



**“What are the impacts of salmon farming on
wild Pacific Salmon ?”**

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**Pacific Fisheries Resource Conservation
Council**





"GLOBAL PRODUCTION OF FARMED SALMON HAS CONSISTENTLY EXCEEDED THE GLOBAL CATCH OF WILD SALMON SINCE 1997."

"THE TOTAL FOOTPRINT OF THE B.C. SALMON FARMING INDUSTRY CURRENTLY AMOUNTS TO ONLY ABOUT 14 KM²."

"ESCAPES FROM SALMON FARMS HAVE BEEN REDUCED SIGNIFICANTLY SINCE THE EARLY 1990s, AND HAVE BEEN MAINTAINED AT OR BELOW 1% OF PRODUCTION SINCE 1995."

"A MULTI-STAKEHOLDER ADVISORY COUNCIL PROVIDES INPUT TO THE B.C. GOVERNMENT ON THE ONGOING DEVELOPMENT AND IMPLEMENTATION OF ITS SALMON AQUACULTURE POLICY FRAMEWORK."

"DESPITE INTENSIFIED SURVEY EFFORTS, NO INDICATIONS OF SUCCESSFUL SPAWNING ON THE PART OF ESCAPED ATLANTIC SALMON WERE FOUND IN B.C. STREAMS AND RIVERS IN 2001."



Where ever it is practiced, net-cage salmon farming is controversial and raises serious environmental concerns.



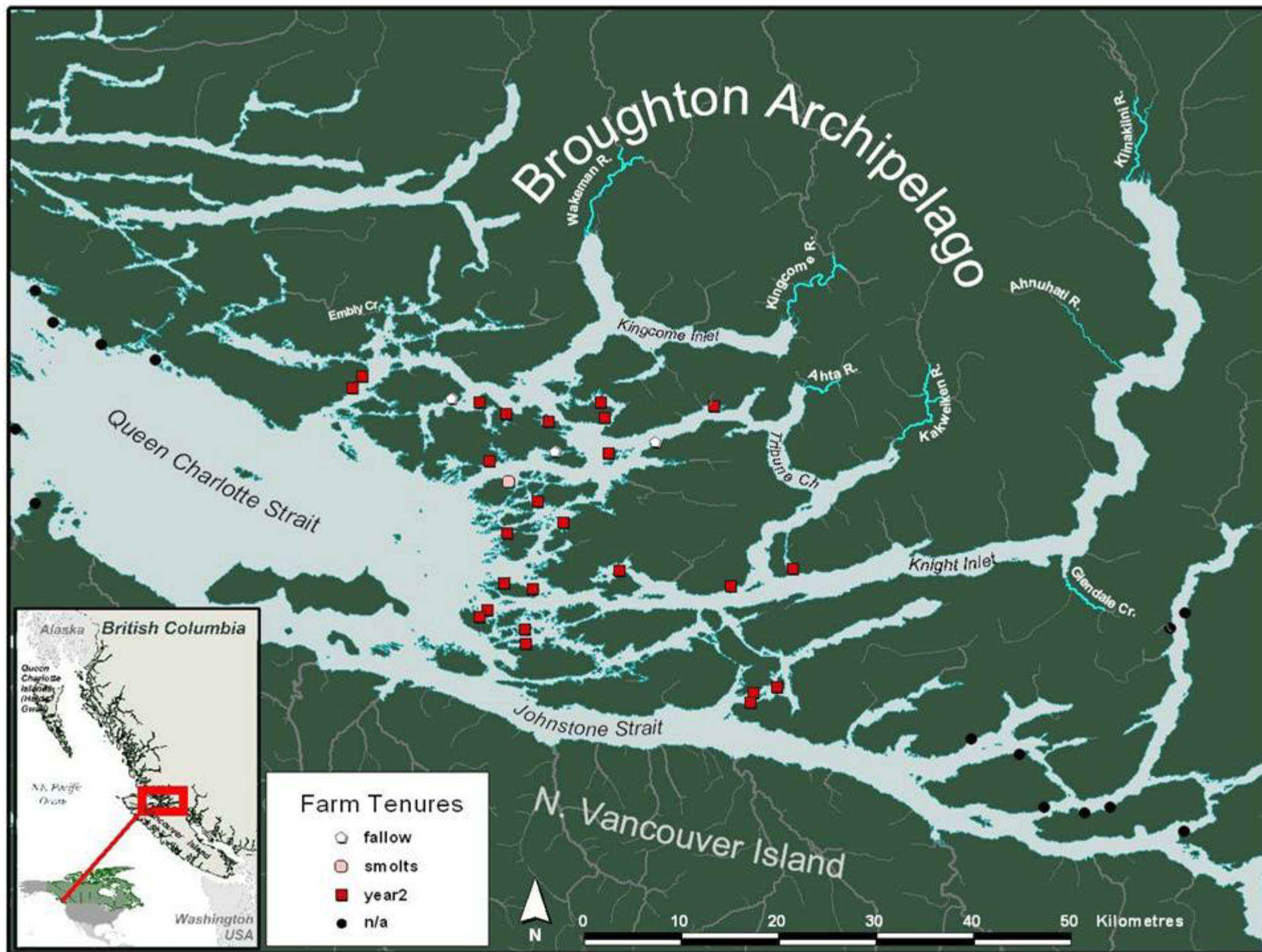
Think Twice About Eating Farmed Salmon





***PACIFIC FISHERIES RESOURCE
CONSERVATION COUNCIL ... Recent Efforts:***

1. The Protection of Broughton Archipelago Pink Salmon Stocks (Nov. 2002)
2. Making Sense of the Salmon Aquaculture Debate. Analysis of issues related to net cage salmon farming and wild salmon in British Columbia (Jan. 2003) ... contractor report to PFRCC
3. Wild Salmon and Aquaculture in British Columbia (Jan. 2003)
4. Proposal to establish a Salmon Aquaculture Forum
Website: www.fish.bc.ca





Pink salmon from non-exposed control site
Bond Sound salinity 25%
June 2001



June 15, 2001
Tribune channel



Denham Island
June 12, 2001

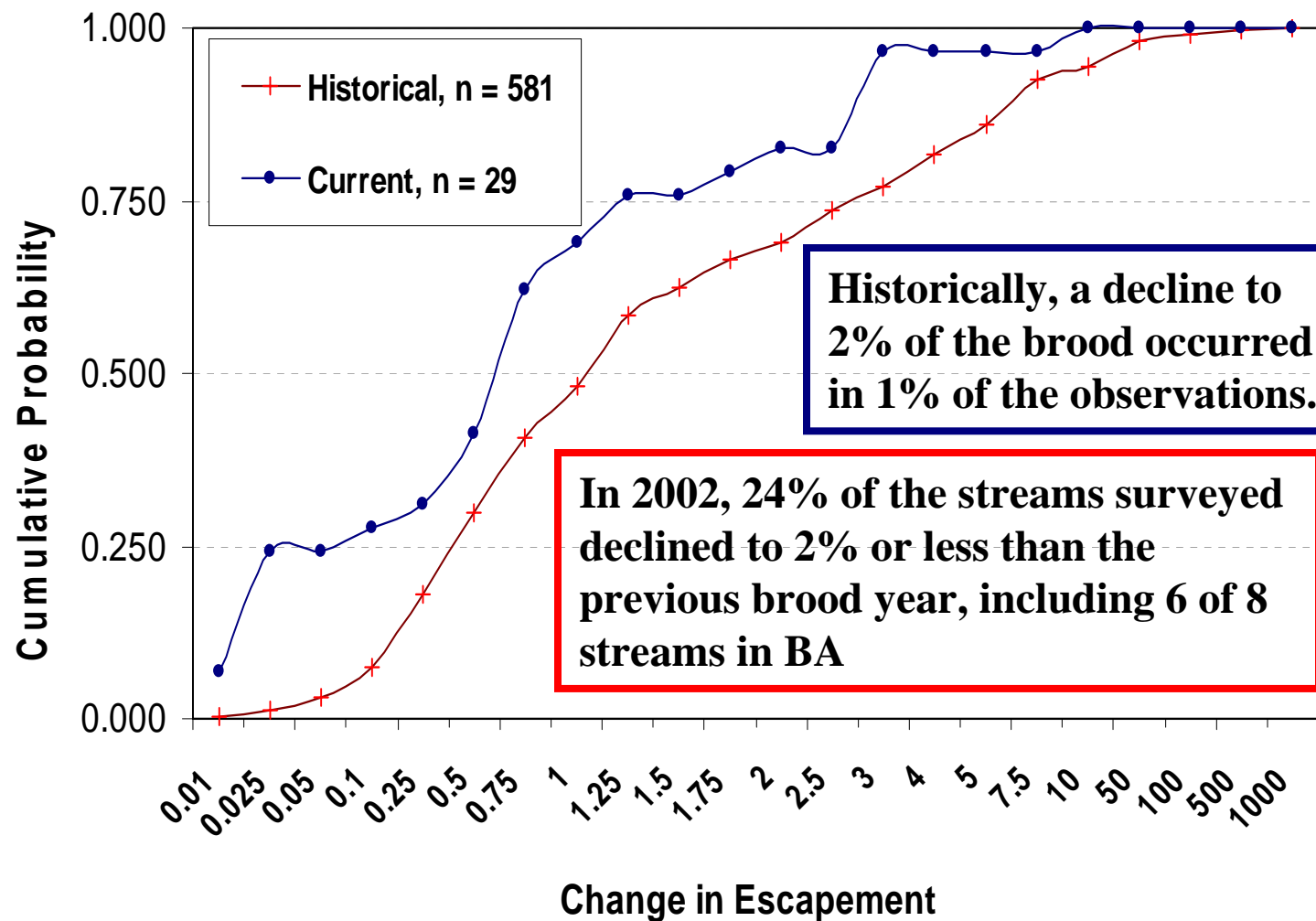


Chinook salmon smolt
July 31, 2001
Broughton Archipelago



Old Pass June 11, 2001

Cumulative probability of Even-Year Pink Salmon deviations between years, based on Study Area streams



Making Sense of the Salmon Aquaculture Debate

Authors: Dr. J. Gardner and D.L. Peterson

Objective: to expand and deepen the current public understanding about the potential impacts of salmon aquaculture on wild salmon by examining, evaluating, and assessing the information and assumptions of opposing interests.

Topics ... risk to wild salmon assessed for each

- 1. Disease Issues and Fish Health (sea lice, bacteria, viruses)**
- 2. Escapes ... Pacific salmon, Atlantic salmon, colonization**
- 3. Habitat Impacts ... Seabed impacts, water quality**



SEA LICE:

“lice from farms will contribute to lice populations in wild salmonids, but the extent and consequences of this have not been quantified”

What is the incremental natural mortality caused by sea lice?

Issues regarding sea lice:

1. Natural pathogen on salmonids, but sea lice assessed to be most serious immediate disease risk to wild salmonids.
2. Long term challenge to control sea lice on farms, including development of resistance to chemical treatments, not likely to eliminate sea lice problems
3. Increasing evidence that sea lice can transmit other disease
4. Use integrated area management plans to control lice
5. Indirect effects of treatment chemicals increased concern in ecosystem.



Bacteria and Viruses:

Pacific salmon are well adapted to bacteria and viruses endemic to BC

But, can pathogens be transmitted from salmon farms to wild salmon?

Issues related to bacteria & viruses:

1. Vaccines can assist control of bacterial diseases but not viral. Viruses higher risk than bacterial risks to wild fish.
2. Anti-biotic resistance reduces effectiveness of treatments but does not increase risks to wild salmonids.
3. Exotic pathogens presents greatest potential risk, but on the Pacific coast have been controlled to-date.
4. "New" diseases are likely to be detected, but natural incidence of disease in wild stocks is difficult to assess.
5. Significant progress has been made in health management on salmon farms (except recent example of I HN)
6. On the Pacific coast, we have no evidence of disease transfer from farms to wild fish, but the potential does exist.



ESCAPES: WILL EXOTICS COLONIZE BC WATERS? WHAT ARE THE GENETIC, ECOLOGICAL, AND DISEASE RISKS ASSOCIATED WITH ESCAPES? HOW MANY FISH ESCAPE?

Estimates from the Atlantic Salmon Watch indicated that approximately 1 million Atlantics salmon have escaped from BC and Washington State farms since 1991, and an equal number of farm-reared Chinook salmon (minor numbers of Coho included).

While there is some assessment of Atlantic escapes, there is NO assessment of the Pacific's since they cannot be identified!



**ASWP reports
1,085 Atlantic
salmon observed
in 80 streams
since 1987.**

Do farmed Atlantic salmon survive in the wild? **YES,**
but quite poorly based on observed adults.

Will farmed Atlantic salmon return to BC rivers and
successfully spawn there? **Yes, they have returned and**
"feral" juveniles have been found (Tsitika River 1998)

Do the results of monitoring suggest that colonization
by Atlantic salmon is occurring. **NO, but possible.**
Monitoring is currently inadequate for good information.

Summary of Escape Issues with Pacific and Atlantic Salmon:

<u>TOPICS</u>	<u>PACIFIC SALMON</u>	<u>ATLANTIC SALMON</u>
GENETIC	<i>Potentially significant, but can not quantified</i>	Very low risk with Pacific salmon, my increase with other species
ECOLOGICAL	Would likely occur, but low risk of impact	Potential impact, but would vary depending on status of other species
DISEASE	Low risk assuming no exotic diseases occur	Risk associated with escapes very low assuming no exotic diseases occur.
MONITORING PROGRAMS for Adults	<i>NONE, may use DNA or tagging to identify</i>	<i>INADEQUATE, no statistical design or dedicated resources</i>
Escape Trends	NUMBERS OF ESCAPES DECREASED RECENTLY	

Habitat issues associated with the seabed, water quality, ecosystem function, and “Performance-based Standards”

Seabed Issues:

- proximity to farm (impacts ~ 30m)
- Sedimentation rates (localized effect at farms, no measures)
- Feeding efficiency (food wt : fish wt gain)
- Recovery time after fallowing (varies)
- BC Waste Control Regulation, basis of Standard value?



Effect of lights on salmon farms not reported on.

Water Quality issues:

- nutrient loading and algal blooms ... no evidence of impact
- Antibiotic residues, unlikely to effect migratory fish, other impacts possible
- Blood water, mortality disposal, and Net cleaning ... limited effect on migratory fish via avoidance.



PFRCC 3rd report is more process oriented than scientific ... 5 recommendations presented.

- 1. Given extensive uncertainty, apply the precautionary principle more rigorously.**
- 2. Undertake research and monitoring to address these uncertainties.**
- 3. Government of Canada should complete the Wild Salmon Policy (establish priority for wild salmon)**
- 4. Regulation of wild and farmed salmon should be integrated into single-bay or area management units.**
- 5. Proposed a Salmon Aquaculture Forum, including a scientific panel, to develop public consensus on issues.**

Summary of the salmon aquaculture issue is this:

1. Defensive posturing is not conducive to objective evaluation ... wild salmon must be considered with aquaculture.
2. Extensive mistrust has developed and there is a critical need for effective dialogue and dedicated research programs.
3. Science can address technical or biological issues, but resolution of value-based decisions requires appropriate public processes which are not functioning now.
4. Aquaculture may have an important role in food production and employment, but it should not be at the expense of wild salmon, cultures, and other public values.
5. Conservation of salmon requires diversity and healthy ecosystems (maybe now more than ever in our time).

