

# Chapter 8 • Salmon farm management

## ■ Introduction

This Commission’s Terms of Reference direct me to investigate and make independent findings of fact regarding the causes of the decline of Fraser River sockeye, including “aquaculture.” As described more fully in this chapter, since December 2010 aquaculture management in British Columbia is a federal responsibility, and the industry is regulated in British Columbia by the Department of Fisheries and Oceans (DFO). To assess whether aquaculture is a cause of the decline and to develop recommendations for improving the future sustainability of the sockeye salmon fishery, it is important for me to set out how salmon farms are regulated and managed, since regulations relate to the risk posed by salmon farms. The focus in this chapter is on whether DFO has (and has had) the policies and practices in place to identify, consider, mitigate, or avoid any risks to Fraser River sockeye posed by salmon farms. It

should be read in conjunction with Chapter 9, Fish health management, and the sections on salmon farms in Volume 2 of this Report.

“Aquaculture” means the cultivation of fish.<sup>1</sup> “Fish” are broadly defined in the *Fisheries Act*, making “aquaculture” also a broad term that encompasses the cultivation of any species of fish and shellfish at any stage of their life cycles.<sup>2</sup> For salmon, this term would include the cultivation of broodstock, cultivation in freshwater hatcheries, and cultivation in ocean net pens.\* Despite the breadth of the term “aquaculture,” concerns raised early on in this Inquiry – through public submissions, public forums, and participants’ submissions on the Commission’s discussion paper of June 2010 – focused on the possible impacts from marine net-pen salmon farms. I have therefore limited the scope of my Inquiry into the effects of salmon farms on Fraser River sockeye. Unless otherwise stated, in this Report the term “aquaculture”

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\* The scope of the *Pacific Aquaculture Regulations*, SOR/2010-270, does not appear to extend to land-based closed containment facilities, unless fish may escape from such facilities into Canadian fisheries waters (see s. 2).

refers specifically to marine salmon aquaculture or “salmon farms.” For example, I have not investigated the impact of shellfish aquaculture on wild sockeye. Freshwater hatcheries are discussed in Chapter 6, Habitat management.

Another point to make at the outset is that sockeye salmon are not farmed; the current preferred species for salmon farming are Atlantic salmon (the majority of salmon farms) and chinook salmon. I discuss enhancement programs for Fraser River sockeye in Chapter 6, Habitat management.



*Salmon farm near Quadra Island, BC, 2010*

## Salmon farms in British Columbia

Salmon farming began in British Columbia in the early 1970s, with the cultivation of coho salmon. The 1980s saw a rapid increase in the number of farms and a shift to predominantly Atlantic salmon. By 1988, 101 different salmon-farming companies were operating in British Columbia.<sup>3</sup> In the 1990s, the industry consolidated such that, by 1997, there were 79 active farms operated by 16 salmon-farming companies. In 2008, 17 companies operated 136 salmon farms in British Columbia’s marine waters. In 2011, at the time of the Commission’s hearings on salmon farms, four main companies engaged in salmon aquaculture on the BC coast, holding 130 tenure licences – not all of which are in active operation at any one time. Those four companies are Mainstream Canada, Marine Harvest Canada, Grieg Seafood BC, and the Creative Salmon Company. Creative Salmon is a Canadian company that raises chinook salmon; the other three companies are Norwegian and raise Atlantic salmon.<sup>4</sup>

The geographical location of salmon farms along the BC coast has changed over the years. Early on, the industry was concentrated on the Sunshine Coast. Later, operators moved to the northeastern and western coasts of Vancouver Island, the Discovery Islands, and the Broughton Archipelago. As of 2010, salmon farms were located around Vancouver Island and the South Central coast (see Figure 1.8.1).

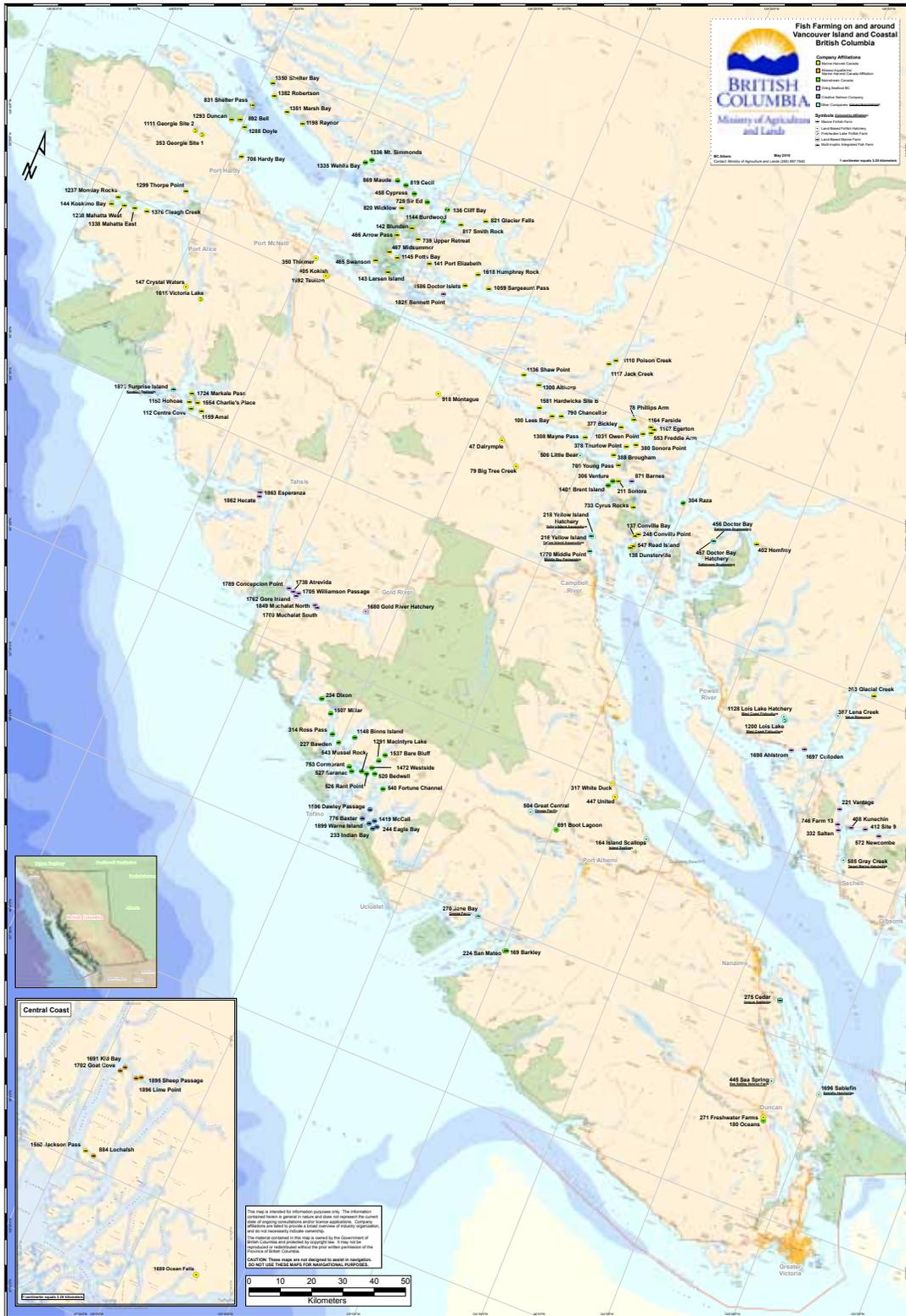
I heard evidence that salmon farms in the Discovery Islands (east of Vancouver Island and north of Campbell River) are located on the migration route of the Fraser River sockeye smolts. I also received submissions from participants concerned about siting farms on this particular section of the sockeye migration route.

Farmed salmon has grown to dominate British Columbia’s provincial salmon harvest. From 2005 to 2009, the landed value\* of farmed salmon in British Columbia ranged from about \$320 million to \$410 million annually.<sup>5</sup> In comparison, over the same period, the landed value of all wild salmon (including sockeye) ranged from about \$20 million to \$60 million annually. In 2010, however, the landed value of sockeye alone was \$91.3 million.<sup>6</sup>

Reports on the number of jobs associated with the BC finfish aquaculture industry vary, depending on whether the jobs counted are direct or indirect, part-time or full-time, or year-round or seasonal. A 2009 PricewaterhouseCoopers LLP report prepared for the province found that salmon farming in British Columbia provides an estimated 6,000 direct and indirect jobs.<sup>7</sup> In 2010, DFO released a study entitled *Socio-Economic Impact of Aquaculture in Canada*, which reported similar numbers. It indicated that, in 2007, the aquaculture industry generated about 6,000 full-time-equivalent (FTE) jobs in British Columbia, which included 2,220 FTEs in direct activities, 2,330 FTEs in indirect jobs, and 1,410 FTEs in induced activities, totaling \$223.3 million in labour income.<sup>†</sup>

\* The “landed value” is the price paid to the commercial fisher or salmon farmer for the whole fish, before processing. In aquaculture, this term can also be referred to as the “farmgate value.” See Exhibit 507, p. 2.

† Exhibit 1366, p. 9. “Direct employment” includes working in hatcheries, farms, processing plants, and administration. “Indirect employment” involves the industries supplying goods and services to aquaculture activities. “Induced activities” arise from spending of income earned by those employed in direct and indirect activities.



A report prepared in 2011 and entered into evidence by the Aboriginal Aquaculture Association states that Aboriginal people represent 14.1 percent of the labour force in the BC aquaculture industry (not including salmon-processing operations) and earn 12.8 percent of the total labour income. With regard to salmon-processing operations in British Columbia (including fish processed from salmon farms), Aboriginal people represent 36.6 percent of the labour force and earn 32.2 percent of total labour income in that sector.<sup>8</sup>

## Recent changes in the regulation of salmon farms

Before December 18, 2010, the province licensed BC salmon farms. DFO, which has federal responsibilities for protection of fish habitat (see chapters 3, Legal framework, and 6, Habitat management), reviewed and approved salmon farm applications, issuing authorizations under section 35 of the *Fisheries Act* where it deemed it appropriate to do so.

In February 2009, Mr. Justice Hinkson (then of the BC Supreme Court) determined that salmon aquaculture is a “fishery” under the jurisdiction of the federal government, and, as such, licensing of salmon farms is a federal rather than a provincial responsibility. Justice Hinkson struck down provincial legislation regulating salmon farms, but delayed the effect of his decision until December 2010 in order to give the federal government time to develop regulations related to BC aquaculture.<sup>9</sup> Justice Hinkson recognized that the land beneath salmon farms is the property of the provincial government, so he ruled tenure decisions to be within the jurisdiction of the province.

I describe the evidence about the federal and provincial roles, both historical and present, in the sections below.

## Concerns about salmon farms

Up to the close of evidentiary hearings (and public submissions) on September 28, 2011, I had received 306 submissions about salmon farms through the Commission’s website. Forty-four of these were submissions on an evidentiary issue (whether a document should become an exhibit in the

hearings); the remaining 262 submissions related to more substantive issues.

The majority (245) of the substantive submissions relating to salmon farming were from people opposed to salmon farming. Almost half of those expressing opposition to salmon farms advocated for the removal of farms from the migration paths of wild salmon or from coastal waters altogether. A similar number advocated for a mandatory transition toward some form of closed containment technology for salmon farms. Those concerns that potentially relate to Fraser River sockeye can be summarized as follows:

- 1 Many submissions expressed concern about the possible spread of disease and pathogens from salmon farms to wild salmon – more specifically, concern that juvenile sockeye migrating in proximity to salmon farms suffer from parasites, such as sea lice, or diseases. A few submissions received before September 28, 2011, expressed concern about the risk of introduction of infectious salmon anemia virus (ISAv) through egg importations. A few submissions also advocated for allowing and funding Dr. Kristina Miller, a DFO research scientist, to test farmed salmon for parvovirus and/or a mortality-related genetic signature.
- 2 Many submissions expressed concern that wild salmon suffer negative effects from salmon farm pollution.
- 3 A common issue of concern was the transparency and accountability of DFO and the aquaculture industry for harm to Fraser River sockeye from the operation of salmon farms. Concerns related to a lack of access to, and collection of, records relating to disease outbreaks, and to a perceived lack of public information about fish farm operations and treatments and chemicals used on the farms.
- 4 A number of submissions expressed concern about DFO having conflicting mandates to both promote aquaculture and preserve wild stocks such as Fraser River sockeye. Some felt that the department’s conservation mandate had been supplanted by the promotion of aquaculture and suggested that separate agencies are needed to avoid this conflict. There were also concerns that the regulation of aquaculture is too weak or not enforced

effectively enough to protect sockeye from the potential harmful effects of salmon farms.

A smaller number (12) of public submissions were from people who support the salmon-farming industry. These submissions make the following points:

- 1 Salmon farming is not related to declines in Fraser River sockeye; stocks were declining before there were salmon farms, and the record return of 2010 shows there can be good runs despite salmon farms.
- 2 Sea lice are not harming Fraser River sockeye, and research that claims otherwise is flawed.
- 3 Salmon aquaculture reduces the pressure to harvest wild stocks such as Fraser River sockeye. Consumer demand for salmon can be met only through farming.
- 4 Salmon farms are essential to the economies of coastal communities, providing employment in remote communities and being the third largest employer in Campbell River.

An even smaller number (five) of submissions provided information (such as suggestions of researchers or information sources for the Commission to explore) without indicating whether the submitters were supportive of the industry.

As explained further in Chapter 9, Fish health management, in November 2011, I decided to reopen the hearings (and public submissions) to hear evidence on recent testing for ISAv in British Columbia. I received 25 public submissions related to ISAv testing, and 156 submissions requesting that the ISAv hearings be live streamed. The 25 submissions about testing aligned with three themes:

- 1 Frustration with DFO, claiming the department is in denial of the presence of ISAv in British Columbia waters.
- 2 Concern that laboratory testing for ISAv has been politicized, advocating that testing for ISAv ought to be carried out by independent third parties, with complete separation from the government. Other submissions said DFO must be proactive in testing for ISAv and developing a course of action in the event ISAv is present in British Columbia.
- 3 Concern about allowing net-pen salmon farms to continue to operate in British Columbia, stating that, given the threat of ISAv infection, salmon farms should be moved onto land. One submission stated that, at the very least, no new licences or renewals should be awarded until more is known about ISAv in the province.

Many of the concerns in public submissions and at the public forums were explored during the evidentiary hearings on disease and aquaculture and in the hearings on ISAv testing. I address some of the scientific issues in Volume 2 of this Report. I discuss management issues in both this chapter and the next.

## ■ Regulatory roles and management programs

### Evolution of aquaculture regulation

In September 1988, Canada and British Columbia signed the Memorandum of Understanding on Aquaculture Development (1988 MOU). In broad terms, the 1988 MOU set out that Canada and British Columbia would co-operate and divide responsibilities for aquaculture such that both jurisdictions would be involved in research and development; the province would license operations; licence applications would be referred to Canada for comment; and both jurisdictions would co-operate in information sharing and compliance and inspection activities.<sup>10</sup> Soon thereafter, British Columbia passed its *Fisheries Act* and its *Aquaculture Regulation*.<sup>11</sup>

In 1995, the province imposed a moratorium on the approval of new fish farms in British Columbia and asked the BC Environmental Assessment Office to conduct a review of the regulation of salmon farms. The BC Environmental Assessment Office released its report, known as the Salmon Aquaculture Review (SAR), in 1997. The report concluded that “salmon farming in B.C., as presently practiced and at current production levels, presents a low overall risk to the environment.”<sup>12</sup> The SAR report

contained 49 recommendations related to farm siting, escaped farmed salmon, farm and wild fish health, waste discharges, interactions with coastal mammals and other species, First Nations issues, managing risk and uncertainty, alternative salmon-farming technology, dispute avoidance and resolution, and implementation.<sup>13</sup>

In response to the SAR, in 2000 the province established the Fish Farm Review Committee, with representatives from provincial ministries and DFO, to review all existing farms in British Columbia to identify farms requiring relocation.<sup>14</sup> Gavin Last, assistant director of the province's Policy and Industry Competitiveness Branch (responsible for aquaculture program administration), testified that, between 2000 and 2002, the provincial government reviewed the existing farm locations for environmental, economic, and social impacts (as discussed below in the section on siting and licensing of salmon farms).<sup>15</sup> During this relocation period, the province continued its moratorium on new salmon farms, maintaining the number of salmon tenures at 121. The province lifted the moratorium in September 2002.<sup>16</sup>

The SAR also prompted the development of a joint application regime between provincial and federal agencies with responsibilities for salmon farms. Mr. Last described how the Fish Farm Review Committee, replaced by the Project Review Team in 2003, screened salmon farm applications for completeness.<sup>17</sup> The province also produced a guide for marine finfish aquaculture applications, setting out the information requirements and the application process.<sup>18</sup> The Project Review Team's work is described further in the discussion below on siting and licensing of salmon farms.

Also in the early 2000s, the province developed Atlantic salmon escape regulations; initiated a Fish Health Auditing and Surveillance Program; developed the *Finfish Aquaculture Waste Control Regulation* (FAWCR);<sup>19</sup> developed a sea lice monitoring program for the Broughton Archipelago; and made Fish Health Management Plans (FHMPs) a required element of provincial salmon farm licences.<sup>20</sup> For more information on fish health surveillance, sea lice monitoring, and FHMPs, see Chapter 9, Fish health management.

By the mid-2000s, the 1988 MOU had become outdated and the industry as a whole, as well as the working relationship between governments,

had changed. Similarly, issues of significance had changed (e.g., sea lice emerged as an issue of concern).<sup>21</sup>

In 2005, DFO published *Canada's Policy for Conservation of Wild Pacific Salmon* (Wild Salmon Policy, or WSP) (see Chapter 10, Wild Salmon Policy). The WSP recognized that the expansion of salmon aquaculture "has not been without controversy."<sup>22</sup> It recognized that aquaculture operations pose risks to wild salmon and set out how these risks are managed:

These potential impacts to wild salmon include: the chance of disease and parasite transfer, competition and genetic effects of escapes, and physical disturbances in near-shore environments. Risks are addressed through mitigation measures such as Fish Health Management Plans, improved cage structures and proper farm siting.<sup>23</sup>

Then in February 2009, the BC Supreme Court released the decision of Justice Hinkson (the *Morton v. British Columbia (Agriculture and Lands)* decision), noted above.<sup>24</sup> Justice Hinkson struck down parts of the provincial *Fisheries Act*, the *Farm Practices Protection (Right to Farm) Act*, and British Columbia's *Aquaculture Regulation* pertaining to finfish aquaculture, and the entirety of the FAWCR.<sup>25</sup> However, Justice Hinkson recognized that "the land beneath the fish farms is the property of the provincial government," so he did not declare tenure decisions to be outside the jurisdiction of the province.<sup>26</sup> Justice Hinkson delayed the effect of his decision for 12 months, to February 2010, to provide time for the federal government to develop sufficient legislation to regulate fish farms.<sup>27</sup> In response to an application from Canada, the court extended the deadline to December 2010.<sup>28</sup>

As a result of the *Morton* decision, in November 2009, DFO released a discussion document about the development of federal regulations for British Columbia aquaculture and a National Aquaculture Strategic Action Plan Initiative, and it organized a number of "regulatory and developmental action planning meetings" in British Columbia.<sup>29</sup> In July 2010, the proposed federal *Pacific Aquaculture Regulations* (PAR) under the *Fisheries Act* were posted to the *Canada Gazette* Part I.<sup>30</sup> Consultations leading up to the PAR are described later in this chapter.

The PAR, which came into force on December 18, 2010, apply to aquaculture in the territorial sea of Canada off the coast of British Columbia; the internal waters of Canada off the coast of British Columbia that are not within the province; the internal waters of Canada in British Columbia; and any facility in the province from which fish may escape into Canadian fisheries waters.<sup>31</sup> The PAR allows the minister to issue aquaculture licences (section 3). Section 4 is the key provision; it enables the minister to make conditions of licence for the proper management and control of the fishery. The PAR also includes prohibitions on aquaculture operators keeping incidental catch (section 5) and operating without a licence (section 7).

In December 2010, Canada and British Columbia signed the Canada–British Columbia Agreement on Aquaculture Management (2010 Agreement). The 2010 Agreement replaced the 1988 MOU and articulated an agreement that took into account the changed jurisdictional picture arising after the *Morton* decision. The preamble to the agreement notes that Canada and British Columbia “share the common goal of having an economically, socially and environmentally sustainable aquaculture sector in British Columbia,” and that the parties “recognise the need to develop collaborative regulatory and management arrangements designed specifically for the Province.”<sup>32</sup>

The 2010 Agreement sets out areas of federal and provincial responsibilities. It provides that “Canada may issue aquaculture licences under the *Fisheries Act* for all aquaculture activities to be undertaken in the province of British Columbia” and that “British Columbia may issue land tenures under the *Land Act* for aquaculture purposes.” The 2010 Agreement provides for the sharing of information; collaboration on public reporting; and coordination of inspections, compliance, and enforcement activities. It indicates that DFO is the lead federal agency for the management of aquaculture in British Columbia, while the provincial Ministry of Agriculture will “represent a provincial view on such matters in dealing with Canada.” Further, it states that the parties will establish a Management Committee to oversee implementation of the 2010 Agreement.<sup>33</sup>

On December 19, 2010, DFO issued licences to all salmon farms that were then licensed by the province. At the time of the hearings on aquaculture

in August and September 2011, the department was still in the process of developing policies to support implementation of the PAR.<sup>34</sup> The state of federal regulatory development for salmon farms is discussed further below.

## Provincial ministries

Until December 2010, when DFO issued aquaculture licences under the PAR, the province divided its responsibilities for aquaculture among a Licensing and Compliance Branch that carried out licensing responsibilities for aquaculture; a Lands Branch that focused on licensing the Crown land use of the seabed; and an Aquaculture Branch that housed other regulatory staff and the veterinarians who conducted fish health work. As a result of ministry reorganizations, these groups have been housed in different ministries over the years, and called different things, but their basic roles remained constant.<sup>35</sup>

In the 1990s, the Licensing and Compliance Branch and the Aquaculture Branch were the responsibility of the Ministry of Fisheries. The provincial government ended that ministry in the early 2000s, and the responsibility for aquaculture moved to the Ministry of Agriculture, Food and Fisheries. In the mid-2000s, aquaculture moved to the Ministry of Agriculture and Lands (BCMAL). As of August 2011, a smaller aquaculture group was located within the Ministry of Agriculture, along with the Animal Health Branch.<sup>36</sup> For ease of reference, the provincial ministry historically responsible for licensing and regulating aquaculture is referred to in this chapter as BCMAL.

Similarly, the Lands Branch has been housed in different organizational structures, including at one time Land and Water BC and then the Integrated Land Management Bureau under BCMAL. As of the hearings on salmon farms in August and September 2011, the Ministry of Forests, Land and Natural Resource Operations (MFLNRO), had responsibility for provincial land tenures. A service organization called FrontCounter BC receives and handles land tenure applications, such as those for aquaculture sites, and forwards them to the appropriate reviewing agencies.<sup>37</sup>

The BC Ministry of Environment (MOE) has historically been involved in the monitoring of salmon farm operations and the administration of

the *Environmental Management Act* and associated regulations related to aquaculture activities.<sup>38</sup> This ministry has also undergone name changes, at some points in the recent past being called the Ministry of Environment, Lands and Parks or the Ministry of Water, Land and Air Protection.<sup>39</sup>

Figure 1.8.2 is a diagram showing the organization of provincial responsibilities for aquaculture in approximately 2004 or 2005, after the lifting of the moratorium that was in place during and following the SAR.

## Federal departments

Federally, DFO is the lead department for salmon farming. In British Columbia, DFO's role has expanded as a result of the *Morton* decision. British Columbia is the only province in which DFO licenses salmon farms.<sup>40</sup>

DFO divides its responsibilities for aquaculture between national headquarters and its regional offices. The department delivers most of its responsibilities for aquaculture through the national Aquaculture Management Directorate (AMD). AMD's regional offices are called Regional Aquaculture Coordination Offices (RACOs).<sup>41</sup>

As of June 2011, nationally, AMD is situated under the Programs sector (see discussion of sectors in Chapter 4, DFO overview). AMD is headed by a director general, who reports to the assistant deputy minister of programs.\* Four directors / managers report to the director general. These directors / managers have responsibility for stewardship, innovation and sector strategies, certification and sustainability reporting, and the national aquaculture secretariat.<sup>42</sup> Additionally, in Ottawa, an executive director of aquaculture operations reports to the senior assistant deputy minister, Ecosystems and Fisheries Management. AMD nationally has a functional relationship, but not a reporting one, with the RACOs.<sup>43</sup> (The management model is described in Chapter 4, DFO overview.)

The director of aquaculture management in the Pacific Region RACO reports to the regional director of fisheries management, who in turn reports to the regional director general.† The regional director general has a functional reporting relationship to the assistant deputy minister, Ecosystems and Fisheries Management (see section on Fraser River sockeye fisheries management structure in Chapter 5, Sockeye fishery management).<sup>44</sup>

The Pacific Region RACO has approximately 54 staff – 44 of whom were added in response to the federal assumption of licensing responsibilities in British Columbia – organized into three sections: Aquaculture Resource Management, Aquaculture Environmental Operations (AEO), and Aquaculture Program Group. Aquaculture Resource Management is responsible for developing the Integrated Management of Aquaculture Plans (IMAPs), discussed below. AEO includes biologists and veterinarians who assess aquaculture projects and monitor fish health and environmental issues. AEO staff work out of offices in Courtenay, Campbell River, and Port Hardy. The Aquaculture Program Group, centred at regional headquarters, conducts work related to governance coordination, Aboriginal engagement, ecosystem approach, and other region-wide issues.<sup>45</sup>

In addition to staff in the AMD, two licensing agents in the DFO's South Coast area office are responsible for issuing aquaculture licences.<sup>46</sup>

With the shift in operational responsibilities to the federal government, DFO's Conservation and Protection Directorate (C&P) received funding for a dedicated aquaculture program in British Columbia. C&P regionally has 12 FTEs, including eight fishery officers, dedicated to aquaculture.<sup>47</sup> The area chief for aquaculture leads the program and reports to the regional director of C&P.‡ (For a more detailed description of C&P, see Chapter 7, Enforcement.)

Figure 1.8.3 shows the organizational structure of the Pacific Aquaculture Regulatory Program (PARP).

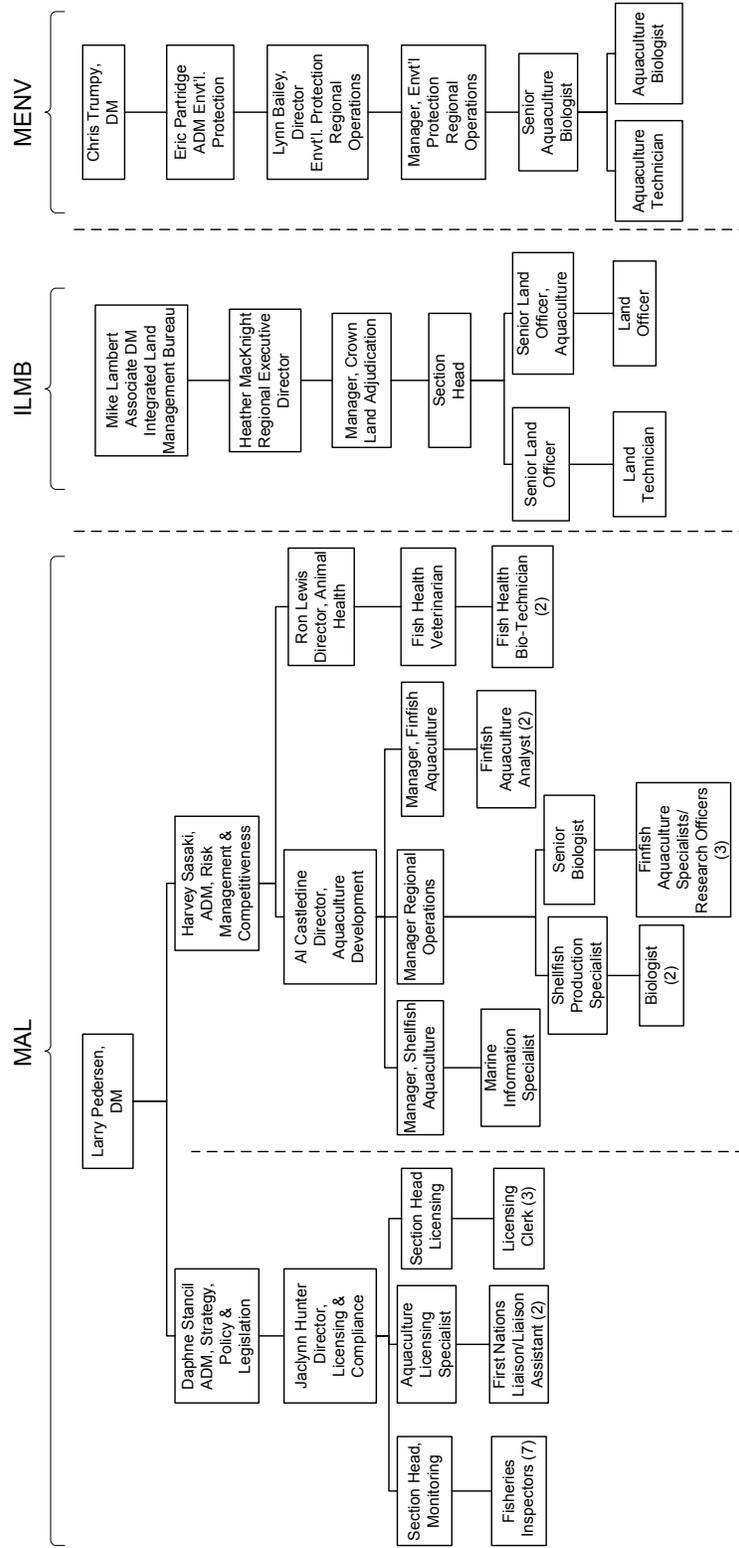
AMD delivers its work principally through two programs: nationally, through the Sustainable Aquaculture Program (SAP); and regionally, through

\* Trevor Swerdfager, who testified before the Inquiry, was the director general of AMD from 2007 to March 31, 2011 (see Exhibit 1578). At the time of the hearings in August and September 2011, this position was filled by Guy Beaupré.

† At the time of the hearings in August and September 2011, the director of aquaculture management was Andrew Thomson, and the regional director general was Susan Farlinger, both of whom testified before the Inquiry.

‡ As of August 2011, the area chief of aquaculture was Brian Atagi. As of July 2011, the regional director of C&P was Randy Nelson. Both Mr. Atagi and Mr. Nelson testified before the Inquiry.

**Province of British Columbia**  
**Ministry Aquaculture Responsibilities**



**Figure 1.8.2 Organization of provincial responsibilities for aquaculture, circa 2004–5 (Ministry of Agriculture and Lands, Integrated Land Management Bureau, and Ministry of Environment)**

Source: Reproduced from Policy and Practice Report 20, Aquaculture, p. 28.

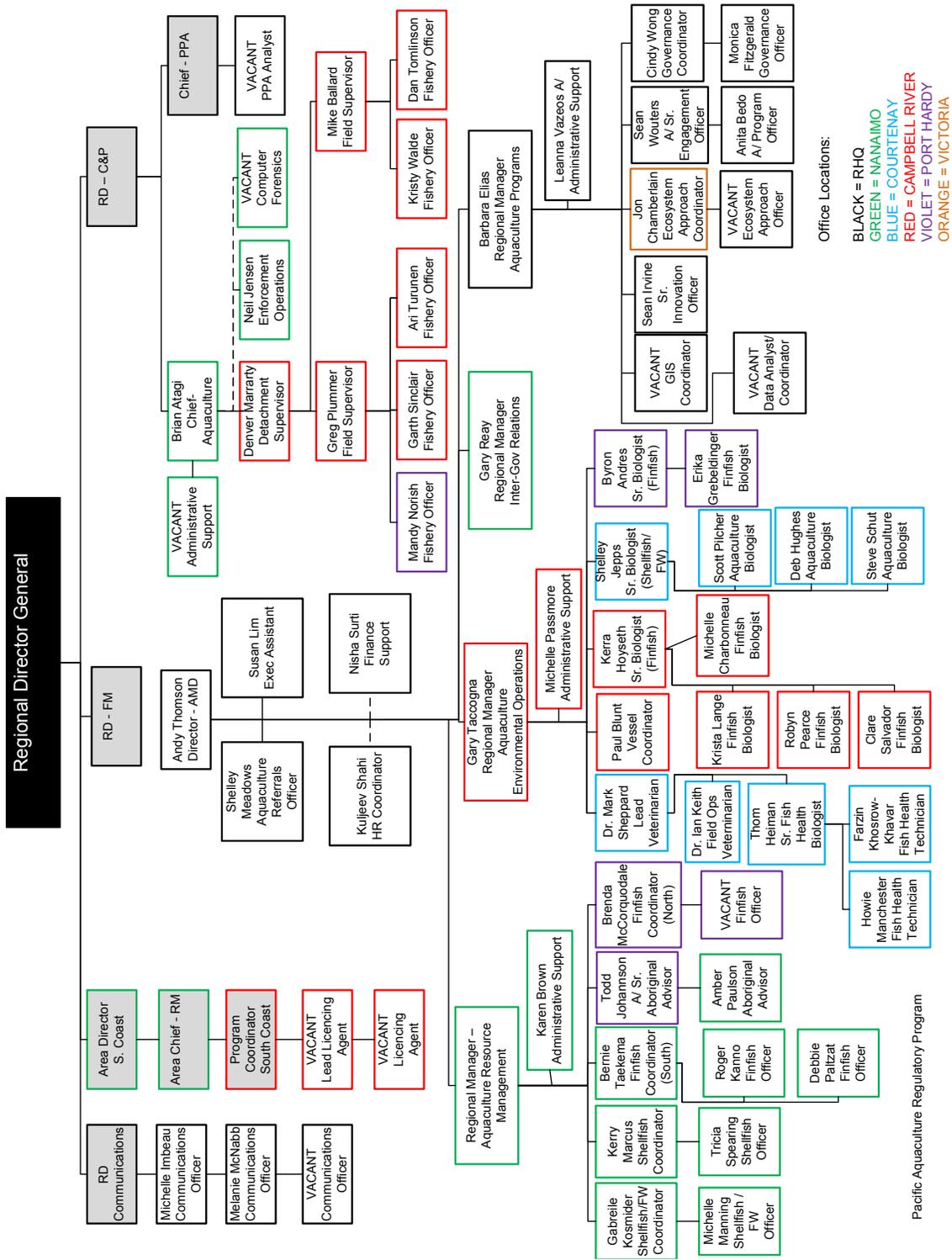


Figure 1.8.3 Pacific Aquaculture Regulatory Program (2011)

Source: Reproduced from Exhibit 1581.

the Pacific Aquaculture Regulatory Program. Since 1991, DFO has also run an Atlantic Salmon Watch Program (ASWP).

Other federal departments with significant responsibilities related to salmon farming include the following:

- Transport Canada approves salmon farms that may be situated in navigable waters. It may conduct reviews under the *Canadian Environmental Assessment Act*<sup>49</sup> in respect of such works (see the discussion below on siting and licensing salmon farms).\*
- The Canadian Food Inspection Agency is responsible for the administration of the *Health of Animals Act*,<sup>50</sup> its related regulations, and the *Feeds Act*.<sup>51</sup> It also co-administers with DFO the National Aquatic Animal Health Program (see discussion in Chapter 9, Fish health management).
- Environment Canada issues “disposal at sea” permits for fish waste under the *Canadian Environmental Protection Act, 1999*<sup>52</sup> (see discussions in chapters 6, Habitat management, and 7, Enforcement), as well as “scare” permits to salmon farms in relation to migratory birds through the Canadian Wildlife Service. As discussed in the habitat management chapter, Environment Canada has administrative responsibility for section 36 of the *Fisheries Act*.

### ***Sustainable Aquaculture Program***

The Sustainable Aquaculture Program is a \$70 million national program, running from 2008 to 2013, designed to enhance “global competitiveness and environmental performance of Canada’s aquaculture industry.”<sup>53</sup> A backgrounder on the program sets out the funding for SAP’s “four pillars to modernize and strengthen Canada’s aquaculture industry”:

- \$13 million for governance and regulatory reform, which “focuses on streamlining federal, provincial and territorial regulations and policies”;

- \$22 million for scientific regulatory research, which “is to strengthen scientific knowledge and advice that supports performance-based environmental standards”;
- \$25 million for innovation “to enhance the sector’s competitiveness and productivity”;
- \$10 million to support “the aquaculture sector’s ability to meet domestic market demands and rigorous international trade and marketing requirements.”<sup>54</sup>

Trevor Swerdfager, former national director general of DFO’s AMD, explained that a large portion of the SAP funding (the \$22 million noted above) has gone to DFO’s Science Branch to support the regulatory agenda. He also said that the goals listed in the SAP backgrounder of making industry “successful” and “competitive” do not “appropriately address the true mandate of the program, which is the sustainability dimension” of the aquaculture industry in Canada.<sup>55</sup>

The Program for Aquaculture Regulatory Research (PARR) is a component of SAP.<sup>56</sup> PARR is designed to “create new knowledge and methods that will support the development of better advice required for policy and decision making and in particular, ecosystem-based management.”<sup>57</sup> Research conducted under PARR must be short term (one to two years), conducted by DFO scientists, and related to the department’s annual research priorities.<sup>58</sup> As explained by Mr. Swerdfager, each year PARR releases a call for proposals to departmental scientists announcing the research priorities, which are developed jointly by AMD and the Science sector.<sup>59</sup> Proposals are reviewed by the PARR Review Committee and approved by DFO Science senior management. In 2009/10, PARR supported eight research projects relating to two identified priorities: fish health management and siting requirements.<sup>60</sup> In 2010/11, PARR identified the Pacific Region’s priorities as wild-farmed interactions and sea lice management, and the “characterization of the susceptibility of wild Pacific salmon populations to sea lice infection.”<sup>61</sup> The PARR 2010/11 funding cycle allocated a maximum of \$300,000 to five (Pacific

\* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 3, Division 1, enacts the *Canadian Environmental Assessment Act, 2012*. As a result, the references in this chapter to the CEAA may not reflect the current law respecting environmental assessment in Canada or the applicability of environmental assessments to salmon farms.

Region) DFO scientists related to the following objectives: “to conduct laboratory studies to describe the susceptibility of juvenile [P]acific salmon to sea lice infection,” “to monitor wild salmon populations to identify when and where vulnerable populations are located in relation to fish farms,” and “to model sea lice dispersal along with the migration routes of Pacific salmon.”<sup>62</sup>

DFO administers other national programs using SAP funds, such as the Aquaculture Collaborative Research and Development Program (ACRDP) and the Aquaculture Innovation and Market Access Program (AIMAP).<sup>63</sup> ACRDP is an “industry driven program that teams industry with DFO researchers” to meet the program’s goals of improving competitiveness of the aquaculture industry, increasing collaboration between DFO and industry on scientific research to enhance aquaculture, facilitate and accelerate technology transfer, and increase scientific capacity for essential aquaculture research and development. ACRDP funding is approximately \$4.5 million annually.<sup>64</sup> AIMAP provides \$4.7 million annually (for five years, starting in 2008) in national grants “focusing on the competitiveness of existing products, new species development, environmental performance, and market access.”<sup>65</sup> AIMAP is

“a nationally competitive process with calls for proposals issued on an annual basis[.]”<sup>66</sup>

### Pacific Aquaculture Regulatory Program

The Pacific Aquaculture Regulatory Program, an ongoing management program for aquaculture in British Columbia, was begun in 2010 to implement the PAR. It costs \$8.3 million annually in A-based funds. This program received an additional \$4 million in 2010 and \$2 million in 2011 to purchase equipment and vessels and to develop an aquaculture information management system.<sup>67</sup> As of September 2010, work under PARP had focused on implementing aquaculture licensing. DFO had also begun to develop a number of policies to support this work, as described below.

At the time of the Commission’s hearings on salmon farms, DFO was in the process of developing a Sustainable Aquaculture Fisheries Framework (SAFF) that “will guide licensing and management of the sector” under PARP.<sup>68</sup> SAFF is depicted in Figure 1.8.4.

DFO is developing three suites of operational policies under SAFF and intends to roll them out sequentially. In August 2011, Andrew Thomson, regional director of the AMD, DFO Pacific Region,

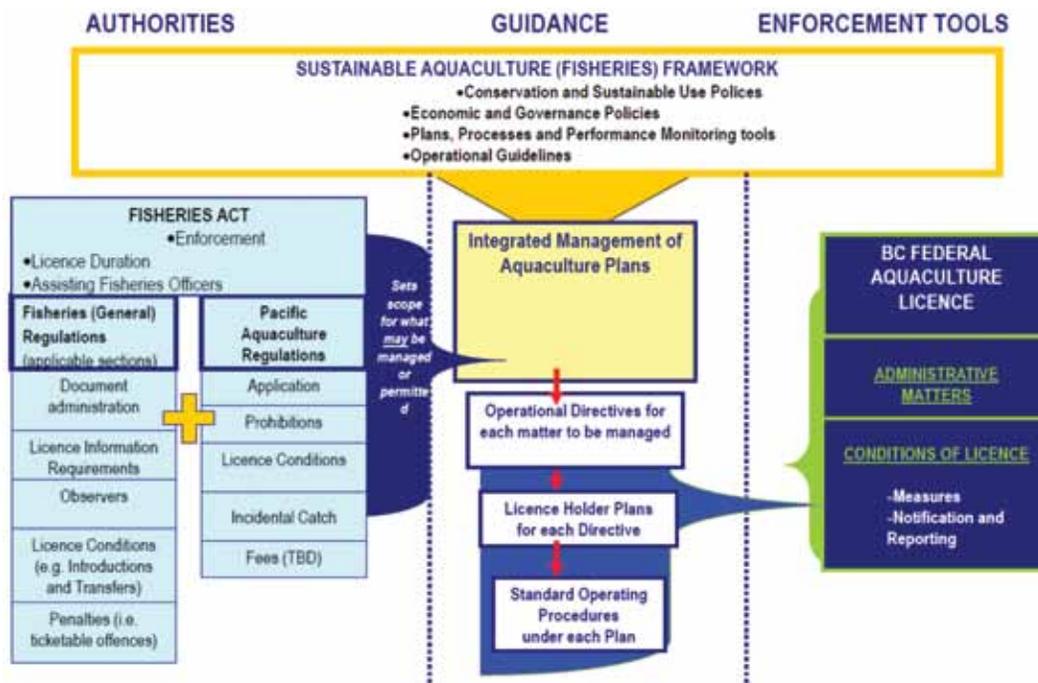


Figure 1.8.4 The Sustainable Aquaculture Fisheries Framework

Source: Exhibit 1591, p. 20.

testified that a first suite of policies – including the sustainable aquaculture framework, the licensing approach, and a public reporting approach – had completed the departmental approval process.<sup>69</sup> At that time, DFO was working on a second suite of environmental management policies and planned to work on a third suite of policies in 2012 related to such things as the precautionary approach, species at risk, and revisions to the 2002 Aquaculture Policy Framework (discussed below).<sup>70</sup> The following policies – in draft at the time of hearings in August and September 2011 – were in evidence before me:

- A Sustainable Aquaculture Fisheries Framework, June 29th, 2011 (DRAFT);<sup>71</sup>
- Public Reporting of Regulatory Information Under the British Columbia Aquaculture Regulatory Regime, June 29th, 2011 (DRAFT);<sup>72</sup>
- Aquaculture Licensing Approach, June 29th, 2011 (DRAFT);<sup>73</sup>
- Identification and Management of Environmental Impacts of [*sic*] Under the British Columbia Aquaculture Regulatory Regime, June 29th, 2011 (DRAFT);<sup>74</sup>
- Ecosystem-Based Approach to Aquaculture Management (DRAFT);<sup>75</sup>
- Approach to Managing Feed-Related Organic Deposition in Aquaculture (DRAFT);<sup>76</sup>
- Integrated Management of Aquaculture Plans (IMAPs) Guidance (DRAFT);<sup>77</sup>
- Policy on the Access to Wild Aquatic Resources as it applies to Aquaculture Discussion Document, March 9, 2011 (Draft for Discussion);<sup>78</sup>
- Approach to Managing Non Feed-Related Organic Deposition in Aquaculture (DRAFT);<sup>79</sup>
- Approach to Fish Health (DRAFT);<sup>80</sup>
- Approach on the Use of Noise (DRAFT);<sup>81</sup>
- Approach on the Use of Light (DRAFT);<sup>82</sup>
- Approach to Managing Fish Transfer, Removal and Production in Aquaculture Facilities (DRAFT);<sup>83</sup> and
- Approach to Chemicals and Litter Management at Aquaculture Sites (DRAFT).<sup>84</sup>

Under SAFE, DFO intends to develop IMAPs to guide aquaculture management. Mr. Thomson

testified that the department expected to release a draft IMAP in the fall of 2011. Like Integrated Fisheries Management Plans (IFMPs) (see section on IFMPs in Chapter 5, Sockeye fishery management), the IMAP is both a process and a document. As a process, it is intended to “enhance First Nations, industry and stakeholder engagement in decision-making regarding management and conservation measures affecting aquaculture activities.” As a document, an IMAP is a reporting tool and contains sources of information on the sector. DFO will develop “sectoral” IMAPs for the finfish and shellfish aquaculture sectors. These plans may be supplemented in the future with specific-area measures that could be attached to the sector IMAPs. DFO also intends to take an ecosystem approach to the management of aquaculture.<sup>87</sup> (For more information on that approach, see Chapter 4, DFO overview.) Its draft policy, *Ecosystem-Based Approach to Aquaculture Management*, describes the ecosystem approach, which

involves protecting ecosystem features by managing the risks caused by human pressures on ecosystems, taking into account the provision of ecosystem goods and services that ultimately benefit societies and economies. This involves incorporating ecosystem information into management decision-making, and takes into account science advice at the ecosystem levels, and uses precaution in management where there are uncertainties.<sup>88</sup>

Mr. Swerdfager testified that it is difficult to translate an “ecosystem approach” into specific management decisions and actions. Nevertheless, he is confident that DFO will be able to take a systems-based approach to aquaculture.<sup>89</sup>

Regarding other aspects of PARP, Mr. Thomson testified that, during the summer of 2011, DFO began to conduct audits, inspections, and complaint investigations, and began consulting on a review of the conditions of licences that were issued in December 2010.<sup>90</sup>

### ***Atlantic Salmon Watch Program***

One of the prominent early concerns about finfish aquaculture in British Columbia was that Atlantic salmon would escape from aquaculture facilities,

establish as wild populations, and then compete with wild Pacific salmon for food and habitat. Another concern was the potential for escaped salmon to spread disease to wild fish.<sup>91</sup>

In 1991, DFO initiated the Atlantic Salmon Watch Program as a research program. The ASWP's objective is to "study the abundance, distribution and biology of Atlantic salmon in British Columbia and its adjacent waters." The ASWP monitors reports of Atlantic salmon observations from commercial and recreational fishers, fish processors, government and independent field staff, and hatchery workers. The ASWP has a toll-free reporting line, and the DFO website provides information about how to distinguish Atlantic salmon from Pacific salmon.<sup>92</sup>

The PAR allow the minister to specify, under the conditions of licence, "the measures that must be taken to minimize the escape of fish from the aquaculture facility and to catch the fish that escape," and "the records that must be kept in relation to ... any major failure of the aquaculture facility's containment structures and the quantity of any fish that escape from the facility."<sup>93</sup> Among other things, the conditions require licence holders to do the following:

- take all reasonable measures to prevent escapes;
- have a written escape response plan;
- take immediate corrective action to control, mitigate, remedy, and confine an escape or suspected escape;
- submit monthly reports to the department;
- report escapes within 48 hours;
- undertake a number of prescribed activities to recapture escaped Atlantic salmon; and
- submit to the department a report of the results of a recapture within 48 hours of the recapture.<sup>94</sup>

## A proposed federal Aquaculture Act

The B.C. Salmon Farmers Association (BCSFA) submitted documentary evidence suggesting an Aquaculture Act may be a better way to regulate the industry than through the *Fisheries Act*. The Canadian Aquaculture Industry Alliance (CAIA) has proposed an Aquaculture Act that would recognize aquaculture as a "food production

practice which takes place with fish as private property and occurs in legally defined private spaces."<sup>95</sup> CAIA says an Aquaculture Act would, among other things, define aquaculture, legitimize it as a business, define and authorize common farming practices, and provide a framework for the planning of aquaculture development in Canada.<sup>96</sup>

In testimony, Mr. Swerdfager said his views on a separate Aquaculture Act "have waffled a little bit over the years ... I think the key thing is that it would be ideal for options to be put before our government to select from as to how best Parliament may want to express itself with respect to aquaculture."<sup>97</sup>

Claire Dansereau, deputy minister, testified that she does not have a "solid opinion" of whether an Aquaculture Act ought to be developed. She said "that the fisheries management should be done as part of an integrated system," and that she did not want to create obstacles to joint management of wild and farmed fish by having these responsibilities split over different departments. In her view, if separate legislation for aquaculture were to be developed, aquaculture should continue to be managed by DFO to prevent a loss of integration in managing the fisheries.<sup>98</sup>

In contrast to the CAIA proposal, David Bevan, associate deputy minister, testified that a new Aquaculture Act is not necessary to give a legal definition of "aquaculture" or to set the rights and responsibilities of fish-farm operators, because those issues have been covered within the new federal regulatory regime. He also said that, at this time, DFO is not prepared to recommend an Aquaculture Act, even though Ms. Dansereau testified that DFO is actively discussing this issue.<sup>99</sup>

## DFO's mandate for aquaculture

One of the issues before me is whether DFO has conflicting mandates with respect to both promoting salmon aquaculture and regulating salmon farms to protect wild salmon stocks. In addition to public submissions, evidence on this issue included testimony from DFO, the province, and representatives from industry and the environmental community, along with documentary evidence about the department's policies and programs.

Catherine Stewart, salmon farming campaign manager for the Living Oceans Society and a representative of the Coastal Alliance for Aquaculture Reform (CAAR), testified that she does not believe it is possible for DFO to successfully both promote and regulate the aquaculture industry. She said the “constitutional mandate to protect ocean and ecosystem health and wild stocks” conflicts with the “political mandate in recent years to be a promoter and an advocate for the aquaculture industry.”<sup>100</sup> Ms. Stewart said that “those two mandates have to be separated” and suggested that the promotion of aquaculture could go to “Industry or Trade Canada or other departments supporting Canadian businesses,” such as Agriculture Canada.<sup>101</sup> “[T]here are a lot of good people and very well-intentioned and very dedicated people in DFO,” she said, but “they’re constrained by the political mandate.”<sup>102</sup>

Mr. Swerdfager did not see DFO to be in a conflict, saying the department can regulate aquaculture and protect wild salmon while promoting the aquaculture industry. In his view, the department is “uniquely well placed” to be “actively engaged in protecting the environment, developing our economy and working at the social scale” as a result of DFO’s “science presence,” its close work with industry, stakeholders, and communities, and its understanding of the dynamics of industry. These things, he said, enable DFO to work with industry toward “sustainability-premised solutions.” Mr. Swerdfager said he finds it “deeply offensive” when “people tell us that we are being unduly biased toward industry.”<sup>103</sup>

Ms. Dansereau recognized the “perception” of a conflict, but she did not agree that DFO has “divided loyalties.” She said, “I believe that we are doing our job as regulators, both of the wild fishery and of the aquaculture fishery, that we view both as fisheries, as the courts have described, and it’s our responsibility to both regulate and promote both of them.” She further stated that DFO does not do marketing for aquaculture; rather, it assists with “market access.” She said that the department’s job is to “show the world that the Canadian products are safe, Canadian products are sustainable, and that’s because we are the regulators that we can speak with a certain

amount of authority on those areas, and that’s the extent of our involvement.”<sup>104</sup> With regard to the market access work carried out by DFO, documentary evidence refers to proposals and work completed by the department in promoting aquaculture projects, jointly with industry, through briefing sessions with seafood retailers such as Safeway.<sup>105</sup> Mr. Thomson described how he was part of a group that met with California senators concerning BC salmon farms.<sup>106</sup> Mr. Swerdfager said that he and another DFO staff member travelled to the Boston Seafood Show.<sup>107</sup>

In later testimony, Ms. Dansereau said that DFO has considered the “potential that we may be perceived to have some conflict between being the regulator and working with the industry” in respect of the application and administration of section 36 of the *Fisheries Act* to salmon farms. Indeed, she said that “it’s very difficult, in some of these circumstances, for the minister of fisheries and oceans on certain files. So it would be better left to potentially another minister doing this[.]” That is why she thought Environment Canada may be better suited than DFO to enforce section 36 of the *Fisheries Act*\* against salmon farms.<sup>108</sup>

Mr. Last acknowledged that there are conflicts and complexities within government in any resource development area. He said when the province was the lead regulator, it attempted to “create some separation between the functions of resource development and enforcement, to keep them separate, and as much as possible, avoid any kind of a conflict.”<sup>109</sup> Dr. Ian Fleming, professor at the Ocean Sciences Centre of Memorial University in Newfoundland and Labrador, similarly explained that in Norway four distinct ministries have a role in aquaculture, and research wings are privatized to create a degree of independence from aquaculture management.<sup>110</sup> Clare Backman, an industry representative from Marine Harvest Canada, said there “appears to be a conflict,” but noted that, in “the modern system of governance, it’s quite common that you have an agency that actually plays dual roles.”<sup>111</sup> Mia Parker, another industry representative, formerly the manager of regulatory affairs at Grieg Seafood, said, “[I]f you accept the premise that aquaculture is a fishery, then this approach to management is consistent

\* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Section 150 amends the *Fisheries Act* (a new s. 43.2) to allow cabinet to designate another minister as the minister responsible for the administration and enforcement of ss. 36(3) through (6).

with how other commercial fisheries are managed in Canada[.]”<sup>112</sup>

The overarching national policy framework for aquaculture reveals the tension in DFO’s mandate. In 2002, the department released DFO’s Aquaculture Policy Framework to guide sustainable development of aquaculture in Canada.<sup>113</sup> This national policy framework confirmed DFO’s role as the lead federal agency on aquaculture, set out DFO’s vision of “sustainable aquaculture development,” and set out nine policy principles to guide the department’s work on aquaculture. These principles are listed in the policy framework:

Principle 1. DFO will support aquaculture development in a manner consistent with its commitments to ecosystem-based and integrated management, as set out in departmental legislation, regulations and policies.

Principle 2. DFO will address issues of public concern in a fair and transparent manner, based on science and risk-management approaches endorsed by the Government of Canada.

Principle 3. DFO will communicate with Canadians and be informed by their views on issues pertaining to aquaculture development.

Principle 4. DFO will respect constitutionally protected Aboriginal and treaty rights and will work with interested and affected Aboriginal communities to facilitate their participation in aquaculture development.

Principle 5. Recognizing that aquaculture is a legitimate use of land, water and aquatic resources, DFO will work with provincial and territorial governments to provide aquaculturists with predictable, equitable and timely access to the aquatic resource base.

Principle 6. DFO will strive to ensure that its own legislative and regulatory frameworks enable the aquaculture sector to develop on an even footing with other sectors.

Principle 7. In partnership with other federal departments, the provinces and territories, the academic sector and industry, DFO will sup-

port responsible development of the aquaculture sector.

Principle 8. DFO will make every effort to understand the needs of the aquaculture industry and to respond in a manner that is solutions oriented and supportive of aquaculture development.

Principle 9. DFO will work with other federal departments and with provincial and territorial governments to coordinate policy development, integrate regulatory frameworks, and improve service delivery.<sup>114</sup>

Principles 1 and 4–9 make it clear that DFO is to support aquaculture development and to provide service to the aquaculture industry. This lead national policy on aquaculture does not mention the protection of either fish habitat or wild stocks, though those considerations might be inferred through Principle 1 by the reference to “ecosystem-based ... management”; Principle 2 by a reference to “risk-management”; and Principle 7 by a reference to “responsible development.”

National funding of aquaculture, including \$70 million for SAP, discussed above, also demonstrates the federal government’s direction that DFO promote aquaculture. Indeed, \$25 million of that funding is to promote aquaculture through innovation to enhance the sector’s competitiveness, and another \$10 million is to strengthen market access through sustainability certifications. In contrast, I heard no similar evidence of this magnitude of spending on the marketing and promotion of wild fish.

The AIMAP grant program has funded such things as Marine Harvest Canada’s research into soft-flesh suppression technology (\$142,500 in 2009), the Canadian Aquaculture Industry Alliance’s market research for BC farmed salmon producers (\$100,000), and work related to aquaculture standards and certification (\$157,000 and \$75,000).<sup>115</sup> Ms. Stewart pointed to spending under this program as demonstrating conflicts and problems in DFO’s priority setting:

You know, where are their priorities? The Department of Fisheries and Oceans should be doing their best to ensure the health of marine ecosystems and wild fish, not subsidizing prof-

itable corporations to contend with internal problems that may affect their profitability. ...

[G]ood husbandry should be the responsibility of a for-profit corporation, not the responsibility of Canadian taxpayers who – and the Department who is currently underfunding Conservation and Protection, and underfunding Science.<sup>116</sup>

During the hearings, counsel for the Aquaculture Coalition suggested that spending for science conducted under ACRDP (described above) has been for the purpose of rebutting negative public perceptions about the industry.<sup>117</sup> He referred to part of a Strategic Review of the ACRDP, completed in 2005:

According to the evidence gathered for the Review, the ACRDP is a relevant and needed program for the Canadian aquaculture industry. Based on domestic and worldwide demand for fish products, the industry has significant potential for growth, provided that certain barriers can be overcome. The industry requires assistance in overcoming a number of challenges that are beyond its ability to address effectively, including technical barriers and challenges related to the environment. *There are also communication challenges as there is a negative perception of aquaculture among certain influential NGOs.*

In bringing a rigorous scientific approach to the issue of environmental impacts associated with aquaculture, ACRDP has the opportunity to clarify some of the misinformation that persists. The industry includes small firms that are marginally profitable and do not have the financial means to invest in research and development that could improve its competitiveness. Projects funded by ACRDP and conducted jointly between industry and DFO scientists are helping to provide answers to issues of optimal fish health, developing new and better species, and best performance practices. The ACRDP therefore has a role to play in the improvement of the industry's competitiveness and the transfer of knowledge from scientists to industry operators. [Emphasis added.]<sup>118</sup>

Ms. Dansereau responded to the suggestion that science funded under the ACRDP is intended to address negative public perceptions of the industry:

[I]t's to ensure that if there is misinformation that is, in fact, frightening people, real truth would be brought to bear on a question. So the fact that industry is part of that ... doesn't make it suspect, it simply means that real research was being done to uncover real truths. And so it is not a communications exercise, it's a science exercise to get at real answers.<sup>119</sup>

In contrast to AIMAP and ACRDP, the limited evidence before me indicates that DFO conducts or funds very little research with scientists outside of industry concerned about salmon farms having negative effects on wild stocks. Michael Price, a biologist with the Rainforest Conservation Foundation, testified that he contacted DFO about doing joint work on sea lice and Fraser River sockeye in the Discovery Islands. He said that it was “frustrating” because, although he had been surveying sockeye in that area since 2007, DFO did not talk to him before setting up its own research program.<sup>120</sup> Dr. Simon Jones, a research scientist with DFO, confirmed that the department has not collaborated with Mr. Price or other researchers in setting up DFO's recent (2010) research work under PARR in relation to sockeye juveniles.<sup>121</sup> (See description of this research in Chapter 9, Fish health management.)

An exception to DFO working with external scientists appears to be the Broughton Archipelago Monitoring Program (BAMP), in which DFO, industry, and CAAR have jointly conducted research related to aquaculture, though BAMP originated as a collaboration between industry and CAAR.<sup>122</sup> Ms. Stewart testified that CAAR became involved in BAMP hoping the collaboration would stop the “my science / your science” debate, but that progress has been “glacial at best.”<sup>123</sup> Mr. Backman said that the progress has been slow because “good research takes time.”<sup>124</sup>

## ■ Siting and licensing of salmon farms

Another issue before me is whether siting salmon farms on the Fraser River sockeye migration route poses a risk to wild sockeye, and, if it does, what steps if any should be taken to ensure the

sustainability of wild sockeye. As discussed in Chapter 2, Life cycle, many Fraser River sockeye smolts are thought to migrate up the east side of Vancouver Island, through the Strait of Georgia and Johnstone and Queen Charlotte straits, and into Queen Charlotte Sound. Salmon farms are located along the Fraser River sockeye migration route in the Discovery Islands, east of Vancouver Island, and north of Campbell River. Many participants in this Inquiry, and members of the public who made submissions, are concerned that diseases and pathogens are passed from salmon farms to wild salmon smolts migrating out to sea.

In this section, I review evidence related to siting and licensing of salmon farms. Evidence related to the transfer of pathogens between farmed and wild fish – the main risk described by those opposed to farms being located on the Fraser River sockeye migration route – is discussed in Chapter 9, Fish health management, and in Volume 2, Causes of the Decline.

## Licences

Since December 2010, salmon farm operators have required both a form of provincial land tenure and a federal finfish aquaculture licence.

The province normally grants salmon farm operators a form of tenure called a “licence of occupation,” issued for a five- to 20-year period.<sup>125</sup> The application fee for a new finfish aquaculture tenure is \$4,925, plus HST. Rental fees for each year of a licence of occupation are calculated based on a set “Finfish Land Value” for finfish aquaculture sites – as of April 1, 2010, \$8,901 per hectare. The annual rent is 7.5 percent of the Finfish Land Value for “intensive areas,” and 7.5 percent of one-half the Finfish Land Value for “extensive areas.”\*

On December 19, 2010, DFO issued the first federal finfish aquaculture licences under the *Pacific Aquaculture Regulations* (PAR) for an initial period of one year.<sup>126</sup> Ms. Dansereau testified that she made the decision to roll over, or “grandfather,” provincial

salmon farm licences into federal ones. She said there was no evidence to not grandfather any of the provincial licences, “and we knew that we would be spending a lot of time working to ensure that the [federal] conditions of licence would be well-established by us through consultation in the future[.]”<sup>127</sup> Further, in making that decision, Ms. Dansereau said the department considered the “unique geography of the Fraser sockeye migration route.” She said there was no need to do a new analysis of farm siting because DFO had been involved in past siting decisions, explaining that “the advice that we have always received from our scientists has always been that there is no threat at this point, or there’s no threat that we are completely aware of[.]”<sup>128</sup> When asked whether DFO took any steps in 2010 to determine whether the siting criteria remained current before deciding to roll over the licences, Ms. Dansereau testified that “the advice I received was such that the sites as they currently were, were in compliance with the rules that existed and that we would be working with [the salmon farmers] over time to ensure that any future requirements would be met.”<sup>129</sup>

Mr. Thomson testified that, in granting the licences, “we chose not to amend the production amounts or species being licensed at any of the aquaculture facilities, so we would not change those amounts in order to keep, if you will, the status quo in place, recognizing we had a very limited amount of time to consult with First Nations and other parties on any potential changes.”<sup>130</sup>

The maximum length of a licence allowed under the *Fisheries Act* is nine years.<sup>131</sup> Mr. Thomson said that, to provide further opportunities for consultation with First Nations, DFO chose short, one-year durations for the licences for finfish.<sup>132</sup> Mr. Swerdfager said that, for the same reason, the department planned to again issue one-year licences in December 2011. However, he said DFO would not commit to not issuing multi-year licences after that time, owing to the nature of consultative processes and the length of time they can take.<sup>133</sup> Mr. Backman indicated that industry is seeking multi-year licences.<sup>134</sup>

As of September 2011, DFO was not charging industry any fees for aquaculture licences.

\* See PPR 20, p. 46. An “intensive area” is defined as “the area of Crown land used for activities and related improvements directly associated with the production of finfish, shellfish or marine plants. The intensive area will include net cages, netting, float camps, net storage, docks and mort sheds as well as a 30-meter buffer around these structures[.]” An “extensive area” is defined as “the area of Crown land used for anchoring structures outside of intensive areas that do not impede navigation or access to lands beyond.”

Mr. Thomson testified that the department would be producing an options and discussion document on licence fees and would consult on licence fees in accordance with the *User Fee Act*.<sup>135</sup> (See discussion of the *User Fee Act* in Chapter 5, Sockeye fishery management.) Ms. Dansereau testified that whether the aquaculture industry will be charged licence fees would be determined “within the next year or two,” and that DFO is contemplating a fee structure that would be similar to other fisheries.<sup>136</sup> Mr. Backman, Ms. Parker, and Ms. Stewart all agreed that fish farm companies should be paying licence fees. Ms. Stewart commented that she would like to see the fees go back into “science and work that will benefit the receiving ocean environment” rather than into general revenue.<sup>137</sup>

### ***Consolidation of federal aquaculture permits and authorizations***

The federal aquaculture licence incorporates and replaces the following previously issued federal permissions:

- DFO Introductions and Transfer permits for routine transfers as defined by the DFO aquaculture licence;
- Harmful Alteration, Disruption, or Destruction of Fish Habitat Authorizations;
- Permit / authorizations to retain incidental catch;
- Access to wild fish resources for routine access as indicated in DFO aquaculture licences; and
- Nuisance seal permits, previously issued under the Marine Mammal Regulations.<sup>138</sup>

Mr. Swerdfager explained that harmful alteration, disruption, or destruction of fish habitat (HADD) authorizations under section 35 of the *Fisheries Act* are no longer issued for salmon farms because “the matters that were previously addressed by those authorizations are now covered as conditions of licence.”<sup>139</sup> Since HADD authorizations are not issued, the *Canadian Environmental*

*Assessment Act* (CEAA) is not triggered by an action under the *Fisheries Act*.<sup>140</sup> However, the CEAA may still be triggered by the *Navigable Waters Protection Act* (NWPA), and, if that occurs, an environmental assessment may be conducted by Transport Canada.<sup>141</sup> Mr. Thomson testified that, although there is no longer a *Fisheries Act* trigger for the CEAA, environmental impacts are considered by DFO in the process of licence issuance.<sup>142</sup> (The CEAA is discussed in more detail in chapters 3, Legal framework, and 6, Habitat management.)\*

### ***DFO licence decision making***

For federal salmon farm licences, the decision level / authority depends on the nature of the decision, as follows:<sup>143</sup>

- *Applications for renewal or involving administrative matters.* These can be addressed by DFO licensing officers. “Administrative matters” could include replacement of a lost licence, changes in contact information, and modifications to management plans and/or supporting protocols where these changes are consistent with policies.
- *Amendments to licence holder name.* These are typically approved by the regional director of Aquaculture Management for the Pacific Region.
- *Technical amendments.* These are typically approved by the regional director of Aquaculture Management for the Pacific Region, after review by DFO technical staff. Technical amendments might include requests to change management plans or related documents, classification of bottom type, benthic monitoring stations, or deletion of a species listed for culture at the facility.
- *Applications requiring special consideration including new sites and others.* These typically require approval by the regional director general. New licences or a significant change to a licence may require an environmental review by DFO and other agencies.

\* I note that Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent on June 29, 2012. Part 3, Division 1, enacts the *Canadian Environmental Assessment Act, 2012*. As a result, the references in this chapter to the CEAA may not reflect the current law respecting environmental assessment in Canada, or the applicability of environmental assessments to salmon farms.

Until DFO has considered any recommendations with respect to salmon farming made by this Inquiry, the department does not intend to make decisions on applications for new salmon farm sites or for amendments to existing licences that have the potential to result in substantial changes. However, the department is continuing to accept such applications.<sup>144</sup>

### ***Conditions of licence***

Exhibit 1594 is the generic Finfish Aquaculture Licence 2010 under the *Pacific Aquaculture Regulations*. This 98-page document sets out the conditions attached to each salmon farm licence. The first two pages of the document set out information for a particular farm (such as species, maximum allowable peak biomass, or other site-specific conditions). Mr. Thomson described how the licence conditions include requirements covering record keeping and reporting; developing and adhering to fish health management plans; monitoring for sea lice, pathogens, and disease; and escape prevention provisions.<sup>145</sup> The generic conditions of licence for salmon farms are organized into 19 sections:

1. Application and Licensed Species
2. Peak Biomass
3. Containment Array Requirements
4. Transfer of Fish
5. Fish Health Management Plan
6. Sea Lice Monitoring
7. Fish Health Record Keeping
8. Fish Health Event Response
9. Fish Health and Sea Lice Reporting
10. Escape Prevention, Reporting and Response
11. Incidental Catch
12. Predator Control
13. Protection of Fish Habitat
14. Fish Mortalities
15. Boat Operations
16. Annual Aquaculture Statistical Report
17. Use of Lights
18. Fish Harvest
19. Administrative Matters

The conditions of licence are discussed further below and in Chapter 9, Fish health management.

## **Salmon farm site applications**

In the early 2000s, the federal and provincial governments harmonized the application and referral process for salmon farms. Since the onset of federal regulation in December 2010, FrontCounter BC has continued to receive new aquaculture applications on behalf of both levels of government. Some renewal applications may proceed directly to DFO without going through FrontCounter BC.<sup>146</sup>

By August 30, 2011, DFO and British Columbia had jointly developed a draft application form for Pacific Marine Finfish Aquaculture. It sets out the information required from salmon farmers applying for a new site, including details about the site's location, the site's conformity with siting criteria (described below), and "intertidal and shallow subtidal habitat surveys" carried out by a "qualified professional."<sup>147</sup> The habitat surveys required with the application include a Juvenile Wild Salmon Beach Seine Survey, which "must be conducted along the entire nearshore area within the proposed tenure to obtain a quantitative assessment, including average mass and weight distribution profile (by species), of migrating smolts."<sup>148</sup> The draft application form also requires a Fish Health Management Plan (described in Chapter 9, Fish health management).<sup>149</sup>

Mr. Thomson acknowledged during testimony that the question of whether a proposed farm is on a migration route for wild salmon does not appear on the application form.<sup>150</sup> Susan Farlinger, regional director general for DFO's Pacific Region, testified that the sockeye migration route "certainly is considered" in the siting of fish farms by "avoiding valued ecosystem components."<sup>151</sup> I infer, based on the information quoted above, that for new applications some of this information might be obtained through the Juvenile Wild Salmon Beach Seine Survey, which a salmon farmer is required to submit along with an application for a new site – though depending on how the survey is designed (e.g., time of year and how far the seine net reaches from shore), the survey may not detect migrating salmon.

### ***Screening by the Project Review Team***

When FrontCounter BC receives an application for a new aquaculture site, the application is initially screened by the Project Review Team to determine whether the information requirements

are complete. The Project Review Team has historically included representation from the BC Ministry of Forestry, Lands and Natural Resources Operations (two positions); Transport Canada (one); DFO (one); and the BC Ministry of Environment (two). The aquaculture referrals officer under the Aquaculture Management Directorate fills DFO's position on the team. The Project Review Team takes up to 30 days to screen the application to "ensure proponents have provided adequate technical information for government agencies to effectively review the application package; and review and compare applications against approved siting criteria and evaluate whether all the required siting buffer information has been provided."<sup>152</sup>

### *Siting criteria*

The draft application form for Pacific Marine Finfish Aquaculture lists 16 siting criteria, adopted by the province and DFO after the Salmon Aquaculture Review (SAR) recommendations. The criteria, which require government reviewers to exercise professional judgment in evaluating proposals for siting new salmon farms, are as follows:

- At least 1 km in all directions from a First Nations reserve, unless consent is received from the First Nation (append consent letter).
- At least 1 km from the mouth of a salmonid-bearing stream determined as significant.
- At least 1 km from herring spawning areas designated as having "vital," "major" or "high" importance.
- At least 300 m from intertidal shellfish beds that are exposed to water flow from a finfish farm and which have regular or traditional use by First Nations, recreational, or commercial fisheries.
- At least 125 m from all other wild shellfish beds and commercial shellfish growing operations.
- An appropriate distance from the areas of "sensitive fish habitat" as determined by DFO.
- An appropriate distance from areas used extensively by marine mammals, as determined by DFO.
- At least 30 m from the edge of the approach channel to a small craft harbour, federal wharf or dock.
- At least 1 km from ecological reserves smaller than 1000 ha or approved proposals for ecological reserves smaller than 1000 ha.
- Not within a 1 km line of sight from existing federal, provincial or regional parks or marine protected areas (or approved proposals for these).
- Not infringing on the riparian rights of an upland owner, without consent, for the term of the tenure licence.
- Not in areas that would pre-empt important Aboriginal, commercial or recreational fisheries.
- Not in area of culture or heritage significance as determined in the *Heritage Conservation Act*.
- Consistent with approved local government bylaws for land use planning and zoning.
- At least 3 km from any existing finfish aquaculture site, or in accordance with local area plan or Coastal Zone Management Plan.
- Consistent with objectives contained in the applicable Integrated Management of Aquaculture Plan(s).<sup>153</sup>

These criteria – with the exception of the last criterion, which must have been added recently to account for DFO's intended IMAPs – have been in place since March 2000 and "take the place of any previous farm siting criteria, including the Coastal Resource Interests Study guidelines and the Salmon Aquaculture Review's recommended salmon farm siting criteria (on which these criteria are based.)"<sup>154</sup> The criteria provide DFO with considerable discretion to determine what are "significant" salmon-bearing streams, and what constitutes sensitive fish habitat.

Mr. Thomson said that the province consulted DFO about the criteria when they were initially developed.<sup>155</sup> Both Mr. Thomson and Mr. Last agreed that the siting criteria were developed by regulators using the best available science and following a precautionary approach. They also agreed that, because of the high cost associated with each application, industry applies for sites that have a greater probability of being approved by the regulators.<sup>156</sup> Providing an industry perspective,

Mr. Backman said the “siting criteria for salmon farms have been in a state of consistent and continual evolution” since the mid-1980s. He explained that the criteria are “scientific[ally] based and also precautionary when there hasn’t been adequate science done.”<sup>157</sup>

Mr. Thomson emphasized that the siting criteria are not (and have not been) the only basis for decision making about licences – they are used only for the initial screening of sites. For example, as Mr. Thomson explained, before the *Morton* decision, DFO habitat biologists would conduct an environmental assessment, often under the CEAA.<sup>158</sup> Mr. Swerdfager said that the siting criteria are “as or more stringent” than those used in Nova Scotia, New Brunswick, Newfoundland, Scotland, Ireland, and Chile.<sup>159</sup>

In contrast, Dr. Fleming, a professor at Memorial University, testified that the siting criteria strike him as “rather vague and unspecific” and that their scientific basis was not clear to him. In particular, Dr. Fleming said the criterion of situating a farm at least 1 km from the mouth of a salmon-bearing stream seemed “arbitrary given the migration paths of the fish, the interactions, the dispersal of diseases and pest, parasites, and the potential for escape interactions with other streams.”<sup>160</sup> Dr. Fleming contrasted the 1 km setback approach with a “zoning” approach used in Norway under which wild salmon stocks are protected through a system of National Salmon Rivers and National Salmon Fjords.<sup>161</sup> The Norwegian Parliament established this system in 2003 so that no additional salmon farms would be established in the National Fjords. As of 2007, there were 29 National Salmon Fjords and 52 National Salmon Rivers, protecting about three-quarters of Norway’s wild salmon production.<sup>162</sup>

Ms. Parker noted that the siting criteria in British Columbia protect every single salmon-bearing stream whereas Norway’s system protects only a limited number of rivers and fjords.<sup>163</sup> However, as Dr. Fleming pointed out, salmon migration in British Columbia is unique, with large numbers of smolts having to travel through the same confined inside passage (and past salmon farms) before reaching the open ocean.<sup>164</sup> Unlike Norway’s National Salmon Fjords, the 1 km setbacks protect only the areas directly around the mouths of *significant* salmon-bearing streams;

these setbacks do not protect fish along their entire migratory route toward the open ocean.

Dr. Laura Richards, regional director of DFO’s Science Branch, testified that she is not aware of any work by DFO Science looking at the cumulative impacts of salmon farms in a confined area, though she said the department does have “some tools that I think we would be able to use to start to look at some of those questions.” As an example, Dr. Richards said DFO has been investigating the water circulation in some of these areas and developing circulation models.<sup>165</sup>

Mr. Thomson said that the department would seek to review the siting criteria given that they have been in place for a number of years.<sup>166</sup> No timeline was suggested for this review.

## Past reviews and assessments of salmon farm sites

Both Mr. Last and Mr. Thomson testified that each of the federal and British Columbia governments has always held vetoes over siting decisions.<sup>167</sup> Mr. Last said that past licensing decisions were made on a case-by-case basis.<sup>168</sup>

Mr. Last testified that, between 2000 and 2002, the provincial government reviewed the existing farm locations for environmental, economic, and social impacts and identified a total of 37 farms that needed to be relocated. Of those 37 farms, six were removed and the companies involved applied for new sites elsewhere; two were put back into the review process as new farm sites; and nine relocations were completed. The remaining farms had their operational strategies, management, or purpose adjusted such that the province believed the farms became suited to their locations.<sup>169</sup> There is no direct evidence before me that answers the question of whether Fraser River sockeye salmon migration routes were specifically considered during this relocation process. However, Exhibit 1615, a table summarizing actions that the province took to implement the Salmon Aquaculture Review’s recommendations, suggests that negative benthic effects were the key driver in these farm relocations.<sup>170</sup>

Mr. Thomson said that the “storyline” of past assessments is complex and that not all salmon farms

have been assessed under the CEAA, partly because they existed before that Act. Some such farms were subsequently screened under the CEAA during the early 2000s, when navigable water permits were reissued. However, Mr. Thomson said that, because the responsibility for navigable water permits shifted from DFO to Transport Canada in 2005, he was not aware of the current status of CEAA assessments of salmon farms.<sup>171</sup>

During the Commission's hearings on habitat management, Rebecca Reid, former regional director of DFO's Oceans, Habitat and Enhancement Branch, indicated that past DFO habitat assessments of proposed salmon farm sites concentrated on benthic effects. She testified that, in relation to the renewal of 97 salmon farm sites in 2005, the department sent letters to Transport Canada. Transport Canada then conducted CEAA screenings of these sites when permits under the *Navigable Waters Protection Act* came up for renewal, advising that, if mitigation measures were employed, no HADDs would result from the sites.<sup>172</sup> Ms. Reid indicated that this advice was based on information from DEPOMOD (depositional modelling), a model used to predict benthic effects from salmon farms.<sup>173</sup>

DFO's letters to Transport Canada make no mention of sockeye migration routes or any assessment conducted by DFO of the potential for salmon farms to transfer diseases to wild salmon.<sup>174</sup> However, Mr. Swerdfager testified that DFO has considered disease issues in siting salmon farms. He said he was "very, very confident that quite a wide range of risks were considered when we made those siting decisions[,]" though it was unlikely the risks could be reduced to zero.<sup>175</sup>

Ms. Farlinger described the screening process that DFO has carried out for new salmon farm sites since the mid-2000s. She explained that it involves, first, a "rough" initial screen that employs the siting criteria in a precautionary way to avoid harming "valued ecosystem components" and then, second, a more detailed look at site-specific habitat impacts such as the "circulation in the area and the deposit of organic material and the level of production." She

also said that these processes have been brought over into the new *Aquaculture Regulation*.<sup>176</sup> Kerra Hoyseth, senior aquaculture biologist in DFO's Aquaculture Environmental Operations, explained that in 2005 a procedure was put in place using DEPOMOD to set thresholds\* for benthic effects from sites. If a site was predicted to exceed the threshold, DFO would consider that site to cause a HADD. Ms. Hoyseth said that threshold has been consistently applied since 2005, though the department did not go back and apply that threshold to sites assessed before 2005.<sup>177</sup>

Mr. Thomson testified that, for those existing salmon farm sites which have undergone screening under the CEAA, the "heart of the assessment" was the Valued Ecosystem Components (VEC) table in which impacts and mitigation responses were listed.<sup>178</sup> In a presentation prepared by Mr. Thomson for the Special Committee on Sustainable Aquaculture in 2006, he described the VEC tables:

#### **Valued Ecosystem Component (VEC) Tables**

A Summarized report on potential effects such as:

- Water quality, fish habitat (e.g., benthic)
- Fisheries resources (e.g., lingcod, rockfish, anadromous)
- Biodiversity (species of concern)
- Human health, recreational / commercial fisheries
- Tourism

VEC table also identifies mitigation measures to minimise / avoid these effects:

- Determinations are made based on the overall potential for environment changes resulting from the *residual effects*. [Emphasis in original.]<sup>179</sup>

Three CEAA screening reports for salmon farm sites are in evidence, two from the Discovery Islands (Read Island and Quadra Island), and one from Nootka Sound.<sup>180</sup> The VEC tables in all three of these reports include consideration of various issues that affect wild fish populations:

\* I note on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 3, Division 5, amends section 35 of the *Fisheries Act* to remove the prohibition on unauthorized HADDs. It replaces it with a prohibition on unauthorized activities that result in "serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery." It is not known how these changes will affect such standards as the threshold described by Ms. Hoyseth.

- the potential introduction and/or transmission of disease and/or parasites from farm fish to wild fish;
- the potential for escaped farm fish to interbreed with or compete with wild salmon;
- the potential for improper storage or disposal of fish mortalities on farms to cause disease transmission to wild fish; and
- the potential for blood water and other discharge associated with harvesting fish to cause water quality changes or to transfer disease to wild fish.<sup>181</sup>
- species at risk;
- ecosystem effects per departmental guidance;
- wild fishery activities; and
- First Nations use of land and resources for traditional purposes as well as other matters.<sup>183</sup>

The department plans to employ the following tools to collect and analyze site-specific information to support its decision making:

In all three of these cases, the review found the risks to be either “low” or “negligible.” An example row from the VEC table from Transport Canada’s CEEA Screening Environmental Assessment Report for an amendment to Marine Harvest Canada’s Conville Bay salmon farm site is depicted in Table 1.8.1.

Table 1.8.2 shows a segment of the cumulative environmental effects analysis for the same salmon farm site.

Neither Mr. Swerdfager nor Mr. Last could identify any case in which an application for a salmon farm site was denied on account of the potential effects on Fraser River sockeye.<sup>182</sup>

- baseline environmental data that the licence holder or applicant is required to provide with the application;
- site impact modelling tools such as depositional modelling;
- assessment of mitigation measures to minimize risks of negative ecosystem effects;
- siting guidelines;
- cumulative effects assessment through consideration of IMAPs, Integrated Oceans Management processes, and IFMPs;
- First Nations and public input through the IMAPs and other federal or provincial consultations; and
- other assessments, such as ones conducted under the CEEA\* triggered by NWPA approvals, or provincial environmental assessments.<sup>184</sup>

## Future reviews and assessments of salmon farm sites

I heard evidence about DFO plans for assessing future salmon farm applications. DFO’s draft policy on “Identification and Management of Environmental Impacts of [*sic*] Under the British Columbia Aquaculture Regulatory Regime” states that, before issuing a licence for a new aquaculture site or making a substantial amendment to an existing licence, the department will consider several things:

- fish habitat: benthic habitat, water quality, algae, and primary production;
- fish resources: wild fish populations and population health, including finfish, marine mammals, sharks, and invertebrate populations;

Ms. Farlinger testified that DFO’s new standards for site selection apply only to new site applications, though new monitoring provisions apply to all active farms, whether new or originally licensed under the provincial regime.<sup>185</sup>

The IMAP process may also have an impact on the assessment of site applications. Mr. Thomson noted that IMAPs are intended to take an area management approach to aquaculture management.<sup>186</sup> “We’d like to move to a more ecosystem-based approach,” he explained, “as opposed to the site-by-site-based approach[.]”<sup>187</sup> Mr. Bevan testified that, as part of area-based management, conditions of licences will not be “cookie-cutter” and that management plans will be defined according to specific areas. “They will be reflective of the overall plan that must apply in the geographical area or the ecosystem

\* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 3, Division 1, enacts the *Canadian Environmental Assessment Act, 2012*. As a result, the references in this chapter to the CEEA may not reflect the current law respecting environmental assessment in Canada or the applicability of environmental assessments to salmon farms.

**Table 1.8.1 Project components and activities and their potential direct environmental effects on Valued Ecosystem Components (VECs) or Valued Social Components (VSCs), associated mitigation measures, and significance of residual effects**

VECs/VSCs	Project component or activity	Potential project-environment interaction	Mitigation measures	Significance of residual adverse effects
Fish resources: Wild fish populations	Introductions and transfers of fish onto the farm site	Potential introduction and/or transmission of disease and/or parasites from farm fish could impact wild fish populations.	Under the Atlantic Salmon Importation Policy, Atlantic salmon smolts cannot be imported from overseas; only fertilized eggs or milt from certified sources are allowed into the country. Imports are limited, held in quarantine, and closely examined before introduction to farms. Species being imported from outside Canada for culture must be certified disease free therefore no impacts are expected. Fish transferred under Section 56 of the Fishery (General) Regulation must not have any disease or disease agent that may be harmful to the protection and conservation of fish. The proponent will adhere to standard introduction and transfer policies. In addition, the existing Fish Health Protection Regulations requires that any facility serving as a source of salmon must undergo rigorous health testing before fish can be provided to culture operations. In addition, a Fish Health Management Plan is required to address issues of fish health for farmed fish and takes into account interactions with wild fish. This Fish Health Management Plan also requires a mandatory sea lice monitoring program to further minimize risks to wild fish populations. The Fish Health Management Plan will be reviewed on an annual basis and will be updated as necessary in conjunction with an adaptive management approach. BCMAFF will conduct audits of sites on a random basis and take compliance enforcement actions where necessary. Site, vessel and visitor-related fish-health protocols (including use of foot baths, disinfection of any equipment used with fish or sediment monitoring) are in place. This is in accordance with the industry-wide protocols in BC.	Low

Source: Reproduced from Exhibit 1630, p. 9.

**Table 1.8.2 Cumulative environmental effects analysis of the significance of residual effects on Valued Ecosystem Components and Valued Social Components**

Valued Ecosystem or Social Component	Residual Effects (After Mitigation) & Significance of these Effects	Other Activities/Projects Contributing to Cumulative Effects	Comments	Significance of Cumulative Effects
Fish resources: wild fish populations	Potential intermittent introduction and/or transmission of disease and/or parasites from farm fish to wild fish populations	Similar potential effects may occur within 0.8 to 3.8 km of the Conville Bay site (Hoskyn Channel), at 3 Marine Harvest sites (Bear Bay, Conville Point and Dunsterville Bay). At a greater distance, 12.2 to 27 km, similar effects would occur in Okisollo Channel at 1 Marine Harvest site (Cyrus Rocks), 1 SKM site, operated by Heritage Salmon Ltd. (Barnes Bay), 1 Pan Fish site (Sonora Island), and 2 Heritage Salmon Ltd. sites (Brent Island and Venture Point – Sonora Island).	Pathogens that originate in salmon farms at renewal sites in Hoskyn and Okisollo Channels are not likely to have significant cumulative adverse effects on migratory salmonids. Uncertainty exists with respect to the migratory patterns of salmonids along the channels/inlets in the area, and on effects associated with groups of salmonids migrating past multiple farm sites a short distance apart (potential IHN reservoir locations). Measures outlined in the companies Fish Health Management Plans reduce likelihood of transmission and effects on wild fish populations. Most existing sites in the area are managed by two companies, which further reduces pathogen transmission risks by enabling area-wide fish-health management protocols. Two sites (Conville Bay and Conville Point) are less than 1km apart.	Low

Source: Reproduced from Exhibit 1630, pp. 16–17.

that is being used by all of the farms in that location,” he stated. The concentration or density of farms could influence the licence conditions that would apply in those areas.<sup>188</sup>

## Salmon farms on the Fraser River sockeye migration route

I heard testimony from a number of witnesses who provided their perspectives on whether salmon farms located on the Fraser River sockeye migration route pose a risk to wild sockeye. The evidence on risks is discussed further in Volume 2 of this Report.

On one side is the evidence of anti-salmon-farming activists and scientific researchers concerned, primarily, about pathogen or disease transfer from farmed to migrating wild sockeye. The concern results from salmon farms breaking the natural pattern of “migratory allopatry.” Dr. Lawrence Dill, biology professor at Simon Fraser University and author of Technical Report 5D, *Dill Salmon Farms Investigation*, described migratory allopatry as the migratory pattern of sockeye in which the return migration of adult fish occurs at a different time from the outgoing smolt migration. Consequently, the adults and juveniles do not cross paths in the water, thereby limiting the opportunity for disease transfer from adult to juvenile fish. Fish farms “close the loop” by providing a reservoir of adult hosts that interact with juvenile salmon during the outmigration in the spring.<sup>189</sup>

According to Alexandra Morton, executive director of Raincoast Research Society, in 1992, salmon farms were sited on the Fraser River sockeye migration route, and, since then, most Fraser River sockeye stocks have been in decline but certain stocks, such as Harrison River sockeye, have been doing very well. Ms. Morton suggested that the Harrison River sockeye are doing well for two reasons: (1) they leave the river when they are very small, so they are not exposed to adult returning sockeye who have swum past fish farms; and (2) they do not themselves swim by fish farms.<sup>190</sup>

With reference to Norway’s National Salmon Fjords, Dr. Fleming said that, if Fraser River sockeye have to pass through narrow passages, and if the stocks are recognized as significant, and if there is a significant effect of disease and parasites

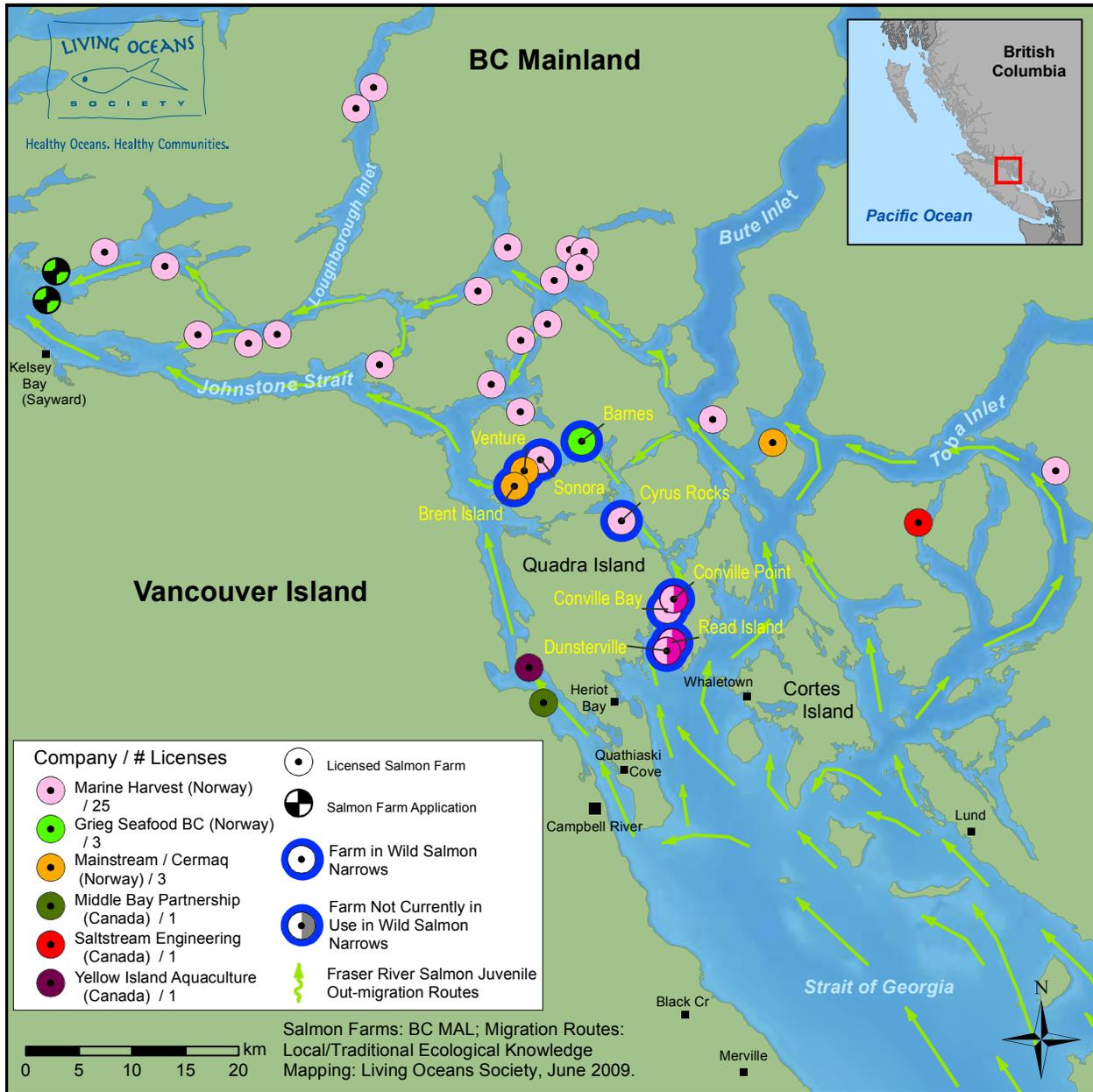
on those fish passing through an area such as the Discovery Islands, then it would be helpful to zone such areas in a similar fashion to Norway’s protected fjords to avoid disease transmission from farmed to wild fish.<sup>191</sup>

Indeed, the Living Oceans Society has proposed exactly that. Ms. Stewart testified that the Living Oceans Society identified nine farms in the Discovery Islands, all located on a migration route that the group dubbed the “Wild Salmon Narrows,” and “prioritized those farms in order to try to clear one migratory route through the Discovery Islands for wild salmon.”<sup>192</sup> Figure 1.8.5, a map prepared by Living Oceans Society, identifies these farms. Six of the nine farms shown are Marine Harvest farms.<sup>193</sup> Ms. Morton said these narrow passages are of more concern than other farm sites because there will be a higher density of “viral particles, or parasite eggs, or juveniles” in a smaller body of water than in a larger one, where the dispersion rate would be greater.<sup>194</sup> Dr. Michael Kent, the author of Technical Report 1, *Infectious Diseases*, confirmed that sockeye salmon swimming past a net pen filled with millions of Atlantic salmon do face an “increased potential” for transmission of diseases to them compared with sockeye swimming through water with no other salmonids.<sup>195</sup>

On the other side is the evidence of salmon farmers and government regulators who say the risks are low and mitigation measures are sufficient. Ms. Dansereau did not agree with a general statement that it makes sense to avoid wild salmon migratory routes. “We don’t function from general statements,” she said. “So we would have to investigate and continue to investigate to see whether or not there was a reason to do that.”<sup>196</sup>

In response to Ms. Morton’s comparison of Harrison River sockeye to other Fraser River stocks, Mr. Backman said that “there are several salmon farms operating in Puget Sound and there are Chinook salmon farms operating on the West coast of Vancouver Island,” implying that Harrison River sockeye may be exposed to these farms, such that a lack of exposure to fish farms does not account for the difference.<sup>197</sup>

Further, as described in Volume 2, Dr. Gary Marty, fish pathologist at BC’s Animal Health Centre, Dr. Mark Sheppard, lead veterinarian in DFO’s Aquaculture Environmental Operations, Dr. Peter McKenzie, veterinarian and fish health manager for Mainstream Canada, and Mr. Swerdfager all



**Figure 1.8.5 Salmon farms in the Wild Salmon Narrows**

Source: Exhibit 1563.

agreed that “the risk of disease in salmon farms is manageable with appropriate care and attention.”<sup>198</sup> Dr. Sheppard said “the risk can never be zero,” but managers minimize as best they can the risks to wild fish.<sup>199</sup> Similarly, Mr. Swerdfager said the regulatory framework in place does not reduce the risk to zero, but “it substantially reduces it.”<sup>200</sup>

Neither government nor industry witnesses were entirely opposed to some experimental

removal of salmon farms from critical migratory routes. For example, Ms. Dansereau testified that she was willing to consider adding, as a condition of the licence, a requirement that salmon farms participate in the experimental removal, fallowing, or relocation of salmon farms currently located along the migratory route.<sup>201</sup> As well, Mr. Last agreed that a zoning mechanism might be helpful and that, if there is a risk to wild salmon from migrating

past fish farms, then the risk would be greater in narrow channels.<sup>202</sup> Dr. Stewart Johnson, head of the Aquatic Animal Health Section, DFO, said that *if* Fraser River sockeye are exposed to pathogens from salmon farms, then moving salmon farms off their migratory route is something that could be done to limit sockeye's exposure to pathogens.<sup>203</sup>

Some evidence suggests that some salmon farmers might like to move their farms closer to the open ocean to reduce the potential for environmental impacts and controversy.<sup>204</sup> Indeed, in final submissions the BCSEA sought the following recommendation from me:

[T]hat DFO provide support for quick access to ocean tenures from Cape Caution to Prince Rupert to allow site relocation for environmental sustainability to continue. As suggested in Exhibit 1942, the industry is interested in moving those sites identified by Mr. Last that were not relocated when the moratorium was lifted, whose operations have been limited in order to remain compliant with environmental performance requirements, closer to the open sea to reduce the potential for environmental impacts and controversy.<sup>205</sup>

Ms. Parker, however, noted in her testimony that the entire BC coast could potentially be considered a migration route for one salmon species or another.<sup>206</sup>

## ■ Monitoring of and compliance by salmon farms

Responsibility for compliance activities in relation to fish farms is shared between C&P and AMD. DFO is implementing a system of industry self-reporting coupled with government audits that builds on both the previous provincial Fish Health Audit and Surveillance Program (described below, and in more detail in Chapter 9, Fish health management) and previous DFO experience in evaluating the effects of salmon farms on fish habitat (described below, and above in the discussion on siting and licensing of salmon farms). This

self-reporting regime mirrors the approach taken by DFO on other fish habitat issues (see Chapter 6, Habitat management).

In this section of the chapter, I review the evidence related to compliance activities at salmon farms and describe monitoring, reporting, and auditing under the federal conditions of licence. Because some elements of the current federal program are modelled on the previous provincial program, and given the recent change in regulatory regime, I begin with a brief description of monitoring and compliance activities under the former provincial regulatory regime for salmon farms.

### The former provincial regime

As the lead regulator of salmon farm operations until December 18, 2010, the province monitored compliance with its aquaculture regulations through a system of industry self-reporting and government inspections and audits.

Inspections of active farms occurred at least annually, conducted by either BCMAL's aquaculture inspectors or MOE's conservation officers. (See description of conservation officers in Chapter 7, Enforcement.) Inspections proceeded according to a 2002 Service Agreement on Coordination of Compliance and Enforcement Programs. Under that agreement, BCMAL (or its predecessors / successors) had the lead role in compliance activities, and MOE (or its predecessors / successors) had the lead role in enforcement activities.\* The agencies agreed to conduct "joint environmental monitoring activities on site in order to achieve harmonization between compliance inspections and on-site activities."<sup>207</sup> Inspections were also carried out according to a biosecurity protocol between the province and industry, under which inspectors provided farms with 48 hours' notice before an inspection and sought input from the farms on the order of farm visits.<sup>208</sup>

BCMAL and MOE used the data collected during inspections to prepare annual reports on industry compliance. The 2009 report stated that the agencies found generally high levels of compliance for both BCMAL requirements (93–100 percent, with an

\* Note that, owing to ministry reorganizations and name changes, the ministries named in the service agreement are different from those stated here. See discussion of provincial ministries above in the regulatory roles and management programs section.

average of 99.4 percent) and MOE requirements (97–100 percent, with an average of 99.6 percent).<sup>209</sup>

In addition to inspections, a number of regulations required salmon farmers to self-monitor and report information to regulators. Regulatory requirements included the following:

- conducting environmental monitoring for benthic effects and reporting the data to regulators;<sup>210</sup>
- reporting (by January 31 each year) the total dry weight and type of feed (including additives) used in the past year;<sup>211</sup>
- reporting information about release of materials into the water (such as therapeutants) and fish health (such as mortality numbers), annually by March 31;<sup>212</sup> and
- reporting fish escapes from farms within 24 hours of discovery.<sup>213</sup>

In the early 2000s, the province implemented a Salmon Health Management Program (also called the Fish Health Audit and Surveillance Program), composed of “on-farm health management plans, mandatory monitoring and reporting of disease events, and a BCMAL audit of industry-reported information[.]”<sup>214</sup> Salmon farms were required to report “site-specific information” to the BCSFA industry database monthly and include all mortality, causes of mortality, and fish health events (FHEs).<sup>\*</sup> The BCSFA then submitted quarterly reports of these data to BCMAL. BCMAL posted quarterly reports about these data as well as its annual Fish Health reports on the Animal Health Branch’s public website.<sup>215</sup> The province published aggregate data (three or more companies combined) for some information provided to them by the BCSFA.<sup>216</sup> In addition to the Fish Health Audit and Surveillance Program, BCMAL also required fish farms to conduct sea lice assessments on active Atlantic salmon farms “on a monthly basis and report that monthly data (in an aggregated form) from each sub-zone.”<sup>217</sup> (Monitoring of fish health under the provincial regulatory regime is discussed further in Chapter 9, Fish health management.)

\* Exhibit 1560, p. 5. For the purpose of industry database reporting, a FHE “is defined as an active disease occurrence or a suspected infectious event on a farm that triggers: 1) veterinary involvement and 2) an action, such as: lab diagnosis, recommendations / report, husbandry change, prescription medication, further investigation, etc. where such action is intended to reduce or mitigate risk associated with that event.”

## Current federal roles and responsibilities

Since December 2010, DFO has been the lead agency for monitoring and compliance activities in relation to salmon farms. These responsibilities are shared between C&P and AMD staff. Mr. Thomson testified that DFO split the role between C&P and AMD’s Aquaculture Environmental Operations (AEO) because assessing some requirements in the conditions of licence demands specific skill sets or specific technical training:

That’s why we have two veterinarians employed, we have fish health biologists, fish health technicians who conduct some of these audits and inspections ... [O]ne of the big pieces of expertise that the C&P officers have, of course, over anything that we have is the ability and expertise around conducting investigations.<sup>218</sup>

In June 2011, C&P and AMD in DFO’s Pacific Region finalized a British Columbia Aquaculture Compliance and Enforcement Strategy 2011/2012. This strategy “aims to create a consistent, strategic, risk-based and integrated approach that will promote, assist and compel compliance with the [PAR] and related policies.”<sup>219</sup> It is one of a suite of documents to guide compliance and enforcement activities as set out in Figure 1.8.6.

The strategy sets out the following (among other things):

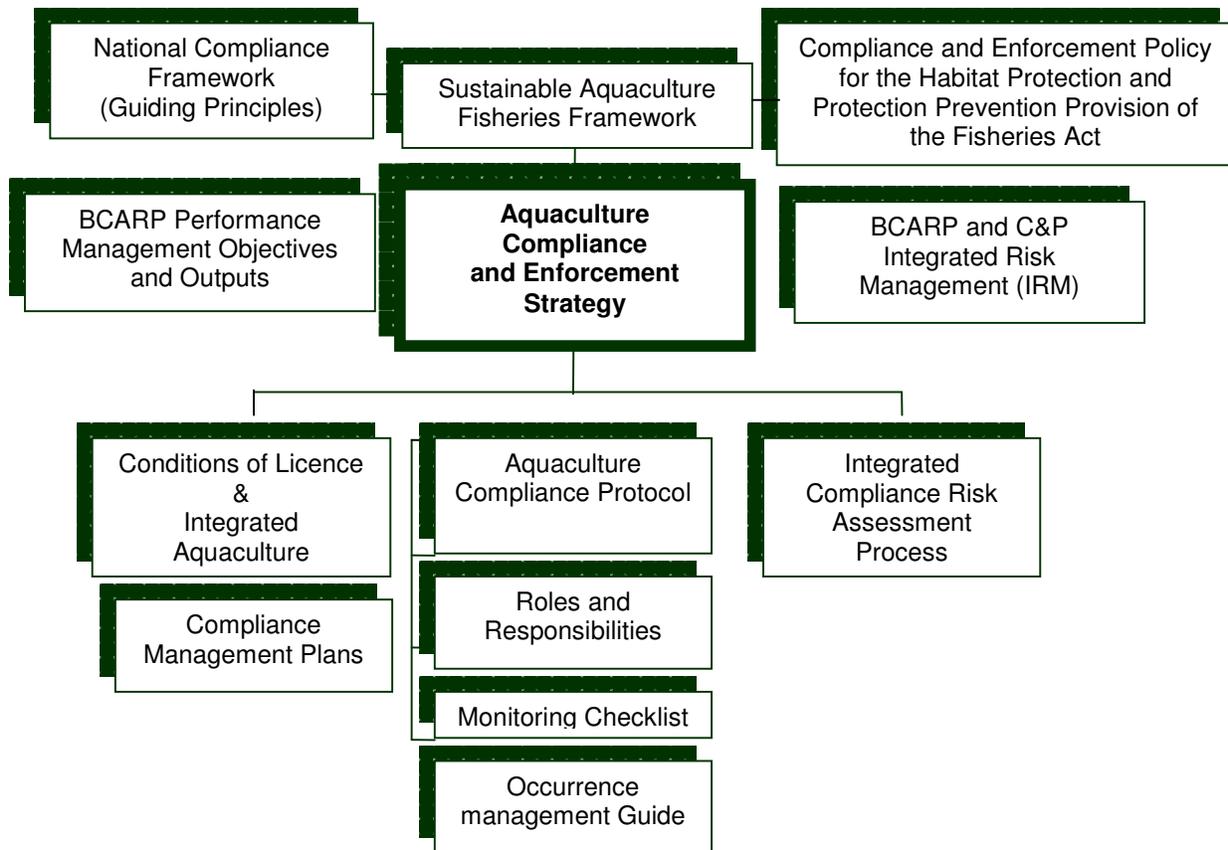
- It will adhere to the National Compliance Framework. [See Chapter 7, Enforcement.]
- Its objectives are to focus on “identifying compliance problems and establishing baseline compliance information” by the end of 2011, and “to focus effort on education and compliance promotion of PAR and the *Fisheries Act*, to increase the aquaculture industry’s awareness of their regulatory obligations and their role in ensuring the protection of the environment in which they operate.”

- Its priorities for compliance and enforcement actions “will be informed by performance of the licence holders as laid out in the performance management strategy, potential risks, impacts of aquaculture activities, and the sensitivity of fish and fish habitat.”
- C&P and AMD will develop annual operational plans.
- C&P and AMD will “manage compliance risks by implementing an integrated risk management process into decision-making and operational planning.”
- “The department will develop an integrated aquaculture compliance risk assessment in 2011/2012.”
- C&P staff will be trained about the regulatory requirements of PAR, and AMD staff will be trained to carry out

their powers as Fishery Guardians and Inspectors.

- C&P and AMD will jointly work on information management and reporting goals.<sup>220</sup>

AMD and C&P have also developed a draft (as of the time of the hearings on aquaculture in August and September 2011), entitled “2011-2013 British Columbia Aquaculture Compliance Protocol”<sup>221</sup> (the Aquaculture Compliance Protocol). The purpose of the Aquaculture Compliance Protocol is to facilitate collaboration between the two programs and “to define the scope, principles, roles, responsibilities, accountabilities, governance, reporting requirements and terms in implementing an aquaculture compliance decision-making process” and to provide “proper management and control of fisheries and the conservation and protection of fish through



**Figure 1.8.6 Relationship of Aquaculture Compliance and Enforcement Strategy to other documents**

Source: Reproduced from Policy and Practice Report 20, Aquaculture, p. 93.

delivery of an integrated coherent and adaptive aquaculture compliance program, informed by risk.”<sup>222</sup> The Aquaculture Compliance Protocol sets out the roles and responsibilities of AMD and C&P concerning aquaculture in the region, stating such things as which organization will be the lead and which will provide support in relation to different deliverables of the program. The deliverables relate to strategic planning, industry engagement and compliance promotion, compliance monitoring, audits and effectiveness monitoring, occurrence screening, responding to non-compliance, information management and reporting, and training and designations.

The Aquaculture Compliance Protocol identifies DFO’s plan to conduct compliance monitoring (under the lead of C&P) and audits and monitoring (under the lead of AMD).<sup>223</sup>

### *Industry self-reporting requirements*

The 2010 generic federal conditions of licence for finfish aquaculture facilities impose a number of information-reporting requirements on licence holders, including monitoring, providing notices, regular reporting, and emergency reporting.<sup>224</sup> Mr. Thomson testified that DFO based its reporting and auditing regime on the province’s, but that DFO made some aspects of reporting “more compulsory.”<sup>225</sup> The breadth of reporting requirements is shown in Table 1.8.3. As discussed in the section below on consultation and public reporting of information, DFO does not release all of this information to the public immediately – some is released after a delay, and some (such as employee names or contact information) is kept confidential.

**Table 1.8.3 Summary of self-reporting requirements under the 2010 finfish aquaculture licence**

<b>Section of Licence</b>	<b>Line Item in Conditions of Licence requiring provision of plan or report</b>
Front page	Licence Holder / Operating Party Name / Company Name
Front page	Contact Info. (e.g., employee name, phone numbers)
Front page	Site location / Description
Front page	Species
Front page	Maximum Allowable Peak Biomass
Front page	Substrate type
2.2	Report of <b>inventory and stocking plan</b> for calendar year (monthly volume and numbers of fish on site broken down by year class; stocking plan with source of fish; age / size at transfer; quantity; transfer period)
3.1	<b>Containment Array Management Plan</b> showing operational layout diagram indicating area of intensive use (cages, etc.) and extensive use (mooring lines, etc.) and noting tenure boundaries, location of cage array, other structures, anchor block location, nav. markings, nav. pathways, domestic water lines, storage and cleaning stations, bottom contours
3.2/3.3	Attestation by qualified professional that containment array designed to withstand prevailing conditions (initial; upon changes)
4.4	<b>Transfer of Fish</b> – Notification of intent to transfer fish, including origin location, destination location, quantity of fish being transferred, and confirmation of health of fish being transferred
9.1	<b>Sea lice reporting for Atlantic salmon</b> – Carrying out sea lice monitoring in program – Reporting requirements in Appendix VII, section 3: <ul style="list-style-type: none"> <li>• Date of most recent sea louse treatment</li> <li>• Date of sampling</li> <li>• Capture methodology</li> <li>• Observations on lice grazing blemishes</li> <li>• Motile lice counted per fish per pen</li> <li>• Average motile lice per fish per pen, per site</li> <li>• Environmental parameters (monthly oxygen; water temperatures, salinity at 1, 5 and 10 m)</li> </ul>
	<b>Sea lice for farmed Pacific salmon</b> – Observations of sea lice blemishes

**Table 1.8.3 cont'd**

Section of Licence	Line Item in Conditions of Licence requiring provision of plan or report
9.2	Fish Health and Fish Mortality Event Reports (monthly) Part A: Reporting month and date, farm name / licence, contact name and phone Part B: Occurrence in month of <ul style="list-style-type: none"> <li>• Unusually high fish mortalities</li> <li>• Vet or Lab Diagnosis of Significance</li> <li>• Disease Outbreak (i.e., elevated losses) (id pathogen)</li> <li>• Cull Event (with explanation)</li> </ul> Part C: Individual incidents of note (may be more than 1) <ul style="list-style-type: none"> <li>• Date of Event</li> <li>• Number of Fish on Site (pieces)</li> <li>• Estimated mortalities (numbers, volume)</li> <li>• Note if an escape from lot during reporting period)</li> <li>• Note if harvest from lot during reporting period</li> <li>• Drug, Dates of Treatment (if applicable)</li> <li>• Treatment Information (withdrawal time prescribed, how applied to animals (in feed or bath), amount per kg of fee, etc.) / Response description</li> <li>• Prescribing Veterinarian</li> <li>• Person Responsible for Administering Treatment</li> </ul> Attester to Information
10.1	<b>Escape prevention measure reports</b> (e.g., net maintenance)
10.3	Immediate notification of <b>escape or suspected escape event</b>
10.4	Follow up written report of the escape within 7 days
10.5	Full written report of escape events <ul style="list-style-type: none"> <li>• Date, estimated time and location of event</li> <li>• Species of finfish involved</li> <li>• Estimated number of fish</li> <li>• Cause or suspected cause of the escape or suspected escape</li> <li>• Calendar year in which fish were stocked at facility</li> <li>• Rearing facility from which fish were received</li> <li>• Average weight</li> <li>• Current fish health records related to the fish that have escaped</li> </ul>
10.6	Monthly report summarizing number of fish escapes or that cannot be accounted for based on inventory records
10.9	Report on results of recapture efforts, including estimated number of fish that escaped and number recaptured
11.4	<b>Incidental catch log</b> of all fish that are caught within the net cages that are of a different species to those listed on the face of this licence, excluding biofouling, including: <ul style="list-style-type: none"> <li>• Species caught</li> <li>• Record of # released and number of mortalities; average weight</li> </ul>
12.2	<b>Predator control measures</b> in place, including: <ul style="list-style-type: none"> <li>• Predator nets (type / mesh size)</li> <li>• Whether predator nets have barrier above water line / distance</li> <li>• Whether predator nets and cages inspected by divers after predator interactions</li> <li>• Depth of predator nets in metres</li> <li>• Use and description of other non-lethal deterrents, including electric fences, shark guards, visual repellents, noise makers, other physical barriers, etc.</li> </ul>
12.3/A.XIII	Report of any <b>Mammal accidental drowning</b> mortality <ul style="list-style-type: none"> <li>• Date of discovery</li> <li>• Whether fish are on site; if no fish, indicate how long empty</li> <li>• Site biomass</li> <li>• Size of fish targeted</li> </ul> Species, number of animals, incident type and system component involved (e.g., containment net, predator net, shark guard, or other) Actions taken with carcass

Section of Licence	Line Item in Conditions of Licence requiring provision of plan or report
12.6	<b>Marine mammal kill reports</b> (quarterly), including name of the facility and licence number; photographs of recaptured mammals with datestamp; number of harbour seals killed; number of California sea lions killed; date each seal / sea lion was killed; and date, species, number and cause of accidental drowning deaths
13.2	<b>Biofouling Management Plan</b> , including level of use of antifoulant treatments and other antifouling control mechanisms; number of nets treated by month; description of organic waste (type, size); frequency of net washing
13.7/A.XV	<b>Benthic monitoring results at peak biomass</b> , including: <ul style="list-style-type: none"> <li>• Site plan with containment array (regular use and harvest / transfer) pens; location of video survey transects and/or sediment sampling stations</li> <li>• All raw results plus analysis</li> </ul>
	<b>Pre-stocking benthic</b> reports where required (see 13.7)
13.20	Chemical and Other Substances Management Plan (Appendix VI) <ul style="list-style-type: none"> <li>• Currently missing from draft COL</li> </ul>
13.24	All spills shall be reported immediately
13.31	<b>Feed and chemical release reports</b> (annual) <ul style="list-style-type: none"> <li>• Monthly total dry weight of feed, including weight of concentration of therapeutants; pigments; pesticides; and zinc and copper formulations</li> <li>• Names of all materials that are directly or indirectly released into the water during the reporting period, including anaesthetics, antifouling agents, and/or substances;</li> <li>• Monthly weight, in tonnes, of mortalities and disposal method; and</li> <li>• Monthly peak finfish biomass in tonnes</li> </ul>
14.1	Immediate reports on <b>mass fish mortalities</b> equivalent to 4000 kg or more within a 24 hour period and/or an amount equivalent to 10,000 kg or more within a maximum 5 day period within 24 hours, including estimated weight in kilograms
16.1 (A.SVI)	Annual Aquaculture Statistical Report, including: <ul style="list-style-type: none"> <li>• Product type, weight, \$ value, total food market sales</li> <li>• Processing info.</li> <li>• Sale of live fish or eggs for restocking</li> <li>• Stocking information</li> <li>• Stock on hand and future plans</li> </ul>
17.1	Annual report on type of lights used, intensity, number and dates and times when lights are used (period of day; season)
18.3	Fish health treatment Declaration Form for Transfers / Harvest (covered for transfers in section 7.3) <ul style="list-style-type: none"> <li>• Aquaculture number</li> <li>• Species of fish</li> <li>• Date of harvest</li> <li>• Name of processing plant to which fish are being delivered</li> <li>• Quantity of fish harvested</li> <li>• Lot number to identify the shipment of fish</li> <li>• Information on all treatments applied to fish within lot while at facility</li> <li>• Name of prescribing veterinarian, if applicable</li> <li>• Name of person responsible for administering treatment</li> </ul>

Source: Reproduced from Policy and Practice Report 20, Aquaculture, pp. 176–78 (Appendix G).

Mr. Thomson explained that, as of early September 2011, DFO was still in the process of developing templates for industry to use to submit the information depicted in Table 1.8.3, and that this work was “part of the ongoing development of the information management system” (see discussion of data management, below). In the interim, salmon farmers are submitting reports to DFO in the best

formats they have available, which Mr. Thomson said has caused some difficulties with information management and flow within the department. He expected a “more full version of the information management system” to be ready between January and March of 2012.<sup>226</sup>

During the hearings on the marine environment, Dr. Jack Rensel, an expert on harmful algal

blooms (and other areas), testified that it would be useful for scientists to be able to access data from monitoring conducted by the salmon farmers on harmful algal blooms – something that is not currently part of the self-reporting requirements.<sup>227</sup> Mr. Robin Brown, head of the Ocean Sciences Division, Science Branch, DFO, said that it would be useful to DFO Science to make it mandatory for salmon farmers to share their information on harmful algal blooms with DFO.<sup>228</sup>

One issue raised during the hearings is whether self-reporting regimes invite selective or incomplete reporting. More specifically, the concern is that information generated through self-monitoring may be biased in favour of the industry. In response to this concern, Mr. Thomson explained that “self-reporting is really a management tool that we use all across our fisheries management system” and that, wherever it is used, it is followed by an audit to verify the information being provided by the licensee.<sup>229</sup> Ms. Parker said that industry self-reporting coupled with government audits is “appropriate, because then you get a two-tiered monitoring which allows both compliance efforts and also verification of whether or not mitigation measures are actually working.”<sup>230</sup> (See also Chapter 6, Habitat management.)

Dr. Josh Korman, author of Technical Report 5A, Salmon Farms and Sockeye Information, who summarized the self-reporting data from the province’s self-monitoring regime, was of the view that both the quality and quantity of information coming out of the provincial monitoring program was “impressive,” though he said the data do not go back far enough in time to confidently assess questions before this Inquiry such as the impact of salmon farms on Fraser River sockeye (see Volume 2 of this Report).<sup>231</sup>

### ***Audits and monitoring***

Under AMD, Aquaculture Environmental Operations (AEO) staff conduct paper reviews, or “desk audits,” of industry self-reported information (described above) and conduct audits and monitoring through site visits / inspections focused on

“fish health, benthic / environmental monitoring, and mitigation monitoring activities.”<sup>232</sup> Two AEO biologists stationed out of Port Hardy monitor marine mammal and Atlantic escapes.\* Biologists working in Campbell River conduct environmental monitoring or benthic monitoring.† AEO’s fish health group, working under the lead veterinarian,‡ conducts sea lice and fish health monitoring, which are described in more detail in Chapter 9, Fish health management.<sup>233</sup>

### **Desk audits**

Ms. Hoyseth described how AEO staff receive information from industry, review it, apply standards and protocols to it, and check companies for compliance with licence conditions. Ms. Hoyseth explained the feedback loop between industry and AEO staff monitoring for benthic effects:

At peak biomass ... the industry is required to do sediment monitoring, based on protocols we have provided to them in their licence. And for soft sediments ... they scoop mud or sediment from under the farm and they do chemical analysis to standards that we’ve provided to them. And for hard bottoms they do video monitoring. All that data is analyzed and reported to us.

... [Q]uite often that data is collected ... by a service provider, so a consultant, most often, who are R bios [registered biologists], so there’s sometimes a third party that does that monitoring. Sometimes that’s industry members. When that data comes to us ... we do a desk audit, we review it. And the thresholds basically are set so that if an impact occurs beyond what we would consider acceptable, the requirement is to fallow the site until those thresholds are reduced, or those impacts are reduced below certain thresholds.<sup>234</sup>

Ms. Hoyseth also said that if a farm goes beyond a threshold for harm, extra monitoring – in addition to a required fallow period – is necessary before the farm can go back into production.<sup>235</sup>

\* As of July 2011, Byron Andres, senior biologist, and Erika Grebeldinger.

† As of July 2011, the senior biologist in this section was Kerra Hoyseth, who testified before the Commission.

‡ As of July 2011, Dr. Mark Sheppard, who testified before the Commission.

## Site visits and inspections

AEO staff began visiting and inspecting fish farms under the Pacific Aquaculture Regulatory Program during the summer of 2011. Ms. Hoyseth said that in 2011 AEO staff had a target of visiting 25 percent of the active salmon farms to conduct benthic audits, but, as of the time of her testimony (September 1, 2011), staff expected to exceed their target and to visit 28 percent of the farms in 2011.<sup>236</sup>

Depending on the purpose of the inspection, sites are chosen for inspections randomly or by risk assessment. For example, sea lice and fish health monitoring, discussed further in Chapter 9, Fish health management, proceeds according to a random selection of sites within different fish health zones.<sup>237</sup> Sites for benthic monitoring are chosen more strategically, based on considerations such as geography, peak biomass, the past history of the site, and any concerns expressed from external sources (such as tips through DFO's "observe, record, and report" line). Ms. Hoyseth explained that AEO tries to visit farms when they are at peak biomass because that is when the greatest environmental effects are expected. For efficiency, she explained, AEO normally plans its visits around a group of farms that are peaking at about the same time in the same area. However, AEO staff also purposely visit farms that they know have had past compliance issues.<sup>238</sup>

During a site visit, AEO staff complete a standard Marine Finfish Aquaculture AEO Inspection Checklist by doing a visual inspection and by speaking with the farm's site manager.<sup>239</sup> The checklist covers the following topics (in summary):

- operational description and information such as the company name, date of inspection, species, biomass, and age of fish;
- site observations such as any non-licensed species observed at the farm, whether harvest or transfer pens were used, whether lights were used, and whether marine mammals were observed in the area;
- diagram and photos of the site; and
- information about active harvests / grade / transfer / mass mortality on site, active sea lice monitoring, and active fish health and fish mortality events.<sup>240</sup>

Ms. Hoyseth explained that some of the elements on the checklist, such as the section of the form that deals with mass mortalities, sea lice monitoring, and fish health events, are "opportunistic." AEO staff will complete these parts of the form only if such elements are occurring when they are on site.<sup>241</sup>

Unlike habitat biologists working under OHEB (see discussion of C&P and habitat staff in Chapter 7, Enforcement), AEO biologists and veterinarians have fishery guardian and inspector status under the *Fisheries Act*.<sup>242</sup> This status enables them to write inspectors' directions under the *Fisheries Act*. When describing the general approach DFO took in designing aquaculture monitoring, compliance, and enforcement, Mr. Thomson testified that, after a "fairly extensive" review of the provincial approach, and considering the objectives of the department, the decision was to provide these additional powers to AEO staff so that they can better carry out the necessary monitoring for the conservation of fish and fish health. For example, "obtaining samples is something that we can compel versus having to ask [for]."<sup>243</sup>

AEO does not have to give notice to farms before a site visit. However, even with notice, the work the AEO group does on benthic impacts cannot generally be affected by any changes made at a salmon farm site. Ms. Hoyseth testified that AEO audit data are not compromised by notice of a visit, and sometimes there are benefits because the farms can alert AEO staff in advance of specific biosecurity procedures to be followed during the visit.<sup>244</sup> (Biosecurity issues are discussed in Chapter 9, Fish health management.)

## Compliance inspections

Fishery officers conduct compliance monitoring, which involves inspections of salmon farms for compliance with licence conditions. Brian Atagi, area chief of Aquaculture, C&P, said that, in 2011, C&P was visiting "as many sites as we can," and as of September 1, 2011, had visited 36 active sites. He would not commit to doing more compliance inspections than previously carried out by the province.<sup>245</sup>

Like AEO staff, fishery officers conduct their inspections according to a checklist. C&P has a draft Finfish Aquaculture Site Inspection Checklist, which Mr. Atagi described as a "living document

that’s always evolving.”<sup>246</sup> Elements of the checklist are assessed by looking at “the site and their records and a portion of it is also gathered through actual observation and checking, say, like the net serial numbers, they’re actually inspected by the officers.”<sup>247</sup> Elements on the draft checklist include the following:

- operational description and information such as company name, date of inspection, species, size of fish, and projected date of harvest;
- aquaculture licence information such as whether the licence is valid and produced on demand;
- questions about record keeping, planning, and procedures with respect to sea lice, fish health, escape prevention and reporting, incidental catch, predator control, fish mortality, light usage, and fish harvest;
- questions about boat operations such as whether vessels are operated in a manner to prevent damage to containment structures and whether there is adequate signage; and
- questions about escape prevention and cage and net integrity, including questions about inspections, record keeping, and net strength testing.<sup>248</sup>

If an occurrence is generated from the inspection (see description of occurrences in Chapter 7, Enforcement), the fishery officer assigns an occurrence number to the inspection.<sup>249</sup>

Mr. Atagi testified that, once the active season for inspections had passed, his team of fishery officers would have more time to work on developing standard operating procedures (SOPs) for “things such as escape response, marine mammal incidents and harvest inspection transfer.”<sup>250</sup>

C&P does not have to give notice to companies before it visits a farm, but, according to Mr. Atagi, notice is usually given once C&P is in visual sight of the farm.<sup>251</sup> At the time of the hearings on salmon farms in August and September 2011, C&P officers had not been refused entry to a farm site.<sup>252</sup>

When either C&P or AEO staff visit a salmon farm site, they need to be aware of biosecurity issues to prevent the transfer of pathogens between farms or between wild and farmed fish.<sup>253</sup> Mr. Atagi noted that biosecurity is a “complication to this fishery,” and that not all the farms follow the same protocols.

For this reason, he said, C&P sent a letter to all salmon farms stating the procedures that it will use in inspecting a farm and inviting the farms to contact C&P if they had particular concerns about those procedures.<sup>254</sup> Generally, biosecurity protocols include the principle that “you go from most sensitive or susceptible fish to less-susceptible fish, which helps protect them,” and may set out procedures for cleaning equipment.<sup>255</sup>

At the time of the Commission’s hearings on aquaculture, no compliance statistics were available for the industry under the federal regime; the program was too new. Mr. Atagi said the industry is in a learning phase with respect to the new conditions of licence. The sorts of compliance issues that fishery officers are seeing range from the “more administrative, some records are missing, all the way in regards to records that the licence isn’t on site to issues of housekeeping such as lack of secondary containment for fuels or equipment that use fuels, that sort of thing.”<sup>256</sup>

### ***Data management***

At the time of the Commission’s hearings on salmon farms in August and September 2011, DFO was developing an Aquaculture Resource Information Management System (ARIMS) to house all data collected from salmon farmers under conditions of licence and through the monitoring, audits, and inspections conducted by AMD staff.<sup>257</sup>

C&P will separately track its work related to occurrences, inspections, investigations, and prosecutions through its Departmental Violation System (DVS), and it will track the time and effort of fishery officers on aquaculture files through its Fisheries Enforcement Activity Tracking System (FEATS).<sup>258</sup> (DVS and FEATS are discussed in Chapter 7, Enforcement.)

## **■ Consultation and public reporting**

In this section, I describe evidence I heard relating to DFO’s consultation and engagement with parties other than the provincial government: industry, First Nations, and non-governmental organizations. I then turn to the issue of public reporting of salmon farm information.

## Consultations leading up to the PAR

Mr. Thomson testified that DFO began consulting on the PAR in the spring of 2009. In particular, the department consulted with First Nations through the First Nations Fisheries Council (FNFC) (see description of the FNFC in the section on Aboriginal fishing in Chapter 5, Sockeye fishery management) and the Aboriginal Aquaculture Association (AAA). During the late summer or fall of 2010, DFO sent letters to individual First Nations seeking comments. It also attended some bilateral meetings with First Nations that requested meetings.<sup>259</sup>

Mr. Thomson said the “process we entered into with [the] First Nations Fisheries Council in gathering the information we did prior to the drafting of the regulation was ... probably a little bit ground-breaking in terms of it was really a great information source prior to regulatory drafting.”<sup>260</sup> Mr. Swerdfager, however, testified that the FNFC made clear to DFO that “information sessions” did not, in the FNFC’s view, fulfill Canada’s duty to consult with First Nations on aquaculture decisions.<sup>261</sup> In 2010, DFO received a number of letters from individual First Nations concerning the proposed PAR.<sup>262</sup> One from the Sechelt Indian Band, dated August 24, 2010, serves as an example:

shíshálh Nation was not consulted and our concerns and interests were not accommodated by any of the existing Provincial licences for aquaculture within our Territory ... Please be advised that we expect to be consulted by Canada with respect to all aspects of your proposed steps for implementing the necessary regulations, policies and strategic plans related to aquaculture (and mariculture) within our Territory.

...

[Y]ou must ensure that shíshálh Nation has been consulted and accommodated with respect to all existing licensed sites within our Territory *before* taking steps to purport to legalize these unlawful tenures. [Emphasis in original.]<sup>263</sup>

Similarly, the Union of British Columbia Indian Chiefs wrote to then Minister Gail Shea on July 15, 2010, and again on August 26, 2010, expressing the

view that the “information sessions” held by DFO with the FNFC and AAA did not meet Canada’s consultation obligations with First Nations and questioning the validity of any licences issued under the PAR.<sup>264</sup> Minister Shea responded in a letter dated October 20, 2010, noting that, after posting of the Regulation in the *Canada Gazette* on July 10, 2010, DFO met with members of the FNFC on July 14, 2010, and offered to meet with them again, but they declined. According to this letter, she also wrote to all BC First Nations offering to meet with any of them, 15 of which had sought meetings to that date.<sup>265</sup>

DFO also consulted industry and environmental groups on the proposed regulations.<sup>266</sup> Ms. Dansereau testified that the department held “extensive consultation right around the province” while developing the regulations and the conditions of licence, including consultations with the province itself.<sup>267</sup> Ms. Farlinger said there were a number of stages to the consultation. Informal consultations took place before the PAR appeared in *Canada Gazette* Part I. A formal consultation phase took place between the appearance of the PAR in *Canada Gazette* Part I and *Canada Gazette* Part II. That process is a specific national process which provides for citizen or group submissions. Then, after *Canada Gazette* II but before licences were issued under the PAR, DFO released draft conditions of licence for comment to the aquaculture industry, First Nations, and other interested groups, and made presentations about the draft conditions of licence to various groups.<sup>268</sup>

## Consultation with the salmon-farming industry

The department works with the salmon-farming industry in various ways. Some arise from the relationship of regulator–regulatee, while others appear to stem from the department’s mandate to support the aquaculture sector (see discussion above on DFO’s mandate for aquaculture).

DFO’s relationship with industry developed well before the PAR. A briefing note to the director general of habitat management from 2005 shows the department meeting with industry representatives with a view to raising public confidence in aquaculture.<sup>269</sup> Other evidence shows senior

people in the department meeting with industry. An example is a meeting in March 2010 between Marine Harvest Canada and the minister, at which the participants discussed the steps taken by the company to address sea lice impacts on wild stocks; the need for a new Aquaculture Act; and the pressure expected from environmental NGOs.<sup>270</sup> (Ms. Dansereau and Mr. Bevan testified that the minister also meets with First Nations groups and the environmental community, and said there is nothing unusual about a government minister meeting a variety of individuals and stakeholders.<sup>271</sup>) Similarly, in the process of developing the federal management framework for aquaculture, DFO met and consulted with industry representatives (and also with various environmental NGOs and others).<sup>272</sup> Moving forward, with respect to IMAPs, Mr. Backman said he expects “ongoing and continual stakeholder input and information-gathering” into salmon farm regulation.<sup>273</sup>

## Consultation with First Nations

As described above, DFO witnesses said the department engaged in consultations with First Nations in the regulatory process leading to the development of the PAR.<sup>274</sup>

DFO does not have an established protocol for consultation with First Nations regarding aquaculture. At the time of the hearings on salmon farms in August and September 2011, the department was receiving legal advice on this matter, with a view to establishing a clear policy.<sup>275</sup> One aspect of consultation is information-sharing; Mr. Thomson indicated that the specific information shared would depend on what a particular First Nation wanted to know.<sup>276</sup>

As stated by Mr. Thomson, the department promotes Aboriginal involvement in aquaculture. “[T]he department was very clear that one of its goals is to increase investment or increase participation by Aboriginal groups into aquaculture generally,” he explained. “And I think that that still remains a policy direction of the department[.]”<sup>277</sup>

Some First Nations participants in this Inquiry were critical of DFO. Their concerns

centred around how much consultation DFO had conducted with First Nations in developing the new aquaculture management framework and the PAR, as well as substantive concerns about that management and regulatory approach. In addition, some First Nations were critical of the department’s decision to “grandfather” existing licences (i.e., those previously issued by the province) when the department assumed jurisdiction over aquaculture.\*

Various First Nations have sought greater engagement and involvement in the management of aquaculture. As an example, on September 25, 2009, the First Nations Summit passed a resolution which maintained that “BC First Nations must be actively involved in any legislative, policy and or decision-making process to reform the aquaculture industry in BC,” and said that “[t]he principles of reconciliation, respect and recognition of First Nations title and rights must be paramount in any legislative, policy or decision-making process regarding changes to the aquaculture industry.”<sup>278</sup> Mr. Swerdfager from DFO indicated that some, although not all, First Nations saw the transfer to federal regulatory jurisdiction as presenting an opportunity to address their concerns about potential impacts on and infringements to First Nations’ constitutional rights.<sup>279</sup> He expects the IMAP approach will address many issues advanced by First Nations concerning the size, location, and number of fish farms along the migration route of Fraser River sockeye.<sup>280</sup>

## Consultation with non-governmental organizations and the general public

The department consulted with environmental groups and provided for input from the public on its proposed aquaculture regulations, which ultimately came into effect in late 2010.<sup>281</sup>

Testifying in August 2011, Mr. Thomson indicated that DFO had “recently, from my office, sent letters out to First Nations, environmental organizations, provincial government and licence holders, describing [steps taken or being taken by

\* For an elaboration of these concerns – both of substance and process – see Exhibits 1236, 1237, 1239, 1240, 1241, 1244, and 1656.

DFO on regulation of aquaculture] and describing our planned engagement strategy going forward in the fall[.]”<sup>282</sup>

Many scientists who testified before the Inquiry told me that they support or encourage more public involvement in both the scientific and management aspects of salmon farm regulation. For example, Dr. Stewart Johnson, and Dr. Craig Stephen, director and president of the Centre for Coastal Health and professor in the Faculty of Veterinary Medicine, University of Calgary, said they thought more involvement from the public and First Nations would be useful in defining socially and ecologically tolerable levels of risk of disease.<sup>283</sup> Dr. Kristina Miller, head of the Molecular Genetics Section, Salmon and Freshwater Ecosystems Division, DFO, said she “certainly wouldn’t stand against” an oversight committee composed of the federal government, the provincial government, First Nations, stakeholders, environmental groups, all charged with reviewing the DFO scientific research agenda and setting priorities.<sup>284</sup> Dr. Kyle Garver, research scientist, Aquatic Animal Health, DFO, said he would also support such a recommendation.<sup>285</sup>

Ms. Parker told me that current public consultation happens on an ad hoc, site-by-site basis, and that one of the advantages of the IMAP process may be a “more regular structured consultation” that is better able to capture impacts and “support broad-based area planning.”<sup>286</sup>

Ms. Stewart testified about some of the hopes and frustrations that NGOs have in consultations with government and in working with both industry and government on joint projects. She said one of the hopes her group had in entering dialogues with Marine Harvest (about sea lice monitoring in the Broughton Archipelago and a joint closed containment pilot project) was that joint discussions would end the battle over research methods. She also said she believes that “DFO could play a significant role in bringing the parties together to discuss methodology and purpose going into scientific studies and perhaps reach some conclusions coming out.”<sup>287</sup> On the other hand, she noted frustrations such as when the Coastal Alliance for Aquaculture Reform raised \$5 million from the Moore Foundation earmarked for investment in closed containment technology in British Columbia (see discussion on closed containment technology in Chapter 9, Fish health management), contingent on matching government

funds, only to have the project die when the change in jurisdictional responsibility happened.<sup>288</sup> She was also critical of DFO for bringing environmental NGOs into discussions only *after* DFO has worked with industry to design projects (such as with DFO’s project to secure organic certification for farmed fish), and for partnering with industry on projects (such as briefing fish retailers) without having environmental NGOs at the table, conducting joint briefings.<sup>289</sup>

## Public reporting of salmon farm information

In this section, I use the term “public reporting” of information about salmon farms to refer *not* to the information that companies furnish to government regulators, but instead to describe the information the government makes available to the public (or requires operators to make available).

Those favouring the public release of data about fish farming articulate a number of reasons why this reporting should occur. Providing such information allows for transparency and accommodates interest – on the part of stakeholders and the public alike – in learning “what is going on” at salmon farms. Dr. Craig Orr, executive director of Watershed Watch Salmon Society, told me that scientists researching salmon farms and their interactions with resident species have long been concerned about the transparency of salmon-farming data in British Columbia for research purposes, and that “there’s far more transparency in Europe.”<sup>290</sup> Documentary evidence makes this same point. In an email, David Lane of the T. Buck Suzuki Environmental Foundation referred Mr. Swerdfager to a paper from the University of Victoria Environmental Law Centre that compared transparency in the regulatory regimes of British Columbia, Norway, Ireland, and Scotland and suggested improvements for transparency in British Columbia. In response, Mr. Swerdfager forwarded the paper to his DFO colleagues, stating his agreement with it and that he thought “our planning is proceeding along these lines.”<sup>291</sup>

On the other side of the ledger are concerns about making too much data public. Without adequate context or professional interpretation, such data may be misunderstood or misrepresented

in the public discourse about salmon farms.<sup>292</sup> Another concern is that an immediate and comprehensive flow of information about salmon farm operations could create difficulties for companies, if it meant the public had notice of some information before shareholders did.<sup>293</sup>

The approach to public reporting under development at the time of the Commission's hearings on salmon farms espouses a different approach to transparency of information than that taken under the previous provincial regulatory regime. As noted above, when the province oversaw salmon farms, it collected data under three main programs. The first was the Salmon Aquaculture Health Management Program, for fish health and medicated feed information. The second was the Aquaculture Inspection Program (dealing with fish-escape data). The third was the Aquaculture Statistics Program, which included harvest values and stocking activity data. (This last program provided the raw materials used to produce the regularly issued statistical report, the *B.C. Seafood Industry Year in Review*.<sup>294</sup>)

Although some of the data the province collected were made available to the public at large, other data were released in a limited or aggregated basis or not released at all. Thus, while the province publicly released information about licences – such as the name, location, and species of fish for a given farm – it would release only summary data, for three or more companies combined, for other types of information about aquaculture operations. This was the case for total medicated feed usage, total escapes, total harvest and “farmgate” value, total wholesale value, and number of licensed sites.<sup>295</sup> As a second example, the provincial government collected data from its inspections and used these for an annual report on industry compliance, which was published on the Ministry of Agriculture and Land's website.<sup>296</sup>

The federal government, for its part, has signalled a move toward a more open flow of information to the public about BC salmon farm operations. As of August 2011, DFO had a draft policy entitled “Public Reporting of Regulatory Information Under the British Columbia Aquaculture Regulatory Regime.”<sup>297</sup> That policy articulates the aim of transparency. It emphasizes that an important aspect of transparency for the public is having access to data on a number of fronts, including environmental monitoring, associated outcomes, and regulatory

compliance.<sup>298</sup> The draft policy anticipates the public release of the following information:

- Regulatory information related to licences and licence holders, including licence holder reports, plans, and other submissions required as a condition of licence; DFO audit and investigation reports and compliance outcomes; and inspection and compliance statistics. Personal information is excluded, consistent with the federal *Privacy Act*.
- DFO policy and programs, including policies and operational guidance and protocols, conditions of licence, and IMAPs.
- Summaries of applications under review and decision information, including summaries of outcomes of environmental assessments undertaken for new licence applications and amendment applications.<sup>299</sup>

According to the draft policy, in some situations the federal government plans to delay the release of information, or mandate the form in which that information will be supplied:

- All information collected as a condition of operator licences will typically be released, but, where more practical or informative, data may be aggregated at the industry level.
- DFO intends to prepare an annual BC Aquaculture Regulatory Program report and may prepare complementary summary and analytical reports.
- DFO plans to have targeted timelines for the release of data:
  - within 20 business days for escape data;
  - on a quarterly basis, with a one-quarter lag time (90 business days) before posting information about new sites (such as location, species, and licence holder name; new marine finfish sites (such as maximum allowable peak biomass, substrate type, and containment array management plan); and marine finfish ongoing operations (such as sea lice counts, incidental catch, use of therapeutants, predator control measures, and reports on mass fish mortalities); and
  - at the end of a production cycle (for business confidentiality reasons) for marine finfish operations – for information such as

inventory and stocking plan and reports, fish health and fish mortality diagnoses, and population harvest declaration form.<sup>300</sup>

In testimony before me, DFO witnesses emphasized the department's commitment to transparency and the public reporting of much more information than was available under the provincial regime. Mr. Bevan testified that, while industry is responsible for following the conditions of licence (which include providing information to DFO), the department's role is to take that information and provide it through a transparent process to the public. Such transparency, he hoped, would show that the department is maintaining a sustainable activity.<sup>301</sup>

Mr. Swerdfager commented on the principles behind the process adopted by DFO:

I think that one of the principles that guided the development of the Pacific Aquaculture Regulation was to substantially enhance the transparency of the aquaculture industry in British Columbia. So the way the regulation is set up and conditions of licence that flow from it has a very strong emphasis on the provision of information to the Department by the industry operators.

I think it's important to emphasize that these are terms and conditions that we are requiring. We are not going to have a discussion with farmers as to what we would like to get from them and how we would like to get it from them and so on. The discussion is very much one of "our modem is stuck on send." We're just telling people here's what you shall produce, and within reason, here's how you shall produce it. Obviously we'll have some discussion in terms of modalities around that, but we are compelling the production of certain information from farmers in a very, very detailed and rigorous way.

We intend to share the vast majority of that information. This policy document that is in draft sets out how we intend to do so. There are some nuances still to be made to it. There are some corrections and updates to it. But generally speaking, the thrust very clearly here is to take the information that we glean from finfish, shellfish and freshwater aquaculture operations in this province, to make it publicly available.

We set about building an information management system to allow us to do that effectively. We had made comments to the effect in public that we had hoped to have that system up and running in April or May. We have certainly been a little bit late on that, but much of that information is now up on the website. It went up last week. It will continue.

The only thing is that we are proposing – or intending, rather – to withhold are things that are very clearly of a private nature, individual's names, addresses, phone numbers. That stuff is often contained, for example, in licences, and we will not be disclosing that sort of information. But all the information that we get from the operation of the industry will be shared publicly, regularly. I can't tell you today it will be published on the second Wednesday of every month or something like that, we're not down to that stage, but it will be very regular and very easily accessible.<sup>302</sup>

DFO is at an early stage in its bid to bring transparency to salmon farming. Mr. Backman said that, although industry is supportive of being more transparent than in the past, meeting all the new reporting requirements has taken a lot of resources and "caused quite a bit of activity."<sup>303</sup> Ms. Parker said she thought DFO has made "a fantastic start."<sup>304</sup> She also said her understanding was that delays for data release built into the reporting policy are to ensure that companies are compliant with securities legislation.<sup>305</sup> Ms. Stewart was more skeptical, saying her understanding for the delay was so that disease information would not "influence the marketability of the product. In other words, the farms don't want it going public if there are diseases, because they might have problems selling those fish"; thus, DFO is delaying release until after the fish have been marketed.<sup>306</sup>

By August 30, 2011, DFO had begun to publish monitoring activities and self-reported data on its public website. The department's reports included site-specific information about sea lice abundance counts; escapes; incidental catch; marine mammal "accidental drownings" and interactions; and aggregated numbers for authorized salmon egg importations (1985 onward).<sup>307</sup> Fish health data other than sea lice data had not been posted as of that date. Data gathered for investigations by

C&P are not made public, although, in the event of a successful prosecution, a press release may be issued.<sup>308</sup>

It bears noting that hearings for this Commission were under way at the time of the “handover” to federal management, and indeed the Commission itself became involved in the question of what information should be available to the public, and what should not. In July 2010, two participant groups in this Inquiry – the Aquaculture Coalition and the Conservation Coalition – brought an application seeking documents relating to fish health, pathogens, and disease, as well as stocking data in farmed salmon, from Canada, British Columbia, and the BCSEA. I ultimately ruled that such data that exist for the period of January 1, 2000, to September 1, 2010, be produced to the Inquiry in respect of 120 fish farms.<sup>309</sup> Although the province initially objected to some of this information becoming public exhibits, it withdrew that objection, and most if not all the information disclosed became exhibits during the hearings on aquaculture. As noted by Mr. Backman during his testimony, the public has never had access to the level of information on salmon farm fish health data that was made available during this Inquiry.<sup>310</sup>

## ■ Findings

The period since February 2009 has been one of many changes in the regulation of salmon farms in British Columbia. Following the *Morton v. British Columbia (Agriculture and Lands)* decision, the Department of Fisheries and Oceans (DFO) has taken significant steps to establish a federal regulatory program for aquaculture in the province. The federal government committed A-based resources to the new Pacific Aquaculture Regulatory Program (PARP), and DFO has built on and improved on the existing infrastructure and programs developed by the province. Still, work remains to fully implement the PARP, such as the Integrated Management of Aquaculture Plans (IMAPs) process, as well as a fully functioning data management system.

On a broader level, DFO suffers from conflicting institutional mandates – on the one hand to regulate salmon farms for the conservation of wild salmon, and on the other hand to promote salmon farm development and products. The testimony of

the deputy minister to the effect that the minister of fisheries and oceans is not well placed to enforce section 36 of the Fisheries Act against salmon farms because of a conflict is telling and, in my view, is equally apparent in relation to section 35 (as that section applied at the time of her testimony). DFO faces conflicting roles in having to tell the world that Canada’s farmed salmon products do not threaten the sustainability of wild salmon, yet at the same time credibly examining the possibility that such products are not safe. DFO’s regulatory work – to site farms, to set conditions restricting farm growth, and to monitor farms and take enforcement actions against them – all suffer from this institutional conflict.

Spending under the Sustainable Aquaculture Program and its related programs raises further concerns that research on wild salmon is getting short shrift. This fact is particularly apparent when contrasting the 2010 allotment of \$300,000 under the program for Pacific Aquaculture Regulatory Research to five DFO scientists in the Pacific Region for short-term research to support policy and regulatory decision-making related to aquaculture, against the annual national spending under the Aquaculture Collaborative Research and Development Program (\$4.5 million) and the Aquaculture Innovation and Market Access Program (\$4.7 million) for research led by the aquaculture industry. Such extensive funding stands in sharp contrast to the limited resources that have been available for Wild Salmon Policy (WSP) implementation and other wild salmon research. The fact that DFO is not yet charging licence fees to salmon farmers adds to the perception of conflict.

In my view, the conflict between regulating and promoting salmon farms is not the same as the conflict that exists in regulating and promoting wild salmon fisheries. For wild salmon fisheries, DFO conducts its regulatory function to conserve and protect the same species and populations of wild fish whose sustainable harvest it is simultaneously promoting. The conflict between conservation and harvest may be managed within DFO because both the conservation mandate and the sustainable harvest mandate relate to the same wild fish: if you over-harvest, you cannot meet your conservation goals, which in turn jeopardizes your ability to harvest. Thus, both goals *should* be pursued simultaneously. Indeed, the conservation mandate

and the sustainable fisheries mandate, in relation to wild fish, *should* become one and the same. That same harmony in mandates cannot exist in relation to farmed salmon. For salmon farms, DFO's promotion or harvest mandate relates to farmed salmon, but its protection mandate relates to wild fish. Since the harvest of farmed salmon is not dependent on wild stocks, DFO could continue to promote the harvest of farmed salmon even if the wild salmon stocks suffered as a result and the wild fishery became unsustainable. In my view, this prospect makes these conflicting mandates unmanageable within a single department.

The WSP states that, although salmon farms pose risks (disease and parasite transfer, competition and genetic effects of escapees, and physical disturbances), those risks are addressed through mitigation measures, such as proper farm siting. However, the current siting criteria for salmon farms do not appear to require consideration of Fraser River sockeye migration routes. As well, the siting criteria have been in use for more than 15 years and, therefore, may not reflect the most recent scientific knowledge about the risks posed by salmon farms. It is time for those criteria to be updated to reflect the best available science, as well as input from First Nations and stakeholders affected by the siting of fish farms. The criteria that salmon farms not be located within 1 km of the mouth of a "salmonid-bearing stream determined as significant" has little relevance to the protection of Fraser River sockeye because there are no salmon farms sited within 1 km of the mouth of the Fraser River. If Fraser River sockeye are at risk from salmon farms along their migration route, it is the route itself that must be protected.

Despite assurances from DFO witnesses that sockeye migration routes have been considered in the siting of salmon farms, other evidence leaves me questioning the extent of that consideration. The state of environmental assessments of current salmon farm sites – with respect to whether they have been assessed and what was assessed – is not clear from the evidence before me, nor is it clear whether the effects of salmon farms on migrating Fraser River sockeye have been assessed in all cases. DFO's past assessments appear to have focused on benthic impacts rather than issues more likely to affect migrating Fraser River sockeye (such as disease

or pathogen transfer; see discussion of salmon farms in Volume 2). Although the three *Canadian Environmental Assessment Act* (CEAA) screening reports put into evidence did consider introduction of diseases and disease transfers from salmon farms, I also heard that not all farms may have been assessed under the CEAA. Further, DFO Science has done little or no research to assess the combined impacts of sockeye salmon migrating past several different salmon farms along their migratory route. DFO witnesses did tell me that, going forward, DFO intends to take an ecosystem approach and, under the IMAPs, evaluate salmon farm siting on an ecosystem rather than a site-by-site basis. This news is encouraging, and I hope it will bring sockeye migration routes to the forefront of considerations.

DFO has developed a model of industry self-reporting and government audits and inspections that mirrors its approach to monitoring of other habitat stressors. Some start-up work remains to be done to ensure that the system is operating as it should. For example, DFO needs to complete in a timely way templates for the industry to use in providing monitoring data; it needs to complete its information management system; and it needs to develop or complete standard operating procedures for its inspections, whether conducted by DFO's Aquaculture Environmental Operations or Conservation and Protection staff. I understand this work to be under way.

Neither salmon farms nor government auditors have, in the past, provided much data about salmon farms to non-government scientists; they have tended to treat this information as proprietary. DFO has made progress in making information from salmon farms more transparent and in reporting this information to the public. This work needs to be continued, particularly to provide access to non-government scientists for research purposes.

DFO has not yet assessed First Nations' potential claims of infringement due to salmon farms, and it has no clear policy or protocol on how to consult with First Nations on salmon farm issues. DFO may benefit from early discussion with First Nations, NGOs, and non-government scientists before making significant management decisions or undertaking significant scientific projects in relation to salmon farms. Discussions conducted contemporaneously with DFO's discussions with

industry may generate more buy-in to decisions or research conclusions.

I discuss these findings and any related recommendations in Volume 3 of this Report.

## Notes

- 1 *Pacific Aquaculture Regulations*, SOR/2010-270, s. 1.
- 2 *Fisheries Act*, RSC 1985, c. F-14, s. 2.
- 3 PPR 20, pp. 8–9.
- 4 PPR 20, p. 11.
- 5 Exhibit 1366, p. 11; Exhibit 507, p. 3.
- 6 Exhibit 508, p. 2; Exhibit 507, p. 3.
- 7 Exhibit 1366, p. 8.
- 8 Exhibit 1977, pp. 5–6.
- 9 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136; and *Morton v. British Columbia (Agriculture and Lands)*, 2010 BCSC 100.
- 10 PPR 20, pp. 13–14.
- 11 *Fisheries Act*, RSBC 1996, c. 149; *Aquaculture Regulation*, BC Reg. 78/2002.
- 12 PPR 20, pp. 14–15.
- 13 Exhibit 1615.
- 14 Exhibit 1615, p. 1.
- 15 Transcript, August 30, 2011, pp. 50–51.
- 16 PPR 20, pp. 15, 17.
- 17 Transcript, August 30, 2011, pp. 48–49.
- 18 Exhibit 1622.
- 19 *Finfish Aquaculture Waste Control Regulation*, BC Reg. 256/2002.
- 20 PPR 20, pp. 16–17. See generally Exhibit 1615.
- 21 PPR 20, p. 18.
- 22 Exhibit 8, p. 31.
- 23 Exhibit 8, p. 31.
- 24 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136.
- 25 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136, 200.
- 26 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136, 167, 201–2.
- 27 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136, 200.
- 28 *Morton v. British Columbia (Agriculture and Lands)*, 2010 BCSC 100, 34.
- 29 Exhibit 1640, pp. 3–4.
- 30 Exhibit 1703, p. 2.
- 31 *Pacific Aquaculture Regulations*, SOR/2010-270, s. 2.
- 32 PPR 20, p. 24.
- 33 PPR 20, pp. 24–26.
- 34 Andrew Thomson, Transcript, August 30, 2011, pp. 14, 23–24.
- 35 PPR 20, pp. 26–27.
- 36 PPR 20, p. 27.
- 37 PPR 20, p. 27.
- 38 *Environmental Management Act*, SBC 2003, c. 53.
- 39 PPR 20, p. 28.
- 40 Exhibit 1588, p. 14.
- 41 PPR 20, p. 46.
- 42 Exhibit 1583
- 43 PPR 20, pp. 47–48; Exhibit 1584; Exhibit 1585.
- 44 Exhibit 1581.
- 45 PPR 20, p. 48; Exhibit 1581; Andrew Thomson, Transcript, September 1, 2011, pp. 3–4.
- 46 PPR 20, p. 49.
- 47 Brian Atagi, Transcript, September 1, 2011, p. 17.
- 48 PPR 20, pp. 52–55.
- 49 *Canadian Environmental Assessment Act*, SC 1992, c. 37.
- 50 *Health of Animals Act*, SC 1990, c. 21.
- 51 *Feeds Act*, RSC 1985, c. F-9.
- 52 *Canadian Environmental Protection Act*, 1999, SC 1999, c. 33.
- 53 Exhibit 1728, p. 1.
- 54 Exhibit 1728.
- 55 Transcript, August 30, 2011, p. 83.
- 56 Trevor Swerdfager, Transcript, August 30, 2011, p. 42.
- 57 Exhibit 1608, p. 1.
- 58 PPR 20, p. 99.
- 59 Transcript, August 30, 2011, p. 42. See also Exhibit 1608.
- 60 PPR 20, pp. 99–100.
- 61 Exhibit 1609, p. 1.
- 62 Exhibit 1777, p. 1; Exhibit 1609, p. 1.
- 63 Exhibit 1731.
- 64 Exhibit 1937, p. 5.
- 65 Exhibit 1729, p. 1.
- 66 DFO website: <http://www.dfo-mpo.gc.ca/aquaculture/sustainable-durable/index-eng.htm>.
- 67 Andrew Thomson, Transcript, September 1, 2011, p. 5.
- 68 Exhibit 1588, pp. 5, 14.
- 69 Transcript, August 30, 2011, p. 14. See also Exhibits 1598, 1599, and 1600.
- 70 Andrew Thomson, Transcript, August 30, 2011, p. 14. See also PPR 20, p. 175 (Appendix F).
- 71 Exhibit 1598.
- 72 Exhibit 1599.
- 73 Exhibit 1600.
- 74 Exhibit 1601.
- 75 Exhibit 1602.
- 76 Exhibit 1603.
- 77 Exhibit 1604.
- 78 Exhibit 1605.
- 79 Exhibit 1610.
- 80 Exhibit 1611.
- 81 Exhibit 1612.
- 82 Exhibit 1576.
- 83 Exhibit 1613.
- 84 Exhibit 1614.
- 85 Transcript, August 30, 2011, pp. 14–15. DFO released a “draft for discussion” interim Integrated Management of Aquaculture Plan for marine finfish on October 21, 2011. See DFO website: <http://www.pac.dfo-mpo.gc.ca/consultation/aquaculture/index-eng.htm>.
- 86 Exhibit 1604, pp. 1–2.
- 87 Exhibit 1602; Susan Farlinger, Transcript, September 22, 2011, p. 80.
- 88 Exhibit 1602, p. 1.
- 89 Transcript, August 31, 2011, pp. 112–13.
- 90 Transcript, August 30, 2011, p. 15.
- 91 PPR 20, p. 90.
- 92 PPR 20, p. 90.
- 93 *Pacific Aquaculture Regulations*, SOR/2010-270, ss. 4(h), 4(o)(viii).
- 94 Exhibit 1594, pp. 12–13.
- 95 Exhibit 1626, pp. 1, 7.
- 96 Exhibit 1626, p. 2.
- 97 Transcript, August 30, 2011, p. 65. See also Exhibit 1627.
- 98 Transcript, September 26, 2011, pp. 47, 54–55.
- 99 David Bevan, Transcript, September 26, 2011, pp. 49–50; Claire Dansereau, Transcript, September 26, 2011, p. 46.
- 100 Transcript, September 7, 2011, p. 7.

- 101 Transcript, September 7, 2011, p. 8. See also Transcript, September 8, 2011, p. 23.
- 102 Transcript, September 7, 2011, p. 18.
- 103 Transcript, August 30, 2011, pp. 9–11.
- 104 Transcript, September 23, 2011, pp. 2–3.
- 105 See Exhibits 1634 and 1836.
- 106 Transcript, August 30, 2011, p. 81.
- 107 Transcript, August 30, 2011, p. 80.
- 108 Claire Dansereau, Transcript, September 28, 2011, pp. 36–37.
- 109 Transcript, August 30, 2011, p. 12.
- 110 Transcript, August 30, 2011, pp. 12–13.
- 111 Transcript, September 7, 2011, p. 11.
- 112 Transcript, September 7, 2011, p. 11.
- 113 Exhibit 216.
- 114 Exhibit 216, p. 4.
- 115 Exhibit 1833.
- 116 Transcript, September 8, 2011, pp. 23–25.
- 117 Gregory McDade, Transcript, September 26, 2011, p. 80.
- 118 Exhibit 1937, p. 2.
- 119 Transcript, September 26, 2011, p. 80.
- 120 Transcript, September 6, 2011, p. 86.
- 121 Transcript, September 6, 2011, p. 16.
- 122 PPR 20, p. 115.
- 123 Transcript, September 7, 2011, pp. 48–50.
- 124 Transcript, September 7, 2011, p. 51.
- 125 PPR 20, pp. 42–43.
- 126 Exhibit 1594; Andrew Thomson, Transcript, August 30, 2011, pp. 23–24.
- 127 Transcript, September 27, 2011, p. 7. See also Transcript, September 28, 2011, p. 38.
- 128 Transcript, September 22, 2011, pp. 77–78.
- 129 Transcript, September 28, 2011, p. 40.
- 130 Transcript, August 30, 2011, p. 25.
- 131 *Fisheries Act*, RSC 1986, s. 7(2).
- 132 Transcript, August 30, 2011, p. 25.
- 133 Transcript, August 31, 2011, p. 111.
- 134 Transcript, September 8, 2011, p. 97.
- 135 Transcript, September 1, 2011, p. 86.
- 136 Transcript, September 23, 2011, pp. 1–2.
- 137 Transcript, September 8, 2011, pp. 16–17.
- 138 Exhibit 1600, p. 2.
- 139 Transcript, August 30, 2011, p. 30.
- 140 Exhibit 1588, p. 6.
- 141 PPR 20, pp. 68–69.
- 142 Transcript, August 30, 2011, p. 108.
- 143 Exhibit 1600, pp. 5–7.
- 144 Exhibit 1595; Exhibit 1596.
- 145 Transcript, August 30, 2011, pp. 32–33.
- 146 PPR 20, p. 70. See also Exhibit 1589, p. 17.
- 147 Exhibit 1589.
- 148 Exhibit 1589, p. 12.
- 149 Exhibit 1589, p. 13.
- 150 Transcript, August 30, 2011, p. 74.
- 151 Transcript, September 22, 2011, pp. 82–83.
- 152 PPR 20, p. 70.
- 153 Exhibit 1589, p. 5.
- 154 Exhibit 1632.
- 155 Transcript, August 30, 2011, pp. 16–17.
- 156 Transcript, August 30, 2011, pp. 56–57.
- 157 Transcript, September 7, 2011, p. 28.
- 158 Transcript, August 30, 2011, p. 18.
- 159 Transcript, August 30, 2011, p. 21.
- 160 Transcript, August 30, 2011, p. 18.
- 161 Transcript, August 30, 2011, pp. 67–68, 106–7.
- 162 Exhibit 1803, pp. 6–7.
- 163 Transcript, September 7, 2011, pp. 34–35.
- 164 Transcript, August 30, 2011, pp. 67–68.
- 165 Transcript, September 22, 2011, pp. 78–79.
- 166 Transcript, August 30, 2011, p. 18.
- 167 Transcript, August 30, 2011, p. 26.
- 168 Transcript, August 30, 2011, p. 71.
- 169 Gavin Last, Transcript, August 30, 2011, p. 51.
- 170 Exhibit 1615, p. 9.
- 171 Transcript, September 1, 2011, p. 87.
- 172 Exhibit 663.
- 173 Transcript, April 5, 2011, pp. 28–31.
- 174 Exhibit 663.
- 175 Transcript, August 30, 2011, pp. 71–72.
- 176 Transcript, September 22, 2011, p. 79.
- 177 Transcript, September 1, 2011, p. 57.
- 178 Transcript, August 30, 2011, p. 61.
- 179 Exhibit 1717, p. 9.
- 180 Exhibit 1625; Exhibit 1629; Exhibit 1630.
- 181 Exhibit 1625, pp. 16–20; Exhibit 1629, pp. 6–8; Exhibit 1630, pp. 7, 9, 10, 16.
- 182 Transcript, August 30, 2011, p. 71.
- 183 Exhibit 1601, p. 2.
- 184 Exhibit 1601, pp. 2–3.
- 185 Transcript, September 22, 2011, pp. 80–82.
- 186 Transcript, August 30, 2011, p. 74.
- 187 Transcript, August 30, 2011, p. 108.
- 188 Transcript, September 22, 2011, p. 84.
- 189 Lawrence Dill, Transcript, August 29, 2011, p. 70.
- 190 Transcript, September 7, 2011, pp. 71, 73.
- 191 Transcript, August 30, 2011, p. 68.
- 192 Transcript, September 8, 2011, p. 5.
- 193 Clare Backman, Transcript, September 8, 2011, p. 5.
- 194 Transcript, September 8, 2011, pp. 5–6.
- 195 Transcript, August 23, 2011, p. 58.
- 196 Transcript, September 26, 2011, p. 79.
- 197 Transcript, September 7, 2011, pp. 83–84.
- 198 Transcript, August 31, 2011, p. 66.
- 199 Transcript, August 31, 2011, p. 89.
- 200 Transcript, August 31, 2011, p. 114.
- 201 Transcript, September 28, 2011, p. 42.
- 202 Transcript, August 30, 2011, pp. 69–70.
- 203 Transcript, August 23, 2011, p. 91.
- 204 David Bevan, Transcript, September 27, 2011, pp. 4–5; Exhibit 1942; Exhibit 1944.
- 205 B.C. Salmon Farmers Association’s written submissions, pp. 139–40.
- 206 Transcript, September 8, 2011, p. 7.
- 207 PPR 20, p. 37.
- 208 PPR 20, p. 36.
- 209 Exhibit 1716, p. 5.
- 210 *Finfish Aquaculture Waste Control Regulation*, BC Reg. 256/2002, ss. 9, 10(1), 10(2).
- 211 *Finfish Aquaculture Waste Control Regulation*, BC Reg. 256/2002, s. 10(4).
- 212 *Finfish Aquaculture Waste Control Regulation*, BC Reg. 256/2002, s. 10(5).
- 213 *Aquaculture Regulation*, BC Reg. 78/2002, s. 4(1).
- 214 Exhibit 1560, p. 4.
- 215 For examples of annual Fish Health reports, see Exhibits 1560, 1670, 1671, 1672, and 1673.
- 216 PPR 20, pp. 35–36.
- 217 PPR 20, p. 41.
- 218 Transcript, September 1, 2011, pp. 29–30.
- 219 PPR 20, p. 92.
- 220 PPR 20, pp. 93–94.
- 221 Exhibit 1708.
- 222 Exhibit 1708, p. 1.
- 223 Exhibit 1708.
- 224 Exhibit 1594.
- 225 Transcript, September 1, 2011, p. 8.
- 226 Transcript, September 1, 2011, pp. 7–8.

- 227 Transcript, August 17, 2011, pp. 48–49.  
 228 Transcript, August 18, 2011, pp. 103–4.  
 229 Transcript, September 1, 2011, p. 9.  
 230 Transcript, September 8, 2011, p. 62.  
 231 Transcript, August 25, 2011, pp. 82–83.  
 232 Kerra Hoyseth, Transcript, September 1, 2011, pp. 10–12; Exhibit 1708, p. 4.  
 233 PPR 20, p. 96.  
 234 Transcript, September 1, 2011, pp. 33–34.  
 235 Transcript, September 1, 2011, p. 55.  
 236 Transcript, September 1, 2011, p. 11.  
 237 Fish Health Zones are identified in Appendix VI of the generic licence conditions. See Exhibit 1594, p. 31.  
 238 Transcript, September 1, 2011, pp. 11–12.  
 239 Exhibit 1706; Kerra Hoyseth, Transcript, September 1, 2011, pp. 13–14.  
 240 Exhibit 1706.  
 241 Transcript, September 1, 2011, pp. 13–14.  
 242 Kerra Hoyseth, Transcript, September 1, 2011, p. 14. See also PPR 20, p. 48.  
 243 Transcript, September 1, 2011, pp. 25–26.  
 244 Transcript, September 1, 2011, p. 18.  
 245 Transcript, September 1, 2011, pp. 15, 108–9.  
 246 Transcript, September 1, 2011, p. 15. See also Exhibit 1707, the draft Finfish Aquaculture Site Inspection Checklist.  
 247 Transcript, September 1, 2011, p. 16.  
 248 Exhibit 1707.  
 249 Exhibit 1707, p. 9.  
 250 Transcript, September 1, 2011, p. 16.  
 251 Brian Atagi, Transcript, September 1, 2011, p. 18.  
 252 Brian Atagi, Transcript, September 1, 2011, p. 76.  
 253 Andrew Thomson, Transcript, September 1, 2011, p. 52.  
 254 Brian Atagi, Transcript, September 1, 2011, pp. 29, 76–77.  
 255 Kerra Hoyseth, Transcript, September 1, 2011, p. 19.  
 256 Transcript, September 1, 2011, p. 20.  
 257 PPR 20, pp. 97–98.  
 258 PPR 20, pp. 97–98.  
 259 Andrew Thomson, Transcript, August 30, 2011, p. 24. See also Exhibits 1642 and 1651.  
 260 Transcript, September 1, 2011, p. 114.  
 261 Transcript, August 30, 2011, pp. 93–94.  
 262 Transcript, August 31, 2011, p. 3.  
 263 Exhibit 1654, p. 1.  
 264 Exhibit 1699; Exhibit 1701.  
 265 Exhibit 1703, p. 2.  
 266 Exhibit 1641, pp. 8–9.  
 267 Transcript, September 27, 2011, p. 8.  
 268 Transcript, September 27, 2011, p. 8.  
 269 Exhibit 661.  
 270 Exhibit 1942.  
 271 Transcript, September 27, 2011, pp. 3–4.  
 272 Exhibit 1641, pp. 8–9.  
 273 Transcript, September 7, 2011, p. 16. See also Mia Parker, Transcript, September 7, 2011, p. 17.  
 274 Claire Dansereau and Susan Farlinger, Transcript, September 27, 2011, p. 8.  
 275 Andrew Thomson, Transcript, August 30, 2011, p. 111. See also Andrew Thomson, Transcript, September 1, 2011, pp. 103–5.  
 276 Transcript, August 30, 2011, pp. 112–13.  
 277 Transcript, September 1, 2011, p. 112.  
 278 Exhibit 1648, p. 1. See also Exhibits 1647, 1657, 1638, and 1639.  
 279 Transcript, August 31, 2011, p. 7.  
 280 Transcript, August 31, 2011, pp. 8–9.  
 281 Exhibit 1641, pp. 8–9.  
 282 Transcript, August 30, 2011, p. 15.  
 283 Transcript, August 23, 2011, pp. 94–95.  
 284 Transcript, August 25, 2011, p. 36.  
 285 Transcript, August 25, 2011, p. 37.  
 286 Transcript, September 7, 2011, p. 17.  
 287 Transcript, September 7, 2011, pp. 48–49.  
 288 Transcript, September 8, 2011, pp. 11–12.  
 289 Transcript, September 8, 2011, pp. 26–27, 31.  
 290 Transcript, September 6, 2011, p. 22.  
 291 Exhibit 1633, p. 2.  
 292 Transcript, September 7, 2011, p. 90. See also Exhibit 1636, pp. 2–3.  
 293 Mia Parker, Transcript, September 7, 2011, p. 93.  
 294 PPR 20, p. 35. See also B.C. Seafood Industry Year in Review reports for the following years: 1993 (Exhibit 504); 1996 (Exhibit 505); 2000 (Exhibit 506); 2004 (Exhibit 510); and 2007 (Exhibit 507).  
 295 PPR 20, pp. 35–36  
 296 Exhibit 1716.  
 297 Exhibit 1590 is a draft of this policy, dated July 10, 2011. Exhibit 1599 is an earlier draft of the same policy, dated June 29, 2011.  
 298 Exhibit 1590, p. 1.  
 299 Exhibit 1590, pp. 2–3.  
 300 Exhibit 1590, pp. 3–5.  
 301 Transcript, September 22, 2011, p. 85.  
 302 Transcript, August 30, 2011, pp. 22–23.  
 303 Transcript, September 7, 2011, p. 16.  
 304 Transcript, September 7, 2011, p. 96.  
 305 Transcript, September 7, 2011, pp. 93–94.  
 306 Transcript, September 7, 2011, pp. 90–91.  
 307 See Exhibit 1597 for screenshots from DFO’s website.  
 308 Brian Atagi and Andrew Thomson, Transcript, September 1, 2011, p. 20.  
 309 Ruling Re: Rule 19 Application for Production of Aquaculture Health Records, December 8, 2010, pp. 20–21.  
 310 Transcript, September 7, 2011, p. 89.