

# PROCEEDINGS

**Seventh North Pacific Rim Fisheries Conference**  
*Balancing Economic Considerations with Fisheries Resource Limitations*

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Busan, Korea

Pacific Rim Fisheries Program  
ALASKA PACIFIC UNIVERSITY  
Anchorage, Alaska

# Founding Countries Reports

## Canada

### Fisheries Off the Pacific Coast of Canada

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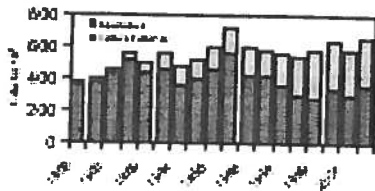
I am going to report to you today about the state of the fishery off the Pacific coast of Canada, and our commercial Fishery is about 125 years old initially the species that dominated the fishery were Pacific salmon, Pacific halibut, and herring and in general after over 100 years of fishing, our stocks are healthy and in pretty good shape.

However our commercial fishery for Pacific salmon is suffering economically and recently, in the last few weeks a report was produced at the request of the Canadian Government and the provincial government of British Columbia, the title of the report is Towards the Sustainable Fishery on Canada's Pacific Coast, and this report categorized the Pacific coast fishery as deeply troubled and not sustainable economically.

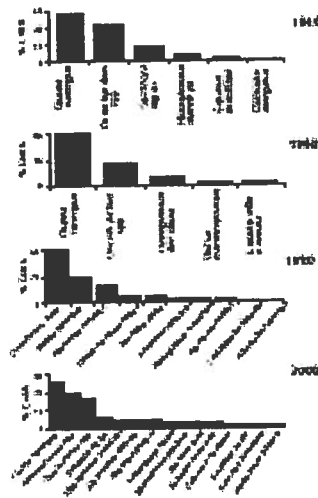
The prices for Pacific salmon have declined, consecutively for nine years, and that is despite a 50 percent reduction in the number of vessels and licenses, and so it appears that there will be major changes in the management of Pacific salmon fishery, but the report itself is an independent report so it is up to government to decide how the report will be implemented. The report is recommending some radical new approaches to the management of the salmon fishery, and the radical management changes are individual vessel quotas. I will not comment on the report any further because it has just been recently produced, but as you will see in my presentation why there are concerns about the economics of the Pacific salmon fishery.

To comment on the condition of the stocks, I think the reason why the stocks are generally healthy off the Pacific coast of Canada, I think it relates to the approach that the citizens have in British Columbia on the Pacific Coast, to the resource. British Columbians regard the environment as an indication of the quality of their life, and so many British Columbians pay attention to what's going on in the fishery resource and the other resources. Also, I may be biased because I am a scientist, but also, I think that we have had a long history of science working cooperatively with the industry and I think our history of science is one of good science, and I think that combinations of having a strong emphasis on fisheries management scientist that works cooperatively with the industry is a key to the success the overall fisheries management. What I am going to do now is go over some overheads that just indicate the status of the stocks in British Columbia.

#### Landed Value

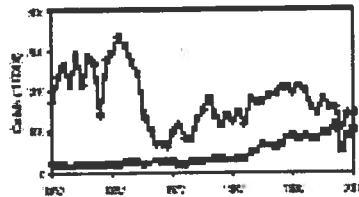


The years that I use vary from time to time, and there is no particular reason why I have selected the years. Mostly just to keep them short, but here we are looking at 1985 to present, and what we are looking at is the total landed value of all of our commercial fisheries with the maroon representing the capture of commercial fisheries and the blue/purple color representing the aquaculture, which is virtually all farm salmon, or Atlantic salmon. So while there has been a decline in the last 10 years in the commercial fishery, there has been an increase in the landed value of farm salmon with the result that the value of the fishery has remained above stable.



This is a complicated slide, so all I want to do is, this is 1940, 60 and 80 and 2000, just to show 20 year intervals, and I mentioned that the Pacific salmon, herring and halibut were major species in the catch, and I have used scientific name, if you just look quickly, you can see that the herring has remained as our most prominent species, except in 1980 where it declines to the second most landed fish, and salmon remains as a key species and so does halibut. The point here is that over this 60 year period, the species that make up the largest percentages of our catch, remained almost consistently as the dominant species.

**Total landings from all commercial finfish fisheries off Canada's Pacific coast**



And this is just a summary of the total landings of the commercial fisheries on Canada's coast, and going back into the early 50's...the total landings were much larger and the reason that the catches declined is a result of the collapse of the herring fishery in the

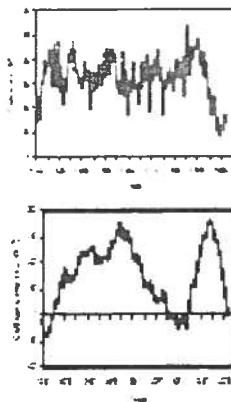
mid 1960's, because of a natural decline in abundance and some over-fishing at the same time, and the fishery for herring was as much as several hundred thousand tons and was used for fish meal and fish oil and after the collapse of that fishery and when the stocks were rebuilt fishermen were no longer allowed to catch herring for reduction and the fishery then was only for Roe, which was used mainly to export to Japan. And consequently the actual catches were much smaller because of the nature of the fishery and this represents our groundfish fishery.

**Landed value all species 2000**

| Species        | Landed value |             | Total       |
|----------------|--------------|-------------|-------------|
|                | 2000         | 2001        |             |
| Chinook salmon | 20.1         | 19.8        | 39.9        |
| Coho salmon    | 19.4         | 18.5        | 37.9        |
| Herring        | 1.7          | 1.5         | 3.2         |
| Halibut        | 1.1          | 1.0         | 2.1         |
| Other species  | 0.7          | 0.6         | 1.3         |
| <b>Total</b>   | <b>43.0</b>  | <b>41.4</b> | <b>84.4</b> |

This is an example of the landed value of the various species in the year 2000; the landed value of aquaculture now exceeds all other fisheries.

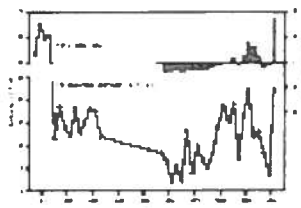
Oncothyridus spp.



Now we are going to take a look at the various species, and we are just going to deal with the fisheries from the mid 1970's, and what we saw and increase to the highest level to the fishery in 1985, and what I think is remarkably about this increase is that we had a forecast which said it was impossible, in fact it was proved mathematically, that it was impossible to rebuild salmon abundances to normal levels that we saw in the 1800's. Ten years after that paper was published, we saw catches that were the highest ever recorded. We went to the highest catches to the lowest catches in as little as 10 year, but the catches are starting to come back again. The decline in catches was a result of a natural reduction in the productivity of the ocean, and a decreased demand. The salmon stock is recovering because of the reduced prices, the

amount of salmon fish landed is substantially less then it was in this period.

Fraser River Pink Salmon  
1900 - 2001

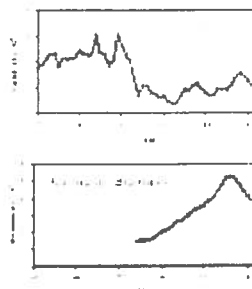


The most abundant salmon in British Columbia is pink salmon. This graph represents the total number of salmon returning to the Frazier River, which is our major salmon producing river in British Columbia. You can see the number of salmon that returned to the river in 2001, I don't have 2003s data, but it is around the same level. As some of you know, pacific salmon come back about every other year in this system, so there are virtually no returns

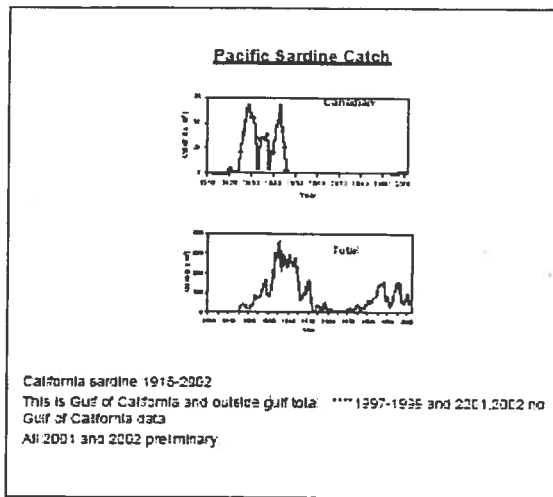
in 2002 but these levels here, represent the highest levels of return in over 100 years to the Frazier System. Because we are not fishing pink salmon because the value is so low, this represents the number of spawners, from a long term average, a number that goes back to the 1950's and we are seeing two times the number of salmon being allowed to spawn on the Frazier River, then ever recorded. In fact the number of salmon that were allowed to spawn in 2001 and 2003 were the highest in over 100 years.

The salmon that represent about 60% of the total value of all salmon caught in our salmon fishery is sockeye salmon, sockeye salmon are most abundant in the Frazier river and a river to the north, but more than 50 percent of the sockeye salmon stock are produced in the Frazier River. This Graph refers to the total returns, and you can from about 1960-1994, we saw an increase in the number of sockeyes that were coming back to our major river. Sockeye have a natural 4-year cycle, that's why you see this oscillation here, the natural decline in production is also represented here but we are starting to see increases as well.

Pacific Halibut



Pacific Halibut, one of our major fisheries, and what we are seeing here is one of the large top predators in the ocean that is doing exceptionally well. The History of the Canadian Catch, the decline here is simply a result of the extension of jurisdictions of Canada and the United States which prevented Canadian fisherman from catching halibut off of Alaska, but the actual biomass Canadians own has actually increased to historic levels.



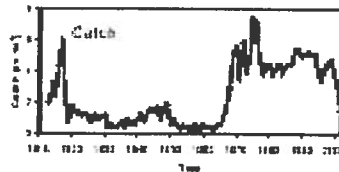
Sardine was our major fishery in the 1920's to about 1947 mainly for fish meal and fish oil. The fishery collapsed and there were no sardines found in the Canadian zone until the early 1990's. The value for sardines is minimal so the fisheries for the sardines that have returned to Canada are very small.

In the early 1950s a fishery started for sablefish (*Anoplopoma fimbria*).



This sablefish; it actually goes by either black cod or sablefish.

**Sablefish**



This is a fishery that started in Canada about 1914, around the First World War as a way of producing codfish for Canadians. The sablefish is not classified as a cod but because of the other name Black cod, it often gets confused as one. The fishery started again in the late 60's and has been rather constant since then. There has

been a slight decline, this is an extremely valuable fishery, it's a quota fishery, well managed, and the stocks, despite their decline are actually coming back up again.

Groundfish fisheries started in the 1960's and our rockfish fisheries (started about 1960) in the 1970's



Our groundfish fisheries didn't really get started on the Pacific Coast until the 1960's and our rockfish fisheries didn't get started until the 1970's and unlike the East Coast of Canada.

Total ground fish catch has increased steadily to the late 1990's this decline here represented an adjustment in the way we managed our fishery and it resulted in a quota management system.

**Groundfish Species and Ages**

|                          |     |
|--------------------------|-----|
| • Pacific hake           | 205 |
| • Chinook salmon         | 150 |
| • Tiger rockfish         | 110 |
| • Pacific ground sardine | 35  |
| • Sanddollar             | 34  |
| • Shortbelly rockfish    | 29  |
| • Shortspine rockfish    | 21  |
| • Starry flounder        | 20  |
| • Yellowtail rockfish    | 24  |
| • Pacific halibut        | 22  |
| • Lower hake             | 20  |
| • Copper rockfish        | 20  |
| • Flathead               | 20  |
| • Vancouver salmon       | 20  |
| • Hump hake              | 20  |
| • Rock hake              | 20  |
| • Pacific cod            | 20  |
| • Lingcod                | 20  |
| • English sole           | 20  |

Mark 2007

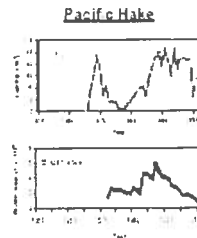
These are our species that our found in our ground fish fisheries. I thought you would be interested in seeing how old the fish can get in Canadian fisheries, with maximum ages of 205 years old...even so of the so called younger fishes are 30, 40, 50 years old. These are maximum ages.

The most recent fishery for Pacific hake (Merluccius productus) started in the 1950's after being developed by the Russian fleet



The most recent fishery has been our Pacific hake fishery. The Russian fleet started it but in recent years it has been mostly a Canadian Fishery.

This is the history the hake where you can see the increase, but you can see there has been a decline, which to be consistent with the in biomass. This is a complicated fishery for Canada, because the Hake catch migrate up from the States, although we do have resident Hake, and we have decided that we need an equivalent of a commission to to agreement on quotas between the two countries.



Catch: 1966-2002  
Biomass: 1970-2002  
Biomass is for WGM  
Note: the catch in 1966 is a 07 number. These catch numbers from Canada

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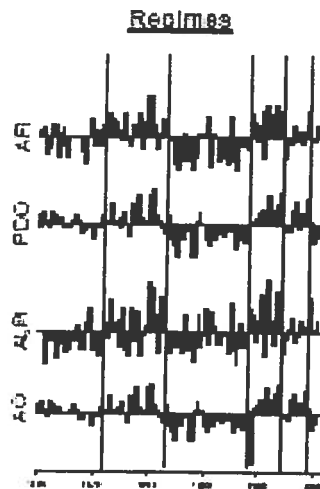


"As a practical matter at the present time, however, the kinds of weather which affect Pacific salmon reproduction have not been shown to have recognizable trends certainly none that are predictable in advance; so the random-series model seems the best kind to use for this group of fish"

W. E. Ricker, 1958.

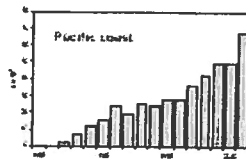
FIGURE 10.1. FISH. REPRODUCED FROM RICKER (1958) BY PERMISSION OF THE UNIVERSITY OF CALIFORNIA PRESS. © 1958 UNIVERSITY OF CALIFORNIA PRESS. ALL RIGHTS RESERVED. ISBN 0-520-00000-0.

As some of you know Dr. Bill Ricker died a few years ago in 2001, September 8<sup>th</sup> and he was the most influential scientist in terms of our management strategy on the pacific coast. What is interesting about this quote is that it was written over 50 years ago. Dr Riker recognized that in order to come up with a successful management strategy for salmon, for fisheries in general, it was necessary to deal with the impacts of climate and the ocean environment. When he looked at the data that was available to him, at that time, he could not see any trends in the data, he saw climate as affecting the dynamics of fish as in a random way, and that is what he wrote.



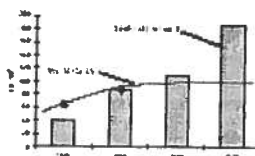
We now know that is not true, we now know that climate and ocean conditions do not follow a random model. Focusing on the period between 1947 and 1977, these are indicators of climate and ocean conditions in the pacific, atmospheric circulations, temperature, winter storminess, and arctic oscillation. You can clearly see that there are trends. This is not random. Because of this recent information, and because many climatologist and fisheries scientists have only recently recognized the trends exist, it becomes clear that we have to have a new way of thinking about fisheries management in terms of how ocean conditions, climate conditions can change the overall productivity of a species and then rather quickly shift that productivity to a new state.

**Salmon Aquaculture**  
*(Salmo salar 95%)*



I mentioned at the beginning of my presentation, aquaculture. And aquaculture is another new and major influence of the fisheries of British Columbia. I think that it's fair to say that the reduced value of the wild pacific salmon is also related to the increasing production of farm salmon in both British Columbia and around the world. So there has been a steady increase in farm salmon production in British Columbia and its probable that this increase will continue and we will probably see other species, such as our sablefish and maybe even eventually halibut culture.

**FAO Seafood demand**



This slide looks at the seafood demand by the year 2030. The amount of seafood we will consume on this planet by the year 2030 is about double what it is was in 1998 and that demand will be there and it can't be met through the commercial capture fisheries. It can only be met through aquaculture. So it's absolutely inevitable that we will see more aquaculture-produced seafood on the planet.



Summary

1. The early fisheries in the late 1800s were for Pacific salmon, Pacific halibut, Pacific herring, Pacific sardine and sablefish.
2. Fluctuations in abundances and catches occurred in the past but in general these species remain healthy.
3. In some cases such as Pacific halibut, pink salmon, Pacific herring in some areas, the abundances are at historic high levels.
4. Climate and climate trends as well as fishing have important impacts on abundances and catches.
5. Aquaculture will be an important component of the future fisheries off the Pacific coast of Canada.

Just to summarize, we have talked about the overall health of the fishery on the Pacific coast of Canada. The early fisheries in the late 1800's were primarily for Pacific salmon, halibut and herring. I mentioned briefly sardine and sablefish. Now you saw some fluctuations over 100 years, but in general the major species remains healthy, and in fact species such as Pacific halibut, pink salmon, Pacific herring in some areas, they are not just healthy, they are at the highest levels of abundance ever recorded in our statistics. I am proposing that climate and climate trends will become a major factor in how we manage our fisheries. This is a new understanding of the overall impact of climate compared to fishing affects and I think as we understand more about these impact, it will have a profound impacts on how we manage our fisheries. Finally aquaculture is rapidly developing, and there is basically no way that we are going to slow down the development of aquaculture in the world. In British Columbia, we are very well positioned to develop our aquaculture industry. I think it will have major impacts on the fishery we have in the future.

Thank you very much.