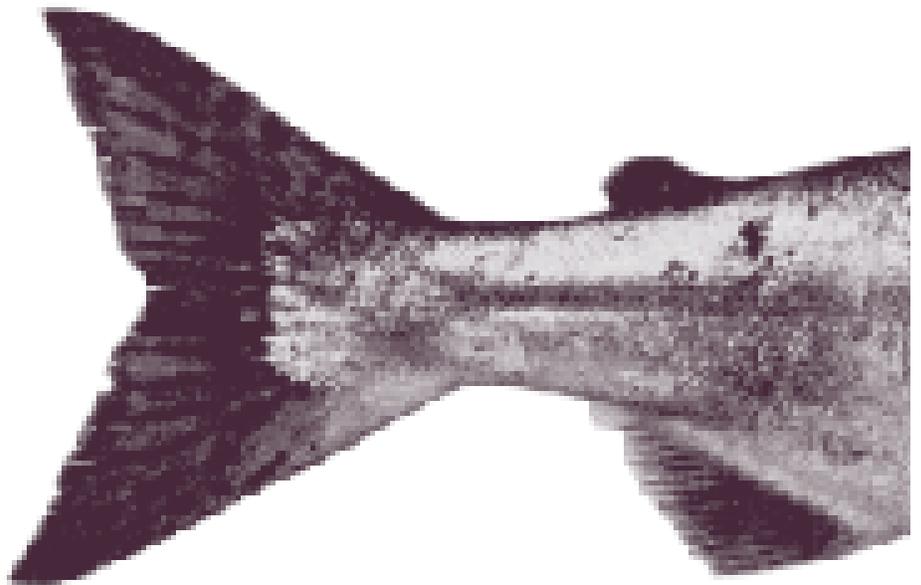

Last Call

A REPORT OF THE PACIFIC SALMON FORESTS PROJECT

The Will to Save Pacific Salmon

by Terry Glavin

David Suzuki Foundation



9.1998

The Authors

David Suzuki Foundation

The David Suzuki Foundation is a federally registered Canadian charity working to design a vision of Earth in which humans live within the planet's productive capacity – and finding and communicating practical steps to bring that vision to reality.

Terry Glavin

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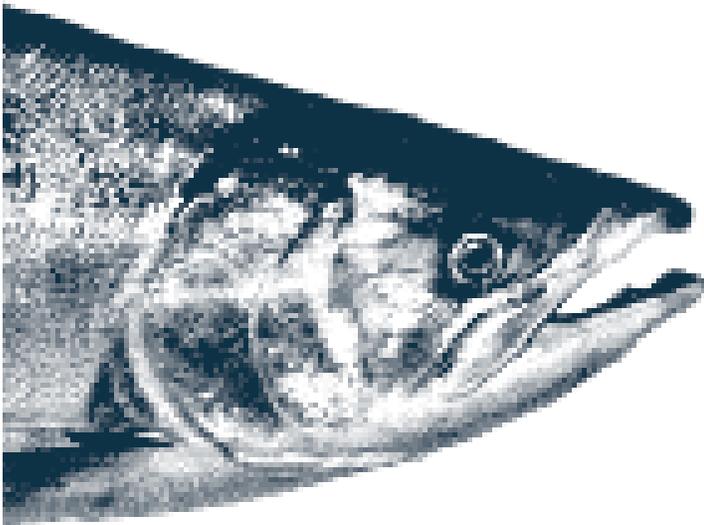


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Mark Hobson photo.

Informed observers — fisheries biologists, Aboriginal People, conservationists, commercial fishermen and anglers — have told us for years that if wild salmon are to have a future on Canada's west coast, we must be prepared to make sweeping changes to the way we do things on land, in rivers and at sea. What's new about this year's message, however, is that time has really run out. There's no time left for argument or assigning blame as to what has caused this crisis. If wild salmon are to be a part of our future, a decision must be made now. It is a straightforward matter: either wild salmon will survive, or they won't. Either salmon will continue to contribute a necessary component to the environmental health of this province, or they won't. Either salmon will be part of our culture, quality of life and economy, or they won't. To decide that wild salmon must have a place in our future is a simple thing to do.

**Either wild salmon will
survive or they won't.**

An Uncertain Future

There is nothing particularly new in the observation that if wild salmon are to have a future on Canada's west coast, we all must be prepared to make sweeping changes in the way we do things on the land, in the rivers, and at sea. Since the beginning of the last century, salmon have disappeared from almost half their former range over the northwestern section of the North American continent. Down through the decades, there have been numerous warnings about the salmon's uncertain future. These warnings have come from Aboriginal Peoples, conservationists, fisheries biologists, government agencies, commercial fishermen and anglers. What's new today is that the time for talking about action has run out.



In recent years, harvests of salmon throughout the North Pacific have reached 800,000 metric tons, annually. This is an amount roughly equal to the weight of the human population of Oregon, Washington, British Columbia and Alaska combined: it is the weight of about 12 million adult human beings. At the same time, human activities — fishing, logging, mining, dam-building, and the construction of roads, bridges, and cities — continue to imperil salmon throughout the western third of North America.

The precise number of salmon runs that have been driven to extinction in the “Lower 48” states is unknown. Some salmon runs south of the 49th parallel are quite healthy, and as of June, 1998, the U.S. National Marine Fisheries Service had identified only four populations as “officially” endangered under the Endangered Species Act. But a closer look presents a grim picture.

Endangered Populations

The first salmon to be listed under the Endangered Species Act were Idaho’s Snake River sockeye. Those fish were followed by the remnant steelhead at the salmon’s southern terminus, north of Los Angeles; Central California coast steelhead; and Sacramento River winter-run chinook. Another five populations - South-central California steelhead, Upper Columbia River steelhead, Snake River fall-run chinook, Northern California coho, and Southern Oregon coho, had been declared “threatened” under the Endangered Species Act. At the time of this writing, however, a further 18 salmon populations, from Southern California to the Canadian border, were classified as candidates for endangered or threatened status, or had been formally proposed for listing under the Act. What all these statutory classifications add up to is a colour-coded map of the U.S. coastal

region, from a point just north of Los Angeles to the Canadian border, depicting the status of salmon populations. Except for a couple of tiny patches in Washington state, the only white space left is where salmon are now completely extinct.

Canadian salmon have no specific “endangered species” laws that would provide maps indicating the location of the biological trauma wards that the salmon’s terrestrial habitats have become. Unlike U.S. fisheries agencies, Canada’s Department of Fisheries and Oceans doesn’t have much comprehensive data about the status of salmon under its jurisdiction. Part of this is because Canadian policy has been to focus management attention upon the “major” salmon runs, and upon those salmon species with the highest commercial value. Part of the reason is that British Columbia and the Yukon Territory are sparsely populated, and cover an area about the size of Washington, Idaho, Oregon and California combined. A 1996 American Fisheries Society review of a variety of Canadian fisheries data sources found that assessments were possible for only slightly more than half the roughly 9,600 salmon stocks in B.C. and the Yukon. But of those, 624 were found to be at “high risk” of extinction, 78 were at “moderate risk,” and 230 were “of special

**Geographic Extent of Threatened or Endangered
Pacific Salmon Stocks in Western U.S., 1998**

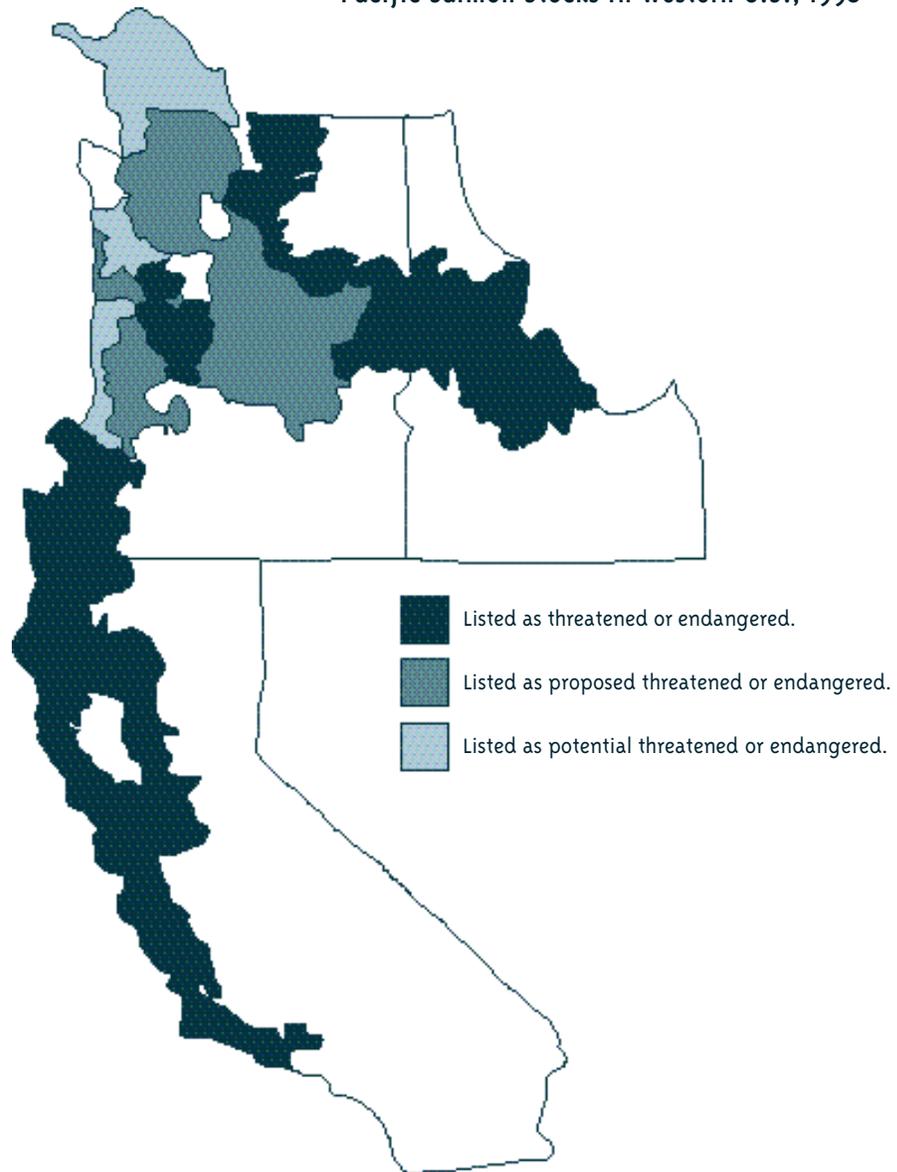


Figure 1 Since wild salmon have a genetic imprint from their natal stream, geographical areas can be used for defining genetically distinct salmon stocks or populations. In the United States, salmon stocks are classified as “Evolutionary Significant Units” or ESUs. The above map depicts the ESUs which are currently listed as “threatened” or “endangered” in addition to those ESUs which are proposed, or have the potential to be, threatened or endangered.

Source: National Marine Fisheries Service, May 4, 1998

concern.” Another 142 were extinct.

In the past, Alaska has been relatively immune to these declines. Those days are gone. In 1997, Alaskan fishing communities were confounded by a completely unanticipated collapse of Alaska’s most productive sockeye fishery at Bristol Bay. Anomalous phytoplankton blooms, never before observed in such intensity so far north, covered such vast areas of the Bering Sea that they were visible from space. The sea turned an aquamarine colour, and dead shearwaters were turning up all summer on both sides of the Alaska peninsula. By September, the bloom was showing up on satellite scanners. In 1998, the phytoplankton blooms - dense concentrations of microscopic plants known as coccolithophores - returned, signalling a continuation of anomalous events in the Bering Sea. Bristol Bay’s sockeye runs collapsed again in 1998, along with chinook runs to the Yukon River, and chum salmon runs to the Kuskowim River.

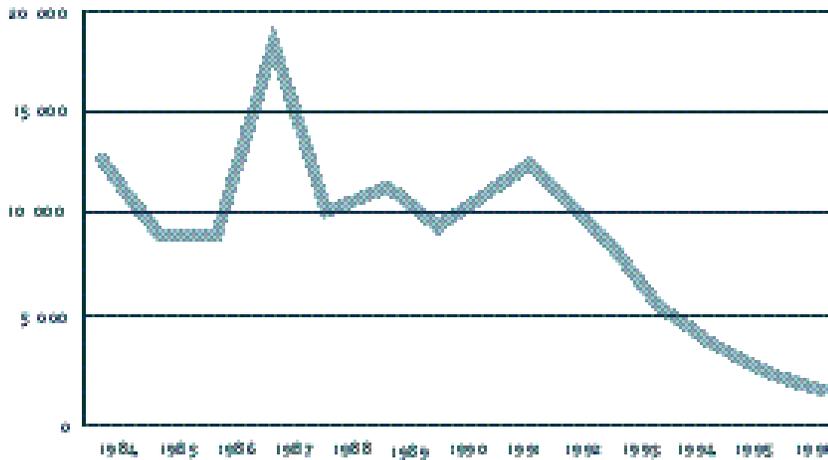
Declining Marine Survival

Large-scale disturbances in marine ecosystems, which first began to take their toll on the marine survival rates of salmon off the California coast, are becoming more frequent and more dramatic. These disruptions have wreaked havoc with coho, steelhead and chinook populations from California to British Columbia. Declining marine survival rates contributed to the unprecedented conservation measures aimed at protecting B.C.’s coastal coho stocks in 1998. Marine survival rates for coho have declined to less than two per cent from 20 per cent in the 1970s, which is a loss in productivity equivalent to losing nine out of every ten coho streams in the

province. Changing ocean temperature regimes are causing salmon to change their homeward migration routes, and major salmon runs are exhibiting unanticipated behaviour in the timing of their returns to B.C.’s rivers. To make matters even more perilous, salmon are encountering extreme stresses in the final stages of the homeward migrations - in the freshwater environment. In 1998, water temperatures in the Fraser River were among the highest on record while water levels were the lowest, turning the Fraser into a death trap for tens of thousands of salmon. These conditions compelled fisheries managers in 1998 to call off some key coastal fisheries, which caused further hardship to a commercial fishing industry already in deep economic crisis.

Scientists from the United States, Canada, Russia and Japan have concluded that the environmental disturbances wreaking such havoc with salmon go far beyond simply natural and temporary events associated with El Niño effects, and the more recently-described effects of La Niña. Whether the profound changes underway in the broad-scale ecosystems of the North Pacific are simply the result of long-term cycles and regime-shifts, or are at least partly aggravated by human-caused activity remains a subject of some conjecture. But joint research efforts by scientists from Canada’s Pacific Biological Station and Japan’s National Research Institute of Far Seas Fisheries conclude that rising greenhouse gas emissions will imperil sockeye salmon populations, and probably all other salmon species, in the decades to come throughout their range. The most recent research, especially trend analyses conducted by the Russian Federal Institute of Fisheries and

Trend in Coho Escapements into Enhanced Coho-producing Streams in the Thompson River Watershed



Source: Shuswap Nation Fisheries Commission, May 1998

Figure 2 The annual cumulative count for coho escapements are based on fence count records for the Louis, Lemieux, Dunn, Eagle, Salmon and Deadman rivers. The plotting of this data demonstrates a dramatic drop in coho escapements in the Thompson River Watershed. Coho escapements peaked in 1987, declined sharply, rallied in 1992 and then have continued to drop. This trend in the Thompson River Watershed could be considered indicative of the general state of coho in BC since commercial activities, like logging, and other events in the watershed do not explain the trend.

Oceanography, suggests that a general decline in salmon's marine survival rates throughout the North Pacific - even without the greenhouse gas factor - should be expected to continue for at least the next quarter-century. The Russian Institute expects that "probable catch trends" over the next 25 years will see landings of wild salmon in the North Pacific decline by half.

In March, 1998, scientists from throughout the Pacific Rim gathered at a Vancouver workshop convened by the North Pacific Anadromous Fish Commission and concluded that climate change is now a factor that, among the scientific community at least, is being given

equal consideration to every other factor that determines salmon abundance throughout the Pacific. In other words, changes in climate may have as large an impact on our salmon as the direct effect of our fisheries.

If wild salmon are to be a part of our future, a decision must be made now. It is a straightforward matter: either wild salmon will survive, or they won't. Either salmon will continue to contribute a necessary component to the environmental health of this province, or they won't. Either salmon will be a part of our culture, quality of life and economy, or they won't.

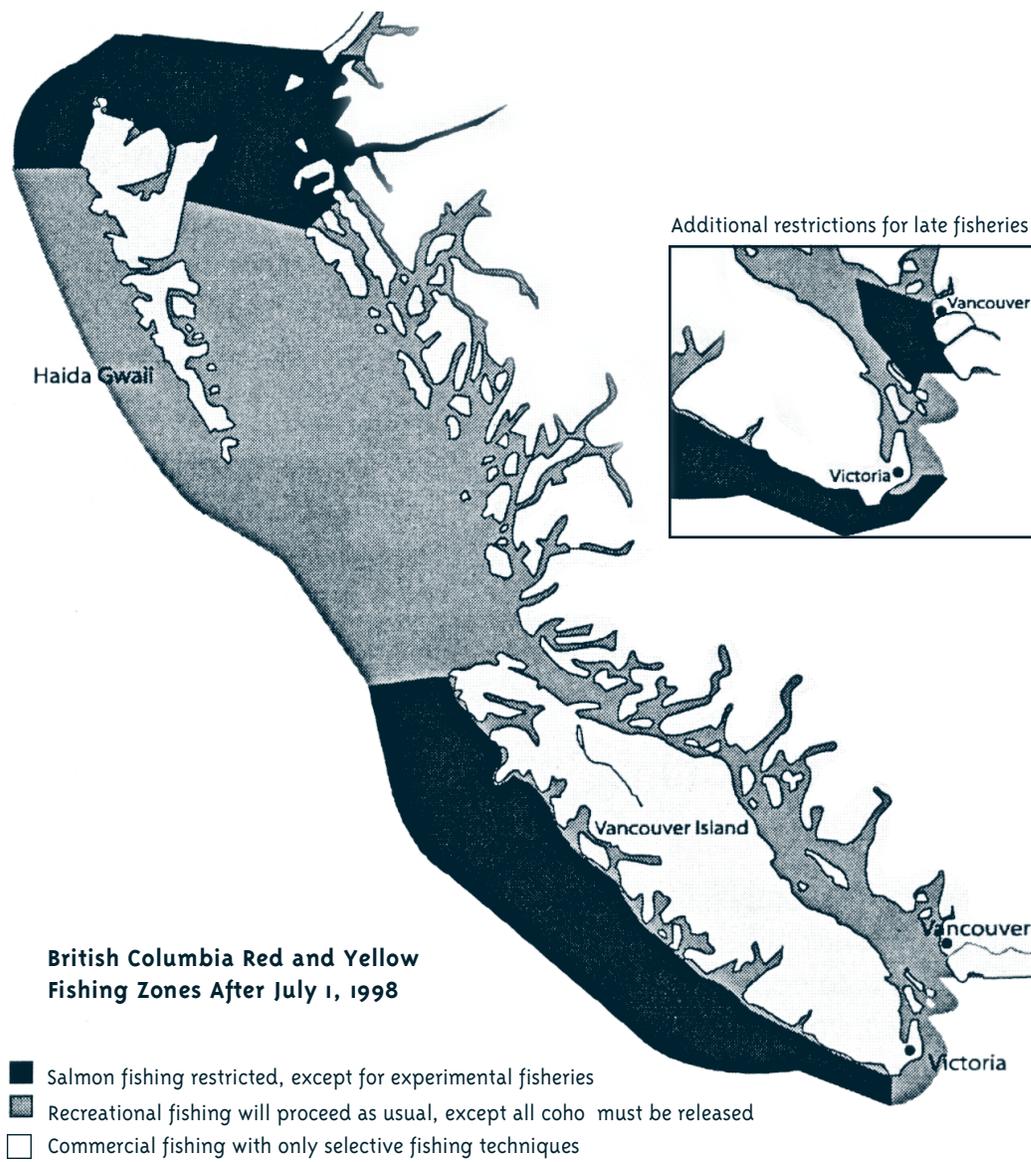


Figure 3 In an attempt to protect coho stocks, the Department of Fisheries and Oceans placed severe restrictions on the fisheries in Canadian waters. The expressed objective was a “zero catch” for coho and resulted in the identification of “red zones” where salmon fishing was restricted, except for experimental fisheries. Important to note is that fishing zones have both a geographical and time dimension reflecting the anticipated movement of coho stocks.

The wise thing to do

To decide that wild salmon must have a place in our future is a simple thing to do. It is the right thing to do. It is the wise thing to do. But the consequences are enormous. It will mean disruptions in the way we live. It will change everything, from the way we build our cities, cut trees, and graze cattle, to the way we govern ourselves. It will mean developing a more mature and balanced understanding of the factors that cause declines in salmon production. It will mean drastic changes in the ways we catch salmon, where we catch them, how much we catch, and even if we can afford to catch them at all.

We have to change. That much is simple enough. The facts show conclusively that the time for change is now.

This report does not purport to review or evaluate everything that science has made known about the necessary conditions for the maintenance and restoration of wild salmon in British Columbia. It is without question that there must be sweeping changes in the way salmon habitat is protected. Continuing damage caused by activities such as logging can no longer be remedied by habitat-restoration programs

The crucial point is to stop the damage first, rather than engage in futile public-policy debates and expend massive amounts of public funds to correct the damage once it is done.

and salmonid-enhancement programs. The crucial point is to stop the damage first, rather than engage in futile public-policy debates and expend massive amounts of public funds to correct the damage once it is done. At the same time, it is futile to concentrate efforts on habitat protection and hatchery production unless we also pay close attention to what happens to salmon at sea.

The protection of salmon habitat is critical. It is an obvious and necessary element for the salmon's continued survival, as is water quality. But of the various threats to salmon, this report is concerned with what happens to salmon in the ocean. Specifically, it focuses on three things:

- 1 The long-term effects on marine survival rates associated with shifts in the composition of marine ecosystems and large-scale ecological disturbances in the North Pacific;
- 2 The continuing impact of outmoded, non-selective "mixed-stock" fisheries, and reliance upon archaic fisheries management instruments such as the Pacific Salmon Treaty;
- 3 The collapse of the volume-based, industrial fisheries that have dominated salmon fishing on North America's west coast since the late 1800s.

Because of the nature of the focus of this report, we must stress that it should not be inferred that because the role of ocean productivity is so vital to salmon abundance, less emphasis is warranted on

habitat-protection measures or other “management” initiatives. The opposite is true: fluctuations and variability in ocean regimes, and the probability of long-term declines in ocean productivity, make changes in land-use and fisheries-management practices that much more crucial. However, it is of utmost important that the causes of declines be identified correctly to avoid spending valuable effort and public funds on “fixing” what may be the wrong thing.

Also, the conclusions we reach here should not be seen as an effort to stake out an “anti-fishing” position. The David Suzuki Foundation enthusiastically supports government policies that allow for vibrant and healthy fisheries for aboriginal communities as well as for the commercial and recreational sectors. Without fish, there can be no fishermen, but a persuasive case can also be made that without fishermen, we would lose yet another line of defence against the forces that are pushing salmon to extinction.

Deep Dysfunctions

Similarly, it is necessary to state that no “side” is favoured in the ongoing harvest-share disputes between Canadian and American

salmon fishermen. It must be said that those disputes are detracting from a far more important and historic dialogue about the future of salmon that must begin now between the people of both Canada and the United States. At the same time, we have watched with dismay as the federal and provincial governments have descended into deep dysfunction in their relationship on the issue of the salmon fisheries.

Political disputes and power struggles have for too long characterized federal-provincial relations with respect to the salmon fisheries of this coast. Such disputes are a luxury the salmon, and the public, can no longer afford.



Seiners, Johnstone Strait, BC.

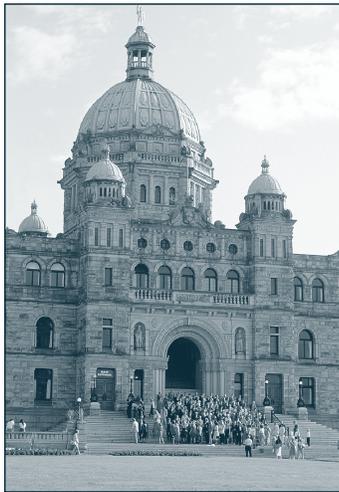


Mixed stock fish catch.

Integrated Strategies to Save the Salmon



Parliament Buildings: Ottawa, Ontario.



Provincial Legislature: Victoria, BC.

Canada and British Columbia must cooperate in the development of policies that focus on integrated, long-term strategies to protect and restore the genetic diversity of Pacific salmon. This strategy must be comprehensive and adaptive, involving federal and provincial jurisdictions right down to the watershed and community level. The strategy must integrate the actions of every level of governance with jurisdiction that impacts upon salmon, and it must afford equal consideration to broad-scale ecological conditions in the North Pacific with all other factors involved in the fate of wild salmon.

In recent years, fisheries scientists throughout the Pacific have begun to document long-term cycles and fluctuations in weather, barometric pressure and ocean productivity, and how those fluctuations mirror trends in the abundance of Pacific salmon. This field of inquiry was first opened by Richard Beamish and Daniel Bouillon, scientists with DFO's Pacific Biological Station, in 1993. Beamish and Bouillon reviewed the annual landings of sockeye, pink and chum in the United States, Canada, Japan and Russia from the 1920s to the 1980s. They compared the fluctuations in the catch over the years with fluctuations in the Aleutian Low Pressure Index, which measures trends in barometric pressure in the North Pacific. The patterns in each country's salmon catch were generally the same as the patterns in the low pressure index, demonstrating that climate influences conditions in the marine environment that play key roles in salmon production.

Sea Surface Temperatures

Off the California coast, between the 1950s and the 1990s, the amount of food available for salmon to eat, which biologists and oceanographers call the "biomass of macrozooplankton," decreased by 80 percent. Over the same period, sea surface temperatures rose by as much as 1.5 degrees C. By September, 1997, sea-surface temperatures recorded at lighthouses along the British Columbia coast were higher than any month of any year since the 1930s, when lighthouse keepers first started tracking these things. In fact, temperatures peaked in late summer at levels expected by random chance to occur only once every 1,000 to 10,000 years. A major change has occurred during the 1990s in the ocean ecosystem off British Columbia's coast. In 1998, nitrates disappeared from surface water in offshore areas, which poses grave threats to various plankton populations, low-trophic level species, and ultimately to the "forage" species necessary for salmon survival.

Comparison of Combined All-Nation Catch of Pink, Chum and Sockeye Salmon to the Aleutian Low Pressure Index

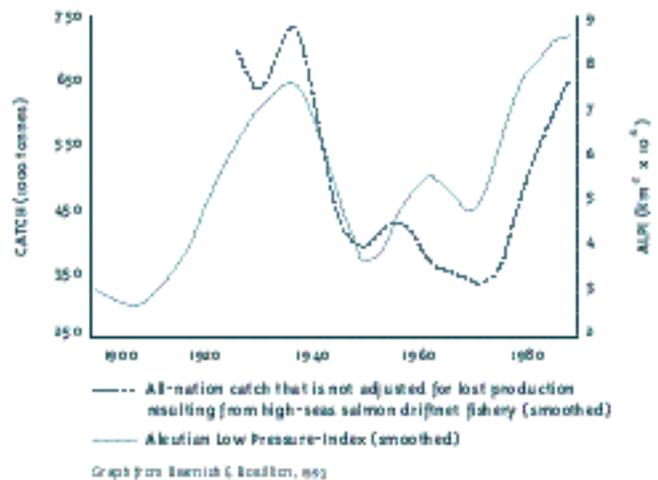


Figure 4 Natural and human-induced climate changes may cause major fluctuations in the carrying capacity of the marine ecosystem, as indicated by this correlation between all-nation salmon catch and the Aleutian Low Pressure Index (ALPI). The ALPI is a measure of the size and quality of the Alaska Gyre as habitat for salmon rearing.

The evidence is before us: The North Pacific is getting warmer, and the structures of various North Pacific ecosystems are



changing. Recent studies show the North Pacific has a “carrying capacity” for salmon and other fish species, and its capacity is determined by long-term cyclical phenomena that can be adversely influenced by human activities, both on land and at sea.

There is no evidence that declines in salmon productivity will remain confined to salmon populations that arise in rivers and streams from heavily urbanized areas, or from watersheds that have been damaged by logging or hydroelectric development, or that have been subjected to overfishing by fleets from British Columbia and the Pacific Northwest states. While Alaska can rightfully claim successes in commercial salmon production and in salmon-fisheries management, the overall productivity of Alaskan salmon stocks may be as easily attributed to relatively recent increases in the marine survival rates of salmon in the northern reaches of the North Pacific and the Bering Sea. Salmon appear to have begun “moving north” in wider migratory arcs in recent years. Meanwhile, alarming declines in marine survival have moved north from California and up the Oregon coast. These declines have swept northward, along the British Columbia coast, and are now producing declines in Alaskan salmon populations. These large-scale disruptions, whatever their cause, are becoming more frequent, more intense, and more dramatic.

What all of this tells us is that the will to save Pacific salmon requires a commitment much more broad than to conventional fisheries issues. For example, the scope of effort must go as far as reducing emissions of greenhouse gases, with governments working internationally to reduce global warming.

Moving to Selective Fisheries

Non-selective “mixed-stock” fisheries management regimes must be brought to an end; “interception” fisheries, undertaken by the commercial and recreational sectors of both Canada and the United States, must be replaced by more stock-specific, selective fisheries. Government policy should expend every effort to assist fishermen and fishing communities in making these difficult transitions.

A Race for the Fish

Since the last century, both Canada and the United States have designed fisheries management regimes that sanction a “race for fish” among their respective fleets and between the fleets of both countries. While fishing effort is usually aimed at harvestable surpluses of relatively healthy salmon populations, a consequence of this practice, which has characterized the industrial harvest of salmon on North America’s west coast since the industrial fishery began more than a century ago, has been a concentration of the industry’s fishing effort in “mixed stock” areas, where many homeward-migration salmon runs mingle and “mix”.

The consequences of focussing the centre of fishing effort in non-selective “mixed-stock” fisheries have been

documented painstakingly for several years. The need to ensure that fisheries are as “selective” as possible has been set out in studies by American and Canadian academics and fisheries scientists, and scientists and



Victoria Times-Colonist February 1, 1995

fisheries analysts with the United Nations Food and Agriculture Organization. In its historic 1996 report, “Upstream: Salmon and Society in the Pacific Northwest”, the U.S. National Research Council expressed the “selective-fishing” imperative this way: “to achieve long term sustainability, which requires sufficient genetic diversity, fishing should occur only where the identity (i.e. the originating population) of the salmon is known, when total fishing mortality is consistent with the productivity of the fish, and when the catching technology ensures minimal mortality in depleted demes [local breeding populations]. This will require fishing methods that allow different degrees of fishing effort on various salmon populations and that allow identification of fish taken from depleted demes so that they can be avoided or released alive.”

The most serious consequence of the loss of small salmon runs is a crippling decline in the biological diversity in salmon – the single, greatest requirement for long-term abundance.

We recognize that significant disruption will result from moving away from non-selective “mixed-stock” fishing practices. We do not propose that governments use

blunt policy instruments to achieve this objective. Rather, under a carefully-managed strategy, developed in consultation with commercial and recreational fishing communities, the necessary transitions can be made. The “experts” in such matters are not just scientists, engineers, or government policy bureaucrats. The expertise exists among and within fishing communities, and that expertise is invaluable.

It must also be said that in some cases, where fishing effort is extremely low - as in certain sports fisheries and some commercial salmon troll fisheries - “mixed-stock” fisheries, if closely monitored under adaptive, in-season management regimes, can be relatively safe. Generally, however, non-selective “mixed-stock” fishing - while it may often result in the sustainable harvest of surpluses from healthy salmon populations - tends to result in the unavoidable depletion of smaller, co-migrating salmon populations. The most serious consequence of the loss of small salmon runs is a crippling decline in the biological diversity of salmon - the single, greatest requirement for long-term abundance.

Untenable Dilemmas

Genetic and spatial diversity is crucial to the long-term viability of salmon. But fisheries managers, and the politicians they report to, find themselves facing untenable dilemmas in their efforts to maintain this necessary diversity. Quite often, decision-makers are placed in the unenviable position of having to shut down fisheries in which the target population is healthy and perhaps even increasing over time, in order to protect a small number of fish from a small run that is declining over time. Sometimes,

tremendous political pressure is brought to bear upon politicians and fisheries managers to open such fisheries. This pressure is made more difficult to resist when an Alaskan fisheries manager considers action to protect a threatened salmon run that is of British Columbia, Washington or Idaho origin, or a British Columbia fisheries manager takes action to protect a salmon run bound for a spawning river in Washington state. In the historic context of mixed-stock fisheries management, the decision, routinely, is to allow unjustifiable fisheries to proceed. If the ultimate consequences of such fisheries become known to the public, it is the politician, the fisheries manager, or the fisheries agency that is expected to shoulder the blame.

Tremendous amounts of public funds have been expended over the years in attempts to make “mixed-stock” fishing as safe as possible. These efforts have generally failed because of the notoriously imprecise nature of mixed-stock fisheries. An unjustifiably high expectation has developed that somehow, fisheries science can plan sustainable mixed-stock fisheries by predicting their outcome and avoiding their destructive effects. The fishing industry, generally, has taken it for granted that somehow scientists will be able to assess the impacts of advances in fishing-gear technology, know precisely how many fish are in the water at any given time, which fish are safe to catch and which fish aren’t, and how many of each run will end up in the fleet’s nets. These expectations are impossible to meet. When efforts are made to plan, manage and assess the ultimate impacts of mixed-stock fisheries, scientists rarely agree among themselves, when the

Tremendous amounts of public funds have been expended over the years in attempts to make “mixed-stock” fishing as safe as possible. These efforts have generally failed because of the notoriously imprecise nature of mixed-stock fisheries.

fishery is completed, about what actually happened. This is particularly true in the case of attempts to regulate “interception” fisheries, involving both American and Canadian fleets, both before and after the Pacific Salmon Treaty was signed in 1985.

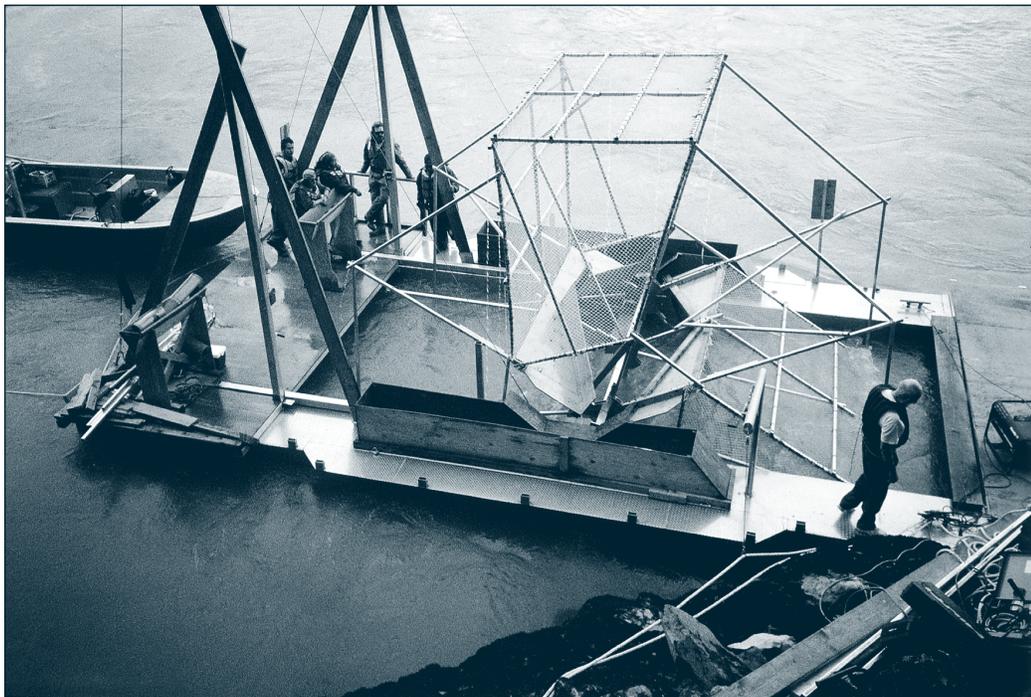
Clearly, the most effective decision our governments can make with respect to salmon-fisheries management on North America’s west coast is to bring to an immediate end the practice of concentrating fishing effort in non-selective “mixed-stock” fisheries.

Recent federal policy statements have highlighted the need to make this transition, and this intended policy shift is laudable. However, there is little evidence that the significant changes in fishing practices such a transition implies will be made comprehensively, quickly and fairly. There is also little evidence that the fishing industry, or the general public, appreciates the

Clearly, the most effective decision our governments can make with respect to salmon-fisheries management on North America's west coast is to bring to an immediate end the practice of concentrating fishing effort in non-selective "mixed-stock" fisheries.

dramatic changes such a major policy shift would bring about, or how dramatic the necessary changes will be to the conventional salmon fisheries of this coast and the communities dependent on them.

If, for instance, the current federal government is sincere about its commitment to move away from "mixed-stock" fisheries management and concentrate fishing effort in "selective" salmon fisheries, then federal policy must also include active efforts to prohibit almost every "interception" fishery the fleets of both Canada and the United States have conducted upon the salmon of each others' rivers over the years. "Mixed-stock" fishing is a practice that has been effectively entrenched in the Pacific Salmon Treaty.



Fishwheel. Photo courtesy of Craig Or Selective Fishing Advisor BC Aboriginal Fisheries Commission.

A New Treaty Based on Conservation

The governments of Canada and the United States must begin discussions immediately to replace the Pacific Salmon Treaty, and its enabling legislation in both countries, with a new convention which binds all the Pacific states and the Province of British Columbia.

The Pacific Salmon Treaty has failed its objectives, which were to avoid harvest-share disputes between Canada and the United States, and to control overfishing by the fleets of both countries. Neither has been achieved. Instead, it has caused significant strains in relations between Canada and the U.S., and even between Canada and the Province of British Columbia.

The Vancouver Sun, July 19, 1997

Fish pirates will pay, Clark says

B.C. armada could “inflict serious harm” on the U.S. fishery,

boats being assembled to catch fish that the Americans would otherwise get. “We can inflict some serious harm on

U.S. fish packer collides with Canadian boat

The Canada-U.S. fish war flared up in Prince Rupert cannery. One U.S. boat

The time has come for a new bi-national salmon treaty — one that reflects not only the legitimate interests of fishermen but also the public interest in salmon, which is a classic common-property resource in the U.S., and

similarly in Canada is by law a resource owned by the Crown. A new treaty must be informed by the importance of maintaining biological diversity in salmon populations, rather than by only short-term industrial purposes, and must also reflect the changed and perilous circumstances surrounding wild salmon at the advent of the 21st Century.

Entrenched Mixed-stock Fisheries

The Pacific Salmon Treaty has failed its objectives, which were to avoid harvest-share disputes between Canada and the United States, and to control overfishing by the fleets of both countries. Neither has been achieved. Instead, it has caused significant strains in relations between Canada and the U.S., and even between Canada and the Province of British Columbia. The Pacific Salmon Treaty has also codified a fisheries management regime that continues to produce disputes between Alaska and the Pacific Northwest

There has only rarely
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states over the protection of salmon runs that Washington, Oregon and Idaho have been attempting to conserve and restore. The Pacific Salmon Treaty is a constitutional instrument that has entrenched "mixed-stock" fisheries.

Given the impossible tasks the two countries have expected the Pacific Salmon Commission (the regulatory body under the treaty) to carry out over the years, it must be said that the Commission has performed remarkably well under the circumstances. It would be wise for both Canada and the United States to build upon the Commission's experience. But clearly, the treaty itself has outlived its usefulness.

In a review of 20 years of catch estimates made available for this report by biologists from the Pacific Salmon Commission, by Canada's Department of Fisheries and Oceans, and by the U.S. National Marine Fisheries Service, what becomes immediately evident is this: there has only rarely been any agreement between the two countries' biologists about how many salmon from their respective rivers are caught by each countries' mixed-stock fisheries in any given year. The pre-treaty pattern of disagreement, dispute and controversy remained largely unchanged long after the treaty came into effect in 1985. And these have not been minor quibbles.

In 1987, for instance, Canadian fisheries managers estimated that Canadian fishermen caught 904,000 Alaska-bound pink salmon. That same year, Alaskan fisheries managers reckoned that Canadians had actually caught 3.3 million Alaskan pink salmon.

In 1988, Canadian fisheries managers

said Canadian fishermen caught 725,000 Washington state coho. U.S. fisheries managers said the Canadians actually caught 1.34 million Washington state coho that year. In 1987, Alaskans said they caught 342,000 Canadian pink salmon. Canadians said the Alaskans caught more than a million Canadian pink salmon that year. In 1990, Canadians said Washington state fishermen caught 229,000 B.C. coho. Americans said the Washington fleet only caught 63,000 B.C. coho that year.

Through the 1990s, the two sets of figures, for B.C. and Washington chinook, sockeye and pink salmon, started to look more or less the same. But then disputes flared over how the estimates of each countries' biologists should be characterized, and whether the figures should be made public. At the time of this writing, there is no complete set of records, either in the form of agreed-upon figures or conflicting estimates, available for public release by fisheries managers in either country.

Sockeye Equivalents

The Pacific Salmon Treaty is a relic of a past age. It is a continuation of an earlier bi-national convention that was negotiated in the 1930s. While failing to regulate "mixed stock" fisheries, it has also proven incapable of meeting its objective of maintaining "equity" between the harvests by both countries' fleets of both countries' salmon. The "equity" dilemma, which has caused fiery debates between Canadian and American negotiators since 1985, is probably impossible to resolve. It's pursuit has resulted in endless and arcane arguments about how to calculate the economic value of salmon, and has resulted in an artificial

fish, a calculated mechanism known as a "sockeye equivalent," that has been used in attempt to ensure balances between each country's catch of each other's salmon. Even in the event of an agreement, for instance, that an equity-imbalance has been produced by, say, a relatively recent Alaskan fishery, Canadian negotiators are often left with little choice but to attempt to negotiate restraints on Washington state fishermen whose traditions of harvesting Fraser sockeye go back well into the last century, and who know nothing and care less about Alaskan fishing.

The U.S. and Canadian participation in annual treaty negotiations has been limited almost exclusively to industry "stakeholder" groups, and the long-term public interest of both countries' citizens, as well as the long-term health of biologically-diverse salmon populations, are not reflected by the treaties' objectives - even in those occasions when the treaty's objectives are met. Talks have collapsed on several occasions since the treaty was signed in 1985. These breakdowns have led to two "fish wars" since 1994, overfishing by both countries' fleets, incidents of civil disobedience and badly-damaged relations between both countries.

Cooperation Instead of Finger Pointing



The Government of Canada and the Government of British Columbia should set aside their differences and immediately commit themselves to assisting commercial fishermen, shoreworkers and fishing communities in developing new fishing practices, new markets, and new ways to “add value” to fewer fish.

There is a bright future in commercial salmon fishing.

Although it may seem a discordant thing to say in the context of the observations we make in this report, it is not overly optimistic. However, if there is to be a commercial fishery for salmon at all, structural change in the industry is necessary.

The industrial salmon fisheries of British Columbia's coast have become increasingly difficult to justify, both environmentally and economically. The conventional fisheries are producing fewer economic benefits to coastal communities as the years pass. Commercial salmon fishing can no longer be regarded as an "industry" in any conventional sense of the term — it no longer provides a decent seasonal livelihood to the vast majority of fishermen, and both the federal and provincial governments must adopt policies reflecting these facts.

Price Collapse

Worldwide, the price influence of the salmon netcage industry on all the major markets, along with a variety of other factors, have caused the unit price of salmon to drop precipitously. Industry analysts long ago conceded that these trends will not reverse, even if wild salmon production drops dramatically. Government responses to this problem have tended to concentrate greater portions of the catch in fewer hands, on an argument of "too many boats chasing too few fish." But a continued reliance on fleet-reduction alone will do nothing to address these trends.

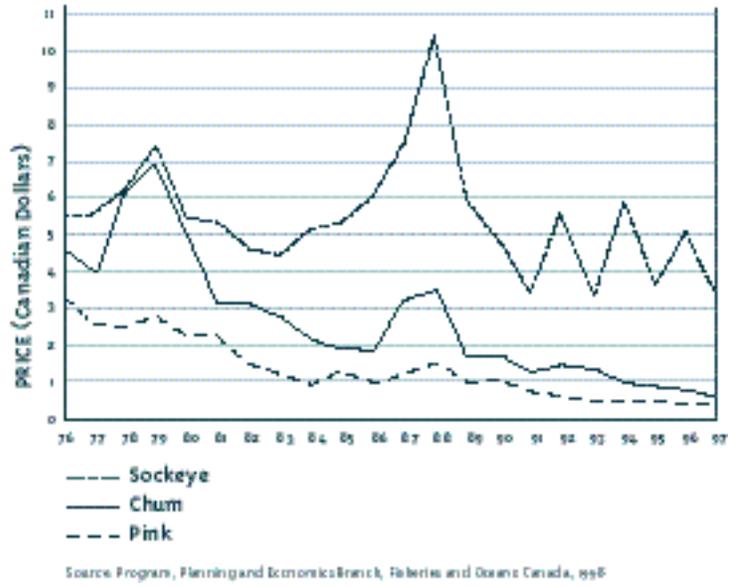
To presume that removing fishery participants through "buyback" schemes will trim the fleet to provide reasonable economic returns to the remaining participants is dubious in light of the anticipated downward trends in wild salmon prices. To expect that far fewer fishery participants will be capable of harvesting the same volume of fish, in more careful and more selective ways, is less than reasonable. The idea of solving these economic problems

by simply concentrating access rights to a Crown-owned public resource among a handful of integrated fishing companies, engaged in capital-intensive fisheries, is generally offensive to British Columbians and contrary to Canadian sensibilities. However, it is clear that the "industry" as we have known it is over, and it must be replaced by something new.

In 1995, wild salmon production exceeded 800,000 metric tons, and farmed salmon production, from its meagre beginnings in the late 1970s, had reached almost 600,000 metric tons. British Columbia's own farmed-salmon production eclipsed the commercial value of B.C.'s wild salmon production by 1995. This year, world farmed salmon production will likely eclipse the all-nations' catch of wild Pacific salmon. The consequence this artificial "abundance" of salmon in the markets poses to the landed value of wild salmon cannot be understated. It has also created a public impression of abundance, when in reality, farmed salmon production

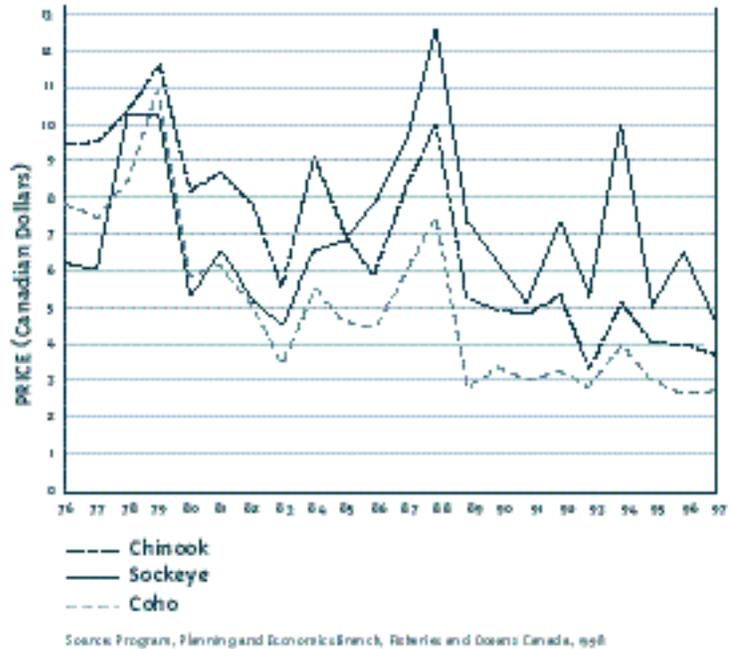
Landed Value for Net-caught Salmon, 1976-97

Figure 5 While prices for salmon have fluctuated over the past twenty years, the most notable, and recent, trend is the dramatic drop since 1988. Adjusted for inflation, prices in 1997 were approximately a third of the price in 1988.



Landed Value for Troll-caught Salmon, 1976-97

Figure 6 Prices for troll-caught species have been more variable than for those caught by the seine fleet. However the general analysis is the same: inflation-adjusted prices have decreased to new lows since the peak in 1988.



has masked the declines and scarcities in wild salmon.

Overall, adjusted for inflation, prices paid to fishermen for the salmon they catch have declined to about a third what they were only a decade ago. This is true from Halfmoon Bay in California through British Columbia, to Alaska. The same price pattern applies to all salmon species, and to salmon caught by all conventional gear-types - seine nets, gillnets, and troll. Old laws of supply and demand don't work in these conditions, and the paradox is that up and down the coast, on both sides of the border, salmon are undergoing significant declines and fishing communities are facing acute scarcities in the raw salmon resource. When wild salmon supply drops, wild-salmon prices do not rise because farmed salmon is everywhere.

A similar paradox has been observed by the Worldwatch Institute: world fish production reached an all-time high of 121 million tonnes in 1997, while at the same time, 11 of the oceans' 15 major fishing areas are in decline. This apparent contradiction arises from the fact that the world's fishing fleets are now moving away from collapsed fish populations and have turned to "forage" species, which occur well down the marine food chain. As Anne Platt McGinn observes in a recent Worldwatch Institute report, the crisis in marine fisheries is being "masked," not just by the increased taking of forage fish and rising imports from Third World fisheries to industrialized countries, but by the rapid growth of aquaculture.

Gunnar Knapp, an economics professor at the University of Alaska in Anchorage, is

World Production of Wild and Farmed Salmon, 1981-1997

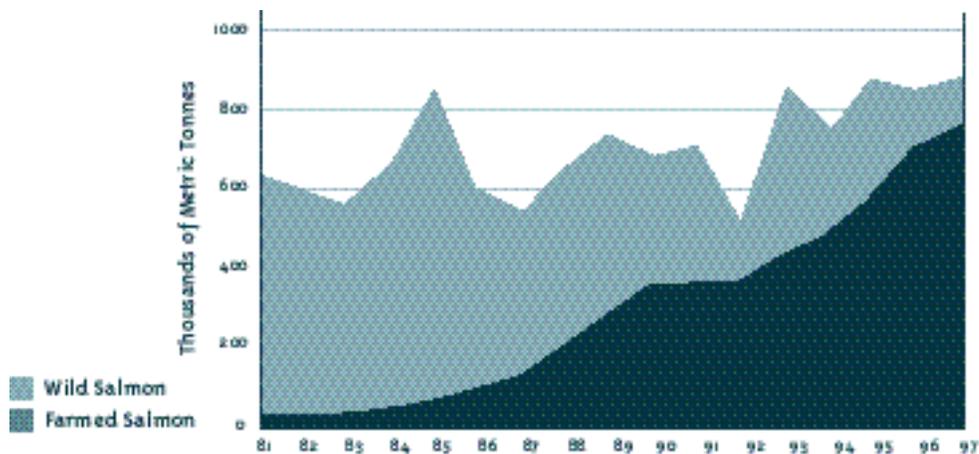


Figure 7 Since 1981, the portion of the world's salmon production coming from salmon aquaculture operations have steadily increased. In 1981, farmed salmon only amounted to 15,000 tonnes but by 1997 had risen to 781,000 tonnes. During the same time, the world's catch of wild salmon increased from 620,000 to 881,000 tonnes.

Source: World Seafood Report; Program, Planning and Economics Branch, Department of Fisheries and Oceans Canada

probably the world's leading analyst on salmon prices and the salmon economy. In a recent assessment of what the future holds, Knapp concluded that farmed salmon production will continue to rise, and any shortfall in total world salmon supplies will be easily and quickly met by increased production by salmon farming corporations, whose production costs have steadily declined since the industry's advent. Already, Knapp observed, some wild salmon runs have gone unharvested in Alaska, simply because conventional fishing costs exceed profits from the sale of wild fish. Prices for wild chinook, sockeye and coho are likely to keep falling, Knapp said. Prices for chum and pink salmon, however, are not likely to fall, simply because they can't: any further price declines will mean fishermen simply will not be able to afford to fish them.

Subsidized Salmon Farms

It must be said that the low consumer costs of farmed salmon, at least in part, reflect the fact that the salmon netcage industry tends to enjoy a "subsidy" in the form of offloaded costs — from the industry's well-known adverse environmental impacts — that are borne by the public owners of inshore aquatic habitat. In the price competition between farmed and wild fish, a fairer competitive field could be established by ensuring that salmon farms find food sources for fish farms other than the low "trophic level" protein being harvested from the seas, and also by requiring netcage operations to move to closed-containment systems. But salmon aquaculture is not going to go away, and the industry's operating costs, Knapp

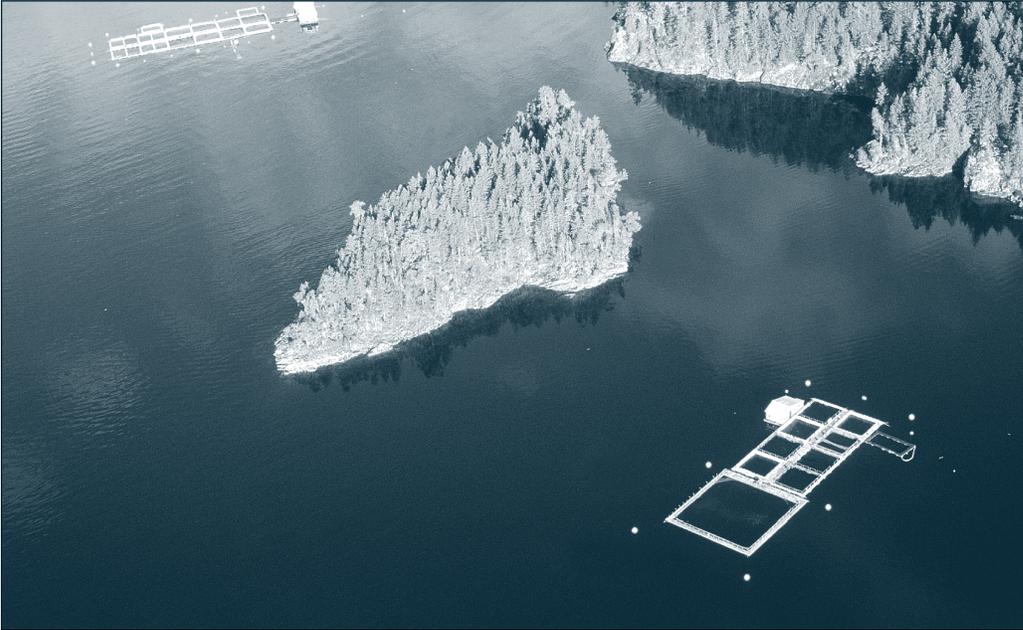
believes, will continue to fall, suggesting that the market price advantage held by farmed salmon will continue well into the future.

At the same time, however, markets are likely to expand for "niche-market" salmon products, Knapp maintains, as well as for value-added products. This bodes well for the intelligent, small-boat fisherman who relies on wild salmon to carve out his own markets. This will require catching no more fish than he can handle himself, and catching small amounts of fish that must be handled and processed carefully. Another important observation that Knapp makes is that live-capture salmon traps, once banned from California to Alaska, will

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Salmon farm near Seattle, WA.



Salmon farm pens, Jervis Inlet, B.C.

likely return. Traps are extremely efficient and can produce high-quality fish, and “traps also represent a potential method of managing mixed-stock fisheries to achieve very specific escapement goals.”

Alternatives to Non-selective Fishing

What all this means is that by allowing the old, volume-based industrial fisheries to die, commercial fishing does not have to die with it. It is only by ending the conventional, industrial fisheries, and by moving away from our reliance on conventional-gear vessels fishing in mixed-stock fisheries, that healthy, productive commercial salmon fisheries can survive. Traps, weirs and fishwheels can be easily and economically deployed as alternatives to non-selective gear such as seine nets, which encircle the fish; gillnets, which ensnare them; and trolling boats, which rely on arrays on hook-and-line gear.

The most effective way to ensure that fishing effort is concentrated in “selective” fisheries is to move the centre of harvest effort back into the river systems, where Aboriginal Peoples maintained “terminal” fisheries that produced significant volumes of salmon for millenia. B.C.’s fish processing companies have long maintained a firmly held position that river-caught fish is of a lower grade - to the point of being unmarketable - and is consequently of no economic value. But the issue is not so simple. Salmon roe generally commands its highest price when it is extracted from fish harvested well into the freshwater environment, and river-caught fish often produce the best quality smoked product. As a 1994 economic study undertaken by the Department of Fisheries and Oceans

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demonstrated, a sockeye salmon fishery, conducted hundreds of kilometres up the Fraser River at or near the sockeyes’ spawning grounds, could be made a commercially-profitable venture. Inland fisheries could produce “sockeye caviar” and smoked-fish products that could easily be commercially viable in markets like Japan and Germany.

At the same time, conventional gear types (seine, gillnet and troll) under carefully-controlled circumstances can be selective, and the conclusions reached in this report should not be construed as to argue for an end to those gear types. Our point is to end non-selective “mixed-stock” fishing as the predominant characteristic of

salmon fishing in both the commercial and recreational sectors. Of utmost importance is also to assist commercial fishermen and coastal communities as they make these transitions.

This report does not propose to set out all the thoughtful and imaginative measures proposed by fishing communities, academics and policy analysts to remedy the many ailments afflicting the salmon economy. But governments must be honest enough with fishing families to tell the truth, and the truth is the commercial salmon fishery, as it has existed for more than a century, is over.

Reeling in the Whirlwind

These conclusions are not based on wistful, utopian notions about the future, or overly pessimistic assessments of the present. They are based on years of analysis by scientists and economists from a variety of disciplines, and from a variety of agencies, including the U.S. National Research Council, the Department of Fisheries and Oceans, the Worldwatch Institute and others.

Indeed, the very changes this report contemplates are already upon us.

While this report was being written, some bold moves toward the establishment of imaginative and effective habitat-protection regimes were underway in the Pacific Northwest under the auspices of the U.S. Endangered Species Act. In Canada, meanwhile, the Department of Fisheries and Oceans has been instructed by the federal government to move fisheries management away from “mixed-stock” fishing and establish selective-fisheries management as the “cornerstone” of salmon management on Canada’s west coast. In British Columbia, the coastwide coho-fishing

ban provoked protests, political controversy and hardship in coastal communities. The severe restraints imposed on various fleet sectors in order to conserve depressed Fraser-bound sockeye runs have also caused severe social dislocation and economic hardship in several B.C. coastal communities. Down the Washington, Oregon and California coasts, meanwhile, salmon populations have continued their declines in abundance.

The chronic harvest-share disputes under the Pacific Salmon Treaty erupted again this season, only a year after Canadian fishermen blockaded an Alaskan ferry in Prince Rupert harbour. Alaska’s fisheries managers were refusing to amend their mixed-stock fishing plans to allow troubled Canadian coho to pass through the Alaskan gauntlet of nets and hooks. B.C. fishermen mounted a highly public protest against the presence of Alaskan-caught coho on the menu in Vancouver’s Keg Restaurant chain, but away from the public spotlight, two-thirds of the canned salmon produced in British Columbia in 1998 came from raw salmon imported from Alaska, often by Canadian firms operating in Alaska. A controversial catch-sharing arrangement between the Canadian and Washington state governments further alienated sectoral leaders in the B.C. fishing fleet, along with the provincial government, causing deeper divisions between federal and provincial politicians over fisheries management issues.

While all these events were unfolding, even the “lucky” fishermen who were able to persist in their fisheries were facing insolvency as a result of the changed market conditions effecting the salmon economy.

We must decide now
whether or not salmon will
be part of our future.

In Alaska, where a sockeye was once worth more than a barrel of Alaskan oil, fishermen this season were sometimes being offered little more than a dollar a pound for sockeye. In British Columbia, the fishermen's union was forced to accept a price regime for salmon that provided fishermen with prices, adjusted for inflation to 1998 dollars, about one-third the prices they commanded a decade earlier - even though Bristol Bay's collapse allowed B.C. fishermen a brief reprieve from the downward spiral that they have witnessed in sockeye prices. In Oregon and Washington, the price declines have been staggering. In 1979, Oregon trollers could command \$5.14 a pound for chinook, adjusted for inflation to 1996 dollars, but prices for Oregon's troll caught chinook had dropped, by 1997, to \$1.50 a pound.

The changes contemplated by this report are now upon us. We must decide whether or not salmon will be part of our future.

The governments of Canada, the United States, British Columbia, and the Pacific States must abandon the belligerent postures they often adopt towards each other and act in common in the public interest, and on behalf of the salmon. Similarly, fishing communities, both native and non-native, along with recreational interests and conservation groups, must set aside their differences and join with the public in facing the realities touched upon in this report. Particularly, the federal government and B.C.'s provincial government must end their ongoing conflicts over fisheries policy.

There is no time left. We must act, now.

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ISBN# 1-5504-681-3

Paper: Genesis Birch 100% post-consumer fiber.
Design: Metaform Communication Design Inc.
Printing: Western Printers



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