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Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon

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Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon

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The Honourable Claude Richmond
Speaker of the Legislative Assembly
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Dear Sir:

I have the honour to transmit herewith to the Legislative Assembly of British Columbia my 2004/2005 Report 5: Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon.

Wayne Strelioff, FCA
Auditor General

Victoria, British Columbia
October 2004

copy: Mr. E. George MacMinn, Q.C.
Clerk of the Legislative Assembly

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Foreword

To Canadians, salmon represents strong and deep ties to our heritage. Salmon has sustained families and communities for generations and has contributed significantly to the economies of British Columbia and the Maritime provinces. Salmon is also a key part of the recreational sports fishing industry on both coasts. Canada is the fourth largest farmed salmon producer in the world; salmon aquaculture provides substantial economic benefits for coastal and rural communities.

In recent years, however, salmon stocks on both the east and the west coasts have been under intense pressure, and Atlantic salmon commercial fisheries in the Maritime provinces have been closed for many years to safeguard the resource. There has been considerable discussion of the effects of salmon aquaculture on wild salmon and the marine environment, including opposition to net-pen salmon farming operations from environmental groups and negative media coverage.

The Auditors General of Canada, British Columbia and New Brunswick are tabling separate reports to their respective legislatures on salmon-related issues. Between 1997 and 2000, the Auditor General of Canada conducted three audits that focussed on Pacific salmon, and this year it completed a follow-up of these audits in collaboration with the two provincial audit offices. The Auditor General of British Columbia examined the provincial government's role in sustaining wild salmon, and the Auditor General of New Brunswick looked at salmon aquaculture in that province.

Fisheries and Oceans Canada is responsible for ensuring that salmon and their habitat are protected, and it is the lead federal agency for aquaculture development. The provincial governments in British Columbia and New Brunswick have strongly supported the development of aquaculture in their provinces. In British Columbia, various provincial departments are responsible for managing lands and natural resources in ways that sustain wild salmon.

Foreword

Our three audits were performed concurrently; our offices participated jointly in certain audit-related processes and shared information on a regular basis. As a result, we were able to accomplish more with less duplication of effort and achieve a broader view and understanding of the issues.

Wild salmon and their habitat

The purpose of policy is to provide a broad framework for a shared vision to guide decisions and activities. Canada's policy on salmon and salmon aquaculture should set clear objectives for managing both wild and farmed salmon and the interactions between them. At the federal level, Fisheries and Oceans Canada has been struggling since 2000 to finalize a wild salmon policy designed to conserve the genetic diversity of wild salmon and protect their habitat. Stakeholders have called for the policy to be finalized to clarify how conservation should be implemented and how fisheries should be managed. At the provincial level, British Columbia does not have a clear vision and an overarching strategy for wild salmon sustainability.

Two of our three audits noted gaps in policy implementation. Fisheries and Oceans Canada, for example, has never reported on the status of fish habitat conservation in Canada or assessed the effectiveness of its Habitat Policy. These continue to be significant challenges for the Department. Similarly, reporting by provincial ministries and agencies in British Columbia on performance relating to sustaining wild salmon is weak.

Salmon aquaculture

All three audits identified gaps in coordination between the federal and provincial governments. Despite numerous committees, agreements, and protocols between the two provinces and the federal government, problems still exist. For example, there are concerns about how long it takes to secure approvals for aquaculture sites, a key aspect of regulating salmon aquaculture.

The three audits also found significant gaps in the scientific knowledge about the potential effects of salmon aquaculture. Fisheries and Oceans Canada's Aquaculture Policy Framework expresses a strong commitment to developing a sustainable aquaculture industry in Canada. But when assessing applications for aquaculture sites, the Department needs to apply more credible, science-based criteria to ensure that approved sites are properly located. It has had difficulty assessing the cumulative effects of salmon aquaculture on wild salmon stocks. And it has to determine how to control the deposit of deleterious substances by salmon aquaculture operations. Wild salmon and habitat remain susceptible to the effects of salmon aquaculture.

In New Brunswick, auditors found that stakeholders have yet to share a common vision of sustainable aquaculture. Therefore the Province lacks a comprehensive strategy for aquaculture development and the management of significant risks. In addition, there are deficiencies in both the monitoring of aquaculture activities and the enforcement of compliance. For example, the provincial government does not adequately monitor aquaculture producers' compliance with the terms of their leases and aquaculture licences. Unlike British Columbia, New Brunswick does not monitor escapes from salmon cages, nor does it require that escapes be reported.

The Salmon Aquaculture Policy Framework of the Province of British Columbia calls for relocating a number of sites that are poorly located and implementing new siting criteria, but key issues remain undecided. British Columbia's guidelines, and siting decisions made in New Brunswick, are based on scientific information that is less than complete.

Need for prompt, concerted action

Concerns about salmon and salmon aquaculture are not new, and neither are attempts to improve the state of the resource and its habitat. But progress has been slow. In the meantime, some salmon populations are in trouble, habitat loss continues to occur, and it is not known what long-term effects salmon aquaculture is likely to have on the natural resource or the environment.

Foreword

Prompt, concerted action is required if the salmon fisheries and salmon aquaculture are to be sustainable. It is also imperative that more than a single level of government be involved in the solution. The collaboration of a variety of agencies within each government and between governments is essential. We urge our respective governments to take immediate action on these important issues.

Sheila Fraser, FCA
Auditor General of Canada

Johanne Gélinas,
Commissioner of the Environment
and Sustainable Development

Wayne Strelioff, FCA
Auditor General of British Columbia

Daryl Wilson, FCA
Auditor General of New Brunswick

Foreword

The chapter "Fisheries and Oceans Canada—Salmon Stocks, Habitat, and Aquaculture" is available on the Office of the Auditor General of Canada Web site (www.oag-bvg.gc.ca). For copies, contact

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Auditor General's Comments

Wayne Strelioff, FCA
Auditor General

British Columbia is one of the few remaining locations in the world to support relatively large numbers of wild salmon stocks. Distributed along British Columbia's entire Pacific coastline, wild salmon have had a profound impact on our history, culture and economy and continue to contribute significant social, economic and cultural benefits. For our First Nations people, salmon remain a primary food source.

Over the last several decades, the long-term sustainability of wild salmon in British Columbia has come into question. Intense debate and conflict over management approaches run in tandem with fluctuations in wild salmon populations and their decline as a fisheries resource. These fluctuations are influenced by the natural variation in ocean conditions, harvesting levels and freshwater habitat quality. The health of freshwater habitat can be impacted by various human activities, such as forestry, water use, urbanization and agriculture. While some runs have increased in abundance in recent years, it is virtually certain that wild salmon will continue to be stressed in the future. Indeed, some experts suggest that the depleted state of wild salmon on the Atlantic coasts of Europe and North America stands as a warning for managers of wild Pacific salmon.

Unlike most natural resources, the management of wild salmon and their habitat is complicated by a unique shared administrative setting. Through Fisheries and Oceans Canada (DFO), federal laws and programs exist to manage issues related to harvesting, the setting of quotas, and habitat protection. At the same time, the provincial government, through a number of ministries, administers the land and resource management functions that can affect wild salmon in their freshwater environment. Sharing these responsibilities has evolved into a complex arrangement between both the two levels of government. Meanwhile, the provincial government has been adjusting its programs and business practices to reflect budget and resources constraints.

I carried out this audit to assess how effectively the Province is managing its responsibilities to sustain wild salmon in British Columbia. I had several reasons for doing this. With a number of new strategies being proposed by the Province for a variety of natural resource and environmental issues, ensuring wild salmon are properly managed is important to British Columbians.

The Province has also wound down a number of program areas established to maintain and restore salmon habitat. The challenge for British Columbia is balancing sustainability goals with social, economic and environmental well-being. And with the recent designation of three salmon species as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and consideration for listing under the federal Species at Risk Act, the challenge has become even greater. The increasing debate over salmon aquaculture and the interaction between farmed and wild salmon has also focussed more attention on the state of wild salmon. Finally, I carried out this audit because I think legislators and the public need to have a better understanding of how effectively the Province is managing its responsibilities to sustain wild salmon in British Columbia.

This examination was carried out in coordination with the federal Auditor General and the Auditor General of New Brunswick to provide a more complete understanding of the complexity of issues associated with the protection of wild salmon in Canada. Specifically, we examined British Columbia's programs for protecting and restoring salmon habitat, and for preventing and mitigating potential impacts of salmon aquaculture on wild salmon stocks.

The findings of the audit concern me. British Columbia's ability to ensure sustainability of wild salmon is handicapped by the lack of a clear vision. While both levels of government appreciate their shared responsibility, their efforts have been weakened by their inability to overcome differing views and come up with a common strategy for wild salmon management. Progress in mitigating the risks associated with farmed and wild salmon interaction is evident. However, uncertainty for the future has been increased as a result of delays in implementing legislation beneficial to wild salmon protection, changing government business practices related to resource management, persistent gaps in information and knowledge, and lack of public accountability reports.

The foundation of a good wild salmon sustainability framework is a vision of sustainable development. From there, the framework must set out policies and programs having clear goals, clear leadership roles and responsibilities of provincial organizations involved, current and accurate inventory information, and a

mechanism to coordinate and measure progress. The framework should culminate in a process for open and transparent reporting of performance to legislators and the public. Our key findings are summarized below.

Key Findings

Management of shared responsibilities for wild salmon needs to be guided by a clear vision

The Province's participation in the management of wild salmon issues has diminished over the last few years. Commitments made through the 1997 Canada-British Columbia Agreement on the Management of Pacific Salmon Fishery Issues and the 2000 Canada-British Columbia Fish Habitat Management Agreement have received less priority. Most program personnel believe that the Province has no direct role or responsibilities to manage wild salmon and their habitat. The provincial focus has always been on freshwater fish and freshwater habitats with salmon considerations taken into account. As a result, the onus for managing wild salmon rests with the Department of Fisheries and Oceans Canada. Moreover, because of the anadromous characteristics of wild salmon, to enhance effectiveness and efficiency of government actions, a clear vision and an overarching integrated federal-provincial strategy, outlining goals, objectives and performance measures for both levels of government, is warranted to address requirements to sustain wild salmon.

The Province needs to be more active in protecting and restoring fish habitat

The government's commitment to establish a Living Rivers Act, develop a 10-year program to restore fish habitat and implement a Living Rivers Strategy has shifted. The benefits of past protection and restoration activities are not well understood because there has been only limited evaluation of their effectiveness. The government's results-based shared stewardship model is placing greater responsibility on stake-holders to prevent, mitigate and monitor impacts to fish habitat, yet there are limited resources being committed to these initiatives. Experience in other jurisdictions illustrates that proactive government participation is essential for ensuring habitat conditions are in place for wild salmon to carry out their life functions. Without an effectiveness evaluation framework in place, however, it will be difficult for

government to establish a science-based approach to assess the outcomes, and to enable ongoing improvement conducive to an adaptive management approach. Knowledge, information and accountability reporting ought to be improved.

Potential impacts of aquaculture are being addressed, but more knowledge is required to improve management practices

The Province has made considerable progress over the last decade by putting in place the conditions necessary to foster a sustainable salmon aquaculture industry. Efforts to establish a regulatory framework with accountabilities over waste management, escape prevention, fish health and compliance and enforcement have largely been accomplished. Still, there are gaps and uncertainty in knowledge about the interactions between salmon aquaculture and wild salmon, particularly around topics such as disease transfer, the ability of farmed Pacific salmon to interbreed with wild Pacific salmon, the colonization capabilities of farmed Atlantic salmon, and the cumulative impacts of salmon aquaculture. Ongoing research is needed in these areas to ensure that salmon aquaculture does not pose an unacceptable risk to wild salmon and the environment.

My Recommendations

To effectively manage its responsibilities to sustain wild salmon, I recommend that the Province:

- **in conjunction with the Department of Fisheries and Oceans Canada, develop a clear vision, with goals and objectives, for sustaining wild salmon and provide public policy direction about what is an acceptable risk to salmon habitat and what is an acceptable loss of salmon runs**
- **develop, in conjunction with the Department of Fisheries and Oceans Canada, an overarching strategy to manage for wild salmon sustainability**
- **identify a lead provincial agency to coordinate efforts for sustaining wild salmon and rationalize the committee structures**

- **coordinate a review of how recent legislative changes have effected wild salmon and examine the outcomes of provisions not being put into force**
- **ensure that initiatives aimed at preventing impacts to salmon habitat incorporate best management practices with measurable indicators and results which are linked to appropriate regulations**
- **review its compliance and enforcement programs within various resource management agencies to ensure sufficient resources for creating deterrents are maintained, and establish a clear policy and decision framework for identifying and approving escalating compliance and enforcement actions**
- **ensure provincial agencies work together to develop methodology and indicators to enable periodic assessment of the effectiveness of habitat protection legislative provisions in meeting goals to sustain wild salmon**
- **institute a program to rank restoration priority, formulate a multi-year restoration program, and determine effectiveness of restoration programs**
- **through the Ministry of Sustainable Resource Management:**
  - **determine, in conjunction with related provincial agencies and federal partners, consistent data standards for collecting and storing information, including wild salmon data, and**
  - **ensure that a program is in place to attest the accuracy, completeness of data and timely accessibility of information for decision makers and users**
- **assess the resource requirements needed to deal with wild salmon issues**
- **take steps to resolve the aquaculture siting issues**
- **pool its research resources with those of relevant federal agencies to more efficiently and effectively address the priority knowledge gaps associated with wild and farm salmon interactions**

- **reassess the statutory time limit and strengthen the penalty provisions in its current aquaculture policy framework**
- **develop a monitoring system and indicators to measure and report out on the overall progress for sustaining wild salmon on a timely basis**

I wish to thank everyone who cooperated with my Office to assist us in gathering the information for this audit. As well, I would like to acknowledge the hard work, professionalism and dedication of my staff in the production of this report.

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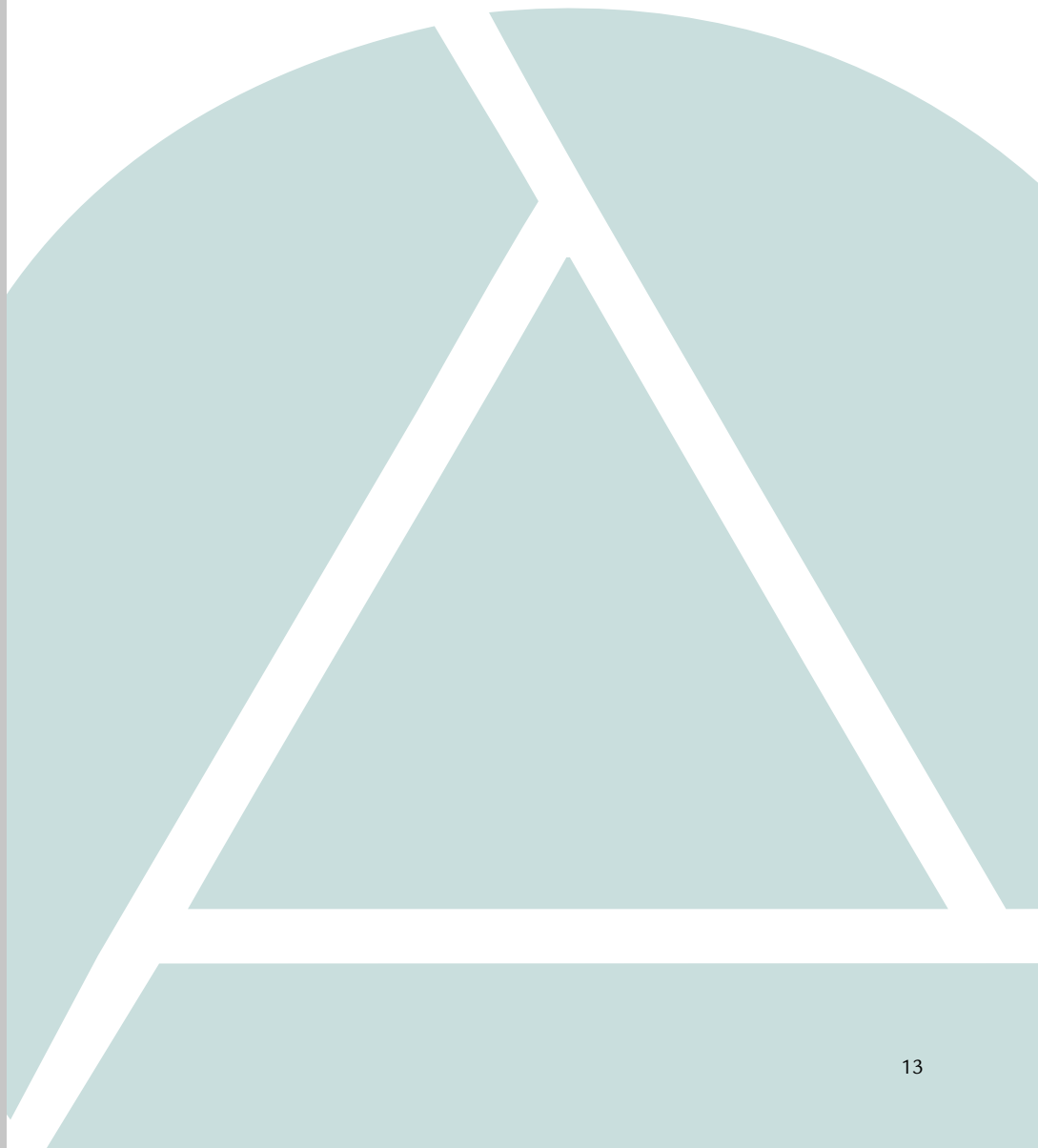
Detailed Report



Audit Purpose and Scope

The purpose of this audit was to assess whether the provincial government has effective programs in place to ensure the sustainability of wild salmon in British Columbia. We examined its programs for protecting and restoring salmon habitat, as well as those for preventing and mitigating the potential impacts of salmon aquaculture on wild salmon stocks.

We concentrated our examination on the four core ministries and two agencies responsible for habitat and fish protection, as well as for land and resource management responsibilities that impact wild salmon. Within each organization, we interviewed those individuals dealing with habitat protection and fish management issues. We reviewed and analysed documents obtained from the ministries and agencies, such as legislation, regulations, government policies and procedures, agreements and reports. As well, we interviewed or corresponded with industry stakeholders, First Nations, non-governmental organizations, academics and others to obtain their input and perspective. Our fieldwork was conducted between May and December 2003.

In this audit, our focus is the five main species of wild salmon. We did not examine the government's role in managing other anadromous fish stocks such as steelhead or sea-run cutthroat. Neither did we examine inland fresh-water fishery issues related to non-anadromous fish or issues surrounding fish hatcheries.

We performed this audit in accordance with assurance standards recommended by the Canadian Institute of Chartered Accountants, and accordingly included such tests and other procedures we considered necessary to obtain sufficient evidence to support our conclusions.

The audit was done in conjunction with similar audits carried out by the Auditor General of Canada and the Auditor General of New Brunswick. Both the Auditor General of British Columbia and the federal Auditor General examined issues surrounding wild salmon habitat, sustainability and wild-farmed salmon interactions. The Auditor General of New Brunswick looked exclusively at the issue of salmon aquaculture. Combined, these three audits provide a national perspective on the status of government programs affecting wild and farmed salmon in Canada.

Overall Conclusion

We concluded that the Province needs to be more aggressive if it is to ensure the future sustainability of wild salmon in British Columbia. Protecting wild salmon habitat and restoring past problems are essential if this goal is to be attained.

Although the Province does not have the primary legal obligation for looking after salmon habitat, its role in managing the habitat is significant. The absence of a provincial vision, however, and of a strategic plan with clear objectives has prevented establishment of a coordinated program. Provincial efforts to manage wild salmon in their freshwater environments have diminished in recent years and what activities remain are now spread over a number of agencies. Existing provincial legislation and regulations do not provide adequate protection for salmon habitat, because some key provisions are either not in force or not being acted on. Salmon conservation plans and programs have lapsed and need to be re-committed. Some strategic initiatives are underway but their progress has been slow. Meanwhile, resource constraints and changing government priorities have resulted in much-reduced direct provincial participation in habitat restoration programs.

The shared responsibility for salmon and their habitat between the federal and provincial governments has led to the creation of a mosaic of agreements and protocols. None of these has substantially clarified roles. Instead the result is awkward arrangements and working relationships between the two levels of government. Lack of agreement over basic principles and objectives has created tension at the operational level.

Concerning the impact of aquaculture operations on wild salmon, the Province does recognize there are some risks to wild salmon and has initiated a number of practices to reduce the known risks. However, additional research and studies are needed before the interactions between wild salmon stocks and aquaculture operations (particularly interactions that affect health and disease), can be better understood and managed.

British Columbia is home to five species of wild Pacific salmon

Five species of wild salmon are found in British Columbia: chinook, chum, coho, pink and sockeye (Exhibit 1). Each species has broad distribution throughout the province. Pink, chum and sockeye are considered the most abundant species while coho and chinook are under pressure.

Exhibit 1

The species of wild Pacific salmon found in British Columbia

Common Name	Market Name	Scientific Name
Chinook salmon 	Chinook, spring, king	Oncorhynchus tshawytscha
Chum salmon 	Chum, dog, keta, silver-bright	Oncorhynchus keta
Coho salmon 	Coho, silver	Oncorhynchus kisutch
Pink salmon 	Pink, humpbacks	Oncorhynchus gorbuscha
Sockeye salmon 	Sockeye, reds, red salmon	Oncorhynchus nerka

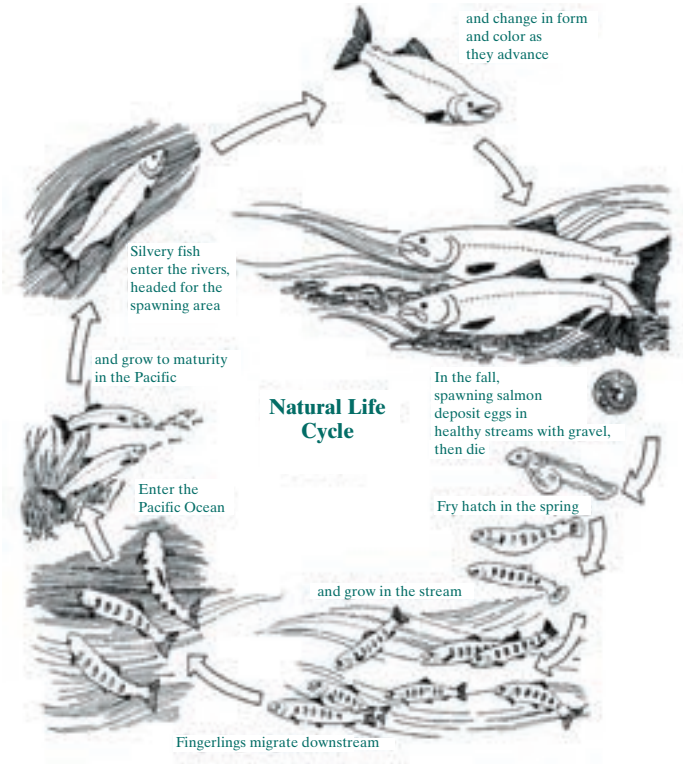
Source: British Columbia Salmon Marketing Council

A salmon's life cycle takes it through many stages and ecosystems—from creeks and streams, to estuaries, the ocean and back again. Salmon are anadromous fish, which means they spend most of their adult lives in the ocean, but spawn, are born and reared in freshwater (Exhibit 2).

Wild salmon require a number of aquatic and biological conditions to be met for them to successfully rear, migrate and spawn. These conditions include clean and well-oxygenated freshwater at proper temperatures; high quality habitat; an adequate supply of food, shade and instream material to help salmon mature and avoid predators; and unimpeded access to and from freshwater. Sustaining wild salmon therefore requires, amongst many factors, healthy and functioning watersheds and ecosystems. Exhibit 3 highlights the biological characteristics and habitat requirements for the five species of wild salmon found in British Columbia.

Exhibit 2

Wild salmon life cycle and food web



Source: Department of Fish and Wildlife, Washington State, U.S.A.

The status of wild Pacific salmon

While recent reports of improved returns of some salmon stocks are encouraging, the results are variable across the province. Optimism must also be tempered by the limited stock and assessment information for many British Columbia river and lake systems.

Our knowledge on the status of wild Pacific salmon stocks in British Columbia is incomplete. The best estimates to date (from a 1996 study conducted by four Canadian fisheries scientists for the North Pacific Chapter of the American Fisheries Society), put the number of runs throughout the province at over 9,000, with the five main species (chinook, chum, coho, pink and sockeye)

Exhibit 3

Life cycle and habitat requirements of wild Pacific salmon in British Columbia

Species	Life Cycle (Years)	Size Max. (Kilos)	Life Cycle in Rearing Habitat (Months)	Life Cycle (Months)	Life Cycle (Weeks)	Types of Freshwater Habitat Requirements for Salmon Spawning/Rearing	Abundance Ranking
Chinook	3—7	45	3—24	24—60	2—20	large river systems/ streams and estuaries	4th
Chum	3—5	21	1—6	21—55	2—12	moderate-size streams/ estuaries and rivers	2nd
Coho	3—5	11	12—21	18	2—12	creeks and tributaries/ streams and side channels	5th
Pink	2	5	1—4	18	4—6	short coastal streams/estuaries	1st
Sockeye	4—5	6	4—36	12—48	4—32	lakes and river tributaries	3rd

Source: Pacific Fisheries Resource Conservation Council (2001) and C. Groot and L. Margolis (1991)

totalling approximately 8,100. A comprehensive inventory has never been conducted of these runs. Many factors make doing this a challenge, including the cyclical nature of marine conditions, the remoteness of spawning areas and the use of artificial propagation and hatcheries that can mask the health of wild populations.

In the absence of comprehensive data, scientists use indicator stocks to gauge the status of individual salmon species and runs. Indicator stocks are species of fish in a given geographic region that is monitored over time to determine its stability in that region compared to the overall health of the particular species elsewhere in the province (see sidebar). Indicator stocks typically consist of large, commercially significant runs. Information on stock status in smaller watercourses is generally not readily available, particularly for those water bodies north of Vancouver Island.

Overall, from a regional perspective, stocks in northern British Columbia are generally considered to be healthy, stocks in the central coast region are experiencing some fishing and habitat pressures, and stocks in the southern region are under pressure. Salmon runs recently designated as endangered by the Committee on the Status of Endangered Wildlife in Canada include the Interior Thompson River coho, the Cultus Lake sockeye and the Sakinaw Lake sockeye. Recovery plans for these stocks are being developed by multi-stakeholder recovery teams.

West Coast Vancouver Island Coho Salmon as an Indicator Stock

There are two wild coho indicator stocks on the west coast of Vancouver Island (WCVI) region: Carnation Creek near Bamfield and Kirby Creek near Sooke. There may be as many as 700 distinct coho populations in the WCVI region. Of the approximately 200 that have reported escapement, about 50% have populations averaging fewer then 85 returning fish, while the average escapement is about 200. Only the Somass and San Juan rivers have escapements exceeding 5,000 fish. Annual fry and adult salmon surveys have been conducted on 30-40 WCVI streams since 1995, to compare abundance in non-indicator systems. Conservation concerns forced the coho fishery to close in 1996. Today, openings for wild coho are rare in the southern portion of British Columbia.

How wild pacific salmon are being impacted

Wild salmon face many types of risks. Over-fishing, degradation or loss of habitat, water withdrawals, land and marine-based development activities, and natural events all threaten stocks. Most impacts are associated with economic development activities that directly affect a wide range of land use processes and functions integral to maintaining salmon habitat – and many of these effects can be permanent.

Exhibit 4 lists the main types of land use and development activities that are having an environmental impact on salmon and their habitat.

Successfully sustaining wild salmon requires the province's active participation

The Canada Constitution Act grants the federal government direct management responsibilities over wild salmon and the senior statutory authority for the protection of their habitat. The Department of Fisheries and Oceans Canada (DFO), under the auspices of the federal Fisheries Act, is responsible for managing all areas of wild salmon life cycle functions, including allocation,

Exhibit 4

Environmental impacts affecting wild salmon and their habitat, by type of activity

Types of Impacts	Types of Activities				
	Agriculture	Forestry	Urbanization	Water impoundments	Finfish fish aquaculture
Changes in channel morphology	✓	✓	✓	✓	
Changes in water flow, quality	✓	✓	✓	✓	✓
Channelization	✓		✓		
Flooding of watersheds				✓	
Impediments to fish migration	✓	✓	✓	✓	✓
Increased erosion processes	✓	✓	✓	✓	
Increased water torrents		✓	✓	✓	
Introduction of chemicals, waste	✓	✓	✓		✓
Loss of organic debris, food supply	✓	✓	✓	✓	✓
Loss of riparian areas	✓	✓	✓	✓	
Loss of wetland areas	✓		✓	✓	
Loss of estuarine areas	✓	✓			
Transfer of diseases					✓
Excessive withdrawal of water	✓			✓	
Reduced instream habitat availability	✓	✓	✓	✓	
Removal of forest cover	✓	✓	✓	✓	

Source: Compiled by the Office of the Auditor General of British Columbia

inventories, escapement, habitat management, protection and restoration. Enacted over 130 years ago, the Act's primary protection requirements for fish are found in sections 35 and 36, which address the prohibition against "harmful alteration, disruption or destruction to fish habitat" (commonly referred to as HADD), and against the discharge of prohibited substances into the fresh-water or marine environment.

For its part, the provincial government has the constitutional right of ownership for Crown lands. This authorizes it to use and manage the development of its lands and resources, as well as components of inland freshwater fish habitat. Actions the Province takes can therefore have consequences for wild salmon. The Province participates in the day-to-day management of wild salmon issues through legislation and regulations that govern land use and resources development activities. Forestry has historically had the most direct impact on salmon habitat, but other forms of land use also contribute to habitat loss. These include urbanization, water impoundments, agriculture, mining, foreshore and linear development such as roads, highways, and pipelines.

There are a number of reasons the Province needs to participate in the management of wild salmon:

To meet its legal responsibilities: The federal and British Columbia governments have signed many agreements with implications for wild salmon, farmed salmon, fish and fish habitat management. The Province has obligations under these agreements. Under the Accord for the Protection of Species at Risk, the Province has agreed to participate in recovery efforts. As a responsible landowner and user, the Province must exercise reasonable care to manage fish habitat and minimize potential impacts to wild salmon.

To maintain socio-economic values: Wild salmon have an important economic value in the British Columbia economy. In 2002, they contributed over $607 million through recreational fishing and commercial landings. Wild salmon are highly sought-after recreational fish species in British Columbia (particularly chinook and coho) and account for approximately 3,590 person-years of employment. Commercial fishing for wild salmon accounts for approximately 950 person years of employment. Meanwhile, salmon

aquaculture generated $289 million in sales in 2002, employing directly and indirectly approximately 4,700 people. Declining salmon stocks have affected families, coastal communities and the province as a whole. In the 1990s, the turmoil of job and income losses in 15 coastal communities has been well documented in reports written by the British Columbia Job Protection Commissioner. The potential listings of anadromous fish species under the federal Species at Risk Act is one of the more pressing issues the Province faces, particularly in heavily populated areas such as the Fraser River Basin where the Cultus Lake sockeye has been listed by COSEWIC.

To exercise environmental stewardship: The Province is responsible for being a good steward over all public lands, and this means effectively managing development activities that impact freshwater fish habitat. Wild salmon cannot carry out their life functions without access to freshwater habitat managed under provincial jurisdiction. In its New Era commitments, the government committed to developing a Living Rivers Act to protect and improve British Columbia's river systems, using scientifically based standards for watershed management, enhancements to fish habitat and a 10-year program to correct past damage. In its service plan, the B.C. Ministry of Water, Land and Air Protection has stated that one of its stewardship goals is to "maintain and restore the ecological diversity of fish and wildlife species and their habitats."

To demonstrate sustainability: Eco-labelling, or eco-certification, is gaining recognition and importance as a marketing tool for selling a variety of natural resource commodities within Canada and into foreign markets. Wild salmon is now being sold as an eco-certified product in some countries. The Province, through the B.C. Wild Salmon Marketing Council, is currently seeking certification under the Marine Stewardship Council designation to sell its product into foreign markets. Demonstrating that viable wild salmon stocks exist will be important to receiving Marine Stewardship Council certification.

To protect the public interest: The current government has stated that, to meet its overall vision of a prosperous and just province, it must provide citizens with a strong and vibrant provincial economy, a supportive social fabric, safe, healthy communities and a sustainable environment. Wild salmon have long been a

symbol of British Columbia's history, cultural identity and natural landscape. They are an important natural resource of high nutritional value as well as cultural and spiritual value to First Nations people. They are also vital to the sport and commercial fishing industries that support businesses, create jobs and provide recreational enjoyment for a significant number of British Columbians and visitors. The state of wild salmon is a reflection on the health of our environment in general, so sustaining them is an important demonstration that the government is delivering on its commitments to protect the public interest.

Management of shared responsibilities for wild salmon needs to be guided by a clear vision

Managing any natural resource sustainably requires a clear vision of intended outcomes, a practical strategy for achieving that vision, and strong, effective leadership to make it all happen. This is no less the case in managing wild salmon stocks in British Columbia, but the situation is complicated by the joint responsibilities and dual efforts of the federal and provincial governments.

Sustaining wild salmon requires a vision be in place to reflect the Province's aspirations and intentions regarding wild salmon. Articulating and acting upon this vision requires clearly stated principles, goals and objectives around issues such as ecosystem integrity, conservation of fish stocks, government and community partnerships, and long-term monitoring and accountability.

In this audit we concluded that the Province does not have a clear vision in place to protect and/or restore salmon habitat, or to guide and support policy and program development for maintaining wild salmon and their habitat. Strong leadership is lacking and there is no central coordination body to oversee provincial activities. More importantly, at the time of our audit, there was limited active engagement with federal decision makers concerning inter-jurisdictional issues. As a result, the exchange of technical information, experiences and coordination at the federal-provincial level, is weak.

In the United States, managing wild salmon issues is a legislated requirement, complete with set timelines and funding authorizations for a range of management activities at both the federal and state levels (see sidebar). A similar long-term commitment has not been made in British Columbia. An overarching vision to guide wild salmon management activities existed throughout the 1990s and early 2000s in the province. It focussed on the principles of conservation, shared responsibility, accountability, and opportunities for economic development. These principles were developed to complement similar management activities being undertaken by the federal government.

Washington State's Salmon Recovery Office

In 1998, the Washington State legislature passed the Salmon Recovery Planning Act to meet its obligations under the federal Endangered Species Act to recover wild salmon and their habitat. Later that year, the Governor's Salmon Recovery Office was created and given the tasked of coordinating the publication of a biennial report on the state of salmon recovery efforts in the State. In support of the biennial report, three documents were written as a first step to better explain the status of wild stocks and to set some targets for recovery efforts. Those efforts include: a state-wide strategy to recover salmon, a state agencies action plan, and a salmon recovery performance management system scorecard.

More than 800 government jurisdictions and agencies play some part in salmon recovery efforts in Washington State. Among them are:

- 2 countries, 6 states, and 28 First Nations;
- at the federal level, 6 departments, some with more than one branch involved;
- at the state level, 14 agencies; and
- at the local level, 39 counties, 277 cities, 44 sewer districts, 125 water districts, 36 irrigation districts, 32 public utility districts, 14 port districts, 48 conservation districts, and 170 municipal water suppliers.

Approximately $266 million was allocated for recovery efforts during the 2001–2003 period to address a variety of issues, including regulatory reform, data collection, inventory development and restoration activities. Management responsibilities for salmon inside 3 miles of the coast in the USA have been delegated to the State governments.

Given the strong federal presence in managing wild salmon issues in Canada and the Province's constitutional authority over Crown land and resources, federal-provincial cooperation is essential to ensure wild salmon stocks continue to flourish along British Columbia's Pacific coast. While the federal government is attempting to develop a policy for managing wild salmon, it has not yet clearly articulated that policy. This, together with the lack of a clear provincial vision, suggests a more formal federal-provincial arrangement is needed—one that marries both governments' efforts into one common approach. Such an arrangement needs to outline a unified vision of wild salmon management in British Columbia to provide public policy direction about acceptable risk levels to salmon habitat and loss of salmon runs. This arrangement should also spell out how both levels of government will handle issues of accountability, reducing duplication, long-term monitoring, and the benchmarking and measurement of proposed activities, successes and failures.

Recommendation

We recommend that the Province, in conjunction with the Department of Fisheries and Oceans Canada, develop a clear vision, with goals and objectives, for sustaining wild salmon and provide public policy direction about what is an acceptable risk to salmon habitat and what is an acceptable loss of salmon runs.

A common strategy is needed

The federal government is seen as having the primary responsibility over wild salmon, yet co-management of the resource has occurred through several agreements with the Province. Having two levels of government involved in managing a variety of habitat protection and restoration activities has created difficulties. Despite a history of shared management, a number of barriers to performance have continued to hamper federal and provincial interactions concerning wild salmon:

1. Both governments need to service their respective interests.
2. No formal, long-term commitment has been made to resource programs to meet responsibilities or objectives. Financial resource commitments tend to ebb and flow over time. Currently the cyclical nature of resources is on the ebb.
3. The parties are often unable to address polarized views and issues surrounding habitat protection and restoration. For example, although the federal government is beginning to accept the precautionary principle and has stated a No Net Loss policy for fish habitat, the provincial government has not.
4. The scale and grouping of objectives, timelines, financial resources and ability of decision-makers to make programs effective are often impeded by changes in organizational structures.
5. Gaps in scientific knowledge and lack of control over biological variables (such as ocean conditions and ocean survival of stocks) pose constant challenges to management regimes.

The inability of the Province to overcome these obstacles has resulted in lack of both a provincial strategy for ministries and agencies to follow, and a common strategy to guide federal-provincial efforts in managing wild salmon issues at an inter-jurisdictional level. The initiatives that do exist are at a very early stage of development.

In the absence of a specific provincial strategy, we examined how government ministries and agencies were directing their efforts to manage habitat requirements for wild salmon. We expected organizations involved with freshwater fish issues to at least have clear plans in place, with policies to guide their programs.

Instead, we found that the shift to the new results-based management approach has resulted in previous policies and strategies pertaining to fish management—and especially wild salmon—are being replaced by new models intended to produce enhanced outcomes. For example, the Province is shifting its strategic approach of managing species from an individual basis to one where biodiversity is managed at a watershed or regional level. The new approach being proposed to integrate land and resource management plans does not provide specific reference to wild salmon, although some have suggested that in light of their special status in British Columbia this attention may be warranted.

Of the strategies and frameworks being developed, we found that some incorporated elements that affect wild salmon: the Living Rivers Strategy, Watershed-based Fish Sustainability Planning Framework, Biodiversity Strategy and Species at Risk Strategy. All of these were at an early stage of development. While these broad scope initiatives get started, we think the Province should consider the special status of wild salmon and articulate a formal strategy specific to their habitat requirements that complements federal initiatives.

Recommendation

We recommend that the Province develop, in conjunction with the Department of Fisheries and Oceans Canada, an overarching strategy to manage for wild salmon sustainability.

Courtesy of the B.C. Ministry of Forests

Spawning sockeye being counted at a fish fence

Clear leadership is essential to coordinate the effective management of complex resource sustainability plans

Clear leadership needs to exist if complex resource and sustainability strategies are to be effectively coordinated and managed. However, we found that an absence of strong leadership and advocacy presents provincial decision-makers with a challenging proposition to ensure salmon stocks and their habitat do not continue to be lost in British Columbia.

Exhibit 5 shows the six provincial organizations that play a role and have responsibilities in managing fish and fish habitat programs.

The two ministries most directly involved in managing wild salmon issues are the Ministries of Agriculture, Food and Fisheries and Water, Land and Air Protection. Each is responsible for taking a lead role in heading up discussions with the federal government on particular topics. The Ministry of Agriculture, Food and Fisheries is responsible for matters of an inter-provincial and economic nature, including negotiating agreements, issuing licences for salmon aquaculture facilities, and advocating the

Exhibit 5

Key provincial organizations with a role in managing wild salmon issues in British Columbia

Ministries

- The Ministry of Agriculture, Food and Fisheries (MAFF) issues operating licences for marine finfish aquaculture facilities under the provincial Fisheries Act. Most of the activities administered by MAFF are in place to protect against the interaction between farmed and wild fish, including management plans, escape plans and fish health plans. The ministry is the lead provincial agency on all inter-governmental wild salmon issues and also regulates fish processing facilities.
- The Ministry of Forests (MoF) is responsible for issuing logging, grazing and range use permits under the Forest Practices Code of British Columbia. Act and the new Forest and Range Practices Act. These acts identify results-based standards for environmental protection that licensees must meet, including, for example, those addressing riparian zone management, water quality, fish habitat identification, slope stabilization and road building. The ministry also provides funding for certain types of fish habitat restoration activities through the Forest Investment Account.
- The Ministry of Sustainable Resource Management (SRM) administers the Land Act, the Water Act, the Fish Protection Act (except for section 12), and is responsible for collecting data on the impacts to fish habitat. A part of its mandate over Crown land disposition and land use administration. The ministry is also responsible for developing government-wide land and water databases, data methodology standards, collection, assessment and storage related tools and activities. It prepares high-level land and resource management plans, sub-regional coastal plans and aquaculture opportunity studies to identify suitable regional aquaculture areas. As well, it has developed a set of sustainability principles for use in land and resource management decision-making.
- The Ministry of Water, Land and Air Protection (WLAP) regulates the environmental impacts of various land-based development activities that affect wild salmon. These legislative tools include the Ecological Reserve Act, Environmental Management Act, Parks Act, Water Act, Wildlife Act, Finfish Aquaculture Waste Control Regulation and Water Regulation. The ministry is also responsible for section 12 of the Fish Protection Act and the related Streamside Protection Regulation (recently amended to Riparian Areas Regulation) that authorizes the Province to establish policy directives regarding the protection and enhancement of riparian areas that may be subject to residential, commercial or industrial development. The Habitat Conservation Trust Fund also falls under WLAP's administration.

Agencies

- B.C. Hydro and Power Authority (B.C. Hydro) participates in managing fish and fish-habitat-related issues through its use of water to generate hydroelectricity. Under the auspices of the water use planning process and compensation programs required under their water licences, B.C. Hydro undertakes a range of activities related to instream flows, water quality, habitat integrity and habitat monitoring.
- Land and Water B.C. Inc. (LWBC) participates in managing impacts to wild salmon largely through its responsibilities for issuing tenures for water licenses and marine finfish facilities. The Land and Water Operations Division oversees water allocation licensing for industrial, commercial and residential uses, while the Aquaculture Development Branch issues tenures for aquaculture operations and acts as the information and document collection and distribution coordinator for the finfish aquaculture facilities approval process. As the operating arm of SRM, LWBC administers over 200 land use permitting functions, many which impact fish habitat.

Source: Compiled by the Office of the Auditor General of British Columbia, 2004

economic benefits of this renewable resource. The Ministry of Water, Land and Air Protection is responsible for managing freshwater fish habitat, as well as waste management issues associated with finfish aquaculture facilities that may impact wild salmon.

The Province has not given these lead organizations clear policy direction for setting provincial goals or objectives around the habitat requirements of wild salmon. Some program personnel noted that a lack of policy direction was creating additional bureaucratic layers as illustrated by the many decision-makers involved in the relocation of salmon farms.

With several organizations involved in managing issues that impact wild salmon, but no one ministry taking a lead role, there has been a proliferation of inter-agency and intra-agency memoranda and service agreements to coordinate activities or assign responsibilities and service levels. For example, the Ministry of Agriculture, Food and Fisheries maintains a database of many agreements, including those with implications for wild salmon, farmed salmon, fish and/or fish habitat.

These memoranda and service agreements specify organizational capacity, responsibilities, duties and, in some cases, dispute resolution processes as a method to coordinate issues and address concerns raised by various ministries and agencies over a wide range of topics. Informal exchange of information by staff through personal communications is also a common method of problem solving.

We found no committee, however, specifically established to deal with wild salmon issues on a regular basis or to coordinate the work of other parties in a comprehensive way. However, there are many committees dealing in some way with fish habitat, salmon aquaculture issues, and fish information management, data collection and quality assurance. Some of these committees have either been discontinued, or are not meeting due to resource constraints and other priorities.

With a framework of so many committees operating at any given time, we concluded that there is uncertainty among all the players over which agreement or committee bears what responsibility. As a result it is unlikely that the actual work

commitments or goals relevant to wild salmon sustainability are being accomplished in an efficient and effective manner.

Recommendation

We recommend that the Province identify a lead provincial agency to coordinate efforts for sustaining wild salmon and rationalize the committee structures.

The Province needs to be more active in protecting salmon habitat

"Fish habitat" is defined in both the federal Fisheries Act and the provincial Fish Protection Act, as "spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes." Other provincial legislation, such as the *Forest and Range Practices Act* and the *Water Act*, include broader environmental characteristics such as water supply, water quality and habitat availability.

A British Columbia court, in its decision described fish habitat as "composed of physical, chemical and biological components and includes such diverse, but interdependent factors as gravel beds, streamside vegetation, water turbidity, aquatic insects and benthic organisms."

Fish habitat, then, consists of more than instream water flow. It includes components such as streamside vegetation, or riparian areas, over which both the federal government and the provincial government have decision-making authority, as well as water quantity and water quality. Much of the legislation developed by the Province for managing freshwater fish species focuses on riparian areas.

Courtesy of B.C. Ministry of Forests

Mature fish habitat

As noted earlier, although responsibility for fish habitat resides with the Department of Fisheries and Oceans Canada, the Province has a mandate to regulate land and water use. Through acts and regulations linked to this mandate, the Province can greatly influence the extent to which fish habitat is affected.

The administration of activities that impact wild salmon habitat falls under a variety of provincial statutes, which are managed by various ministries and agencies that often have different, and sometimes competing, priorities. In this audit, we examined the nature of existing legislation and regulations to protect and restore salmon habitat, and the extent to which existing programs are addressing concerns over habitat protection, maintenance and restoration.

What we found was that the provincial government has no formal legislation in place outlining its role in regulating wild salmon issues. Several current Acts do include provisions beneficial to wild salmon (Exhibit 6).

The Fish Protection Act does not provide adequate protection for salmon habitat

The provincial Fish Protection Act provides incomplete protection for wild salmon. The Fish Protection Act focuses on four major objectives: ensuring sufficient water for fish; protecting and restoring fish habitat; improving riparian habitat protection and enhancement; and strengthening local and urban areas government powers in environmental planning. It was implemented to recognize that fish need a minimum flow of fresh water to survive and should be adequately acknowledged in the decision-making process.

Responsibilities for the Act are split between the Ministry of Sustainable Resource Management and the Ministry of Water, Land and Air Protection. The areas where particular concern relating to protection of fish habitat has been raised include: designation of sensitive streams and recovery plans; directives for streamside protection setbacks and buffers; and instream flow protection. Regulations or standards have been, or are being developed to address each of these, but we noted that actions have been slow to follow. This is particularly the case with designation

Exhibit 6

Status of key provincial legislation that affects salmon habitat protection, restoration and management

		Area of Habitat Covered						
Ministry Responsible	Legislation	Riparian Habitat Classification	Area Protection	Waterway Water Flow Protection	Water Damage Prevention	Activities Quality Protection	Development Planning and Impact	Management Status
Water, Land and Air Protection	Fish Protection Act	✓	✓	✓		✓	✓	Not fully in force
Forests	Forest Practices Code Act	✓	✓		✓	✓	✓	Replaced by Forest and Range Practices Act
Forests	Forest and Range Practices Act	✓	✓		✓	✓	✓	New legislation takes effect on January 1, 2006
Water, Land and Air Protection	Environment Management Act					✓	✓	Replaced Waste Management Act in October 2003
Sustainable Resource Management/ Water, Land and Air Protection	Water Act			✓	✓	✓	✓	Recently amended

Source: Compiled by the Office of the Auditor General of British Columbia

of sensitive streams, and those sections of the Fish Protection Act with provisions linked to water licensing and instream flow protection under the Water Act.

The Fish Protection Act includes a number of positive features for protecting fish and fish habitat. For example, section 7 provides for recovery plans for sensitive streams and section 10 addresses fish and fish habitat considerations in water management planning.

Courtesy of B.C. Ministry of Water, Land and Air Protection

Water impoundment obstructing fish passage

Section 4 addresses dam construction to protect fish habitat. Historically, dams have cut off salmon from their spawning areas and have led to the extinction of a number of salmon runs. The Act names 17 rivers on which dam construction is prohibited.

Overall, we found that, while the Fish Protection Act provides a sound basis for improving the level of protection for salmon habitat, the lack of implementation of several important provisions significantly weakens its value. For example:

Section 8 provides for greater consideration of fish needs when decisions about water allocations or changes to stream flows are made. However, the section is not in force.

Section 5 provides for managers to use discretionary power when making decisions about water allocations under the Water Act. But again the section is not in force.

Section 6 calls for the designation of "sensitive streams." These are bodies of water with specified fish populations, whose sustainability is deemed at risk because of inadequate water flows or degradation to fish habitat (see sidebar). A set of criteria was developed to assist in designating sensitive streams. Fifteen streams were so designated in 1997. To date, that list has not been

expanded, even though many other streams would likely qualify. The Act also provides for the development of "recovery plans" for sensitive streams (see sidebar), but no current provincial efforts are underway to develop these plans.

Section 12 allows the Province to require local government to undertake streamside protection and enhancement of riparian areas. Under the provision, the Province passed the *Streamside Protection Regulation* in 2001, calling for municipalities to establish minimum streamside setbacks by 2006 and to enforce for protection through bylaws. While this is a strong provision, it lacks any compliance or enforcement provisions under which the provincial government will hold local governments accountable for streamside protection and enhancement areas. The absence of a provision that will allow verification compliance with the regulatory regime is a significant weakness. Of more concern however, is that this important regulation has been put on hold pending further review of its implications.

Designation of sensitive streams under the Fish Protection Act

To help identify candidate streams for designation as sensitive, fisheries managers use the following criteria.

The streams must:

- be located in a watershed containing a significant population of salmon (e.g. coho as an indicator species);
- be a high priority for designation because of its precarious nature and the value of its fish stocks at risk, and because of its potential for high productivity given the nature of existing fish habitats;
- be located in an area with sensitive yearly flows and significant human populations or industrial water users;
- have water flow limitations that are keeping fish production from achieving historic levels;
- have water abstraction and associated weirs and intakes that are adversely affecting stream flows and fish migration;
- offer good potential for recovery of fish populations, either with or without a recovery plans; and
- not be otherwise being addressed under the water use planning licence review process.

In total, 15 rivers and streams have been designated sensitive streams in three regions of the province:

Vancouver Island

- Black Creek, Goldstream Creek, Englishman River, Little Qualicum River, French Creek, Little River and Fulford Creek

Lower Mainland

- Chapman Creek, Silverdale Creek, Kanaka Creek, West Creek, Lang Creek, Whonnock Creek and Nathan Creek

Omenica/Peace

- Salmon River

Recovery strategies and plans for sensitive streams

Recovery planning is the process undertaken to ensure the survival and recovery of species and ecosystems at risk. Recovery strategies represent the best available scientific, traditional and community knowledge about a species or ecosystem and what is required to achieve recovery. Recovery plans consist of two parts, a recovery strategy and a recovery plan. The recovery strategy outlines:

- current knowledge about the species or ecosystem;
- known threats to the species or ecosystem and mitigation activities to address those threats;
- for a species, its critical habitat;
- the goals, objectives and approaches for recovery of the species or ecosystem; and
- the date recovery plan is expected to be completed

Recovery plans are more detailed studies providing information about what needs to be done to meet the objectives of the strategy, and an evaluation of the socio-economic costs associated with recovery efforts. Recovery plans are usually prepared by a recovery team made up of agencies responsible for the management of the species or ecosystem, as well as species or ecosystem experts from other agencies, universities, conservation, aboriginal and stakeholder groups. According to the Ministry of Water, Land and Air Protection, recovery plans have been completed for Black Creek and Englishman River.

The provincial Water Act does not adequately value fish

The provincial Water Act also contains provisions beneficial to wild salmon, but has not been used as an effective tool for protecting fish habitat. One weakness we see is that the Act does not require fish water needs be considered in a rigorous or consistent manner. In a number of areas around the province, licensing of water for agriculture and other uses has led to lower water flows and increased water temperatures. Another weakness is that the Province does not monitor water use and the degree to which licensees comply with licence requirements. This concern was also raised by the Pacific Fisheries Resource Conservation Council in its 2003 report on water use conflicts between people and fish.

As British Columbia's population expands and economic development initiatives require more water to meet demand, meeting fish needs is becoming increasingly difficult. Abnormal drought conditions could exacerbate the situation even further. For example, in the summer of 2003, a drought in the Okanagan forced the town of Summerland to declare a local emergency and the local council voted to cut off all water for fish flows and divert the water to community use. As a result, many fish, including kokanee and rainbow trout were impacted. Even normal drought conditions can impede the water requirements of fish being met, as

Courtesy: Office of the Auditor General of British Columbia, 2004

Residential development encroaching on salmon habitat in the Fraser Valley

can changing weather conditions particularly in dry, semi-arid areas like the Okanagan where water shortages are an ongoing concern.

We did note, however, that the Province, through the ministries of Water, Land and Air Protection and Sustainable Resource Management, is developing instream flow guidelines to protect fish and fish habitat. These are intended to help resource managers in determining the amount of water that can be extracted from a river without adversely affecting fish and their habitat. However, historically, guidelines have proven to be less effective than legislation as they are generally not enforceable.

At the time of our audit, we also noted that B.C. has no groundwater legislation. Groundwater extraction can affect water flows in streams and rivers, thereby indirectly affecting the quality of fish habitat.

Recommendation

We recommend that the Province coordinate a review of how recent legislative changes have effected wild salmon and examine the outcomes of provisions not being put into force.

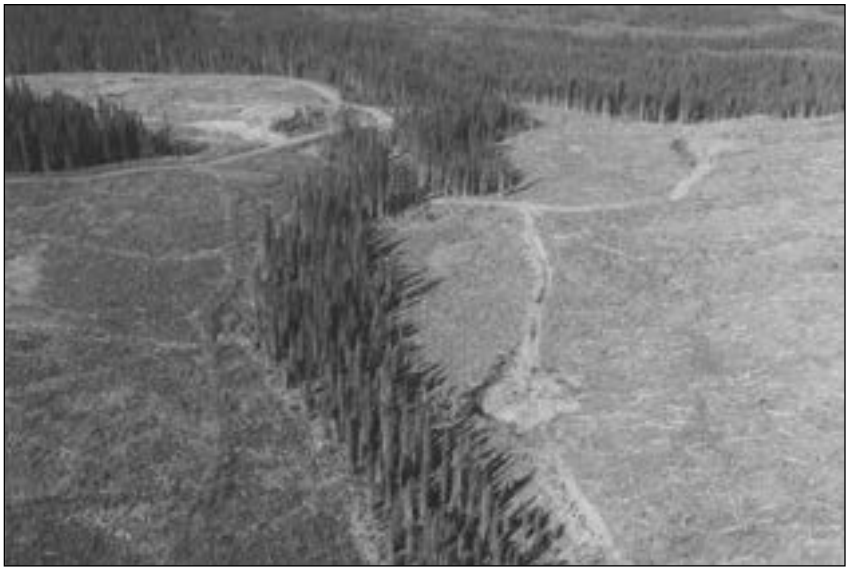
The Forest Practices Code and related guidebooks provide good direction on best practices

Streamside trees and other vegetation provide shade that cools a stream's temperature, attract insects that are food for fish, allow root structures to stabilize stream and river banks, and provide cover from predators. These riparian areas (also often referred to as set backs or buffers) are protected in some degree in forest-related legislation.

One area where the Province's efforts to protect salmon habitat have proven beneficial is in the preparation of guidebooks covering fish habitat identification, management and restoration activities (Appendix A). Over the last decade, several provincial ministries have developed numerous guidebooks to assist natural resource users manage their land use practices around fish habitat. These guidebooks consist of standards and management practices explicitly designed to protect, prevent, manage and mitigate environmental impacts, in support of habitat management legislation. Some of these documents were considered best practice guides and were "voluntary," while others became legally-cited, and hence formed part of various regulations.

For example, a number of guidebooks were legally cited and associated with the Forest Practices Code. They dealt with prevention of damage to fish habitat through appropriate planning and practices. Compliance with these guidebooks became mandatory. However, no guidebooks will be cited in the new Forest and Range Practices Act. Forest licensees will be expected to achieve the same management objectives as those associated with the Forest Practices Code, but will be given more latitude to implement innovative practices to achieve environmental objectives. The guidebooks will serve as examples of minimum best practices.

A key provision in the Forest Practices Code affecting habitat —one continued in the Forest and Range Practices Act—is the requirement for the establishment of riparian reserves and riparian management zones. Riparian reserves are areas around streams, wetlands and lakes that meet the management area standards for receiving some added degree of protection. They cannot be



Courtesy of B.C. Ministry of Forests

A riparian buffer zone surrounding a fish-bearing stream in the interior

harvested unless government specifically approves it for certain circumstances. Riparian management zones constitute the larger area surrounding a riparian reserve zone, in which some harvesting of trees is permitted.

A classification system based on stream characteristics related to riparian habitat was developed in the early 1990s for better managing the capacity of streams to produce freshwater fish, including salmonids. All class S1 to S4 are fish-bearing streams, for example, while S5 and S6 are streams without fish. The Province maintains setbacks around fish-bearing streams according to riparian management area standards set in the Forest and Range Practices Act and the Forest Practices Code (Exhibit 7).

Under sections 12 and 13 of the *Government Actions Regulation* in the Forest and Range Practices Act, provisions exist for the Minister of Water, Land and Air Protection to protect significant downstream fisheries values by designating a river, stream or creek as a fisheries-sensitive watershed or a temperature-sensitive stream. These designations trigger special management functions to protect fish values depending on the water body in question.

Exhibit 7

Forest and Range Practices Act Riparian Management Standards

Riparian Class	Average Channel Width (metres)	Riparian Management Area (metres)	Riparian Reserve Zone (metres)	Riparian Management Zone (metres)
S1—A	>100	100	0	100
S1—B	>20 but not S1-A	70	50	20
S2	>5 to = 20	50	30	20
S3	1.5 to = 5	40	20	20
S4	< 1.5	30	0	30
S5	> 3	30	0	30
S6	= 3	20	0	20

Source: B.C. Ministry of Forests

Guidelines for agricultural operations are under development

Similar guidelines have also been developed to address impacts to fish habitat in the agriculture industry. Several years ago, the Partnership Committee on the Environment and Agriculture was established to review agricultural guidelines to determine whether setbacks similar to those in the Streamside Protection Regulation could be adopted for use by producers. More recently, the Resource Management Branch of the Ministry of Agriculture, Food and Fisheries' has published environmental guidelines for producer groups, to help them minimize impacts on fish habitat. Today under the auspices of the Agricultural Policy Framework, the Agricultural Environmental Partnership Committee is working to encourage industry best practices including manure management, riparian habitat protection, water quality, erosion, and bank and gully stabilization.

New environmental farm plans are being developed in conjunction with the Ministry of Water, Land and Air Protection's Environment Stewardship Division, the Agriculture Council of British Columbia, the Department of Fisheries and Oceans Canada

and other interested producer groups. Program funding has been approved by federal and provincial governments, with the emphasis now being focussed on what aspects of environmental farm plans will receive priority in 2004. The Resource Management Branch also provides extension education assistance to farming communities for water management and other best practices. Most of these measures are voluntary. Similar to the shift to best management practices in the forest industry, they allow licensees and operators more flexibility to employ or propose best practices based on expert or professional judgements.

Recommendation

We recommend that the Province ensure that initiatives aimed at preventing impacts to salmon habitat incorporate best management practices with measurable indicators and results which are linked to appropriate regulations.

Changing business processes in government are creating uncertainty around due diligence requirements

Under the current government, considerable policy change has occurred in how ministries and agencies deliver and account for their responsibilities and program activities. In the organizations responsible for managing the province's natural resources, this change has created challenges for regulators, licensees and users alike.

Government has shifted its business processes from the historical command-and-control functions of reviewing, approving and authorizing resource extraction, land use development plans and projects, to the task of setting environmental management and protection objectives and standards. Under the more prescriptive approach, development plans and projects had to be submitted either directly by proponents or indirectly by other provincial and federal agencies to regulating agencies (such as the ministries of Forests or Water, Land and Air Protection, or the federal departments) for approvals.

The new results-based regime now requires the private sector to share more direct responsibility for habitat protection and stewardship functions by taking on some of the planning,

Courtesy of B.C. Ministry of Water, Land and Air Protection

Agricultural practices can create bank instability, erosion and sedimentation in fish-bearing streams

information collection and monitoring activities previously performed by government agencies. No requirement to submit operational plans for review and approval is generally expected, except for forest stewardship plans. The Province is focussing on monitoring impacts, measuring performance, and putting greater onus on licensed users to meet provincial environmental and sustainability goals through the results-based approach. At the same time, qualified professionals will be relied on to provide assurance by certifying compliance with results-based requirements.

In examining this issue, we were informed that dealing with project referrals has become an extremely onerous task for ministries to handle efficiently on a timely basis. Some of these referrals require many employees and many hours to complete. As a result, the traditional format of reviewing, approving and authorizing project approvals is being phased out.

Our concern is that this new approach may increase the risk to fish habitat since it eliminates many of the previously required planning and due diligence requirements undertaken by government agencies. Before, government was in the position of being able to identify and prevent potential problems and assign mitigating actions. In the future, government will only be in the position of trying to fix problems after they have occurred.

Environmental compliance and enforcement programs are being redesigned

Compliance is the state of having satisfactorily or fully implemented environmental requirements. Enforcement refers to the set of actions that regulators take to achieve compliance.

The Province has stated it is maintaining diligence on compliance and enforcement activities through a new framework that strives to minimize paperwork, while supporting science-based, results-oriented legislation through a strict enforcement regime. This new framework will focus on monitoring:

- compliance with set standards on-the-ground
- effectiveness of standards to ensure desired results are achieved
- and validation on-the-ground results are directly tied to actions and standards implemented

The current framework being used in British Columbia reflects a recent trend of governments towards an integrated approach of incentive-based measures and regulatory mechanisms. This new trend builds on the strengths of the traditional regulation model to emphasize continuous improvement over all forms of pollution abatement, cumulative impact assessment, broader public participation and access to information (see sidebar).

Trends in Compliance and Enforcement Policy Development

Credible programs with good compliance monitoring and enforcement components can be important for achieving government objectives of good environmental stewardship. An independent survey of corporate environmental managers conducted by KPMG assessed why companies implement best environmental management practices. The findings suggested that, by far, the most important reason was the legal duty to comply with regulations, followed by the potential for board of director's liability. A recent report by the Organisation for Economic Co-operation and Development suggested that inadequate compliance underlies the failure of many regulatory policies. To ensure policy effectiveness, the report suggests governments should employ many kinds of policy instruments "backed up with a variety of enforcement activities such as inspections and sanctions." Writings by the Economics of Industrial Pollution Control research team from the World Bank Group also suggest that "environmental regulators must have a battery of tools at their disposal to address the wide range of pollution problems facing nation states." Such tools should include "a credible threat of real punishment" or "walk softly, but carry a big stick." In Canada, a 2001 report by the government of Ontario entitled *Managing the Environment: A Review of Best Practices,* stated that "while emphasizing flexibility, to be effective, an integrated environmental compliance assurance strategy must maintain a strong abatement and enforcement presence."

One of the main risks to salmon habitat is from logging operations. The Forest Practices Board has been conducting compliance audits of licensees and logging practices, as well as reviews of provincial agencies' regulatory activities on forests practices since 1996. In its reports it has proposed that the ministries develop a joint strategy to ensure that compliance and enforcement activities fully consider water, fish and wildlife. It has also suggested that enforcement of the new results-based regime will likely be more difficult, expensive and uncertain than before. The board points to the lack of operational planning, lack of clear and measurable results and the introduction of a due diligence defence as being its reasons for this concern. The Forest Practices Board has reported that, on occasion, government managers do not give sufficient weight to environmental values when setting penalties.

At the time of our audit, the Ministry of Water, Land and Air Protection had approximately 120 conservation officers stationed throughout the Province, while the Ministry of Forests had approximately 300 staff assigned to its compliance and enforcement branch. The staff levels were lower than prior years. This has resulted in fewer inspections being carried out on an annual basis and greater emphasis being placed on the use of risk assessment tools as a method to determine where and how infractions will be weighted and pursued.

We observed that ministries are adopting more stringent administrative penalties and more severe fines in their legislation, although the Province has yet to establish a clear policy in this regard. In fact, the Ministry of Water, Land and Air Protection has been reviewing its compliance and enforcement approaches due to the significant changes to its core business, legislation and business models. Some interagency compliance and enforcement service agreements have been established, but are still being finalized.

In British Columbia, violations to fish habitat represent only a small percentage of infractions levied by provincial compliance and enforcement officials. Infractions to wild salmon are not treated any differently then those violations to other freshwater fish species. The Ministry of Forests, for example, uses a risk ranking system to determine where to concentrate its compliance and enforcement efforts to minimize impacts to forest biodiversity, of which fish and fish habitat are one area considered. Most other ministries also require risk assessments to determine potential

Courtesy: Office of the Auditor General of British Columbia, 2004

The Campbell River, just west of its estuary

impacts to fish habitat, although it is common for these agencies to defer to the Department of Fisheries and Oceans Canada as the senior decision-maker.

Recommendation

We recommend that the Province review its compliance and enforcement programs within various resource management agencies to ensure sufficient resources for creating deterrents are maintained, and establish a clear policy and decision framework for identifying and approving escalating compliance and enforcement actions.

Evaluation of program effectiveness has been limited

In British Columbia, there have been limited evaluations carried out to assess the effectiveness of legislation or prescribed standards in protecting fish and fish habitat. Concerns have been expressed about the adequacy of the requirements for smaller creeks and streams and whether they adequately protect these water bodies. For example, petitions submitted to Canada's Commissioner of the Environment and Sustainable Development over logging impacts around fish-bearing streams in British Columbia have drawn questions over the effectiveness and timeliness of provincial

measures to protect salmon habitat. However, the Department of Fisheries and Oceans Canada, and the British Columbia ministries of Forests and Water, Land and Air Protection in 2000, carried out a review of riparian area practices on small streams (S4) in the interior of the province. The review concluded that practices were consistent with guidebook policy. Further, the audit found that the Forest Practices Code's objectives for small streams were effective and the overall impact to designated stream channels and fish habitat was considered as low.

Some staff we interviewed also raised concerns over the uncertainties and complex nature of applying results-based principles to the diverse range of habitat ecosystems throughout the province. Many personnel are finding the new processes demanding and suggested that methodologies need to be developed to guide staff. Some suggested it could be difficult to make the transition from an output or checklist based compliance and enforcement process, to one in which professional judgement calls for assessing the quality and effectiveness of results achieved.

In an effort to assist employees, ministries have developed, or are in the process of developing, employee development and performance plans in which staff will be provided with focused training relevant to their job function. Efforts to develop methodologies are also underway. For example, the Ministry of Forests has endorsed a formal effectiveness evaluation program to assess riparian and watershed management activities. The framework will act as an accountability measure to ensure that the goals of the program are being met. However, we found that most indicators, methodologies and programs being employed for monitoring outcome and effectiveness values were still at a developmental or pilot testing stage making it difficult to evaluate their utility. Consequently, risks to wild salmon habitat may increase.

Recommendation

We recommend that the Province ensure provincial agencies work together to develop methodology and indicators to enable periodic assessment of the effectiveness of habitat protection legislative provisions in meeting goals to sustain wild salmon.

When insufficient habitat protection provisions are in place or compliance with those provisions has not been enforced, restoration may be required. The need to turn to restoration highlights past deficiencies in the resource management system.

The restoration of wild salmon habitat involves repairing any physical damage done to the aquatic and biological conditions necessary for the fish to carry out their life functions. Activities to restore habitat quality and habitat availability include altering water flows and drainage patterns, minimizing erosion, restoring cover and shade along waterways and creating off-channel and side channel rearing areas. Appendix B provides a sample of best practices developed by provincial agencies for watershed restoration.

In this audit, we expected to find that ministries and agencies had programs and plans in place for restoring wild salmon habitat. We found that because government has significantly reduced its investment in restoration activities over the last few years, many of these programs and plans no longer exist.

Initiatives to restore salmon habitat have been significantly curtailed

Over the last decade, the Province made significant contributions to wild salmon and fish habitat restoration. Now, however, limited resources are being directed towards these areas. In the mid-1990s, the B.C. Salmon Habitat Conservation Plan (1995) and the B.C. Fisheries Strategy (1997) outlined how government would contribute to restoring fish habitat affected by historical land use practices while preventing further loss of salmon habitat. Forest Renewal B.C. and the former Ministry of Environment, Lands and Parks also coordinated provincial initiatives that aimed to benefit the freshwater habitat requirements for juvenile and returning spawners. These organizations set the foundation for programs such as the Watershed Restoration Program and the Urban Salmon Habitat Program that funded activities to restore streams and riparian areas damaged by past forest extraction practices, and to protect and restore salmon habitat in urban areas, particularly within the Georgia Basin.

Between 1994 and 2001, consecutive governments made significant investments in fish habitat restoration activities, mostly through Forest Renewal B.C., Fisheries Renewal B.C.

Courtesy: Office of the Auditor General of British Columbia, 2004

A stream bank stabilization project on a tributary of the Salmon River

and the former Ministry of Environment, Lands and Parks. The Watershed Restoration Program provided over $350 million with significant focus on salmon spawning and rearing habitat, while the Urban Salmon Habitat Program directed over $7 million to deal with urban salmon habitat.

Under the current government, resource allocations have changed. In managing wild salmon, the major question facing decision-makers is how much restoration work can the Province engage in and support. The government, in its 2001 New Era commitments, stated it would support environmental stewardship action plans by passing a Living Rivers Act to protect the province's river systems, enhance fish habitat and develop a 10-year program to correct past damage. To date, however, no such Act is in place, nor has a ten-year program for habitat restoration been established. Indeed, at the time of our audit, the Living Rivers initiative was being refocused to apply ecosystem based principles together with $2 million funding, which is now being managed through the Vancouver Foundation. Resource constraints and the shift to a results-based management model have reduced provincial involvement in direct habitat restoration activities considerably.

The Province has streamlined its involvement in salmon habitat restoration down to four program areas: the Ministry of Forests' Forest Investment Account; the Ministry of Water, Land and Air Protection's Living Rivers Strategy and Habitat Conservation Trust Fund; and, BC Hydro's Fish and Wildlife Compensation Programs.

The Forest Investment Account is funded by a vote of the legislature. It was initiated upon the dissolution of Forest Renewal B.C. as a mechanism for funding forest management activities. One of its objectives is to improve the public forest asset base by restoring damaged ecosystems. Under this objective, the program includes projects for treating watersheds to restore ecosystem function and structure, including aquatic attributes.

At the time of our audit, the amount of provincial funding for fish and fish habitat related issues was approximately $10 million. Most available funds are not targeted to wild salmon, though BC Hydro's Bridge-Coastal Fish and Wildlife Restoration Program is an exception. There is also considerable reliance on the federal government and non-profit organizations to fund restoration activities, although their resources are also constrained.

To make the best use of scarce resources, funds ought to be spent based on priority. Currently, information on restoration needs is incomplete and scattered throughout the province in various regional offices. There is no single inventory of the work previously completed or the ranking of watersheds and habitat requiring restoration. There is also limited information on, and monitoring of, the high risk watersheds that were initially

Addressing Salmon Management Issues for Hydroelectric Development

BC Hydro established the Bridge-Coastal Fish and Wildlife Restoration Program (BCRP) to restore fish and wildlife populations and habitat in areas affected by hydroelectric generation facilities in coastal British Columbia. The Bridge River/Coastal Generation Area includes the Fraser Valley, Vancouver Island, Coastal, Bridge River and Shuswap regions. BC Hydro contributes $1.5 million in annual funding to support fish and wildlife projects. Approximately 50% of that is allocated for salmon compensation. Projects undertaken through the BRCP include fish passage assessment, recovery planning, off-channel rehabilitation, spawning channel restoration and habitat inventories. Through the BCRP and the water use planning process, BC Hydro is also examining a variety of issues affecting wild salmon, including inventory data collection, rehabilitation, maintaining instream flow requirements and monitoring. BC Hydro will undertake research and monitoring activities for 10 years as part of new permitting requirements under its water licenses.

identified for restoration work, or the watersheds that have been restored to gauge how they are responding to past restoration efforts. The absence of an existing restoration plan and program precludes us from commenting on the resource and capacity requirements to undertake these activities.

Restoration efforts have not been evaluated for their effectiveness

Effectiveness evaluations are necessary to ensure scarce resources have been allocated in an efficient and effective manner. Very few evaluation programs are currently in place to assess existing efforts in restoring salmon habitat.

We found that some evaluations have been carried out in the past, such as the one on the Urban Salmon Habitat Program done in 2000. That evaluation concluded that the program delivery had been effective and that program impacts appeared to be positive but were difficult to measure. We also found two evaluations of the Watershed Restoration Program. One focused on how to better deliver the program. The other evaluated projects funded by the program to determine whether site-level objectives were met. The conclusion of the latter was that while the objectives had generally been met, the early successes had declined over time. It called for routine inspections to ensure projected benefits are maintained.

The water use planning process that BC Hydro is engaged in with the Province and the Department of Fisheries and Oceans Canada incorporates processes to evaluate effectiveness in the future. A monitoring program for all water use plans will be undertaken based on 5, 10 and 15-year intervals to determine how successful each plan is working in individual systems. A variety of indicators will be monitored to determine how habitat characteristics are responding to restoration prescriptions.

It is important to note that successful restoration program outcomes require an effectiveness evaluation. The issues discussed in the sidebar below illustrate that many factors must be addressed to make restoration efforts successful, not just those directly tied to stream restoration. Seattle's experience is a case in point.

Bringing Back the Salmon: BC Hydro at Work

Sockeye once teemed in the Coquitlam River. Sockeye require river systems that include lakes for spawning. In 1914, construction of a dam to provide electricity to the region ended the sockeye migration into Coquitlam Lake. The sockeye were thought to be extinct until recent DNA analysis of several fish from the lake suggested the possibility that the original strain of migratory sockeye might be re-established. Studies have been commissioned by the Bridge-Coastal Fish and Wildlife Restoration Program, which is funded by BC Hydro. It is believed that a run of about 40,000 sockeye could be restored. The estimated cost to achieve this is between $1.5 million and $7.5 million over 10 years.

Once restored, streams need effective protection including regulation by governments to ensure their quality is maintained. Efforts will be diminished if degradation through pollution or stream changes recurs. Restoration programs should therefore be considered in a more holistic manner than in the past.

Recommendation

We recommend that the Province institute a program to rank restoration priority, formulate a multi-year restoration program, and determine effectiveness of restoration programs.

Why Evaluations are Important

The City of Seattle has spent more than $26 million restoring major salmon streams throughout its metropolitan area. Until recently, there was no focused efforts to determine the effectiveness of the restoration activities on salmon stocks. In 2002, a study was launched to see whether the restoration efforts were working. The study found that the water in many of the restored urban streams was dirty enough to kill coho salmon—most before they could spawn. The culprit was stormwater flushing quickly into the streams.

The study compared an urban stream to a rural one. In the urban stream, only 8 of 64 female coho survived to spawn. In the rural stream, 114 of 115 female fish survived. These findings suggest that urban restorations require more than making simply changing the streams themselves. Pollution flowing from the urban landscape has to be controlled if restoration efforts are to be effective in terms of fish production.

To make informed decisions about fish and fish habitat protection and restoration, decision-makers need ready access to basic inventory information about the physical and biological status of watersheds and related aquatic ecosystems. We looked at how the Province was undertaking information management activities related to data collection, coordination, quality control and accessibility.

The Province has considerable information about fish and fish habitat that is being consolidated

Through direct government programs and development activities permitted on Crown lands, the Province has collected a variety of land and resource information of value in the management of salmon. This includes information associated with forestry, hydroelectric development, agriculture, mining, oil and gas development, aquaculture, tourism and other land use activities. Such information is used for a range of purposes, from seeking provincial regulatory approvals and managing provincial freshwater recreational stocking programs, to planning provincially funded habitat rehabilitation or restoration projects.

Historically, without a central provincial agency to do it, individual government programs have themselves collected extensive information over the years on fish, including salmon, and their habitat. This information covers physical locations of lakes, streams, rivers, creeks and wetlands as well as their surface area, gradient and channel width, the condition of the riparian habitat and details of the aquatic environment (such as species present, size and weight of fish, and food supplies). However, less attention was given to organizing and capturing the data so it could be easily retrieved and analysed for decision-making.

Overall, the Province has a considerable amount of fish habitat and watershed management data at its disposal. With the creation of the Ministry of Sustainable Resource, the Province has begun to centralize and consolidate this information in one agency, but there is still a need to reduce the backlog in converting data into electronic format. For example, we were informed that some data collected by projects funded through the Forest Renewal B.C. watershed restoration program have not yet been properly catalogued in government databases. This, we believe compromises the information's completeness and accessibility.

Current data lacks wild salmon focus, but is still useful

We found that a number of databases developed over the last 30 years contain information pertinent to wild salmon. The principal tool used to manage fish inventory data today is the Fish Inventory Summary System. Administered by the Ministry of Sustainable Resource Management, this system collects information on freshwater fish and fish habitat from a variety of sources and integrates it into summary format. Topics summarized include: number of waterbodies, fish distribution, number of releases, enhancement and management, potential and constraints, obstructions, harvest and use, land use, life history and timing, resource use, angler access information, value and sensitivity.

In addition to the Fish Information Summary System, the government manages other fish information databases (Appendix C) including lakes, wetlands, watersheds and a number of physical, chemical and biological characteristics associated with their habitat. Few of these databases were developed with wild salmon or their habitat requirements as the focal point for data collection or analysis. Nevertheless, the information is useful for managing wild salmon issues.

Concerns over data accuracy and gaps are being addressed

Accurate, reliable information is needed if resource management decision-making is to be effective. Assessments by the Ministry of Sustainable Resource Management of some of these datasets raised concerns about their accuracy and timeliness and called for these problems to be cleared up.

Other government reports have identified a number of information gaps in the baseline knowledge of aquatic ecosystems. Key gaps include information on:

- freshwater needs of individual stream system such as flow and temperature requirements
- stream flow monitoring
- water use distribution of existing licences
- size, recharge time and current conditions of aquifers

We were informed that the data clean-up and completeness improvement process is underway.

Consistent application of data collection standards is needed

Standards for data collection helps ensure that datasets are easy to access and the information retrieved is of good quality for management decision-making.

Data sampling, collection and reporting methodologies and guidelines have been used by several provincial agencies for a number of years. With the establishment of the Resources Inventory Committee in 1991, the Province began to develop standard methodologies. Some of these documents (listed in Appendix D), provide sound criteria and procedures for collecting and analyzing information on a wide range of freshwater fish species, habitat types and conditions. However, there is still no one generally accepted best practice.

Because regions had significant autonomy in the past, adherence to guidelines and quality control standards varied. Some information was also collected by non-governmental groups or volunteers who might not have had sufficient training in applying these provincial standards. We learned that the Ministry of Sustainable Resource Management is working with a reconstituted standard development committee (the Resource Information Standards Committee) on improving standard methodologies and considering implementing a fish and fish habitat inventory auditing program to improve the quality of data being collected, and to monitor compliance with standards and best practices.

There is inadequate coordination between provincial ministries, agencies, industry and non-governmental organizations on the methodologies used to identify, measure and evaluate fish habitat. Data standards are largely voluntary and are often not integrated with their federal counterparts. As a result, the government has inadequate assurance about the accuracy of data. It also cannot provide assurances that the methods used to collect information by all parties are reliable or that the gathered data can be used to its full potential by all user groups. Considering the government's objectives for a results-based framework, and an increasing reliance on second and third party users to provide fish habitat data to provincial agencies, improvements are necessary to ensure data is standardized and coordinated if a comprehensive and current inventory is to be established and maintained.

The Ministry of Sustainable Resource Management has become the central agency to coordinate all land and resource management information in the province, of which freshwater fisheries data is one such type of information. The ministry chairs the Resource Information Standards Committee, the forum in which data standards are now identified, discussed and developed. The Resource Information Standards Committee currently manages over 200 standards, procedures, field guides, field forms and background documents, many of which have implications for freshwater fish and fish habitat issues.

The Province is moving towards operating as a standards setter, regulator and monitoring agent versus its historical role of data collector. There has been a significant reduction in the amount of fieldwork being conducted to collect fish habitat related information. The trend is to partner with stakeholders such as natural resource licensees and third parties to collect and share land and resource data. Instituting these changes will require consistent standards and procedures and long term commitment. The government in general and the Ministry of Sustainable Resource Management more specifically face many challenges over the collection and coordination of wild salmon information on an on-going basis.

Recommendation

We recommend that the Province, through the Ministry of Sustainable Resource Management:

- **determine, in conjunction with related provincial agencies and its federal partners, consistent data standards for collecting and storing information, including wild salmon data, and**
- **ensure that a program is in place to attest the accuracy, completeness of data and timely accessibility of information for decision makers and users**

Resource capacities need to be identified

Ministries and agencies accountable for freshwater fish issues rely on skilled staff and consultants to carry out government responsibilities and programs. Managing fish habitat is not a new area of administration, but as science contributes new information, government must have the resources to attract scientists into public service, as well as provide staff with the opportunities to upgrade and learn new skills.

We found that the Province has many world-class scientists working in various areas of fisheries biology and habitat management. Among these professionals are biologists, hydrologists, forest ecologists, fluvial geomorphologists, civil engineers, physical geographers, environmental planners, computer scientists and economists. Many are trained to the masters, doctorate and post-doctoral level.

We also were informed that training opportunities for staff were adequate and range from workshops and courses to conferences and technical seminars. However, current resources are stressed because of the shift to results-based regulations, competing operational demands, program downsizing and workforce adjustment. Many skilled people are leaving or have left government, which requires program managers to do more with less. We noted as well, some uncertainty over the longer term as to the future capacity needs to manage wild salmon sustainability issues. The changing nature of legislation and management approaches, the reliance on third parties for information, and the knowledge and data gaps for gathering, interpreting and managing fish and fish habitat information are all contributing to this uncertainty.

Where their budgets accommodate it, ministries and agencies hire outside consultants and contractors to carry out field research and analysis. The ministries and agencies we talked with acknowledged that more attention should be given to managing wild salmon issues, and there is a recognition that the Province has responsibilities to manage impacts to fish habitat from activities under provincial jurisdiction. Dealing with matters such as managing biodiversity and restoring lost habitat requires a long-term commitment of time and resources, including the allocation of dedicated staff. We concluded that most ministries and agencies

still need to determine the extent of the problem before long term staffing and fiscal requirements to address wild salmon sustainability issues can be addressed.

Recommendation

We recommend that the Province assess the resource requirements needed to deal with wild salmon issues.

Addressing the Impacts of Salmon Aquaculture

British Columbia's salmon farming industry started about 30 years ago and has grown substantially. Today the province is the fourth largest producer in the world after Norway, Chile and the United Kingdom. In 2002, according to provincial statistics, 12 companies produced 85,400 tonnes of salmon and generated 900 on-farm jobs from 121 tenured farms. The main species produced are Atlantic salmon (85%), Pacific Chinook (12%) and Pacific Coho (3%).

The Province has a goal of seeking "optimum economic benefits to British Columbia from fisheries and aquaculture while protecting the environment." It has been suggested that the controlled expansion of salmon aquaculture could generate over $1 billion in economic activity over the next 10 years. The Province therefore advocates aquaculture with a vision of an economically competitive industry that develops in an environmentally and socially sustainable manner.

At the same time the salmon farming industry has faced substantial opposition. Many concerns over the effects of the industry on wild salmon and the marine environment have been raised and views on the risks on wild stock posed by farms have been conflicting. An incomplete understanding of the risks that salmon aquaculture poses to the environment and wild salmon has generated considerable and intense debates in British Columbia.

We expected to find that the Province had programs in place to identify the risks to wild salmon and to mitigate or offset those risks. We found that there are gaps and uncertainty in knowledge about the interactions between salmon aquaculture and wild salmon, particularly around topics such as disease transfer, the ability of farmed Pacific salmon to interbreed with wild Pacific salmon, the colonization capabilities of farmed Atlantic salmon, and the cumulative impacts of salmon aquaculture. Ongoing research is needed in these areas to ensure that salmon aquaculture does not pose an unacceptable risk to wild salmon and the environment.

Courtesy: British Columbia Salmon Farmers Association

A net pen cage fish farm

Roles and responsibilities for managing salmon aquaculture

Both the federal and provincial governments have jurisdiction over, and therefore overlapping responsibilities for the regulation of salmon farming. To provide clarity for their respective authority, the Province and the Department of Fisheries and Oceans Canada came to an agreement on responsibilities and coordination of activities in their 1988 Memorandum of Understanding on Aquaculture Development. Under the Memorandum of Understanding, British Columbia has primary responsibility for day-to-day operational activities and is responsible for licensing, monitoring and managing sites once they are in production. The Department of Fisheries and Oceans Canada retains authority in the areas of conservation and protection of wild salmon, fish and fish habitat. The federal government retains responsibility for food safety outside the Memorandum of Understanding.

The provincial organizations directly involved in managing salmon aquaculture in the province are the: Ministry of Agriculture, Food and Fisheries; Ministry of Water, Land and Air Protection; Ministry of Sustainable Resource Management, and Land and Water British Columbia Inc. The Ministry of Agriculture, Food and Fisheries is the provincial lead agency and is authorized under the provincial Fisheries Act to issue farm licenses. It has also taken on an advocacy role for the salmon farming industry. Land and Water British Columbia Inc. issues tenures for aquaculture operations and acts as the information and document collection and distribution coordinator for the finfish aquaculture facilities approval process. The Ministry of Sustainable Resource Management prepares high-level land and resource management plans, sub-regional coastal plans and aquaculture opportunities studies to identify suitable aquaculture areas. The Ministry of Water, Land and Air Protection regulates waste and monitors environmental impacts as a result of fish farm operations.

Services agreements are used to better define individual agency roles and responsibilities. For example, on compliance and enforcement issues, Ministry of Agriculture, Food and Fisheries is designated as the lead authority for compliance, while Ministry of Water, Land and Air Protection is the lead on enforcement. Coordinating committees have also been established at the project level (Project Review Team) and management level (Directors Aquaculture Committee) to guide policy discussions. We observed that attention is being devoted to wild salmon protection issues. However, tension and divergence of opinions between the two levels of government does occur as illustrated by policy differences surrounding siting criteria for salmon farms. In July 2003, the two governments established the Pacific Council of Fisheries and Aquaculture Ministers to provide a forum to discuss issues of concern regarding fisheries and aquaculture management in British Columbia.

Identifying and managing the risks of salmon aquaculture operations

The three main areas of risk in the salmon farming industry concern: health effects from the transfer of parasites and diseases (e.g. sea lice, bacterial like kidney disease, and viral disease like infectious hematopoietic necrosis); competition from escaped

farmed fish (e.g. genetic diversity and food supply); and marine environmental impacts of aquaculture operations (e.g. on water quality and the seabed ecosystem).

The Province responded to public concerns over fish farms by placing a moratorium on salmon industry expansion in 1995. The British Columbia Environmental Assessment Office then conducted a comprehensive risk assessment of the industry. Completed in 1997,the "Salmon Aquaculture Review" concluded that salmon farming poses a low risk to wild salmon, but qualified that by adding "as currently practiced and at current production levels." Production levels in 1995 were 23,800 tonnes. In 2002, they had increased to 85,400 tonnes, for the same number of farms.

The Salmon Aquaculture Review nevertheless provided suggestions to further mitigate the risks assessed during the review. These covered areas associated with: farm siting criteria, interaction between escaped farmed salmon and Pacific salmon, fish health and transfer of diseases between farmed and wild salmon, waste and environmental impacts and implementation.

The Province accepted the report's conclusion of low risk and developed a risk management framework. In September 2002, after also taking into consideration similar studies in other jurisdictions, the Province decided it had a risk management regulatory framework in place and lifted the moratorium. The Salmon Aquaculture Policy Framework requires the relocation of poorly sited existing farms and implementation of new siting criteria. It also outlines improved fish escape prevention measures, waste management regulations and best management practices for maintaining fish health. The Aquaculture Regulation—the responsibility of the Ministry of Agriculture, Food and Fisheries, under the B.C. Fisheries Act—provides rules for farm operations and escape prevention. The Finfish Aquaculture Waste Control Regulation—the responsibility of the Ministry of Water, Land and Air Protection, under the Waste Management Act (replaced by the Environmental Management Act)—provides waste management standards and monitoring requirements for fish farms.

We found that although constructive measures for fish health, waste, best practices, and compliance and enforcement have been put into place, important issues remain unsolved.

Disagreement on key farm siting issues persist

Properly sited salmon farms can reduce negative impacts on the marine environment, including impacts on wild salmon habitat. Having good siting criteria is therefore one of the best risk reduction approaches. The Province has drawn up 15 such criteria based on the Salmon Aquaculture Review recommendations (Appendix E). These criteria were developed mostly using professional judgement supported by risk management principles. The criteria set minimum distances to separate farms from certain areas such as shellfish beds and sensitive salmon-bearing streams.

These guidelines were developed using professional judgement and risk management principles, but federal and provincial agencies disagree over a number of key outstanding issues. Those key issues include: where the tenure boundary measurements for a farm should start; what the criteria should be to define values for wild salmon stream buffers, fish habitat buffers and seabed characterizations; and, whether existing farm sites should be "grandfathered" (allowed to remain because they existed before).

Over the last two years, 37 poorly sited salmon farms have been identified for relocation to more suitable areas. However, few of these sites have been relocated because environmental reviews are still proceeding.

Escape prevention measures have improved, but knowledge gaps remain

Farmed salmon can escape from aquaculture facilities and survive in the wild. Escapees have been known to reproduce and compete for spawning space and food with wild salmon. The Ministry of Agriculture, Food and Fisheries has suggested that escape prevention is a more cost-effective approach than dealing with the impacts of escaped fish. The Aquaculture Regulation requires farm operators to: improve net cage equipment design and maintenance; strengthen containment structures, net cage mesh and cage support systems; conduct inspections and establish record keeping programs; develop best management plans for facility operations, escape reporting and recovery.

The number of reported escapes has dropped in the last two years. However, knowledge gaps and disagreement remain about

what happens to escaped salmon, particularly whether they have survived in large enough numbers to interbreed and compete with wild salmon for habitat. We noted the Province has contributed funding to the Atlantic Salmon Watch Program, operated by the Department of Fisheries and Oceans Canada, "to study the abundance, distribution and biology of Atlantic salmon in British Columbia and its adjacent waters."

Fish health measures are improving detection of diseases

The potential for transfer of disease between farmed and wild salmon is a concern. The Salmon Aquaculture Review and other studies have pointed to the need for an aquatic animal disease program. While awaiting a national program to be established, the Ministry of Agriculture, Food and Fisheries has implemented a number of measures to deal with farmed salmon health issues. For example:

- In November 2000, the ministry started a fish health auditing and surveillance program. Under the program, fish health staff randomly audit 30% of active farms in an area or zone every quarter and collect specimens for health evaluation. The range of fish health issues tested for include bacteriology, virology and pathogens such as infectious hematopoietic necrosis. The ministry also audits fish health reports submitted by industry as a condition of licensing. These reports are maintained and managed by the ministry on a separate fish disease database.
- In 2001, the Fish Health Advisory Committee was formed to advise on health management issues and establish best practice guidelines. In November 2003, for example, guidelines were developed requiring every salmon farm site to have a Fish Health Management Plan in place. These plans are now a condition of licensing and must contain the key elements shown in Exhibit 8.

Monitoring of sea lice is now required by all fish farm operators

Sea lice in farmed salmon have been a problem in British Columbia since at least 1992 when the provincial Ministry of Agriculture and Fisheries sought federal approval to use pyrethin, an insecticide, to control sea lice infestations.

Exhibit 8

Required Elements of a Fish Health Management Plan

A. Characterizing the Health Status of Fish at a Culture Facility

1. Fish health records
2. Monitoring disease and infection

B. Identifying and Managing Risks to Fish Health

1. Water quality
2. Factors that predispose fish to disease
3. Vaccination
4. Broodstock health management

C. Reducing Exposure to, or Spread of, Disease Causing Agents

1. Outbreak investigation and management
2. Management of dead fish
3. Bio-Security
4. Release or escape of fish from a culture facility
5. Movement of fish

D. Use of Drugs and Chemicals in Fish Health Management

1. Diagnostic support
2. Drug, chemical and biological use of disease treatment and prevention

Source: B.C. Ministry of Agriculture, Food and Fisheries

Federal representatives noted that sea lice were a potential problem because control methods might not be compatible with the shellfish industry. In 2003, the Pacific Fisheries Resource Conservation Council concluded that sea lice are the most significant salmon aquaculture issue facing wild salmon.

In response to increasing concerns over the effects of sea lice on juvenile wild salmon, the Ministry of Agriculture, Food and Fisheries introduced a sea lice monitoring program in November 2003, now required as part of a facility's Fish Health Management Plan. The program applies to all companies and farms operating in the salmon farming industry. Operators are required to report monitoring results, and these are audited as part of the fish health auditing and surveillance program.

The measures implemented by the ministry provide early detection and diagnosis for intervention and treatment. With the limited availability of treatment drugs, however, some experts suggest that more preventive measures are desirable. A joint federal-provincial sea lice monitoring project conducted in the Broughton Archipelago in 2003 recently reported that its findings on the impact of sea lice infestations on migrating pink salmon were inconclusive. More knowledge is necessary before long-term solutions can be identified.

Suitability of performance-based standards for determining the impact on marine habitat will be reviewed

Habitat impacts from salmon farms are generally of two types: water quality impairment and seabed contamination. Both are associated with waste discharges, feed not being consumed and chemical residues from farm operations polluting the water column. The affected areas are normally confined to the farm sites, but little is known about their wider impacts on wild salmon. To address these waste management issues, the Province enacted the Finfish Aquaculture Waste Control Regulation in September 2002.

The Ministry of Water, Land and Air Protection is responsible for enforcing the regulation, which sets a performance standard to limit the impact of farm sites on the seabed. The regulation is based on the sampling measurement of a chemical—sulphide concentrations—which are sampled below the farm site on the ocean floor at or beyond 30 meters from the edge of farms. Farm operators are also required to monitor their sites according to protocols set by the ministry and report results within set timetables. Debate still remains around the need to do more research to apply such values in British Columbia. The ministry recognizes this issue and will review the regulation in five years.

Compliance and enforcement can be improved

To foster better compliance with regulations, inspections are conducted at least once a year and cover essential areas required by both the Ministry of Agriculture, Food and Fisheries and the Ministry of Water, Land and Air Protection. The inspections involve comprehensive checklists that cover pertinent elements of

the Aquaculture Regulation and best management practices associated with the Finfish Aquaculture Waste Control Regulation. The areas inspected include: conformance with management and best practice plans; fish health record keeping; stock inventory reports and record keeping; net maintenance, marking and record keeping; frequency of net inspections; escape prevention and response plans; and farm site operations.

Inspection results are reported annually and made publicly available on the Ministry of Agriculture, Food and Fisheries website. Non-compliances are enforced through written warnings, violation tickets with small fines and formal prosecution. We found that because the Finfish Aquaculture Waste Control Regulation regulatory regime is new and in transition, operators are still learning to meet the requirements, and hence their compliance rate could be improved. We also heard some concerns over the short statutory time period for initiating enforcement actions, and over the limited penalty provisions of the Aquaculture Regulation.

Further knowledge is needed

The Province's ability to manage the risks associated with the interaction between wild salmon and aquaculture is still hindered by significant gaps and uncertainty in knowledge. Recent analysis by several scientists has pointed to the need for more information in a number of high-risk areas:

- the source, extent and relationships of disease transfer between wild and farmed salmon, and particularly the potential link related to sea lice,
- the freshwater habitat behaviour of escaped Atlantic salmon and their ability to spawn and colonize,
- identification of escaped farmed Pacific salmon and their potential to breed with wild salmon, and
- the cumulative effects of aquaculture operations on the marine environment, including their impact on wild salmon.

We note that the Province has provided research funding of $3.75 million to improve aquaculture practices and $1.25 million to establish a chair in Aquaculture and the Environment at the University of British Columbia. The British Columbia Aquaculture

Research and Development Committee, with administrative support from the Science Council of British Columbia, has also been set up to coordinate and prioritize research. These are positive measures. In our view, however, these projects are directed more towards improving farm operation technology and the identification and treatment of disease affecting farmed salmon rather than at assessing the potential impacts of farmed stock on wild salmon populations. The need to attend to issues surrounding disease transfer, escapes and cumulative impacts on wild salmon remain a concern. To fill these knowledge gaps during a time of reduced government financial resources, participation and cooperation of both levels of government and other stakeholders are needed.

Recommendation

We recommend that the Province:

- **take steps to resolve the aquaculture siting issues**
- **pool its research resources with those of relevant federal agencies to more efficiently and effectively address the priority knowledge gaps associated with wild and farm salmon interactions**
- **reassess the statutory time limit and strengthen the penalty provisions in its current aquaculture policy framework**

Government's overall performance in managing sustainability issues is becoming a component of annual reporting practices in many jurisdictions. Public sector organizations are increasingly expected to report publicly on their performance in dealing with environmental issues.

In this audit, we looked at accountability reporting to the Legislature and the general public at two levels: corporate-wide addressing all of government's responsibilities for wild salmon and their habitat; and by ministry and agency, with each organization reporting on its individual responsibilities and activities.

We found limited accountability reporting on wild salmon, and although some program-specific output reports such as annual compliance and enforcement inspection reports are available, their timeliness needs improvement.

Government-level reporting is deficient

The Province does not produce on an annual basis any one document that examines how well it is managing its objectives to support wild salmon issues in British Columbia. Most program personnel frequently iterated their belief that the Province and their organization has no direct role or responsibilities to manage wild salmon and their habitat. As a result, they have paid limited attention to gather and report on information on managing wild salmon. The lack of recognizing a role for the Province and the absence of such information concerns us.

Reporting by ministries and agencies is deficient

We noted that no ministry or agency provides information to the Legislative Assembly on activities undertaken to support the sustainability of wild salmon. Some information is included in annual reports, but it tends to be very cursory, and often addresses freshwater fish species and not wild salmon. An exception is BC Hydro which refers in its Triple Bottom Line report to its water use planning process and power generation activity impacts on sensitive fish habitat. The Ministry of Forests' 2002/03 service plan report also shows that $10 million was spent on restoration and rehabilitation. However, the report notes that this was spent

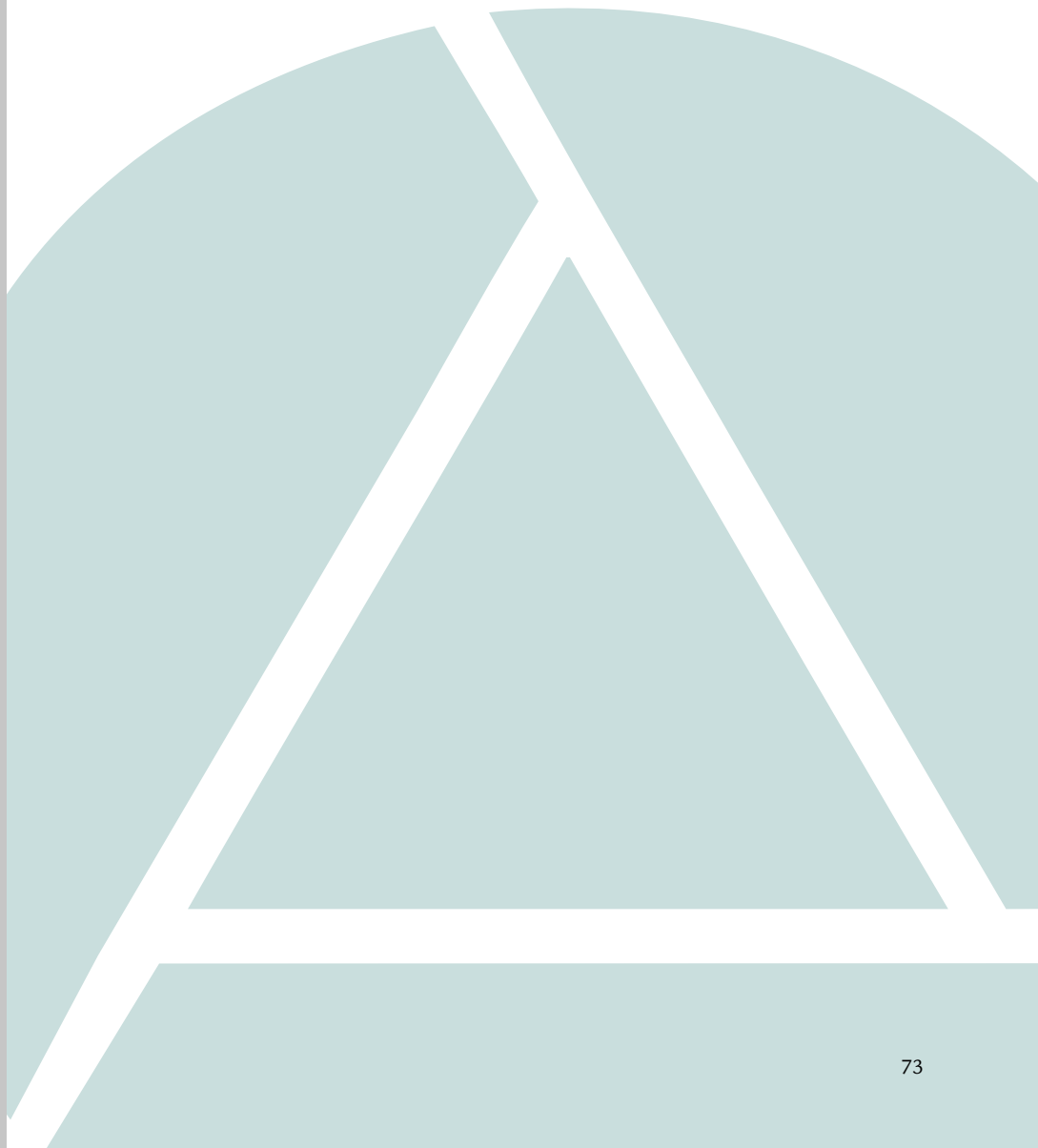
on permanent road deactivation, landslide and gully rehabilitation and assessments. There is no indication that any stream restoration work was carried out under the program.

Several ministries provide reports on compliance and enforcement programs, but they are not reported on in a timely basis.

Recommendation

We recommend that the Province develop a monitoring system and indicators to measure and report overall progress for sustaining wild salmon in a timely basis.

Response from the Government of British Columbia



Response from the Government of British Columbia

October 1, 2004

Morris Sydor
Senior Principal
Office of the Auditor General of British Columbia
2nd Floor, 8 Bastion Square
PO BOX 9036 STN PROV GOVT
Victoria, BC V8W9A2

Dear Mr. Sydor:

I am pleased to provide a copy of the response of the British Columbia government to your office's upcoming report ***Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon***. This response was prepared by staff from the Ministries of Agriculture, Food and Fisheries, Water, Land and Air Protection, and Sustainable Resource Management. The response has been reviewed and approved by the Cabinet Committee on Environment and Resource Development.

We appreciate the considerable effort that your staff have put into preparing this report and their courteous interaction with staff from our Ministries. We look forward to working with our colleagues at the Department of Fisheries and Oceans to implement the recommendations to sustain wild salmon populations on the Pacific coast.

I understand that we will be provided with copies of the final report prior to its release.

Sincerely,

Original Signed By

Rory McAlpine
Deputy Minister

pc: Gordon Macatee, Deputy Minister
Ministry of Water, Land and Air Protection

Chris Trumpy, Deputy Minister
Ministry of Sustainable Resource Management

Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon

The Ministries of Agriculture, Food and Fisheries, Water, Land and Air Protection and Sustainable Resource Management, would like to thank the Office of the Auditor General for the hard work and diligence in preparing this audit on provincial programs to sustain wild salmon in British Columbia. We welcome the opportunity to provide a response to the report's key findings and recommendations. This response has been reviewed by the Cabinet Committee on Environment and Resource Development and is made on behalf of government.

Ministries appreciate that the audit report recognizes the jurisdictional complexity in managing wild salmon stocks to ensure their sustainability, and that constitutional responsibility for wild salmon rests with the government of Canada through Fisheries and Oceans Canada (DFO). We also appreciate that this audit has been undertaken in close cooperation with the Auditor General of Canada. Ministries recognize the important role that provincial policies and programs for land use and resource management have on the sustainability of wild salmon and welcome this audit as a means of evaluating their effectiveness.

The provincial government shares the audit's concern over the long term sustainability of wild salmon and the difficulty in overcoming differing views among orders of government and stakeholders in carrying out our shared responsibilities. We agree that the "foundation of a good wild salmon sustainability framework is a clear vision of sustainable development" and would note that this must be a shared vision between governments, First Nations, the fisheries sector, and communities of interest. A priority for the provincial government is to work more closely with DFO and other federal agencies to increase the province's influence over federal policy and the management of Pacific fisheries to secure their sustainability and the associated benefits to the province. Through the new Pacific Council of Fisheries and Aquaculture Ministers (PCFAM), we will be actively seeking a new working relationship that supports shared decision-making for the management of BC's wild fishery resources in a manner that respects federal constitutional authorities.

Ministries note that the report recognizes the considerable progress that has been made in recent years in improving the management of the salmon aquaculture sector and that there are a variety of provincially led mechanisms and programs already in place to protect and restore salmon habitats in freshwater. We agree that it will be important to continuously improve our science and information resources and to develop evaluative measures for reporting the effectiveness of programs and our progress towards a shared vision of wild salmon sustainability.

The Audit's Key Findings

A Clear Vision for Wild Salmon Sustainability

As noted, the provincial government agrees that a clear and shared vision is an essential foundation for wild salmon sustainability. This will be particularly important as the federal government finalizes its "Wild Salmon Policy" to ensure that it reflects provincial perspectives and objectives for wild fisheries. The Ministry of Agriculture, Food and Fisheries (MAFF), has been designated as the lead provincial agency to pursue the development of this common vision with the government of Canada through the new PCFAM. Joint work is underway to develop a workplan for approval by Ministers to advance this objective. MAFF is working closely with the Ministry of Water, Land and Air Protection (MWLAP), as the lead agency for habitat protection and biodiversity, to ensure that provincial programs fulfill our commitment to wild salmon sustainability. Both of these Ministries work through the Deputy Minister's Committee on Environment and Resource Development to ensure consistency and coordination in the delivery of provincial fisheries programs, and that other ministries' natural resource management policies and programs are sensitive to the needs of fish.

It is also intended that the new arrangements through the PCFAM will facilitate the rationalization of the many mechanisms for inter-jurisdictional cooperation that currently exist between the federal and provincial governments. Some of the new innovative mechanisms for sharing responsibility and decision making are being seen as a model by other Canadian jurisdictions.

Provincial Activities to Protect and Restore Salmon Habitat

The provincial government uses ecosystem and watershed approaches to manage the land and water base for the sustainability of all natural resource components - including salmon, and our strategies, policies and legislation are focused on the whole environment, not just a single species. In the long-term, these broad approaches should be effective mechanisms for protecting and sustaining salmon and will serve as the basis for interaction with federal policy and program frameworks.
The provincial focus has principally been on freshwater fish and freshwater habitats, and salmon considerations were, and are, taken into account as an important component of the freshwater ecosystem. While the province clearly has a vested interest in maintaining sustainable salmon populations, BC has never had a direct role in managing salmon per se, where management infers responsibility for establishing production goals and allocations.

Ministries agree that no single piece of provincial legislation has been developed to protect salmon, rather provisions to protect fish and their habitats exist in a number of provincial resource management statutes including the *Water Act*, *Forest and Range Practices Act*, *Fish Protection Act*¸ and the *Environmental Management Act* (formerly the *Waste Management Act*). Federal departments, particularly DFO, have been actively engaged in the development and review of this legislation and associated regulations to ensure consistency in the intent and equivalency of provincial measures with the provisions of the *Fisheries Act (Canada)*.

For example, DFO is actively working with the Ministry of Forests (MOF), and MWLAP to ensure that the new regulations under the *Forest and Range Practices Act* will assist DFO in fulfilling its habitat protection mandate. An action plan to address remaining issues was recently approved by the MOF/MWLAP/DFO Joint Steering Committee at the Assistant Deputy Minister level.
British Columbia and DFO have followed a similar collaborative process in the development of the new Riparian Areas Regulation under the provincial *Fish Protection Act*; a results-based approach to protecting riparian fish habitat in urban areas. Another example acknowledged in the audit, is the close partnership that has developed between fisheries agencies and the agriculture sector under the Agricultural Environment Partnership Committee and

through the Environmental Farm Planning initiative which will serve as a proactive tool to prevent damage to fish habitat and wild fish populations before it happens, as a preferred approach over repairing damage after it has already occurred. Similar efforts will continue through the auspices of PCFAM and we agree with the recommendation to review the effectiveness of legislation that affects wild salmon.

Both the provincial government and DFO are actively engaged in changing business practices relating to salmon habitat protection to results-based approaches. In making this transition, the province is undertaking a referral management strategy to ensure that where habitat protection objectives can be more efficiently achieved, particularly for activities that pose a low risk to fish habitat, the province will use a results-based approach that relies on guidelines, standards and best management practices. DFO is moving in a very similar direction under its "5 Point Plan for Environmental Modernization" and the associated Risk Management Framework. The Canada/BC Environmental Regulatory Reform Committee, composed of provincial Deputy Ministers and federal Regional Director Generals has approved a joint workplan to implement these initiatives on a collaborative basis. The shared goal is the identification and application of common decision support tools for decision-making respecting fish habitat.

In undertaking programs to restore fish habitat previously impacted by human activities or natural disasters, Ministries agree that it is important to establish priorities and to develop strategic watershed restoration plans. The province has indicated previously that its priorities for anadromous fisheries are the steelhead bearing systems of the Greater Georgia Basin and the Fraser and Thompson Rivers, which are also important rivers for critical salmon populations, and the sockeye populations of the mid-coast. In this regard we have actively supported strategic planning to set restoration priorities within watersheds through the Canada/BC Watershed Fish Sustainability Planning framework or similar planning models. Many watershed plans are already complete and moving into the implementation phases.

Previous investments in habitat restoration over the past decade continue to provide benefits and the provincial

government has recently committed an additional $5 million for programs to protect and restore watersheds as part of the Living Rivers Strategy. This is in addition to the $2M allocated to the Living Rivers Trust Fund which was established in 2002. The province will work with the Vancouver Foundation as trustee of the original fund, as well as other third parties, to develop priorities and program delivery systems that complement federally supported programs such as the Pacific Salmon Endowment Fund, and international funds such as the Pacific Salmon Commission's northern and southern restoration and enhancement funds. The new provincial money will also work with resources available from the provincial Forest Investment Account, the Habitat Conservation Trust Fund, BC Hydro's three compensation programs and other federal and provincial programs to undertake specific restoration projects on a priority basis.

Effectiveness evaluation of watershed restoration activities has occurred in specific watersheds. The best example is the multi-year research investigation of the effectiveness of instream habitat restoration on the Keogh River that is still ongoing. Further, the province has worked with the Pacific Salmon Foundation to develop a monitoring strategy for recovery efforts being conducted under the Pacific Salmon Endowment Fund. Further advances in effectiveness evaluation are expected through the implementation of the new Water Use Plans associated with BC Hydro's water licenses, and monitoring and evaluation undertaken in association with the new Riparian Areas Regulation under the *Fish Protection Act*.

Addressing the Impacts Of Salmon Aquaculture

Ministries note the audit's conclusion that the province has made considerable progress over the last decade in putting in place the conditions for a sustainable salmon aquaculture industry, particularly in the areas of waste management, escape prevention, fish health, and compliance and enforcement. MAFF recognizes that there remains issues associated with management of finfish aquaculture and have committed resources to continue to explore these issues. The management regime for finfish aquaculture is under continuous refinement and improvement, and as new information becomes available government will modify management regimes and regulations accordingly.

The provincial government has concluded that the 1997 Environmental Assessment Office review of the salmon aquaculture industry correctly identified the risks associated with the salmon aquaculture industry and made appropriate recommendations to further minimize them. Government accepted these recommendations in its Salmon Aquaculture Policy framework, and has largely addressed the recommendations in the new management and regulatory framework developed for the finfish aquaculture industry.

The audit states that there are "…gaps and uncertainty in knowledge about the interactions between salmon aquaculture and wild salmon…". While ongoing research is always useful, the provincial government is confident that informed decisions can be made with existing information regarding the level of risk posed to wild salmon. We are committed however, to continue to evaluate new information with the goal of continual improvement of our management and regulatory regime. Gaps in our scientific knowledge about potential effects of salmon aquaculture are being actively addressed by government, industry and academia. MAFF has committed significant resources to research, undertaken with UBC to create a Chair for Sustainable Aquaculture, and will continue to work through the BC Aquaculture Research and Development Committee and Aqua-net to prioritize our research activities. In cooperation with the government of Canada and Western Economic Diversification, the Ministry recently established the new British Columbia Centre for Aquatic Health Sciences in Campbell River with $2.4 million in funding to coordinate and provide applied research and services addressing health, safety and welfare issues for wild and cultured fish and their environments.

With regard to the science-based criteria used to evaluate farm siting, locations are evaluated using information provided by the applicant on the fisheries habitat values and oceanographic conditions of the site and surrounding area. Reviews examine the current data, the habitat values, the nature of the bottom substrate and the positioning of the net-pen array in addition to the biomass being proposed for the site. A benthic loading model called "Depomod" is used to evaluate the potential footprint of the farm, and determine if the farm can operate and be consistent with the

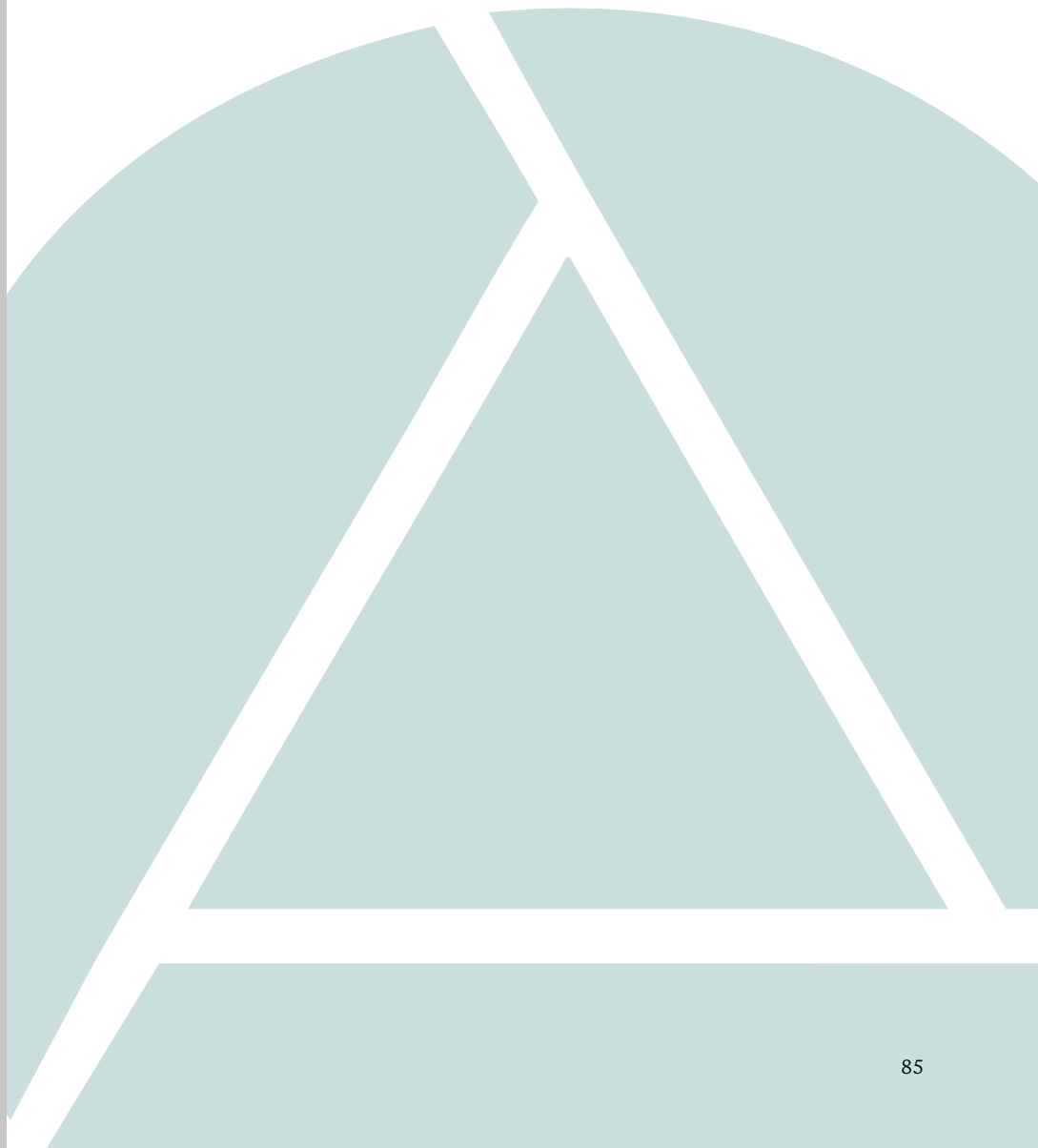
waste management standards and whether sensitive habitat will be impacted. The report correctly notes that good siting criteria are one of the best risk reduction approaches and current siting guidelines developed by the Province are an important safeguard to protect wild fish populations. These siting guidelines were developed using professional judgment supported by risk management principles and we will work continue to work actively with DFO and stakeholders to improve siting criteria and decision making processes. We will also continue to encourage DFO to complete their environmental reviews so that relocations can occur in a timely fashion.

Reporting on Progress to Sustain Wild Salmon

The audit concludes with a recommendation to develop a monitoring system and indicators to measure and report progress on wild salmon sustainability. It is the province's view that this will be most effectively accomplished cooperatively with the federal government through work sponsored by PCFAM. The federal and provincial governments have worked extensively in the past on cooperative efforts for state of environment reporting and the recently concluded *Memorandum of Understanding Respecting the Implementation of Canada's Oceans Strategy on the Pacific Coast of Canada* contains provisions to advance the cooperative development of indicators for the marine environment and associated ecosystems.

Ministries would again like to thank the Auditor General and his staff for their diligent and professional work in preparing this audit and look forward to working cooperatively with the Government of Canada and colleagues in Fisheries and Oceans Canada to implement the recommendations to sustain wild salmon populations on the Pacific coast.

Glossary



Glossary

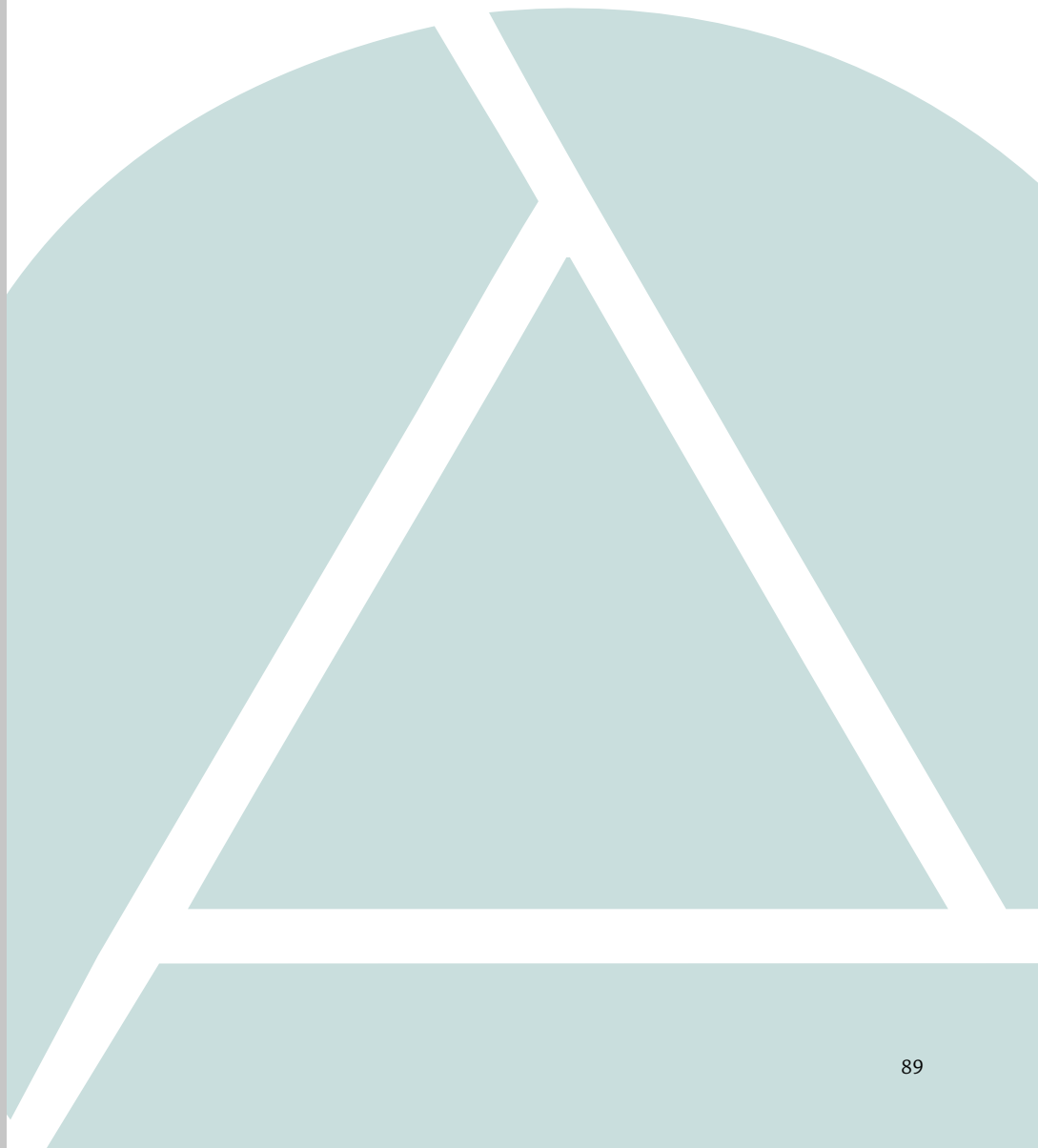
Acre-foot	The volume of water covering 1 acre at a depth of one foot. One acre- foot equals 1.23 million litres or 325,000 imperial gallons
Anadromous	Fish that must ascend freshwater rivers and streams from the sea in order to spawn.
Escape	A farmed salmon that has escaped into the marine environment from the cage structure in which it is cultured and housed
Fish-bearing stream	A stream in which fish are present or potentially present at some time during the year if introduced barriers or obstructions are either removed or made passable for fish
Fish habitat	The areas in and about a stream or river, such as spawning grounds and nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly to carry out their life cycle processes
Fish-sensitive zone	Side and back channels, ponds and swamps, seasonally flooded depressions, lake littoral zones and estuaries that are seasonally occupied by over wintering anadromous fish
Freshwater habitat	The generic term used to identify the various habitat types found within a given river, creek or stream, such as holding, instream, off-channel, over wintering, rearing, riparian and spawning habitat
Habitat	The areas in and about a stream including (a) the quantity and quality of water on which fish or wildlife depend directly or indirectly to carry out their life processes, and (b) spawning grounds and the nursery, rearing, food supply and migration areas
Instream habitat	The wetted perimeter of a river, creek or stream used by salmon to carry out their life functions. Instream habitat consists of stream channels that vary in size, composition and depth and that have been shaped by rocks and pieces of wood found in the channel
Life cycle processes	The series of changes in form (stages) through which an organism develops from a fertilized ovum through to the fertilized ovum of the next generation. The length of time taken by an organism to go through this set series of changes
Rearing Habitat	Areas in rivers or streams where juvenile salmon find food and shelter to live and grow to prepare for their migration out to sea
Rehabilitation	The process of producing conditions more favourable to particular groups of organisms, especially the economic valuable or aesthetically desirable components of native flora and fauna, without necessarily returning the system to its undisturbed condition

Glossary

Restoration	The process of returning ecosystems or habitat to their original structure and species composition
Riparian habitat	The area adjacent to a stream that may be subject to temporary, frequent or seasonal flooding; it supports plant species typical of an area of inundated or saturated soil conditions, and that are distinct from plant species on freely drained adjacent upland sites
Runs	The seasonal migration undertaken by fish usually as part of their life history
Sensitive stream	A stream designated under section 6 of the Fish Protection Act that includes the tributaries of the designated stream unless otherwise stated
Spawning	The fish reproduction process, characterized by females and males depositing eggs and sperm into the water simultaneously or in succession to fertilize the eggs
Stream	A watercourse formed when water flows between continuous, definable banks. The flow in the channel may be perennial or intermittent
Stock	A fish spawning in a particular lake or stream that is genetically self-sustaining and isolated geographically or temporally during reproduction
Watershed	An area of land (the catchment or drainage basin), bounded by a topographic height of land, that delivers water along a stream channel to a common outlet. Watersheds are the natural landscape units from which hierarchical drainage networks are formed
Wild salmon	A large, soft-finned, anadromous fish of the genus Onchorhynchus indigenous to northern latitude countries. Seven species are found in British Columbia: chinook, chum, coho, sea-run cutthroat, pink, sockeye and steelhead

Source: Compiled by the Office of the Auditor General of British Columbia

Appendices



Appendix A

A Sample of Guidebooks and Best Management Practices Related to Managing Impacts on Fish Habitat from Land Use and Resource Development Activities

Document	Descriptions
Channel Assessment Procedures (1996)	Presents a number of methods and procedures to identify and classify the characteristics of disturbed channels and reaches within channels
Fish-Stream Crossing Guidebook (2002)	Identifies methods to plan, prescribe and implement sound practices for fish-stream crossings consistent with the federal Fisheries Act and the Forest Practices Code
Fish-Stream identification Guidebook (1998)	Addresses the identification of streams on the basis of fish presence to ensure the protection of fish populations and habitats during forest harvesting operations
Forest Road Engineering Guidebook (2002)	Identifies a variety of road engineering field practices to meet statutory and regulatory requirements including road design, drainage, bridges, culverts and deactivation methods
Gully Assessment Procedure Guidebook (2001)	Describes methods to prevent gully erosion and slope failures to protect stream and fish habitat
Mapping and Assessing Terrain Stability (1999)	Identifies relevant standards and procedures for mapping and assessing terrain stability for landslides, debris flows and drainage networks
Regional Lake Classification and Lakeshore Management	Describes management planning requirements for lakes larger then 5 hectares in size that can directly impact fish habitat
Guidebook (1996) Riparian Assessment and Prescription Procedures (1999	Outlines the procedures necessary to identify the loss of riparian function due to past logging practices
Riparian Management Area Guidebook (1995)	Provides guidance on planning and conducting operations within the riparian management area and fisheries and marine sensitive zones
Watershed Assessment Procedures Guidebook (1999)	Focuses on procedures to assess changes in peak flows and the potential for landslides, accelerated surface erosion and changes to channel riparian buffers

Source: Compiled by the Office of the Auditor General of British Columbia

Appendix B

A Sample of Watershed and Stream Restoration Best Management Practices

Document	Descriptions
Channel Conditions and Prescription Assessment (1996)	Provides procedures to assess stream channel morphology and prescription methods
Fish Habitat Assessment Procedures (1996)	Outlines methods for evaluating poor forest harvesting practices and the impacts they have on fish and aquatic resources
Fish Habitat Rehabilitation Procedures (1997)	Outlines procedures for planning and restoring the rehabilitation of watersheds and streams
Fish Passage Culvert Inspection Procedures (2000)	Provides information on providing access at fish-bearing crossings including tributary streams, lakes, off-channels, back channels, ponds and sloughs
Framework for Conducting Effectiveness Evaluations of Watershed Restoration Projects (1999)	Outlines how to develop a framework to develop restoration evaluation plans for roads, gullies, landslides, riparian areas and streams
Guidelines for Planning Watershed Restoration Projects (1995)	Provides local stakeholders with a framework for restoring fish habitat through resource assessment and by implementing effective activities
Road Rehabilitation Handbook: Planning and Implementation Guidelines Parts 1 & 2 (1994)	Provides technical information and methodologies for planning resource road rehabilitation projects including upgrading and deactivation in areas of past use

Source: Compiled by the Office of the Auditor General of British Columbia

Appendix C

A Sample of Fish and Fish Habitat Related Databases and Data Capture Tools Managed by the B.C. Ministry of Sustainable Resource Management

Database/Data Capture Tool	Descriptions
Bathymetric Maps (BATH)	BATH is a database stores information about bathymetric (depth) maps of surveyed lakes
Canada-B.C. Data Warehouse	This is a joint federal-provincial project to share datasets of common interest
Field Data Information System (FDIS)	FDIS is a data capture and reporting tool for fish and fish habitat information collected to Resource Information Standards Committee standards. It includes data for lakes and streams
Fish and Fish Habitat Inventory Reports Index	This index provides access to all electronic products (such as reports and databases) from Forest Renewal BC and other fish and fish habitat projects
Fish Habitat Inventory Initiative Program (FHIIP)	FHIIP consists largely of Forest Renewal BC datasets for stream information
Fisheries Data Warehouse (FDW)	FDW combines data from different kinds of computers and different software into one integrated fisheries database
Fisheries Information Summary System (FISS)	FISS stores summary-level information about fish and fish habitat at a 1:50,000 scale from a variety of computerized and hard copy reports
Fisheries Project Registry (FPR)	FPR provides historical record of where large projects have occurred up until most of 2001
Lake Survey Database	This database stores detailed lake survey information using lake inventory standards developed prior to 1997
Resource Analysis Branch (RAB) Stream Surveys	RAB consists of stream data collected during the 1970s and plotted with aquatic mapping standards
Stream Survey System	Developed through the FHIIP, this database stores detailed streams surveys done from 1985 to 1996
Watershed Atlas	This database is a collection of Arcview maps and Oracle data that produces an intelligent stream network used as a framework for referencing all other fisheries data and information (1:50,000 scale)
Watershed Dictionary	This document contains information extracted from the Watershed Atlas about lakes, streams, wetlands and watersheds

Source: Compiled by the Office of the Auditor General of British Columbia

Appendix D

A Sample of Standards and Best Practices Used to Assess Fish Presence, Habitat Characteristics and Attributes by the B.C. Ministry of Sustainable Resource Management

Document	Descriptions
Aerial Photography and Video-graphy Standards for Fish Habitat Channel Assessment (1996)	Presents a set of standards and procedures for collecting remotely sensed data for the inventory, maintenance and enhancement of fisheries streams throughout British Columbia.
Ambient Freshwater and Effluent Sampling Manual (1997)	Covers the minimum requirements to ensure quality and consistency of the field aspects of ambient water and effluent data collection
Automated Water Quality Monitoring Field Manual, Version #1 (1999)	Addresses the minimum requirements for establishing and operating a reliable automated water quality monitoring program
Bathymetric Standards for Lake Inventories (1999)	Describes the standards and procedures used to carry out a bathymetric survey and produce a lake bathymetric map according to the Fisheries program standards
Freshwater Biological Sampling Manual (1997)	Covers the minimum requirements to ensure quality and consistency of the field aspects of biological data collection
Guidelines for Interpreting Water Quality Data (1998)	Presents minimum requirements for interpreting and reporting water quality data
Guidelines for Monitoring Fine Sediment Deposition in Streams, Version #3 (2002)	Outlines sediment deposit collection techniques, data analysis, sediment monitoring and reporting protocols
Lake and Stream Bottom Sediment Sampling Manual (1997)	Covers the minimum requirements to ensure quality and consistency of the field aspects of lake and stream bottom sediment data collection
Overview Fish and Fish Habitat Inventory Methodology, Version #1 (1999)	Describes the standards for fish and fish habitat inventory methodologies for large watersheds as defined from the 1:50,000 Watershed Atlas
Reconnaissance Fish and Fish Habitat Inventory – Fish Collection	Provides instructions for recording relevant fish sampling data required on the fish collection form and the individual fish data card Form Field Guide (2000)
Reconnaissance Fish and Fish Habitat Inventory Standards and Procedures (2001)	Describes reconnaissance level survey requirements at 1:20000 scale for entire watersheds, including all phases of inventory, pre-field data review, data compilation, and preparation of final reports and maps
Standards for Fish and Fish Habitat Maps, Version #3 (2001)	Presents guidelines to standardize map formats, content and presentation of fish and fish habitat information on aquatic inventory maps at a range of scales

Source: Compiled by the Office of the Auditor General of British Columbia

Appendix E

Criteria for Siting New Finfish Aquaculture Facilities

Under the current provincial regulatory regime in British Columbia, development proposals for new salmon farms must meet the following requirements and be located:

1. At least 1 km in all directions from a First Nations reserve (unless consent is received from the First Nation)
2. At least 1 km from the mouth of a salmon-bearing stream determined as significant in consultation with DFO and the Province
3. At least 1 km from herring spawning areas designated as having "vital," "major" or "high" importance
4. At least 300m from inter-tidal shellfish beds that are exposed to water flow from a salmon farm and which have regular or traditional use by First Nations, recreational, or commercial fisheries
5. At least 125m from all other wild shellfish beds and commercial shellfish growing operations
6. An appropriate distance from areas of "sensitive fish habitat", as determined by DFO and the Province
7. An appropriate distance from the areas used extensively by marine mammals, as determined by DFO and the Province
8. At least 30m from the edge of the approach channel to a small craft harbour, federal wharf or dock
9. At least 1 km from ecological reserves smaller than 1,000ha
10. Not within a 1km line of sight from existing federal, provincial or regional parks or marine protected areas (or approved proposals for these)
11. Not within the infringement area on a riparian rights owner, without consent, for the term of the tenure licence
12. Not in areas that would pre-empt important Aboriginal, commercial or recreational fisheries as determined by the province in consultation with First Nations and DFO
13. Not in areas of cultural or heritage significance as determined in the Heritage Conservation Act
14. Consistent with approved local government bylaws for land use planning and zoning
15. At least 3 km from any existing finfish aquaculture site, or in accordance with a local area plan or Coastal Zone Management Plan

Source: B.C. Ministry of Agriculture, Food and Fisheries

Appendix F

Office of the Auditor General: Risk Auditing Objectives and Methodology

The Office has three lines of business:

- Attesting to the reliability of government financial statements;
- Assessing the quality of government service plan reports;
- Examining how government manages its key risks.

Each of these lines of business have certain objectives that are expected to be achieved, and each employs a particular methodology to reach those objectives. The following is a brief outline of the objectives and methodology applied by the Office for assessing the management of risk within government programs and services, that is, risk auditing.

Risk Auditing

What are Risk Audits?

Risk audits (also known as performance or value-for-money audits) examine whether money is being spent wisely by government—whether value is received for the money spent. Specifically, they look at the organizational and program elements of government performance, whether government is achieving something that needs doing at a reasonable cost, and consider whether government managers are:

- making the best use of public funds; and
- adequately accounting for the prudent and effective management of the resources entrusted to them.

The aim of these audits is to provide the Legislature with independent assessments about whether government programs are implemented and administered economically, efficiently and effectively, and whether Members of the Legislative Assembly and the public are being provided with fair, reliable accountability information with respect to organizational and program performance.

Appendix F

In completing these audits, we collect and analyze information about how resources are managed; that is, how they are acquired and how they are used. We also assess whether legislators and the public have been given an adequate explanation of what has been accomplished with the resources provided to government managers.

Focus of Our Work

A risk audit has been described as:

> *...the independent, objective assessment of the fairness of management's representations on organizational and program performance, or the assessment of management performance, against criteria, reported to a governing body or others with similar responsibilities.*

This definition recognizes that there are two forms of reporting used in risk auditing. The first—referred to as attestation reporting—is the provision of audit opinions as to the fairness of management's publicly reported accountability information on matters of economy, efficiency and effectiveness. This approach has been used to a very limited degree in British Columbia because the organizations we audit do not yet provide comprehensive accountability reports on their organizational and program performance.

We believe that government reporting along with independent audit is the best way of meeting accountability responsibilities. Consequently, we have been encouraging the use of this model in the British Columbia public sector, and will apply it where comprehensive accountability information on performance is made available by management.

As the risk audits conducted in British Columbia use the second form of reporting—direct reporting—the description that follows explains that model.

Our "direct reporting" risk audits are not designed to question whether government policies are appropriate and effective (that is achieve their intended outcomes). Rather, as directed by the Auditor General Act, these audits assess whether the programs implemented to achieve government policies are

being administered economically and efficiently. They also evaluate whether Members of the Legislative Assembly and the public are being provided with appropriate accountability information about government programs.

When undertaking risk audits, we look for information about results to determine whether government organizations and programs actually provide value for money. If they do not, or if we are unable to assess results directly, we then examine management's processes to determine what problems exist or whether the processes are capable of ensuring that value is received for money spent.

Selecting Audits

All of government, including Crown corporations and other government organizations, are included in the universe we consider when selecting audits. We also may undertake reviews of provincial participation in organizations outside of government if they carry on significant government programs and receive substantial provincial funding.

When selecting the audit subjects we will examine, we base our decision on the significance and interest of an area or topic to our primary clients, the Members of the Legislative Assembly and the public. We consider both the significance and risk in our evaluation. We aim to provide fair, independent assessments of the quality of government administration and to identify opportunities to improve the performance of government. Therefore, we do not focus exclusively on areas of high risk or known problems.

We select for audit either programs or functions administered by a specific ministry or government organization, or cross-government programs or functions that apply to many government entities. A large number of such programs and functions exist throughout government. We examine the larger and more significant of these on a cyclical basis.

Our view is that, in the absence of comprehensive accountability information being made available by government, risk audits using the direct reporting approach should be undertaken on a five- to six- year cycle so that Members of the Legislative Assembly and the public receive assessments of all significant government operations over a reasonable time period. We strive to achieve this schedule, but it is affected by the availability of time and resources.

Appendix F

Planning and Conducting Audits

A risk audit comprises four phases—preliminary study, planning, conducting and reporting. The core values of the Office—independence, due care and public trust—are inherent in all aspects of the audit work.

Preliminary Study

Before an audit starts, we undertake a preliminary study to identify issues and gather sufficient information to decide whether an audit is warranted.

At this time, we also determine the audit team. The audit team must be made up of individuals who have the knowledge and competence necessary to carry out the particular audit. In most cases, we use our own professionals, who have training and experience in a variety of fields. As well, we often supplement the knowledge and competence of our staff by engaging one or more consultants to be part of the audit team.

In examining a particular aspect of an organization to audit, auditors can look either at results, to assess whether value for money is actually achieved, or at management's processes, to determine whether those processes should ensure that value is received for money spent. Neither approach alone can answer all the questions of legislators and the public, particularly if problems are found during the audit. We therefore try to combine both approaches wherever we can. However, because acceptable results-oriented information and criteria are often not available, our risk audits frequently concentrate on management's processes for achieving value for money.

If a preliminary study does not lead to an audit, the results of the study may still be reported to the Legislature.

Planning

In the planning phase, the key tasks are to develop audit criteria—"standards of performance"—and an audit plan outlining how the audit team will obtain the information necessary to assess the organization's performance against the criteria. In establishing the criteria, we do not expect theoretical perfection from public sector managers; rather, we reflect what we believe to be the reasonable expectations of legislators and the public.

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Conducting

The conducting phase of the audit involves gathering, analyzing and synthesizing information to assess the organization's performance against the audit criteria. We use a variety of techniques to obtain such information, including surveys, and questionnaires, interviews and document reviews.

Reporting Audits

We discuss the draft report with the organization's representatives and consider their comments before the report is formally issued to the Legislative Assembly. In writing the audit report, we ensure that recommendations are significant, practical and specific, but not so specific as to infringe on management's responsibility for managing. The final report is tabled in the Legislative Assembly and referred to the Public Accounts Committee, where it serves as a basis for the Committee's deliberations.

Reports on risk audits are published throughout the year as they are completed, and tabled in the Legislature at the earliest opportunity. We report our audit findings in two parts: an Auditor General's Comments section and a more detailed report. The overall conclusion constitutes the Auditor General's independent assessment of how well the organization has met performance expectations. The more detailed report provides background information and a description of what we found. When appropriate, we also make recommendations as to how the issues identified may be remedied.

It takes time to implement the recommendations that arise from risk audits. Consequently, when management first responds to an audit report, it is often only able to indicate its intention to resolve the matters raised, rather than to describe exactly what it plans to do.

Without further information, however, legislators and the public would not be aware of the nature, extent, and results of management's remedial actions. Therefore, we publish updates of management's responses to the risk audits. In addition, when it is useful to do so, we will conduct follow-up audits. The results of these are also reported to the Legislature.

Appendix G

Office of the Auditor General: 2004/05 Reports Issued to Date

Report 1

Follow-up of Performance Reports, April 2004

Report 2

In Sickness and in Health: Healthy Workplaces for British Columbia's Health Care Workers

Report 3

Preventing and Managing Diabetes in British Columbia

Report 4

Internal Audit in Health Authorities: A Status Report

Report 5

Salmon Forever: An Assessment of the Provincial Role in Sustaining Wild Salmon

This report and others are available on our website at http://www.bcauditor.com

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