes.[2] Little wonder, then, that outbreaks of typhoid and other diseases were a regular occurrence in the vicinity.

Like most other cities in this period, Vancouver was forced to contend with seemingly intractable pollution problems arising from its rapidly growing population and the increasing waste streams that it generated. Urban sanitation was probably the most pressing environmental question facing North American cities in the century between 1850 and 1950, as rapid urbanization and industrialization brought millions of people into novel and crowded living circumstances. The resulting problems of disease, dirt and disorder spawned a series of scientific, technical and social initiatives designed to mitigate the public health and environmental impacts of urban population concentration. Vancouver provides an illuminating case of the development of urban

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[1] "More complaints of septic tank," *Vancouver Province*, 25 August 1906, 1.

[2] Robert K. Burkinshaw, *False Creek: History, images, and research sources* (Vancouver: City of Vancouver Archives, 1984), 21-25.

sanitary services because of its relatively recent settlement starting in 1886. Compared with many older cities in North America, Vancouver was relatively unencumbered with historical, physical, social and political obstacles to urban infrastructure development.[3] It also enjoyed favourable geographical and environmental circumstances: with a ready clean water supply and ample surrounding waterways for waste disposal, it seemed an ideal site for the construction of capital-intensive technological networks. At least initially, Vancouver's leaders and voting citizenry displayed an enthusiasm for public works expenditures that must have been the envy of other North American cities, where penny-pinching voters repeatedly rejected the massive investment required for sanitary systems.

In spite of these apparent environmental and social advantages, continual sewage pollution problems plagued Vancouver waters. These problems were rooted not in the ignorance or negligence of civic elites or citizens, but rather in the basic assumptions about pollution and nature embedded in the technologies and strategies chosen by subsequent generations of planners. Turn-of-the-century scientific notions of disease etiology and water pollution implied that the currents and flows of these waters would purify sanitary wastes through dilution and through biochemical action. Thus, sanitary engineers proposed the construction of a network of gravity-operated, water-flushed sewers to carry domestic wastes to the edges of urban settlement, where they would be discharged into the surrounding marine and river waters untreated. The use of regional waters as a "sink" for wastes was further justified by utilitarian conservation ideology, which categorized waters in terms of their utility (as drinking water, recreational water, industrial waters, etc.) and

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[3] These problems are explored in the context of urban infrastructure development in established cities following urban conflagrations in Christine Meisner Rosen, *The Limits of Power: Great fires and the process of city growth in America* (Cambridge: Cambridge University Press, 1986).

defined pollution in terms of the loss of utility or danger (for humans) created by degraded waters.[4]

Sewerage planning and development in Vancouver transformed urban space and nature in the period before 1960. Confronted by natural features and pollution problems that crossed artificial municipal boundaries, planners and politicians advanced regional solutions that attempted to co-ordinate the exploitation of area waters as sinks for waste. Just as local waterways were rationalized into a technological waste disposal network, urban governance was reoriented towards regional conceptions of space. The new metropolitan conception of "Greater Vancouver" created political conflict, however, as some municipalities rejected what they perceived as the unequal distribution of the environmental and economic costs and benefits of rationalized pollution. Ultimately, the politics and technical problems of pollution control forced the provincial government to intervene and reluctantly re-scale some aspects of pollution planning and authority to the provincial level. The creation of the B.C. Pollution Control Board in 1956 out of the struggle for sewerage in Greater Vancouver profoundly shaped future provincial pollution control and administration.

Constructing a modern sink: the sewerage of Vancouver

> An extended system of sewerage and a supply of pure water are absolutely essential; and when these are secured ... Vancouver will have utilized to the utmost the advantages of her position from a hygienic standpoint, and will owe still more to the teachings of sanitary science than she now does to the natural salubrity of her surroundings and her climate.[5]

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[4] Terence Kehoe, *Cleaning Up the Great Lakes: From cooperation to confrontation* (DeKalb, Ill: Northern Illinois University Press, 1997), chap. 1.

[5] The quote was written by J.M. Lefevre, first chairman of the Vancouver Board of Health, and appeared in David J. Oppenheimer, *Vancouver City: Its progress and industries, with practical hints for capitalists and intending settlers* (Vancouver: News-Advertiser, 1889), 32. The "sanitary advantages" of Vancouver's geography are also highlighted in *The Financial, Professional, Manufacturing, Commercial, Railroad and Shipping Interests of Vancouver, B.C.* (Vancouver: Daily World, May 1891), 2.

This glowing assessment of Vancouver's natural amenities, appearing in a promotional pamphlet published by Mayor David Oppenheimer, reflected the progressive self-image of Vancouver's elites and the links they made between urban prosperity, opportunity and sanitation. Founded in 1886 as the terminus of the transcontinental Canadian Pacific Railroad, the settlement on the shores of Burrard Inlet was quickly transformed from an isolated sawmill village into a bustling new city. (Fig. 1.1) As plans and surveys were drawn up for the new "terminal city," civic boosters promoted the early establishment of urban amenities and infrastructure. Indeed, by 1889, the young city was already supplied with a secure, unpolluted source of fresh water, and boasted a new, if somewhat crude, sewer system that served the city's central district. Many observers have commented on the combination of favourable geographical circumstances and timely infrastructure planning and development in Vancouver.[6]

These achievements, coming a mere three years after incorporation and a catastrophic fire that razed the young city, contrasted with the drawn-out struggles over urban infrastructure development in other North American cities. Elsewhere in late nineteenth-century Canada, urban reformers found it difficult to persuade voters to finance expensive public works that might improve the filthy conditions of towns and cities. Fitful efforts at sanitary reform in Montreal, Toronto, Ottawa and other eastern cities were prompted by epidemics of cholera in the 1840s and 1860s, along with repeated visitations of typhoid, diphtheria and other waterborne diseases at the

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[6] Margaret W. Andrews, "The Best Advertisement a City Can Have: Public health services in Vancouver, 1886-1888," *Urban History Review/Revue d'Histoire Urbaine* 12, 3 (1984), 19-27; Louis P. Cain, "Water and Sanitation Services in Vancouver: An historical perspective," *BC Studies* 30 (Spring 1976), 27-43; Patricia E. Roy, *Vancouver: An illustrated history* (Toronto: James Lorimer and Co., 1980), 32, 73; Graeme Wynn, "The Rise of Vancouver," in Graeme Wynn and Timothy Oke, eds., *Vancouver and Its Region* (Vancouver: University of British Columbia Press, 1992), 116-118.

end of the nineteenth century.[7] The most notable legacy of these reforms was the creation of public health boards and a modest medical health bureaucracy to oversee efforts at disease prevention and control; these represented a significant extension of municipal and provincial state power into the regulation of private and social life.[8] In spite of the enthusiasm for reform, the practical achievements of sanitary reformers in the realm of sewerage and drainage were, for a time, fairly modest. Poor economic times meant that during the 1890s, voters in Charlottetown and Toronto repeatedly rejected appropriation bylaws for investments in sewerage systems. Where sewerage systems were constructed, they often discharged raw sewage into the nearest waterway, resulting in the pollution of rivers, harbours and drinking water supplies.[9]

The slow and uneven implementation of sewerage and drainage systems was a major topic at the Canadian Commission of Conservation's Dominion Public Health Conference, held in Ottawa in 1910. The conference was called in response to a report by the Senate Committee on Public Health and Inspection of Foods, which noted that "the public health of Canada is being considerably imperilled by the present custom of disposing of sewage, garbage, etc., into the lakes,

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[7] Geoffrey Bilson, *A Darkened House: Cholera in nineteenth-century Canada* (Toronto: University of Toronto Press, 1980); Douglas O. Baldwin, "The Campaign Against Odours: Sanitarians and the genesis of public health in Charlottetown, Prince Edward Island (1855-1900)," *Scientia Canadensis* 10, 1 (1986), 72-82; Douglas Baldwin, "Sewerage," in Norman R. Ball, ed., *Building Canada: A history of public works* (Toronto: University of Toronto Press, 1988); Heather A. MacDougall, "The Genesis of Public Health Reform in Toronto, 1869-1890," *Urban History Review/Revue d'Histoire Urbaine* 10, 3 (1982), 1-9; Colleen McNaughton, "Promoting Clean Water in Nineteenth-Century Public Policy: Professors, preachers, and polliwogs in Kingston, Ontario," *Histoire Sociale/Social History* 32 (2001), 49-61; Tom Davey, *Recollections of Water Pollution Control in Ontario* (Aurora, Ont: Pollution Control Association of Ontario, 1985), Chapter 5.

[8] Margaret W. Andrews, "The Emergence of Bureaucracy: The Vancouver Health Department, 1886-1914," *Journal of Urban History* 12, 2 (1986), 131-55; Logan Atkinson, "The Impact of Cholera on the Design and Implementation of Toronto's First Municipal By-Laws, 1834," *Urban History Review/Revue D'Histoire Urbaine* 30, 2 (March 2002), 3-15; Baldwin, "The Campaign Against Odours"; Curtis, "Social Investment in Medical Forms."

[9] Baldwin, "Sewerage."

rivers and streams of the country."[10] Testimony at the Dominion Health Conference confirmed that domestic water supplies across the country were polluted. Draft federal legislation for the prohibition of water pollution from sewage, garbage and factory wastes was developed at the conference and passed the Senate in 1911, but the bill never received approval from the House of Commons.[11] Subsequent Conservation Commission investigations of sanitary systems across Canada documented the pitiable state of wastewater disposal in Canadian towns and cities, and the high cost in disease and pollution it exacted. According to the Commission's 1912 figures, amongst nine industrial nations only the United States suffered a higher rate of typhoid than Canada's 35.5/100,000 people. The author of the 1912 study lamented, "Are we as Canadian citizens content to allow the stigma of the second highest typhoid death rate in the civilized world to continue [to be] attached to Canada? Are we content that our beautiful lakes and rivers shall be turned into sewage disposal areas and open sewers? Not a bit of it."[12] Unfortunately, this call to arms went largely unheeded: a 1916 survey listed nearly half of the nation's 528 domestic water supplies as "possibly polluted," usually by domestic sewage.[13]

Vancouver was far less affected by the ravages of water-borne contagious disease than contemporary Montreal, Toronto and Winnipeg. A smaller population, a secure and unpolluted drinking water supply, a favourable location near large water bodies and a lower incidence of

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[10] *Commission of Conservation – Second Annual Report* (Montreal: John Lovell and Son, 1911), 118. The Commission was very active in its study of urban pollution issues, though its concrete achievements were less apparent. See Michel F. Girard, "The Canadian Commission of Conservation: Urban planning," in Char Miller, ed., *The Altas of U.S. and Canadian Environmental History* (New York: Routledge, 2003), 108-109.

[11] Ibid., 168. On the debate surrounding the bill, and its fate, see Jennifer Read, "'A Sort of Destiny': The multi-jurisdictional response to sewage pollution in the Great Lakes, 1900-1930," *Scientia Canadensis* 22-23 (1994-95), 113-117.

[12] T. Aird Murray, *The Prevention of the Pollution of Canadian Surface Waters* (Ottawa: Commission of Conservation, 1912), 23-24.

[13] Leo G. Denis, *Water Works and Sewerage Systems of Canada* (Ottawa, Commission of Conservation, 1916), 136.

slum crowding kept disease figures comparatively low in the decades around the turn of the twentieth century. Community health was also aided by progressive public health policies. The city's first health bylaw, passed within a year of incorporation, regulated the construction and operation of privies, cesspools and house drains. It also proscribed the fouling of waterways and land by "dead animals, fish, dirt, rubbish, excrement, dung, manure, offal or any other refuse," and created the posts of Medical Health Officer and Sanitary Inspector to oversee the health of the city.[14] New homes and businesses were required to connect water closets to the city's growing sewerage system, and their plumbing was subject to city inspection and approval. By the end of the century, the city even began to construct public "sanitary conveniences" to discourage the increasingly unacceptable practice of public urination.[15]

The city's earliest sewerage system, designed by civil engineer Edward Mohun, aimed to exploit the "natural advantages" of Vancouver's seaside location. Reporting to the Canadian Society of Civil Engineers in 1888, Mohun described the city's site, atop small "eminences" and nearly surrounded by salt water, as ideal for the "rapid and economical removal of surface water" from the region's ample rainfall. Separate sanitary sewers, flushed by the gravity-fed water supply, would ensure the easy conveyance of sewage to marine waters. Since the city's water supply came from secure, unpopulated watersheds on the north shore of Burrard Inlet, sewage disposal presented no threat to domestic waterworks. Mohun, like most sanitarians at the end of the nineteenth century, assumed that the rapid removal of wastes and their adequate dilution was the main goal of sewerage and drainage works — even though the self-purifying processes of

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[14] City of Vancouver Archives (CVA), MCR 18 Sec. 30, "Public Health Bylaw 7," February 1887. See also Andrews, "The Emergence of Bureaucracy."

[15] Margaret W. Andrews, "Sanitary Conveniences and the Retreat of the Frontier: Vancouver, 1886-1926," *BC Studies* 87 (Autumn 1990), 3-22.

water were poorly understood. In any case, the protection of public health from dangerous bacteria and sewer gases overrode concern for environmental degradation. Indeed, Mohun even contemplated the potential benefit of nutrient enrichment of local waters for the promotion of fisheries.[16]

However, the fast-growing city quickly overwhelmed Mohun's system. The primitive wooden box sewers discharged sewage via outfalls just below low water mark, resulting in widespread shoreline pollution. The extension of these outfalls to residential and recreational areas in the West End of Vancouver encountered fierce opposition from citizens revolted at the prospect of swimming in sewage-laden waters. In 1901, a group of prominent residents, led by H. O. Bell-Irving and Sir Charles Hibbert Tupper, petitioned against an outfall near the popular English Bay bathing beach. Speaking before city council, Tupper asserted "he thought that a natural prejudice would exist against the place if it were made a receptacle for sewage; the bay would become a place to be avoided, parents would not let their children go there, [and] property would depreciate..."[17] In addition, the shore-side "septic tanks" (really just settling chambers) at the sewer outlets often backed up at high tide, fouling the surrounding air with noxious fumes.[18]

Rates of typhoid and other waterborne communicable diseases in Vancouver fluctuated in the pre-war years; a spike in the number of cases and deaths in 1910 and 1911 probably reflected

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[16] Edward Mohun, "The Sewerage System of Vancouver, B.C.," *Transactions of the Canadian Society of Civil Engineers* 2 (1888), 243-67. Based on the commentaries following this paper, Mohun's design was relatively well received, though he was criticized for using wood (which he claimed was necessitated by the cost of importing Portland cement). See also the approving assessment of engineer T.C. Keefer in the *Daily News-Advertiser*, 30 October 1887, Canadian Institute for Historical Microreproductions document number 15658.

[17] "Skeptics on septics," *Vancouver Province*, 3 August 1900, 2; "The bay threatened," *Vancouver Province*, 23 July 1900, 7.

[18] "More complaints of septic tank"; "Will remedy septic nuisance," *Vancouver Province*, 31 July 1906, 1; "City's sewerage system inadequate," *Vancouver Province*, 22 January 1907, 1; "Complaint about another septic tank," *Vancouver Province*, 27 May 1907, 1.

both population growth and deteriorating sanitary conditions.[19] City health inspectors pointed to the sewage pollution of city streams and surrounding waters as a major contributor to disease outbreaks, particularly in the heavily populated districts surrounding the east end of False Creek, the rapidly industrializing but poorly flushed inlet and tidal flats at the heart of the city. The Mohun plan called for the protection of False Creek waters, but the inlet received sewage anyway, as well as garbage, manure, slaughterhouse wastes and other city offal. The False Creek area became a focus of sanitary concern as a flashpoint for typhoid outbreaks, particularly amongst crowded immigrant and squatter settlements.[20] These concerns took on a racial dimension in health and plumbing inspector Robert Marrion's 1912 report. Marrion highlighted the persistence of connections between morality and sanitation, as he catalogued the unsanitary conditions of the "foreign element" in Vancouver. False Creek and Chinatown became objects of sanitary surveillance and concern, and a repository for racialized fears of infection.[21]

Water pollution was not confined to the False Creek or central city areas, however. Rapid

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[19] CVA, PDS 11, Vancouver Health Department, *Annual Report* (1912), 43. This report contained the figures in the table below (Vancouver's population in 1911 was 100,401):

Reported Cases of Typhoid, 1909-1912

Year	Total cases	Total deaths
1909	142	7
1910	265	27
1911	212	23
1912	163 (39 imported)	21

[20] On pre-war sanitary conditions, see CVA, PDS 11, Vancouver Health Department, *Annual Report* (1910-1912), and CVA, MCR 38, W.A. Clement, *City Engineer's Report*, 21 January 1908. The tidal flats at the head of False Creek were drained in the 1910s to create the Canadian Northern Railway terminus and railyards. Burkinshaw, *False Creek*, 32-35.

[21] Marrion's report is contained in CVA, PDS 11, Dr. F.T. Dr. Underhill, "Medical Health Officer Annual Report" in Vancouver Health Department, *Annual Report* (1911), 10; on the intersections of race, space and power in Vancouver, see Kay J. Anderson, *Vancouver's Chinatown: Racial discourse in Canada, 1875-1980* (Montreal and Kingston: McGill-Queen's University Press, 1991).

urban expansion before the First World War necessitated the use of residential septic tanks in the absence of sewers, resulting in contamination of surface creeks and groundwater. Sewer construction could not keep up with the emergence of new suburban communities in South Vancouver, Point Grey and Burnaby as well as the addition of new territories such as D.L. 301 and Hastings Townsite. (Fig. 1.2) Septic tanks operate by allowing solid matter to settle in subterranean tanks, while wastewater diffuses through a system of pipes into a soil, rock or tile septic field, which theoretically purifies the water as it percolates through the field.[22] However, much of the region is situated on poorly draining sites such as swamps or delta, or steep areas where waters seep rapidly down through the groundwater to collect in streams or low-lying areas. These factors, combined with the region's high rainfall, meant septic tanks often discharged at or near the surface, and complaints about septic overflows running in ditches were perennial.[23] Condemning poorly constructed home septic systems, the *Vancouver Province* railed, "When we find these septic tanks lining a residence street, separated but by a few feet, and pouring their contents into the gutters on the thoroughfare, from which there constantly arises a sickening stench, we can realize how injurious this system of treating sewage must be to the health of the community."[24]

The problems of wastewater disposal were also closely related to the ample fresh water supply enjoyed by Vancouverites. By 1908, the city had developed the Capilano and Seymour

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[22] The development of septic tanks and their environmental problems are highlighted in Melosi, *The Sanitary City*, chap. 7, and Rome, *The Bulldozer in the Countryside*, chap. 3.

[23] For early-century complaints about septic tanks in the suburban areas, see British Columbia Archives and Records Service (BCARS), GR-0132 Health Department, box 12 files 1-2 (Burnaby), box 16 file 10 and box 17 file 1 (Point Grey/Kerrisdale), and box 20 files 1-2 (South Vancouver). Vancouver was not alone in confronting this problem: see box 21 file 5 on Victoria/Saanich septic tank problems.

[24] "Septic tanks," *Vancouver Province*, 26 October 1909, 6.

river watersheds on the north shore of Burrard Inlet for a secure, municipally owned water supply.[25] As urban infrastructure historians have noted, per capita water consumption increased dramatically with the provision of municipal water supplies. Although these supplies were initially intended primarily for street flushing and fire fighting, householders installed running water taps, bathing facilities and flush toilets, straining the modest drainage networks of most cities.[26] Vancouver was no exception to this trend. Health and plumbing inspector Robert Marrion noted in 1912 that "nearly every householder demands an up-to-date water closet and every water closet requires a septic tank, this needs an overflow which usually discharges the excrement in solution into the channel of the nearest street or lane, thus causing complaints to be made from the people in the locality who are generally creating nuisances themselves."[27] Older land-based disposal methods such as privy vaults and cesspools were also overwhelmed by the increasing volume of wastewater from indoor plumbing, and the overflow was carried into surface ditches and local creeks.[28]

Despite growing annual expenditures for sewer construction, pollution from sewage threatened the progressive self-image of Vancouver's boosters. A 1908 report recommending an expanded trunk sewer system was endorsed by city council, but foundered due to the high

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[25] Andrews, "The Best Advertisement a City Can Have"; Cain, "Water and Sanitation Services in Vancouver."

[26] Jean-Pierre Goubert, *The Conquest of Water: The advent of health in the industrial age* (Oxford: Polity Press, 1989), 102; Hoy, *Chasing Dirt*, 64-65; Melosi, *The Sanitary City*, chap. 7. Since Vancouver's water supply was unmetered, figures on early consumption are at best estimates. E.A. Cleveland's report to the provincial government as B.C.'s comptroller of water rights estimated Vancouver's per capita consumption at 175-200 Imperial gallons per day. This figure was considered high compared with consumption in both metered and unmetered American cities. But there was considerable variation noted both among municipalities in the region and between cities in North America. See E.A. Cleveland, *Report to the Honourable T.D. Pattullo, Minister of Lands on the Question of Joint Control of Water Supply to the Cities and Municipalities on Burrard Inlet* (Victoria: Department of Lands, October 1922), 44-63.

[27] Underhill, "Medical Health Officer Annual Report," 2-3.

[28] "Fairview streams badly polluted," *Vancouver Province*, 25 August 1906, 2; "Cesspool must be done away with," *Vancouver Province*, 27 October 1906, 2.

construction costs and competing budgetary priorities.[29] Civic leaders responded as did many other North American jurisdictions in this period: they sought a regional solution to waste disposal problems. In 1911, leaders from four Burrard Peninsula municipalities — Point Grey, Vancouver, South Vancouver, and Burnaby — formed the Burrard Joint Sewerage and Drainage Committee, under the chairmanship of Vancouver reformer and alderman H. H. Stevens, to investigate co-operative solutions to the problem.[30] The committee hired eminent sanitary engineer R. S. Lea of Montreal to study and design a sewerage and drainage system for the area. Lea, a McGill University professor of civil engineering, had assisted in designing sewerage projects in Massachusetts, P.E.I., Nova Scotia and Quebec. He was a member of a growing professional cadre of municipal engineers dedicated to improving the health and efficiency of cities through the planned construction of technological systems for waste disposal, water supply and other urban amenities.[31]

To plan and develop a waste disposal system for the city, Lea was forced to overcome the paucity of data on the Burrard Peninsula area. Few accurate precipitation records existed, and detailed topographical investigations of the region, only recently begun by the Joint Sewerage Committee, remained incomplete. Lea's final report, completed in 1913, offered a detailed survey of the physical and, to a lesser extent, social geography of the region, and included population

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[29] Clement, *City Engineer's Report*; "Urgent need of sewerage extensions," *Vancouver Province*, 31 October 1908, 3; "City council's action regarding sewerage," *Vancouver Province*, 21 November 1908, 13; "Adoption of new sewerage system," *Vancouver Province*, 4 December 1908, 2; "City sewerage," *Vancouver Province*, 25 May 1910, 6.

[30] CVA, Add. MSS 1257, 63-A-2, file 1, Burrard Joint Sewerage and Drainage Committee, *Minutes*, 1911-13. New Westminster declined to join the committee but began its own limited sewerage and drainage system around 1911.

[31] "Lea, Richard Smith," in Henry James Morgan, ed., *The Canadian Men and Women of the Time*, 2nd ed. (Toronto: William Briggs, 1912), 645; Baldwin, "Sewerage," 225.

forecasts and discussions of urban morphology and governance structures.[32] Hydrological investigations examined the suitability of the surrounding waters to receive wastes. Lea documented a rugged, spottily developed peninsula riven by dozens of short, low-volume streams outletting to the surrounding ocean (to the north and west) and the massive Fraser River to the south (Fig. 1.3). In what may have been the area's first oceanographic survey, he conducted float tests in the Strait of Georgia and Fraser River estuary in order to gauge both the effects of the tides and the dilution capacities of these waters. He calculated the tidal volume of English Bay and Burrard Inlet to determine the best location of trunk sewer outfalls to obtain maximum dilution and dispersion of sewage. Lea's hydrographic work also revealed the influence of the Fraser River on English Bay, as discharge from the river's North Arm was carried around Point Grey and circulated through the bay with the tides. He approvingly noted this freshwater influence would help ensure that solid wastes would not rise to the surface of English Bay.[33]

As Lea later reflected, these geographical and hydrological conditions provided the foundation for his sewerage plan. Since the entire peninsula drained downslope to salt water or the Fraser River, nearly the entire system could be operated on a gravity-flow basis. Based on the four natural watersheds, Lea divided the peninsula into separate "sewerage areas" for administrative, planning and construction purposes. Retrospectively reviewing these conditions (and the relative lack of pre-existing infrastructure), he concluded that the region "afforded the unique opportunity of projecting an entire new system in accordance with a uniform plan of development, which, by

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[32] R.S. Lea, *Report by R.S. Lea to the Burrard Peninsula Joint Sewerage System* (Vancouver: Vancouver and Districts Joint Sewerage and Drainage Board, 1913 [1917]). Walter Van Nus noted that infrastructure planning often generated the earliest triangulation surveys and large-scale topographical maps of Canadian cities. See Walter Van Nus, "The Plan-makers and the City: Architects, engineers, surveyors and urban planning in Canada, 1870-1939" (PhD diss., University of Toronto, 1975), 270.

[33] Lea, *Report*, 25.

reason of the favourable local conditions and the definite limits set to the drainage areas by the height of land, could be economically designed to provide for practically any probable future growth."[34] The Lea plan was guided by the concept of assimilative capacity, the notion that the ability of water to dilute and disperse wastes was a natural function that could be calculated and exploited. The risk in Lea's strategy was that the receiving waters would be irredeemably fouled by such a process. His relativist definition of pollution, however, sanctioned the idea of nature as a sink for human wastes:

> The degree to which [sewage-laden waters] can be said to constitute a nuisance depends on the uses to which the waters and shores are put, and on the density of, and proximity thereto, of human habitations. For instance, to cite an extreme case: a river might be intensely polluted by the sewage from a community without causing a nuisance, provided it flowed away to the sea through an uninhabited country, was not navigable, nor suitable for purposes of recreation, and was not, in its natural state, frequented by fish.[35]

Lea's definition of pollution weighed hygienic, aesthetic and economic considerations, not environmental quality per se. Guided by utilitarian conservation ideology, he held that waste disposal was a legitimate use of water that was not employed for other, higher purposes.

The Lea plan projected a rationalized hydrology onto the landscape which incorporated local waterways into a capital-intensive, technological waste-disposal network. (Fig. 1.4) To be built on the separate system, it consisted of a series of underground trunk sewers to collect sewage (not storm water) from houses via laterals, which in turn fed into larger interceptor sewers that would transport wastewaters across natural and political divisions and deposit them at sea or in the river via submerged outfalls. Stormwater would be conducted through separate conduits

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[34] R.S. Lea, "Supplementary Report" (1917) in *Report by R.S. Lea to the Burrard Peninsula Joint Sewerage System* (Vancouver, Vancouver and Districts Joint Sewerage and Drainage Board, 1913 [1917]), 63.

[35] Lea, *Report*, 16.

enclosing the peninsula's natural streams. Lea counselled that the construction and finance of works of "common interest ... including interceptors, purification works, and all works designed for the prevention of pollution of natural bodies of water," be undertaken by a joint board. Individual municipalities would remain responsible for maintenance of laterals and regular trunks.[36] Funding for the scheme would come through levies of individual municipalities, as well as through the issuance of bonds by the regional board.

In proposing a regional-scale solution to this problem, Lea favoured technologies and scales of organization developed during this period to deal with the increasing complexity of cities and their pollution problems. Here, as elsewhere, regional co-operation emerged from the conjunction of social forces, such as economics and technology, and natural circumstances. Administration and finance of such large-scale technological networks required a different scale of organization to function effectively. As historian Sarah Elkind has noted, "The transfer of responsibility for water supply and sewerage from the individual to the public and from small to ever larger physical and governmental structures illustrates the expanding awareness of interconnection, first between one household and the next, then between neighbourhoods, cities and watersheds, and finally between adjacent drainage basins, bays, and states."[37] In the Vancouver setting, the peninsula's streams crossed municipal boundaries and discharged to waters shared by every municipality in the region, including those unrepresented on the sewerage committee. Thus, the need for co-ordinated construction and finance, driven by economic and political imperatives,

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[36] Ibid., 43.

[37] Sarah S. Elkind, *Bay Cities and Water Politics: The battle for resources in Boston and Oakland* (Lawrence, Kan.: University Press of Kansas, 1998), 3. On the development of metropolitan-scale municipal organization for infrastructure development, see also Melosi, *The Sanitary City*, chap. 7; Schultz, *Constructing Urban Culture*, chap. 4; Tarr, "Water and Wastes," 199-201; and Angus N. MacKay, "Metropolitan Organization and Water Pollution Control." in *Pollution and Our Environment Background Papers*, vol. 2 (Ottawa: Canadian Council of Resource Ministers, 1966).

was also predicated on the natural systems of the region.

After a review by two engineers, the Lea plan was quickly adopted. The provincial government passed enabling legislation in 1913 and amendments in 1914 chartering the Vancouver and Districts Joint Sewerage and Drainage Board (VDJSDB). Made up of elected officials from member municipalities, this board oversaw the gradual extension of the sewerage system along the lines laid out by Lea. It also purchased portions of existing municipal systems from individual cities, thereby consolidating its control over metropolitan nature. But the board had difficulty convincing outlying municipalities of the value of regional sewerage development. In a review of its first half-dozen years of operation, the VDJSDB forcefully argued that "it is evident that water supply, sewerage and drainage problems cannot be solved within man-made political boundaries alone, but must be treated as watershed problems." Pointing to regional boards elsewhere, the review noted that "many of them [came] into being because of the fact 'that as no man liveth unto himself' neither can one community be entirely independent of another whose political boundary lines interfere with its natural boundaries."[38] Still, cities such as New Westminster joined the scheme only reluctantly, while municipalities on the north shore of Burrard Inlet remained outside the regional plan entirely.

Over the next 35 years, a combination of financial constraints, the Depression and war meant that Lea's key recommendation for the construction of separate stormwater and sanitary pipes was largely neglected. Instead, much of the city's sewage was channelled through combined collector sewers (Fig. 1.5) This resulted in a hybrid system in which the streams of the peninsula were enrolled for waste disposal (as opposed to merely drainage) purposes. Unfortunately for

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[38] Vancouver and Districts Joint Sewerage and Drainage Board, *Sixth Annual Report* (Vancouver: The Board, 1919), 15-16.

Vancouverites, this practice ensured sewage continued to flow along with storm runoff into shallow or inappropriate receiving waters. The worst pollution resulted from the failure to eliminate outfalls in False Creek, as both Lea and Mohun had advised. A 1927 report on False Creek noted that this shallow tidal inlet received sewage from 16 outfalls. The report's author, A.R. Mackenzie, described how, "during the summer months, the atmosphere around Main Street and the Connaught bridge is considerably tainted, the maximum of offence being at low water stage in the estuary. The odour is unmistakably of sewer origin and the different sewer outfalls can be easily located where intensification of the peculiarly local smell is apparent."[39] By 1943, 1,524 of Vancouver's most densely populated acres drained raw sewage some or all of the time into False Creek (where typhoid again appeared in 1937 and 1938).[40] Although city engineers contended that tidal action was usually sufficient to disperse the wastes, the presence of rank, polluted waters at the geographical heart of the city proved a public health menace and a constant, unwelcome reminder of the failure to master the urban environment.

Pollution problems arose from both design flaws and natural circumstances. The contents of combined sewers that did not discharge directly to False Creek were diverted to interceptor sewers, which carried the wastewaters to a deep-water outfall extending some 3,000 feet into English Bay from the end of Imperial St. (today's Discovery St.). However, the interceptor was of insufficient capacity to cope with Vancouver's frequent rainstorms, during which diluted sewage

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[39] CVA, 61-C-5 file 2, A.R. Mackenzie, *Report on False Creek* 14 July 1927, 1-2. The Connaught Bridge was replaced by the current Cambie St. Bridge.

[40] CVA, Add. MSS 1257, 64-A-3, file 4, "Vancouver & Districts Joint Sewerage and Drainage Board Memo on Drainage Areas Flowing into False Creek and English Bay," 19 May 1943. On the typhoid outbreak, see "Typhoid germs infest creek, probe reveals," *Vancouver Province*, 8 January 1938, 1; "Sewer change mooted here," *Vancouver Province*, 10 January 1938, 2; "Health head would evict 500," *Vancouver Province*, 11 January 1938, 1; "Special committee to battle typhoid," *Vancouver Province*, 13 January 1938, 1; "False Creek and typhoid," *Vancouver Province*, 20 January 1938, 6.

would pour out of near-shore stormwater outfalls.[41] In addition, numerous outfalls discharged raw sewage to the North Arm of the Fraser River from New Westminster to the river mouth. At high tide, the North Arm backed up, entraining sewage and industrial waste. At low tides, these polluted waters spilled into the Strait of Georgia and were carried around Point Grey into English Bay. Although Lea's own float tests had documented this oceanographic phenomenon, he mistakenly calculated that the North Arm waters would be sufficient to dilute the wastes they received. Instead, the effects of river water and tidal circulation in English Bay (and the outflow from False Creek) helped ensure that beach pollution continued to threaten popular English Bay and Kitsilano bathing spots.[42] In a bizarre demonstration of this effect in 1946, a load of bananas dumped from a cargo ship near Point Atkinson in West Vancouver floated ashore on the beaches near False Creek. Public health officials warned citizens not to eat the fruit, however, as it had been floating in sewage-contaminated water.[43] Newspaper editorials regularly criticized civic officials for allowing pollution to persist: "The sea, as a sewage disposal basin, was adequate enough when the city was small. It is not proving adequate now, but that may be because we are

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[41] "Vancouver & Districts Joint Sewerage and Drainage Board Memo." Because the system relied on gravity flow to carry sewage, those areas lying at lower elevation than the interceptor running along the south shore of False Creek to the Imperial St. outfall discharged to adjacent waters unless pumped. Pumps were often not installed or not working properly. The same situation pertained along the north shore of False Creek, where dry-weather flows were diverted to the West End Interceptor, but during rainstorms the effluent poured into False Creek.

[42] On the interactions of the Fraser River, ocean tides, and winds in the Strait of Georgia see A.H. Hutchinson and C.C. Lucas, "The Epithalassa of the Strait of Georgia," *Canadian Journal of Research* 5 (August 1931), 231-284; Michael Waldichuk, "Physical Oceanography of the Strait of Georgia, British Columbia," *Journal of the Fisheries Research Board of Canada* 14, 3 (1957), 321-486. This tidal flushing problem in the North Arm was also commented on in a report prepared for the Provincial Board of Health on the sewerage of Point Grey and Kerrisdale: BCARS, GR-0132, Health Department, box 17 file 1, Edward Mohun, "Sewage, Point Grey Municipality, Kerrisdale and Magee Districts," 14 May 1912. The state of city beaches was the subject of some debate, mostly over what standards of coliform counts were considered acceptable for public bathing waters. See Erwin Kreutzweiser, "City to Eliminate Polluted Beaches," *Vancouver News-Herald*, 18 August 1949, 11; Erwin Kreutzweiser, "Controversy Rages Over Beach Pollution," *Vancouver News-Herald*, 19 August 1949, 1; Erwin Kreutzweiser, "City's Beaches Disease-Free," *Vancouver News-Herald*, 22 August 1949, 2.

[43] "Our sewerage problem," *Vancouver Province*, 5 October 1946, 4

not using it properly."[44] Designed to exploit the natural advantages of Vancouver's sea- and river-side location, the modified Lea system failed to overcome the pitfalls of relying on natural drainage and dilution.

The ocean was not the only source of pollution or the only example of the unintended consequences of urbanization. As noted, the city's creeks, once prominent landscape features, were gradually enclosed in either stormwater or combined sewer pipes. Remnants that remained above ground were now regarded as pestilential threats. For example, China Creek was a major drainage system in the eastern part of the city, at one time famous for its salmon runs and for the brewery established on one of its branches. The mainstem rose near present-day Kingsway and Knight Street as Gibson Creek, and flowed north to outlet at the head of False Creek,[45] collecting four tributaries along the way. The growth of the Cedar Cottage district prompted sewer construction in the area even in advance of the Lea plan, and most of China Creek was channelled through combined sewers into the Clarke Drive interceptor sewer, which diverted the flow to Burrard Inlet. But when the tidal flats at the False Creek were filled in to create the new Canadian Northern Railway yards, the lower portion of China Creek was turned into a sluggish, polluted ditch that received occasional overflows from the combined sewer. Local public health and aesthetic concerns led ultimately to the culverting of the stream in the early 1950s.[46]

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[44] "Our sewerage problem," *Vancouver Province*, 17 February 1947, 4. See also: "Laving the beaches," *Vancouver Province*, 6 November 1946, 4; "We need better sewage disposal," *Vancouver Province*, 18 June 1947, 4; "Our sewerage problem still with us," *Vancouver Province*, 9 December 1947, 4.

[45] The head of False Creek was drained in the 1910s — see note 20.

[46] On China Creek and the stream network generally, see Vancouver and Districts Joint Sewerage and Drainage Board, *Sixth Annual Report*; Gerry Harris and Sharon Proctor, *Vancouver's Old Streams*, rev. ed. (Vancouver: Vancouver Public Aquarium Association, 1989); J.C. Matthews, ed., *Mount Pleasant Early Days* (Vancouver: City of Vancouver Archives, 1957); Michael Kluckner, *Vancouver: The way it was* (Vancouver: Whitecap Books, 1984), 124. CVA, Major Matthews Collection, topical and categorical files, "China Creek," contains clippings documenting the pollution concerns of the 1950s.

If sewers sometimes created environmental problems, so did their absence. As noted above, rapid urban expansion had prompted the use of domestic septic tanks in suburban areas such as Kerrisdale, Kitsilano, West Vancouver, South Vancouver and Burnaby, creating a nuisance through overflows and inadequate drainage.[47] By 1948, the problem was so acute that the city considered restricting new housing development or asking developers to build sewers themselves and be paid back in the future.[48] An estimated 25 per cent of the city used septic tanks, and although the problem was greatest in south and southeast sections of the city, pockets of unsewered areas could be found throughout the Burrard Peninsula area. For instance, in 1952, an outbreak of polio in a Point Grey neighbourhood was allegedly connected to septic tanks serving some 100 residences. Septic overflows apparently drained into nearby Camosun Bog, a remnant wetland area at the edge of the city (and near a newly constructed elementary school) that had been partially drained for development beginning in 1929.[49] The bog's naturally high water table meant that septic tank overflows in the area may have allowed polluted water to remain near the surface. Residents linked three local cases of polio among neighbourhood children to the tainted bog and demanded the immediate extension of sewerage and drainage to the area. Meanwhile the city and the province bickered over jurisdictional responsibility for the cleanup (since the bog was partially on University Endowment Lands, which were administered by the provincial

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[47] "Sewage conditions protested," *Vancouver Province*, 16 April 1947, 3; Bill Lamb, "Twenty Years, $24 Million to End Septic Tank Problem," *Vancouver Sun*, 14 September 1951, 3. "We Can't Shrug This Off," *Vancouver Province*, 8 September 1951, 4; "Don't Encourage Septic Tanks," *Vancouver Province*, 22 September 1951, 4. See also CVA, Add. MSS. 103-A-3 file 1, Minutes of Metropolitan Health Committee, 20 October 1948, which contains a report by city engineer J.C. Oliver highlighting septic tank problems.

[48] "Sewer development at promoters' risk," *Vancouver Province*, 9 July 1948, 2.

[49] Wynn, *Vancouver and Its Region*, 168-69. As this piece notes, Camosun Bog provides an interesting window on the micro-scale effects of urbanization, natural change, and subsequent restoration. See also www.naturalhistory.bc.ca/CamosunBog (retrieved April 2004).

government). However, sewer construction was quickly begun in the area, and a second major drain for Camosun Bog was installed at 19th Avenue and Camosun Street in 1960, further contributing to the bog's retreat. This incident prompted other neighbourhoods across the city to demand sewerage services, even as the city struggled with ballooning sewerage budgets and natural sinks that were nearing their capacity.[50]

As if in response to the "polio boy" episode, the first draft of a comprehensive new sewerage and drainage plan appeared in the fall of 1952. This plan emerged from a detailed review of the regional sewerage system which was launched by the VDJSDB in 1950 and conducted by a committee that included the head of the Board, E. A. Cleveland, and two well-known California sanitary engineers, A. M. Rawn and Charles Gilman Hyde.[51] Typically referred to as the Rawn report,[52] the study may be seen as an enlargement and extension of the Lea report's basic strategies and assumptions. It, too, surveyed the region's physical and social geography, pollution problems, climatic conditions and economic development. It also acknowledged the threat — indeed, the fact — of pollution of inland waterways and shore waters by sewage. The investigators started from the premise that beach pollution in English Bay, not environmental degradation, was the major threat posed by sewage, so that the basic strategy of waste disposal,

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[50] "Council tackles problem of Point Grey swamp," *Vancouver Province*, 6 June 1952, 19; "Clean-up of swamp promised," *Vancouver Province*, 11 June 1952, 2; "Third polio case here reported," *Vancouver Province*, 17 June 1952, 1; "Action urged on disease-ridden swamp," *Vancouver Province*, 18 June 1952, 21; "Demand sewerage system," *Vancouver Province*, 21 June 1952, 21; "Early start likely on 'polio boy' sewer," *Vancouver Sun*, 18 July 1952, 5; "Residents demanding new sewers," *Vancouver Sun*, 19 July 1952, 21.

[51] Rawn was Los Angeles County's chief sanitary engineer and, later, chairman of the State Water Pollution Control Board of California, while Hyde was an emeritus professor of engineering at the University of California. Cleveland, also the head of the Greater Vancouver Water Board, served on the committee until his death in 1952, when his place was taken by Vancouver city engineer John Oliver.

[52] Greater Vancouver Sewerage and Drainage Survey, *Sewerage and Drainage of the Greater Vancouver Area, British Columbia*, A. M. Rawn, Charles Gilman Hyde, and John Oliver, Board of Engineers (Vancouver: Vancouver and Districts Joint Sewerage and Drainage Board, 1953).

dilution, remained intact. As California's top pollution control official, Rawn had concluded that, "Because it can act as a natural treatment system, [the ocean] should be used for this purpose with respect to sewage."[53] Like Lea, the Rawn team approached the problem of sewerage as fundamentally a geographical one: given certain hydrological, topographical, geological, climatic and land-use considerations, how to transport wastewaters safely through space to a location where they may be efficiently discharged. They also confronted the inadequate scale of the VDJSDB by expanding regional planning to include municipalities to the north, east and south of Burrard Peninsula (although areas south of Richmond were not included in the original plan).

In order to properly utilize the assimilative capacity of local waters, Rawn required detailed hydrological information. In particular, the Rawn survey tackled the problem of the circulation of Fraser River water in Burrard Inlet. Data were compiled on water quality and flow characteristics of the Fraser River from various sources. Detailed oceanographic surveys in the Strait of Georgia and Burrard Inlet were conducted in collaboration with the Pacific Oceanographic Group of the Fisheries Research Board of Canada and the federal Hydrographic Service, among other organizations. The "Fraser Estuary Project" married basic science with the practical engineering problem of sewage disposal. Fisheries oceanographers were attracted by the prospect of advancing their study of estuarine hydrology and the behaviour of pollutants in coastal waters.[54] Their study included the collection and analysis of water samples from dozens of stations, as well as measurements of tidal currents and their velocities in the Strait of Georgia and Burrard Inlet. Aerial surveys of the estuary documented the movement of Fraser River discharge,

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[53] Quoted in Michael Waldichuk, *Sewage Pollution in British Columbia in Perspective,* Canadian Industry Report of Fisheries and Aquatic Sciences No. 153 (Ottawa, Department of Fisheries and Oceans, 1984), 6.

[54] CVA, Add. MSS 1257, 63-F-5, file 1, Minutes of meeting between Pacific Oceanographic Group and Vancouver and Districts Joint Sewerage and Drainage Board, 21 April 1950.

particularly from the polluted North Arm, across the surface of the strait and into Burrard Inlet (Fig. 1.6). Unlike Lea, who considered the presence of surface fresh water in Burrard Inlet a boon, Rawn concluded that the North Arm was the source of at least some of the contamination plaguing English Bay beaches.[55]

The Rawn team used these and other observations to select outfall sites and to determine the degree of treatment required before discharge. The final report proposed a technological solution to account for regional population growth while preserving water quality. It envisioned a system that incorporated, yet almost completely reversed, the natural hydrology of the area (Fig. 1.7). The overriding need to prevent further pollution of Burrard Inlet, Vancouver harbour and English Bay entailed the proposed interception of all north-bound sewage from Vancouver and parts of neighbouring Burnaby, and its transmission southward through a deep tunnel to a treatment plant at Iona Island at the mouth of the Fraser River near Richmond. Much of the sewage draining southward to the Fraser River, particularly to the North Arm, was also targeted for diversion to Iona. There, the sewage would receive primary treatment (essentially comminution or "chopping," settling and removal of solids, and chlorination) before flowing through an open channel across Sturgeon Bank into the Strait of Georgia.[56] A similar sewage treatment facility, Lions Gate, was proposed for the North Shore of Burrard Inlet at First Narrows, to be built on the Capilano Indian Reserve. Not all wastewaters would be diverted to the treatment plants, however. During peak flows, such as during heavy rainstorms, combined runoff was channelled through old outfalls into

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[55] Greater Vancouver Sewerage and Drainage District, *Sewerage and Drainage*, 123

[56] Sturgeon Bank is a shallow, tidally inundated estuary area at the mouth of the Fraser River. The open channel was devised, in effect, to carry the wastes further out towards the open water of the Strait of Georgia during low tide. It was assumed that ample mixing would occur during high tide, when the channel was covered by water, to prevent pollution. See Greater Vancouver Sewerage and Drainage District, *Sewerage and Drainage*, 155-56.

the river, inlet and harbour. This allowed the new system to retain the existing combined sewerage works, a significant economic savings. Where raw sewage disposal was still permitted (notably, into the Main Arm of the Fraser from New Westminster, Richmond and parts of Burnaby), submerged outfalls were planned that took advantage of the river's tremendous flow.

The Rawn plan, then, plotted the diversion of wastewaters away from the numerous dispersed outfalls to concentrate them at fewer treatment and discharge points that were considered most advantageous from a sanitary viewpoint. This reconfiguration of the region's liminal spaces delineated shores and shorewaters to be preserved for aesthetic and recreational purposes, such as English Bay, and those defined as sinks for waste, such as the Fraser River and Sturgeon Bank. These waters and their uses were defined by their capacity to assimilate wastes, but also by their non-utility for other purposes. Beyond this, environmental quality considerations were nearly totally absent from the Rawn report, save for a nascent concern with toxic chemicals that might pose a threat to fish and wildlife. Rawn discounted the impact of sewage discharge to the Fraser on fish life, assuming that the river's high levels of dissolved oxygen would more than compensate for the oxygen-depleting characteristics of wastewaters.[57]

Rawn's plan, like Lea's, was a product of the engineering mentality that viewed nature in strictly utilitarian terms. Rather than been seen as an environment, Greater Vancouver's waters were scientifically and rhetorically constructed as a resource, an amenity and a sink for wastes. The complex environment of water was reduced to measurable biophysical and chemical parameters, which could be exploited in service of waste disposal. Pollution was defined as a statistical condition, based on levels of dissolved oxygen or numbers of coliform bacteria in

[57] Ibid., 101.

water. But this condition was not the same across space and time: different measures of pollution were deployed in different places, depending on the use-value of the water and shore, and the projected development of a given area. The quantification of nature allowed the Rawn team to calculate the assimilative capacity of area waters, while discounting alternative conceptions of pollution or environmental quality. In this sense, the map- and table-filled, 278-page final report can be read as both a reflection of these attitudes, and a rhetorical mobilization of the authority of science and engineering in the service of a technocratic vision of the urban environment.[58]

To administer and finance the plan, the Rawn report advised maintaining most of the same basic features of the VDJSDB, whereby municipalities would share the cost of works of common benefit to the region. But while it was hailed by Vancouver newspapers, the plan encountered stiff resistance from some regional municipalities which balked at the cost of expensive infrastructure works to benefit (they argued) Vancouver beach-goers. In particular, Richmond residents protested their city's selection as the site for an "oversized outhouse" at Iona Island.[59] Richmond Reeve Ray Parsons, along with leaders from other outlying municipalities, worked to block provincial enabling legislation in 1954 and 1955. "The only excuse for including us in this scheme is to provide an area in which to dump the effluent on our west shores and also to obtain our financial assistance," accused a Richmond brief to the province.[60] Their tactics worked: newly elected provincial Minister of Municipal Affairs Wesley Black proved reluctant to impose the Rawn plan

[58] The role of quantification in generating authority for particular decisions is discussed in Theodore M. Porter, *Trust in Numbers: The pursuit of objectivity in science and public life* (Princeton, Princeton University Press, 1995).

[59] The comment came from Lou Blanchard, "Richmond would lose," letter, *Vancouver Sun*, 16 October 1953, 4. See also "City's Sewerage Plan Bitterly Opposed," *Vancouver Sun*, 19 September 1953, 13; Roy W. Brown, "Beaches Safe," *Vancouver Sun*, 2 October 1953, 4.

[60] "Gov't to get protest on sewage dump," *Vancouver Sun* 13 December 1955, 2.

on unwilling cities.

In response to the political deadlock over the sewerage plan, a newly created Metropolitan Joint Committee and the VDJSDB each prepared reports promoting metropolitan sewerage schemes. Rawn himself was recalled from Los Angeles to promote the adoption of his plan. In his report to Premier and Minister of Finance W.A.C. Bennett, VDJSDB Chairman T.V. Berry lamented that "the communities... outside the present Sewerage District, are not conscious of the metropolitan aspects of the problem nor are they willing to consider or concede their responsibilities to their neighbours in matters of sewage disposal."[61] By 1955, with regional planning in disarray, and sewage problems mounting, calls came to either force municipalities to join a new scheme, or dissolve the existing Joint Board and let each city construct its own facilities.[62] The provincial government's response not only confirmed the Rawn plan as the basis for sewerage planning in the region, but launched a new approach to pollution control for the entire province.

Re-scaling pollution control: The B.C. Pollution Control Board

By the early 1950s, the growing scale of sewage pollution had drawn attention to the ineffectiveness of pollution control regulations in B.C. A variety of public agencies undertook studies of threatened environments and began to explore the jurisdictional, legal and practical problems posed by pollution. However, their efforts reflected divergent institutional interests in water, as well as varying capacities for the regulation of polluting activity. The Greater Vancouver

[61] CVA, Add MSS 1257, 63-F-5, file 4, T. V. Berry, *Memorandum to the Honourable Minister of Finance for the Province of British Columbia Relative to the Present Status of Planning of Sewerage and Drainage of the Lower Mainland*, 3 August 1955, 9. See also CVA, PDS 492, Joseph E. Howes, *Sewerage and Sewage Treatment Facilities: A report to the Metropolitan Joint Committee*, 1959.

[62] "Sewer plan down the drain," *Vancouver Province*, 25 February 1955, 4; "Scrap sewer board, municipalities urge," *Vancouver Province*, 22 October 1955, 19; "Leadership at last," *Vancouver Sun*, 8 December 1955, 4.

sewage question provided an initial focus for pollution concerns, and stimulated a program of environmental surveillance to determine the effect and extent of pollution. Ultimately, the provincial government asserted its authority for the regulation of water pollution — and the enactment of the Rawn solution — through the creation of a Pollution Control Board (PCB) in 1956. This innovation expanded and intensified the role of the state in the control of water resources, municipal growth and industrial development. In B.C., the PCB was a tentative first step towards co-ordinated pollution control regulation in the province. As we will see, its limited scope and effectiveness were a product of its creation in response to the Lower Mainland sewage controversy.

These stirrings of regulatory activity mirrored trends in the management of water resources across North America. Anti-pollution regulations before the Second World War in most Canadian provinces were confined to public health acts and water acts aimed at regulating sewage disposal.[63] Existing statutory prohibitions against pollution, where they existed, were judged to be ineffective or unenforceable, and governments increasingly turned to technocratic regulatory bodies to design and implement workable solutions to domestic and industrial pollution problems. Beginning in the interwar years, states and provinces across the continent had created a variety of technocratic pollution control boards, stream commissions, public health bureaus and other public agencies to address the growing problem of urban and industrial pollution.[64] Both in the U.S. and

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[63] On the development of Canadian pollution control boards and commissions, see Jim Anderson, *Provincial Legislation Respecting the Pollution of Waters by Phosphates, Pulp and Paper and Human Sewage* (December 1972); Jennifer Read, "Addressing "A quiet horror": The evolution of Ontario pollution control policy in the international Great Lakes, 1909-1972," (PhD diss., University of Western Ontario, 1999).

[64] Craig E. Colten, "Too Much of a Good Thing: Industrial pollution in the Lower Mississippi River," in Craig E. Colten, ed., *Transforming New Orleans and Its Environs: Centuries of change* (Pittsburgh: University of Pittsburgh Press, 2000); Peter C. Yeager, *The Limits of Law: The public regulation of private pollution* (Cambridge: Cambridge University Press, 1991), chaps. 3 and 4; Melosi, *Sanitary City*, 230-233, 314-318; Kehoe, *Cleaning Up the Great Lakes*, chap. 1.

Canada, the scope and effectiveness of these bodies varied considerably between jurisdictions. As Martin Melosi notes of American state agencies, "The results of checking water pollution [before the Second World War] were often disappointing. There were inconsistencies in the regulations and enforcement was lax."[65] In both countries, jurisdictional disputes limited federal initiatives in water-pollution control to interstate or interprovincial waters, or to specific areas of legislative competence, such as fisheries protection in Canada. In the 1950s, specific statutes for the control of water pollution were enacted in B.C., Manitoba, New Brunswick and Ontario. In all but Ontario, these laws and regulations were limited to the control of municipal waste disposal and "provided little focus on the problem of pollution" overall.[66] The Ontario Water Resources Commission, created in 1956, contained provisions for the overall supervision and regulation of water resources, including pollution. In general, however, provincial pollution control legislation in Canada remained confined to the traditional realm of protecting public health.

Before the PCB was formed, pollution control regulation in B.C., like that of other provinces, was scattershot and of limited effectiveness. Since the late nineteenth century, the province had restricted domestic pollution under the Health Act, and the construction of sewerage works was subject to the approval of the Provincial Health Officer. The Water Act also contained a section proscribing pollution. But few if any actions were undertaken under either Act. As environmental law expert A.R. Lucas observed, "in the application of the specific pollution sections (most often by health authorities) the tendency was to lose sight of the broader objectives of water resource allocation. There was confusion and competition among the governing

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[65] Melosi, *Sanitary City*, 231.

[66] Anderson, *Provincial Legislation*, 63. See also J. R. Menzies, "Water Pollution in Canada by Drainage Basins," in J. G. Nelson and M. J. Chambers, eds, *Water: Selected readings* (Toronto: Methuen, 1981 [1961]?), 213-233.

authorities. Pollution control (in the sense of prior prevention) was difficult since the various provisions merely made existing pollution the subject of penalties."[67] In addition, both provincial Fish and Game Branch officials and federal Department of Fisheries officials investigated and occasionally prosecuted polluters for violations of the federal Fisheries Act. But these efforts suffered from the same lack of coherence and after-the-fact shortcomings as Lucas noted above.[68]

Moves to address these inadequacies emerged on two fronts beginning in 1950. The Dominion-Provincial Fraser River Board, a co-ordinating body of provincial and federal government officials, conducted pollution surveys of the Fraser and Vancouver Harbour. However, the activities of the board's pollution committee remained confined to investigations, and avoided making regulatory recommendations. The second site of regulatory activity was the Public Health Engineering Branch of the provincial Department of Health. Staffed mainly by sanitary engineers and public health inspectors, this branch promoted the rational planning of waste disposal to avoid pollution. The Director of Public Health Engineering, Reginald Bowering, sat on the Dominion-Provincial Fraser River Board, and was also a founding member the Pacific Northwest Pollution Control Council, an international group of health department officials and sanitary engineers established in 1949.[69] In 1952, Bowering and his assistant, N.J. Goode, circulated a proposal among provincial officials for a pollution control body with a mandate "to so limit or reduce stream pollution that other uses to which the stream may be put will not be unduly restricted and so that the greatest possible use can be made of our water resources and the

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[67] Alastair R. Lucas, "Water Pollution Control in British Columbia," *U.B.C. Law Review* 4, 1 (May 1969), 64.

[68] On the Fish and Game Branch and Department of Fisheries, see especially chapters 3 and 4, *infra*.

[69] BCARS, GR-0132 Department of Health, box 5 files 3, 4, 6.

maximum benefit accrue to the people of British Columbia."[70] Up to this time, water pollution issues had been dealt with through informal interdepartmental channels that allowed various departments to comment on waste discharges (usually as a part of water rights applications), but did not concentrate effective regulatory authority in any one body. Bowering and Goode's experiences with this mechanism, and their more recent connection with the Fraser River Board, had raised several concerns with this process: the division of pollution control authority among various government agencies; the lack of workable standards for water quality; the scarcity of research into pollution problems; and the place of pollution control amongst resource development priorities.[71]

The Bowering and Goode proposal warned that with B.C. on the cusp of rapid industrial and population growth, a competent technical authority was needed to ensure pollution did not degrade the province's relatively clean waters. Bowering promoted this idea through Health Department reports and publications, and at the B.C. Natural Resources Conference, a technocratic conservation think-tank that annually brought together bureaucrats, academics and industry representatives to discuss resource development policy.[72] In 1953, a pollution panel at the conference endorsed the establishment of such a body in the name of the wise use of water

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[70] BCARS, GR-0132 Department of Health, box 23 file 1, N.J. Goode, "The Control of Stream Pollution in British Columbia," typescript, ND (1952). This draft was circulated to various departments with an interest in pollution control for their comments, most of which endorsed some sort of pollution control commission.

[71] BCARS, GR-0132 Department of Health, box 5 file 5, N.J. Goode, Memo, Re: Stream Pollution - Fraser River, 28 January 1952.

[72] R. Bowering, "Pollution Control in B.C. Today," in *Transactions of the Seventh British Columbia Natural Resources Conference*, (Victoria: BCNRC, 1954). See also British Columbia, Health Branch, *Annual Report of the Public Health Services of British Columbia*, (Victoria: Department of Health Services and Hospital Insurance, 1953, 1955); and "Stream-pollution control means protection of health, recreation, farming, and industry," *BC's Health*, bulletin of the Department of Health and Welfare, March 1952, 1, cited in BCARS, GR-0132 Department of Health, box 23 file 1.

resources.[73] It was also backed by the leading voice of B.C. sportsmen, author and conservationist Roderick Haig-Brown, who argued that "It is axiomatic that pollution should be prevented," and the costs of control absorbed by industry.[74] Both Department of Health and Water Rights Branch officials positioned their departments as the logical authority for such a body, but the unique circumstances surrounding the creation of the PCB meant it found its first home in the Department of Municipal Affairs.

The political impetus for the creation of the Pollution Control Board arose from the crisis surrounding the Rawn plan. Indeed, the idea for such a body was floated by Rawn himself at intergovernmental meetings on the sewerage plan held in 1952.[75] Faced with continued resistance from Richmond and other suburban municipalities, the province hesitated for three years to approve the Rawn plan. Finally, early in 1956, the provincial government drafted legislation to create a new Greater Vancouver Sewerage and Drainage District (GVSDD), but with only three members — Vancouver, Burnaby and the University Endowment Lands — a membership virtually unchanged from the original joint board. But at the same time, Municipal Affairs Minister Black announced the creation of a body to set and enforce water quality standards, in the hope of bringing municipalities into the new sewerage district by forcing them to curb pollution.[76]

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[73] *Transactions of the Seventh British Columbia Natural Resources Conference*, 309.

[74] University of British Columbia Library, Archives and Special Collections Division, Roderick Haig-Brown Papers, Box 119 file 5, "Pollution Panel. Sixth Resources Conference. Minutes of Meeting of September 19, 1952." Notably, however, Haig-Brown's axiom was emphatically not endorsed by the panel, who adopted instead the position that "pollution is an aspect of proper resource use."

[75] Greater Vancouver Regional District Library historical files, "Minutes of Meeting of Government Officials with Representatives of Vancouver Sewerage and Drainage Board to Discuss Proposed Plans of Board," 10 December 1952. See also BCARS, GR-0132 Department of Health, box 5 file 5 for minutes of subsequent meetings.

[76] "Board to be set up on sewage problem," *Vancouver Sun*, 23 February 1956; "Shirking responsibility," *Vancouver Sun*, 24 February 1956, 4. That the PCB was primarily seen as a "big stick" to compel participation in the sewerage scheme is evident from correspondence in the sewerage board's file on the Rawn report, CVA, Add. MSS. 1257, 63-F-5, file 4.

In spite of its lofty rhetoric regarding "the public interest to maintain and ensure the purity of all waters of the province consistent with the public health and public enjoyment thereof," the resulting *Pollution-control Act*[77] was very much an artifact of the Vancouver controversy. It mandated the creation of a Pollution Control Board to "determine what qualities and properties of water shall constitute a polluted condition" and to regulate and enforce standards for effluent and water quality only within the waters of the Lower Fraser Basin below Hope and of the Strait of Georgia between Halfmoon Bay on the Sechelt Peninsula to the north and Boundary Bay to the south. This board, appointed by Cabinet, was authorized to issue waste-discharge permits for sewage and other discharges, and to require treatment of effluent where deemed necessary. The act also created a category of offence for contravention of the act or of a board order, subject to a fine up to $250 or up to a year in jail. Because the act dealt exclusively with discharges from municipal lands within this area, the minister of municipal affairs was made responsible.[78]

The composition of the PCB revealed a delicate balance struck between technical and political considerations. Its chairman, J.E. Brown, was the deputy minister of municipal affairs, who was joined by the deputy minister of health and the province's chief forester. Technical members included Bowering; R.G. McMynn, chief biologist of the Fish and Game Branch; Valter Raudsepp, chief engineer for the Water Resources Service; and Charles Brackenridge, a former Vancouver city engineer. The board was rounded out by one other non-governmental member, R.T. Reynolds, a Delta farmer. Reliant on laboratory and support services provided by the Health

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[77] *Statutes of British Columbia* 1956 c. 36.

[78] Ibid.

Branch, the PCB was understaffed and overwhelmed with duties almost from its inception.[79]

The board quickly showed that it embraced technocratic notions of assimilative capacity and pollution. In determining its procedures, the board members "generally agreed that persons should apply for the right to pollute the waters of the area, that public notice should be given of the intention to apply and that opportunity should be given anyone likely to be affected to make known to the Board his objections to the granting of this right."[80] Its early decisions on sewage disposal to the Fraser approved raw sewage discharges until "water quality conditions have deteriorated to a point where the PCB considers it against the public interest," at which time treatment would be mandated. Meeting in 1957 with federal and provincial fisheries officials, as well as the International Pacific Salmon Fisheries Commission, board members tended to cast fisheries interests as narrowly focussed and advised fisheries officials that in some cases, decisions on waste disposal might go against them. Economic, technical and political considerations, it was clear, would rule PCB decisions on how and when to control pollution.[81] Essentially, the board operated as a resource management agency, allocating access to assimilative capacity in areas where competing resource uses might create problems. Much like the operation of water rights administration, the emphasis of the board's operation was administrative fairness and the efficient utilization of public waterways.[82]

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[79] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01, file 1, Pollution Control Board Minutes, 21 November 1956.

[80] Ibid.

[81] Ibid., Minutes, 24 May 1957, 17 June 1957, and 4 September 1957.

[82] Campbell et. al. characterized pollution control regulation as restrictive rather than allocative. My contention is that the lack of actual regulation and enforcement by the board before the 1960s meant the system was *de facto* allocative, in the sense that a pollution permit granted the permittee access to water's assimilative capacity. Richard S. Campbell, Peter Pearse and Anthony Scott, "Water Allocation in British Columbia: An economic assessment of public policy," *U.B.C. Law Review* 7 (1972), 247-292.

The PCB almost immediately plunged into the Iona Island controversy. The Greater Vancouver Sewerage and Drainage District was required, under the new legislation, to apply for a pollution permit to operate the Iona Sewage Treatment Plant. The application was immediately appealed by the Township of Richmond. Keenly aware of the controversial nature and far-reaching implications of the issue, the board called a public hearing on the application for 5-6 September 1957, in Vancouver. It was an unprecedented forum: never before had interest groups and the public in B.C. been given access to pollution control and sewage disposal decisions beyond municipal bylaw-approval referendums. At the hearing, several Richmond groups offered technical and political objections to the Iona Island treatment plant. The Richmond municipality's brief argued, "We feel this scheme will merely transfer pollution from one area to another."[83] It contended that the Rawn team failed to consider alternatives to the Iona Island site, where the township planned to develop a recreational area. The brief also noted that the municipality's own water sampling had revealed "considerable pollution" on the North Arm side of Iona Island, which it feared could be made worse by the open-channel outfall design. By contrast, testimony from the Vancouver Board of Trade accused Richmond of holding regional health and development hostage. Meanwhile, commercial fisheries and fish and game advocates urged that consideration be given to the protection of aquatic life, whatever plan was adopted. The GVSDD argued that provincial legislation creating the district gave it the authority to carry out the Rawn plan, which included the treatment plant and related works.[84] Rawn testified that the Iona Island location was chosen as a site for sewage treatment in consultation with Richmond's own city engineer, based on the findings

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[83] *Transcript of Hearing before the Pollution-Control Board, September 5-6, 1957* (Victoria: The Board, 1958), 73.

[84] Ibid., 52.

that the area waters were already polluted by sewage outflow from the north and middle arms of the Fraser River. The hearing also heard testimony from Fisheries Research Board oceanographer J.P. Tully to the effect that the open channel across Sturgeon Bank was devised so as to maximize the mixing of effluent and seawater before its transport in the currents of the Strait of Georgia.[85]

Satisfied with the technical testimony of the sewerage district's experts, in early 1958 the PCB approved the Iona application with only slight amendments.[86] Richmond immediately appealed the decision to the provincial Cabinet, and launched a public relations campaign to discredit the Rawn plan. Meanwhile, Vancouver newspapers again called for the government to compel participation by all regional municipalities in the sewerage scheme. Defending the Sturgeon Bank outfall, the GVSDD placed a newspaper advertisement urging Vancouverites to "[t]hink of the action of fresh water from the Fraser River on the south, the movement of currents and the out-going tide, and a channel cut three miles out to Sturgeon Bank, well away from the shore, as parts on a giant flushing machine."[87] To the GVSDD, the assimilative capacity of the Strait of Georgia provided an almost limitless hydrological resource for cheap and effective waste disposal. It characterized Richmond's objections as "groundless" and appealed to the authority of the Rawn team's scientific expertise: "When it comes to designing a complicated plant, who do you listen to: your next-door neighbors [sic] or skilled engineers?"[88]

As the provincial Cabinet delayed its decision through the summer of 1958, alarmingly

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[85] Ibid., 131-141, 238.

[86] But not without controversy within its own ranks, as Delta farmer and board member R.T. Taylor dissented. BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01 file 1, Pollution Control Board Minutes, 17 February 1958.

[87] See display advertisements in: *Vancouver Sun*, 14 August 1958, 11; *Vancouver Sun*, 21 August 1958, 16, 21.

[88] Ibid.

high coliform counts at English Bay beaches prompted beach closures by the Vancouver Health Board. The public outcry over the return of beach pollution virtually guaranteed Richmond's protests would be overridden.[89] The Iona application received Cabinet approval in September with some additional environmental monitoring conditions, and the Rawn plan became the template for the sewerage and drainage network of Greater Vancouver for the next fifty years.[90] Its implementation, however, proceeded slowly and remained contentious. The Iona Island treatment plant was not brought on-line until 1963. Public pressure for pollution control continued to build during this period and, with some reluctance, seven other municipalities joined the GVSDD by 1967. In spite of the slow pace of construction and the rapid growth of the metropolitan area, which strained existing infrastructure, in the early 1960s most in the region felt the Rawn plan would permanently banish the spectre of sewage pollution.

Conclusion

By 1960, then, Vancouver had transformed its sewerage and drainage system from a local system of simple gravity-operated pipes and rudimentary "septic tanks" to an integrated regional system of interceptors, trunk sewers, tunnels, pumps, and, soon, treatment plants. Regional politics and conceptions of space and nature were also transformed in this process. The story of sewerage in Vancouver exemplifies the interaction of natural and cultural systems in shaping urban geographies. Vancouver, like cities elsewhere, attempted to address sewage pollution by re-

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[89] "Fast action on sewers asked," *Vancouver Sun,* 22 August 1958, 29. The connection between the beach closures and the final decision was also alluded to in Greater Vancouver Sewerage and Drainage District, *Annual Report* (Vancouver: GVSDD 1958), 14. Although beach pollution complaints had been heard for years, this appears to have been the first time the beaches were actually closed. Cynics later suggested the closure of the beaches by the Vancouver Parks and Recreation Board, on the advice of local health authorities, may have been politically motivated to force the provincial government's hand on the Rawn Plan: see Rod Morgan, "A mighty sewage struggle," *Vancouver Sun,* 10 December 1970, 6.

[90] The verbatim Cabinet decision can be found in BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01, file 1, Pollution Control Board, Minutes of Meeting, 24 September 1958.

scaling environmental planning and governance first to inter-municipal and regional scales, and later to the provincial scale. As Sarah Elkind described in connection with Boston and Oakland, "regionalism [and] political reforms were linked directly to the natural environment. Physical conditions, including urban pollution and resource shortages, played a crucial role in marshalling public support behind expensive and elaborate public works."[91] New visions of the urban region as a place united by environmental circumstances emerged and shaped the ways in which residents of the Fraser River-Georgia Strait region understood and governed themselves.

In retrospect, however, it is clear that the strategy of regionalization endorsed by sanitary engineers failed in important respects. Rather than solving waste disposal problems, these plans merely introduced "longer pipes" and larger sinks for domestic wastes.[92] This strategy reconfigured the natural hydrology of the region, turned salmon streams into sewage and stormwater carriers, and remade marine and river waters into sewage disposal facilities. Even the Pollution Control Board's efforts to manage water pollution simply rescaled the same old strategy of dilution and assimilative capacity, first encompassing the Lower Fraser Valley and, later, the entire watershed. Yet these developments were widely hailed as a technological triumph, an indication of the progressive vision of civic leaders, and a positive foundation for the further growth and development of the metropolitan region.

The technological fixes proposed by sanitary engineers relied on the notion that nature presented a set of stable, predictable conditions that could be measured, evaluated and exploited. The natural action of rivers and tides were viewed by planners as an extension of their

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[91] Elkind, *Bay Cities and Water Politics*, 9.

[92] Ibid., 166.

technological systems. But this notion was undermined by changing interpretations of natural conditions, and the natural variability of these conditions. On the one hand, up until the late 1940s, city engineers accepted the Lea theory that the influence of fresh water from the Fraser River on Burrard Inlet was a positive one, which helped with the dispersion and absorption of sewage. Thus, the city concentrated on the installation of interceptors to relieve pollution in False Creek, and considered discharges to the North Arm of the Fraser acceptable. The oceanographic investigations undertaken by Rawn helped debunk Lea's interpretation, recasting the river water as a threat to Vancouver beaches. Neither Lea nor Rawn could explain the seemingly episodic appearance of beach pollution concerns, however. Their attempts to create predictive models of estuarine circulation and tidal behaviour failed to consider the complexity of the factors influencing tidal behaviour and water circulation in the Fraser estuary/Strait of Georgia.[93] In addition, the haphazard appearance of pollution concerns seems to indicate a role for natural variability in the production of polluted conditions in Vancouver waters. As oceanographer Michael Waldichuk noted in his physical oceanography of the Strait of Georgia, "The daily tidal influence, the winds, the daily fluctuations in runoff introduce a combination of factors which produce essentially random distributions of properties in the surface waters."[94]

As flawed or limited as these sewerage schemes were, their realization was also affected

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[93] See, for instance, Richard E. Thomson, *Oceanography of the Pacific Coast* (Ottawa: Department of Fisheries and Oceans, 1981), 159-169.

[94] Waldichuk, "Physical Oceanography of the Strait of Georgia," 477. Jerome Williams urges a cautious approach to the creation of predictive models of pollution effects, because of the dynamic, changing nature of the ocean environment: see his *Introduction to Marine Pollution Control* (New York: John Wiley & Sons, 1979), 13-16. In addition to daily, monthly, seasonal and annual variability, longer-term, global-scale factors such as the El Niño Southern Oscillation meteorological phenomenon may also affect local conditions, including sea surface temperature and precipitation, that in turn affect pollution. In this regard, the fact that the El Niño event in 1957-58 — the year of the beach closure — had significant effects along the B.C. coast is suggestive. See S. Tabata, "El Niño Effects Along and Off the Pacific Coast of Canada During 1982-83," in *El Niño North: Niño effects in the Eastern Subarctic Pacific Ocean*, Warren S. Wooster and David L. Flaherty, eds. (Seattle: University of Washington, 1985), 85-96; J.P. Tully, A.J. Dodimead, and S. Tabata, "An Anomalous Increase of Temperature in the Ocean off the Pacific Coast of Canada through 1957 and 1958," *Journal of the Fisheries Research Board of Canada* 17, 1 (1960), 61-80.

by the vagaries of politics and history. The fateful changes to the Lea plan, including the adoption of combined sewerage and the failure to eliminate outfalls to False Creek, were in no small part attributable to the costs of infrastructure development. For a developing city enduring the effects of the Depression and war, sewerage was but one of many pressing budgetary concerns. Rapid population growth, particularly following the Second World War, strained the capacity of this underbuilt system at the same time as crowding the beaches with ever-greater numbers of urban recreationalists. Thus, beach pollution emerged as a major motivation for the reconstruction of Vancouver's waste sinks. The incorporation of the existing combined sewers into the Rawn plan has left contemporary Vancouverites faced with the continued problem of combined sewer overflows and a massive sewer separation bill. These shortcomings, as Rosen points out in relation to Chicago's sewerage system, often reflected the technical and informational constraints faced by engineers and planners in the past.[95] Thus, though epidemic diseases such as typhoid were largely eliminated by the Lea and Rawn systems, the reliance of these systems on the natural assimilative capacity of regional waters meant that shoreline, estuarine and river contamination remained a constant threat. As Chapter 2 recounts, in the 1960s, the region's population grew and environmental values began to shift. The recurring problems created by the system's design, as well as the willingness of pollution control authorities to continue to exploit assimilative capacity, would result in increasing public and scientific challenges to government and technocratic authority over urban nature.

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[95] Rosen, *Limits to Power,* 60-63.

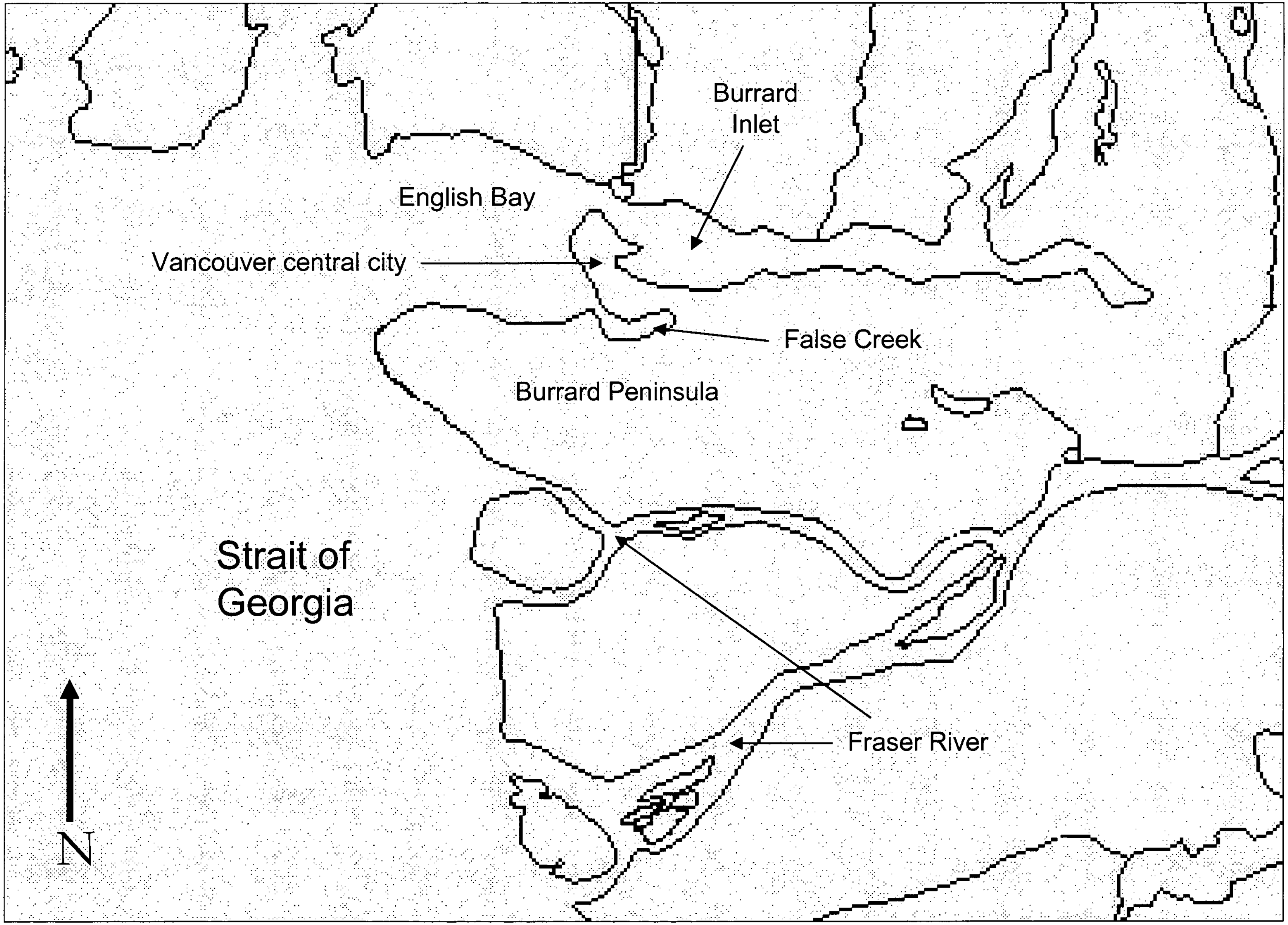

Figure 1.1: Burrard Peninsula and the waters of the Greater Vancouver region.

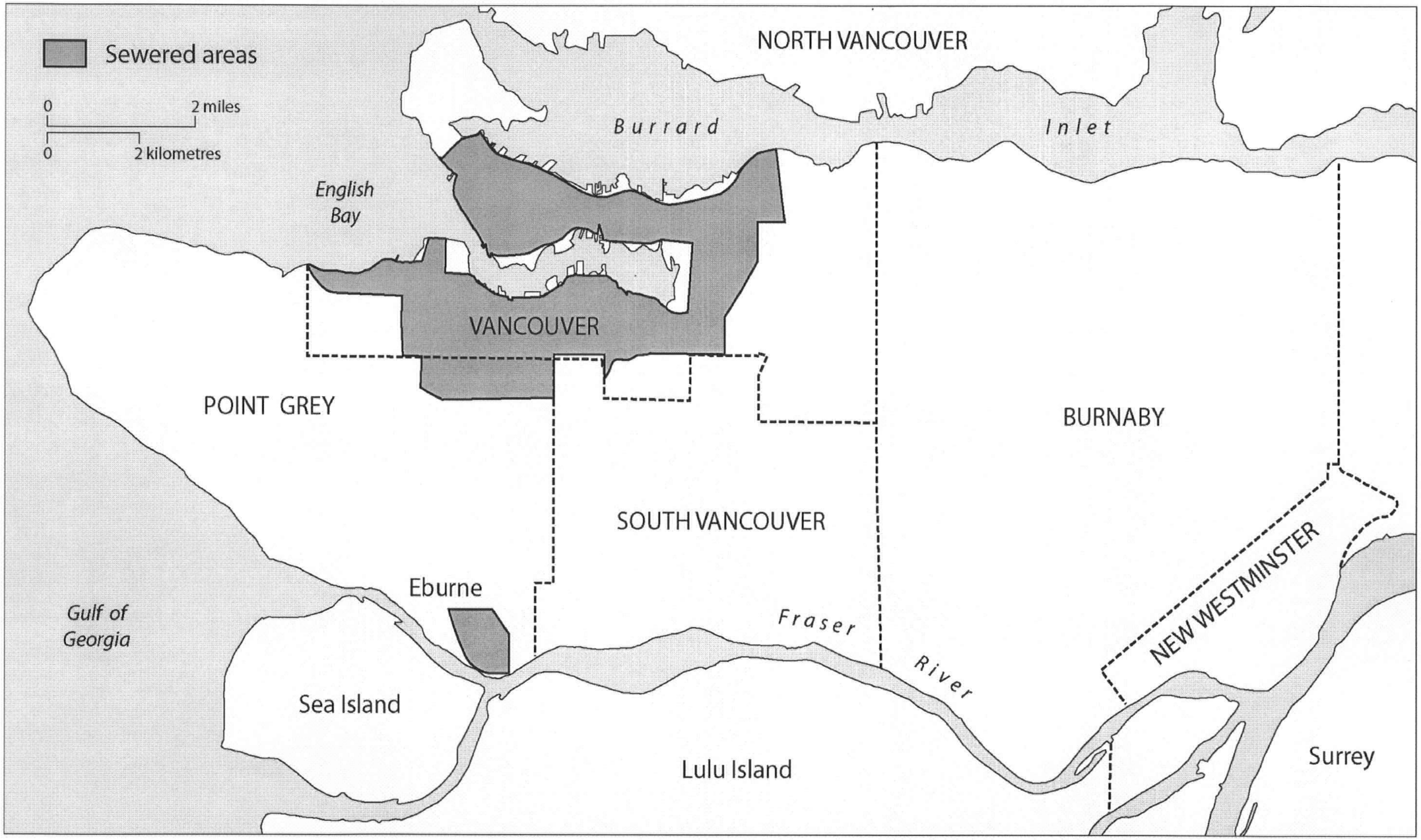

Figure 1.2: Sewered and unsewered areas of Vancouver, 1912. Although Vancouver and neighbouring municipalities were rapidly expanding south- and eastwards, sewerage facilities were confined to the central city areas. Map by Eric Leinberger. Source: R.S. Lea, *Report by R.S. Lea to the Burrard Peninsula Joint Sewerage Committee* (Vancouver: Vancouver and Districts Joint Sewerage and Drainage Board, 1913 [1917]).

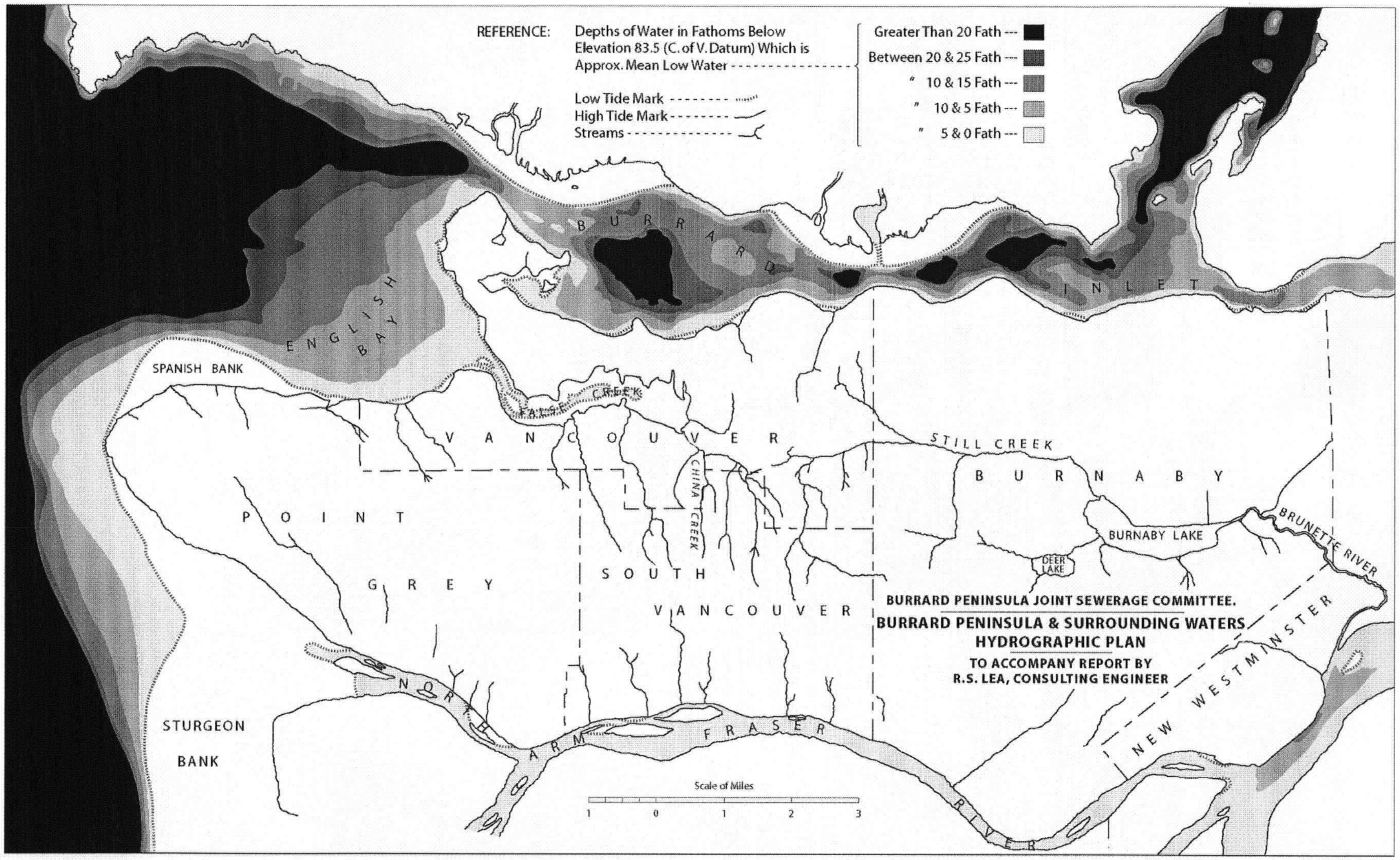

Figure 1.3: R.S. Lea's map of the original hydrology of Burrard Peninsula. Lea's surveys were among the first topographical and hydrological studies of the region. The major stream networks shown became the basis of the city's sewerage and drainage network. Redrawn by Eric Leinberger from: R.S. Lea, *Report by R.S. Lea to the Burrard Peninsula Joint Sewerage Committee* (Vancouver: Vancouver and Districts Joint Sewerage and Drainage Board, 1913 [1917]).

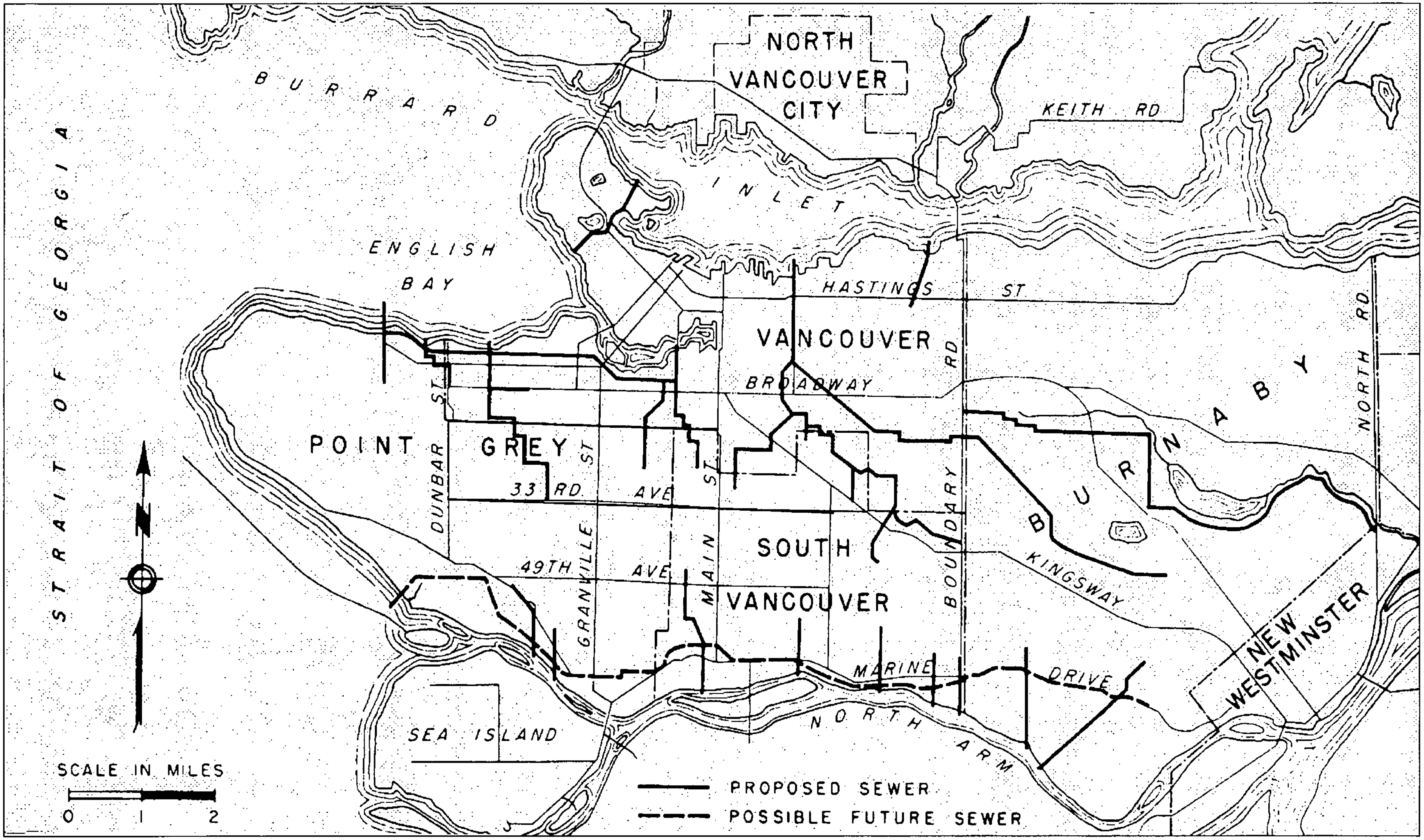

Figure 1.4: R.S.Lea's design for the trunk sewer system of Burrard Peninsula. This map was reproduced in Greater Vancouver Sewerage and Drainage Survey, *Sewerage and Drainage of the Greater Vancouver Area*, British Columbia, A.M. Rawn, Charles Gilman Hyde, and John Oliver, Board of Engineers (Vancouver: VDJSDB, 1953), 264.

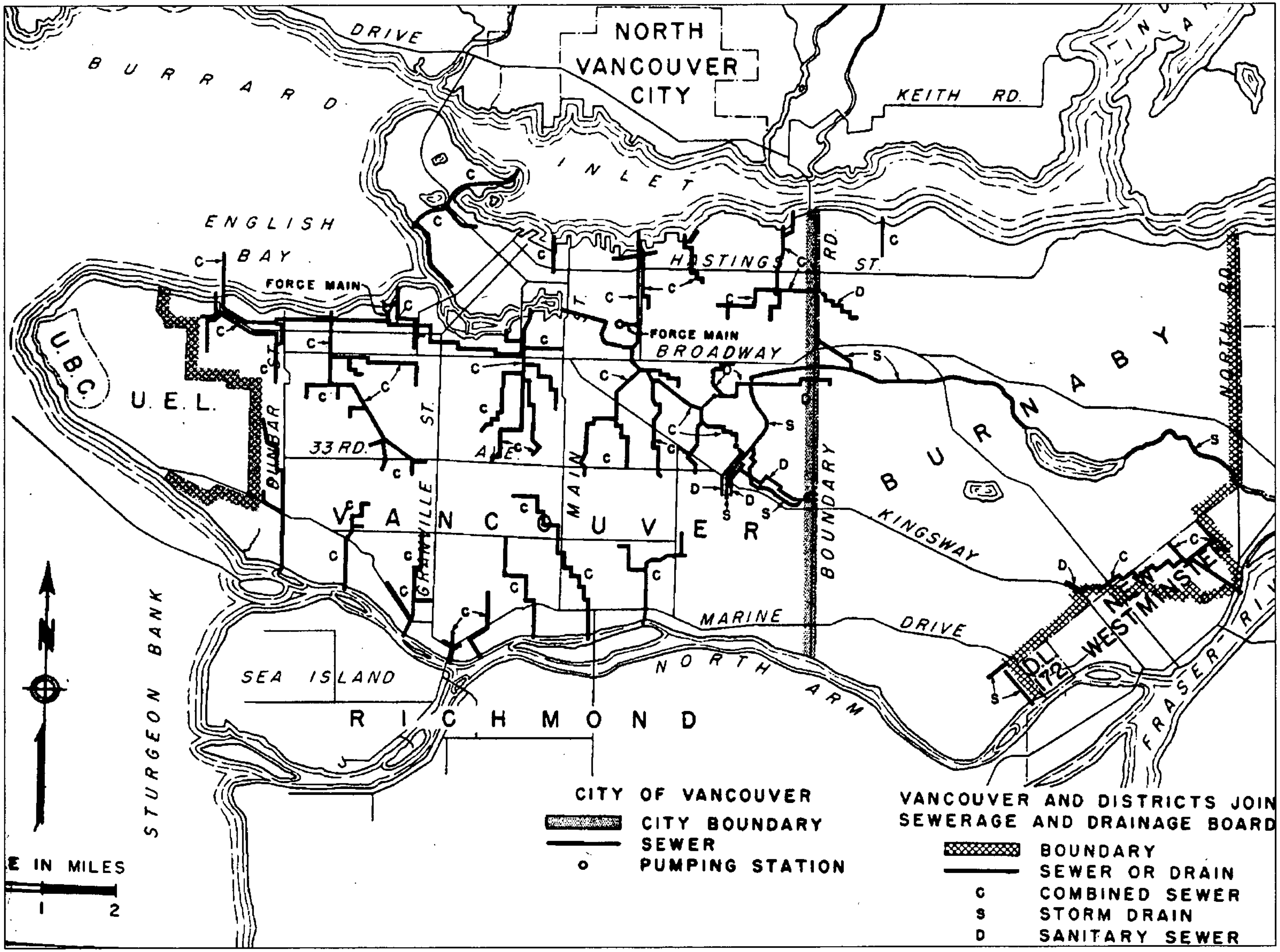

Figure 1.5: Sewerage and drainage of Burrard Peninsula, circa 1950. Instead of the separate system proposed by Lea, combined sewers (marked 'c') discharged sanitary wastes and stormwater some or all of the time to area waters. Source: Greater Vancouver Sewerage and Drainage Survey, *Sewerage and Drainage of the Greater Vancouver Area*, British Columbia, A.M. Rawn, Charles Gilman Hyde, and John Oliver, Board of Engineers (Vancouver: VDJSDB, 1953), 78.

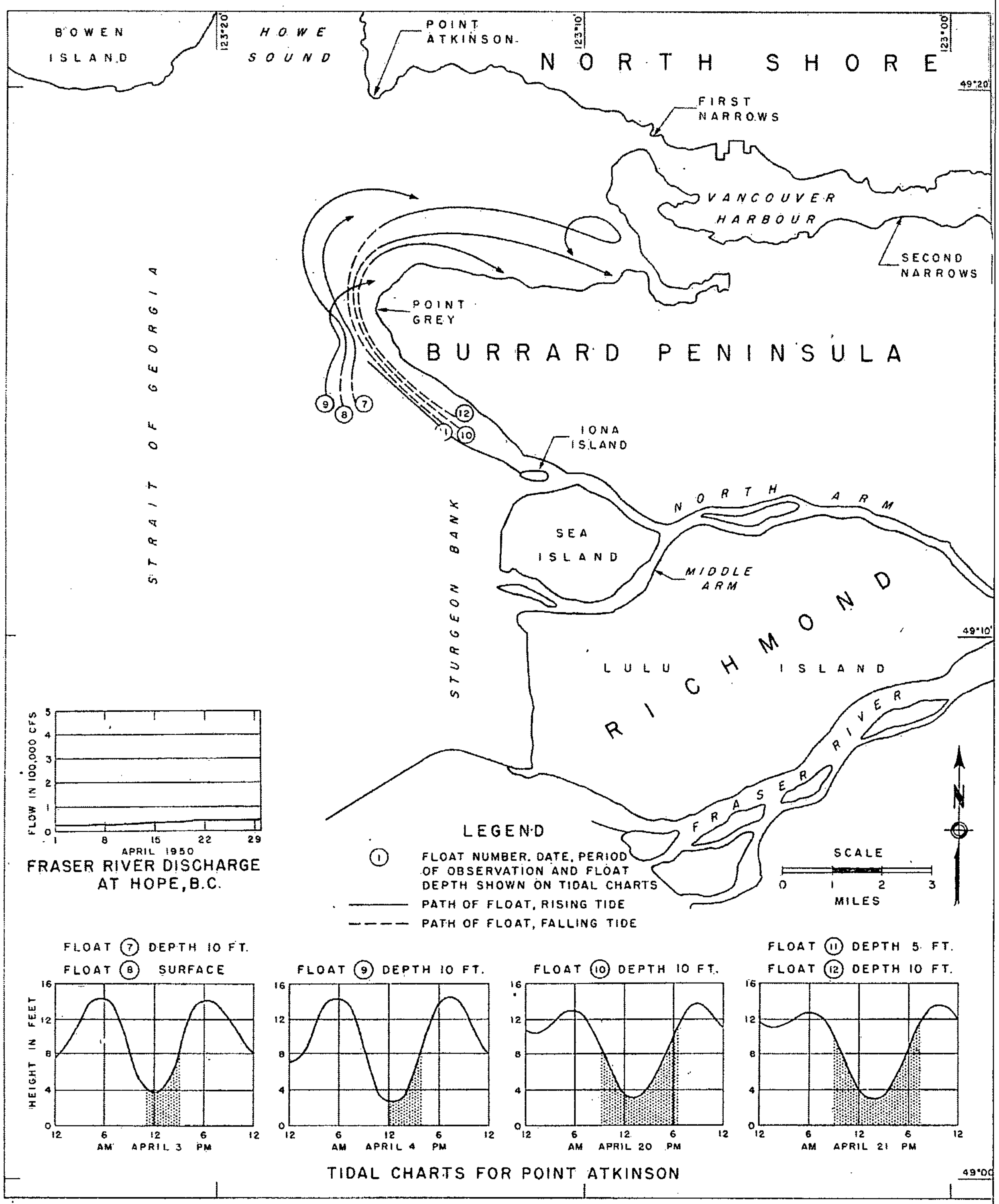

Figure 1.6: Current observations made by the Fraser Estuary Project, April 1950. A series of float tests were conducted during 1950 to determine the interactions of the Fraser River discharge and the currents of the Strait of Georgia and English Bay. These observations were used to confirm the source of beach pollution in English Bay and to select the location of the Iona Island sewage treatment plant. Source: Greater Vancouver Sewerage and Drainage Survey, *Sewerage and Drainage of the Greater Vancouver Area*, British Columbia, A.M. Rawn, Charles Gilman Hyde, and John Oliver, Board of Engineers (Vancouver: VDJSDB, 1953), 117.

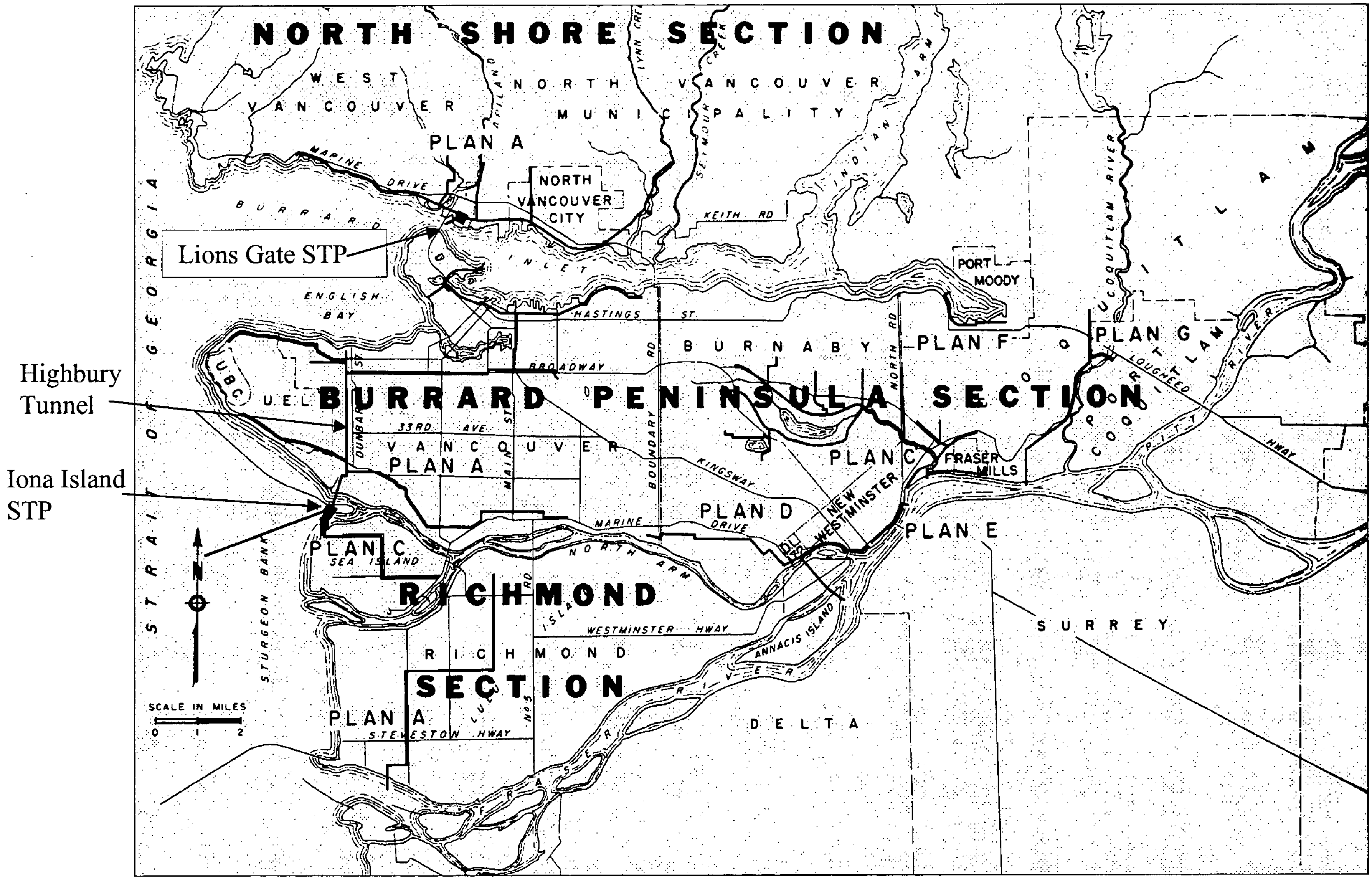

Figure 1.7: Diversion and treatment of Vancouver wastewater under the Rawn plan, 1953. This proposal envisioned the diversion of all north-bound sewage southwards through a series of interceptors and the Highbury Tunnel to the Iona Island treatment plant at the mouth of the Fraser River. Also note the proposed Lions Gate treatment plant on the north shore of Burrard Inlet. Source: Greater Vancouver Sewerage and Drainage Survey, *Sewerage and Drainage of the Greater Vancouver Area*, A.M. Rawn, Charles Gilman Hyde, and John Oliver, Board of Engineers (Vancouver: VDJSDB, 1953), 208.

Chapter 2
Fraser Savers: Urban water pollution in the age of ecology

Rivers are some of the best-loved, and most-abused, landscapes. Because of their vital fresh waters, biological productivity and transportation services, rivers, and particularly estuaries, are prime locations for human settlements. Rivers have also traditionally performed the critical function of waste disposal. The vaunted "self-purifying" agencies of water, while poorly understood before the end of the nineteenth century, have been eagerly exploited by humans for the removal of domestic and industrial wastes. But the many uses of rivers are not independent of one another; pollution, in particular, can impinge upon or destroy the metabolic, biological, recreational, navigational and aesthetic functions of rivers. Pollution is often regarded as the misuse of water resources out of carelessness or ignorance. However, the story of polluted rivers is more often the result of the unintended consequences of the conscious exploitation of water's assimilative capacity for waste disposal. In attempting to plan and engineer rivers as "organic machines" for waste disposal, humans have all too often disastrously simplified or misunderstood the complexity of aquatic environments.[1]

The urban region in the Lower Fraser Valley has had a variety of transformative impacts on the Fraser River. This included long use as a sink for domestic and industrial wastes. Long an economic and transportation artery for the region, the Lower Fraser became the scene of rapid

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[1] Richard White, *The Organic Machine: The remaking of the Columbia River* (New York: Hill & Wang, 1995). For some recent perspectives on rivers and pollution, see Mark Cioc, *The Rhine: An eco-biography, 1815-2000* (Seattle: University of Washington Press, 2002); Craig E. Colten, "Too Much of a Good Thing: Industrial pollution in the Lower Mississippi River," in Craig E. Colten, ed., *Transforming New Orleans and Its Environs: Centuries of Change*,(Pittsburgh: University of Pittsburgh Press, 2000); Craig E. Colten, "Illinois River Pollution Control, 1900-1970," in Lary Dilsaver and Craig E. Colten, eds., *The American Environment: Interpretations of past geographies* (Lanham, Md: Rowman and Littlefield, 1992); John T. Cumbler, *Reasonable Use: The people, the environment, and the state, New England 1790-1930* (Oxford, Oxford University Press, 2001); Theodore Steinberg, *Nature Incorporated: Industrialization and the waters of New England* (Cambridge: Cambridge University Press, 1991); Joel A. Tarr, "Land Use and Environmental Change in the Hudson-Raritan Estuary Region, 1700-1980," in *The Search for the Ultimate Sink: Urban pollution in historical perspective*, Joel A. Tarr (Akron: University of Akron Press, 1996).

urban and industrial development after the Second World War. The region's growing population required the expansion of sewerage and drainage networks; much of this swelling flow was discharged into the Fraser untreated. In addition, the industrial expansion of the period, especially the construction of pulp mills at Kamloops and Prince George, contributed new waste streams. These developments, combined with the longstanding use of the river as a sink for waste, threatened the symbolically and economically important salmon fisheries of the river. In the 1950s, regulatory agencies from all levels of government concerned with the Fraser tackled pollution control as an aspect of managing the river as a "multiple-use" waterway. Scientific studies and regulatory recommendations reflected this basically utilitarian view of the river. By the mid-1960s, however, changing conditions in the river and changing public environmental values sparked increasing criticism of the technocratic management of the river. The 1970 *Fraser River Report*, published by an environmental group, the Society for Pollution and Environmental Control (Fig. 2.1), was emblematic of this emerging concern. Its cover illustrated by a toilet, the report indicted government and industry for what it regarded as the wanton exploitation of the river as a waste sink, and warned of the potentially devastating impacts on aquatic life and public health. By the end of the 1960s, biologists, fishing interests and citizen groups were all expressing similar apprehension about the declining state of the river.

Perhaps more important than the biophysical changes emerging as a result of waste disposal practices was the fact that the Fraser had become a symbolic repository of pollution anxiety. Along with other North Americans in the 1960s, Vancouverites had become increasingly aware of pollution issues. This was due in part to widely publicized issues, such as Rachel Carson's dramatic portrayal of pesticide pollution in her bestseller *Silent Spring*, or the controversy surrounding the eutrophication of Lake Erie. But rising pollution anxiety was also fuelled by local events, issues and environments; in British Columbia, the Fraser River became the focus of intense public fears about the environmental impacts of urbanization and industrialization. The river that symbolically united the region also connected communities along its shores through a geography of pollution and risk. As Matthew Gandy has written of the nineteenth-century Seine, rivers embody the entwining of biophysical and symbolic realms in definitions of pollution.[2] As a potent environmental symbol, the Fraser emerged as a political and social battlefield over environmental policies and priorities in B.C. society. The debate over pollution, with the river at its heart, reflected both changing scientific ideas and social values surrounding water quality.

The greatest controversy centred around the environmental impacts of the use of the Fraser River and estuary for sewage disposal. The previous chapter showed that Vancouver's anti-pollution strategy was based on the planned exploitation of regional assimilative capacity. This strategy entailed the reshaping of the land- and waterscapes of Greater Vancouver to create a rationalized hydrology to remove dangerous pollution from the expanding city, while employing natural waterways as sinks for waste. However, the elimination of geographically dispersed outfalls and the transmission of wastewaters to a small number of points for treatment and disposal threatened to create areas of acute, long-term contamination. By the early 1970s, the political debate around the perceived pollution of the Fraser culminated in sustained public furor over sewage disposal and primary treatment plants in the ecologically sensitive Fraser estuary. In large part, this controversy reflected changing environmental values around the exploitation of the river as a sink for wastes. The issue was also influenced by the identification of new types of pollution, most notably environmentally persistent toxic chemicals and heavy metals.

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[2] Matthew Gandy, "The Paris Sewers and the Rationalization of Urban Space," *Transactions of the Institute of British Geographers, New Series* 24, 1 (1999), 36.

By the early 1980s, changing social and environmental conditions had significantly challenged the pollution control priorities of regulatory agencies. No longer was assimilative capacity assumed to be acceptable policy. It would be difficult, however, to attribute this shift solely to objective environmental degradation. As this chapter shows, scientific consensus on the level of pollution in the Fraser was elusive. In fact, throughout the period examined here, pollution of the river was often portrayed as potential or incipient. Debates about the quality of the Fraser River were, ultimately, political controversies over the uncertain future of the urban environment in the Greater Vancouver region. For environmentalists, the Fraser served as a potent symbol of the failures of the pollution control system in the province. As an iconic landscape, the river also symbolizes the dynamic of social values and environmental change embodied in the idea of pollution.

Mighty river

The Fraser River, one of western North America's great rivers, occupies an important place at the centre of the British Columbia history and geography. Rising on the western slope of the Rocky Mountains in northeastern B.C., it flows west and south towards the Pacific Ocean, its watershed draining an area of 234,000 square kilometres. At Hope, the Fraser River enters a widening valley, now only 140 kilometres from its outlet in the Strait of Georgia. This final section is intensively modified by human activity (Fig. 2.2). Sumas Lake in the Fraser Valley was drained in the 1920s, and the river has been extensively diked for flood control and agricultural land reclamation. As the river enters its delta at New Westminster, it is lined with wood products manufacturers, chemical plants, industrial estates and shipping facilities. The river splits here to embrace the island city of Richmond between its North and South (or Main) arms; shortly before reaching the ocean, the smaller North Arm forks again to form Sea Island. At its mouth, the river's average discharge ranges from a winter low of 750 cubic metres per second (cms) to a massive 11,500 cms during spring freshet. The silty plume from the river's discharge can be detected in the Strait of Georgia over 19 kilometres from the river mouth.[3]

The historic economic, social and ecological importance of the Fraser is undeniable. The river was a critical conduit of trade and transportation in both pre- and post-colonial periods. Its sediments created the fertile soils of the agricultural Fraser Valley region; its fresh waters and nutrients continue to sustain a biologically diverse and productive, if truncated, estuary and wetland region in the delta. Perhaps most importantly, the Fraser hosts a remarkable anadromous salmon populations that supported comparatively dense aboriginal settlements in pre-colonial times and that, by the turn of the twentieth century, formed the basis of a highly profitable fish-canning industry at the river's mouth. The salmon, both as a resource and as a cultural symbol, is a powerful facet of the identity of Native and non-Native British Columbians alike.

The river's utility extended to providing a ready waste conduit for the region. Both the 1889 and 1913 plans for Vancouver's sewerage system advocated the use of the river's assimilative capacity to absorb urban wastewaters. Following the acceptance of the Rawn report on the region's sewerage in 1958, nearly all of the waste streams of Vancouver and Burnaby were diverted from English Bay and False Creek to the Iona Island sewage treatment plant, located at the mouth of the Fraser River. As recounted in the previous chapter, the main goal of the revamped sewerage system was the protection of Vancouver's beaches on English Bay and harbour waters on Burrard Inlet. In creating its plan, the Greater Vancouver Sewerage and Drainage Survey

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[3] This description of the Lower Fraser is compiled from: Richard C. Bocking, *Mighty River: A portrait of the Fraser* (Vancouver: Douglas & McIntyre, 1997), chap. 10; Graeme Wynn and Timothy Oke, eds., *Vancouver and Its Region* (Vancouver: UBC Press), chaps. 5 and 7. On Sumas Lake, see Laura Cameron, *Openings: A meditation on history, method and Sumas Lake* (Montreal and Kingston: McGill-Queen's University Press, 1997).

project collected data on water conditions such as salinity and oxygen levels, and tidal-estuarine behaviour of river waters entering the Strait of Georgia. This picture of oceanographic conditions in the estuary and inlets aided the selection of the Iona Island site for a primary sewage treatment plant. The survey team calculated that, although the Iona plant discharged its effluent to the Fraser estuary, tidal action and the sheer volume of water in the strait would ensure it posed no pollution problem. In addition, data on the river's flow rate and dissolved oxygen levels were used to determine that "sewage may be discharged to the river without treatment" from New Westminster and communities further upriver without a negative impact on fish, particularly salmon.[4]

In the wake of the Rawn report, the question of treatment and the river's assimilative capacity dominated debates over water quality and waste disposal in the Fraser. The network of trunk sewers and interceptors used to collect and remove wastewaters from urban areas required large-scale, centrally located treatment facilities, sometimes receiving millions of gallons per day of sewage and/or stormwater. The basic principles of municipal sewage treatment technology were established by the early twentieth century, although considerable refinement and development in techniques followed.[5] The main goals of sewage treatment were to remove unsightly floating or entrained solids from the waste, to reduce the amount of organic materials in the effluent and to reduce or eliminate pathogenic bacteria before discharge to receiving waters. Settling chambers,

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[4] Greater Vancouver Sewerage and Drainage Survey, *Sewerage and Drainage of the Greater Vancouver Area, British Columbia*, A. M. Rawn, Charles Gilman Hyde, and John Oliver, Board of Engineers (Vancouver, Vancouver and Districts Joint Sewerage and Drainage Board, September 1953), Chapter 12. The pollution studies of the Pacific Oceanographic Group were considered to be pioneering work in the field: see M. Waldichuk, "Report on Pollution Studies Conducted in Western Canada," in *Aquatic Pollution Studies, 1902-1966*, Fisheries Research Board of Canada (Ottawa: FRB, 1966 [1957]).

[5] This discussion is digested from Douglas Baldwin, "Sewerage," in Norman R. Ball, ed., *Building Canada: A history of public works* (Toronto: University of Toronto Press, 1988); Martin V. Melosi, *The Sanitary City: Urban infrastructure in America from colonial times to the present* (Baltimore, Johns Hopkins University Press, 2000), 168-172; Joel A. Tarr, "Water and Wastes: A retrospective assessment of wastewater technology in the United States, 1800-1932," in *The Search for the Ultimate Sink: Urban pollution in historical perspective*, Joel A. Tarr (Akron: University of Akron Press, 1996); and Greater Vancouver Regional District library historical files, Theo V. Berry, "Disposal of Spent Water in the Greater Vancouver Area," reprint of speech, 9 October 1958.

such as those used in Vancouver's late-nineteenth-century sewer system, did remove some solids from the sewage, but constituted a very basic level of treatment. Full primary treatment, such as that offered at the Iona Island plant, consists chiefly of screening the effluent stream entering the plant; passing it through a "grit chamber" to allow heavy particles to settle; and then chopping the waste in a comminutor. The waste is then carried into settling chambers to allow for further settling of solids, and finally discharged. The resulting waste stream may also be subject to chlorination or other disinfection processes intended to kill remaining bacterial pathogens. The settled sludge also presents disposal problems. Secondary treatment technologies employ filtration and/or bacterial processes to remove even greater proportions of organic materials and nutrients. These processes include trickling filters or, more popularly, activated sludge; the latter process, in which the effluent is aerated and "seeded" with bacteria which consume the organic materials, reduces the oxygen-consuming and bacterial components of the final effluent by more than 90 per cent. These were the most widely used of a number of sewage treatment and disposal technologies developed and refined before the Second World War that included chemical precipitation and filtration processes.

Debates over the adoption of sewage treatment were influenced both by the cost of implementing treatment works and changing values in pollution control. The cost of treatment facilities meant the adoption of treatment processes by Canadian communities served by sewerage was slow and haphazard.[6] A national survey in 1957 by the Central Mortgage and Housing Corporation revealed that, of 298 municipalities surveyed, only 51 treated sewage, and the majority of these used only primary treatment. "Some municipalities have evidently relied on the

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[6] Baldwin, "Sewerage," 238-239.

action of tidal waters but in the last few years disturbing evidence about the inefficiency of this method has come to light," the report noted.[7] It was estimated that 5.2 million Canadians lived in municipalities threatened by or currently experiencing pollution from domestic wastes. These conclusions stimulated the 1960 launch of a national municipal waste treatment and disposal loan program to help growth-strained cities construct and operate sewage treatment systems.[8]

In addition to the exigencies of municipal finance, the issue of waste treatment was influenced by the attitude of engineers, public health authorities and the public towards pollution and assimilative capacity. Before the 1930s the overarching emphasis on biological measures of water quality, as well as fiscal constraints, shaped the prevailing sanitary engineering wisdom that dilution, if well planned, remained an effective method of waste disposal. Martin Melosi discusses the "broadening viewpoint" of sanitary engineers in the years before the Second World War, which began to emphasize broader criteria of environmental quality than the simple disease-control goals of the original Sanitary Movement.[9] Concerns over the degradation of waterways from nutrient enrichment or oxygen reduction emerged, as did nascent concerns for the chemical constituents of sanitary wastes. Although these changing views were registered among pollution control experts and agencies in Canada, Toronto's deputy director of water purification lamented the persistence of "a rather general attitude on the part of individuals, municipalities and industries alike that streams and rivers are the natural means of disposal of liquid and semi-liquid waste

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[7] Central Mortgage and Housing Corporation, *Sewerage Service for Urban Housing in Canada* (Ottawa, CMHC, January 1957), 4. Figures cited in Baldwin, "Sewerage," 238, seem to indicate a rather higher incidence of treatment in 1950 — around 51 per cent — among a wider survey of communities.

[8] George Seaden, *Municipal Sewage Disposal: Trends, problems, solutions,* vol. 2 (Ottawa, Central Mortgage and Housing Corporation, 1970), 1-2.

[9] Melosi, *Sanitary City*, 256. See also Tarr, "Water and Wastes."

materials which must be removed from a site promptly to avoid nuisance."[10] Both the costs of waste disposal and perceptions of pollution — along with developing environmental problems — would play an important role in the controversies over sewage treatment in Greater Vancouver in the 1960s and 1970s.

Around the same time as the Rawn report was planning waste disposal to the Fraser and its estuary, water quality in the Fraser became an issue of scientific and regulatory concern. The long-standing problem of pollution along the low-volume, industrialized North Arm evolved into a general concern for the entire lower section of the river. A long list of regulatory agencies at various levels of government exercised jurisdiction over the Fraser, including the National Harbours Board, the federal Department of Fisheries, the International Pacific Salmon Fisheries Commission, as well as the provincial Health Branch, Fish and Game Branch, Water Rights Branch and Pollution Control Board. Several of these agencies were represented on the Dominion-Provincial Fraser River Board, an intergovernmental committee formed in 1949 to co-ordinate the development and protection of the river. The board consulted with the Rawn team on the planning of Vancouver's sewerage, and, with the B.C. Research Council, co-produced a survey of water quality in the Lower Fraser in the early 1950s. Although the report noted generally good conditions in the lower river, it also revealed trends towards oxygen depletion and high bacterial counts in the North Arm of the river.[11] Both federal and provincial officials on the board's pollution committee expressed alarm over the lack of effective provincial standards and controls to protect

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[10] Rudolph E. Thompson, "Why Does Sewage Treatment Lag?" *Water and Sewage*, 84, 9 (September 1946), 48. See also A.E. Berry, "The Pollution-Control Problem," *Municipal Utilities* 91, 7 (July 1953), 19-22, 34-36, and Baldwin, "Sewerage," 240.

[11] British Columbia Research Council, *Fraser-Thompson River System Water Quality* (Vancouver: BCRC, 1952). The work of the Dominion-Provincial Fraser River Board is documented in British Columbia Archives and Records Service (BCARS), GR-0132 Department of Health, box 5 files 5-6.

water quality.[12] At a 1952 meeting, B.C. Director of Public Health Engineering Reginald Bowering warned "river pollution in British Columbia had taken only fifty years to reach the present stage of contamination and unless control was established in the near future, continued development would bring about serious conditions in the streams of the province before many years had passed."[13] This board, however, declined to offer any concrete pollution-control policy recommendations, and its pollution committee disbanded by 1954.

The value of the commercial salmon fishery on the Fraser stimulated government efforts to study the effects of waste disposal on the river and its estuary. Under the federal Fisheries Act, federal and provincial officials shared the administrative burden of fisheries management: federal officials administered commercial fisheries while provincial officials regulated inland sport fisheries. In addition, the Fraser River sockeye salmon stocks were protected and administered under the International Pacific Salmon Fisheries Commission, established by treaty between the United States and Canada in 1937. A summary of pollution research published in 1965 by the Fisheries Development Council, an intergovernmental research and discussion body formed in 1956, listed a number of studies into the impact of industrial and domestic wastes in the Lower Fraser.[14] Of these studies, the most significant were conducted by Fisheries Research Board (FRB) officials in the Fraser Estuary. Oceanographers with the FRB revealed how water pollution problems were related to the complex interactions of the tides, river discharge, oceanic circulation

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[12] The constitutional division of powers under Sec. 91 and 92 of the *British North America Act* granted jurisdiction of most natural resources to provincial governments. Although the federal government retained jurisdictional authority over navigable waters and fisheries, provincial governments were ceded the power to create and administer water quality standards.

[13] BCARS, GR-0132 Department of Health, box 5 file 5, Dominion-Provincial Board, Fraser River Basin, Minutes of Second Meeting, Committee No. 2 (Domestic and Industrial Water Supply, Sanitation and Pollution), 22 May 1952.

[14] Fisheries Development Council, *Summaries of Fisheries Research on the Pollution Problem* (Vancouver: Department of Fisheries, August 1965).

and climatic conditions. As discussed in Chapter 1, oceanographers from the FRB's Pacific Oceanographic Group conducted surveys of estuarine circulation in 1950 for the Greater Vancouver Sewerage and Drainage Survey. The FRB's pollution working group, headed by oceanographer Michael Waldichuk, subsequently launched a long-term study to monitor ocean conditions and pollution problems in the Burrard Inlet-Fraser Estuary region, including the tidally influenced sections of the lower river.[15] While a decade of annual surveys between 1957 and 1968 by Waldichuk reported few critical pollution problems, it did reveal the effect of naturally variable climatic conditions on water quality and assimilative capacity in the region. Some years (such as 1958, the year Vancouver's beaches were closed by health officials), dry summers and low volume in the Fraser meant lower dilution factors, while cool, wet conditions generally resulted in good water quality in the river and the surrounding marine waters.

Until the early 1960s, the major concern of fisheries officials was the impact of high levels of organic wastes and suspended solids in domestic wastes on fish and the aquatic environment. Bacterial action consumes the dissolved oxygen in water as organic materials are broken down. Dissolved oxygen levels lower than five parts per million pose a serious threat to fish life. The amount of biodegradable material in effluent is calculated as its biochemical oxygen demand.[16]

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[15] Ibid., C-18; see also summaries of the surveys in Fisheries Research Board of Canada, *Annual Report of the Biological Station at Nanaimo, B.C.* (Fisheries Research Board, 1957/58-1969). Michael Waldichuk also completed his PhD research on the physical oceanography of the Strait of Georgia during this period: see Michael Waldichuk, "Physical Oceanography of the Strait of Georgia, British Columbia," *Journal of the Fisheries Research Board of Canada*, 14, 3 (1957), 321-486. The "pollution oceanography" program of the FRB is further explored in relation to pulp mill pollution in Chapter 4.

[16] The measurement of biochemical oxygen demand, or BOD, is somewhat confusing and is cited in different ways. Since the oxygen-consuming decay of materials takes place over time, the standard measure is BODx, where x is the number of days (usually five) over which the test is run. Normally, the test is conducted by the collection of samples that are then stabilized at 20° C, and a comparison of the dissolved oxygen levels between the samples before and after the test period yields the measure of the BOD. But BOD may be reported as parts per million (ppm) — the number of units of oxygen consumed for every million units of water, or in pounds of BOD, which is a conversion of the measurement of BOD in milligrams per litre. The measure of an effluent's BOD may be affected by other factors such as salinity, temperature and toxic chemicals that inhibit the growth of oxygen-consuming bacteria. For useful definitions of BOD, see "Biochemical oxygen demand (BOD)" in William Ashworth, *The Encyclopedia of Environmental Sciences* (New York: Facts on File, 1991), 42-43; and Allan M. Springer, *Industrial Environmental Control: Pulp*

Nutrients in sewage such as nitrogen and phosphorous can promote the growth of blue-green algae or other toxic algae in poorly flushed or low-volume receiving waters. In extreme cases, nutrient enrichment and the subsequent depression of oxygen levels can literally choke the life from natural waterways, a process known as eutrophication. In the 1960s, this phenomenon became a major concern in states and provinces bordering Lake Erie. Late in the decade, fears the lake was "dying" from nutrient enrichment from domestic wastewaters prompted a well-publicized campaign to remove phosphorous from detergents.[17] Another concern was suspended solids, whether grit, sludge or other materials, which could clog fish gills or collect on the bottoms or shores of waterways, potentially smothering benthic organisms or contaminating habitat and spawning areas. In the 1950s and 1960s, these problems had yet to arise in the well-flushed Fraser River, but researchers remained concerned that rising waste volumes could affect salmon, particularly in the zone of tidal influence in the Fraser Estuary.[18]

By contrast, regional and provincial officials monitoring the river tended to emphasize bacterial assessments of water quality, reflecting the predominant concern for public health effects. The standard test for bacterial contamination measured the most probable number (MPN) of coliform bacteria, an organism associated with fecal contamination and considered an indicator of the possible presence of pathogenic bacteria such as typhus, cholera and dysentery. After 1956, the

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and paper industry (New York: Wiley-Interscience, 1986), 6-7.

[17] Jennifer Read, "Let Us Heed the Voice of Youth": Laundry detergents, phosphates and the emergence of the environmental movement in Ontario," *Journal of the Canadian Historical Association*, New Series 7 (1996), 227-250; Terence Kehoe, "'You Alone Have the Answer": Lake Erie and federal water pollution control policy, 1960-1972," *Journal of Policy History* 8, 4 (1996), 440-469.

[18] British Columbia Research Council, *Fraser-Thompson River System Water Quality*, 3-4. In fact, the North Arm was described in this report as "moderately polluted." See also Pacific Salmon Commission Library and Archives, box 1100.1 file 14, James A. Servizi, "Phosphorous and nitrogen in the Strait of Georgia." manuscript report, International Pacific Salmon Fisheries Commission, April 1970. A useful review of relevant studies undertaken by various agencies is included in A.H. Benedict, K.J. Hall and F.A. Koch, *A Preliminary Water Quality Survey of the Lower Fraser River System* (Vancouver: Westwater Research Centre, 1973).

Greater Vancouver Sewerage and Drainage District maintained sampling stations at various points around the region to monitor coliform counts as an indicator of sewage pollution. The provincial Pollution Control Board also used coliform counts as part of its survey of domestic wastes in the Lower Fraser. This board was created in 1956 to develop water quality objectives and issue waste discharge permits for the section of the Fraser River below Hope. As described above, the board was also intended, in part, to compel regional municipalities to participate in the Rawn plan for regional sewerage. In 1960, the board counted 221 domestic waste outfalls within its jurisdiction alone; a 1961 review calculated the sewage of an additional 28,000 people entered the river above Hope. The board dismissed the impact on the river of biological oxygen demand and suspended solids from sewage, concluding "the river is not sufficiently polluted to make it difficult for fish as far as oxygen is concerned."[19] Thus, its 1962 water-quality objectives, established based on the uses of different reaches of the river, remained confined to bacterial parameters. Although coliform counts in the Lower Fraser exceeded safe drinking-water levels, the natural turbidity of the Fraser precluded its use as a domestic water supply for Lower Fraser communities. Between Hope and the mouth of the Pitt River, median most probable number (MPN) coliform counts were to remain at bathing water standards (240 organisms per 100 millilitres). Water-quality objectives in the Fraser Delta reflected the industrial use of these reaches: the South Arm was permitted counts as high as 24,000/100 mL, while the Middle and North arms were allowed counts up to 10,000/100 mL. In the case of the polluted North Arm, the board acknowledged this objective was unattainable until all direct discharge of sewage to the low-volume North Arm was diverted to the Iona Island treatment plant. The report concluded that, if all

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[19] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01 file 1, Minutes of the Pollution Control Board 22 August 1960, 16 July 1962, 9 October 1962.

the waste streams reaching the Fraser were treated, all parts of the river could meet bathing water and even drinking water (50/100mL) bacterial standards.[20]

Thus, while the late 1950s saw inklings of concern about the Fraser, most observers regarded water quality as good. Proper planning, most assumed, would ensure the river would avoid the fate of heavily polluted eastern streams. By studying and quantifying the assimilative capacity of the Fraser River, pollution control and fisheries authorities hoped to balance the exploitation of water's biochemical processes for waste disposal while protecting both aquatic life and other human uses of the river. The protection of water quality was regarded as an aspect of the rational management and control of nature. Aesthetic criteria, such as smell, taste and appearance, as well as the presence of specific pathogenic organisms such as typhus bacilli, became less important to water quality debates as the more egregious effects of sewage disposal were brought under control. Quantitative representations of water quality (and assimilative capacity), such as BOD, suspended solids and coliform counts, in development since early in the century, benefited from increasingly standardized laboratory procedures and interpretations.[21] Scientific investigations sought to make the natural properties of the river "legible" (in the words of anthropologist James Scott) to government engineers, who could then rationally envision and exploit the river for waste disposal.[22] In spite of this increasing regulatory scrutiny, no coherent picture of the waste load being absorbed by the Fraser River had emerged. Nor were the long-term

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[20] BCARS, GR-1114 Fish and Game Branch, box 60 file 40-07 1962-63, "Pollution Control Standards for the Lower Fraser and Burrard Inlet," ND (probably 1962).

[21] W. R. Derrick Sewell, "Environmental Perceptions and Attitudes of Engineers and Public Health Officials," *Environment and Behavior* 3, 1 (March 1971), 23-59; Joel A. Tarr, "Industrial Wastes, Water Pollution, and Public Health, 1876-1962," in *The Search for the Ultimate Sink*, 364-373.

[22] James C. Scott, *Seeing Like a State: How certain schemes to improve the human condition have failed* (New Haven: Yale University Press, 1998).

effects of increasing domestic waste streams, or the increasing amount and chemical complexity of industrial effluents, well understood.

These investigations were the work of technocratic managers and government scientists, and took place largely at the margins of public awareness. Before the era of mass environmental awareness, Joel Tarr notes, pollution problems "were dealt with by sanitary engineers, public analysts and inspectors, and sewage and waste-treatment experts, whose titles and activities did not excite public attention, at least not until a local well became polluted, or a nearby stream was covered with foam from novel detergents."[23] Public confidence in technological solutions and expert authority remained high. In the wake of the controversy over the beach closures by the Vancouver Health Board in 1958, public concern about water pollution quickly subsided. Still, the controversy over the Rawn plan, and the urbanization and industrialization of the Lower Fraser, drew some criticism over the state of the river. As early as 1958, Attorney-General Robert Bonner described the Fraser as "an open sewer draining the whole valley."[24] His comments were echoed by members of the B.C. Federation of Fish and Game Clubs, sportsmen who decried the pollution of recreational waters and called attention to the increasing development along the banks of the Fraser.[25] These observers demanded the new Pollution Control Board head off the pollution of the province's most important freshwater resource. In his 1961 book *The Living Land*, author and conservationist Roderick Haig-Brown urged the immediate treatment of domestic and industrial

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[23] Joel A. Tarr, "Industrial Waste Disposal in the United States as a Historical Problem," *Ambix* 49, 1 (March 2002), 2.

[24] "How's Pollution on the Fraser?," *Vancouver Province*, 2 October 1958, 4. Concerns about pollution in the North Arm predate even the Lea report. See BCARS, GR-0132 Department of Health and Welfare, Provincial Health Officer, box 17, file 1, Edward Mohun, "Sewage, Point Grey Municipality, Kerrisdale and Magee Districts," 14 May 1912.. The issue was raised again in the 1930s, this time by the North Fraser Harbour Commission: see ibid., box 20 file 1.

[25] W. F. Reeves, "Treasure water," (letter) *Vancouver Province*, 15 July 1959, 4; Bud Elsie, "Action urged to cut down pollution," *Vancouver Province*, 19 August 1960, 17; G. Ed. Meade, "Action vital now to halt pollution," (letter) *Vancouver Sun*, 2 September 1960, 4.

wastes reaching the Fraser, "not only for protection of the most valuable salmon runs in the world, but to permit the continued growth and development of the city of Vancouver."[26] Still, before the mid-1960s, more Vancouverites appeared concerned about the "atmospheric sewage" of air pollution from sawmills, other industries, and backyard burners.[27]

Over the next decade, however, environmental issues, and particularly water pollution, swelled into a major social and political issue for British Columbians. As an environmental concern, pollution had become the critical focus for what Samuel Hays called the "second wave" of environmentalism.[28] Historian Robert Gottleib has observed that, water pollution problems that were assumed to have been overcome in the first wave of urban environmental reform dramatically reasserted themselves in the 1950s and 1960s, as the long-term effects of inadequate waste disposal practices became evident.[29] Postwar "effluent society" began to confront the unanticipated consequences of urbanization, mass consumption and the alteration of the natural environment.[30] The "voice of youth," raised against a variety of social and political institutions in the tumultuous cultural politics of the 1960s, railed against the bureaucratic mismanagement,

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[26] Roderick Haig-Brown, *The Living Land: An account of the natural resources of British Columbia* (Toronto: Macmillan, 1961), 225.

[27] "Combatting atmospheric sewage..." *Vancouver Province*, 3 December 1959, 4. Citizens fought for municipal authorities for decades in Vancouver and Victoria to achieve effective "smoke" control bylaws. The provincial Pollution Control Board did not regulate air pollution, however, until 1971.

[28] Samuel P. Hays, *Beauty, Health, Permanence: Environmental politics in the United States, 1955-1985* (New York: Cambridge University Press, 1987), 55.

[29] Robert Gottlieb, *Forcing the Spring: The transformation of the American environmental movement* (Covelo, Calif.: Island Press, 1993), 78.

[30] This phrase is adapted from a Canadian reader on pollution, Frank J. Taylor, Philip G. Kettle and Robert G. Putnam, eds., *Pollution: The effluence of affluence* (Toronto, Methuen, 1971). On urban issues and environmentalism, see Samuel P. Hays, "The Role of Urbanization in Environmental History," in *Explorations in Environmental History* (Pittsburgh: University of Pittsburgh Press, 1998).

consumer culture and urban-industrial order that led to environmental degradation.[31] Even in B.C., with its comparatively low level of urban development and industrialization, and ample tracts of wilderness, pollution became an outrage in search of a problem. Signalling the rise of this issue, an eight-part *Vancouver Sun* series on pollution appeared in 1965. It opened with an ominous account of the province-wide problems of sewage pollution. Notably, health reporter Arnie Meyers emphasized threats to the Fraser River, along which over 40 communities discharged raw or partially treated sewage.[32] Appearing at a University of British Columbia conference on water pollution later that year, Meyers urged the creation of a citizen's anti-pollution action group.[33] By the mid-late 1960s, pollution was repeatedly identified in news stories and editorials as a "growing menace" to the unspoiled waters of the province, prompting demands for more effective government action.[34]

Events in 1967 made the provincial Pollution Control Board the focus of increasing public disquiet with the technocratic management of pollution in the Fraser. The Pollution Control Board was widely criticized for being composed of mostly high-level senior servants, and was seen to be subject to political interference. The board was beset by controversies over its permit-issuance and public-hearing processes arising from the Buttle Lake mine tailings dispute (see Chapter 3,

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[31] Read, "Let us Heed the Voice of Youth"; Gottlieb, *Forcing the Spring*, chap. 3; Donald A. Chant, ed., *Pollution Probe* (Toronto, New Press, 1970); Robert Paehlke, "Eco-History: Two waves in the evolution of environmentalism," *Alternatives* 19, 1 (1992), 18-23; Adam Rome, "'Give Earth a Chance': The environmental movement and the Sixties," *Journal of American History* 90, 2 (2003), 525-554.

[32] Arnie Myers, "Sewers have no sex appeal – so pollution goes on," *Vancouver Sun*, 11 September 1965, 3.

[33] *Conference on Water Pollution Proceedings* (Vancouver: University of British Columbia, 1965); "Stronger fight on pollution urged," Vancouver Sun, 4 December 1965, 3; Dave Laundy, "Charge polluters with cost of controls, says Loffmark," *Vancouver Sun*, 4 December 1965, 3; Arnie Myers, "Water pollution spreading," *Vancouver Sun*, 3 December 1965, 18.

[34] Two earlier examples include: "Count our blessings," *Vancouver Sun*, 14 September 1965, 4; "Waste no one can afford," *Vancouver Sun*, 17 May 1966, 4.

infra). By 1965, its jurisdiction included the entire Fraser and Columbia watersheds, as well as parts of Vancouver Island, and the board evaluated both domestic and industrial discharges. While it was nominally responsible for controlling waste discharges, the board's tiny monitoring and enforcement staff was unable to cope with the increasing flow of applications. It was dismissed as an ineffective "rubber stamp" that issued permits to pollute, rather than seeking to stop pollution.[35] That year, new legislation reformed the board by separating it into the Pollution Control Branch, an administrative body charged with monitoring pollution and issuing permits for waste discharges, and the Pollution Control Board, a policy- and standard-setting body that also acted as an appeal board for decisions of the branch. Opposition and public critics were dubious of the effectiveness of these changes: "As long as it's cheaper for the irresponsible to pollute than to clean up, no fancy machinery will make this province a better place in which to live."[36]

The Pollution Control Board was also embroiled in the fractious local politics of pollution in the Greater Vancouver area. Early in 1967, health officials and the local media had strongly criticized an application to the board by the Greater Vancouver Sewerage and Drainage District to dump raw sewage from Richmond, south of Vancouver, into the Main Arm of the Fraser. "At a time in history when pollution of the oceans themselves is of international concern, anything that further contributes to the process requires real soul-searching at the highest level," wrote the *Vancouver Sun*.[37] For its part, Richmond officials claimed the municipality could not afford the

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[35] For a sampling of these views, see "What's a billion?," *Vancouver Sun*, 12 March 1966, 4; "Mr. Bennett's Conversion. Better late than never," *Vancouver Sun*, 8 August 1966, 4; "Tardy recognition," *Victoria Times*, 13 August 1966, 4; "Better cause for emotion?," *Vancouver Sun*, October 4, 1966, 4; "Opposition raps new pollution bill," *Vancouver Sun*, 18 March 1967.

[36] Minister Ray Williston outlined the new Pollution Control Act in "Plants to need pollution permit," *Vancouver Sun* 14 March 1967, BC Sessional clipping books (microfilm). For reaction, see "Wait for the product," *Vancouver Sun*, 18 February 1967, 4; "Pollution board accused of usurping health duties," *Vancouver Sun*, 21 February 1967, BC Sessional clipping books (microfilm).

[37] "Puget Sound's lesson," *Vancouver Sun*, 16 May 1967, 4.

cost of treatment and that the low volume of sewage would have a negligible effect on the river. Health officials and the newly appointed Director of Pollution Control, engineer Charles Keenan, publicly sparred over the potential health hazards from sewage pollution in the river.[38] Meanwhile, fisheries workers launched a campaign to force the Pollution Control Board to curb pollution in the Fraser, in spite of the board's assurances that dissolved oxygen levels were unaffected by sewage.[39] Local fishermen had long complained that polluted conditions in the North Arm had virtually eliminated fish passage through its waters. "In a way, it is perhaps too bad we have a river and an ocean on our doorstep. If they weren't there we'd have to treat our sewage whether or not we could afford it,"commented William Hourston, regional director of the federal fisheries department.[40]

Amid this increasing politicization of waste disposal, the board launched a technical report and public hearing in 1967 on a policy for waste discharges and water quality in the Lower Fraser River. In his report *Pollution and the Fraser*,[41] consulting engineer C. A. Goldie reported on bacteriological and chemical sampling data compiled since 1950. Goldie noted the absence of biological surveys to determine what, if any, environmental changes had occurred in the river. His report accepted the use of the river as a sink for wastes — so long as the practice did not impair

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[38] "Bacteria count in Fraser 20 times accepted figure," *Vancouver Sun*, 3 August 1967, 1; "Now – top this," *Vancouver Sun*, 14 August 1967, 4; "Deciding the Fraser River's fate," *Vancouver Province*, 14 August 1967, 4.

[39] Norman Hacking, "Pollution worries fishermen," *Vancouver Province*, 7 April 1967, 21; Ron Rose, "'I won't rinse my dishes in that slime anymore'," *Vancouver Sun*, 30 August 1967, 29. The United Fishermen and Allied Worker's Union was prominent in the fight over Fraser pollution: see "In this day and age?," *Vancouver Sun*, 16 February 1967, 4.

[40] Jack Ramsay, "Is Fraser health trap?," *Vancouver Sun*, 29 May 1967, 1. See also "Hands off what?," *Vancouver Sun*, November 28, 1967, 4; "How much more pollution for the Fraser?," *Vancouver Province*, 8 December 1967, 4; "A little bit too much," *Vancouver Sun*, 20 December 1967, 4.

[41] British Columbia. Pollution Control Board, *Pollution and the Fraser* (Victoria: Department of Lands, Forests and Water Resources, 1967).

other uses. Still, the conclusions were alarming: many reaches of the Lower Fraser showed evidence of high bacterial contamination, and he suggested that the combination of domestic and industrial waste inputs could eventually have damaging consequences for fish life in the river. Hundreds of industrial and domestic outfalls were surveyed in the Lower Fraser Valley—Goldie could not even estimate the pollution load—reinforcing the image of the river as an open sewer. Perhaps most notably, in a postscript to the report, Goldie also referred to what he called "aesthetic considerations," commenting: "Public interest in pollution is rapidly gaining momentum with the popular view that pollution in any form should not be tolerated."[42] Rather than dismiss this view, Goldie suggested that, given the benefits and costs of wastewater treatment, this radical anti-pollutionist sentiment had merit.

The August 1967 public hearing on the Goldie report showcased divergent perspectives on river pollution and its solution. Fishermen's union organizer Buck Suzuki raised fears of declining resources and health hazards, while the B.C. Wildlife Federation called for the establishment of clear water quality standards and the creation of an independent Fraser River Board to co-ordinate pollution control activities. By contrast, at the hearing and in the press, the Greater Vancouver Sewerage and Drainage District challenged the report's data and joined municipalities in lamenting the expense of sewage treatment.[43] While the sewerage district acknowledged the Pollution Control Board's jurisdiction over all waste discharges to the Fraser River, it claimed that its own provincial enabling legislation gave it a mandate to enact the provisions of the Rawn

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[42] Ibid., 52.

[43] "Pollution report blasted," *Vancouver Sun*, 10 August 1967, 11; "Pollution warning sounded," *Vancouver Province*, 22 August 1967, 9; "Local gov'ts asked to check pollution," *Vancouver Province*, 23 August 1967, 2; "Sewage hearing 'just a waste'," *Vancouver Sun*, 29 August 1967, 42. Also, "Fraser River pollution problems," *Vancouver Province*, 20 July 1967, 4, commented on the Goldie report.

plan. In its written brief on the Goldie report, the GVSDD argued that the financial strain placed on member communities (and local taxpayers) by rapid development meant that pollution-control expenditures should only be required where demonstrably necessary. The district contended that its own water-quality monitoring network would indicate when the assimilative capacity of regional waters was being reached, and waste treatment required.[44]

In 1968, the Pollution Control Board released its treatment and water quality standards for the Lower Fraser River, along with a pamphlet entitled "Control of Water Pollution in British Columbia." The published objectives attempted to balance municipal concerns about costs with rising public demands to protect environmental quality. The goal of the objectives, according to the board, was to defuse public controversy by "separating fact from fiction, the emotional from the unemotional, to set aside prejudice and so discern the truth."[45] The pamphlet's preamble outlined a pollution philosophy conforming to traditional engineering notions of assimilative capacity and water uses: "If the waste is discharged into the sea where abundant dilution and dispersion takes place due to natural currents, then no offensive problem is likely to arise, hence no pollution problem."[46] However, the board also acknowledged that the river's ability to absorb and dilute wastes without creating "offence" or health risks was limited, and may already have been exceeded in places. Most significantly, the board's policy for the Lower Fraser required primary or secondary treatment for all new and existing sewage discharges and organic industrial

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[44] BCARS Accession No. 88-0408 Environmental Appeal Board, box 79-02, Greater Vancouver Sewerage and Drainage District, *In the Matter of the "Pollution Control Act" and In the Matter of the Establishment of Policy for the Control of Water Pollution in the Lower Fraser Basin,* August 1967.

[45] Ibid., 1.

[46] British Columbia, Pollution Control Board, "Control of Water Pollution in British Columbia," (Victoria: Pollution Control Board, 1968), 2.

effluents by 1975. In addition, the policy addressed concerns about effluent toxicity by mandating bioassay tests of chemical industrial wastes discharged to the river.[47]

The immediate effect of this policy was to force the GVSDD to revisit plans to allow Richmond to dispose of raw sewage into the Fraser River. In 1968, Richmond Mayor E. R. Parsons, in a brief to the Pollution Control Board written for the GVSDD, had argued against the mandatory primary treatment of Richmond sewage. Parsons insisted that the proposed Main Arm outfall was located close enough to the Strait of Georgia that treatment was unnecessary, and that the cost of treatment would impose "an unbearable burden on a suburban community faced simultaneously with urgent demands for a whole host of public works and services."[48] Nevertheless, within a few months of the announcement of the new Fraser River waste treatment policy, the GVSDD proposed two new high-rate primary treatment plants in the Fraser River: one north of Richmond at Annacis Island, to serve eastern and southern suburban communities, and one at the south end of Richmond just upstream from the historic salmon canning and fishing community of Steveston (Fig. 2.3). The plants were planned to be operational by the Pollution Control Board's 1975 deadline. Thus, under the new plan, most of the region's wastewater would be treated and discharged at three locations on the Fraser River near Richmond, completing the reorganization of regional hydrology begun under R.S. Lea in 1913.[49] While plans for sewage treatment were welcomed by many observers, some questioned why the sewerage district was

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[47] Bioassay tests use captured fish to measure their survival rates in various concentrations of natural water and effluent. The result may be used to mandate higher effluent treatment or better outfall design and location to reduce the death rate. The PCB's standard required that 100 per cent of test fish survive over 96 hours in a 50/50 sample of effluent and river water. Ibid., 5.

[48] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-02, Greater Vancouver Sewerage and Drainage District, *In the Matter of Defining and Interpreting Policy for the Control and Abatement of Pollution in the Greater Vancouver Area,* May 1968, 1.

[49] "52 million scheme OK'd to end sewage pollution," *Vancouver Sun*, 20 November 1969, 1.

given seven years to implement treatment: "Lessons of the past and of other parts of the world settled earlier than ours have still not been learned and the warnings of experts are unheeded that the time to start is now, not seven years from now."[50] Over the next few years, these initial reservations would swell into a massive public outcry from the rapidly expanding urban environmental movement.

A mighty sewage struggle: the debate over treatment at Annacis Island

By the late 1960s, the issue of water pollution and sewage disposal had become a major battleground of environmental politics in B.C. Mounting criticism of sewage and pollution policies in the Lower Fraser region was echoed around the province. In 1968, Municipal Affairs Minister Dan Campbell announced a provincial policy requiring all municipalities in the province to treat their sewage before disposal. This created an uproar amongst B.C. municipal leaders.[51] Through the late 1960s, sewage treatment disputes in Prince George, Nelson and, most notably, Victoria, pitted engineers who favoured dilution against public health advocates and citizens increasingly alarmed about the environmental impacts of untreated wastes. Rampant beach pollution and public outcry in Victoria forced an engineering study of the city's sewerage, which controversially failed to recommend treatment. As Victoria journalist John Mika noted, "In effect, discharging the raw sewage would convert the coastal waters off much of the region into a huge salt-water sewage-treatment lagoon."[52] Controversy over raw sewage disposal in Victoria raged in the early 1970s, as the capital region installed long outfalls and diffusers to minimize the environmental impact of

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[50] "Why wait seven years?," *Vancouver Sun,* 8 February 1968, 4.

[51] "Sewage hearing 'just a waste.'"

[52] John Mika, "Which expert to believe is problem for ratepayers," *Victoria Times*, 15 August 1968, 14. See also John Mika, "Sewage Plan Safety Factor Set Too Low," *Victoria Times*, 16 August 1968, 1; John Mika, "Economics determined sewer plan," *Victoria Times*, 17 August 1968, 1.

raw sewage disposal in the Strait of Juan de Fuca.[53]

At times, the issue elicited absurd, but telling gestures. On a sunny morning in June 1969, Vancouver's flamboyant Mayor Tom 'Terrific' Campbell landed on the front page of the Vancouver Sun by taking a swim in English Bay. His morning dip was intended to assure anxious Vancouverites that city beaches were uncontaminated by sewage. That week, a media battle raged between provincial Liberal leader Dr. Pat McGeer and Gerald Bonham, Vancouver's medical health officer, over elevated coliform counts at popular bathing sites around the city.[54] *Vancouver Sun* columnist Bob Hunter — who later co-founded the environmental group Greenpeace — derided Campbell's "frolic in the fecal surf," writing that "if the mayor would spend less time wading in the water in front of the cameras and more time wading into the job of halting further pollution, we'd all be better off."[55]

The issue of sewage and pollution control spilled onto the floor of the provincial legislature. Successive Social Credit government throne speeches in the early 1970s announced the government's commitment to preserving the "total environment" of British Columbia, and promised stiffer pollution-control measures.[56] But both opposition critics and backbench Social Credit members of the legislature ridiculed the government's record on pollution. As the minister

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[53] A. H. Murphy, "Pollution is a dirty word. But there's an answer to it," *Victoria Colonist*, 20 July 1971, 12E; Hubert Beyer, "Sewage: au revoir, but not farewell," *Victoria Colonist*, 26 March 1972, 22; Derek Ellis, "Sewage – Victoria (Canada)," chap. in *Environments at Risk: Case histories of impact assessment* (Berlin: Springer-Verlag, 1989), 126-154; Charles J. Keenan, *Environmental Anarchy: The insidious destruction of social order: a legacy of the Sixties* (Victoria: Cappis Press, 1984), 39-44. The Capital Regional District continues to discharge untreated sewage to the Strait of Juan de Fuca, which continues to generate controversy.

[54] Peter Trask, "Mayor 'proves' beaches safe with 15-minute dip at Kitsilano," *Vancouver Sun*, 13 June 1969, 1; "Some beach pollution rated high," *Vancouver Province*, 16 June 1969, 1; "Another battle in the pollution war," *Vancouver Province*, 17 June 1969, 4; "City pollution study team named," *Vancouver Province*, 19 June 1969, 1.

[55] Bob Hunter, "Bob Hunter,"*Vancouver Sun*, 14 June 1969, 19.

[56] Ian Street, "Bennett pledges stiffer environmental controls," *Victoria Colonist*, 23 January 1970, 1; "Environment First," *Victoria Colonist*, 23 January 1971, 16.

in charge of both resource development and, since 1965, pollution control, Lands, Forests, and Water Resources Minister Ray Williston was sharply criticised: "How will [Williston] be able to square his role in preventing pollution with his activities in creating pollution by granting licences to industry to befoul the air and water?" one opposition member demanded.[57] The issue even divided Cabinet, as a public spat erupted between Williston and Health Minister Ralph Loffmark over the approval of raw sewage disposal plans in Victoria. In an attempt to assert the traditional jurisdiction of health authorities over sewage disposal, Loffmark threatened to issue waste-treatment standards separate from those of the Pollution Control Board. Loffmark lost the political battle for control of pollution standard-setting powers within the government, but the controversy undermined the government's already shaky credibility on water quality.[58] "Pollution control is a myth in B.C.; pollution is out of control," charged opposition leader Tom Berger.[59] Increasingly, pollution became seen as the soft underbelly of a long-serving government that seemed increasingly out of tune with the changing values of the electorate.

Pollution problems also stimulated some of the earliest environmental activism in Vancouver. Although small ecology groups had cropped up at universities in the mid to late 1960s, few had garnered significant immediate support or attention beyond campus. At the time, the public environmental lobby in the province was largely confined to sportsmen's organizations and ephemeral groups formed in reaction to local problems. The Richmond Anti-Pollution Association

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[57] "Pollution board accused of usurping health duties," *Vancouver Sun*, 21 February 1967, B.C. Sessional clipping books (microfilm).

[58] John Mika, "Premier-Loffmark on collision course," *Victoria Times*, 10 August 1968, 3; Alex Young, "Frontal Attack for Pollution," *Vancouver Province*, 7 September 1968, 1; "While the Cabinet Struggles," *Victoria Times*, 15 January 1969, 4; "Loffmark Loses, Says Strachan," *Vancouver Sun*, 16 January 1969, 26.

[59] Iain Hunter, "Berger calls Loffmark unhorsed pollution fighter," *Vancouver Sun*, 1 February 1969, 13.

(RAPA) began as one such group. In 1968, RAPA was formed by Richmond residents and various groups calling for secondary treatment at regional sewage plants, including members of the United Fishermen and Allied Workers' Union and the Richmond Rod and Gun Club.[60] The group lobbied to overturn the Richmond raw sewage dumping plan; RAPA secretary Lois Boyce even ran (unsuccessfully) as a candidate in the local elections. Appearing before the federal standing committee on fisheries and forestry hearings in Vancouver, Boyce denounced the GVSDD attitude that "the solution to pollution is dilution."[61] RAPA also invited pollution experts from Vancouver's universities to study the issue of Fraser river pollution and sent a brief to the provincial Cabinet on water pollution policy. The group's activities did not remain confined to local issues, however. In 1970, RAPA helped found the B.C. Environment Council, a co-ordinating body for the proliferating environmental groups of the province. Its members also appeared before several Pollution Control Board inquiries into waste-disposal policies for various industries in the early 1970s.

Shortly after the formation of RAPA, the Scientific Pollution and Environmental Control Society (SPEC) appeared, and became the most prominent early anti-pollution organization in the province. Formed in early 1969, it quickly became a vehicle for considerable public concern about environmental issues in the province. SPEC held rallies, marches and public forums on pollution issues from 1969 onwards, and its membership grew rapidly, especially among students and young people. As its name suggested, this organization was concerned with a broad spectrum

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[60] "Effluent Dye Tests Urged in Fraser Pollution Dispute," *Vancouver Sun*, 16 July 1968, 11; "Fraser Sewage Plan Protested," *Vancouver Sun*, 17 July 1968, 15; "Pollution Foes to Protest Richmond Sewage Dumping," *Vancouver Sun*, 23 July 1968, 23; Alan Daniels, "'Kiss Fraser salmon goodbye,'" *Vancouver Province* 10 September, 1970, clipping from Society Promoting Environmental Conservation (SPEC) Archive, box 994.01.01 file 9. The society's name changed in 1981.

[61] House of Commons Standing Committee on Fisheries and Forestry, *Minutes of Proceedings and Evidence,* April 21, 1969, 833.

of ecological issues from strip mining to air pollution to oil shipping. But SPEC's earliest concern was water pollution in Vancouver. At the group's inaugural public meeting in January 1969, sanitary engineer John Stigant poured out a barrel of polluted Burrard Inlet water to illustrate his concern. In spite of such dramatics, the group attempted to promote itself as a "scientific" voice in environmental debates, yet one that challenged the authority of government in environmental affairs. Its early members included university biology and ecology professors, lawyers and other professionals who attempted to preserve the group's reputation for environmental credibility. In the summer of 1969, SPEC launched an independent water sampling program to monitor the city's shorelines, especially those in Burrard Inlet. News outlets praised their efforts and contrasted their openness with the lack of information from public authorities.[62]

In 1970, SPEC issued its explosive *Fraser River Report*. Using data compiled by student workers, it was an instantly controversial examination of pollution in the Fraser watershed from both industrial and domestic sources. *Sun* columnist Bob Hunter endorsed the report, writing that it documented "a river in its death throes ... being killed by industry, by cheap treatment methods, by lack of foresight and concern, by governmental ignorance."[63] The report prompted a *Sun* editorial accusing the GVSDD of being "wedded to studies of the Fraser's garbage-assimilation capacity which are hopelessly out of date."[64] Both industry and pollution-control authorities attacked the report, deriding its amateur survey and sampling techniques as unscientific and tainted with

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[62] "Beaches in city 'approach danger'," *Vancouver Sun*, 5 August 1969, 15; "Now we know – don't we?" *Vancouver Sun*, 6 August 1969, 4.

[63] Bob Hunter, "Bob Hunter," *Vancouver Sun*, 28 May 1971, 31.

[64] "Is half-safe safe enough?," *Vancouver Sun*, 9 February 1971, 4.

"emotionalism."[65] Certainly, the report's portrayal of pollution was provisional, impressionistic and highly variable in quality. But more important than its specific findings was the report's challenge to the exclusive authority of government and industry scientists over pollution and environmental quality. The *Fraser River Report* illustrated how, under scrutiny from environmental groups, the cool certainties of technocratic environmental managers became the subject of heated debate and uncertainty. The rise of RAPA, SPEC and other groups signalled the new confidence of ecological arguments against pollution that rejected the philosophy of assimilative capacity. These groups and their ideas would play a major role in the battle over water quality and pollution control in the Fraser River in the early 1970s.

Environmental critics were aided by the increasingly obvious failures of existing institutions and systems to control pollution. City of Vancouver Health Department surveys in 1969 and 1970 revealed that gross pollution persisted in both the North Arm of the Fraser and False Creek. Along the North Arm, "a pungent odour was present at several [sewage] outfalls and foreshores. The foreshores were usually black-brown in colour and the presence of gas bubbles, presumably methane gas, indicating decomposition. Much of the sewage is held in the surrounding area by incoming tides only to flow freely in the river when the tide is outgoing. Several lumber mills have reported large buildups of faecal [sic] matter on their log booms."[66] Richmond residents decried the stench and foul waters in the vicinity of the Iona treatment plant.[67] Provincial

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[65] Alex Young, "Report on Fraser 'amateur, misguided'," *Vancouver Province*, 17 December 1970, 28; Jeff Wells, "River report dismissed: work of greenhorns," *Vancouver Sun*, 16 December 1970, cited in SPEC Archive, box 994.01.01 file 994.01.01.009. The report was retrospectively denounced by former Director of Pollution Control Charles Keenan in *Environmental Anarchy*, 24.

[66] City of Vancouver Archives (CVA), City of Vancouver Health Department, box 146-C-2 file 17, Report by L. Percival to J.A. Stringer, Sanitary Control Officer, 22 July 1970, 2.

[67] "Suit cites sewage pollution," *Vancouver Sun*, 21 November 1969, 17.

legislators from Richmond and New Westminster offered lurid descriptions in the legislature of the "slimy swamp" on Sturgeon Bank near the Iona treatment plant outfall, and samples of sewage-polluted effluent were delivered to Williston on the floor of the legislature to protest the government's handling of pollution problems.[68] Testifying before the federal House Standing Committee on Fisheries and Forestry, fisheries union organizer Buck Suzuki claimed "Fishermen working the lower Fraser encounter ever-increasing amounts of domestic sewage entangled in gillnets and considerable concern has been expressed for the health of men working in these conditions."[69] The vaunted assimilative capacity of the Fraser River, in particular, appeared to be threatened by the increasing volume and concentration of domestic and industrial wastewaters under the GVSDD sewerage system.

The dispute over the use of waterways as natural treatment facilities reached a crescendo during the battle over the sewage treatment plant at Annacis Island. As a *Sun* feature noted, this "mighty sewage struggle" pitted "engineering technocrats" against an emerging "ecological consciousness."[70] At stake between these groups were the divergent perceptions of nature and pollution embodied in the principles of assimilative capacity versus waste treatment. Between 1971 and 1975, the controversy over the Annacis proposal generated two hearings before the Pollution Control Board, two reviews by the provincial Cabinet, and considerable public debate and scientific study. In 1971, the PCB approved a GVSDD application to operate a high-rate primary treatment plant at Annacis Island on the Main Arm of the Fraser to treat sewage from New Westminster and parts of Vancouver, Burnaby, Surrey and several eastern valley communities, and

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68 *Debates of the Legislative Assembly of British Columbia*, 29th Parliament, 1st session, 23 March 1970, 719-20, 729.

69 Standing Committee on Fisheries and Forestry, *Minutes*, 534.

70 Rod Morgan, "A mighty sewage struggle," *Vancouver Sun*, 10 December 1970, 6.

to discharge the treated effluent to the Main Arm of the Fraser. The plant would have an ultimate capacity of 129 million gallons per day. Enormous public outcry followed from advocates of secondary treatment, including Jack Davis, the federal fisheries and environment minister. SPEC and RAPA headed a broad coalition that included the B.C. Federation of Labour, the local Sierra Club chapter, the United Fishermen and Allied Workers' Union, and the newly formed B.C. Environment Council.[71] Although the project would result in the diversion of dozens of raw sewage outfalls from the river, these groups contended the Fraser River could not absorb the additional organic materials that would remain in primary effluent from Annacis. Initial agitation by critics forced an appeal hearing in 1971, but the Pollution Control Board upheld the permit issued to the Greater Vancouver Sewerage and Drainage District to discharge primary-treated effluent.

Opponents kept up their pressure on provincial authorities, however, and with the election of a provincial New Democratic Party government in 1972, the issue came under review by an ad hoc committee of the legislature as well as Bob Williams, the new minister of forests and water resources. As strident critics of the former Social Credit government's pollution policies, the New Democrats found themselves under intense political pressure to enforce higher standards of treatment. After the review, the Pollution Control Board was forced to amend its original decision and to require secondary treatment at Annacis Island by 1977 (the primary treatment plant was due

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[71] Ron Rose, "Sludge, stench clog Fraser cruise," *Vancouver Sun*, 21 August 1970, 29. See also, Leonard Taylor, "Sorting out sewage priorities," *Vancouver Province*, 3 March 1971, 4; "Ottawa's stand – them that has, gets," *Vancouver Sun*, 1 November 1971, 4; Steve Boyce, "Annacis sewage plant facts withheld from public," (letter) *Vancouver Sun*, 10 November 1972, 5. On the role of SPEC in this dispute, see the following files held at the offices of the current Society Promoting Environmental Conservation in Vancouver: SPEC Archive, box 994.02.03, file 6, "Report of the Executive Director to the SPEC Annual General Meeting," 17 April 1971; box 994.02.05 file 1, Executive Committee minutes, 29 November 1972; and box 994.02.06 file 7, "Annacis Island Sewage Treatment Plant," brief to Pollution Control Board, July 1974. See also University of Victoria Archives, AR-372 Derek Mallard papers, box 5 file 5.38, SPEC, "Annacis Island Primary Sewage Treatment Plant Notes," typescript, ND. This was probably prepared for information purposes during the campaign.

to come on-stream in 1975).[72] The GVSDD immediately appealed this decision, based on the fact that the plant would discharge primary effluent between 1975, when construction was completed, and 1977, in evident contradiction of the new PCB policy. When the government attempted to broker a compromise solution on the scheduled upgrade of the plant, the sewerage district appealed this "clarification" of government policy as well.

By contrast, proponents of secondary treatment supported the new government policy by writing supporting briefs and launching a public campaign to "save" the Fraser River. Environmental groups and fisheries advocates challenged the sewerage district's technical expertise by hiring their own engineers and criticizing the district's data on water quality. In briefs to the PCB during both the 1971 and 1974 appeals, these groups mobilized ecological arguments to advance a sophisticated scientific critique of the use of assimilative capacity. Federal fisheries officials argued that the environmental uncertainty surrounding the plan meant secondary treatment should be mandated as a precaution against pollution. "We cannot allow ourselves to be placed in the position whereby a minimum of treatment is provided until such time as ecological damage can be proven to have taken place," wrote regional director W. R. Hourston in 1971.[73] Several briefs contended that simple calculations of dissolved oxygen levels used by sewerage district engineers failed to account for the occasional flow reversals in the river, as incoming tides from the Strait of Georgia blocked the discharge of the Fraser. Opponents argued that these conditions, occurring during periods of low river flow (November to April) and high tides, could create a "slug" of

[72] BCARS, Accession no. 88-0407 Environmental Appeal Board, box 18, B.C. Government News Release, "Re: Secondary Treatment for Annacis Island," 7 December 1972.

[73] BCARS, Accession no. 88-0407 Environmental Appeal Board, box 18, no file number, W. R. Hourston, Director of Fisheries, Pacific Region, to W. N. Venables, Director of Pollution Control, 23 April 1971. See also Society for Pollution and Environmental Control, "Annacis Island Sewage Treatment Plant."

concentrated, toxic effluent in the Main Arm of the river or result in localized oxygen depletion. Another major technical objection to the plan focussed on the long-term impacts of discharging nearly the entire region's waste streams into the Fraser Estuary. Fisheries biologist Otto Langer, in a brief for the B.C. Environment Council, argued that "the Fraser Estuary cannot be viewed as a convenient medium into which we continually and indefinitely keep dumping our ever increasing amounts of municipal and industrial wastes. Even secondary treatment must not be mistaken as [an] indefinite safeguard for life in the Fraser River."[74] There also emerged in this debate a much stronger concern for the discharge of toxic chemicals from urban industrial facilities that discharged their wastes into municipal sewers — though no one knew how much or just which chemicals were released.

The technical objections registered in briefs to the Pollution Control Board were amplified by new studies into the degradation of the Fraser Estuary by sewage. A report to the PCB on Sturgeon Bank noted "severe" biological, chemical and aesthetic pollution in the vicinity of the Iona treatment plant outfall, confirming the observations of Richmond residents.[75] Fisheries and environmental officials from the federal Environmental Protection Service and the International Pacific Salmon Fisheries Commission launched a program to study the toxicity of municipal effluent to fish at various concentrations.[76] In a study for the salmon commission, biologist James

[74] BCARS, Accession no. 88-0407 Environmental Appeal Board, box 18, O. E. Langer, "BCEC Brief Supporting the Government of British Columbia Order to the Greater Vancouver Regional District to Provide Secondary Treatment at the Annacis Island Sewage Treatment Plant," 19 September 1974.

[75] Cited in "Resume for Permit Amendment Application on behalf of the Greater Vancouver Sewerage and Drainage District (GVS&DD) dated February 16, 1981), Ministry of Water, Land, and Air Protection file PE-23. This administrative file was accessed at the Surrey office of the ministry, with the assistance of pollution officer Ed Lai.

[76] See G. Tanner and G. Trasolini and L. Nemeth, *A Study on Wastewater Characteristics of Greater Vancouver Sewage Treatment Plants and Major Sewers* (Vancouver, Environmental Protection Service, December 1973), Report no. EPS 5-PR-73-11. The IPSFC undertook a series of studies in the early 1970s into the toxicity of municipal sewage and chlorinated effluent to salmon. See John F. Roos, *Restoring Fraser River Salmon: A history of the International Pacific Salmon Fisheries Commission, 1935-1985* (Vancouver: Pacific Salmon Commission, 1991), 179-180.

Servizi identified the environmental risks of the regional diversion and treatment strategy: "(R)aw sewage outfalls now located at various points along the lower Fraser will be blocked and the sewage collected by interceptors and passed through large treatment plants prior to discharge. As a consequence, millions of gallons of chlorinated sewage will be discharged every day at two points, Gilbert Road and Annacis Island sewage treatment plants, thereby reducing the opportunity for dispersion and thorough mixing." Thus, while waste treatment was useful to control raw sewage discharges, the concentration of effluent at critical locations presented new potential threats to migratory fish passing through the estuary. In particular, Servizi noted, new studies identified the hazards to aquatic life created by disinfecting effluent with chlorine.[77] Finally, a preliminary water quality survey of the Lower Fraser was completed in 1974 by a team of scientists from the Westwater Research Centre at the University of British Columbia. The report was guardedly optimistic about water quality in the Lower Fraser, but cautioned that much more sampling and analysis work was needed to determine the seasonal range of conditions in the river, and their causes.[78]

In defence of primary treatment, the GVSDD reverted to its familiar position that the river's assimilative capacity was more than adequate to protect human health and aquatic life. It also contended that the high costs of secondary treatment (estimated at nearly double the capital construction and annual operating costs of primary plants) were unjustified. In a 1971 letter to the

[77] IPSFC Library and Archives, box 1100.0 file 19, James A. Servizi, "Current and Future Research and Monitoring Projects Related to Pollution and its Effect on Fraser River Sockeye and Pink Salmon," 11 May 1971, 9. Servizi's studies on the environmental effects of residual chlorine in municipal effluent led to the adoption of dechlorination at the Annacis Island and Lulu Island sewage treatment plants. See D.W. Martens and J.A. Servizi, "Acute Toxicity of Municipal Sewage to Fingerling Sockeye Salmon," (New Westminster: IPSFC 1974); D.W. Martens and J.A. Servizi, "Dechlorination of Municipal Sewage Using Sulphur Dioxide," (New Westminster: IPSFC 1975); J.A. Servizi and D.W. Martens, "Preliminary Survey of Toxicity of Chlorinated Sewage to Sockeye and Pink Salmon," (New Westminster: IPSFC 1974).

[78] Benedict, et. al., *A Preliminary Water Quality Survey*, 35-36.

PCB, GVSDD Commissioner Frank Bunnell presented technical information showing that the amount and quality of effluent discharged at Annacis Island would have a negligible effect on the river. "Really the most important consideration for the selection of a [treatment] process is the receiving water available for discharge. You can see from the foregoing on B.O.D. [biochemical oxygen demand] that the size of the receiving river or body of water can determine the selection of the process. Also whether or not it is a recreational water is an essential factor and also whether it be salt or fresh water."[79] The district's 1974 brief went further, arguing that no scientific evidence indicated that water quality would be improved by secondary biological treatment. In fact, the brief contended, demands for secondary treatment masked the real pollution threat from sewage: the presence in the waste stream of toxic chemicals that were unaffected by treatment systems. To counter this problem, the district recommended that legislation be passed to control the disposal of toxic chemicals and heavy metals into municipal sewers.[80]

In addition to these technical aspects of water quality and the environmental effects of sewage disposal, the Annacis debate highlighted changing environmental values and increasing public distrust of government pollution control agencies. For many, like *Vancouver Sun* outdoor columnist Lee Straight, the degraded Fraser was a symbol of the loss of British Columbia's pristine nature: "What we've lost and must recover soon is a big, rich river with clean, grassy banks, now licked by swirling garbage and buffeted by acres of drab logs. I'd be glad to get back a clean Fraser without the fishing. Something tells me that if we don't restore that river sooner than

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[79] BCARS, Accession no. 88-0407 Environmental Appeal Board, box 18, F. R. Bunnell to W. N. Venables, 6 January 1971. This box also contains a letter outlining the reasons for appeal of secondary treatment orders in 1974: A.C. Kelly, chairman of GVSDD, to Bob Williams, Minister of Forests and Water Resources, 18 March 1974.

[80] BCARS, Accession no. 88-0407 Environmental Appeal Board, box 18, "Submission of the Greater Vancouver Sewerage and Drainage District in the Appeal Concerning the Annacis Island Treatment Plant," 1974.

planned, we're all lost."[81] Secondary treatment advocates organized a public campaign appealing to the symbolic importance of the river and demanding public participation in environmental decision-making. RAPA urged local residents to become "Fraser Savers" and support the political fight for secondary treatment. Dozens of letters poured into PCB offices appealing to the "balance of nature" that was threatened by the continued degradation of the river.[82] Fraser River dockworkers and fishers filed a petition with the PCB demanding secondary treatment and in 1972 held a floating protest on the river demanding a public hearing on the issue.[83] For many critics, the failure of the PCB or the GVSDD to hold a public hearing was a betrayal of public trust. Barry Leach, head of the Douglas College Institute of Environmental Studies and a leading figure in the campaign, urged citizens to "flush" regional planners who were insensitive to public concerns and ecological issues.[84]

Sewerage district officials and engineers resented the politicization of technical decision-making. In characterizing the decision as a technical one, the district attempted to foreclose on what they regarded as alarmist and unfounded fears about pollution in the Fraser. The higher costs of secondary treatment were unjustified by the technical evidence, the district argued: the assimilative capacity of the river was entirely sufficient to absorb the organic constituents of primary treated effluent. "It is attractive to subscribe to the belief that secondary treatment will solve any pollution problem in the Fraser River when in fact the large investment involved could

[81] Lee Straight, "Lee Straight," *Vancouver Sun*, 3 December 1971, 23.

[82] These letters are filed in BCARS, Accession no. 88-0407 Environmental Appeal Board, box 18.

[83] "Sewage treatment plant draws angry protests," *Vancouver Sun*, 4 December 1972, 13.

[84] John Gibbs, "Gathering on sewage told: 'flush' regional district," *Vancouver Sun*, 29 November 1972, 6.

produce little result."[85] The GVSDD protested the implementation of "rigid" treatment standards for the Fraser in its appearance before a separate PCB inquiry on municipal waste discharges in 1973: "One cannot talk in simplistic terms when discussing the amount of treatment necessary in any area. The size and use of the receiving waters must be considered when selecting the various methods of dealing with severe pollutants," the district contended.[86]

In late 1974, the provincial Cabinet considered the GVSDD appeals of the secondary treatment requirement for Annacis Island. The decision by the Cabinet on 21 April 1975 upholding the PCB ruling came as little surprise, since it was a government committee that had forced the board to adopt the policy of secondary treatment in the first place. In addition, the ruling established a special committee, under the direction of the provincial Environment and Land Use Committee Secretariat, to consider the cumulative ecological effects of sewage disposal and toxic chemicals in the Fraser River.[87] In one sense, this decision was a watershed victory for those who opposed the doctrine of assimilative capacity, which had held sway over pollution control decision-making in the Lower Mainland, and the province, for nearly a hundred years. Environmental politics played an important role in the government's decision. The Annacis controversy had galvanized regional environmental groups who advanced the notion that ecological factors, not merely technical, economic, public health or aesthetic considerations, should guide waste-disposal decisions. Ensuring the ecological health of the Fraser had become a

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[85] BCARS, Accession no. 88-0407 Environmental Appeal Board, box 18, "Submission of the Greater Vancouver Sewerage and Drainage District," 5.

[86] British Columbia Department of Lands, Forests, and Water Resources. Water Resources Service, Pollution Control Branch, *Public Inquiry Into Municipal Type Waste Discharges* (Victoria, Water Resource Service, 1973), 284-285.

[87] BCARS, Accession no. 88-0407 Environmental Appeal Board, box 18, Government of British Columbia, Lieutenant-Governor in Council, "In the Matter of the Appeal - Pollution Control Act. Greater Vancouver Regional District - Annacis Island Plant," 21 April 1975.

symbolic touchstone for critics of regional and provincial pollution-control structures. As an "iconic" landscape, the river served as a focus for political debates over environmental values that ultimately trumped strictly technical considerations in decision-making.

Rather than dispel controversy over the health of the Fraser, however, the Annacis decision served to refocus and reorient environmental concern. In particular, concern mounted over the issue of toxic chemicals and heavy metals in the waste stream, which had been identified by the sewerage and drainage authority as the most significant pollution source. The measurement of toxic constituents in wastewaters improved in the 1950s and 1960s as new technical instrumentation and laboratory methods were developed to detect chemicals and identify their effects. This expanded the range of quantitative measures of pollution and assimilative capacity beyond the traditional parameters of BOD, dissolved oxygen and bacterial counts.[88] A new and disturbing pattern surfaced of long-term and sublethal environmental effects of waste discharges from both domestic and industrial sources. Increasing public concern about these contaminants was fuelled by controversies over DDT and pesticide use, the issue of low-level, global radiation contamination, and such incidents as the mercury poisoning of Japanese citizens at Minamata.[89]

Toxic contaminants such as lead, zinc and copper, as well as certain types of synthetic and organic chemicals, enter the domestic waste stream through surface runoff in cities, household cleaners and pesticides, agricultural runoff and industrial inputs. These contaminants are unaffected by primary and secondary biological treatment systems; in addition, they are mostly stable in the environment, that is, they are not broken down or absorbed through biological or

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[88] James W. Parlour, *The Urban Pollution Study: Summary report* (Ottawa: Ministry of State for Urban Affairs, 1974), 38; Tarr, "Industrial Wastes, Water Pollution, and Public Health," 376-378.

[89] Hays, *Beauty, Health and Permanence*, chap. 6; Timothy S. George, *Minamata: Pollution and the struggle for democracy in Japan* (Cambridge: Harvard University Press, 2001).

chemical action. At certain concentrations, these contaminants may be directly toxic to aquatic life. Of greater concern, however, is that these contaminants accumulate in sediments or in the tissue of organisms. They also tend to bioaccumulate and concentrate in the food chain as organisms at one trophic level feed on other organisms that have absorbed contaminants. Thus, at higher levels on the food chain, dangerous levels of heavy metals or toxic chemicals may accumulate in animal tissues, affecting individual health, reproduction and behaviour.

In the late 1970s, the question of toxic contaminants largely supplanted the issue of bacterial contamination or oxygen demand as the most significant environmental threat in the Fraser Estuary. Scientific concern from a number of sources, including fisheries officials, engineers and university researchers, coalesced around the issue. The accumulation of toxic chemicals was first identified as a concern in the Sturgeon Bank area of the Fraser Estuary, in the vicinity of the Iona treatment plant outfall. A 1973 federal Environmental Protection Service report on effluent toxicity from regional sewage treatment plants warned that "the majority of sewer systems monitored are already carrying sufficient contaminants to cause fish mortalities."[90] Scientists at the Westwater Research Centre publicized the issue of toxics through a public lecture series and a 1976 book, *The Uncertain Future of the Lower Fraser*.[91] Westwater also urged reform of the pollution control regulatory system in B.C., a call endorsed by city editorialists.[92] Subsequent studies on the performance of the Annacis Island sewage treatment plant, undertaken on behalf of the GVSDD, confirmed that the accumulation of toxics in the estuarine environment posed

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[90] Tanner et. al., *A Study on Wastewater Characteristics*, iii.

[91] Anthony H.J. Dorcey, ed., *The Uncertain Future of the Lower Fraser* (Vancouver, Westwater Research, 1976).

[92] "A dark cloud," *Vancouver Sun*, 24 April 1976, 4; "The answer is yes," *Vancouver Sun*, 26 April 1976, 4.

a significant, though as yet not fully understood, environmental risk.[93]

Ironically, the problem of toxics in the domestic waste stream derailed plans for secondary treatment at Annacis Island. In its report, the study committee established as part of the 1975 Cabinet decision recommended delaying the staged upgrade to secondary treatment until 1978 while various options for the treatment of effluent and control of toxic chemicals were explored. As a result, the Annacis Island waste discharge permit was again amended in April 1977 to incorporate a joint PCB and GVSDD "source control program" for the control of toxics. This program sought to identify significant sources of these chemicals and divert them from the domestic waste stream. The new permit also included new effluent standards for discharge from the Annacis Island plant which included limits on heavy metals, phenols, oils and other chemicals, as well as standards for effluent toxicity (measured by bioassay tests on fish). But the GVSDD and PCB struggled to establish an effective source control program, and the Annacis plant regularly exceeded these permit levels, its effluent often acutely toxic at low concentrations.[94]

In 1980, the Pollution Control Board held a public inquiry to explore the failure to control toxic chemicals in the waste stream, and continuing concerns about the degradation of the Lower Fraser. The inquiry reprised many of the environmental policy problems and attitudes that had characterized sewage pollution debates for most of the century. Testimony at the inquiry revealed that the control of toxics was hampered by jurisdictional overlap between cities, regional boards and provincial authorities. The issue was traced to a basic problem of waste management: while sewer construction and operation was well-defined and co-ordinated, authority to control what

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[93] B.C. Research, *Summary of the Effects of the Annacis Island Sewage Discharge on the Water Quality in the Fraser River* (Vancouver: B.C. Research, 1978).

[94] J.A. Servizi, D.W. Martens, and R.W. Gordon "Acute Toxicity at Annacis Island Primary Sewage Treatment Plant," (New Westminster, IPSFC, 1978).

went into sewers was unclear, and nobody appeared to know the nature and extent of the problem. The board heard scientific evidence of heavy-metal concentration in marine organisms in the Fraser Estuary, as well as concern over periodic and localized oxygen depletion. There were also renewed fears that Vancouver's beaches were contaminated by both stormwater and the increasing number of overflow incidents that plagued the city's overworked, aging combined sewer system. The Annacis Island plant had not been upgraded to secondary treatment, and it failed to meet its permit conditions for suspended solids and BOD, while the operation of the Iona Island plant had resulted in "serious degradation and eutrophication" near the outfall, and "contamination of Sturgeon Bank biota with heavy metals and [polychlorinated biphenyls]."[95] Without better administrative co-ordination and the source control of industrial inputs, observed PCB chairman C. J. G. Mackenzie, "the ultimate fate of the Lower Fraser and its estuary is that it will be trampled to death within another generation."[96] In spite of these observations, the inquiry report backed away from recommending upgraded waste treatment: "Although there are very large volumes of wastes emanating from the Vancouver metropolitan area, these tend to be matched by the very great capacity of the Fraser River to dilute and absorb them."[97] Emphasizing source control of toxic inputs, the board dismissed the need for greater biological treatment of wastes. After the decade-long "mighty sewage struggle," the environmental strategy for the Fraser River remained precariously balanced between demands for precautionary treatment and the continued reliance on the river's assimilative capacity. For many British Columbians, however, the Fraser had become a

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[95] British Columbia, Pollution Control Board, *Conclusions of the Board Regarding the Lower Fraser River Public Hearing on 18-22 February 1980* (Victoria: PCB, 1980), 35.

[96] BCARS, Accession no. 88-0407 Environmental Appeal Board, box 21, "Observations of the Chairman," (draft) March 10, 1980.

[97] Pollution Control Board, *Conclusions of the Board*, 31.

"river of tears," a beloved watershed under continued threats from pollution and government indifference.[98]

Epilogue and conclusion

In July 1980, near the mouth of the Fraser River, fisheries biologist Ian Birtwell witnessed thousands of fish flopping on shore, gasping for air, while seabirds plundered entire schools floating sluggishly near the water's surface. The fish kill, which Birtwell estimated in the millions, was attributed to an episode of severe oxygen depletion in the shallow waters overlaying Sturgeon Bank. It prompted charges laid under the Fisheries Act, instigated by the Union of B.C. Indian Chiefs.[99] This was the second appearance before a B.C. provincial court judge that year for the GVSDD; earlier, the district pleaded guilty to four of 34 charges under the Pollution Control Act for failing to abide by the conditions of its discharge permit for the Iona Island sewage treatment plant. For these infractions, the sewerage district received a suspended sentence, and was ordered to conduct a comprehensive review of strategies to abate pollution from the plant.[100] In the fish kill case, the GVSDD and Greater Vancouver Regional District (GVRD) officials charged also pleaded guilty. In sentencing the offenders to fines of $5,000 each, Judge Philip Govan decried the slow progress in dealing with the growing volume and chemical complexity of the domestic waste stream. He reflected that the problem of sewage pollution was, at root, a "small 'p' political problem, one which governments of every political stripe and every level must grapple with in the first instance. But the priorities of these governments must be guided by the demands of the

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98 "River of tears," *Vancouver Sun*, 22 February 1980, 4; see also Moira Farrow, "'Beautiful B.C.' befouled by waterway sludge, algae," *Vancouver Sun*, 25 June 1977, 16.

99 Phil Needham, "Fraser pollution like nightmare, witness testifies," *Vancouver Sun*, 7 May 1981, 2; Phil Needham, "GVRD gets $10,000 fine for polluting," *Vancouver Sun*, 8 May 1981.

100 "Resume for Permit Amendment Application."

electorate; it is they who must put sewage treatment plants ahead of bridges, stadiums, dams or other monuments."[101] Govan's comments highlighted the persistent failure of public authorities to adequately address pollution problems, even when well known.

In the wake of the 1980 inquiry and 1981 prosecutions, the Fraser River continued to be the object of intense scrutiny by government agencies, environmental groups and university scientists. During the 1980s, provincial and federal environmental agencies held public consultations and conducted scientific studies to create a Fraser River Estuary Management Plan.[102] These efforts, while welcomed, were criticized by environmental groups as failing to confront the ongoing pollution of the river's estuary. In 1987, the Fraser River Coalition, a public watchdog group for the Fraser, pointed out that sewage treatment plants continued to discharge primary-treated effluent, wastewater volumes continued to rise along with population growth and density in the region, and no comprehensive source control program was yet developed.[103] Much of the GVRD's efforts since 1980 have been directed towards correcting this legacy of degradation, whether through treatment plant expansion and upgrades, source control programs or the elimination of combined sewer overflows, which to this day periodically discharge diluted untreated sewage into the Fraser, False Creek and Burrard Inlet during winter rains.[104] In the 1990s, the GVRD reviewed

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[101] *R. v. Greater Vancouver Regional District and Greater Vancouver Sewerage and Drainage District* (1981), cited in Environmental Protection Service, *Prosecutions Under the Pollution Control and Habitat Protection Provisions of the Fisheries Act* Vol. 3 (Ottawa: Environment Canada, 1984), 136.

[102] The management plan emerged from co-operative studies dating back to a late 1970s Federal-Provincial Task Force on the Fraser River: see "A Living River By the Door," Fraser River Estuary Study Phase 2 (Vancouver: Fraser Estuary Management Project, 1982); "A Living Working River: An estuary management plan for the Fraser River," final version (Vancouver: Fraser Estuary Management Project, August 1994).

[103] *Proceedings, Second Fraser River Conference*, March 6-7, 1987 (Fraser River Coalition and Kwantlen College, 1987).

[104] Greater Vancouver Regional District, *Combined Sewer Overflows*, Fact Sheet #3 (Burnaby: GVRD, 1999). This and other related information are available online at www.gvrd.bc.ca. See also www.city.vancouver.bc.ca/engsvcs/watersewers/sewers/history.htm (Accessed May 2004).

its waste-management policies and proposed a Liquid Waste Management Plan which, controversially, failed to recommend secondary-treatment upgrades for the Iona Island or Lions Gate treatment plants. The Annacis Island and Lulu Island plants were upgraded in 1998.[105]

The environmental problems and controversies surrounding the health of the Fraser and waste treatment policy are rooted in the attitudes and strategies of earlier generations of engineers and planners. The Lea and Rawn plans for Vancouver's sewerage deployed the technocratic strategy of transporting wastewaters from across the region to a relatively small number of points, where they could either be discharged into deep or fast-moving waters, or receive treatment before disposal. The critical reliance of this system on the absorptive capacity of area waters as a kind of natural waste treatment system was overwhelmed by the geographic concentration of contaminated wastewaters at fewer locations. While the reshaping of the regional hydroscape through capital- and technology-intensive systems corrected the uncontrolled disposal of wastes and resulting local pollution of creeks, beaches and ditches, it ultimately created a situation of long-term and intensive environmental degradation at one of the most ecologically sensitive places in the region, the Fraser Estuary.

The failure of this environmental re-engineering effort to achieve effective pollution control mirrored similar problems and unintended outcomes elsewhere. Sarah Elkind has described how regional infrastructure networks in Boston and Oakland

> gave to growing cities the water supplies and waste disposal mechanisms they needed to prosper. By expanding public authority over natural resources they increased public access to vital services. ... On the other hand, these systems intensified and concentrated resource use in some potentially dangerous ways.

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[105] Greater Vancouver Regional District, *Liquid Waste Management Plan* (Burnaby, GVRD, 2001); David Lane, "Hidden Killer," pamphlet (Vancouver: T. Buck Suzuki Environmental Foundation, ND [2001?]); Scott Simpson, "Treating rivers of human waste," Vancouver Sun, 25 October 2001, B6-B7, and Scott Simpson, "Sewage plan creates anxiety: Trout die in effluent from primary treatment," *Vancouver Sun*, 26 October 2001, B4.

> Narrow policy goals and extensive water use devastated rivers, marshes, and bays. Over-confidence in the ability of technology to meet resource needs by manipulating natural systems ultimately impaired the ability of those natural systems to absorb the byproducts of modern industrial life.[106]

Clearly, the extension of state control over regional nature enabled the co-ordination of regional anti-pollution efforts. Yet it failed in the end to overcome the reliance on regional waterways as sinks for waste. The scientific and discursive construction by municipal and provincial engineers of the natural environment in terms of its waste-processing capacity blinded them to the ecological implications of this strategy. Regulatory authorities only considered these implications when compelled to do so by changing political and scientific perspectives on the environment.

Changes to sewage-treatment policy, however slow in arriving and haphazard in their implementation, were in large part the result of changes in how Vancouverites regarded local waters, especially the Fraser River. As historian Samuel Hays has pointed out, threats to iconic landscapes or waterways, such as Chesapeake Bay or Puget Sound in the United States, played an important role in stimulating environmental action based on shared local perceptions and sense of identity.[107] If pollution can be understood, at base, as "matter out of place," Vancouverites increasingly questioned whether the river was an acceptable place for domestic wastes. Counterpoised to the notion of water's assimilative capacity was a vision of "natural" waters sullied by sewage.[108] Debates over sewage treatment and pollution control were, as Neil Evernden

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[106] Elkind, *Bay Cities and Water Politics*, 171.

[107] Hays, *Beauty, Health and Permanence*, 36-37.

[108] Mary Douglas, *Purity and Danger: An analysis of concepts of pollution and taboo* (New York, Frederick A. Praeger, 1966); Adam W. Rome, "Coming to Terms with Pollution: The language of environmental reform, 1865-1915," *Environmental History* 1, 3 (July 1996), 6-28.

asserts, "an indicator of underlying disagreements about societal goals."[109] The moral and political implications of pollution policy mingled with ecological ideas to produce an comprehensive critique of the failures of government policy and the technocratic management of the Fraser River.

Once seen as a convenient and efficient receptacle for wastes, the ocean and river waters abutting Greater Vancouver gradually came to be seen as a recreational amenity, a public health problem and then as an ecological system. The protection of the amenity value of Vancouver's beaches emerged as an issue early in the twentieth century, and remained an important environmental priority throughout the history of sewerage planning and development. Closely related to recreational uses were the public-health concerns surrounding wastewater disposal; while the region's drinking water supply was not threatened by sewage, swimmers, fishermen, and shellfish consumers, among others, were exposed to the fears and risks of waterborne disease. For most of the century, the engineers' and planners' answer to protecting public health and urban amenities was more efficient exploitation of assimilative capacity. Ecological concerns were not so easily allayed. The threats that domestic wastewaters posed to the aquatic environment, once a concern only to fisheries officials and sportsmen, became a potent public issue by the late 1960s. Stirred by appalling pollution episodes elsewhere in North America, Vancouverites deployed ecological criticisms of the planned exploitation of water's assimilative capacity. Looking back on the development of public concerns, pollution and fisheries scientist Michael Waldichuk reflected,

> The environmental movement of the 1970's has had a great impact on perceptions of pollution by sewage as well as by many other materials. Some of these perceptions may be ill-founded, but they have necessitated, nevertheless, a very close look by environmental scientists and engineers at all the environmental and ecological effects of sewage, and have led to designs of systems for treatment and

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[109] Neil Evernden, "Pollution," in Robert Paehlke, ed., *Conservation and Environmentalism: An encyclopaedia* (New York: Garland, 1995), 525.

disposal that would minimize these effects as much as possible.[110] Environmentalists rejected the GVSDD's vision of the Strait of Georgia and Fraser River as a "giant flushing machine" and advanced the notion of regional waters as an integrated environment that sustained valuable and meaningful aquatic life. Such a system, these new environmentalists argued, could not be reduced to the calculus of dissolved oxygen levels or tidal cycles; rather, the precautionary principle of avoiding potential environmental degradation required optimum levels of treatment and thorough environmental monitoring and enforcement.

Urban water pollution problems galvanized the incipient environmental movement in the province. As historian Douglas Stradling has argued, even before the age of mass environmental consciousness, sewage and smoke pollution reminded urban dwellers, often unpleasantly, of their interactions with and reliance on natural systems. Many of the key themes of environmentalism — the public health and environmental effects of urbanization, the use of technological systems to overcome environmental problems, and the role of the public and the state in regulating pollution — were rehearsed in the context of sewage problems beginning in the first quarter of the twentieth century.[111] Water quality was a central issue for SPEC, whose dramatic growth in 1969-70 made it the province's largest environmental group. Like Pollution Probe, the Toronto-based environmental group that emerged around the same time, SPEC and other groups parlayed growing popular consciousness of ecological issues and longstanding concerns with waste disposal into a potent political force that challenged reigning orthodoxies about waste disposal and environmental policy. By the early 1970s, sportsmen, unions, fishermen, public health advocates, student groups

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[110] Waldichuk, *Sewage Pollution in British Columbia*, 1.

[111] Stradling, *Smokestacks and Progressives*.

and urban professionals had joined to fight for protection of the Fraser River, mainly for ecological reasons.

Of course, the battles over sewage treatment and disposal did not occur in a vacuum. Contemporary industrial water pollution concerns helped inform and animate public opposition to provincial and regional policies on sewage. But the long history and intense urban experience of sewage-disposal problems meant that this issue critically shaped the terms of debate around water pollution in the province. In particular, the competing notions of assimilative capacity versus water quality, which emerged early on in sewage debates, appeared in later struggles over industrial pollution from mines and pulp mills, albeit in somewhat different ways. The idea that water's waste-absorbing capacity was a resource that could be reliably measured, conserved and exploited also gained credibility through the Vancouver's sewerage planning exercises. This idea, and subsequent criticisms, played a major role in industrial water pollution policies and controversies, particularly in the postwar period.

Figure 2.1: The cover of the Society for Pollution and Environmental Control's *Fraser River Report* (1970) graphically represented public perceptions of the Fraser River in the late 1960s.

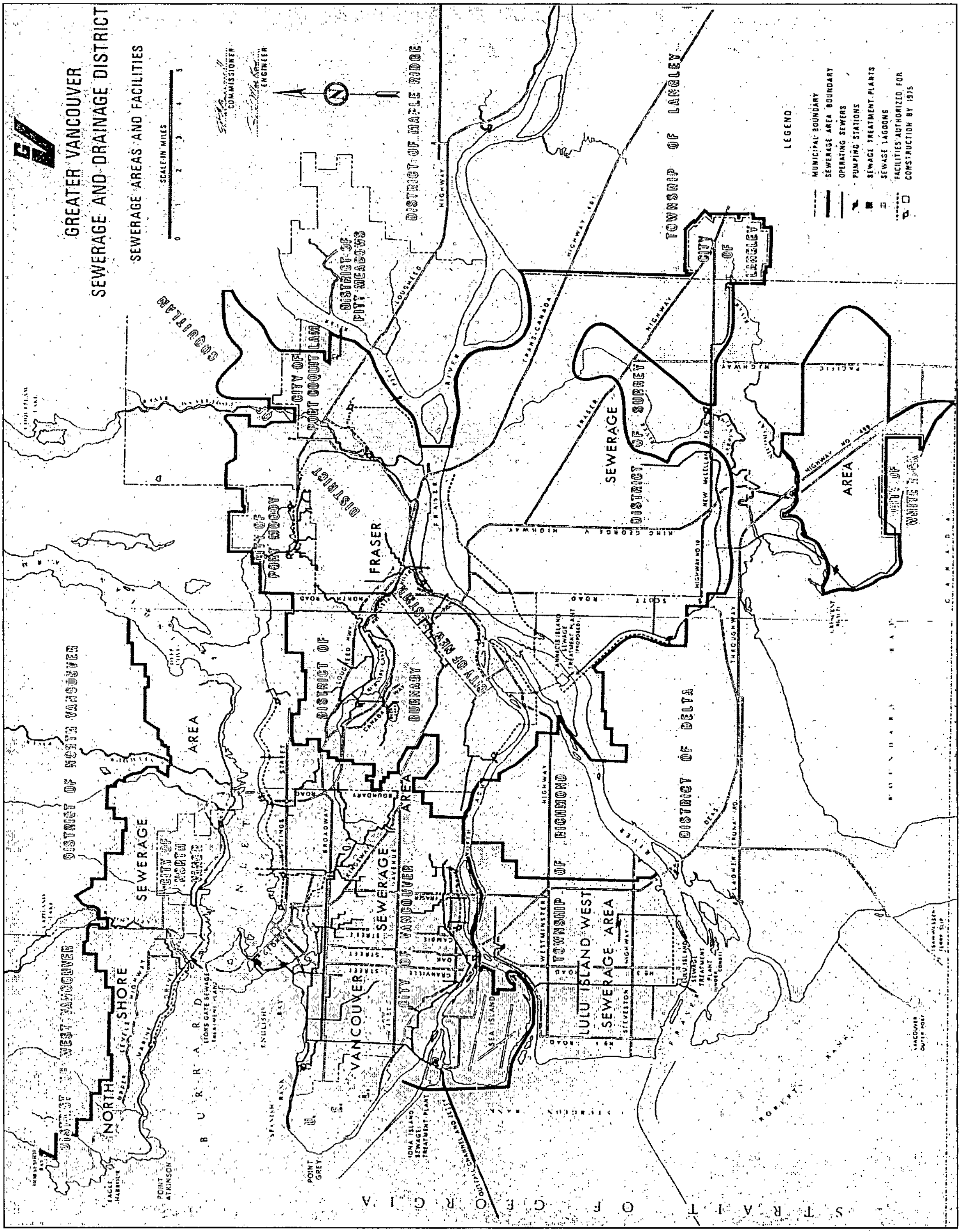

Figure 2.2: Sewerage and drainage facilities of Greater Vancouver. Note the locations of the Annacis Island sewage treatment plant (on the Fraser River near New Westminster) and Lulu Island sewage treatment plant (at the mouth of the Fraser on the south end of Richmond). Also note the outfall channel extending across from the Iona Island treatment plant. Source: University of British Columbia library.

Section 2
Polluting the Hinterland: Water pollution from the mining and pulp and paper industries

The pattern of industrial water pollution problems in British Columbia closely matches the history of the province's resource-extractive industries, particularly mining and forestry. The rapid transformation of nature and society in twentieth-century B.C. was based on the industrial conversion of natural resources into export commodities. This activity typically took place near small, resource-dependent settlements or remote, sparsely populated areas. In these settings, pollution from industrial activities was often ignored. Rugged topography and variable climatic conditions increased the difficulty (and cost) of resource recovery and made pollution control a technical and economic problem. Industrial concerns cited these problems in opposing strict waste-dumping restrictions. But industry also used the remote location of their activities to justify waste discharges, based on a philosophy of extensive resource use and the assimilative capacity of the surrounding environment. If lakes or streams were fouled by sawdust or mine tailings, there were clean waterways just over the next ridge. In any case, the few fish (and fishermen) affected were regarded as minor costs on the ledger of the province's economic development.

Pollution increased in proportion to the widening scope and increasing intensity of resource development after the Second World War, when massive mines, smelters and pulp mills spread throughout the province. Described by one historian as B.C.'s "Great Leap Forward," the postwar boom included an ambitious government program of highway and railway construction, hydroelectric-dam development and vigorous promotion of capital investment in resource-extractive industries. As a "company province," government resource policies favoured industrial development, while implicitly or explicitly sanctioning their use of waterways as sinks for waste.[1] As historian Margaret Ormsby noted in the epilogue to her 1958 *British Columbia: A history*, in spite of the "despoliation of nature" most British Columbians "counted as gain" the mines and mills that sprang up in the province's wilderness.[2]

Early in the century, critics of industrial pollution in B.C. were few and easily dismissed. If domestic pollution posed well-recognized threats of epidemic disease and urban squalor, industrial pollution was related to hazier issues such as water quality and aquatic life. As Joel Tarr, Adam Rome and other historians have noted, these less pressing concerns reached far fewer people than the warnings about domestic pollution sounded by the Sanitary Movement.[3] Where public health was not threatened, industry found it much easier to deny or rationalize stream degradation in the name of progress and development. As one B.C. mining engineer put it, "If civilization is to go forward and improve, the great rivers and lakes must continue to be the cleansing agents of the land."[4] As in the United States, fisheries interests in B.C. were among the earliest critics of industrial polluters. Mine waste and pulp mill effluent threatened both sport fisheries and valuable commercial fisheries. As the scale of this pollution threat grew during the century, fisheries advocates prompted legal and regulatory responses from both the federal and provincial agencies responsible for fish protection.

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[1] On the pro-development policies of the B.C. government, particularly the Social Credit governments of 1952-1972, see Martin Robin, *Pillars of Profit: The company province, 1934-1972* (Toronto: McClelland and Stewart, 1973); David J. Mitchell, *W.A.C. Bennett and the Rise of British Columbia* (Vancouver: Douglas and McIntyre, 1983).

[2] Margaret A. Ormsby, *British Columbia: A history* (Toronto: Macmillan, 1958), 485-486.

[3] Adam W. Rome, "Coming to Terms with Pollution: The language of environmental reform, 1865-1915," *Environmental History* 1, 3 (July 1996), 6-28; Joel A. Tarr, "Industrial Wastes, Water Pollution, and Public Health, 1876-1962," in *The Search for the Ultimate Sink: Urban pollution in historical perspective*,(Akron: University of Akron Press, 1996); Donald J. Pisani, "Fish Culture and the Dawn of Concern over Water Pollution in the United States," *Environmental Review* 8, 2 (1984), 117-131.

[4] *Transactions of Seventeenth British Columbia Natural Resources Conference* (Victoria: BCNRC, 1967), 75.

The following chapters explore how competition for access to water resources shaped industrial pollution regulation in B.C. The formal and informal institutions and practices developed to resolve such resource conflicts constitute what political scientists and environmental economists call "environmental governance." Environmental governance institutions "define who is authorized to use a resource and provide for the exclusion of unauthorised users, establish rules regulating how authorised users can use the resource and provide for their enforcement, organise conflict resolution, and provide for collective choices over governance institutions."[5] These institutions can be as specific as statutory laws and regulatory bodies, or as general as cultural practices and ideological perspectives. As Jouni Paavola points out, these arrangements are not static, but rather reflect particular historical and political conditions, social and cultural values and environmental circumstances. For instance, historians and resource economists have explored the variety of environmental governance regimes that have shaped how common-property or open-access resources (such as pelagic fisheries) have historically been allocated, managed or "enclosed."[6] The assimilative capacity of water, or its ability to dilute and disperse wastes, was regarded by industry and government as one such resource. Water-quality regulation emerged out

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[5] Jouni Paavola, "Water Quality as Property: Industrial water pollution and common law in the nineteenth-century United States," *Environment and History* 8, 2002, 296; see also Jouni Juhani Paavola, "Governing Waters: The development of water pollution policy in the United States, 1850-1980," (PhD diss., Michigan State University, 2000). As Paavola notes, much of the literature on environmental governance emerges from economists' analysis of the management of common property regimes and political scientists' explorations of environmental policy. As such, there is often a strong emphasis on modelling decision-making and exploring ideology, rather than examining the interplay of history, environment and ideas. For examples of Canadian environmental governance literature, see: Robert Paehlke and Douglas Torgerson, eds., *Managing Leviathan: Environmental politics and the administrative state* (Peterborough, Ont: Broadview Press, 1990) and Edward A, Parson, ed., *Governing the Environment: Persistent challenges, uncertain innovations* (Toronto: University of Toronto Press, 2001).

[6] Garrett Hardin, "The Tragedy of the Commons," *Science* 162, 3859 (13 December 1968), 1243-1248; S.V. Ciriacy-Wantrup and Richard C. Bishop, "'Common Property' as a Concept in Natural Resources Policy," *Natural Resources Journal* 15 (October 1975), 713-727; David Feeny, Fikret Berkes, Bonnie J. McCay, and James Acheson, "The Tragedy of the Commons: Twenty-two years later," *Human Ecology* 18, 1 (1990), 1-19; David Feeny, Susan Hanna, and Arthur F. McEvoy, "Questioning the Assumptions of the "Tragedy of the Commons" Model of Fisheries," *Land Economics* 72, 2 (May 1996), 187-205. For a good example of the history of regulating of fugitive, common-property resources such as the fishery, see Arthur F. McEvoy, *The Fisherman's Problem: Ecology and the law in the California fisheries, 1850-1980* (Cambridge: Cambridge University Press, 1986).

of conflicts over access to water for waste disposal, and other uses of water resources such as domestic water supplies or fisheries. The regime of environmental governance that emerged from this conflict in B.C. was shaped by the province's economic history, the geography of industrial development, changing and contested understandings of pollution and assimilative capacity, and the particular environmental impacts of mining and pulp mill pollution.

For much of the province's history, provincial governments in British Columbia fostered legal regimes and patterns of resource development that favoured maximum exploitation of resources with minimal concern for environmental impacts. As historian Robert Cail has demonstrated, early provincial administrations guided and promoted this development under the banner of maximum beneficial use of resources, while retaining a strong government presence in resource ownership and land tenure.[7] These priorities were reflected in provincial water law and administration. As in California and Australia, the unique economy of placer gold mining provided the impetus for the province's first water laws.[8] The first British Columbia Gold Fields Act, proclaimed by Governor James Douglas in 1859, allowed Free Miners to record, or claim, a specific amount of water for the working of mining claims. The regulations also set out provisions for the timely utilization of water privileges, proscriptions against waste and conditions for the

[7] Robert E. Cail, *Land, Man, and the Law: The disposal of Crown lands in British Columbia, 1871-1913* (Vancouver: University of British Columbia Press, 1974). On the politics of resource development, see Robin, *Pillars of Profit*; Martin Robin, *The Rush for Spoils: The company province, 1871-1933* (Toronto: McClelland and Stewart, 1972); Jeremy Wilson, *Talk and Log: Wilderness politics in British Columbia, 1965-1996* (Vancouver: University of British Columbia Press, 1998); Jeremy Wilson, "Forest Conservation in British Columbia, 1935-1985: Reflections on a barren debate," *BC Studies* 76 (Winter 1987/88), 3-30.

[8] Donald J. Pisani, "The Origins of Western Water Law: Case studies from two California mining districts," in *Water, Land and Law in the West: The limits of public policy, 1850-1920* (Lawrence: University Press of Kansas, 1996), 36. See also from the same volume, "Enterprise and Equity: A critique of Western water law in the nineteenth century."

sale of water rights.[9] The 1865 Land Act further clarified these rights, insisting that the grant of exclusive water privileges required the construction of a ditch or flume for the conveyance of water — an echo of the role of the fence in land enclosures. The Act also expanded the entitlement of water recording to irrigators. Gold commissioners and stipendiary magistrates were charged with issuing water licences and mediating conflicts between users.[10] Notably, water records were measured in "miner's inches," reflecting the priority given mining in the development of B.C.'s water resources.

This water rights system was intended to replace the customary and common-law traditions of riparian rights. Inherited from English common law, the riparian doctrine protected stream-side landowners' rights to flows "undiminished in quality or quantity," recognizing water itself, if not access to it, as a common-property resource.[11] By the 1890s, it was clear that the province regarded riparian rights as an obstacle to development. Its 1892 Water Privileges Act explicitly vested the ownership of water in the Crown and created a licensing system for its use. This effectively curtailed riparian rights for all but actually exercised domestic uses. A set of tolls and fees for the recording and use of water was established. An 1897 act to consolidate the province's various water laws described this action as the defence of the "public interest" in water.[12] The subsequent passage of provincial Water Acts in 1909 and 1914 brought the province's water under

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[9] BCARS, GR-1006 Water Rights Branch, box 3 files 1, 3, 7, contain notes and copies of this early legislation. See also M. B. Clark, "Water, Private Rights and the Rise of Regulation: Riparian rights of use in British Columbia, 1892-1939," *The Advocate* 48 (March 1990), 253-262.

[10] Cail, *Land, Man, and the Law*, chap. 4.

[11] Ludwik A. Teclaff, *Water Law in Historical Perspective* (Buffalo: William S. Hein Co., 1985), chap. 5, explores these three phases of water-quality regulation. The eclipse of the riparian doctrine as an effective pollution control is explored in Paavola, "Water Quality as Property."

[12] Clark, "Water, Private Rights and the Rise of Regulation."

a modernized administrative framework. A Chief Water Commissioner was appointed to oversee the recording and issuing of water licences and a Board of Investigation was created to survey the water resources of the province and to ensure their rational allocation. The 1914 Act also extinguished all claims of riparian owners who did not record their water use by 1916.[13]

The government justified its abrogation of riparian rights by the need to promote the maximum beneficial use of all resources, including water.[14] Guided by this philosophy, environmental governance in B.C. turned to centralized, state control and distribution of water resources, resulting in the "enclosure" of water.[15] Water law placed a premium on use, whether in-stream or consumptive, and established a schedule of rents paid to the state for this use. It rejected the traditional rights of riparian owners, instead sundering water from adjoining land and inserting it into a controlled resource market, initially primarily for the benefit of miners, power developers and irrigators. The result was the replacement of systems of local uses, rights and obligations with a system of abstract, distant administration based on the commodification of nature. This regime removed water from its ecological context and functions, subjecting it to the abstract measurements of flow rates and water records. In this sense, water was "simplified" and made "legible" as a commodity available for mobilization into capitalist development projects.[16]

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[13] BCARS, GR-1006, Water Rights Branch, box 1 file 21, "Historical Development of Water Legislation in B.C.," ND (1950s?). This was one of several drafts, and probably written by A.K. Sutherland, the Branch solicitor. See also Clark, "Water, Private Rights and the Rise of Regulation."

[14] BCARS, GR-1006 Water Rights Branch, box 2 file 14, "Memorandum RE Cook v. The Corporation of the City of Vancouver," 2 April 1914.

[15] I draw here upon the discussion of law and enclosure in E. P. Thompson, "Custom, Law and Common Right," in *Customs in Common* (London: Merlin Press, 1991), 97-184. While Thompson focuses on the question of land, not water, he broadly hints at the broader ecological implications of the private appropriation and division of the resource commons. See also Theodore Steinberg, *Nature Incorporated: Industrialization and the waters of New England* (Cambridge: Cambridge University Press, 1991), 16.

[16] James C. Scott, *Seeing Like a State: How certain schemes to improve the human condition have failed* (New Haven: Yale University Press, 1998).

Under this arrangement, "purposes that involve collective consumption and 'public goods' that depend on maintenance of flows — such as aesthetic, wildlife, and recreation benefits — [were] not licensed."[17] Nor was water quality a priority under this regime. In spite of a provision in the Water Act proscribing the fouling of watercourses, licensees were not guaranteed the quality of water they recorded. In any case, the section of the act dealing with pollution was rarely, if ever, invoked.[18] With the province controlling both resource allocation and water quality, provincial water officials were unlikely to pursue pollution problems to the detriment of industrial development. Thus, the major significance of the water rights regime in B.C. was to establish allocative rights to nominally public water resources that allowed water to be appropriated, with virtual total security of tenure, by private concerns.[19] The legal framework of water-rights administration appeared to limit, if not totally eliminate, the use of private nuisance and riparian rights claims by opponents of pollution, although some court decisions from the 1890s forward continued to assert the relevance of these claims.[20]

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[17] Richard S. Campbell, Peter Pearse and Anthony Scott, "Water Allocation in British Columbia: An economic assessment of public policy," *U.B.C. Law Review* 7 (1972), 256 n.20. Municipal water supplies are, however, subject to water records.

[18] Patrick Good, "Anti-Pollution Legislation and Its Enforcement: An empirical study," *U.B.C. Law Review* 6, 1 (June 1971), 274.

[19] Lucas, "Water Pollution Control in British Columbia," 86; Campbell et. al., "Water Allocation in British Columbia." Campbell et. al. actually contrast "allocative" system of water records with the "restrictive" system of pollution control. They argue pollution permits offer no security of tenure and are based on the control of free access, rather than the granting of secure tenure over some fraction of water. My contention is that the system of pollution permits was effectively an allocative one, granting access (with virtual security of tenure, unless permit conditions were breached [and often even if they were]) to some fraction of the "assimilative capacity" of water. Though this was enacted in the form of effluent quality restrictions, the implication was that the receiving water's absorptive capacity removed the remaining contaminants. Another important contrast is that no rents were paid, other than application fees, for the use of assimilative capacity. The authors, in fact, suggest the creation of a market in assimilative capacity to rationalize the access to this resource while maximizing environmental quality.

[20] My survey of reported cases of nuisance and riparian damage claims for pollution of streams turned up only a few instances of these traditional common-law remedies in B.C. In her article in the *Advocate*, Clark, *op. cit.,* discounts the past and potential effectiveness of common-law remedies, as does Alastair Lucas in Alastair R. Lucas, "Water Pollution Control in British Columbia," 84-85. However, a reply to Clark, by Christopher Harvey ("Riparian Water Rights: Not dead yet," *The Advocate* 48 [July 1990], 517-524) contends that the existence of legislation and policy around pollution in B.C. have limited, but not nullified nuisance and riparian claims as potentially effective anti-pollution remedies.

The privileging of use over quality in B.C. mirrored developments in water law elsewhere in North America. Up to the end of the nineteenth century, water quality was regulated in both Canada and the United States through private nuisance law and riparian law. Beginning in the early nineteenth century in Eastern North America, the pressures of industrialization and increasing water conflicts prompted legal and judicial re-evaluation of riparianism. American jurists developed the doctrine of "beneficial use" which prioritized economic development, rather than the protection of water quality, and limited the nuisance claims of those affected by pollution in the name of the "public good" of industrial activity. In some states, judges developed a rough measure, known as the balancing test, of the community benefits of industrial pollution or mill dams. Historian Theodore Steinberg contends that the balancing test constituted "a shift in people's very perception of nature" towards "an instrumental conception of water use" and the idea of water as an abstract commodity.[21] While there is some evidence of similar judicial "balancing" of economic benefits and traditional water rights in Canada, Jennifer Nedelsky contends that Canadian judges were more likely to uphold the riparian rights. Judgements on sewage disposal, sawdust pollution and pulp mill wastes in Canada between 1850 and 1950 often upheld nuisance actions or riparian proprietorship claims.[22] In spite of this tendency, legal historian Jamie

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[21] Steinberg, *Nature Incorporated*, 16. There is a growing literature on nuisance law and the "beneficial use" doctrine in the United States: see Teclaff, *Water Law in Historical Perspective*, chap. 1; John T. Cumbler, *Reasonable Use: The people, the environment, and the state, New England 1790-1930* (Oxford: Oxford University Press, 2001); Christine Meisner Rosen, "Differing Perceptions of the Value of Pollution Abatement Across Time and Place: Balancing doctrine in pollution nuisance law, 1840-1906," *Law and History Review* 11, 2 (Fall 1993), 303-381; Christine Meisner Rosen, "'Knowing' Industrial Pollution: Nuisance law and the power of tradition in a time of rapid economic change, 1840-1864," *Environmental History* 8, 4 (October 2003), 565-597.

[22] Jennifer Nedelsky, "Judicial Conservatism in an Age of Innovation: Comparative perspectives on Canadian nuisance law, 1880-1930," in *Essays in the History of Canadian Law, Volume I*, David H. Flaherty, ed. (Toronto: University of Toronto Press, 1981); Jamie Bendickson, "Private Rights and Public Purposes in the Lakes, Rivers, and Streams of Ontario, 1870-1930," in *Essays in the History of Canadian Law, Volume II*, David H. Flaherty, ed. (Toronto: University of Toronto Press, 1983). Relevant water-quality cases are cited in Canadian Abridgement, 2nd ed., "Water Records: Modification of common law rights." Crowther v. Town of Coburg [1912] 1 DLR 40 was an oft-cited case of sewage pollution; McKie v. K.V.P. Co. Ltd. [1949] 1 D.L.R. 39 granted an injunction based on riparian rights against the Kalamazoo Vegetable and Parchment Co. pulp mill for polluting the Spanish River in

Bendickson notes "the record casts considerable doubt on the proposition that the primary defenders of the environment were individual litigants with private interests to protect under the common law."[23]

Statutory authority for the regulation of water quality in Canada was distributed amongst local authorities, and provincial and federal governments. Municipal governments regulated domestic wastes and other public health issues under bylaws and health boards, often under the authority of provincial legislation. Under the British North America Act that outlined the rights and responsibilities of provincial and federal governments, jurisdiction over most natural resource management, including water use, was vested in the provinces. Federal jurisdiction over water was limited to interprovincial and navigable waters. However, before the mid-twentieth century, the most effective statutory pollution-control powers rested in the federal Fisheries Act. Administration of this act was shared between federal and provincial agencies, although arrangements differed across the country. In B.C., federal officials policed anadromous and commercial fisheries; their provincial counterparts supervised inland waters and sport fisheries (although these remained under the legislative purview of the federal government). The first Fisheries Act of 1867-68 prohibited persons from throwing "offal" and other "deleterious substances" overboard from boats into fish-bearing waters. But the act also allowed the Minister of Fisheries to exempt from this prohibition "streams in which he considers that its enforcement is

Ontario.

[23] Jamie Bendickson, "Ontario Water Quality, Public Health, and the Law, 1880-1930," in G. Blaine Baker and Jim Phillips, eds., *Essays in the History of Canadian Law in Honour of R.C.B. Risk* (Toronto: Osgoode Society for Legal History, 1999).

not requisite for the public interest."[24] It also specifically prohibited the deposit of mill rubbish and sawmill wastes, among other substances. The major 1932 revision of the Act maintained this anti-pollution section and the small fines it provided for upon conviction. As one observer has noted, under the Act, "protection of fish ... became the surrogate in Canada for federal protection of the environment."[25] Even after the creation of provincial pollution-control authorities, fish protection often remained the most potent rationale for controlling waste discharges from industry. As the following chapters show, both provincial and federal fisheries officials played a critical role in investigating problems, developing regulations and enforcing pollution controls.

The increasing scope and complexity of pollution conflicts over the course of the twentieth century spurred jurisdictions across North America to create tribunals or boards empowered to licence waste discharges, investigate damage claims and compensate pollution victims.[26] Typically staffed by engineers and sometimes industry representatives, pollution control bodies tended to adopt an indulgent attitude towards industrial waste dischargers. These authorities regarded the ability of water to absorb and dilute wastes as a resource to be managed and distributed. Historians have described their approach to industrial pollution control as "co-

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[24] Kernaghan Webb, "Industrial Water Pollution Control and the Environmental Protection Service," (Law Reform Commission of Canada, May 1983), 64-67.

[25] A.R. Thompson, cited in ibid., 32. See also "The Participation of the Government of Canada in the Investigation and Abatement of Water Pollution," *Canadian Fisheries Reports* 9 (July 1967), 1.

[26] On Canadian water pollution boards, see Jamie Bendickson, "Ontario Water Quality, Public Health, and the Law"; Jennifer Read, "Addressing "A quiet horror": The Evolution of Ontario Pollution Control Policy in the International Great Lakes, 1909-1972," (PhD diss., University of Western Ontario, 1999); Jim Anderson, *Provincial Legislation Respecting the Pollution of Waters by Phosphates, Pulp and Paper and Human Sewage*, Ministry of State for Urban Affairs, December 1972. American pollution control authorities are discussed in: Craig E. Colten, "Too Much of a Good Thing: Industrial pollution in the Lower Mississippi River," in Craig E. Colten, ed., *Transforming New Orleans and Its Environs: Centuries of change* (Pittsburgh: University of Pittsburgh Press, 2000); Craig E. Colten, "Illinois River Pollution Control, 1900-1970," in Lary Dilsaver and Craig E. Colten, eds., *The American Environment: Interpretations of past geographies* (Lanham, Md: Rowman and Littlefield, 1992); Terence Kehoe, *Cleaning Up the Great Lakes: From cooperation to confrontation* (DeKalb, Ill., Northern Illinois University Press, 1997), chap. 1; Craig E. Colten and Peter N. Skinner, *The Road to Love Canal: Managing industrial waste before EPA* (Austin, University of Texas Press, 1996), chap. 4.

operative pragmatism" which tended "to underscore the primacy of private production over environmental protection or resource conservation values."[27] This description applied to the B.C. Pollution Control Board, which was created in 1956 but assumed jurisdiction over industrial waste discharges in 1965. The following chapters show how this board, housed within the development-oriented provincial Water Resources Service, proved reluctant to restrict industrial polluters. By the end of the 1960s, the perceived failures of the board to rein in mining and pulp mill pollution made it a target for critics of the provincial government's record on pollution control.

Conceptualizing the history of industrial pollution control in terms of environmental governance highlights important facets of B.C.'s environmental history. First, regarding pollution policies in the same light as resource-development policies "opens up a view of environmental policies as institutions that govern the use of environmental resources not unlike other ownership arrangements do: environmental policies establish rights to environmental resources, assign them to certain resource users, and engender a particular allocation and distribution of resources."[28] In B.C., industrial concerns regarded the assimilative capacity of water as a free resource available for their use. But conflict arose between industrial waste dischargers and other water users, most notably recreational and commercial fishers and their regulatory agencies. Second, this perspective illustrates how environmental governance is shaped by institutional arrangements. The following chapters demonstrate how the division of legal and administrative jurisdiction over the environment between federal and provincial authorities critically influenced approaches to

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[27] Peter C. Yeager, *The Limits of Law: The public regulation of private pollution*, (Cambridge, Cambridge University Press, 1991), 161; Jan G. Laitos, "Legal Institutions and Pollution: Some intersections between law and history," *Natural Resources Journal* 15, 3 (July 1975), 423-451.

[28] Paavola, "Governing Waters," 8-9.

pollution control and their effectiveness. The various agencies charged with pollution control varied considerably in their willingness, authority and capacity to confront pollution; these factors, too, were affected by changing political and social circumstances. Finally, the case studies in these chapters reveal how environmental governance is influenced by what political scientists Doern and Conway have called "the powerful biophysical determinants of environmental federalism."[29] Geographical and ecological circumstances — and perceptions of them — shaped not only the context of environmental governance, but its practice as well. Provincial-scale environmental factors, such as the presence of a valuable commercial anadromous fishery, and local-scale conditions, such as the characteristics of particular water bodies, decisively affected pollution control decisions. Dynamic environmental conditions and natural variability and uncertainty also proved to be significant challenges to the rational management of industrial waste-disposal practices.

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[29] G. Bruce Doern and Thomas Conway, *The Greening of Canada: Federal institutions and decisions* (Toronto: University of Toronto Press, 1994), 83-84.

Chapter 3
Mining: Pollution from the "wasting resource"

From Sheep Creek near Salmo, B.C., reports reached B.C.'s Provincial Game Warden A. Bryan Williams in the summer of 1912 of a milky white substance in the water and of piles of dead fish on the stream banks. "All the fish have been destroyed for the entire length of the creek and many dead fish are seen in the Salmon River," he wrote to F. H. Cunningham, federal Chief Inspector of Fisheries for B.C. Williams believed that "as the poison gets lower down, the fish will be exterminated." The culprits were identified as the Queen mine-mill and Motherlode mine-mill, lode gold operations located in the Sheep Creek watershed (Fig. 3.1). Local residents had "complain[ed] very bitterly" to Cunningham about the Motherlode mill, which used a cyanide process to recover gold when, after a year out of production, it reopened in 1911.[1] J.E. Read, a local merchant, wrote:

> It is not our intention that the mining industry be hampered in any way, but there is no reason why it should be allowed to polute [sic] and poision [sic] our trout streams making them dangerous to man and beast as well as annihiliateing [sic] the fish that we are endeavouring to protect ... when it can be prevented by having the waste water from the mills settled or ground filtered before allowing it back to the stream as they do in other places.[2]

Williams recommended an investigation and, if necessary, prosecution of the mill under the Fisheries Act for allowing cyanide from the gold recovery process to enter the stream.

Federal and provincial fisheries officials differed on what they saw at Sheep Creek, and how to deal with it. Dispatched to investigate, federal Assistant Fisheries Inspector A.P. Halladay

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[1] National Archives of Canada, Vancouver Office (NAC-Van), Department of Fisheries – Pacific Region records, RG 23, PR Vol. 2239, file 34-1 part 1, A. Bryan Williams, Provincial Game Commissioner, to F.H. Cunningham, Chief Inspector of Fisheries, 27 July 1912. See also British Columbia Archives and Records Service (BCARS), Provincial Game Warden records, GR-0446, box 39 file 9.

[2] Ibid., J.E. Read to F.H. Cunningham, 23 July 1912.

found little evidence of cyanide from the mill in the creek, only some muddiness below the mill's waste rock dump. The mill managers told Halladay the fishing was just fine, and warned that the costs of filters or other pollution control measures would prove too costly to implement. Under such pressure, Halladay concluded: "It would be a very grave mistake on the part of the Department to do anything that would in any way hamper this very important industry" which is "the very life of the little towns and villages down this valley." Williams rejected Halladay's reports, noting his own inspectors had conducted interviews and investigations that corroborated the fish-kill stories. He called for action by the federal fisheries department to protect the fish and the settlers' drinking water supply.[3] In the end, neither federal or provincial officials took action to abate the pollution of Sheep Creek, and the mines and mills continued to operate sporadically and pollute the creek for decades to come.

This early-century vignette encapsulates the geographical and regulatory problems of mine pollution control in B.C. Located in remote areas, mining companies were often the sole or primary employer in the region. Their activities generated hundreds, sometimes thousands of tons per day of waste rock and tailings, as well as chemical-laced "slimes" from the reduction or separation processes that yielded valuable metals from the ore. For much of the century, standard practice was to dispose of these wastes in the nearest waterway, particularly in mountainous areas such as the Kootenay and Boundary districts where tailings dams or impoundments were difficult and expensive to construct. In any case, mining operators proved resistant to controlling pollution in what they regarded as remote corners of a vast wilderness. Reluctant to disrupt economic

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[3] Ibid. A.P. Halladay, Assistant Inspector of Fisheries, to F.H. Cunningham, 20 September 1912, and Williams to Cunningham, 22 October 1912. Later examples of pollution at Sheep Creek are cited in: NAC-Van, Department of Fisheries – Pacific Region records, RG 23, PR Vol. 2237, file 9-S20-S32 (1922); and BCARS, GR-1109 Fish and Game Branch, box 12 file 31 and box 13 file 1 (late 1940s).

activity, divided in their jurisdiction and unsure of their authority to control pollution, fisheries and health officials shied away from confrontations with mine officials, relying instead on a combination of negotiation and supplication to secure cooperation. Before the mid-1960s, provincial pollution-control authorities lacked the legislative authority and the political will to regulate mining wastes. When times were good, companies (reluctantly) instituted pollution controls. But given the volatile export markets for their products and their precarious profitability, mining companies often avoided or simply refused to implement safer disposal techniques.

The story of mining pollution sheds new light on the political and environmental changes wrought by industrial modernization in British Columbia. Mining and industrial water-pollution control was tightly interwoven with the rise of the regulatory state in B.C. and the development of environmental governance. This changing pollution-control regime was moulded by a combination of local environmental problems, competing regulatory aims of government agencies and the changing social and environmental values of British Columbians. Some of the mines and controversies discussed in this chapter are well known, others less so. The mines included do not constitute an exhaustive overview of the B.C. industry, and largely omit certain major mines. Instead, the cases discussed illustrate important aspects of mining pollution and environmental politics. From relatively modest early to mid-century hard-rock mining operations, to a mine in a provincial park, to large, open-pit and strip-mining operations that developed in the late 1960s, the instances explored here trace significant changes in provincial approaches to pollution control. The debates over how to measure and control water pollution from mining operations also illustrate the changing social and political context of environmental regulation. In particular, these episodes registered the changing environmental perception of British Columbians, many of whom came to regard the streams, lakes and tidewaters as an environmental amenity under threat from mining and industrial pollution. These cases also form an important, if lesser-known part of the history and geography of pollution and environmental damage from mining in the North American west.

Early in the century, industrial discharges were virtually unregulated. Provincial and federal fisheries officials attempted to convince mine operators to impound tailings, control waste dumps and avoid releasing toxic chemicals. These efforts were sporadic, uncoordinated and largely dependent on the goodwill of the particular company involved. Particularly after the Second World War, the provincial Fish and Game Branch emerged as a defender of environmental quality from within the ranks of a strongly development-oriented provincial state. The concerns of fisheries officials and sportsmen were amplified in the mid-1960s by the growing anxiety over pollution that gripped the North American public in this decade. Politically charged mining-pollution disputes in the 1960s spurred the significant changes to provincial pollution-control policies, including the extension of provincial Pollution Control Board jurisdiction to include industrial discharges. However, controversies over its failure to accommodate public participation and to adequately protect against pollution forced major reorganizations of the board. Ultimately, intense public furor surrounding open-pit and strip mines in the East Kootenays and on Vancouver Island precipitated further reforms of environmental governance, including the adoption of environmental impact-assessment procedures.

This emphasis on political and regulatory aspects of pollution should not obscure mining's very real environmental impacts. This chapter focuses on the effect of mine tailings and concentrator wastes on waterways. Mining operations polluted rivers, lakes and seas around the province with alarming frequency and with little apparent compunction, causing problems of erosion, siltation, organic pollution and acid mine drainage. Smelters and concentrators also produced considerable air pollution.[4] Awareness of these impacts was general and longstanding, but individual cases were furiously disputed. Most in the industry regarded pollution as the price of progress, and regarded environmental regulation as an unjustified imposition of the state. They regarded tailings dumping as a fairly harmless activity, or at worst a temporary, localized disruption of normal stream quality. These views were challenged by fisheries officials and, later, environmentalists, who contended that tailings damaged stream quality and productivity, smothered river-, lake- and sea-beds, and contributed to the bioaccumulation of heavy metals and toxics in aquatic organisms. The science of pollution became the battleground of politics, as industry, government and environmentalists invoked scientific authority to advance their vision of how the environment ought to be regulated.

The history of mining in B.C. may be seen as the exploitation of ever-lower grades of valuable metals and coal through the application of ever-greater amounts of capital and more intensive and sophisticated technological processes. From the prospector's pick-axe and gold pan to the massive earth movers of mountain-levelling strip mines, the topographical challenges of Cordilleran mining and the geological character of mineral deposits have shaped the extraction technologies, economic structure and environmental practices of the industry.[5] After the Fraser River gold rush in the 1860s, the initially dispersed and disorganized placer gold-mining operations pushed northwards. Coal, developed in the Nanaimo area on Vancouver Island and in the Crow's Nest Pass region of the Rocky Mountains, was also an important early resource. By the

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[4] The dispute over smelter-stack emissions from the Cominco smelter near Trail, B.C., is discussed in James Robert Allum, "Smoke Across the Border: The environmental politics of the Trail Smelter investigation" (PhD diss., Queen's University, 1995); John D. Wirth, *Smelter Smoke in North America: The politics of transborder pollution* (Lawrence, Kan: University of Press of Kansas, 2000).

[5] Logan W. Hovis, "The Origins of 'Modern Mining' in the Western Cordillera, 1880-1930," (University of British Columbia Special Collections, SPAM 1819, 1986), paper presented to BC Studies conference, 3-4.

1880s, mining capital and labour in the southern half of the province turned towards the development of hydraulic and lode (hard rock) mining, particularly in the Kootenay and Boundary regions, located along the U.S. border and southeastern portions of the province. As historian Harold Innis has noted, underground mining required the in-flow of substantial capital to finance technological and infrastructure investments in drilling equipment, mills and camps, as well as the construction of transportation networks to facilitate the importation of energy (initially coal) and foodstuffs and the export of bulky concentrates to smelters and thence of metals to markets.[6] The hard-rock mining industry of the Kootenay and Boundary districts was an extension of the American mining frontier. Much of the capital, labour and mining technology employed in B.C. came directly from the Coeur D'Alene district of northern Idaho, or other mining districts of the American west. The industry and its subsidiary activities in turn transformed the Kootenay region — and the province — as settlers arrived, towns sprung up and connections to the rest of the province and nation were built.[7]

The shift from placer to lode mining was accompanied by an increase in the scale of mining's environmental impacts. Before the Second World War, gold mining continued to decline while the production of base metals such as copper, zinc and silver increased substantially. The recovery of these metals required the crushing, milling and concentration of large quantities of ore,

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[6] Harold A. Innis, *Settlement and the Mining Frontier* (Toronto: MacMillan, 1936), chap. 5.

[7] Jeremy Mouat, *Roaring Days: Rossland's mines and the history of mining in British Columbia* (Vancouver: University of British Columbia Press, 1995); Robert A.J. McDonald, "Victoria, Vancouver, and the Economic Development of British Columbia, 1886-1914" in W. Peter Ward and Robert A.J. McDonald, eds., *British Columbia: Historical readings* (Vancouver: Douglas and McIntyre, 1981); Paul Phillips, "The Underground Economy: The mining frontier to 1920," in Rennie Warburton and David Coburn, eds., *Workers, Capital, and the State in British Columbia*, (Vancouver: University of British Columbia Press, 1998); R. Cole Harris, "Industry and the Good Life around Idaho Peak," in *The Resettlement of British Columbia: Essays on colonialism and geographical change* (Vancouver: University of British Columbia Press, 1996), 197.

which produced a tremendous volume of waste materials.[8] The unwanted materials consisted mostly of overburden, or surficial soils and rocks removed to gain access to ore bodies, and tailings, or finely ground waste rock and wastewater remaining from the beneficiation or concentration process. In addition, the character of the ore body — whether high- or low-grade, and its geological characteristics — dictated to a large degree the methods and impacts of extraction. Different mining processes, whether open-pit or underground, and milling techniques yielded varying quantities and qualities of tailings and overburden, with attendant differences in landscape and environmental effects.[9]

After the Second World War, mining activity in British Columbia underwent a qualitative shift towards large-scale, highly capitalized, integrated developments.[10] Mining historian Logan Hovis has described how decreasing grades of ores in the Western Cordilleran mining belt had already stimulated the emergence of so-called "modern mining" techniques and practices earlier in the century. These methods, pioneered in the mining regions of Montana and Utah, included the movement of vast quantities of ore (rather than the more selective practices of the past) using mechanized earth-moving and drilling equipment, the integration of mining, ore processing and

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[8] An excellent guide to these processes include: Earle A. Ripley, Robert E. Redman, and Adèle A. Crowder, *Environmental Effects of Mining*, 2nd ed. (Delray Beach, Fla: St. Lucie Press, 1996). See also George W. Poling, "Treatment of Mineral Industry Effluents in British Columbia," in James B. Stephenson, ed., *The Practical Application of Economic Incentives to the Control of Pollution: The case of British Columbia* (Vancouver: University of British Columbia Press, 1977), 47-82.

[9] Mining landscapes are also discussed in Richard V. Francaviglia, *Hard Places: Reading the landscapes of America's historic mining districts* (Iowa City: University of Iowa Press, 1991). While Francaviglia is mainly concerned with the "reading" of mining landscapes for social and historical information, he does concede that, "despite an environment's purported ability to heal itself or to be healed in the wake of serious industrial contamination (such as that often associated with mining), it is apparent that the impacts of both historic and contemporary mining activity are likely to be measurable — and visible — for hundreds of years" (127-8).

[10] Jo Harris, "Mineral Development," in Colin J.B. Wood, ed., *British Columbia, The Pacific Province: Geographical essays*, (Victoria: Western Geographical Press, 2001), 266-67.

transportation and marketing functions, and a fundamental change in the role of labour.[11] Open-pit and strip-mining techniques associated with modern mining allowed companies to process vast quantities of rock for vanishingly small fractions of precious metal, but left devastated landscapes and created tremendous amounts of waste rock and tailings. New concentration and smelting technologies enabled mining companies to recover ever-greater fractions of target minerals from the ore body. These processes often utilized toxic chemicals, creating noxious byproducts that were released into the environment. Historian Timothy LeCain argues that the modern mining system, based on the principles of mass production, resulted in "environmental mass destruction." Denuded landscapes such as the Berkeley Pit in Utah, the strip-mined mountains of Kentucky, or poisoned environments of Sudbury dramatically illustrated the catastrophic potential of "modern mining."[12] The dawning of the age of ecology coincided in B.C. with the arrival of mega-project open-pit and strip-mining operations which threatened unprecedented levels of environmental destruction. The industry's romantic, pick-and-shovel image faded, replaced by that of the monolithic multinational corporation bent on the pillage of provincial resources and the poisoning of provincial waters.[13]

Almost as much as land, water is a critical part of mining processes. Whether swishing around gold pans, flowing down sluice boxes or blasting away entire hillsides, water was a major component of early placer and hydraulic mining efforts. The siltation of the Sacramento River and

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[11] Hovis, "The Origins of 'Modern Mining' in the Western Cordillera."

[12] Timothy J. LeCain, "Moving Mountains: Technology and environment in western copper mining," (PhD diss., University of Delaware, 1998), 613, 706. LeCain notes the Berkeley Pit was initially considered a tourist attraction, a kind of technological sublime landscape.

[13] Payne links the growing trend towards multinational corporate dominance of the B.C. mining sector with the development of the large-scale, capital- and technology-intensive methods of open-pit and strip mining. See Payne, "Corporate Power," 7.

San Francisco Bay from hydraulic mining during the California gold rush illustrates hydraulic mining's potentially massive environmental impacts.[14] Water performs important functions in milling processes as well, transporting crushed ore in a "slurry" to digestion machines, forming the medium for the ore-concentration process, and acting as a means of waste disposal (both transporting wastes in solution and receiving them in the environment). Water-pollution problems arising from mining activity also include erosion and landslides from tailings dumps and open pits, and the direct deposit or leaching of heavy metals and/or toxic chemicals used in the concentration process into waterways.

In spite of a notorious history of environmental damage, the mining industry balked at environmental regulation, appealing to the economic and geographical constraints facing mineral extraction. As mining historian Duane A. Smith has documented, American mining industry leaders used their power, influence and prestige to stop efforts to regulate mining's environmental impacts.[15] In B.C., the industry traditionally occupied an influential place in provincial politics; industry leaders occupied prominent places among the province's business and political elite. Defenders of the industry often cited its importance to the provincial economy: in the century or so between 1851 and 1953, the total value of mineral production was some $3.2 billion; between 1950 and 1980, production values reached $2.1 billion.[16] The profitability of mining ventures,

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[14] David Beesley, "Beyond Gilbert: Environmental history and hydraulic mining in the Sierra Nevada," *Mining History Journal* 7, 1 (2000), 71-80; Gray Brechin, *Imperial San Francisco: Urban power, earthly ruin* (Berkeley: University of California Press, 1999).

[15] This attitude is amply documented in Duane A. Smith, *Mining America: The industry and the environment, 1800-1980* (Lawrence, Kan., University Press of Kansas, 1987).

[16] A. Peter Hertzberg, *Mining and Pollution in B.C.* (Victoria: University of Victoria, 1982), 4. Although the substance of his article deals with the 1970s, Raymond Payne alludes to the pro-industry policies of the twenty-year Social Credit reign. See Raymond W. Payne, "Corporate Power, Interest Groups, and the Development of Mining Policy in British Columbia, 1972-77," *BC Studies*, 54 (Spring 1982), 3-37.

however, was tempered by often extreme market volatility, which resulted in the sporadic operation of mines and their high sensitivity to operational costs. Unlike forests or fisheries, minerals are a non-renewable resource and must be harvested where found. Thus, mining executives characterized minerals as a "wasting asset" that required maximum utilization and exploitation wherever found — even if inside provincial parks.[17] As one mining engineer commented in 1956, "There is no such thing as conservation in the mining business ... After all, it is not a renewable resource so how can you conserve it anyway?"[18] This also meant mines had limited lifespans, an economic disincentive for capital investment in pollution controls. Miners often claimed the temporally and spatially delimited impacts of mining would allow degraded land or water to recover, making environmental controls unnecessary.[19] In the generally business-friendly climate of frontier British Columbia, these economic and environmental arguments helped forestall government action to regulate industrial waste disposal practices.

Conservation of Payrolls: Early mining pollution regulation in B.C.

Before the 1960s, the disposal of mine wastes was virtually unregulated in B.C. As elsewhere in North America, legislative strictures against pollution generally related to public health, rather than environmental quality. However, in many jurisdictions the legal regulation could

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[17] Early expressions by miners of this antipathy to parks may be found in "Mining in Parks," *Mining and Industrial Record* 29, 7 (July 1926), 109, and "Correspondence: Mining in parks," *Mining and Industrial Record* 30, 7 (July 1927), 127.

[18] *Transactions of the Ninth Resource Conference* (Victoria: BCNRC, 1957), 447. The BCNRC was a non-governmental body consisting of representatives from industry, government, universities and other groups that met roughly annually between 1948 and 1972 to discuss resource conservation and planning problems. The sentiment quoted here was echoed on nearly every mining panel held during the conferences. Industry representatives, Mines Department officials and university mining engineers tended to share the same philosophy: a deep opposition to the "locking up" of resources in the name of conservation, particularly in parks; a commitment to multiple use and maximum resource utilization; and a general antipathy to government interference in mining affairs.

[19] L. F. Wright, "Control of Mineral Processing with Respect to Pollution," *Western Miner and Oil Review* 34, 9 (September 1961), 33-38.

also be accomplished through private litigation against damage to water rights or private property. In the western United States private litigation was an important method of limiting the environmental impact of mining. In the mining districts of California, Colorado, Montana and Idaho, state control of water pollution was negligible in the late-nineteenth and early-twentieth centuries. State governments either turned a blind eye to environmental damage from the industry, or enacted legislation granting virtual eminent domain of mines over streams. Downstream water users and landholders affected by pollution, especially farmers, turned to private litigation under property and water law for remedy. For example, legal action by farmers in California ended the practice of hydraulic mining in the Sierra Nevada mountains in the 1880s.[20] Farmers and ranchers in Montana and Idaho also challenged the unregulated dumping of tailings into rivers, charging that they degraded farmland, ruined crops and threatened the health of livestock. Mining companies bitterly contested these suits, often claiming their tailings (or smoke) were harmless and charging that farmers were attempting to gouge the companies for money. In many cases, judges proved reluctant to issue injunctions against tailings disposal. Rather, citing the economic benefit to society of the industry, they typically imposed small fines. To avoid litigation, mining companies negotiated the purchase of "pollution easements" with farmers or, in some cases, constructed tailings impoundments.[21] Such litigation was not undertaken to defend water purity or environmental quality per se, but rather as a defence of the water rights claimed by farmers or as a property damage claim.

By contrast, in British Columbia, private litigation in defence of water rights or property

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[20] Beesley, "Beyond Gilbert."

[21] For examples from the United States, see Smith, *Mining America,* 113-119; David Stiller, *Wounding the West: Montana, mining, and the environment* (Lincoln: University of Nebraska Press, 2000); Frederick L. Quivik, "Smoke and Tailings: An environmental history of copper smelting technologies in Montana, 1880-1930" (PhD diss., University of Pennsylvania, 1998).

damage from water pollution was rarely undertaken. The use of civil remedies in B.C. was constrained by legal, social and environmental factors. The 1897 Water Clauses Consolidation Act abrogated traditional riparian rights to water, except for domestic uses. In its place was a system of allocative rights based on the use of water for various purposes. The system of water rights developed in B.C. allowed miners to register water "records" for "the continuous and economical workings of said mine or mines, and the carrying away of tailings and debris associated therefrom..." Thus, stream-side landowners could not automatically claim the right to the flow of water "undiminished in quality or quantity" by virtue of their riparian tenancy. Court decisions in 1892 and 1927 against mines for damage to downstream riparian property appeared to uphold some aspects of riparian rights, if damage to land or property could be proven.[22] But by "enclosing" water use under statutory controls and limiting common-law riparian rights, the B.C. government may have restricted the public's ability to file suit against water polluters.

The small and dispersed population of mining regions may also account for the paucity of anti-pollution litigation. Most residents lived clustered in small mining towns near prominent mines, and were employees of the industry or related services. In addition, agricultural settlement was limited in many of these areas due to topography and climate. In the case of the Trail smelter dispute, the presence of agricultural interests downwind from the smelter's sulphurous emissions proved critical in forcing the company to abate its polluting discharges.[23] Typically, however, remote mining operations may not have directly affected the water requirements of downstream

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[22] These cases were: Columbia River Lumber Co. v. Yuill and others [1897], 2 British Columbia Reports 237; and Salvas v. Bell [1927]4 Dominion Law Reports 1099. The limitation of riparian remedies for pollution are discussed in Alastair R. Lucas, "Water Pollution Control in British Columbia," *U.B.C. Law Review* 4, 1 (May 1969), 56-86; M. B. Clark, "Water, Private Rights and the Rise of Regulation: Riparian rights of use in British Columbia, 1892-1939," *The Advocate* 48 (March 1990), 253-262.

[23] Allum, "Smoke Across the Border"; Wirth, *Smelter Smoke in North America.*

residents. Private civil litigation may also have been limited because the most obvious damage from mine tailings disposal was not to private property but to a fugitive, common-property resource: fish. In the absence of demonstrable public-health effects or property damage from tailings, the anti-pollution section of the federal Fisheries Act provided the only effective power for controlling pollution. Instead of the courts, critics of mine pollution turned to federal and provincial fisheries officials when they sought the abatement of stream pollution. Before the 1960s, however, the ability of fisheries officials to control pollution was hindered by divided jurisdiction and a lack of political will to enforce pollution laws to the detriment of industrial development.

These trends were illustrated by conflicts over mining pollution of the Similkameen River in the Boundary region. In the first two decades of the twentieth century, this district experienced a major mining boom based around the Greenwood and Hedley mining camps (Fig. 3.2). The Hedley camp included several mines along the Similkameen, an international river that rises in the north Cascade Mountains near the U.S.-Canada border, flowing south-eastward through a narrow valley to its confluence with the Okanogan River in Washington State. Gold claims were staked on Nickel Plate Mountain in 1894, and the high-grade ore attracted mining capital from Montana to develop a mine-mill complex at the town of Hedley. Between 1905 and 1929, the Nickel Plate Mine and reduction plant was one of Canada's biggest gold producers.[24] The company's operations were capitalized at nearly a million dollars for the construction of the mine, tramways for transportation of ore, and a modern reduction plant to recover free gold and concentrate the ores for shipment to a

[24] This description of the mine location is derived from Charles Camsell, *The Geology and Ore Deposits of Hedley Mining District, British Columbia* (Ottawa: Department of Mines, 1910). See also Doug Cox, *Mines of the Eagle Country: Nickel Plate and Mascot* (Penticton: Skookum Publications, 1997). These mines operated off and on for nearly 100 years as technology improved and gold prices fluctuated. Between 1904 and 1955, the Nickel Plate Mine produced gold valued at $40.5 million (based on an average value from 1904-29 of $20.67 per ounce, and from 1934-55 of $35 per ounce).

smelter in Tacoma, Washington.[25] At the Daly Reduction Co. mill, ore was processed in a "40-stamp" mill, and the crushed rock was sorted by size and grade. The crushed ore or "slimes" were processed in cyanide solutions, which precipitated gold from mineralized ore into concentrate. The reduction plant sluiced tailings from its stamp mill and cyanidation plant into the river via Twenty-mile Creek.[26]

Downstream, farmers near Keremeos complained in 1911 that cyanide-laced wastes from the plant were destroying the river as a water supply and affecting local sport fisheries. The ranchers sent a petition to their federal Member of Parliament demanding an investigation. After two inspections of the river, federal fisheries overseers dismissed the effects on fish life and on ranchers, noting the Similkameen was not a salmon stream and therefore did not support a commercial fishery. Still, they encouraged the company to install filter tanks to allow tailings to settle out before discharging the process water to the river. In spite of this arrangement, more complaints were made in 1916 and 1918 about the company's practice of washing slimes from the tanks into the river. Fishery investigator A.P. Halladay warned that the company provided an important local payroll; even if any harm to fish was detected, "It of course then would be a question as to which is of the most value, the interests of the mines, or the interests of the small portion of land that will be affected by its operations."[27] No further action was contemplated against the mill by federal officials.

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[25] Many articles in the *Mining and Engineering Record* (*MER*) trace the operation of the Hedley camp, including *MER* 5, 5 (1899), 28; *MER* 22, 5 (1917), 101-102.

[26] Camsell, *The Geology and Ore Deposits of Hedley*, 15-18, 182-184. During initial production, at least some of the tailings were diverted to a slag pond for later reprocessing. Until 1912, "free gold" was recovered and smelted in a small refinery at the mill. There are excellent technical descriptions in Cox, *Mines of the Eagle Country*, chap. 3.

[27] NAC-Van, Department of Fisheries – Pacific Region records, RG 23, PR-2237, file 9-S6-S19, Report by A.P. Halladay, inspector of fisheries, to F.H. Cunningham, chief inspector of fisheries, 16 September 1918. The Similkameen pollution problem is documented in this file as well as related files in this record group: PR Vol. 2239, file 34-1 part 1 and 2; PR Vol. 2240, file 34 part 3.

Fisheries officials were also reluctant to intervene when a large copper-reduction plant was proposed at Copper Mountain upstream from Hedley. In 1916, the B.C. Copper Company proposed to dump some 4,000 tons per day of tailings from this plant into the Similkameen, which the local fisheries inspector feared would cloud the river with silt for up to 40 miles downstream. F.H. Cunningham, federal chief fisheries inspector for B.C., expressed his department's ambivalence: "Whilst the Department is anxious to protect the fish it cannot be done at the expense of such an undertaking. At the same time the developing of both the Lumber and Mining industries, together with the conservation of the Fisheries, must be worked out and arranged for on the best basis possible, having in view the interests of all concerned."[28] Cunningham essentially washed the federal department's hands of the regulation of the proposed reduction plant, offering to "rescind" (essentially, disregard) the section of the Fisheries Act proscribing water pollution. Meanwhile his provincial fisheries counterpart, J.B. Babcock, also indicated to the company that his department would not pursue the matter. For its part, the company argued its tailings discharges should remain unregulated since they consisted of harmless mud.

Pollution from both these operations continued for decades — even provoking complaints from Washington State, dozens of miles downstream — but the pattern of official tolerance for stream damage never wavered. In the spring of 1926, Washington State officials reported downstream residents' complaints of "intestinal distress" and damage to fish habitat along the lower Similkameen River. However, B.C. public health officials and fisheries inspectors cleared the companies of any damage except the "discolouration" of water.[29] More recently, long-term

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[28] NAC-Van, Department of Fisheries – Pacific Region records, RG 23, PR Vol. 2239, file 34-1 part 2, F.H. Cunningham to H. Shotton, 24 October 1916.

[29] BCARS, GR-0435 Department of Fisheries, box 123 files 1223, 1226, 1233 contain references to the ongoing pollution of the Similkameen by mine tailings from 1920-1941.

environmental problems from Similkameen mining have come to light. Because the gold was found in mineral deposits called arsenopyrites, free gold was tainted with a dark hue and the tailings and "slimes" were laced with arsenic. Although often recovered for use as a laboratory chemical, arsenic was "a waste product as far as the mines [were] concerned."[30] The long-term effects of failing to control tailings discharge have included elevated arsenic levels in the river and bottom sediments. A 2003 assessment of water quality by the Washington State Department of Ecology concluded that "there have been more than a hundred years of mining history in the drainage and that the mining related enrichment of arsenic in the water and sediments will take many more years to be mitigated."[31]

The reticence of fisheries officials to act on public complaints in the Similkameen Valley illustrated not only prevailing pro-development attitudes but also the weakness of anti-pollution regulation before 1960. Given the deficiencies of the provincial Water Act, the only effective power to control pollution rested in the federal Fisheries Act, which in effect provided the surrogate for environmental protection law. The anti-pollution section of the act provided a blanket prohibition against the dumping of "deleterious substances" including industrial wastes into waters containing fish, and did not require proof of damage to fish life in order to be enforceable.[32] This potentially far-reaching statute was undermined, however, by the divided administration of fisheries and the lack of political will for its enforcement. Fisheries jurisdiction

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[30] Camsell, *Geology and Ore Deposits of Hedley*, 184.

[31] Washington State Department of Ecology, *Lower Similkameen River Arsenic Total Maximum Daily Load* (Department of Ecology and Environmental Protection Agency, January 2004), 16. The report indicated that an estimated 77 mines had operated in the basin, most on the B.C. side of the border. Since the natural background levels of arsenic in the river already exceed U.S. safe drinking water levels, the additional arsenic contributed by sediments and runoff from mined areas and tailings dumps is a significant water-quality concern.

[32] Kernaghan Webb, *Industrial Water Pollution Control and the Environmental Protection Service* (Ottawa: Law Reform Commission of Canada, May 1983), 64-70.

in Canada was shared between federal and provincial agencies; federal officials policed anadromous and commercial fisheries; their provincial counterparts supervised interior waters and sport fisheries (although these remained under the legislative purview of the federal government).[33] This resulted in confusion and conflict such as that seen in the Hedley and Sheep Creek episodes. In addition, both federal and provincial officials appeared hesitant to prosecute offenders except in extreme cases; the young country's industrial development took precedence over the protection of sport fish.[34] Fisheries officials actively removed countless "obstructions" to fish passage such as log jams and boulders, yet failed to develop a coherent approach to the mounting pollution problems that posed many of the same risks to both sport and commercial fish propagation and survival.

Still, by the 1940s the increasing clash of industrial development and recreational interests prompted B.C. Game Commission officials to pay closer attention to the effects of mining on the aquatic environment. In the late 1930s, provincial officials had gained full administrative control over interior sport fisheries through an agreement with the federal Department of Fisheries, though they still operated under the federal Fisheries Act. Meanwhile, an upturn in the mineral markets and the ongoing development of the industry resulted in increasing pollution problems, particularly in the Boundary and Kootenay regions. Provincial Game Commission annual reports began to include listings of specific mine-pollution problems in these areas and recounted the efforts of divisional fisheries biologist C.H. Robinson to identify polluters. Robinson noted that, in some cases, tailings disposal discoloured stream waters and smothered bottom-dwelling fauna. When, in

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[33] "The Evolution of Fisheries Management Policy," in Anthony Scott and Philip A. Nehrer, eds, *The Public Regulation of Commercial Fisheries in Canada* (Ottawa: Economic Council of Canada, 1981), 13.

[34] Kernaghan Webb, *Pollution Control in Canada: The regulatory approach in the 1980s* (Ottawa: Law Reform Commission of Canada, 1988), 3.

1944, mines in the Sheep Creek watershed were closed due to low prices, Robinson observed that "for the first time in approximately twenty years the lower reaches of the [Salmon] river and Sheep Creek are free of pollution."[35] Fish and game officials also consulted with mine developers on the location and construction of tailings impoundments or other methods of tailings disposal to avoid damage to fish streams.

Provincial Game Commission efforts to control mine pollution increased during the postwar expansion of outdoor recreational activity and tourism. In B.C., parks attendance skyrocketed from just over 100,000 in 1948 to over 1.5 million in 1955 and about 3.5 million in 1960.[36] In addition, hunting and fishing activity, both by tourists and residents, increased steadily in B.C. after the Second World War, a trend that continued through the end of the 1960s.[37] Outdoor recreation placed a premium on environmental quality and, as elsewhere in North America, recreationalists and sportsmen were often at the forefront of public concern about pollution and environmental degradation. In 1947, sportsmens' clubs from around the province formed the B.C. Federation of Fish and Game Clubs, forerunner of the B.C. Wildlife Association, and "began to extend their interests ... beyond the regulatory aspect of fish and game management, to ecological and environmental issues which affected these recreational resources."[38] This group was created

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[35] British Columbia, Provincial Game Commission, *Report of the Provincial Game Commission* (Victoria: Government of British Columbia, 1944).

[36] J.K. Youds, "A Park System as an Evolving Cultural Institution: A case study of the British Columbia provincial park system, 1911-1976" (MA thesis, University of Waterloo, 1978), 76.

[37] See figures compiled from provincial statistics in Yasmeen Qureshi, "Environmental Issues in British Columbia: An historical-geographical perspective" (MA thesis, University of British Columbia, 1991), 77-81.

[38] J.G. Terpenning, "The B.C. Wildlife Federation and Government: A comparative study of pressure group and government interaction for two periods, 1947 to 1957, and 1958 to 1975" (MA thesis, University of Victoria, 1982), 9. On sportsmen and pollution, see Donald J. Pisani, "Fish Culture and the Dawn of Concern over Water Pollution in the United States," *Environmental Review* 8, 2 (1984), 117-131; Nicholas Casner, "Angler Activist: Kenneth Reid, the Izaak Walton League, and the crusade for federal water pollution control," *Pennsylvania History* 66, 4 (1999), 535-553; John F. Reiger, *American Sportsmen and the Origins of Conservation*, 3rd rev. ed. (Corvallis, Ore: Oregon State University Press, 2001).

with the active encouragement of the B.C. Game Commission, and its members worked closely with provincial game officials on matters of policy and enforcement.

The growth in outdoor recreation was accompanied by the expansion and professionalization of government game conservation activity. After the Second World War, the Game Commission began to implement a system of "scientific" game management, hiring university-trained biologists including E.H. Vernon, R.G. McMynn, P.A. Larkin and J.T. Hatter.[39] Ecological ideas had "come of age" during the 1930s, and wildlife management techniques were undergoing a revolution in this period under the influence of English biologist Charles Elton and the American game expert, Aldo Leopold. Whereas game management had previously been preoccupied mainly with the promulgation and enforcement of hunting and fishing restrictions, under the influence of ecological ideas it emphasized the importance of habitat, population dynamics, and predator-prey relationships to the maintenance of game populations.[40] The Game Commission also promoted an ecological perspective on outdoor recreation among sportsmen. Its popular magazine, *Wildlife Review*, first published in 1954, was liberally seeded with quotations from leading conservationists such as Leopold, as well as articles extolling the importance of habitat preservation and pollution control. In the early 1950s, the Game Commission created a Protection Division headed by McMynn, and expanded its field inspection and "fish culture"

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[39] James Hatter, *Politically Incorrect: The life and times of British Columbia's first game biologist* (Victoria: O & J Enterprises, 1997), 62. The concern for planning and developing recreational resources was reflected at the annual B.C. Natural Resources Conferences of the 1950s. Panels at these conferences advocated scientific management of recreational resources for the benefit of B.C.'s growing tourism industry, as well as for the benefit of residents. See *Transactions* (Victoria: BCNRC, 1952, 1953, 1955).

[40] On the development of animal ecology and its application to game management, see P.J. Bowler, *The Earth Encompassed: A history of the environmental sciences* (New York: W.W. Norton, 1992), 527-532; Thomas R. Dunlap, *Nature and the English Diaspora: Environment and history in the United States, Canada, Australia, and New Zealand* (Cambridge: Cambridge University Press, 1999), 228-239; Curt Meine, *Aldo Leopold: His life and work* (Madison: University of Wisconsin Press, 1988), chap. 13.

activities designed to protect and improve game-fish habitat. McMynn, Vernon and other biologists in the Game Protection Division began to develop standard water-quality testing procedures and data gathering methods to aid in field studies of pollution. In 1957, the province established a Department of Recreation and Conservation, which centralized parks, outdoor recreation, tourism and wildlife management under one ministry, and renamed the Game Commission the Fish and Game Branch.[41]

The Fish and Game Branch's increasing concern with pollution also emerged from the so-called "agency-referral" system for reviewing development applications in the 1950s. The branch, along with the Health Branch and the federal fisheries department, were forwarded copies of water-rights applications for comment.[42] The dramatic expansion of industrial development in this period is reflected in the increasing number of these applications: in 1952, the Game Commission was sent over 900 applications for review, and by the mid-1960s, the province handled some 1,200 water-use submissions annually.[43] Reviewing these applications placed a considerable strain on fisheries and health officials, who lacked sufficient staff time or data on stream volume and quality. The branch's recommendations, in any case, carried only suggestive power. As Reginald Bowering, head of public health engineering, noted ruefully, the agency-referral system

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[41] These developments are traced through the annual reports of the Commission: before 1957, see *Report of the Provincial Game Commission*; thereafter British Columbia, Department of Recreation and Conservation, *Report of the Department of Recreation and Conservation* (Victoria: Government of British Columbia). Before its inclusion in the new "Rec and Con" department, the Game Commission was administered under the Office of the Attorney General, a reflection of its policing function.

[42] This system is described with regard to forestry cutting permit applications in Jeremy Wilson, *Talk and Log: Wilderness politics in British Columbia, 1965-1996* (Vancouver: University of British Columbia Press, 1998), 106-7.

[43] *Report of the Provincial Game Commission,* 1952; BCARS, GR-1006 Water Rights Branch, box 1 file 34, "Excerpts from an address during the budget debate by the Honourable R. G. Williston, Minister of Lands, Forests and Water Resources," photocopy, 17 February 1966.

provided only the facade of protection for provincial waters.[44] Nevertheless, by the late 1950s, the Fish and Game Branch had assumed the role of front-line agency in combatting industrial pollution in the province.[45]

The increasing pollution-control activities of fish and game officials often met with resistance from the industry. Game Commission staff struggled to identify problem areas and negotiate tailings impoundment or other improvements with often hostile mining companies. Pressure from fisheries inspectors commonly met with resistance from mining companies, until the Game Commission threatened prosecution under the Fisheries Act. Then, the mine either ceased operations or (reluctantly) installed tailings-impoundment facilities. For instance, fish and game inspectors' reports in the late 1940s on the Sheep Creek Gold Mines company detailed the difficulty of impounding tailings in the steep terrain of Sheep Creek. The company met with Game Commission officials but refused to undertake impoundment of its tailings: "in fact their attitude herein has been not only unco-operative but might also be described as defiant," wrote a fisheries inspector. In many ways, this attitude typified mining companies around the province and revealed the feebleness of attempts to rein them in. The inspector concluded, "The situation in this part of the country at present has come to the point where [the Game Commission] must decide whether or not the Dominion Fisheries Act has any teeth in it, that is, can mining companies wilfully disregard the Fisheries Act and the recreational rights of a large proportion of the people under the plea that

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[44] British Columbia, Health Branch, *Annual Report of the Public Health Services of British Columbia* (Victoria: Department of Health Services and Hospital Insurance, 1953).

[45] The Fish and Wildlife Branch was referred to as the province's "environmental policeman" in Christiana S. Crook, *Environment and Land Use Policies and Practices of the Province of British Columbia*, 2 vols. (Victoria: B.C. Institute for Economic Policy Analysis, 1975), 86-87. See also Hatter, *Politically Incorrect*, chap. 4.

their costs would rise if an attempt were made to impound their tailings."[46]

In the 1950s, the Sheep Creek company provided the Game Commission opportunity to test the application of the Fisheries Act to B.C. recreational waters, albeit at a different location.[47] The company, in addition to its holdings in the Sheep Creek gold field, operated the Mineral King mine-mill complex on Toby Creek, a medium-sized tributary of the Columbia River near Invermere. The Mineral King claim was a low-grade silver-lead-zinc property containing an estimated 325,000 tons of ore reserves. With the recovery of depressed post-war lead and zinc prices, the company constructed a mill in 1954 and began processing ore. The Game Commission, concerned about tailings entering Toby Creek, consulted with the company about the location of its impoundment. When this first impoundment proved too small to accommodate the accumulating tailings, Game Commission staff undertook efforts on behalf of the company to secure nearby land for a new impoundment and apply for rights-of-way for tailings flumes (or launder lines). As the issue dragged on through 1956 and 1957, complaints reached the renamed Fish and Game Branch about the pollution of the popular local fishing creek. A report by fisheries biologist F.P. Maher at the end of 1957 recounted the frustrating delays and obstructive attitude of the company. The company contended that "they were only really keeping the mine operating to keep the men employed" — a disputable claim, given its profitability.[48] Maher argued that prosecution, while distasteful, might be warranted since the company's blunt refusal to control pollution was

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[46] BCARS, GR-1109 Fish and Wildlife Branch, box 13 file 1, Memo, Game Fish Culture - Pollutions, C. F. Kearns, inspector, to F. R. Butler, Game Commissioner, 9 December 1947.

[47] The following account is based on correspondence and reports found in BCARS, GR-1027 Fish and Wildlife Branch, box 125 files 9-10.

[48] Ibid., file 10, F. P. Maher, "Report on the Pollution of Toby Creek, Near Invermere, by Operations of the Mineral King Mine," 18 December 1957. The gross value of production at Mineral King mine to May 1959 was over $5 million. See "The Sheep Creek story," *Western Miner and Oil Review* 31, 9 (September 1959), 25-27.

undermining the branch's authority throughout the region. While this suggestion was well received inside the branch, Minister of Recreation and Conservation Earle Westwood warned Game Commissioner Butler away from overzealous prosecutions.

Even as Westwood did so, the mine's small tailings impoundment collapsed on 24 May 1958, almost killing a worker and sluicing nearly 100,000 tons of tailings into Toby Creek. Butler immediately laid a charge against the company under Sec. 33(2) of the Fisheries Act. After visiting the site and confronting the devastation, Westwood and Mines Minister Ken Kiernan allowed the prosecution to proceed. As Fisheries Inspector C.E. Estlin wrote to Game Commissioner Butler, the case was closely watched by all sides: "Fish and Game clubs, as well as Mining interests are keenly aware of this pending Court case and I feel it is of the utmost importance that a conviction be registered."[49] Despite the importance of the case, Estlin was instructed to conduct the prosecution himself, without legal assistance.

At a hearing in Kimberley, the indictment was upheld and the company forced to pay the statutory penalty of a $20 fine, plus $9 court costs. Branch officials hoped that the paltry penalty would cause "eyebrows to be raised" about the seeming impunity with which companies committed their offences, even when caught and convicted. The mining industry reacted with outrage. An editorial titled "Conservation of Payrolls" in the industry periodical *Western Miner and Oil Review* savaged the decision and the Fish and Game Branch, writing that "the game fish conservationists [must] recognize that an overly zealous harassment of the mining industry is a poor substitute for co-operation and appreciation of the industry's problems." Citing the usual extenuating circumstances of difficult terrain, operational costs and the need to protect jobs, the

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[49] Ibid., file 9, Game Department memo, C. E. Estlin to F. R. Butler, 16 June 1958.

editorial dismissed the need for protecting the "inconsequential stream."[50]

Any deterrent value that the 1958 prosecution might have had was soon undermined when a second prosecution of the company, five years later, failed. The long and detailed transcript of the September 1963 trial indicated a more vigorous defence by the company, which stood accused of pollution by deliberately diverting tailings to the creek when its pipes froze the previous winter.[51] In this case, however, the magistrate dismissed the action, ruling that Sec. 33(2) of the Fisheries Act required proof that the accused had "knowingly" dumped the "deleterious substance" into the water. This required proof not merely of having committed the act, but of *mens rea*, or "guilty mind" in doing so. Yet the question of intentionality had been ruled immaterial in the 1958 case, when the magistrate ruled that the negligent act of allowing tailings to enter the creek was enough to warrant conviction.[52] Faced with contradictory rulings against a company openly hostile to pollution control, provincial fisheries officials despaired of the heightened burden of proof required to convict polluters. Fish and Game Branch files reveal that, in many cases, the enforcement of the Fisheries Act was hampered by difficulties in gathering evidence of the effects of pollution on fish and presenting proof of this damage in court. Branch officials were frustrated by the ineffectiveness of the Fisheries Act, and no further pollution prosecutions under the Act were undertaken until the end of the decade. Rather, the Act was used as leverage in negotiations with industrial concerns over pollution abatement.

The Sheep Creek and Similkameen River episodes illustrated the difficulty of regulating

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[50] "Conservation of payrolls," *Western Miner and Oil Review* 31, 7 (July 1958), 8.

[51] For the 1963 prosecution, see BCARS, GR-1109 Fish and Wildlife Branch, box 125 file 9 and box 126 file 1.

[52] Webb notes the problem of *mens rea* remained a source of judicial confusion and contradiction in pollution cases well into the 1970s, when a new category of offence, "strict liability," was created to remove the need to prove intent or foreknowledge of pollution. Webb, *Pollution Control in Canada,* 33-36.

the modest-scale, dispersed and often remotely located industry. Only a near-disaster spurred provincial water and mining officials to pursue prosecution. Fish and Game Branch field officers, while active in negotiating tailings impoundment with mining operations, remained hamstrung by official unwillingness to wield the Fisheries Act sanctions and by the contradictory rulings and weak penalties these sanctions produced. For its part, mining's "conservation of payrolls" mentality discounted environmental impacts as transitory and ephemeral, and rejected government interference in production practices. The reaction of company officials to requests for pollution abatement indicated they believed that tailings disposal was a legitimate use of waterways. Large concerns such as the Consolidated Mining and Smelting Co.'s Kimberley and Trail operations were allowed to dump thousands of tons per day of tailings into the Columbia and St. Mary rivers without sanction, setting a poor precedent for smaller companies and undercutting enforcement efforts.[53] The actions of mining companies were tacitly, and sometimes openly, supported by government mines department officials and politicians eager to exploit mineral resources at almost any environmental cost.

In contrast with the Similkameen River, no long-term damage to Toby Creek appears to have resulted either from the negligent Sheep Creek mine, other mines in the watershed, or from subsequent operations reprocessing Sheep Creek tailings to recover barium. During its productive years, the Mineral King mine produced two million tons of ore and left 750,000 tons of tailings in a ramshackle impoundment which, during the 1970s, sluiced fine silt into the creek. Nevertheless,

[53] Federal fisheries department files and provincial fish and game files indicate the massive (and hugely profitable) Cominco Trail smelter complex and Kimberly concentrator and fertilizer plant were treated with kid gloves, in spite of their tremendous waste discharges. This is attributed (if somewhat obliquely) to the size and political influence of the company. See NAC-Pacific Region, RG 23, PR vol. 2239, file 34-1 part 1 for reports from the 1910s. See reports from the 1940s in BCARS, GR-1109 Fish and Game Branch, box 13 file 1.

water-sampling data indicated no significant impacts on the fast-running creek.[54] A 1985 report noted that effluent from the mine-tailings impoundment exceeded pollution-control permit levels for metals while the tailings were still being reprocessed (which stopped in 1980). But it also noted that water quality exceeded Canadian Drinking Water Standards downstream from the mine.[55] By the 1980s, Toby Creek's primary use was now recreational, not industrial: the valley became home to the Panorama resort lodge, and the creek was notable for fishing, rafting and kayaking.

In many ways, the water pollution problems of the B.C. hard-rock mining industry before 1960 echoed earlier trends in neighbouring regions such as the Coeur D'Alene mining district in northern Idaho. In both B.C. and Idaho, politicians and government mines departments promoted and defended the industry, with little regard for environmental damage. The few who complained — sportsmen, farmers and fisheries officials — struggled against a powerful, profitable industry that provided important payrolls in economically dependent regions.[56] Unlike in the U.S., however, private water law or property litigation was a negligible factor in spurring government intervention into pollution problems in B.C. This may have been partly because the environmental impacts of tailings disposal were not severe enough to prompt damage suits downstream. In many cases, mining operations were located in remote areas where few downstream were affected, or along high-volume rivers like the Columbia, which were large enough to absorb the wastes. The

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[54] British Columbia, Water Investigations Branch, *Kootenay Air and Water Quality Study Phase I: Water quality in Region Seven, the Upper Columbia River Basin* (Victoria: Ministry of Environment, August 1976).

[55] R. Nijman, *Upper Columbia River Area: Toby Creek, Sinclair Creek, the Columbia River from Toby Creek to Edgewater and the Spilliamcheen River: Water quality assessment and objectives* (Victoria: Ministry of Environment, 1985).

[56] Nicholas A. Casner, "Toxic River: Politics and Coeur D'Alene mining pollution in the 1930's," *Idaho Yesterdays* 35 (Fall 1991), 2-19; Keith R. Long, "Tailings Under the Bridge: Causes and consequences of river disposal of tailings, Coeur D'Alene mining region, 1886 to 1968," *Mining History Journal* 8 (2001), 83-101.

control of mining pollution in B.C. fell to the provincial Fish and Game Branch, which investigated and monitored mining impacts on fisheries. These efforts were hampered by the Branch's limited staff and technical capacity, as well as the legal shortcomings of the anti-pollution provisions of the Fisheries Act.

Buttle Lake: Pollution gets political

By the late 1950s, smaller lode operations like Sheep Creek were in decline as the structure and practices of the B.C. mining industry changed substantially. Gold mining continued to wane, but by 1960, increasing world demand for copper, lead and zinc sparked renewed mineral exploration and development. New technologies for the extraction and processing of very low-grade ores (often containing less than 1 per cent of the target mineral) introduced strip and open-pit mining methods to B.C.[57] The value of mining exports grew rapidly from $140 million in 1950 to nearly half a billion dollars two decades later.[58] But the mining boom also coincided with the growth of government conservation activity and the spectacular increase in outdoor recreation and tourism activities. British Columbians were beginning to value their rugged province for more than its trees, minerals and other resources; aesthetic and recreational values became increasingly important to an affluent post-war society. In addition, the popular media and conservation spokesmen raised public consciousness of the environmental impacts of pollution and development around North America. It seemed almost inevitable that these antinomial forces would collide — and they did in the early 1960s at a remote Vancouver Island lake.

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[57] Harris, "Mineral Development," 266-67. See also John Douglas Belshaw and David J. Mitchell, "The Economy Since the Great War," in Hugh J.M. Johnston, ed., *The Pacific Province: A history of British Columbia* (Vancouver: Douglas and McIntyre, 1996). The arrival of the "mega-project" resource development era in Canada is well-documented in Morris Zaslow, *The Northward Expansion of Canada, 1914-1967* (Toronto: McClelland and Stewart, 1988), chap. 9.

[58] Jean Barman, *The West Beyond the West: A history of British Columbia* (Toronto: University of Toronto Press, 1991), 287-88, and table on page 376.

The decade-long controversy over mining and pollution at Buttle Lake in Strathcona Park transformed environmental politics in B.C. The Social Credit government allowed the development of an open-pit mine (albeit a relatively small one) in the heart of a wilderness park on Vancouver Island. This decision triggered a strong reaction, not only among naturalists and sportsmen, but also among urban and working British Columbians alarmed at the quickening pace and widening scope of industrial resource development. These concerns clashed with the staunchly pro-development mining industry and its political backers. The dispute highlighted the shortcomings of provincial environmental governance, and in particular the Pollution Control Board. This episode also marked the beginnings of sustained public attention to the question of industrial water pollution in B.C. The Western Mines proposal created a political firestorm that reached the floor of the legislature, landed the PCB in court and forced the first halting steps to modernize the province's laissez-faire approach to pollution control and industrial development.

Located in a rugged section of north-central Vancouver Island, Strathcona Park had previously been at the centre of a resource-development controversy. Established in 1911 under special legislation, its initial boundaries were formed by a right-angle triangle encompassing some 214,245 hectares of north-central Vancouver Island. These boundaries were arbitrarily drawn and "did not follow physiographic patterns, political boundaries, or private boundaries, and they even excluded a major portion of an important recreational feature, the principal lake [Buttle]."[59] The park was remote and largely unsurveyed, but intended to provide British Columbians and tourists a destination for wilderness recreation and wildlife appreciation. In spite of the lack of road access, Buttle Lake gained a reputation as a pristine destination fishing lake for wealthy sportsmen (Fig.

[59] Youds, "A Park System as an Evolving Cultural Institution", 53.

3.3). In the early 1950s, a proposal to dam Campbell River below the park, raising the level of the lakes inside the park boundary, had sparked opposition from the province's sportsmen and nascent environmental groups. Led by famous fisherman-author Roderick Haig-Brown, opponents had attacked the "desecration" of Buttle Lake by the project. Public hearings in 1951 had resulted in some modification, but not the defeat, of the dam proposal. The dispute, however, foreshadowed the emerging conflicts between development and environmental quality, both through the public hearings and Haig-Brown's campaign to publicize the importance of protecting wilderness areas and parks.[60]

The seeds for the mining controversy were sown long before the dam episode. In 1918 the park was opened to mining exploration through special amendments to the Strathcona Park Act.[61] By the time the Act was repealed and Strathcona integrated into the provincial parks system (classified as a Class "A" wilderness park) in 1957, it contained some two dozen Crown-granted mineral claims and a ten-square-mile lease block, most clustered around the south end of Buttle Lake. Although the park was classified as a wilderness area, extensive exploratory drilling was undertaken to determine the extent and value of the mineralization on these claims. In 1959, an internal Parks Branch assessment warned of the potential destruction of already-compromised recreational values by mining and associated activity. "It is difficult to believe that in all of Vancouver Island there is no room for a park of this quality and that every last corner of the Island must be developed," the report lamented. The Parks Branch recommended that the mining claims

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[60] Ibid.; this and other controversies in Strathcona Park are also discussed in Qureshi, "Environmental Issues in British Columbia."

[61] Strathcona was B.C.'s first provincial park, created in 1911 under a special act to commemorate the visit of Lord Strathcona. On the early history of the park, see Eric Michael Leonard, "Parks and Resource Policy: The role of British Columbia's provincial parks, 1911-1945" (MA thesis, Simon Fraser University, 1974).

be extinguished.[62]

Accustomed to unfettered access to resources, mining interests regarded recreational concerns as insignificant. The provincial Department of Mines, estimating the value of the ore body at $100 million, pressured the Minister of Recreation and Conservation to allow mining in the park under Park Use Permits. Between 1961 and 1965, Western Mines Limited (now the owner of the claims) elaborated plans for a 750 ton-per-day mine-mill complex, open-pit and underground mines, power and water supplies, a haulage road and a townsite inside the park.[63] This activity, along with "salvage" logging in parts of the park, elicited public outcry from unions, recreationalists and, of course, Roderick Haig-Brown, who lived in nearby Campbell River. They feared that resource exploitation and pollution would destroy the recreational value of the park. The government and mining companies countered that, since ore bodies could not be moved, they had to be mined where they were found, even if inside a park.[64] Indeed, under the Social Credit government, resource-development priorities trumped parks and recreational values. In his history of the B.C. parks system, J.K. Youds has noted that "large class 'A' parks were as open to inspection by commercial resource interests as were the class 'B' parks; if valuable resources were found, the parks could easily be changed to class 'B'."[65] In addition, between 1948 and 1961, B.C. cut nearly 1.9 million hectares from the total parks area of 4.4 million hectares, in part to facilitate resource development. In early 1965, the new Recreation and Conservation Minister

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[62] BCARS, GR-1991 Parks Branch, Reel B01773 section 3, memo, H.G. McWilliams to D.B. Turner, 22 December 1959.

[63] These developments are chronicled in BCARS, GR-1991 Parks Branch, Reel B01773 section 3.

[64] BCARS, GR-1991 Parks Branch, Reel B01773 section 4 documents these exchanges. Among the labour groups expressing outrage was the B.C. Federation of Labour, an umbrella organization of labour unions.

[65] Youds, "A Park System as an Evolving Cultural Institution," 89.

(and former Mines Minister) Ken Kiernan downgraded parts of Strathcona Park undergoing logging and mining to Class "B" status (which allowed resource extraction). This prompted fierce reactions from Haig-Brown and the B.C. Wildlife Federation.[66] Still, a Special Legislative Committee struck in early 1966 to examine the issue backed Kiernan's approval of the development.

Initially, concern centred around the presence of the mine and a townsite with road access inside the park. In 1966, Western Mines revised its plans for tailings impoundment at Myra Creek, and sought to dispose of concentrator wastes through a deep-water discharge pipe directly to Buttle Lake. "Subaqueous" tailings disposal was already practised at the Bluebell Mine at Riondel and other small operations in the Kootenays. Initially, the lake-dumping proposal was approved by both the Water Resources Branch and the Fish and Wildlife Branch, which concluded that the underwater disposal of tailings would not adversely affect water quality or fisheries. To demonstrate the harmlessness of tailings, Western Mines General Manager Charlie Campbell invited reporters to join him in drinking water containing settled tailings. *Victoria Times* outdoors columnist Arthur Mayse remained unconvinced: "The Strathcona Park story, which began with an unspoiled wilderness playground scarce parallelled in North America, is about to enter on yet another of the sordid chapters which mark its political spoilage for gain," he wrote. "Now come the mill wastes and mine tailings, to be dumped with their toxic chemicals into Buttle Lake."[67]

Anticipating further public criticism, in June 1966 the government extended the jurisdiction

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[66] Ian Street, "Pollution worry," *Vancouver Province*, 23 February 1966, 5; Roderick Haig-Brown, "Buttle Lake: Rape of a public park," *Vancouver Sun*, 5 March 1966, 6; University of British Columbia Special Collections and University Archives, Roderick Haig-Brown Papers [hereafter Haig-Brown Papers], box 121 file 3, B.C. Wildlife Federation, "Submission to Special Legislative Committee Concerning Western Mines Proposed Community Development in Strathcona Park," 18 February 1966.

[67] Arthur Mayse, "Arthur Mayse," *Victoria Times*, 16 August 1966, 15; Ab Kent, "Mine tailings used in drink; no effect YET," *Victoria Times*, 25 August 1966, 11.

of the PCB to include Strathcona Park. Since its creation in 1956, the board had dealt mainly with sewage disposal issues, though it also presided over industrial discharges originating from sources inside municipal boundaries. The board's original jurisdiction over the Lower Fraser had twice been extended to include the entire Fraser River watershed, southern Vancouver Island and the Columbia River watershed. It issued five-year, renewable pollution-control "permits" regulating the volume and quality of effluent discharges, based on the notion that the amount of waste entering a given water body should not exceed its assimilative capacity. In 1965, the PCB was transferred from the Department of Municipal Affairs to the Water Resources Branch. This meant that, while it began to regulate all industrial discharges, it did so from within the development-oriented Ministry of Lands, Forests and Water Resources. Under the Pollution Control Act, the board was empowered "to determine what qualities and properties of water shall constitute a polluted condition," yet the PCB evaluated permit applications without reference to published water-quality standards and based on effluent data provided by the applicant.[68] For instance, an applicant was required to report the volume of effluent, its biological oxygen demand, pH (acidity or alkalinity), temperature, the amount of suspended solids and the major chemical and/or bacteriological components it contained. Neither the receiving water conditions, nor the impact on aquatic life, were typically evaluated. The board's small staff (consisting mostly of engineers) undertook virtually no monitoring and enforcement, and restricted its efforts to permit issuance and limited planning.[69] The chief inspector of mines, J.W. Peck, was added to the board when its jurisdiction was extended to include Strathcona Park; nevertheless, it was far from clear whether

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[68] *Pollution-control Act* 1956, Revised Statutes of British Columbia 1960, Chapter 289, Sec. 4(a).

[69] The procedures of the PCB from 1956-65 are gleaned from the board's minutes in BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01 files 1 and 2.

the board had the technical capacity to evaluate mining pollution.[70]

The government's attempt to defuse the conflict through the Pollution Control Board backfired. In August 1966, the PCB received applications from Western Mines for tailings disposal to Buttle Lake, as well as for sewage disposal to the lake from the proposed mining camp inside the park. During the permit-review process, the PCB received nearly 100 letters objecting to the applications. The board rejected these objections without comment and granted the permits without a public hearing, prompting furious reactions from objectors. A three-part editorial in the *Sun* denounced the decision: "Like the person who titters at funerals, the government of British Columbia has chosen this moment to show that it doesn't give a damn for history, water conservation, parkland preservation, or the sensibilities of its citizens, if these come in conflict with the will of industry."[71] It called for the board's resignation and a complete overhaul of provincial pollution-control policy.

A rapid sequence of events in the winter of 1966-67 plunged the proposal deeper into confusion and acrimony. Citing the lack of a public hearing, the Campbell River Water District took the PCB to court, asking for the permits to be quashed. As the holder of a water licence for the town's drinking water supply, the water district feared the drinking water might be contaminated by trace chemicals or heavy metals from the Western Mines tailings. Although the water district lost a lower-court decision, the B.C. Court of Appeal ruled in January 1967 that the PCB had violated the principles of "natural justice" in not allowing the district the chance to

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[70] BCARS, 88-0408 Environmental Appeal Board, box 79-01 file 3, Pollution Control Board Summary Records, 26 April 1965, 26 June 1965, 5 July 1966.

[71] "A neat double-cross. From a rubber stamp. But give up? Never!" *Vancouver Sun*, 24 September 1966, 4.

appear at a public hearing.[72] Meanwhile, a scientific report commissioned by the water district and conducted by the B.C. Research Council was issued then retracted amidst allegations of bias and "emotionalism."[73] Nevertheless, the report exposed the questionable company and government evaluation of the tailings-disposal system, and the complete lack of information regarding the impact on aquatic life.

By the beginning of 1967, the furor over the mine had stalled the applications, stoked public outrage over pollution and damaged the reputation of the PCB. As public and media attention to pollution rose in the late 1960s, opponents of the development-oriented Social Credit government used the Buttle Lake controversy to attack the government's record on the environment. One opposition politician delivered a bottle of "Buttled" water to Recreation and Conservation Minister Ken Kiernan, who refused the drink.[74] In addition, the Buttle Lake proposal stimulated public activism. Two groups formed on Vancouver Island to protest the Western Mines development: the Nanaimo-based Citizens Anti-Pollution League and the Campbell River Pollution Control Society. The former was an ephemeral group that attempted to connect the Buttle development with other island pollution concerns such as air pollution from the pulp mill at Port

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[72] The decision was accessed in BCARS, GR-1114 Fish and Wildlife Branch, box 57 file 40-02-01 I.

[73] "The final indictment.," *Vancouver Sun*, 5 November 1966, 4; "Buttle Lake pollution debunked," *Vancouver Province*, 9 November 1966, 4; "Buttle Lake fears just 'emotionalism'," *Vancouver Sun*, 10 January 1967, 5; Arnie Myers, "Research council's report says mine data incomplete," *Vancouver Sun*, 8 November 1966, 2. See also the account of the affair in Charles J. Keenan, *Environmental Anarchy: The insidious destruction of social order: A legacy of the Sixties* (Victoria: Cappis Press, 1984), 53-57. Keenan was the chief engineer of the PCB at this time, and dismissed the protests against the lake-dumping plan as media distortion and environmentalist hyperbole.

[74] The ongoing furor in the legislature included Ken Kiernan's initial promise, then refusal, to drink tailings-laced Buttle Lake water. See stories in B.C. Legislative Sessional clipping books [microform], including: "Buttle Lake fears just 'emotionalism'," *Vancouver Sun*, 10 January 1967; "Buttle biologists tagged emotional," *Vancouver Province*, 2 February 1967; Iain Hunter, "Kiernan ignores blast on Buttle," *Vancouver Sun*, 3 February 1967; "'Bare 2nd pollution report,' Williston challenges NDP," *Vancouver Sun*, 10 February 1967; "Kiernan refuses Buttle cocktail," *Vancouver Sun*, 28 February 1967. Hansard transcripts of legislative debates were not recorded until 1971. Instead, the Legislative Library filed clippings from newspaper accounts of debates.

Alberni.[75] The Campbell River group, which formed in 1966 in response to the Buttle Lake issue and other local pollution concerns, submitted a brief to the Special Legislative Committee in 1966. It also held what may have been the first environmental protest march in B.C.: in March 1967, nearly 100 placard-waving people descended on Victoria to present government officials with samples of tailings-laden Buttle Lake water.[76]

Of more lasting significance was the politicization of the B.C. Wildlife Federation. Formerly a narrowly focussed and co-operative interest group, the leadership of the BCWF pushed the organization towards the vocal and politicized defence of nature in the wake of the Buttle Lake affair. After initially accepting assurances that mine tailings would not pollute the popular fishing lake, the sportsmen's group, through its executive director Howard Paish, launched increasingly vitriolic attacks on the project. The BCWF passed two resolutions at its 1966 convention condemning the industrial development of parks and calling for a biological survey of Buttle Lake. The BCWF regarded the Western Mines development as a failure of government resource planning. The group criticized the government for its failure to recognize the aesthetic, recreational and other non-material values jeopardized by pollution and rampant resource development in parks. By 1967, one BCWF member noted, the group had assumed a more political role in advocating for environmental protection: "The Fed. has reached a turning point ... the quiet voice

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[75] "Nanaimo citizens form league to fight pollution," *Vancouver Province*, 2 November 1966, 29; "Join the club," *Vancouver Sun*, 3 November 1966, 4; see also a letter and brief of the Alberni Valley Citizens' Committee on Pollution to the Special Legislative Committee on Pollution, February and May 1966, cited in Haig-Brown Papers, box 78 file 2.

[76] "Government gets 'Buttled' water," *Vancouver Sun*, 21 March 1967, cited in University of British Columbia Special Collections and University Archives, Fisheries Association of B.C. fonds, box 31 file 11. See also University of British Columbia Special Collections and University Archives, *Submission by the Campbell River District Pollution Control Society to the Pollution Control Board Concerning the Addition of Mine Tailings Into Buttle Lake, Strathcona Park, Vancouver Island* (1968). Public activism against the tailings disposal plan is also considered in Carol Gamey, *Mining Conflicts* (Victoria: University of Victoria, 1983).

is becoming louder. The Fed. is gaining in stature, in importance and as an influential power..."[77] Paish even criticized the Fish and Wildlife Branch, the traditional ally of the BCWF, for its failure to staunchly defend park values and environmental quality.[78]

The controversy precipitated major revisions to the PCB. In 1967, Lands, Forests, and Water Resources Minister Ray Williston introduced a revamped Pollution Control Act that created a full-time technical agency, called the Pollution Control Branch, with power to investigate pollution, issue permits and punish violations. The Pollution Control Board remained as a policy-oriented body to develop pollution control standards and act as an appeal board for decisions of the branch and its director (the irascible engineer, Charles Keenan). Williston acknowledged that the new act was passed in response to the Buttle Lake issue as well as the growing public concern over pollution throughout the province.[79] Critics pointed out that senior civil servants continued to serve on the board and that Williston retained ministerial responsibility for both resource development and pollution control.[80] Their concerns turned to fury the following year when Williston sought to restrict the ability to file formal objections to waste discharge applications. Clearly a reaction to the Buttle Lake imbroglio, Williston proposed amendments to the Pollution Control Act that limited objections to those with a "direct interest" in land, air or water affected

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[77] BCARS, GR1027 Fish and Wildlife Branch., box 85 file 1, Jack Grundle, "Summary of 11th Annual BCWF Conference," 5 (emphasis in original). See also in the same file "Executive Director Howard Paish's Report" and in box 85 file 3, "The muddied waters of Buttle Lake," BCWF *Newsletter* 1, 2 (April 1967), 1.

[78] Ibid. A 1968 exchange of letters between the BCWF executive and James Hatter, Director of the Fish and Wildlife Branch, illustrated the tension that emerged between these allies. The BCWF criticized Hatter's personal performance as director and urged the branch to press recreational interests more strongly within government. Hatter replied that the recent politicization of the BCWF threatened to scupper the advances the branch had made in resource decision-making. See Haig-Brown Papers, Box 121 file 2.

[79] "Socreds plan pollution police force," *Victoria Colonist*, 17 February 1967; "Plants to need pollution permit," *Vancouver Sun,* 14 March 1967, B.C. Legislative sessional clipping books [microform].

[80] "Pollution board accused of usurping health duties," *Vancouver Sun*, 21 February 1967. B.C. Legislative sessional clipping books [microform].

by a pollution permit. Conservation groups, opposition politicians and the media were incensed by the proposed changes. The *Sun* accused the government of trying to "get off its back for once and for all those bothersome conservationists and fishermen who keep asking whether the government is for them or against them."[81] Eventually the government softened the limitation on objectors, but the Director of Pollution Control retained sole discretion over whether or not to hold a public hearing on permit applications.

In spite of the political storm surrounding the applications, the Lynx mine (as it was called) began to discharge tailings into Buttle Lake in the spring of 1967. As part of a compromise negotiated with the Campbell River Water District, an independent consultant was appointed to study the effects of the tailings. In January 1969, G.B. Langford, an Ontario mining engineer, concluded that the plan "conformed to acceptable health and engineering standards" and that the impact on aquatic life would be minimal. The publicity surrounding the project waned, while Fish and Wildlife Branch officials maintained a vigil over the operation.[82]

The branch's tepid approval of the lake disposal plan quickly turned to concern as the mine increased to full production capacity. Branch files indicate growing anxiety over the prospect of accumulating chemicals and heavy metals in the southern end of Buttle Lake. They also document frequent operational problems resulting in heavy turbidity (cloudiness) from the mine tailings that

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[81] "Pollution act to get new teeth," *Vancouver Sun*, 14 February 1968; "Opposition attacks pollution control body," *Vancouver Sun*, 24 February 1968; "None of our business?" *Vancouver Sun*, 1 March 1968, 4;"Pollution protest 'still allowed'," *Vancouver Sun*, March 1, 1968; "NDP move fails on pollution bill," *Vancouver Sun*, 16 March 1968; "More limited than Bill 33," *Victoria Times*, 14 April 1968, 21; "Pollution protests," *Victoria Colonist*, 16 April 1968, 4; "The growing chorus," *Vancouver Sun*, 24 May 1968, 4. Those stories without page numbers cited in B.C. Legislative sessional clipping books [microform].

[82] BCARS, Accession no. 88-0408 Environmental Appeal Board, Box 79-02 file 10, Summary Record 10 May 1968; L. Foubister, "Buttle Lake Water Quality: History of Western Mines with Respect to Pollution Control Act," 1980, reprinted in M. J. R. Clark, *Impact of Westmin Resources Ltd. Mining Operation on Buttle Lake and the Campbell River Watershed* (Victoria, Ministry of Environment, 1982). Langford's final report appeared in 1969: see "Monthly reports due on Buttle lead count," *Victoria Times*, 28 February 1969, B.C. Legislative sessional clipping books [microform].

threatened to undermine the lake's biological productivity. In 1969, the regional fisheries biologist for the area, J.C. Lyons, described his frustration at the ongoing pollution and asked his superiors, "how much of this are we to allow under public pressure and for how long? ... What we say and do will affect our credibility as a serious defender of our resource."[83] Co-operation between the Pollution Control Branch and the Fish and Wildlife Branch declined. Senior Fish and Wildlife staff wrote the Pollution Control Branch demanding that it "impose regulations and operating conditions which relate directly to waste disposal."[84]

By 1971, scientific studies and monitoring at Buttle Lake had uncovered adverse environmental effects from the tailings. Water sampling revealed alarmingly high copper, lead and zinc concentrations, and a study of trout livers indicated the bioaccumulation of lead and copper up to 1,000 per cent above normal levels. In addition, data collected between 1967 and 1971 revealed that the mine was in almost continuous violation of its permit conditions.[85] Though James Hatter, the director of the Fish and Wildlife Branch, attempted to downplay these findings, Campbell River residents, conservationists and the media denounced the government for its failure to control pollution. Their pressure sparked a bizarre turnaround in December 1971, when Recreation and Conservation Minister Ken Kiernan first announced the company would be required to impound tailings on land, then rescinded the order later the same day after learning from the company that there was not enough land to do so. The *Sun* derisively commented that the government, "having handed over the people's heritage to private interests, appears determined to

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[83] BCARS GR-1114 Fish and Wildlife Branch, box 57 file 40-02-01 I, Memo, J.C. Lyons to E.H. Vernon, 1 August 1969.

[84] Ibid., J. Hatter and E.H. Vernon, Fish and Wildlife Branch, to W. Venables, Director of Pollution Control Branch, 23 September 1969.

[85] BCARS, GR-1114 Fish and Wildlife Branch, box 61 file 40-09-00 1971, G.R. Peterson, "Summary of Analyses for Heavy Metals in Buttle Lake – 1966-1970," 5 February 1971; see also various reports and memos in file 40-02-01 I.

justify its reckless error at every step."[86] By the end of the Social Credit government's tenure in late 1972, Buttle Lake was emblematic of provincial environmental mismanagement and ineffective pollution-control laws.

The heavy metals controversy made Buttle the subject of long-term, intensive study for the next two decades. The threat of contaminated drinking water supplies was largely dismissed, as water quality remained above Canadian drinking water standards. Scientists found no evidence of acute toxicity to aquatic life, but remained concerned about the long-term problems of bioaccumulation of heavy metals in fish tissue, declining biological productivity and a decline in population and diversity of various types of lake plankton, the base of the lacustrine food chain.[87] For many observers, Buttle Lake remained the "beauty that died," a potent symbol of the victory of avarice over ecology.[88] Under continued pressure to rein in these effects, the company abandoned lake disposal of tailings in July 1984, after depositing an estimated two million tons of debris in the lake. A "fragile" recovery of aquatic life was observed almost immediately.[89]

By the early 1970s, then, Buttle Lake had become a site of intense environmental contestation and pollution concern. Five public agencies had established water-quality monitoring sites around the lake and a sixth — B.C. Research — compiled and published data from sampling sites. The livers of fish and the chemistry of water had become contested elements of an emerging

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[86] Iain Hunter, "Mine ordered to end dumping," *Vancouver Sun*, 9 December 1971, 1; "No change at Buttle," *Vancouver Sun*, 11 December 1971, 4.

[87] B.C. Research, *The Effect of the Disposal of Mine Tailings by Western Mines Limited on the Water Quality of Buttle Lake* (Vancouver: B.C. Research, 1974); M. J. R. Clark, *A Preliminary Review of Buttle Lake Water Quality* (Victoria: Ministry of Environment, 1980), Report No. 80-2.

[88] Ron Park, "Buttle Lake, the beauty that died," *Victoria Colonist* (magazine), 5 March 1978, 6; "Buttle Lake 'could be dead within a decade'," *Victoria Colonist*, 31 May 1980, 1.

[89] J. Deniseger, et al., *The Effects of Decreasing Heavy Metal Concentrations on the Biota of Buttle Lake; Vancouver Island, British Columbia* (Victoria: Ministry of Environment and Parks, 1988).

scientific and ideological battle over the use of nature by industry in British Columbia. As the controversy raged in the media and within government, the work of "objective" engineers, biologists and scientists became inserted into these deeply politicized debates, sowing doubts about the ability of experts to define and quantify polluted conditions. Science was destabilized as a source of factual, impartial information in debates over pollution, as scientific data were freely combined with aesthetic or economic appeals to bolster political positions. The limits of technical knowledge and unforeseen consequences meant attempts to definitively characterize environmental changes and their implications were fraught with uncertainty.

The dispute also forced the government into a halting expansion of the state pollution-control apparatus, though the Pollution Control Board and Branch remained woefully understaffed. Controlled largely by resource-ministry civil servants and staffed by engineers, these bodies retained their bias towards the exploitation of assimilative capacity, rather than environmental protection. This approach put them increasingly at odds with a public anxious about the effects of development and bombarded with images and reports of environmental degradation from around the world. The first stirrings of environmental protest in the province served notice that the government would no longer have a free hand in administrating environment and resources. Yet, as one columnist remarked, "The problem really is that neither the government nor the public have really decided what pollution is all about, and because of that our approach to the problem is highly confused."[90] The political disputes over how to reconcile pollution and industrial progress would only intensify in the 1970s as new mega-development proposals materialized that galvanized public opposition to pollution.

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[90] Robert McConnell, "A tax on pollution would make purity pay," *Vancouver Province*, 4 June 1969, 4.

Pollution in the era of the mega-mine

The ten-acre open-pit mine at Buttle Lake would come to seem quaint by comparison with the next phase of mega-mine development in B.C. Near the East Kootenay town of Sparwood, giant dragline shovels stripped away a 900-acre swath of Harmer Ridge for coal ore to fill 200-ton dumptrucks — the world's largest. On Rupert Inlet, Vancouver Island, more than a billion tons of material was moved over 25 years, producing an oval-shaped open pit 7,900 feet long, 3,500 feet wide and 1,320 feet below sea level — surpassing the Dead Sea as the deepest surface depression on earth.[91] These figures give some sense of the tremendous leap in the scale of mining methods in B.C. As one observer has noted, "By 1968, open-pit mining operations accounted for 40 per cent of BC mining activity yet no regulations existed to control such activity."[92] "Open cast" mining is used to exploit large, usually low-grade ore deposits using mechanized extraction and processing techniques. These methods typically disturb greater surface areas, as "overburden" (surface material lying atop the deposit) is removed, which also creates vast amounts of waste materials from the rock containing the ore deposit.[93] Strip mines, typically associated with relatively shallow coal deposits, became infamous for their devastation of the overlying soils and topography, most notoriously in the Applachian Mountains of Kentucky. Yet the mining industry celebrated these methods, not only for their improved safety compared with underground mining, but also for the economies of scale that made these extensive, low-grade deposits economical to exploit.

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[91] "Kaiser Resources: Meeting increased demand," *Western Miner* 53, 1 (January 1980), 35-37; Craig Aspinall, *The Story of Island Copper* (Vancouver: BHP Minerals Canada, 1995).

[92] Hertzberg, *Mining and Pollution in B.C.*, 18.

[93] Ripley, et. al., *Environmental Effects of Mining*, 17-18.

Unlike in the United States, where these techniques were developed earlier in the century, the arrival of the "mega-mine" in B.C. coincided with a dramatic rise in public environmental concern.[94] By the late 1960s, pollution had emerged as the signal issue of the "second wave" of environmentalism, replacing to a considerable extent conservationists' earlier emphasis on the preservation of natural scenery and wildlife habitat.[95] While these concerns were not mutually exclusive, pollution fears animated the mass environmental consciousness of the late 1960s. The association of pollution with modern industrial and technological society made it a potent rallying point against the kind of mass-scale, mechanized developments represented by open-cast mining. Following the Western Mines controversy, the mining industry in B.C. was painted as an environmental villain; proposals for large-scale coal strip mining in the East Kootenay and for a giant, open-pit copper-molybdenum mine on Vancouver Island only further stoked environmentalist outrage. These projects came under fire for their devastation of large areas of natural landscape and the potential of water pollution from erosion, acid mine drainage and heavy metal leaching from tailings and open pits.

In 1968, California-based Kaiser Resources announced plans to take up to 90 million tons of coal from Harmer Ridge near Fernie through a Canadian subsidiary. Although coal deposits had been mined in the Crow's Nest region since the turn of the century, these relatively small coking

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[94] Because they were developed during the early part of the twentieth century, opposition and criticism of open-pit and strip mining in the U.S. typically emerged long after these projects were underway. See Smith, *Mining America*; Henry Caudill, *My Land is Dying* (New York: E.P. Dutton, 1971); LeCain, "Moving Mountains"; Quivik, "Smoke and Tailings"; Robert V. Bartlett, *The Reserve Mining Controversy: Science, technology, and environmental quality* (Bloomington, Ind: Indiana University Press, 1980); Thomas R. Huffman, "Exploring the Legacy of Reserve Mining: What does the longest environmental trial in history tell us about the meaning of American environmentalism?" *Journal of Policy History* 12, 3 (2000), 339-368.

[95] Robert Paehlke, "Eco-History: Two waves in the evolution of environmentalism," *Alternatives* 19, 1 (1992), 18-23.

coal operations had barely sustained the small communities of Natal and Fernie.[96] Using ultra-modern, mechanized strip-mining methods, the company proposed to extract and process coal from the Elk River valley and ship it to the United States and Japan via a newly constructed "superport" at Roberts Bank near Vancouver. Kaiser's announcement was followed in quick succession by several proposals for other strip mines in the nearby Fording River watershed. These developments were eagerly welcomed by the B.C. government, which quickly moved to create new regulations for the reclamation of strip-mined land under the Mines Regulation Act. The industry, through the Mining Association of B.C., was invited to help draft the regulations, although the association preferred that reclamation of disturbed land be on a "voluntary" basis at the companies' discretion.[97] In addition, Kaiser was allowed to begin work on the mine sites in advance of these new regulations.

The Kaiser development sparked fierce debates over the regulation of landscape impacts and pollution from large-scale strip mining. The provincial Fish and Wildlife Branch, anticipating coal development in the region, produced a survey of big game resources in the Elk Valley that recommended restricting development in sensitive bighorn sheep and elk wintering ranges. [98] Public critics of the Kaiser project were led by the B.C. Wildlife Federation, which feared the province could be turned into another Kentucky: the scene of devastated, unreclaimed landscapes,

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[96] Bruce Ramsey, *100 Years of Coal Mining: The Elk River valley* (Sparwood, B.C: Ramsey Publications, 1997). See also Robert D. Turner, "Crowsnest Coal," www.crowsnest.bc.ca/coal.html, accessed February 2004. These operations were not without pollution problems of their own: smoky coke ovens filled the valley with acrid smoke, and Michel Creek, a tributary of the Elk River, was frequently polluted by the leaky or malfunctioning impoundment of contaminated water from a coal-washing plant at Michel. See BCARS, GR-1114 Fish and Wildlife Branch, box 57 file 40-02-01 V 1968.

[97] Martin Robin notes that despite the promise of vast revenues, the Kaiser project was heavily subsidized by public money through infrastructure development and yielded little in resource rents. Robin, *Pillars of Profit*, 300-301. The strong influence of the MABC on the drafting of reclamation legislation is amply documented in BCARS, GR-1579 Department of Mines, box 45 file 860.

[98] BCARS, GR-1114 Fish and Wildlife Branch, box 57 file 40-02-01 V 1968, R. A. Demarchi, "A survey of the big game resources in the coal license area in the upper Elk and Fording River watersheds," B.C. Fish and Wildlife Branch report, January 1968. This report was cited often by opponents of the development such as the BCWF, so may have been provided to them.

widespread water pollution and erosion from strip mining.[99] The Kaiser proposal was also the target of the newly formed Society for Pollution and Environmental Control, a Vancouver-based environmental group established in 1969. A brief written by one of the group's founders, Fernie native Gwen Mallard, argued that strip mining would leave an "everlasting heritage of raped land" and called for the area to bet set aside as a park.[100] These groups aired their concerns at public hearings on the proposed reclamation legislation, held by the provincial Select Standing Committee on Mining and Railways in March 1969. Meanwhile, a harshly critical CBC television documentary and a tragic slide from a Kaiser overburden pile that killed two people driving on a highway near Sparwood showered negative publicity on the company.[101] The reclamation regulations proclaimed later that year by the government were aimed at ensuring the revegetation and stabilization of stripped areas, but the Fish and Wildlife Branch remained concerned that water pollution remained unaddressed by this or any other regulations.[102] As an in-house branch report noted, "The Pollution Control Act is aimed at controlling defined emissions and discharges and is completely inappropriate for dealing with the massive and general disturbance

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[99] See Haig-Brown papers, box 121 file 6, B.C. Wildlife Federation, "Surface Mining: A challenge to wise resource management," submission to Cabinet, 6 December 1968, and documents in BCARS, GR-1114, Fish and Wildlife Branch, box 57 file 40-02-01 V 1968. The BCWF went so far as to send a delegation to tour Kentucky sites and invited a Kentucky anti-mining activist to B.C. to evaluate the Kaiser proposal.

[100] "Preservation of Elk Valley — March, 1969" in *IntroSPECt* Special Report Edition (1970), 5.

[101] "Two bodies found under slide debris," *Vancouver Province*, 26 November 1968, 1; "Kaiser man says CBC show 'unfair'," *Vancouver Sun*, 26 November 1968, 30. The CBC story stimulated a flood of letters from across Canada to the Fish and Wildlife Branch and the B.C. Wildlife Federation denouncing the development. See B.C. Wildlife Federation *Newsletter* 2, 8 (December 1968), 1-3; and BCARS, GR-1114, Fish and Wildlife Branch, box 57 file 40-02-01 V 1968-69.

[102] The industry remained deeply hostile to comprehensive reclamation legislation or any pollution controls, arguing it imposed an unreasonable economic burden to preserve "aesthetics." In the end, the government created a technical committee to develop detailed reclamation guidelines made up almost entirely of Mines Department and industry representatives, including a representative from Kaiser. See "New rules charted for mines," *Vancouver Sun*, 29 March 1969, 1; K. G. Donald, "Production and Reclamation Planning by Kaiser Resources," *Western Miner* 42, 10 (October 1969), 102-112. The work of the technical committee is documented in BCARS, GR-1114 Fish and Wildlife Branch, box 57 file 40-02-00 1969 and file 40-02-01 V 1968-69, and GR-1579 Department of Mines, box 28 file 322. On the reclamation effort, see Bryce Williams, "Kaiser's strip mine operation awful to behold," *Vancouver Sun*, 25 June 1970, 25.

characteristic of large mining operations."[103]

Subsequent events bore out the branch's apprehension. Kaiser's operations resulted in the siltation of Harmer Creek, a trout stream tributary to the Elk River. Despite the opposition of the Mines Minister, in 1969 the company was ordered to build impoundments to contain silt-bearing runoff from reaching the Elk.[104] Two years later, the company was fingered for polluting area creeks with wastewater from its coal processing facilities. Michel Creek and Elk River waters repeatedly ran black with spills and overflows of millions of gallons of coal "fines" and washing water containing phenols, ammonia and nitrates. The creek was "void of fish life," according to the local conservation officer. None of the company's operations had a pollution permit from the Pollution Control Branch, despite the fact the branch operated water-quality monitoring stations in the area.[105] These problems raised the ire even of industry-friendly local mayors. The Kaiser project seemed to underline the futility of the province's pollution-control apparatus, as well as highlighting the ad hoc approach to resource planning that continued to plague even large developments. Newspaper editorialists derided government environmental protection as a "paper tiger" and a "mining disaster" and dismissed the Pollution Control Branch as a "fraud."[106] Still,

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[103] BCARS, GR-1114 Fish and Wildlife Branch, box 57 file 40-02-00 1971, E.H. Vernon, "The Protection of Fish and Wildlife Under the Mines Regulation Act," December 1970.

[104] Bryce Williams, "Conservation officer fears strip mine has hurt trout," *Vancouver Sun*, 17 May 1969, 1; "Curb creek silt, gov't tells Kaiser," *Vancouver Sun*, 28 May 1969, 14. See also BCARS, GR-1114 Fish and Wildlife Branch, box 57 file 40-02-01 V 1968-69 and box 58 file 40-02-01 V 1971. These files indicate that the Fish and Wildlife Branch, frustrated by the lack of action by either the Mines Branch or the Pollution Control Branch, quietly began to gather evidence for a prosecution of Kaiser under the Fisheries Act for allowing "thousands of tons of silts and sands" to enter the Harmer/Elk waters. The prosecution never went forward, but a combination of Branch pressure, bad press, and public outrage spurred the company to better control erosion.

[105] Ibid.; Malcolm Turnbull, "Two mine inspectors probe Kaiser spills," *Vancouver Province*, 7 April 1971, 25; "Kaiser acts to cut pollution," *Vancouver Province*, 8 April 1971, 29; "Kaiser pollution deadline set," *Vancouver Province*, 14 April 1971, 1; Malcolm Turnbull, "Leaks pose ecological worry," *Vancouver Province*, 5 April 1971, 23.

[106] "The same old paper tiger," *Vancouver Sun*, 10 April 1971, 4; Malcolm Turnbull, "Gov't helpless in Kaiser spill," *Vancouver Province*, 6 April 1971, 1; Bruce Yemen, "The big stick. Or soft shove," *Victoria Times*, 24 April 1971, 5.

Kaiser escaped prosecution for any environmental damage, thanks in large part to the vigorous defence of the company by provincial mining officials.

Frustration over the weak regulation of pollution from the Western Mines and Kaiser Resources developments culminated in the unprecedented controversy over the huge Island Copper Mine (ICM) project near Port Hardy on northern Vancouver Island. The American mining giant Utah Mining and Construction Company proposed an open-pit mine for the extraction and processing of some 280 million tons of low-grade copper-molybdenum ores. The plan included the disposal of vast amounts of concentrator wastes into nearby Rupert Inlet. Armed with proof of mining pollution problems from earlier developments and fuelled by a widespread distrust of government pollution-control policy, environmental groups forced a comprehensive review of the development. Environmentalists challenged the philosophy of assimilative capacity that had traditionally guided miners' use of water as a medium of waste disposal. As a result, environmental considerations were (reluctantly) included in the project's final design. Political pressure and environmental activism transformed the ICM proposal from yet another unregulated development into a model for environmental impact assessment and monitoring practices worldwide.

The unique geographical situation of the Island Copper Mine magnified the controversy over its environmental impact. The massive ore body was discovered in 1963 along the northern shore of Rupert Inlet, one of a trio of inlets splayed from the main body of Quatsino Sound on the rugged, remote northwest coast of Vancouver Island (Fig. 3.4). Like many inlets on the west coast of B.C., it is a long, narrow and deep basin separated from outer waters by a shallow sill.[107] The

[107] The description in this paragraph is drawn largely from Michael Waldichuk and R. J. Buchanan, *Significance of Environmental Changes Due to Mine Waste Disposal into Rupert Inlet* (Fisheries and Oceans Canada, B.C. Ministry of Environment, 1980), 4-7.

system, known for its biological productivity, supported limited local commercial fisheries for crabs, prawns and salmon; the latter spawn in significant numbers in streams draining into the inlets. Other fishery resources in the inlets include herring, halibut and other groundfish. Local First Nations exploited these for food, particularly in the turbulent, but biologically rich Quatsino Narrows that separated Rupert and Holberg inlets from Quatsino Sound.

The mine's ore body was located so close to tidewater that plans to develop the mine included the use of stripped overburden and waste rock to create approximately 600 acres of new shoreline. The mineral values of the ore were exceedingly low (an average of 0.41 per cent copper and less than .02 per cent molybdenum), which required the processing of massive amounts of material.[108] Combined with the mine's location, this created problems for tailings disposal: the potential for seismic activity limited the size and stability of land impoundments, while the high coastal rainfall meant acid drainage and leaching from tailings piles could threaten local salmon streams and possibly the inlet itself.[109] Given these constraints, Utah proposed to dispose of concentrator wastes through a deep-water pipeline extending 2,400 feet from shore and discharging at more than 150 feet below the surface. The waste stream was projected to include an unknown quantity of residual minerals, as well as traces of chemical reagents from the flotation process used to recover minerals. These wastes would be diluted using seawater and treated with a flocculant, a type of electrolyte that aids in the coagulation of fine particles. Thus, while the 9.3 million gallons per day of effluent would contain some 32,000 tons of finely ground tailings, it was

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[108] Aspinall, *The Story of Island Copper*, 9. Estimates of the mineral grades of this ore were marginally higher at the time of the application. Ultimately, the ore body included nearly 400 million dry short tons of ore; the operation removed nearly a billion tons of material between 1971 and 1995, when the mine closed.

[109] Brian R. Martin, "The Causes of Scientific Disputes in Impact Assessment and Management: The Utah Mines case," (MA thesis, University of British Columbia, 1985), 37-38. These concerns were raised by both the company and the federal Department of Fisheries, which initially supported the inlet dumping plan.

predicted that the tailings would settle quickly — and stay — on the inlet floor and remain chemically inert.[110]

Public confidence in pollution control policies, already damaged in wrangling over the Western and Kaiser controversies, sank to new lows in the Utah affair. In fact, the Pollution Control Branch stood by while the company, after signing export contracts with Japanese companies in mid-1969, sought various approvals for its development plans. Meanwhile, the federal Department of Fisheries entered into direct negotiations with Utah over its tailings-disposal plans, which the department approved in November.[111] Unusually, the province also sought a performance bond from Utah to ensure proper reclamation of waste-rock dumps and the open pit itself.[112] By the fall of 1969, when the PCB finally received waste-discharge permit applications, the Island Copper Mine was already well under construction.

The PCB review of the Utah discharge application was beset with many of the same conflicts as the Western Mines development.[113] Once again, the government attempted to defuse pollution fears by ordering an independent study by the B.C. Research Council. In the wake of the Western Mines dispute, the government had attempted to limit the number and types of objections, and in 1969 appointed three Cabinet ministers to the Board: Minister of Health Ralph Loffmark,

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[110] University of Victoria Archives, Accession no. 2000-069, Island Copper Mine fonds [hereafter ICM fonds], box 13 section 4.10.5 file 00-069, transcript of Pollution Control Branch public hearing (2 vols.), 2 December 1970, vol. 1, 20-27. This transcript contains all briefs to the hearing as well as the proceedings. This data is from the Utah brief.

[111] Martin, "The Causes of Scientific Disputes in Impact Assessment"; "Pollution body raps Davis on Rupert Inlet dumping OK," *Vancouver Sun*, 17 November 1969, 19; BCARS, GR-1579 Department of Mines, box 28 file 337-4 contains the contracts.

[112] "Security deposits ordered," *Victoria Times*, 21 January 1970, 1. The performance bond was a mere $110,000, but was the first ever required of an open-pit mine.

[113] An excellent summary of the hearing controversy, from the point of view of informed participants, is Alastair R. Lucas and Patrick A. Moore, "The Utah Controversy: A case study of public participation in pollution control," *Natural Resources Journal* 13, 1 (1973), 36-75.

Minister of Municipal Affairs Dan Campbell and Minister of Lands, Forests, and Water Resources Ray Williston. The impression of the board and Pollution Control Branch as politicized entities was further reinforced when the new director of pollution control, William Venables, used a technicality to exclude all but four of the 150 objections to the Utah application he received. Furious, SPEC and other groups whose briefs were excluded threatened court action against the Director.[114] Despite the protests, the Pollution Control Branch hearing into the Utah application went ahead with just four recognized objectors on 2 December 1970 in Port Hardy.

If the branch intended to foreclose public debate and scrutiny of the Utah application at the Port Hardy hearing, it failed miserably. The Utah proposal surfaced as the fledgling environmental movement in B.C. was beginning to grow in sophistication, membership and influence.[115] Environmental opposition was led by the Society for Pollution and Environmental Control, through both its head office in Vancouver and its Vancouver Island branches. SPEC was joined by the anti-sewage pollution group, Richmond Anti-Pollution Association, as well labour groups, fisheries interests, recreational groups and a variety of ad hoc ecology groups. However, the B.C. Wildlife Federation broke ranks with environmental groups and supported the inlet-dumping option, no doubt influenced by the federal fisheries department's approval (although they did recommend

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[114] "Public hearing set on sea dumping bid," *Victoria Times*, 9 September 1970, 2; Don Vipond, "Utah hearing: Many want to speak," *Victoria Times*, 11 September 1970, 1; Doug MacRae, "Cabinet muffling objectors to mine waste dump – SPEC," *Victoria Times*, 12 September 1970, 1; "SPEC seeks voice at Utah hearing," *Vancouver Sun*, 21 November 1970, 9. After the public hearing, the Board heard appeals from SPEC and RAPA of their exclusion. In spite of their references to earlier court decisions in the Western Mines case, the environmentalists' appeal was rejected by the Board and, later, Cabinet, with the proviso that they could submit technical evidence in writing to the director of pollution control within 30 days.

[115] Paehlke, "Eco-History"; Dianne Draper, "Environmental Interest Groups and Institutional Arrangements in British Columbia Water Management Issues," in Bruce Mitchell, ed., *Institutional Arrangements for Water Management: Canadian Experiences*, (Waterloo, ON: Department of Geography, University of Waterloo, 1975). Draper's case studies in this paper include the Island Copper Mine. The growth of environmentalism in B.C. is explored further in Chapter 5 *infra*.

strong environmental monitoring).[116] Drawing on experts from B.C. universities, environmentalists inserted themselves into the scientific debate over the proposal, disrupting the PCB and industry monopoly on expertise. Robin Harger, SPEC vice-president and University of British Columbia ecologist, spearheaded SPEC's efforts to lobby government authorities and the company for an ecological survey of the inlet. The group even submitted a draft survey design for Utah to follow; under pressure, the company hired an independent engineering firm to conduct studies of the inlet. In addition, a group of well-known U.B.C. scientists, including biologist P.A. Larkin and ecologist C.S. Holling, filed a brief to the PCB objecting to the Utah plan.[117]

Although the main SPEC brief was excluded from the hearing, SPEC mobilized its legal, scientific and media resources to support two island members who had been admitted as objectors. SPEC scored a public-relations coup when over two-thirds of the employees working at the construction site of the Utah mill signed a petition condemning the exclusion of objectors by the Pollution Control Branch. The hearing itself proved to be a disaster for Utah. With counselling from advisors provided by SPEC, retired nurse Elaine Price and millworker Ed Morton chipped away at the technical edges of the Utah proposal. They also argued that the PCB's highly technical hearing and objection processes were largely inaccessible to average citizens. They pointed out that the hearing itself was moot, since the company had already invested nearly $7 million in site preparations and mill construction.[118]

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[116] "Rupert Inlet dumping accepted," *Victoria Times*, 20 January 1970, 8. See also an extract from its submission to Cabinet 15 December 1969, reprinted in the SPEC newsletter *IntroSPECt*, 29-30. The BCWF relied heavily on scientific information and interpretations of both provincial and federal fisheries officials.

[117] Lucas and Moore, "The Utah Controversy," 43 n.46.

[118] Transcript of Pollution Control Branch public hearing, vol. 2. See also Diane Janowski, "A mine – or a mess?," *Victoria Colonist*, 29 November 1970, 1; "Utah goes ahead with mine plans," *Victoria Times*, 3 December 1970, 1; Donna Clements, "A housewife fights big industry on pollution," *Victoria Times*, 8 December 1970, 32.

Most devastating, however, was the brief presented at the public hearing by Patrick Moore on behalf of the Pacific Salmon Society. At the time, Moore (who went on to become a high-profile Greenpeace activist) was a PhD student in ecology at U.B.C. and an environmental activist who combined the radical politics and lifestyle of the period with a keen and careful scientific eye. Moore shredded the cursory scientific studies underlying the Utah proposal, contending that his own oceanographic investigations proved that turbulence at lower depths could result in the transport of tailings and turbidity within the inlet. He also exposed the lack of ecological studies done in advance of the proposal, raising the spectre of accumulation of toxic materials in the sediment and the bioaccumulation of heavy metals in the marine biota. Further, Moore savaged both company and B.C. Research Council reviews, arguing they were tainted by pro-industry bias on the part of the investigators.[119] Moore's completed PhD thesis featured his scientific studies at Rupert Inlet, a well as long sections describing the hearings and criticizing the Pollution Control Board. It was accepted only after allegations that the university had been pressured to reject it became public.[120]

The performance of the "unfortunately long-haired" Moore at the hearing embarrassed the company, which was clearly unprepared for stiff challenges on technical grounds.[121] By revealing the shortcomings in the proposal, critics such as Moore also exposed the failures of the PCB

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[119] Transcript of Pollution Control Branch public hearing, vol. 2. The BC Research Council had prepared a pre-hearing report, essentially a literature review on the effects of underwater tailings disposal that featured no field investigations at Rupert Inlet: ICM fonds, box 12, B.C. Research, "The Disposal of Mining and Milling Wastes with Particular Reference to Underwater Disposal," April 1970.

[120] Patrick A. Moore, "The Administration of Pollution Control in British Columbia: A focus on the mining industry" (PhD diss., University of British Columbia, 1973). Moore claimed that he was told by the Dean of Science that someone outside the university threatened that Moore would never work in government or industry in B.C. if he pursued the Island Copper topic. In any case, Moore went on to work for Greenpeace for 15 years. See Aspinall, *The Story of Island Copper*, 31.

[121] For this characterization of Moore and coverage of the hearings, see Doug MacRae, "Put mine waste in ground, salmon group urges Utah," *Victoria Times*, 2 December 1970, 1; and Doug MacRae, "Do citizens care about pollution?," *Victoria Times*, 12 December 1970, 1.

permitting process, which relied almost entirely on studies conducted by applicants. The increasingly sophisticated deployment of science and expert authority by environmentalists allowed them to challenge the exclusive technocratic authority of industry and government. The scientific expertise and engineering bias of the Pollution Control Branch came under fire as critics advanced ecologically based claims.

Environmentalist pressure resulted in unprecedented conditions being attached to the discharge permit issued to Utah in January 1971. The PCB required the company to construct an emergency tailings impoundment on land for use in the event that environmental problems arose in the inlet. The company was ordered to set up and pay for an independent agency to carry out an environmental monitoring program in the inlet. A panel of scientists from U.B.C. was created to evaluate monitoring data on turbidity, seabed covering, water contamination, fisheries impacts, habitat and ecosystem changes, effects on biological productivity, biological contamination and other land and freshwater impacts.[122] These detailed anti-pollution conditions were touted as the most restrictive ever applied to a Canadian resource development, though the project was still regarded by some as a gigantic "experiment" on the effect of mine tailings in the marine environment.[123] As D.V. Ellis, a marine biologist at the University of Victoria and scientific panel member subsequently noted, the Island Copper Mine became a test case not only for tailings disposal, but for environmental impact assessment and monitoring procedures that became

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[122] ICM fonds, box 1 section 4.10.1 contains the "pre-operational report" of the panel as well as the Summary Reports for the first few years of monitoring. The panel's initial report contained a survey of baseline water quality and ecological conditions of the inlet, something never conducted by the company. Much of the vast ICM holding at the University of Victoria consists of technical reports of this and subsequent company monitoring programs over the life of the mine. The executive summaries of these and other reports can be accessed online through www.gateway.uvic.ca/archives.

[123] "Utah wins permit – with safeguards," *Victoria Colonist*, 21 January 1971, 1; "Pollution 'safeguards' forced on Utah," *Victoria Times*, 21 January 1971, 1; Leonard Taylor, "Utah: A $74 million anti-pollution test tube," *Vancouver Province*, 25 January 1971, 4; Charles Wolverton, "Tailings rich for science," *Vancouver Province*, 2 June 1971, 9.

standard for similar developments worldwide.[124]

Along with sewage, pulp mills and the Kaiser and Western Mines episodes, the Utah conflict had exposed environmental issues as the soft underbelly of an aging Social Credit government, one opponents attacked with alacrity. The government's reaction, however, typified the fundamental Social Credit misunderstanding of the political salience of environmental issues.[125] Acknowledging the problem of evaluating resource developments after they had already commenced, the government created a new body, the Environment and Land Use Committee. Lands, Forests and Water Resources Minister Ray Williston indicated that the Utah affair was the key factor behind the establishment of the committee.[126] However, the ELUC was comprised of ministers from relevant departments, with their respective deputy ministers serving as a "technical committee." The government described this arrangement as a way to ensure social, ecological and economic factors were considered before development. But critics derided ELUC for further centralizing and politicizing pollution-control and resource-development issues. As one commentator put it in the *Victoria Times*, "It seems quite clear the balance, in the eyes of the government, is still tipped heavily in favor of development. Not development at any price,

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[124] Derek Ellis, "Mining – Island Copper (Canada)," chap. in *Environments at Risk: Case histories of impact assessment* (Berlin: Springer-Verlag, 1989), 75-76. See also his preface to Derek V. Ellis, ed., *Marine Tailings Disposal* (Ann Arbor, MI: Ann Arbor Science), 1982, and C. A. Pelletier, "Environmental Data Handling and Long-term Trend Monitoring at Island Copper Mine," in the same volume.

[125] The decadent Social Credit administration of 1969-1972 repeatedly referred to environmental quality as part of its "Good Life" platform, but rarely betrayed anything more than a superficial understanding of ecological problems. Premier W. A. C. Bennett tended to equate pollution control with aesthetics, and regarded "pollution" as a kind of environmental buzzword with which to spice up speeches, such as the comment that the north of the province was to become "a pollution-free area where people can become part of opening up a new empire." Jes Odam, "Pollution-free idyll planned in north," *Vancouver Sun*, 22 August 1970, 1. On the bankruptcy of Social Credit environmental policy, see Robin, *Pillars of Profit*, 292-94.

[126] "Environment first," *Victoria Colonist*, 23 January 1971, 16; "Williston unveils measures to prevent another Utah," *Vancouver Sun*, 26 January 1971, 26; "B.C. cabinet takes reins on pollution," *Victoria Colonist*, 28 January 1971, 1; "Responsibility where it should be," *Victoria Colonist*, 30 January 1971, 4; "PCB won't make political decisions," *Victoria Times*, 27 January 1971, B.C. Legislative sessional clipping books [microform]. On the initial composition and activities of the ELUC under Social Credit, see Williston fonds, box 8 file 10.

perhaps, but still development over the preservation of the environment where natural resources exist."[127]

Much like the Annacis Island controversy for sewage disposal, the Island Copper Mine case marked a watershed in environmental issues in B.C. Disputes over mine tailings disposal exposed the deep flaws in the province's pollution-control structures, guided as they were by the engineering mentality of assimilative capacity. The Pollution Control Board and Branch proved loath to impose stringent anti-pollution conditions that might hamper development. Despite its growing presence in regulating industrial development, the board struggled to gain public confidence under the appearance of political interference. As one columnist lamented, "What the environmentalists want is an honest government effort to ensure that this development is not encouraged at the expense of our greatest resource — the province itself."[128] Fundamentally, the board was saddled with ineffective legislation rooted in the old provincial water law, which treated pollution as a kind of natural resource to be parcelled out amongst applicants, rather than a problem to be curtailed or regulated. The Social Credit government, whose string of election wins between 1952 and 1972 were rooted in the aggressive development of the resource frontier, proved deaf to the growing calls for effective environmental legislation. As Lucas and Moore noted, the controversy revealed the government's deep antipathy to public participation in resource management.[129] Only the potent public and media pressure of the Utah controversy forced

[127] Ian Street, "B.C. government not even trying to save environment," *Victoria Times*, 16 May 1971, 5. See also Bruce Yemen, "Conflict abounds in B.C.'s anti-pollution approach," *Victoria Colonist*, 30 January 1971, B.C. Legislative sessional clipping books [microform].

[128] Doug MacRae, "Do citizens care about pollution?" *Victoria Times*, 12 December 1970, 1; Bruce Yemen, "Why does gov't fear unknowns of pollution?" *Victoria Times*, 26 December 1970, 3. SPEC's thwarted appeal process is documented in SPEC Archive, box 994.02.02 file 2 and *IntroSPECt*, 12-30.

[129] Lucas and Moore, "The Utah Controversy."

innovations in environmental governance. The virtual exclusion of ecological considerations from waste-disposal decisions was replaced, however cynically, by the rudiments of environmental planning and monitoring processes.

Opposition to mining pollution was rooted in an alternative conception of the province's water not merely as a resource for exploitation, but as ecologically and symbolically valuable. To a certain extent, these ideas were rooted in the changing political economy of the province, where a youthful, urbanized and affluent population advanced new notions of value in nature. Yet these ecological appeals could also come from surprising sources, such as unions, workers and ratepayers' groups, who had begun to question the environmental costs of the relentless exploitation of natural resources. A snapshot of the groups supporting the march on the legislature to protest the Utah proposal indicates the breadth of this concern: they included the B.C. Natural History Society, SPEC, the B.C. Wildlife Federation, the International Woodworkers of America, the Pacific Trollers' Association and various industrial unions.[130] Pollution provided a rallying point for a broad spectrum of British Columbia society, from sportsmen to hippies to housewives, to launch criticism of the perceived plundering of provincial resources.

Ironically, the substantive criticisms of the Utah tailings-disposal plan were proven both right and wrong. As the 1970s progressed, evidence emerged that the tailings, rather than remaining on the bottom of Rupert Inlet, were subject to upwelling, creating turbidity and had been transported into neighbouring Holberg Inlet and even into Quatsino Narrows. A damning federal Environmental Protection Service report in 1978 accused the tailings of obliterating benthic (seabed) habitat, which led to a further round of scientific disputes and allegations of bias on the

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[130] "Gov't buildings picketed to protest sea-dump bid," *Vancouver Sun*, 29 November 1969, 10; "Labor council hits dump plan," *Victoria Times*, 20 November 1969, 14; "'One letter worth 1,000 signatures'," *Victoria Times*, 21 November 1969, 31.

part of the company's environmental-monitoring program.[131] Still, after nearly three decades of operation, it appeared that the ultimate environmental effects of the tailings dumping were limited. The mine tailings did coat the bottom of Rupert Inlet and were swept into neighbouring Holberg Inlet and Quatsino Sound. Bottom fauna quickly recolonized these areas however, and fish and shellfish populations recovered to their pre-mining numbers and diversity shortly after the mine's closure in 1995.[132] Some time later, Moore himself acknowledged that while he had accurately predicted these problems, the ocean was probably the best place for the tailings. The Island Copper Mine has been hailed as a model of environmental impact monitoring and any adverse effects of the tailings disposal were expected to be temporary and recoverable.[133]

Conclusion

In late 2003, the United States Environmental Protection Agency ended talks with Canadian mining giant Teck Cominco aimed at cleaning up pollution from the company's Trail, B.C., smelter in Lake Roosevelt, a reservoir downstream on the Columbia River. The EPA contended that heavy metals in lake sediment samples on the American side of the border presented a hazard to aquatic

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[131] D. Goyette and H. Nelson, *Marine Environmental Assessment of Mine Waste Disposal into Rupert Inlet, British Columbia* (Vancouver: Environmental Protection Service, 1977). "Pollution panel president 'biased'," *Vancouver Sun*, 17 January 1978, A19; "Sludge from copper mine 'destroying' life in 2 inlets," *Vancouver Sun*, 20 January 1978, B1; "Inlet report 'unscientific'," *Vancouver Sun*, 21 January 1978, A1; "How much worse?," *Vancouver Sun*, 25 January 1978, A4. The controversy over the Goyette report led to a further "independent" scientific review: Michael Waldichuk and R. J. Buchanan, *Significance of Environmental Changes Due to Mine Waste Disposal into Rupert Inlet* (Vancouver: Fisheries and Oceans Canada and B.C. Ministry of Environment 1980). These authors confirmed many of Goyette's observations, and recommended certain modifications to discharge procedures and the environmental-monitoring program, as well as further research. The Utah issue also sparked considerable debate at a Pollution Control Board public hearing into the mining industry: see British Columbia. Ministry of the Environment, *Public Inquiry to Review Pollution Control Objectives for the Mining, Mine-Milling and Smelting Industries of British Columbia* (Ministry of Environment 1978), vol. 1, 93-103, vol. 4, 64-90; "Pollution panel president 'biased'," *Vancouver Sun*, 17 January 1978, A19.

[132] ICM fonds, box 10, B. Welchman and C. Aspinall, "Mine Closure and Sustainable Development: Island Copper Mine: a Case History," paper prepared for the World Bank Mine Closure and Sustainable Development Workshop (Washington, D.C., 2000).

[133] ICM fonds, box 13 section 4.10.6., Patrick Moore,"Hard Choices for Environmentalists and the Mining Industry," address to Prospectors and Developers of Canada, 10 March 1997; see also his comments in Aspinall, *The Story of Island Copper*, 173-74. On the monitoring program as a pioneering environmental impact assessment, see note 124. The mine closed in 1995 and under a reclamation scheme, the pit was flooded with seawater and remained under continued monitoring for water quality.

life. Over nearly a century of operation at Trail, the company had dumped an estimated 10-20 million metric tonnes of smelter slag, waste rock and other byproducts from its lead-zinc smelter and fertilizer plant into the river. Among the toxic constituents of Cominco waste streams were cadmium, phosphorous, mercury, fluoride and ammonia; other potentially damaging contents included gypsum fibres, heavy metals and very fine waste rock. In spite of pollution complaints dating back to the early twentieth century, government officials tolerated uncontrolled discharges by the Consolidated Mining and Smelting Company (or Cominco) for decades because it assumed that the assimilative capacity of the high-volume river would absorb or disperse the wastes.[134] By the 1970s, when the company finally applied for a pollution control permit, provincial authorities proved willing to adjust their pollution control objectives for this prestigious and influential company. In 1979, the Pollution Control Board allowed a company appeal of the strict effluent-quality standards in its permit, based on the conclusion that no measurable effects from these wastes were detected more than three miles downstream.[135] As the recent EPA action shows, downstream residents are now reckoning with the environmental legacy of this official indulgence of pollution.

The Cominco case echoes the pollution story related in this chapter through less well-known, yet historically significant B.C. mines. The waters of Sheep and Toby creeks, the

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[134] Early complaints about the Trail smelter surfaced in 1909 and 1911, but no action was taken against the company. See note 53.

[135] BCARS, GR-3079 Ministry of Agriculture Specialist Services, box 446-18 file 2 contains a number of documents relating to the technical aspects of the Cominco appeal. For evaluations of the environmental impact of the Trail smelter wastes, see British Columbia, Water Investigations Branch, *Kootenay Air and Water Quality Study Phase I. Water Quality in Region 8, the Lower Columbia River Basin* (Victoria: Ministry of Environment, 1977), and British Columbia, Water Investigations Branch, *Kootenay Air and Water Quality Study Phase II: Water quality in the Lower Columbia River Basin*, (Victoria: Ministry of Environment, April 1979). Cominco's environmental impacts are also discussed in the Mining Association of B.C.'s brief in British Columbia, Ministry of the Environment, *Public Inquiry to Review Pollution Control Objectives for the Mining, Mine-Milling and Smelting Industries of British Columbia* (Victoria: Ministry of Environment, 1978), vol. 5 exhibit A, 99-100, 185.

Similkameen and Elk rivers, Buttle Lake and Rupert Inlet were environments deliberately enrolled by the mining industry for the disposal of its waste products. The industry adamantly maintained that the effects of tailings disposal were ephemeral — that once mines closed, nature would wash away any localized, temporary problems created. This justified their fierce opposition to anti-pollution regulations. In some of these cases, such as at Toby Creek and at Rupert Inlet, the assimilative capacity of the environment appeared able to absorb these wastes with only transitory environmental effects. In other cases, however, the longer-term effects of uncontrolled dumping have included the destruction of fish habitat through soil erosion and siltation of creeks, the bioaccumulation of heavy metals and the concentration of toxic chemicals in sedimented tailings.

The cases illustrate how mine pollution regulation in B.C. was forged from a combination of particular legal and political circumstances. Early in the twentieth century, the industry used its economic clout and political influence to limit environmental regulation. The unique constitutional and administrative arrangements for fisheries protection under the Fisheries Act empowered fishery protection officials to prompt mining companies to act in an environmentally responsible manner. This authority nurtured a growing environmental-regulation capacity within the B.C. Fish and Game Branch, which acted as a buffer against the relentlessly pro-development policies of its own government's political representatives. As its role in the Buttle Lake controversy showed, the branch developed into the province's de facto environment ministry, defending environmental quality against the depredations of industry more forcefully even than the provincial Pollution Control Board. In contrast with the PCB's engineering view of the environment as assimilative capacity, the branch asserted the importance of water quality to ecological health in the evaluation of industry's environmental impacts.

The conflicting roles of the Fish and Wildlife Branch and the PCB provide insight into the complex and often contradictory impulses that guide government environmental actions. James Scott has suggested that attempts by the modern state to re-engineer nature and society through rational, scientific planning often fails, sometimes catastrophically, due to the failure of planners to account for environmental or social complexity. His accounts of German forestry, Brazilian city planning and Soviet collectivization tend to portray the state as a unitary actor, inexorably extending its bureaucratic control over a "simplified" nature and society.[136] Similarly, the Social Credit government of W.A.C. Bennett, has been portrayed as unswervingly dedicated to industrial development through the exploitation of natural resources. Any efforts at resource conservation have been dismissed as symbolic policies designed to protect and foster the liquidation of provincial resources.[137] However, the anti-pollution efforts of the provincial Fish and Game Branch suggest that it provided an important countervailing force to this development drive. The branch was overworked, underfunded and often ignored by other ministries. Yet it developed a significant anti-pollution research and investigation capacity, influenced resource-development policies and provided the B.C. environment with a modicum of protection long before pollution-control authorities were empowered or became active in regulating industrial discharges. Its efforts suggest a wariness regarding generalizations about the "state" or the "government" in assessing the development of environmental governance.

Controversies over mining pollution in the late 1960s and 1970s registered the changing environmental values and politics of the period. A public increasingly sensitized to pollution and environmental quality began to question whether large-scale industrial developments always

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[136] James C. Scott, *Seeing Like a State: How certain schemes to improve the human condition have failed* (New Haven: Yale University Press, 1998).

[137] Robin, *Pillars of Profit*; Jeremy Wilson, "Forest Conservation in British Columbia, 1935-1985: Reflections on a barren debate," *BC Studies* 76 (Winter 1987/88), 3-30.

constituted "progress." While isolation meant that their environmental impacts may not have been widely perceived, mines could also be seen as the "skunk in the garden" in comparison with the surrounding wilderness.[138] New concerns for environmental quality were articulated, along with fears that ecological degradation could result in the destruction of civilization. For many, the mining industry epitomized this destructive tendency, with its demands to mine in parks and its antipathy to pollution controls. The Social Credit government and its pollution-control authorities resisted demands for greater public input into resource decision-making. As was the case with the Annacis Island sewage treatment debate, the Kaiser coal and Island Copper Mine episodes exemplified the government's disdain for public participation and accountability. Mining pollution controversies, however, further damaged the government's frayed credibility on environmental issues. While not a decisive issue, the poor Social Credit environmental record certainly contributed to the government's election loss to the New Democratic Party in 1972.[139] Public pressure and even court challenges forced provincial authorities to include public input. Changing environmental values and new avenues for public scrutiny of mining projects would prove influential in late-1970s issues such as the Quinsam coal development, the AMAX molybdenum mine and the decision to declare a moratorium on uranium mining in B.C.[140]

The story recounted here also suggests connections between the environmental politics of mining in the United States and Canada. Mining "wounded the west" in Canada, just as it did in

[138] E.F. Roots, "Mining, Environment, and Control," in Stephenson, ed., *Practical Application of Economic Incentives*, 100.

[139] This is suggested in the account of the 1972 campaign in Robin, *Pillars of Profit*, 306-07; see also the pre-election editorial, "The election and the environment," *Vancouver Province*, 16 August 1972, 4, and columnist Bob Hunter's post-election reflection, "Bob Hunter," *Vancouver Sun*, 21 September 1972, 41.

[140] Gamey, *Mining Conflicts*.

Montana, Idaho and Colorado. The intense debates in B.C. over the environmental impacts of mining directly echoed the strong public reaction against mines across North America. By the 1960s, as Duane Smith notes, mining was widely characterized as rapine, and the industry struggled to reform its environmental image.[141] Many of the industry's leaders, including Utah Mining and Construction, AMAX, Asarco and Cominco, were continental actors who influenced mining attitudes and practices on both sides of the border. But the history of mining regulation also provides points of contrast, both in terms of legal regimes and political contexts as well as local environmental impacts. These cases suggest that litigation played a far less important role in restricting mining pollution in B.C. than in the U.S., while the legislative authority to control pollution under the federal fisheries act provided avenues for pollution abatement not found in the U.S. Such common connections, themes and issues suggest the possibilities for a fully comparative environmental history of mining in the North American west.

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[141] Smith, *Mining America*, chaps. 9 and 10.

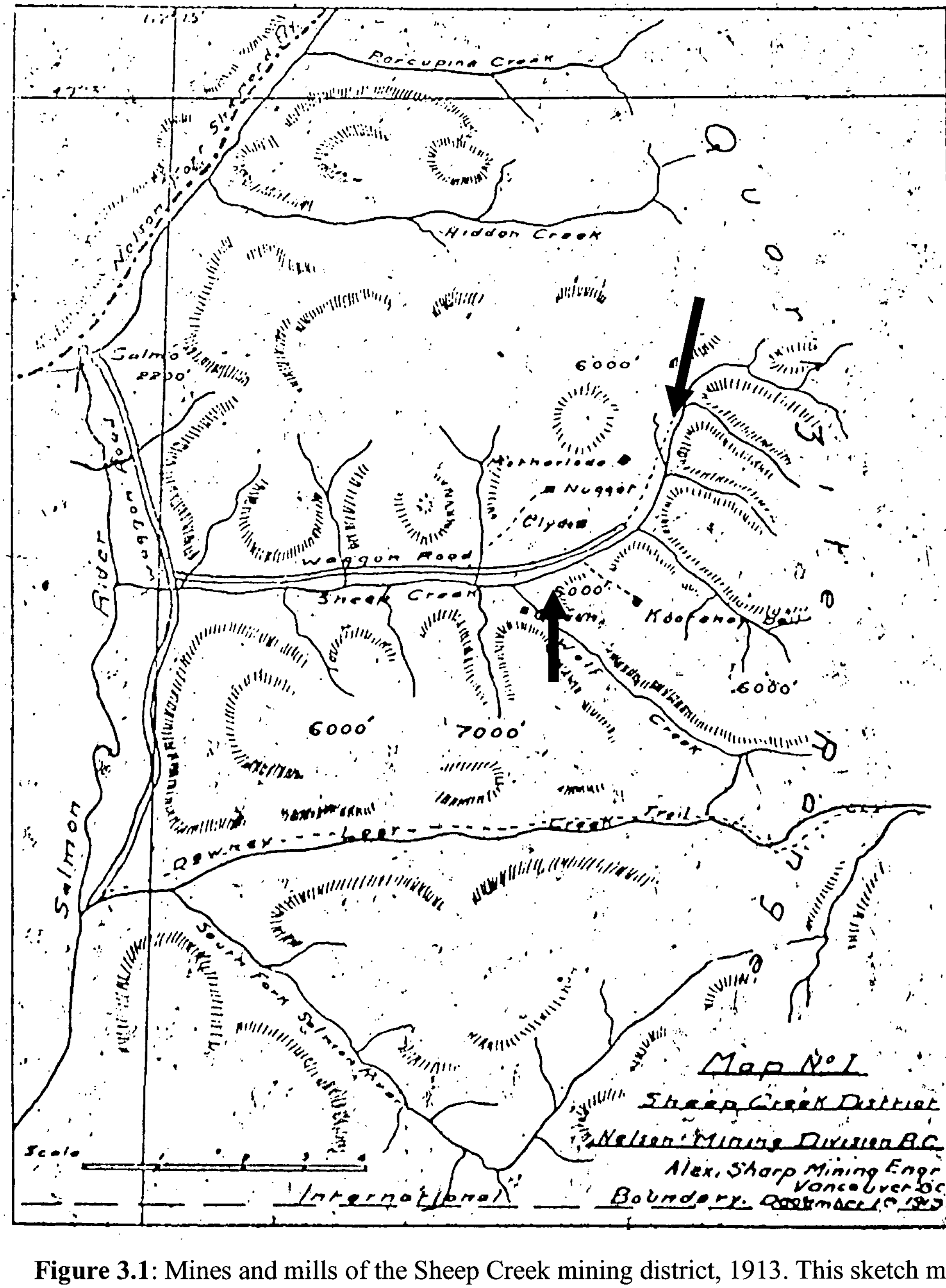

Figure 3.1: Mines and mills of the Sheep Creek mining district, 1913. This sketch map by mining engineer Alexander Sharp illustrates the rugged terrain that typified the Kootenay and Boundary mining districts. The location of the Queen and Motherlode mines are indicated by arrows. Source: Alexander Sharp, *Report on the Queen Mines, Salmo, B.C.* (Vancouver, 1913).

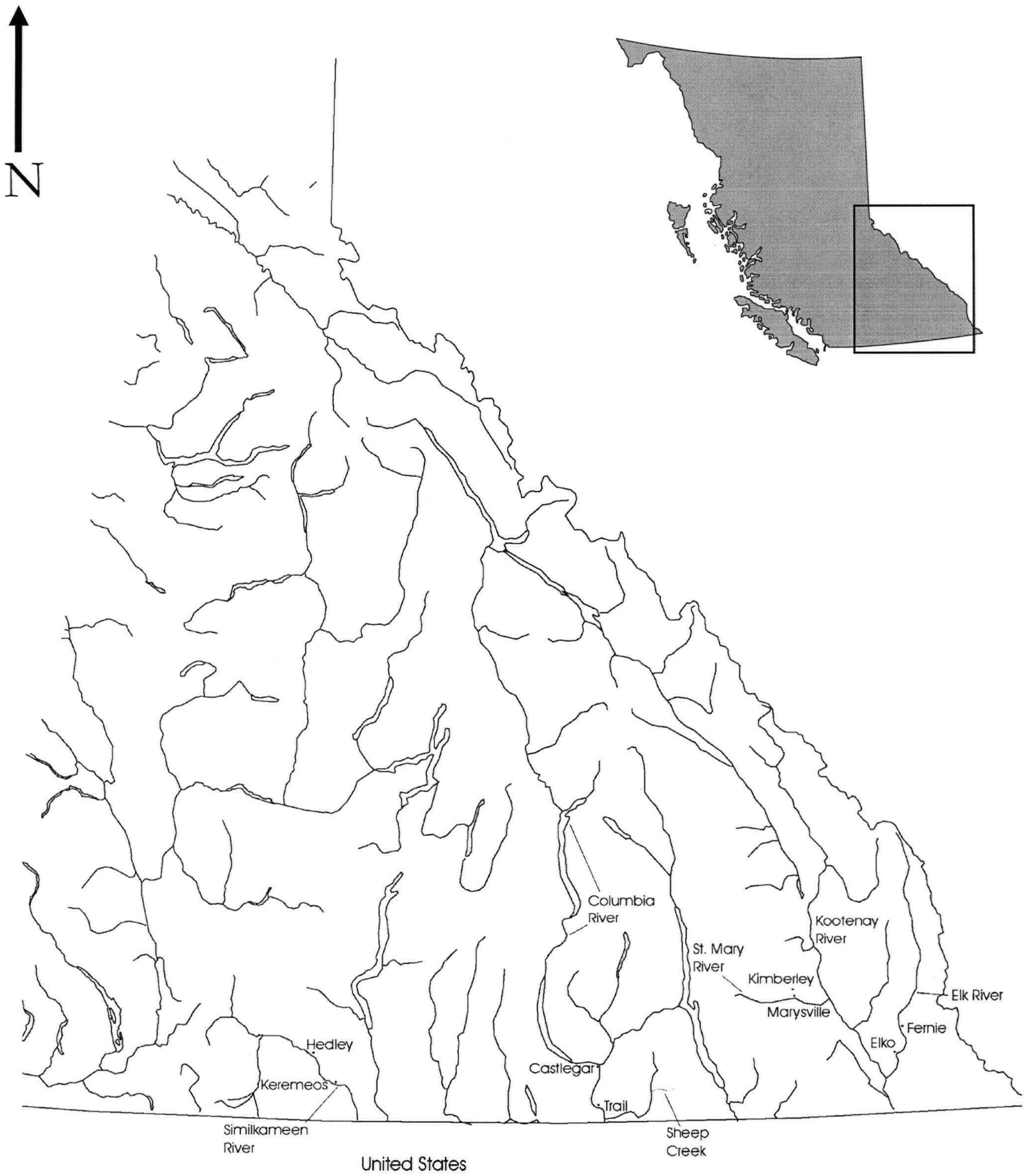

Figure 3.2: Southeastern B.C., showing the location of towns and rivers referred to in Chapter 3.

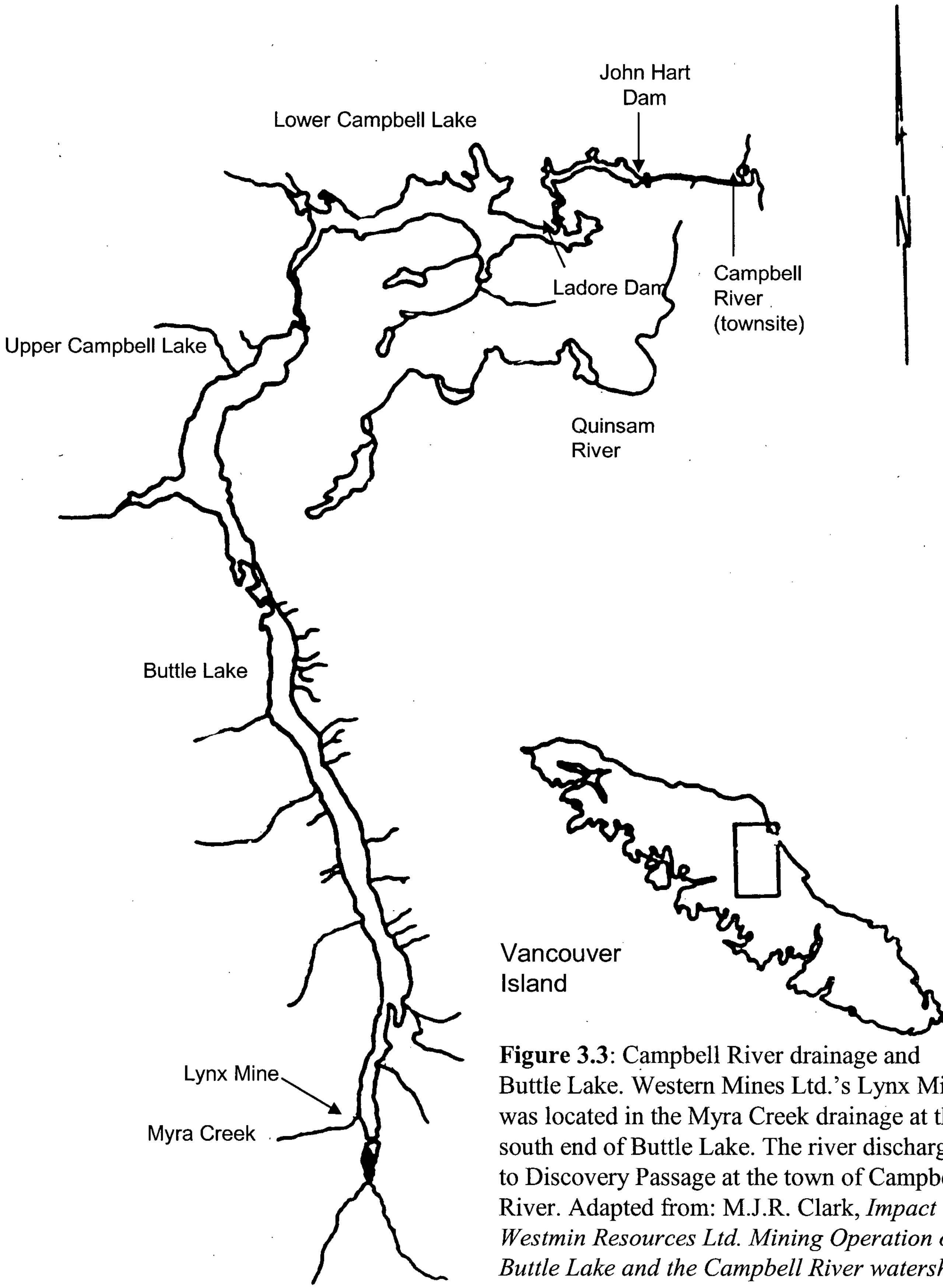

Figure 3.3: Campbell River drainage and Buttle Lake. Western Mines Ltd.'s Lynx Mine was located in the Myra Creek drainage at the south end of Buttle Lake. The river discharges to Discovery Passage at the town of Campbell River. Adapted from: M.J.R. Clark, *Impact of Westmin Resources Ltd. Mining Operation on Buttle Lake and the Campbell River watershed* (Victoria: Ministry of Environment, 1982).

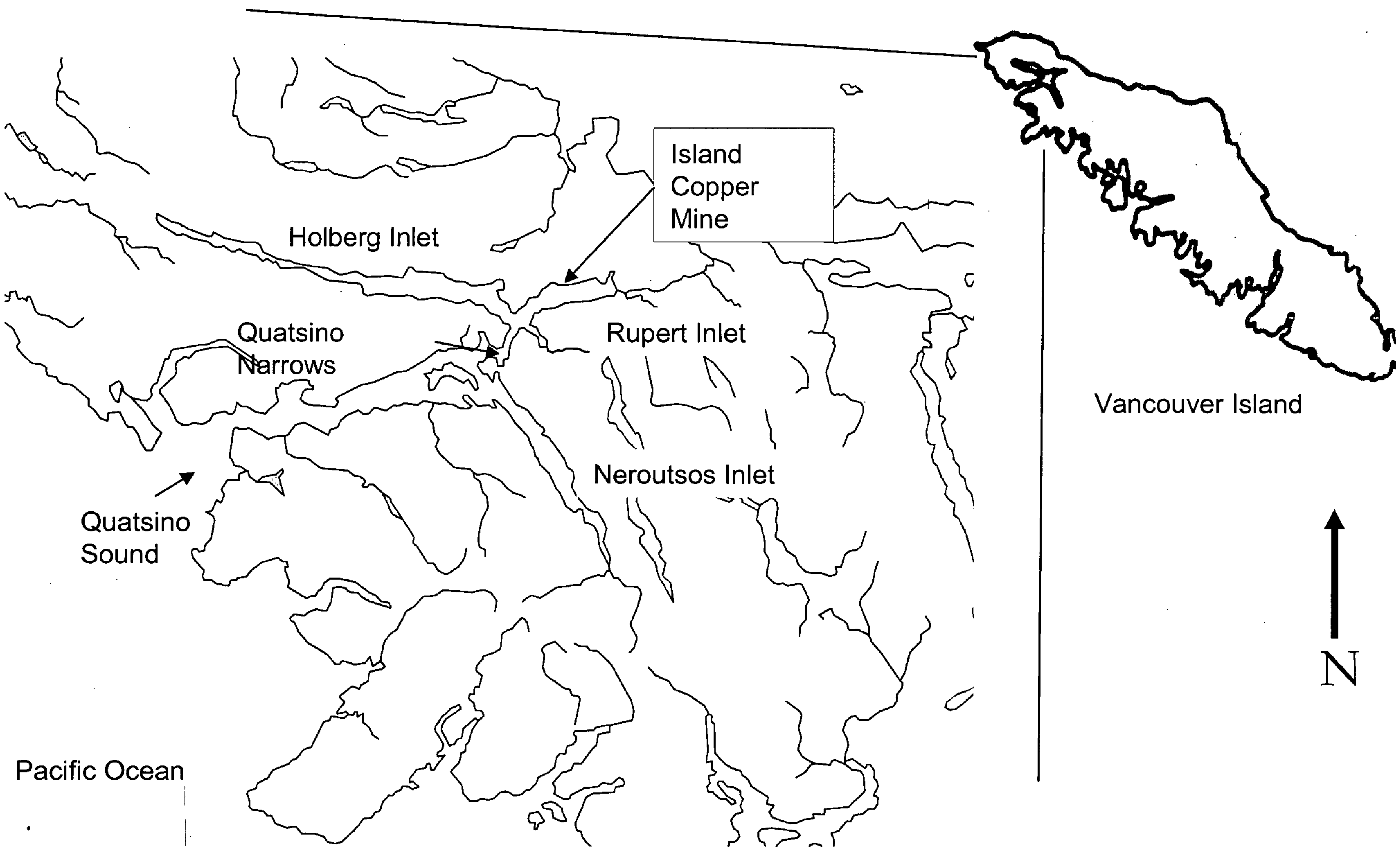

Figure 3.4: Quatsino Sound on northwestern Vancouver Island, showing the location of the Island Copper Mine on Rupert Inlet.

Chapter 4
Governing Assimilative Capacity: The science and politics of pulp mill pollution

Pollution, as environmental economist Jouni Paavola writes, creates "interdependencies" between resource users — those who use the environment for waste disposal, and those who require a clean environment. These interdependencies, or conflicts, are typically resolved by state environmental laws and regulations, although they may also be regulated by market forces or informal common-property regimes. Paavola describes state environmental policies as "institutions that govern the use of environmental resources and resolve conflicts between agents that have interdependent interests."[1] Pulp mill pollution control in B.C. presented a regulatory problem because of its "interdependency" with another economic resource, the commercial fishery. Since both the pulp and paper industry and the fishery required access to the same resource, water, these industries became caught in a web of environmental conflict and regulation.

Driven by American demand for newsprint and other paper products, in the early twentieth century the pulp and paper industry emerged as a major manufacturing industry in many parts of Canada. Pulp and paper production was extremely energy- and water-intensive, and resulted in the discharge of a high volume of liquid wastes containing residual process chemicals, organic compounds and wood fibres. In B.C., the development of the industry along coastal inlets and major salmon rivers definitively shaped the legal, institutional and political response to pulp mill pollution. On the one hand, the diluting capacity of ocean inlets and large rivers was regarded by industry as sufficient to ensure no adverse environmental effects from pulp mill wastes. On the other hand, the potential impact of these wastes on the commercial fishery shifted the scale of

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[1] Jouni Juhani Paavola, "Governing Waters: The development of water pollution policy in the United States, 1850-1980," PhD (Michigan State University, 2000), 46.

environmental regulation. Because commercial fisheries management was a federal government responsibility in Canada, federal fisheries officials played a greater role in addressing pulp mill pollution than they did in confronting other water pollution problems. This arrangement brought federal regulations and institutions into conflict with provincial industry and regulatory authorities. However, the capacity of federal officials to "govern" waste disposal was constrained by problems of authority and knowledge. Before the 1970s, federal officials resisted the politically unpalatable enforcement of the strict anti-pollution sections contained in the federal Fisheries Act. Rather, federal fisheries institutions attempted to cooperate with the industry to develop scientific knowledge and strategies to protect fish habitat from pulp mill pollution without resorting to law enforcement.

Efforts by federal fisheries regulators to confront and control pulp mill pollution in B.C. demonstrated the influence of place and environment on both scientific endeavour and environmental governance. The following account of the regulatory history of the B.C. pulp and paper industry highlights the interplay of science, politics and environmental regulation. In his study of nineteenth-century water-quality science in England, historian Christopher Hamlin has described how history and politics decisively influenced how research was conducted and its results interpreted. Rather than the progressive discovery and application of eternal principles to environmental control, Hamlin's study concludes that the development of science-based regulations is best understood as a contested project of social and political consensus-building around a particular construction of nature.[2] As a "rich and expressive idiom" of conflicts over the control of nature, water science became a disputed source of authority for the state regulation of

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[2] Christopher Hamlin, *A Science of Impurity: Water analysis in nineteenth century Britain* (Berkeley: University of California Press, 1990), 4.

water. As the geographer David Livingstone asserts, scientific knowledge is also an artifact of place and time, the particular geographical and historical circumstances in which it is produced.[3] Environment, too, plays a role in shaping scientific practices and constructions of nature; Matthew Evenden posits that "scientific ideas are not simply discursive constructions; they also represent complex relationships between humans and the rest of nature."[4] As this chapter shows, the particular environmental and political conditions of the B.C. pulp and paper industry shaped the attempts by fisheries scientists and regulators to develop scientific authority for the regulation of pulp mill effluent.

Federal regulatory strategies changed through time and space, in relation to shifting political circumstances, and in response to changing scientific understanding of the environmental impacts of pulp mill effluent. These changes are explored through three episodes in the environmental governance of pulp mills in B.C. The first episode examines the pollution research program developed by Fisheries Research Board oceanographers in the 1950s. This research aimed to establish a scientific basis for regulating the expanding coastal industry. As the example of the effluent disposal planning for Alberni Inlet on Vancouver Island reveals, this project sanctioned the exploitation of the ocean's assimilative capacity as a sink for industrial waste. In the second example, the establishment of pulp mills in the Fraser River watershed in the 1960s threatened the economically and symbolically important salmon fishery that was nurtured on the Fraser system's spawning grounds. In an important shift in approach, the International Pacific

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[3] David N. Livingstone, *Putting Science in its Place: Geographies of scientific knowledge* (Chicago: University of Chicago Press, 2003).

[4] Matthew Evenden, "Remaking Hell's Gate: Salmon, Science, and the Fraser River, 1938-1948," *BC Studies* 127 (Autumn 2000), 50. Other recent perspectives on science and environmental history that have influenced this analysis include: Arthur F. McEvoy, *The Fisherman's Problem: Ecology and the law in the California fisheries, 1850-1980* (Cambridge: Cambridge University Press, 1986); and Richard Rajala, *Clearcutting the Pacific Raincoast: Production, science and regulation* (Vancouver: University of British Columbia Press, 1998).

Salmon Fisheries Commission, which administered the fishery under a Canada-U.S. treaty, rejected the use of assimilative capacity in favour of a policy of non-toxicity of all waste discharges. Like the Fisheries Research Board, the IPSFC developed scientific knowledge to demand innovative waste treatment practices at new interior mills. Finally, I consider the changes to the federal regulatory regime in the early 1970s that resulted in the development of effluent quality regulations aimed at controlling pulp mill pollution across Canada. The application of these regulations to existing operations was fraught with jurisdictional conflict and practical difficulties. At Port Alice, one of the province's oldest — and dirtiest — mills, complex local environmental and social conditions confronted government pollution regulators as they sought to enforce these tighter pollution controls. New provincial and federal regulations threatened to close the mill, the sole support of a remote, economically dependent community. If, as G. Bruce Doern has suggested, the pulp and paper industry is "a veritable microcosm of the Canadian political economy," the controversy over pollution at Port Alice embodied the historical and geographical problems of environmental governance not only in B.C., but in Canada.[5]

The production of pulp and paper from wood involves the separation of wood fibres and their recombination into paper and other products. Before the mid-nineteenth century, paper-making used various fibrous materials, including rags, hemp and other plants.[6] Mechanically ground wood fibres were sometimes used in combination with these other materials to produce paper, but ground wood alone produced a weaker pulp and inferior paper product. Spurred by

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[5] G. Bruce Doern, "Sectoral Green Politics: Regulation and the Canadian pulp and paper industry," *Environmental Politics* 4, 2 (Summer 1995), 223.

[6] As John Cumbler shows, paper production before the 1880s, which created paper from rags boiled in caustic lime, was responsible for polluting New England rivers. See John T. Cumbler, *Reasonable Use: The people, the environment, and the state, New England 1790-1930* (Oxford, Oxford University Press, 2001), 54-56. Eastern Canadian paper mills used a similar process throughout the nineteenth century, in some cases adding ground wood fibres to the rag pulp to reduce costs.

rising demand for newsprint, packaging and other paper products, processes were developed in Europe and North America in the late nineteenth century to chemically separate wood fibres. The resulting rapid expansion of wood pulp production formed part of the "second industrial revolution," in which new chemicals and chemical processes created an array of new technologies and products.[7] These processes also created a variety of health and environmental hazards, many of which remained undetected or inadequately understood for decades. Historian James Hull asserts that these processes, along with the development of paper-making and bleaching technologies, "allow[ed] paper to be produced in quantities limited ultimately only by ecological factors and the financial and political resources necessary to secure control of softwood forests in Canada and elsewhere."[8] The first chemical process mill in North America was reputed to have been built in Northern Ontario in 1885.[9] By the early twentieth century, virtually all pulp and paper production used one of two chemical processes, known as sulphite and kraft, or a combination of chemical and mechanical processes.

For the first two-thirds of the twentieth century, the pulp and paper industry dominated Canada's manufacturing sector. The industry benefited from access to ample supplies of wood and water, as well as its proximity to the rapidly expanding American newsprint market. The tremendous expansion of pulp and paper production in central Canada began before the First World War, when first the Ontario provincial government, then the federal government, placed

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[7] James P. Hull, "The Second Industrial Revolution and the Staples Frontier in Canada: Rethinking knowledge and history," *Scientia Canadensis* 18, 1 (1994), 22-37.

[8] James P. Hull, "Science and the Canadian Pulp and Paper Industry, 1903-1933" (PhD diss., York University, 1985), 1.

[9] William F. Sinclair, *Controlling Pollution from Canadian Pulp and Paper Manufacturers: A federal perspective* (Ottawa: Environment Canada, 1990), 19; on the nineteenth-century history of the industry, see George Carruthers, *Paper Making in Canada* (Toronto: Garden City Press, 1947).

restrictions on pulpwood exports in order to foster a domestic industry.[10] With American supplies of pulpwood in Michigan and Wisconsin dwindling, American pulp and paper firms were attracted to Ontario and Quebec. This development accelerated further when American publishing interests, including newspaper magnate William Randolph Hearst, successfully lobbied for the removal of the U.S. import tariff on newsprint. "Soon the Canadian papermaking industry became almost exclusively a manufacturer of newsprint," over 90 per cent of which was exported to the U.S. by the end of the 1920s. Unfettered access to the booming American newsprint and paper products markets meant explosive growth for the pulp and paper sector, which by the Second World War led the national economy in value of production and employment.[11]

American demand also stimulated the establishment of the pulp and paper industry on the west coast, although growth was initially slower and more fitful than in central Canada. British Columbia's earliest paper production occurred at a short-lived rag pulp and paper-producing operation at Alberni on Vancouver Island, which closed in 1896 due to a shortage of raw materials. To foster the wood-pulp industry in B.C., the provincial government issued four vast pulpwood leases in 1901. By 1912 three mills on the mainland coast produced both sulphite and groundwood pulp, as well as newsprint: on Howe Sound near present-day Squamish, at Powell River further north on Malaspina Strait and at Ocean Falls on the central coast. These mills exploited the plentiful stands of coastal western hemlock, a species considered undesirable for sawlogs but which produced an excellent pulp product. To an even greater degree than in central

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[10] H.V. Nelles, *The Politics of Development: Forests, mines and hydro-electric power in Ontario, 1849-1941* (Toronto: University of Toronto Press, 1974), 83-87.

[11] Thomas R. Roach, *Newsprint: Canadian supply and American demand* (Durham, N.C.: Forest History Society, 1994), 6; Sinclair, *Controlling Pollution from Canadian Pulp and Paper,* 20-21. As Sinclair documents, the industry doubled in size between 1901-1921 thanks to expanding markets and Canada's vast fibre, energy and water resources. On the environmental consequences of advertising and mass circulation newspapers, see John G. Burke, "Wood Pulp, Water Pollution, and Advertising," *Technology and Culture* 20, 1 (January 1979), 175-195.

Canada, the heavy capital requirements of the industry were supplied by foreign capital from Britain and the United States. After this initial growth spurt, the industry was hampered by market downturns due to wars and Depression; by 1945 there were still only five mills.[12]

After the war, buoyant world demand for pulp and paper products, combined with the spread of kraft pulping, spurred accelerated development. Since kraft pulp production allowed for the use of sawmill wastes such as chips, it attracted forest companies seeking to reduce wood waste by integrating sawmill and pulp mill operations. In 1948, the Macmillan Export Company, forerunner of the B.C. forestry giant MacMillan Bloedel, constructed the province's first kraft pulp mill at Port Alberni on Vancouver Island, which produced pulp from chips and wood waste from its Alberni sawmill. Driven by rapid growth for pulp and paper products, by the late 1950s the number of pulp mills had doubled, and many existing mills had increased production. In the following decade, the wave of industrial expansion into the B.C. interior carried with it the pulp and paper industry. This development was fuelled by foreign direct investment and the rise of integrated forest companies lured to B.C. by vast government timber grants.[13] In 1973 there were two dozen pulp and/or paper mills throughout the southern half of the province, which accounted for about 40 per cent of forest industry production and were major investment, employment and export generators.[14] By this time, raw pulp for export was the primary product of the industry,

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[12] On the early growth of the B.C. industry, see W. A. Carrothers, "Forest Industries of British Columbia," in A.R.M. Lower, *The North American Assault on the Canadian Forest: A history of the lumber trade between Canada and the United States* (Toronto: Ryerson Press, 1938) 312-327; Donald MacKay, *Empire of Wood: The MacMillan Bloedel story* (Vancouver: Douglas and McIntyre, 1982), chap. 3, 85-89; G. W. Taylor, *Timber: History of the forest industry in British Columbia* (Vancouver: J.J. Douglas, 1975), chap. 6.

[13] Taylor, *Timber*, chap. 13; Patricia Marchak, *Green gold: the forestry industry in British Columbia* (Vancouver: University of British Columbia Press, 1983), 38-40.

[14] Jeremy Wilson, *Talk and Log: Wilderness politics in British Columbia, 1965-1996* (Vancouver: University of British Columbia Press, 1998), 21-2; see also a series of promotional accounts published by B.C. Hydro in the 1960s and early 1970s: *The Pulp and Paper Industry of British Columbia* (Vancouver: B.C. Hydro and Power Authority).

rather than newsprint or finished paper products.

The pulping processes developed in the late nineteenth century were enormously energy- and water-intensive, although changing technologies have markedly improved their environmental performance. The two major chemical processes, acid-sulphite and alkaline-kraft, both accomplished fibre separation entirely via chemical action. These processes employed different chemical liquors to cook wood fibres. Chemical pulp was produced in a slurry of water, then dried for sale as market pulp or further treated for the production of paper and other pulp products. These treatments often included bleaching, usually using elemental chlorine.[15] Sulphite mills produced unbleached pulp for newsprint, bleached pulp for finer papers and "dissolving" grades for rayon, acetate and film manufacture, and other specialized paper types. Bleached kraft pulp was used in the manufacture of newsprint, sanitary papers and products such as paperboard and box liners. After the 1940s, the kraft process spread rapidly, since the chemicals used (except for bleachery chlorine) could be recovered and reused in the process, whereas sulphite cooking liquors were wasted each time. The kraft process also produced a stronger pulp and resulted in a higher utilization of wood fibre.

Water was critical to every aspect of the pulping process, from cooking the wood fibres in a chemical broth, to washing the "stock" and bleaching the final product. At each stage, process waters picked up colour, soluble and insoluble wood fibres, carbohydrates and lignin from wood, residual process chemicals and chemical condensates, all of which were discharged with wastewaters. Early in the twentieth century, a typical mill produced over 80,000 gallons of wastewater per ton of pulp produced; even by late century, pulp mills discharged up to 50 million

[15] Neil McCubbin, *The Basic Technology of the Pulp and Paper Industry and Its Environmental Protection Practices*, EPS Report no. 6-EP-83-1 (Ottawa: Environment Canada, October 1983) contains an overview of these processes.

gallons of wastewater per day.[16] The environmental effects of this effluent varied with environmental conditions, the pulping process used and the qualities of the final waste stream. Pulp mill waste was well known for its high biochemical oxygen demand (or BOD, a function of the large amounts of biodegradable organic materials), its suspended solids (usually wood fibre lost in the pulping process, but also from debarking and milling operations), and its colour, odour and foam. Sulphite mills discharged much higher levels of both BOD and fibrous waste. In 1960, one scientist estimated the biochemical oxygen demand of a 500-ton-per-day kraft mill as equivalent to the daily domestic wastes of a city of 236,000; a similar-sized sulphite mill discharged wastes equivalent to 1.9 million people.[17] For much of the century, little was known about the precise environmental effects of the chemical constituents of the waste stream. Since the 1980s, concerns have increased about the health and environmental effects of trace amounts of chemicals contained in pulp mill wastes, including carcinogens such as dioxins and furans.[18]

In spite of their noxious air and water discharges, North American pulp and paper mills were lightly regulated before the 1960s. Located in rural, often single-industry towns, pulp mills enjoyed public and government support. The "paternalistic" relationship between mill owners and employees in company towns may have contributed to public quiescence regarding environmental

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[16] A. J. Bruley, *Training Manual on the Basic Technology of the Pulp and Paper Industry and Its Waste Reduction Practices*, EPS Resport no. 6-WP-74-3 (Environment Canada, May 1974); M. Waldichuk, "Water Pollution from Pulpmill Effluent in British Columbia: A general overview," in W. M. Pomeroy, ed., *Proceedings of Pulp Mill Effluent Monitoring*, (Ottawa: Environmental Protection Service, May 1983), 17; P.A. Larkin, *Freshwater Pollution, Canadian Style* (Montreal and Kingston: McGill-Queen's University Press, 1974), 59-60.

[17] Michael Waldichuk, "Pulp Mill Pollution in British Columbia," *Pacific Biological Station Circular* 57 (June 1960).

[18] These include a family of chemical compounds known as chlorinated organics, which are not only toxic but persistent, accumulating in the environment and in animal and plant tissues. Sinclair, *Controlling Pollution from Canadian Pulp and Paper*, 217; Sierra Legal Defence Fund, *Pulping the Law: How pulp mills are ruining Canadian waters* (Vancouver and Toronto: Sierra Legal Defence Fund, 2000).

damage.[19] U.S. states and Canadian provinces, which retained the principal authority to set and enforce their own water quality standards, were disinclined to pursue polluting mills. In the United States, geographer Craig Colten and engineer Peter Skinner have concluded that "the few cases in which the state took action against polluters indicates there was little effective pressure for manufacturers to abide by existing laws before the late 1960s."[20] The same may be said of Canadian governments. In one extreme case, the Ontario government thwarted a private civil action against the Kalamazoo Vegetable and Parchment Co. mill in Espanola, passing special legislation allowing the company to continue polluting the Spanish River.[21] In the absence of strong provincial regulations, the most potent environmental-protection legislation in Canada was the Fisheries Act. The act directly targeted wastes from the wood-products industry in its anti-pollution regulations: the sections of the act prohibiting the deposit of "deleterious substances" into fish-bearing waters specifically proscribed mill rubbish and sawmill wastes. Thus, federal fisheries inspectors were the country's most important industrial-pollution regulators.[22] The existence of the law did not ensure either enforcement or compliance. The absolute prohibition of

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[19] The term "paternalism" is developed in William D. Solecki, "Paternalism, Pollution and Protest in a Company Town," *Political Geography* 15, 1 (1996), 5-20. In *Green Gold, op cit.*, Marchak discusses the dominance of rural resource-dependent towns by forest corporations, and argues workers were "tied to the beast" even when critical of it.

[20] Craig E. Colten and Peter N. Skinner, *The Road to Love Canal: Managing industrial waste before EPA* (Austin, University of Texas Press, 1996), 129; see also Peter C. Yeager, *The Limits of Law: The public regulation of private pollution* (Cambridge, Cambridge University Press, 1991), 58-61.

[21] McKee v. KVP Co. [1949] 1 Dominion Law Reports 39; Donald A. Chant, ed., *Pollution Probe* (Toronto: New Press, 1970), 70; Doug Macdonald, *The Politics of Pollution: Why Canadians are failing their environment* (Toronto: McClelland and Stewart, 1991), 180. On Canadian provincial regulation up to the 1970s, see Jim Anderson, *Provincial Legislation Respecting the Pollution of Waters by Phosphates, Pulp and Paper and Human Sewage* (Ottawa: Ministry of State for Urban Affairs, December 1972). On weak state regulation in the U.S., see Yeager, *The Limits of Law*, 58-61; Council on Economic Priorities, *Paper Profits: Pollution in the pulp and paper industry* (Cambridge, Mass.: The MIT Press, 1972), 35-39.

[22] In the nineteenth century, streams were damaged by sawdust pollution and log-driving activities in eastern Canada. This led early conservationists to lobby provincial and federal governments for laws to prohibit the dumping of sawdust in rivers and lakes, leading to the passage of separate anti-sawdust dumping legislation in 1873. Gilbert Allardyce, "The Vexed Question of Sawdust": River pollution in nineteenth century New Brunswick," *Dalhousie Review* 52, 2 (1972), 177-90; R. Peter Gillis, "Rivers of Sawdust: The battle over industrial pollution in Canada, 1865-1903," *Journal of Canadian Studies* 21, 1 (Spring 1986), 84-103.

waste discharges under the Fisheries Act made it difficult to enforce. Since governments were unable to prevent all waste dumping, enforcement was usually only triggered by proof of damage to fish. Such evidence often remained elusive. This also meant that the legislation punished damage after the fact, rather than preventing pollution. Attempts by fisheries inspectors to prosecute sawmills under the Fisheries Act encountered difficulties in documenting the charge, as well as magistrates sympathetic to local industries. In any case, the paltry fines under the act were a poor deterrent to pollution.[23]

Toxic tides: science and the regulation of assimilative capacity on the B.C. coast

In British Columbia, the early pulp industry benefited from the transportation and wastewater disposal options available on tidewater. Despite the seemingly limitless dilution potential of the ocean, pulp mills quickly came into conflict with the other major oceanic resource, the fishery. However, there is no evidence that the Fisheries Act provisions were enforced against pulp mills in B.C. before the 1970s. The earliest documented complaint about pulp mill effluent was registered against the B.C. Sulphite Fibre Co. pulp mill on Howe Sound in 1912, when fishery inspector W.M. Moore, hearing reports of shellfish poisoning and foul waters near the mill, sent water samples to the federal fisheries department laboratory in New Westminster for analysis. The samples were "strongly acidic" and contained sulphides and chlorides considered toxic to fish. Initially, Chief Fisheries Inspector F.H. Cunningham demanded the mill correct the problem, under threat of prosecution. In response, the mill suggested that the effluent was amply diluted with wash waters and excess water from its power generators before discharge, and contended that cod were

[23] National Archives of Canada, Vancouver Branch (NAC-Van), RG 23 Department of Fisheries, PR vol. 2308 files 2-5; PR vol 2236 file 9-O1-O5; PR vol 2237 file 9-S6-S19 document some of these problems. Federal fisheries officials seemed to take the lead in most of these investigations until the 1940s, although provincial and federal officials pledged to collaborate on reporting, investigation and enforcement. See British Columbia Archives and Records Service (BCARS), GR-0435 Department of Fisheries, box 123 files 1223-24 and 1228 for examples of sawdust pollution.

regularly caught from the mill's docks. Seeming to accept these explanations, the federal fisheries department quickly withdrew its threats.[24]

The federal government turned to scientific research to reckon with pollution problems as the coastal pulp and paper industry expanded. Fisheries officials regarded pollution, along with log jams, stream damage and rock slides, as a technical problem, an "obstruction" to the conservation and development of commercial fish stocks. Research into these problems was conducted through the Biological Board of Canada (later renamed the Fisheries Research Board of Canada [FRB]). Although administered by an independent board, the FRB responded to research questions directed to it by the Minister of Fisheries, as well as by local Department of Fisheries officials. In 1908, the board established two permanent research stations, on the Atlantic coast at St. Andrews, N.B., and on the Pacific coast at Nanaimo on Vancouver Island. Government scientists and visiting university researchers based at the Pacific Biological Station studied west coast marine biology, the biology and life-history of target species, oceanographic conditions and climatological factors affecting the fishery. They also investigated "fish cultural" problems such as stream obstructions, spawning conditions and artificial propagation. A Pacific Fisheries Experimental Station was added at Prince Rupert in 1926 to conduct research into fish harvesting and processing technologies.[25]

As the FRB developed into "one of the finest aquatic research establishments in the world,"[26] it also conducted some of Canada's earliest studies of water pollution. These studies

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[24] NAC-Van, RG 23 Department of Fisheries, PR vol. 2307 file 1-12.

[25] Kenneth Johnstone, *The Aquatic Explorers: A history of the Fisheries Research Board of Canada* (Toronto: University of Toronto Press/Fisheries Research Board, 1977), chap. 6, 9.

[26] James W. Parlour, *The Urban Pollution Study: Summary report* (Ottawa: Ministry of State for Urban Affairs, September 1974), 35.

included the first efforts by fisheries scientists to analyse pollution problems through laboratory tests. The FRB-sponsored research by A.P. Knight at Queen's University around the turn of the century included an analysis of the toxicity of sulphite pulp mill waste from a mill at Chatham, N.B.[27] Knight developed early "bioassay" testing procedures, using live fish in a controlled environment to test the effects of pollution on survival. Acknowledging the potential impact on fish life and habitat, he nevertheless concluded that the effects of sawdust and pulp mill wastes were minimal in waterways that afforded ample dilution. FRB field surveys of specific pollution problems began on both coasts in the 1920s and 1930s. A.H. Hutchinson and C.C. Lucas conducted a survey of Neroutsos Inlet on northwestern Vancouver Island, site of the Port Alice sulphite pulp mill, in 1927. They concluded mill effluent had little effect on the inlet's modest fishery.[28] Likewise, as the head of the Pacific Experimental Station at Prince Rupert, N.M. Carter advised in 1937 that a proposed sulphite pulp mill in that city would not significantly affect the fishery, so long as the tides diluted and mixed with the effluent.[29] While the chemical components of pulp mill waste were poorly understood, fisheries scientists knew that pulp mill wastes discharged large amounts of suspended solids and could exert a tremendous biochemical oxygen demand on receiving waters.[30] But where no apparent harmful effects could be proven or forecast, the federal

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[27] Knight's pioneering studies were published in *Contributions in Canadian Biology* between 1902-1907, and are collected in Fisheries Research Board of Canada, *Aquatic Pollution Studies, 1902-1966* (Ottawa, Fisheries Research Board, 1966).

[28] This research is referred to in Michael Waldichuk, "Some Oceanographic Characteristics of a Polluted Inlet in British Columbia," *Journal of Marine Research*, 17 (1958), 536-551.

[29] BCARS, GR-0435 Department of Fisheries, box 123 files 1229-1230.

[30] Joel A. Tarr, "Industrial Waste Disposal in the United States as a Historical Problem," *Ambix*, 49, 1 (March 2002), 15-16. See also Cumbler, *Reasonable Use*, 149-50. Parlour, *Urban Pollution Study*, 38, notes that by the 1930s, laboratory tests for key water pollution parameters of dissolved oxygen, biochemical oxygen demand and pH (alkalinity and acidity) were widely established.

fisheries department was unwilling to obstruct industry. In 1937, Fisheries Minister J.E. Michaud wrote in connection with pulp mill development in B.C. that while the Fisheries Act was intended to "prevent injury to fish life due to pollution of waters ... my Department seeks to place no unnecessary impediment to development of any industry."[31] Without strong scientific authority, the Department of Fisheries emphasized research and negotiation, rather than strict enforcement of the Fisheries Act.

The prospect of further coastal expansion of the industry stimulated scientific research by fisheries scientists at the Nanaimo station. Pollution research developed in tandem with the growth of oceanographic research. In 1933, chemist J.P. Tully became the station's oceanographer and "proceeded almost single-handed without adequate funds or vessels, to develop the field of dynamic [physical] oceanography."[32] Oceanographic study at the Pacific Biological Station was rooted in the applied concerns of fisheries oceanography. Physical oceanographic research (particularly strong in the United States at this time) emphasized the study of ocean characteristics as they related to the fluid dynamics of ocean waves, water-mass movements, current circulation and meteorological conditions. Like biological oceanography, physical oceanography was strongly quantitative and oriented to the mathematical modelling of ocean conditions.[33] The primary goal of

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[31] See BCARS, GR-0435 Department of Fisheries, box 123 files 1229-1231. These files reveal that fisheries officials often relied on studies and reports from elsewhere for their conclusions about the harmfulness of pulp mill effluent.

[32] W.A. Clemens, "Reminiscences of a Director," *Journal of the Fisheries Research Board of Canada* 15, 5 (September 1958), 794-796; Johnstone, *Aquatic Explorers*, 131-132, 152-153; H.B. Hachey, "History of the Fisheries Research Board of Canada," *Fisheries Research Board Manuscript Report Series (Biological)* 843 (1965), 176.

[33] In general, oceanographic research separated along biological and physical lines; biological oceanographers studied the effects of environmental conditions on the marine biota, while physical oceanographers analyzed the chemistry and physics of marine water, currents and tides. For general accounts of the history of oceanography, see Eric L. Mills, *Biological Oceanography: An early history, 1870-1960* (Ithaca, Cornell University Press, 1989); Susan Schlee, *A History of Oceanography: The edge of an unfamiliar world* (London, Robert Hale and Co., 1973). See also T.R. Parsons,"The Development of Biological Studies in the Ocean Environment" in M. Sears and D. Merriman, eds., *Oceanography: The past* (New York: Springer-Verlag, 1980), 540-550; Harry N. Scheiber, "Modern U.S. Pacific Oceanography and the Legacy of British and Northern European Science," in *Man and the Maritime Environment*, Stephen Fisher, ed. (Exeter, Eng: University of Exeter Press, 1994); Eric. L. Mills, "The Oceanography

oceanographers was to determine the relationship between these conditions and commercial fisheries.[34] In some ways, the "environmental" orientation of oceanographic research made it an obvious perspective for the study of the effects of pollution. Indeed, northern European oceanographers are credited with pioneering field studies of ecosystem dynamics through their research on the dynamics of plankton populations.[35]

Oceanographic research benefited from growing prestige and support after the Second World War, in part due to its strategic importance in the war effort. Wartime innovations in oceanographic instrumentation and methods, along with the many outstanding research questions about the Pacific Ocean, boosted the growth of Pacific hydrographic and physical oceanographic research in both the U.S. and Canada.[36] Canadian Pacific oceanography quickly expanded its focus from the study of near-shore waters to open-ocean research in the North Pacific.[37] J.P. Tully was the nucleus of the Pacific Oceanographic Group, a research team linked to multi-agency national research efforts through the Canadian Joint Committee on Oceanography, a body created in 1948 to co-ordinate the rapid expansion of governmental physical oceanographic and hydrographic research. By the 1950s, a Canadian review of marine science concluded, "the best oceanography in Canada, and some of the best in the world, was being done at [the FRB's] west coast

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of the Pacific: George F. McEwan, H.U. Sverdrup and the origin of physical oceanography on the West Coast of North America," *Annals of Science* 48 (1991), 241-266.

[34] On the application to oceanography to fisheries research in the Pacific, see Arthur F. McEvoy, *The Fisherman's Problem: Ecology and the law in the California fisheries, 1850-1980* (Cambridge: Cambridge University Press, 1986), 201-205.

[35] Mills, *Biological Oceanography.* On European fishery hydrography and oceanography, see Helen M. Rozwadowski, *The Sea Knows No Boundaries: A century of marine science under ICES* (Seattle: University of Washington Press, 2002).

[36] Ibid.

[37] Fisheries Research Board of Canada, *Annual Report* (Ottawa: FRB, 1953).

complex."[38]

After the Second World War, a major pollution research program was established by oceanographers at the Pacific Station. Its genesis lay in J.P. Tully's study of pulp mill pollution in Alberni Inlet on Vancouver Island. In 1938, the Bloedel, Stewart and Welch Company (unusually) asked the Department of Fisheries to evaluate its plans to locate a sulphite pulp mill at the head of the inlet on the central west coast of Vancouver Island. The mill was to be situated at the mouth of the Somass River, a salmon-bearing stream that discharged to the inlet. The problem was referred to the FRB, and Tully undertook a detailed oceanographic survey of the inlet to determine the potential environmental effects of the effluent. His approach was a pioneering effort to apply estuarine modelling principles to the problem of waste disposal.[39] The study (which also formed the basis of Tully's PhD dissertation at the University of Washington) consisted of a physical oceanographic survey measuring salinity, dissolved oxygen, pH, temperature and other physical characteristics; measurements of tidal flows, currents and the effects of the Somass River on mixing and flushing; and a scale model of the inlet for conducting dye tests to determine the behaviour of effluent in these conditions. While relating estimated water conditions to those required to sustain fish life, the study did not include biological surveys.

Tully's goal was to create a quantitative, mechanistic picture of the fluid dynamics of Alberni Inlet in order to determine the assimilative capacity of its waters and to recommend the location of mill-waste outfalls. The major pollution impact of pulp mill effluent was deemed to be

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[38] R.W. and L.M. Dickie Stewart, *Ad Mare: Canada looks to the sea* (Ottawa: Science Council of Canada, 1971), 140.

[39] In 1959, Tully presented his research methodology on estuarine transport to an international conference of sanitary engineers and ocean scientists: see John P. Tully, "On Structure, Entrainment, and Transport in Estuarine Embayments," in E.A. Person, ed., *Proceedings of the First International Conference on Waste Disposal in the Marine Environment* (New York: Pergamon Press, 1960).

its biochemical oxygen demand (BOD), or the amount of oxygen in the water consumed by bacteria breaking down the organic compounds in the waste. The high BOD of mill effluent threatened to reduce oxygen levels in receiving water below the critical value of 5 parts per million required to sustain fish life. Tully's study indicated that the flushing action of oxygen-rich fresh water from the Somass River, which remained atop the denser sea water and flowed towards the mouth of the inlet, was necessary for the rapid dispersion of wastes and the reoxygenation of polluted waters. He developed a numerical estimate of pollution ("Pmax"), calculated as the ratio of the biochemical oxygen demand of the effluent to the dissolved oxygen available in water. In other words, this figure represented the assimilative capacity of inlet waters over and above the requirements of fish. Thus, so long as the effluent required less than 100 per cent of this assimilative capacity, waste disposal would not harm fish.[40] From his calculations, Tully concluded that oceanographic and environmental conditions in Alberni Inlet precluded the establishment of a sulphite mill at the head of the inlet, due to the extreme biochemical oxygen demand of the effluent. He outlined several options for mitigating the impact of the sulphite waste liquor; the company, partly in response to these recommendations and partly for economic reasons, chose instead to construct a less-polluting kraft (sulphate) mill at Port Alberni in 1947.[41]

Reviewing the initial performance of the mill, Tully concluded his research had "established a workable measure of pollution, defined the tolerable limits, and shown how they

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[40] The concept is best explained in John P. Tully, "Pollution Research in Alberni Inlet," *Progress Reports of the Pacific Biological Station* 76 (October 1948), 70-71.

[41] MacKay, *Empire of Wood*, 85-88. The B, S &W plan called for the use of waste wood from its Alberni valley sawmills. MacKay comments that the decision to move to the kraft process was based on quality and economy — pollution control is not mentioned.

can be determined, either before or after pollution occurs, in inlets and rivers."[42] The same principles were applied to solve other pollution problems as they arose at Alberni Inlet. The mill's original production capacity was 220 tons per day of bleached kraft pulp, which resulted in some six million gallons per day of wastewater. Wastes were discharged via an open sewer across swampy tidal flats at the mouth of the Somass, which threatened to create intermittent toxic concentrations of effluent, particularly at times of low river flow.[43] Twice the company was prevailed upon to relocate the outfall to where the effluent would mix more effectively with receiving waters. Although follow-up surveys of Alberni Inlet noted ample dissolved oxygen levels were maintained throughout the affected area, the announcement of expanded production at the mill raised concerns about the dilution and dispersion of increased volumes of effluent.[44] Experimental biologists at the Pacific Biological Station carried out bioassay tests to determine the maximum concentration of effluent in receiving waters to avoid interfering with fish migration or causing fish mortality.[45] To forestall potential pollution problems, the company constructed a storage dam and reservoir upstream on the Somass River to ensure a consistent freshwater flush for the inlet.

The control of the Somass River appeared to solve the problem of maintaining oxygen levels in the surface waters and estuary. However, by the late 1950s, problems appeared on the inlet floor. At this time, even the more-efficient kraft pulp mills wasted 10-25 per cent of the wood

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[42] Tully, "Pollution Research in Alberni Inlet," 71.

[43] Michael Waldichuk, "Effect of Pulp Mill Waste in Alberni Harbour," *Progress Reports of the Pacific Biological Station* 101 (December 1954), 26.

[44] Michael Waldichuk, "Pulp Mill Pollution in Alberni Harbour, British Columbia," *Sewage and Industrial Wastes* 28, 2 (February 1956), 199-205.

[45] D. F. Alderdice and J. R. Brett, "Some Effects of Kraft Mill Effluent on Young Pacific Salmon," *Journal of the Fisheries Research Board of Canada* 14, 5 (1957), 783-795.

fibres they consumed.[46] At the Alberni mill, as elsewhere, massive accumulations of sludge and waste fibres from the mill coated the ocean bottom near the outfall. Tully had anticipated these deposits but dismissed them as inconsequential. Instead, they proved to be damaging. In September 1956, a dredging operation in Alberni Harbour stirred bottom sediments, which released toxic hydrogen sulphide from the decomposing fibre beds, killing thousands of fish in the vicinity.[47] Of greater concern than this episode, however, was the discovery that fibre decomposition had resulted in the gradual reduction in oxygen levels at depth, which left an increasingly thick bottom layer of deoxygenated water in which fish could not survive. In a 1961 report, FRB oceanographer Michael Waldichuk speculated that a particular set of environmental conditions — such as a long dry spell (reducing the freshwater flush of the inlet), combined with the disturbance of this bottom layer — could result in a catastrophic fish kill.[48] Indeed, annual pollution surveys began to reveal that the considerable interannual variation in climatic conditions at Alberni had a major impact on the ability of the inlet to absorb wastes. Warm, dry summers resulted in poor conditions at all depths in the inlet; cool, damp summers ensured ample runoff and adequate replenishment of oxygen levels. Climatic conditions, interacting with the long-term effects of organic deposits on the inlet floor, had resulted in the overall degradation of fish habitat.[49] In response to these conditions, fisheries officials pressured the mill's owner, MacMillan Bloedel, to install clarifyers and screens to recover more of the solids from the effluent. Ironically, this process may have resulted in an

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[46] Bruley, "Training Manual."

[47] A. S. Hourston and R. H. Herlinveaux, "A 'Mass Mortality' of Fish in Alberni Harbour, B.C.," *Fisheries Research Board of Canada, Pacific Progress Report* 109 (1957), 3-6.

[48] *Annual Report of the Biological Station* (1961), F16.

[49] These conditions had become acute by 1965, although no direct impacts on fish were recorded. See *Annual Report of the Biological Station* (1965), L2.

increased air pollution problem, as the wastes were used as hog fuel in burners that spewed fly ash into the atmosphere, infuriating Port Alberni residents. By 1970, 25 tons per day of wood solids were being recovered, dissolved oxygen levels in the inlet had stabilized and the mill announced plans to install an aerated lagoon effluent treatment system to reduce biological oxygen demand and suspended solids — a first for tidewater mills in B.C.[50]

At Alberni Inlet, oceanographic research into pollution control became implicated in the reengineering of nature as a sink for industrial wastes. Like the attempts to forecast sewage pollution chronicled in Chapter 1, however, Tully's model foundered on the shoals of natural variability and unintended consequences. Instead of a model instance of waste disposal, Alberni became an experimental site for the observation of the long-term effects of pulp mill pollution. As FRB oceanographer Michael Waldichuk noted (perhaps ruefully) in 1965, "Alberni Inlet has continued to serve as a field laboratory for the study of industrial pollution and its effects on the marine environment."[51] A temporary shutdown of the mill in 1964 offered FRB researchers the opportunity to contrast the unpolluted harbour with the conditions after the resumption of waste discharges.[52] As Waldichuk reflected after another episode of low dissolved oxygen in the inlet in the 1980s, natural variability in climatic conditions and the unpredicted effects of long-term

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[50] The treatment system was installed in conjunction with a further major mill expansion. See Waldichuk, "Water Pollution from Pulpmill Effluent," 44-45; B. Stockton Clear, "How MB fights pollution," *Canadian Pulp and Paper Magazine* 23, 7 (July 1970), 38-38; W.J. Schouwenburg, "Experience of Pollution Treatment Facilities at Existing Tidewater Mills in British Columbia," presentation to Fisheries Development Council meeting, 8 December 1969, cited in University of British Columbia Special Collections and University Archives, Fisheries Association of British Columbia fonds [hereafter FABC fonds], box 31 file 17. For a technical description of the treatment facilities installed in the early 1970s, see Environmental Protection Service, *Mill Characterization: MacMillan Bloedel Alberni Division* EPS Manuscript Report 74-8 (West Vancouver: Department of Environment, October 1973).

[51] *Annual Report of the Biological Station* (1965), L-2. For a complete listing of Alberni Inlet-related studies to 1965, see Fisheries Development Council, *Summaries of Fisheries Research on the Pollution Problem* (Vancouver: Department of Fisheries, August 1965), A-25, C-1, C-7, C-14, C-31, C-32, C-35, and C-36.

[52] A.E. Werner and W.F. Hyslop, "Distributions of Kraft Mill Effluent in a British Columbia Harbour," *Journal of the Fisheries Research Board of Canada* 24, 10 (1967), 2137-2153.

degradation had complicated attempts to re-engineer Alberni Inlet. "Perhaps some luck has been involved, as well as good pollution control, in that no major disaster has occurred with respect to mass destruction of salmon by low dissolved oxygen due to pulpmill pollution in Alberni Harbour," he concluded.[53] In the early 1990s, the mill was made subject to special federal Department of Environment regulations designed to protect the commercial, native and sport fisheries of the inlet.[54]

The Alberni waste-disposal project inaugurated a coordinated research program into pollution oceanography by the FRB during the 1950s and 1960s. Tully's Alberni study provided a model of predictive science that formed the template for this program. As noted in Chapter 1, in 1950 oceanographic survey methods and staff from the Pacific Oceanographic Group were recruited to analyse the interactions of Fraser River and Strait of Georgia waters in order to determine the sewage disposal requirements for the Vancouver region.[55] This approach was further adapted and extended by fellow University of Washington graduate Michael Waldichuk, who joined the Pacific Biological Station in 1952. In 1954, Waldichuk became head of the station's pollution investigation section. Pulp mill discharges remained the major focus of pollution research over the next fifteen years. To assist Waldichuk's pollution group, the Pacific Biological Station hired a chemist in 1957 to develop methods for the detection of pulp mill effluent in seawater, and to isolate and test the various chemical constituents of effluent. Biologists at the

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[53] Michael Waldichuk, "Alberni Inlet, British Columbia: A multi-use fjord system with fisheries resources and a large waste-disposal component," in *Proceedings, Seventh International Ocean Disposal Symposium* (Ottawa: Environmental Canada, 1988), 130.

[54] Schouwenburg, "Experience of Pollution Treatment Facilities"; on the Alberni-specific regulations, see W. T. Stanbury, *Regulating Water Pollution by the Pulp and Paper Industry in Canada* (Vancouver: FEPA Research Unit, August 1993), FEPA Working Paper 192, chap. 2, 15-20.

[55] This project is described in Greater Vancouver Sewerage and Drainage District, *Sewerage and Drainage of the Greater Vancouver Area, British Columbia*, (Vancouver: GVSDD, September 1953), chap. 12.

station also undertook laboratory bioassay tests to determine the lethal concentration of pulp mill wastes in seawater, and the relationship between effluent toxicity and biochemical oxygen demand.[56] These efforts were largely supplementary to the major research initiative: Waldichuk's ten-year oceanographic survey of B.C. coastal waters receiving industrial wastes.

In addition to assessing existing environmental conditions, the survey program aimed to produce oceanographic information as a statistical basis for the prediction and abatement of pollution in areas affected by industries, particularly pulp mills. This information was intended for use to advise industry on the location of mills and their outfalls so that "pollution would not create a serious hazard for the fisheries."[57] By 1961, Waldichuk had completed his first round of coastal surveys of ten mill locations along the coast, and developed a geographical/oceanographic classification system for evaluating pollution threats from marine effluent disposal. He divided B.C. coastal waters into three types: fjord-type inlets (such as Alberni and Neroutsos inlets); semi-enclosed embayments (such as Wainwright Basin at Prince Rupert); and tide-swept channels (such as Discovery Passage near Campbell River). Each of these environments exhibited characteristic features, from tidal effects and water circulation to water temperature, salinity and fresh-water runoff. (Figure 4.3) These environments were appraised for their assimilative capacity and their ability to disperse wastes. While each location also exhibited unique geographical circumstances, Waldichuk's classification system provided a preliminary basis for recommending waste disposal

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[56] On the progress of these studies, see pollution sections in Fisheries Research Board of Canada, *Annual Report of the Biological Station at Nanaimo, B.C.*, Fisheries Research Board, 1954-69; Michael Waldichuk, "The Detection and Measurement of Water Pollution – Chemical Analysis," *Canadian Fisheries Reports*, 9 (July 1967), 23-32. This research reflected significant postwar developments in instrumentation and methods of analytical chemistry. See Tarr, "Industrial Waste Disposal." For a discussion of bioassay tests and effluent toxicity studies, see the section below on the International Pacific Salmon Fisheries Commission.

[57] M. Waldichuk, "Review of Water Pollution Research in British Columbia" (reprint), presented at the Annual Meeting of the Fisheries Research Board of Canada, Ottawa, January 1962, 7.

practices in these waters.[58]

The oceanographic survey project also addressed the practical need to evaluate the growing number of mill developments along the coast. Waldichuk conducted pre-development or pre-expansion surveys at Osborn Bay near Crofton, Duncan Bay near Elk Falls, Baynes Sound near Union Bay, Muchalet Inlet near Gold River, Howe Sound near Squamish and Douglas Channel near Kitimat, which resulted in recommendations to avoid the pollution of inshore waters and oyster leases by pulp mill wastes. In addition, surveys of existing mills documented successes and failures in effluent disposal. Those mills located along well-flushed waters, such as Harmac on Northumberland Channel near Nanaimo and Powell River on Malaspina Strait, were found to cause little measurable pollution. Moderate pollution resulted from the sulphite mill at Ocean Falls on the central coast, mostly attributable to the deposition of fibres on the bottom of Cousins Inlet.

These studies yielded concrete suggestions for mill design and improvement. But it remained unclear whether fisheries officials wielded any actual authority or influence over existing plants. This became evident when surveys documented serious pollution problems, as they did at Alberni Inlet, and at two other locations on the coast: the Port Alice mill on Neroutsos Inlet (discussed later) and Wainwright Basin at Prince Rupert. In 1961, Waldichuk discovered the waters surrounding the Prince Rupert mill "in an advanced state of pollution." For a decade, the sulphite pulp mill had discharged untreated wastes into semi-enclosed bays connected to each other and open water via narrow, shallow channels. Poor water circulation in the basin meant waste sulphite liquor remained trapped, depressing oxygen levels to near zero in some locations.

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58 Ibid. This classification of receiving waters appeared often in Waldichuk's many publications on marine pollution. See for instance, Michael Waldichuk, "Marine Aspects of Pulp Mill Pollution," *Canadian Pulp and Paper Industry* 15, 6 (June 1962), 36; M. Waldichuk, "Waste Disposal in Relation to the Physical Environment – Oceanographic Aspects," *Syesis* 1 (1968), 4-27; Waldichuk, "Water Pollution from Pulpmill Effluent in British Columbia."

Waldichuk noted the presence of planktonic and other marine organisms, but his observations suggested that a stressed and possibly simplified biotic community remained. Although a productive in-shore herring fishery had recently begun in the area, Waldichuk suggested that degenerating aquatic conditions would ultimately threaten this fishery, as well as Skeena River salmon runs passing through these waters.[59] In spite of these problems, pollution continued unabated at Prince Rupert for years; in fact, the Columbia Cellulose company proposed to add a kraft pulp mill at this location in 1964.[60]

Despite the growing scientific knowledge of pulp mill pollution, the Department of Fisheries appeared no more likely than earlier in the century to force mills to curb the discharge of "deleterious substances." The strategy of research and negotiation adopted by federal fisheries officials reflected the weak regulatory regime for the pulp and paper industry. In the absence of public health threats, the provincial government left the industry's wastes essentially unregulated. Revisions to the federal Fisheries Act in 1960-61 increased penalties for pollution. But without scientific certainty and political will, these penalties went unenforced. "Attention has thus been directed toward procuring full information on the effects of any pollutant on fish and reaching a mutually acceptable compromise, rather than dictating a complete prohibition," the department noted in a submission to the Canadian Council of Resource Ministers' Pollution and Our Environment conference in 1966.[61] As was the case in the United States and across Canada,

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[59] *Annual Report of the Biological Station* (1961), F4-F14.

[60] Schouwenburg, "Experience of Pollution Treatment Facilities at Existing Tidewater Mills in British Columbia." This paper noted that in light of the existing pollution, the company was encouraged to pipe its spent sulphite liquor out to open water. The pipeline constructed to do so broke, however, and a major herring kill resulted in 1968. No charges were laid. The company was finally prosecuted for sulphite liquor spills in 1970 and 1972.

[61] "The Participation of the Government of Canada in the Investigation and Abatement of Water Pollution," *Canadian Fisheries Reports* 9 (July 1967), 2.

federal and local officials were unwilling to challenge an economically and politically powerful industry in the years before pollution became a major public concern in the late 1960s.

The resort to scientific planning over strict law enforcement is also explained by the "technocratic optimism" of the postwar period.[62] Many fisheries officials and oceanographers regarded pollution control as an aspect of the "multiple use" of water resources. They shared with industry and the engineering profession the notion that the assimilative capacity of the environment, where ample, should be used for waste disposal purposes. At the First International Conference on Waste Disposal in the Marine Environment in 1959, Roger Revelle, director of the Scripps Institution of Oceanography, maintained that "one of the resources of the sea, both actual and potential, is its availability for the disposal of the waste products of our industrial civilization." Revelle (and others at the conference) argued that scientific planning of waste disposal, not restrictive regulation, was the solution to avoiding pollution.[63] Tully's quantitative representations of estuarine circulation were a contribution to the notion that water's natural biophysical processes could be managed and exploited as "assimilative capacity." As historians Peter Taylor and Donald Worster note, this approach echoed "systemic" views within ecological thought, which regarded environmental processes as interlocking systems "in which scientists could intervene and exert control."[64] Waldichuk's geographical classification system was intended, in part, as a guideline to the selection and evaluation of sites for the "safe" disposal of wastes without treatment. This

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[62] This phrase is from Peter J. Taylor, "Technocratic Optimism, H.T. Odum, and the Partial Transformation of Ecological Metaphor after World War II," *Journal of the History of Biology* 21, 2 (Summer 1988), 213-244.

[63] Roger Revelle, "Welcoming Address," in Pearson, ed., *Proceedings of the First International Conference on Waste Disposal*, 4-5. See also A.M Rawn, "Fixed and Changing Values in Ocean Disposal of Sewage and Wastes," in the same volume, 6-11. Rawn, Los Angeles County's head sanitary engineer, was the lead consultant in the Greater Vancouver Sewerage and Drainage Survey from 1950-53; see chap. 1.

[64] Taylor, "Technocratic Optimism," 233; Donald Worster, *Nature's Economy: A history of ecological ideas*, 2nd edition (New York: Cambridge University Press, 1994), 302-306.

meant, essentially, ensuring "dilution and dispersion of the pollutant to safe levels," which required foremost an understanding of "circulation and diffusion processes in the environment." While many questions about the long-term biological effects of pulp mill wastes in the marine environment remained unanswered, Waldichuk contended that "our oceanographic approach to pollution problems has achieved our primary aim of finding means of pollution prevention."[65] Waldichuk's emphasis on physical oceanography avoided basing regulations and negotiations on what he regarded as the more difficult-to-prove biological measures of environmental impacts.

By the early 1960s, Waldichuk and Tully had built up a major centre of pollution research and expertise at the FRB's Pacific Biological Station. Oceanographic pollution studies at the station were among the first significant research efforts into industrial pollution anywhere in the country before the 1960s.[66] The Nanaimo program was shaped by the particular problems posed by the coastal geography of B.C., as well as the prevailing concern of FRB scientists with research into the propagation and development of the fishery resource. These efforts predated the emergence of pollution as a focus of public concern and government policy in the mid-to-late 1960s.[67] As historian Frances Anderson chronicles, pollution became a national priority for the Fisheries Research Board only after 1966, the year of a highly publicized Canadian Council of Resource Ministers conference on pollution. Notably, it was J.P. Tully, in his capacity as oceanographic consultant to the chairman of the FRB, who called for the expansion of research

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[65] M. Waldichuk, "Review of Water Pollution Research in British Columbia," 30-1.

[66] Pollution research at the FRB's St. Andrews, N.B., station lagged somewhat behind the Pacific station, and tended to emphasize biological effects of industrial pollution. See John B. Sprague, "Perspective on a Career: Changing approaches to water pollution evaluation," *Marine Pollution Bulletin* 25, 1-4 (1992), 6-13; James W. Parlour, "Federal Funding of Water Pollution Research and Development, 1945-1972," reference paper prepared for the Urban Pollution Study (Ottawa: Ministry of State for Urban Affairs, December 1972). Section 8 summarizes FRB research at all stations.

[67] The national leadership of the FRB in pollution research was approvingly noted in a major federal study: Parlour, *Urban Pollution Study*, 45 n.32.

into complex industrial and agricultural chemicals, the effects of pollution on plants and fish, and how to reduce these effects by waste treatment.[68] In 1969, the federal Minister of Fisheries Jack Davis explicitly mandated pollution study as a major priority of the FRB.[69] Marine pollution research at the Pacific Biological Station also predated the growth in international concern for the issue. As Helen Rozwadowski recounts, marine pollution research received little sustained attention from Atlantic oceanographers before the late 1960s.[70]

Waldichuk's experiences in the 1950s and 1960s helped launch his subsequent career in national and global marine pollution assessment. A prodigious publisher of scientific papers and reports, he was appointed the head of the newly established Pacific Environmental Institute, a west coast marine research laboratory in 1971. In the early 1970s, he also joined a number of national and international marine pollution working groups and technical committees, including the United Nations Joint Group of Experts on Scientific Aspects of Marine Pollution.[71] Waldichuk initially embraced the predictive emphasis of pollution oceanography, but his experiences at Alberni and elsewhere led him to a more cautious view. Although committed to the "rational" control of waste disposal, Waldichuk urged regulators to build ample "safety factors" into their calculations of assimilative capacity, in order to compensate for unforseen circumstances or variable natural conditions. "Until we have some of the needed information on cumulative effects, it will be

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[68] Frances Anderson, "Policy Determination of Government Scientific Organizations: A case study of the Fisheries Research Board of Canada, 1963-1973," (PhD diss., Université de Montréal, 1988), 199-204.

[69] Ibid., 210. Shortly after he did so, however, the FRB found its growth and activities curtailed by a government reorganization. See Frances Anderson, "The Demise of the Fisheries Research Board of Canada: A case study of Canadian research policy," *Scientia Canadensis* 8, 2 (December 1984), 151-156.

[70] Rozwadowski, *The Sea Knows No Boundaries*, 212-213.

[71] On Waldichuk's influential career in international marine pollution science, see the special issue dedicated to him of *Marine Pollution Research* 25, 1-4 (1992), especially 3-13.

necessary to impose safety factors, that may sometimes seem unjustified, in design of waste disposal facilities," he noted.[72] Later in his career, he also urged the development of long-term, ecological studies of the effects of pulp mill wastes.[73]

Interior pulp expansion and the threat to fisheries in the 1960s

A new era in "cellulose forestry" developed in the 1960s in response to massive world demand for wood pulp and government promotion of the industry in B.C. Whereas before the Second World War most pulp mills produced newsprint and other paper products, the massive expansion of the industry into the interior was driven by demand for pulp as a raw material for reprocessing elsewhere. In 1960, there were ten pulp and/or paper mills in the province, all but one located on the coast; fifteen years later there were two dozen facilities, nearly half located inland (Fig. 4.4). Over this period, the total annual production of pulp increased to 5.27 million metric tonnes from less than two million. Favourable forest-licensing schemes designed to promote industrial expansion attracted foreign capital investment in these new facilities.[74] Many of these operations were integrated forest companies, which allowed pulp mills to acquire from associated sawmills a guaranteed source of chips, sawdust and wood waste, increasingly important sources of fibre for pulp production. The industry was a key component of the Social Credit government's promotion of industrial expansion into the northern interior. Pulp mills were

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[72] Waldichuk, "Pulp Mill Pollution in British Columbia,"; Michael Waldichuk, "Some Water Pollution Problems Connected with the Disposal of Pulp Mill Wastes," *Canadian Fish Culturist* 31 (October 1962), 33.

[73] Waldichuk, "Water Pollution from Pulpmill Effluent in British Columbia," 48. See also See Michael Waldichuk, "Prediction of Environmental Effects Based on Invalid Assumptions," *Marine Pollution Bulletin* 19, 2 (1988), 45-46; Sprague, "Perspectives on a Career." Some of these outstanding research issues remain: see J.W. Owens, "Regulation of Pulp Mill Aquatic Discharges: Current status and needs from an international perspective," in Mark R. Servos et. al., eds, *Environmental Fate and Effects of Pulp and Paper Mill Effluents* (Delray Beach, Fla.: St. Lucie Press, 1996), 661-671.

[74] The term "cellulose forestry" is from Taylor, *Timber*, chap. 14. Figures from Marchak, *Green Gold*, 3, ; see also 36-51 for a description of the industry and its expansion.

inextricably linked with the government's development of transportation systems and hydroelectric schemes, as well as the mechanization and integration of the forest industry.[75] The sulphurous smokestacks of pulp mills came to symbolize the surging economy and prosperity of the industrializing province.

In part, this movement into the interior was enabled by technological changes that improved the environmental performance of pulp mills. Innovations in kraft pulping after the Second World War reduced the amount of water used and the amount of fibre wasted. These changes were driven by economics, not pollution control, as kraft mills also produced a stronger, more attractive product while conserving process chemicals and wood fibre.[76] In 1944, less than 9 per cent of Canadian pulp production used the kraft process; by 1964, over one-quarter did so.[77] All of the mills built in B.C. after 1960 used the kraft process, and a number of older mills on the coast changed from sulphite to kraft. By the 1970s, kraft pulp accounted for about 75 per cent of production in B.C.[78] Still, the prospect of pulp mills polluting interior rivers raised alarm. Pulp and paper companies resisted waste recovery or pollution abatement that did not result in process efficiencies or marketable byproducts. Pulp mills located on rivers in eastern Canada and the

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[75] Martin Robin, *Pillars of Profit: The company province, 1934-1972* (Toronto, McClelland and Stewart, 1973), 255. On the mechanization of the industry to the end of the 1960s, see Richard Rajala, *Clearcutting the Pacific Raincoast: Production, science and regulation* (Vancouver, University of British Columbia Press, 1998), chap. 1.

[76] Douglas Jones, *Capital Investment in Pollution Abatement Equipment by the Pulp and Paper Industry for Selected Provinces, 1960-1971*, Ministry of State for Urban Affairs, 1973, 1-2; James W. Parlour, "The Politics of Water Pollution Control: A case study of the Canadian Fisheries Act amendments and the pulp and paper effluent regulations, 1970," *Journal of Environmental Management*, 13 (1981), 137.

[77] See tables in Sinclair, *Controlling Pollution from Canadian Pulp and Paper*, 45, 47. This trend continued into the 1980s. The decline in sulphite pulp production as a percentage of pulp produced mirrored the growth of kraft pulping in this period, while groundwood pulp maintained a significant share of production.

[78] Ibid. This is in contrast to the national industry profile, in which groundwood process pulp continues to play a more significant role. Groundwood pulp is often combined with higher-strength chemical grades for certain products. Various innovations to the mechanical pulping process, as well as its very high level of fibre utilization, meant that between 1944 and 1984, its share of overall production declined only slightly. National levels of sulphite production, however, declined significantly during this period.

United States were notorious polluters.[79] In Canada, the Spanish and Ottawa rivers in Ontario, the Exploits River in Newfoundland, and the Saint John and Miramichi rivers in New Brunswick were all polluted, in some cases severely, by pulp mill effluent.[80]

Interior pulp-mill developments proceeded amidst scientific and regulatory uncertainty surrounding pollution control. The jurisdiction of the provincial Pollution Control Board, established in 1956, was initially confined to the Lower Fraser below Hope and to the control of municipal wastes. Fisheries protection authority was divided between federal and provincial officials, with the latter administrating interior sport fisheries while federal officials administered commercial fisheries. At this time, neither federal nor provincial agencies had established standards for either receiving water quality or effluent characteristics. Instead, pollution control measures were determined through ad hoc, case-by-case negotiations based on estimates of the effects of pollution. However, such negotiations were separate from resource ministry approvals of developments. Often companies only discussed pollution abatement once they had already secured government timber leases and development contracts. For instance, in the 1950s provincial Fish and Game Branch officials learned of the plans for the first interior mill, at Castlegar on the Columbia River, from reading newspaper reports.[81] Since the Columbia's

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[79] For American examples, see Cumbler, *Reasonable Use*; Council on Economic Priorities, *Paper Profits*; Richard A. Bartlett, *Troubled Waters: Champion International and the Pigeon River controversy* (Knoxville, University of Tennessee Press, 1995); Glen Harris and Seth Wilson, "Water Pollution in the Adirondack Mountains: Scientific research and governmental response, 1890-1930," *Environmental History Review* 17, 1 (Winter 1993), 47-71.

[80] For Canadian examples, see G.R. Vavasour and A.A. Blair, "Pollution survey of Humber Arm and Exploits River," *Journal of the Fisheries Research Board of Canada* 12, 5 (1955), 682-697. The Ottawa River on the Quebec-Ontario border was the most polluted of a number of pulp mill locations in Quebec, see Terra Nova, *Environmental Aspects of the Pulp and Paper Industry in Quebec*, 2nd rev. ed. (Montreal: STOP, 1972), 128-29. On the Spanish River, see note 14. Fisheries Research Board officials routinely investigated pulp mill pollution in New Brunswick rivers. See Fisheries Research Board of Canada *Annual Report*, 1938, 1941, 1958-59, 1959-60.

[81] BCARS, GR-1109 Fish and Game Branch, box 11 file 29 documents the Castlegar mill development from the perspective of provincial fish and game officials.

commercial fishery was already devastated by hydroelectric dam development downstream, federal fisheries officials declined to review the mill's discharge proposals. Provincial fisheries officials only reviewed the development once construction was already underway, and relied on company reports to determine the potential impact of the mill. As a result, when the Castlegar mill began operation in 1960, its effluent disposal was largely unregulated, due to administrative disinterest, jurisdictional confusion and an easy reliance on the vast assimilative capacity of the Columbia River.[82]

However, the regulatory problem of interior pulp mill expansion came into sharper focus with the proposed location of subsequent developments: the Fraser River watershed. The Fraser and its tributaries formed a network of spawning routes and natal streams for the bulk of the west coast salmon fishery. This valuable, international fishery exploited anadromous Pacific salmon along the northwest coast of North America. By mid-century, this fishery had begun to recover from severely depressed numbers due in part to landslides which blocked the mainstem of the Fraser River at Hell's Gate in 1913 and 1914. The "rehabilitation" of Fraser River sockeye runs was a major accomplishment of the International Pacific Salmon Fisheries Commission (IPSFC), a joint United States-Canada body established by international convention in 1937 and charged with the regulation and development of the Pacific sockeye (and later pink) salmon fishery.[83] In 1939, the IPSFC passed a resolution requesting that Canadian governments notify and consult the commission about any development projects in the Fraser watershed "that will result in modifying

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[82] BCARS, Accession No. 88-0408 Environmental Appeal Board, box 79-02 file 1, Minutes of Pollution Control Board, 27 March 1961, 19 June 1961. The mill did pollute the Columbia River: residents downstream in the village of Kinnaird complained vociferously about wood fibres from the mill which clogged the intakes for the town's domestic water supply. They denounced the "special privilege" granted Celgar.

[83] This near-catastrophe and the restoration are recounted in Matthew D. Evenden, *Fish versus Power: An environmental history of the Fraser River* (Cambridge: Cambridge University Press, 2004), chaps. 1, 3.

any spawning area therein or in the damming, pollution, or diversion, of any waters thereof that are used by migrating fish either in the adult or young stages."[84] Not surprisingly, IPSFC officials regarded industrial development in the Fraser watershed uneasily. "British Columbia is industrializing almost overnight" the commission noted in 1951, with many proposals for hydroelectric dams, pulp mills and logging operations concentrated along the Fraser.[85] Although it possessed no direct authority over development proposals, the IPSFC justified its concerns on the basis of its treaty mandate for fish protection.

The threat posed by pulp mills to commercial salmon stocks recast the context and principles of pollution control. IPSFC reports in 1950 and 1951 evaluated the potential environmental impact of a kraft pulp mill located at Quesnel on the Fraser River south of Prince George. Referring to studies from Washington State and Oregon on the lethal concentration of pulp mill effluent, the reports concluded that the ample dilution factor and rapid flushing of the Fraser would ensure waste disposal had little impact on fish. However, IPSFC researchers added that "the disposal of sewage and industrial wastes by dilution, as considered here, is no longer considered the best practice, since it is contingent upon adequate dissolved oxygen being available in the diluting water."[86] With accelerated population growth and industrial development in the watershed, they concluded, dilution may not suffice to absorb future wastes.

The IPSFC's concern and uncertainty about the impact of unregulated industrial

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[84] John F. Roos, *Restoring Fraser River Salmon: A history of the International Pacific Salmon Fisheries Commission, 1935-1985* (Vancouver: Pacific Salmon Commission, 1991), 57.

[85] International Pacific Salmon Fisheries Commission, *Annual Report* (IPSFC, 1952), 8. On the epic battles over dams on the Fraser River system, known as the "fish versus power" debates, see Evenden, *Fish versus Power*.

[86] "Report on the Operation of a Proposed Sulphate Pulp Mill in the Quesnel Area and Its Effect on Sockeye Migrants," IPSFC Report, 29 October 1950. Cited in Pacific Salmon Commission Library files, box 1100.1 file 3. Thanks to Teri Tarita, Pacific Salmon Commission librarian, for access to these files.

development in the Fraser watershed was echoed by other agencies and groups connected to the fishery. In 1958, several government agencies, unions, and non-governmental organizations, including the IPSFC, formed the Fisheries Development Council to facilitate the "common understanding, study and discussion of the fisheries problems associated with industrial development in British Columbia." In addition to studying the impact of hydro-electric power development, these groups (principally the government agencies) conducted research into a wide spectrum of industrial and domestic water pollution problems.[87] Foremost among these research projects was the question of pulp mill pollution and an attempt to develop "a measurement of the toxicity and stress created by the rapidly increasing and complex chemical nature of industrial pollution of the Fraser River from Prince George to Georgia Strait."[88] Research included the chemical and biological studies undertaken at the Fisheries Research Board in conjunction with its pollution surveys of coastal mills discussed above.[89] In the mid-1960s, fisheries officials sitting on a Federal-Provincial B.C. Fisheries Committee also formed a pollution working group to survey and co-ordinate research conducted by provincial and federal fisheries agencies, as well as by university fisheries biologists in B.C. Noting the jurisdictional and technical questions plaguing pollution control, a September 1966 report by this group called for the establishment of "a national basis for control of the state of pollution which now exists in British Columbia."[90] The growing

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[87] For an overview of these research projects, see Fisheries Development Council, *Summaries of Fisheries Research.* Among the agencies and groups listed as members were the IPSFC, federal Department of Fisheries, the provincial Department of Recreation and Conservation, the Institute of Fisheries at the University of British Columbia, the Fisheries Association of B.C., the United Fisheries and Allied Workers' Union, the Fishing Vessel Owners' Association, the Native Brotherhood of B.C., the B.C. Wildlife Federation and conservationist Roderick Haig-Brown. See also Evenden, *Fish versus Power.*

[88] International Pacific Salmon Fisheries Commission, *Annual Report* (New Westminster: IPSFC, 1959), 21.

[89] Fisheries Development Council, *Summaries of Fisheries Research*, C10, C14, C22, C28, C29, C31, C34.

[90] Documents relating to this working group were found in BCARS, GR-1027 Fish and Wildlife Branch, box 92 file 10, and GR-1114 Fish and Wildlife Branch, box 62 file 41-00.

threat to fisheries posed by pulp and paper industry expansion had fuelled a coordinated effort to develop scientific authority for pollution regulation.

In the early 1960s, proposals to establish up to three kraft pulp mills at Prince George and one at Kamloops prompted federal fisheries officials to develop interim standards for pulp mill effluent disposal. A joint committee of the IPSFC, federal Department of Fisheries and the Fish and Game Branch undertook a study of river conditions and estimated the impact of pulp mill effluent on fish. In its 1961 "interim report,"[91] the committee discovered little applicable research existed on the prolonged exposure to diluted kraft mill wastes of spawning salmon, as well as eggs and alevins (salmon hatchlings) developing in spawning beds. The study concluded that while the Fraser River offered ample dilution for the oxygen demand of wastes, biological waste treatment and the control of chemical wastes was necessary to minimize the effects on spawning salmon. This report provided the foundation for evaluating pulp mill proposals and negotiating discharge conditions for the remainder of the decade. In an explicit rejection of assimilative capacity, the report endorsed the principle that "all wastes from industrial plants should be treated by any known methods to reduce their toxicity to a minimum regardless of the degree of subsequent dilution available in the adjacent waterway."[92] Standards based on the report specified certain maximum concentrations of toxic chemicals in the effluent, methods of sludge disposal, the recovery of wood solids from debarking machines and the control of chemical spills. The report called for effluent treatment by retention for five days in aerated lagoons before discharge, in order to reduce both biochemical oxygen demand and effluent toxicity. To confirm the effectiveness of

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[91] Canada, Department of Fisheries, *Interim Report on Proposed Kraft Pulp Mills on the Fraser River Near Prince George, with Recommendations for the Treatment and Disposal of Wastes* (Vancouver: Department of Fisheries, September 1961).

[92] International Pacific Salmon Fisheries Commission, *Annual Report* (1963), 29.

this treatment, the report recommended outflow from this retention basin to be non-toxic to yearling salmon over 96 hours in mixture of 65 per cent effluent and 35 per cent river water.[93]

These standards were challenged by pulp mill companies leery of the high costs of constructing and operating treatment systems. Between 1962 and 1964, fisheries officials negotiated waste treatment design and standards with pulp and paper companies. While talks with the Kamloops Pulp and Paper company went well, Prince George Pulp and Paper Company officials resisted expensive and, in their view, unnecessary treatment "primarily because of a difference of opinion as to whether the Fraser River's capacity for dilution should be utilized in the disposal of toxic wastes or whether this capacity should be maintained as a margin of safety for the protection of the fishery resource."[94] In addition, disputes emerged over the interpretations of effluent toxicity tests. In the early 1960s, considerable uncertainty remained surrounding the toxic constituents of pulp mill effluent, the effectiveness of biological treatment in reducing toxicity, and the interpretation of the basic test for toxicity, the bioassay.[95] In the standard laboratory test for toxicity, organisms were exposed to various doses (or, in the case of effluent, concentrations) of chemicals for a preset duration, usually between one and four days. The time to death of the organisms at various concentrations was observed. The results were typically calculated and expressed as the median lethal concentration (LC50), or the concentration at which half or more of the organisms survived the test. Pollution control officials typically regarded "safe" dilution

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[93] A copy of the standards is reprinted as Appendix B in Robert O. Sylvester, *An Evaluation of the Thompson River and Kamloops Lake as Receiving Waters for a [sic]Kraft Pulp Mill Effluent* (Victoria: Pollution Control Board, 1965).

[94] Ibid.

[95] See BCARS, GR-1114 Fish and Wildlife Branch, box 62 file 41-00, J. B. Sprague, "Toxicity of Pollution to Aquatic Life – A Summary of Research in Canada," Fisheries Research Board of Canada report, revised 19 November 1964.

factors as 10 per cent of this concentration in the environment.[96] The test, however, was criticized because it did not identify what made the effluent toxic. Nor did it determine the effects of long-term exposure to effluent or the sub-lethal effects of lower concentrations. The "safety factor" for dilution, set at 10 per cent of the median lethal concentration, was essentially arbitrary.

Ironically, both government and industry based their arguments for and against treatment on this scientific uncertainty. Industry-backed research by the B.C. Research Council on pulp mill wastes disputed the requirement for expensive biological treatment in aerated lagoons. The council noted that little was known about the particular toxic elements of the waste stream, or about sub-lethal concentrations of these elements. In addition, these studies also disputed the interpretation of bioassay tests on fish. Council reports on laboratory tests showed that fish became "acclimatised" to effluent, as no additional fish died if they survived the typical 96-hour test period. Further, if the amount of effluent in the test tanks was gradually increased, the lethal concentration required to kill test fish increased.[97] Thus, the council studies asserted, the only firm basis for determining adequate pollution control was to consider the vast dilution factor offered by the Fraser River at Prince George. The proposed Canadian Forest Products mill at Prince George would discharge 22 million gallons per day of effluent from the pulp mill and bleaching plant; the minimum volume of the Fraser was estimated at 200 times that amount. Industry researchers concluded the only treatment necessary was the neutralization of the effluent stream to stabilize its pH before

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[96] On the development of bioassay procedures and interpretations, see Alderdice and Brett, "Some Effects of Kraft Mill Effluent,"; D.F. Alderdice, "The Detection and Measurement of Water Pollution – Biological Assays," *Canadian Fisheries Reports* 9 (July 1967), 33-39; J.B. Sprague, "Measurement of Pollutant Toxicity to Fish I. Bioassay Methods for Acute Toxicity," *Water Research* 3 (1969), 793-821; John C. Davis, "Progress in Sublethal Effect Studies with Kraft Pulpmill Effluent and Salmonids," *Journal of the Fisheries Research Board of Canada* 33 (1976), 2031-2035.

[97] See the B.C. Research Council progress reports in BCARS, GR-1114 Fish and Wildlife Branch, box 62 file 41-01-07. C.C. Walden, "Water pollution and the kraft pulp mill industry," *Western Fisheries* 71, 1 (October 1965), 18-20, 36-40 summarizes some of this research.

discharge to the river.[98]

To back its demands for waste treatment, beginning in 1963 the IPSFC conducted its own research aimed at developing measures of the toxicity of kraft mill effluent and testing pulp mill waste-treatment methods. Headed by biologist James A. Servizi, the study examined the toxicity of kraft mill effluent in freshwater to adult and juvenile salmon, as well as to salmon eggs and alevins, or hatchlings. Like the Fisheries Research Board oceanographic program, this research was intended to arm fisheries officials with a scientific basis for negotiating pollution abatement. Servizi's bioassay tests at the IPSFC's Cultus Lake laboratory on the effects of bleached kraft mill waste, however, raised doubts about the efficacy of using acute toxicity tests as a base for environmental standards. While normal bioassay procedures used young, healthy specimens, Servizi exposed spawning fish, eggs and alevins to long-term concentrations of pulp mill effluent. A wide variety of responses, from erratic behaviour to death, were observed at concentrations as low as 2 per cent effluent. Secondary treatment of effluent, however, substantially reduced its toxicity, along with its biochemical oxygen demand. Servizi concluded that the standard 96-hour test was insufficient for documenting the effects of exposure at different life stages. The laboratory bioassay test also failed to account for the variability of environmental conditions from season to season and the variability in effluent characteristics, which he found differed among various samples in spite of coming from the same mill. Finally, bioassay tests failed to indicate the precise chemical cause and biological effects of adverse reactions in fish.[99]

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[98] BCARS, GR-1114 Fish and Wildlife Branch, box 62 file 41-01-07, Progress Report No. 6, 26 March 1964.

[99] Pacific Salmon Commission Library files, box 1150.1 file 1, James A. Servizi , "A Summary of Results on the Characteristics, Toxicity, and Biological Treatment of Kraft Pulp Mill Effluent Representative of Proposed Mills in the Fraser River Drainage," Manuscript report, November 1964. The full account of this research was published as J.A. Servizi, E.T. Stone, and R.W. Gordon, "Toxicity and Treatment of Kraft Pulp Bleach Plant Waste," IPSFC Progress Report No. 13 (New Westminster: IPSFC, 1966).

In spite of Servizi's reservations about the bioassay tests, the IPSFC research provided fisheries officials with enhanced scientific authority for their treatment demands. American forestry giant Weyerhauser acceded to the need for advanced biological treatment of its wastes for its mill at Kamloops, since it discharged to the lower-volume Thompson River. Weyerhauser's cooperation was critical to ensuring the interior industry as a whole adopted some form of treatment.[100] In 1964, two mills under development at Prince George, Northwood and P.G. Pulp, agreed to install biological treatment basins, although with only 24-hour retention, as opposed to five days at the Kamloops mill. As well, the mills implemented a variety of "in-plant" measures to reduce the toxicity of their effluent. They were also subject to an ongoing monitoring program carried out by the IPSFC and Department of Fisheries.[101] This shift towards the regulation of effluent quality represented an important departure in pollution regulation. At tidewater mills, where dilution was considered adequate, research and regulation were oriented towards determining the assimilative capacity of the marine environment. This resulted in some modifications to outfall design and waste-disposal practices, but ultimately did not undermine the basic practice of using the ocean as a sink for waste. But the perceived threat to fish life posed by using rivers was considered much greater. Rivers had long been positively regarded for their "self-purifying" capacities, but examples elsewhere, such as the Spanish River in Ontario or Willamette River in Oregon, suggested that high volumes of oxygen-consuming and toxic wastes from pulp mills could overwhelm this self-cleansing function and destroy all life in the river. In

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[100] Weyerhauser was recognized as an industry leader in the voluntary installation of pollution controls. In fact, the samples of secondary kraft mill effluent used in Servizi's bioassay tests came from a Weyerhauser mill in Washington State. See Council on Economic Priorities, *Paper Profits*, 44-45.

[101] These meetings and negotiations are documented in: BCARS, GR-1114 Fish and Wildlife Branch, box 62 file 41-01-07, and Pacific Salmon Commission Library pollution files, box 1100.1 file 8.

addition, since the ultimate industrial development of the Fraser watershed remained unknown, fisheries officials argued that future projects might be deterred if the assimilative capacity of the river was used up by current industries. The stipulation that pulp mill wastes must be non-toxic at the point of discharge represented a firm rejection of assimilative capacity. For the first time, the principle of waste treatment formed the foundation of pollution control standards.

It was also significant that the stimulus for regulating interior pulp and paper mills had come from federal officials. The threat to commercial salmon stocks meant that provincial Fish and Game officials, so prominent in interior mining-pollution disputes, played a secondary role in pulp mill pollution disputes. The provincial Pollution Control Board lagged behind in the regulation of industrial wastes. Although its jurisdiction was extended in late 1962 to include the entire Fraser watershed, the board initially remained on the sidelines during negotiations over treatment levels. The PCB appeared to struggle with a lack of technical capacity to evaluate the complex industrial permit applications it received in the mid-1960s.[102] The board's small staff lacked the research capacity of federal fisheries agencies, meaning that it relied mostly on industry to report the contents, volume and impact of its effluents. Belatedly, in 1964 the board ordered a review of the Kamloops pulp mill proposal, hiring University of Washington engineering professor R.O. Sylvester to examine the impact of the effluent on the Thompson River. Appearing in 1965, his study essentially endorsed the extensive treatment and monitoring system worked out by the company and fisheries officials.[103] The PCB issued waste discharge permits for interior mills

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[102] This impression is gleaned from the minutes of the board found in BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-02 files 1-2.

[103] Sylvester, *An Evaluation of the Thompson River and Kamloops Lake*. Sylvester was also contracted to conduct a review of the cumulative impact of all four pulp mills in the Fraser watershed. But the results were deemed too controversial to release by the PCB, who were made uneasy by the report's exploration of "certain philosophies respecting water quality management." In any case, the report appeared after three of the four mills were already in production. See BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01 file 3, Summary Report, 12 January 1967.

reflecting these arrangements.

The PCB, however, endured the political fallout when these mills failed to meet the discharge standards negotiated by federal fisheries officials. The changing political climate surrounding pollution control in the 1960s brought increasing public scrutiny of pulp mills. As British Columbians became more sensitized to the problem of water pollution, some became concerned that the prosperity brought by pulp mills to interior towns might contain "a deadly threat."[104] The provincial government had vigorously promoted pulp mill development: by 1966, seven pulp mills were in operation or under construction in the interior, with plans for many more.[105] After 1965, the PCB was housed within the Lands, Forests and Water Resources ministry, leading some critics to question the effectiveness of a pollution control body within a resource-development ministry. One editorialist accused the PCB of being "the creation of the development-minded government" and of lacking "any rational approach to pollution — it issue permits here, rejects applications there, on the basis of local conditions, local protests, local pleadings."[106] Revisions to the Pollution Control Act in 1967 included pledges to set standards and issue permits for all industrial discharges in the province. The new act also created a technical arm, the Pollution Control Branch, under a Director of Pollution Control to evaluate waste-discharge proposals. The new act signalled the government's intention to depoliticize technical pollution-

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[104] Arnie Myers, "Prosperity: a deadly threat," *Vancouver Sun*, 13 September 1965, 6.

[105] British Columbia Hydro and Power Authority, *The Pulp and Paper Industry of British Columbia* (Vancouver: B.C. Hydro and Power Authority, October 1966).

[106] "We need a new approach to pollution.," *Vancouver Province*, 12 August 1968, 4; editorials along the same vein appeared regularly through the mid-to-late 1960s. See: "What's a billion?," *Vancouver Sun*, 12 March 1966, 4; "Mr. Bennett's Conversion. Better late than never," *Vancouver Sun*, 8 August 1966, 4; "Tardy recognition," *Victoria Times*, 13 August 1966, 4.

control administration.[107]

In 1968 and 1969, repeated violations of provincial permit conditions by the three Prince George pulp mills placed pollution enforcement under intense scrutiny. These mills discharged a combined 75 million gallons per day of wastewater into the Fraser River. Settling and oxidation basins, with 24-hour retention time, were installed to reduce wood solids, BOD and toxicity of the effluent. From the outset, however, the plants had difficulty meeting negotiated effluent-quality standards. Bioassay tests revealed that mill effluent was highly toxic to fish. "As time has progressed the strength of waste discharges has increased ... to a level where the treatment facilities have been overloaded and treated effluents have failed to meet standards of BOD and toxicity," noted one report. "Fortunately, dilution has acted as a safety factor, and partially treated wastes have been assimilated without evidence of harm to the fishery resource."[108] The Northwood and Prince George Pulp and Paper mills resisted upgrades to their treatment systems. The Northwood mill was the most frequent violator and the IPSFC accused the mill's owners of being "disinterested in the successful operation of a pulp mill waste treatment system."[109] Permit violations by Northwood were made public when Tom Berger, leader of the opposition New Democratic Party, accused Lands, Forests, and Water Resources Minister Ray Williston of attempting to cover up the pollution, which occurred in Williston's constituency. "[T]his company as been allowed to use the Fraser River as a garbage dump, and this government has connived at

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[107] "Socreds plan pollution police force," *Victoria Colonist*, 17 February 1967; "Pollution board accused of usurping health duties," *Vancouver Sun*, 21 February 1967; "Opposition raps new pollution bill," *Vancouver Sun*, 18 March 1967; "Plants to need pollution permit," *Vancouver Sun*, 14 March 1967, all in B.C. Legislative sessional clipping books [microform].

[108] Pacific Salmon Commission Library files, box 1100.1 file 19, James A. Servizi, "Current and Future Research and Monitoring Projects Related to Pollution and Its Effects on Fraser River Sockeye and Pink Salmon," 11 May 1971, 2-3.

[109] IPSFC, *Annual Report* (1968), 5. The report for the following year notes the same problems.

this kind of activity," Berger told the legislature.[110] Berger was joined by federal Fisheries Minister Jack Davis in condemning the Northwood mill and the Pollution Control Branch.[111]

For its part, the branch repeatedly warned Northwood to upgrade its effluent quality to meet permit standards. But its feeble enforcement policy eroded public confidence in its authority. As one legal observer noted, "it is evident that our provincial government is not taking an activist role in issuing directives that its legislation be enforced. The legislation is available in declaratory form, but the refusal of the government to provide the means for effective enforcement renders its declarations little more than mere empty words."[112] Like state and provincial environmental agencies elsewhere in North America, the branch's failure to ensure compliance meant its permits were "virtual licenses for industries to continue to pollute."[113] Its philosophy was probably best summed up in a 1970 brief commenting on the proposed Canada Water Act: "The control of pollution and its planning is directly connected with provincial social and economic planning and priorities and is also strongly associated with the development of natural resources under provincial jurisdiction."[114] Environmental protection ranked low on the branch and board's list of

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[110] Williston initially denied that the mills were violating their permits. Berger subsequently moved a vote of censure against the minister for "misleading" the legislature. The vote was defeated by the government majority. "Mills thumbing nose on pollution – Berger," *Vancouver Province*, 27 March 1969, 18; Iain Hunter, "Williston blasted over mill," *Vancouver Sun*, 27 March 1969, B.C. Legislative sessional clipping book [microform]; see also Iain Hunter, "Berger calls Loffmark unhorsed pollution fighter," *Vancouver Sun*, 1 February 1969, 13.

[111] "'Maverick' mills warned by Davis," *Vancouver Sun*, 31 May 1969, 75.

[112] Patrick Good, "Anti-Pollution Legislation and Its Enforcement: An empirical study," *U.B.C. Law Review* 6, 1 (June 1971), 280.

[113] Council on Economic Priorities, *Paper Profits*, 38; on the lack of vigorous enforcement of environmental regulations elsewhere in North America, see Colten, *Road to Love Canal*, 90-91; Macdonald, *The Politics of Pollution*, 138. The "licence to pollute" accusation was frequently leveled at the PCB. See Alastair R. Lucas, "Legal Techniques for Pollution Control: The role of the public," *U.B.C. Law Review* 6, 1 (June 1971), 176; Good, "Anti-Pollution Legislation and Its Enforcement,"; A. H. Murphy, "Pollution is a dirty word. But there's an answer to it," *Victoria Colonist*, 20 July 1971, 12E.

[114] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-02 file 10, "British Columbia Proposals on Pollution Control Requirements in British Columbia and the Proposed Canada Water Act," 30 January 1970.

priorities. Instead, they remained preoccupied with the allocation and management of assimilative capacity to industrial and municipal waste dischargers.

Federal enforcement of anti-pollution laws at interior pulp mills was hampered by scientific uncertainty, ineffective laws and a lack of political will to undertake prosecutions of offenders. "Pulp mill waste disposal ranks first as the most serious source of pollution today in the province," federal officials told a national pollution conference in 1966.[115] This sentiment was echoed by the IPSFC, which noted that "there remains the serious question as to how much additional domestic and industrial waste could be put in the [Fraser] river without affecting the salmon runs."[116] One report from 1969 recommended gathering information for a prosecution at Northwood if the company's flagrant permit violations were not resolved, but no action was taken.[117] In the absence of an episode of "gross" pollution, usually due to negligence, the blanket prohibitions under the act were difficult, if not impossible, to enforce. Since the long-term, sub-lethal effects of pulp mill effluent were hard to prove, they were also hard to restrict.[118] The IPSFC, the body perhaps most actively involved in negotiating advanced pollution control standards at the Fraser watershed mills, possessed no direct enforcement authority. By the end of the 1960s, some began to question the federal fisheries department's record on pollution control. At 1969 public hearings in Vancouver of the House of Commons Standing Committee on Fisheries and Forestry, fisheries advocates and environmentalists criticized the "gentleman's agreements"

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[115] R.E. and K.J. Jackson McLaren, "The Impact of Water Pollution on the Uses for Water – Fisheries," *Pollution and Our Environment: Background papers* (Ottawa: Canadian Council of Resource Ministers, 1966), 1.

[116] IPSFC, *Annual Report* (1965), 2.

[117] FABC fonds, box 31 file 17, K.J. Jackson, "Development of Facilities and Experience on Fraser River Mills," presentation to Fisheries Development Council meeting, 8 December 1969.

[118] Kernaghan Webb, *Industrial Water Pollution Control and the Environmental Protection Service* (Ottawa: Law Reform Commission of Canada, May 1983), 222-236.

governing pollution control. The Department of Fisheries was also castigated for its poor record of enforcement.[119] As environmentalists inferred, the longstanding tradition of cooperative development of waste disposal regulations between industry and government agencies may have also hampered enforcement.

Based on the environmental standards of the time, efforts to control pulp mill pollution in the Fraser watershed were a qualified success. Fisheries researchers played a critical role in establishing high effluent-quality standards for interior mills. The treatment systems implemented at the four mills were among the earliest advanced-treatment systems for pulp mills in North America. The goal of protecting fish life from catastrophic concentrations of toxic pulp-mill effluent was achieved, even if many interior mills consistently failed to meet pollution-control permit restrictions.[120] Pollution control was, however, ultimately based on the combination of effluent treatment and the assimilative capacity of receiving waters. By measuring the effectiveness of pollution control with reference to the survival of commercial fish species, effluent quality standards resulted in geographically uneven environmental protection. Where commercial fish species were absent, such as in the Columbia River, greater deviation from toxicity and other environmental standards was tolerated. The environmental governance regime imposed on interior operators enabled the industry to avoid complete treatment or recovery of its wastes, with the tacit approval of regulatory agencies. This practice also failed to account for the long-term effects of

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[119] House of Commons Standing Committee on Fisheries and Forestry, *Minutes of Proceedings and Evidence* No. 15, 21 April 1969, No. 16, 22 April 1969, No. 17, 23 April 1969. Parlour contends this criticism of federal fisheries enforcement reinforced efforts within the department to revise and strengthen the Fisheries Act. Parlour, "The Politics of Water Pollution Control, 130.

[120] The Council of Forest Industries Brief to the second provincial inquiry into waste discharges from the forest industry contains data and testimonials as to the environmental performance of pulp mills. See British Columbia, Pollution Control Branch, *Public Inquiry into the Pollution Control Objectives for the Forest Products Inquiry of British Columbia. Proceedings* (Victoria: Ministry of Environment, 1976), vol. 4.

industrial waste disposal. In 1969, Jack Davis asserted wood fibres from Prince George mills could be detected as far south as Mission in the Fraser River.[121] In the early 1970s, slime buildup (caused by nutrient enrichment) in the Thompson River and Kamloops Lake, a placid, widening section of the river, necessitated treatment upgrades as the Kamloops pulp mill expanded production. In addition, the official tolerance of sub-lethal pollution subsequently created regulatory difficulties in the 1980s as longer-term effects and new, "second-generation hazards" from pulp mill effluent were identified.[122]

"King of Polluters": Pulp, politics and pollution in the 1970s

The rise of mass environmental consciousness in North America around 1970 altered the political context for pulp mill regulation. The U.S. Earth Day and Canadian Survival Day events, both held in 1970, brought environmental issues into the political spotlight. Anti-pollution groups formed across Canada, including Ontario's Pollution Probe, B.C.'s Society for Pollution and Environmental Control (SPEC) and STOP (Save Tomorrow, Oppose Pollution), with chapters in Montreal and Edmonton. Water pollution was foremost among these groups' concerns, particularly in Ontario and British Columbia.[123] In their analyses of public-opinion polling, Kathryn Harrison and James Parlour contend that the burst of federal activity on pollution from 1968-72 was stimulated by the dramatic emergence of pollution as a public issue. Perceptions of a pollution crisis in Canada were fuelled by a significant increase in mass media coverage of pollution

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[121] "'Maverick' mills warned by Davis," *Vancouver Sun*, 31 May 1969, 75; "Northwood in error, says Davis," *Vancouver Province*, 7 June 1969, 25.

[122] Doern, "Sectoral Green Politics"; Stanbury, *Regulating Water Pollution by the Pulp and Paper Industry*, chap. 3.

[123] R. Brian Woodrow, "The Development and Implementation of Federal Pollution Control Policy and Programs in Canada, 1966-1974" (PhD diss., University of Toronto, 1977), 94; Parlour, *Urban Pollution Study*, 148-154.

issues.[124] Environmental groups used this media interest to target the pulp and paper industry. In one notable example from 1970, SPEC issued a mock "wanted" poster for forestry giant MacMillan Bloedel, a company environmentalists labelled "King of the Polluters." The campaign portrayed the company and its pulp mills as "environmental outlaws"and received wide (if mostly critical) coverage in the mainstream press.[125] SPEC members staged the presentation of a gift-wrapped container of pulp mill effluent to an unwary Premier W.A.C. Bennett during a visit to Prince Rupert in 1971. The group also opposed new mill developments at Houston and Quesnel.[126] SPEC and other environmentalists used a public inquiry into waste discharges in the forest industry held by the Pollution Control Branch in 1970 as a forum to denounce the polluting practices of the pulp and paper industry.[127]

Amidst growing public concerns about the state of the nation's waters in the late 1960s, the federal government initiated a broad program of water pollution regulation. The 1970 Canada Water Act, the 1970 Fisheries Act revisions and the 1971 creation of the Department of Environment formed part of an unprecedented extension of federal activity into water quality management, an area normally administered by the provinces. The Canada Water Act sought to

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[124] Kathryn Harrison, *Passing the Buck: Federalism and Canadian environmental policy* (Vancouver: University of British Columbia Press, 1996), 59-62; J. W. Parlour and S. Schatzow, "The Mass Media and Public Concern for Environmental Problems in Canada, 1960-1972," *International Journal of Environmental Studies* 13, 1 (1978), 9-17.

[125] SPEC Archive, box 994.02.03 file 1, Scott Honeyman, "SPEC takes aim at forest giant," *Vancouver Sun,* 18 July 1970.

[126] SPEC Archive, box 994.02.03 file 1, Iain Hunter, "Family talks back to 'great munificent father,'" *Vancouver Sun,* 11 August 1970; box 994.01.01 file 1, "Eddie Albert joins anti-pollution group," *Vancouver Sun*, 21 July 1969; *PerSPECtive,* 8 March 1971, 6; *PerSPECtive,* May-June 1971, 1.

[127] The transcripts and briefs submitted to the inquiry are reproduced as British Columbia, Water Resources Service, *Public Inquiry into Waste Discharges from the Forest Products Industry*, 9 vols. (Victoria: Water Resources Service, 1970). For coverage of the environmentalists at the hearing, see Barry Broadfoot, "Industry on defensive at Vancouver hearing," *Canadian Pulp and Paper Industry Magazine* 23, 10 (October 1970), 27-29; Barry Broadfoot, "SPEC urges revisions to present pulp mills," *Vancouver Sun*, 13 August 1970, 13.

create watershed-based pollution-planning authorities that would distribute and manage assimilative capacity as part of a multi-use resource-management strategy. As Parlour has noted, the development and implementation of this act was dogged by interdepartmental rivalry between the Department of Fisheries and Department of Energy, Mines, and Resources over the authority to regulate pollution. By embracing assimilative capacity, the Canada Water Act also appeared to directly contradict the anti-pollution provisions of the Fisheries Act.[128] However, the planning authorities mandated by the act were never established, and the act was essentially shelved by the government.[129] Changes to the Fisheries Act included stiffer penalties for polluting fish-bearing waters, expanded powers of investigation and enforcement and the development of industry-wide pollution controls for various industries. Fisheries Minister Jack Davis declared that federal effluent-quality regulations were intended to keep pollution "inside the factory fence" and to virtually eliminate polluting waste discharges. Davis acknowledged that the former act's blanket prohibition of waste dumping had provided little effective protection against pollution:

> The sections in question were all to embracing, too comprehensive. ... What we really need in legislation of this kind is not an absolute prohibition of everything thrown into waters but more precise measurements of what can be thrown into water and to keep it clear, clean and useful to fisheries... By defining in the regulations the concentrations which can or cannot be tolerated... we will have a more precise and useful tool in legislation..."[130]

The pulp and paper industry, Canada's largest manufacturing sector and the largest liquid waste-producing industry, was the first target of federal pollution standards. These regulations

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[128] James W. Parlour, "The Politics of Water Pollution Control: A case study of the formation of the Canada Water Act, Part I: Comprehensive water resource management; Part II: Nutrient Control," *Journal of Environmental Management* 12 (1981), 31-64.

[129] Woodrow, "Development and Implementation of Federal Pollution Control Policy," 432.

[130] Cited in Webb, "Industrial Water Pollution Control," 69.

were developed over the course of 1970-71 through negotiations between industry representatives and the federal government. Enforcement fell to the Environmental Protection Service, an investigation and enforcement body created in 1971 under the Department of Environment (which at the time subsumed the Department of Fisheries). The Pulp and Paper Effluent Regulations aimed to avoid the creation of "pollution havens" by establishing nation-wide standards and explicitly rejected the use of assimilative capacity as a method of waste disposal. Federal regulators argued that, since little was known about environmental conditions at each mill location, it was more efficient to regulate the effluent than receiving water quality.[131] The regulations sought to control only three parameters of pulp and paper effluent: biochemical oxygen demand, suspended solids and selected toxic constituents. Colour, foam, pH and other characteristics and constituents of the waste stream were not included in the regulations. The effluent was also required to pass a bioassay test in which 80 per cent of test fish survived for 96 hours in a 65 per cent effluent solution. Discharge limits were based on the installation of "best practicable technology" for controlling pollution as determined through industry and government consultation. These limits were intended as baseline national standards that were sufficiently flexible to take into account the economic, social and technological conditions at each mill. But critics charged the regulations failed to recognize the wide variations in environmental impacts and assimilative capacity, whether a small eastern Canadian river or the B.C. coast. Individual mills could be forced to offer too much treatment, or not enough, to protect the environment. In particular, older mills located in eastern Canada (and on the B.C. coast) feared the costs of complying with improved effluent

[131] James W. Parlour, "The Politics of Water Pollution Control: A case study of the Canadian Fisheries Act amendments."

standards for little perceived environmental benefit.[132]

Jurisdictional and administrative politics plagued the formulation and enactment of these regulations. Both federal and provincial governments raced to develop strict environmental policies in response to public demand. But they also sought to extend or defend their constitutional authority over water quality.[133] Existing or newly created pollution-control agencies in many provinces rejected the federal regulations as too lenient; others, like B.C. and Quebec, resisted federal regulation altogether.[134] In B.C., the provincial government adopted a "get tough" stance with the pulp and paper industry, promising to force even older, coastal mills to adopt effluent treatment.[135] The provincial Pollution Control Branch created its own set of pollution control "objectives" after a public inquiry in 1970. Both provincial and federal standards included multiple categories of effluent quality objectives. Thus, federal regulations stipulated different treatment requirements for new, existing or upgrading mills; provincial objectives included A-, B-, or C-level objectives, which represented "stages" of improving environmental performance to be met by mills over time.[136] The duplication and complexity of these regulations were a major

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[132] Webb, "Industrial Water Pollution Control," 85-86; Stanbury, *Regulating Water Pollution by the Pulp and Paper Industry*, chap. 2.

[133] Pollution control became another venue for the federal-provincial political grandstanding that characterized B.C. politics. See, for instance, Iain Hunter, "Williston accuses Davis of bungling act revision," *Vancouver Sun* 14 August 1970; "Pollution isn't solitaire," *Vancouver Province*, 17 August 1971, 4; Ron Rose, "Sludge, stench clog Fraser cruise," *Vancouver Sun*, 21 August 1970, 29.

[134] Parlour, "The Politics of Water Pollution Control: A case study of the Canadian Fisheries Act amendments"; Harrison, *Passing the Buck*, 72-73.

[135] Ian Street, "Polluting pulp mills face closure in 1971," *Victoria Colonist*, 4 February 1970, B.C. Legislative sessional clipping books [microform]; "Conform or close," *Canadian Pulp and Paper Industry Magazine* 23, 3 (March 1970), 67.

[136] Pollution Control Branch, *Report on Pollution Control Objectives for Forest Products Industry of British Columbia* (Victoria: PCB, 1971).

irritant to the pulp and paper industry.[137] In addition, while these standards were a product of industry-wide negotiations with federal and provincial regulators, in practice individual mills negotiated compliance schedules based on location, the age of the mill and the cost of upgrading treatment. The result was regulatory conflict and confusion, and the uneven application of supposed "national" or "province-wide" standards.

In many cases, it also remained unclear that the goal of protecting the environment was being achieved. Overall, the environmental performance of the pulp and paper industry in Canada improved markedly in the 1970s. Pollution from pulp mills had been on the decline since the early 1960s, mostly due to process improvements that provided an economic benefit to the mills. Between 1960 and 1971, "[total] dissolved solids and BOD were reduced by 33 per cent, water use by 19 per cent, while total production of the Canadian industry increased by 46 per cent over that produced in 1960."[138] By the early 1970s, most of the remaining room for improvement in effluent quality lay in external treatment, a net cost to producers that was less enthusiastically embraced by the industry. To help producers meet new regulations, the federal government and the Canadian Pulp and Paper Association set up the Co-operative Pollution Abatement Research Program to fund research into pollution abatement methods and technology. The combination of regulation, research and negotiation appeared to work: a 1988 Environment Canada report approvingly noted, "the volume of effluent dumped into Canadian waters by the pulp and paper industry has been reduced substantially since 1971."[139]

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[137] Charles J. Keenan, *Environmental Anarchy: The insidious destruction of social order: A legacy of the sixties* (Victoria: Cappis Press, 1984), 80-88.

[138] Jones, *Capital Investment in Pollution Abatement Equipment,* 5.

[139] Sinclair, *Controlling Pollution From Canadian Pulp and Paper Manufacturers*, 183.

This industry-wide improvement masked considerable regional variation in environmental performance, both across Canada and within individual provinces. In B.C., a 1973 EPS report cited 19 out of 22 pulp mills for failing to meet standards for one or more of BOD, suspended solids or toxicity.[140] Between 1974-1978, fewer than half of the province's mills met federal standards for toxicity or suspended solids. However, nearly all B.C. mills were in compliance with standards for discharges of organic matter. This was attributable in part to the technology used in the recent development of the interior industry. By comparison, mills in eastern Canada, using older technology, fared much more poorly on environmental performance.[141] Kathryn Harrison notes that, "despite a record of widespread and persistent non-compliance with federal standards, the federal government only rarely intervened. Not only did the provinces fail to enforce their own permits, but those permits often did not satisfy federal requirements." The federal Environmental Protection Service deferred to provincial regulators to avoid the intergovernmental conflicts occasioned by vigorous enforcement of federal standards.[142] Harrison concluded that the federal legislative and regulatory blitz of the early 1970s consisted largely of "symbolic politics" intended to mollify an aroused public. The presence of valuable commercial salmon in the rivers, estuaries and inlets of the province meant that in B.C, the enforcement of regulations was somewhat more vigorous. Between 1970 and 1976, over 80 per cent of all prosecutions of mills

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[140] Rob Turner, "Nineteen B.C. pulp mills fail pollution tests," *Vancouver Province*, 21 August 1973, 9.

[141] Webb, "Industrial Waters," chap. 5, 24-29; Sinclair, *Controlling Pollution from Canadian Pulp and Paper Manufacturers*, 186; Peter Nemetz, "Pollution Generation and Abatement in the British Columbia Pulp and Paper Industry," in James B. Stephenson, ed., *The Practical Application of Economic Incentives to the Control of Pollution: The case of British Columbia* (Vancouver: University of British Columbia Press, 1977). Nemetz provides useful data on mill characteristics, effluent quality, and regulatory compliance in the early 1970s.

[142] Harrison, *Passing the Buck*, 107, 113.

under the Fisheries Act came against B.C. mills.[143]

One such prosecution was launched against the aging sulphite mill at Port Alice, known as the "single largest polluter in Canada."[144] The Port Alice mill exemplified the regulatory confusion and conflict that beset the industry in the 1970s. It also illustrated the long-term political, economic and environmental problems of tolerating pollution. The eight-year long dispute over the permit conditions for the Port Alice mill featured Pollution Control Board hearings, a provincial Cabinet appeal, political interference from the federal fisheries minister, a conviction under the federal Fisheries Act and a large environmental-impact study. Government regulators attempted to address the long-term impacts of the mill's reliance on the assimilative capacity of Neroutsos Inlet. But in this remote, economically dependent region, the costs of pollution control were measured against the economic viability of a major local employer. The politically volatile Port Alice case severely tested the willingness of governments to enforce environmental protection at the cost of economic hardship.

The Port Alice mill was built in 1917 on Neroutsos Inlet, part of the Quatsino Sound system on the northwest coast of Vancouver Island. It was one of three mills operated by the Whalen Bros. company, which had acquired one of the four original pulp leases issued by the provincial government in 1901.[145] Beginning in 1918, the mill produced about 200 tons per day of sulphite pulp for newsprint. The mill was acquired via merger by Alaska Pine and Cellulose Co. in 1951 and subsequently sold to U.S. giant Rayonier in 1954. Rayonier twice expanded the mill's

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143 Sinclair, *Controlling Pollution From Canadian Pulp and Paper Manufacturers*, 105. There were only six prosecutions in B.C. in this period.

144 Stanbury, *Regulating Water Pollution by the Pulp and Paper Industry*, chap. 3, p. 13.

145 Taylor, *Timber*, 86.

production capacity, to over 300 tons per day in 1958 and over 800 tons per day by 1964, when it also began to produce so-called "dissolving grades" for fabricated pulp products such as acetate, rayon and specialized printing papers.[146] The mill used a notoriously polluting calcium-base sulphite process. The sulphite liquor used in the pulp-cooking process could not be economically recycled, so was discharged along with pulp-washing waters. Sulphite pulping was also highly inefficient, resulting in up to 50 per cent fibre loss. The resulting waste stream, flowing at about 29,000 gallons per minute, was highly acidic, exerted an extremely high biological oxygen demand and contained hundreds of pounds of spent chemicals and tons of suspended solids. The biochemical oxygen demand of the effluent was estimated as equivalent to the domestic wastes of a city of 3.5 million people.[147] This effluent was discharged from a wooden flume near the head of Neroutsos Inlet and spread through the sheltered fjord.

Pollution complaints emerged within a decade of the mill's establishment. However, a 1927 investigation by fisheries officials concluded that water quality in the inlet remained within acceptable limits to sustain fisheries.[148] In April 1957, 54 local fishermen sent a petition to the Minister of Fisheries claiming expanded production at the Port Alice mill would threaten the local fishery.[149] Later that summer, Fisheries Research Board oceanographer Michael Waldichuk conducted a survey of the inlet, noting the relatively low volume of fresh water flowing into this otherwise typical fjord. Long, thin and relatively sheltered, the inlet contained resident or transient

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[146] R. Tollefson and E. Tokar, *Environmental Improvement at Neroutsos Inlet, B.C.* (Port Alice, B.C.: Rayonier Canada, December 1978), 3.

[147] See Rayonier brief and testimony in *Public Inquiry into Waste Discharges from the Forest Products Industry*, vols. 7 and 8.

[148] This conclusion was reported in Michael Waldichuk, "Some Oceanographic Characteristics of a Polluted Inlet in British Columbia," *Journal of Marine Research* 17 (1958), 549.

[149] A copy of the petition is contained in FABC fonds, box 31 file 17.

species of salmon, herring and rock cod. Waldichuk surveyed the physical and chemical conditions in the inlet, observing the "reddish brown" colouration and foaming of the surface waters up to five miles from the mill. Although a systematic biological survey was not conducted, he observed that,

> for a mile north and south of Port Alice on both sides of the Inlet, no evidence could be found of intertidal plant or animal life, excepting a greyish-green fungus slime... . The cobbles, sand, and other shore materials were plated with a glossy, pitch-like substance. ... It has been remarked by local residents that a good way to remove fouling from boats is to tie up at the mill's wharf for a few days.[150]

The impacts on fish life were less apparent, since fish were able to survive in oxygenated deeper waters. But Waldichuk noted that pink salmon, the most pollution-sensitive of the five salmon species, were absent from the inlet, and fisheries inspectors reported that Neroutsos Inlet was "by far the most inferior inlet of the Quatsino Sound system as a salmon producer."[151] He concluded that long-term environmental degradation had occurred in the inlet due to the mill effluent. Conditions in the inlet continued to decline in the 1960s, with little action on the part of federal or provincial regulators, or the company. Annual surveys in the early 1960s revealed that dissolved oxygen levels in the inlet were declining even below the surface layer, which contained most of the mill effluent. This trend indicated that Neroutsos Inlet could soon become devoid of oxygen and barren of aquatic life.[152]

Amidst rising public concern about pulp mill pollution, Port Alice gained notoriety as a wanton polluter. Federal Fisheries Minister Jack Davis referred to Port Alice repeatedly in

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[150] Waldichuk, "Some Oceanographic Characteristics of a Polluted Inlet," 545.

[151] Ibid., 549.

[152] See pollution reports in *Annual Report of the Biological Station* (1959-1962).

speeches criticizing the pulp and paper industry.[153] At the PCB forest industry inquiry in 1970, an environmentalist presented damning pictures of the "sudsy," discoloured waters of the inlet, wood waste being dumped in the waters and a garbage dump at the edge of the inlet, partially ablaze.[154] At the same inquiry, the mill admitted that its operations "severely affected" the inlet. But Rayonier also argued that, since the pollution did not substantially affect other uses of the water, the mill should be allowed to use the assimilative capacity of the water.[155] The company announced an eight-year plan to convert its calcium-base process to a less-polluting ammonia process, and to begin to recover and incinerate the spent liquor. It also promised to reduce solids in the effluent and to stop dumping stumps and wood waste into the harbour. But Rayonier also warned the PCB that rapid application of pollution restrictions could put the mill out of business, which would effectively kill the company town of Port Alice. The mill was the lifeblood of the village of Port Alice, population 1,700. Rayonier had built much of the town's housing and community facilities in the early 1960s, and the town was only formally incorporated in 1964. The mill dominated economic and social life in the region, where the only other major industries were fishing, logging and the nearby Island Copper Mine. Rayonier told pollution control officials that "Port Alice illustrates the choices that society must make today, and the factors that must be considered, in order to apply the right social and economic incentives and burdens to achieve maximum public benefit."[156] The company argued that the mill's long existence meant it should

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[153] "'Maverick' mills warned by Davis,"; "Davis warns industry of pollution," *Vancouver Sun*, 16 April 1971, 25.

[154] *Public Inquiry into Waste Discharges from the Forest Products Industry*, vol. 2, 239-241.

[155] Ibid., vol. 8, 63-83. This portion of the testimony included a Rayonier environmental impact assessment report, which documented the effects of the mill on Neroutsos Inlet: Roger Tollefson, John G. Denison, and Erick M. Tokar, "Improvement in Water Quality in Neroutsos Inlet, British Columbia," 1970.

[156] Ibid.

receive special consideration when developing and applying environmental standards.

Subsequent attempts to regulate the Port Alice mill resulted in confusion and acrimony. The mill was required to both apply for a provincial Pollution Control Branch discharge permit and to negotiate a separate compliance schedule for mill upgrades from the federal Environmental Protection Service. In practice, EPS officials deferred to provincial regulators in setting discharge standards — although they did issue a separate compliance schedule in 1973. Meanwhile, however, Rayonier appealed the provisions of its provincial pollution permit. The permit required a two-stage abatement of mill effluent: the first, the recovery of spent sulphite liquor, was required by 1975. The second stage, the installation of primary and secondary treatment facilities, was required by the end of 1978. These modifications would allow the mill to meet provincial Level B objectives for effluent quality. The permit also required immediate improvement of dissolved oxygen levels in the water, which would be monitored at a sampling station near the mouth of the inlet. The mill contended these provisions would require an immediate curtailment of production and place an unreasonable economic burden on the mill and the community. The Rayonier appeal sparked a public hearing before the Pollution Control Board, held in Victoria in June-July 1973. In advance of the hearing, the company cut production at the mill by 15 per cent, resulting in the layoff of 70 employees and sparking accusations that environmental laws were "strangling" the town.[157]

The 10-day-long appeal hearing was regarded by the PCB as "possibly the most crucial appeal yet brought before the board."[158] At stake in the adversarial hearing was the authority of

[157] "Rayonier reduces pulp production," *Vancouver Sun*, 16 June 1973, 1; "Gov't pollution laws are 'strangling' town," *Vancouver Sun*, 18 June 1973, 8; "What price tough controls?," *Vancouver Province*, 9 July 1973, 4.

[158] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01 file 6, "News Release," 9 August 1973.

regulators to impose standards for environmental protection. The appeal was "easily the longest and most costly ever mounted before the board and [was] seen as a landmark effort testing the determination of the province to impose tough clean-up standards in the forest industry."[159] The company based its appeal on the social and economic impacts of costly pollution-control upgrades at the mill. Its appeal notice charged that the Director of Pollution Control failed to take into consideration the "problem of providing continuing employment in the relatively remote area in which the facility is situate[d]."[160] The lawyer for the Director of Pollution Control challenged the relevance of this "non-technical" information, but the board allowed the company to present witnesses and experts describing the mill and the town's precarious economic situation. This testimony was echoed by media accounts of the unfolding "pollution crisis" in the community. News reports portrayed the town's residents as "pawns" in a political and bureaucratic struggle over environmental regulation. Government scientists' claims that Neroutsos Inlet was a "biological desert" were countered with demonstrations that fish could still be caught in the inlet. As a "company town" reliant on employment from the mill, residents feared Port Alice was being snuffed out by hyper-vigilant regulators.[161]

In addition to economic- and social-impact testimony, conflict emerged at the hearing over the company's "right" to use the assimilative capacity of the inlet. Rayonier lawyer Charles Locke charged that the permit "failed to give sufficient effect to a proper balance between the right of the

[159] "Epic pollution battle near end," *Victoria Times*, 19 July 1973, 7.

[160] BCARS, GR-1159 Pollution Control Board of B.C., *Proceedings, Rayonier Canada Ltd. Appeal to the British Columbia Pollution Control Board Relating to the Port Alice Pollution Control Permit Number PE-1240 Issued March 30, 1973*, Box 1 file 1, 9. See also the account of the hearing in Michael W. McPhee, "Water Quality Management in British Columbia: Pollution control in the pulp and paper industry," (MA thesis, Simon Fraser University, 1978), 275-283.

[161] Tony Eberts, "Port Alice – town on trial for its life," *Vancouver Province*, 30 June 1973, 5.

general public to enjoy a reasonably undisturbed environment on the one hand, and the right of those other segments of the public who use it judiciously for proper productive purposes."[162] Locke argued that the company, having operated in the area for nearly 57 years, had essentially acquired a prescriptive right to use the inlet for waste disposal — although he acknowledged this right was limited by other uses of the inlet. Locke called expert testimony from an oceanographer, a biologist, an engineer and a chemist in an effort to prove the mill's use of the inlet did not infringe on recreational or fisheries use of natural resources. The company also argued that pollution control standards should not be considered absolute but rather be adapted to particular environmental and economic conditions.[163]

Louis Lindholm, lawyer for the Director of Pollution Control, rejected the notion of a prescriptive "right to pollute," contending that waste discharges were allowed only at the indulgence of the government. Lindholm framed the question of upholding the permit as a challenge to the PCB's authority to set environmental standards: "Is the Board serious about the application of policy objectives which have been laid down?" he asked in his summation.[164] He rejected the notion that standards should reflect the age, type or location of the mill, saying these variations would lead to "double standards" and "regulatory chaos." While disputing the company's complaints about the costs of "stage 2" pollution controls, he asserted, "We are not to adopt, I suggest, a double standard from which we test the degree of pollution abatement by the size of the permittee's pocketbook."[165] Lindholm's defence of the Port Alice permit also included testimony

[162] *Proceedings, Rayonier Canada Ltd. Appeal,* box 1 file 1, 10.

[163] Ibid., box 2 file 1, 153.

[164] Ibid., 75.

[165] Ibid., 117, 129.

from scientific experts, including federal Environmental Protection Service biologists and the oceanographer Waldichuk. Their testimony described pollution effects including low dissolved oxygen in the inlet water, the coating of the inlet floor with thick mats of wood solids and the acute lethality of the effluent to fish. One federal fisheries officer reported that live clams had "died off" in the vicinity of the mill and herring kills had been reported at the mouth of the inlet where it connected to Quatsino Sound.

A compromise decision handed down by the PCB on 9 August 1973 neither satisfied Rayonier nor resolved the pollution of the inlet. The board allowed for modified environmental standards and monitoring procedures and extended the deadline for "stage 1" pollution controls, but upheld the requirement for the installation of secondary treatment facilities. The decision was regarded as precedent-setting, in that the PCB had explicitly considered the economic and social impacts of imposing pollution control standards, rather than judging permits on a strictly technical basis.[166] While the company immediately restored former production and employment levels, Rayonier also appealed the secondary treatment provision to the provincial Cabinet. Only five days after Rayonier launched its appeal, Environmental Protection Service officials charged the company under the Federal Fisheries Act for another fish kill in Neroutsos Inlet. In early September, an estimated 15,000-20,000 herring had been killed under low-oxygen conditions in the inlet caused by the sudden influx of mill effluent due to the company's resumption of full production. A trial date was set for early in 1974.[167]

Further adding to the controversy, federal Fisheries and Environment Minister Jack Davis

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[166] "Pollution compromised," *Vancouver Province*, 11 August 1973, 4; Tony Eberts, "Pubs are jumping," *Vancouver Province*, 13 August 1973, 8.

[167] The case is reported in Environmental Protection Service, *Case Law: Prosecutions under the pollution control provisions of the Fisheries Act*, Vol. 1, Environment Canada, 1976, Part II, R. v. Rayonier 1974.

attempted to intervene in the provincial Cabinet appeal. Although officials from his own ministry supported the PCB permit and had recently charged the company with a pollution violation, Davis pleaded with the B.C. Cabinet committee to modify the permit conditions, arguing that the mill faced unusual technical difficulties in meeting them.[168] Despite Davis's intervention, the recently elected provincial New Democratic Party government, eager to appear tougher than its predecessors on polluters, rejected the Rayonier appeal. Minister of Resources Bob Williams bragged that "every administration in this province has lived with the mess in that inlet, every administration except this one, so that there's been some guts being shown here, but some flexibility as well..." Williams also asserted that in the future, his government planned to institute a system of "negative rent" for the use of assimilative capacity, whereby the government would charge polluters for the use of the environment for waste disposal.[169]

After the dramatic events of 1973, the Port Alice situation again retreated to the arena of bureaucratic management. The federal EPS secured a conviction of the company for the 1973 fish kill, then returned to negotiating a compliance schedule for the mill. To avoid future gross pollution of the inlet while installing pollution control equipment, the company agreed to barge spent sulphite liquor from the mill out to the open sea for dumping — with government approval. "The informal approval of open dumping is a good illustration of how in practice, EPS officials recognize[d] and abide[d] by the concept of assimilative capacity, even though the *Fisheries Act*

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[168] McPhee, "Water Quality Management in British Columbia," 288; Webb, *Industrial Water Pollution Control*, 336-337. Davis' motivation for intervening is unclear. Webb concludes that Davis was simply ignorant of his own local officials' involvement in the case. Up until this point, Davis had been a strong proponent of upgrading older mills. His seeming reversal in this case may be related to politics; between 1972 and 1972, his Liberal Party formed a minority government.

[169] BCARS, GR-1159 Box 3 Proceedings, Appeal to Cabinet, 29 October 1973; "Rayonier loses appeal," *Vancouver Province*, 11 January 1974, 11.

legally and conceptually d[id] not allow for it," Kernaghan Webb has observed.[170] Provincial regulators also proved flexible in their application of pollution controls, allowing the mill to delay the implementation of a sulphite-liquor recovery boiler. Once these controls had been installed, environmental conditions in Neroutsos Inlet improved markedly. In a mandatory environmental assessment in 1978, Rayonier reported that nearly 70 per cent of the biological oxygen demand was removed from the effluent, and dissolved oxygen levels in the surface layer of the inlet had begun to recover. The company also began to reduce the wood waste and suspended solids discharged to the inlet. Biological studies, however, indicated the mill continued to affect the health and diversity of the marine biota, and the effluent remained toxic to fish in bioassays at fairly low concentrations. The environmental impact study concluded that the adverse effects of the mill pollution, formerly affecting the entire inlet, were now confined to an area one to two kilometres from the point of discharge.[171]

The Port Alice appeal hearings were hailed as evidence of the provincial government's commitment to enforceable pollution-control standards. But the government's long history of tolerance for waste discharges constrained its ability to develop and enforce standards for water quality or effluent control. The economic geography of the pulp and paper industry created political obstacles to the enforcement of strict environmental-protection standards. Attempts to apply pollution standards were subject to political interference and subtle — or in the case of Port Alice, blatant — job blackmail, in which companies used their overwhelming economic importance to rural communities as leverage against government regulation. Geographer William

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[170] Webb, *Industrial Water Pollution Control*, 343.

[171] R. Tollefson and E. Tokar, *Environmental Improvement at Neroutsos Inlet, B.C.*, Vol. 1, Summary Report (Port Alice, B.C.: Rayonier Canada, December 1978), contains a summary report with background information on the mill permit. The entire report runs to some eight volumes, mostly containing tabular matter.

Solecki claims that the rural setting of pulp mills makes their communities uniquely vulnerable to this type of pressure.[172] Nor was the federal government any more committed to the strong enforcement of its own pollution regulations. Its Pulp and Paper Regulations were subject to negotiation and flexible compliance schedules that allowed for "special pleading" by mills on the basis of age, geographical location, or economic problems. Many industry observers have applauded this "realistic" flexibility in the application and enforcement of standards, contending that the blanket application of strict pollution control measures is irrational and potentially economically devastating.[173] Others have argued that the deference of federal regulators to provincial authorities "calls into question whether the federal government's intent really was administrative efficiency, or merely escape from costly and politically unpleasant responsibilities."[174] Port Alice remained the prime example of these regulatory problems long after the compromise of the 1970s. The mill retained its reputation as the "single largest polluter in Canada." When new federal pollution regulations were promulgated in 1992, many thought the mill would be forced to close. It stayed open, but the mill's economic and environmental viability has remained precarious.[175]

Coda and conclusion

Scientific uncertainty and environmental unpredictability have continued to plague efforts to rationally exploit and manage the assimilative capacity of the aquatic environment in B.C. While

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[172] Solecki, "Paternalism, Pollution and Protest."

[173] Sinclair, *Controlling Pollution from Canadian Pulp and Paper*; Stanbury, *Regulating Water Pollution by the Pulp and Paper*; Webb, *Industrial Water Pollution Control* each endorse negotiated compliance with national standards.

[174] Harrison, *Passing the Buck*,

[175] Stanbury, *Regulating Water Pollution by the Pulp and Paper*, chap. 13, p. 3. On the mill as a continuing source of regulatory conflict, see Glenn Bohn, "Battle raging over pulp mill pollutants," *Vancouver Sun*, 11 January 1988, B1.

a number of the pulp mills surveyed by fisheries regulators in B.C. appeared to operate without significant environmental impacts, occasional spills or other accidents could result in environmental damage. In 1981, for instance, the Port Mellon pulp mill accidentally discharged 40,000 gallons of toxic black liquor into Howe Sound, earning it a $25,000 fine.[176] As demonstrated at Alberni Inlet, Neroutsos Inlet and other locations around B.C., the long-term impacts of exploiting assimilative capacity could also be devastating. Reviews of the environmental impacts of the Crestbrook pulp mill on the Kootenay River and the Celgar pulp mill on the Columbia River indicated that these mills, built under the lax pollution-control regime of the 1960s, had significantly degraded these watercourses.[177] Finally, and perhaps most ominously, the late-1980s discovery in pulp mill effluent of dioxins and furans— chlorinated organic chemicals produced by pulp bleaching that were reputed human and animal carcinogens — threatened the gradual toxification of the marine environment. These chemical compounds are persistent, bioaccumulate in plant and animal tissues and may be transported long distances by air and water. By the late 1980s and 1990s, the industry had again become the subject of intense wrangling over the science and policy of environmental regulation.[178]

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[176] "R. v. Canadian Forest Products Ltd. 1981, " in Environmental Protection Service, *Prosecutions Under the Pollution Control and Habitat Protection Provisions of the Fisheries Act* (Vancouver: Environment Canada, 1984).

[177] Canada, Environmental Protection Service, *Environmental Review of the B.C. Timber (Celgar Pulp Division) Pulpmill at Castelgar, B.C.* (Vancouver: EPS, November 1981); P. H. Whitfield and G. Oliver, *Effects of the Crestbrook Forest Industries Pulpmill at Skookumchuk on Water Quality of the Kootenay River Before and After the Implementation of Rapid Infiltration of the Effluent* (Vancouver: EPS, March 1983).

[178] Sierra Legal Defence Fund, *Pulping the Law: How pulp mills are ruining Canadian waters* (Vancouver and Toronto: Sierra Legal Defence Fund, 2000); Carol Van Strum and Paul Merrell, *No Margin of Safety: A preliminary report on dioxin pollutin and the need for emergency action in the pulp and paper industry* (Vancouver: Greenpeace, 1988 [1987]). This latter report is a Canadian reprint of an American report that sparked a major Greenpeace anti-dioxin campaign and spurred U.S. Environmental Protection Agency actions to require the control of dioxin in pulp mill effluent and other sources. Greenpeace activism in B.C. stimulated a national study of dioxin by Environment Canada.

For the first three-quarters of the twentieth century, government regulators struggled to develop and enforce pollution standards for the expanding pulp and paper industry in B.C. Attracted by the province's ample forest and water resources, the industry regarded waste treatment as an unnecessary cost. Before the 1960s, its coastal location meant that the industry relied on the seemingly infinite assimilative capacity of the ocean. During its subsequent interior expansion, the industry similarly regarded the province's large rivers as adequate protection against pollution. For pulp mills, local waterways were a sort of resource commons which provided millions of gallons per day of industrial process waters, as well as a handy medium for waste disposal. The industry was able to diffuse or export its environmental effects downstream, so long as public health or other resources were unaffected. In this sense, the story of pulp and paper pollution echoed the utilitarian attitude towards the aquatic environment that characterized sewage disposal and mine tailings disposal. As the industrial use and abuse of water came into conflict with another economic use of the commons, the fishery, conflicts emerged which drew state regulatory and scientific attention.

Environmental governance regimes, in attempting to mediate the "interdependencies" of resource exploitation and pollution, are created in response to particular historical and geographical contexts. The environmental, legislative and jurisdictional obstacles to pulp mill pollution control point to the critical importance of what Bruce Doern and Thomas Conway call "the powerful biophysical determinants of environmental federalism."[179] In B.C., the pulp and paper industry was regarded as a threat to commercial fisheries. This resource conflict, or "interdependency," shaped the scientific, bureaucratic and industrial response to pollution

[179] G. Bruce Doern and Thomas Conway, *The Greening of Canada: Federal institutions and decisions* (Toronto: University of Toronto Press, 1994), 84.

problems. Differences between the regulatory approach to coastal versus interior pollution problems reflected the constellation of authorities involved and the differing environmental context of the Fraser River versus the Pacific coast. Finally, regulations were developed within a larger social and political context of federal-provincial politics, growing public fears of water pollution and continental trends in water quality management and administration. As this account shows, in the history of pollution control, place, scale and environment matter.

Of course, many pollution problems and proposed solutions were shared with other parts of North America where the pulp and paper industry was located. Like the mining industry, the pulp and paper industry was continental in scope, sharing markets, ownership, technological practices and environmental impacts across borders. In the American context, Colten and Skinner have recounted the failure of state water quality regulation, the pattern of tolerating pollution from valuable industry, and the jurisdictional conflicts raised by federal government intervention into pollution control.[180] A 1972 national study of pulp mill pollution in the U.S. characterized the industry as a reckless giant that "borrowed" public resources such as forests and water and "returned" them damaged.[181] The pollution problems from pulp mills on Puget Sound, just across the Canadian border in Washington State, reveal the shared challenges of regulating old, dirty mills. Contemporary local pollution conflicts in Washington, such as the closing of an Everett sulphite mill attributed to pollution regulation, echoed debates in B.C. over economics and the environment.[182] Elsewhere in Canada, the pulp and paper industry created widespread river

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[180] Colten and Skinner, *Road to Love Canal.*

[181] Council on Economic Priorities, *Paper Profits.*

[182] United States Department of the Interior Federal Water Pollution Control Administration and Washington State Pollution Control Commission, *Pollutional Effects of Pulp and Paper Mill Wastes in Puget Sound* (Portland, OR, and Olympia, WA, 1967); Mark Wilson, "Pollution crisis crippling mill town," *Vancouver Province*, 26 January 1972, 15

pollution problems. These problems helped stimulate the expansion of federal authority over water quality in the 1970s. As in B.C., the Canadian industry as a whole resisted stiffer pollution control regulations, citing the high costs of waste treatment. The Port Alice case exemplified the economic challenges faced by older mills across Canada that used the highly polluting sulphite process.

Yet attempts to control and regulate pulp and paper pollution discussed in this chapter demonstrate the importance of place and environment in the evolution of environmental governance. Pulp and paper pollution control in B.C. was decisively influenced by the presence of a valuable fishery and the existence of strong, if flawed, federal fisheries-protection legislation. This provided a basis for federal regulators and fishery scientists to intervene in pollution problems which the provincial government, before the mid-1960s, appeared disinterested in addressing. However, the anti-pollution sections of the Fisheries Act proved both politically and technically difficult to enforce. Prohibiting any and all waste discharges was considered unreasonable. But proving harm to fish was difficult unless a major pollution event occurred. In the final analysis, only dead fish were enough to elicit strong action on the part of regulatory agencies; prosecutions were only undertaken for accidental spills or fish kills, not for ongoing violations of federal or provincial standards. In 1977, the power of the Fisheries Act was extended somewhat with the addition of protections for fish eggs and prohibitions of the harmful alteration of fish habitat. Prosecutions, however, contributed little to efforts to control the long-term degradation of aquatic environments."In effect," Kernaghan Webb concluded, "continuous pollution problems cannot be 'corrected' by [prosecutions]."[183] Instead, the policy of negotiating variable compliance schedules with operators merely institutionalized the longstanding practice — denied in policy

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[183] Webb, *Industrial Water Pollution Control*, 236.

statements — of establishing pollution controls based on the assimilative capacity or economic situation of particular mills.

Scientific research into pollution problems reflected both the social and institutional contexts of environmental regulation, and the particular environmental problems and conditions posed by pulp mill waste disposal. This account of pollution research and regulation disrupts the simplistic view of the increasing regulation due to environmental enlightenment, or the progressive development of environmental science. Rather, both regulation and the science that underwrote it were contested activities, deeply affected by changing social and political arrangements, environmental values and the particular environments in which they were enacted. As David Livingstone has observed, "scientific knowledge bears the imprint of its location."[184] In the case of pollution research, the landscape and environmental conditions confronted by pollution researchers deeply influenced how they approached environmental problems and what prescriptions they arrived at for their solution. Scientific and regulatory practices and innovations elsewhere (or at different scales) clearly affected the politics of pollution control in B.C. But the foregoing shows how these larger trends intersected with local history, geography and politics to create a unique context for the elaboration of environmental governance regimes.

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[184] Livingstone, *Putting Science in its Place*, 13.

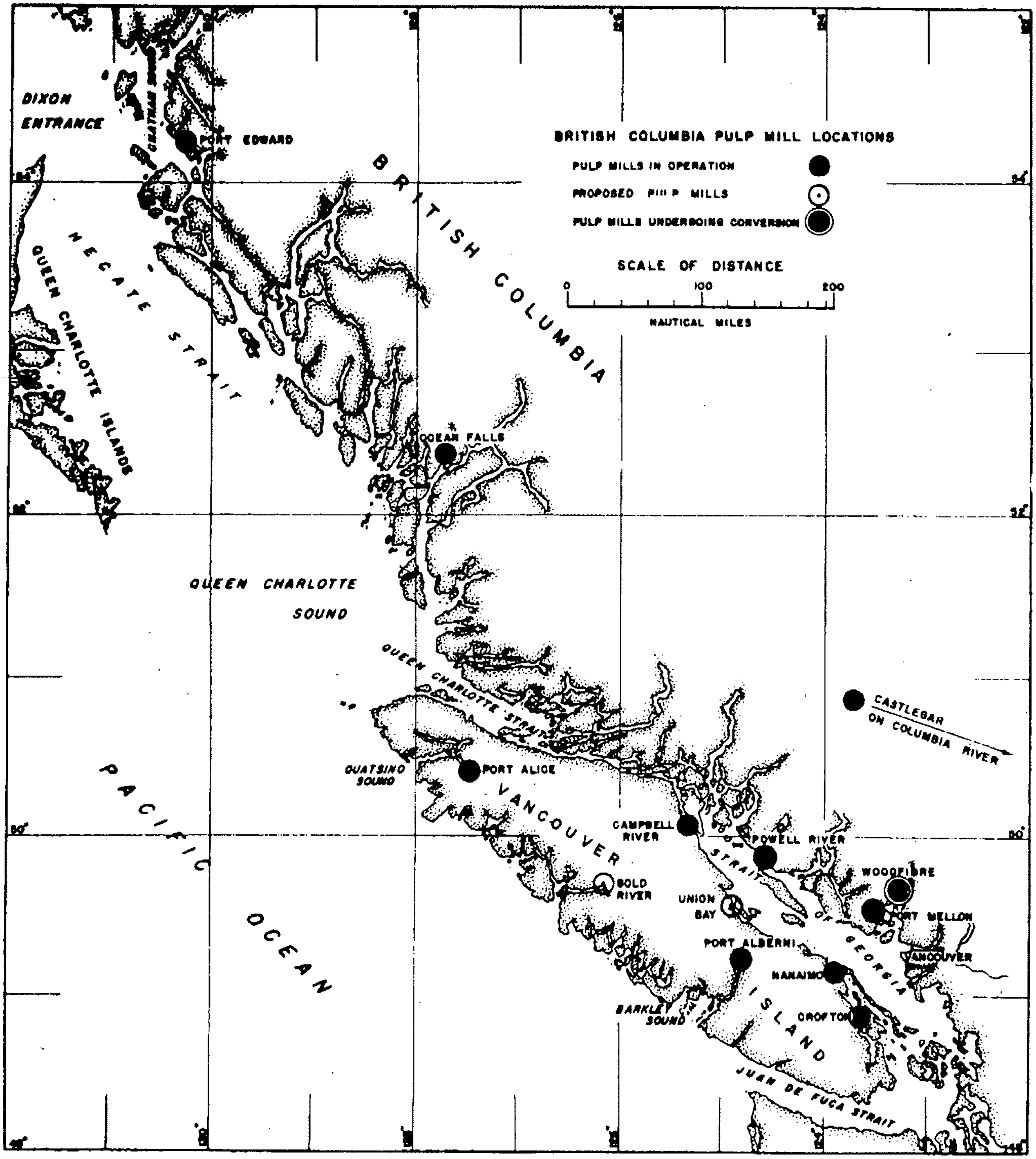

Figure 4.1: Locations of pulp mills on the B.C. coast, 1960. Source: Michael Waldichuk, "Marine Aspects of Pulp Mill Pollution," *Canadian Pulp and Paper Industry* 15, 6 (June 1962), 36.

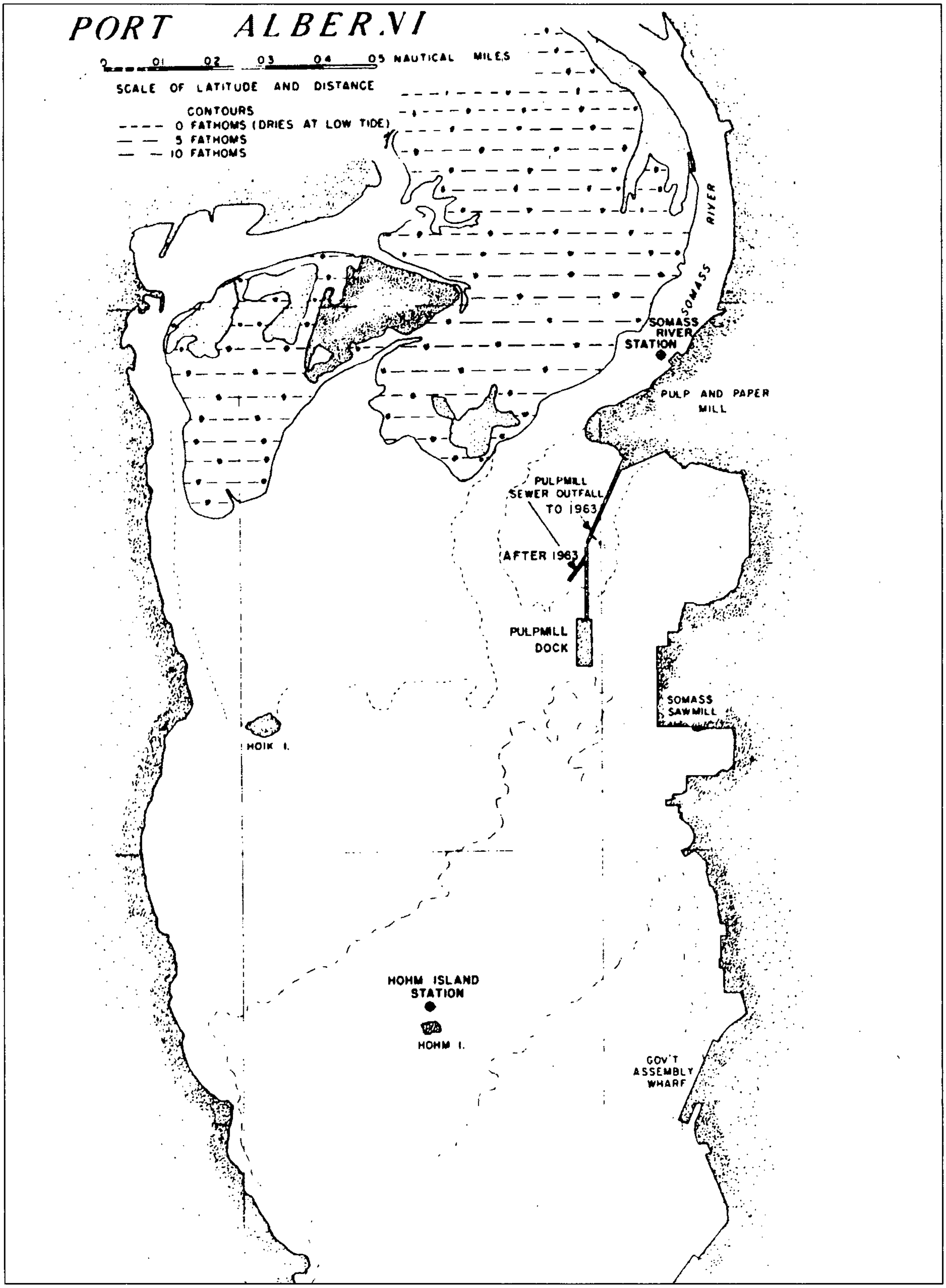

Figure 4.2: The head of Alberni Inlet and the Somass River estuary. The location of the pulp mill was intended, in part, to take advantage of the freshwater "flush" provided by the Somass discharge. Source: M. Waldichuk, J.R. Markert and J.H. Meikle, "Seasonal physical and chemical data for Alberni Harbour and Somass River, 1958-1969," *Fisheries Resaerch Board Manuscript Report Series* 1028 (June 1969), 2.

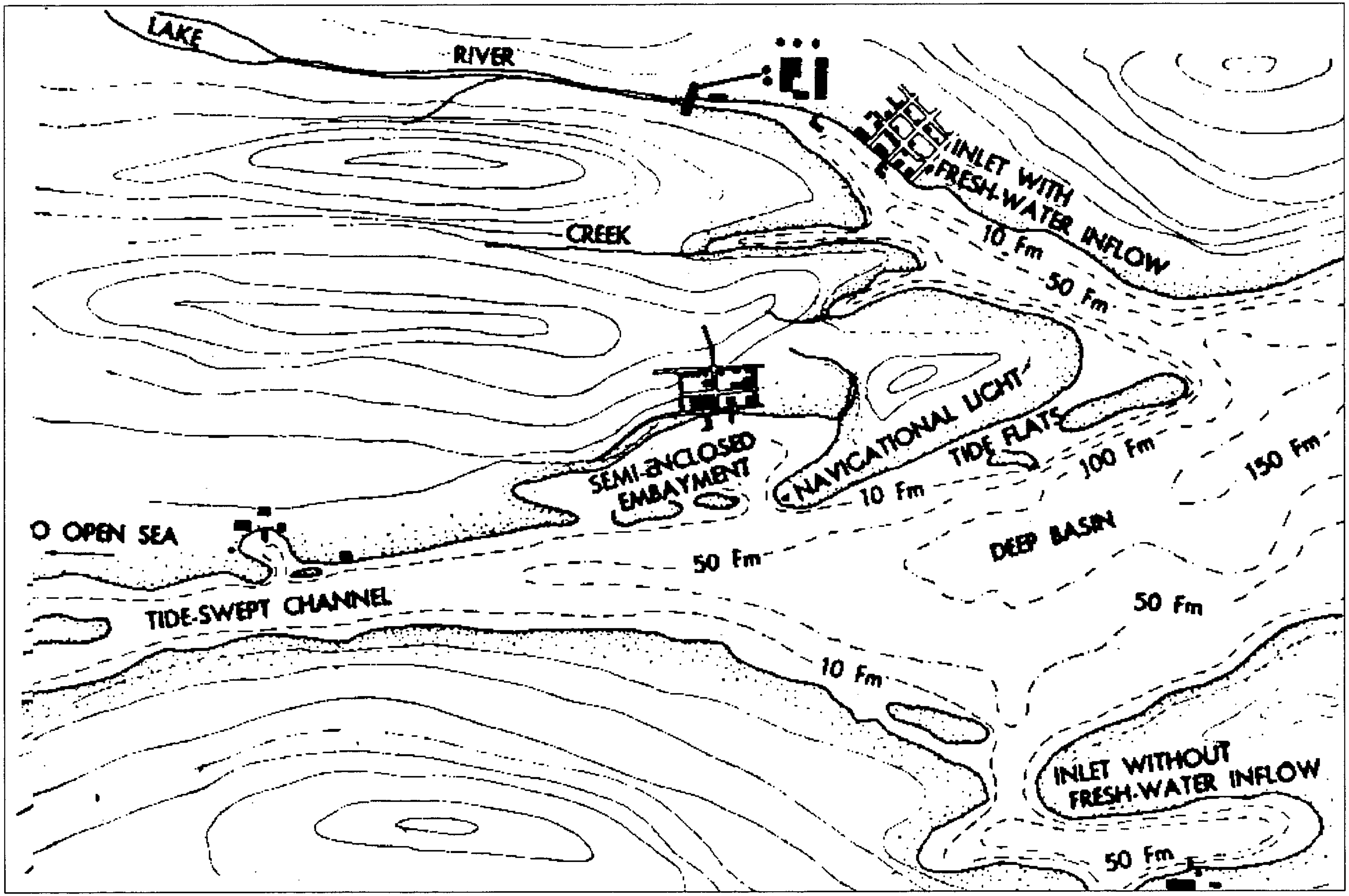

Figure 4.3: Waldichuk's schematic diagram of typical marine environments along the B.C. coast, 1968. This typology was devised to guide the location and evaluation of pulp mill effluent discharges. Source: Michael Waldichuk, "Marine Aspects of Pulp Mill Pollution," *Canadian Pulp and Paper Industry* 15, 6 (June 1962), 38.

Figure 4.4: Locations of pulp mills in B.C., 1983. The mills shown had all been built by the mid-1970s. Source: /atlas.gc.ca/site/english/maps/archives/5thedition

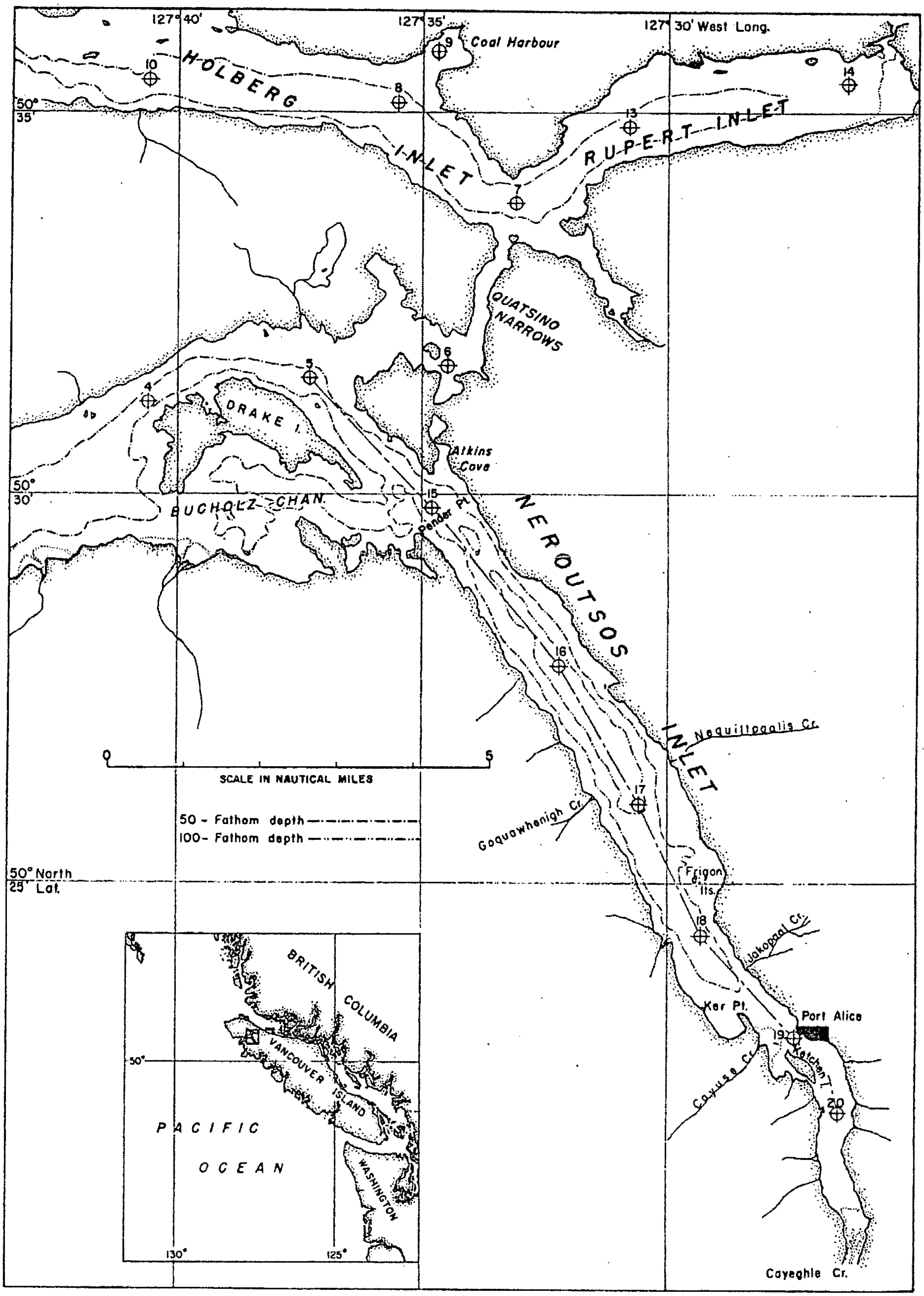

Figure 4.5: Quatsino Sound, showing the location of Port Alice on Neroutsos Inlet. Source: Michael Waldichuk, "Some Oceanographic Characteristics of a Polluted Inlet in British Columbia," *Journal of Marine Research* 17 (1958), 537.

Section 3
Crisis: Pollution, politics and environmentalism in B.C.

In a 1970 pamphlet, Vancouver Alderman Harry Rankin described pollution as a matter of "suicide or survival." "Do we face an imminent environmental collapse because of mounting pollution?" he asked readers. His answer was yes — and it was accompanied by an indictment of British Columbia's lax pollution controls, declining environmental quality and corporate greed.[1] "Pollution is indigenous to the kind of society we live in where powerful corporations in their drive for profits show little or no regard for human welfare," he wrote. Although focussed on B.C., Rankin's pamphlet drew heavily from the apocalyptic imagery and rhetoric that dominated late-1960s environmental writing in North America. That the idea of an environmental "crisis" was being invoked by a city councillor — albeit a leftist, social-activist one — testifies to the power and pervasiveness of crisis thought in this period. The Rankin text also demonstrates how pollution concern animated environmental politics in B.C. in the late 1960s.

This final section explores the politics of pollution control in B.C. during the period of rapidly changing environmental values associated with the rise of environmentalism as a social movement. First, I examine the catalytic effect of pollution on environmental advocacy in B.C. in the late 1960s through the activities of two organizations, one established (the B.C. Wildlife Federation [BCWF]) and one new (the Society for Pollution and Environmental Control [SPEC]). The BCWF was an umbrella organization for local sportsmen's groups formed in 1957 to lobby the provincial government on fish and game issues. BCWF members maintained close links with provincial Fish and Game Branch officials and regularly alerted them to local pollution problems. By the late 1960s, the federation had become politicized under the leadership of executive director

[1] Harry Rankin, *Pollution: Suicide or survival?* (Vancouver: Broadway Printers, 1970), 1.

Howard Paish. As industrial development expanded into the B.C. hinterland, the BCWF became increasingly strident in opposition to provincial government policies on forestry, mining and pollution control. Although not normally a constituency associated with late-1960s environmentalism, in B.C. sportsmen's voices were prominent in the rising chorus of criticism surrounding the despoliation of the environment. Sportsmen were joined by a number of anti-pollution and environmental groups founded in B.C. in the late 1960s, including the first Canadian chapter of the Sierra Club,.the anti-nuclear group Greenpeace and SPEC. The fortunes of SPEC, in many ways, neatly traced the trajectory of pollution concerns in the Canadian public consciousness. Formed in early 1968 as pollution began to emerge as a major public issue, SPEC grew rapidly into a province-wide, and nearly national, environmental force. The group incorporated many of the environmental movement's diverse constituencies: angry housewives, environmental engineers, ecology professors, draft-dodgers, unemployed students and disaffected resource workers. It became, for a time, the province's main voice in environmental politics. Riven by divisions and lacking a coherent political strategy, however, SPEC was reduced to a core membership in Vancouver by 1973. At the same time, pollution gave way in the public sphere to issues such as the energy crisis and inflation. SPEC's influence was also eclipsed by the high-seas derring-do of Greenpeace anti-whaling campaigns and by British Columbians' growing concern with wilderness preservation. While diminished, SPEC remained a significant player in local environmental politics in the 1970s, with pollution issues at the forefront of its environmental concerns.

The second portion of the chapter focuses on clashes over pollution control standards and philosophies during series of public inquiries held by the provincial Pollution Control Board during the 1970s. These inquiries were an attempt to develop pollution control "objectives" for the regulation of various waste sources. Though nominally exercises in technical fact-finding, these inquiries became "theatres of regulation" in which conflicting values and ideas about pollution and the environment were advanced. Their unique format — the presentation of technical briefs with opportunities for public cross-examination — created a venue for sportsmen's organizations, community groups, environmentalists, government officials and industry alike to debate philosophies of pollution control. As experiments in public participation in environmental regulation, the inquiries provided a forum for political engagement and environmental policy input. The adversarial inquiries dramatized the conflicting views of assimilative capacity and environmental quality that characterized pollution control policy debates. The inquiries demonstrated how even supposedly "technical" aspects of environmental issues such as pollution are rife with politics and ideology.

Apocalypse now: Crisis rhetoric and the politics of pollution

As Harry Rankin's pamphlet indicated, the rhetoric of apocalypse pervaded environmental writing and thought across North America late in the 1960s. One apparently did not have to see the Cuyahoga River catch fire or experience the lung-singeing smogs of New York City to believe that the natural world was imperilled. Indeed, all one had to do was pick up the newspaper or browse the shelves of the local bookstore: doom-talk was everywhere, and it influenced perceptions of pollution and environmental problems. Literary critic Lawrence Buell describes Rachel Carson's *Silent Spring* as inaugurating a shift in environmental writing from "keening over the values and goods of a lost nature tradition to evoking a world unnaturally deformed by humans": "Though never equalled by any subsequent nonfiction or fiction, *Silent Spring* helped spark a small tsunami of catastrophe rhetoric in environmental science and screeds and in popular literature."[2] North Americans were bombarded by forecasts of everything from local environmental degradation to total global ecological collapse. Fears about pollution, along with environmental "limits" and spiralling population growth, were at the heart of what Ulrich Beck has called "texts of the ecological Sturm und Drang movement of the 1970s."[3]

American writers such as Carson, Paul Ehrlich, Barry Commoner and Murray Bookchin provided the key texts of this millennial genre. Their writings informed a wide readership of the principles and ideas of ecology while simultaneously announcing an imminent (or already occurring) "eco-catastrophe" brought about by industrial modernity, population growth or environmental damage.[4] Canadian writers borrowed liberally from this apocalyptic imagery to proclaim that, in spite of the vast size and small population of the country, Canada also faced an environmental crisis. Journalist R.D. Lawrence's sensational description of Canadian pollution problems, *The Poison Makers*, ominously opened, "As you read this, the wastes that you have helped to make have already put their contaminated mark upon you and your family. You and yours are soiled by pollution; you may never come clean again."[5] Lawrence's dystopic vision of Canadian "throwaway" society distributed blame for environmental collapse widely, accusing government, industry and individuals of ecological crimes. "How do I tell you that you are a

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[2] Lawrence Buell, *From Apocalypse to Way of Life: Environmental crisis in the American century* (New York: Routledge, 2003), 180, xiii.

[3] Ulrich Beck, *Risk Society: Towards a new modernity* (London: Sage, 1992), 42.

[4] The reader *Eco-Catastrophe* (San Francisco: Canfield Press, 1970) contains writings from the latter three, and was published by the radical San Francisco journal *Ramparts*; see also Garrett de Bell, *The Environmental Handbook* (New York: Ballentine, 1970), a reader published for the first Earth Day; and an earlier reader, Gerald Leinwand, ed., *Air and Water Pollution* (New York: Pocket Books, 1969). Perhaps the most enduring (yet optimistic) of this apocalyptic genre is Barry Commoner's *The Closing Circle* (New York: Bantam, 1972 [1971]).

[5] R.D. Lawrence, *The Poison Makers* (Canada, Thomas Nelson & Sons, 1969), 1.

reckless killer, that you are a careless selfish person intent on only your own small circle of life?" he asked rhetorically.[6] Lawrence urged "panic" in the face of this crisis as the only solution to the apathetic response of public officials. Other treatises were less inflammatory but still contributed to the pervasive sense of dread about pollution. "Perhaps because of all the publicity, perhaps because we've known all along the bill would some day have to be paid, the summer of 1970 made many Canadians realize what a garbage-heap they were making of their once beautiful, open land," journalist John Fisher reflected.[7] Academics and experts joined in the condemnation of the "effluence of affluence," if in more measured tones. "There is yet no cause for optimism," wrote McGill University marine biologist M.J. Dunbar, since "public and governmental attitudes to water pollution, as to all pollution, vary somewhat from region to region, sometimes for reasons of economic advantage, sometimes out of apathy, often out of ignorance."[8]

Many of these authors cited a growing list of international environmental problems to illustrate their warnings of imminent disaster. Incidents of gross pollution in the 1960s at home and abroad contributed to a mounting sense of crisis. These included the wreck of the oil tankers *Torrey Canyon* in the English Channel and *Arrow* in Nova Scotia's Chedabucto Bay, as well as leaks from oil drilling off the coast of Santa Barbara, California; the ignition of pollutants in the Cuyahoga River near Cleveland; waterways choked with foam from phosphate detergents; and the declaration that Lake Erie was "dying" from industrial and domestic waste discharges.

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[6] Ibid., 48.

[7] John Fisher, *What You Can Do About Pollution Now* (Don Mills, Ont.: Longman, 1971), 281.

[8] M. J. Dunbar, *Environment and Good Sense: An introduction to environmental damage and control in Canada* (Montreal and Kingston: McGill-Queen's University Press, 1971), 19. See also Robert M. Irving and George B. Priddle, eds., *Crisis: Readings in Environmental Issues and Strategies* (Toronto: Macmillan, 1971); Rorke Bryan, *Much is Taken, Much Remains: Canadian issues in environmental conservation* (North Scituate, Mass.: Duxbury Press, 1973); P.A. Larkin, *Freshwater Pollution, Canadian Style* (Montreal and Kingston: McGill-Queen's University Press, 1974).

Radioactive pollution, whether fallout from nuclear testing or the ocean dumping of wastes, raised fears of global poisoning of the oceans and atmosphere.[9] Mass media coverage of pollution issues in Canada and the United States traced a slow, upward arc through the mid-1960s, to a spike in the 1968-70 period, then dropped off substantially.[10] This mirrored trends in public opinion polling. Pollution barely registered in issue-oriented polls before 1968. Two years later, pollution was a major concern for Canadians; 91 per cent of those who responded to one poll said they were aware of pollution. Yet by 1972, pollution had fallen well behind energy, unemployment and the economy among the preoccupations of Canadians.[11] The connection between public concerns and media coverage was strong; polling data from both countries indicated that most people received their information on environmental issues from the media.[12] For many Canadians, media coverage of severe pollution episodes elsewhere intersected with concerns about local problems to bring environmental problems under intense scrutiny.

The atmosphere of crisis surrounding environmental affairs also reflected the social, cultural and political upheaval of the 1960s in North America. As Adam Rome argues, environmentalism was an important facet of the burgeoning social movement politics of the age,

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[9] Typical of the apocalyptic visions confronting Canadians in their daily paper in the late 1960s were John Davy, "Polluted planet headed toward disaster," *Victoria Times*, 19 November 1968, 5; John Davy, "Time to stop exploiting earth," *Victoria Times*, 20 November 1968, 5; "Decline and fall?," *Victoria Times*, 21 November 1968, 4. Frank J. Taylor, Philip G. Kettle and Robert G. Putnam, eds., *Pollution: The effluence of affluence* (Toronto: Methuen, 1971) is largely a compilation of stories from the mainstream press across Canada.

[10] J. W. Parlour and S. Schatzow, "The Mass Media and Public Concern for Environmental Problems in Canada, 1960-1972," *International Journal of Environmental Studies* 13, 1 (1978), 9-17.

[11] James W. Parlour, *The Urban Pollution Study: Summary report* (Ottawa: Ministry of State for Urban Affairs, September 1974), 151-152; Kathryn Harrison, *Passing the Buck: Federalism and Canadian environmental policy* (Vancouver: University of British Columbia Press, 1996), 59-62, contains a good discussion of public opinion polling.

[12] Parlour, "The Mass Media and Public Concern," 12-13.

including the women's movement, the New Left and a revitalized liberalism in the United States.[13] Social concerns about the "urban crisis" often cited the declining environmental quality of urban cores as a symptom of the social and economic problems of the city, especially in the United States.[14] As in the U.S., social and cultural ferment in Canada influenced how environmental issues were perceived. In Canada, the association of students and "radicals" with environmentalism was also strong, as university campuses provided the seed-bed for many early environmental groups.[15] The tenor of Canadian environmental discourse was also shaped by the resurgent nationalism of the period. English-Canadian nationalism and cultural identity coalesced around a rejection of "continentalism" and the strong economic and cultural influence of the United States. As Robert D Page asserts, Canadian environmentalism was influenced by the intellectual climate that spawned such neo-nationalist thinkers as Mel Watkins and George Grant, and organizations such as the Committee for an Independent Canada and the Council of Young Canadians.[16] Opponents of rampant resource development or pollution often lashed out at "foreign" (read: American) multinational corporations as environmental offenders, and the cultural critique of capitalist values sometimes contained an implicit or explicit reference to industrial modernity as an American phenomenon. For example, the first issue of *PerSPECtive*, SPEC's environmental magazine,

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[13] Adam Rome, "'Give Earth a Chance': The environmental movement and the sixties," *Journal of American History* 90, 2 (2003), 525-554.

[14] Samuel P. Hays, "The Role of Urbanization in Environmental History," in *Explorations in Environmental History*, (Pittsburgh: University of Pittsburgh Press, 1998), 93; Robert Gottlieb, *Forcing the Spring: The transformation of the American environmental movement* (Covelo, Calif: Island Press, 1993), 96-105. Titles reflecting urban environmental concern included Lewis Herber, *Crisis in Our Cities* (New Jersey: Prentice-Hall, 1965) and Richard J. Whalen, *A City Destroying Itself* (New York: William Morrow, 1965). Leinwand, *Air and Water Pollution,* contains readings from these and other urban-environmental tracts.

[15] Jennifer Read, "Let us heed the voice of youth": Laundry detergents, phosphates and the emergence of the environmental movement in Ontario," *Journal of the Canadian Historical Association,* New Series 7 (1996), 227-250.

[16] Robert Page, *Northern Development: The Canadian dilemma* (Toronto: McClelland and Stewart, 1986), chap. 2; Alvin Finkel, *Our Lives: Canada after 1945* (Toronto: Lorimer, 1997), 165-175.

depicted the name "British Columbia" in a blend of the Union Jack and Stars and Stripes, below which sailed a boat called the SS Sell Out.[17] Environmentalism in Canada was, in part, the expression of a desire to exert domestic control over "Canadian" nature and to incorporate nature into a positive national identity.[18]

The history of pollution politics in B.C. suggests that, during the late 1960s and early 1970s, pollution was at least as important an issue for environmentalists as wilderness preservation or resource conservation. Although little has been written about pollution and environmentalism in Canada, environmental philosopher Robert Paehlke identifies pollution as the number one issue for the "first wave" of environmental concern in Canada. By Paehlke's reckoning, "The preservation and conservation of wilderness and nature were not a first order priority for most early (1960s/1970s) environmentalists."[19] Historian Jennifer Read has traced the regulatory and political history of Great Lakes pollution, which included an account of the activist group Pollution Probe, founded in 1969.[20] More recently, Frank Zelko completed a comprehensive history of the formation and development of Greenpeace, the international environmental

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[17] *PerSPECtive* (March 1971), 1. Accessed in SPEC Archive, box 994.02.04 file 7.

[18] Thomas L. Burton, *Natural Resource Policy in Canada: Issues and perspectives* (Toronto: McClelland and Stewart, 1972), 39-41; Marilyn Dubasak, *Wilderness Preservation: A cross-cultural comparison of Canada and the United States* (New York: Garland, 1990), 55-56; Ernest B.H. Shelvey, "Skagit Scenes: Landscape formation in the Pacific Northwest" (PhD diss., Arizona State University, 1999), 374-75; Ian Angus, *A Border Within: National identity, cultural plurality and wilderness* (Montreal and Kingston: McGill-Queen's University Press, 1997). This anti-Americanism emerged particularly strongly in the debates over the Island Copper Mine and Kaiser Coal developments, both of which were undertaken by Canadian subsidiaries of U.S. mining giants.

[19] Robert Paehlke, "Eco-History: Two waves in the evolution of environmentalism," *Alternatives* 19, 1 (1992), 18.

[20] Jennifer Read, "Addressing "A quiet horror": The evolution of Ontario pollution control policy in the international Great Lakes, 1909-1972" (PhD diss., University of Western Ontario, 1999); Read, "Let us heed the voice of youth."

organization founded in Vancouver in 1971.[21] Although famous for their anti-nuclear and wildlife preservation campaigns, Greenpeace activists were also strongly influenced by fears of pollution and environmental crisis. But most studies of Canadian environmentalism ignore pollution politics in favour of parks and wilderness protection, wildlife conservation or resource issues.[22] This reflects, in part, the persistent tendency to see nature as a rural phenomenon and to ignore urban issues in environmental history. As the following chapter shows, pollution was an important register of the changing environmental values of the period. Motivated by visions of a global environment in peril, local groups such as SPEC challenged the ideology of progress that had guided resource policies for most of the century. Environmentalists contributed to the opening-up of government institutions and forced the consideration of ecological and amenity values of the environment.

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[21] Frank Zelko, "'Make it a Green Peace': The history of an international environmental organization" (PhD diss., University of Kansas, 2003).

[22] Other Canadian studies that reach into the "environmental era" include: George Warecki, *Protecting Ontario's Wilderness: A history of changing ideas and preservation politics, 1927-1973* (New York: Peter Lang, 2000); Jeremy Wilson, *Talk and Log: Wilderness politics in British Columbia, 1965-1996* (Vancouver: University of British Columbia Press, 1998); Bruce W. Hodgins and Jamie Bendickson, *The Temagami Experience: Recreation, resources, and aboriginal rights in the northern Ontario wilderness* (Toronto: University of Toronto Press, 1989); Shelvey, "Skagit Scenes."

Chapter 5
Beyond Assimilative Capacity: Pollution, politics and environmental values

On the chilly evening of 29 January 1969, between 200 and 300 people attended one or another of two public meetings held by anti-pollution activists in the Vancouver area. At one meeting, sponsored by the local Voice of Women chapter, the head of the B.C. Wildlife Federation was joined by a soil scientist, a provincial health branch official and a Vancouver lawyer, all of whom advocated improvements in pollution control and resource management. At the other meeting, held at Simon Fraser University, a new environmental organization called the Society for Pollution Abatement (later renamed the Society for Pollution and Environmental Control) was launched to combat pollution through "public involvement and pressuring politicians." The SFU meeting exhibited a much more radical tone than the one across town.[1] John Stigant, founder of the society, reputedly opened the proceedings by dumping a container of polluted Burrard Inlet water onto the floor and declaring, "I hope you are all proud of yourselves. We are the filthiest animals on this planet."[2]

These meetings signalled the emergence in the late 1960s of pollution as a catalyst for environmental activism in B.C. Anti-pollution activism played a critical role in the transformation of environmental values in urban and industrial North American society.[3] Yet there are few

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[1] "'Mankind on garbage heap'," *Vancouver Province*, 30 January 1969, 36; "Pollution fighters organize," *Vancouver Province*, 30 January 1969, 36; "200 get lowdown on pollution as speakers list prime causes," *Vancouver Sun*, 30 January 1969, 20.

[2] Society Promoting Environmental Conservation Archive, no box number, unpublished manuscript history of SPEC by Christine Mullins, 1980s (?), 6 (hereafter, Mullins history). This archive is held in the SPEC offices in Vancouver, B.C. Thanks to SPEC for access. Interestingly, Stigant, who announced his desire to set up an anti-pollution group the previous December, indicated that he had felt he received little support for his idea from the B.C. Wildlife Federation. See "'Beautiful B.C.' isn't, says pollution fighter," *Vancouver Sun*, 16 December 1968, 29

[3] Samuel P. Hays, "Three Decades of Environmental Politics: The historical context," *Explorations in Environmental History* (Pittsburgh: University of Pittsburgh Press, 1998), 345-346; Samuel P. Hays, *Beauty, Health, Permanence: Environmental politics in the United States, 1955-1985* (New York: Cambridge University Press, 1987), 55; Robert Paehlke, "Eco-History: Two waves in the evolution of environmentalism," *Alternatives* 19, 1 (1992), 18-19.

detailed studies of the myriad local anti-pollution organizations that formed across the continent in the years around the first Earth Day in 1970.[4] Their stories are important to understanding the complex circulation of environmental ideas that shaped environmental politics at a variety of scales. Pollution generated an outpouring of environmental concern and activity precisely because it was felt most intensely within local environments. As geographer Thomas Burton reflected in 1972, "environmental problems have become issues of general public concern largely because a deteriorating natural environment is obvious to the ordinary citizen in a way that declining natural resources are not."[5] The history of pollution politics in B.C. in the 1960s and 1970s reveals how this local concern intersected with the continental, even global phenomenon of environmentalism. B.C. environmentalists' perceptions of pollution linked local issues with fears of environmental crisis at the national and international scales. Local activists absorbed the larger issues, ideas and tactics of the environmental movement, adapting them to local conditions. North American trends in public opinion and media coverage of pollution also influenced these perceptions, which coloured how B.C.'s environmental problems were understood and framed by environmentalists. In turn, the ideas and activities of local environmental activists fed into the continental anti-pollution movement, particularly through the national ambitions of groups such as SPEC and

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[4] Scott Hamilton Dewey, *Don't Breathe the Air: Air pollution and U.S. environmental politics, 1945-1970* (College Station, Tex: Texas A&M University Press, 2000), explores pollution politics up to 1970, and argues that pollution played a much larger role in shaping postwar environmental politics than historians have previously acknowledged. Anti-pollution activism by national groups is well-documented in the U.S.; see previous note, and Robert Gottlieb, *Forcing the Spring: The transformation of the American environmental movement* (Covelo, Calif: Island Press, 1993). Some of the work of local American anti-pollution groups is explored in Christopher Sellers, "Body, Place and the State: The makings of an 'environmentalist' imaginary in the post-World War II U.S.," *Radical History Review* 74 (1999), 31-64; Adam Rome, "'Give Earth a Chance': The environmental movement and the sixties," *Journal of American History* 90, 2 (2003), 525-554. A useful example from an earlier period is Douglas Stradling, *Smokestacks and Progressives: Environmentalists, engineers, and air quality in America, 1881-1951* (Baltimore: Johns Hopkins University Press, 1999). Toronto's Pollution Probe is profiled in Jennifer Read, "Let us Heed the Voice of Youth": Laundry detergents, phosphates and the emergence of the environmental movement in Ontario," *Journal of the Canadian Historical Association*, New Series 7 (1996), 227-250.

[5] Thomas L. Burton, *Natural Resource Policy in Canada: Issues and perspectives* (Toronto: McClelland and Stewart, 1972), 138.

Greenpeace.

Intense public environmental concern prompted explosive growth in the number of environmental organizations and their membership across North America in the late 1960s. In the United States, national groups such as the Sierra Club, Friends of the Earth and the Wilderness Society experienced rapid membership growth, while innumerable local, grassroots groups were also created. In Canada, the National and Provincial Parks Association was formed in 1963 to promote and protect parklands. However, environmental activism was directed mainly at provincial governments, which bore constitutional responsibility for natural resources administration.[6] In the late 1960s, local anti-pollution groups such as Pollution Probe, SPEC and STOP (Save Tomorrow, Oppose Pollution) formed and grew rapidly. In 1973, the federal Department of Environment listed some 360 environmental groups across Canada. A 1974 study of Canadian environmental groups concerned with water pollution (including those mentioned above) suggested these groups were mostly urban-based, many grew out of universities and most were oriented towards local issues rather than national problems. In spite of the creation of the Canadian Association for the Human Environment, a national organization that anti-pollution groups helped found, the study concluded that environmentalists' activities were poorly co-ordinated and that they "have limited ... knowledge of the activities of other groups." Still, the report concluded these groups were successful in sensitizing the public through mass media campaigns and influencing decision-makers through reports and briefs.[7]

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[6] Burton, ibid., catalogues and analyzes Canadian environmental groups; see also Marilyn Dubasak, *Wilderness Preservation: A cross-cultural comparison of Canada and the United States* (New York: Garland, 1990); George Warecki, *Protecting Ontario's Wilderness: A history of changing ideas and preservation politics, 1927-1973* (New York: Peter Lang, 2000).

[7] James W. Parlour, *The Urban Pollution Study: Summary report* (Ottawa: Ministry of State for Urban Affairs, September 1974), 159-166. The study was conducted as part of a large study of pollution policy in Canada by this ministry. It included interviews and secondary research on six local groups and two national groups.

The opening section of this chapter explores the transformative impact of pollution on the nascent environmental movement through the anti-pollution activities of the B.C. Wildlife Federation and the Society for Pollution and Environmental Control. Rising public fears of an "environmental crisis" attracted support, membership and media coverage to both groups. Together, and with other groups, these organizations established a vibrant environmental movement in B.C. in the late 1960s and early 1970s. They challenged the resource-development orientation of the provincial government and gave voice to local expressions of the environmental crisis then sweeping North American society. Anti-pollution activists forced the creation of new avenues of public participation in environmental governance and greater accountability in resource decision-making. Pollution was eclipsed in the mid-1970s by issues such as wilderness preservation, but many environmentalists, and SPEC in particular, continued to challenge the technocratic attitudes of industrialists and regulators who clung to the doctrine of assimilative capacity.

In B.C., anti-pollution activists confronted an aggressively pro-development provincial government. The Social Credit party of Premier W.A.C. Bennett (1952-1972) presided over an unprecedented economic expansion that included road- and railway-building, hydroelectric dam construction, pulp-mill and forestry development and increased mining activity. The Bennett government combined massive public works with policies to attract foreign capital to finance grand natural-resource development projects in the provincial interior. "The companies invested and plundered, and the Premier kept the way safe and open," historian Martin Robin has observed.[8] Bennett trumpeted the exploitation of natural resources as "progress" that brought the

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[8] Martin Robin, *Pillars of Profit: The company province, 1934-1972* (Toronto: McClelland and Stewart, 1973), 257.

"good life" to British Columbians.[9] In the introduction to the province's *Official Centennial Record*, published in 1958, Bennett celebrated B.C.'s history as "the story of development, of the building of a ... homogenous province; of a God-fearing pioneer people dedicated to progress, strengthened by their contest with a great land at first reluctant to yield its full resources."[10] Such pro-development politics and rhetoric were not unique to B.C.[11] But "Bennett's Boom" transformed provincial society and nature with astonishing rapidity after the Second World War.

Initially, few questioned the environmental costs of this development. The government effectively deflected concerns about the scale or impact of resource development through symbolic policies. These policies were designed to provide the appearance of environmental responsibility while in fact allowing environmental abuses to go largely unchecked. As Jeremy Wilson and Patricia Marchak have shown, the province's forest policies, while billed as conservation, were geared to expanded harvesting and the concentration of corporate control over forest lands. New forest licensing arrangements, developed and refined through two royal commissions on forestry in the 1940s and 1950s, intended to place forest exploitation on a "sustained-yield" basis. As Wilson notes, "the powerful positive symbolism associated with sustained yield contributed to the drift into complacency" by shielding the liquidation of public forests from scrutiny and debate.[12]

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[9] Jean Barman, *The West Beyond the West: A history of British Columbia* (Toronto: University of Toronto Press, 1991); chap. 12; David J. Mitchell, *W.A.C. Bennett and the Rise of British Columbia* (Vancouver: Douglas and McIntyre, 1983); John Douglas Belshaw and David J. Mitchell, "The Economy Since the Great War," in Hugh J.M. Johnston, ed., *The Pacific Province: A history of British Columbia* (Vancouver: Douglas and McIntyre, 1996).

[10] British Columbia Centennial Committee, *British Columbia Official Centennial Record: 1858-1958: A century of progress* (Vancouver: Evergreen Press, 1958), 9.

[11] Lloyd Musolf, *Legislatures, Environmental Protection, and Development Goals* (Beverly Hills: Sage Publications, 1975), series 90-016, vol. 2, for instance, compares the development ideologies of California and British Columbia.

[12] Patricia Marchak, *Green Gold: The forestry industry in British Columbia* (Vancouver: University of British Columbia Press, 1983), 49-52; Jeremy Wilson, "Forest Conservation in British Columbia, 1935-1985: Reflections on a barren debate," *BC Studies* 76 (Winter 1987/88), 22.

Similarly, government pollution actions were more symbolic than substantive. The Pollution Control Board was created in 1956 to "maintain and ensure the purity of all waters of the Province consistent with the public health and public enjoyment thereof, the propagation and protection of wildlife, birds, game, and other aquatic life, and the industrial development of the province..."[13] In practice, however, the board was severely limited in jurisdiction and power. Substantial portions of the province remained outside the board's authority. Nor did the board regulate industrial discharges until the mid-1960s. It operated with a skeleton staff of four engineers in its early years and was virtually unable to investigate pollution reports. In 1966, when Bennett announced that the government would launch a "war" on pollution, many observers scoffed.[14] The government shared with industry the notion that the use of waters as a sink for waste was a justifiable resource use, to be conserved and managed, but not eliminated. Minister of Lands, Forests and Water Resources Ray Williston maintained that the province was a national leader in pollution control while declaring (seemingly paradoxically) that "our greatest assets are the rivers of the province that carry away the debris of pollution."[15] Many accepted the assertion that B.C.'s small population enjoyed abundant freshwater and wide-open spaces, thus avoiding the "affliction" of water pollution.[16] These views, deeply entrenched in the Social Credit administration, became the target

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[13] "An Act to control the pollution of the waters of British Columbia," *Statutes of British Columbia* (1956), chap. 36, 139.

[14] Arnie Myers, "B.C.'s pure water can be saved," *Vancouver Sun*, 15 September 1965, 8; "Mr. Bennett's conversion... better late than never," *Vancouver Sun*, 8 August 1966, 4; "Tardy recognition," *Victoria Times*, 13 August 1966, 4.

[15] British Columbia Archives and Records Service (BCARS), GR-1027 Fish and Wildlife Branch, box 84 file 2, Ray Williston speech to the 1966 B.C. Wildlife Federation Convention, 5 May 1966; this dictum guided Pollution Control Board decisions as well. See the PCB report in British Columbia, Health Branch, *Annual Report of the Public Health Services of British Columbia*, (Victoria: Department of Health Services and Hospital Insurance, 1960), 56.

[16] This was, and remained, a widely articulated assertion, even by promoters of pollution control. See, for instance, R. Bowering, "Pollution Control in British Columbia Today," in *Transactions of the Sixth Resources Conference* (Victoria: BCNRC, 1953); Roderick Haig-Brown, *The Living Land: An account of the natural resources of British Columbia* (Toronto: Macmillan, 1961), 220; Arnie Myers, "B.C.'s pure water can be saved," *Vancouver Sun*, 15 September 1965, 8

of anti-pollution activists in the 1960s.

Sportsmen and the pollution crisis: the B.C. Wildlife Federation

Hunters and fishermen (these groups were almost exclusively male in the immediate postwar era) were among the first to challenge the resource-development juggernaut in B.C. Their recreational activities carried them into the hills and valleys of the province, where they confronted the often devastating impact of hinterland resource extraction. By definition, hunting and fishing require habitat for game, making environmental quality important for sportsmen. The sporting ethic's emphasis on the aesthetic and moral qualities of outdoor recreation meant sportsmen valued wilderness in ways very different than pro-development provincial administrations. In the 1960s, the main umbrella group for sportsmen, the B.C. Wildlife Federation, became highly critical of provincial environmental policies. Previously concerned mainly with wildlife conservation and fish and game licensing issues, the BCWF developed a strident critique of pollution problems resulting from expanding resource development. The group's politicization suggests an important role for established conservation organizations in the changing environmental values of the postwar period.

The role of sportsmen in conservation and environmental history is a contentious subject. For some historians, sportsmen exhibited the amateur natural history tradition of nature appreciation and environmental awareness. Their Romantic ideals, sporting ethics and close interaction with nature made them pioneers of conservation and environmentalism.[17] Others

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[17] Stephen Fox, *John Muir and His Legacy: The American conservation movement* (Toronto: Little, Brown and Co., 1981); John F. Reiger, *American Sportsmen and the Origins of Conservation*, 3rd rev. ed. (Corvallis, Ore: Oregon State University Press, 2001). This role of hunters in the conservation movement has sparked lively debate: see Thomas Dunlap, "Sport Hunting and Conservation, 1880-1920," *Environmental Review* 12 (Spring 1988), 51-60, and Reiger's reply in *Environmental Review* 12 (Fall 1988), 94-96. See also Thomas R. Dunlap, *Nature and the English Diaspora: Environment and history in the United States, Canada, Australia, and New Zealand* (Cambridge: Cambridge University Press, 1999), chap. 8.

characterize the Romantic ideals of sportsmen as elitist and complicit in "making a modern wilderness" through the extension of state control over space, animals and rural peoples.[18] This debate has turned on the role of sportsmen in debates over park establishment, game regulations and wildlife protection. Fewer scholars have considered the role of sportsmen as defenders of environmental quality. Yet Donald Pisani, Nicholas Casner and Stephen Fox have documented that sportsmen were among the first to decry the destruction of rural streams. Water pollution was a long-standing concern for such groups as the Izaak Walton League in the United States. Certainly many of these early-century "angler activists" were members of the urban elite, but their concerns about water quality intersected with those of rural residents and commercial fishers affected by the disappearance of fish due to pollution.[19] Angling groups in eastern Canada and the United Kingdom also agitated for pollution abatement long before widespread public concern about water quality outside urban settings.[20]

Organized fish and game clubs in B.C., as elsewhere, were both advocates for hunting and fishing interests, and custodians of a particular sporting ideal. As historian George Colpitts points out, sportsmen's organizations emerged in western Canada after 1880 as the reliance on wild game

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[18] Tina Loo, "Making a Modern Wilderness: Conserving wildlife in twentieth-century Canada," *Canadian Historical Review* 82, 1 (March 2001), 92-121; J. Michael Thoms, "A Place Called Pennask: Fly-fishing and colonialism at a British Columbia lake," *BC Studies* 133 (Spring 2002), 69-98; George Colpitts, *Game in the Garden: A human history of wildlife in Western Canada to 1940* (Vancouver: UBC Press, 2002), chaps. 3, 5; Karl Jacoby, *Crimes Against Nature: Squatters, poachers, thieves, and the hidden history of American conservation* (Berkeley: University of California Press, 2001); Louis S. Warren, *The Hunter's Game: Poachers and conservationists in twentieth-century America* (Cambridge, Mass.: Yale University Press, 1997).

[19] Fox, *John Muir and His Legacy*; Nicholas Casner, "Angler Activist: Kenneth Reid, the Izaak Walton League, and the crusade for federal water pollution control," *Pennsylvania History* 66, 4 (1999), 535-553; Donald J. Pisani, "Fish Culture and the Dawn of Concern over Water Pollution in the United States," *Environmental Review* 8, 2 (1984), 117-131; John T. Cumbler, *Reasonable Use: The people, the environment, and the state, New England 1790-1930* (Oxford: Oxford University Press, 2001), 166-179; Gottlieb, *Forcing the Spring*, 157.

[20] R. Peter Gillis, "Rivers of Sawdust: The battle over industrial pollution in Canada, 1865-1903," *Journal of Canadian Studies* 21, 1 (Spring 1986), 84-103; reference to lawsuits by angling groups in the UK is made in Christopher Harvey, "Riparian Water Rights: Not dead yet," *The Advocate* 48 (July 1990), 517-524.

as a food source declined. Rod and gun clubs derided Native and "foreign" hunting practices, and sought regulations to "protect" fish and game stocks against the depredations of "meat hunters."[21] Many of these clubs advocated game conservation measures as part of a sporting ideal imported largely from Britain and the United States. This ideal emphasized communion with nature and "fair chase" and "sporting" methods for enjoyment of the hunt, rather than for sustenance or the thrill of killing. Sportsmen cultivated "woodcraft" or natural history knowledge, as well as an appreciation of the mystery and beauty of nature.[22] In the mid-twentieth century, game conservation also contained elements of the technocratic, wise-use ideas associated with Progressive-era conservation. Many sportsmen supported government efforts to develop scientific game-management practices and policies to develop larger "crops" of fish and game to support the "market demand" for recreational resources.[23] Sportsmen's ideals thus intersected both with the movement to control nature and the Romantic tradition of nature appreciation. At times contradictory, these impulses informed the reactions of sportsmen's organizations to the impact of pollution on fish and game habitat.

These recreational and amenity values of nature resonated more broadly with the rise of

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[21] Colpitts, *Game in the Garden,* chap. 5. See also Karen Wonders, "A Sportsman's Eden, Part I: A wilderness beckons," *The Beaver* 79, 5 (October-November 1999), 26-32. On early game clubs in B.C., see also J.G. Terpenning, "The B.C. Wildlife Federation and Government: A comparative study of pressure group and government interaction for two periods, 1947 to 1957, and 1958 to 1975" (MA thesis, University of Victoria, 1982); and Yasmeen Qureshi, "Environmental Issues in British Columbia: An historical-geographical perspective" (MA thesis, University of British Columbia, 1991), 72-74.

[22] For discussions of the sporting ethic, see Dunlap, *Nature and the English Diaspora*, 60-65; Reiger, *American Sportsmen*. In *Man and the Natural World: A history of the modern sensibility* (London: Pantheon, 1983), Keith Thomas explores the tradition of natural history thought in Britain, but only hints at the sporting tradition within it. It is related to other ideas of nature in George Altmeyer, "Three Ideas of Nature in Canada, 1893-1914," *Journal of Canadian Studies* 11, 3 (1976), 21-36.

[23] Arn Keeling, "'A Dynamic, Not a Static Conception': The conservation thought of Roderick Haig-Brown," *Pacific Historical Review* 71, 2 (May 2002), 239-268. Aldo Leopold, the American forester, game manager and environmental thinker, embodied some of these at-times contradictory impulses. See Curt Meine, "The Preservation of Utility and the Utility of Preservation: Leopold's fine line," in Max Oelschlaeger, ed., *The Wilderness Condition: Essays on environment and civilization*, (San Francisco: Sierra Club Books, 1992).

mass tourism and outdoor recreational activities after the Second World War. Historian Alan MacEachern refers to this period as one of "recreational democracy" that saw increasing numbers of newly affluent middle-class and working-class people engage in camping, hiking and other outdoor activities.[24] In B.C., the number of anglers and hunters in B.C. grew dramatically, as did government revenues from both resident and non-resident sportsmen. At the same time, tourism and park use increased exponentially.[25] The province also sought to take advantage of the explosive growth in tourism and travel in postwar North America by promoting outdoor recreation in B.C. Provincial bureaucrats and others called for the establishment of a ministry to oversee parks, recreation and environmental quality. "B.C.'s clean streams, which we take for granted, are a joy to our visitors, and to ourselves when we return home," argued D.B. Turner, assistant deputy minister of water resources, in a 1956 report to Minister of Lands, Forests, and Water Resources Ray Williston.[26] The following year, the government created the Department of Recreation and Conservation, which consolidated various branches including the Game Commission (which was renamed the Fish and Game Branch) and the Parks Branch.

The anti-pollution activities of B.C. sportsmen were fostered by their close relationship with provincial fish and game officials. As John G. Terpenning documents, the provincial Game

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[24] Alan MacEachern, *Natural Selections: National parks in Atlantic Canada, 1935-1970* (Montreal and Kingston: McGill-Queen's University Press, 2000), 160-164. On the impact of tourism and recreation on changing environmental values, see Alexander Wilson, *The Culture of Nature: North American landscape from Disney to the Exxon Valdez* (Toronto: Between the Lines, 1991).

[25] The number of hunting licences issued in B.C. increased steadily until the end of the 1960s. See statistics in Yasmeen Qureshi, "Environmental Issues in British Columbia: An historical-geographical perspective" (MA thesis, University of British Columbia, 1991); on park attendance, J.K. Youds, "A Park System as an Evolving Cultural Institution: A case study of the British Columbia provincial park system, 1911-1976" (MA thesis, University of Waterloo, 1978), 73, 91.

[26] University of Victoria Archives, AR-002 Ray Williston fonds, box 7 file 10, typescript report by D.B. Turner to Ray Williston, 1956. Calls for such a ministry were also made at several B.C. Natural Resource Conference meetings: see *Transactions of the Sixth Resources Conference* (Victoria: BCNRC, 1953), 155-56, and *Transactions of the Eighth Resources Conference* (Victoria: BCNRC, 1955), 41

Commission had encouraged the formation of local rod and gun clubs in the early-twentieth century. These clubs helped report problems and even enforce game laws in the far-flung corners of the province at a time when the Game Commission was a tiny branch of government.[27] Local anglers were often the first to detect — and to complain about — the disposal of sawdust or mine tailings into local streams. For example, anglers raised fears that the Little Campbell River near White Rock might be polluted from a flax retting mill built during the Second World War. Subsequent fish kills prompted an investigation, aided by leaders of the Semiahmoo Indian band. The company was convicted under the Fisheries Act for several fish kills in 1944.[28] In return for the assistance of local rod and gun clubs in conservation matters, in 1947 the Game Commission created the B.C. Fish and Game Zones' Council as a provincial co-ordinating body for local rod and gun clubs, and cultivated it as a lobby group for recreational issues. The group was the forerunner of the B.C. Wildlife Federation. The council met annually with Game Commission officials to hear reports on commission activities and scientific papers on progress in fish and game management, as well as to pass resolutions submitted by local clubs on game conservation issues. These meetings, as well as the Game Commission publication *Wildlife Review*, also promoted ecological concepts and new ideas in scientific game management among sportsmen.[29] In the early 1950s, Terpenning notes, the council's conservation concerns expanded to include environmental quality, including passing resolutions supporting the inclusion of recreational

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[27] Terpenning, "The B.C. Wildlife Federation and Government," 8-9.

[28] BCARS, GR-1027 Fish and Wildlife Branch, box 37 file 6 documents the investigation and prosecution of the Fraser Valley Flax Co-operative.

[29] Terpenning, "The B.C. Wildlife Federation and Government," 14-20; *Wildlife Review* began publication in October 1954. It was written by Game Commission staff and biologists, and liberally seeded with quotes from Aldo Leopold, Theodore Roosevelt, and other conservation icons. Directed at sportsmen, it promoted ethical sporting behaviour, the development of "recreational resources," and scientific fish and game management.

interests in resource management decisions, and calling for the creation of a provincial pollution control authority.[30] Thus, sportsmen provided political support to the policy goals of the fish and game officials, who also sought greater influence in resource management.

In the 1960s, sportsmen became increasingly critical of pollution and environmental management. In part, this may have reflected the rapid industrialization of the hinterland during the Social Credit ascendancy; it was probably also attributable to the strong activist leadership of successive BCWF executive directors, G. Edward Meade (1958-1964), Howard Paish (1964-1968) and Geoff Warden (1968-1977). After 1957, the Fish and Game Branch no longer organized or funded the annual game convention, although the close relationship between government fish and game officials and the sportsmen's group continued. As Terpenning notes, a more "aggressive" body emerged from the "emancipation" of the federation after 1957, one that was more critical of government game and conservation policies. [31] Through the early 1960s, the annual convention passed resolutions that called for the expansion and improvement of provincial pollution controls, and demanded a Royal Commission on pollution. "Today the North American is running out of pure water; he is going down in history as the greatest polluter of all time," Meade wrote in a 1960 letter in the *Vancouver Sun*.[32] Local fish and game clubs continued to target polluters in their area. For instance, at Kimberley, site of the massive Cominco lead-zinc mine and concentrator, the local rod and gun club was among the first to criticize the company's indiscriminate disposal of toxic

[30] Ibid., 23, 107-108.

[31] Ibid., 25. The close relationship is underscored by the large holding of BCWF files in the Fish and Game Branch records in the B.C. Archives.

[32] G. Ed. Meade, "Action vital now to halt pollution," *Vancouver Sun*, 2 September 1960, 4; Bud Elsie, "Action urged to cut down pollution," *Vancouver Province*, 19 August 1960, 17; BCARS, GR-1027 Fish and Game Branch, box 83 files 3-6 contain files on the annual convention.

concentrator wastes into area streams. Many of these sportsmen were also company employees, making their opposition more remarkable.[33]

Perhaps the most articulate sportsman-critic of pollution was author and conservationist Roderick Haig-Brown. A famous fly-fishing writer and stipendiary magistrate living in Campbell River, Haig-Brown used his public profile to raise awareness of pollution issues.[34] Haig-Brown served as president of the local rod and gun club in the 1950s, and was a long-time member of the provincial wildlife federation. As a well-known advocate of recreational interests, Haig-Brown served on expert panels investigating recreation and pollution problems for the B.C. Natural Resources Conference in the 1950s. Although he often adopted the language of "multiple use" in his defence of fishing interests, he rejected the use of waterways as waste sinks. In a CBC radio broadcast in 1953, part of a series of broadcasts on outdoors issues, Haig-Brown declared pollution "should never be allowed." The notion of "safe" levels of pollution, he asserted, was a dangerous one for the environment. "It is a more respectable act to build latrines on the steps of the city hall than to foul the river with sewage," he railed.[35] Haig-Brown's criticisms of provincial pollution-control policies became even more pointed in the late 1960s. "Pollution for profit is nineteenth-century thinking, but B.C. has plenty of nineteenth-century minds still around to support

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[33] Arnie Myers, "Kimberley pollution angers sportsmen," *Vancouver Sun*, 14 September 1965, 10; see also BCARS, GR-1114 Fish and Wildlife Branch, box 57 file 40-02-01, which contains letters from a campaign by the Kimberley Rod and Gun Club to pressure officials to control pollution in the St. Mary River.

[34] On the conservation ideas and activities of Roderick Haig-Brown, see Arn Keeling, "'A Dynamic, Not a Static Conception.'"; Arn Keeling and Robert A.J. McDonald, "The Profligate Province: Roderick Haig-Brown and the modernizing of British Columbia," *Journal of Canadian Studies* 36, 3 (Fall 2001), 7-23; E. Bennett Metcalfe, *A Man of Some Importance: The life of Roderick Haig-Brown* (Seattle: James W. Wood, 1985); Qureshi, "Environmental Issues in British Columbia," 82-92.

[35] University of British Columbia Special Collections and Archives, Roderick Haig-Brown Papers [hereafter Haig-Brown Papers], box 51 file 1, transcript of CBC Radio broadcast series *Crying in the Wilderness*, #4 "Game Fish, July 1953, 4-5. Another early statement condemning pollution was contained in "Let Them Eat Sawdust" from Roderick Haig-Brown, *Measure of the Year* (Vancouver: Douglas & McInyre, 1990 [1950]), in which Haig-Brown questioned the ideology of progress that he argued led to wasted resources and a degraded environment.

it," he wrote in 1970. In addition to public pronouncements on pollution, Haig-Brown also joined fellow sportsmen in opposing industrial developments such as the copper-molybdenum mine in Strathcona Park, discussed below. Along with fellow sportsmen, Haig-Brown provided a persistent critique of pollution problems before they came to mass public consciousness in the mid-1960s.

Under the direction of former teacher Howard Paish in the late 1960s, the BCWF adopted a "gloves off" approach to recreation and pollution issues.[36] In 1966, the federation adopted new objectives that included "mak[ing] British Columbians aware of the dangers of land, water and air pollution; [acting] wherever possible to prevent pollution; and [co-operating] in every way possible with all groups with similar objectives."[37] At its convention in Prince George that year, the federation passed nine anti-pollution resolutions and received the report of a newly created pollution committee. The sharp increase in pollution concern reflected the industrial development threatening popular sport fishing areas, such as the construction of pulp mills along interior rivers, the dumping of mine tailings in Buttle Lake and log driving on the Stellako River. Over the following decade the BCWF carried out a three-pronged attack on government pollution policies. First, it employed traditional lobbying strategies such as passing resolutions at conventions and submitting briefs to government. Second, its leadership became increasingly prominent opponents of pollution both in the popular media and at public events. Finally, the BCWF intervened in specific resource-development controversies that it regarded as precedent-setting for pollution control policy.

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[36] Jeremy Wilson, *Talk and Log: Wilderness politics in British Columbia, 1965-1996* (Vancouver: University of British Columbia Press, 1998), 105-106.

[37] Terpenning, "The B.C. Wildlife Federation and Government," 13.

The BCWF regarded pollution as a failure of proper resource planning. While it was committed to the managerial concept of "multiple use" of resources, the BCWF criticized its practice in B.C. The group contended that parks and recreational concerns, including environmental quality, were low on the list of government priorities. Its briefs to Cabinet repeatedly rejected the reliance on assimilative capacity in evaluating pollution controls: "if those responsible for the enforcement of pollution control regulations have predetermined standards of water quality that are known to both administrators and to water users, and which can be effectively enforced on a watershed basis, then environmental quality will be maintained in existing pollution free areas."[38] Federation briefs also called for assessments of the ecological impacts of resource development. Beyond these "technical" concerns, the BCWF defended aesthetic and non-material values in nature, and saw pollution as a threat to these values. Of the Fraser River, the group asserted that "the mere fact that people know the river is ... showing an undesirably high level of bacterial contamination, the knowledge that it could be receiving industrial and domestic effluents that could be harmful to fish and wildlife, detracts from the quality of the total regional environment." These "nebulous" measures of environmental damage, the federation maintained, were just as important as technical evaluations of water quality.[39] As executive director Geoff Warden argued in 1971, "The public's case for a clean environment doesn't stand or fall on how many parts per million of suspended solids are permissible, how many standard colour units will not destroy the aesthetics of a stream, or how much particulate matter can be permitted to escape from a smokestack .... The public's approach is more subjective,

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[38] Haig-Brown Papers, box 121 file 3, B.C. Wildlife Federation brief to provincial Cabinet, 25 October 1966.

[39] Ibid., box 112 file 3, "Submission by the BCWF to the Pollution Control Board Public Hearing on the Report Pollution and the Fraser," August 1967.

but no less valid for that."[40] To ensure these views were incorporated into government decision-making, the BCWF pushed for greater government openness and public participation in environmental governance. It questioned the ideology of development and progress that ruled resource policy in B.C., asserting that "prosperity that depends on the fouling of our environment can only give us short-term benefit. It can hardly pass for 'progress.'"[41]

The status of the BCWF as public environmental watchdog was enhanced by its prominence in the disputes over mine tailings disposal at Buttle Lake and strip mining in the Elk Valley. In both cases, the federation led public outcry over the perceived failure of government agencies, most notably the PCB, to consider the impact of resource development on environmental quality. In 1966-67, the federation, along with Roderick Haig-Brown, opposed the Pollution Control Board approval of plans to dump mine tailings into Buttle Lake in Strathcona Park. The BCWF was frustrated by the government's refusal to conduct a biological survey of Buttle Lake or to hold a public hearing on the development. Paish and Haig-Brown condemned the development as the "rape of a public park" and the destruction of the park's recreational values.[42] While the project eventually went ahead, the federation concluded that, "[i]f it has achieved no other purpose, perhaps the present controversy will have shown [the government] just how the public feels about park values and about pollution."[43] The BCWF was also at the centre of the controversy over plans for massive coal strip mines in the East Kootenay region. Fearing

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[40] BCARS, GR-1027 Fish and Game Branch, box 86 file 4.

[41] BCARS, GR-1027 Fish and Game Branch, box 85 file 3, BCWF, "Today and Tomorrow," pamphlet (1968).

[42] On the Buttle Lake controversy, see Haig-Brown Papers, box 77 file 6, box 78 file 2, box 80 file 7, box 82 file 2, box 121 file 2. Also, Roderick Haig-Brown, "Buttle Lake: Rape of a public park," *Vancouver Sun*, 5 March 1966, 6. The controversy is also discussed in Chapter 3 *supra*.

[43] BCARS, GR-1027 Fish and Game Branch, box 85 file 3, BCWF, *Newsletter* 1, 2 (April 1967), 1.

permanent habitat destruction and stream pollution, the BCWF launched a campaign for the strict regulation of strip mining practices and landscape restoration. The campaign drew on support and information from Izaak Walton League members in the United States who had campaigned for the restriction of devastating strip mining practices in Kentucky.[44] The group's efforts were featured in a 1968 CBC television program on the issue, which led to a deluge of support from across the province and the country. Commenting on the hundreds of letters received, its newsletter welcomed the "conservation conscience" developing in Canada and the strong emotional reaction of the public to the potential devastation of the environment.[45]

The anti-pollution campaigns of the late 1960s transformed the BCWF from a traditional conservation lobby to a politicized environmental advocate. Dismayed at the failure of government agencies to consider recreational priorities, the group became a strong critic of government policy. After the Buttle Lake affair, executive director Howard Paish commented, the BCWF decided it had to "rock the boat" in order to demonstrate to the government it was "prepared to speak out when it sees the resources of this province being abused."[46] In newsletters and speeches, the federation denounced government agencies — including the leadership of the Fish and Wildlife Branch. Under the leadership of Paish and Warden in particular, the BCWF became an activist rather than an advisory group. It also built links with other environmental groups, co-founded the B.C. Environment Council and joined the broad-based opposition to the Skagit River dam development, the ROSS (Run Out Skagit Spoilers) Committee. However, it is difficult to gauge

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[44] Haig-Brown Papers, box 121 file 1 contains a speech to the BCWF from David Schneider, president of the Kentucky Chapter of the Izaak Walton League, outlining the Kentucky campaign. The federation's Howard Paish also visited Kentucky on a fact-finding tour.

[45] B.C. Wildlife Federation *Newsletter*, December 1968, and January-February 1969.

[46] BCARS, GR-1027 Fish and Wildlife Branch, box 85 file 1, "Executive Director Howard Paish's Report," 1967.

how deep this activist tendency ran amongst the rank and file members of the organization. Anti-pollution resolutions continued to be forwarded by local clubs and passed at the annual convention. But speeches by Paish and Warden also chided members for their complacency, and urged them to become more vocal environmental advocates in their communities.[47]

This newly politicized BCWF articulated a set of alternative environmental values, but did so using mainstream tactics. Rarely did it invoke "crisis" talk, though the wide audience it found for its pollution concerns was undoubtedly influenced by it. Nor did it engage in demonstrations or theatrical protests, other than at the protest against the flooding of the Skagit Valley in 1971. Valuing its contacts and reputation among government officials, the federation consistently advocated a reasoned, technical approach to pollution issues. The group located technical expertise in ecology, rather than in the engineering vision of environment. In a written statement to the PCB, Geoff Warden argued that, "In our opinion the first criterion [of pollution control] should be that naturally occurring biological communities should not be impaired as a result of industry's activities."[48] The BCWF also urged the consideration of non-material values in setting pollution goals.

The BCWF was the most vocal pollution critic in the province for most of the 1960s. Howard Paish spoke at several conferences on pollution, garnering press attention for his critical descriptions of environmental problems around the province.[49] In the late 1960s, the BCWF

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[47] BCARS, GR-1027 Fish and Wildlife Branch, box 86 file 3, "Executive Director Howard Paish's Report," 1969; box 86 file 4, "Executive director's report, Geoff Warden," 1971.

[48] British Columbia, Pollution Control Branch, *Public Inquiry into Waste Management and Environmental Control in the Forest Products Industry* (Victoria: Water Resources Service, 1970), vol. 9, 55-56.

[49] Arnie Myers, "Water pollution spreading," *Vancouver Sun*, 3 December 1965, 18; Arnie Myers, "Natural resources speakers clash over water pollution," *Vancouver Sun*, 24 February 1967, 23. These conference appearances included: Rosenthal, Henry and Graham A. Drew, eds., *Conference on Water Pollution Proceedings* (Vancouver: University of British Columbia, 1965); Henry Rosenthal, ed., *Proceedings of Conference on B.C. Environment: 1967* (Vancouver: Department of University

launched a newsletter and published a pamphlet highlighting its role in environmental protection. These activities were part of a conscious effort to raise public awareness of pollution problems and to pressure the government to preserve or improve environmental quality. By the mid-1970s, the BCWF's prominence in pollution politics had faded. The federation was eclipsed by the dramatic tactics and broad public appeal of newer environmental groups such as SPEC and Greenpeace. Membership in the BCWF, which peaked around 20,000 in the mid-late 1960s, began to decrease as the number of sportsmen in the province fell. The group's lobbying focus returned to parks and wildlife issues. Members continued to appear at various provincial pollution inquiries, but the quality of their presentations declined.

Sporting groups often fade from prominence in accounts of the transition from conservation to the environmentalism of the 1960s. But, like members of the National Wildlife Federation in the U.S., B.C. sportsmen were an important part of the social reaction against environmental degradation. Their evolving concerns symbolized the transition within the conservation movement from the embrace of technocratic management and control to an emphasis on the protection of environmental quality and the preservation of non-material values in nature.[50] Among sportsmen, this shift was influenced by larger postwar trends such as the spread of ecological ideas among sportsmen and game managers, the spectacular growth of outdoor recreation activity and the spread of pollution problems due to rapid industrial development. Sportsmen's advocacy was effective in B.C. They challenged the reigning conception of provincial waters as a sink for wastes and criticized the government for its failure to consider the ecological and amenity values of

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Extension, University of British Columbia, 1967); *Transactions of the Seventeenth Resources Conference* (Victoria: BCNRC, 1967). Water resources was also the theme of this last conference.

[50] Gottlieb, *Forcing the Spring*, 157-158; Hays, *Beauty, Health, and Permanence*, 70.

environment. Along with other environmental groups, the BCWF demanded greater public input into government decision-making. They were successful in pressuring the government to hold public inquiries into pollution control in the 1970s and to create a provincial Environment and Land Use Committee in 1971 to review major resource developments.[51] Sportsmen, and the BCWF in particular, supported the environmental protection activities of the Fish and Wildlife Branch, and BCWF briefs pressured the province to increase financial support for the branch.

The activism of the BCWF gave voice to the pollution concerns of workers and sportsmen living in the B.C. hinterland. Local clubs from across the province, including in those regions dependent on resource-extractive industries, submitted anti-pollution resolutions to the annual conventions. The interventions of the BCWF questioned the ideology of progress but did so from the political mainstream. Although leaders like Haig-Brown, Paish and Warden became ardent anti-pollution spokesmen, sportsmen avoided the dramatic protest tactics of some environmental groups. Their protests typically fell short of the comprehensive critique of modern industrial society advanced by contemporary environmentalists. Still, as geographer David Harvey has suggested, this conservative conservationism "has its romantic side, but it can also produce a hard-headed politics of place that is highly protective of a given environment."[52] For sportsmen, anti-pollution agitation was foremost a defence of place and nature. They sought to defend the relatively unspoiled environment of B.C. from the course of rapacious development that had so damaged environments elsewhere in North America.

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[51] Dianne Draper, "Environmental Interest Groups and Institutional Arrangements in British Columbia Water Management Issues," *Institutional Arrangements for Water Management: Canadian experiences* (Waterloo, Ont.: Department of Geography, University of Waterloo, 1975), 125, 147. Draper notes that the federation's lobbying successes reflected the group's perceived credibility and stability compared with other environmental groups.

[52] David Harvey, *Justice, Nature, and the Geography of Difference* (Cambridge, Mass: Blackwell, 1996), 178-179.

Tilting at pulp mills: SPEC and the environmental movement in B.C.

SPEC was neither the first nor the largest environmental group to form in B.C. during "the age of ecology." But its explosive growth and its equally rapid retreat make it indicative of the shifting winds of pollution concerns. "More and more of life's hazards and annoyances are being lumped under the word 'pollution,'" noted one observer.[53] These fears included anxiety over urban issues such as transportation, health and safety issues such as chemicals in the environment and anger at the despoliation of the wilderness areas. The diverse membership of SPEC reflected the deep cultural anxiety over pollution and environmental collapse that seized North Americans at the end of the 1960s. The group provides a useful window on the diversity of local organizations and issues that characterized the North American environmental movement. The relatively small population of British Columbia and the paucity of other environmental groups meant that after its formation in 1969, SPEC quickly became the major vehicle for environmental activism in B.C. Internal struggles over organizational form and tactics created tensions within its initially broad coalition of middle-class professionals, scientists, students and counterculture activists. Its near collapse only three years after its founding resulted from a combination of internal problems and broader social changes that undermined the group's mass movement base. Although unstable, often broke and riven by ideological differences, SPEC articulated ecological ideas and demanded a public voice in resource development and environmental decision-making.

Environmentalism, as historian Robert Gottlieb has argued, is difficult to define because of the eclectic roots of the movement and its organizational diversity. Environmental groups range from apolitical advocates of scientific conservation to radical, even revolutionary defenders of

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[53] A. H. Murphy, "Pollution is a dirty word. But there's an answer to it," *Victoria Colonist*, 20 July 1971, 12E.

wild nature. In some cases, environmental groups may contain members with many different goals and backgrounds, willing to embrace very different tactics and ideals. Sociologists use the term "new social movement" to describe the characteristic features of environmental groups.[54] Though the defining qualities of new social movements are often contested, they include the use of "pressure group" tactics such as demonstrations, media stunts and propagandizing to raise public awareness of a given issue. They may also use direct action tactics such as blockades, boycotts and even "monkey wrenching," or eco-sabotage. More generally, new social movement groups are notable for the way in which they connect cultural and lifestyle issues to their political goals. This was particularly apparent and important for the environmental movement.[55] For environmentalists, ecological ideas not only informed political action but also demanded the transformation of culture, society and everyday life. For a movement that lacked a manifesto or a central ideology, ecology provided the closest thing to shared principles. In the parlance of the 1960s, "the ecology" signified both the physical environment, and a set of precepts for human interaction with the environment.[56] Environmentalists linked pollution and ecological degradation to industrial

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[54] For an overview of some of the sociological theories on new social movements, see Jean L. Cohen, "Strategy and Identity: New theoretical paradigms and contemporary social movements," *Social Research* 52, 4 (Winter 1985), 663-716; other articles in this same issue of *Social Research* also explore contemporary theory, though less clearly. For sociological views of the history of environmentalism, see Riley E. Dunlap and Angela G. Mertig, eds., *American Environmentalism: The U.S. environmental movement, 1970-1990* (Philadelphia: Taylor and Francis, 1992). For a Canadian exploration of these theories, see William K. Carroll, "Social Movements and Counterhegemony: Canadian contexts and social theories," in William K. Carroll, ed., *Organizing Dissent: contemporary social movements in theory and practice, 2nd ed.* (Toronto: Garamond, 1997).

[55] Michel Séguin, Louis Maheu et Jean-Guy Vaillancourt, "Les Nouveax Mouvements Sociaux de l'Environnement: Au couer de changements politiques et culturels," *Journal of Canadian Studies* 30, 1 (Spring 1995), 102-14, usefully characterizes environmentalism within new social movements. See also Iain Wallace and Rob Shields, "Contested Terrains: Social space and the Canadian environment," *Understanding Canada: Building on the new political economy* (Montreal and Kingston: McGill-Queen's University Press, 1997).

[56] Robert Nisbet, "Environmentalism," chap. in *Prejudices: A philosophical dictionary* (Cambridge: Harvard University Press, 1982), 104-107.

modernity and "technological society" as well as the Western consumerist lifestyle.[57] Environmentalists linked personal and community change with environmental change through the rejection of this lifestyle and the adoption of ecologically acceptable social and political forms. The emphasis on recycling, sewage, transportation, and energy issues located environmental problems (and solutions) in the realm of the local, the personal and the everyday. This aspect of environmentalism both reflected and attracted the countercultural element of the 1960s. "[M]any of the hippies were not just seeking to commune with nature," historian Adam Rome points out. "They also were motivated by apocalyptic visions of the collapse of industrial civilization."[58] Environmentalists confronted public culpability for "ecological collapse" in ways more intimate and personal than anti-war activism or movements for racial equality. This created new spheres of action and concern, and linked fears of global ecological collapse to local instances of environmental degradation.

These ideas found fertile ground in late-1960s Vancouver. As the economic and cultural centre of the province, the city housed a growing urban middle class. Disconnected physically (though not economically) from the resource-extractive industries of the provincial hinterland, this group enjoyed the affluence and education often associated with the adoption of the "postmaterial" values of environmentalism. The growth and political power of this group was perhaps best symbolized by the emergence of The Electoral Action Movement, or TEAM, a civic political coalition formed in the late 1960s to oppose a major freeway route into the city's downtown. With its gentle climate and natural setting, Vancouver also attracted many young Canadians (and

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[57] Hays, "Three Decades of Environmental Politics." See also Mary Douglas and Aaron Wildavsky, *Risk and Culture: An essay on the selection of technical and environmental dangers* (Berkeley: University of California Press, 1982).

[58] Rome, "'Give Earth a Chance'." On the countercultural element in the environmental movement, see also Gottlieb, *Forcing the Spring*, 98-103.

Americans) seeking to "drop out" of mainstream society. The Kitsilano neighbourhood, near beaches, "head" shops and cheap housing, became known as Canada's Haight-Ashbury: a haven for "freaks," disaffected young people and students dabbling in the counterculture scene.[59] As Frank Zelko points out, Vancouver's small but vibrant alternative scene became a unique meeting place for diverse elements of the Canadian counterculture and New Left, as well as American war-resisters and draft-evaders. In 1971, this milieu spawned a movement to disrupt the American nuclear tests at Amchitka, Alaska, which led to the founding of the environmental group, Greenpeace.[60] Vibrant student politics, particularly at the recently opened Simon Fraser University in Burnaby, added to the political and social turbulence of the period. Other parts of the province also experienced increasing affluence and rapid urbanization between 1951 and 1971. Postwar resource development created new wealth and jobs in the provincial hinterland, and many settlements around the province evolved from small "company towns" to more diverse and stable urban centres.[61]

In the mid-to-late 1960s, "ecology groups" were formed at B.C.'s three university campuses. These ephemeral groups, often composed of students and faculty, ranged from local action committees to general environmental discussion groups. One such group, the University of Victoria's "Enqual," was founded in early 1967 and included both government and university scientists, as well as students. Another Victoria group calling itself the Pollution Solution Society

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[59] Jean Barman, *The West Beyond the West: A history of British Columbia* (Toronto: University of Toronto Press, 1991), 292-293. See also Myrna Kostash, *Long Way from Home: The story of the Sixties generation in Canada* (Toronto: Lorimer, 1980).

[60] Ibid., 314-315; Kotash, *Long Way From Home*, 121-123; Frank Zelko, "'Make it a Green Peace': The history of an international environmental organization" (PhD diss., University of Kansas, 2003), 116-122.

[61] The percentage of British Columbians living in urban centres increased to 75.7 per cent in 1971 from 52.8 per cent in 1951. See Veronica Strong-Boag, "Society in the Twentieth Century," in Johnston, ed., *The Pacific Province*, 280-285.

was created in mid-1968 in response to that city's ongoing sewage-pollution controversy.[62] These early stirrings of environmental activism failed to generate a lasting presence until the creation of the Society for Pollution and Environmental Control. SPEC's official founding is credited to the seemingly unlikely duo of Derrick and Gwen Mallard, who hosted the first organizational meeting at their Coquitlam home in January 1969. Derrick was an electrical engineer who had immigrated to Vancouver Island from Britain after serving in the Royal Air Force in the Second World War. He married Fernie, B.C.-born Gwen Uphill, and worked for both the B.C. Power Commission and B.C. Hydro in the 1950s before moving to Vancouver to serve as an audio technician for the Simon Fraser University psychology department. Gwen and Derrick enjoyed hiking and canoeing; Derrick later reflected that it was "[f]rom this rear canoe seat and other vantage points, [that] the deterioration of local ecosystems [became] evident."[63] Along with the middle-aged Mallards, the group's founders included other middle-class professionals such as engineer John Stigant, SFU biologist A.L. Turnbull and lawyer William Ellis. Although the latter was elected the first president of SPEC, Derrick Mallard was elevated to the position after Ellis left the group in October 1969.[64]

The early leadership and membership of SPEC was a diverse group prone to infighting and ideological divisions. This was a product of the generational and philosophical differences amongst the students, professionals and scientists active in the group, as well as the presence of

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[62] "Fight for 'Enquality' city group's credo," *Victoria Colonist*, 15 January 1967, 21; "Science seeks solution," *Victoria Colonist*, 26 January 1967, 22; Eric Maurice, "'Pollution solution stinks'," *Victoria Times*, 24 July 1968, 1; Eric Maurice, "Beach paraders fail to move beach dwellers," *Victoria Times*, 29 July 1968, 11. Preliminary discussions towards the formation of Enqual dated from late 1966. See correspondence in Haig-Brown Papers, box 79 file 7.

[63] University of Victoria Archives, AR-372 Derrick Mallard Papers (hereafter Mallard papers), box 5 file 5.22, Derrick Mallard, "Address to the B.C. Professional Engineers Association," 9 December 1971.

[64] SPEC Archive, box 994.02.01 file 1, 2.

strong personalities and inadequate leadership. SPEC's membership grew phenomenally in its first two years, tapping into Vancouver's flowering counterculture and student movements, as well as connecting with widespread, if latent, environmental concerns in provincial society. After its first year, SPEC claimed 3,500 members, and by the end of 1970, 8,000. The exact composition of this membership is difficult to determine accurately, but SPEC estimated that, amongst the 8,000, half were "average concerned citizens," 2,000 students, 1,000 business people and managers, 700 scientists, engineers, architects, teachers, doctors, lawyers and other professionals, 200 affiliated organizations including businesses, unions, civic groups, and recreational and environmental groups, and 100 elected officials from all levels of government. Beginning with a merger with a West Vancouver group known as "Effluent Society," SPEC created or took over local environmental action groups to form regional branches. Mallard toured B.C. communities in 1969 and 1970, encouraging local environmentalists to form SPEC groups. By the end of 1970, SPEC listed branches in 39 communities around B.C., and others forming, although membership was highly concentrated in Greater Vancouver.[65] To cope with a growing membership and expanding activities, SPEC rented office space first on Kingsway in Burnaby, then on West 6th Ave. in Vancouver's Kitsilano neighbourhood. By 1971, two full-time employees and many volunteers worked at "SPEC House" to fill requests for information and co-ordinate campaigns.[66]

As SPEC grew, its leaders attempted to position it as a provincial and national force for environmentalism. SPEC supported or participated in campaigns with such groups as the Richmond Anti-Pollution Association, the Sierra Club's new Vancouver chapter, the B.C. Wildlife

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[65] Mallard papers, box 5 file 5.54, "The History of the SPEC Federation," ND (probably early 1971).

[66] Mallard papers, box 5 file 5.24, "SPEC... A Year and Six Months to Where?" (ND [1971]), 2-3.

Federation and the Don't Make a Wave Committee, the forerunner of Greenpeace. SPEC initially balked at — though later joined — a proposed B.C. Environmental Council, which was intended to co-ordinate environmentalist activity in the province. Some in SPEC regarded the council as an attempt at co-optation; others felt it might usurp SPEC's pre-eminence in the provincial movement.[67] SPEC's expansion into Alberta sparked visions of a national organization. After the group was profiled in the national *Star Weekly* magazine and mentioned in the *New York Times*, requests for information flooded SPEC from across the country.[68] The eastward spread of SPEC met the westward expansion of Pollution Probe, an environmental organization founded in Toronto in 1969 that had branches in Manitoba and Saskatchewan. In July 1970, these groups spearheaded the creation of the Canadian Association on Human Environment (also known as Environment Canada).[69]

The diversity of the group's early projects reflected the diffuse nature of contemporary pollution and environmental concerns. SPEC's formal objectives were to promote environmental protection, to prevent pollution, to undertake scientific studies of ecological and pollution problems and to publicize information on environmental issues.[70] Many early SPEC campaigns were pet projects of the society's founders. Kootenay native Gwen Mallard instigated SPEC's

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[67] Dick Schuler, "Group's head hints conflict," *Vancouver Sun*, 20 November 1969, 40; Stephen Brown, "SPEC leery [sic] of Socred-tainted Environmental Council," *Vancouver Free Press*, 17-24 December 1969, 14, cited in SPEC Archive, box 994.01.01 file 1.

[68] Edward Cowan, "British Columbia fights pollution," *New York Times*, 11 December 1969, cited in SPEC Archive, box 994.01.01 file 1; "Organized resistance: it works," *Star Weekly*, ND [1969], cited in SPEC Archive, box 994.02.03 file 1.

[69] SPEC Archive, box 994.02.01 file 13, Minutes, Canadian Association on Human Environment founding meeting, 31 July, 1-2 August 1970, Lac Echo, Quebec. The following year, a national conference was held in Vancouver, hosted by SPEC, but little else seems to have come of this group. The "Environment Canada" name did not imply any connection with the federal Department of Environment which later bore the same title.

[70] Mallard papers, box 5 file 5.24, "SPEC... A Year and Six Months to Where?" (ND [1971]), 1.

vigorous opposition to the planned Kaiser Resources coal strip mine in the Elk Valley. This campaign blended habitat and wilderness protection with pollution concerns. Other early issues included Burrard Inlet pollution by oil refineries; opposition to offshore oil exploration in the Strait of Georgia; reducing pesticide use; and Derrick Mallard's noise pollution investigations.[71] In 1970, new projects included opposition to the Island Copper Mine plan to dump mine tailings into Rupert Inlet on Vancouver Island, demands for secondary treatment of domestic sewage at the proposed Annacis Island sewage treatment plant in Vancouver, and a campaign against air and water pollution from the province's expanding pulp and paper industry. Though its own focus was on pollution-related issues, it also supported wilderness preservation and other campaigns such as the Run Out Skagit Spoilers (ROSS) committee.

SPEC's most compelling messages and actions linked personal lifestyle issues and local pollution problems with fears of a global "environmental crisis." The inaugural issue of *PerSPECtive*, SPEC's magazine, promised to "cover the growing ecological crisis from your backyard to the planetary system." While denouncing "the system" in vague terms, the debut editorial noted that, "As an individual the most important step you can take is to get involved in survival."[72] To this end, SPEC members conducted litter drives and pesticide pick-up campaigns in communities across the province. In Vancouver, SPEC members conducted and publicized independent coliform bacterial counts at city beaches as a public service. The province's first recycling program was a pilot project co-sponsored by SPEC and a group called the Joshua Society, begun in January 1971. The group also published information pamphlets on phosphate

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[71] SPEC Archive, box 994.02.01 file 5, Executive Committee meeting minutes, 16 February 1969, and file 6, *ERTCEPS: The SPEC newsletter* 2 (October 1969); Mallard Papers, box 5 file 54, "Origin of the Society for Pollution & Environmental Control," January 1970.

[72] "Editorial," *PerSPECtive* 1:1, 8 March 1971, 2.

detergents, energy use, domestic solid waste problems, "ecology in the home," and "a taxpayer's guide to sewage treatment."[73] SPEC board member and Unitarian Church minister Jack Kent pledged to stop shaving as a symbol of "the repossession of ourselves" from the clutches of consumerist lifestyle. "This is no Utopian dream to be realized in some distant future — it is a matter of human survival that demands immediate action," he told an SFU audience in 1970.[74]

SPEC's anti-pollution strategies uneasily blended more traditional lobbying and public education efforts with the social-protest forms of the 1960s. SPEC members presented a general brief and 13,651-signature petition to the PCB in 1969, and appeared before the provincial Select Standing Committee on Mining and Railways to oppose the Elk Valley development.[75] To promote public awareness of pollution issues, the group established an information service at its offices, producing pamphlets, newsletters and information sheets on pollution, and providing a speaker's bureau service which by the end of 1970 had delivered 400 presentations on environmental issues.[76] In an attempt to take its message province-wide, in 1970 SPEC launched the "Ecology Caravan," a travelling environmental education and advocacy centre that toured the province in the summer of 1970. Unfortunately for SPEC, the caravan was a debacle, due to the unreliability of its youthful drivers.[77] More successful was the *Fraser River Report*, produced by students employed

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[73] Mallard Papers, box 5 file 29 contains a number of these pamphlets, as well as a catalogue listing the available titles.

[74] Mike Graham, "Anti-luxury stand sparks hairy vow," *Vancouver Sun*, 4 June 1970, 15.

[75] Mallard Papers, box 5 file 30 "Presentation to the Pollution Control Board," 10 November 1969; Mallard Papers, box 3 file 36, "Preservation of B.C.'s Elk Valley," brief to Select Standing Committee on Mining and Railways, March 1969; "Group urges check on coal mining," *Vancouver Province*, 22 March 1969, 47. Gwen also filed a brief with the Parliamentary Committee on the Constitution of Canada in January 1970 on this issue.

[76] Mallard Papers, box 5 file 29 includes a number of SPEC's information pamphlets, including "Would You Swim in Your Toilet?" on sewage treatment (ND); "Pulp Mill Pollution," (ND), "Air Pollution - A Matter of Concern," (ND). A complete list of fact sheets and pamphlets is included in *Spectalogue* (ND [1972?]), also in this file. The group also produced packages intended for use in classrooms. The public newsletter was first called *Spectre*, then *PerSPECtive*, and appeared semi-annually.

[77] SPEC Archive, box 994.02.02 file 2, Executive Director's Report, 4 November 1970.

by SPEC under a government Opportunities for Youth grant. Although heavily criticized by government and industry, the report provided a model of public interest research and advocacy welcomed by others.[78] This education and lobbying function was generally well received by mainstream British Columbians. As Nanaimo branch members reported, "Reception by media is generally very good; responsive to 'good deeds' i.e.: litter pick up, but it appears they are reluctant to take the more unpopular job of 'belling the cat' and pinning down big industry and the city council to act on certain issues."[79] Avowedly non-political, SPEC made a self-conscious effort to attract scientists, particularly ecologists, to its organization. University of British Columbia professors David Suzuki and Robin Harger served on the group's executive in 1970. The group's rarely used formal name was the "Canadian *Scientific* Pollution and Environmental Control Society." SPEC carefully cultivated an image of non-partisanship and reasoned criticism of government policy.

This "responsible approach" was accompanied by countercultural elements and social-protest techniques. At the first general membership meeting in May 1969, President William Ellis declared SPEC to be "a militant organization ready to fight... The Society will tread on toes and make enemies."[80] The group was clearly influenced by and exploited fears of environmental apocalypse. Among the names initially proposed for the group was the Society for the Prevention

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[78] Society for Pollution and Environmental Control, *Fraser River Report* (Vancouver: SPEC, 1970). For reaction to the report, see Jeff Wells, "River report dismissed: work of greenhorns," *Vancouver Sun,* 16 December 1970, cited in SPEC Archive, Box 994.01.01, File 994.01.01.009; Alex Young, "Report on Fraser 'amateur, misguided'," *Vancouver Province*, December 17, 1970, 28; "Is half-safe safe enough?," *Vancouver Sun*, February 9, 1971, 4; Bob Hunter, "Bob Hunter," *Vancouver Sun*, 28 May 1971, 31, and 29 May 1971, 31.

[79] SPEC Archive, box 994.02.01 file 12, Branch Reports, November 1970. See also salutary editorials from suburban newspapers in Greater Vancouver in box 994.01.01 file 1.

[80] SPEC Archive, box 994.02.01 file 5, Minutes of general membership meeting, 5 May 1969.

of Environmental Collapse.[81] At its first protest march, at Port Moody in June 1969, protesters carried a coffin symbolizing the death of Burrard Inlet.[82] In March 1970 — one month before the American Earth Day — SPEC co-sponsored a "Festival for Survival" in Stanley Park. The event included a protest march that was part "freak" festival, complete with bongos and marijuana, and part political demonstration. The group also organized local events for the national Earth Week and Survival Day in October.[83]

This precarious balance of lobbying and protest tactics crumbled into open conflict within SPEC regarding the goals and strategies of the anti-pollution movement. Mallard himself admitted, in a March 1970 interview, that "young people such as the students at SFU... believe that something pretty close to revolution will be necessary to stop pollution."[84] The chief advocate of radical tactics was the ecologist Robin Harger, a young, soft-spoken New Zealander who lectured in the University of British Columbia Department of Zoology. Harger espoused a kind of Aquarian-age ecological philosophy that mixed New Left politics, ecological ideas and millenary visions of "the extinction of the human race" due to pollution and over-population.[85] Harger, who succeeded Mallard as president of SPEC in June 1970, encouraged controversial techniques and strident, sometimes bizarre rhetoric to promote social change. For instance, his proposal for an air

[81] The group was erroneously referred to by this name by counterculture columnist and Greenpeace co-founder Bob Hunter in "Bob Hunter," *Vancouver Sun*, 13 June 1969, 17.

[82] "Rally to launch pollution fight," *Vancouver Sun*, 3 June 1969, 18.

[83] "SPEC's clean fight spreads," *Vancouver Express*, 24 March 1970, 4. The *Express* was a paper published by employees of Pacific Press, publisher of the *Vancouver Sun* and *Province*, during a labour dispute. See also SPEC Archive, box 994.02.01 file 12, SPEC Branch Reports, November 1970; Mullins history, 32.

[84] "SPEC's clean fight spreads."

[85] "On the pollution front, middle-class activists confront 'the extinction of the human race,'" *Maclean's*, January 1971, 28-9. See also Harger's contributions to a Hamilton-based magazine called *Dasein* in 1971, located in SPEC Archive, 994.02.03 file 2.

pollution campaign in the fall of 1970 included a "plan [to] sow confusion among the enemy which will now be waiting for the next savage thrust into the gut of the established order..."[86] Harger's stance appealed to the students, hippies and unemployed youth who flocked to SPEC House seeking a cause, a job, or just somewhere to hang around and "rap" about revolution.

SPEC's forestry campaign revealed the emerging divisions between the "radicals" and the "moderates." On the one hand, the group presented a well-received brief to a public inquiry into waste discharges from the forest products industry held by the PCB in August 1970. At the inquiry, SPEC legal chairman Gerry Culhane deftly cross-examined industry representatives. The group enjoyed positive press coverage and felt it had forced pollution control authorities to consider stricter standards.[87] As part of its campaign, SPEC also issued a "wanted" poster branding forestry giant MacMillan Bloedel an "environmental outlaw" and "King of the Polluters." Issued by protestors in mock-medieval dress, the poster drew widespread criticism from the mainstream press for its extreme rhetoric. Many SPEC branches distanced themselves from the poster; the Nanaimo executive quit the group *en masse*.[88] The following spring, Harger and Culhane were implicated in a failed plot to set off "stink bombs" at a forest industry luncheon in Burnaby. In a perceptive analysis, newspaper columnist and environmental activist Bob Hunter likened SPEC's

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[86] SPEC Archive, file 994.02.02 file 2, memo, R. Harger to SPEC Executive, 10 September 1970. Harger became president after Mallard resigned amidst controversy over his dismissal from Simon Fraser University. Though Mallard argued the firing was politically motivated, the university maintained Mallard had failed to deliver equipment the university ordered from his home-based electronics company. Mallard was immediately hired as SPEC's first executive director.

[87] Barry Broadfoot, "SPEC urges revisions to present pulp mills," *Vancouver Sun*, 13 August 1970, 13; Barry Broadfoot, "Industry on defensive at Vancouver hearing," *Canadian Pulp and Paper Industry Magazine*, October 1970, 27-29. Interestingly, the alternative weekly newspaper, the *Georgia Straight*, reprinted the SPEC brief to the inquiry in its entirety. See SPEC Archive, box 994.01.01 file 9.

[88] SPEC Archive, Mullins history, 43; SPEC Archive, box 994.02.02 file 2, Executive Director's Report, 4 November 1970; box 994.02.03 file 1, Scott Honeyman, "SPEC takes aim at forest giant," *Vancouver Sun*, 18 July 1970; box 994-01.01 file 3 contains correspondence relating to the acrimonious resignation of the Nanaimo executive. The Nanaimo group included Fisheries Research Board scientists and employees of the local MacMillan Bloedel pulp mill who were uncomfortable with these propaganda tactics.

tactical quandary to the choice American black activists faced between the mainstream National Association for the Advancement of Colored People or the revolutionary Black Panthers. "It is a giant step from one's patio to The Revolution," Hunter mused. He contended that while social revolution was necessary to avoid ecological disaster, SPEC risked alienation from the political mainstream — and much of its own membership — if it continued to advocate radicalism.[89]

These questions of tone and tactics were critical for anti-pollution activists. The apocalyptic rhetoric of much pollution discourse in the 1960s had earned environmental advocates the label of "emotionalism." Branding environmentalists as "emotional" and therefore irrational or unscientific was a standard tactic of government and industry in B.C. and elsewhere. Many within the movement argued that, in order to gain access to decision-makers and to influence the "mainstream" public, environmentalists needed to portray themselves as "scientific," reasoned critics of pollution. Others, however, believed that strong rhetoric was necessary to stir government and the public to action.[90] Commenting on the need for citizen activism, B.C. wildlife biologist Ian McTaggart-Cowan argued that, "Of course, you are going to get people who are irrational! Of course you are going to have the cry of emotion. ... But, the net value of these groups of people is extremely high indeed. I think it is imperative in our social situation."[91] SPEC gained early respect from government authorities for its "reasoned approach" to pollution issues.[92] But as its message became more strident, and the group gained more influence, it was criticized for

[89] SPEC Archive, box 994.01.01 file 5, Bob Hunter, "Survival-crusaders fight for own survival," *Vancouver Sun*, 22 August 1970.

[90] Bruce Yemen, "Why does gov't fear unknowns of pollution?," *Victoria Times*, 26 December 1970, 3; "Better cause for emotion?," *Vancouver Sun*, 4 October 1966, 4. The B.C. Wildlife Federation defended "emotional" reactions to environmental problems in BCWF *Newsletter*, January-February 1969, 2-3.

[91] *Transactions of Seventeenth British Columbia Natural Resources Conference* (Victoria: BCNRC, 1967), 85.

[92] Murphy, "Pollution is a dirty word."

becoming "irrational." One forest industry official chided SPEC's *Fraser River Report*, saying that "Instead of being led up the path of emotionalism by those radicals who use half-truths, sensationalism and innuendo that is designed and calculated to create media headlines, we should examine current problems in a logical fashion and try to put things into their proper perspective."[93] SPEC and other groups also risked being linked with radical political groups such as the leftist Vancouver Liberation Front. With the long history of anti-Communist rhetoric in the province, such an association could have damaged the group's mainstream appeal.

The controversy over tactics eventually fractured the organization. Rather than lending scientific authority to SPEC's anti-pollution activities, Harger became a lightening rod for criticism from both inside and outside the organization. Harger's politicization of the ecology message led to media criticism that "ecology freaks" had taken over the group.[94] Denied tenure in the Department of Zoology at UBC, Harger claimed he was targeted due to his activism. SPEC rallied around Harger, but by 1971 the group was deeply split.[95] David Suzuki and seven others quit the executive in 1971. Mallard hinted publicly that the group had been infiltrated by leftist radicals. Conflicts between office staff and the demands of SPEC branches for greater input into

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[93] Alex Young, "Report on Fraser 'amateur, misguided'." Particularly vicious in his criticism was former Director of Pollution Control Charles Keenan, who dismissed environmentalists as emotional nature lovers out to destroy progress and capitalism in B.C. See, for instance, his statements at a University of Victoria "teach-in" on pollution in "Secrecy policy under attack," *Victoria Colonist*, 8 March 1970, or his presentation to the forest products industry public inquiry in Barry Broadfoot, "Expert discounts pulp mill threat," *Vancouver Sun*, 21 August 1970, 29. Keenan vented his hatred of environmentalists in a later book, Charles J. Keenan, *Environmental Anarchy: The insidious destruction of social order: A legacy of the sixties* (Victoria: Cappis Press, 1984).

[94] SPEC Archive, box 994.01.01 file 9, Trevor Lautens, "Trevor Lautens," 28 July 1970. Notably, Lautens was also a member of SPEC. Harger was also criticized for initiating a SPEC press release denouncing the federal government for its deployment of the War Measures Act in October 1970 in response to the FLQ crisis in Quebec.

[95] U.B.C. denied Harger was targeted for his activism, rather for his lack of productive research. See Harger's notes in box 994.02.03 file 3. The difficulty of balancing science and activism was discussed by Pollution Probe founder and scientist Donald Chant in D.A. Chant, "Pollution Probe: Fighting the polluters with their own weapons," in Robert M. Irving and George B. Priddle, eds., *Crisis: Readings in environmental issues and strategies* (Toronto: Macmillan, 1971).

the organization's priorities and campaigns contributed to the internal strife.[96] The annual general meeting in April featured a showdown between advocates of "responsible militancy" and the revolutionary ecologists. After a stormy meeting, Harger resigned from the executive along with radical lawyer Gerry Culhane to form a separate group, the short-lived Environmental Systems Community Association.[97] As one West Vancouver delegate noted, SPEC had decided that "the solution to pollution is revolution — but not yet."[98]

These disputes did not derail SPEC's initial incredible growth. Membership reached 12,000 by mid-1971, and the group claimed 45 branches around the province and western Canada. SPEC members were engaged in dozens of local and provincial projects, from opposing the Bulkley Valley pulp mill near Houston, to saving trumpeter swan habitat in Shoemaker Bay at Port Alberni, to battling B.C. Hydro over its indiscriminate spraying of pesticides along powerlines and right-of-ways around the province. SPEC sponsored fundraising campaigns to send protest vessels *Greenpeace* and *Greenpeace Too!* to protest American nuclear testing at Amchitka. Duncan SPEC member Kurt Horn sailed on the second ship. Gwen Mallard and fellow middle-aged activist Alice Coppard hitchhiked across Canada to collect signatures protesting an oil tanker shipping route along the B.C. coast. In spite of its divisions and savage criticism from industry and government opponents, SPEC enjoyed a positive image as pollution fighters. "I know of no more

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[96] The divisions between the "radicals" and the "moderates" were not always clear-cut. For instance, Mallard supported the Don't Make a Wave Committee plan to disrupt the Amchitka nuclear test, while Harger and Culhane did not. On SPEC's internal dissension, see SPEC Archive, box 994.02.03 file 6, Memo, Derrick Mallard to Branch Executives, 31 March 1971, and Report of the Executive Director to the SPEC Annual General Meeting, 17 April 1971; box 994.02.04 file 4, memo, Jim Marunchak to Branch Presidents, 16 March 1971; Mullins history, chap. 2.

[97] The AGM received ample coverage in the mainstream press, indicating both SPEC's high profile and, perhaps, the press's love of controversy. See "3 quit pollution group after hot annual meeting," *Vancouver Sun*, 19 April 1971, 10, as well as two sidebar stories; SPEC Archive, box 994.01.01 file 12, Alex Young, "Leftist spectre haunts SPEC," *Vancouver Province*, 17 April 1971, and box 994.02.03 file 6, "Perspective," transcript of CHQM radio editorial, 19 April 1971.

[98] "Director foils SPEC revolt," *Vancouver Province*, 19 April 1971, 23.

dedicated and informed group of laymen" wrote *Victoria Times* columnist Jack Scott.[99]

Amidst this growth lay the seeds of SPEC's decline. By the end of 1971, newspaper articles were already commenting on the decline of pollution as a hot-button issue.[100] Membership had begun to fall, funds were short and many of the regional branches appeared to be inactive. SPEC's fractious office politics failed to improve under new president Bill Terry.[101] Several incidents occurred that further damaged SPEC's credibility, including one in which students hired by Mallard to record noise levels at a Led Zeppelin rock concert were beaten up by bouncers and their equipment smashed. As executive director, Derrick Mallard felt increasingly isolated from SPEC's younger, activist cadre, who sneered at his obsession with noise pollution. In April 1972, the Mallards quit the group, amidst deep acrimony and accusations of threatening phone calls from others in the group. The couple moved to Vancouver Island, where they attempted to start a Vancouver Island SPEC branch, which was rejected by the main organization.[102] In his last contribution to the organization, he represented SPEC as an observer at the United Nations Conference on the Environment at Stockholm, Sweden, in 1972. The Mallards formed a separate environmental group and remained environmental activists for the rest of their lives.[103]

Between 1972 and 1974, SPEC endured a difficult transition from a mass-movement

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[99] Jack Scott, "Pollution panic not the answer," *Victoria Times*, 10 March 1971, 17.

[100] Donna Clements, "'I'm quitting because the kitchen is on fire'," *Victoria Times*, 17 November 1971, 37; "SPEC group hurt by lack of interest," *Victoria Times*, 25 October 1971, 6; Bryan McGill, "Pollution: weary of words," *Victoria Times*, 15 April 1972, 5.

[101] SPEC Archive, box 994.01.02 file 3, Minutes, Fifth Federation Council Meeting, 8-9 January 1972.

[102] Mallard Papers, box 5, file 54 contains memos, correspondence, and other materials reflecting this conflict, including "Presentation to SPEC Council 22 April 1972," draft speech by Derrick Mallard.

[103] The new group was called the Citizens' Association to Save the Environment. See Mallard papers, box 7 file 7, "The Mallards Don't Duck the Issues," undated magazine clipping [probably 1973]; Derrick Mallard, "Environmental pioneer held on to activist passion to the end," *Vancouver Sun*, 8 December 1999, A15; Richard Watts, "Mallard leaves a legacy of environmental ethics," *Victoria Times-Colonist*, 2 June 2001, B1.

organization to a public-interest lobby group. Its internal disarray, and what one Chilliwack branch member called "the hairy great love-bead image projected by the office staff," had alienated many rank and file members.[104] A report on the resignation of the Mallards confirmed many of their complaints about office inefficiency and the organization's lack of direction. Membership continued to decline and SPEC was financially dependent on an unreliable stream of government grant money. Still, the group began to put its ideological battles behind it and to restore its lost credibility with government agencies. While acknowledging a role for "radical, counter-culture environmental action" such as that of Greenpeace, in 1972 President Bill Terry insisted SPEC could be just as effective as a "watchdog" working "through the system."[105] Terry's optimism seemed borne out by SPEC's successful agitation for the upgrade of the Annacis Island sewage treatment plant in Vancouver. During the Annacis dispute, SPEC members directly lobbied Members of the Legislative Assembly and Cabinet ministers in the recently elected New Democratic Party government at the party's convention. This effort, combined with a public awareness campaign, proved a winning formula for SPEC and its allies.[106] During the 1970s, the group used these methods to push for the creation of an Agricultural Land Reserve in B.C., to intervene in various provincial hydroelectric dam projects, to stop the construction of an oil-tanker port at Kitimat and to force a provincial moratorium on uranium exploration and mining. In 1976, then-president Mike Jessen commented that SPEC had survived the downturn in environmental concerns during the energy crisis, and continued financial and organizational problems. SPEC

[104] SPEC Archive, box 994.02.04 file 9, Chilliwack Branch President Jody Cameron to SPEC President Bill Terry, 12 May 1972.

[105] SPEC Archive, box 994.02.05 file 9, President's Report, 8 January 1972.

[106] SPEC Archive, box 994.02.05 file 1, Executive Committee minutes, 29 November 1972. For more detail on the Annacis Island controversy, see Chapter 2 *supra*.

membership had declined to fewer than 2,000 (where it would remain for the rest of the decade), and its organization had largely receded to its Vancouver base. But the group remained influential in local and provincial environmental issues. "While we are no longer a mass citizen's movement, we have become a very powerful lobby," Jessen concluded.[107] Like many American environmental groups, SPEC had claimed a place in the "environmental policy system" as environmental concerns became institutionalized in government.[108]

The issues taken on by SPEC refracted globally significant environmental problems and ideas through the prism of local problems. In 1972, SPEC passed resolutions endorsing the concepts of environmental "limits" and zero growth, which emerged from the Club of Rome's "Limits to Growth" report, the 1972 U.N. Conference on the Environment, and the writings of Malthusian environmentalists such as Paul Ehrlich. These concepts influenced the group's advocacy for urban transportation planning and the preservation of agricultural lands from urban sprawl. An editorial in *PerSPECtive* noted that "the central premise of environment action is shifting from that of pollution abatement to that of attacking the source of pollution, growth itself."[109] The energy crisis of the 1970s had prompted increased energy development and exploration activities by western governments. In B.C., the public utility company, B.C. Hydro, proposed a series of hydroelectric and coal-burning energy developments. SPEC fought many of these initiatives, arguing that the utility had overestimated demand and was not doing enough to

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[107] Cited in Mullins history, 103.

[108] Gottlieb, *Forcing the Spring*, chap. 4, describes how mainstream environmental groups became part of an "environmental policy system" in the United States.

[109] "Editorial," *PerSPECtive* 2, 2 (May 1972), 2. Issues of *PerSPECtive* in 1972 and 1973 are peppered with articles on growth and environmental limits, overpopulation and the concept of "Spaceship Earth."

promote energy conservation.[110] As they were for environmentalists elsewhere, oil and natural gas pipelines and oil tanker traffic were prominent issues for SPEC. The group also joined with other environmental groups to form the Canadian Coalition on Nuclear Responsibility to monitor nuclear power development in Canada.[111]

Given SPEC's rapid expansion and retreat, it is tempting to attribute the organization's fortunes to the vagaries of social concern for the environment. After all, North American public-opinion polls and other indicators suggested that, by the end of 1972, pollution was "played out" as a public issue, replaced by concerns over the economy and the energy crisis. After the initial flush of enthusiasm for social movement activities, many youthful activists withdrew from the public sphere, eroding its basis of support. Still others turned to wilderness preservation issues then gathering strength in B.C.[112] Mass participation and membership in environmental organizations had slowed after a sudden burst, and many groups became preoccupied with lobbying newly established government environmental agencies or industries as part of the "environmental policy system." These trends undoubtedly affected SPEC. But the peculiar organizational and political circumstances surrounding the group also contributed to its expansion, contraction and transformation.

The early history of SPEC encapsulates the complexity, diversity and tensions within

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[110] Mullins history, chap. 6. The prominence of energy issues for B.C. environmentalists in the 1970s is noted in Jim Cooperman, "The Roots of the Network - A Thirty Year Retrospective," *B.C. Environmental News* (1999), 1.

[111] Ibid. See also issues of *PerSPECtive* for 1973 in SPEC Archive, box 994.01.02 file 5 and various documents for 1974 in box 994.01.02 file 9. Some of these campaigns are touched on in Gary Gallon, "Twenty SPECtacular years," *Vancouver Sun*, 4 April 1970, A-11.

[112] On the growing prominence of wilderness issues in B.C., see Wilson, *Talk and Log*, 101-105. The first Sierra Club chapter in B.C. was formed in 1969 by American expatriates Terry Simmons and Jim Bohlen. The Vancouver chapter spearheaded the campaign to save the Skagit Valley from flooding. See Ernest B.H. Shelvey, "Skagit Scenes: Landscape formation in the Pacific Northwest," (PhD diss., Arizona State University, 1999), 380-383. In 1970, Ric Careless set up an unsanctioned Sierra Club chapter on Vancouver Island to preserve the Nitinat Triangle from logging. See Ric Careless, *To Save the Wild Earth: Field notes from the environmental frontline* (Vancouver: Raincoast Books, 1997), chap. 1.

environmentalist thought and actions during this period. Born in a climate of cultural upheaval and fears of environmental crisis, the organization precariously balanced middle-class aspirations for environmental quality with a radical critique of modern technological society. Its adoption of social movement tactics, such as media stunts and protests, helped spread its message of ecological awareness. This message found a receptive audience, particularly, but not exclusively, among urban British Columbians increasingly critical of the stale-dated, closed government of W.A.C. Bennett. The vast postwar expansion of population, mines, pulp mills and other industrial developments in B.C. peaked just as environmental concerns became widespread. The disdain of many in politics and industry for these concerns fuelled public outrage at perceived environmental abuses, while the government's belated appeal to ecological concerns was dismissed as the cynical ploy of a dying administration. Perhaps ironically, the election of the New Democratic Party to provincial office in 1972 may have contributed to the dissipation of environmental concern in B.C. The NDP's initial commitment to more open government and to public accountability in resource decision-making made it seem as though environmentalists had seized power. Still, as columnist Bob Hunter pointed out, the B.C. environmental movement was already fragmented and in transition on the eve of this political victory.[113]

Internal crises and declining membership forced SPEC to adopt the techniques and strategies of an environmental lobby group. Rejecting the theatrical direct-action tactics of Greenpeace, SPEC evolved into a research and lobby group that resembled the "PIRG" (public-interest research group) model of American consumer advocate and environmentalist Ralph Nader. While SPEC still participated in environmental protests, its hallmarks became direct lobbying of

[113] Bob Hunter, "Bob Hunter," *Vancouver Sun*, 21 September 1972, 41; "B.C. warns polluters to clean up," *Victoria Times*, 1 November 1972, 1.

politicians and government agencies, and appearances at public hearings and inquiries — venues which SPEC activism had helped establish in B.C. Like its Ontario sibling, Pollution Probe, the group's watchdog activities have been critical in establishing the principle of public accountability in environmental affairs.

Theatres of regulation: Public inquiries and the politics of pollution in the 1970s

Regulatory accountability and public participation in environmental decisions became critical issues for environmentalists in the 1970s. In response to public environmental concerns, all levels of government across North America enacted legislative and policy initiatives in this period. While many new laws and regulatory agencies allowed some form of public consultation, the scope and effectiveness of this input varied widely.[114] Environmentalists became concerned that government environmental and anti-pollution agencies were being "captured" by industry interests, shutting out public and environmental concern. Having achieved a measure of environmental protection, many feared it would be rolled back under the cover of unaccountable bureaucratic processes. As historian Samuel Hays has described, in many cases "administrative environmental politics became even more intense than legislative politics" as environmentalists, industry and government jockeyed for influence over the planning and enforcement of environmental regulations.[115] Administrative processes determined the actual effectiveness of regulation, yet were often the most obscure and inaccessible to the general public, since they involved detailed technical problems, scientific debates and legal issues.

In B.C., environmentalists aggressively sought to open government regulatory processes to

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[114] See the reviews of various public participation systems and their problems in: P.S. Elder, ed., *Environmental Management and Public Participation* (Calgary: Canadian Environmental Law Research Foundation, 1975). See also the special issue on public participation of *Natural Resources Journal* 16, 1 (1976).

[115] Hays, *Beauty, Health, and Permanence*, 469.

public scrutiny. The PCB was regularly criticized as an unaccountable body composed of civil servants who answered to political masters.[116] In the late 1960s, various groups launched lawsuits to force the provincial PCB to hold public hearings into pollution-control permit applications. As legal scholar Alastair Lucas and activist Patrick Moore noted, these cases had some impact in opening the decision-making process to public inputs. But Lucas and Moore also suggested that "public hearings may in fact be used mainly as a safety valve by the Director [of Pollution Control]" in cases of particularly controversial developments.[117]

The intense political pressure on pollution control authorities led to an experiment in environmental regulation by the B.C. government. Between 1970 and 1978, the provincial Pollution Control Branch held a series of public hearings on pollution control policy and objectives for the province. Rather than dealing with individual permits, these hearings sought public and industry input into the establishment of pollution control "objectives" for various pollution sources. The process of setting waste discharge standards or environmental quality objectives through a public hearing process was unique in Canada.[118] In some North American jurisdictions, public participation was incorporated into evaluations of specific resource-

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[116] See, for instance, "Pollution board accused of usurping health duties," *Vancouver Sun*, 21 February 1967; "Opposition raps new pollution bill," *Vancouver Sun*, 18 March 1967, both stories from B.C. Legislative sessional clipping books [microfilm]; "The worst things in life are free," *Vancouver Province*, 6 May 1968, 4.

[117] Alastair R. Lucas and Patrick A. Moore, "The Utah Controversy: A case study of public participation in pollution control," *Natural Resources Journal* 13, 1 (1973), 74. The issue of access to permit-review processes was intensely debated during the conflict over mine tailings disposal at Buttle Lake and in relation to the 1968 revisions to the Pollution Control Act, which sought to limit who qualified for standing as an "objector." "NDP move fails on pollution bill," *Vancouver Sun*, 16 March 1968, B.C. Legislative sessional clipping books [microform]; "None of our business?," *Vancouver Sun*, 1 March 1968, 4

[118] British Columbia, Department of Lands, Forests, and Water Resources, *Report of the Water Resources Service: Year ended December 31, 1971* (Victoria, Province of British Columbia, 1972), 103. This impression is also given in reviews by environmental law expert Alastair R. Lucas:, "Legal Techniques for Pollution Control: The role of the public," *U.B.C. Law Review* 6, 1 (June 1971), 188, and "Legal Foundations for Public Participation in Environmental Decision-Making," *Natural Resources Journal* 16, 1 (January 1976), 87-88; and Jim Anderson, *Provincial Legislation Respecting the Pollution of Waters by Phosphates, Pulp and Paper and Human Sewage* (Ottawa: Ministry of State for Urban Affairs, December 1972), 25-29.

development or waste discharges, but not into the creation of standards.[119] However, regional water-management authorities did occasionally include public input components, including the federal-provincial Okanagan Basin Board, established in 1969.

The B.C. pollution control inquiries were intended to generate technical and scientific information relevant to setting pollution control guidelines. In spite of this technical mandate, these hearings became contested forums for debates over environmental values and the politics of pollution control. As "theatres of regulation," these inquiries became courtroom dramas pitting contrasting philosophies of pollution control against one another. By determining what counted as "technical" evidence and valid testimony, the inquiry panels attempted to exclude social, economic and political dimensions of pollution from their consideration. Environmentalists, recreationalists and community groups appearing at the hearings defied the resolutely technical focus of the inquiries, and demanded that social, aesthetic and non-material criteria be incorporated into pollution control decisions. At the same time, industrial concerns attempted to force the PCB to consider economic factors in establishing pollution policies. In many ways, the inquiries were the culmination of debates over assimilative capacity and environmental quality in B.C. begun in the 1950s and 1960s. Running into the thousands of pages, the transcripts of these inquiries are a remarkable record of the contested ideas of nature and perceptions of risk that shape how pollution was defined, and what policies resulted.

Pollution regulation became deeply politicized in the waning years of the Social Credit administration. The PCB remained under the direction of Minister of Lands, Forests, and Water Resources Ray Williston, who was also responsible for promoting resource development in the

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[119] Terence Kehoe, *Cleaning Up the Great Lakes: From cooperation to confrontation* (DeKalb, Ill.: Northern Illinois University Press, 1997), chap. 3; Peter C. Yeager, *The Limits of Law: The public regulation of private pollution* (Cambridge: Cambridge University Press, 1991), chap. 5.

province. "How will [Williston] be able to square his role in preventing pollution with his activities in creating pollution by granting licences to industry to befoul the air and water?" asked one opposition Member of the Legislative Assembly.[120] In an attempt to defuse a Cabinet conflict over authority for water quality in 1968, the government appointed three cabinet ministers to the PCB, enraging critics who charged political interference in pollution control decisions.[121] As pollution came to the forefront of environmental concerns in 1970 and 1971, pollution control policy became a ready target for government detractors. Episodes such as the Utah Mines and Kaiser Coal developments, in which development was begun well in advance of Pollution Control Branch approvals, were seen to indicate the government's pro-development attitude. Opposition politicians derided pollution controls as inadequate and called for the creation of a provincial Department of Environment.[122] To counter criticisms of a development bias and defend its procedures, pollution control authorities launched a public-relations effort. A 1968 B.C. government film entitled *British Columbia's Natural Heritage* promoted government efforts to protect the B.C. environment.[123] In a feature interview in the *Victoria Colonist* in 1971, the new

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[120] "Pollution board accused of usurping health duties," *Vancouver Sun*, 21 February 1967, B.C. Legislative sessional clipping books [microfilm].

[121] See BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01 file 10, Summary Record, 11 March 1969. Order-in-council #669 appointed ministers Dan Campbell (Municipal Affairs), Ray Williston (Resources), and Ralph Loffmark (Health) to PCB "to ensure co-ordination in the public interest of the actions and responsibilities of those Departments most directly concerned." At the meeting, Williston remarked that ministers' role was to facilitate information/opinion transmission between Cabinet and the PCB so "that a uniform policy could be evolved to satisfy the public interest, as pollution control is assuming prime importance in the minds of the public, even though many find it difficult to specifically define the nature of their concern." For reaction, see "At least restore political purity..." *Vancouver Province*, 19 June 1969, 4.

[122] "Pollution bill coming," *Vancouver Sun*, 15 January 1971, 17; "Gov't fighting paper war against pollution – McGeer," *Vancouver Province*, 25 January 1971, 10. Alberta was the first province to establish a provincial Department of Environment, in 1970. Others followed suit, but British Columbia did not create a Department of Environment until 1976.

[123] BCARS, F1981: 12/003, Lew Parry Film Productions, *British Columbia's Natural Heritage* (B.C. Public Health Branch, 1968) . The government also took out advertisements in major daily newspapers trumpeting its pollution-control efforts. The ads, predictably, were criticized: Ian Street, "Government ads use money needed to control pollution," *Victoria Colonist*, 21 November 1971, 5. Senior members of the Pollution Control Branch also gave speeches to various groups around the province "to acquaint people with the role of the [branch]...": see *Report of the Water Resources Service* (1971), EE 103.

director of pollution control, William Venables, declared himself "a missionary" for pollution control. He contended that the Pollution Control Branch undertook all "reasonable" actions to combat pollution and chided anti-pollution activists such as SPEC for their "grandstanding."[124]

As criticism of its environmental policies mounted, the embattled government enacted further reforms of pollution control and environmental authorities. In 1970, the Pollution Control Act was amended to force all new and existing industrial waste sources to register discharges (including airborne discharges) by the end of 1971. Under Venables, the Pollution Control Branch was expanded and reorganized, and for the first time included biologists as well as engineers on its staff.[125] In late 1969, the government created a new Cabinet Environment and Land Use Committee to investigate the environmental dimensions of major resource-development projects. This was an explicit attempt to relieve the Pollution Control Branch of "political" decisions concerning the social and economic impacts of development and environmental controls.[126] The committee was regarded by some as a further example of the Social Credit tendency of centralizing and politicizing decision-making, particularly since its head was Minister of Lands, Forests, and Water Resources Ray Williston. One commentator wrote, "It seems quite clear the balance, in the eyes of the government, is still tipped heavily in favor of development. Not development at any price, perhaps, but still development over the preservation of the environment where natural

[124] Diane Janowski, "'I'm a missionary'," *Victoria Colonist*, 10 January 1971, 20. See also Murphy, "Pollution is a dirty word," for another example of Pollution Control Board media relations.

[125] *Report of the Water Resources Service*(1972). From 1970-72, the staff of the branch more than quadrupled from 40 to 185, to cope with the vast number of permit applications coming before the branch.

[126] "Williston unveils measures to prevent another Utah," *Vancouver Sun*, 26 January 1971, 26; "B.C. cabinet takes reins on pollution," *Victoria Colonist*, 28 January 1971, 1; "Responsibility where it should be," *Victoria Colonist*, 30 January 1971, 4. Although created in late 1969, the committee did virtually nothing until it was "relaunched" in 1971 in response to the political controversy over the Utah Mining Company's Island Copper Mine. Minutes from ELUC from 1969 until Social Credit left office are held in University of Victoria Archives, AR-002 Ray Williston fonds, box 8 file 10.

resources exist."[127] Nor did the Environmental and Land Use Committee deflect criticism from the Pollution Control Branch. As the thousands of unpermitted air and water discharges in the province became apparent, opposition politicians, environmentalists and the press ripped government authorities for their ineffectiveness: "The people who are responsible for control and ultimate elimination of practices leading to pollution seem unable to produce very much in the way of reassurances that they are making progress."[128]

Amidst this climate of distrust and the politicization of pollution policy, the government launched a series of public inquiries into pollution control. The inquiries were intended to fulfil both technical and political purposes. On the one hand, they sought "technical" information on pollution problems for the development of numerical "objectives" for effluent quality. Rather than statutory standards, these objectives were intended as guidelines for the director of pollution control in issuing permits. As the large number of waste discharge sources in the province became apparent, the Pollution Control Branch quickly realized that its practice of site-specific evaluations of effluent quality and the environment's assimilative capacity was untenable.[129] As the newly appointed chief engineer noted in 1971, "The lack of [comprehensive discharge] standards meant each application had to be judged on its own merits starting from first principles — an ideal system where the number of applications for permit is limited, but very time-consuming and

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[127] Bruce Yemen, "Conflict abounds in B.C.'s anti-pollution approach," *Victoria Colonist*, 30 January 1971; Ian Street, "B.C. government not even trying to save environment," *Victoria Times*, 16 May 1971, 5; "First, clean the house," *Vancouver Sun*, 9 July 1971, 4; "The election and the environment," *Vancouver Province*, 16 August 1972, 4.

[128] "Tough policies the answer," *Victoria Colonist*, 16 May 1972, 4. See also Peter McNally, "Olympia ecology watchdogs don't just bark," *Victoria Times*, 19 January 1972, 1; "2,105 polluters unregistered," *Victoria Times*, 2 February 1972, 8; "MLA says pollution board 'issues licences to pollute'," *Vancouver Sun*, 15 February 1972. See also *Debates of the Legislative Assembly of British Columbia*, 29th Parliament, 3rd Session, 29 March 1972, 974-975.

[129] The branch listed over 2,200 liquid effluent discharges in the province, nearly half of which remained unregistered at the deadline, 31 December 1970. *Report of the Water Resources Service* (1972), 99. See also "Registration isn't termination," *Vancouver Province*, 11 January 1971, 4; "Deadline extended for polluters," *Vancouver Sun*, 16 November 1971, 11.

incompatible with the rapid growth and development taking place in the Province."[130] A lack of background information on existing environmental conditions made this system difficult to administer. In addition, some municipalities and industries complained that a lack of published standards made pollution control decisions seem arbitrary. The use of a public inquiry process to determine technical pollution control standards also indicated a strong political motivation. It allowed environmental agencies to give the impression that pollution control decisions were subject to scientific scrutiny and technical considerations, rather than political or industry influence.[131] Yet by allowing the general public and interest groups to present briefs and attend the hearings, the government also deflected criticisms that its processes were closed or inaccessible. Legitimation of pollution control policies appeared to be at least as important an outcome as any technical information the inquiries might elicit.[132]

During the 1970s, the Pollution Control Board held seven inquiries: two on forestry (1970, 1976) and two on mining (1973, 1978), as well as one on each of the petroleum and chemical industries (1972), food and beverage processing, agricultural and other miscellaneous industries (1972), and municipal wastes (1973). These inquiries were bookended by public hearings into domestic waste discharges into the Lower Fraser River in 1967 and 1980. Their basic format was established at the first forestry hearing in 1970, though it was refined at subsequent inquiries in response to problems or complaints. The director of pollution control chaired most of the inquiries

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[130] *Report of the Water Resources Service* (1972), 99.

[131] Alastair R. Lucas, "Legal Foundations for Public Participation"; Hays, *Beauty, Health, and Permanence*, 477-478.

[132] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-02 file 10, news release, "Pollution Control Inquiry Ordered for Forest Industry," 21 April 1970, Hon. Ray Williston, Minister of Lands, Forests and Water Resources; news release, "Poor Public Response to Pollution Control Inquiry Concerns Resource Minister," 24 June 1970, Hon. Ray Williston, Minister of Lands, Forests and Water Resources. In the latter release, Williston expresses surprise at the initially muted public response to the inquiry, given the "extent of public comment and criticism on the subject of pollution control, especially that in the forest industry."

and exercised considerable latitude to determine procedure. For each probe, an "expert" panel was selected to sit as a kind of commission of inquiry. This body typically included university biologists and engineers, a health professional, an economist, a member of the general public and a senior member of the Pollution Control Branch staff. The panel received written briefs from industry, government agencies and public interest groups, who then appeared before the panel during the hearing to answer questions. Their testimony and briefs were also subject to cross-examination by other registered participants and even to questions from the gallery. This quasi-judicial aspect of the hearings proved controversial, particularly for scientific experts forced to defend their opinions against hostile questioning.[133] While industry groups often appeared with legal counsel, public groups unfamiliar with legal procedures struggled with the limitations of formal cross-examination. The cross-examination process, however, provided a unique opportunity for members of the public and environmental groups to challenge industry assertions directly and to advance alternative environmental values. Later inquiries attempted to relax these rather formalized and antagonistic interactions and included other avenues for public input such as pre-inquiry meetings and inquiry sessions held in regional centres.

The inquiries generated considerable public and media coverage. For instance, among the 39 presenters at the first forestry inquiry were the United Church of Canada, the Federation of B.C. Naturalists, two pulp and paper workers' unions, the Provincial Council of Women, SPEC, the BCWF and a number of community groups. The hearings also included briefs from federal and provincial government environmental agencies and industry groups. Later inquiries attracted fewer briefs from environmental and community groups, partly due to their discouragement at the

[133] Derek Ellis, *Environments at Risk: Case histories of impact assessment* (Berlin: Springer-Verlag, 1989), 276.

technical constraints of the proceedings. Attendance at the public gallery was low, probably reflecting the highly technical nature of much of the testimony and the length of the inquiries. The director of pollution control repeatedly lamented the lack of public attendance, but media interest remained high.

From the first inquiry, the politically charged nature of pollution issues became apparent. In his opening statement to the first forest industry inquiry in 1970, Director of Pollution Control William Venables defined pollution as "a term with numerous scientific and social meanings as it may refer to conditions which may affect man's health or the life cycle of other animals and vegetation, or in social terms pollution refers to the adverse effects on man's sensibilities and his 'quality of life' and therefore [is] a factor in environmental quality."[134] In spite of this acknowledgment of social values, Venables sought to contain testimony and the discussion of briefs to technical considerations for waste disposal from forestry operations. Environmentalists and other groups contested this technical focus by asserting strong social, moral and aesthetic arguments against pollution. Their briefs reflected the wide-ranging environmental fears and issues that had coalesced around the concepts of pollution and explicitly rejected a solely technical approach to the problem. As the Sierra Club's "militant conservationist" brief to the forest inquiry asserted, "Pollution is a social problem and not a technological problem per se. Physical remedies provide only short-term solutions within a broader economic, social, political, moral and cultural context."[135] Others, including labour union briefs, challenged the notion that pollution was a necessary byproduct of economic "progress." The BCWF submission noted that "public opinion

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[134] *Public inquiry into waste management and environmental control in the forest products industry*, vol. 1, 4. Hereafter, these transcripts will be referred to as Forestry I.

[135] Ibid., vol. 8, 322.

has a great deal to do with the degree of pollution control that can be imposed successfully" and argued "the public in B.C. is more conscious of the need to maintain a quality environment than ever before."[136] Many briefs lamented the restriction to technical considerations, and attempted to link the need for tough pollution standards and restrictions to social and political concerns.

Nor did industry groups strictly conform to the inquiry's "technical" mandate. Briefs by the Council of Forest Industries (COFI, an industry lobby group), consulting engineer and former Director of Pollution Control Charles Keenan, and various forestry companies emphasized economic and social considerations. While the COFI brief subtly called for the panel to consider the costs to industry of improving environmental performance, Keenan's brief was a vehement "plea for sanity" in pollution issues. Keenan derided public pollution fears as hysterical, arguing that the technical problem of pollution control was lost in "a maze of unproductive hearings and emotional outbursts."[137] Venables expressed frustration at both industry and public groups for their failure to provide technical information. Exercised by the "irrelevant" and "erroneous" statements in many of the briefs, he nevertheless reflected at the inquiry's end that the process had revealed a broad spectrum of social attitudes towards pollution control.

Determined to keep testimony to technical concerns at the first mining inquiry in 1972, the inquiry panel excised the introductions to several briefs containing social and economic information in advance of the public hearing. Although industry briefs were edited along with union and environmentalist submissions, the effect was to delegitimize the inquiry process in the eyes of the public. Environmental groups reacted angrily; the BCWF pulled out of the process, and

[136] Ibid., vol. 1, 129; vol. 6, 244-46 contains the union assertion.

[137] Ibid., vol. 7, 166.

SPEC nearly did so. In a brief to the provincial Cabinet, the federation asserted that "the suspicion is strong that these inquiries are set up either to pander to the administrative convenience of the Pollution Control Branch, or to make a pretense of providing a vehicle for public opinion while so hedging and circumscribing the hearings with restrictive terms of reference that public opinion is actually being stifled."[138] At the close of the mining inquiry, Venables defended the brief-cutting, referring to the need to keep the inquiry "free from emotion or unsupported information..."[139] Subsequent inquiries appeared somewhat more tolerant of non-technical information, perhaps reflecting the negative publicity surrounding this episode. But Michael McPhee contends that declining attendance by public interest groups at later inquiries indicated their frustration at the failure of the inquiries to tackle the principles behind pollution control.[140] Similar frustrations also led some groups, such as the Sierra Club, to protest outside the public hearings.[141]

When they attempted to present technical information, public groups faced major obstacles. These groups often lacked appropriate expertise and faced barriers to obtaining technical information. In some cases, environmentalists and public groups enlisted technical experts to write briefs or appear on their behalf at inquiries. For instance, the B.C. Environment Council was represented by sanitary engineer Mary Ann Franson at the municipal waste hearing in 1973, while

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[138] BCWF *Newsletter,* April 1972, 1; Mark Wilson, "Pollution hearing 'filtered'," *Vancouver Province*, 4 March 1972, 26; Mark Wilson, "'Script' written for hearings, group charges," *Vancouver Province*, 7 March 1972, 7; "B.C. mining inquiry called a 'sham'," *Vancouver Sun*, 4 March 1972, 11.

[139] British Columbia, Pollution Control Branch, *Public inquiry into the matter of waste discharges from the mining, mine-milling and smelting industries* (Victoria: B.C. Research Council, 1972), 1378-1379. Hereafter, these transcripts will be referred to as Mining I.

[140] Michael McPhee, "Public Involvement in Setting and Enforcing Pollution Control Standards in British Columbia," in W. R. Derrick Sewell and Mary L. Barker, eds., *Water Problems and Policies* (Victoria: University of Victoria Department of Geography, 1980), 167.

[141] Ron Rose, "Pollution hearing shown dying fish," *Vancouver Sun*, 14 March 1972, 33; Bob Hunter, "Bob Hunter," *Vancouver Sun*, 15 March 1972, 43.

SPEC briefs regularly drew on the expertise of biologists and ecologists. Even some community groups could be quite resourceful; the Gambier Island Community Association submission to the second forestry inquiry in 1976 was aided by scientists at the Pacific Environment Institute and the federal Environmental Protection Service.[142] Many public submissions, however, were based more on fear and conviction than on scientific data because their authors simply lacked the technical ability to evaluate pollution problems. Undocumented assertions about "smells" and "dirty water" were easily dismissed by cross-examiners.[143] At the second mining inquiry in 1978, panel member and UBC mining engineer J.B. Evans ridiculed several presenters for their lack of technical sophistication.[144] In addition, environmentalists found industry submissions difficult to evaluate because of their sheer volume and the complexity of the technical information they contained.

Technical participation in the hearings was also limited by access to relevant information. At both the first forestry and mining inquiries, SPEC complained that the industry stonewalled its requests for technical information on waste discharges from mines and mills. Other groups complained that the Pollution Control Branch's own information on waste discharges was not accessible. "The right of the public to protest or complain, or even to obtain a reasonable amount of information on what is intended or is being done, is at present far too restricted," the Federation

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[142] British Columbia, Pollution Control Branch, *Public Inquiry into the Pollution Control Objectives for the Forest Products Inquiry of British Columbia. Proceedings* (Victoria: Ministry of Environment, 1976), vol. 5, exhibit 10. Hereafter, this inquiry will be referred to as Forestry II.

[143] See for example, the testimony of the Vernon branch of SPEC in Forestry I, vol.3, and that of the Regional District of East Kootenay in Mining I, vol. 3B, exhibit 4; and B.C. Wildlife Federation briefs in Forestry II (vol. 5, exhibit 12) and in British Columbia, Pollution Control Branch, *Public inquiry to review pollution control objectives for the mining, mine-milling and smelting industries of British Columbia* (Victoria: Ministry of Environment, 1978) [hereafter Mining II], vol. 4.

[144] Mining II, vol. 1, 143; vol. 4, 40-42, 289, 308.

of B.C. Naturalists asserted.[145] Frustrated in his attempts to gather information about mining effluent from the branch, environmentalist Patrick Moore charged that the government was shielding irresponsible mining companies and conducting a "guerilla war against the public interest."[146] Access to information from companies and the Pollution Control Branch was linked to the issue of accountability of government and industry. Many groups regarded the branch as a "secretive" organization that released information only grudgingly. "We find it incredible that information of this nature, dealing with the private use of the publicly owned water resources of this province is unavailable to the public."[147] These complaints were partly responsible for the opening of branch files, including environmental monitoring data, to the public.[148]

Industry submissions to the early 1970s inquiries regarded demands for environmental impact assessment and monitoring with hostility. Rather, they advocated pollution control be established on the basis of the characteristics of each waste stream, and that pollution standards be "technically feasible and economically tolerable."[149] Industry briefs hinted that costly pollution controls could close down operations in remote communities. Charles Keenan derided the use of biological and ecological indicators to determine pollution control requirements. In a curt exchange during his testimony at the first mining inquiry in 1972, Keenan claimed that engineers,

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[145] Cited in BCARS, GR-1114 Fish and Wildlife Branch, box 55 file 40-01-00 1970, Federation of B.C. Naturalists, "Presentation to the Pollution Control Inquiry into the Forest Products Industry," 11 August 1970, 4.

[146] Moira Farrow, "Mining pollution briefs cut," *Vancouver Sun*, 2 March 1972, 39. The problems of access to information at the first mining inquiry was the subject of a series of columns by fellow Greenpeace member Bob Hunter in the *Vancouver Sun*: 15 March 1972, 43; 24 March 1972, 29; 25 March 1972, 33.

[147] Forestry I, vol. 6, 248.

[148] Alastair R. Lucas, "Legal Foundations for Public Participation, 92 n.93. The Pollution Control Branch initially allowed public access to permits, but not to monitoring or enforcement data. However, at the municipal inquiry, Venables announced that a databank of water quality monitoring results would be made publicly accessible. British Columbia, Pollution Control Branch, *Public inquiry into municipal type waste discharges* (Victoria: Water Resources Service, 1973), vol. 1, 4.

[149] Mining Association of B.C. brief, Mining I, vol. 3A.

rather than biologists, possessed the relevant expertise to determine pollution control standards and methods. His cross-examiner, environmentalist Gerry Culhane, shot back: "if we have so much knowledge from engineers how come we have environmental problems?"[150]

The debates over technical knowledge revealed the difficulty of eliciting scientific information from an adversarial public hearing process. As marine biologist Derek Ellis has pointed out, experts who appeared on the stand at the hearings felt intimidated by cross-examiners. On the one hand, they feared being discredited by close questioning; on the other hand, they risked simplifying complex scientific problems by delivering simplified answers to questions.[151] At several inquiries, scientists from federal and provincial environmental protection agencies sparred with industry experts over appropriate measures of environmental impacts. Industry representatives dissected environmentalists' often poorly documented technical evidence. Even the expert panels conducting the inquiry were subject to criticism. At the second mining inquiry in 1978, controversy flared when Moore, then-president of the Greenpeace Foundation, accused the head of the inquiry's expert panel, J.B. Evans, of being "an apologist for the mining industry." Evans, a UBC mining engineer, worked as a consultant to industry, including serving as the head of the environmental monitoring panel for the controversial Island Copper Mine on Vancouver Island.[152]

The most animated debates surrounded the principle and practice of using the environment's assimilative capacity to dispose of wastes. Domestic and industrial waste dischargers strenuously advocated for the development of site-specific pollution control

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[150] Mining I, 747.

[151] Ellis, *Environments at Risk*, 276.

[152] "Pollution panel president 'biased'," *Vancouver Sun*, 17 January 1978, A19.

objectives for each waste discharge based on the assimilative capacity of the receiving environment. Their briefs argued that assimilative capacity was a resource that should be made available for use. The Mining Association of B.C. maintained industry had the "the right to use the assimilative capacity" so long as it did not abuse the environment or harm other users.[153] This sentiment was echoed at the 1973 municipal inquiry by the Greater Vancouver Regional District, which contended that assimilative capacity was the most significant factor in planning the disposal or treatment of domestic wastes. "One cannot talk in simplistic terms when discussing the amount of treatment necessary in any area. The size and use of the receiving waters must be considered when selecting the various methods of dealing with severe pollutants," the GVRD brief asserted. These groups rejected the availability of proven waste treatment technology as a basis for standards. They argued that forcing industry and municipalities to adopt the most current technology, regardless of cost or environmental need, was irrational. Somewhat self-servingly, they noted that basing standards on technology did not guarantee protection for particularly environmentally sensitive areas. Industry briefs also noted that the hinterland location of most mining and forestry operations meant that the downstream impacts of waste disposal were of little consequence for other uses of water resources. Straying from the technical aspect of standard-setting, industry groups added that the costs of "unnecessary" pollution control would place an unreasonable burden on industry. "[T]he conversion of natural resources results in the distribution of economic and social benefits to the community at large. It follows that the economic and social costs of environmental damage should be viewed in relation to these benefits rather than in

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[153] Mining I, vol. 3, 12.

isolation," a Council of Forest Industries brief noted.[154] In other words, the community must absorb some of the environmental "costs" of industrial activity in exchange for its economic benefits.

Environmentalists and government environmental agencies rejected assimilative capacity as the basis of pollution control. These groups regarded arguments for assimilative capacity with suspicion, since they seemed to justify the long-standing practice of untreated waste dumping. Rejecting site-specific discharge assessments, these groups advocated enforceable province-wide standards based on technical feasibility. "We do not subscribe to the theory that the solution to pollution is dilution," Patrick Moore told the first mining inquiry.[155] They also cited scientific uncertainty as a justification for strict, precautionary waste treatment standards. "At present (and in the immediately foreseeable future), the complex nature of natural plant and animal associations makes it impossible to predict such absorptive capacity with anything like certainty," argued ecologist Robin Harger in the SPEC brief to the first forest inquiry in 1970.[156] The ambitious goal of the new federal Department of Environment was "to keep all pollutants, insofar as possible, inside the factory fence."[157] Both federal fisheries and environmental officials and provincial fish and wildlife officials appealed for the development of both effluent quality and receiving water guidelines. Industry should be made responsible for its own wastes, they argued. Environmental advocates sought to shift the burden of proof for environmental effects back onto industry. Many briefs argued that ecological studies and environmental impact assessments should be carried out before allowing industrial developments. In its brief to the first mining inquiry, the Fish and

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[154] Forestry II, vol. 4 exhibit 1, 31-32.

[155] Mining I, 1249.

[156] Forestry I, vol. 2, 73.

[157] Forestry I, 191.

Wildlife Branch argued that industry should bear the cost of these surveys and monitoring requirements since, "in many instances, the necessity of obtaining such information has placed a significant burden on the manpower and funds of various agencies of government."[158] This plea reflected the strain placed on the Fish and Wildlife Branch of having to evaluate thousands of water-rights and pollution-control applications annually.

The objectives issued by the Pollution Control Branch in the wake of the inquiries proved controversial. They contained both numerical effluent-quality guidelines, intended as minimum standards for waste discharges, and largely descriptive receiving water objectives. In its preamble to the municipal waste objectives, the branch noted that it considered assimilative capacity "a renewable resource to be conserved," but noted that the "use of such assimilative capacity of aquatic receiving areas may already have gone beyond acceptable limits for certain specific receiving waters within the province."[159] For each pollution source (forestry, mining, municipalities, etc.), the branch set effluent quality guidelines at three levels (A, B, or C), reflecting the different ages, effluent quality and receiving environments of various plants. In spite of these attempts to establish "dynamic" and flexible standards, waste dischargers reacted negatively when they were first issued. When draft forest industry pollution objectives were leaked to the press in 1971, the Council of Forest Industries suggested some pulp mills might be forced to close due to the cost of meeting the standards. "These are the mills which were built under non-existent pollution control laws," the council complained.[160] Industry objections led to

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[158] Mining I, Appendix A, exhibit 7. See also Fish and Wildlife Branch brief to Forestry I, vol. 1.

[159] British Columbia, Water Resources Service, *Pollution Control Objectives for Municipal Type Waste Discharges in British Columbia* (Victoria: Department of Lands, Forests, and Water Resources, 1975), 10

[160] "Pulp mill closure forecast if pollution code adopted," *Vancouver Sun*, 25 June 1971, 1; Mark Wilson, "Pollution guidelines still hazy," *Vancouver Province*, 2 June 1971, 9.

the revision and relaxation of the guidelines when finally published in September 1971.[161] The Mining Association of B.C. was so appalled at the mining industry objectives that it appealed the objectives first to the Pollution Control Board, then the provincial Cabinet.[162] Their appeal was supported by a member of the inquiry panel, U.B.C. resource economic Peter Pearse, who dissented from the panel recommendations. Pearse contended that province-wide standards were economically and technically irrational: "Pollution control requires attention, in the first instance, to the environment — its assimilative capacity, and the quality of air and water desired."[163] The MABC argued that the "objectives" constituted de facto standards that would cripple the industry if enforced. The appeals were dismissed, although some of the objectives were amended.

Environmentalists were also displeased with the pollution control objectives. Many regarded the site-specific application of the objectives as "business as usual." In reaction to the first forest industry objectives, the B.C. Wildlife Federation decried the lack of a specific pollution control strategy, contending that it suspected the major purpose of the objectives was to circumvent future opposition to permits applications.[164] Environmental advocates acknowledged environmental variability, but feared the continued practices of site-by-site negotiation of pollution controls would perpetuate the exemptions and extensions granted to dirty industries in the past. They also cited the board's poor record of enforcing the provisions of pollution permits as a

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[161] Mark Wilson, "B.C. pollution branch eases up in mill code," *Vancouver Province*, 9 September 1971, 23.

[162] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-01, file 8 Pollution Control Board Summary Record, 25 May 1973, 14 August 1973, and file 5, Summary Record 12 February 1974. On the controversy over the objectives and the failed Cabinet appeal, see Keenan, *Environmental Anarchy*, 107-111.

[163] "Pollution advisor disagrees with report," *Vancouver Sun*, 1 March 1973, 7.

[164] "Pulp mill closure forecast if pollution code adopted"; "Pulp industry pollution guidelines condemned," *Vancouver Province*, 24 June 1971, 19; see also BCARS, GR-1027 Fish and Wildlife Branch, box 86 file 4, BCWF, "Submission to the Executive Council, Government of the Province of British Columbia," 9 December 1971, 29-31.

rationale for clear, strict standards.

From a technical standpoint, the inquiries held during the 1970s appeared to achieve their goals. From the 1970s onward, the objectives formed the basis for evaluating pollution control permits, negotiating compliance and upgrading schedules, and occasionally prosecuting violators. The chairman of the Pollution Control Board in the late 1970s, C.J.G. Mackenzie, claimed the public inquiries had "produced a series of guidelines that have been consulted, copied and quoted widely throughout North America and the world."[165] The development of numerical objectives lent scientific authority to politically embattled pollution control agencies. As historian Ted Porter has noted, bureaucratic decision-makers rely on such numbers for their appearance of impartiality. "A decision made by the numbers (or by explicit rules of some other sort) has at least the appearance of being fair and impersonal. Scientific objectivity thus provides an answer to a moral demand for impartiality and fairness. Quantification is a way of making decisions without seeming to decide. Objectivity lends authority to officials who have very little of their own."[166] At the same time, the inquiries and objectives sought to provide certainty for industrial concerns that had grown increasingly anxious about overlapping environmental jurisdictions, the proliferation of regulations and their poor public image as rampant polluters.

The political achievements of the inquiries remained less obvious. They were intended, at least in part, to legitimize government pollution policy by providing public consultation opportunities. The inquiries resulted in pollution control objectives the government could point to as concrete evidence of their attack on pollution problems. But as "theatres of regulation," the

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[165] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-02 file 4, C. J. G. Mackenzie to Stephen Rogers, 2 November, 1981.

[166] Theodore M. Porter, *Trust in Numbers: The pursuit of objectivity in science and public life* (Princeton, Princeton University Press, 1995), 8.

inquiries, quite unintentionally, also provided a forum for social and political debate over the use of nature. Environmentalists in particular regarded the inquiries as a battleground for control of public resources and the defence of environmental quality. However, the format and mandate of the inquiries also constrained environmentalist influence on pollution control policy. As one observer has commented, the inquiries "established the futility of public input at technical hearings: the public had neither the ready access to essential data, nor (some felt) the critical acumen to assess them in any event."[167] Even when environmentalists or community groups introduced technical information at the B.C. inquiries, the cut and thrust of cross-examination proved a difficult challenge. The technical mandate forced environmentalists to couch criticisms in scientific, usually ecological terms, while more general concerns about policy formation, public access to information and the principles of pollution were outside formal consideration. Historian Samuel Hays has argued that "administrators recognized the critical role of numbers both from a management and a political point of view," thus they typically attempt to constrain the influences on their formulation.[168] The resolutely technical focus of the pollution control inquiries acted to limit both the terms of debate and the public accessibility to the process.

These very limitations revealed a fundamental paradox in the inquiry process. Nominally set up to consider and evaluate scientific and technical information, the process of subjecting briefs to oral cross-examination revealed environmental science to be a messy, contested realm. Scientists and technical experts found it difficult to articulate scientific information effectively, and often resented attempts to discredit them by hostile cross-examiners.[169] Experts felt pressured to

[167] A. Peter Hertzberg, *Mining and Pollution in B.C.* (Victoria: University of Victoria, 1982), 22.

[168] Hays, *Beauty, Health, and Permanence,* 477.

[169] Ellis, *Environments at Risk.*

deliver clear-cut answers to technical questions on the stand. When they could not, their answers were deferred to later written submissions, which effectively removed them from public scrutiny. It also remained unclear whether environmentalist concerns were incorporated into the resulting pollution control objectives. Political demands for stricter controls and better enforcement probably contributed to stepped-up permit enforcement by pollution control authorities. But, in spite of the reservations of industry groups, the pollution control objectives issued by the Pollution Control Board continued to rest on the concept of assimilative capacity and balanced site-specific considerations with province-wide water quality guidelines.

After the second mining inquiry in 1978, no further industry-wide inquiries were held. A final public hearing into environmental conditions and pollution control problems in the Lower Fraser took place in 1980, just as the Pollution Control Board was being legislated out of existence, to be replaced by the Environmental Appeal Board.[170] The reason for abandoning the inquiries is unclear. Outgoing board chairman C.J.G. Mackenzie reflected that the board inquiries had "served the province well": "Within two years of the formation of the Pollution Control Board, consideration of contentious matters about pollution was changed from rowdy protests to sometimes heated but structured and rational debate," he wrote to the Minister of Environment, Stephen Rogers, in 1981. Mackenzie contended that the new Environmental Appeal Board would further centralize environmental standard-setting, to the detriment of the Pollution Control Board's historical "flexible" approach.[171] The end of the inquiries — and the board — closed a significant chapter in the history of pollution control in B.C.

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[170] This inquiry is discussed in Chapter 2, *supra*.

[171] BCARS, Accession no. 88-0408 Environmental Appeal Board, box 79-02 file 4, C. J. G. Mackenzie to Stephen Rogers, 2 November, 1981.

Conclusion

Pollution politics in B.C. mirrored trends in environmental issues across North America, while reflecting the province's distinct local problems and political context. As Samuel Hays asserts, "The years between 1965 and 1972 were a well-defined phase of environmental history in terms of issues that emphasized the reaction against the adverse effects of industrial growth as distinct from the earlier emphasis on natural-environmental objectives."[172] Proposed pollution control solutions often combined the search for technological solutions to environmental problems with denunciations of modern industrial society for the creation of these problems. But while Hays, Joel Tarr, and other scholars have usefully outlined major trends in pollution control and politics, it often remains unclear in their accounts how these trends played out at smaller scales. As recent studies by historians Douglas Stradling and Scott Dewey have suggested, the study of local pollution controversies provide a useful lens for capturing the links between larger trends in environmental politics and the complexity of local efforts to protect the environment..[173] This account of the politics of pollution in B.C. makes concrete the connections between changing environmental values, local environmental problems and the rise of environmentalism as a social movement. Although environmental politics in B.C. is closely associated with wilderness preservation efforts and the anti-nuclear and anti-whaling campaigns of Greenpeace, pollution was a catalytic issue for many of the movement's founders. The history of pollution politics in British Columbia also speaks to the distinct political, cultural and environmental conditions that inflected environmental politics in Canada.

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[172] Hays, *Beauty, Health, and Permanence*, 55.

[173] Dewey, *Don't Breathe the Air*; Stradling, *Smokestacks and Progressives*.

Mounting concern about pollution in B.C. reached a crescendo in the period between 1968 and 1972. Long-standing frustration amongst sportsmen and commercial fishermen over the weakness of provincial pollution controls grew into general anxiety about the perceived degradation of the province's environment. These concerns coalesced around the problem of water pollution from industrial and domestic waste disposal. In the late 1960s, water pollution in B.C. was widely regarded as nearing a "crisis" state. This perception was driven in part by the pervasive apocalyptic rhetoric surrounding the rise of environmentalism as a mass social movement. But pollution was also compelling to British Columbians because pollution is an environmental issue most keenly felt and understood at the local level. Polluted beaches and contaminated fishing streams represented the violation of beloved landscapes. It was these local, even parochial concerns that translated into province-wide environmental mobilization and appeals to provincial authorities to abate pollution.

The intensity of pollution politics in B.C. speaks to how perceptions and values shape supposedly "technical" issues such as pollution control. Environmentalists rejected the assurances provided by municipalities and industry that the "assimilative capacity" of the environment could safely absorb their wastes. They disputed the notion that the waste-disposal function of the environment constituted a natural resource to be managed and conserved. Rather, they advanced a view of clean water as an environmental amenity that required protection from pollution. Environmentalists cast doubt on the ability of engineers and other experts to safely measure the environmental impact of waste disposal, and highlighted the scientific uncertainty around the long-term effects of pollutants. By asserting an ecological perspective on pollution control, they shifted the terms of debate over waste disposal and forced industry and government to incorporate biological and ecological measures into their environmental assessments. Aside from the technical questions surrounding water safety and environmental quality, moral and aesthetic arguments were also mobilized to portray pollution as an abuse of nature. This admixture of political, technical and moral discourse surrounding pollution was illustrated by a union brief to the forestry inquiry, which declared that "our members do not accept the philosophy that pollution is the price of progress. We believe that pollution is a technical and social evil that can be eradicated."[174]

The public inquiries dramatized these competing environmental values. In many ways, the context for these inquiries was set by the battles over waste disposal and pollution control documented in earlier chapters of this dissertation. Disputes over sewerage planning, mine tailings disposal and pulp and paper effluent around the province influenced the widespread public perception that government and industry were insensitive to public concerns. The political controversy surrounding the government's failure to allow public input into pollution control decisions contributed to the creation of the inquiry process as a forum for public consultation. It is unclear, however, that the resulting pollution policies adequately incorporated the environmental values expressed in community and environmentalist testimony before the hearings. Rather than depoliticize pollution control, the inquiries had the effect of confirming for many environmentalists the resolutely technical focus of the Pollution Control Branch.

Nevertheless, the burst of public concern and activism around pollution issues between about 1968 and 1973 decisively reshaped environmental governance in B.C. The creation of the Environment and Land Use Committee in 1971 signalled that large-scale development proposals would receive more oversight than in the past. Controversies over individual pollution problems, such as the Island Copper Mine and the Port Alice pulp mill, also helped force the adoption in

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[174] Forestry I, vol. 6, 246.

B.C. of environmental assessment processes. Through the 1970s, provincial environmental management authorities were refined and extended, including the creation of a Ministry of Environment in 1975. These changes reflected developments in environmental management and governance practices adopted around the continent in the 1970s. But it is clear from this study that these reforms were adopted reluctantly in B.C. and usually in direct response to public pressure.

The politicization of pollution control was an early expression of the battles for control over natural resources management that have characterized B.C. politics since the 1960s. As Jeremy Wilson has argued about the wilderness movement, the efforts of environmentalists were in large part an attempt to exert democratic authority over resource exploitation. Environmentalists, he contends, "forced government and industry to defend assumptions and practices that, for far too long, went unchallenged."[175] Pollution control debates emphasized the lack of public accountability for waste disposal policies and practices. Environmental issues, in this sense, were expressions of political aspirations and concerns of many in B.C. society who increasingly regarded the ideology of progress and development with suspicion. The pollution of the environment mirrored the pollution of politics by cozy (and shady) business-government dealings and the rhetoric of resource exploitation. For many environmentalists, pollution provided a vehicle for the assertion of social values and public accountability in environmental affairs.

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[175] Wilson, *Talk and Log*, xxix-xxx.

Conclusion
"Placing" pollution in B.C. history

For the first three-quarters or so of the twentieth century, the British Columbia environment was intensively transformed by human action. The spread of urban settlements, the development of long-distance transportation systems and the expansion of industrial resource-extractive activity resulted in profound environmental changes. Among the effects of these activities was water pollution, which may be defined as the unwanted or detrimental alteration of natural aquatic environments. British Columbians polluted their waters most extensively through the discharge of urban wastes, the disposal of waste rock, tailings and effluent from mining operations, and the discharge of chemical and organic effluent from pulp and paper mills. The environmental changes created by these activities ranged from small-scale, local and temporary stream pollution, to episodes of extreme contamination that resulted in fish kills or threats to public health, to the long-term degradation of water quality. These environmental impacts produced conflicts between the requirements of waste disposal and other water uses, such as recreation, fisheries or drinking water. Social conflicts over the effects and control of pollution provide insight into the divergent environmental values held by different groups in B.C. society. They also shed light on the contested process of developing environmental protection regulations, a process that mirrored developments elsewhere in Canada and North America, but which in B.C. reflected particular social conditions and environmental problems.

Environmental pollution is often regarded as the product of chance, ignorance or malice. Indeed accidental spills, unintended consequences or careless waste disposal are often causes of environmental damage, and examples of these problems abounded in B.C. But the foregoing account takes as its focus not merely pollution, but pollution *control*. Attempts to regulate, manage or control waste discharges reposition pollution as the site of social and political debates over the appropriate use of nature and contested perceptions of environmental problems. As one technical definition of pollution has noted, "Because pollution is judged on the basis of degradative changes, there is a strongly anthropocentric bias to its determination. In other words, humans decide whether pollution is occurring and how bad it is."[1] Pollution has a history and a geography because definitions of pollution embrace political economy, social relations and cultural conceptions of the environment, as well as physical transformations of environmental conditions.

If pollution is in large part anthropocentrically defined, a major component of this definition comes from science and technical expertise. Knowledge of pollution has been historically shaped by debates over appropriate measures of environmental change, technological innovations in detecting these changes and the authority of science to recommend particular solutions. As this study shows, efforts to document pollution and recommend policies for its abatement emerged in close relation to the political and social context of environmental regulation. Diverse technical communities have attempted to characterize pollution problems based on their particular expertise and perspective, from engineers to health professionals to fisheries scientists and ecologists. These perspectives were mobilized in political debates by different elements of society to justify their particular prescriptions for pollution control. These contesting scientific perspectives had a history as well. As health concerns surrounding water pollution faded from immediate concern early in the century, for instance, engineers became increasingly powerful in planning waste disposal and pollution control systems. For much of the century, engineers enjoyed high public confidence in their ability to manage the environment. However, the engineering

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[1] Bill Freeman, "Pollution," in William P. Cunningham et. al., eds., *The Environmental Encyclopedia* (Detroit: Gale Research, 1994), 640.

approach was increasingly challenged by life scientists, particularly ecologists, as the prestige and authority of their disciplines grew, and as public distrust of established expertise increased.

Changing social values and perceptions of environmental hazards played an important role in defining pollution in B.C. Particularly early in the century, public fears of pollution centred around health fears associated with domestic sewage pollution of beaches and public water supplies. Few voices were raised against the industrial use of waterways as sinks for waste. Municipal planners, industrial concerns and government pollution control authorities regarded the management of waste and prevention of pollution as a problem of resource use. For these officials, the environment's assimilative capacity was subject to rational exploitation and distribution, so long as waste disposal did not impair other recognized "uses" of water. However, the rising public anxiety over chemical pollution stoked concerns about large-scale environmental contamination from industry and from toxic chemicals in the domestic waste stream. In addition, the desire for environmental amenities, both in urban settings and beyond, heightened concerns about the threat posed to ecological systems by pollution. These shifting concerns reflected the changing environmental values of a provincial population that in the 1960s began to count the cost of the unprecedented prosperity acquired from the industrial exploitation of nature. Pollution concerns were central to the emergence of the environmental movement in B.C., echoing the importance of this issue in perceptions of the "environmental crisis" many thought North American was plunging into at the end of the 1960s.

Pollution debates were critically shaped by legal and political arrangements for environmental governance in B.C. Pollution control illustrates important facets of the rise of the regulatory state in twentieth-century Canada and its extension of surveillance and control over nature. The constitutional division of powers in Canada granted control over natural resources, including water, to the provinces, with the important exception of commercial fisheries. Legal regimes governing water use and protection developed by the provincial government in the early twentieth century influenced the administration of waste disposal: the pollution permit system developed by the Pollution Control Board closely resembled the essentially distributive system of water rights administration in the province. This practice granted companies free access to a portion of the assimilative capacity of particular water bodies. Federal fisheries regulation, however, provided an important countervailing limitation on the use of assimilative capacity through its statutory power to protect fish life. This mandate empowered both provincial fish and game and federal fish protection officials to evaluate and limit waste discharges long before the creation of specific pollution control legislation. In the absence of other anti-pollution legislation, fish protection became a proxy for environmental protection, and government fisheries departments became de facto environmental protection agencies. These agencies had a profound impact on pollution regulation, including enforcement activities and the development of scientific expertise in pollution problems. The scope of their activities, however, was limited by political considerations, jurisdictional overlap and confusion and the limits to pollution prevention and enforcement under the federal Fisheries Act. The 1970 revisions of the Fisheries Act and the creation of the Environmental Protection Service attempted to rectify these problems, but pollution control remained mired in jurisdictional politics.

Regarding pollution as a problem of environmental governance provides a fruitful perspective on how pollution problems arise and are confronted. Water quality may be regarded as a kind of commons, since until recently water itself has been regarded as common property. As historian E.P. Thompson has described, struggles over the control and enclosure of common property resources were, at root, struggles for the control of space and nature.[2] Beginning in the nineteenth century, water was "enclosed" by state systems of water rights administration around the world, including in B.C. These systems were by and large aimed at the allocation of use rights to resources among private users for economic purposes. The resource that the Pollution Control Board administered was "assimilative capacity," which was allocated to industrial and domestic waste dischargers based on technical evaluations of the ability of water to dilute and disperse wastes. Though this system was intended to maintain water quality at a certain level, private and institutional users acquired what was essentially a prescriptive right to exploit the biophysical processes of water for waste disposal. Even when this practice resulted in pollution, these rights were rarely revoked.

Common property notions of water quality were reasserted by opponents of industrial pollution. Fisheries advocates regarded water quality as essential to their use of public resources. Fish, after all, were common property resources which required the use of the aquatic commons for their survival and propagation. Environmental amenities and public health, similarly, were contingent upon the protection of water quality for the common good. Further, environmentalists conceived of aquatic systems as a kind of ecological commons, which humans shared with other forms of life. Allowing private users to threaten or degrade water quality was, at base, a violation of the commons. Public rights, or even the rights of other species, were transgressed in the enclosure and privatization of water quality through "licenses to pollute." Although common-property concepts were rarely invoked explicitly, opposition to pollution clearly reflected the values of the commons, including demands for greater public accountability in pollution control

[2] E. P. Thompson, "Custom, Law and Common Right," chap. in *Customs in Common* (London: Merlin Press, 1991).

administration. On the other hand, some critics of the pollution control regime argued that an effluent fee system of secure, private rights in assimilative capacity was necessary to avoid the uncertainty and conflict around the use of the environment for waste disposal.[3] The history of pollution control, then, sheds important light on the struggle for democratic accountability and the public control of common natural resources.

Geographical conditions and environmental change were crucial elements in the development of pollution control. Scientists and engineers attempting to grapple with pollution problems confronted complex environmental conditions that often resisted easy characterization. Their attempts to "simplify" complex and dynamic environmental conditions to make them more amenable to management failed to account for unintended consequence or unanticipated environmental changes. Time and again in B.C., the long-term environmental consequences of the use of aquatic systems as a sink for wastes indicated the limits of this view. The environment was a dynamic, variable and unpredictable force that resisted simplification or unproblematic enrolment into waste disposal systems. In addition, particular local environmental conditions — such as the presence in B.C. of a valuable commercial fishery for anadromous salmon — influenced the jurisdictional, scientific and political conflicts surrounding pollution abatement. It is frightening to speculate what the condition of the Fraser River would be today in the absence of salmon: a dammed and contaminated canal resembling Europe's Rhine or the Columbia, instead of a (mostly) wild and free-running river.

Pollution problems were critically influenced by questions of place, scale and location. These problems were shaped by ecological and social processes operating at at a variety of

[3] Richard S. Campbell, Peter Pearse and Anthony Scott, "Water Allocation in British Columbia: An economic assessment of public policy," *U.B.C. Law Review* 7 (1972), 292. These authors suggest that "the property value of discharge licenses would respond to the demand for scarce assimilative capacity just as the value of rights to water and land responds to demands for them."

scales, from the local to the regional, interregional, continental and global. Other geographical factors included the jurisdictional questions surrounding environmental regulation; the location and scale of pollution sources such as cities and industry; the impact of national and international trends and ideas in pollution control; and the particular places and environments in which pollution problems were encountered. As the many cases of pollution traced in this dissertation reveal, both the effects and the perception of pollution were related to the scale and location of a particular waste site. For instance, while oceans were considered by many as almost limitless waste sinks, the development of the pulp and paper industry in the Fraser watershed presented what many regarded as a large-scale threat to salmon that used the river as a pathway to spawning sites. The measurement of assimilative capacity, or the dilution factor offered by the environment, was in many ways a measurement of scale, since the environmental impact of the waste directly related to the amount (and characteristics) of the discharge and the volume (and characteristics) of the receiving waters. The oceanographic classification system developed in the 1950s to plan and evaluate pulp mill sites also reflected how the geographical problems of scale and location shaped pollution control decisions. Pollution concerns also indicated the salience of scale to environmental governance. As the example of sewerage planning in Vancouver shows, environmental problems often transgressed political boundaries, prompting a rescaling of environmental management. The politics of scale and jurisdiction explored in this thesis indicate that environmental governance is a product of complex historical interactions between political authorities and local environmental conditions.

The story of pollution control is the story of the transformation of nature and society in the twentieth century under the influence of industrial capital. In this period, B.C. underwent a rapid transition from a sparsely settled frontier to a complex modern industrial society. It did so, like other modernizing societies, based on the transformation of public nature into private commodities through industrial resource development. This market-driven process was facilitated and promoted by legal regimes and patterns of resource ownership and land tenure aimed at the maximum exploitation of resources. This system left nature "incorporated" into economic systems, with little regard for the environmental services it provided.[4] This practice, and the environmental problems it created, became the target of growing public sentiment against the abuse of nature. After the Second World War, changing public environmental values mingled with outrage over examples of environmental damage to generate a backlash against government and industry. Public sentiment around North America increasingly identified industrial society and technology as the culprit in environmental pollution. Environmentalist ideas and forms of protest circulated around North America and had a profound impact on local environmental conflicts around the continent. These trends affected the politics of pollution in British Columbia, which shared many of the same developments and problems as other provinces and states.

This study suggests, however, that place and environment mattered in the history of pollution control in B.C. The environmental challenges of the province's landscape and waterways influenced how pollution control technologies, science and ideas developed elsewhere were applied in B.C. In many parts of the province, ample waters and the absence of downstream users meant that dilution seemed adequate to meet waste disposal needs for both cities and industry. The peculiar economic and geographical conditions of the province's remotely located industries influenced attitudes and policies towards waste disposal. The intense pollution politics in B.C. were shaped by the particular politics of development in the province, as well as by the kind of

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[4] Ted Steinberg stresses the role of capital in transforming the natural landscape of North America in Theodore Steinberg, *Nature Incorporated: Industrialization and the waters of New England* (Cambridge: Cambridge University Press, 1991); Theodore Steinberg, *Down to Earth: Nature's role in American history* (New York: Oxford University Press, 2002).

Arcadian environmental imagination of many who came to live here.[5] As "an indicator of underlying disagreements about societal goals,"[6] pollution debates pointed to larger social and political changes in the province, as British Columbians reckoned with the environmental and social effects of the province's rapid urbanization and industrialization in the twentieth century. This was perhaps most notable in the dramatic emergence of a vibrant environmental movement in the late 1960s that challenged provincial resource-development priorities.

The questions raised in this dissertation about the politics and priorities of water quality management are not merely of historical interest. Contemporary struggles over pollution reflect similar tensions over environmental governance, the science and technology of pollution control, and conflicts over environmental values. The contested development of environmental governance in B.C. produced a system geared towards the control of "point-source" discharges and the direct measurement and regulation of harmful substances in the environment. In the 1990s, this approach was changed to incorporate an emphasis on sustainable water management, as the provincial government passed new laws and regulations aimed at comprehensive planning and protection for water. The guiding principle behind this new approach was stewardship, the notion that industrial development and human settlements must account for the protection of natural systems in their use of water resources.[7] Since the turn of the twenty-first century, however, the politics of deregulation, privatization and globalization have begun to undermine moves towards sustainable

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[5] The paradox of the British Columbian identity, based in the rugged beauty of the land yet viciously exploitative of nature, is noted in Barman, *The West beyond the West*, 342. See also Alan Pritchard, "West of the Great Divide: Man and nature in the literature of British Columbia," *Canadian Literature* 102 (August 1984), 36-53.

[6] Neil Evernden, "Pollution," in *Conservation and Environmentalism: An encyclopaedia*, Robert Paehlke, ed. (New York: Garland, 1995), 525.

[7] Smith, "Water Resources," 75-78. See also British Columbia, Ministry of Environment, Lands and Parks, *Stewardship of the Water of British Columbia* 8 vols. (Victoria: MELP, 1993), especially vol. 7, "Water Quality Management" and vol. 8, "Water Conservation." This document announced a shift in policy to encompass the consideration of "ecosystem objectives" in management.

resource management. Late in 2003, the B.C. government passed a new Waste Management Act that aimed to "de-permit" thousands of waste discharges, submitting them instead to self-regulated "codes of practice" or eliminating regulations altogether. These changes were part of a larger project to relax so-called "command-and-control" regimes of environmental governance and create a system of "results-based" management that allowed private enterprise greater freedom to regulate its own activities. The West Coast Environmental Law Foundation has criticized the new act's "risk management" approach to pollution, contending that it reduced government enforcement capabilities, public accountability and access to information on exactly what was being emitted to the environment, where and how much.[8] By creating new categories of risk and pollution, the government has sought to redefine waste-disposal activities in terms reminiscent of the doctrine of assimilative capacity. These developments indicate that changes to environment governance and the politics of pollution continue to shape efforts to protect and defend water quality and the public interest in B.C.

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[8] On the Waste Management Act review, see Charlie Smith, "B.C.'s pollution law reviewed," *Georgia Strait*, 26 September – 3 October 2002, 13; Chris Rolfe, "Response to the Waste Management Act Review's Discussion Paper on Authorization of Waste Discharge" (Vancouver: WCEL, 2002); and "Bill 57 – Environmental Management Act 2003. Deregulating British Columbia's main pollution law," West Coast Environmental Law Deregulation Backgrounder, accessed online at www.wcel.org, June 2003. See also Robin Junger, *Waste Management Act Review, Discussion Paper #1: Authorization of waste discharge* (Victoria: Ministry of Water, Land and Air Protection, 2002); Deborah K. Lovett, Waste Management Act Review, *Discussion Paper #2: Appeals under the Waste Management Act* (Victoria: Ministry of Water, Land and Air Protection, 2002).

Bibliography

Archival sources

Documentary information on pollution is extremely scattered and difficult to come by. Many gaps remain in the historical record of pollution regulation, as well as in the specific case studies included in this dissertation. Much information on permits and monitoring probably still resides in regional offices of the current Ministry of Water, Land and Air Protection, particularly in cases where the permittee is still active. Arranging access to these historical files proved impractical, especially given the wide geographical and historical sweep of my study. Contemporary government reports, as well as information gleaned from various other locations, provided ample insight into the machinery of permit issuance and pollution policy.

My search was aided by several archivists and librarians, including Andrew Fabro at Environment Canada's Pacific and Yukon Regional Branch, Teri Tarita of the Pacific Salmon Commission, George Brandak at the University of British Columbia's Special Collections Division, Jane Turner at the University of Victoria Archives, and Ed Lai of the Pollution Prevention Division of the B.C. Ministry of Water, Land, and Air Protection. Ivan Bulic of SPEC arranged access to the SPEC library and archive. Background information and useful tips were provided by Lois Boyce, Ben Marr and Anthony Dorcey.

The following lists holdings in both public and private archives consulted during this research. By and large, I reviewed only those boxes and files that contained information on pollution and environmental protection. Specific boxes, files and documents are referred to in the footnotes.

British Columbia Archives and Records Service, Victoria, B.C.
- Accession no. 88-0407 Environmental Appeal Board
- Accession no. 88-0408 Environmental Appeal Board
- GR-0880 Ministry of Environment. Power and Special Projects Division.
- GR-1159 Pollution Control Board (Port Alice hearing)
- GR-0132 Department of Health and Welfare, Provincial Health Officer and Department of Public Health Engineering files
- GR-1027 Fish and Game Branch
- GR-1109 Fish and Wildlife Branch
- GR-1114 Fish and Wildlife Branch
- GR-0435 Department of Fisheries
- GR-3079 Department of Agriculture Specialist Services
- GR-1006 Water Rights Branch
- GR-0446 Provincial Game Warden
- GR-1579 Department of Mines
- GR-1991 Parks Branch
- MS-2500 Cominco fonds

City of Vancouver Archives, Vancouver

Add MSS. 54 Major Matthews Collections
Add MSS. 1257 Greater Vancouver Regional District engineering files
MCR 18 City Bylaws
MCR 36 City of Vancouver Board of Works minutes
MCR 2-46 City of Vancouver Health Committee minutes
PDS 11 City of Vancouver Health Department reports
PDS 38 City of Vancouver Engineering Department reports
PDS 492 Metropolitan Joint Committee

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PE-27 and PE-387 monitoring files

University of British Columbia Special Collections and University Archives, Vancouver
Roderick Haig-Brown Papers
Fisheries Association of British Columbia Papers

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AR-069 Island Copper Mine fonds
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