

COMMON FUTURE, DIFFERENT POLICY PATHS?

Managing the Escape of Farmed Atlantic Salmon in British Columbia and Washington State

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INTRODUCTION

THE AQUACULTURE INDUSTRY in North America has been developing at such a rate that regulatory policy making has been hard put to keep up with need. As with many other new industries, expansion of aquaculture has gone hand in hand with an increasing awareness of possible environmental repercussions. Different types of aquaculture raise different environmental concerns, but none seems to so capture the issue of uncertain risk as the potential effects of salmon aquaculture on the Pacific coast. According to a recent analysis prepared for the Pacific Fisheries Resource Conservation Council, “Our understanding of the risks posed to wild salmon by salmon farming – through disease, escapes and habitat impacts – is plagued by unknowns and uncertainty. Our ability to assess risk is limited because we are dealing with partial, and in some cases a complete lack of data” (Gardner and Peterson 2003, 95). One highly uncertain risk of salmon aquaculture that has been particularly controversial in British Columbia is the escape of farmed Atlantic salmon from the net pen enclosures in which they are raised into the surrounding waters of the Pacific.¹ Escaped Atlantics, once deemed incapable of survival outside of farms, are now being found as far north as Alaska (where finfish farming is banned); once deemed incapable of competing for wild habitat and reproducing, farmed Atlantics are now being discovered in a variety of rivers along the Pacific coast and have successfully spawned in some river systems (Gardner and Peterson 2003).

¹ Although Atlantic salmon escapes continue to be a major concern, the focus of attention and protest in British Columbia has shifted somewhat in the last few years to the issue of sea lice, and the farm’s role in propagating and transferring these parasites to wild salmon.

When there is high scientific uncertainty about the probability and magnitude of a risk, policy makers have a great deal of leeway in choosing how to respond to that risk (Hoberg 1997, 1990; Jasanoff 1990, 1986). High uncertainty allows policy makers and other stakeholders to call up selected evidence and arguments to support whatever policy responses they prefer. Consider, for example, the dramatic contrast in British Columbia between the science-based claims of government policy makers about escaped Atlantic salmon and the science-based counterclaims of those who oppose their policies. A BC Ministry of Agriculture and Lands (2006a) website on aquaculture proclaims that:

The available scientific evidence overwhelmingly indicates that Atlantic salmon escapees cannot successfully colonize in our waters. The numbers of Atlantics found have remained very small over several years, and there remains very little risk of a self-sustaining population of Atlantics becoming established here. The Atlantic Salmon Watch Program is closely monitoring streams where Atlantic salmon have been seen or have spawned in the past. There is no evidence that Atlantics have successfully established in those streams.

Similarly, Fisheries and Oceans Canada (2003) asserts that: “One of the arguments made by fish farming opponents is escaped Atlantic salmon can result in established Atlantic salmon populations competing with Pacific salmon for habitat. This is simply not true ... There is no evidence that escaped Atlantic salmon pose a threat to Pacific salmon.” By contrast, the Coastal Alliance for Aquaculture Reform (n.d.) comes to different conclusions regarding the evidence of risk:

According to the Department of Fisheries and Oceans, Atlantic salmon have been found in over 81 BC rivers and streams. It is worth noting that only a small portion of BC rivers have been surveyed so far – meaning non-native Atlantic salmon could be inhabiting many more ... Atlantic salmon compete with wild salmon for habitat and have been known to eat wild salmon fry and eggs. Atlantic salmon have been found spawning, and juveniles surviving in the wild.

Given the current level of scientific uncertainty about escaped Atlantic salmon, how have policy makers in British Columbia and the State of Washington elected to manage the risk? This article compares the evolution of salmon escape policies in these neighbouring jurisdictions during the period from 1970 through 2003. Although the size of the BC salmon net pen industry, measured by production capacity, is about ten times that of the industry in Washington State (Amos and

Appleby 1999), a comparison of their policies is of particular interest for two reasons. The most obvious is that the two industries share the water of the Pacific coastal region and, thus, the repercussions of each other's policy successes and failures concerning migratory fish. Second, and directly related to the above, various tentative gestures have been made to coordinate policies between the two jurisdictions. Were these to be pursued, the extent and nature of policy divergence would become especially salient politically and environmentally.

How do the policies in British Columbia and Washington compare? Promotional claims on the BC side suggest that the divergence is definitive – British Columbia's "aquaculture regulations constitute the most comprehensive escape prevention standards in the world" (BCMAFF 2003). However, despite such enthusiastic marketing, British Columbia's policy framework does not appear to be significantly different from that of Washington State: escapes are prohibited by condition of licence on either side of the border; reporting of escapes and escape-related data is mandatory; both jurisdictions require that industry establish escape "prevention and response" plans; and both have policies in place to monitor the presence of escaped Atlantic salmon in the marine environment.

According to Banting, Hoberg, and Simeon (1997), policy convergence between two countries can come about as the result of four different types of forces: international legal constraints, international economic integration, parallel domestic pressures, and a process of cross-border learning or emulation. There are no existing international legal standards for salmon escape management that bind policy makers in British Columbia or Washington State. Nor does economic integration seem to offer an explanation for the current state of affairs. In the future the aquaculture industry may use the standards in one jurisdiction as a bargaining tool to obtain similar (relaxed) standards in the other by arguing that this is necessary to maintain economic competitiveness or by threatening to move operations to the other jurisdiction. To date, however, this interplay has not been a significant force, possibly because the opportunities for expansion of salmon farming in Washington have been limited and the demand for new sites has been substantially greater than the available supply.

Parallel domestic pressures and cross-border learning appear to have the most potential as explanatory variables. Geographic proximity would certainly favour cross-border learning, and it is important not only because of the potential for governmental policy emulation but also because it might facilitate a sharing of knowledge among non-governmental groups attempting to affect policies. At the same time,

significant Atlantic salmon escapes from aquaculture enterprises have occurred in both jurisdictions, resulting in similar domestic pressures to address the escapes. But because the fish escape into different institutional environments, with different interest groups using different mechanisms to exert pressure for change, policy responses to the escaped salmon have evolved along different paths.

In this article we examine the extent to which parallel domestic pressures and cross-border learning have been instrumental in the apparent convergence of Atlantic salmon escape policy between British Columbia and Washington State. In doing so, we show that these jurisdictions actually display important differences in policy design and implementation. These differences become especially evident when the dependent variable of “salmon escape policy” is subdivided into two functional components: “compliance and enforcement” and “research and monitoring.” Moreover, aquaculture policy on the Pacific coast has entered what is likely to be a period of rapid change. While there has historically been a marked tendency towards convergence between British Columbia and Washington, we argue that profound differences in the underlying factors that have influenced policy development in the two jurisdictions may provide the basis for future divergence.

We begin our discussion by identifying domestic factors in the two jurisdictions that might be expected to play significant roles in shaping policy responses to the risk of Atlantic salmon escapes. Next, we review the history of escape policies in British Columbia and Washington, focusing first on compliance and enforcement, then on research and monitoring. Then we return to the key domestic factors identified in the first section of the paper and discuss whether or not these factors have exerted parallel pressures for convergence. We also highlight examples of cross-border learning and consider how this mechanism has affected policy making. We conclude by summarizing our arguments and offering projections for future policy development.

DOMESTIC POLICY FACTORS

Frameworks for policy analysis commonly emphasize the roles of actors, ideas, and institutions in the formulation and implementation of policy (e.g., Howlett and Ramesh 2003; Hoberg 2001). Important actors in aquaculture policy in British Columbia and Washington include the industry itself, government policy makers, environmental organizations, commercial and sport fishers, and First Nations or tribal groups. These actors have been able to draw on different sources of power (such as

financial resources or the currency of certain ideas) and have used different strategies in different institutional systems to influence policy development in the two jurisdictions. The processes that unfold are not just the result of dynamics arising from current conditions but, rather, evolve along trajectories set by historical decisions and actions.

The salmon aquaculture industries in Washington and British Columbia both got their start in the 1970s, but development was slow until the mid-1980s, when the industry in British Columbia began to expand at a rapid rate. By 1999 Washington State had a farmed salmon production capacity of approximately ten million pounds per year, whereas British Columbia's capacity was approximately 100 million (Amos and Appleby 1999). British Columbia is planning for substantial additional growth, and in 2002 the province asserted that "aquaculture expansion could lead to more than one billion dollars a year in economic activity, and 9,000 to 12,000 new jobs over the next decade, most in coastal communities" (BCMAFF 2002a). Although opponents of aquaculture development have contested these projections, it is reasonable to expect that differences in the amount of capital in the industry, beliefs about anticipated growth, and the associated power differentials of the actors involved would be instrumental in affecting the decisions of government policy makers.

Beliefs about the likelihood of Atlantic salmon survival in the wild are another idea-based source of power for actors in the two jurisdictions, and it is one that is influenced by the outcomes of earlier policy actions. In the past, both British Columbia and Washington have attempted to introduce Atlantic salmon into their waters, most recently in British Columbia in 1935 and in Washington as late as 1981. Apparently, no Atlantics established themselves in the wild as a result of these initiatives. Proponents of salmon farming have claimed that this history indicates that escaped Atlantics will similarly fail to establish in the wild under current conditions, but this claim has been criticized for a number of significant reasons. Most notably, escaped Atlantics from aquaculture facilities are often more mature than the smolts that were used in deliberate introductions and so may be more likely to survive. Also, stocks of competing native salmon populations have declined.² Nonetheless, these introduction failures are often offered to justify the comparatively low concern given to escapes on the Washington side, where the most recent introduction attempts took place. The historically based perception

² For a more in depth discussion of British Columbia's introduction attempts, and how they compare to recent salmon escapes, see Volpe (2000). Volpe posits that "the very factors that resisted Atlantic salmon colonization years ago have now been altered to favour colonization" (29).

that Atlantic salmon cannot become established in Pacific waters may downplay assessments of risk associated with escapes and, consequently, could weaken the regulatory motivation of current policy makers.³

Institutional differences are also important for shaping current policy actions and for setting the path of ensuing policy decisions. Further, these institutional differences are, themselves, the result of historical processes. The contrast between the institutional contexts for resource management in the United States and Canada has long been noted, as has the manner in which these differences affect the ability of environmental groups to utilize legal remedies to pursue their goals.⁴ It would be reasonable to hypothesize, then, that this institutional factor would have a divergent effect on aquaculture policy. In addition, how regulatory authority is allocated within each jurisdiction among various government institutions should also be significant in the differential development of policy.

Finally, some scholars argue that substantial policy change rarely occurs unless triggered by changes in the background conditions, or “exogenous factors,” within which actors, ideas, and institutions operate (Hoberg 2001, 1998; Sabatier 1993). Important background conditions vary depending on the policy issue at stake. For example, Hoberg identified five conditions that are relevant to the BC forestry industry: public opinion, elections, economic conditions, the macropolitical system, and other policy sectors. For aquaculture policy development, two background conditions appear to be key: elections resulting in a change in governing party and the timing of what Kingdon (1995) calls “focusing events.” A good example of the former is the change of government that took place in 2001 in British Columbia. During the period prior to the election, when the New Democratic Party government was in power, efforts to impose environmental controls on aquaculture were likely to be considered important to maintaining electoral support from the party’s environmental constituency. The replacement of this government by the more pro-business Liberal Party no doubt affected the relative emphasis that provincial officials felt should be given to environmental as compared to economic concerns. The Liberals also brought different views about appropriate regulatory approaches and the role of government. “Focusing events,” in contrast, are major occurrences such as disasters or crises that can bring particular issues to

³ See Goldstein and Keohane (1993) for a discussion of the role of ideas as “road maps” in policy development.

⁴ For a more detailed discussion of the differences in the environmental regulatory regimes and the institutional reasoning behind them, see Hoberg (1997).

the attention of decision makers as problems, alter public opinion and the political environment sufficiently to shift the balance of power of interest groups, and open windows for policy change (Kingdon 1995). For aquaculture, each occurrence of a major Atlantic salmon escape represents a potential focusing event (see Table 1).⁵

With these domestic factors in mind, we now turn our attention to the actual history of escape policies in both jurisdictions.

THE DEPENDENT VARIABLE: SALMON ESCAPE POLICY

In both British Columbia and Washington State the stated policy on escaped Atlantic salmon is clear: escapes are not permitted. However, while both jurisdictions have formally adopted this policy, the reality of implementation is another matter – and one that bears more significance from an environmental perspective. In order to better understand the differences here, it is helpful to focus on two related but functionally distinct components of escape policy, which can roughly be designated “compliance and enforcement” and “research and monitoring.”

“Compliance and enforcement” considers how policy makers implement their policies.⁶ It encompasses the types of instruments selected, the sanctions available and imposed, and the resources (financial and human) that are allocated to achieve policy objectives. In common terms, compliance and enforcement captures the practical aspects that determine whether regulatory policies are purely symbolic or are actually and effectively being carried through.

By “research and monitoring” we mean all initiatives related to data collection and advancing scientific knowledge about escapes and their effects. This includes inspection of facilities and even public involvement in the monitoring and reporting process, such as in the Atlantic Salmon Watch Program.⁷ The term also includes government

⁵ Large escapes of multiple fish are only one facet of the salmon escape problem. “Chronic leakage” refers to the unknown number of salmon that escape from small holes in damaged or poorly maintained net pens – estimated by the Washington Department of Fish and Wildlife (1999) at 100,000 fish per year in British Columbia. Additional leakage may occur when salmon farmers increase the mesh size of their nets as the fish grow. Smaller, slow-growing fish can escape through the larger mesh.

⁶ In British Columbia, for example, responsibility for the implementation of aquaculture escape policy was divided into *compliance* (assigned to the Ministry of Agriculture Food and Fisheries) and *enforcement*, (assigned to the Ministry of Water Land and Air Protection).

⁷ The Atlantic Salmon Watch Program is a cooperative research program in which fishers, hatchery workers, and others report observations of Atlantic salmon (Fisheries and Oceans Canada 2005).

TABLE 1
*Reported Farmed Atlantic Salmon Escapes:
 British Columbia and Washington State*

British Columbia		Washington State	
Year	Number of Fish	Year	Number of Fish
1987-90	None reported	1990	None reported
1991	6,650	1991	None reported
1992	9,546	1992	None reported
1993	9,000	1993	None reported
1994	62,809	1994	None reported
1995	51,883	1995	None reported
1996	13,137	1996	107,000
1997	7,472	1997	369,000
1998	80,975	1998	22,639
1999	35,954	1999	115,000
2000	31,855	2000	None reported
2001	55,414	2001	None reported
2002	11,257	2002	None reported
2003	30	Not available	Not available

Sources: BCMAL 2006b; WDFW 2006.

Although the number of escaped Atlantic salmon reported in British Columbia in 2003 was low (thirty fish), this does not mean that the problem was resolved. A *Victoria Times Colonist* article in March 2005 discussed a reported escape of 33,000 fish that occurred in May 2004 from a farm in Nootka Sound operated by Greig Seafood, which had not yet been included in official tables because the provincial government had not released escape statistics for 2004 (Dickson 2005). As of February 2006, reported escape tables on BC and Canadian federal government websites still did not include data for any years after 2003. There are also other reasons to treat reported escape numbers with caution. First, they do not include chronic leakage of fish from net pens (see note 5). Second, the numbers are self-reported, and during periods when compliance monitoring is lax, industry may not report all escapes. Third, historical data show a lack of correlation between reported escape numbers and commercial and sport fish catches of Atlantics. For example, while only 6,650 fish reportedly escaped from BC and Washington farms in 1991, catches of Atlantics in Washington were comparable to those in 1996, when a combined 120,137 escapes were reported.

initiatives and support of research and development directed towards new preventative technologies related to the risk of escaped Atlantic salmon.⁸ Research and monitoring activities play a variety of different roles in the policy-making process (Clark 2002; deLeon 1999; Lasswell 1971). First, research and monitoring are important for the identification and understanding of problems in the initiation (agenda setting) and estimation (policy formulation) functions. For example, research and monitoring are essential for assessing the risks associated with salmon escapes and for increasing the scientific knowledge available for designing escape policies. Studying problems can sometimes be an easy substitute for the pain of controversial action, but this reservation does not necessarily override the potential benefits. Second, monitoring can be crucial to policy implementation (e.g., to assess compliance with regulatory standards and to support the imposition of sanctions). At the very least, monitoring can increase the motivation of industry actors to regulate themselves in order to present a clean public image, and sometimes it can open the doors for public outcry or potential legal action should the data prove unsavoury. Finally, research and monitoring are vital to the policy evaluation function, providing knowledge about the effectiveness and outcomes of policies, and supporting decisions about policy modification or termination.

Compliance and Enforcement

Washington State

Washington State's salmon aquaculture industry began in the early 1970s. Since that time, successive legal battles over waste discharge permits for aquaculture facilities have resulted in ongoing refinement of net pen pollution regulations under the US federal Clean Water Act (33 U.S.C. § 1251) and the Washington State Water Pollution Control Act (90.48 R.C.W.). These results indicate that licence appeals were a highly effective method of legal protest against salmon farming. Goldberg and Triplett (1997, 106) describe the struggle over the first permits as follows:

In 1989 a coalition of environmental organizations threatened to sue the US Environmental Protection Agency (EPA) for failing to regulate pollutants from salmon netpens under the Clean Water Act, and EPA compelled Washington State to issue discharge permits. The state

⁸ This could include technologies to aid in preventing the escape of salmon (such as closed containment net pens) or technologies to aid in reducing the potential impact of escaped salmon (such as the development of non-reproducing stocks).

issued three permits for netpens in 1990, which were then appealed by local environmental organizations.

This first issuance of discharge permits and the resulting legal domino effect appears to have set the path for regulation in Washington. Under the State Environmental Policy Act (43.21C R.C.W.), the public is entitled to have input into the permit approval process and can appeal a permit within a specified time period after it is issued. As a result, National Pollution Discharge Elimination System permits for aquaculture have been characterized by a history of issuance and appeal, with subsequent rulings by the Pollution Control Hearings Board clarifying the basis for permits and the standards for pollution.

Environmental achievements under this process are still ongoing. For example, in 1998 a coalition of environmental groups appealed Discharge Elimination System permits that had been issued to the Washington Department of Fish and Wildlife (for its own purposes) as well as to Global Aqua USA L.L.C. and Cypress Island, Inc.⁹ While the legal action named both the Department of Fish and Wildlife and the Washington Department of Ecology, the environmental groups subsequently dropped the Department of Fish and Wildlife from the suit in return for a legal agreement that the department would in future kill and analyze any intercepted Atlantic salmon as well as compile any data on Atlantics they collected (Amos and Appleby 1999). This legal agreement was a first step towards a monitoring program similar to that in British Columbia.

In 1997, permit appeals led to a Pollution Control Hearings Board ruling that, as point-source biological waste, escaped Atlantic salmon could be defined legally as a “pollutant” (Amos and Appleby 1999). This ruling was significant in providing the legal foothold for action against farms with escapes. Shortly after this ruling the Department of Ecology issued an Administrative Order (No. DE 97WQ-N296) to Global Aqua/Cypress Island Inc., the main element of which was a mandatory requirement to develop a “Fish Release Prevention and Monitoring Plan.” The order only dictated the plan at the level of broadly stated end products, such as the necessity for “emergency procedures,” “identification of technology,” and “procedures to recapture.” Leaving the responsibility for the details of the plan to industry in this manner

⁹ The appeal was filed by the Marine Environmental Consortium, Washington Environmental Council, Protect our Waters and Natural Resources, and Washington Trout (State of Washington, PCHB, 1998).

differs markedly from the explicit prescriptions developed by the BC government two years later, as will be discussed.

A broad selection of enforcement mechanisms that range from warnings to fines (Hunter and Waterman 1996) are available for response to violations of the National Pollution Discharge Elimination System permits. However, availability does not necessarily mean utilization, and despite the potential for action relatively little enforcement has occurred.¹⁰ Additional appeals may force further clarification of what exactly constitutes a “violation” under the Discharge Elimination System prohibition of escapes and releases. This clarification, in turn, may provide the basis for further action by environmental organizations against violating fish farms.

While permit appeals have been the most prevalent means of forcing regulatory accountability, new regulations introduced in 2003 are likely to affect at least some aspects of this pattern. In 1985 the Washington legislature took away the Department of Fish and Wildlife’s authority to regulate salmon farms. In 2001 Bill 1499 returned a portion of this authority, granting the department the “authority to work with marine net pen operators to improve prevention of escapes from net pens” (WDFW 2001). In response to this bill, the department worked with net pen operators towards the establishment of new rules for escapes. Washington passed these new regulations in 2003 (WAC 220-76). While part of the new regulations is essentially a reiteration of the requirement for escape prevention and response plans, as already specified by National Pollution Discharge Elimination System permits, a significant new addition is the introduction of a system of marking fish to identify their source. The regulation states that “each permit application must contain a means mutually agreed to by the department and the aquatic farmer to individually identify to the aquatic farmer all marine finfish in aquaculture hatched after December 31, 2003” (WAC 220-76-100).

Interestingly, according to an official from the Washington Department of Fish and Wildlife, that agency was fully aware of British Columbia’s prescriptive approach to regulating escapes when it negotiated with Washington net-pen operators to create an outcome-based approach (personal communication, Andy Appleby,

¹⁰ Bill Moore, from the Washington Department of Ecology, stated in November 2000 that, to his awareness at that time, there was only one other case of an Administrative Order issued since Global Aqua/Cypress Island Inc. (personal communication). Furthermore, at that time it appeared that the maximum penalty imposed on fish farms that were in violation of the order had been the issuance of a notice of violation against Northwest Sea Farms, Inc. for its June 1999 escape of 115,000 fish (Amos and Appleby 1999).

July 2004). The state did not want escapes but was willing to leave it to fish farmers to work out how to achieve this goal. Establishing a means of identifying growers responsible for escaped fish could also be a significant step towards recovering costs. However, these costs are limited to recovery efforts (such as through recapture fisheries) and eradication of any resulting Atlantics discovered to be spawning. They do not include regulatory expenses or penalties for environmental damage. Even more significantly, as only one grower (Cypress Island Inc.) owns all of Washington's net pens, this marking procedure actually only serves to distinguish Washington's escaped Atlantics from British Columbia's escaped Atlantics. Consequently, marking could ultimately be advantageous to the Washington industry. Given that there is a proportionally greater chance of escapes resulting from their much larger industry neighbour to the north, there is a possibility that such marking could result in absolution for the Washington industry when Atlantics are discovered in the state's waters. The 2003 regulations also provide the Department of Fish and Wildlife with control over which species can be used in aquaculture and prohibit the use of transgenic fish (WAC 220-76-100).

British Columbia

From the start, escape policy for British Columbia's salmon farming industry has been inclined more towards consultation, monitoring, and assessment than command and control regulation and enforcement. British Columbia's industry started at about the same time as Washington State's – in the early 1970s. In the 1980s the industry began a period of rapid expansion, reaching a peak of 118 grow-out sites in British Columbia by 1988 (BCEAO 1997).¹¹ The rapid growth triggered public concerns over the industry's effects on the marine environment and on other coastal uses, particularly given the lack of a coordinated regulatory framework (BCEAO 1997). By 1986 public pressure prompted a thirty-day moratorium on licence issuance while the provincial government conducted public consultations and assessed concerns (Pechlaner 2002). Recommendations arising from the inquiry were mostly adopted and

¹¹ Like many other resource industries in British Columbia, salmon aquaculture subsequently went through a period of rationalization and consolidation. As Marshall (2003, 9) observes, "Over its history, BC's salmon aquaculture industry has become increasingly concentrated in the hands of fewer corporations. In 1989, there were 50 fish farm companies in BC. In 1997, there were 15. Now, there are 11. Five multinational companies control 109 of 131 (83 per cent) fish farm licences and generate 82 per cent of total production in the province. Four of those companies (Stolt-Nielson, Pan Fish, Nutreco, and Cermaq) are based in Europe while one (George Weston) is Canadian, based in Toronto."

industry regulation was increasingly rationalized, ultimately culminating in a 1988 memorandum of understanding between federal and provincial regulatory bodies. Nonetheless, the British Columbia Office of the Ombudsman continued to receive numerous complaints about the industry, and it initiated its own investigation (BC Office of the Ombudsman 1988). Ultimately, the province adopted new regulations in 1989, stipulating that the aquaculture industry must take “reasonable precautions” to prevent escape (BC Reg. 364/89). Despite the new regulations, continued concerns over escaped salmon led to the initiation of a salmon monitoring program, the Atlantic Salmon Watch Program (ASWP), in 1991. This program was a joint federal-provincial initiative to monitor and compile data on the presence of Atlantic salmon in British Columbia, in part by soliciting reports from farmers, fishers, and recreational anglers.

By 1995 British Columbia’s policy process had come full circle, with a new indefinite moratorium on licences and an extensive environmental review by the BC Environmental Assessment Office, complete with interest group submissions and public consultation. In contrast, then, to the development of industry policy in Washington State, which was largely a legalistic process of policy refinement through permit issuance, permit appeals, and legal challenges, policy development in British Columbia consisted of cycles of public protest, consultation, and policy revision. The last decade in British Columbia has seen this process accelerate.

What were the results of the environmental review commenced in 1995? In 1997, the BC Environmental Assessment Office released the *Salmon Aquaculture Review*. It concluded that “current measures for the prevention, monitoring and reporting of escapes are ineffective and must be improved” (BCEAO 1997, A-1). Aquaculture facilities in British Columbia require licences under section 13 of the provincial Fisheries Act (R.S.B.C. 1996, c. 149). Under sections 18 and 19, the responsible minister has the ability to suspend, revoke, or refuse to reissue a licence if there has been a violation of the act, the regulations, or the conditions of licence. In addition, section 25 provides for financial penalties for any such violation. The “Aquaculture Regulations” (BC Reg. 78/02) not only prohibit the release of fish (s. 3[1]), but state that the licence holder “shall take reasonable precautions” to prevent their escape (s. 3[2]). Reasonable precaution, however, as noted in the *Salmon Aquaculture Review*, is difficult to define and enforce (BCEAO 1997).

In October 1999 the BC government announced a five-point salmon aquaculture policy initiative to be implemented over the course of two years. The initiative included monitoring requirements, research commitments, and a requirement for industry to develop escape prevention and response plans. In August 2000, after a serious escape of Atlantic salmon from Stolt Sea Farm Inc. (*Nanaimo Daily News* 2000), the industry was given sixty days to submit its escape response and prevention plans. In October 2000, new amendments to the Aquaculture Regulations (BC Reg. 335/00) outlined detailed equipment and practice requirements that would be necessary to meet the standards for adequate escape prevention precautions. Further amendments to the regulations were made in April 2002 to target prevention efforts and resources at higher risk activities (BCMAFF 2003). While obviously similar in objective to Washington's response plans, the requirement for escape prevention plans in British Columbia did not leave the specifics to the industry but, rather, included such details as required net-pen mesh size, breaking strength, and anchoring. Essentially, these were regulations of the process of salmon farming, in contrast to the outcome-based regulations in Washington State.

Although the provincial government promoted these amendments to the regulations as sufficient to address escape incidents, the new requirements for equipment and practices mainly repeated standards that had already been widely adopted within the industry. Furthermore, a regulatory impact statement prepared for the launch of the amendments in 2000 stated that, "with the exception of the new escape recapture plans, the proposed changes are already currently required as a condition of license; all farms would have eventually submitted these plans" (BCMAFF 2000). Indeed, industry representatives indicated at the time that they were already in compliance with the majority of these regulations,¹² which suggests that it was unlikely there would be significant reductions in risk.

What the equipment and practice requirements did clarify, however, is the exact meaning of "reasonable precaution." Thus, the policy process in British Columbia has progressively clarified and refined exactly what it is that constitutes a violation of the aquaculture regulations. Washington State's National Pollution Discharge Elimination System permit/appeal process has had a similar effect, although achieved through different means. Whether clarification of precautionary ex-

¹² E-mail correspondence with Alexandra Morton of Wild Orca (an environmental organization based in the Broughton Archipelago), 17 November 2000.

pectations in British Columbia actually increases regulatory strength remains to be seen.

In February 2002 the ministry issued a news release on “Fish Farm Compliance” advising that its staff had “inspected all 83 active fish farms during the 2001 inspection cycle” and “informed companies about areas of concern.” The release said that firms failing to comply with orders to fix problems “will face enforcement action, which may include warnings, violation tickets, fines or charges” (BCMAFF 2002b). Clearly, the agency was taking a discretionary approach towards violations, with escalating mechanisms for enforcement similar to those in Washington. More recent information from the ministry suggests that this approach continues as a recent list of their compliance and enforcement activities includes

- awareness, education, promotion, and training activities;
- promoting industry best practices, developing cooperative partnerships and agreements contributing to government objectives;
- conducting monitoring, inspections, and audits;
- conducting investigations on alleged legislative and/or licensing violations for marine plant and wild oyster industries;
- acting as initial contact for public and industry complaints for finfish and shellfish aquaculture and referring enforcement files to the Ministry of Water, Land and Air Protection;
- if necessary, recommending administrative remedies such as licence suspension or cancellation, and;
- public reporting on the compliance status of salmon farm inspections.

(BCMAFF 2005a)

If past conduct is indicative, sanctions will be underutilized. Previous regulations under the Waste Management Act (R.S.B.C. 1996, c. 482) were not hampered by the ambiguity of the escape regulations. Yet, despite there being clearer mechanisms under that act, there was little enforcement against fish farms.¹³ Significantly, in specific reference to the Waste Management Act, the Salmon Aquaculture Review noted the difficulty in assessing whether “the lack of charges and prosecutions

¹³ To our knowledge, there was only one incident in which an environmental group attempted to pursue charges against Stolt Sea Farm Inc. on the basis of habitat degradation for sediment deposits under the net pen. The fate of that private prosecution was described by the Auditor General of Canada (2000, 30.36) as follows: “the Crown Counsel of the federal Department of Justice stayed the charges on the grounds that licensing of the site (with knowledge of the effects) would reduce the chances of a conviction. It was acknowledged that there was evidence of damage to the sea bed below and adjacent to the salmon farm.”

indicates a high level of regulatory compliance throughout the industry or inadequate monitoring by regulators” (BCEAO 1997, vol. 4, part B XIII). More recently, a decision by provincial officials not to lay charges for the Stolt Sea Farm’s escape of more than 30,000 Atlantic salmon in the summer of 2000 led to the temporary resignation of the BC minister of agriculture food and fisheries in 2003 – amidst allegations that the minister’s office had interfered with the investigation in support of the industry (CBC News 2003). A special prosecutor found that there was no criminal intent involved, and the government reinstated the Minister.

Even in those cases where the agency does elect to impose sanctions, the penalties may not be adequate to provide an effective deterrent. In his 2004/05 *Assessment of the Provincial Role in Sustaining Wild Salmon*, the Auditor General of British Columbia (2004, 69) noted concerns over the “limited penalty provisions of the Aquaculture Regulation” and recommended that the province “strengthen the penalty provisions in its current aquaculture policy framework” (70).

Research and Monitoring

Concurrently with the introduction of the new regulatory framework in 2000, the BC government increased its emphasis on monitoring. Following the escapes from Stolt Sea Farm Inc. in 2000, British Columbia announced that it would intensify inspection of farms, including random spot audits and underwater videotaping (BCMAFF and MELP 2000). This followed an already established predisposition towards monitoring, initiated with the 1991 Atlantic Salmon Watch Program. In 2001 that program was further expanded with the First Nations Atlantic Salmon Watch, in which members of coastal First Nations conduct surveys of Atlantic salmon in traditional wild salmon spawning territories (Fisheries and Oceans Canada 2005).

This emphasis on monitoring and data collection appeared earlier in British Columbia than in Washington State, where monitoring only began officially in 1998, after the Washington Department of Fish and Wildlife settlement agreement legally required the agency to monitor Atlantics “during their usual course of business” (Amos and Appleby 1999). While this requirement was a significant step in monitoring, it lagged behind British Columbia’s program both in timing and in comprehensiveness of data collection. Officials in Washington have discussed adoption of a program similar to British Columbia’s for some time, but fractured regulatory authority and funding issues have impeded implementation. As a result, data collection in Washington has been sufficiently hampered that the official in charge in 2000 observed

that he “couldn’t quantify, necessarily, but could detect presence or absence” of Atlantics (personal communication, Andy Appleby, WDFW, 20 November 2000).

In a clear example of cross-border learning, a December 1998 permit appeal in Washington¹⁴ was based on a report published by the BC Ministry of Environment Lands and Parks (Rimmer 1998) on the discovery of Atlantic salmon by BC fisheries staff during field surveys. Of further significance is the reliance on BC reports in the assessments of Washington State agencies,¹⁵ which may indicate that comparable reports from Washington were insufficient.

In British Columbia the provincial ministry in charge of aquaculture has also shown a certain level of commitment to the research and development of new technologies that may alleviate some of the environmental concerns regarding aquaculture (including escapes) in both jurisdictions. In 2000 the province invited proposals for alternative “green” salmon farming projects and offered to grant new tenures (even though there was a moratorium in place at the time) to successful proposals (BCMAFF 2005b). By 2005 three of the proposed projects were operating, and each “involved various versions of closed-containment systems, along with other ‘green’ technologies and production approaches” (BCMAFF 2005b).

British Columbia has launched or contributed to several other major research and development initiatives related to aquaculture in the last few years, as has the Canadian federal government. These include:

1. The BC Aquaculture Research and Development Committee, established in 2001;
2. The BC Aquaculture and Environment Fund, established in 2002 with \$3.75 million from the province;
3. The University of British Columbia Centre for Aquaculture and the Environment, initiated in 2002, in which Fisheries and Oceans Canada is a partner and the province contributed \$1.25 million towards a research chair;
4. The Aquaculture Collaborative Research and Development Program, a Fisheries and Oceans Canada initiative funded at approximately \$4.5 million per year; and

¹⁴ PCHB Nos. 96-257 to 266, and 97-110.

¹⁵ For example, the Amos and Appleby (1999) report relied on both the British Columbia Environmental Assessment Office’s Salmon Aquaculture Review and on yearly published Summaries of British Columbia Catches and Sightings of Atlantic Salmon.

5. AquaNet, which receives funding from the federal government to support joint university-industry research initiatives.

(BCMAFF 2005c)

Overall, it would appear that, from the perspective of monitoring, research, and technological development, British Columbia has been substantially more engaged than has Washington State.

HOW DID WE GET HERE:

REVISITING THE DOMESTIC FACTORS

In this section we revisit the key domestic policy factors identified earlier and discuss how they have shaped policy approaches and contributed to convergence and divergence in the two jurisdictions.

Development Potential and State Support for Aquaculture

When policy makers believe that an industry has the potential to develop into a dynamic sector of the economy, bringing with it tax revenues, employment opportunities, and spin-off industries, they have a strong incentive to be supportive. Consequently, the suggestion that British Columbia has allocated more resources to research and development than has Washington State should come as no great surprise, given the substantially larger size and perceived growth potential of the BC aquaculture industry. However, even taking industry size into consideration, further dynamics appear to have relevance. Hoberg (2001, 15) observes that there “tends to be an inverse relation between profitability and the power resources of industry groups in a particular sector” to influence policy. Declining industry profitability threatens jobs, and job losses threaten governments, which consequently are interested in supporting industry stability: “In other words, the worse off a sector is economically, the better off it is politically” (Hoberg 1998, 10). With respect to aquaculture, this relationship is not restricted to a particular sector of the economy but has a rural community component. The coastal communities of British Columbia have been plagued by prolonged downturns in the fishing, forestry, and mining industries. Consequently, any industry that might alleviate the severe economic stress on the BC coast will warrant high government interest. In this sense, although the power of the developing aquaculture industry may be directly related to its size and to beliefs about its growth potential, it may also be inversely

related to the profitability of the traditional resource-based industries that historically supported coastal communities.

In the BC aquaculture industry, a highly cooperative relationship has developed between government and capital that is directed towards the shared goal of improving aquaculture's environmental image. Both actors understand that public fears about salmon escapes may threaten the growth of the industry. As noted in a news release from Fisheries and Oceans Canada's commissioner for aquaculture development, "the debate over the potential of escaped farm salmon to negatively impact wild salmon stocks has hindered the development of salmon aquaculture in Canada" (Fisheries and Oceans Canada 1999). Any government interested in furthering development necessarily has to address this debate, and the government and aquaculture industry have joined in efforts to overcome fears about escapes. Industry itself welcomed the BC Environmental Assessment Office's environmental review, the implementation of its recommendations, and many of the other provincial efforts aimed at greening aquaculture (BC Salmon Farmers Association 1998a). At times industry even deflected criticism over escapes with entreaties for the government to act on the recommendations outlined by the Assessment Office. Two factors cannot be overlooked concerning this level of cooperation: (1) critics have been dubious about the actual impact of many of these policy changes, suggesting that the cost to industry of such improvements is more than offset by the benefits of an improved image; and (2) the government has demonstrated, from its funding of research, monitoring, and technological development, that it has a preference for passive monitoring and voluntary compliance over strict command and control regulatory enforcement, and that it is willing to take a wide variety of environmental expenses onto its own shoulders, effectively subsidizing the environmental component of the industry. The Canadian Centre for Policy Alternatives has argued that the amount expended by the provincial and federal governments on aquaculture research and development, together with tax credits and other direct and indirect subsidies, is so large that it is "questionable ... whether the aquaculture industry is contributing positively to government revenue" (Marshall 2003, 17).

While resource communities in Washington are also in great need of economic alternatives, the development potential of the Washington industry has been limited for reasons that are not related to escapes, such as a limited number of suitable site locations, the prevalence of plankton blooms, and, to a lesser extent, strict local foreshore access

regulations.¹⁶ This is not to say that the industry could not develop further in Washington but, that, unlike in British Columbia, the impetus to develop has been strongly tempered in the past by external expansion limitations.¹⁷ Industry expansion potential alone does not account for the differential development of environmental controls in the two jurisdictions; however, in the context of powerful interest group dynamics, it takes on much greater salience as the state must balance between competing interests in order to maintain social legitimacy while achieving economic goals.

Regulatory Authority

The allocation of regulatory authority over aquaculture among different hierarchical levels of government is relatively similar in the two jurisdictions. Practical authority is held primarily at the state and provincial levels for both nations, and it resides in a small number of agencies, depending on the issue.¹⁸ As noted, primary control over aquaculture in British Columbia is allocated to the provincial Ministry of Agriculture and Lands (formerly the Ministry of Agriculture, Food and Fisheries), and there is a formal “Service Agreement” in place between this ministry and other provincial agencies setting out the relationship among them and how they will coordinate compliance and enforcement activities (BCMAFF 2005a). This explicit coordination of authority stands in marked contrast to Washington State’s chronology of failure to coordinate the authority of multiple agencies.

While Washington’s Department of Ecology has regulatory authority over aquaculture permits, between 1985 and 2001 the Department of Fish and Wildlife had responsibility over farmed salmon – and for any potential impact they might have on wild salmon – *after* an escape had occurred. This created a serious regulatory hurdle, described by Andy Appleby from Fish and Wildlife as the “mop and bucket” approach: the

¹⁶ In Washington, marine net-pen salmon farms must go through a complex approval process at the federal, state, and county levels, and local-level siting approvals often involve public hearings (Aarset 2002). According to Aarset (2002, 37), “Salmon farming is a relatively new enterprise, and considerable political energy has been allocated to exclude this as a legitimate interest in the coastal areas of Washington State. Salmon-farmers who use available tools to gain their own goals are seen as degrading the value of highly priced private property.”

¹⁷ As we discuss later, however, these constraints on aquaculture expansion in Washington State may be less important in the future, as the US federal government recently announced a program to encourage aquaculture development in offshore waters (from three to 200 miles offshore) that are under federal rather than state jurisdiction, where foreshore access restrictions do not apply and suitable sites are abundant.

¹⁸ For example, specific issues like tenure rights, waste disposal, or antibiotic usage will each be handled by the appropriate government agency.

Department of Fish and Wildlife had the authority to mop up the mess but no authority to fix the leak (personal communication, November 2000). Bill 1499, which returned limited authority to the department, went some way to correct this imbalance. Interestingly, while the Department of Fish and Wildlife worked with industry to prevent escapes, the most significant feature of the resulting regulations was the provision of a means of marking fish to distinguish Washington-escaped Atlantics from those that originated in British Columbia (personal communication, Andy Appleby, July 2004).¹⁹ The impact of this new provision remains to be seen, but, as long as penalties remain weak, being able to determine that escaped fish come from a Washington source may still only provide a limited motivation to reduce escapes.

Frequent mention has been made in British Columbia, at least as recently as in a 4 October 2000 news release (BCMAFF and MELP 2000), of plans for coordinating policies between Washington and British Columbia by means of a formal intergovernmental agreement. While the logic behind a desire to coordinate policy is obvious – given the commonality of the problem and, to an uncertain degree, the result – the actuality of coordination is not so simple. Conversations with key players on both sides of the border (personal communications, Andy Appleby, WDFW, and Andrew Morgan, BCMAFF) indicate that, despite the repeated promotion, at least the formal side of a coordination effort has stalled, impeded by the division of regulatory authority (and therefore of the authority to commit to a coordinated policy) in Washington State. Some attempts have been made to consolidate authority over aquaculture at the state level in Washington, and the return of limited authority to the Department of Fish and Wildlife was a step in this direction, but the practicalities of consolidation leave many doubts.²⁰ At bottom, despite the passage of years, no formal agreements specific to aquaculture have been struck between British Columbia and Washington, although informal meetings and consultations appear to continue. For example, Washington's decision to use an "end product" regulatory approach of marking fish for identification of escapees, while in direct contrast to British Columbia's more prescriptive regulatory policies, was made in full awareness of its neighbour's approach and even included consul-

¹⁹ In British Columbia such marking of fish could actually distinguish between different growers within the province, but implementation would be complicated because smolt production for the BC industry is not limited to one grower.

²⁰ The significance of this new authority is tempered somewhat by the departure of Andy Appleby, the aquaculture coordinator in the Washington Department of Fish and Wildlife. As of July 2004 his position remained unfilled.

tations with BC officials (personal communication, Andy Appleby, WDWF, July 2004).

The intent here is not to overstate the importance of a formal agreement, when, all else being equal, similar ends could be achieved informally. The chronology of policy development in British Columbia and Washington makes it clear that much policy convergence has in fact been the result of a process of cross-border learning and sharing. The escape response plans and the Atlantic Salmon Watch Program are cases in point. However, all else is rarely equal, and Washington is significantly disadvantaged by regulatory difficulties. The problem with fractured regulatory authority is not limited to the subnational level, and much criticism has also been directed at the US federal government for its weak role in aquaculture development.²¹ For instance, a 1996 joint subcommittee concluded that the US federal regulatory framework is “complex, fragmented, and uncertain,” with those engaged in offshore marine aquaculture subjected to a “highly uncertain regulatory framework” (Joint Subcommittee on Aquaculture National Science and Technology Council 1996, 4.4.8). While the Canadian federal government has not been free of criticism concerning its approach to the allocation of regulatory authority, it has generally encouraged cooperation and interjurisdictional awareness. The 1988 Canada–British Columbia Memorandum of Understanding regarding respective roles in the development of aquaculture is a good example. A shared desire to promote the industry has facilitated cooperation among several federal and provincial agencies. Furthermore, the Canadian federal government seems to be financially committed to aquaculture development in a manner that the US government has not been. In August of 2000 the Canadian government dedicated \$75 million to a “program for sustainable aquaculture,” of which more than \$32 million was allocated to science, research, and development (Fisheries and Oceans Canada 2000). The effects of this program have been felt at the provincial level. There are clear indications, however, that US federal support for aquaculture is on the upswing as the country moves to promote offshore aquaculture.

In sum, Washington State has been disadvantaged by problems of fractured regulatory authority and weak federal commitment to aquaculture, which have impeded international coordination and contributed to weaknesses in research and monitoring. These problems have not, however, ultimately resulted in a lack of environmental regulation. The

²¹ For a much more in depth analysis of the chronology and inefficiencies of United States’ federal authority over aquaculture, see Tiddens (1990).

creation of regulation has instead been driven by Washington's legalistic institutional structure, which has been used by environmental groups to force regulatory response.

*Actors, Available Strategies,
and Background Conditions*

A substantial body of theory has developed explaining the different institutional frameworks in which Canadian and American environmentalists operate, and how this difference affects the strategies available for action on either side of the border. It is undeniably the case that "within a given institutional context and ideational context, actors adopt the strategies most likely to advance their interests" (Cashore et al. 2001, 245). For example, environmental actors in Canada have on occasion attempted to use the courts to stop or restrict the activities of BC salmon farms, but these attempts have been few and for the most part unsuccessful. As the Canadian legal system of judicial review is more focused on ensuring procedural fairness in administrative decision-making processes than on substituting the judgment of courts for that of regulatory decision makers, the Canadian system is much less conducive to the legal campaigns that are possible in the United States. The reluctance of Canadian judges to interfere with the substantive aspects of government administrative decisions is not limited to aquaculture cases, and this has been a source of great frustration for environmentalists seeking to use the courts as a "second chance" at agency decisions that they feel do not adequately protect the environment (Boyd 2003). In contrast, judges in the United States have been quite willing to substitute their own judgment about substantive matters for that of agency "experts." As a result, BC environmentalists have been forced to rely to a greater extent on public pressure strategies.

How successful has this approach been? In British Columbia a wide coalition of environmental, First Nations, and commercial fisher groups has mounted a substantial anti-fish farm lobby effort. In addition to this banding together of diverse interests within the province, cross-border efforts along the Pacific coast have been initiated by BC lobby groups to increase the pressure against farms. The results include some significant solidarity actions, such as an open letter to Prime Minister Jean Chretien and President George W. Bush protesting the potential lifting of the BC moratorium, including over 200 signatories of commercial fisher groups, fish companies, environmental organizations, sports groups, businesses, tribal interests, political leaders, communities, and scientists

from both sides of the border (available at Georgia Strait Alliance 2002). Here, cross-border learning mixes with cross-border intervention.

Cross-nationally, there have been two main action streams: (1) scientific knowledge, such as escape data and stream monitoring research, has been readily shared and distributed not only among government groups in the policy context but also among interest groups seeking to strengthen their positions (with the predominant direction of flow from British Columbia to Washington); and (2) political successes from one jurisdiction are used as exemplars in the other (with the predominant direction of flow from Washington to British Columbia). These interchanges have had some interesting effects. For example, while US environmentalists were using BC data to prove their cases in court, BC industry proponents were using Washington environmentalists' legal failures to champion the lack of validity of environmentalists' claims (BC Salmon Farmers Association 1998b).

British Columbia's powerful lobby force provides a highly charged context, but it would appear that the most recent surge of policy development on the BC side can largely be explained by the hypothesis that "significant policy change is unlikely without significant change in background conditions" (Hoberg 2001, 15; and see Sabatier 1993). The crucial background condition for aquaculture policy has been the size and timing of Atlantic salmon escapes.

The BC government's 1995 declaration of a moratorium on the expansion of salmon farms while it referred the issue to the Environmental Assessment Office for review was a highly demonstrative "addressing" of the concerns that lobby groups had raised in public fora. In 1997 the Assessment Office issued its recommendations, and again the provincial government made many public statements about its concern about and lack of tolerance for escapes and environmental risk. That the "moratorium" itself did not prevent a huge increase in production of farmed salmon²² suggests that the government's actions were primarily an attempt to placate opposition groups while not threatening capital. Similarly, in February 2000 the multi-stakeholder Salmon Aquaculture Implementation Advisory Committee was formed "to involve First Nations, coastal communities, environmental organizations, industry and the federal and provincial governments in the implementation of regulations, policy development, and the strategic development of the salmon farming industry" (BCMAFF 2002c). However, much to the

²² Based on Fisheries and Oceans Canada (2004) statistics, the total production of salmon from aquaculture in British Columbia increased from 27,275 tonnes in 1995 (the year the moratorium was put in place) to 68,000 tonnes in 2001 (the year before the moratorium was lifted).

surprise of some committee members, minutes were not even taken at an early meeting (personal communication, David Lane, T. Buck Suzuki Foundation, 17 April 2002), giving stakeholders the sense that it was the appearance of consultation that was desired rather than actual input from concerned groups.

At that time, one might have speculated that, as capital became further entrenched and the public tired of the debate, the regulatory “evolution” would stall. However, in the summer of 2000, during a period of high publicity over the potential lifting of the moratorium and the announcement of a huge federal grant for aquaculture research and development, two escapes (one of over 30,000 fish) occurred within two weeks. This did much to intensify the debate, and amendments to the aquaculture regulations were announced within months thereafter. The excessive speed with which this occurred, a fact not concealed by the officials in charge, is testament to the power that opposition groups had amassed.

Elements of this concession to environmental groups can be found in Washington as well. For example, a significant portion of the 2003 “new regulations” included sections on escape reporting and recapture plans that only reiterated existing requirements. The redundancy would seem to indicate a need to appease similar to that in British Columbia, and it is acknowledged in the text itself: “For the purpose of meeting the requirements of this section, plans and manuals required by the department of ecology through the National Pollution Discharge Elimination System (NPDES) permit process may be submitted for approval” (WAC 220-76-120). However, while such appeasement pressures are evident in Washington, their magnitude is nowhere near as great as it is in British Columbia. The Washington industry is vastly smaller than British Columbia’s, and there is a multiplicity of other causes competing for environmentalists’ attention. Even for those groups focused on the preservation of wild salmon, aquaculture is often not even on their list of active concerns, falling so far behind habitat protection and hydroelectric dams as to be almost negligible.

While environmental opposition may not be as focused on aquaculture in Washington as it is in British Columbia, that state’s legal system provides its environmental groups with a profitable avenue for action, effective for attaining and (potentially) enforcing licence criteria. Further study is needed to establish fully the effects that these groups have had on the evolution of regulations, but it appears that in Washington a small but dedicated group, the “environmental consortium,” has been able to use the courts effectively to initiate change. However, the Fish

and Wildlife settlement agreement notwithstanding, the courts seem less likely to force research or monitoring actions.

Permit appeals are not the only source of salmon farming lawsuits in the United States. In 2003, for example, a class action lawsuit was launched against the three largest US grocery chains (accounting for 6,000 stores in more than thirty states), for “failing to comply with federal law requiring disclosure of artificial colouring in farm-raised salmon” (Smith and Lowney, PLLC 2003). While the suit is specific to colouring, it advertises opposition to farmed salmon more generally by claiming that the failure to report colouring misleads the public into believing it is purchasing wild salmon. Associated news releases and a website provide publicity and disseminate information about the negative effects of farmed salmon.

All in all, the evolution of aquaculture policy in Washington State is quite in keeping with the characterization of the US environmental regulatory process as “costly, confrontational, litigious, formal, and unusually open to participation” (Jasanoff 1990, 63).

CONCLUSION

Salmon aquaculture escape regulations in British Columbia and Washington State have generally tended to converge. However, when escape policy is divided into two components – “compliance and enforcement” and “research and monitoring” – important differences emerge. Significant divergence is evident in research and monitoring, which is far more developed in British Columbia than it is in Washington. Compliance and enforcement, on the other hand, shows much greater convergence in approach, emphasizing bureaucratic solutions such as “escape prevention and response” plans, with discretionary and often weak enforcement against violators. The domestic factors that have led to this convergence, however, differ significantly. In British Columbia high potential for industry development, substantial interest group pressure, and a relatively coherent regulatory authority have created a system of policy amendment through cycles of consultation and response. This system is extremely vulnerable to exogenous factors, such as major escapes, which increase domestic pressures to address the policy issue. In Washington, low development potential, regulatory fragmentation, and limited interest group involvement have precluded this sort of policy evolution; instead, the different institutional context has made legal actions a viable tool for a determined few. While cross-border learning is clearly occurring, rather than being a force for change in

and of itself, its role in policy development appears to have been most important when it is used strategically by various actors.

Both Washington and British Columbia have, in effect, needed to go back to the drawing board to establish clearer conditions of aquaculture licensing. While British Columbia chose to focus on process, specifying the particulars of escape prevention measures, Washington, focusing on the end product, has been developing clearer definitions of what constitutes a violation. This difference opens up the potential for future divergence. As discussed by Hoberg (1997), the “discretionary nature” of Canadian policy making allows for “a greater risk of backsliding.” Under conditions of low environmental pressure, such as when the salience of the issue for the public declines, or when there is an economic downturn sufficient to tip the perceived “jobs versus environment” scale, there may be a concordant relaxing of net pen regulation compliance monitoring. With the “end product” approach in Washington, backed by a more interventionist judicial system, net pen compliance monitoring is not as necessary, and enforcement is less subject to political will than to the commitment of environmental groups to pursue violations through legal means.

That said, new conditions are developing in the Washington-BC aquaculture regulation arena that could significantly shift the existing dynamics. First, since the change of provincial government in 2001, British Columbia has been promoting performance-based measures that focus on assessment of outcomes rather than process-oriented regulation to deal with a variety of environmental concerns. It is quite possible that British Columbia’s prescriptive approach to aquaculture regulation may change accordingly. Moreover, the provincial government’s downsizing program has greatly reduced the number of staff in its agencies, which makes comprehensive compliance monitoring problematic. The backsliding discussed above may be easier under these conditions.

Second, the US federal government has recently announced its intention to address its “seafood deficit” by increasing its annual domestic aquaculture production from \$1 billion to \$5 billion by the year 2025 (Weiss 2005). This is a significant change in one of the domestic factors discussed. All of the US salmon farming development discussed in this article has been within the three-mile coastal boundary for Washington State waters, whereas the emphasis for new federal aquaculture development is on offshore operations in federal waters (personal communication, Eileen McVey, National Ocean and Atmospheric Administration Central Library, 13 August 2004). The territory for such aquaculture

can extend up to 200 miles offshore, and this expanded potential for growth could reproduce for Washington some of its northern neighbour's keen interest in ameliorating resistance and facilitating development. At the same time, moving the industry offshore will reduce its saliency for the public and weaken the potential for environmentalists to adopt the pressure tactics familiar to British Columbia. Further, while the NPDES permits themselves are federal, in some jurisdictions (such as Washington State) they are state administered, thus the jurisdiction of the permit issuance and appeal activities discussed here is limited to the three-mile coastal boundary for state waters. In sum, in addition to indicating a renewed federal interest in aquaculture, the new federal policy would shift regulatory authority to the federal level,²³ increase the development potential of aquaculture, and decrease public awareness of any problems by moving the farms out of public view.

Third, as the new "marking" regulations in Washington come into full expression, there is likely to arise a new level of Washington-BC integration. While the finding of marked escaped Atlantic salmon would strengthen any case brought by Washington environmentalists for a violation of the Pollution Discharge Elimination System, a finding of unmarked salmon would indicate escapes from British Columbia, with as yet to be determined consequences.²⁴ This could stimulate a new form of cross-border negotiation, which might finally lead to more coordinated management across the two jurisdictions.

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²³ In June 2005 the US administration recommended legislation to Congress that would set up a system for expediting the federal permitting of offshore fish farms in federal waters (Weiss 2005). Although the proposal includes a requirement that offshore farms be consistent with state laws, specific environmental protection measures were left to the commerce secretary to decide (*ibid.*).

²⁴ To further complicate these questions of the future, there is the question of whether any inclusion of Atlantic salmon in offshore aquaculture production would require the same marking procedure as that for Washington State Atlantics.

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APPENDIX A

WASHINGTON STATE AQUACULTURE POLICY SIGNIFICANT EVENTS

- 1970s Industry gets its start.
- 1980 National Aquaculture Act, 1980.
- 1989 As a result of environmentalists's threats to sue US EPA under Clean Water Act, EPA compels WDOE to issue permits for net pen facilities.
- 1990 Permits issued by WDOE and appealed by environmental groups.

- 1993 Washington legislation requiring WDOE to set standards for net pen pollution.
- 1995 WDOE sets standards (WAC 173-221A and 173-204).
- 1996 More permits issued by WDOE and appealed by environmental groups.
- 1997 (May) Escaped Atlantic salmon designated a “pollutant” by PCHB.
- 1997 (July) WDOE issues administrative order to Global Aqua to develop “fish release prevention plan” and “accidental fish release response plan.”
- 1998 Via legal settlement, WDFW agrees to monitor for Atlantics.
- 1998 PCHB rules WDOE must amend NPDES permits to include conditions addressing fish escapes and trial studies using all female smolts.
- 1999 PCHB orders WDOE to undertake a review of British Columbia’s Tsitika River data.
- 2001 Bill 1499 grants WDFW authority to negotiate escape prevention with industry.
- 2003 New regulations (WAC 220-76) result from Bill 1499: farmed fish must be marked to identify the aquatic grower.

BRITISH COLUMBIA AQUACULTURE POLICY SIGNIFICANT EVENTS

- 1970s Industry gets its start.
- 1980s Industry rapidly develops.
- 1986 Thirty-day moratorium on licences: Gillespie Report.
- 1988 Federal/Provincial Memorandum of Understanding re: aquaculture roles and development.
- 1990 Aquaculture Regulations: “reasonable precaution” licence condition for escape prevention.
- 1991 Atlantic salmon monitoring program initiated (joint federal/provincial program).
- 1992 Atlantic Salmon Watch Program launched.
- 1995 Federal Aquaculture Development Strategy.
- 1995 BCEAO asked to conduct review of aquaculture regulations.
- 1995 Moratorium on the issuance of new salmon tenures.
- 1997 BCEAO Salmon Aquaculture Review completed, includes 49 recommendations.
- 1999 Five-point salmon aquaculture policy initiative announced.

- 2000 (February) Multi-stakeholder Salmon Aquaculture Implementation Advisory Committee (SAIAC) formed.
- 2000 (August) Federal government announces \$75 million sustainable aquaculture program.
- 2000 (October) Amendments to the Aquaculture Regulations stipulate what “reasonable precaution” entails and include detailed escape prevention and response requirements.
- 2000/O1 Approval of “green technology” pilot projects.
- 2001 Change of BC government from New Democratic Party to Liberal.
- 2002 Amendments to the Aquaculture Regulations target prevention efforts and resources at higher risk activities.
- 2002 Moratorium on new salmon tenures is lifted.
- 2002 British Columbia announces \$5.1 million funding for three independent research partnerships on aquaculture and the environment.