"STREAMS BEING RUINED FROM A SALMON PRODUCING STANDPOINT":

Clearcutting, Fish Habitat, and Forest Regulation in British Columbia, 1900–45

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THE RELATIONSHIP OF FORESTS to healthy fish populations has drawn a good deal of scientific and regulatory attention over recent decades in British Columbia. Indeed, according to one recent report, almost five hundred rivers, streams, and lakes have "suffered major losses" in fish habitat as a consequence of industrial forestry. Habitat degradation more generally has played a part in the extinction of at least 140 salmon runs. Environmental organizations point the finger of blame at weak enforcement of the federal Fisheries Act and equally poor performance by provincial environmental regulators under a referral process that provides for joint assessment of practices that threaten salmon stocks. The province's 1995 Forest Practices Code, drafted to protect riparian zones, had by many accounts failed as a regulatory instrument even before a 2002 Liberal government deregulation initiative, thanks to the reluctance of industry and the Ministry of Forests to accept restrictions on clearcutting practices.[1]

The answer, declared the Sierra Legal Defence Fund (SLDF) in 1997, lay in denying loggers access to streamside timber. Only by preserving the riparian zones intact could the streams be afforded protection against bank erosion, sedimentation, higher water temperatures, and debris torrents. "The health of riparian areas is vital to the health of the forest ecosystem as a whole," asserted the SLDF. More recently, a 2002 Raincoast Conservation Society analysis of central and north coast wild salmon

[1] John Werring, *High and Dry: An Investigation of Salmon Habitat Destruction in British Columbia* (Vancouver: David Suzuki Foundation, 2007), 1; Brian Harvey and Misty MacDuffie, *Ghost Runs: The Future of Wild Salmon on the North and Central Coasts of British Columbia* (Victoria: Raincoast Conservation Society, 2002), 14.

runs found that 74 percent were depressed. In addition to calling for changes in fishing regulations and greater caution in aquaculture policy, the report urged an end to clearcutting in drainages that support wild runs. Despite the Department of Fisheries and Oceans' 1986 "no net loss" salmon habitat protection policy, degradation continues due to poorly defined government policies, insufficient funding and staff, and recent deregulation. A real commitment to ecosystem-based management is required, write Jeffrey Young and John Werring, one that involves "the establishment and enforcement of conservation objectives."[2]

Early twentieth century fisheries managers and fishers would have agreed with some or all of these observations, albeit in somewhat different language. This article seeks to analyze the forestry-fisheries conflict from 1900 to 1945, documenting relations between fisheries officials and forest managers, the sources of habitat degradation, and the obstacles to regulatory action. It should, perhaps, come as no surprise to environmental historians that little progress was made in overcoming the structural obstacles to stream protection in this era. Foresters and fisheries managers had their hands full dealing with the allocation and conservation of the resources in their respective fields. Further complicating matters, forests came largely under provincial control, while Ottawa had primary responsibility for salmon. In an era of almost continuous federal-provincial acrimony over natural resource jurisdiction and revenues, the Dominion trod carefully in its relations with British Columbia and its dominant industry in the area of habitat protection.

Fisheries managers and fishers were far from silent, however. The record, indeed, is one of frequent complaint about the destructive consequences of streamside logging, a critical perspective that came to take in the broader implications of clearcutting for watershed dynamics. Yet, mindful of the province's jurisdiction over forests, Ottawa pressed for Victoria to control the timber industry rather than to test the potential power of the federal Fisheries Act. Even the 1932 incorporation of a specific prohibition against the deposit of logging waste in streams did not produce a vigorous regulatory stance.

One explanation is that unfettered forest exploitation meant more to British Columbia than undisturbed streams did to the Dominion. That would become clear on the rare occasions when federal managers took

[2] Sierra Legal Defence Fund, *Stream Protection under the Code: The Destruction Continues* (Vancouver: SLDF, 1997), 1-3; Harvey and MacDuffee, *Ghost Runs*, 10, 16; Jeffrey Young and John Werring, *The Will to Protect: Preserving BC's Wild Salmon Habitat* (Vancouver: David Suzuki Foundation, 2006), 17.

an aggressive approach to enforcement, in the case of the Stellako River log drives in the 1960s and the clearcutting controversy at Riley Creek on Haida Gwaii late the following decade. In both cases Ottawa retreated when challenged, seeking honourable compromise when the province refused to yield. Like a sediment-choked stream, the constitutional waters were murky, with doubt prevailing over just how far federal jurisdiction over salmon conservation could be pushed in regulating logging. Not until hearing British Columbia's logging-inspired cases in the 1970s did Supreme Court decisions provide some clarity. The slow pace of scientific inquiry into the ecological dynamics of fish population renewal also comes into play. As one American researcher put it in 1954: "We can say siltation is bad, removal of shade good or bad, water level fluctuation is bad, and make other general statements, but this is not sufficient. We are going to be asked … how much can be tolerated without serious loss to the resource." Answers to these questions remain elusive today but the problems are old ones, cited frequently as causes of declining fish populations and incorporated in demands for forest practice reform in the years prior to the Second World War. Understanding why proposals for reforms went unheeded, in the final analysis, demands attention to a political economy that treated both resources as commodities but that ranked the returns of timber above those of fish. "Some resources," Graeme Wynn notes, "were prized more than others" in the exchange-value calculus of industrial capitalism. Moreover, a profit-sharing arrangement bound the province and timber capital to each other in a relationship that left plenty of room for squabbling over the size of the shares but that left them united against any challenge to profitable forest exploitation. Fishers and managers of commercial salmon stocks had a voice but virtually no input in the affairs of the logging industry, and recreational fishers had even less. Timber, by the end of the first decade of the twentieth century, drove the BC economy. Fisheries managers, federal and provincial, were in a subordinate relationship to foresters, their political bosses, and to the industry to which they catered.[3]

Professionals in both fields identified with what Samuel P. Hays sees as the central tenet of conservation: "rational planning to promote efficient development and use of all natural resources." But what would it mean for conservation when one arena of resource exploitation damaged

[3] Howard A. Tanner, "Place of Fish and Game in Multiple Use of Watersheds," *Transactions of the American Fisheries Society* 87 (1954): 386-91; Graeme Wynn, "'Shall We Linger along Ambitionless': Environmental Perspectives on British Columbia," *BC Studies* 142/43 (2004): 11.

the productivity of another? Resolving that problem demanded an altered conception of efficiency, one that would tolerate some sacrifice of hard-won profits in the logging sector to the needs of fish and those who captured them. The most logical but extreme solution, involving protection for streamside timber, would mean relinquishing access to the most highly valued stretches of that resource. The philosophy of multiple-use, which came into circulation during the 1930s, offered a conceptual path to balance, but among BC foresters only Ernest Manning seemed to think seriously along these lines before the Second World War. During this period, foresters, as a rule, managed forests in a way that contemplated few constraints on practices to conserve that resource. Demands for a more holistic notion of conservation to embrace the needs of another resource that fell largely under Dominion authority met rigidities in outlook and economic reality that were too strong to overcome.[4]

This was not a conflict between dedicated conservationists and ruthless exploiters. The salmon canners and the federal fisheries officials who catered to their needs were adept at using the language of conservation to control access to the resource, a tendency most clearly demonstrated in their attack on First Nations salmon weirs. Commercial fishers had their own allocation motives, campaigning to deny licences to the Japanese, fighting with sport fishers over rights to salmon, and waging an internal war over catch-share that pitted the troll, gillnet, and seine sectors against each other. But it would be a mistake of equal magnitude to dismiss all expressions of conservationist sentiment as a mask for material concerns. Among rural resource users, argues Richard Judd, a "conservation consciousness" provides strong cultural sanctions against wasteful and destructive practices. Karl Jacoby also detects the existence of a subsistence-based moral economy among rural westerners, one that approves human use of nature but condemns selfish, wasteful, market-driven over-exploitation. British Columbians have expressed similar convictions, particularly towards timber capital's lack of regard for the well-being of their communities and environments that supported economic diversity and nature-based recreation. Commercial and sport fishers along the coast could forge a common conservationist front, then, sometimes even with First Nations, in protesting against policies and

[4] Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1880–1920* (Cambridge: Harvard University Press, 1959), 2. For discussion of the origins of the multiple-use concept, see Donald W. Floyd, "Whither Multiple Use?" *Journal of Forestry* 104 (2006): 102.

practices that sacrificed their environs to the profits of the dominant industry.[5]

If foresters manage forests, and fisheries officials fish and fishers, then much existing scholarship tends to fall into these compartments. The historiography of early twentieth-century BC forestry is strong in policy analysis thanks to Stephen Gray, Gordon Hak, and Ken Drushka, among others. Thomas Roach depicts the Forest Act, 1912, as a "bold initiative" that incorporated advances from across the continent. Gray, Hak, and I have offered less enthusiastic narratives asserting the forest industry's success in making conservation serve capital accumulation imperatives, and contemplating the relationship of forestry to aquatic ecosystems only supports this line of argument.[6]

The Pacific fisheries literature is notable for a recent body of fine work on the tendency of policy to privilege industrial and even elite recreational interests over the subsistence needs of Aboriginal peoples. Matthew Evenden's environmental history of the Fraser River and Joseph Taylor's subtle understanding of Pacific salmon management offer rich insights. I have considered aspects of more modern fish-forestry interactions in the case of the Stellako River log drives of the 1960s and New Democratic Party (NDP) government regulatory initiatives early the next decade. Missing, however, is analysis of the formative period of modes of production, related discourse on the ecological consequences of industrial forest practice, and the associated policy challenges – a gap this article attempts to fill.[7]

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[5] Richard Judd, *Common Lands, Common People: The Origins of Conservation in Northern New England* (Cambridge: Harvard University Press, 1997), 4-5; Karl Jacoby, "The State of Nature: Country Folk, Conservationists, and Criminals at Yellowstone National Park," in *The Countryside in the Age of the Modern State: Political Histories of Rural America*, ed. Catherine McNicol Stock and Robert D. Johnston, 91-112 (Ithaca: Cornell University Press, 2001).

[6] Stephen Gray, "The Government's Timber Business: Forest Policy and Administration in British Columbia, 1912-1928," *BC Studies* 81 (1989): 24-49; Gordon Hak, *Turning Trees into Dollars: The British Columbia Coastal Lumber Industry, 1858-1913* (Toronto: University of Toronto Press, 2000); Ken Drushka, *Stumped: The Forest Industry in Transition* (Vancouver: Douglas and McIntryre, 1985); Thomas R. Roach, "Stewards of the People's Wealth: The Founding of British Columbia's Forest Branch," *Journal of Forest History* 28 (1984): 22-23; Richard A. Rajala, *Clearcutting the Pacific Rain Forest: Production, Science, and Regulation* (Vancouver: UBC Press, 1998); Richard A. Rajala, "Clearcutting the British Columbia Coast: Work, Environment and the State," in *Making Western Canada: Essays on European Colonization and Settlement*, ed. Catherine Cavanaugh and Jeremy Mouat, 104-32 (Toronto: Garamond Press, 1996).

[7] Douglas C. Harris, *Fish, Law, and Colonialism: The Legal Capture of Salmon in British Columbia* (Toronto: University of Toronto Press, 2001); J. Michael Thoms, "A Place Called Penask: Fly-Fishing and Colonialism at a British Columbia Lake," *BC Studies* 133 (2002): 69-98; Dianne Newell, *Tangled Webs of History: Indians and the Law in Canada's Pacific Coast Fisheries* (Toronto: University of Toronto Press, 1993); Matthew D. Evenden, *Fish versus Power: An Environmental History of the Fraser River* (New York: Cambridge University Press, 2004); Joseph E. Taylor III, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (Seattle: University

THE CLASH OF INDUSTRIES AND THE JURISDICTIONAL WEB

Although the habitat needs of trout and steelhead figured in the clash of fishers and loggers, and increasingly so as sport fishing became more important to tourism, the commodity value of Pacific salmon took priority prior to the Second World War. The lifecycle of the five species involves a wondrous adaptation to fresh- and saltwater environments. Adults lay and fertilize eggs in the gravel beds of streams, the alevins emerging from the eggs after two or three months of incubation. They remain in the gravel for up to two additional months, then leave the gravel as fry to feed on tiny organisms. The sockeye have an extended dependence on fresh water, living in streams and lakes for as long as three years before heading to sea. Pink and chum, on the other hand, descend to stream estuaries almost immediately, gaining strength before entering the ocean environment. Chinooks, also known as spring or tyee, and coho spend at least a year in the streams. After varying periods at sea, all seek to return to their natal stream to spawn and die.[8]

The capacity of salmon to reproduce successfully depends on a myriad of factors. Leaving aside the spawners' need to escape the nets and hooks of commercial, recreational, and subsistence fishers, to permit ascent the streams must have sufficient flow and freedom from obstruction. The acceptable range of water temperature and purity is quite narrow, and the gravel beds must be relatively free of sediment. Even under ideal conditions, predators and environmental causes take a high toll. According to one estimate 50 percent of fertilized eggs perish prior to hatching, 25 percent of alevins survive to become fry, and only 3 percent of these will return as adults to spawn.[9]

The salmon's reproductive mission faced new challenges in the 1870s, with the arrival of the commercial fishery on the Fraser and Skeena rivers. Over the next decades the industry expanded aggressively in search of the sockeye that appealed on the British market. By the turn of the century, two-person sail-equipped gillnetting crafts adopted from the Columbia River had proven their worth, with various ethnicities sharing

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of Washington Press, 1999); Richard A. Rajala "This Wasteful Use of a River: Log Driving, Conservation, and British Columbia's Stellako River Controversy, 1965-72," *BC Studies* 165 (2010): 31-74; Richard A. Rajala, "Forests and Fish: The 1972 Coast Logging Guidelines and British Columbia's First NDP Government," *BC Studies* 159 (2008): 81-120.

[8] Derek V. Ellis, "The Fish: An Ethnogram for Management," in *Pacific Salmon Management for People*, ed. Derek V. Ellis (Victoria: University of Victoria, 1977), 35-58; Taylor, *Making Salmon,* 5-6.

[9] Geoff Meggs, *Salmon: The Decline of the British Columbia Fishery* (Vancouver: Douglas and McIntyre, 1991), 10-11.

the fishery with Aboriginal peoples. In the canneries, mass production methods involving powered conveyor belts, soldering machines, and multi-bladed gang knives sped output by the early 1900s, when the "Iron Chink" offered a way to eliminate the Chinese butchers whose skill at the head of the canning line had dictated the pace of production. Although manual methods continued to prevail in many of the province's small, isolated up-coast canneries, a modern factory regime had been erected in the large facilities by the early twentieth century.[10]

At the same time, mechanization increased the range and capacity of the gillnet fleet. Oars and sails gave way to gas engines on the lower coast, and over a hundred larger purse seiners operated in coastal waters by 1911. The 1913-14 Hell's Gate slides, triggered by Canadian Northern Railway blasting, decimated the Fraser River sockeye run above that point. The canners accordingly turned more attention to streams supporting pink, coho, and chum salmon, species previously considered of minor importance. The mobile seine fleet expanded dramatically to over four hundred vessels in 1926, and new canneries sprang up along the coast until a process of contraction began in the 1930s, reducing the number of smaller, more isolated plants.[11]

The coastal logging industry erected its own factory regime during the late nineteenth and early twentieth centuries, one with a spatial organization that ultimately ensured conflict with the fishing industry. Fortunately, the rapids and waterfalls caused by abrupt changes in topography made log driving difficult along the coast despite determined efforts by operators such as the Cowichan Lake Lumber Company on the Cowichan River. Each drive between 1890 and 1908 left logs in jams and strewn along the banks, sometimes requiring dynamite to free them. The *Cowichan Leader*, anxious to protect the river's value as a destination for sport fishing tourists, frowned upon the drives and urged the Canadian Pacific Railway to build a branch line to Cowichan Lake from the Esquimalt and Nanaimo mainline. When the company announced its intention to do so, the drives stopped, but not before altering

[10] Geoff Meggs and Duncan Stacey, *Cork Lines and Canning Lines: The Glory Years of Fishing on the West Coast* (Vancouver: Douglas and McIntyre, 1992), 5-46; Duncan Stacey, *Sockeye and Tinplate: Technological Change in the Fraser River Canning Industry, 1871–1912* (Victoria: British Columbia Provincial Museum, 1982), 20-23; Dianne Newell, "The Rationality of Mechanization in the Pacific Salmon Canning Industry before the Second World War," *Business History Review* 62 (1998): 626-55.

[11] Meggs, *Salmon*, 111-13, 152; Dianne Newell, "Dispersal and Concentration: The Slowly Changing Spatial Pattern of the British Columbia Salmon Canning Industry," *Journal of Historical Geography* 14 (1988): 22-36.

channels, breaking down banks, and damaging pools that had provided fine fishing.[12]

The Harrison River and others came in for such abuse, but efficient river driving required controlled flows of the sort that few small coastal streams offered. It was a different matter in the interior, where a splash dam built by the Adams River Lumber Company extinguished the upper Adams River sockeye run even before the Hell's Gate slides. But along the coast during the early twentieth century, the machines and methods associated with clearcutting drew most of the ire of fishers and fish managers.[13]

Just as salmon and trout needed unspoiled streambeds, clean and cool water, and food, loggers demanded unfettered access to the valley bottoms through which those streams ran. There the timber grew most prolifically, the technologies of clearcutting could be deployed most efficiently, and the streambeds themselves offered advantages in bringing logs in. With the transition from oxen and horses to steam power in the late nineteenth century, coastal log transportation became a four-stage process. Once felled, logs were "yarded" by cable to the landing by steam "donkeys" for loading onto rail cars, then they were hauled by locomotives either to salt water or directly to the sawmill. The heavily capitalized firms ran their railways through the valley bottoms, clearcutting as they went. Prior to the introduction of overhead yarding systems after 1900, donkeys yarded logs along the ground, a tortuous process that gave way to real factory efficiency with the running of cables through rigging atop a spar tree. In high lead and skidder logging, clearcuts, formerly limited in scale, extended across the valleys and as far up the hillsides as cost efficiency dictated.[14]

The positioning of rail lines, landings, and steam yarding and loading equipment adjacent to streams spelled trouble for fish, fishers, and fisheries managers. Describing the coastal forest industry in 1914, E.A. Sterling noted that the merchantable timber lay "in the protected 'draws' or valley bottoms, where little streams break into the 'salt chuck,' or on

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[12] Richard A. Rajala, *The Legacy and the Challenge: A Century of the Forest Industry at Cowichan Lake* (Lake Cowichan: Lake Cowichan Heritage Advisory Committee, 1993), 21-22; *Cowichan Leader*, 15 December 1906; *Cowichan Leader*, 23 November 1907.

[13] Arnold M. McCombs and Wilfred W. Chittenden, *The Harrison-Chehalis Challenge* (Harrison Hot Springs: Treeline Publishing, 1988), 10; Mark Hume, *The Run of the River: Portraits of Eleven British Columbia Rivers* (Vancouver: New Star Books, 1992), 106-12; C. Heather Allen, "Lumber and Salmon: A History of the Adams River Lumber Company," *Wildlife Review* 8 (1979): 22-24. For a discussion of the Stellako drives in the North American context of the practice, see Rajala, "This Wasteful Use," 31-74.

[14] Richard A. Rajala, "The Forest as Factory: Technological Change and Worker Control in the West Coast Logging Industry, 1880-1930," *Labour/Le Travail* 32 (1993): 73-104.

moist slopes." The province was rich in fish, game, minerals, and scenery, Sterling observed: "[But] the timber, under present circumstances, is a greater asset than all of the others combined." A few years later, in an unintended bit of irony, William J. Turnbull remarked that overhead systems permitted logs to be drawn off the slopes "just as easily as a trout [was] brought to the landing on a line."[15]

The Sterling and Turnbull observations each provide insights that bear on the troubled relationship between forest exploitation and fish habitat. Timber far outranked salmon as a generator of private profit and public revenue by 1914, a trend discussed below, and the emerging factory regime had severe ecological consequences. Yarding logs to streamside landings caused bank erosion, and the deposit of slash and debris in amounts far greater than those produced by natural processes (Figure 1). Cutting to the water's edge deprived the fish of cover, shade, and food sources. Hauling logs across streams, or along the bed itself, shifted spawning gravel. Overhead cable logging was a high-speed affair, tearing up the forest floor, uprooting saplings and undergrowth, and leaving enormous amounts of slash that made cutovers vulnerable to fire. Progressive clearcutting produced vast expanses of denuded land and exposed streams to wild fluctuations in flows. In rainy seasons freshets swept downstream, increasing sedimentation, scouring spawning beds, and carving new channels. Alternatively, in late summer and early fall, stream levels fell dramatically, stranding fish in isolated, shallow pools and dry creek beds.[16]

Scientific understanding of such processes came slowly, but observation alone left little doubt that forest industry practices altered stream conditions in a variety of harmful ways. No issue drew more negative commentary during this period than the amount of debris loggers left in fish-bearing waters, a problem that many felt prevented spawners from passing upstream and young fish from making their journey to the sea. Given recent findings on the importance of large woody debris to healthy stream ecology, one might question the validity of these concerns, as some commentators did during these years. On the other hand, early twentieth-century loggers left enormous amounts of slash and non-merchantable wood behind, and such material entered streams on a scale that can only be imagined today. The impact of clearcutting on

[15] E.A. Sterling, "16,000 Miles of Forested Shoreline," *American Forestry* 20 (1914): 228-29; William J. Turnbull, "The Timbers of British Columbia," *Journal of the Royal Society of Arts* 70 (1922): 280.

[16] For brief discussions, see Jim Lichatowich, *Salmon without Rivers: A History of the Pacific Salmon Crisis* (Washington, DC: Island Press, 1999), 62-65; Taylor, *Making Salmon*, 55-57.

Figure 1. A Comox Logging skidder crew yarding logs across the Oyster River, about 1927. Burned in the 1922 fire, the Oyster River region still contained much fire-damaged but salvageable timber. In this photograph the four chokermen and two hookers (barely visible at centre right) have just sent three 12 metre logs across the river to the skidder landing (out of the picture to the left). Near the top of the photo is the "carriage" from which a line descends with two choker lines. See also Mackie, *Mountain Timber*, 102. Photograph by Walter Montgomery. Courtesy of Gloria Twamley.

watershed dynamics was a more complex scientific and regulatory matter, but across North America deforestation wreaked havoc on stream flows, a phenomenon evident in coastal British Columbia by the late 1920s.[17]

If the spatial organization of coastal logging made some level of damage to streams inevitable, Canadian federalism produced a complicated and contentious jurisdictional picture. The British North America Act awarded the Dominion control over "seacoast and inland

[17] Don C. Bragg and Jeffrey L. Kershner, "Course Woody Debris in Riparian Zones: Opportunity for Interdisciplinary Interaction," *Journal of* Forestry 97 (1999): 30–35.

fisheries," including, in the case of salmon, the non-tidal portion of rivers. British Columbia took possession of the beds of watercourses upon entering Confederation in 1871, established Crown authority over the flows of streams under an 1892 statute, and organized a water rights branch in 1911. The federal Fisheries Act, extended to the Pacific coast in 1876, contained a potentially powerful prohibition against the deposit of deleterious substances in fish-bearing waters, although early restrictions on the canners' dumping of offal went unenforced. Earlier colonial legislation preventing the dumping of sawdust and wood waste into rivers by sawmillers was incorporated into the Fisheries Act, but that, too, went unenforced even after an 1892 court ruling upheld the statute. Early on, then, the Canadian forest industry demonstrated its capacity to have environmental law rendered meaningless. Federal regulation of gear and fishing times to permit escapement followed in the 1890s on the west coast as several provinces launched constitutional challenges to Ottawa's authority, citing their jurisdiction over property and civil rights. Hoping to secure revenue from licence fees, British Columbia adopted its own set of fishing regulations in 1897.[18]

The next year the Judicial Committee of the Privy Council (JCPC) in London, England, confirmed the Dominion's power to regulate fisheries and allocate licences, but it upheld the provinces' property rights. That left fisheries in a "complex snarl" of jurisdictional overlap, Joseph Gough asserts, in which the provinces controlled property rights in non-tidal fisheries while Ottawa possessed jurisdiction over management. "Practical arrangements" were eventually worked out, with the provinces taking the main role in trout management and recommending regulations over all fisheries for Ottawa's enforcement. In the case of salmon, however, the Dominion controlled salt-water licencing, imposed conservation measures for virtually all waters, and was responsible for enforcement of regulations.[19]

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[18] Joseph P. Gough, *Managing Canada's Fisheries: From Early Days to the Year 2000* (Silery: Septentorion, 2006), 87, 113-14; Douglas M. Swinerton, *A History of Pacific Fisheries Policy* (Ottawa: Department of Fisheries and Oceans, 1993), 12; K.R.F. Denniston, "Water in British Columbia and Its Administration," in *Proceedings, Fourth Annual Game Convention, University of British Columbia* (Vancouver, 1950), 115; Gilbert Allardyce, "The Vexed Question of Sawdust: River Pollution in Nineteenth-Century New Brunswick," *Dalhousie Review* 52 (1972): 177-90; Graeme Wynn, *Canada and Arctic North America: An Environmental History* (Santa Barbara: ABC-CLIO, Inc., 2007), 211-12.

[19] Gough, *Managing Canada's Fisheries*, 114; W.P. Hourston, "The Legal and Administrative Framework of the Fishing Industry," *Transactions of the 13th British Columbia Natural Resources Conference* (British Columbia Natural Resources Conference, 1961), 262-63; Frank Millerd, "The Evolution of Management of the Canadian Pacific Salmon Fishery," 7-9, available at Digital Library of the Commons, http:/dlc.dlib.indiana.edu/archive/00000999.

After the 1898 JCPC decision, British Columbia's salmon canners secured an ongoing role for the province with the appointment of John Pease Babcock as fisheries commissioner. The Dominion had established a hatchery near New Westminster in 1884, but with fifty-nine canneries operating by the end of the decade, and the pack reaching over a million cases in the "big" years of the sockeye's four-year cycle, the canners sought stronger measures to improve upon nature's productivity. Babcock, a Minnesotan with a reputation for developing chinook hatcheries on the Sacramento River, came north in 1901 and established a provincial hatchery at Seton Lake a year later. Babcock also studied sockeye spawning, consistent with his "practical mandate" to increase the supply of the dominant commercial species. The Dominion's Pacific Biological Station at Nanaimo pursued natural science research for a couple of decades after its founding in 1908, then federal science too became oriented to problems in salmon management. By 1910, in addition to Babcock's Seton Lake hatchery, the federal Department of Marine and Fisheries (DMF) operated seven such facilities, and BC Packers Ltd. operated a hatchery on Vancouver Island's Nimpkish River. However, by this time, biologists had already begun to have doubts about the hatchery solution.[20]

British Columbia continued to jockey for revenue from fishing and cannery licences in the broader campaign for "better terms" in Confederation, but a 1913 JCPC judgment confirmed Ottawa's jurisdiction in tidal waters, including creeks and rivers for which no property rights existed. This ruling left the province with the authority to licence fishers in non-tidal waters, except for those in the federal railway belt, although the power to regulate in the interests of conservation was vested with Ottawa. Court decisions in the late 1920s further entrenched federal jurisdiction over conservation and fishing operations, and British Columbia's power to regulate fish processing provided some monies from the licensing of canneries. Ottawa increased its role in administering sport fisheries in the non-tidal waters frequented by salmon but turned supervision of that sector over to the province in 1937. What it all added up to was a preponderance of federal authority in a context of ongoing provincial suspicion of Ottawa's control, which was alleged to be both inefficient

[20] John N. Cobb, *Pacific Salmon Fisheries*, 3rd ed. (Washington, DC: Government Printing Office, 1921), 244-45; "The Fisheries of Canada," *Journal of the Royal Society of Arts* 40 (13 November 1891-11 November 1892): 930; Gough, *Managing Canada's Fisheries*, 140; Swinerton, *History of Pacific Fisheries Policy*, 13; Matthew Evenden, "Locating Science, Locating Salmon: Institutions, Linkages, and Spatial Practices in Early British Columbia Fisheries Science," *Environment and Planning D: Society and Space* 22 (2004): 355-372; British Columbia, *The Fisheries of British Columbia* (Victoria: King's Printer, 1910), 56.

and to represent an unreasonable capture of revenue from a provincial resource.[21]

In forestry, jurisdictional lines and revenue streams operated more clearly in British Columbia's favour. The British North America Act conferred property rights on the provinces and an industry-state relationship emerged that bound the province's economic well-being to the forestry sector. Despite a good deal of conflict over how the wealth generated by forest exploitation would be shared, and associated debate over property rights, British Columbia's timber capitalists, political elites, and foresters accepted that a strong mutuality of interest prevailed. For the most part, then, demands for restrictions on the capital accumulation practices of logging in order to accommodate fish would meet a united front that ranged from indifference to opposition. The following excursion into the political economy of forestry documents the emergence of a profit-sharing relationship between timber capital and the province, a relationship that conferred virtual rights of property upon the holders of Crown forests and discouraged consideration of any measure that might reduce the shared take.

THE BRITISH COLUMBIA STATE, THE FOREST INDUSTRY, AND PROFIT SHARING

Under the 1865 Land Ordinance, the Colony of British Columbia had rejected the practice of granting land outright to sawmillers, instead selling cutting rights in the form of leases and collecting annual rental fees and royalty payments on felled timber. An 1884 amendment to the Lands Act provided a point of entry for independent loggers through the special timber licence (STL) – short-term, non-transferable tenures that granted individuals rights to a single 259 hectare tract. Private forestland became available during the 1880s as well, when the Dunsmuirs began selling tracts outright from the 809,371 hectare Esquimalt and Nanaimo Railway (E&N) land grant, offering outright ownership and almost complete freedom from the provincial Crown's regulatory authority. Still, a basic system of tenures had been erected to encourage industrial expansion and to capture rents from the Crown forests. The take was not impressive, however, as forests generated just 7 percent of government revenues in 1901.[22]

[21] Millerd, "The Evolution of Management," 12-21; Gough, *Managing Canada's Fisheries*, 158, 203; Cicely Lyons, *Salmon: Our Heritage* (Vancouver: BC Packers Ltd.), 389; "The Fisheries Department of British Columbia," *Western Fisheries* 12 (1936): 15.

[22] R. Peter Gillis and Thomas R. Roach, *Lost Initiatives: Canada's Forest Industries, Forest Policy and Forest Conservation* (New York: Greenwood Press, 1986), 131-35; Gordon Hak, *Turning*

Alterations to the BC Lands Act accompanied the growth caused by rising North American demand for lumber. The dramatic policy revision came in 1905, in the wake of requests from STL holders for greater tenure security. Banks would not accept the licences as collateral for loans, operators informed Premier Richard McBride, who considered their case for an extension of STL terms to twenty-one years, along with elimination of the transfer and holding restrictions, "well founded." The amendments would reshape British Columbia's economy by vastly increasing the property rights and value of STLs. Existing licences were made renewable for sixteen years, the life of new tenures for twenty-one years. All became marketable commodities by granting the right to transfer and dropping the limit on individual holdings. The new tenures attracted an immediate wave of investment capital. Much of this capital was speculative, but the money poured in. Between 1905 and the end of 1907, when McBride halted the plunder, investors claimed over 3.88 million hectares of timberland. Revenue from staking and renewal fees rose from $177,686 in 1904 to $2.4 million in 1908, up to 40 percent of the provincial budget.[23]

In 1906, Chief Commissioner of Lands and Works R.F. Green nicely captured something of the new dynamic of industry-government relations. All doubts about "the lack of stability of title" had been removed, a security he described as "most beneficial both to the lumbermen and the lumber industry, and therefore to the people as a whole." But if public and private interest had become one and the same, Green went on to convey a sharp and prescient, if perhaps unintended, sense of the province's fragile landlord status. "No matter what that future might have in store," he declared, "no government can ever afford to enact any legislation that will, in any way, check or embarrass, or in any way interfere with … the lumber industry on which the progress of the

Trees into Dollars: The British Columbia Coastal Lumber Industry, 1858–1913 (Toronto: University of Toronto Press, 2000), 23, 67–79; Richard Yerburgh, "An Economic History of Forestry in British Columbia" (MA thesis, University of British Columbia, 1931), 34–35; Robert Cail, *Land, Man and the Law: The Disposal of Crown Lands in British Columbia, 1871–1913* (Vancouver: UBC Press, 1974), 100; C.J. Taylor, *The Heritage of the British Columbia Forest Industry: A Guide for Planning, Selection and Interpretation of Sites* (Ottawa: Environment Canada, 1987), 72, 80.

[23] R.F. Green, "Timber Conditions in British Columbia," *Canadian Forestry Journal* 2 (1906): 188; H.N. Whitford and R.D. Craig, *Forests of British Columbia* (Ottawa: Commission of Conservation, 1918), 89; "Provincial Legislature," *Victoria Daily Colonist*, 7 April 1905, BC Legislative Library Sessional Clipping Book (hereafter LLSCB), 1905, p. 77; Gray, "Government's Timber Business," 26; Whitford and Craig, *Forests of British Columbia*, 90; Ken Drushka, *In the Bight: The BC Forest Industry Today* (Madeira Park: Harbour Publishing, 1999), 164.

Province so much depends, and from which the Government derives such a large proportion of its revenue."[24]

Developments over the next twenty years only bound lumbermen and the provincial government more closely together. At the end of 1907 McBride placed a reserve on all unalienated Crown lands, but the STL holders had already launched a campaign for amendments to make their tenures renewable in perpetuity. McBride acknowledged that the "forced logging" of all STL timber over the next two decades would be ruinous to the lumber market, promised new law to protect industry rights, and called a Royal Commission to make comprehensive forest policy recommendations.[25]

At the Fulton Commission hearings, a confident industry framed licence extension and fixed royalty rates as essential to the creation of a stable investment climate. The commissioners agreed with the first demand in an interim report, paving the way for a spring 1910 amendment granting licence perpetuity. The measure would usher in an era of industry-government "co-partnership" McBride told his critics, and with the submission of the Fulton Commission's Final Report in January 1911, Lands Minister William Ross promised "a sane and business-like policy of conservation." The theme of partnership figured prominently in both the report and the legislation it informed. The principle of profit sharing under the royalty system ensured that relationship, commission member A.C. Flumerfelt explained. McBride, assuring British Columbians that their stake in Crown timber remained secure, declared that the province retained "an interest tantamount to government partnership with the licensee."[26]

How the profits were to be divided between the partners would be a matter of ongoing conflict, but a relationship of mutual dependence

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[24] Green, "Timber Conditions," 188, 191.

[25] *Pacific Lumber Trade Journal* (hereafter *PLTJ*) 13 (1907): 31; Whitford and Craig, *Forests of British Columbia*, 90; "Asking Extension of Timber Licence Period," *Timberman* 9 (1908): 25; "A Review of 1907 Lumbering and Trade Conditions," *PLTJ* 13 (1908): 37; *Western Lumberman* (hereafter *WL*) 5 (March 1908): 15; "Lumbermen Ask Government to Extend the Life of Licences," *WL* 6 (March 1909): 40.

[26] "Extension of British Columbia Timber Licences," *WL* 6 (April 1909): 13-14; "The BC Timber Situation: Two Remedies," *Canadian Forestry Journal* 5 (1909): 148-50; Robert Howard Marris, "'Pretty Sleek and Fat': The Genesis of Forest Policy in British Columbia, 1903-1914" (MA thesis, University of British Columbia, 1979), 48-52; "The Forestry Commission's Report," *Daily News-Advertiser*, 27 January 1910; "Timber Policy Was Liberals," *Victoria Daily Times*, 1 March 1910, LLSCB; "Tenure of Title of BC Timber," *WL* 8 (January 1911): 34; Roland D. Craig, "Stumpage Values in British Columbia," *Canadian Forestry Journal* 8 (1912): 39-41; "Timber Policy of Government," *Victoria Daily Colonist*, 24 January 1912; A.C. Flumerfelt, "The Forestry Problems of British Columbia," *British Columbia Magazine* 7 (1911): 1064; "Last Word in Forest Law," *Victoria Daily Colonist*, 7 February 1912, LLSCB.

had been cemented. Under the Forest Act, 1912, H.R. MacMillan took charge of the new Forest Branch, and timber sale tenures gave state agents authority over the cutting of small tracts adjacent to the licences and leases. For decades, however, sales contributed only a tiny fraction of the annual cut. The bulk of the timber, already alienated under STL documents, restricted foresters to fire protection and revenue collection duties. Even adjusting the latter to increase the Crown's take would prove difficult. Industry opposition to a proposed 1913 hike in STL royalty rates forced Ross to back down. With timber capital pushing for fixed rates, and government seeking to uphold its autonomy, the two sides compromised in the 1914 Royalty Act. In pegging royalty charges to the wholesale price of lumber for the next forty years, Ross explained, "true profit sharing" had been achieved. MacMillan, too, hailed the new mutuality of interest that linked industry and government as "partners in the stumpage value." [27]

First World War-era inflation that drove industry costs up faster than lumber prices doomed the arrangement, leading to several years of bickering. The two sides arrived at a 1924 compromise that set rates over the next decade, but with markets decimated by the Great Depression the Conservative government of Simon Fraser Tolmie reduced the charges in 1932. New Liberal premier T.D. Pattullo restored the rates to pre-Depression levels the next year, but over the early twentieth century the industry-state relationship in forestry had taken on the character of a profit-sharing clearcutting regime geared to a market-driven notion of efficiency. With the pre-1912 tenures acknowledged to embody equity in timber, and neither licence documents nor the Forest Act making any reference to fish habitat, the clearcuts expanded in progressive fashion, reducing entire valleys to wastes of stumps and slash.[28]

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[27] "The British Columbia Forest Act," *Canadian Forestry Journal* 8 (1912): 88-91; H.R. MacMillan, "Present Condition of Applied Forestry in Canada," *Proceedings of the Society of American Foresters* 10 (1915): 126-28; "Minister of Lands on Timber Industry," *WL* 10 (March 1913): 50-51; "Dissatisfied with Forest Act," *Victoria Daily Times*, 17 February 1913, LLSCB; "Proposed Increase in Timber Royalties," *WL* 10 (October 1913): 48-50; "Discuss Question of Increased Royalties," *Victoria Daily Colonist*, 6 February 1914, LLSCB; Gray, "Government's Timber Business," 33-34; "Royalty Fixed on Profit-Sharing Basis," *WL* 11 (March 1914): 46-48; Roland T. Craig, "The Taxation of Forest Land in Canada," *WL* 11 (September 1914): 48-49; H.R. MacMillan, "Government Stumpage Prices in British Columbia," *WL* 11 (1914): 24-25; "The Timber Business of British Columbia," *WL* 13 (February 1916): 20.

[28] Robin Fisher, *Duff Pattullo of British Columbia* (Toronto: University of Toronto Press, 1991), 148-57; "Relief for BC Timber Owners," *WL* 15 (July 1918): 26; "Timber Industries Council Completes Organization," *WL* 18 (March 1921): 27; Gray, "Government's Timber Business," 35-38; Ralph A. Logan, "British Columbia's Special Timber Licences," *WL* 15 (October 1918): 67-68; W. McNeill, "The Timber Royalties Question: Article No. 2," *WL* 8 (April 1924): 24-25; W. McNeill, "The Timber Royalties Question," *British Columbia Lumberman* 8 (1924):

This era of timber liquidation unfolded without regulation until the 1930s, when the vast acreage of barren cutover land provoked a good deal of public concern. Pattullo's chief forester, Ernest Manning, waged a campaign for forest practice reform from 1935 until his death in 1941 – a campaign that incorporated the language of multiple-use in promoting the value of forests as playgrounds and sources of fish and game habitat. Manning's pragmatic but reformist vision merits attention both for its promise and for the constraints it confronted. The latter involved his profession's dedication to the project of liquidating old-growth forests, the power of the dominant industry in protecting its managerial prerogatives, and Pattullo's own commitment to capitalist principles of economic organization. Manning would, however, stretch the meaning of conservation in a way that neither his predecessors nor his immediate successors were inclined to do. But before turning to Manning it is necessary to understand the obstacles to multiple-use that took root during the preceding decades, relationships between federal and provincial resource managers, and timber capital's defence of its domain.[29]

STREAM OBSTRUCTION, DEFORESTATION, AND THE REGULATORY VACUUM

The myth of resource inexhaustibility had already been shattered in the case of salmon during the first decade of the twentieth century, when runs fluctuated in ways that defied understanding. Babcock attributed a poor 1903 sockeye run to overfishing, particularly by American fish traps and drag seines on Puget Sound. A small 1906 sockeye catch reinforced that conclusion as the Fraser system had yet to suffer from the sort of industrial and agricultural developments that had destroyed the Sacramento River spawning grounds. Federal fisheries inspectors also devoted attention to habitat concerns during these years, reserving particularly harsh words for the "sluice dams" some loggers used to flush their cut downstream to sawmills. Protecting the spawning grounds, and "thereby assisting nature in her work of propagation," would far outweigh anything that could be accomplished in fish culture, a DMF

20-21; "New Timber Royalties Measure Passes Legislature," *British Columbia Lumberman* 9 (1925): 44; J.R. Dickson, "Changes in Timber Disposal Regulations in Canada during 1933," *Forestry Chronicle* 10 (1934): 139-40; J.R. Dickson, "Summary of Changes in Timber Disposal Regulations in Canada, 1934," *Forestry Chronicle* 11 (1935): 99.

[29] Jeremy Wilson, "Forest Conservation in British Columbia, 1935-1985: Reflections on a Barren Political Debate," *BC Studies* 76 (1987-88): 10; Rajala, *Clearcutting the Pacific Rain Forest,* 154-66.

inspector observed. But the runs continued to fluctuate, and, in 1913, a biologist confessed: "We know very little about the conditions which cause the variations."[30]

Federal fisheries managers, convinced nevertheless that logging contributed in some measure to the commercial fisheries' problems, tried to elicit the support of provincial colleagues in imposing controls to assure free passage of salmon to and from the spawning grounds. In 1914, DMF deputy minister George J. Desbarats conveyed his displeasure with the "exceedingly regrettable condition of affairs on remote rivers caused by logging operations" to his provincial counterpart. At Thurston Bay debris had been deposited in an important salmon stream on a scale "as to entirely prevent the passage of fish." Several similar cases had been observed, and Desbarats advised that forestry officials should exert control over those cutting timber under provincial authority. A provincial fisheries official sent the request along to Acting Chief Forester Martin Grainger, who promptly moved it along to the comptroller of water rights.[31]

A regrettable pattern had been set. Federal bureaucrats with neither authority over logging nor an inclination to consider logging debris a deleterious substance requested provincial action against the forest industry, but their concern only initiated a shuffling of paper among provincial resource managers. DMF engineer J. McHugh developed a stream clearance program, but with wartime labour shortages hindering that work, in 1917 Chief Fisheries Inspector F.H. Cunningham held the logging interests responsible for many such blockages. Having cut their limits the operators departed, leaving streams plugged with sunken logs and slash, material that formed the nucleus of jams that, over time, became impassable to fish "except at certain stages of the water, and even then only with great difficulty."[32]

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[30] British Columbia, *Report of the Fisheries Commissioner for British Columbia for the Year 1903* (Victoria: King's Printer, 1904), 1; British Columbia, *Report of the Fisheries Commissioner for British Columbia for the Year 1906* (Victoria: King's Printer, 1907), 3-5; Canada, *Annual Report of the Department of Marine and Fisheries, 1903-1904* (Ottawa: King's Printer, 1904), xiv; Canada, *Annual Report of the Department of Marine and Fisheries*, 1910-11 (Ottawa: King's Printer, 1911), 401; J.P. McMurrich, "Salmon Fisheries of British Columbia," *Commission of Conservation, Report of the Fourth Annual Meeting, 1913* (Toronto: Bryant Press, 1914), 48.

[31] G.J. Desbarats to Deputy Commissioner of Fisheries, 22 December 1914; Deputy Commissioner of Fisheries to Chief Forester, 29 March 1915; Acting Chief Forester to Comptroller of Water Rights, 9 April 1915. All in British Columbia Ministry of Forests and Range (hereafter BCMFR), Victoria, file 0669, British Columbia, Ministry of Forests, O Series Correspondence Files.

[32] Canada, *Forty-Ninth Annual Report of the Fisheries Branch, Department of the Naval Service, 1915-16* (Ottawa: King's Printer, 1916), 263-70; Canada, *Fiftieth Annual Report of the Fisheries Branch, Department of the Naval Service, 1916-17* (Ottawa: King's Printer, 1917), 252-54, 238.

In decimating the Fraser River sockeye runs the Hell's Gate slides deepened the conflict between the forest and fishing industries. Increasing exploitation of coho, pink, and chum salmon by the purse seine fleet brought many smaller coastal streams into commercial prominence as loggers edged further up-coast and along the east coast of Vancouver Island in search of tidewater timber. By the mid-1920s, several of the province's seventy-nine logging railways were penetrating deep into Vancouver Island valleys, high-lead "shows" proliferated in the mainland inlets, and the coastal cut more than doubled over the decade. Provincially, the 762,000 kilometres of timber logged in 1925 dwarfed the 1905 figure of 51,816 kilometres.[33]

Confronting industrial logging on an ever-increasing scale, DMF officials continued to campaign for provincial regulation of streamside forest practices. Concerned that debris clearance expenditures were being nullified, in November 1919 Assistant Deputy Minister W.A. Found asked Babcock, now the assistant fisheries commissioner, to have the Forest Branch prevent companies from creating obstructions and to "hold liable those who [might] do so." Cooks Creek, a coho, chum, and steelhead stream draining into Fanny Bay, was being cleared of logging slash as a company prepared to initiate another operation near its banks. A similar situation applied to the Big Qualicum River, cleared during the past summer for a distance of over 6.4 kilometres from its mouth. Since July, a crew had been clearing obstructions (the result, in part, of Comox Logging and Railway Company operations) from Black Creek near Comox, but a superintendent's promise to remove the slash had gone unfulfilled.[34]

Babcock suggested that the canners were "too ready to believe that log jams [were] a serious menace to the runs on the Fraser," nor did he know "how far our Forestry people [could] go in the matter," but he pledged to do his best to see that they protected the streams. Found considered Babcock's views on the large rivers valid, but he insisted that debris jams became real barriers to ascending salmon "in the smaller streams and at certain seasons." Forwarding Found's concerns to Chief Forester Martin Grainger, Babcock asked about any regulations that might be

[33] Evenden, "Social and Environmental Change"; Matthew Evenden, "Social and Environmental Change at Hells Gate, British Columbia," *Journal of Historical Geography* 30 (1) (2004): 146-47; Robert D. Turner, *Logging by Rail: The British Columbia Story* (Victoria: Sono Nis Press, 1990), 48; Walter G. Hardwick, *Geography of the Forest Industry of Coastal British Columbia* (Vancouver: Tantalus Research Ltd., 1963), 15-18.

[34] W.A. Found to J.P. Babcock, 8 November 1919; Found to Babcock, 10 November 1919. Both in British Columbia Archives (hereafter BCA), GR 435, box 123, BC Department of Fisheries Records.

applied. When Grainger replied that the Forest Act gave his agency no jurisdiction over operators' use of streams, Babcock turned to the Water Rights Branch, asking if the Water Act might provide a remedy. Sections 3 and 4 of the act seemed relevant, responded C.A. Pope, as they made it an offence to obstruct flows useful for power generation by depositing sawdust, stumps, slash, and other wood waste into streams. The proper course of action would be for Found to file a complaint with a local justice of the peace and then prosecute the alleged offender.[35]

Babcock passed the above memo along to Found, who saw the solution not in expensive and uncertain court action but in the introduction of preventative clauses in provincial cutting rights. The lack of a provision in the Forest Act was no reason to allow "streams [to be] ruined from a salmon producing standpoint," and DMF clearance work would be fruitless without provincial cooperation. Babcock endorsed Found's request for measures to "impose on the companies the conditions desired," if possible. Grainger reaffirmed that this was not possible, citing the Forest Act's silence on the issue. Pope had indicated that a Water Act clause seemed to apply but pointed out that either level of government was free to enact new legislation providing clear authority.[36]

There the matter lay at the end of 1919, with Found frustrated in his first attempt to persuade the province to assume responsibility for salmon habitat. He tried again in September 1920, alerting Babcock to "the urgent necessity for proper control over those who are granted logging licences by the Provincial Government." The salmon were ascending in streams cleared the previous year, at great expense, but the work would be nullified if loggers remained free to create obstructions. Finding the situation "discouraging from a fisheries administrative standpoint," Found continued to use Babcock as an intermediary in dealing with Forest Branch officials. Babcock obliged, sending Found's request to new chief forester Percy Caverhill, along with a personal reference to the blockage of many Vancouver Island streams and the need for regulation, but Caverhill again asserted the absence of a Forest Act provision and

[35] J.P. Babcock to W.A. Found, 20 November 1919; Found to Babcock, 29 November 1919; J.P. Babcock, Memorandum for the Chief Forester, 20 November 1919; M.A. Grainger, Memorandum to the Deputy of Fisheries, 25 November 1919; J.P. Babcock to W.A. Found, 2 December 1919; J.P. Babcock, Memorandum for the Comptroller of Water Rights, 2 December 1919; C.A. Pope to the Assistant to Commissioner of Fisheries, 6 December 1919. All in BCA, GR 435, box 123.

[36] W.A. Found to J.P. Babcock, 12 December 1919; J.P. Babcock, Memorandum for the Chief Forester, 20 December 1919; M.A. Grainger, Memorandum to the Commissioner of Fisheries, 27 December 1919. All in BCA, GR 435, box 123.

referred Babcock to Pope's suggestion for Dominion action under the Water Act.[37]

With the ball back in his court, Babcock volunteered to take up any suggested provincial Fisheries Act amendments with the Forest Branch. The issue was one of jurisdiction, Found replied. The Water Act seemed adequate, but was it "not eminently unreasonable to suggest that the officers of this Department … should be expected to enforce such legislation?" Surely Babcock would agree that the province must enforce its own law. Expressing agreement, Babcock related that he had already asked the Forest Branch to take measures to control loggers. DMF field staff might assist, however, by reporting obstructions to Babcock's agency, which would "endeavour to see that the Forestry Branch [took] action."[38]

Forestry officials had not shown the slightest inclination to become involved in stream protection, of course, but the DMF had another iron in the fire, enlisting the salmon canners to pressure the provincial government. W.D. Burdis of the BC Salmon Canners Association followed through with a request to MLA and commissioner of fisheries William Sloan for passage of the necessary legislation. Sloan, having recently proposed a provincial takeover of fisheries administration, explained his department's limited patrol functions. The Dominion, "with its large revenue collections in th[e] Province" and greater field staff, was better positioned to handle the matter. Nevertheless, the canners could be sure of action when justified by evidence. Just what sort of action, and on whose part, Sloan did not specify. Babcock, nevertheless, told Caverhill that, if notified of Water Act violations by DMF officers, prosecutions "[would] be undertaken," implying that the Fisheries Commission would initiate proceedings, and he closed with a request that, "in so far as [was] consistent with your practice care be exercised in controlling logging operators."[39]

A delighted Found promised federal cooperation, and chief inspector of the DMF's Western Fisheries Division J.A. Motherwell went on to ask provincial officials to provide notice of all logging permits as they

[37] W.A. Found to J.P. Babcock, 11 September 1920; J.P. Babcock, Memorandum for the Chief Forester, 21 September 1920; Chief Forester, Memorandum to the Commissioner of Fisheries, 23 September 1920. All in BCA, GR 435, box 123.

[38] J.R. Babcock to W.A. Found, 27 September 1920; Found to Babcock, 24 November 1920; Babcock to Found, 2 December 1920. All in BCA, GR 435, box 123.

[39] E. Hawken to Secretary, BC Salmon Canners' Association, 24 November 1920; W.D. Burdis to W. Sloan, 2 December 1920. Both in BCA, GR 435, box 123. See also Cicely Lyons, *Salmon: Our Heritage* (Vancouver: Mitchell Press Ltd., 1969), 345-46. And see W. Sloan to W.D. Burdis, 3 December 1920; J.P. Babcock to Chief Forester, 7 December 1920. Both in BCA, GR 435, box 123.

were issued, giving the name and address of operators. Invited into the fish protection fold as participants in a referral system, Caverhill responded with a distinct lack of enthusiasm. "It is not necessary that everyone who contemplates logging in this Province shall obtain a permit through this Department," he told Motherwell, presumably referring to pre-1912 tenures and E&N belt Crown grants. Providing the desired information "would be very difficult if not impossible," but he would see that Motherwell received the registrar of timber marks used in calculating stumpage charges, allowing fishery officers to determine the identity and forest district of all operators.[40]

Given the immense size of the province's nine forest districts, that arrangement provided a flimsy basis for a systematic referral system. A discouraged Motherwell noted in 1921 that, as knowledge of spawning conditions improved, the need for clearance operations became more apparent. In 1923, repeating his request for Forest Branch cooperation, Motherwell advised that "the operations of the loggers [were] in a great many cases doing immense damage to the salmon and other fisheries." If notified in advance, local officers could coach logging managers on fishery requirements. Most logging in the province involved no permit, headquarters forester George Melrose repeated, and since only a small number of post-1912 timber sales had any effect on streams, referral would "place a big burden on our already overworked staff which perhaps might be a waste in 95 percent of the cases." An alternative would be for Motherwell to discuss the matter with Vancouver District Forester L.R. Andrews, who was responsible for Vancouver Island and the lower coast. As Melrose wrote to Motherwell, once Andrews informed Forest Branch headquarters of the DMF's desires: "We can then see what can be done."[41]

There is no record of further progress towards a referral system at this time. The federal approach boiled down to passing reports of stream abuse to provincial officials in a futile hope for action under the Water Act. In 1921, for example, the Wilson-Brady Logging Company began logging a licence bordering the west side of Reid Creek, near Topaz Harbour. Discovering that the company had deposited debris into the creek the following year, a DMF overseer notified the Quathiaski Cove

[40] W.A. Found to J.B. Babcock, 8 December 1920, BCA, GR 435, box 123; J.A. Motherwell to P.Z. Caverhill, 19 March 1921, BCMFR, file 0669; Caverhill to Motherwell, 12 April 1921, BCMFR, file 0669.

[41] Canada, *Fifty-Fifth Annual Report of the Fisheries Branch, Department of Marine and Fisheries, 1921–1922* (Ottawa: King's Printer, 1922), 54. See also J.A. Motherwell to Provincial Forestry Department, 22 May 1923; G.P. Melrose to J.A. Motherwell, 25 May 1923. Both in BCMFR, file 0669.

BC provincial police constable. A subsequent meeting elicited a promise from Brady to clear the obstruction, but he severed his connection to the company before following through, and his successor refused to fulfill the commitment. In 1924, with the company preparing to shift its rail line to the east side of the stream, Motherwell took up the case. Forcing compliance would be unfair to the new investor, Motherwell informed Babcock, but the original partner "should be held culpable." The familiar shuffle ensued, a "rather hesitant" Water Rights Branch inviting the DMF to initiate legal proceedings. Motherwell seemed no more willing to initiate a prosecution. Admittedly, the firm's licence had no language regarding the disposal of debris, but the Water Act could be used to force the company to remove the slash. Since no Dominion regulation applied, it would be "unusual" for his agency to step in, Motherwell advised.[42]

But when Babcock approached the Water Rights Branch, the comptroller denied any responsibility in the matter. The Water Act allowed an "injured party" to seek a remedy for obstructions, in this case the DMF. His department "could not undertake the prosecution where someone else [was] injured." A meeting involving Babcock and Water Rights officials produced additional legal obstacles – the difficulty of ascertaining the stream's pre-logging condition and of proving the company's responsibility for the obstructions. Babcock, perhaps tiring of the jurisdictional game, told Motherwell that he had "never found any stream so obstructed by logs and timber that salmon were prevented from making their way through." Many fisheries officers and anglers attributed more damage to "so-called jams" than warranted, and a closer inspection of Reid Creek might reveal that the fish passed upstream without undue delay. A similar scenario played out to the north three years later, on Pitt Island, and, as the rate of cut rose, the DMF found it "increasingly difficult to supervise the operations of loggers," although Motherwell and McHugh did report some limited success in having companies clear streams at their own expense. The latter went so far as to express pleasure at industry's growing recognition that obstructions would not be tolerated, although the annual reports for the 1920s reveal no prosecutions.[43]

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[42] J.A. Motherwell to J.P. Babcock, 16 April 1924, BCA, GR 435, box 123.

[43] J.P. Babcock, Memorandum for the Comptroller of Water Rights, 22 April 1924; Comptroller of Water Rights to J.P. Babcock, 26 April 1924; J.P. Babcock to J.A. Motherwell, 29 April 1924. All in BCA, GR 435, box 123. See also A. Mackie to Deputy Minister of Lands, 26 May 1927; Assistant Comptroller to Mackie, 31 May 1927. Both in BCA, BC Ministry of Lands Records, GR 1443, reel B4514, file 28400W. And see Canada, *Fifty-Eighth Annual Report of the Fisheries Branch, Department of Marine and Fisheries, 1924-1925* (Ottawa: King's Printer, 1925), 58, 91.

Remaining concerned about both the timing of Adams River Lumber Company log drives and the debris problem, Motherwell continued to pursue the introduction of restrictive measures in both provincial water licences and cutting rights. The first proved impossible because the company's licence could not be altered without its consent, Caverhill explained, and most of the province's timber had similarly been alienated with no provision for salmon protection in tenure contracts. Moreover, a restriction on the timing of drives to avoid disruption of spawning might create hardship for operators in moving timber to mills. Had any such regulations been imposed elsewhere on timber under either Dominion or provincial jurisdiction, Caverhill asked? Dodging that question, Motherwell shifted the focus back to the debris issue early in 1927 with a complaint about hand loggers. Caverhill pointed out that virtually all of their cutting took place along the coastal shoreline but promised to investigate any reports of abuse by that sector.[44]

Motherwell, unable to meet his goal of an annual inspection for all BC salmon streams, his officers covering large stretches of "wild country," was unable to counter Caverhill's claim that industry was innocent of most debris problems. Doggedly, he renewed his request for a district-level referral system. Some forest rangers already reported obstructions to local fishery officers, he told Caverhill, but a directive from Victoria for all to cooperate in this way would be helpful. That would add an additional burden to an overworked ranger staff, Assistant Chief Forester Ernest Manning replied, but DMF field men should feel free to maintain personal contact with district forest officers. The conviction that salmon faced impassable barriers in their journey to and from spawning grounds remained strong, then, despite an awareness that some debris accumulations had value in providing protection for young fish in their seaward migration, in serving as "collectors of food," and in helping prevent the scouring of spawning beds by slowing flows during freshets. Only those jams that blocked fish should be targeted for removal, Pacific Biological Station director W.A. Clemens noted in 1930.[45]

If some debris accumulations were good, and others bad, mounting scepticism about the benefits of hatchery production placed greater em-

[44] J.A. Motherwell to J.C. McDonald, 21 December 1926; McDonald to Motherwell, 24 December 1926; P.Z. Caverhill to Motherwell, 28 December 1926; Motherwell to Caverhill, 28 January 1927. All in BCMFR, file 0669.

[45] Canada, *Sixty-First Annual Report of the Fisheries Branch, Department of Marine and Fisheries, 1927–1928* (Ottawa: King's Printer, 1928), 27, 77. See also J.A. Motherwell to P.Z. Caverhill, 17 April 1928; E.C. Manning to Motherwell, 27 April 1928. Both in BCMFR, file 0669. And see W.A. Clemens, "The Problem of the Conservation of the Sockeye Salmon in British Columbia," *Transactions of the American Fisheries Society* 60 (1930): 265-66.

phasis on the protection of "nature's great production areas," as Clemens put it. Joseph Taylor has documented declining enthusiasm for artificial methods of reproduction among biologists during the early twentieth century. "There is little to indicate a high degree of efficiency of sockeye hatcheries," Stanford University biologist Charles H. Gilbert observed in 1917, and evidence from elsewhere indicated that streams with hatcheries did "little, if any better than the streams without hatcheries." In 1925, the Biological Board of Canada tackled the issue systematically with a twelve-year study at Cultus Lake dedicated to comparing the efficiency of artificial and natural methods of sockeye propagation. Russell Foerster's research there would result in closure of the Dominion's Pacific coast hatcheries after 1935, but, in the interim, related studies contributed to an appreciation of the need to protect spawning habitat.[46]

Gilbert, contracted by Babcock in 1912 to study the life history of the sockeye, did critical work in this regard. Wishing to determine whether or not salmon returned to their stream of origin to spawn, Gilbert's analysis of the fish scales of sockeye resolved a "home stream theory" debate that had bedevilled biologists for years, at least for that species. In 1920, delighted that Gilbert's work supported his own position, Dominion fisheries official E.E. Prince pronounced that the sockeye returned to spawn "not only in the river of their nativity, but to the very spot where they were reared as fingerlings." Each stream seemed to have its own race of salmon, then, emphasizing the need for protection of particular spawning grounds.[47]

Springs conformed to the same behaviour, W.A. Clemens reported in 1930, and, although preliminary results of tagging experiments at Massett Inlet suggested that the homing instinct might not be as strong for pinks, in 1934 Babcock expressed confidence that the phenomenon governed the migration of all Pacific salmon. The reasons remained unknown, but the growing consensus on the validity of the home-stream theory coupled with the closure of the federal hatcheries in the mid-1930s had clear implications. "The preservation, improvement and development of

[46] Clemens, "Problem," 266; Taylor, *Making Salmon*, 217-18; R.H. Gilbert, "The Sockeye Run on the Fraser River: Its Present Conditions and Future Prospects," in British Columbia, *Report of the Commissioner of Fisheries for the Year Ending Dec. 31, 1917* (Victoria: King's Printer, 1918), 114; R.E. Foerster, "Propagation's Part in the Conservation of Sockeye Salmon," *Transactions of the American Fisheries Society* 58 (1928): 52-67.

[47] Edward E. Prince, "Why Do Salmon Ascend from the Sea?" *Transactions of the American Fisheries Society* 49 (1920): 154; Evenden, "Locating Science," 361-65.

natural spawning grounds" demanded more attention than ever, DMF engineer Charles Bruce observed towards the end of the decade.[48]

With the annual value of forest production approaching $94 million during the late 1920s, BC fisheries managers confronted more disturbing trends than stream obstruction. Since the eighteenth century, in eastern North America the disruption of hydrological cycles by deforestation had raised concerns over domestic water supplies and fish populations. Early naturalists drew a clear connection between denuded watersheds and dramatic fluctuation in stream flows, evidence of the disruption of a divinely inspired natural balance. By the mid-nineteenth century, a recognition of the role of forests in conserving water by capturing moisture in the soil and humus for gradual release prompted George Perkins Marsh to warn that the clearing upheld as progress threatened the very basis of American civilization.[49]

Early twentieth century resource managers such as Michigan's Filibert Roth thought it safe to conclude that forests held soil in place, reduced surface runoff, and moderated the effects of sun and wind. Pennsylvania Fisheries officials N.R. Butler and Charles Reitell contributed to a growing body of commentary on the value of streamside stands, the latter observing that destruction of the "giant sponge" of the forest floor subjected small creeks and brooks to seasonal cycles of flood and low flows. Connecticut's John W. Titcomb ranked pollution and overfishing behind deforestation as causes of declining Atlantic salmon populations. Ontario could not afford to leave timber standing, forester Clifton D. Howe remarked in 1932, but anglers faced disappointment "when nature's balances ha[d] all been disrupted."[50]

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[48] W.A. Clemens, "The Part Which the Pacific Biological Station Is Playing in the Conservation of Canada's Pacific Fisheries," *Western Fisheries* 7 (1933): 9; Clemens, "Problem," 206; W.A. Clemens, R.E. Foerster, and A.L. Pritchard, "The Migration of Pacific Salmon in British Columbia Waters," in *The Migration and Conservation of Pacific Salmon*, ed. Forest Ray Moulton (Lancaster: Science Press, 1939), 55-57; British Columbia, *Report of the Commissioner of Fisheries for the Year Ended Dec. 31, 1934* (Victoria: King's Printer, 1934), 104; Canada, *Ninth Annual Report of the Department of Fisheries, 1938-1939* (Ottawa: King's Printer, 1939), 140.

[49] British Columbia, *Report of the Forest Branch of the Department of Lands for the Year Ended Dec. 31, 1928* (Victoria: King's Printer, 1929), 22, 27; Richard Judd, "'A Wonderful Order and Balance': Natural History and the Beginnings of Conservation in America, 1730-1830," *Environmental History* 11 (2006): 8-36; Donald J. Pisani, "Forests and Conservation, 1865-1890," *Journal of American History* 72 (1985): 340-59; Michael Williams, *Americans and Their Forests: A Historical Geography* (New York: Cambridge University Press, 1989), 370-71.

[50] Filibert Roth, "The Fisherman and Reforestation," *Transactions of the American Fisheries Society* 35 (1906): 164-68; N.R. Butler, "Forest Influence on Stream Pollution," *Canadian Forestry Journal* 12 (1916): 878-79; "Effects of Drought and Extreme Heat of Summer on Fish Life," *Transactions of the American Fisheries Society* 51 (1921-22): 133; Dr. Charles Reitell, "More Forests, Better Fishing," *Forest and Outdoors* 21 (1925): 261-63; John W. Titcomb, "Forests in

By the late 1920s, the scars left by clearcutting elicited similar observations on Vancouver Island. Touring by automobile in 1930, journalist Helen Kerr and her party caught trout at Cameron Lake, but at Great Central Lake she contrasted the "great bare patches on the flanks of the hills" to the rich green of adjacent unlogged slopes. At Campbell River the "yawning emptiness" of the clearcuts again drew her attention, and hot, dry summers during this period prompted J.A. Motherwell to consider the implications when low water in several streams that passed through Vancouver Island cutovers prevented the first runs of salmon from reaching their spawning grounds. Prior to clearcutting, flows had been abundant year-round, but drought conditions in 1928 and 1929 reduced rivers in the heavily logged Cowichan, Comox, and Ladysmith regions to trickles. Only an immediate commitment to reforestation would maintain the runs, Motherwell concluded.[51]

Log jams continued to rank highly among DMF concerns, with the agency spending $4,126 to remove obstructions from fifty-two streams in 1932. An amendment to the Fisheries Act that year made it an offence to deposit "slash, stumps, or other debris into waters frequented by fish or into the sources of such waters." Since strict enforcement would have curtailed most logging in the province, P. Scott and W. Schouwenberg conclude in a review of habitat protection under the Act, the law's application demanded "a degree of judgement." The forest industry exerted pressure to ensure discretion. In 1931, fisheries inspector H.M. (Harry) Beadnell encouraged the Comox Logging and Railway Company to keep Comox Lake and neighbouring streams clear of debris on its vast operations. Foremen had been so instructed, manager Robert Filberg informed Beadnell, who was well known for protecting the "liberty and pleasure of fishes." "Some of us poor fish have to live too," he reminded Beadnell.[52]

Relation to Fresh Water Fishing," *Transactions of the American Fisheries Society* 56 (1926): 127–29; Clifton D. Howe, "Tomorrow's Fishing," *Forest and Outdoors* 28 (1932): 132–35.

[51] Helen Kerr, "Motor Vagabonding on Vancouver Island," *Canadian Geographical Journal* 1 (1930): 353–67; Canada, *Sixty-Second Annual Report of the Fisheries Branch, Department of Marine and Fisheries, 1928–1929* (Ottawa: King's Printer, 1929), 96; Canada, *Sixty-Third Annual Report of the Fisheries Branch, Department of Marine and Fisheries, 1929–1930* (Ottawa: King's Printer, 1930), 102, 110; *Cowichan Leader*, 23 January 1930.

[52] P. Scott and W. Schouwenberg, "Environmental Foresight and Salmon: New Canadian Developments," in *Pacific Salmon Management for People*, ed. Derek V. Ellis (Victoria: University of Victoria, 1977), 126; Canada, *Office Consolidation of the Fisheries Act* (Ottawa: King's Printer, 1936), 9; H.H.M. Beadnell to R.J. Filberg, 10 June 1931; Filberg to Beadnell, 13 June 1931. Both in Royal BC Museum, Comox Logging and Railway Company Records, box 1 (records transferred to the Courtenay and District Museum and Palaeontology Centre [hereafter CDMPC] subsequent to the author's research).

Figure 2. Comox Logging and Railway Company gas-electric shovel crossing the Oyster River to clear railway grades, 1927. Photography by Walter Montgomery. See also Mackie, *Island Timber*, 155. Image F-08667 courtesy of the Royal BC Museum, BC Archives.

Figure 3. Comox Logging and Railway Company rigging crew and steam donkey crossing the Cruickshank River, ca. 1940. See also Mackie, *Mountain Timber*, 226. Courtesy of Doreen Telosky.

Filberg's jocular tone vanished after another complaint in 1932. Having made a sincere effort to comply with Beadnell's cautions, which were "too numerous to recall," Filberg delivered a clear, if sarcastic, lesson in BC political economy. "If our efforts are not satisfactory to you," he instructed Beadnell, "at any time upon your instructions we will lay off the crews working at Comox Lake and suspend our operations." Conversations with other Island operators indicated that they had endured much less annoyance from fishery officials than had Filberg and that, in "riding [him] unduly," Beadnell had pushed too hard. If Beadnell was dissatisfied with his crews' compliance, Filberg repeated, "[they were] ready to quit at any time." Beadnell's superior, J.F. Tait, supervisor of fisheries at Nanaimo, hurried to mollify Filberg. Beadnell was "thoroughly conscientious," but all officers were expected to "use discretion in their dealings with those connected with other industries." Comox Logging's past efforts were much appreciated, and officials hoped for continued "reasonable care" in preventing stream pollution (Figure 2).[53]

Cooperation continued to prevail over confrontation in a 1937 exchange involving the firm's logging adjacent to the Tsolum and Cruickshank rivers. That May, Beadnell's successor, A. McDonald, asked Filberg to clear the Tsolum of debris before pinks began their late-summer run, when falling water levels would "unquestionably prevent salmon from ascending." Removal would not be difficult with the high-lead equipment currently stationed next to the Tsolum, "and in fact actually yarding logs across the river," McDonald mentioned in passing. Filberg agreed, a week later accompanying Tait, engineer J. McHugh, and McDonald on an inspection of the Cruickshank River, site of a similar situation (Figure 3). Again Filberg promised a cleanup after construction of a railway spur line along the river, and Tait approved the arrangement. "It is not the wish of this Department that those engaged in the industry be unduly obstructed," Tait informed Filberg, who praised the official's handling of the matter in a way that balanced industrial efficiency and fish conservation. But the following year, with operations wrapping up along the Tsolum, McDonald reported that logs and debris threatened to develop into several impassable jams. Filberg assured McDonald that a September slash burn would probably consume most of the material, and the firm would "do [its] part" in keeping streams open, even clearing older jams easily reached by its equipment. Doubting that the slash burn

[53] H. Beadnell to R.J. Filberg, 18 June 1932; Filberg to Beadnell, 22 June 1932; J.F. Tait to Filberg, 7 July 1932. All in CDMPC, Comox Logging and Railway Company Records, box 1.

would clear the Tsolum, McDonald nevertheless expressed appreciation for Filberg's cooperative attitude and promised to monitor the situation.[54] Encouraging cooperation in the conduct of logging, and urging operators to engage in post-logging cleanup, reflected the federal department's pragmatic acceptance of the timber industry's economic and political power in a province wedded to forestry profits. Debris violations led to a few prosecutions and small fines in the mid-1930s, but clearcutting as a mode of production remained beyond the scope of the Fisheries Act. Even the introduction of an alternative technology that permitted selective logging came with mixed blessings as stream beds proved to be convenient yarding roads for the caterpillar tractors that came into use during the decade.[55]

ERNEST MANNING AND THE MULTIPLE-USE MOMENT

After a sharp decline in forest exploitation during the first three years of the Great Depression, the gradual revival in trade coincided with a growing critique of unregulated clearcutting, even sentiment favouring a ban on the practice, by British Columbians disturbed at the failure of a new forest to appear in the vast cutovers. The well-being of fish and their habitats played a part in conservationist discourse and contributed to Chief Forester Ernest Manning's embrace of the multiple-use philosophy of forest management. Manning not only campaigned for moderate regulation to curb the worst abuses of clearcutting but also advanced a conception of forests that encompassed their recreational and tourism value in cultivating the support of anglers and fisheries managers for his conservation agenda. Although the depth of Manning's commitment to multiple-use remains a matter for some conjecture, his 1941 death raising the intriguing question of what might have been, his tenure stands out as a brief, albeit unfilled, moment of potential for a more balanced approach to forest and water conflict.[56]

That, certainly, was on the minds of British Columbians when Caverhill's death led to Manning's appointment as chief forester in 1935. The plight of the coho in Comox Valley streams had prompted Captain E. Lloyd of Courtenay to demand remedial action in 1934. Forwarding

[54] J.F. Tait to R.J. Filberg, 17 June 1937; Tait to Filberg, 17 June 1937; Filberg to Tait, 25 June 1937; McDonald to Filberg, 22 May 1938; Filberg to McDonald, 25 May 1938; McDonald to Filberg, 27 May 1938. All in CDMPC, Comox Logging and Railway Company Records, box 1.

[55] Canada, *Fifth Annual Report of the Department of Fisheries, 1934-1935* (Ottawa: King's Printer, 1935), 175; Canada, *Sixth Annual Report of the Department of Fisheries, 1935-1936* (Ottawa: King's Printer, 1936), 217-18.

[56] Rajala, *Clearcutting the Pacific Rain Forest*, 154-66.

Lloyd's concerns to BC commissioner of fisheries G. Pearson, MP A.W. Neil related that, in the denuded watersheds, creeks ran dry in the summer. Even if planting entire watersheds was out of the question (and Lloyd accepted this), reforesting the streamsides with fast-growing willows would help as a buffer against runoff, in cooling the waters, and in providing a breeding ground for insects. Neil considered the proposal well worth deliberation, but a technical report prepared by Pearson's staff described it as "highly impractical." The cost of planting the banks of "former streams" would be unjustified given their "limited past production." Nor was it certain that the home-stream theory applied in these waters as it did on the major sockeye rivers. If coho spawners found their natal stream blocked, it was "altogether likely that they would continue along the coast until drawn to another." As for debris accumulations, most were swept downstream by freshets, and the responsibility for clearing those that did not lay with the Dominion.[57]

Small salmon streams, in this provincial analysis, were beyond rehabilitation, unworthy of protection, or someone else's problem. Condemnation of the logging industry's disregard for aquatic habitats continued to figure in the broader critique of industrial forestry, however. For example, the Shirley Workers and Farmers Association complained when, in 1936, loggers plugged a Sooke area stream with debris. "Too much logging close to lakes and streams" came up for discussion at a Victoria and District Fish and Game Association meeting later that year. In 1937, the BC Trollers' Association called on the Forest Branch to reforest cutover streamsides. The Duncan Chamber of Commerce and Port Alberni Board of Trade joined the chorus by urging stricter control of forest practices in the interests of anglers and commercial fishers.[58]

Fisheries unions, upset by closure of the salmon hatcheries, responded by demanding the reallocation of federal funds to stream clearance and the initiation of relief projects tailored to salmon conservation. The province had introduced the Young Men's Forestry Training Plan in 1935, involving unemployed British Columbians in forest protection and park development. Still needed, however, was a similar program devoted to the study and improvement of smaller streams, which drew less attention than the major sockeye rivers. The fishers should not be cast as perfect

[57] A.W. Neil to G. Pearson, 3 January 1934; G. Pearson to Capt. E. Lloyd, 4 January 1934; Technical Advisor, Memorandum for the Commissioner of Fisheries, 5 January 1934. All in BCA, GR 435, box 123.

[58] F.G. Aldham to Deputy Commissioner of Fisheries, 15 February 1936, BCA, GR 435, box 123; "Many Attend Game Dinner," *Victoria Daily Times* 15 December 1936; "Suggest Clearing Salmon Rivers," *Comox Argus*, 8 July 1937; M. Taylor to Chief Forester, 30 December 1937, BCMFR, file 0669; "ABTVI and Resolutions," *Comox Argus*, 10 November 1938.

ecologists, given their enthusiasm for bounties on seals, the shooting of predatory birds, and for relief programs in ridding sockeye lakes of trout and other "enemies of salmon." For Manning, nevertheless, their voices added a useful thread to the fabric of Depression-era environmental concern.[59]

The chief forester took advantage of popular pressure for less destructive logging when he condemned the massive clearcuts that had denuded entire valley bottoms on Vancouver Island and the lower coast, leaving a fringe of higher elevation timber to re-seed cutovers. Over 242,811 hectares of cutover land in the Vancouver Forest District was devoid of new growth, and another 161,874 hectares exhibited minimal restocking. Only 25 percent of cutover private lands in the E&N Railway belt featured satisfactory reforestation. According to a 1937 report, on both private and Crown land, operators pursued "rapid liquidation of their timber assets."[60]

Manning's proposed reforms would compel operators to burn slash after logging and, more problematically, require them to reserve seed trees to promote natural reforestation. He warned that barren land was inimical to the province's future, in the process making common cause with potential allies in tourism, sporting, and commercial fishing circles. "It is becoming increasingly clear," he declared in 1936,

> that we must value our forests not only as a source of our supplies of timber but also for their other uses – as food and shelter for our game and fur-bearing animals, as regulators of the water flow of the streams in which we fish, and as attractions for the tourist and other recreationalists who delight in the great outdoors. Our forest areas must be developed and protected from fire in the interests of these "multiple-uses."

Far-sighted planning would allow managers to "harmonize" the various uses, but, in a 1936 article, expressing sympathy with those devoted to fish and game conservation, Manning ruled out the reservation of streamside timber on the grounds of industry property rights. Depriving

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[59] "The Forgotten Fish," *Fisherman*, 21 October 1939; H.E., "Open Letter to Fisheries Department for Research on Blueback Run," *Fisherman*, 11 April 1939; "Provincial Legislative Program for the Fishing Industry," *Fisherman*, 23 April 1937; Bob Stewart, "Conservation," *Fisherman*, 18 November 1937. For insight into the forestry relief programs of the period, see Richard A. Rajala, "'From on-to-Ottawa' to 'Bloody Sunday': Unemployment Relief and British Columbia Forests, 1935-1939," in *Framing Canadian Federalism: Historical Essays in Honour of John T. Saywell*, ed. Dimitry Anastakis and P.E. Bryden (Toronto: University of Toronto Press, 2009), 118-50.

[60] F.D. Mulholland, *The Forest Resources of British Columbia* (Victoria: King's Printer, 1937), 75-77; D.L. McMullen, "Esquimalt and Nanaimo Land Grant: Survey and Recommendations for Improved Forest Practice," BC Forest Branch, unpublished report, 1937, 1, 34.

loggers of access to those trees was an attractive but impractical idea because it required property holders to be compensated. Yet it seemed a pity "to destroy, for so little profit, that which it [would] take a quarter of a century or more to rebuild."[61]

If the pattern of timber rights precluded preservation, Manning could still make use of the fish habitat issue in his reforestation campaign. In 1937, he met with J.A. Motherwell to ask for information about the benefits of forest cover for salmon. Still waiting a month later, he followed up with a reminder. "I have been given to understand that where it has been necessary to log we should get a new crop around our lakes and along our streams as rapidly as possible on account of the shelter given the fish and the effect on them of the shade and temperature of the water," he wrote, requesting an opinion. Logging had concerned his agency for years, Motherwell replied. Soils were robbed of their capacity to hold moisture, causing streams to dry up in the late summer months and cutting early runs off from spawning grounds. Autumn runs had an easier time of it, but the young fry suffered huge losses the following summer as flows diminished and water temperatures rose to dangerous levels. Conversely, heavy rains on deforested slopes caused rapid runoff and freshets that scoured spawning beds, killing eggs and fry. Finally, streams clearcut to their banks had less abundant insect populations upon which some fish species relied. "Undoubtedly," Motherwell concluded, "the sooner a new crop of timber grows up along these streams the better for the … salmon fisheries industry."[62]

In his 1937 annual report, Manning again advocated the application of multiple-use principles in reaping the full benefit of forests, describing sportsmen and tourists as legitimate forest users and as "sources of revenue capable of great expansion." Good roads alone would not bring tourists to Vancouver Island, he told a joint meeting of the Nanaimo Board of Trade and Cowichan Fish and Game Association; rather, they would be brought by: "the beauty of our scenery, our delightful camping places, and our green forest areas in which to hunt and fish." Impressed with US Forest Service and National Parks Service planning methods during a 1938 tour, later that year Manning tried to convince the legislature's forestry committee of the wisdom of "a wise, balanced forestry administration." Manning's statements coincided with a suf-

[61] British Columbia, *Report of the Forest Branch of the Department of Lands for the Year Ended Dec. 31, 1936* (Victoria: King's Printer, 1937), 7; E.C. Manning, "Is British Columbia to Be Sea of Barren Hillsides?" *Victoria Daily Times*, 5 November 1936, magazine section.

[62] E.C. Manning to J.A. Motherwell, 24 September 1937; Motherwell to Manning, 2 October 1937. Both in BCMFR, file 0669.

ficient volume of public support to prompt a 1937 rebuttal from industry. Recent years had witnessed "a lamentable swing … towards unreasonableness on the question of whose interests predominate in the timbered areas of this province," declared the *British Columbia Lumberman*: "the industrialist who pays wages or the tourist or sportsman who spends them." Not only did lumbering contribute millions of dollars annually to the economy, some of workers' earnings went to the purchase of canned salmon. Moreover, logging interfered with the tourism sector far less than tourists and sportsmen did with the timber industry. Fires caused by their carelessness "did more damage to the haunts of game or to pollute fishing streams than all the logging operations in the province."[63]

The 1938 Bloedel Fire – sparked by Bloedel, Stewart and Welch operations and sweeping through over 40,468 hectares of cutover land between Menzies Bay and Courtenay – could not be blamed on campers. The fire added legitimacy to Manning's regulatory campaign, but his relations with Premier Pattullo had begun to sour, the latter accusing him of inciting public support for larger Forest Branch appropriations. Editorial opinion favoured the chief forester, and Manning continued to warn that overcutting threatened to leave "an impoverished heritage to [the province's] children," but his statements on clearcutting regulation adopted a more moderate tone. His multiple-use agenda took on new energy, however, at least in tourism promotion, when the Forest Branch assumed administrative control over parks in 1939.[64]

Promoting tourism was consistent with Manning's goal of drawing the fullest possible benefit from Crown forests, but the Second World War derailed his plans and worried his supporters. The relief projects that had supplied the labour for park development were cancelled that autumn, saddening author, fisher, and conservationist Roderick Haig-Brown. Cheered by "a healthy change in attitude here in British Columbia," Haig-Brown now worried that war would "bring well to the front the two worst enemies of conservation, profit and expediency." As timber

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[63] British Columbia, *Annual Report of the Forest Branch for the Year Ended Dec. 31, 1937* (Victoria: King's Printer, 1938), 9-11; "Foresters to Make Park Study," *Victoria Daily Times*, 5 October 1938; "Forest Park Work Studies," *Victoria Daily Times*, 21 October 1938; "Qualicum Fire Held Example Slash Menace," *Cowichan Leader,* 10 June 1938; "Address by the Chief Forester to the Forestry Committee of the British Columbia Legislature," 15 November 1938; "The Tourist Industry and the Lumber Domain," *British Columbia Lumberman* 21 (1937): 14.

[64] "Conservation and Politics," *Province*, 2 December 1938; "Reforestation Issue Raised in the Legislature," *News-Herald*, 29 November 1938; Rajala, *Clearcutting the Pacific Rain Forest*, 163-64; "City Has Greatest Winter Sports Area of Continent, Says Manning," *News Herald*, 24 April 1939; "Great Tourist Year Forecast," *Victoria Daily Times*, 27 July 1939. For an account of the Bloedel fire, see Richard Somerset Mackie, *Island Timber: A Social History of the Comox Logging Company, Vancouver Island* (Victoria: Sono Nis Press, 2000), 272-84.

and salmon were subjected to higher demand, spokespeople for "proper use" might fall silent as wartime discipline inhibited the free expression of opinion, he predicted in a letter to the *Comox Argus*'s Ben Hughes. Haig-Brown also sent a copy to Manning, urging policy-makers to avoid sacrificing natural resources to "ruthless exploitation" so that the veteran returned to a country "in no worse shape than when he left."[65]

Manning quoted Haig-Brown's words at length in his November 1939 address to the legislature's forestry committee, and the onset of war inspired similar concerns from one commercial fisher, who called for pressure on politicians to ensure that "the constructive work of conservation [was] not pigeon-holed as it [had been] the last time." Those who fished for recreation and for a living should develop a common conservation program, Percy Sabin suggested: "After all, when the timber is all cut and the streams are all dried up or polluted by industrial plants, or filled with mud and chunks by logging, there'll be very few fish for any of us to catch."[66]

Conflict between sport and commercial fishers over catch allocation would only deepen with time, but in the months surrounding Canada's entry into the Second World War they and tourism promoters combined blunt criticism of industry with serious multiple-use proposals. In June 1939, the Associated Boards of Trade of Vancouver Island urged the retention of timber along streams, lakes, and roads. That spring, Sooke resident W.J. Shannon had accused the Pioneer Logging Company of filling Coal Creek "so full of logs and debris that it [was] impossible for a fish to get up-stream." Cumberland miners complained that debris in Comox Lake and surrounding streams drove locals and tourists away from favoured fishing and swimming spots. Vancouver Island commercial fisher Elgin "Scotty" Neish advised the Alert Bay Board of Trade of the need for controls on logging. Excessive runoff from clearcut hillsides caused freshets that either killed salmon eggs or left the spawn exposed to dry streambeds the following summer. Neish also remarked on "insurmountable" stream obstructions, but he cautioned against wholesale removal. In slowing flows during freshets and creating spawning pools, some jams served a useful purpose. Roderick Haig-Brown agreed, going so far as to recommend the re-establishment of some debris ac-

[65] R. Haig-Brown to E.C. Manning, 15 November 1939; R. Haig-Brown to B. Hughes, 2 September 1939. Copies of both in the possession of the author, courtesy of Helen Manning Akrigg.

[66] Address by the Chief Forester to the Forestry Committee of the British Columbia Legislature, 9 November 1939, copy in the possession of the author, courtesy of Helen Manning Akrigg. 13-14; "Conservation Fund Must Be Maintained," *Fisherman*, 13 February 1940; Percy Sabin, "Sportsmen, Attention!" *Fisherman*, 30 January 1940.

cumulations that had been blasted out on small streams as these formed resting places and food sources for young fish.[67]

Perhaps the most striking 1939 proposal originated with the Prince Rupert-based North Island Trollers' Cooperative Association, which called on the Pattullo government to adopt: "a comprehensive conservation policy for the timberlands of the Province which are a part of the watersheds draining into salmon spawning streams." The submission prompted an exchange of views among policy-makers and administrators, one that reveals both constraints and possibilities. Minister of Lands A. Wells Gray assured the group that his department would consider "practicable suggestions" but cautioned that many spawning streams passed through privately held timberland – equities that must be considered. Addressing that reality, Manning proposed a few months later that the public bear some of the cost of seed tree reservation, but there is no evidence that he or Wells Gray seriously contemplated a similar approach to streamside stands. In discussing the trollers' plea with Assistant Commissioner of Fisheries George Alexander, Manning credited the damp north coast climate for reducing the fire menace and promoting rapid restocking. However, a higher incidence of slash fires on the lower coast meant greater damage to organic matter on the cutovers and delayed natural reforestation, with negative consequences for stream flows. His staff was anxious to cooperate "within practical limits" on salmon conservation, he informed Alexander. Federal minister of fisheries J.A. Michaud, who had also been briefed by the trollers, secured Wells Gray's agreement to the joint inspection of instances in which logging appeared to harm fish life.[68]

Federal fisheries officials continued to report critically on logging during the early 1940s, but production would trump conservation in both industries during the war, as Haig-Brown feared. Full-out production of canned salmon for British consumption drove fisheries policy, and Manning, as Pacific Coast assistant to Timber Controller H.R. MacMillan, struggled to meet his superior's demands for increased Douglas fir output. Then, on 6 February 1941, Manning perished with eleven others

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[67] "Better Spirit on Island," *Comox Argus*, 29 June 1939; W.J. Shannon to Fisheries Department, 1 May 1939; J. Robertson to Department of Fisheries, 20 June 1939. All in BCA, GR 435, box 123. See also Elgin Neish, "Protection of Small Streams," *Fisherman*, 6 June 1939; "Conservation," *Fisherman*, 1 August 1939; "Million Anglers Are Waiting," *Comox Argus*, 7 April 1939.

[68] "North Island Trollers Report Progress," *Western Fisheries* 18 (1939): 17. See also G. Dolson to A. Wells Gray, 15 September 1939; Wells Gray to Dolson, 27 September 1939; G. Alexander to Commissioner of Fisheries, 5 October 1939; J.A. Michaud to Wells Gray, 6 October 1939; Wells Gray to Michaud, 26 October 1939. All in BCMFR, file 0669. And see Rajala, *Clearcutting the Pacific Rain Forest*, 166.

in a Trans-Canada Airlines crash while returning west from Ottawa. An outpouring of editorials followed, the *Vancouver Sun* calling him "the father of BC conservation." A sporting magazine praised his close relationship with fish and game associations and the balance he had struck in meeting industry needs while preserving forests. Manning, Haig-Brown wrote, had given those "whose lot it is to look upon the devastated areas behind the highlead machines" the assurance that "something was being done."[69]

Just what path Manning would have taken in the postwar era cannot, of course, be determined. What is clear is that his successor, C.D. Orchard, shared little of his enthusiasm for either state regulation or multiple-use. Orchard's laissez-faire philosophy of business-government relations followed in the tradition of cooperation that took shape during the early twentieth century, and the sustained-yield agenda he realized in the tree farm licence policy of the late 1940s prioritized maximum timber production to the virtual exclusion of all other considerations. The multiple-use leanings evident in Manning's thinking figured much less prominently in Orchard's writing. Ideologically and intellectually, Manning was better equipped to seek a balanced approach to conflict, and at his death, fisheries officials were just beginning to assemble the data needed to press foresters to accommodate their resource.[70]

Central in this process was the Pacific Biological Station's Ferris Neave, who had begun investigating the effect of logging on the Cowichan River in 1933 in response to complaints of declining runs from the Duncan Chamber of Commerce and Cowichan Fish and Game Association. Reporting in 1941, Neave found that seasonal flows fluctuated more violently as the watershed had been clearcut. Winter floods, occurring after salmon had deposited their eggs, tore up spawning beds with significant losses. Alternatively, the Cowichan's freshets cut new channels, stranding young fish in isolated, shallow pools during dry periods. The "lethal effects" of siltation were also evident, and late summer water temperatures rose above ideal levels. By the late 1940s, Neave had documented "a widespread deterioration in stream conditions" on Vancouver Island. Pink salmon runs on several Qualicum-area streams had been reduced "almost to the

[69] Gough, *Managing Canada's Fisheries*, 214; Lyons, *Salmon*, 437; Canada, *Tenth Annual Report of the Department of Fisheries, 1939-40* (Ottawa: King's Printer, 1940), 134-38; Canada, *Eleventh Annual Report of the Department of Fisheries, 1940-41* (Ottawa: King's Printer, 1941), 72-74; "Manning Was Father of B.C. Conservation," *Vancouver Sun*, 7 February 1941; "E.C. Manning," *Angler and Hunter* 6 (1941): 7; Helen Manning Akrigg, "Ernest C. Manning," in *Manning Park Memories: Reflections on the Past* (Victoria: Ministry of Lands and Parks, 1991), 14.

[70] For discussion of Orchard's approach to government-industry relations, see Rajala, *Clearcutting the Pacific Rain Forest*, 190-99.

vanishing point." Although biologists were uncertain about the relationship between habitat destruction and overfishing in the declining salmon pack, they recognized changes in the freshwater environment as "a potent cause of fluctuations in the abundance of mature salmon."[71]

Pacific Biological Station staff hoped to initiate a long-term study of a watershed as it underwent logging but were unable to establish a project of the sort that the US Forest Service launched on the H.J. Andrews Experimental Forest during the late 1940s, which tested cutting practices in order to identify methods of stream protection. Alaska was the site of similar research, but it was not until the early 1970s that agencies and industry initiated the Carnation Creek project on Vancouver Island. In the mid-1940s, station director R.E. Foerster could only express regret that, in many areas, "full scale removal of timber [had] taken place, and conditions in the streams [were] rendered very bad indeed."[72]

CONCLUSION

Would Manning have charted a different path, one more attuned to the interests of fishers and the tourism sector? That he seemed to be inclined to do so is no guarantee, given the legacy of entrenched property rights in timber that McBride had bequeathed to British Columbia, the industry's continuing political influence, and the province's legal claim to a share of forestry profits. The constraints of federalism should not be underestimated either. Ottawa had constitutional authority, it seemed, but exercising it in an aggressive way would have infringed upon an industry that fell under provincial control and invited more bickering and court challenges, a scenario that unfolded in the 1970s with mixed results in the Dan Fowler and Northwest Falling Contractors cases. Persuasion and the levying of occasional small fines for debris violations represented the limit of federal action, threats that fishers described as meaningless. Streamsides, and even the waters themselves, occupied a grey area that encouraged a cautious regulatory approach, and federal

[71] Ferris Neave, "Cowichan River Investigation," 1941, 12-13, unpublished manuscript, Pacific Biological Station Library; Ferris Neave, "Fecundity and Mortality in Pacific Salmon," *Transactions of the Royal Society of Canada* 42 (1948): 102-3; Ferris Neave and W.P. Wichett, "Factors Affecting the Freshwater Environment of Pacific Salmon in British Columbia," *Proceedings, Seventh Pacific Science Congress* 4 (1949): 555. See also Ferris Neave, "Natural Propagation of Chum Salmon in a Coastal Stream," *Progress Reports of the Pacific Coast Stations of the Fisheries Research Board of Canada* 70 (1947): 20-21.

[72] R.E. Foerster to R.G.H. Cormack, 27 Oct. 1945, Pacific Biological Station Library; Sally Duncan, "Openings in the Forest: The Andrews Story," *Forest History Today* (1999): 20-28; Harold E. Anderson and George A. James, "Watershed Management and Research on Salmon Streams of Southeast Alaska," *Journal of Forestry* 55 (1957): 14.

demands for provincial regulation of its chief industry produced only frustration. British Columbia's devotion to the capital accumulation potential of its forests far outweighed Ottawa's interest in protecting Pacific salmon, a dynamic highlighted on the Stellako River in the 1960s and at Riley Creek on Haida Gwaii in the following decade. In both instances federal fisheries ministers backed down when confronted with the province's determination to uphold forest industry freedoms.[73]

Moreover, the scientific foundation for multiple-use regulation was only just being developed. If fisheries officials were sure that clearcutting to the banks of streams posed problems, the obvious solution – leaving intact borders of timber – raised too many questions to resolve without years of research. How wide should leavestrips be? What streams merited that level of protection? Even the debris problem yielded no simple answers, given the scepticism with which Haig-Brown and others viewed federal stream clearance efforts. Nor would science, even scientific consensus, eliminate the legal obstacles to streamside regulation. Could operators be deprived of access to trees held under pre-1912 tenure contracts, to say nothing of the unquestioned property rights attached to timber within the E&N belt? Not without compensation, officials acknowledged. Manning knew that it would take time to create the political will to realize that aspect of his agenda; and time, it turned out, he did not have.[74]

Finally, relations between forest and fisheries managers were far from equal. By training and inclination most foresters had little interest in taking on a role in fisheries management, and the Forest Act gave them no such authority. Fisheries agencies finally achieved their goal of a referral system in the late 1950s, but true inter-professional cooperation proved elusive. Throughout the postwar period Orchard's tree farm licences offered corporations enormous managerial freedom in a Cold War political culture that equated state intervention with communist totalitarianism. Manning was no leftist crusader, but his brand of New Deal liberalism might have required adjustment under the Coalition and Social Credit governments that demonized the Co-operative Commonwealth Federation while opening the remaining Crown forests to multinational timber capital. Not until the early 1970s did Dave Barrett's NDP government take a patch-logging

[73] "Ruthless Logging Methods Ravage Salmon Fishing, Inquiry Told," *Fisherman*, 2 May 1944; Rajala, "This Wasteful Use," 31-74; Richard A. Rajala, *Up-Coast: Forests and Industry on British Columbia's North Coast, 1870-2005* (Victoria: Royal British Columbia Museum, 2006), 204-5.

[74] Rajala, *Clearcutting the Pacific Rain Forest*, 163-64.

approach to the forestry-fisheries conflict, its Coast Logging Guidelines provoking massive forest industry opposition.[75]

A look back to the pre-Second World War years promotes understanding of the spatial, technological, economic, and political structures that made putting multiple-use conservation into practice such a difficult, drawn-out process. "Wise use and exploitation of one resource almost always restricts or damages the returns from another," a 1966 BC Fish and Wildlife Branch manual notes, expressing a truth well known to early twentieth-century fishers and fish managers. They had confronted the consequences of unregulated clearcutting even as they pursued the same sort of commodity-driven approach to fish. To one degree or another, materialist values permeated the treatment of all resources, even among the anglers who demanded access to fish in their leisure pursuits.[76]

Evident here, however, is also a current of conservationism that deplored the abuse of valued landscapes in pursuit of private profit and public revenue. This persistent sense of avoidable loss, of a desire for "proper use," as Haig-Brown put it, gathered strength during the 1930s, finding an official voice in the person of Ernest Manning. The extent to which his death diverted British Columbia from a less aggressive postwar clearcutting regime is open to debate, but he embodied the potential to respond in some measure to demands for land-use reform. Postwar sustained-yield forestry as moulded by C.D. Orchard, coupled with assurances that multiple-use management would achieve compatibility in outdoor recreation, tourism, and commodity exploitation, offered panaceas that only provoked conservationist outrage. Denuded streamsides, industrial activity in parks, log drives that put streams into the service of timber companies, and the aerial application of DDT to control forest insects all inspired widespread dissent well before the environmental movement emerged. That the promise of multiple-use went unfulfilled owes much to the inflexibility of the structures of forest exploitation that arose in the first decades of the twentieth century, and their resilience is evident today as we continue to pursue sustainability in forest and fish management.[77]

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[75] Richard A. Rajala, "Clearcutting, Multiple Use, and the Politics of Salmon Habitat in British Columbia, 1945-1970," paper presented to the annual meeting of the American Society for Environmental History, Boise, Idaho, 12-15 March 2008; Scott Prudham, "Sustaining Sustained Yield: Class, Politics, and Post-War Forest Regulation in British Columbia," *Environment and Planning D: Society and Space* 25 (2007): 258-83; Rajala, "Forests and Fish," 81-120.

[76] British Columbia, *Field Manual of Sport Fish Habitat Protection* (Victoria: Fish and Wildlife Branch, Department of Recreation and Conservation, 1966), i.

[77] Wilson, "Forest Conservation in British Columbia," 17-23; Rajala, "This Wasteful Use," 31-74; Richard A. Rajala, "The Vernon Laboratory and Federal Entomology in British Columbia," *Journal of the Entomological Society of British Columbia* 98 (2001): 185-86; Arn Keeling and Robert McDonald, "The Profligate Province: Roderick Haig-Brown and the Modernization of British Columbia," *Journal of Canadian Studies* 36 (2001): 7-23.