Global Sustainability Overview of Pacific Salmon Fisheries

June 2013

Executive Summary

This briefing represents the first edition of the Sustainable Fisheries Partnership global sustainability overview of Pacific salmon fisheries and describes assessment results produced through the application of an adapted, species-specific version of the FishSource sustainability criteria. The analysis covers 81 principal salmon fisheries that target five species (pink, chum, sockeye, coho, and Chinook salmon) across the North Pacific and account for 97% of global wild-capture salmon harvest.

Ratings for five scoring criteria from the public database FishSource (www.fishsource.com) were used to group fisheries into the following three categories:

Category A – Fisheries that score 8 or above across all FishSource criteria
Category B – Fisheries that score 6 or above across all FishSource criteria
Category C – Fisheries where at least one criterion is scored below 6

Data used in generating FishSource ratings for individual salmon fisheries used in this report generally included the 2011 season, and was taken from stock assessments, MSC assessments and audits, and other publicly available information. The ratings are based on current status at, and trends leading up to, a certain point in time (usually more than a year in the past), which is not necessarily the year in which the raw material is being harvested or purchased. Consequently, the analysis presented in this briefing cannot be used as a practical, 'real-time' purchasing guide, but rather as a source of information in assessing performance trends over a period of several years.

In addition to categorization of fisheries, the analysis described in this paper also includes recent catches, harvest trends, hatchery releases, percent enhanced portion of the harvest, gear types, MSC certification, and outstanding MSC conditions (for certified fisheries). Results were aggregated both by region and by species.

In summary, the briefing and accompanying dataset, Annex A, conclude that for salmon fisheries:

- **21%** of the total volume of Pacific salmon included in our analysis comes from fisheries in very good condition (Category A). This total includes 84% of coho, 49% of sockeye, 21% of pink, 16% of Chinook, and 4% of chum salmon global harvest volumes.

- **30%** of the total volume of Pacific salmon included in our analysis comes from fisheries that are in good condition but would benefit from improvements in management responsiveness or hatchery impacts (Category B). This total includes 65% of Chinook, 40% of sockeye, 36% of pink, and 16% each of coho and chum salmon global harvest volumes.

- **49%** of the total volume of Pacific salmon included in our analysis comes from fisheries with significant management, stock status, or hatchery impacts issues, and significant improvements are needed (Category C). This total includes 80% of chum, 43% of pink, 18% of Chinook, and 11% of sockeye salmon global harvest volumes (no coho fisheries were included in Category C).

- Among Alaskan salmon fisheries irrespective of target species, 55% of harvest volume was rated as Category A, 19% as Category B, and 26% as Category C.

- Among Russian salmon fisheries irrespective of target species, 0.07% of harvest volume was rated as Category A, 47% of Category B, and 53% as Category C.

- Among British Columbian salmon fisheries irrespective of target species, 0.02% of harvest volume was rated as Category A, 96% as Category B, and 3% as Category C.

- Of salmon fisheries occurring in the Japanese EEZ, only chum salmon fisheries were included in this analysis, and all volume was rated as Category C.

- Analysis of harvest trends over the past 15 years indicates that the interdecadal Pacific oscillation (cycle of ocean conditions) is currently favoring the Western Pacific as reflected by increasing Russian pink salmon harvest. Meanwhile, trends that are likely driven by processes operating at finer spatial scales than that of the Pacific oscillation include wide variability in British Columbia harvest of sockeye and chum salmon, as well as declining harvest trends among East Pacific Chinook salmon.

- Global production of hatchery fish has increased over the past 15 years from a low of 4.68 billion juvenile releases in 2001 to a high of 5.19 billion releases in 2010. A substantial decrease in releases (down to 4.16 billion) occurred in 2011 due to hatchery infrastructure damage sustained during the 2011 tsunami in Japan. Among the top three

hatchery-producing regions (1. Japan, 2. Alaska, and 3. Russia), increases in the numbers of hatchery releases were particularly observed among Russian chum salmon. Increased releases of pink and chum salmon from Alaskan hatcheries have also occurred during 2009–2012.

- Eight salmon fisheries accounting for 44% of the total global salmon harvest volume have achieved MSC certification through 2012. Alaska salmon is included in the certified volume, although the fishery is currently in re-assessment. (If late April news reports hold true, and all Alaska salmon fisheries are recertified except Prince William Sound pink and chum salmon, approximately 34% of global harvest would have the MSC certification. If Alaska salmon fisheries were to leave the MSC program entirely, only 7% of the total global salmon harvest volume would have MSC certification).

  An additional 2% of the global harvest volume is currently in full assessment, and the remaining 54% of the harvest is not currently part of the MSC program. East Pacific (Alaskan and British Columbian) fisheries have been engaging with MSC as aggregate, region-scale fisheries that account for all harvest of a particular region, while West Pacific (Russian and Japanese) fisheries have undergone assessment at the district scale, leaving most of West Pacific harvest presently uncertified.

- The analysis of MSC conditions status among the eight MSC-assessed salmon fisheries indicates that all five certificates for which one or more surveillance audits have taken place during the current certification contain conditions that stand open beyond their completion due dates. However, Certification Bodies note some progress among all of these fisheries in their respective most recent audit reports.

- Alaskan Category C ratings pertain mainly to hatchery issues in the Prince William Sound district fishery, the epicenter of Alaskan pink salmon hatchery production. Recommended improvements include the identification and implementation of hatchery management measures to address documented straying issues and minimize hatchery impacts on wild stocks.

- Russian Category C ratings resulted mainly from illegal fishing problems and poorly understood or unmitigated hatchery impacts on wild stocks. It is recommended that Russia implement urgently needed measures to curb illegal, unregulated, and unreported (IUU) fishing and trade in illegal fish in and from Russia.

- All Japanese salmon included in the assessment were classified as Category C due to poorly understood and unmitigated hatchery impacts on wild stocks. Implementation of the draft Hokkaido Wild Salmon Policy, including research on and mitigation of impacts of hatchery fish on wild stocks, is recommended.

- Most British Columbia salmon falls into Category B, and much attention has recently been paid to high volatility in annual returns of Fraser sockeye salmon, which support the region's most significant salmon fishery. It is recommended that the fishery act upon the recommendations of the Cohen Commission and otherwise fully implement the Wild Salmon Policy. Particular needs throughout British Columbia include status benchmarking for salmon Conservation Units (CUs) and integration of CU-scale information into harvest control rules.

Among all region-specific improvement recommendations provided in this document, the following are considered to be priorities:

- A North Pacific-wide moratorium on hatchery expansion should be established until such time as risks to wild populations from hatchery impacts are, at the highest level, ascertained and integrated into a precautionary management strategy.
- Urgently needed measures to curb illegal fishing and trade in illegal fish in and from Russia should be implemented. This includes observer programs, on-site inspection of fishing areas, catch verification, traceability measures, and intergovernmental agreements on IUU fishing.
- There is room to improve data transparency in all production regions. Salmon management data important for the assessment of fishery sustainability should be made publicly available, including annual escapement data, escapement goals and the models upon which they were developed, proceedings involved in the determination of catch limits, annual reporting of in-season management decision making, and hatchery evaluations.

Introduction

This briefing represents the first edition of the Sustainable Fisheries Partnership global sustainability overview of Pacific salmon fisheries and describes assessment results produced through the application of an adapted, species-specific version of the FishSource sustainability criteria. The FishSource approach to salmon fishery assessment looks at both current management and stock status as well as at trends over the past 15 years in scoring salmon fisheries for 14 sub-criteria on a scale of 0–10. The sub-criteria are nested under five overlying scores that generally align with the five FishSource criteria in the original assessment method, developed for use with whitefish fisheries (Table 1). Lowest scores among nested sub-criteria are adopted as the scores for each of the five criteria. The salmon-specific FishSource assessment method can be downloaded here.

The FishSource salmon method was developed on the basis of statistical and empirical analysis of MSC salmon fishery assessment results in order to maximize correspondence between the FishSource and MSC fisheries assessment methodologies. It will take time to develop scores for all salmon fisheries for all 14 sub-criteria, an ongoing process. In the meantime, many of the scores included in this report were derived from a quick assessment format, through which scores for each of the five FishSource criteria were assigned in range rather than numeric format (≥8, ≥6, <6). If a fishery has undergone MSC assessment, quick assessment entails derivation of scores and rationales from relevant MSC performance indicators, possibly updated with research published since the most recent certification.

For fisheries without MSC assessment, quick assessment generally involves analysis of only one nested sub-criterion (the sub-criterion where lower scores are deemed most likely on the basis of preliminary information) for each of the five criteria. Generally, data used to score these profiles was the most recent available in 2011. Numeric scores, meanwhile, indicate fisheries that have undergone full, independent analysis using the FishSource method. Data used for these full analyses was the most recent data available as of early 2013 (mostly 2011 data with some 2012 data).

Ratings of the individual fisheries are based on current status at, and trends leading up to, a certain point in time (usually more than a year in the past), which is not necessarily the year in which the raw material is being harvested or purchased. Consequently, the analysis presented in this briefing cannot be used as a practical, 'real-time' purchasing guide but rather as a source of information in assessing performance trends over a period of several years.

For the purposes of grouping fisheries according to broad performance level, fisheries have been organized into categories:

Category A – Fisheries that score 8 or above across all FishSource criteria
Category B – Fisheries that score 6 or above across all FishSource criteria
Category C – Fisheries where at least one criterion is scored below 6

Table 1: Salmon-specific adaptation of the five FishSource scores developed for use in assessment of whitefish fisheries.

Criterion /Score (Whitefish)	Criterion/Score (Salmon)	Nested Sub-Criteria
1. Is the management strategy precautionary?	1. Is management responsive?	1.1 In-season responsiveness 1.2 Multi-season responsiveness 1.3 Responsiveness to habitat issues
2. Do managers follow scientific advice on output controls?	2. Are the management guidelines appropriate?	2.1 Escapement goal development and implementation
3. Does the fishery comply?	3. Are the management guidelines and responses based on adequate data?	3.1 Illegal harvest and deviation between reported and actual catch 3.2 Harvest monitoring 3.3 Escapement monitoring
4. Is the fish stock healthy?	4. Has stock productivity been maintained?	4.1 Escapement trends 4.2 Harvest trends
5. Will the fish stock be healthy in the future?	5. Are hatcheries or other enhancement activities negatively affecting wild stocks?	5.1 Hatchery contribution to fishery 5.2 Wild stock management 5.3 Straying magnitude and measurement 5.4 Hatchery: wild stock mixing 5.5 Hatchery policies

In addition to categorization of fisheries, the analysis described in this paper also includes recent catches, harvest trends, hatchery releases, percent enhanced portion of the harvest, gear types, MSC certification, and outstanding MSC conditions (for certified fisheries).

Not all salmon fisheries have been included in this analysis; those 81 fisheries that are included account for 97% of global wild-capture harvest of Pacific salmon. All included fisheries target

one of five species (pink salmon, chum salmon, sockeye salmon, coho salmon, or Chinook salmon) and occur in Alaska, Russia, Japan, or British Columbia. Masu and steelhead salmon fisheries, as well as fisheries occurring in the Pacific Northwest US and Korea and several others, are not included in this analysis. Among the fisheries not included, several (Kamchatka Chinook and coho salmon, Pacific Northwest Chinook salmon, North Coast British Columbia Chinook salmon, and Hokkaido pink salmon) are planned for inclusion in the next annual iteration of this report.

Results

Overall Status of Salmon Fisheries

The results are presented in Excel workbook format in Annex A with the following included spreadsheets (some of the graphs and charts included in Annex A are also included in the main body of this document):

"Master" – Provides scores for 81 district fishery profiles and 12 regional umbrella profiles that summarize results for nested district fishery profiles (the lowest scores among nested fisheries for each of the five scores appear in the regional umbrella profile). District fisheries are gear-, geography-, and species-specific (the five main commercial species of Pacific salmon are included in this analysis). For each fishery, catch volume in 2010–2011 (average of the 2 years), gear type, and the percent of hatchery contribution to the harvest are indicated, as are the MSC status of the fishery and the number of outstanding conditions that need to be fulfilled.

"Volume and category analysis by species" – This data is presented as pie charts (Figure 2) that show proportions and volumes of A, B, and C scores among all assessed fisheries for each of the five fisheries (regions are aggregated).

"Volume and category analysis by region" – This data is presented as a single pie chart (Figure 1) that indicates proportions and volumes of A, B, and C scores in Alaska, British Columbia, Russia, and Japan (species are aggregated).

"Volume and category analysis by species & region" – Five bar graphs, one per species, indicate regions' contributions to harvest volume that was scored as Category A, B, and C.

"Harvest trends" – This data is presented as linear graphs for each species that cover both the 81 salmon fisheries currently included in FishSource and those that are not. The upper trendline indicates total, Pacific-wide harvest, while the other trendlines indicate contributing harvest in a particular region (Alaska, Russia, British Columbia, and Japan) during 1997–2012. Data for 2012 is not available for all regions.

"Hatchery trends" – This data is presented as five linear graphs (one per species), representing 1997–2012 hatchery releases from both the 81 salmon fisheries currently included in FishSource and those that are not. The upper trendline indicates total, Pacific-wide harvest, while the other trendlines indicate contributing releases from a particular region (Alaska, Russia, British Columbia, and Japan). Data for 2012 is not available for all regions.

"MSC information" (2 sheets) – Two bar graphs summarizing MSC statistics are presented summarizing data from both the 81 salmon fisheries currently included in FishSource and those that are not. The first bar graph indicates the proportion of total global harvest of each species that is MSC certified, in MSC full assessment, and neither certified nor in full assessment. The second bar graph indicates the proportions of open and resolved conditions for each MSC-certified salmon fishery.

Examination of Annex A allows the following conclusions to be drawn:

21% of the total volume of Pacific salmon included in our analysis comes from fisheries in very good condition (Category A). Of the 20 fisheries in Category A, 18 are located in Alaska (including the Annette Island Reservation), and one each in Russia and British Columbia.

30% of the total volume of Pacific salmon included in our analysis comes from fisheries that are in good condition but would benefit from improvements in management responsiveness or mitigation of hatchery impacts (Category B). Of the 34 fisheries in Category B, 15 are located in Alaska, 11 in British Columbia, and nine in Russia. Score 2 (Management objectives, i.e., escapement goal development and application) was rated "≥6" the most often among the five scores, resulting in the fisheries' inclusion in Category B.

49% of the total volume of Pacific salmon included in our analysis comes from fisheries with significant management, stock status, or hatchery impacts issues, where significant improvements are needed (Category C). Of the 25 fisheries in Category C, 16 occur in Russia, four in Alaska (three in Prince William Sound and one on Annette Island), three in Japan, and two in British Columbia. IUU fishing (Score 3) and hatchery impacts (Score 5) were most often responsible for fisheries' inclusion in Category C.

The slight predominance of very good and good fisheries (Categories A and B) vs. fisheries with significant issues (Category C) in terms of Pacific-wide volume is apparent in Figure 1, which aggregates categories by region. When categories are aggregated by species, meanwhile, Category A predominates among coho and sockeye salmon, Category B among Chinook and pink salmon, and Category C among chum salmon (Figure 2). These results are indicative of the high contributions of hatcheries to some chum and pink salmon fisheries (and associated impacts on wild stocks), as well as declining stock status trends among East Pacific Chinook salmon and issues associated with the species' management in mixed-stock fisheries.

MSC Information

Of the North Pacific-wide harvest of salmon across the five main commercial species, 44% of total volume is MSC certified, 2% is in full MSC assessment (the Aniva Bay, Russia, pink salmon fishery; the Kitami, Japan, fall chum salmon fishery; and the Southeast Alaska Chinook salmon troll fishery), and 54% is not certified. As Figure 3 indicates, pink and chum salmon account for the bulk of the uncertified volume (particularly the Western Pacific supply, i.e., uncertified Russian pink and chum salmon fisheries and Japanese chum salmon fisheries). Although the Alaskan salmon fishery is currently undergoing reassessment and the 2007 certificate has expired, all Alaskan fisheries except the Southeast Alaska Chinook troll fishery are treated as "certified" in our analysis because all product currently on the market (fished in the 2012 or

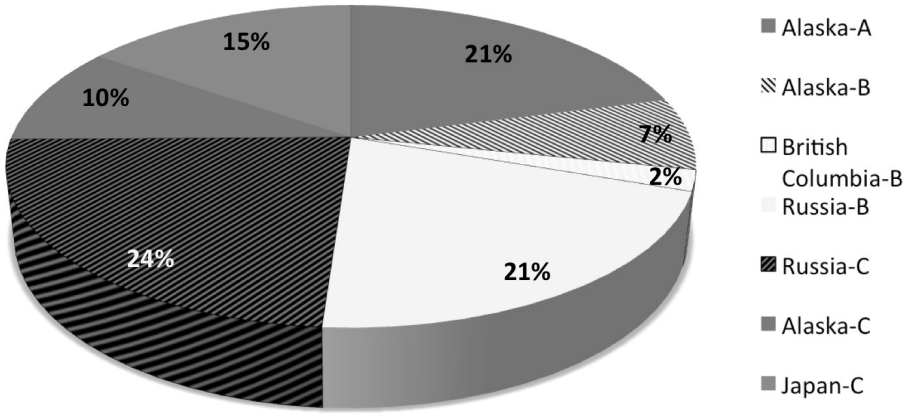

Figure 1: Pie chart representing the volume of Pacific salmon from each region organized by category (A, B, and C). British Columbia A and C volumes, as well as the Russia A volume, are not shown because they each account for less than 0.1% of the Pacific–wide harvest volume.

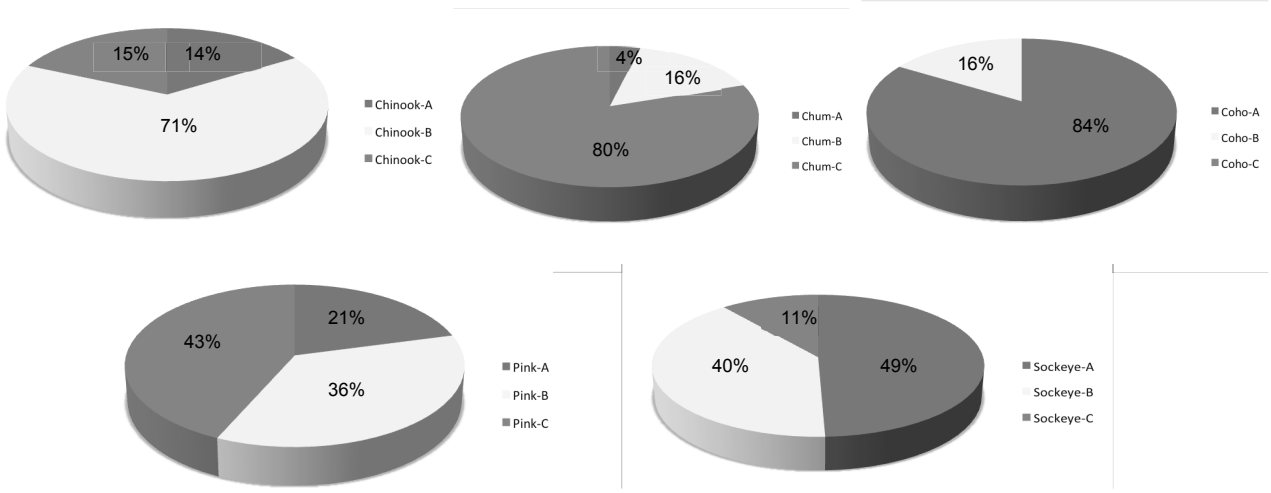

Figure 2: Pie charts representing the volumes of each of five species of Pacific salmon by category (A, B, and C). Harvest from all regions is aggregated. Upper row, left to right: Chinook salmon, chum salmon, coho salmon. Bottom row, left to right: pink salmon, sockeye salmon.

prior seasons, before the 2007 certificate expired) can bear the MSC label. If late April news reports hold true, and all Alaska salmon fisheries are recertified except Prince William Sound pink and chum salmon, approximately 34% of global harvest would have the MSC certification. If Alaska salmon were to leave the MSC program entirely, only 5% of the total global salmon harvest volume would have MSC certification.

In observing the scale of MSC-certified salmon fisheries, one can see that East and West Pacific salmon fisheries are approaching the MSC program variously. While the Alaskan and British Columbia salmon fisheries have entered the MSC program as region-scale units encompassing all harvest in various nested districts, Western Pacific fisheries have undergone assessment as more discrete, district-scale units. That trend appears to be continuing, judging by the West Pacific fishery units currently undergoing assessment (Aniva Bay pink salmon and Kitami fall chum salmon).

There are eight current MSC certificates for salmon fisheries (including Alaska's lapsed certificate), five of which are already over one year old and have thus undergone one or more surveillance audits. Progress of fisheries toward resolution of open MSC conditions is indicated in Figure 4. The Alaskan, Iturup Island, BC sockeye, BC pink, and Annette Island salmon certificates all contain conditions that stand open beyond their due completion dates. However, Certification Bodies note some progress among all five fisheries in their respective most recent audit reports.

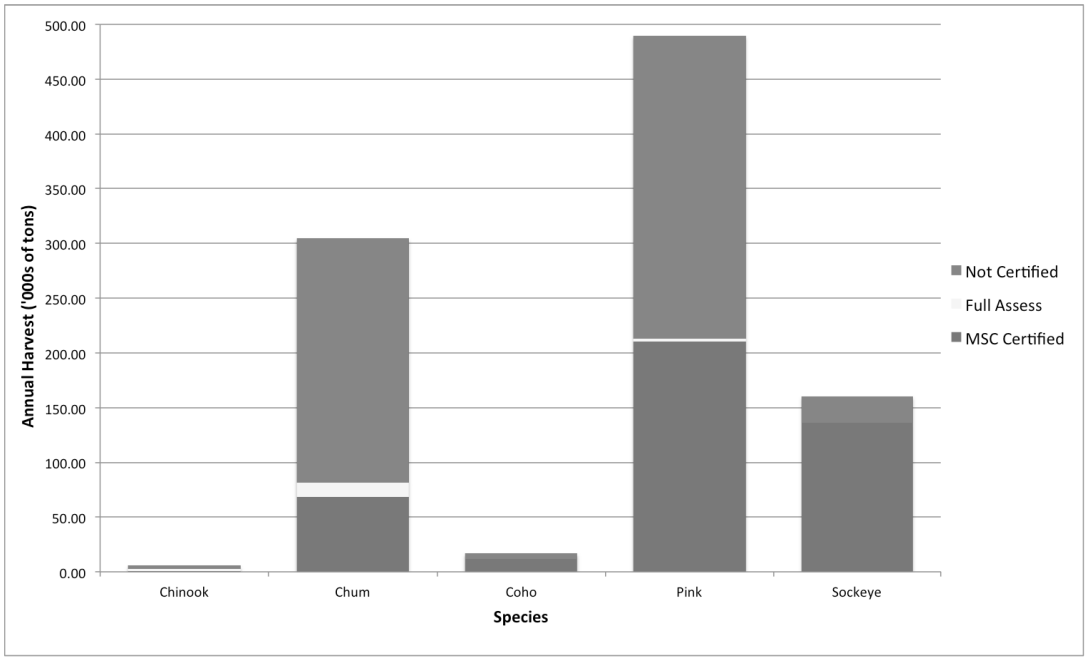

Figure 3: Bar graph indicating MSC status of the North Pacific-wide salmon harvest (average of the 2010–2011 seasons) by species. Fisheries accounting for the majority of sockeye and coho salmon volumes are certified, while that is not the case for the other three species.

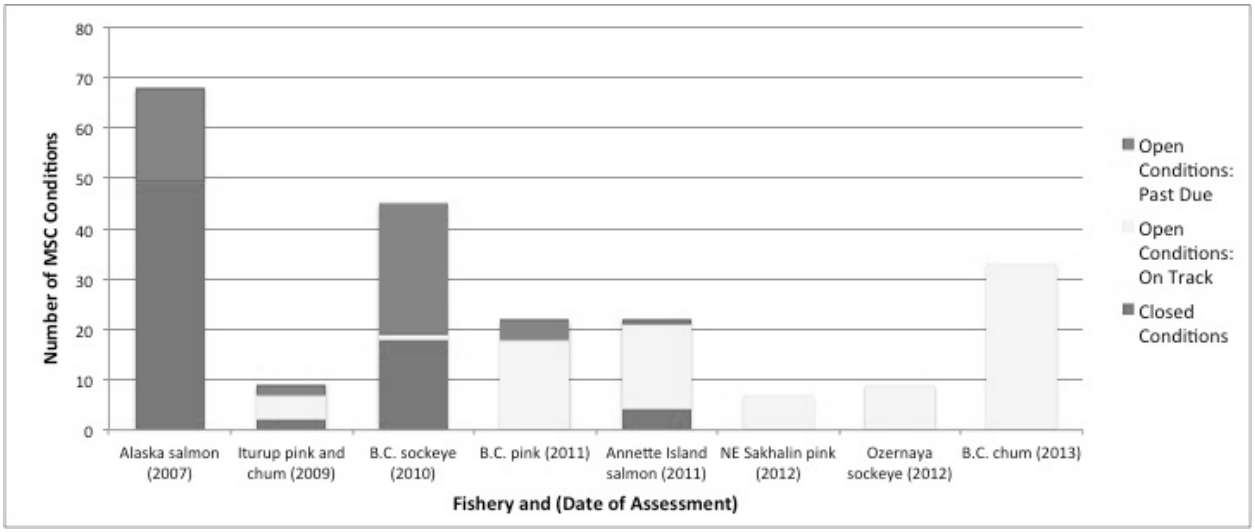

Figure 4: Bar graph indicating the number and status of MSC conditions among the eight MSC-certified salmon fisheries as of April 2013.

Fishery Improvement Projects

Besides the improvement processes underway for fisheries through the MSC program, there is one Fishery Improvement Project for which information is publicly available. See https://sites.google.com/site/fisheryimprovementprojects/home/russia-salmon-fip. High Liner Foods and the Wild Salmon Center have also recently announced the launch of a "global Wild Salmon FIP."

Regional Improvement Needs

Alaska:

The Alaska salmon fishery harvests five species of salmon (pink, chum, sockeye, coho, and Chinook salmon) in coastal, adjacent open-ocean, and river areas of the state. In 2010–2011, Alaska accounted for 37% of wild-capture Pacific salmon harvest, with pink salmon comprising approximately 50% of the regional share, followed by sockeye (30%), chum (17%), coho (3%), and Chinook salmon (0.74%). Alaska accounts for the majority (>60%) of global wild-capture harvest of sockeye and coho salmon (FishSource 2013). The 2012 all-species commercial harvest of 286,760 metric tons was among the lowest harvests recorded in the last 16 years, with a reduced pink salmon harvest chiefly responsible (Figure 5). Chinook and coho salmon harvests were also very low, with federal disaster status conferred to three district Alaskan Chinook salmon fisheries by the United States Department of Commerce (Figure 6) (NMFS 2012). While salmon harvests vary widely from year to year in response to environmental conditions, and the overall 2012 Alaskan harvest is within expectations of natural fluctuation,

scientists at Alaska Department of Fish & Game (ADF&G) are displaying concern with respect to declining trends among certain Chinook salmon stocks (ADF&G 2013).

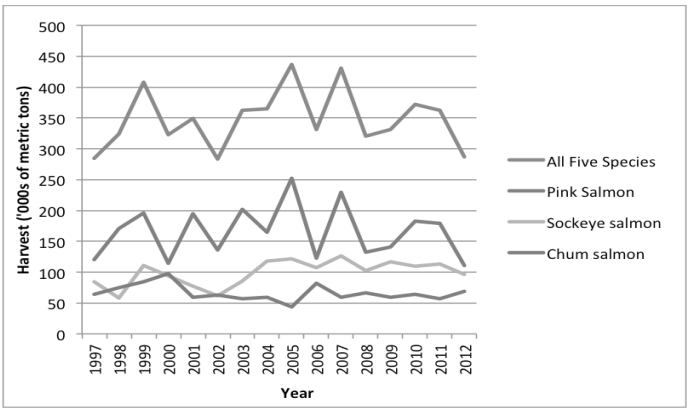

Figure 5: 1997–2012 Alaska commercial harvest of all five commercial salmon species (blue line), as well as the component harvests of pink, sockeye, and chum salmon.

Alaska salmon fishery management is among the best in the world, as depicted by the preponderance of Category A fisheries located in the geography. Recognized strengths of the fishery include its data transparency, escapement monitoring coverage, and explicit prioritization of wild stocks in legislation. Nevertheless, some sustainability concerns exist, including hatchery management issues, impacts of mixed-stock fisheries on weak stocks, and the pending Pebble Mine project in Bristol Bay. Concerns also exist around bycatch of Chinook and other salmon in other (non-salmon) commercial fisheries.

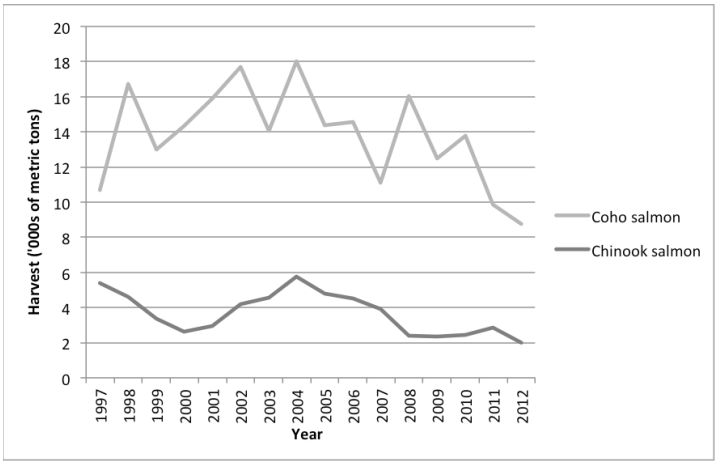

Figure 6: 1997–2012 Alaska commercial harvest of coho and Chinook salmon. Both species recorded their lowest statewide harvests during the analyzed period in 2012.

At the time of the fourth MSC surveillance audit for Alaska salmon in October 2011, 19 open conditions remained. Required improvements included estimating hatchery stray rates in specified regions; incorporating this information into escapement goal-setting and monitoring; demonstrating that enhanced fish were not adversely affecting wild fish; conducting research at the sub-stock scale and incorporating results into management objectives; and improving information on contributions of component stocks in mixed stock fisheries and adjusting harvest strategies, escapement goals, and monitoring. The majority of the open conditions are focused upon hatchery issues in Prince William Sound and Southeast Alaska, epicenters of Alaskan pink and chum salmon hatchery production, respectively (Figure 7). For example, in the Prince William Sound fishery (which accounts for all Alaskan Category C ratings along with Annette Island sockeye salmon):

- Pink salmon wild stock yields have exhibited meaningful declines over the last 15+ years and may result from interactions between wild and hatchery fish.

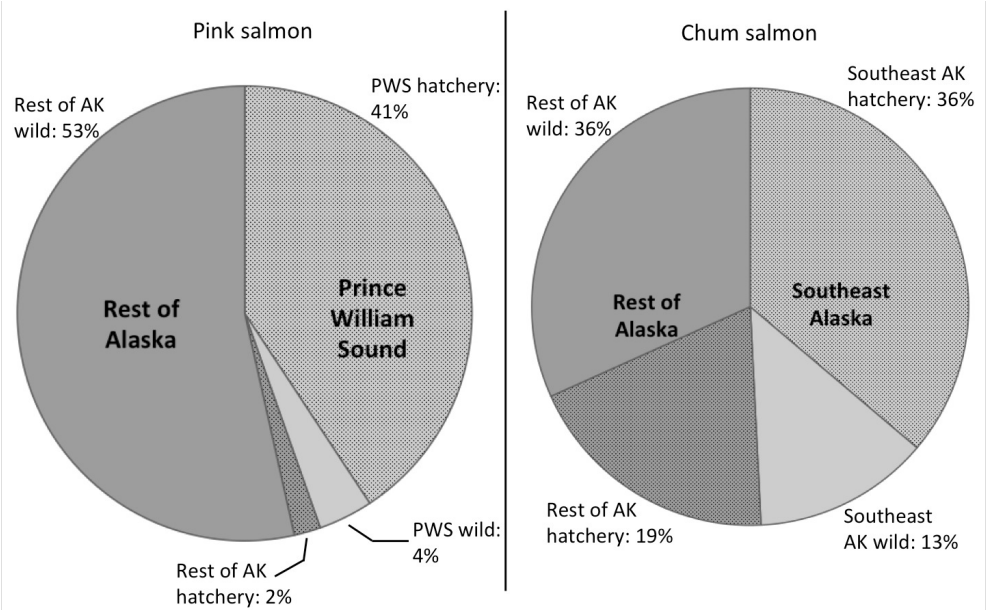

Figure 7: Pie charts indicating the Prince William Sound hatchery pink salmon contribution to total Alaskan pink salmon harvest (left) and the Southeast Alaska hatchery chum salmon contribution to total Alaska chum salmon harvest (right). Hatchery contributions of both the regions of interest (blue) and the rest of Alaska (orange) are indicated by dotted shading patterns.

- Some district-specific pink salmon broodlines have missed their escapement goals multiple times over the last 15 years.
- Escapement goals have been lowered multiple times for some district-specific broodlines in association with missed management objectives
- There have been compliance issues with the local hatchery operator (Prince William Sound Aquaculture Corporation) and there is a lack of public information about how those issues are being resolved (FishSource 2013).
- Hatcheries account for the majority of pink salmon production in Prince William Sound (87% portion of harvest on average for 2010–2011). Comparably, the enhanced contribution to pink salmon production in Southeast Alaska, the second most significant region for Alaskan harvest of the species, averaged only 1.1% for that same period (White 2010; Vercessi 2011). While Alaskan hatchery releases plateaued after achieving a peak in the early 2000s, pink and chum salmon fry releases have been exhibiting gradual increases over the past 4 years (Figure 8).

The following recommended improvements have been identified for the region:

- Encourage robust implementation, transparent reporting, and external peer review of ADF&G's Prince William Sound and Southeast Alaska hatchery interaction studies announced in 2012 (ADF&G 2012). Studies should be expanded to include sockeye salmon.

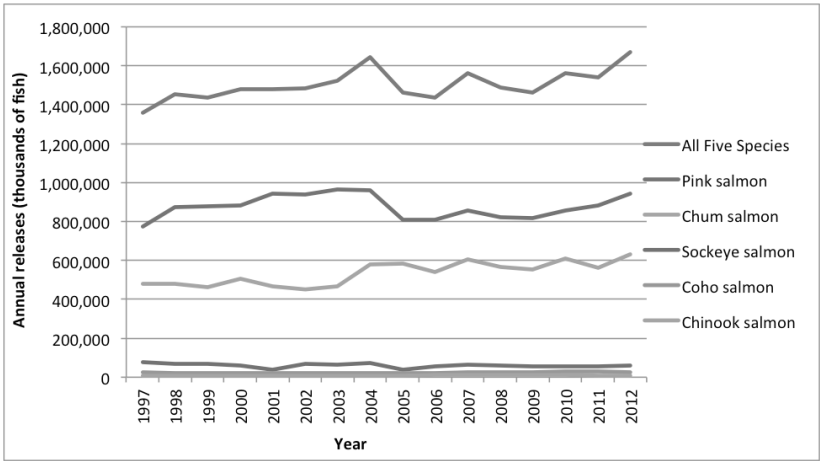

Figure 8: Alaskan hatchery releases, 1997–2012, across all five commercial species (blue line) and for component species alone. Steady increases in releases have occurred during 2009–2012.

- Identify and implement hatchery management measures to address documented straying issues and minimize hatchery impacts on wild stocks. Measures include, but are not limited to:
  - adjustments to release numbers, timing, and location
  - adjustment of wild stock escapement goals; and
  - development of robust approaches to enumerate wild stock escapement in cases where escapement is composed of both wild and hatchery salmon.

- Conduct/complete necessary stock identification and assessment surveys, and ensure that harvest strategies protect all components of mixed-stock fisheries.

- Develop a public improvement plan now for outstanding conditions in Prince William Sound and Southeast Alaska. A credible Fishery Improvement Project will help close conditions, or allow companies with sustainability policies that include credible FIPs to continue sourcing from the fishery if certification and chain of custody are not achieved.

- Oppose development of the Pebble Mine.
  RATIONALE: The proposed Pebble Mine is a gold, copper, and molybdenum mine located in the headwaters of two rivers that feed Bristol Bay and its globally significant sockeye salmon fishery. If built, it would be one of the largest mines in the world. Both a *Draft Environmental Protection Agency Watershed Assessment* (May 2012) and subsequent *Peer Review Report* of the assessment found that the mine would have negative impacts to salmon under even normal operation.

Russia:

In 2010–2011, Russian Far East fisheries accounted for 43% of wild-capture Pacific salmon harvest, with pink salmon comprising approximately 68% of the regional share, followed by chum (22%), sockeye (9%), coho (1%), and Chinook salmon (0.2%). Russia accounted for the majority (59%) of global wild-capture harvest of pink salmon in those years. Growing harvests of pink salmon, associated with favorable ocean conditions for Western Pacific-origin pink salmon, are responsible for a steadily growing Russian salmon harvest since the beginning of the millennium (Figure 9). Japan also operates an offshore driftnet fishery in the Russian EEZ that targets sockeye salmon, with incidental harvest of other salmon species. This fishery accounted for 6% of sockeye salmon harvested in the Russian EEZ in 2010–2011 (FishSource 2013). 2012 data for Russia have not yet been publicly reported.

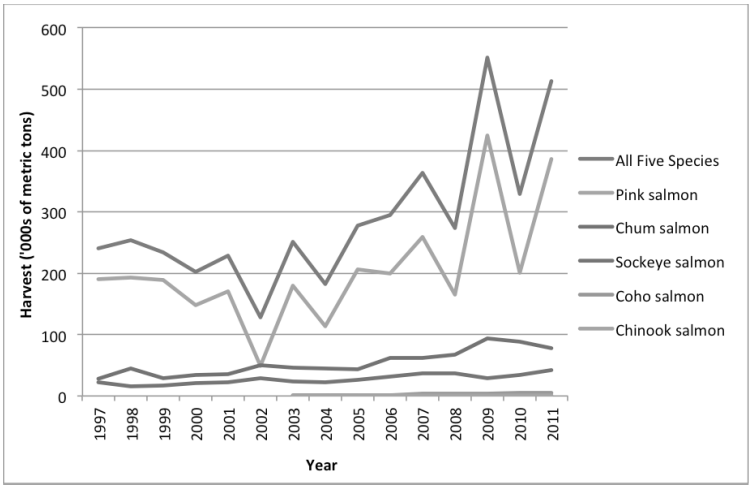

Figure 9: 1997–2012 Russia commercial harvest of all five commercial salmon species (blue line), as well as the component species harvests.

While the Russian salmon fishery benefits from the pristine and expansive nature of its freshwater salmon habitat, illegal fishing, data transparency, and hatchery impacts issues are detracting factors. Recommended improvements include:

- Implement urgently needed measures to curb illegal, unregulated, and unreported (IUU) fishing and trade in illegal fish in and from Russia. This includes observer programs, on-site inspection of fishing areas, catch verification, traceability measures, and intergovernmental agreements on IUU fishing.
  RATIONALE: IUU fishing is a problem in almost all Russian salmon fisheries. Data on poaching is limited, and estimates of the magnitude vary greatly themselves. The magnitude of salmon poaching was estimated at 40–92% of the legal catch throughout the Far East in one study (Augerot 2009); meanwhile, poaching rates on Sakhalin were estimated at 20–25% of legal catch in another study (Trumble and Lajus 2008). Fisheries for which estimated illegal harvest amounts to >25% of the legal harvest receive a score of "<6" on Score 3 (Accuracy of Data and Illegal Fishing), and this was responsible for many of the Category C ratings of Russian fisheries.

- Implement hatchery research and management reforms to minimize interactions with and impacts to wild populations. This includes implementing straying studies and marking and sampling programs; establishing genetic baselines; and reviewing release numbers, timing, and location. Harvest rates on mixed wild:hatchery aggregates may also be too high for sustaining certain wild populations. A moratorium on hatchery expansion should be

established until such time as risks to wild populations from hatchery impacts are, at the highest level, ascertained and integrated into management objectives.
RATIONALE: Sakhalin Island and the Kuril Islands (including MSC-certified Iturup) are large-scale producers of hatchery chum salmon, accounting for 66% of Western Pacific chum salmon production together with neighboring Japan (Figure 10). Russian hatchery chum production has grown approximately 50% since 2005.

- Make salmon management data publicly available, including annual escapement data, escapement goals and the models upon which they were developed, proceedings involved in the determination of catch limits in the offshore driftnet fishery, and annual reporting of in-season management decision making.

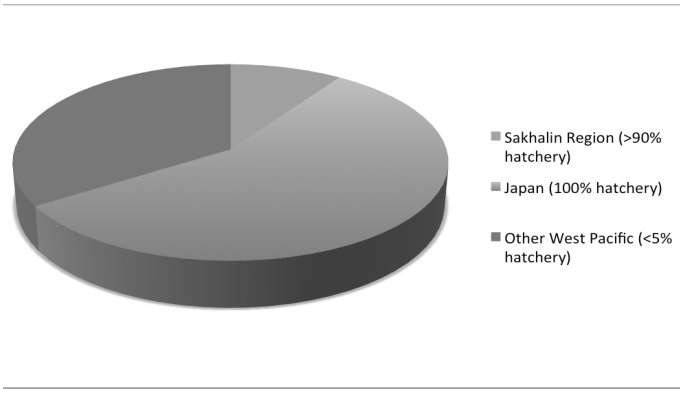

Figure 10: The mostly hatchery contributions of Japan (red) and Sakhalin-Kurils (orange) to Western Pacific total chum salmon production are compared with the contribution of the rest of the Western Pacific region (green).

- Ensure regional concerns around impacts to salmon from current and proposed oil, gas, mining, and forestry projects are mitigated and addressed.
RATIONALE: Of particular concern is exploratory drilling for oil and gas, which has been underway in the West Kamchatkan shelf since 2005. Should a large-scale extraction project result in the future, it would impact the wealth of salmon resources that migrate through the area.

Japan:

Japanese salmon fisheries harvest three species of Pacific salmon (pink, chum, and masu). In 2010–2011, Japanese harvest in the Japanese EEZ accounted for 16% of wild-capture Pacific salmon harvest, with chum salmon comprising 92% of the regional share, followed by pink (7%) and masu salmon (1%). Japan accounts for nearly half (47%) of global wild-capture harvest of chum salmon. Reduced chum salmon hatchery releases were observed in 2011 in connection with the tsunami that occurred in March of that year. 2012 statistics for harvest and hatchery releases are not yet available.

In Japan, where wild stocks were formerly managed by protecting natural spawning habitat in rivers, the approach changed to hatchery-based management at the turn of the twentieth century. Almost 100% of Japanese chum salmon production is of hatchery origin. Due to the management system's prioritization of hatchery fish and absence of measures for the conservation of wild fish, all Japanese chum salmon fisheries are rated "Category C" in this assessment. Chum hatchery production has held stable at 1.8–1.9 billion annual releases per year over the last 15 years.

Recommendations regarding hatchery research, a moratorium on hatchery production increases, and data transparency made above with respect to Russia are also relevant to Japan. Additionally, the following recommended improvement has been identified:

- Implement the Hokkaido Wild Salmon Policy, including guidelines for the development of wild stock escapement goals and monitoring, as well as research on and mitigation of impacts of hatchery fish on wild stocks.
  RATIONALE: The ongoing MSC full assessment of the Kitami fall chum salmon fishery may prompt implementation of the Hokkaido Wild Salmon Policy, a draft of which was prepared in 2008 but does not yet appear to be in official implementation (Nagata, 2010). Official adoption of this plan could mark a break with over 100 years of Japanese hatchery-based salmon fishery management.

<u>British Columbia:</u>

The British Columbia salmon fishery harvests five species of Pacific salmon (pink, chum, sockeye, coho, and Chinook salmon) in coastal, adjacent open-ocean, and inland areas of the province. In 2011, BC accounted for 2.2% of wild-capture Pacific salmon harvest, with sockeye salmon comprising approximately 53.5 % of the regional share, followed by pink (24%), chum (12.5%), Chinook (7%), and coho salmon (3%) (FishSource 2013). Overall, British Columbian salmon harvests have exhibited great inter-annual variation over the past 15 years, particularly with respect to pink and sockeye salmon (Figure 11). For example, the most significant sockeye salmon fishery in BC, that of the Fraser River, has been significantly curtailed (<1,000 metric tons of harvest) due to low returns five times in the last 8 years (one of those occasions occurred in 2012). However the fishery had an unexpectedly good year in 2010, when harvest exceeded 18,000 metric tons.

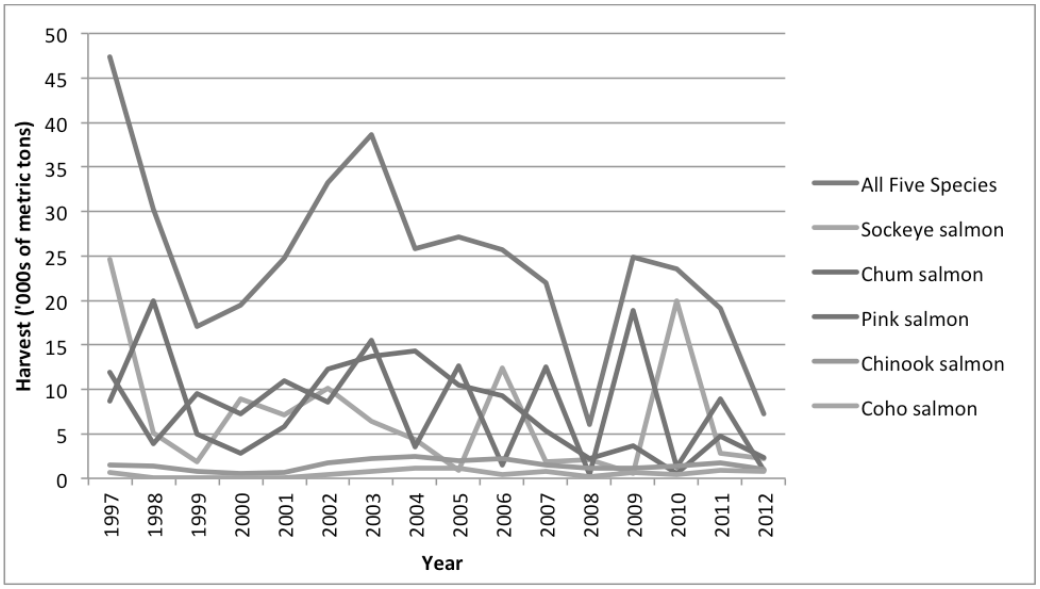

Figure 11: 1997–2012 British Columbian commercial harvest of all five commercial salmon species (blue line), as well as the individual species component harvests.

Salmon management and related issues garnered much attention in British Columbia in 2012. There was widespread public debate and concern regarding proposals to weaken or alter fish habitat and water protection laws. Omnibus Bill C-38 was passed, raising concerns about weakening Canada's fish habitat, water, environmental assessment, endangered species, and other laws. In October, the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River (known as the Cohen Commission) issued a final report, which included 75 recommendations to improve the future sustainability of Fraser River and other BC salmon. The recommendations focused heavily on implementation of Canada's 2005 Wild Salmon Policy (WSP), along with taking a much closer look at salmon aquaculture.

Improvement needs include, but are not limited to:

- Full implementation of the Wild Salmon Policy
- Complete benchmarking of all salmon Conservation Units (CUs)
    - Ensure status information for all CUs is publicly available
    - Ensure CU status is effectively incorporated into stock groupings used for commercial fishery management, including robust recovery planning for all CUs in the "Red Zone," i.e., below their lower benchmarks (WSP Strategy 1)
- Develop and implement adequate policies for catch reporting and compliance monitoring
- Implement all recommendations from the Cohen Commission final report in both the Fraser River and other B.C. salmon fisheries, including:
    - Develop specific timelines and milestones for WSP implementation, and create a new position within the Department of Fisheries and Oceans (DFO) to "champion" WSP implementation
    - Establish dedicated funding for WSP implementation
    - Remove mandate to promote salmon farming from DFO
    - Curtail salmon aquaculture production and licensing along wild salmon migration paths, and increase research.

Discussion

The results of Global Sustainability Overview of Pacific Salmon Fisheries can be concisely summarized as follows:

- The good: The majority (51%) of global salmon harvest by volume is either very well managed (Category A) or well managed (Category B).
- The bad: There are pressing sustainability concerns in all major production regions, and over half of the global harvest volume is neither engaged in the MSC program nor in a credible Fishery Improvement Project.

Among all region-specific improvement recommendations provided in this document, the following are considered to be priorities:

- A North Pacific-wide moratorium on hatchery expansion should be established until such time as risks to wild populations from hatchery impacts are, at the highest level, ascertained and integrated into management objectives.
- Urgently needed measures to curb illegal fishing and trade in illegal fish in and from Russia should be implemented. This includes observer programs, on-site inspection of fishing areas, catch verification, traceability measures, and intergovernmental agreements on IUU fishing.
- There is room to improve data transparency in all production regions. Salmon management data important for the assessment of fishery sustainability should be made publicly available, including annual escapement data, escapement goals and the models upon which they were developed, proceedings involved in the determination of catch limits, annual reporting of in-season management decision making, and hatchery evaluations.

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Note: Citations for all hatchery and harvest data represented in graphs and charts and discussed in the text can be found in Annex A (attached).

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