

Policy and Practice Report

Overview of Habitat Enhancement and Restoration

1 April 2011

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Introduction

1. DFO defines “enhancement” as “some form of intervention that increases survival of fish in early life history stages, followed by the release of juveniles for rearing to maturity in the ocean”.¹ This broad definition contemplates enhancement taking a variety of forms including hatcheries, spawning channels, lake enrichment and habitat restoration projects.
2. This Policy and Practice Report (“PPR”) provides an overview of Department of Fisheries and Oceans (“DFO”) policies and programs relating to salmon habitat enhancement and restoration. It also provides information on provincial habitat restoration programs that are potentially relevant to sockeye and information on federal and provincial government-linked organisations and programs that are involved in salmon habitat restoration. The information in this PPR is derived from documents and information disclosed to the commission or otherwise publicly available.² Appendix 1 provides a list all of documents and websites cited in this PPR. Descriptions of policy and programs, reviews and or other assessments set out in this report are as provided in the documents or websites cited and are not necessarily the views of the commission.
3. This PPR is not intended to be comprehensive of all DFO, provincial or other policies and programs relating to habitat management generally. Rather, it is intended to provide background for the habitat enhancement and restoration portion of the commission’s hearings. For more information on other habitat-related topics please see the following commission PPRs:
 - a. Policy and Practice Report: The Department of Fisheries and Oceans’ Habitat Management Policies and Practices, March 8, 2011 [Habitat Management PPR]; and
 - b. Policy and Practice Report: Enforcement of the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act*, March, 7, 2011.

¹ Ringtail Document CAN045245 at 1.

² Note: Where Ringtail Documents are cited to a page number it is the Ringtail page number and not the document page number that is provided.

4. The commission also intends to publish PPRs on integrated management and planning; municipal wastewater, pulp and paper, and mining effluents; freshwater urbanization; hydro, water flow and temperature; logging; and gravel extraction.
5. Finally, the commission intends to publish a scientific literature review to inform the investigation into the potential effects of salmon enhancement on Fraser River sockeye salmon [Commission Scientific Literature Review].

DFO organisational structure

6. The management of fish habitat, which includes habitat conservation, restoration and development, is currently undertaken by DFO Pacific Region staff, including staff within the Oceans, Habitat and Enhancement Branch (“OHEB”), Conservation and Protection Directorate and Science Branch, as well as staff from the Province, other agencies, public organizations, industry groups and First Nations. The day-to-day delivery of habitat-related programs, participating in planning initiatives and other partnerships and undertaking habitat restoration activities is conducted primarily by OHEB staff in Area offices.³

Oceans, Habitat and Enhancement Branch

7. In 1995-1996, a new Habitat and Enhancement Branch was established amalgamating the Salmonid Enhancement Program (see section, “Salmonid Enhancement Program” below), Habitat Management and the Fraser River Action Plan (see section “Fraser River Action Plan” below).⁴ Subsequently, in 2004, the Habitat Enhancement Branch combined with the Oceans program to become OHEB.⁵
8. The Regional Director (“RD”) of OHEB reports functionally to two Assistant Deputy Ministers at National Headquarters in Ottawa and line reports to the Pacific Regional Director General (the “RDG”). OHEB managers at Regional Headquarters (e.g. Director, Salmonid Enhancement Program) line report to the

³ Ringtail Document CAN000320 at 17.

⁴ Ringtail Document CAN022668 at 60.

⁵ Ringtail Document CAN051531 at 7.

RD of OHEB.⁶ The five Area OHEB managers (e.g. Area Chief, Lower Fraser) line report to each Area Director in their office and functionally report to the RD of OHEB. The five Area Directors line report to the RDG.⁷

9. OHEB has four major programs:⁸
 - a. Salmonid Enhancement Program;
 - b. Habitat Management Program;
 - c. Oceans Program; and
 - d. Species at Risk.

DFO policy context

Policy for the Management of Fish Habitat

10. DFO's "Policy for the Management of Fish Habitat" is supposed to provide guidance to departmental staff, developers and the public on the management of fish habitat.⁹ According to DFO, the overall policy objective is a net gain in the productive capacity of fish habitat, using the goals of habitat conservation, restoration and development.¹⁰ Strategies such as protection and compliance, integrated resource planning, research, public consultation, information and education, cooperative action, habitat improvement and monitoring are all elements of the Habitat Policy and Habitat Management Program.¹¹
11. The Department states that one goal of the policy is fish habitat restoration which involves rehabilitating the productive capacity of fish habitats in selected areas where economic or social benefits can be achieved through the fisheries resource.¹² Another stated goal is fish habitat development, which involves improving and creating fish habitats in selected areas where the production of

⁶ Ringtail Document CAN185557 at 2.

⁷ *Ibid.*

⁸ As of April 2011.

⁹ Ringtail Document CAN000320 at 17.

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² Ringtail Document CAN033598 at 65.

fisheries resources can be increased for the social or economic benefit of Canadians.¹³

12. The *Habitat Improvement Strategy* is the means by which DFO says it will initiate projects and provide advice to other interested groups to restore and develop fish habitats in support of the *Policy for the Management of Fish Habitat*.¹⁴ Under this strategy, habitats may be restored by rehabilitating streams, eliminating or controlling exotic species, predators, parasites and competitors, removing man-made and storm-related physical barriers and, in cooperation with Environment Canada, requiring the installation and operation of suitable waste treatment technology.¹⁵
13. The *Cooperative Action Strategy* supports involvement by government agencies, public interest groups and the private sector to conserve, restore and develop fish habitats.¹⁶ Implementation is intended to be assisted by the development of cooperative arrangements such as national or regional committees and foundations or boards with industry, non-government groups, other government agencies and DFO representatives.
14. According to DFO, the Salmonid Enhancement Program (see section “Salmonid Enhancement Program” below) plays a key role in contributing to the policy objectives of the *Policy for the Management of Fish Habitat*.¹⁷
15. For further information on DFO’s Policy for the Management of Fish Habitat please see the commission’s Habitat Management PPR.

Wild Salmon Policy

16. *Canada’s Policy for Conservation of Wild Pacific Salmon, 2005* (the “WSP”) states that enhancement-based production of salmon will continue to be used as

¹³ *Ibid.*

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ *Ibid.* at 67.

¹⁷ Ringtail Document CAN063231 at 5.

a means of addressing social and biological objectives through the rebuilding of populations with an unacceptable chance of extirpation and by providing harvest opportunities and fishery benefits.¹⁸ It also states that the enhancement program will continue to evolve towards greater emphasis on community stewardship, habitat restoration and rebuilding of priority Conservation Units (“CUs”).

17. Strategy 5 of the WSP deals with annual program delivery.¹⁹ Action Steps 5.3 and 5.4 relate to habitat enhancement and restoration. Action Step 5.3 states that annual work plans will specify priorities for habitat rehabilitation or restoration work to be done by DFO alone or in partnership with others and will specify investigative work needed to fill knowledge gaps.²⁰ Planning for restoration and habitat improvements will incorporate projects conducted by First Nations, volunteers and stakeholders and make use of more accessible data from a number of sources.²¹ Annual reports on regulatory functions related to key habitats and restoration and rehabilitation works are supposed to be prepared.
18. Action Step 5.4 stipulates that long-term objectives for enhancement projects will be set as part of a planning or recovery process for a CU.²² Enhancement programs will last more than a year, but annual production targets and strategies will be documented in yearly Integrated Fisheries Management Plans (“IFMPs”) and will be consistent with objectives for CUs. Annual enhancement targets and strategies are currently set out in IFMPs although they are not provided at the CU level and there is no indication of whether these targets are consistent with objectives for CUs.²³ Also under Action Step 5.4, adult salmon production is to be assessed for adherence to the rebuilding schedule and enhancement guidelines and practices.

¹⁸ Cohen Commission Exhibit 8 at 30 and 36.

¹⁹ *Ibid.* at 32-33.

²⁰ *Ibid.* at 33.

²¹ *Ibid.*

²² See also Ringtail Document CAN004647 at 9-11.

²³ See e.g. Ringtail Document CAN004037.

Canadian Biodiversity Strategy

19. Section 1.58 of the *Canadian Biodiversity Strategy* states:²⁴

Reduce to acceptable levels, or eliminate, adverse impacts of species introductions on aquatic biodiversity resulting from aquaculture projects, fisheries enhancement programs and inter-basin transfers of water and organisms.

20. Impacts from species introductions which include introductions through the production of hatchery fish are considered by the Federal-Provincial Transfers Committee (the “FPTC”). The mandate of this committee is to look at issues around the movement of aquatic organisms and since approximately 2000 all Salmonid Enhancement Program releases have been reviewed by the FPTC. Also, there is a National Code on Introductions and Transfers administered by Science Branch that hatcheries must follow.²⁵

Enhancement Guidelines for Salmon Enhancement Programs

21. The draft 2008 Enhancement Guidelines for Salmon Enhancement Programs (the “Enhancement Guidelines”) describe the Salmonid Enhancement Program and its objectives, identify risks of enhancement, outline considerations in planning enhancement programs and identify policies that govern these programs.²⁶

22. The Enhancement Guidelines state that populations targeted for enhancement should be those stocks that are believed likely to become extinct in a few generations without intervention, or populations that are currently at a level substantially below the carrying capacity of a given system.²⁷ The Enhancement Guidelines also say that enhancement for sustaining fisheries aims to increase a population above a natural productivity level or return it to a former productivity

²⁴ Canadian Biodiversity Strategy (1995), online: [biodivcanada.ca <http://www.biodivcanada.ca/560ED58E-0A7A-43D8-8754-C7DD12761EFA/CBS_e.pdf>](http://www.biodivcanada.ca/560ED58E-0A7A-43D8-8754-C7DD12761EFA/CBS_e.pdf).

²⁵ Ringtail Document CAN005328.

²⁶ Ringtail Document CAN051531 at 6.

²⁷ Ringtail Document CAN051531 at 17.

level and may be used to establish, stabilise or maintain harvest opportunities for First Nations and other fisheries.²⁸

23. The Enhancement Guidelines contain specific directions as to what managers should consider when assessing management strategies and weighing associated risks, benefits and costs of enhancement:²⁹
- a. Any probable beneficial or harmful effects on diversity of native fishes and their aquatic habitat, with particular emphasis on threatened and endangered species, must be examined;
 - b. The potential beneficial or harmful genetic effects on native fish if there is a possibility of interbreeding between cultured and native fish should be investigated and evaluated;
 - c. Potential beneficial or harmful effects (physiological, behavioural, health, genetic) of cultured fishes on population abundance and population variables, such as size structure, growth rate, recruitment rate, and mortality rate, of native and naturalized fishes, should be examined;
 - d. The history of the target stocked species and other fish transplants into the fishery must be evaluated to determine the history and genetic composition of existing fish populations;
 - e. The potential for propagated fishes to introduce virulent disease agents to native fishes and naturalized fishes should be considered;
 - f. Disease susceptibility of wild fish populations (host, pathogen, environment) need to be evaluated and the potential for pathogenic agents to establish a disease epizootic in the wild should be determined;
 - g. Relative occurrences of fish disease agents in the wild, and their potential interactions and impacts on propagated fishes, should be evaluated;
 - h. Potential inter-specific and intra-specific behavioural interactions, such as competition, predation, changes in reproductive behaviour, that would have significant adverse effects on native and naturalized fishes should be considered;
 - i. The potential for stocked fish to invade non-target areas or expand their range to non-target habitats should be determined;

²⁸ *Ibid.*

²⁹ *Ibid.* at 20-21.

- j. Any potential beneficial or harmful environmental effects of fish propagation, such as water discharge, broodfish collection, and fish escapement, on the local aquatic community must be identified;
 - k. Potential beneficial or harmful effects of increased and directed public use of aquatic environments on biotic communities and human communities;
 - l. Public health issues that may be of importance to hatchery operations and enhanced fishes, as might be related to external factors, such as bioaccumulation of chemical contaminants, should be evaluated;
 - m. Potential for enhanced fish to persist and flourish without continued enhancement must be evaluated;
 - n. Monitoring activities should continue to evaluate effects after enhancement commences;
 - o. An adaptive management process should be implemented to acquire data to answer a set of questions that will determine if enhancement goals are being accomplished responsibly and in the most cost efficient manner; and
 - p. Species stocked into altered habitats must be compatible with the physical, chemical, and biotic conditions of the altered habitat. In determining the species to be enhanced,
 - i. primary consideration should be given to native species;
 - ii. if no native species can meet management "goals", the non-native species best suited to use the productivity of the altered habitat should be chosen; and
 - iii. if non-native species are used in the altered habits, impacts to existing native species and desired naturalized species must be considered.
24. DFO has not yet worked through this list to determine how to incorporate these considerations into Salmonid Enhancement Program practices, but many of these items are supposed to be encompassed by the biological risk assessment framework currently under development.
25. The Enhancement Guidelines exist only in draft form, but they represent the practices that the Salmonid Enhancement Program currently has in place.

Excess Salmon to Spawning Requirements

26. The Excess Salmon to Spawning Requirements (“ESSR”) initiative was implemented in 1993 with the Aboriginal Fisheries Strategy. ESSR salmon are salmon that cannot be harvested in First Nations, commercial or recreational fisheries and return to spawn in a natural area or enhancement facility in numbers exceeding the estimated spawning capacity of the area or facility.³⁰
27. The Chehalis First Nation has an ESSR Licence to harvest surplus Fraser sockeye and chum returning to the Weaver Creek enhancement facility.³¹ Surplus salmon are harvested by beach seine at the Harrison River/Morris Creek confluence and by brailing equipment at the entrance to the Weaver Creek spawning channel.³²

Stewardship and Community Involvement

28. The term “stewardship” as used by DFO means the activities of all Canadians caring for their land, air and water and sustaining the natural processes on which life depends.³³ In 2001, OHEB formed a Stewardship and Community Involvement unit to lead the integration and strategic development of stewardship and community involvement programs for habitat and enhancement activities in the Pacific Region.³⁴ This unit is within the Salmonid Enhancement Program (see section “Salmonid Enhancement Program” below).
29. DFO’s Regional guiding principles are supposed to be consistent with those of the Canada Stewardship Agenda and the national Oceans Sector Stewardship Framework.³⁵ These documents recognize and confirm that stewardship is

³⁰ Ringtail Document CAN007410 at 1.

³¹ Ringtail Document CAN048122 at 2.

³² *Ibid.*

³³ Stewardship and Community Involvement, online: Fisheries and Oceans Canada <<http://www.pac.dfo-mpo.gc.ca/sep-pmvs/stewardship-intendance-eng.htm>> [Stewardship and Community Involvement Website], citing Canada Stewardship Agenda: Naturally Connecting Canadians, 2002.

³⁴ Ringtail Document CAN002680 at 113.

³⁵ Stewardship and Community Involvement Website. For more information on Canada’s Stewardship Agenda see: <http://www.stewardshipcanada.ca/>. There is little substantive information on the Oceans Sector Stewardship

implemented at the local level, recognise the existence of diverse social and economic conditions and introduce integrated planning as a concept.³⁶

Salmonid Enhancement Program

30. The Salmonid Enhancement Program (“SEP”) only exists within the Pacific Region and includes hatcheries, community stewardship and resource restoration activities.³⁷ SEP applies to all salmonids: sockeye, chum, coho, pink and chinook salmon as well as cutthroat and steelhead trout.³⁸ SEP was established in the 1970s primarily to increase harvest,³⁹ but according to DFO, it now has three major functions:⁴⁰
- a. Fish production: To conserve and preserve vulnerable salmon stocks and to sustain fisheries;
 - b. Community involvement: To increase public awareness and build community stewardship; and
 - c. Resource restoration: restoring, developing and improving fish habitat.
31. In accordance with the three major functions, there are three main program components (or “units”) within SEP:
- a. Major Enhancement Operations Facilities;
 - b. Community Involvement Program (including Community Economic Development Program facilities); and
 - c. Resource Restoration Program.
32. As of April, 2011, there were 23 major enhancement facilities and spawning channels managed by government employees, 21 community hatcheries operated as part of the Community Economic Development Program and about

Framework in Ringtail or on the World Wide Web, but see Ringtail Documents CAN025166 at 4 and CAN174844 at 3.

³⁶ *Ibid.*

³⁷ Ringtail Document CAN185557 at 5.

³⁸ Salmon Enhancement Program, online: Fisheries and Oceans Canada <<http://www.pac.dfo-mpo.gc.ca/sep-pmvs/about-sujet-eng.htm>> [SEP Website].

³⁹ Ringtail Document CAN175093 at 11.

⁴⁰ Ringtail Document CAN185557 at 8 (as of September 2010).

350 public involvement projects (“PIPs”) supported by 18 DFO Community Advisors.⁴¹

33. DFO states that SEP has a multi-pronged approach to enhancing wild salmon stocks that includes:⁴²
- a. Hatcheries: Provision of controlled spawning, protected incubation and, usually, rearing of salmon to fry or smolt size;
 - b. Spawning channels: Groundwater or river-fed structures that increase the available area and improve conditions for spawning and in-gravel incubation;
 - c. Semi-natural fish culture structures: Incubation boxes, side-channel spawning/rearing, and so forth, to increase freshwater survival with low tech/low-cost intervention;
 - d. Fishways: Placement of structures or removal of obstructions to improve fish passage;
 - e. Habitat improvements: Placement or removal of structures to increase spawning and rearing productivity;
 - f. Lake and stream enrichment: Addition of nutrients to lakes and streams to increase primary productivity and hence food availability for juvenile salmon; and
 - g. Public education: Classroom and educational activities, outdoor-club, Aboriginal and other community- based activities to increase awareness and stewardship of fish stocks and habitat and to provide economic opportunities in remote communities.
34. Until 2007, SEP unit managers at Regional Headquarters all reported directly to the RD of OHEB. Since approximately 2008, these managers have reported to a Director of SEP⁴³ who reports directly to the RD of OHEB.⁴⁴ Although SEP is

⁴¹ Ringtail Document CAN185557 at 8; SEP PowerPoint presentation at 4 provided to the commission on March 8, 2011 by DOJ [SEP PowerPoint Presentation].

⁴² Ringtail Document CAN033598 at 58.

⁴³ Ringtail Document CAN063231 at 9. The Directors of SEP: Greg Savard from September 2008 to May 2010, Carol Cross for June and July 2010 and Kaarina McGivney as of August 2010.

⁴⁴ Rebecca Reid from 2007 to May 2010 and Greg Savard as of May 2010.

part of OHEB in the Pacific Region, it reports functionally to, and is funded through, Ecosystems and Fisheries Management nationally.⁴⁵

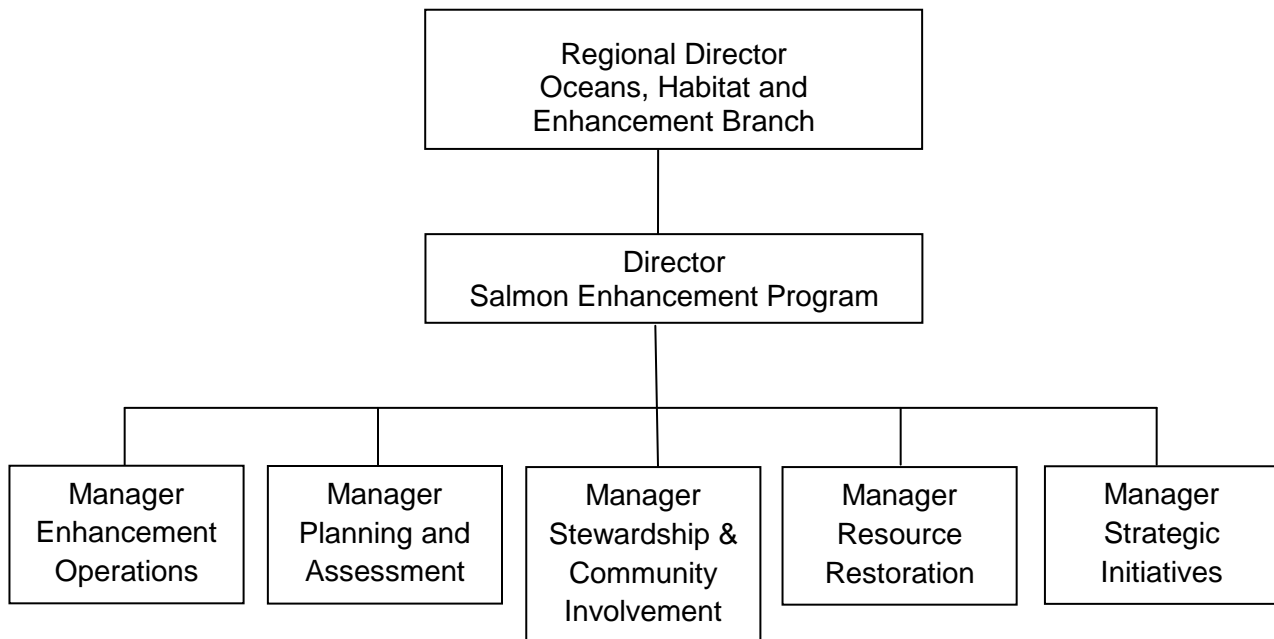


Figure 1: Organisational structure of Salmonid Enhancement Program

35. An executive level SEP Leadership Team provides direction to SEP. Its members include:⁴⁶
- a. RD, OHEB (Team Lead);
 - b. RD, Fisheries and Aquaculture Management (“FAM”) and other FAM staff at National Headquarters;
 - c. RD, Science;
 - d. Director of SEP;⁴⁷
 - e. Area Directors; and
 - f. SEP Managers/OHEB Area Chiefs as required.

⁴⁵ Ringtail Documents CAN063231 at 10 and CAN027637 at 5.

⁴⁶ Ringtail Documents CAN149323 at 2 and CAN063231 at 10.

⁴⁷ Note: CAN149323 are draft terms of reference for the SEP Leadership Team and the SEP Director is not listed as a member of the team. However, the document is dated November 2007 and the first Director of SEP took the position in 2008.

36. Key SEP program decisions are made by the Regional Management Committee.⁴⁸

Evolution of SEP objectives

37. When DFO launched SEP in 1977, the goal was to arrest - and reverse – salmonid population decline by doubling the catch of salmon over thirty years.⁴⁹ One critical assumption was that enhancement could mitigate lost or degraded salmon habitat.⁵⁰
38. According to DFO, the main goals of SEP have changed since its inception in 1977, with the emphasis shifting from fish production for harvest to conservation and the integration of enhancement, habitat and harvest activities.⁵¹ The current goals are stated as:⁵²
- a. Restore depleted stocks to higher levels of abundance (by increasing freshwater survival using hatcheries and spawning channels or indirectly through habitat improvement);
 - b. Mitigate major habitat losses (including from dams and urbanization impacts);
 - c. Provide harvest opportunities (especially for terminal or selective fisheries); and
 - d. Re-establish extirpated stocks (by introduction of fish from similar stocks into abandoned and presumably underutilized habitat).

SEP reviews

39. SEP has been reviewed a number of times. The first “review” was in fact a comprehensive study of the economic rationale for salmonid enhancement that was produced by a working group of federal and provincial government economists who were tasked with overseeing the economic and social planning

⁴⁸ Ringtail Document CAN063231 at 10.

⁴⁹ *Ibid.* at 4; SEP Website.

⁵⁰ SFU Speaking for the Salmon Series, *Reconciling the conservation of wild salmon and the production of enhanced salmon under Canada’s Wild Pacific Salmon Policy: A discussion* (February 23-24, 2009), online: <<http://www.sfu.ca/cstudies/science/resources/1273697823.pdf>> [SFU Symposium] at 4.

⁵¹ Ringtail Document CAN033598 at 58.

⁵² *Ibid.*

of the proposed SEP in 1976.⁵³ There were also reviews in 1984,⁵⁴ 1985,⁵⁵ 1988,⁵⁶ 1993,⁵⁷ 1994⁵⁸ and 2005.⁵⁹

SEP risk assessment

40. The September 2007 SEP risk assessment identified the following as high risk areas:⁶⁰
- a. Inability to adequately demonstrate performance;
 - b. Insufficient biological assessment and research to address future needs; and
 - c. Outdated performance measurement strategy.

2009 program review

41. The DFO Audit and Evaluation Directorate reviewed SEP in 2008/09.⁶¹ The evaluation found SEP was aligned with federal government priorities and DFO mandates and strategic outcomes. It also found SEP has had success in meeting hatchery production targets, providing community outreach and raising public awareness of conservation and protection of fish habitat.⁶² However, the evaluation identified a lack of science and research-based support.⁶³ It recommended finalising a performance measurement strategy and developing facility infrastructure and succession plans.⁶⁴ The SEP Revitalization Plan (see section “SEP Revitalization” below) is intended to address these recommendations.⁶⁵

⁵³ See Ringtail Documents CAN000415 and CAN000416-429 (appendices).

⁵⁴ Ringtail Document CAN000431.

⁵⁵ Ringtail Document CAN000410.

⁵⁶ Ringtail Document CAN000433.

⁵⁷ ARA Consulting Group Inc., *Program Review: Salmonid Enhancement Program*, April 1993 (DFO#NCR92-255). Not available in Ringtail, but cited to in CAN063231 at 10, footnote 10.

⁵⁸ Ringtail Document CAN000412.

⁵⁹ Ringtail Documents CAN281635 and CAN255079.

⁶⁰ Ringtail Documents CAN002953 and CAN149326 at 2.

⁶¹ Ringtail Documents CAN075232 at 47 and CAN069301 at 25.

⁶² Ringtail Documents CAN075232 at 47 and CAN027637.

⁶³ Ringtail Document CAN027637 at 22-23.

⁶⁴ Ringtail Documents CAN075232 at 47 and CAN027637 at 7.

⁶⁵ Ringtail Document CAN075232 at 47.

SEP contract audit

42. Treasury Board requested a program evaluation and audit of 2006 SEP contracts in response to Treasury Board's decision to extend SEP sole source contracting authorities.⁶⁶ This internal audit was completed in June 2009.⁶⁷

SEP Revitalization

43. As part of a Strategic Program Review in 2007, a SEP Revitalization initiative was launched by the RD of OHEB to help SEP respond to key strategic challenges, directions and risks within the context of the Pacific Implementation Plan 2006-2010 (under Pacific Fisheries Reform).⁶⁸ These challenges include adapting to the WSP and its goal of integrated resource planning, climate change and its impact on fish production, the *Species at Risk Act* and its associated recovery plans for vulnerable salmon stocks and responding to SEP's aging hatcheries and spawning channels.⁶⁹ A key challenge for SEP is to make the best use of limited resources and respond to current and emerging needs, given SEP's limited flexibility due to high fixed costs, increasing operational costs and resistance of stakeholders to program changes.⁷⁰
44. The idea is to re-shape SEP programs over time through a series of change initiatives and integrated planning processes envisioned under the WSP.⁷¹
45. SEP Revitalisation focuses on five key areas:⁷²
 - a. Strategic funding approaches (improve business planning, infrastructure strategy, review of major program components such as Resource Restoration and the Community Involvement Program, including a separate review of the Community Economic Development Program (see section

⁶⁶ Ringtail Document CAN022344 at 9.

⁶⁷ Ringtail Document CAN157169.

⁶⁸ Ringtail Documents CAN166588 at 4 and CAN149323 at 1. Note: SEP Revitalization was originally called the "SEP Long Term Strategic Plan".

⁶⁹ Ringtail Document CAN149325 at 1.

⁷⁰ *Ibid.*

⁷¹ Ringtail Document CAN149324 at 1.

⁷² Ringtail Document CAN212278 at 3.

- “Community Economic Development Program” below), enhance partnering arrangements, update of production planning prioritisation plans);
- b. Production planning (improve decision-making, link to Regional priorities and WSP implementation guidelines);
 - c. SEP evaluation and contract audit (complete);⁷³
 - d. Biological risk assessment (determine core priorities given reduced capacity); and
 - e. Human resource strategies and planning (succession planning/knowledge transfer, staff key positions, review Area organisational structure).
46. The SEP Leadership Team is supposed to champion the initiative by providing strategic advice and advancing cross-program linkages in support of SEP Revitalization.⁷⁴
47. Under SEP Revitalization, work was initiated on a number of elements, including:⁷⁵
- a. Improving processes to engage senior managers, Fisheries Management and Stock Assessment on key SEP strategic issues;
 - b. A review of integrated fish production planning and decision-making processes and prioritization tools (ongoing⁷⁶);
 - c. Development of a strategy to improve the planning and budget allocation process (ongoing⁷⁷);
 - d. Development of infrastructure recapitalization strategies and plans and improved capital planning processes in conjunction with Real Property Technical Services (ongoing⁷⁸);
 - e. Development of a SEP Logic Model, as part of a Results-Based Management and Accountability Framework, to set the foundation for improved planning and performance evaluation (complete; see section “SEP Logic Model” below);

⁷³ See Ringtail Documents CAN027637 and CAN157169.

⁷⁴ Ringtail Document CAN149323 at 1.

⁷⁵ Ringtail Documents CAN022344 at 8-9, CAN166588 at 4 and CAN212278 at 4.

⁷⁶ Ringtail Document CAN212278 at 4-5; SEP Revitalization: An Update, PowerPoint Presentation dated May 18, 2010 [SEP Revitalization Presentation] at 3.

⁷⁷ Ringtail Document CAN212278 at 4.

⁷⁸ *Ibid.*

- f. Examining current partnering arrangements and opportunities for revenue generation and to access new sources of funding (inactive as of May 2010⁷⁹);
 - g. Implementation of the Community Economic Development Program (“CEDP”) review recommendations; and
 - h. Program related reviews of Resource Restoration, CEDP and the Community Involvement Program (ongoing except for the CEDP review which is complete⁸⁰).
48. Work on a biological risk assessment framework is ongoing. The SEP Logic Model has been developed (see section “SEP Logic Model”, below). In summary, although some constituents of the SEP Revitalization initiative have been completed, as of April 2011 the work on this initiative has not been concluded and there is no scheduled completion date.

SEP Logic Model

49. The SEP Logic Model was created by DFO to form the basis for a performance measurement framework for SEP.⁸¹ The model has been summarised this way, “Every program undertakes activities that consume inputs to produce outputs that contribute to outcomes”.⁸²
50. The SEP Logic Model sets out the following:⁸³
- a. Eight SEP Activities:
 - a. Fish culture;
 - b. Assessment;
 - c. Habitat restoration;
 - d. Foster delivery of public education and awareness;
 - e. Participate in public stewardship;
 - f. Planning/consultation;
 - g. Technical support; and
 - h. Facilities maintenance;

⁷⁹ SEP Revitalization Presentation at 3.

⁸⁰ Ringtail Document CAN212278 at 4.

⁸¹ Ringtail Document CAN149326 at 3.

⁸² *Ibid.* at 4.

⁸³ Ringtail Document CAN212278 at 12.

- b. Creating five SEP Outputs:
 - a. Fish production from hatcheries and managed spawning channels;
 - b. Restored and enhanced fish habitat;
 - c. Salmon stock assessment information;
 - d. Public education and awareness programs; and
 - e. Partnerships with First Nations, communities and external parties;
 - c. Leading to three SEP Immediate Outcomes:
 - a. Vulnerable salmon populations are supported;
 - b. Enhanced salmon to provide harvest opportunities; and
 - c. First Nations, local communities and external parties participate in cooperative fisheries and watershed stewardship activities;
 - d. In turn, leading to three SEP Intermediate Outcomes:
 - a. The public has access to harvest opportunities; and
 - b. The public supports the protection, stewardship and rebuilding of salmon and their habitat;
 - e. Resulting in one Final Outcome: Healthy and diverse salmon populations that support harvest opportunities and contribute to sustainable marine and freshwater ecosystems.
51. The Final Outcome is essentially a reformulation of the Wild Salmon Policy goal. There has been limited external consultation with stakeholders regarding the SEP Logic Model.

SEP program components

Major Fish Enhancement Facilities

52. Hatcheries and spawning channels are a major component of SEP. In BC, there are 23 major hatchery facilities and spawning channels run by DFO.⁸⁴

History of Fraser sockeye enhancement

53. Fraser River sockeye enhancement was first attempted in the late 19th century when the Bon Accord hatchery was built at Port Mann, BC and between 1901

⁸⁴ Ringtail Document CAN075232 at 47; SEP PowerPoint Presentation at 4.

and 1917, several other hatcheries were constructed.⁸⁵ In 1922, the Royal Commission on B.C. Fisheries formally questioned the benefits of these hatchery operations and requested a scientific evaluation which was begun in 1925 at Cultus Lake by the Biological Board of Canada.⁸⁶ These studies showed that the benefits attributable to artificial propagation of sockeye were minor and that the number of sockeye adults produced through enhancement had been negligible.⁸⁷ As a result, all sockeye hatcheries were closed in 1937.⁸⁸

54. From the 1940s to the 1960s, the International Pacific Salmon Fisheries Commission (“IPSFC”) implemented a number of projects to remove obstructions and build fishways which included building spawning channels in the 1960s at Weaver Creek in the lower Harrison, Gates Creek in the upper Anderson-Seton system and in the Nadina River.⁸⁹ In 1946, Farwell Canyon fishways were constructed to help sockeye migrating to the Chilko River and Lake system.⁹⁰ These fishways have now been abandoned for decades.⁹¹
55. In 1988, DFO built a spawning channel on the Chilko River.⁹² This spawning channel was intended to enhance the sockeye population spawning at the outlet of Chilko Lake and was the result of DFO’s Fraser River Sockeye Task Force’s strategy to increase production potential of Fraser sockeye.⁹³ However, by 2003, DFO recognised that the channel had not met its biological objective and it was decommissioned.⁹⁴
56. There was hatchery production for Fraser sockeye at Shuswap Hatchery for the Upper Adams area in 1988, 1992, 1996, 2000 and 2001.⁹⁵ The program is

⁸⁵ Ringtail Document CAN018954 at 39.

⁸⁶ *Ibid.* at 40.

⁸⁷ Ringtail Document CAN018954 at 40.

⁸⁸ *Ibid.*

⁸⁹ *Ibid.*

⁹⁰ Ringtail Document CAN022174 at 18.

⁹¹ *Ibid.*

⁹² Ringtail Document CAN018954 at 40.

⁹³ Ringtail Documents CAN022174 at 12 and CAN046022 at 2.

⁹⁴ Ringtail Document CAN022174 at 12.

⁹⁵ Ringtail Documents CAN002785 and CAN170520; SEP PowerPoint Presentation at 12.

generally only run in dominant return years. SEP submitted fry supplementation project proposals for Upper Adams sockeye to the Pacific Salmon Commission's Southern Boundary Restoration & Enhancement Fund (the "SBREF") in 2005 through 2008, but because spawner numbers were so low in these years enhancement could not be implemented (because there were too few spawners for brood stock).⁹⁶ In 2009, there were no funds available from the SBREF and no funds within SEP to support this hatchery production.

57. There are currently six Fraser River sockeye hatchery and or spawning channel facilities in operation: the Gates Creek Channel, Weaver Creek Channel, Horsefly Spawning Channel, Nadina Spawning Channel, Inch Creek Hatchery (Upper Pitt River stock) and Cultus Lake Lab Hatchery.⁹⁷
58. In addition, there are two flow control facilities that support sockeye production. The McKinley Lake Flow Control facility draws cold water from the outlet arm of McKinley Lake and discharges it into McKinley Creek during sockeye spawning season. This facility was built by the IPSFC in the late 1960s and has been operated by DFO since 1986, mainly on dominant and subdominant return years.⁹⁸ The Mitchell Dam is another flow control structure that provides two feet of negative water storage in Mitchell Lake.⁹⁹ It was built by DFO in 1988/89 to provide warm water storage as part of a planned spawning channel on the Mitchell River that was never constructed; its goal is to provide increased incubation success for downstream-spawning sockeye and it is still in operation.¹⁰⁰

Fraser sockeye enhancement

59. Compared to other areas of the Pacific Region and compared to other salmonid species there is relatively little Fraser River sockeye enhancement. This may be

⁹⁶ Ringtail Document CAN172738.

⁹⁷ As of April 2011; Ringtail Documents CAN185557 at 9 and CAN075232 at 45.

⁹⁸ Ringtail Document CAN022174 at 24.

⁹⁹ *Ibid.* at 26.

¹⁰⁰ *Ibid.*

due to a number of factors, including the results of the experiments with sockeye hatchery production in the 1920s and 1930s, the susceptibility of sockeye to viruses like infectious hematopoietic necrosis and the fact that both spawning and lake rearing habitat have been generally abundant.¹⁰¹

60. According to DFO, enhanced Fraser sockeye stocks are not significant contributors to any of the Fraser run-timing groups except for Weaver sockeye which has been a relatively significant contributor to the Late-runs in two of four cycle years (the 2008 and 2009 cycle lines).¹⁰² Enhancement is, however, a significant contributor to the abundance of at least two Fraser sockeye stocks: Weaver and Gates sockeye¹⁰³ and arguably is a significant contributor to the Cultus population as well.¹⁰⁴

Annual consultation on production priorities

61. SEP production priorities are addressed during the annual SEP hatchery production planning process.¹⁰⁵ This process is Area-based and is linked to Regional budget and work plans.¹⁰⁶ Stakeholders and First Nations have input into this process through Integrated Harvest Planning Committee or sectoral committees like the Sport Fishing Advisory Board or Commercial Salmon Advisory Board as well as through local public consultation processes.¹⁰⁷

Community Involvement Program

62. DFO's Community Involvement Program ("CIP") aims to bring people from communities throughout the province together to participate in locally-based enhancement efforts.¹⁰⁸ This Program involves the:¹⁰⁹

¹⁰¹ SEP PowerPoint Presentation at 12; Interview of Greg Savard on March 22, 2011.

¹⁰² Ringtail Document CAN075232 at 46.

¹⁰³ Ringtail Document CAN018954 at 40

¹⁰⁴ Ringtail Document CAN186055.

¹⁰⁵ Ringtail Document CAN055763.

¹⁰⁶ Presentation on the Salmonid Enhancement Program to the Sport Fish Advisory Board, dated February 3, 2008.

¹⁰⁷ Ringtail Document CAN055763.

¹⁰⁸ Community Involvement Program, online: Fisheries and Oceans Canada <<http://www.pac.dfo-mpo.gc.ca/sep-pmvs/sci-icp/cip-ppc-eng.htm>>.

- a. Community Economic Development Program;
- b. Public Involvement Program (“PIP”) which helps to secure donated labour, expertise and other resources to re-establish salmonid populations in rivers and streams and includes:
 - i. Streamkeepers Program, which trains and supports citizens in the monitoring, protection and improvement of aquatic habitat;
 - ii. Community Advisors who provide technical advice and financial support to volunteer salmon enhancement and watershed stewardship projects;
 - iii. A range of educational material to teach school children about the value of the salmon resource (e.g. “Salmonids in the Classroom”);
 - iv. StreamTalk stewardship newsletter; and
 - v. Storm Drain Marking Program; and
- c. Salmon Enhancement and Habitat Advisory Board, which is a public consultation group intended to assist DFO in developing policy.¹¹⁰

Community Economic Development Program

63. Through SEP’s CEDP, DFO contracts with community-based groups to operate local enhancement projects such as hatcheries, raceways, spawning channels or aeration towers.¹¹¹ The program is intended to help restore depleted salmonid stocks in British Columbia and to improve the self-reliance, independence and social and economic stability of Aboriginal people in British Columbia.¹¹²
64. The CEDP was initiated as a Native Pilot Program consisting of two projects in the 1976/77 fiscal year. The experimental program was expanded to six projects in fiscal year 1977/78, and they became elements of the planning that resulted in SEP.¹¹³ During the first year it was recognized that non-Aboriginal communities with a strong interest in salmonid enhancement, and suffering from high unemployment rates, could also benefit from the program.¹¹⁴

¹⁰⁹ *Ibid.*

¹¹⁰ SEHAB Who We Are, online: Salmon Enhancement and Habitat Advisory Board <<http://www.sehab.org/who-we-are>>.

¹¹¹ Community Economic Development Program, online: Fisheries and Oceans Canada <<http://www.pac.dfo-mpo.gc.ca/sep-pmvs/projects-projets/cedp-pdec/index-eng.htm>> [CEDP Website].

¹¹² *Ibid.*; Ringtail Document CAN022655 at 5.

¹¹³ Ringtail Document CAN000314 at 16.

¹¹⁴ *Ibid.*

65. As of April 2011, there were 21 CEDP projects.¹¹⁵ More than half of the projects are operated by First Nations and the rest by community organisations. The majority of projects are located in remote or rural communities.¹¹⁶ Specifically, CEDP projects are involved in five key activities:¹¹⁷
- a. Fish culture (including collecting brood stock, spawning and incubation, hatchery rearing of fry, operating sea pens and fish culture support to other facilities);
 - b. Project operations (including administration, off-site maintenance such as fish way or fish ladder maintenance and on-site maintenance such as grounds keeping);
 - c. Habitat conservation (including fry salvage programs, riparian planting and management, water quality and temperature recording, habitat surveys and mapping and habitat restoration);
 - d. Public stewardship (including hosting field trips on site, off-site field trips and educational programs, watershed planning processes, trade shows/education fairs/community events and local government planning processes); and
 - e. Assessment (including fry counting programs, fry density inventories, hydraulic sampling programs, sampling for biological traits and adult counting fences).
66. Each CEDP project is supposed to be involved in all five types of these key activities to various degrees, but fish culture is the most dominant project activity.¹¹⁸
67. The CEDP had a significant budget reduction in the 1995/96 fiscal year.¹¹⁹
68. The CEDP was reviewed in 1982¹²⁰ and 2005/06.¹²¹ The 2005/06 review identified a program funding shortfall and also found that DFO staff were unable to provide an adequate level of support and direction to CEDP contractors.¹²²

¹¹⁵ SEP PowerPoint Presentation at 4.

¹¹⁶ CEDP Website.

¹¹⁷ *Ibid.*

¹¹⁸ *Ibid.*

¹¹⁹ Ringtail Document CAN000314 at 17.

¹²⁰ Ringtail Document CAN000124.

¹²¹ Ringtail Documents CAN022179 and CAN000072.

¹²² Ringtail Document CAN000072 at 8.

DFO's response to the review recommendations was to develop a four-year plan for CEDP program renewal.¹²³

Public Involvement Program

69. PIP provides seed funding (usually less than \$10,000) and in-kind contributions of technical support by a DFO Community Advisor to volunteer-based projects operated by individuals and community organisations at arm's length from DFO.¹²⁴ The program includes projects focused on habitat conservation and restoration, stewardship, public education and outreach.¹²⁵ Each DFO Community Advisor allocates seed funding for materials and supplies to support local priority PIP projects in his or her geographic area of responsibility.¹²⁶ Projects include small scale hatcheries, habitat restoration, stream monitoring, assessment, watershed planning, education, awareness, advisory services and streamkeepers. In total, Community Advisors have an annual operating budget of approximately \$1.35 million.¹²⁷
70. The Streamkeepers Program was piloted in 1994 and launched officially in 1995.¹²⁸ It provides training and technical support to community groups wanting to become involved in habitat assessment, monitoring and rehabilitation activities.¹²⁹ Also in 1995, SEP's Community Involvement Division produced the *Streamkeepers Handbook: a Practical Guide to Stream and Wetland Care*.¹³⁰ The Handbook sets out the objectives of the Streamkeepers Program:¹³¹
- a. To provide volunteers with the training and support required to protect and restore local aquatic habitats;
 - b. To educate the public about the importance of watershed resources; and

¹²³ Ringtail Document CAN056845.

¹²⁴ Ringtail Document CAN173789 at 1.

¹²⁵ *Ibid.*

¹²⁶ Ringtail Document CAN173789 at 1.

¹²⁷ Ringtail Document CAN063780 at 2.

¹²⁸ Ringtail Document CAN002800 at 75.

¹²⁹ *Ibid.*

¹³⁰ Ringtail Document CAN024228.

¹³¹ *Ibid.* at 15.

- c. To encourage communication and cooperation in watershed management.
71. Streamkeepers work with SEP's Community Advisors who provide technical assistance for stream enhancement projects and help Streamkeepers coordinate with government, other agencies, experts and community groups.¹³² The Pacific Streamkeepers Federation is a non-profit society that provides support for many volunteer streamkeeper groups in BC and the Yukon.¹³³ The aims of the Federation are to:¹³⁴
- a. Provide an information exchange for streamkeeper and enhancement groups;
 - b. Help co-ordinate streamkeeper and enhancement efforts;
 - c. Lend a larger voice to streamkeeper and enhancement issues;
 - d. Facilitate training for streamkeeper and enhancement groups;
 - e. Help like-minded groups get started;
 - f. Provide support for existing streamkeeper and enhancement groups;
 - g. Foster co-operation amongst watershed stakeholders; and
 - h. Promote local management of aquatic resources.
72. In 2010, there were 86 local Streamkeeper and hatchery organisations that were members of the Pacific Streamkeepers Federation.
73. For more than 25 years, DFO has supported educators in B.C. and the Yukon who teach their students to understand, respect and protect freshwater, estuarine and marine ecosystems and to recognize how all humans are linked to these complex environments. This is done through OHEB's Stream to Sea education program.¹³⁵

¹³² Ringtail Document CAN024228 at 15-16.

¹³³ *Ibid.* at 16.

¹³⁴ About PSkF, online: The Pacific Streamkeepers Federation <<http://www.pskf.ca/program/about.html>>.

¹³⁵ Stream to Sea, online: Fisheries and Oceans Canada <<http://www.pac.dfo-mpo.gc.ca/education/index-eng.htm>>.

Salmon Enhancement and Habitat Advisory Board

74. According to DFO, the Salmon Enhancement and Habitat Advisory Board (“SEHAB”) represents the views of community stewardship volunteers on the protection, restoration and enhancement of salmon and salmon habitat in the Pacific Region, many of whom are involved in PIP projects.¹³⁶ SEHAB executive members meet with the Director of SEP and or the RD, OHEB to discuss stewardship issues. As of May 22, 2009, SEHAB received \$30,000 annually from SEP to cover members’ meeting and travel costs three to four times a year.¹³⁷
75. SEHAB was originally known as the Salmonid Enhancement Task Group (“SETG”) and was formed in 1976 under SEP.¹³⁸ SETG was originally tasked with providing advice on the species and stocks to be enhanced as well as advice on specific policies and programs.¹³⁹ In the fall of 1996, the SETG name was changed to SEHAB when DFO’s Habitat Management Program and SEP were combined into one branch.¹⁴⁰

Resource Restoration Program

76. In partnership with the community, SEP undertakes significant or major habitat rehabilitation projects beyond the skills, ability, duration and budget of volunteers.¹⁴¹ These efforts include building side-channels, improving water flows, and stabilising stream banks, rebuilding estuary, removing barriers to fish migration and planting streamside vegetation.¹⁴² SEP works on these projects with a wide variety of partners including First Nations, industry, community and conservation groups, private landowners and other government agencies.¹⁴³

¹³⁶ Ringtail Document CAN063780 at 1-2.

¹³⁷ *Ibid.* at 2.

¹³⁸ *Ibid.* at 1.

¹³⁹ Ringtail Documents CAN001027 at 10 and CAN000400 at 28.

¹⁴⁰ Ringtail Document CAN063780 at 1.

¹⁴¹ Ringtail Document CAN014207 at 6.

¹⁴² Resource Restoration, online: Fisheries and Oceans Canada <<http://www.pac.dfo-mpo.gc.ca/sep-pmvs/restoration-restauration-eng.htm>> [Resource Restoration Website].

¹⁴³ *Ibid.*

Often, SEP biologists and engineers design the projects and provide technical advice and assistance and the community partner provides resources and some funding.¹⁴⁴

77. A list of Lower Fraser Area habitat restoration projects carried out by SEP's Resource Restoration Program that may provide benefits to Fraser River sockeye is set out in Table 3 of the commission's Technical Report 12 at page 57.

SEP budget

78. Funding to SEP in 1990 was \$38 million, but this declined to approximately \$23 million by 2003/04.¹⁴⁵ Despite the budget reduction, annual expenditures remained at about \$26 million because SEP did not have the approval to close facilities which was the only way to meet the size of its budget cut.¹⁴⁶ The resulting operational budget gap had to be funded by contributions from other regional programs.¹⁴⁷ In 2007, SEP's annual operating budget was stabilized and this addressed the historic SEP "legacy debt" (a structural deficit dating from 1996¹⁴⁸) although it did not resolve a continued shortfall between budget and program expenditures which in 2008 was approximately \$450-550,000.¹⁴⁹ For 2010, SEP's budget was about \$26 million;¹⁵⁰ for 2010/11, the SEP budget is \$27 million.¹⁵¹
79. Infrastructure funding of \$8 million for SEP was announced in 2009 as part of Canada's Economic Action Plan.¹⁵² This money is to be used to upgrade 33 hatcheries and facilities from 2009 to 2011, including \$5.4 million to refurbish 19 salmon hatcheries and spawning channels and \$2.6 million to repair and upgrade

¹⁴⁴ Resource Restoration Website.

¹⁴⁵ Ringtail Document CAN022668 at 44 and 94.

¹⁴⁶ Ringtail Document CAN063231 at 9.

¹⁴⁷ Ringtail Documents CAN022668 at 94 and CAN175093 at 11.

¹⁴⁸ Ringtail Document CAN075722.

¹⁴⁹ Ringtail Documents CAN075232 at 47, CAN022344 at 8, CAN011103, CAN166588 at 5-7 and CAN056010 at 2.

¹⁵⁰ See e.g. Ringtail Documents CAN016803 and CAN019394.

¹⁵¹ Ringtail Document CAN185557 at 6.

¹⁵² Ringtail Document CAN157321.

buildings at 26 SEP facilities.¹⁵³ Funds from the Economic Action Plan must be spent entirely in the two years and DFO is responsible for any shortfall.¹⁵⁴ This money does not, however, address SEP's ongoing operational issues that arise from the fact that the program does not have enough annual funds to fully run its facilities.¹⁵⁵

80. Most of SEP funding (~75%) goes to its major enhancement facilities and the Community Economic Development Program.¹⁵⁶
81. With respect to Fraser sockeye and SEP, money has been allocated through the FAM budget as follows:¹⁵⁷
 - a. 2005/06: 1,260,069;
 - b. 2006/07: 1,462,525;
 - c. 2007/08: 1,479,451;
 - d. 2008/09: 1,174,591; and
 - e. 2009/10: 1,125,938.

Fraser River Action Plan

82. In the 1990 federal budget, the Fraser River Watershed was singled out as requiring priority action because of its high fisheries, ecosystem and environmental values.¹⁵⁸ In 1991, as part of its Green Plan, the government established the Fraser River Action Plan ("FRAP") which was a program sponsored by DFO and Environment Canada.¹⁵⁹ The plan was to last six years

¹⁵³ Ringtail Document CAN175478 at 2.

¹⁵⁴ Ringtail Document CAN022736 at 30.

¹⁵⁵ Ringtail Document CAN063231 at 4.

¹⁵⁶ Ringtail Documents CAN075232 at 47 and CAN063231 at 2; SEP PowerPoint Presentation at 4.

¹⁵⁷ BMB Data Consulting Services, *Costs Attributable by the Department of Fisheries and Oceans for Sockeye Salmon in the Fraser River*, Phase II Final Report, version 3, October 15, 2010 at 20.

¹⁵⁸ Ringtail Document CAN002592 at 75.

¹⁵⁹ *Ibid.*

and came with \$100 million in funding.¹⁶⁰ The FRAP ended on March 30, 1997.¹⁶¹

83. Fraser River Action Plan goals were to build partnerships, reverse environmental degradation in the Fraser River Basin, rehabilitate degraded areas and develop a management program to achieve sustainable development.¹⁶² Specific objectives included a 30% reduction in the discharge of harmful industrial effluents by 1996, and the virtual elimination of releases of persistent toxic substances by the year 2000. Another objective was to double sockeye salmon stocks within 20 years from an average of 8 million fish in the 1975-86 period to 16 million.¹⁶³
84. The first objective, building partnerships, involved the creation of the Fraser River Estuary Management Program and the Burrard Inlet Environmental Action Plan (see section “Fraser River Estuary Management Program”, below) and the precursor to the Fraser Basin Council (see section “Fraser Basin Council”, below).¹⁶⁴
85. From 1991 to 1995, the FRAP created or improved more than 167,000 m² of spawning or rearing habitat in the Fraser River Basin from Prince George to the Fraser estuary.¹⁶⁵ As well, it improved habitat on about 70 km of streams.¹⁶⁶ This included reduced siltation through bank stabilization and fencing on ~5 km of the Chilliwack River, and tree planting and bank stabilization on many other streams aimed at improving rearing habitat.¹⁶⁷ However, a 1998 DFO review of FRAP found that FRAP did not succeed in achieving its originally-stated goal of restoring salmon populations to historic levels and that the activities undertaken

¹⁶⁰ Ringtail Document CAN045143 at 3.

¹⁶¹ Ringtail Document CAN002787 at 13 (para. 28.68).

¹⁶² Ringtail Documents CAN001363 at 10 and CAN045143 at 3.

¹⁶³ Ringtail Document CAN001363 at 10.

¹⁶⁴ Ringtail Document CAN045143 at 3.

¹⁶⁵ Ringtail Document CAN001363 at 11.

¹⁶⁶ *Ibid.*

¹⁶⁷ *Ibid.*

were too limited in scope to address the large-scale habitat changes occurring in the Fraser Basin.¹⁶⁸

86. The DFO review also concluded that the Fraser River was only slightly cleaner than prior to FRAP. However, FRAP had contributed to a much clearer picture of the extent, sources and potential for mitigation of pollution.¹⁶⁹

Resource Rebuilding Strategy

87. In 1998, the Minister of Fisheries and Oceans announced a five-year, \$100 million Resource Rebuilding Strategy which was aimed at conserving and protecting Pacific salmon and their habitat.¹⁷⁰ This strategy was part of the Pacific Fisheries Adjustment and Restructuring Program. Key components included:¹⁷¹
- a. Habitat Conservation and Stewardship Program: Created steward positions to work with communities on watershed management planning and habitat protection activities;
 - b. Habitat Restoration and Salmon Enhancement Program: Provided funding for projects to improve or create habitat, rebuild or conserve stocks or promote local resource and watershed stewardship;
 - c. Strategic Stock Enhancement Program: Funded the immediate use of existing hatcheries to conserve or rebuild endangered salmon stocks; and
 - d. Pacific Salmon Endowment Fund: A long-term fund, independently operated, to ensure a stable source of funding for projects developed by local stewardship groups.

Habitat Conservation and Stewardship Program

88. The Habitat Conservation and Stewardship Program (“HCSP”) was in place from 1998 to March 31, 2003.¹⁷² In B.C., the program was managed primarily through a Program Manager in the Habitat and Enhancement Branch, the five Area

¹⁶⁸ Ringtail Document CAN045143 at 6.

¹⁶⁹ *Ibid.* at 5-6.

¹⁷⁰ Ringtail Document CAN000976 at 1.

¹⁷¹ *Ibid.*

¹⁷² Ringtail Document CAN185837 at 14-15.

Chiefs and five Area Coordinators as well as a Steering Committee, an Operations Committee and DFO Regional Headquarters' support staff.¹⁷³ It was intended to provide funding to hire people to work within local communities to protect fish habitat rather than provide funding for capital projects.¹⁷⁴ The goal was to establish partnerships to enhance habitat protection and expand community capacity to steward fish habitat resources by:¹⁷⁵

- a. Incorporating fish habitat protection requirements into local land and water use plans;
 - b. Increasing public and stakeholder awareness of fish habitat requirements;
 - c. Improving habitat mapping and inventory data required for land management and resource planning;
 - d. Increasing local stream surveillance and monitoring;
 - e. Improving compliance monitoring of development projects;
 - f. Providing technical information, advice and support to partners and communities;
 - g. Piloting the development of watershed management plans for several priority watersheds;
 - h. Enhancing and restoring habitats as part of watershed management plan(s); and
 - i. Increasing community responsibility for watershed management.
89. Four types of positions (known as “stewards”) were developed and funded through HCSP: Stewardship Coordinator, Habitat Steward, Habitat Auxiliary (HA) and Habitat Fishery Officer. The latter two positions were DFO employees, while the former two were employed by “Community Partners” using program funding.¹⁷⁶ Approximately 100 steward positions were funded for each of the five years of the program time-frame.¹⁷⁷ Stewardship Coordinators and Habitat

¹⁷³ Ringtail Document CAN000976 at 2.

¹⁷⁴ *Ibid.*

¹⁷⁵ *Ibid.*

¹⁷⁶ *Ibid.* Community Partners included Local Roundtables, First Nations, local government and non-government organisations.

¹⁷⁷ *Ibid.*

Stewards were community liaisons who worked with advocacy groups to increase awareness of fish habitat requirements and to develop tools to implement habitat protection efforts.¹⁷⁸ Habitat Auxiliaries provided technical biological support to the Program; Habitat Fishery Officers focused on preventative approaches to enforcement to prevent impacts to fish habitats.¹⁷⁹

90. After the end of the program, DFO evaluated HCSP in 2003.¹⁸⁰
91. Although DFO employees, HAs were term appointments.¹⁸¹ The objective of the HCSP was to train HAs in fish habitat protection techniques and then have this knowledge and attitude transferred through the position (and person) to organisations in the resource and development sectors. DFO's evaluation of the HCSP reports that this objective was not met as most HAs were not hired by community and resource partners when the HCSP funding ended, but rather many became permanent DFO employees.¹⁸²

Habitat Restoration and Salmon Enhancement Program

92. The Habitat Restoration and Salmon Enhancement Program ("HRSEP") provided funding for habitat restoration projects from fiscal year 1997/98 to 2001/02.¹⁸³ The first year of the program was funded under the Pacific Salmon Revitalization Strategy and the subsequent years under the Pacific Fisheries Adjustment and Restructuring Program.¹⁸⁴
93. The focus of HRSEP was habitat restoration, stock rebuilding and resource and watershed stewardship.¹⁸⁵ In terms of habitat restoration, investments were made in community conservation projects including:¹⁸⁶

¹⁷⁸ Ringtail Document CAN000976 at 3.

¹⁷⁹ *Ibid.*

¹⁸⁰ Ringtail Document CAN022164.

¹⁸¹ *Ibid.* at 44-45.

¹⁸² *Ibid.* at 45.

¹⁸³ Ringtail Document CAN009534.

¹⁸⁴ *Ibid.*

¹⁸⁵ Ringtail Document CAN000976 at 4.

¹⁸⁶ *Ibid.*

- a. Building side channels, adding spawning gravel and placing large woody debris and boulders into streams to enhance and spawning and rearing habitat;
 - b. Planting riparian vegetation and stabilising eroding banks;
 - c. Installing fencing to restrict livestock access to salmon streams and protect riparian stability; and
 - d. Modifying barriers to fish passage and constructing water-storage dams in upper watersheds to improve water flows.
94. The salmon stock rebuilding portion of the program focused on increasing weak salmon populations through enhancement and assessment projects. Resource and watershed stewardship activities involved community-based initiatives such as stream inventories, habitat mapping, adult and juvenile fish monitoring, protecting habitat through watershed planning and development of community education programs.¹⁸⁷

Strategic Stock Enhancement Program

95. The stated objective for the Strategic Stock Enhancement Program was “to develop and implement, through local area-based programs and using existing hatcheries, the immediate enhancement of threatened stocks to ensure long-term maintenance of stock integrity and genetic diversity”.¹⁸⁸ The main focus of the program was to rebuild specific populations of Thompson and Upper Skeena River coho as well as Puntledge River summer chinook through short-term hatchery enhancement and fry releases to natal streams.¹⁸⁹ DFO also stated that it would identify priority watersheds for fish production planning and implementation of strategic stock and habitat enhancement.¹⁹⁰

¹⁸⁷ Ringtail Document CAN000976 at 4.

¹⁸⁸ *Ibid.* at 5.

¹⁸⁹ *Ibid.*

¹⁹⁰ *Ibid.*

96. The program's guiding principles included:¹⁹¹
- a. Enhancement efforts must be coupled with harvest restrictions;
 - b. Enhancement is not intended to maintain catch levels during wild stock rebuilding;
 - c. Enhancement efforts will be only one cycle;
 - d. Candidate stocks are those where returns are severely depressed, where under-utilised habitat or areas inaccessible to spawners exist and where brood stock are available and accessible to collection;
 - e. No transplantation;
 - f. No more than 30% of returning spawners collected from throughout the run; and
 - g. Matrix spawning for small populations.
97. Some parts of this program, for example certain hatchery operations that were established under HCSP program funding, are still operational.

Pacific Salmon Endowment Fund Society

98. The Pacific Salmon Endowment Fund Society ("PSEFS") is a non-profit society established by DFO to be the custodian of the Pacific Salmon Endowment Fund ("PSEF").¹⁹² PSEFS is also responsible for setting program priorities for funding by PSEF. Since 2001, the Pacific Salmon Foundation (the "PSF"; see section "Pacific Salmon Foundation" below) has had an agreement with the PSEFS to be the Program Manager for the annual funds and to participate in the development and growth of the fund.
99. The monies are to be used to develop recovery plans for specific watersheds to bring together actions aimed at rebuilding Pacific salmon stocks. These recovery plans are supposed to include an understanding of the current state of salmon

¹⁹¹ *Ibid.*

¹⁹² Ringtail Document CAN000976 at 7.

and their habitat, biological limits to recovery, local and regional fisheries and the potential and requirements for recovery.¹⁹³

Lake Enrichment Program (Science Branch)

100. Lake enrichment (or fertilisation) is a salmon enhancement technique that DFO has used in an attempt to improve the freshwater rearing conditions of wild sockeye salmon.¹⁹⁴ It involves adding nutrients to surface waters of selected lakes during the sockeye growing season to increase the amount of plankton (food) for juvenile salmon. The objective is to increase the growth and survival of the sockeye salmon (i.e. productivity) in freshwater in order to improve numbers of returning adults.¹⁹⁵ Juvenile sockeye feed on small animals (zooplankton) that in turn feed on microscopic plants (phytoplankton). Phytoplankton need nutrients and light for growth and their growth rates are limited by the amount of nutrients in the surface waters of lakes. The idea underlying lake enrichment programs is that by making small, regular additions of nutrients throughout the growing season, phytoplankton growth rates are increased and more food should be available for zooplankton and in turn, juvenile sockeye.¹⁹⁶
101. Nitrogen and phosphorus are the two nutrients that limit the growth of phytoplankton in lakes and are the only elements other than water that are added to lakes through the Lake Enrichment Program.¹⁹⁷ All of the nitrogen and phosphorus nutrients used by DFO are in forms that phytoplankton normally rely on for their growth in the lakes.¹⁹⁸
102. Nutrient addition does not increase sockeye salmon abundance in every lake and this may be because some sockeye populations are not food-limited by their freshwater growth phase but by other factors such as fishing pressure, spawning

¹⁹³ *ibid.*

¹⁹⁴ Lake Enrichment Program, online: Fisheries and Oceans Canada <<http://www.pac.dfo-mpo.gc.ca/sep-pmvs/lep-pel/lep-pel-eng.htm>>.

¹⁹⁵ *ibid.*

¹⁹⁶ *ibid.*

¹⁹⁷ *ibid.*

¹⁹⁸ *ibid.*

habitat, predation and or competing species. According to DFO, nutrient addition cannot solve all the problems with sockeye stocks in B.C.¹⁹⁹

103. Lake fertilisation is expensive, costing up to hundreds of thousands of dollars per year per lake.
104. In 1977, under the direction of Science Branch a Lake Enrichment Program (“LEP”) was incorporated into SEP.²⁰⁰ From its inception, LEP was considered primarily a research program to investigate the ecology of BC coastal lakes.²⁰¹ This research-focused approach continued until 1997, when SEP Enhancement Operations Division took over administration of LEP from Science Branch.²⁰² At this time, the idea was that LEP’s focus would change to de-emphasise research and instead apply the lake fertilisation technique to more projects.²⁰³ To this end, a list of potential priority projects was developed by a HEB/Science LEP team to guide the program, but due to funding shortfalls in other areas of HEB from 1999-to 2001, LEP postponed implementing most of the major projects during this time.²⁰⁴ As of April 2011, LEP is almost completely defunct and Great Central Lake on Vancouver Island is the only lake being enriched.
105. With respect to Fraser River sockeye, Chilko Lake was fertilised in 1988 and 1990-1993.²⁰⁵ Adams Lake was fertilised in 1997 and 2001.²⁰⁶ No other Fraser sockeye lake has been enriched.
106. For more information about DFO lake enrichment projects, see:
 - a. Hyatt, K.D., McQueen, D.J., Shortreed, K.S. and Rankin, D.P. 2004. Sockeye salmon (*Oncorhynchus nerka*) nursery lake fertilization: review and summary of results. Environmental Review 12: 133-162 (CAN009961);

¹⁹⁹ *Ibid.*

²⁰⁰ Ringtail Document CAN070195 at 1.

²⁰¹ *Ibid.*

²⁰² *Ibid.* at 2.

²⁰³ *Ibid.*

²⁰⁴ *Ibid.*

²⁰⁵ Ringtail Document CAN018954 at 40.

²⁰⁶ Ringtail Documents CAN070195 at 2 and CAN002802 at 67 and 114; SEP PowerPoint Presentation at 4.

- b. Hume, J.M.B., Morton, K.F., Lofthouse, D., MacKinlay, D., Shortreed, K.S., Grout, J. And Volk, E. 2003. Evaluation of Restoration Efforts on the 1996 Upper Adams River sockeye salmon run. Canadian Technical Report of Fisheries and Aquatic Sciences 2466 (CAN170261);
- c. Shortreed, K.S., Morton, K.F., Malange, K. and Hume, J.M.B. 2001. Factors Limiting Juvenile Sockeye Production and Enhancement Potential for Selected B.C. Nursery Lakes. Canadian Science Advisory Secretariat Research Document 2001/098 (CAN007457); and
- d. Lake Enrichment Program Bibliography and References available on the DFO Lake Enrichment Program Bibliography and References webpage.²⁰⁷

Aboriginal Fisheries Strategy Agreements

107. The Aboriginal Fisheries Strategy (the “AFS”) was introduced by DFO in 1992.²⁰⁸ There are two main types of negotiated agreements made under the AFS: Project Funding Agreements and Comprehensive Fisheries Agreements. Project Funding Agreements may be used to support a broad range of activities including habitat assessment and enhancement; Comprehensive Funding Agreements can include cooperative management projects for the improvement of the management of fisheries in general such as fish enhancement and habitat management.²⁰⁹

Modern Final Agreements

108. Three Fraser sockeye-related Modern Final Agreements allow Canada and each Treaty First Nation to negotiate agreements in respect of enhancement and stewardship activities (Tsawwassen, Maa-nulth and Yale Modern Final Agreements).²¹⁰

²⁰⁷ Lake Enrichment Program Bibliography and References, online: Fisheries and Oceans Canada <<http://www.pac.dfo-mpo.gc.ca/sep-pmvs/lep-pel/references-eng.htm>>.

²⁰⁸ Cohen Commission Policy and Practice Report: Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing, December 2, 2010 at para. 86. For more information on the AFS, please see the commission’s Aboriginal Fishing PPR.

²⁰⁹ *Ibid.* at paras. 93-95.

²¹⁰ *Ibid.* at Appendix 3 at 159.

The Pacific Salmon Commission's role in habitat enhancement and restoration

Pacific Salmon Treaty

109. Each year, the US and Canada must provide to each other and to the Pacific Salmon Commission (the "PSC") information about the operations of, and plans for, existing salmon enhancement projects,²¹¹ plans for new projects and each Party's views about the other Party's salmon enhancement projects.²¹² The PSC must forward this information to the Panels and the Panels must examine the information and report their views to the PSC in light of the principles in Article III.²¹³ The PSC then reviews the reports and may make recommendations to the Parties.

Northern and southern endowment funds

110. The PSC has two endowment funds each administered by a Restoration and Enhancement Fund Committee with three Canadian and three American members:²¹⁴

1. The Northern Boundary and Transboundary Rivers Restoration and Enhancement Fund (the "Northern Fund"); and
2. The Southern Boundary Restoration and Enhancement Fund (the "Southern Fund").

111. The purpose of the two funds is to support activities in both countries that develop improved information for resource management, rehabilitate and restore marine and freshwater habitat and enhance wild stock production through low technology techniques. Anyone can submit a proposal and projects funded are those that meet the needs and goals of the PSC. Projects relating to Fraser

²¹¹ Defined in An Agreement Between the Government of Canada and the Government of the U.S.A. concerning Pacific Salmon signed January 28, 1985, Annex IV revised 1999, as amended January 27, 2009 (Cohen Commission Exhibit 65) [Treaty], Article I as, "man-made improvements to natural habitats or application of artificial fish culture technology that will lead to the increase of salmon stocks".

²¹² *Ibid.* at Article V, para. 2.

²¹³ *Ibid.* at paras. 2 to 3.

²¹⁴ *Ibid.* at Annex IV, Chapter 7, Attachment C.

River sockeye are funded by the Southern Fund. Information on projects funded by these funds between 2004 and 2009 is available on the PSC's website.²¹⁵

Habitat and Restoration Technical Committee

112. In February 2006, the PSC established a Habitat and Restoration Technical Committee ("HRTC") to report to the PSC on the status of naturally spawning stocks subject to the *Pacific Salmon Treaty*, on non-fishing factors that are limiting the production of these stocks and on options to address habitat factors.²¹⁶ However, HRTC terms of reference were only formalised in 2010 and the work of this committee is in the early stages of development. The HRTC is currently reviewing how habitat-related information is shared in North America among agencies and individuals, reviewing best practices on reporting on habitat status and trends, reviewing best practices for monitoring effectiveness of habitat restoration and looking at how the HRTC can provide advice to the Northern and Southern Funds.²¹⁷

Watershed-based Fish Sustainability Planning ("WFSP")

113. This was a formal framework developed jointly by the federal and provincial governments in 2001 to provide guidance to community groups, First Nations and other groups with an interest in the conservation of the fisheries resource on a consistent collaborative planning approach for identifying priorities in fish sustainability (e.g. enhancement, habitat restoration and protection).²¹⁸ The intention was that DFO Regional Headquarters would coordinate and help the Area offices in the development of WFSPs.²¹⁹

114. The framework is set out in a guidebook (the "WFSP Guidebook") developed jointly by DFO and the Province. The WFSP Guidebook outlines steps that communities can follow to prioritise enhancement, management and fisheries

²¹⁵ Restoration and Enhancement Fund, online: Pacific Salmon Commission <http://fund.psc.org/pubs_fund.htm>.

²¹⁶ Ringtail Document CAN115728 at 3.

²¹⁷ As of April 2011.

²¹⁸ Ringtail Document CAN002781 at 113.

²¹⁹ *Ibid.*

habitat improvements and it is supposed to guide management and enhancement efforts using methods and processes that seek “to maintain and restore natural ecosystem processes” on a regional or watershed scale.²²⁰ Using the Guidebook, at least two Fraser River communities have developed watershed-based strategies for protecting and restoring fish habitat and populations.²²¹

115. In addition to the WFSP Guidebook, there is also a background report commissioned by DFO and the BC Ministry of the Environment called “Watershed-based Fish Sustainability Planning: Implementation Experience and Requirements”. The document was commissioned to assist DFO and the Province in defining the requirements and capacity needs for implementing WFSPs.²²²
116. Dr. Hyatt testified at the commission’s hearings that the WFSP initiative was part of a wide-range of watershed and fisheries projects executed through active collaborations among the Province, DFO and community stewardship groups who received funding from programs like Forest Renewal BC and Fisheries Renewal BC between approximately 1993 and 2002.²²³ According to Dr. Hyatt, both of these provincial programs were terminated following a provincial election. The WFSP was never a DFO program and thus did not provide federal government funding for communities developing watershed-based strategies.
117. For more information on this see the commission’s intended PPR on integrated management and planning.

²²⁰ Ringtail Document CAN051531 at 15; Cohen Commission Exhibit 313B at 3. The WFSP Guidebook is Ringtail Document BCP000430.

²²¹ See Ringtail Documents CAN017832 and CAN005915.

²²² Cohen Commission Exhibit 313B at 3.

²²³ *Ibid.* at 2-3.

The Province's role in salmon habitat enhancement and restoration

Provincial ministries

118. As of April 2011, the provincial Ministry of Forests, Lands and Natural Resource Operations works on ecosystem restoration under various organisational units such as: Range Branch, Assistant Deputy Minister (“ADM”) Provincial Operations, Integrated Resources and various Resource Management units under the ADM of Regional Operations for all regions. The Ministry of the Environment also appears to do work on ecosystem restoration (for example, the Ecosystems Protection & Sustainability Branch).²²⁴ In addition, there was a Strategic Policy Division in the Ministry of Environment as of March 2011 which had responsibility for stewardship outreach. This responsibility used to be under the Strategic Initiatives unit of the Environmental Stewardship Division of the BC MOE, which no longer exists.

Provincial programs

119. The Province has been involved in a number of salmon habitat enhancement and restoration programs including:
- a. Watershed Restoration Program;
 - b. Urban Salmon Habitat;
 - c. Fisheries Renewal BC;
 - d. BC Hydro Fish and Wildlife Compensation Program;
 - e. Habitat Conservation Trust Fund; and
 - f. Living Rivers Trust Fund.

Watershed Restoration Program

120. The Watershed Restoration Program (the “WRP”) of Forest Renewal BC was intended to be a major source of information regarding the impact of habitat

²²⁴ Ministry of Environment, online: B.C. Government Directory
<<http://dir.gov.bc.ca/gtds.cgi?show=Branch&organizationCode=ENV&organizationalUnitCode=ESS>>.

alteration on salmon populations and a contributor to the recovery of many streams degraded by forest operations.²²⁵ The WRP initiated watershed restoration projects throughout British Columbia.²²⁶ Forest Renewal BC administered the program and the Ministry of Environment and the former Ministry of Lands and Parks and former Ministry of Forests were responsible for delivery of the program.²²⁷

121. The program attempted to re-establish conditions similar to unlogged watersheds by hill slope stabilisation, road deactivation and rehabilitation, riparian re-vegetation, fish habitat restoration and mitigation.²²⁸
122. Forest Renewal BC and Fisheries Renewal BC (see section “Fisheries Renewal BC”, below) were terminated following a provincial election and the WRP ended with the demise of Forest Renewal BC.²²⁹

Urban Salmon Habitat Program

123. Initiated in 1995, this program was intended to manage, protect, restore and educate people about salmon habitat issues in urban environments, in particular in the Georgia Basin.²³⁰ There were three major initiatives. One was the encouragement of stewardship projects by providing funding and resources to community-based organisations for public education, habitat resource assessment, landowner contact programs, watershed planning, monitoring and evaluation, rehabilitation and restoration.²³¹ Another was to develop partnerships between the province, regional districts, municipalities and communities through cost-sharing for staffing.²³² The third initiative involved raising awareness of conservation issues and stream-stewardship programs.

²²⁵ Ringtail Document CAN001363 at 10.

²²⁶ Ringtail Document CAN001363 at 10.

²²⁷ Ringtail Document CAN002592 at 77.

²²⁸ *Ibid.*

²²⁹ Cohen Commission Exhibit 313B at 2.

²³⁰ Ringtail Document CAN002592 at 78.

²³¹ *Ibid.*

²³² *Ibid.*

124. The Urban Salmon Habitat Program has been terminated.²³³

Fisheries Renewal BC

125. Fisheries Renewal BC was created in 1997 with the mandate to undertake programs and initiatives to promote the protection, conservation and enhancement of fish stocks and habitat.²³⁴ Programs were delivered through community umbrella organisations. In the Upper Fraser Valley, \$300,000 was allocated for restoration assessment, watercourse and sensitive zone mapping and clay-slide stabilisation engineering in 1998/99.²³⁵ Fisheries Renewal BC was shut down in 2001.²³⁶

BC Hydro Fish and Wildlife Compensation Program

126. BC Hydro's Fish and Wildlife Compensation Program is intended to compensate for the impacts to fish, wildlife and their supporting habitats affected by BC Hydro owned and operated generation facilities.²³⁷ It is delivered through a partnership that includes BC Hydro, the Province and DFO.²³⁸ As of April 2011, this program was still operational.

Habitat Conservation Trust Fund (formerly the Habitat Conservation Fund)

127. This provincial program provides independent financing for habitat restoration, enhancement and acquisition. The types of projects funded are lake and stream fertilization, stream clearance, fish passage improvements, placement of spawning gravel and installation of screens at pump intakes.²³⁹ The money

²³³ Office of the Auditor General of British Columbia, *2004/2005 Annual Report of the Auditor General of British Columbia*, June 2005 at 50-51 (available online at: <http://www.bcauditor.com/pubs/2005/annual/20042005-annual-report-auditor-general-british-columbia>).

²³⁴ Ringtail Document CAN002592 at 78.

²³⁵ *Ibid.*

²³⁶ Ringtail Document CAN002576 at 93; Cohen Commission Exhibit 313B at 2-3.

²³⁷ About the FWCP, online: BC hydro

<http://www.bchydro.com/about/our_commitment/compensation_programs/about_fwcp.htm>.

²³⁸ *Ibid.*

²³⁹ Ringtail Document CAN001363 at 11.

comes from a percentage of fees attached to inland fishing, trapping, guiding and hunting licenses.²⁴⁰ As of April 2011, this program was still in place.

Living Rivers Trust Fund

128. The Living Rivers Trust Fund (“LRTF”) was established by the Province in 2002 to provide seed funding for river conservation activities. The Fund is administered by the Living Rivers Advisory Group.²⁴¹
129. There are five principal objectives for the LRTF:²⁴²
- a. Improve the science basis for watershed protection and restoration;
 - b. Increase public understanding and commitment to watershed protection and restoration, and the conservation and sustainable use of water;
 - c. Strengthen partnerships and identify priorities by supporting councils, cooperative mechanisms and planning frameworks;
 - d. Enhance effectiveness of community groups and councils by developing science capacity and decision support tools; and
 - e. Support specific watershed management and restoration activities.
130. The LRTF is scheduled to be wound up by the end of 2012.²⁴³

Government-linked organisations relevant to habitat enhancement and restoration

Fraser River Estuary Management Program

131. The Fraser River Estuary Management Program (“FREMP”) was formed in 1985.²⁴⁴ It coordinates environmental management and decision-making in the Fraser River Estuary defined as covering the Lower Fraser River from Kanaka

²⁴⁰ Ringtail Document CAN002592 at 75; Welcome to the Habitat Conservation Trust Foundation, online, Habitat Conservation Trust Foundation <www.hctf.ca>.

²⁴¹ Living rivers, online: Living rivers <<http://www.livingrivers.ca/index.html>>; BC Fish Regulations flyer, online: Ministry of Environment <http://www.env.gov.bc.ca/fw/fish/regulations/docs/0809/fa_LivingRiversTrustFund.pdf> [MOE Fish Regulations Flyer].

²⁴² *Ibid.*

²⁴³ Ringtail Document CAN124251 at 3.

²⁴⁴ Ringtail Document CAN006034.

Creek to the Strait of Georgia.²⁴⁵ FREMP aims to provide for the safeguard of habitat values, yet still permit industry and communities to function around the river.²⁴⁶ It operates through partnership agreements, the most recent of which links FREMP to the Burrard Inlet Environmental Action Program.²⁴⁷ Together the FREMP partners coordinate their long range planning and operational decision-making for the Fraser River estuary using a consensus-based approach to find “made in the estuary” environmental management solutions.²⁴⁸

132. The FREMP Environmental Review Committee reviews projects on the river side of the top bank of the Fraser. This process was set up in order to provide a one-stop review process for proponents.²⁴⁹ Major projects are, however, reviewed under federal and provincial environmental assessment legislation.²⁵⁰
133. The purpose of forming the FREMP partnership is to facilitate the implementation of the actions contained in the Estuary Management Plan and to coordinate activities intended to achieve sustainability.²⁵¹ The primary objectives of FREMP are:²⁵²
 - a. Conserve and enhance the environmental quality of the river and estuary to sustain healthy fish, wildlife, plants and people;
 - b. Respect and further the estuary's role as the social, cultural, recreational and economic heart of the region; and,
 - c. Encourage human activities and economic development that protect and enhance the environmental quality of the estuary.

²⁴⁵ BIEAP/FREMP Home Page, online: BIEAP/FREMP <<http://www.bieapfremf.org/>>.

²⁴⁶ Ringtail Document CAN002592 at 83.

²⁴⁷ Memorandum of Understanding: Respecting the Coordinated Management of the Burrard Inlet Environmental Action Program (BIEAP) and the Fraser River Estuary Management Program (FREMP), 2007, online: BIEAP/FREMP <<http://www.bieapfremf.org/mou.html>>.

²⁴⁸ Partners, online: BIEAP/FREMP <<http://www.bieapfremf.org/fremf/partners/index.html>> [FREMP Partners Website].

²⁴⁹ Cohen Commission Technical Report 12 at 51.

²⁵⁰ *Ibid.*

²⁵¹ FREMP Partners Website.

²⁵² *Ibid.*

134. Six agencies are involved: DFO, Environment Canada, Transport Canada, BC Ministry of Environment, Metro Vancouver (formerly Greater Vancouver Regional District) and Port Metro Vancouver.²⁵³

Fraser River Estuary Management Plan: A Living Working River

135. The Estuary Management Plan provides a framework for intergovernmental cooperation on how and where current and future use of the water and shoreline will occur along with linkages to adjacent upland areas within the Fraser River estuary.²⁵⁴ The Plan integrates habitat management and recreation activities with strategies for water and sediment quality, log management, navigation and dredging and urban and water-related industrial development.²⁵⁵

FREMP Action Programs

136. FREMP has seven action programs, one of which is the Fish and Wildlife Habitat program.²⁵⁶ One of the things that the Estuary Management Plan directs FREMP partners to do is identify and help secure protection for particularly important habitat.²⁵⁷ Activities completed in support of this direction include:²⁵⁸
- a. Adding more than 75,000 square metres of estuarine marsh habitat and more than 30,000 square metres of riparian habitat to the Estuary; and
 - b. A net gain of 96,000 square metres of productive habitat from compensation and enhancement projects since 1986.

Pacific Fisheries Resource Conservation Council

137. Following a recommendation by the Report of the Fraser River Sockeye Public Review Board, *Fraser River Sockeye 1994, Problems and Discrepancies* (1995), the Pacific Fisheries Resource Conservation Council (“PFRCC”) was established

²⁵³ *Ibid.*

²⁵⁴ Ringtail Document CAN006034.

²⁵⁵ *Ibid.*

²⁵⁶ Fraser River Estuary Management Program Overview, online: BIEAP/FREMP <http://www.bieapfrempp.org/main_frempp.html>.

²⁵⁷ Fish and Wildlife Habitat, online: BIEAP/FREMP <http://www.bieapfrempp.org/frempp/managementplan/actionareas_fish.html>.

²⁵⁸ *Ibid.*

in 1988 under the Canada-BC Agreement on the Management of Pacific Salmon Fisheries Issues, 1997, to act as an overseer, in part, of habitat issues affecting salmon.²⁵⁹ The PFRCC's role is to advise the federal Minister of Fisheries and Oceans, the British Columbia Minister of Fisheries and the public and to assist in encouraging the free exchange of information among governments, First Nations, stakeholders and the general public.²⁶⁰ The key roles of the PFRCC are to:²⁶¹

- a. Provide strategic advice regarding stock conservation and enhancement, habitat restoration, protection and improvement, and fisheries conservation objectives. This includes identifying stocks in need of conservation actions and stocks where there is insufficient information to assess their conservation status.
- b. Describe the effects of conditions in freshwater and marine ecosystems on the conservation of Pacific salmon.
- c. Review and make recommendations pertaining to research programs, stock and habitat assessments, enhancement initiatives, and government policies and practices related to conservation of Pacific salmon and their freshwater and ocean habitat.
- d. Integrate scientific information with knowledge and experience of First Nations, stakeholders and other parties.
- e. Alert the Minister of Fisheries and Oceans and the public on issues that threaten the achievement of departmentally defined conservation objectives for Pacific fish populations or their freshwater or ocean habitat.
- f. Provide information to governments and the public on the status of Pacific salmon stocks and their freshwater and ocean habitat in order to enhance understanding and support for fish conservation and habitat protection.

Pacific Salmon Foundation

138. Established in 1989 by the Government of Canada and volunteers, the objective of the Pacific Salmon Foundation ("PSF") is to conserve, restore and enhance Pacific salmon and their habitat through volunteer, community-based projects.²⁶²

²⁵⁹ Ringtail Document CAN002592 at 81; Cohen Commission Public Submission 0444-PFRCC_251456.

²⁶⁰ About Us PFRCC, online: Pacific Fisheries Resource Conservation Council <http://www.fish.bc.ca/about_the_pfrcc>.

²⁶¹ *Ibid.*

²⁶² Ringtail Documents CAN036624 at 2, CAN122612 at 2 and CAN157772 at 1.

The focus has been to collaborate with DFO stewardship programs like SEP to support science for the long-term survival of Pacific salmon and to provide strategic recovery planning in priority watersheds.²⁶³ As noted above, the PSF has been the Program Manager of the Pacific Salmon Endowment Fund since 2001.

139. Revenues generated by the sale of the Pacific Salmon Conservation Stamp affixed to the Pacific Sportfish Licence issued by DFO and by a surcharge on Commercial Fishers' Registration Cards funds PSF projects like its Community Salmon Programs.²⁶⁴ The Foundation also raises funds for its projects from the private sector.

140. An evaluation of the PSF was done by DFO's Review Directorate in 2000.²⁶⁵

Fraser Basin Council

141. According to its website, the Fraser Basin Council (the "FBC") was established in 1997 as a non-governmental, not-for-profit, non-partisan organization with a mandate to ensure that decisions about the Fraser Basin will protect and advance its social, economic, and environmental sustainability into the future.²⁶⁶ The predecessor to the FBC was the Fraser Basin Management Board which had a mandate to develop a strategic plan for the Fraser Basin.²⁶⁷ The FBC considers the needs of the entire Basin rather than those of any single jurisdiction, interest, organization or individual and is first and foremost, an advocate for the sustainability of the entire Basin.²⁶⁸

142. To achieve its goals, the FBC acts as an impartial, trusted facilitator operating under a model of collaborative leadership.²⁶⁹ Under this model, FBC Directors from four orders of Canadian government, the private sector and civil society

²⁶³ Ringtail Document CAN036624 at 2.

²⁶⁴ Ringtail Document CAN157772 at 2.

²⁶⁵ Ringtail Document CAN175010.

²⁶⁶ About FBC, online: Fraser Basin Council <http://www.fraserbasin.bc.ca/about_us/index.html> [FBC Website].

²⁶⁷ Vision of the FBC, online: Fraser Basin Council <http://www.fraserbasin.bc.ca/about_us/vision.html>.

²⁶⁸ FBC Website.

²⁶⁹ *Ibid.*

work together to tackle issues, overcome conflict, find common ground, make decisions, generate long-term solutions to complex issues and take advantage of opportunities to enhance sustainability “on the ground”.²⁷⁰

143. Issues that the FBC has addressed include flood preparation, controlling the spread of invasive plant species, managing the effects of climate change, strengthening rural communities, developing a sustainable fish and fisheries strategy, building constructive aboriginal and non-aboriginal relationships and measuring progress towards sustainability.²⁷¹ There are also issues of concern to specific regions of the Basin such as threats to property and navigation from waterborne debris in the Fraser Valley, maintaining a healthy estuary at the mouth of the River, developing a Sustainable Region Initiative in the Greater Vancouver Regional District [sic], addressing deteriorating water quality in Shuswap Lake, developing a set of sustainability indicators for the City of Quesnel and resolving conflicts over water flows on the Nechako River.²⁷²
144. The FBC’s Charter for Sustainability is an agreement signed by public and private sector interests.²⁷³

Fraser Salmon and Watershed Program

145. The Fraser Salmon and Watersheds Program (the “FSWP”) is a multi-year initiative to conserve and restore the diversity and abundance of salmon within the Fraser Basin.²⁷⁴ It began in 2007, with a contribution of \$10 million over four years from the provincial Living Rivers Trust Fund and a further commitment of \$10 million (\$5 million in cash and \$5 million in-kind, over five years) from DFO through the federal Fraser Basin Initiative.²⁷⁵ Jointly managed by the FBC and the PSF, the FSWP is overseen by a Steering Committee, with representatives

²⁷⁰ *Ibid.*

²⁷¹ What We Do, online: <http://www.fraserbasin.bc.ca/about_us/what.html>.

²⁷² *Ibid.*

²⁷³ Fraser Basin Council, *Charter for Sustainability* (1997), online at: <http://www.fraserbasin.bc.ca/about_us/documents/FBCcharter.pdf>.

²⁷⁴ Basin Wide Programs, online: Fraser Basin Council <http://www.fraserbasin.bc.ca/programs/basin_wide.html> [FBC Programs Website].

²⁷⁵ *Ibid.*; Ringtail Documents CAN036624 at 2, CAN180209 and CAN180210 at 1.

from federal, provincial and Aboriginal governments. Funding is administered through the PSF.²⁷⁶

146. FSWP pursues its mission by identifying, scoping, implementing and funding priority activity in four program areas:²⁷⁷
 - a. Education and engagement;
 - b. Integrated planning and governance;
 - c. Habitat & water restoration and stewardship; and
 - d. Improved information/ approaches for sustainable integrated fisheries management.
147. In addition there are activities that intersect with all four of these program areas, arising from the following overarching goals:²⁷⁸
 - a. Engaging First Nations and their perspectives in the activity of all four program areas; and
 - b. Coordinating the information generated by FSWP projects to enable maximum data sharing and reuse both within and outside of the FWSP.
148. The Living Rivers Business Plan for Fraser Basin Salmonids and Watersheds provides guidance on implementing the FSWP activities.²⁷⁹
149. As the FSWP is funded by the Living Rivers Trust Fund and the FBI and both of these funding initiatives are supposed to be terminated by 2012, this is the final year for the program.
150. For more information on the FSWP see the commission's intended PPR on integrated management and planning.

²⁷⁶ FBC Programs Website.

²⁷⁷ Fraser Salmon & Watersheds Program, online: Fraser Salmon & Watersheds Program <<http://www.fswp.ca/>>.

²⁷⁸ *Ibid.*

²⁷⁹ Fraser Basin Council and Pacific Salmon Foundation, *Living Rivers Business Plan for Fraser River Basin Salmonids and Watersheds*, online: Fraser Basin Council <<http://www.fraserbasin.bc.ca/programs/documents/lrbp.pdf>>.

Salmonid enhancement and restoration: Potential issues of concern

Hatchery-wild fish interactions

151. Hatchery releases of salmon fry and smolts of all species for Pacific Rim countries (Canada, Japan, South Korea, Russia and the US) range from 4.7 to over 5 billion annually from 1993 to 2008.²⁸⁰ Canada released 330 million hatchery salmon in 2008.²⁸¹ For sockeye, releases from the Pacific Rim countries were 253 million in 2008 and releases from Canada were 176 million, with 5 million from the Interior of BC, which presumably would include most Fraser River sockeye enhancement facilities.²⁸² Releases of sockeye from the South Coast region were 32 million; these fish could include Cultus Lake hatchery sockeye.²⁸³
152. According to DFO and others, production enhancement poses some risks to wild salmon:²⁸⁴
- a. Wild populations harvested in mixed stock fisheries with more productive enhanced populations may be over-exploited (this has been a concern for Cultus and Weaver sockeye);
 - b. Hatchery practices may alter genetic diversity;
 - c. Wild salmon may have to compete with hatchery salmon for food and space in marine and freshwater environments;
 - d. Hatchery populations may have an increased risk of expressing pathogens because specific hatchery conditions may stress fish or lower immune response; and
 - e. Pathogens may be transported outside of the hatchery through effluent or the release of untreated infected fish.²⁸⁵

²⁸⁰ Annual Statistics 2008, online: NPAFC Statistical Yearbook

<<http://www.npafc.org/new/publications/Statistical%20Yearbook/Data/2008/2008page.htm>>.

²⁸¹ *Ibid.*

²⁸² *Ibid.*

²⁸³ *Ibid.*

²⁸⁴ Cohen Commission Exhibit 8 at 30; Ringtail Documents CAN002595, CAN007494, CAN175099, CAN142777, CAN004647, CAN051531 at 19-25 and CAN004647 at 8; Commission Scientific Literature Review; SFU Symposium at 6.

²⁸⁵ For a discussion of Fraser River sockeye diseases and parasites see the commission's Technical Report 1.

153. As early as 1986, DFO was aware of these concerns. The 1986 Auditor General's Report noted that:²⁸⁶
- a. Fish from some facilities may be displacing wild stocks of salmon, rather than adding to them;
 - b. Harvesting of enhanced fish may be adversely reducing the genetic diversity of the salmon stocks and thereby increasing certain risks to the salmon population; and
 - c. SEP has aggravated or created mixed stock harvesting problems. To protect the wild stocks mixed in with the enhanced stocks, fishery managers have limited the harvest of enhanced stocks to lower levels than would otherwise be possible.
154. In addition, the SEP program review in 1994 conducted by Peter Pearse identified some possible risks to wild production from enhanced stocks.²⁸⁷ Dr. Pearse noted that in the late 1970s when SEP was being established, there were warnings about the risks associated with large-scale enhancement which were largely ignored.²⁸⁸
155. Further, in 2004, academics, consultants and DFO scientists provided advice related to five "big picture" science issues for BC salmon.²⁸⁹ One of the issues was the role of hatcheries. The authors stated that with the exception of assessment programs conducted to assess cultured production, there has been minimal investment in the research necessary to understand and manage the risks of potential interactions between wild and hatchery fish.²⁹⁰ The report recommended an experimental management study to assess large scale changes in enhanced production.²⁹¹ It also recommended a set of research programs to assess reproductive fitness of individuals in hatchery and wild populations, the fitness of cultured salmon spawning in natural populations and

²⁸⁶ Ringtail Document CAN032179 at 16.

²⁸⁷ Ringtail Document CAN000412 at 11-12.

²⁸⁸ *Ibid.* at 18.

²⁸⁹ Ringtail Document CAN267755.

²⁹⁰ *Ibid.* at 16-17.

²⁹¹ *Ibid.* at 17.

the possible impact of cultured salmon on the productivity of natural populations.²⁹²

156. In June 2008, the PFRCC recommended that scientific research related to hatchery fish should be specifically directed towards measuring any consequences for genetic fitness from their breeding with wild salmon.²⁹³ The PFRCC also identified the need for research on the question of whether or not hatchery fish compete with wild fish for resources in the North Pacific.
157. SEP employs guidelines to manage spawning and hatchery practices to try to maintain genetic diversity and minimise impacts on resident freshwater juveniles.²⁹⁴ Risk mitigation for disease transference occurs through fish health management plans, effluent management and disease screening.²⁹⁵ There are guidelines for disease outbreaks as well.²⁹⁶
158. With respect to the risk of over-fishing and obscuring trends in wild stocks, DFO states that as much as possible, harvest strategies should be of a terminal or selective nature and that resource management operational guidelines will describe a process for establishing appropriate harvest rates and will describe an assessment framework for monitoring stock status.²⁹⁷ As of April 2011, final resource management operational guidelines do not exist.
159. In relation to possible negative effects from competition in the freshwater juvenile environment, DFO says that these can be minimised by the use of rearing and release guidelines that reduce competition by releasing juveniles at appropriate size and times.²⁹⁸
160. Regarding wild-hatchery interactions in the marine environment, DFO states that it needs to commit to relevant research and incorporate increases in

²⁹² Ringtail Document CAN267755 at 17.

²⁹³ Ringtail Document CAN002582 at 18.

²⁹⁴ Cohen Commission Exhibit 8 at 30; Ringtail Documents CAN004647 at 5-6 and CAN051531 at 40-51.

²⁹⁵ Ringtail Documents CAN004647 at 8-9 and CAN051531 at 39-40, 51-58 and 85-90.

²⁹⁶ Ringtail Document CAN004647 at 8-9.

²⁹⁷ *Ibid.* at 6-7.

²⁹⁸ Ringtail Document CAN004647 at 7-8.

understanding into its guidelines.²⁹⁹ Further, DFO's 2008 draft Enhancement Guidelines (most recent version dated March 31, 2008) state that in an attempt to identify ecological risks and evaluate mitigation of those risks, scientific evaluations should be conducted.³⁰⁰ However, according to a PFRCC report on wild-hatchery salmon impacts, DFO research in B.C. has focused on returns from hatchery productions rather than on interactions with wild fish and these studies have been criticised for their short-term nature and inconsistent or weak methodologies.³⁰¹ And, in 2009, the Budget Alignment and Strategic Review assessment of SEP stated that:³⁰²

The continuing need for SEP will be more relevant with a better understanding of the interactions between enhanced salmon and wild salmon through additional scientific research in areas such as salmon genetics which is currently underway and oceans carrying capacity in the Strait of Georgia where there is, at present, no formal process in place.

161. To date, DFO has done no research on the possible impact of hatchery production on BC wild salmon populations due to limitations on marine carrying-capacity and or inter- and intra-species interactions (i.e. ecological interactions) in the marine environment. In the 1990s DFO staff designed an experiment to evaluate density-dependent effects of hatchery fish on Strait of Georgia chinook and coho.³⁰³ However, this experiment was never initiated.³⁰⁴ Around 2008, SEP made a request to Science Branch for a study design to determine the carrying capacity for salmonids in Georgia Strait.³⁰⁵ There is no written response to this request, but informal talks about this study design between SEP and Science Branch are apparently still ongoing.

²⁹⁹ *Ibid.* at 8.

³⁰⁰ Ringtail Document CAN051531 at 20.

³⁰¹ Ringtail Document CAN002595.

³⁰² Ringtail Document CAN063231 at 6.

³⁰³ Perry, E.A. 1995. Salmon Stock Restoration and Enhancement: Strategies and Experiences in British Columbia. American Fisheries Society Symposium 15:152-160.

³⁰⁴ Ringtail Document CAN197491 at 23 and 25; SFU Symposium at 10.

³⁰⁵ Request for Science Information and/or Advice, Pacific Region. There is no date on the request, but the request for advice advises that there is a need to start studying this issue as soon as possible and states that the latest possible date to receive the advice is December 31, 2008 (see p. 2).

162. Although DFO states that SEP works with Science Branch and harvest management to understand hatchery and wild interactions and that strategies are modified if there appears to be an impact from hatchery practices,³⁰⁶ this statement does not apply to understanding hatchery-wild interactions in the marine environment and thus no strategies are modified in relation to any potential impacts relating to these types of interactions.
163. Similarly, DFO states in annual Integrated Fisheries Management Plans (under the enhancement objectives section) that, “DFO is aware of potential interaction with wild stocks. These can take the form of greater than target exploitation rates on wild stocks due to abundant hatchery stocks; predation or competition for available food sources; or negative genetic effects. However, hatchery programs are designed to avoid or minimise the risk of negative interactions with wild stocks.”³⁰⁷ Hatchery programs are designed to avoid or minimise the risk of negative interactions with wild stocks, but only with respect to such possible interactions in the freshwater environment specific to a particular hatchery.
164. Finally, the 2009 DFO review of SEP identified a lack of science and research based support.³⁰⁸
165. For further information on the potential impact of hatchery fish on BC wild salmon see:
- a. Commission Scientific Literature Review;
 - b. Ruggerone, G.T., Peterman, R.M., Dorner, B. and Myers, K.W. 2010. Magnitude and Trends in Abundance of Hatchery and Wild Pink Salmon, Chum Salmon, and Sockeye Salmon in the North Pacific Ocean. *Marine and Coastal Fisheries Dynamics, Management and Ecosystem Science*, 2: 306-328 (SGA000005);
 - c. Naish, K.A., Taylor III, J.E., Levin, P.S., Quinn, T.P., Winton, J.R., Huppert, D. and Hilborn, R. 2008. An Evaluation of the Effects of Conservation and

³⁰⁶ See e.g. Ringtail Document CAN166001 at 15.

³⁰⁷ See e.g. Ringtail Document CAN004037 at 38.

³⁰⁸ Ringtail Document CAN027637 at 22-23.

Fishery Enhancement Hatcheries on Wild Populations of Salmon. *Advances In Marine Biology*, 53: 61-194 (CAN142777);

- d. Pacific Fisheries Resource Conservation Council. 2005. *Perspectives on Salmon Enhancement and Hatcheries: What the Council Heard* (CAN175099);
- e. Gardner, J., Peterson, D.L., Wood, A. and Maloney, V. 2004. *Making Sense of the Debate About Hatchery Impacts*, prepared for the Pacific Fisheries Resource Conservation Council (CAN002595); and
- f. Environment and Natural Resources Institute, University of Alaska Anchorage, *Evaluating Alaska's Ocean-Ranching Salmon Hatcheries: Biologic and Management Issues*, 2001; and
- g. Cooney, R.T. and Brodeur, R.D. 1998. Carrying capacity and North Pacific salmon production: stock-enhancement implications. *Bulletin of Marine Science* 62: 443-464.

Wild Salmon Policy elements relating to enhancement and restoration

166. According to the WSP, the risks of hatchery production to wild salmon are to be assessed through a biological risk assessment framework.³⁰⁹ The biological risk assessment framework *per se* does not yet exist, but SEP has developed an Excel spreadsheet called the “Hatchery Risk Assessment Tool” that contains five criteria for risk and provides “relative risk” from stock to stock, which is used to assess risks of site-specific hatchery stocks to nearby wild stocks.³¹⁰ The scope of this tool is limited to the possible biological risks to local (native and zone of influence) wild salmon stocks resulting from the production of enhanced salmon at hatcheries and spawning channels.³¹¹ It is not capable of assessing risk in the context of ecological interactions and carrying-capacity in the marine environment.³¹²
167. Action Steps 5.3 and 5.4 relate to requirements for annual program delivery of habitat enhancement and restoration work, including hatchery production.

³⁰⁹ Ringtail Document CAN014302 at 2; Cohen Commission Exhibit 8 at 36.

³¹⁰ Hatchery Risk Assessment Tool (HRAT): User and Administrator Guide, dated January 30, 2008 [HRAT].

³¹¹ HRAT at 6.

³¹² SFU Symposium at 18; HRAT.

According to DFO, despite the wording of Action Step 5.3, this work is the purview of OHEB's Habitat Management Program and not SEP.

168. In terms of implementation of Action Step 5.4, DFO says that where there is already a planning or recovery process in place for a Conservation Unit (as there is for Cultus and Sakinaw sockeye) that involves enhancement, the recovery plan will specify how enhancement is to be used. Production for these populations is then assessed in terms of adherence to a rebuilding schedule and with respect to enhancement guidelines and practices for the recovery process. One example of a guideline is that DFO will only remove 30% of the returning stock or CU for brood stock and hatchery fish will be allowed to contribute no more than 50% of the return (Fisheries Aquaculture Management and SEP can have a joint agreement to relax this guideline, however, as has been done for Cultus fish).
169. See also: "Enhancement and the Wild Salmon Policy", a presentation to the Strategic Directions Committee, dated June 28, 2007 (Ringtail Document CAN286428) for a summary of WSP issues in relation to SEP.

Funding

Funding hatchery infrastructure vs. habitat restoration, stewardship and education

170. Because of inflation and increasing and competing demands for SEP resources, according to DFO, SEP has no program flexibility to address priorities or even maintain existing facilities.³¹³ Production facilities require about 75% of the SEP annual budget.³¹⁴ Closure of facilities may be required to provide funding flexibility, but senior managers say that Ministerial approval is required to close down hatchery facilities and that public resistance to suggested hatchery closures makes this option unattractive to the Department.³¹⁵

³¹³ Ringtail Document CAN075232 at 47.

³¹⁴ SEP PowerPoint Presentation at 4.

³¹⁵ SEP 2008/09 Budget (draft), dated May 10, 2008 at 4.

171. On the other hand, habitat programs like Resource Restoration and CIP make up only about 25% of SEP's \$26 million annual budget.³¹⁶ These community-based programs are very successful at leveraging money from non-government sources and habitat restoration and stewardship education arguably do not create the risk to wild populations that large production of hatchery fish might pose. A shift in funding priorities from hatchery infrastructure to habitat restoration programs would appear to be consistent with the precautionary principle and with the acknowledged shift from SEP's historical focus on providing harvest opportunities to supporting fish conservation and the implementation of the WSP.³¹⁷
172. The PFRCC Report, "The Role of Public Groups in Protection and Restoring Habitats in British Columbia, with a Special Emphasis on Urban Streams" states that the focus on artificial restoration methodologies by SEP as compared to the restoration or protection through advocacy of habitat may have done more damage than good over the years because it gave the public the perception that unnatural human intervention is sufficient to maintain stocks of fish in the face of increasing watershed degradation.³¹⁸ Also, several of the commission's public submissions have recommended restoration, community stewardship and education as priorities for DFO.³¹⁹
173. Finally, although SEP was launched in 1977 with the goal of doubling the catch of salmon over thirty years,³²⁰ despite enhancement efforts, many salmon stocks have declined, including Fraser River sockeye and South Coast chinook and coho.³²¹ Total catch of Pacific salmon by Canada has declined dramatically since the mid-1990s as well.³²² SEP's original goal of doubling the commercial catch has failed, although Upper Adams sockeye are cited as an example of a SEP enhancement success and some might argue that enhancement may be the

³¹⁶ SEP PowerPoint Presentation at 4.

³¹⁷ See e.g. Cohen Commission Exhibit 8 at 30 and 36.

³¹⁸ Ringtail Document CAN002594 at 29

³¹⁹ Cohen Commission Public Submissions 0220-North, 0268-Guerin, 0300-Claydon 0327-WATER_588416 and 0434-Fulton.

³²⁰ Ringtail Document CAN063231 at 4.

³²¹ SFU Symposium at 6; Ringtail Document CAN285362 at 12 and 22-23.

³²² Ringtail Document CAN285362 at 13.

only thing keeping the Cultus stock from extinction.³²³ In any event, DFO acknowledges that fish culture is not sustainable over the long-run.³²⁴ If this is the case, then it supports a reconsideration of the funding model.

Fraser River sockeye enhancement funding issues

174. Fry and adult assessment programs at Gates Creek sockeye spawning channel were not carried out in 2008/09 season due to a lack of funding.³²⁵ Also for funding reasons, in 2008 the Horsefly spawning channel was not operated even though this was an off-cycle year when the channel would typically operate.³²⁶ DFO anticipated that the effect of this closure would be lower production of sockeye spawning in this area, but the actual impact will not be known until 2012 return.³²⁷

CEDP and PIP funding

175. The CEDP and PIP have not received any adjustment in their budgets for inflation over the last 17 years.³²⁸ This is true also for SEP's budget as a whole. The Sport Fishing Advisory Board has suggested that the impact of this has been that these programs have not been able to keep up with increasing costs and are losing key staff.³²⁹

Departmental Strategic Review

176. Currently, DFO is in the first year of a Treasury Board Strategic Review that requires all government departments to reduce their budgets by 5% over three years.³³⁰ The SEP response to this departmental budget reduction is that SEP

³²³ SFU Symposium at 5; Ringtail Document CAN170261.

³²⁴ Ringtail Document CAN023193 at 2.

³²⁵ Ringtail Document CAN180750 at 2.

³²⁶ *Ibid.* See also e-mail correspondence about this at Ringtail Document CAN130447,

³²⁷ Ringtail Document CAN056010 at 2.

³²⁸ Ringtail Document CAN058006.

³²⁹ *Ibid.*

³³⁰ As of April 2011; Cohen Commission Transcripts, November 2, 2010 at 61.

operations are already at or below critical funding levels and that any budget reductions would result in facility closures.³³¹

Ocean ranching

177. DFO has defined ocean ranching as the enhancement of a fish stock by non-government groups who expect some financial return.³³² More recently, the Department defined it as “investment in the enhanced production of salmon on the basis of some preferred access to the resultant new salmon production or its value”.³³³ According to DFO, what distinguishes ocean ranching from existing salmon enhancement is the expectation of direct financial returns by those undertaking the enhancement.³³⁴

178. In 1999, DFO stated that ocean ranching had:³³⁵

...been the operating principle of the Salmonid Enhancement Program for 20 years and the technology is well developed. Community groups through the Excess Salmon to Spawning Requirements Policy (ESSR), currently practice limited private ocean ranching in BC.

179. By May 1999, two pilot ocean ranching projects (Pallant and Nimpkish) had been approved in principle by DFO with the aim to provide data that would aid in the development of a long-term policy on ocean ranching.³³⁶ In 2000, another ocean ranching pilot project was approved by DFO: The Theodosia Salmon Enhancement Project.³³⁷ Two other sites were operated as ocean ranches by proponents with technical coordination and support from DFO, although not formal pilots (Homalco-Orford and Henderson Lake). None of these formal or informal pilots involved Fraser River sockeye. In March 2005, the Native Brotherhood of BC produced a business case assessment for a BC coastal zone

³³¹ Ringtail Documents CAN180400 at 2 and CAN180401.

³³² Ringtail Document CAN045245 at 1.

³³³ Ringtail Document CAN005486 at 1.

³³⁴ Ringtail Document CAN045245 at 1.

³³⁵ Ringtail Document CAN223634 at 1.

³³⁶ *Ibid.*

³³⁷ Ringtail Document CAN070196.

ocean ranching strategy which was supported by Western Economic Diversification and provided to DFO.³³⁸

180. Internal DFO documents indicate that the Pacific Region was developing a policy framework for ocean ranching in 1999, but that no such policy has been produced and no formal evaluation was done on the formal or informal pilot projects.³³⁹ According to DFO, because of the *Larocque v. Canada (Minister of Fisheries and Oceans)*, [2006] F.C.J. No. 985 (C.A.) [*Larocque*] decision Canada is no longer pursuing ocean ranching as part of its fisheries policy.³⁴⁰ *Larocque* holds that the federal government cannot use a public resource for program cost recovery.
181. The BC Legislative Assembly's Special Committee on Sustainable Aquaculture Final Report recommends that ocean ranching not be implemented.³⁴¹

³³⁸ Ringtail Document CAN024957.

³³⁹ Ringtail Documents CAN223634, CAN045245 at 1, CAN223500 at 1 and CAN018830 at 1.

³⁴⁰ Ringtail Document CAN022736 at 31.

³⁴¹ Ringtail Document AQU000247 at 47-48.

Appendix 1: List of documents and websites cited by this Policy and Practice Report

Ringtail documents

Count	Doc ID	Title	Date
1	AQU000247	BC Special Committee on Sustainable Aquaculture, <i>Final Report of Special Committee on Sustainable Aquaculture</i>	May 2007
2	BCP000430	Watershed-Based Fish Sustainability Planning, Conserving B.C. Fish Populations and their Habitat, A Guidebook for Participants	Jan 2001
3	EV.CAN.0001.000000.CAN000072	Review - Community Economic Development Program - Volume 1	Sep 2006
4	EV.CAN.0001.000000.CAN000124	Assessment of the Community Economic Development Program	May 1982
5	EV.CAN.0001.000000.CAN000314	Fisheries Related Programs for Aboriginal People	No date
6	EV.CAN.0001.000000.CAN000320	No title [document appears to be a DFO summary of management of Pacific salmon in 1999-2000]	No date
7	EV.CAN.0001.000000.CAN000400	Pacific Policy Roundtable - Report to the Minister of Fisheries and Oceans on the Renewal of the Commercial Pacific Salmon Fishery	Dec 1995
8	EV.CAN.0001.000000.CAN000410	Opportunities for Salmonid Enhancement Projects in British Columbia and the Yukon - A Revised Version of the Preliminary Report by the Enhancement Opportunities Subcommittee to the Salmonid Enhancement Phase II Planning Committee	Jan 1985
9	EV.CAN.0001.000000.CAN000412	Salmon Enhancement - An Assessment of the Salmon Stock Development Program on Canada's Pacific Coast	May 1994
10	EV.CAN.0001.000000.CAN000415	The Economic Rationale for the Salmonid Enhancement Program and Appendices	Mar 1977
11	EV.CAN.0001.000000.CAN000416	The Economic Rationale for the Salmonid Enhancement Program, Appendix 20: Policy Paper on Processing Capacity	Mar 1977
12	EV.CAN.0001.000000.CAN000417	The Economic Rationale for the Salmonid Enhancement Program, Appendix 1: List of Members of the Economics Working Group and Amended List	Mar 1977
13	EV.CAN.0001.000000.CAN000418	The Economic Rationale for the Salmonid Enhancement Program, Appendix 2: Estimation of Commercial Fishery Benefits and Associated Costs for the National Income Amount	Mar 1977
14	EV.CAN.0001.000000.CAN000419	The Economic Rationale for the Salmonid Enhancement Program, Appendix 3: Existing and Potential Demand for Commercial Salmon Production	Mar 1977
15	EV.CAN.0001.000000.CAN000420	Markets for Canadian Salmon: An Economic Analysis of Market Demand	Apr 1977
16	EV.CAN.0001.000000.CAN000421	The Economic Rationale for the Salmonid Enhancement Program, Appendix 6: Evaluation of Incremental Recreational Benefits From Salmonid Enhancement	Mar 1977

17	EV.CAN.0001.000000.CAN000422	The Economic Rationale for the Salmonid Enhancement Program, Appendix 7: Evaluation of Incremental Indian Food Fish Benefits from Salmonid Enhancement	1977
18	EV.CAN.0001.000000.CAN000423	The Economic Rationale for the Salmonid Enhancement Program, Appendix 8: An Estimate of the Opportunity Costs of a Salmonid Enhancement Facility	Mar 1977
19	EV.CAN.0001.000000.CAN000424	The Economic Rationale for the Salmonid Enhancement Program, Appendix 10: Potential Regional Impact of the Salmonid Enhancement Program	Mar 1977
20	EV.CAN.0001.000000.CAN000425	The Economic Rationale for the Salmonid Enhancement Program, Appendix 12: The Employment Impacts of Salmonid Enhancement Proposals and the Social Cost of Labour	Feb 1977
21	EV.CAN.0001.000000.CAN000426	The Economic Rationale for the Salmonid Enhancement Program, Appendix 13: The Environmental Account Impacts of Salmonid Enhancement Proposals	Jan 1977
22	EV.CAN.0001.000000.CAN000427	The Economic Rationale for the Salmonid Enhancement Program, Appendix 14: An Ex-Post Benefit-Cost Analysis of the Big Qualicum River Development Project	Mar 1977
23	EV.CAN.0001.000000.CAN000428	The Economic Rationale for the Salmonid Enhancement Program, Appendix 17: Policy Paper on Resource Rent and Cost Recovery in the Commercial Fishery	1977
24	EV.CAN.0001.000000.CAN000429	The Economic Rationale for the Salmonid Enhancement Program, Appendix 19: Policy Paper on Fishing Fleet Size	Feb 1977
25	EV.CAN.0001.000000.CAN000431	The Salmonid Enhancement - The Evaluation of Phase I - An Executive Summary	Jan 1984
26	EV.CAN.0001.000000.CAN000433	Economic Impact Analysis of the Salmonid Enhancement Program	Mar 1988
27	EV.CAN.0001.000000.CAN000976	Resource Rebuilding Summary [DFO]	No date
28	EV.CAN.0001.001000.CAN001027	Summary of Consultative Bodies Fisheries and Oceans Pacific Region [DFO]	Feb 1989
29	EV.CAN.0001.001000.CAN001363	Discussion Paper Prepared for Pacific Policy Roundtable - Pacific Salmon - Environment and Habitat Issues	Sep 1995
30	EV.CAN.0001.002000.CAN002576	Pacific Fisheries Resource Conservation Council 2001-2002 Annual Report	Oct 2002
31	EV.CAN.0001.002000.CAN002582	Pacific Fisheries Resource Conservation Council 2007 Annual Report	May 2008
32	EV.CAN.0001.002000.CAN002592	Pacific Fisheries Resource Conservation Council Report: Freshwater Habitat	Jun 1999
33	EV.CAN.0001.002000.CAN002594	Pacific Fisheries Resource Conservation Council Report: The Role of Public Groups in Protecting and Restoring Habitats in British Columbia, with a Special Emphasis on Urban Streams	Sep 2001
34	EV.CAN.0001.002000.CAN002595	Pacific Fisheries Resource Conservation Council Report: Making Sense of the Debate about Hatchery Impacts - Interactions Between Enhanced and Wild Salmon on Canada's Pacific Coast	Mar 2004
35	EV.CAN.0002.000000.CAN002680	Pacific Salmon Commission 2001/2002 Seventeenth Annual Report	Mar 2003
36	EV.CAN.0003.000000.CAN002781	Pacific Salmon Commission 2002/2003 Eighteenth	Feb

		Annual Report	2004
37	EV.CAN.0003.000000.CAN002785	Pacific Salmon Commission 2006/2007 Twenty Second Annual Report	Feb 2009
38	EV.CAN.0003.000000.CAN002787	1997 December Report of the Auditor General of Canada, <i>Chapter 28 - Fisheries and Oceans Canada - Pacific Salmon: Sustainability of the Resource Base</i>	Dec 1997
39	EV.CAN.0003.000000.CAN002800	Pacific Salmon Commission 1995/96 Eleventh Annual Report	
40	EV.CAN.0003.000000.CAN002802	Pacific Salmon Commission 1997/98 Thirteenth Annual Report	May 1998
41	EV.CAN.0003.000000.CAN002953	Department of Fisheries and Oceans Risk Profile of the Salmon Enhancement Program	Sep 2007
42	EV.CAN.0004.000000.CAN004037	Pacific Region Draft #1 Integrated Fisheries Management Plan Salmon Southern B.C. June 1 2010 to May 31 2011	
43	EV.CAN.0004.000000.CAN004647	Draft 2 - WSP Enhancement Operational Guidelines [DFO]	
44	EV.CAN.0005.000000.CAN005328	Common Menu Bar Links - National Code on Introductions and Transfers of Aquatic Organisms [DFO website]	Jan 2008
45	EV.CAN.0005.000000.CAN005486	Status of Native Brotherhood of BC (NBBC) Proposal on Ocean Ranching Policy Development [DFO Briefing Note]	Apr 2006
46	EV.CAN.0005.000000.CAN005915	The Horsefly River State of the Watershed Report Volume II - Stage II of a Watershed Based Fish Sustainability Plan	Mar 2009
47	EV.CAN.0005.000000.CAN006034	FREMP, <i>A Living Working River</i>	Jan 2003
48	EV.CAN.0005.002000.CAN007410	Harvesting of Excess Pacific Salmon to Spawning Requirements Operational Policy [DFO]	Jul 1993
49	EV.CAN.0005.002000.CAN007457	Factors Limiting Juvenile Sockeye Production and Enhancement Potential for Selected BC Nursery Lakes, CSAS 2001/098	Jan 2001
50	EV.CAN.0005.002000.CAN007494	Making Sense of the Debate About Hatchery Impacts [Pacific Fisheries Resource Conservation Council summary]	No date
51	EV.CAN.0006.001000.CAN009534	Habitat Restoration in British Columbia [DFO]	No date
52	EV.CAN.0007.000000.CAN009961	Sockeye salmon (<i>Oncorhynchus nerka</i>) nursery lake fertilization: Review and summary of result, Environmental Review 12: 133-162	Nov 2004
53	EV.CAN.0007.001000.CAN011103	Call for Reversal of Budget Cuts [DFO]	Jan 2007
54	EV.CAN.0008.002000.CAN014207	Questions for Discussion: Issues for Fish Habitat Partnering [Pacific Salmon Foundation]	No date
55	EV.CAN.0008.002000.CAN014302	Speaking Notes for SCOFO Chapter 5 CESD Report	No date
56	EV.CAN.0009.002000.CAN016803	Draft letter to Mr. Carl Hunt from Susan Farlinger, Regional Director, Fisheries and Aquaculture Management	Jan 2010

57	EV.CAN.0009.003000.CAN017832	Implementation of the Chilliwack River Watershed Strategy - Report Number: 09-1422-0005	Mar 2009
58	EV.CAN.0009.004000.CAN018830	Regional Management Committee Decision Paper - Title: Ocean Ranching of Pacific Salmon [DFO]	Feb 2006
59	EV.CAN.0009.004000.CAN018954	Fraser River Sockeye Salmon July 1995 [DFO]	Jul 1995
60	EV.CAN.0009.004000.CAN019394	JJQ 527 Response [DFO]	
61	EV.CAN.0010.000000.CAN022164	50 Lessons Learned - Final Report for the Habitat Conservation and Stewardship Program	Mar 2003
62	EV.CAN.0010.000000.CAN022174	Salmon Enhancement Projects in the Upper Fraser River - History Development and Current Status, Canadian Manuscript Report Fisheries and Aquatic Sciences XXXX 2004	Mar 2004
63	EV.CAN.0010.000000.CAN022179	Community Economic Development Program Review	Jun 2005
64	EV.CAN.0010.000000.CAN022344	Fisheries and Oceans Canada Pacific Region Implementation Plan 2006-2010 Report on Progress as of March 2008	Mar 2008
65	EV.CAN.0010.001000.CAN022655	SEP Long Term Plan - Community Economic Development Program (CEDP) (A Model for Revitalization)	Sep 2008
66	EV.CAN.0010.001000.CAN022668	David Suzuki Foundation Report: An Assessment of Fisheries and Oceans Canada Pacific Region's Effectiveness in Meeting its Conservation Mandate	Jun 2005
67	EV.CAN.0010.001000.CAN022736	Sport Fishing Advisory Board South Coast Board Meeting - Detailed Minutes - April 4-5 2009	Apr 2009
68	EV.CAN.0010.001000.CAN023193	Re: 'The Role of Public Groups in Protecting and Restoring Freshwater Habitats in British Columbia with a Special Emphasis on Urban Streams' a Background Report Prepared for Consideration by the Pacific Fisheries Resource Conservation Council	Feb 2002
69	EV.CAN.0010.002000.CAN024228	The Streamkeeper's Handbook: A Practical Guide to Stream and Wetland Care [DFO and Province of BC]	Jan 1995
70	EV.CAN.0010.003000.CAN024957	Ocean Ranching - Free Range Salmon - An Unrealized Opportunity for British Columbia's Coastal Community Development - A Pre-Feasibility 'Business Case' Assessment of a British Columbia Coastal Zone Ocean Ranching Strategy - Final Report [Native Brotherhood of BC]	Mar 2005
71	EV.CAN.0010.003000.CAN025166	Draft Rev July 22 - Canada's Stewardship Agenda - Implementation of Priority Actions - A Report to the Joint Meeting of Resource Ministers Council [Federal-Provincial-Territorial Stewardship Working Group]	Sep 2003
72	EV.CAN.0010.006000.CAN027637	DFO Evaluation Directorate - Salmonid Enhancement Program - Project Number 6B105 - Final Evaluation Report	Sep 2009
73	EV.CAN.0010.010000.CAN032179	1986 Report of the Auditor General of Canada	Jan 1986
74	EV.CAN.0010.012000.CAN033598	Fisheries and Oceans Canada - Freshwater Activities Assessment [DFO Policy Sector]	
75	EV.CAN.0011.000000.CAN036624	Fraser Sockeye Review: Fraser River Basin Initiative [DFO Briefing Note]	

76	EV.CAN.0011.009000.CAN045143	Review of the Fraser River Action Plan Draft November 1998 [DFO Review Directorate]	Nov 1998
77	EV.CAN.0011.009000.CAN045245	Issue: DFO Involvement in Ocean Ranching for Pacific Salmon [DFO Briefing Note]	Jan 2000
78	EV.CAN.0011.010000.CAN046022	Subject: Re: MCU 2005-001-01083 Johansen [DFO E-mail]	Apr 2005
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1. Cohen Commission Exhibit 8
2. Cohen Commission Exhibit 65
3. Cohen Commission Exhibit 313B

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Appendix 2: List of selected habitat enhancement and restoration recommendations from previous reports relating to Fraser River sockeye

The recommendations set out below are a selection of recommendations from previous reports that relate to habitat enhancement and restoration. This is not a comprehensive list of all recommendations that may have been made on these topics, but the recommendations are from the reports canvassed in Cohen Commission Exhibit 14.

Dr. Peter Pearse, Turning the Tide: A New Policy For Canada's Pacific Fisheries, The Commission on Pacific Fisheries Policy, Final Report, 1982

1. Create a fund called the Pacific Fisheries Conservation fund, administered by DFO, spent only on habitat improvement and other fish-production measures (at 25).
2. Artificial enhancement projects should be approved only if investigation reveals that equivalent net gains cannot be achieved through improving fisheries management or reducing fishing pressure. (at 58).

Pacific Policy Roundtable, Report to the Minister of Fisheries and Oceans on the Renewal of the Commercial Pacific Salmon Fishery, December 1995

1. Recommendation 17: Habitat management and fish production must be planned and carried out on a watershed basis. These plans must also take into account wider implications, as necessary, such as Canada/U.S. Treaty requirements. Greater efforts must be made to obtain agency and private-sector buy-in to watershed planning in order to ensure the sustainability of the fisheries resource.
2. Recommendation 19: DFO programs and related Provincial program to facilitate stream stewardship and community involvement in habitat management and salmon enhancement be broadened and strengthened.
3. Recommendation 22: A program should be initiated whereby off-season and unemployed fishers and shore workers (and other members of the public) are trained in habitat restoration and fish production skills so as to undertake gainful and meaningful work to assist in the conservation of the fisheries resource.
4. Recommendation 26: DFO and BC should initiate a program to train and employ off-season and unemployed fishers and shore workers in gainful and useful work in the development of the fisheries resource and its habitat. This program should focus on communities with priority needs for employment and fisheries rebuilding, and be integrated with both the federal habitat restoration and salmon enhancement programs and the provincial watershed restoration and urban salmon streams programs.

Bryan Williams, Q.C., Chair, The 2004 Southern Salmon Fishery Post-Season Review –
Part 1: Fraser River Sockeye Report, March 2005

1. Recommendation 16: That riparian habitat in tributary watersheds throughout the Fraser basin be protected and restored to reverse the warming effect that lack of cover creates through the disruption of the hydrologic cycle.

Appendix 3: List of abbreviations

ADM – Assistant Deputy Minister

AFS – Aboriginal Fisheries Strategy

CEDP – Community Economic Development Program

CIP – Community Involvement Program

CU – Conservation Unit

DFO – Fisheries and Oceans Canada

ESSR – Excess Salmon to Spawning Requirements

FBC – Fraser Basin Council

FPTC – Federal-Provincial Transfers Committee

FRAP – Fraser River Action Plan

FREMP – Fraser River Estuary Management Plan

FSWP – Fraser Salmon Watershed Program

HCSP – Habitat Conservation and Stewardship Program

HRSEP – Habitat Restoration and Salmon Enhancement Program

HRTC – Habitat Restoration and Technical Committee (PSC)

IFMP – Integrated Fisheries Management Plan

IPSFC – International Pacific Salmon Fisheries Commission

LEP – Lake Enrichment Program

LRTF – Living Rivers Trust Fund

OHEB – Oceans, Habitat and Enhancement Branch (DFO)

PFRCC – Pacific Fisheries Resource Conservation Council

PIP – Public Involvement Program

PPR – Policy and Practice Report

PSEF – Pacific Salmon Endowment Fund

PSEFS – Pacific Salmon Endowment Fund Society

PSC – Pacific Salmon Commission

PSF – Pacific Salmon Foundation

RD – Regional Director

RDG – Regional Director General

SEHAB – Salmon Enhancement and Habitat Advisory Board

SEP – Salmonid Enhancement Program

SETG – Salmonid Enhancement Task Group

WFSP – Watershed-based Fish Sustainability Program

WRP – Watershed Restoration Program

WSP – Wild Salmon Policy