PACIFIC FISHERIES RESOURCE CONSERVATION COUNCIL
Conseil pour la conservation des ressources halieutiques du pacifique

RESPONSIBLE FISHING IN CANADA'S PACIFIC REGION SALMON FISHERIES: SYNOPSIS

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SUMMARY

Responsible fishing practices are being incorporated into fisheries around the world, including the BC salmon fishery. The BC salmon fishery's move towards more responsible fishing is supported by both international and Canadian agreements and laws. Other initiatives, such as Marine Stewardship Council certification, also promote responsible fishing practices. Nevertheless, several constraints keep the BC salmon fishery from fully implementing responsible fishing practices. Four factors that constrain the fishery are mixed-stock harvesting, competition within the commercial fishery, economic conditions, and compliance and enforcement. One mechanism that can help to address several of these factors is the use of selective fishing practices. Selective fishing can be applied to all sectors of the commercial fishery, including purse seining, gill netting, and troll fishing, as well as to First Nations' and recreational fisheries. To date, several fisheries along the BC coast have successfully incorporated elements of responsible fishing into their practices. Examples are the Skeena River Fishery, the Fraser River Fishery, the Area F Troll Fishery, and the West Coast Vancouver Island Recreational Fishery. These examples show how the BC salmon fishery has begun to transform into a responsible fishery. However, more work can be done by governments and by the industry to promote responsible fishing through measures that motivate change within the salmon fishery, encourage conservation, advance training and education, increase stock assessment, and support joint decision-making.

Photo: Elan Park

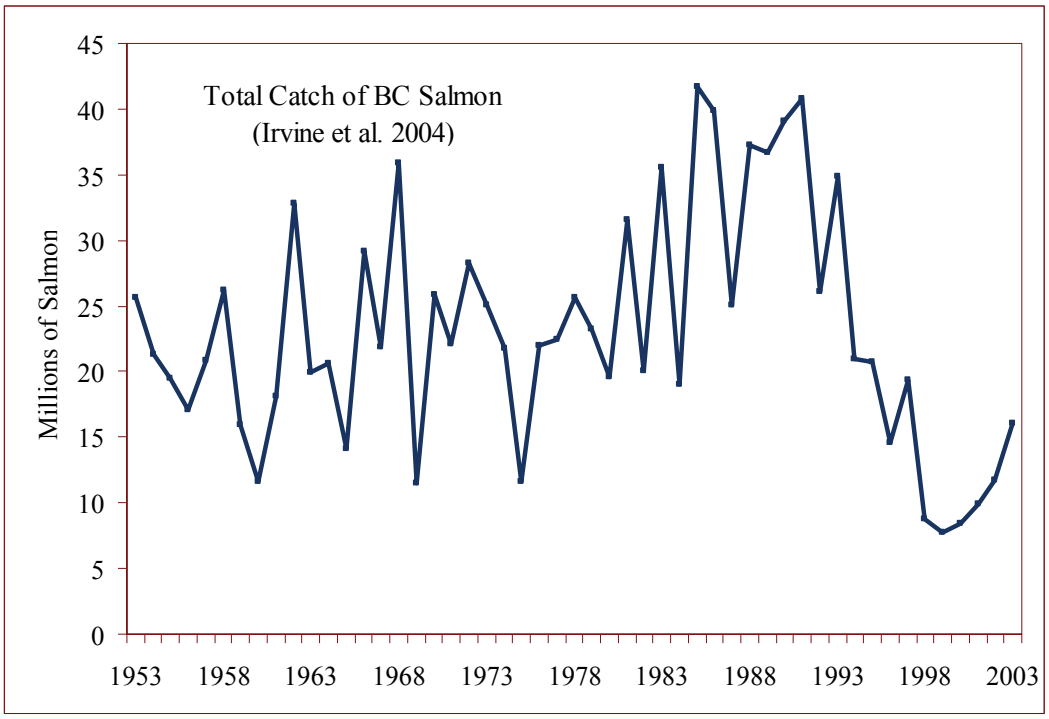
INTRODUCTION

Pacific salmon in British Columbia have sustained ecosystems and First Nation peoples for thousands of years, and for the last hundred years, Pacific salmon have fuelled significant commercial and recreational fisheries. Over the past several decades, catches of Pacific salmon have been declining. Some stocks (discrete populations) have become critically endangered: for example, Cultus Lake sockeye, Sakinaw Lake sockeye, and Interior Fraser River coho.

Over this same period, people have begun to realize and understand that Pacific salmon face multiple pressures. These pressures include physical changes to their freshwater habitats, such as dams being built and riparian (stream-side) vegetation being removed. Poor conditions in the ocean also affect their survival as the salmon feed and grow. And now, climate change and the mountain pine beetle epidemic are altering ocean conditions, water flow patterns and raising water temperatures in streams. These environmental pressures compound the already significant mortality of Pacific salmon in fisheries that harvest mature fish as they migrate towards their spawning grounds.

Fishing responsibly is one potential relief to these deteriorating conditions. Since the early 1990s, both the federal Fisheries and Oceans Canada and BC salmon harvesters have been pursuing ways to reduce the incidental harvest of non-target, and often weaker, species and stocks in the salmon fishery, as well as ways to reduce the mortality of those non-target species that are caught. Becoming more selective in harvesting fish is a key requirement for more responsible fishing practices.

The report *Responsible Fishing in Canada's Pacific Region Salmon Fisheries* by Elmar Plate, Robert Bocking, and Karl English of LGL Limited (available at www.fish.bc.ca) discusses the current state of responsible fishing in the BC salmon fishery and recommends ways for the fishery to become more responsible. The report also provides examples of responsible fishing practices in key salmon fisheries. Here, we provide a summary of the report.



WHAT IS RESPONSIBLE FISHING?

Responsible fishing means that a fishery is conducted to fairly benefit all the people involved in the fishery without causing unacceptable changes in fish populations and their ecosystems. A responsible fishery includes many elements to conserve both the fish and the fishery itself.

Key elements of a responsible fishery include:

1. **Having goals** that define what is desirable for the fishery and for ecosystems
2. **Using conservation measures** that are precautionary (err on the side of caution)
3. **Protecting ecosystems** for both species and their habitats
4. **Allocating benefits** that will provide harvesters with the incentives to fish in a way that helps to conserve the resource
5. **Decision-making** that includes all participants and interest groups and that is open and transparent
6. **Supporting management** that includes current scientific information, enforcement of policies and legislation, and regular evaluation of performance

WHAT SUPPORTS RESPONSIBLE FISHING IN THE BC SALMON FISHERY?

Responsible fishing is supported by international and Canadian agreements, laws, policies, and initiatives.

Internationally, three agreements specifically address responsible fishing, and Canada has either adopted or signed each one:

- United Nations Food and Agriculture Organization (UN FAO) Code of Conduct for Responsible Fishing and its associated International Plans of Action
- United Nations Convention on the Law of the Sea
- Canada–United States Pacific Salmon Treaty

Canada has laws that are related to—though not specifically about—responsible fishing:

- The Fisheries Act protects fish and fish habitat and manages domestic fisheries.
- The Species at Risk Act (SARA) requires the protection of species at risk and their habitats.
- The Oceans Act conserves the ocean environment and resources, while managing the resources in economically and environmentally sustainable ways.

Under the Canadian Constitution, First Nations' people in Canada have protected ancestral and treaty rights to fish, which includes the use of fish for food, social, and ceremonial purposes. Canada and fishery managers must be responsible in ensuring that First Nations' right to fish comes second only to conservation. This means ensuring that sufficient fish are provided for First Nations' needs before allocating fish to the commercial and recreational sectors.

Canada also has many policies and initiatives related to responsible fishing. These policies and initiatives endorse several of the elements of responsible fishing, but they are not yet fully implemented, in part because of funding shortfalls. These policies and initiatives include:

- A New Direction for Canada's Pacific Salmon Fisheries (1998)
- Allocation Policy for Pacific Salmon (1999)
- Policy for Selective Fishing in Canada's Pacific Fisheries (2001)
- Wild Salmon Policy (2005)
- Pacific Fisheries Reform (2005)
- Pacific Integrated Commercial Fishing Initiative (2007)

The fishing industry itself has also spearheaded initiatives on responsible fishing practices. For example, in 1994, the Canadian commercial fishing industry created the Canadian Code of Conduct for Responsible Fishing Operations. The fishing sectors also convene advisory processes (e.g., the Commercial Salmon Advisory Board and the Sport Fishing Advisory Board, which provide advice and recommendations to the Minister of Fisheries and Oceans on a wide variety of topics, including responsible fishing practices).

The Marine Stewardship Council (MSC), a nonprofit organization, grants certification to fisheries that meet its requirements. Responsible fishing and salmon management is critical to obtaining MSC certification. MSC certification is becoming a necessity in many international markets, and the BC Salmon Marketing Council is currently seeking certification for BC's sockeye, pink, and chum salmon fisheries.

WHAT CONSTRAINS RESPONSIBLE FISHING IN THE BC SALMON FISHERY?

Despite the many agreements, laws, policies, and initiatives that support and advance responsible fishing, several constraints keep all sectors of the BC salmon fishery from fully implementing responsible fishing practices. The four greatest constraints are continued harvesting of multiple species and stocks from mixed-stock fisheries in both ocean and river fisheries; the competitive style of the commercial fishery; low economic value; and inadequate compliance and enforcement.

Fisheries Targeting Multiple Species and Stocks: Many salmon fisheries in BC occur in areas where several different salmon species or several different stocks of the same species swim together as they migrate through the ocean and rivers towards their spawning streams. More often than not, only one of the co-migrating species or stocks is sufficiently abundant to withstand fishing pressure. When fish harvesters attempt to catch fish from the strong species or stocks, they also harvest the non-target species or stocks and this can result in over-harvesting of these less abundant or reproductively weaker populations. Reducing or eliminating the catch of non-target species and stocks while still harvesting the target species is one of the greatest challenges of salmon fishery management.

However, there are several ways to lessen the impact to non-target stocks in a mixed-stock salmon fishery. One way is for harvesters to use selective fishing methods. For example, harvesters can fish with specific gear, use revival tanks to allow non-target fish to recover before releasing them, or fish only at certain times when non-target species or stocks are less abundant. Another way to reduce the impact of a mixed-stock fishery is to move the fishery away from areas where species or stocks are co-migrating. Because species and stocks tend to separate more as they get closer to their natal spawning locations, conducting fisheries near river mouths or in rivers (terminal areas) is a way to reduce the harvest of non-target species or stocks. In larger river systems, such as the Skeena and Fraser rivers, the salmon stocks continue to co-migrate even in the river. The most selective salmon fisheries occur in rivers just downstream of spawning areas. The vast majority of these are either First Nations' fisheries for food, social, and ceremonial purposes or recreational fisheries. Commercial fisheries are rare in rivers in BC, because the fish are considered to be less valuable than if they were caught in the ocean or close to the river mouth.

Competition and Pace: The BC salmon fishery currently operates as a competitive fishery. Under this system, the Department of Fisheries and Oceans sets the fishing conditions, including the species to harvest, the type of fishing gear to use, the fishing area, and the length of time the area is open to fishing. Licenced harvesters can then catch as many of the target fish as they want, as long as they use the specified gear and stay within the catch area and opening dates.

The salmon fishing fleet has the capability to harvest a vast quantity of salmon each year, and many harvesters have invested large sums of money in their boats and gear. To make as much profit as possible, commercial harvesters fish as quickly as they can to haul in as many fish as they can. This way of fishing means a fast-paced, competitive fishery, which reduces the incentive to minimize by-catch of non-target species and to minimize mortality of by-catch. Taking care to responsibly release unwanted by-catch would mean slowing down and therefore catching fewer of the target fish and making less money.

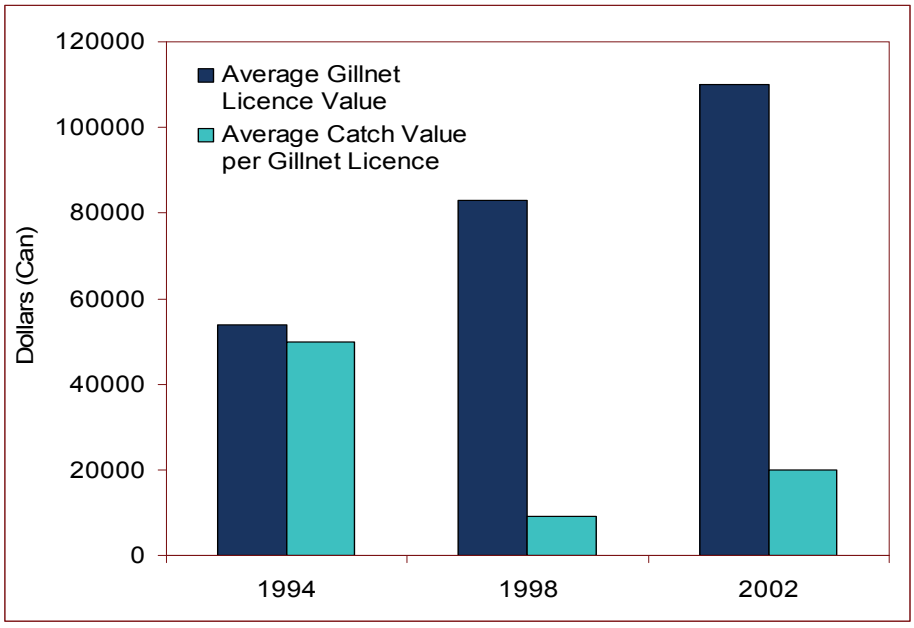
There are, however, ways to slow the salmon fishery down and allow more attention to be paid to how fish are caught and handled, without compromising profits. We describe two of these alternate ways of fishing, both a form of share-based fisheries: individual transferable quotas, also called the ITQ system, and pooled or cooperative fisheries.

In the ITQ system, the Department of Fisheries and Oceans gives individual harvesters a quota. Their quota allows them to catch a specified amount (e.g., weight, number, percentage) of the total number of fish that managers determine can be harvested (called the total allowable catch). There are several advantages to the ITQ system. First, because individual harvesters have a licence to catch a pre-determined number of fish, it enables harvesters to fish at their own pace and with more care and responsibility. They release any by-catch that is caught in better condition. Secondly, ITQs allow harvesters to focus more on their fishing techniques, so they can strive for higher quality and value of their catch.

There are also potential disadvantages to the ITQ system. For example, the quota is often given to harvesters free of charge, but after that it becomes a commodity and harvesters can decide to keep or sell their quota. Therefore, a concern exists of quotas being bought and held by only a few individuals or companies. In a pooled fishery, fishery managers specify how many fish can be caught, the gear to be used, and the area to be fished. The harvesters licenced to fish in that area then, as a cooperative or pool, decide who will catch the fish and how the profits will be distributed. As with the ITQ system, a pooled fishery slows down the harvesting and allows for more careful fishing practices.

Economic Value: The commercial sector of the BC salmon fishery is currently experiencing poor economic conditions. Because the fishery operates in a competitive style, there is no time for harvesters to bring in the highest quality of catch. A lot of the catch, especially sockeye and pink salmon, are processed into low quality, low value canned fish. In 2001, for example, the BC Salmon Marketing Council reported that 50% of the wild salmon harvest was canned. In contrast, only 15% of the wild salmon harvest was prepared into products with higher value, such as smoked salmon. In addition, wild caught salmon are selling into markets that also buy large numbers of farmed salmon. This situation increases salmon supply and decreases its price.

If markets for higher quality wild salmon products were secured, then processors would be able to pay harvesters more money per pound for high quality wild fish. Harvesters would then be motivated to catch and deliver fish of higher quality. In this way, the processing industry can play a significant role in the promotion of more responsible fishing practices in the BC salmon fishery.



Compliance and Enforcement: Failing to adhere to selective fishing practices, such as the use of on-board revival tanks before releasing non-target catch, continues to be a problem in the salmon fishery. Other concerns include illegally keeping by-catch and unauthorized sales of catch. Although punitive measures are not as desirable as motivational measures for promoting responsible fishing, sometimes they are necessary.

Several actions would increase compliance with fishing regulations. More fishery officers are needed on the fishing grounds. Alternatively, or in addition to more fishery officers, electronic monitoring systems could be installed on fishing boats as is currently done for BC ground fisheries and crab fisheries. Penalties for not complying with regulations must be clearly defined and sufficient. For example, a clear and sufficient penalty could be to immediately exclude the harvester from further fishing during the opening. Suspension penalties may be more effective, in some cases, than monetary fines. Local watershed committees could also motivate harvesters to comply with regulations and fish more responsibly by creating ownership of harvest decisions.

Photo: Elan Park

WHY SELECTIVE FISHING?

Fishing practices that are designed to target a particular species or stock while avoiding, or releasing unharmed, non-target species or stocks are called selective fishing practices. Non-selective fishing practices can result in the over-harvest of weaker stocks of salmon and, at least for some gear (e.g., gillnets), can reduce the size of salmon returning to spawn. Both factors can decrease the number of fish available for future harvests. The use of selective fishing practices reduces the number of non-target fish caught as by-catch while allowing harvesters to return by-catch to the water in better condition, thereby reducing mortality rates. Selective fishing practices have advantages for harvesting the target species, too, because fish caught live and in good condition can have greater economic value than dead fish. They may also allow fish harvesters to avoid selecting for only the larger fish. Selective fishing practices include using selective fishing gear and changing the way of fishing. Different modifications can be made to make salmon fishing gear more selective.

Purse seines are nets that harvesters use to encircle a school of fish before pulling the bottom edge of the net closed with a rope. Purse seines can be selective for the size of fish they catch by fitting the net with a device that allows small fish to escape without being brought on board. Purse seiners can also reduce fish stress and mortality by using a small motorboat to keep the middle portion of the net from collapsing while the main fishing boat encircles the school of fish. Once fish are captured in the net and ready to be brought on board, the traditional method has been to bring the net and its contents onto the deck of the boat. This can compress fish and expose them to air, both factors contributing to high fish stress and mortality. Other methods, which minimize air exposure and compression, are the use of a round dip net, called a sock brailer, to scoop fish along with some water from the net onto the boat, and the use of fish transfer pumps followed by wet sorting.

Gill nets traditionally catch fish behind the operculum (gill plate). Mortality rates in gill nets are high, especially if the nets are set and unattended for many hours. One way to increase catch survival using gill nets is to have short soak times, such as 30 minutes or less. Studies have shown that short soak times combined with gentle handling practices and the use of revival tanks can reduce mortality from gill nets to less than 10% of the fish caught. Another selective method uses a 'weed line' to lower the top edge of the gill net by one or two metres below the water surface so that species that migrate near the water surface can pass unharmed over the net. A variation of the traditional gill net is a tooth-tangle net, which entangles salmon by their teeth or other projections around the mouth. Tooth-tangle nets don't suffocate fish or cut their gills, so they promote the capture of live fish in good physical condition.

Troll fishing involves a fishing boat moving slowly while it trails lines with hooks through the water. By regulation, the hooks must be single and barbless to minimize damage to the hooked fish. Large lures target larger fish, so small non-target fish can be avoided by using a lure size appropriate to the fish being caught. Once caught, unwanted fish that are transferred quickly to an underwater revival cage at the side of the boat have a good chance of survival. Ideally, fish are transferred to the revival cage using a dip net rather than direct handling.

Live capture methods are less widely used types of fishing that allow harvesters to fish more selectively for salmon. The effectiveness of the methods described below depends heavily on both location and operator experience, so they need to be investigated further before becoming accepted harvesting methods in the BC salmon fishery.

- Fish wheels or paddle traps look like a simple water wheel with baskets to scoop fish from the water and slide them into a holding tank. They can be operated by the water current or by a motor.
- Fish traps or trap nets allow fish to enter from one direction and then trap the fish in a series of nets from which they can't find an escape route.
- Reef nets guide fish into a capture bag that must be quickly raised to retain the fish before they detect the net and escape.
- Fishing weirs span a stream to channel migrating fish through a gate and into a holding pen.
- Beach seine nets are operated manually from the shore or near the shore using a small boat.

A fishwheel with baskets lifted for towing.

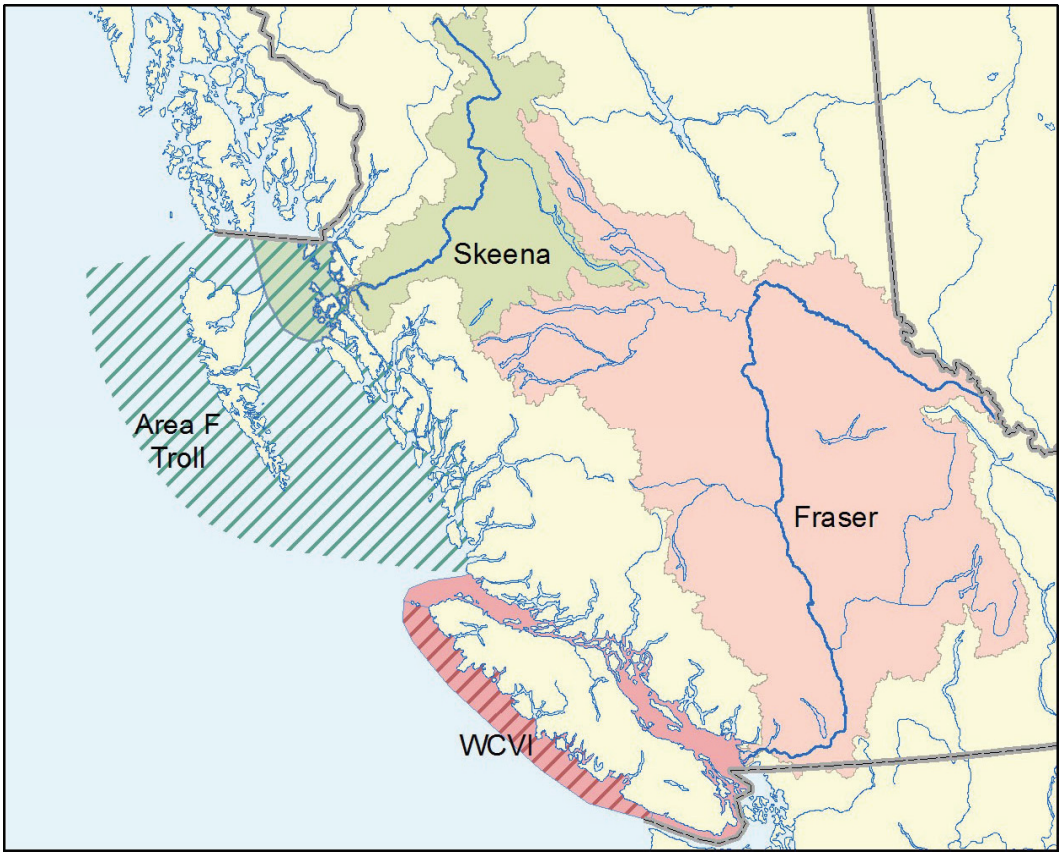
Recreational fishing for salmon must use barbless hooks, but they can be treble hooks, which cause higher mortality than single hooks. Fishing methods that offer the lure or bait slowly also have higher mortality rates. The use of single, barbless hooks presented quickly to the fish would increase selective fishing in the recreational fishery. Lower retention limits and a requirement to keep all fish caught within legal limits would also reduce mortality of released fish.

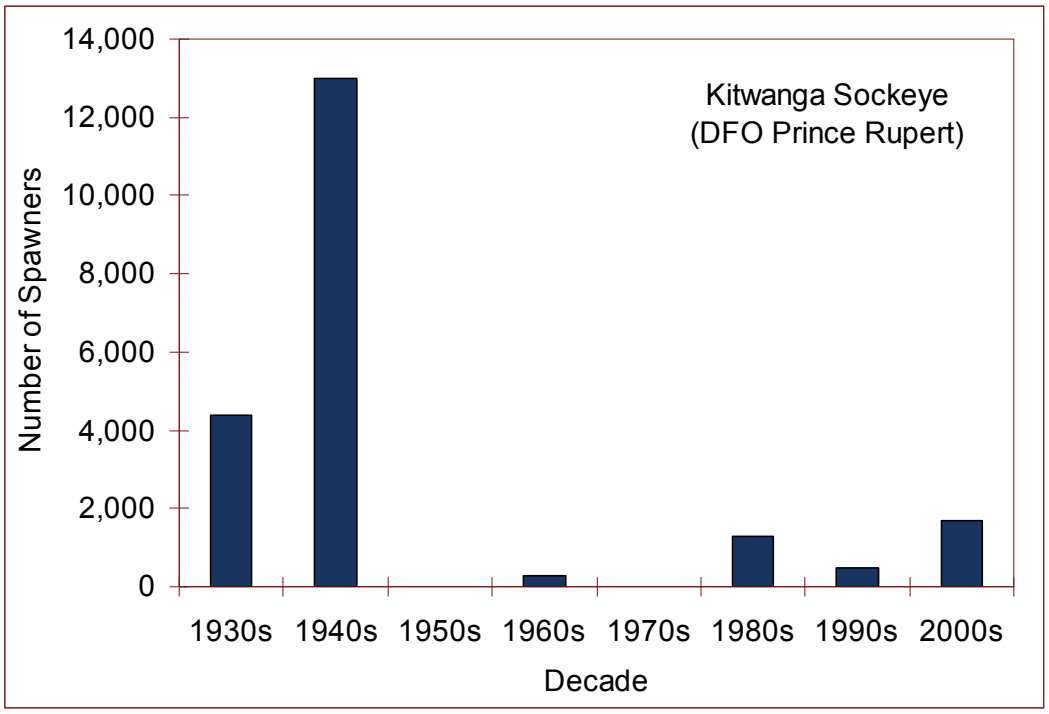
WHERE IS RESPONSIBLE FISHING BEING PRACTICED?

Several fisheries along the BC coast have incorporated elements of responsible fishing into their practices. Here, we describe four case studies from the BC salmon fishery.

The **Skeena River Fishery** primarily targets abundant pink salmon stocks and an enhanced stock of sockeye salmon from Babine Lake. These pink and sockeye stocks co-migrate with wild sockeye, steelhead, coho, chum, and chinook stocks, so the Skeena commercial salmon fishery is dealing with considerable mixed-stock and mixed-species challenges. The enhanced sockeye stock—which has had its numbers increased with the help of man-made spawning channels—poses particular difficulties for the fishery. When the spawning channels produce a lot of young salmon, harvesters expect to catch a lot of these fish as adults when they return to spawn. A high harvest rate of the enhanced Babine sockeye causes even more devastation for weaker co-migrating wild stocks, such as the Kitwanga River sockeye, which have declined to only a fraction of their early 1900s population size.

To address the mixed-stock challenges, the commercial gillnet and seine fisheries targeting Skeena stocks in the ocean have been modified through the use of a variety of selective fishing measures. In addition, wild stocks have been protected in several instances by closing access to fishing either at a particular time in the migration or in a particular location. In-river First Nations' fisheries have been piloted for harvesting salmon using selective fishing techniques in lower portions of the Skeena River where stocks are still co-migrating. Selective harvesting at terminal areas near spawning grounds also occurs, although these fish have lower economic value.





The **Fraser River Fishery** has historically included seine and gillnet fisheries for commercial harvest of sockeye, pink, and chum salmon and troll fisheries for commercial harvest of chinook and coho salmon. First Nations' and recreational fisheries have also targeted most of these species. Several salmon populations are of high conservation concern in the Fraser River, including Cultus Lake sockeye, Early Stuart sockeye (a run with more than 40 stocks), and Interior Fraser coho. Interior Fraser steelhead and lower Fraser white sturgeon are also species of concern in the Fraser River.

For the past two decades, numerous selective fishing methods have been tested in the Fraser River fisheries in an attempt to minimize the mortality of non-target fish species. Methods that show the most promise include purse seines in marine waters, tooth-tangle nets and beach seines in the lower Fraser, fish wheels and dip nets in the Fraser canyon areas, and weirs and traps in tributaries. Fishery managers have also instituted restrictions on both the timing and location of harvests in an effort to reduce impact to weak stocks. In some years, all fisheries that may have encountered certain stocks of concern have been closed.

The **Area F Troll Fishery** focuses primarily on chinook and coho salmon that originate from streams in Washington and Oregon states and southern BC. A quota for the troll fleet is set each year with guidance from the Canada–United States Pacific Salmon Treaty. The fishery's main challenge is to harvest its total allowable chinook catch while taking into account the conservation concerns with West Coast Vancouver Island (WCVI) chinook stocks. The WCVI chinook are an important resource to First Nation people and coastal fisheries from Vancouver Island all the way to southeast Alaska. Each year, a ceiling for WCVI chinook mortalities is set, and the Area F Troll Fishery cannot exceed this number.

Managers of this mixed-stock fishery have used a variety of means to determine the composition of the chinook catch and to monitor the Area F harvest of WCVI Chinook. If there is evidence that the catch of WCVI chinook is greater than the allowable amount, managers with the Department of Fisheries and Oceans delay opening the fishery or close it early. Selective fishing measures required of the fleet include the use of barbless hooks and the use of a revival tank for injured or stressed by-catch.

Recently, the Area F Troll Fishery has been operated as a demonstration fishery to assess the use of an individual transferable quota (ITQ) system. During the demonstration, or pilot, period, licence holders are given the option of participating in the traditional competitive fishery or in the demonstration fishery. Boats in the competitive fishery compete for a total catch based on the number of boats in the fishery multiplied by 1,000. In the demonstration fishery, each licensee is assigned a catch limit. Most boats have opted to participate in the demonstration fishery, which is open for a longer time during each season than the competitive fishery. The demonstration fishery has resulted in higher quality of fish caught and greater safety on the boats; because harvesters can choose their fishing days and know they are still entitled to catch their individual quota of fish.

The **West Coast Vancouver Island Recreational Fishery** mainly targets chinook and coho salmon. This recreational fishery takes about 30% of the combined commercial and recreational harvest of chinook and about 15% of the coho harvest. The WCVI Recreational Fishery has seen considerable change in effort as harvesters that used to fish in the Strait of Georgia have moved to fish on the west coast of Vancouver Island. The fishery is managed to protect several chinook and coho stocks of concern that migrate through both inshore and offshore areas along the west coast of Vancouver Island en route to streams in BC and the United States.

Fishery managers forecast the abundance and catch of chinook and coho using information for several indicator salmon stocks. They can then implement restrictions on the timing and location of fishing. In addition, protection corridors have been created for chinook and coho stocks of concern. Red zones do not allow any fishing of chinook or coho, while yellow zones allow only non-retention fishing for wild chinook or coho. All recreational fisheries on the west coast of Vancouver Island are restricted to the use of barbless hooks. Treble hooks, though allowed, are discouraged, and circle hooks are being encouraged. Retention limits are small for the recreational fishery: a daily limit of two chinook (only one if a female spawner from a wild stock) and a daily limit of two coho from enhanced stocks or terminal fisheries only. To promote responsible fishing practices, the Sport Fishing Institute of BC is designing a responsible fishing branding system for fishing guide operations. The system, which is still in development, may include a training program about responsible fishing and the submission of catch data.

WHAT MORE SHOULD BE DONE?

The BC salmon fishery has begun to transform into a responsible fishery, but there is increasing recognition that more needs to be done. Government, First Nations, and industry should pursue several additional measures to further promote responsible fishing in the BC salmon fishery.

Motivating change: The current economic state of the fishery can be improved by continuing to slow down the fishery through, for example, ITQ (individual transferable quota) fisheries such as in the Area F Troll Fishery, as well as pilot pool or cooperative fisheries. Marine Stewardship Council certification should motivate managers and fish harvesters to be more responsible, which will in turn enable harvesters to get the maximum benefits for the investments they make into selective harvesting and other responsible fishing practices. Incentives should also be created for processors to add value to salmon products and reward harvesters with a higher price if they deliver high quality salmon to processors.

Harvesters who successfully and consistently use responsible fishing practices should also be rewarded with more access to salmon. Treaty and non-treaty agreements with First Nations should be concluded so that all harvesters have a clear understanding of what share of the harvest goes to each of the First Nations', commercial, and recreational fisheries. Finally, monitoring by fishery officers or electronic means should be increased to ensure compliance with selective gear requirements.

Conservation measures: Continuing to pilot projects that transfer the harvest of allowable catch to terminal areas in rivers will help to reduce mixed-stock fisheries. Negative interactions between enhanced stocks and wild stocks of concern should continue to be assessed so that enhancement programs can be modified to align with responsible fishing practices. Because selective fishing methods are critical in minimizing by-catch and increasing fish value, proven methods should be fully implemented and their use enforced in mixed-stock fisheries. Specific requirements should be set for the type of gear and other selective fishing practices that harvesters use in purse seine, gill net, troll, and recreational fisheries, as well as in First Nations' food, social, and ceremonial fisheries. In addition, funding should be increased for research into new selective fishing methods as well as for formalizing the process of integrating new fishing methods into the fishery.

Training and education: All salmon harvesters should receive training in fish handling techniques and selective fishing methods. Such training could be required for obtaining a fishing licence. General education of participants in the fishery should be provided to promote their understanding of the need for responsible fishing.

Stock assessment: Stock assessment programs should be increased to monitor populations of both target and non-target fish and to improve management of existing and new selective fisheries. Involving harvesters directly in data collection can foster greater ownership and responsibility in the salmon fishery.

Joint decision-making: All participants in the BC salmon fishery—the commercial sector (both harvesters and processors), the recreational sector, First Nations, the federal government, the provincial government, and environmental organizations—should work together to make decisions and to manage and promote responsible fishing with a unified voice. Decision-making groups should make management decisions using the best available science and data and using the precautionary approach.

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