Information from The David Suzuki Foundation about Salmon Aquaculture, Contaminants in Farmed Salmon, and Sea Lice Research Findings

Compiled by Vivian Krause

9 June 2009
"There is good science in the campaign of course. All campaigns at the David Suzuki Foundation begin with good science."

- Dr. David Suzuki, 20 May 2002
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Information from the David Suzuki Foundation

A. General Information About Salmon Aquaculture

1. Salmon Aquaculture: The Risks of Open Net-Cage Salmon Farming

This brochure is misleading in that it equates salmon aquaculture with salmon farming and makes no mention of ocean-ranching. This brochure makes only negative comments about salmon farming. None of the advantages are cited.

2. Lessons About Farmed Salmon Every Canadian Should Know.

All of the so-called "lessons" about farmed salmon are negative. This article mentions none of the positive aspects of salmon farming, such as the fact that it avoids the risks of over-fishing, the killing of endangered species of salmon as by-catch and the drain of ocean-ranching on the food chain and the carrying capacity of the Pacific ecosystem.

The article also does not mention that farmed Atlantic salmon is higher than omega-3 fatty acids than any other fish - a fact that every Canadian should know.

3. Why You Shouldn't Eat Farmed Salmon.

This brochure contains a number of inaccurate and misleading comments. For example:

- The brochure says that farmed salmon contain higher levels of unhealthy saturated fats and lower levels of beneficial omega-3 fatty acids. This statement is inaccurate. According to the U.S. Institute of Medicine, farmed Atlantic salmon is higher in omega-3 fatty acids than any other fish.

- The brochure says, "Farmed salmon are administered chemical dyes to color their flesh an appealing salmon pink." The fact is, "dyes" are not given to farmed salmon. Carotenoid pigments are included in fish feed to mimic the natural diet of salmon in the wild.

- This brochure raises concern about escapes of farmed fish and their interaction with wild fish. The brochure does not mention that farming causes far less interaction between wild and cultured fish, than does ocean-ranching.

- The brochure says, "Farmed salmon is healthier than wild." The fact is, farmed, wild and ranched salmon are all wholesome foods.

None of the advantages of salmon farming and none of the positive aspects of farmed salmon, such as the high level of omega-3 fatty acids, are mentioned.

1 http://www.davidsuzuki.org/files/Aquabrochure.pdf
2 http://www.davidsuzuki.org/files/General/NewsletterSummer05.pdf
3 http://www.iom.edu/CMS/3788/23788/37679.aspx
4 http://www.davidsuzuki.org/files/PSF_Salmon_Brochure.pdf
5 http://www.iom.edu/CMS/3788/23788/37679.aspx
This page shows excerpts from the brochure titled Salmon Aquaculture.

Salmon Aquaculture

"Canada's Auditor General has called for a full, environmental assessment of the salmon farming industry in British Columbia. And it's no wonder. The salmon farming industry has grown rapidly in Canada over the last 25 years, and with it a heated controversy on whether it is safe for wild salmon, for the marine environment, and even for human health."

Dr. David Suzuki

The Risks of Open-Net Cage Salmon Farming

Disease
The densely packed conditions in which the salmon are raised require the use of antibiotics and other drugs to control disease, and traces of these substances are passed on to consumers. Infectious salmon anemia (ISA) is the most common, and deadly, disease affecting farmed salmon. Major outbreaks of ISA have occurred in Scotland, the U.S. and New Brunswick, devastating not only the farmed fish but also the

Escapes
Because net cages float in the open ocean, they can be torn apart during storms - something that has happened repeatedly in BC, resulting in major escapes. Escapes also occur because of accidents.

Habitat and Species Destruction
The federal Department of Fisheries and Oceans, through the Fisheries Act, is mandated to protect wild fish stocks and their marine habitat. In recent years, environmental organizations and First Nations have gathered evidence of habitat damage and injury and death to marine mammals caused by net cage fish farms. Government regulators, however, have offered little response.

Wild Salmon: A tastier, healthier choice
When it comes to taste and texture wild salmon is the hands-down winner. Several blind salmon tasting tests have shown that food critics, fish industry representatives and fishermen choose wild salmon over farmed every time. Testers have judged the taste and texture of wild salmon to be far superior to farmed varieties, which are often found to be bland and mushy.

But wild salmon doesn't just win the taste test: It is healthier too. Wild salmon is one of the best sources of omega-3 fatty acids - vital nutrients for growth and development. Due to the makeup of its feed - fish meal, fish oil and various by-products and fillers - farmed salmon contains higher levels of unhealthy saturated fats and lower levels of beneficial omega-3 fatty acids. Saturated fats contribute to health problems like heart disease and stroke while omega-3 fatty acids reduce the risk of such diseases. A U.S. Agriculture Department study found that farmed Atlantic salmon contains 70 percent more fat than wild salmon because of the high fat content in the feed.

Increasingly, the issue of toxins in oily fish like salmon is being examined by researchers. Wild fish, including salmon, have been found to contain toxins. However, a European Union study shows that farmed fish are the food-producing animal most exposed to dioxins because of the high level of contamination found in their feed materials. When fish meal and oil are manufactured, any toxins in the processed fish become highly concentrated and, in turn, become even more concentrated in the saturated fatty tissues of farmed fish.

Solutions
The David Suzuki Foundation believes the greatest solution to the myriad problems caused by salmon farming is to convert the industry to closed containment systems. With every crisis caused by open-net cage salmon farming, it becomes clearer that the industry must only be allowed to operate in escape-proof, disease transfer-proof closed systems that ensure zero discharge and keep antibiotics, drugs and pesticides out of the marine environment.
Lessons about farmed salmon every Canadian should know

Why your salmon choices matter

By JENNIFER BROWN

Going to the grocery store to pick up a salmon for the barbecue isn’t as easy as it used to be. For some of us it’s become a confusing and guilt-ridden minefield.

That’s because many of Canada’s formerly plentiful salmon runs are disappearing due to fish farms, habitat destruction, and government mismanagement. But with a little information you can help wild salmon survive for future generations. Here’s the low-down on everything you wanted to know about farmed salmon but were afraid to ask.

LESSON ONE
Salmon farming is unsustainable

Farmed salmon, produced in fish farms, are carnivores that eat other fish. “Feed fish” usually comes from developing countries. It takes up to four kilograms of feed to produce just one kilogram of farmed salmon. You do the math. There’s nothing sustainable about that equation.

LESSON TWO
Farmed salmon spread sea lice

Salmon farms use floating net cages in the open ocean that are crowded with up to a million salmon at a time. These fish pens are a breeding ground for diseases and parasites which can infect wild fish swimming past the farms. A recent study, supported by the David Suzuki Foundation, showed that parasite sea lice from salmon farms in B.C.’s Broughton Archipelago are infecting wild juvenile salmon at rates many times higher than natural levels.

LESSON THREE
Atlantic salmon shouldn’t be in the Pacific

Salmon farms on Canada’s west coast raise Atlantic salmon, alien to Pacific waters. Millions have already escaped, some of which have even been found in streams as far away as Alaska. How these alien fish will affect Pacific wild salmon stocks has yet to be determined.

LESSON FOUR
Toxins are bad for you

Studies have shown that farmed salmon contain higher levels of PCBs and other toxins than wild fish. Farmed-raised fish are also periodically given antibiotics in their feed, which gets into the marine environment. Some experts are concerned that this may contribute to the increase in antibiotic-resistant disease worldwide.

CONTINUED ON PAGE 4
WHAT TO BUY?

- **Buy wild** Always request wild over farmed salmon in grocery stores and restaurants. Sometimes farmed salmon is marketed as “fresh”, although fresh does not necessarily mean “wild.”

- **Be selective** Certain types of wild salmon such as Sockeye, Chum and Pink aren’t farmed. These are often found fresh or in tins. When shopping, check for environmental certification that indicates the salmon was sustainably produced.

- **Balance your diet** Despite the health benefits of wild salmon, we can’t all eat it all the time. Other seafood can balance your diet without costing the earth. Visit the Monterey Bay Aquarium website (www.montereybayaquarium.org) for a list of sustainable seafood choices and the David Suzuki Foundation website (www.davidsuzuki.org) for more information on wild salmon.

CONTINUED FROM PAGE 1

LESSON FIVE

**Your support helps wild salmon**

A salmon’s life isn’t easy. Ninety per cent of salmon don’t even make it to adulthood. And destructive human activities aren’t making things easier. Climate change is altering ocean conditions and raising river temperatures while logging and road building are degrading fish streams. Urban development and industrialized agriculture also pollute and destroy crucial habitat.

Despite these grim realities, the government continues to favour industry interests over conservation – with salmon habitat bearing the brunt of these shortsighted policies. The Foundation continues to raise awareness about this issue, providing extensive input on the Department of Fisheries and Oceans’ wild salmon policy, and lobbying both levels of government for increased salmon protection.

LESSON SIX

**Don’t get mad, do something!**

Management of wild salmon is primarily the responsibility of the federal government. You can make your voice heard by contacting Geoff Regan, Minister of Fisheries and Oceans Canada, at <regan.g@parl.gc.ca>. Let him know that B.C. salmon are in
What You Can Do Personally

Don't buy farmed salmon ANYWHERE

In restaurants, grocery stores and fish shops, if the fish is not labelled wild or farmed always ask before purchasing. If the salmon served is "Atlantic" it means it is farmed salmon. Often you will see the term "fresh" salmon even though it is not salmon "season". This is another indication that the salmon is farmed.

In restaurants, often the server doesn't know, so ask them to inquire from the chef. Please remember it is not the server's fault if the establishment serves farmed salmon, but explain that you will not be ordering farmed fish.

Farmed salmon is turning up everywhere. Most recently it has been added to the menu on BC Ferries.

Phone your local hospitals and ask whether farmed salmon is served to patients.

If your organization, union, service club, business or family ever organizes a banquet and salmon is offered please inquire if it is farmed or wild and let the caterer know you don't want farmed salmon. If you attend a banquet, ask before accepting the salmon.

To find out more, download our brochure Why you shouldn't eat farmed salmon, (PDF)

To receive email updates about salmon aquaculture issues, join ART, the Aquaculture Response Team. Just visit our email subscription page and fill in the fields.

Find you what you can do Politically, or send a fax to the provincial government today!
Why You Shouldn’t Eat
Farmed Salmon

Environmental Reasons

1. Farmed salmon are grown in floating net cages and impact wild salmon and other marine species by spreading disease and parasites.

2. Farmed salmon are given antibiotics, other drugs and pesticides. The drug-laden wastes from surplus food and feces pollute the marine environment.

3. Most farmed salmon in British Columbia—about 70 percent—are alien Atlantic stocks. The United Nations says the introduction of exotic species is extremely harmful to local ecosystems and is one of the greatest threats to nature.

4. Farmed salmon escape from their net cages—often by the thousands—and can displace fragile wild stocks from their habitat.


Health Reasons

1. Farmed salmon are given antibiotics that are also used to treat human illness. This contributes to the dangerous increase of antibiotic-resistant disease worldwide.

2. Farmed salmon receive more antibiotics by weight than any other livestock.

3. Farmed salmon contain higher levels of unhealthy saturated fats and lower levels of beneficial omega-3 fatty acids. A U.S. Agriculture Department study found farmed Atlantic salmon contain 70 percent more fat than wild Atlantic salmon because of the high fat content in their feed.

4. Farmed Atlantic salmon contain 200 percent more fat than wild Pacific pink or chum salmon.


U.S. Food and Drug Administration Nutrition Database (www.fda.gov).

The Real Story

Myth Farmed salmon help feed the world.

Fact Farmed salmon actually represent a ‘net loss’ of protein worldwide. Three to five kilograms of other fish are used to make the feed to produce every kilogram of farmed salmon.

Myth Farmed salmon help conserve threatened or endangered wild salmon stocks.

Fact Farmed salmon pose a threat to wild stocks because:

- Parasites and disease can pass through the net cages and contaminate wild salmon.
- Farmed salmon have greatly reduced the price of wild salmon, forcing fishermen to increase their catch in order to make a living.

Myth Farmed salmon tastes just like wild salmon.

Fact In blind taste tests, farmed salmon loses every time. Testers—including chefs, food critics and fishermen—have judged the taste and texture of wild salmon to be far superior to farmed varieties, which are often found to be bland and mushy. Farmed salmon are also administered chemical dyes to colour their flesh an appealing salmon pink; otherwise the flesh would be grey.

What’s Wild, What’s Farmed?

Whether ordering or buying salmon always ask if it’s wild or farmed. If salmon is a fixed menu item it is most likely farmed. Farmed salmon is often marketed as ‘fresh’, especially when wild salmon is not in season.

Some types of wild Pacific salmon are not farmed so ask restaurants and stores to carry these:

Sockeye Chum Pink

Canned salmon is also wild because the mushy consistency of farmed varieties makes them difficult to can. Some varieties of salmon pate, however, are made from farmed salmon and usually sold at exorbitant prices.
Why You Shouldn’t Eat Farmed Salmon

Salmon Farming in Canada

On the Atlantic and Pacific coasts, netcage salmon farming began in the 1970s. These privately run floating feedlots use publicly owned coastal waters to earn profits while at the same time polluting the water. On land, this kind of corporate behaviour is restricted.

Governments hoping for new economic opportunities for coastal communities have encouraged the industry, offering subsidies and grants. The federal and provincial governments, however, do not provide any analysis comparing the benefits of salmon farming to the environmental, social and economic costs borne by other industries like commercial fisheries and tourism.


Disease

Fighting disease is a constant battle in netcage salmon farms because of the densely packed conditions in which the salmon are raised. Tens of thousands of salmon, as many as 50,000, are kept in a single netcage.

Salmon farmers use antibiotics—including many of the same ones used to treat human infections—and other drugs and pesticides to control disease. Traces of these substances are passed on to consumers and contribute to the dangerous increase of antibiotic-resistant disease worldwide.


Join the David Suzuki Foundation’s AQUACULTURE R!
Why You Shouldn’t Eat Farmed Salmon

Escapes
Over one million Atlantic salmon have escaped into British Columbia waters, raising concern about disease transfer and competition with wild salmon for breeding space and food. On the East Coast, the risks are equally serious with the potential of farmed Atlantic salmon breeding with wild stocks and weakening their genetic makeup.

Nets are lost in the open ocean and can be torn apart during storms, resulting in major escapes. Escapes also occur because of accidents, deficient farm operations, predation by marine mammals and inadvertent release during transport.

Human Health
When it comes to taste and texture, wild salmon is the hands-down winner. It is also healthier than farmed salmon.

Wild salmon is one of the best sources of omega-3 fatty acids, which are vital nutrients for growth and development. Farmed salmon contain higher levels of unhealthy saturated fats and lower levels of beneficial omega-3 fatty acids because of the makeup of its feed—fish meal, fish oil and various by-products and fillers. Farmed Atlantic salmon has 100 percent more fat than wild pink or chum salmon.

Many people are turning to fish for a healthy contribution to their diet. This is generally a wise decision, but when it comes to salmon—choose wild over farmed for your and your family’s well-being.

B. About Contaminants in Farmed Salmon

4. New scientific studies raise concern over toxicity of farmed fish feed.

This document states, "startling new scientific evidence from Canada and Britain suggests that potentially dangerous levels of toxic chemicals are contained in the feed given to farmed salmon" (italics added). The fact is, the research reported contains no evidence of potentially dangerous levels of such chemicals in salmon feed.

This document states, "The research shows that the contaminants, known as persistent organic pollutants, are especially dangerous for children, nursing mothers and pregnant women or women considering pregnancy." The fact is, the research reported contains no evidence of risks to human health.

For this study, only eight fish were analyzed, four farmed salmon and four 'wild' salmon. Given that the sample of only eight fish was extremely small, the sample was not representative of either farmed or wild fish as a whole. Hence, generalizations are not warranted about either farmed or 'wild' salmon and the results are not "very, very clear" as reported in the David Suzuki Foundation's press release.

"Dr Easton said: 'The results were very, very clear. Farmed fish and the feed they were fed appeared to have a much higher level of contamination with respect to PCBs, organo-chlorine pesticides and polybrominated diphenyl ethers than did wild fish - in fact it was extremely noticeable the difference.'"

- The BBC, 3 January 2001

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6 [http://www.davidsuzuki.org/Campaigns_and_Programs/Salmon_Aquaculture/News_Releases/newsaquaculture01040101.asp](http://www.davidsuzuki.org/Campaigns_and_Programs/Salmon_Aquaculture/News_Releases/newsaquaculture01040101.asp)
New scientific studies raise concern over toxicity of farmed fish feed

January 4, 2001 VANCOUVER, CANADA - Starting new scientific evidence from Canada and Britain suggests that potentially dangerous levels of toxic chemicals are contained in the feed given to farmed salmon in Canada and Scotland, the David Suzuki Foundation announced today.

The research shows that the contaminants, known as persistent organic pollutants, are especially dangerous for children, nursing mothers and pregnant women or women considering pregnancy. The studies were conducted in Canada by Dr. Michael Easton for the David Suzuki Foundation and in Britain by Dr. Miriam Jacobs in conjunction with the U.S. Environmental Protection Agency.

"We are calling on the Canadian government to immediately heed these findings and to fund the next stage of research needed to determine the safety of farmed salmon and salmon feed for people who consume this fish regularly," said Jim Fulton, executive director of the David Suzuki Foundation.

"Our research, conducted by Dr. Easton, is a pilot study that examined a small sample size. But the results demonstrate reason for concern and the need for further study. We believe it is now the responsibility of the federal government to fund research that can shed more light on these findings," he added.

The research by Drs. Easton and Jacobs shows the farmed fish sampled contained much higher levels of pollutants, including 10 times more Polychlorinated Biphenyls (PCBs), than wild fish. Their studies were conducted independently of each other.

"The results were very, very clear." Dr. Easton, a Vancouver-based geneticist and expert in ecotoxicology, told the British Broadcasting Corporation in a television documentary to be aired this Sunday (Jan. 7) in Britain.

"Farmed fish and the feed that they were fed appeared to have a much higher level of contamination with respect to PCBs, organochlorine pesticides and polynuclear aromatic ethers than wild salmon. In fact, we were astounded," he said.

"It is a function of how the feed is made. Of their concentrating of these different materials to produce high-protein diets for the fish and ultimately the contaminants are no longer concentrated as well," Dr. Easton said, adding that these pollutants affect the nervous system, the immune system and can cause cancer.

"They're a neural toxin, which causes learning disabilities (especially in children) but they are also an immune toxic," he told the BBC. "They cause depression of the immune system that enables you to catch colds and flus and infections much more easily than normal, and they also aid the production of cancer."

Dr. Jacobs, a toxicologist at the School of Biological Sciences at the University of Surrey (U.K.), told the BBC: "I am concerned about the dietary intake of small children and infants. Their dietary intake will be far greater than for an adult based on body weight. An ongoing study in Holland has been monitoring for background levels of PCBs in very young children and up to school age, and it has been found that there is a greater risk of infection and a greater risk of impairment of cognitive development in those children that have higher intake of PCBs."

While the contaminant levels discovered by Drs. Easton and Jacobs were below government-approved safety levels, both scientists said they are concerned for people who regularly eat farmed salmon, and also about how governments establish risk-assessment values for human consumption of chemicals and pollutants.

The BBC program Warning from the wild: The price of salmon especially raises questions about British Standards, which are far weaker than those of the World Health Organization (WHO) and other European countries which are following the newly established WHO standards. A spokesperson for Britain's Food Standards Agency says they only recommend a person eat one portion of farmed salmon a week.

"Once again, we have so many questions raised by scientists about this industry," Mr. Fulton said. "What we want from the Canadian government is that they fund additional scientific investigation. We are a small research agency and we cannot afford to conduct the next stage of research which is estimated at approximately $600,000." Those funds could be found in the office of Canada's Aquaculture Commissioner whose office has an annual budget of over $2 million, Mr. Fulton added.

"I presume that some of the work his office should be doing is this type of scientific research so I look forward to speaking to the Minister of Fisheries (Hon. Herb Dhaliwal) about the possibility of continuing Dr. Easton's work," he said.

For more information and to arrange interviews, please call Jean Kavanagh of the David Suzuki Foundation at 604-732-4228, ext. 229 or 604-251-5729.

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5. **Media Advisory - Setting the record straight: Toxicity of farmed salmon**

The research findings reported provide no evidence of "toxicity" in farmed salmon.

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**Media Advisory - Setting the record straight: Toxicity of farmed salmon**

January 11, 2001 - VANCOUVER - In recent days, Anne McMullin of the B.C. Salmon Farmers Association and other spokespeople for the salmon farming industry in Canada have made erroneous assertions about:

1. The British television documentary Warnings from the Wild: The price of salmon, and statements made by British researcher Miriam Jacobs who was interviewed for the documentary;
2. Research sponsored by the David Suzuki Foundation.

Setting it straight:

1. Miriam Jacobs has not said she was misquoted in the British Broadcasting Company (BBC) documentary nor has she challenged any aspect of the programme as alleged by Ms. McMullin and other salmon farming representatives. A report on BBC Online did attribute research data from Dr. Michael Easton (sponsored by the David Suzuki Foundation) to Ms. Jacobs, but that was quickly corrected to Ms. Jacobs and Dr. Easton's satisfaction.

Ms. Jacqui Spiers of the University of Surrey press office issued the following statements on behalf of Ms. Jacobs.

1. Miriam's complaint on Thursday regarding inaccuracies on the BBC website was dealt with rapidly. She has also made clear the difference between her findings and those of Dr. Easton in Canada.
2. Neither she nor the University has any complaint regarding last night's programme.
3. She does not wish to add further to the comments she made during the programme.
4. She does not wish to comment on Ms. Fagan's (of Intrafish news agency) perception as to the message of the programme.

Ms. Spiers can be reached at 44-148-387-9906.

Ms. McMullin and other salmon farming representatives contend that Dr. Easton's research "A pilot study examining contaminant loads in farmed salmon, wild salmon and commercial salmon feed" has not been peer-reviewed and will be further peer reviewed in the journal publication process. Publication is expected soon in a reputable journal, and in keeping with standard practice for most academic journals, Dr. Easton has requested that the name of the journal be kept confidential until the publication date.

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For more information, please call: Jim Fulton, executive director, or Jean Kavanagh at 804-732-4228.

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[7](http://www.davidsuzuki.org/Campaigns_and_Programs/Salmon_Aquaculture/News_Releases/newsaquaculture01110101.asp)
This document states, "research from Canada and Britain suggested that potentially dangerous levels of toxic chemicals are contained in the feed given to farmed salmon." The problem is, the research reported does not contain evidence of risks of potentially dangerous levels of toxic chemicals in salmon feed.

Health minister urged to assess risks of eating farmed salmon

January 8, 2001 - VANCOUVER - Federal Health Minister Allan Rock must immediately order wide-scale testing of farmed salmon produced in Canada in order to determine contaminant levels and the safety of regular human consumption of the fish, the David Suzuki Foundation said today.

Additionally, Minister Rock must ensure that his department and the Bureau of Food Safety and Consumer Protection publish information about safe-level standards for the consumption of farmed salmon by adults, especially pregnant women and nursing mothers, and children, said Jim Fulton, the Foundation's executive director.

"I have spent hours speaking to Health Canada officials and people from Food Safety and Consumer Protection and I wasn't able to get any assurance that such safe-level standards even exist in Canada never mind being accessible to the public," Mr. Fulton said.

Concern about contaminant levels was raised last week when research from Canada and Britain suggested that potentially dangerous levels of toxic chemicals are contained in the feed given to farmed salmon. The Canadian research was conducted by Dr. Michael Easton for the David Suzuki Foundation and in Britain by Dr. Miriam Jacobs of the University of Surrey in conjunction with the U.S. Environmental Protection Agency.

The research was cited in a British Broadcasting Corporation television program aired Sunday. In the program, Dr. Nigel Harrison, a contaminants expert in Britain's Food Standards Agency, advised that adults should eat a maximum of one portion of farmed salmon a week because it may contain contaminants like Polychlorinated Biphenyls (PCBs).

"In Britain and Europe, consumers can find out about safe-level standards for contaminants in oily fish like salmon and be told just how much is safe to eat. We have no such information readily available," Mr. Fulton said.

"We are asking Canada's Health Minister to come clean with Canadians and advise us about potential health hazards of regularly eating farmed salmon," he added.

"The federal government has been the lead promoter of salmon farming in Canada since 1964. My concern is that federal agencies have not vigorously researched the health or ecological impacts of salmon farming because the government itself is the main promoter of the industry."

Mr. Fulton has written to Minister Rock asking him to address this issue immediately.

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For more information, please call Jim Fulton or Jean Kavanagh at 604-732-4228, ext. 229.

http://www.davidsuzuki.org/_pvw370829/campaigns_and_programs/salmon_aquaculture/news_releases/newsaquaculture01080101.asp
This document states, "Dr. Easton's study shows that the contaminants, known as persistent organic pollutants, are especially dangerous for children, nursing mothers and pregnant women or women considering pregnancy." The fact is, the research findings referred to do not provide evidence of risks to human health.

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http://www.davidsuzuki.org/Campaigns_and_Programs/Salmon_Aquaculture/News_Releases/newsaquaculture02040201.asp

The fact is, the research reported does not suggest that BC's farmed salmon contain "high" levels of contaminants.

Note: The term 'contaminants' is spelled incorrectly in the headline of the article.


In this form letter, Dr. Suzuki thanks his supporters for helping him “to uncover the fact that B.C. farmed salmon is heavily contaminated with PCBs and other toxins.” The problem is, Dr. Suzuki reported uncovering a “fact” that he did not actually uncover. The truth is that the research findings referred to by Dr. Suzuki in his letter do not show that B.C. farmed salmon is heavily contaminated with PCBs.

As shown, Dr. Suzuki also said in Ontario, "I would never feed farmed salmon to a child. It's poison." In Australia, he described farmed salmon as "full of toxic chemicals."


This document states, "The *SCIENCE* report cites Environmental Protection Agency consumption advice, which, based on the new findings, would recommend against eating more than one meal per month of B.C. farmed fish. Those in high-risk categories such as children and expectant mothers should eat much less." The fact is, the *SCIENCE* report makes no mention of "B.C. farmed fish."

This document overlooks or disregards the fact that the level of PCBs detected in farmed salmon was less than 2 per cent of what Health Canada and the U.S. Food and Drug Agency consider to be the action or "intolerable" levels of PCBs, unavoidable contaminants which are present to some extent in all foods.

11. **The Skinny on Salmon.** Undated.

This document states, "wild salmon is healthier than farmed." The fact is, the world's leading health authorities do not hold this view. For example, the EU Food Safety Authority says, "There are no consistent differences between wild and farmed fish both in terms of safety and nutritional contribution."

This document states, "huge international study comes out that says farmed salmon contain far more toxins than wild salmon" and "the tradeoff with farmed salmon is that it also contains much higher levels of contaminants like PCBs.” The words "far more toxins" and "much higher" are misleading. The actual levels of PCBs detected in farmed and wild salmon were 0.0366 ppm and 0.0048 ppm respectively. The action level for PCBs in fish is 2.0 ppm - 54 times higher than the level observed in farmed salmon.

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Toxic salmon

Study shows BC’s farmed salmon contain high levels of contaminates

by JEAN KAVANAGH

When news of a ground-breaking aquaculture pilot study commissioned by the Foundation first emerged in January, a spokeswoman for the BC Salmon Farmers Association called it “junk science.”

The study, Contaminant Loads in Farmed Salmon, Wild Salmon, and Commercial Salmon Feed by Dr. Michael Easton, has now been accepted for publication in the respected international journal Chemosphere.

Because the study is the first of its kind to discuss the human health implications of contaminant levels found in BC farmed salmon, it was featured in a BBC/CBC television documentary The Price of Salmon, which aired on CBC’s The Nature of Things in February.

“The results are very clear: In the samples tested, farmed fish and farmed fish feed have a much higher level of contamination with respect to persistent organic pollutants than the wild fish tested,” said author Dr. Michael Easton, a geneticist and expert in ecotoxicology.

THE FARMED FISH were more than 10 times more contaminated than the wild fish when tested for Polychlorinated biphenyls (PCBs), Polychlorinated dibenyl ethers (PBDEs) and Organochlorine pesticides (OCs, except toxaphene). The source of this contamination appears to be the commercially produced salmon feed, which shows contaminant levels very similar to the farmed salmon, said Dr. Easton.

The higher contaminant levels are a result of how the feed is made – by concentrating different materials (other fish species) to produce the high-protein diet for the farmed fish.

“The type of toxic contaminants found in this study are neural toxins, which are especially dangerous for children, nursing mothers and pregnant women.”

“The type of toxic contaminants found in this study are neural toxins, which are especially dangerous for children, nursing mothers and pregnant women, or women considering pregnancy. But they are also immunotoxic, causing depression of the immune system that enables people to catch colds, flus and infections much more easily than normal. They are also linked to cancer,” Dr. Easton explained.

BASED ON ANALYSIS of polychlorinated biphenyls (PCBs), the evidence in Dr. Easton’s study indicates that a person weighing 60 kg who ate more than one or two 200g portions a week of BC farmed salmon would exceed the World Health Organization’s (WHO) Tolerable Daily Intake (TDI) guidelines for PCBs (1998).

Health Canada regulations allow up to 10 times more exposure per week than current WHO standards. Dr. Easton says Canadian standards must be revised to include the neurologically toxic PCBs, and that the Canadian TDI needs to be revised and brought more in line with WHO standards.

In 1999, the Foundation began investigating what scientific research had been undertaken in this area and we discovered that very little exists,” said Executive Director Jim Fulton.

“So we commissioned this pilot study in order to gather initial scientific evidence and to determine the need for expanded studies,” he explained.

The samples tested (four farmed salmon, four wild salmon and five samples of commercial salmon feed) were analysed for: PCBs, 118 cogeners; PBDEs, 41 cogeners; OCs, 25 compounds; polycyclic aromatic hydrocarbons (PAHs), 20 compounds, and mercury, methyl and inorganic.
Dear Ms. Krause,

This may be one of the most unusual "Thank you" letters you've ever received, but here goes...

I want to say thank you for helping me to uncover the fact that B.C. farmed salmon is heavily contaminated with PCBs and other toxins. Thank you, also, for helping bring to light that over one million of these farmed salmon have escaped into B.C. waters, to mix with wild, native salmon. (A study conducted by the U.N. says that this introduction of non-native species into natural fish stocks is one of today's major environmental threats.)

I really do mean Thank you. This news is not good — far from it. But it's good that we now know the scope and severity of the situation. Your last gift to the David Suzuki Foundation made this research possible. And now, we can work to shine the public spotlight on it.

Our efforts became infinitely more difficult when the B.C. government lifted the six-year ban on salmon farming expansion on January 31, 2002.

What does lifting the ban on salmon farming mean? Simply put, it means that if you and your family enjoy seafood, more of the salmon on your dinner
plate may be farmed salmon. And you’ll also see more salmon feedlots on the B.C. coast.

This is not a pretty picture, but at least we know what we’re up against.

This about-face on the salmon-farming moratorium is typical of what you and I, as people who care about the environment, are facing today. And it’s yet another reason why your continued support of the David Suzuki Foundation is so important (and so greatly appreciated).

For the reality is this: Once we think we have a situation in hand, once we feel that true, measurable progress has been made, there are political forces that attempt to change it.

For you and me, this does not mean “back to the drawing board,” but it does mean that new strategies need to be developed — and they need to be developed quickly, for I believe (and I’ll speak frankly here) that B.C.’s farmed salmon poses a risk to human health and our environment.

And there are now a million of them swimming in our waters...

Your last gift to the Foundation helped in several important ways:

- You funded the research I mentioned above on salmon farming.

- You helped us to produce and publish “Why You Shouldn’t Eat Farmed Salmon,” a brochure that quickly zoomed to the top of our website’s “most downloaded file” list. (A sure indication that British Columbians are concerned that the ban has been lifted.)

- You helped us launch a pilot project by my friend and colleague Dr. Michael Easton that allowed us to delve deeper into suspicions that contaminants found in farmed salmon were affecting the human food chain.

That we are confronted, in this day and age, with the prospect of unsafe food is indeed a sad commentary. Couple this with the fact that wild, healthy
salmon are crucial to B.C.’s ecosystem, and we have a situation that can only be described as urgent.

As you know, environmental threats can happen very quickly. And you and I need to be ready to react with equal speed.

My colleagues at the David Suzuki Foundation have developed a plan to conserve our wild salmon fish stocks.

Your gift today will help me put our plan into motion. In fact, your support is crucial in making these strategies work.

Encouraged by the incredible response to our “Why You Shouldn’t Eat Farmed Salmon” brochure, I want to take this next phase right into the supermarket, and right onto the dinner table. In other words, I want you to help me make this issue a part of our everyday lives.

There is science in the plan, of course. All campaigns at the David Suzuki Foundation begin with good science. But this plan is not about some esoteric formula you need a degree in biology to understand. This is about dinner. It’s about the food you eat. It’s about feeding your family.

With your help, here’s what we’ll do:

1. Develop a campaign to encourage supermarkets to properly label farmed salmon, so you’ll know exactly what you’re eating, and can make informed decisions.

2. Work with the London-based Marine Stewardship Council to certify fish from sustainable sources. You’ll be able to support the people who work so hard to bring you fresh, wild seafood.

3. Produce a restaurant guide to help the chefs of British Columbia choose fish from sustainable sources.

Food labeling, certification of food sources, and educational literature are the initial elements of the plan I’m asking you to support. The fourth and fifth elements are more long-term (but no less important):

4. Develop an integrated strategy to protect the health of our wild fish

Please turn over
stocks (there have been two major viral outbreaks in fish farms this year already) and **protect the diversity** of our wild fish (and maintain employment) **without** harming human health.

5. Continue our work to **prevent an increase in the number of salmon farms** off the B.C. coast.

These are ambitious projects, but I believe they are absolutely necessary. Please help me to implement them by sending your special gift to the David Suzuki Foundation today. I know you will be as generous as you are able.

This crisis is too big for any one person or organization to solve. But **together**, we are a truly formidable voice for our environment. And together, we can find sustainable alternatives to the current crisis that is salmon farming in B.C.

Thank you.

*To your good health!*

David Suzuki

P.S. Would you consider showing your support at this important time by joining our monthly giving club – the Friends of the Foundation? You'll contribute to this, and our other campaigns, in a significant and highly effective way. Your reply form has all the details. Thanks again.

P.P.S. Please visit our website at [www.davidsuzuki.org](http://www.davidsuzuki.org) to download the "**Why You Shouldn't Eat Farmed Salmon**" brochure that I mentioned in this letter. You can help spread the truth about salmon farming by sharing with your family and friends the brochure *you* helped us produce.
The great salmon debate

SUSAN SAMPSON

For Canada's most famous scientist, it's wild salmon or nothing.

But what about the average family who can't afford it? The difference in price between wild and farmed salmon can be $7 a pound.

"It's not our inalienable right to eat salmon," David Suzuki says, "I would never feed a child farmed salmon. It's poison."

Suzuki seems annoyed by the price question. Too bad. Because it's the average consumer who needs to hear (and heed) his message about an ecosystem on the verge of collapse and about individual responsibility to turn the world around. The same average consumer who picks up Atlantic (read farmed) salmon at the supermarket, or even the fast food masses who think Harvey's new salmon burger is the height of maritime cuisine.

At Feast of Fields on Sunday, where he led a forum on salmon aquaculture, Suzuki was preaching to the converted: chefs, growers, organic activists and business people, and the gourmet grazers who could afford to pay $100 for a ticket.

Organizers say more than 1,000 people attended the 15th annual Feast of Fields run by Organic Advocates — reorganizing, regrouping and returning after a one-year hiatus. On a glorious day at Rouge Park, close to the Pickering border, visitors sampled organic tidbits, wines and brews, served in delicious harmony with the environment. For the first time, a forum was held as a prelude to the fundraising feast.

So many factors have made salmon farming a disastrous enterprise. Salmon are raised by the millions in vast, submerged net cages patrolled by divers who collect the dead. Crowding makes the fish prone to diseases and parasites like sea lice. They are treated with antibiotics and biocides. They are fed fish pellets, which promote the concentration of toxic chemicals like PCBs and mercury in their flesh. (A recent study warned people not to eat farmed salmon more than once a month.) Waste from feces and uneaten food pollutes surrounding waters. Fish that escape mess with the gene pools of their wild cousins. The salmon are even fed pink dye to look pretty; fish farmers can customize the colour.

When we're talking about wild Canadian salmon here, we're talking B.C. salmon. The wild Atlantic breed has been fished close to extinction. So when you see Atlantic salmon, a good guess is that it's farmed. Farmed salmon is usually wild. As for organic farmed salmon, that's an oxymoron, says panelist Jennifer Lash, executive director of the Living Oceans Society and co-ordinator of the Coastal Alliance for Aquaculture Reform.

The trouble is, labelling systems are uncertain, so you often don't know what you're buying. Proper labelling is one facet of what Lash's groups want from salmon farmers. Here's what's fair, she says: 0 escapes, 0 percent risk of disease transfer, 0 farms in communities that don't want them and 0 risk to the environment.

"The environment," she says, "is bearing the cost of salmon farming."
Blue-tongue blizzard at Oz

Michelle Reynolds
October 19, 2006 12:03am

WHEN David Suzuki launched into an impassioned plea for Australia to combat climate change no one was safe yesterday, not even the chef who cooked his lunch.

During his hour-long National Press Club address, the renowned environmentalist swore repeatedly -- despite his speech being broadcast live on ABC TV -- criticising everyone from John Howard to his own supporters in the audience for eating the salmon and rice.

"You all sat here and chowed down on farmed salmon and obviously you don't give a s--- about what you're putting into your body," the 70-year-old bellowed.

Speakers and guests at the weekly press club address are fed. The award-winning Canadian ate his meal.

"You know what a farmed salmon is, it's filled with toxic chemicals," he said.

"I know Tasmanian salmon, those are not Tasmanian salmon. Those are Atlantic salmon that are brought and raised in cages in Tasmania."

Dr Suzuki said Australia was a disappointment to the world because it had not ratified the Kyoto protocol, a pact between industrialised nations to cut carbon dioxide emissions by 2012.

He said as a result, Australia had no credibility as a "responsible global citizen".

"I've always thought of Australia as caring about being responsible international citizens, and by rejecting Kyoto, Mr Howard declares that Australia is an international outlaw, not to be bound by these kinds of treaties the rest of the world agrees to."

Dr Suzuki said the global media was more interested in reporting on celebrities such as Paris Hilton, Bill Clinton and Monica Lewinsky, Princess Diana, Michael Jackson and O.J. Simpson, than climate change.

He said if he abused the Prime Minister he would get better coverage.

"If I were to say -- I'm not saying this, but if I were to say -- 'John Howard is an s---hole', I might even get a 10-inch column (in a newspaper)."

Dr Suzuki slammed Australia for allowing rice and cotton farming, and went on to condemn the Government's $350 million drought package for stricken farmers as an "ad hoc, knee-jerk" reaction.

He went on to praise -- sarcastically -- Mr Howard for acknowledging global warming. "Mr Howard has now acknowledged that global warming is happening. Thank God, it's about time," Dr Suzuki said.

"So 'boom', right away the solution is nuclear power. This guy ought to be booted out of office for that kind of approach to the problem, I mean, it's crazy."
International farmed salmon study supports groundbreaking Suzuki Foundation research

January 8, 2004 -

VANCOUVER - Results of a large-scale scientific study on the toxicity of farmed fish released today in the journal Science support a pioneering study undertaken by the David Suzuki Foundation three years ago.

In 2001, the Foundation reported that potentially dangerous levels of toxic chemicals are contained in the feed given to farmed salmon in Canada and Europe. The study released today confirms these findings on a much larger scale.

Scientists tested approximately two tons of farmed and wild salmon, and salmon feed collected from fish farm wholesalers and retailers in major cities in North and South America and Europe, including Vancouver and Toronto. Their findings indicate that contaminants are significantly higher for farmed salmon than wild salmon.

The Science report argues that "consumption of farmed salmon may result in exposure to a variety of persistent bioaccumulative contaminants with the potential for an elevation in attendant health risks."

Dr. David Bates, former Dean of Medicine at the University of British Columbia, is an international expert on pollution. He concurs that there is a serious risk to health from ingesting contaminants such as PCBs in our everyday diet.

"Studies have shown that PCBs have a remarkable ability to potentiate cancer," Bates says. "The European Union and the World Health Organization have set acceptable levels and this was done after analysis of an array of scientific studies. Unfortunately, Canadian levels are much less stringent and the Canadian government has been lax in dealing with this issue."

The study also found that concentrations of contaminants in farmed salmon from Europe were significantly greater than farmed salmon from both North and South America.

"While European farmed fish are worse, Canadian farmed salmon are still a potential health risk," says Otto Langer, Director of Marine Conservation.

"The study found that even the least contaminated farmed salmon have significantly higher contamination levels of PCBs, dioxins, and other chemicals than wild salmon. This once again underscores the need for Canada to modernize our regulations regarding the amount of PCBs and chemicals acceptable for human consumption."

The Science report cites Environmental Protection Agency consumption advice, which, based on the new findings, would recommend against eating more than one meal per month of B.C. farmed fish. Those in high-risk categories such as children and expectant mothers should eat much less.

The report authors also recommend fish producers and retailers label salmon as farmed.

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Food: Is it safe?

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- The skinny on salmon
- Fishing for omega-3s
- Mad cows, madder consumers
- Conclusion

The Skinny on Salmon

If you are a little confused by recent farmed salmon stories, you aren’t alone. Here’s what essentially happened:

1. Huge international study comes out that says farmed salmon contain more toxins than wild salmon. Recommends people limit eating farmed salmon to one meal or less per month.
2. Salmon farming industry freaks out, disputes findings, questions scientists, blames environmentalists (?) and considers new slogan: Farmed salmon – no, really, it’s good for you!
3. Media portrays the whole thing as he says, she says, so public gets confused.

Okay, here’s the real scoop. Salmon is a healthy food choice, full of great stuff like omega-3 fatty acids that are good for our hearts. Unfortunately, as the recent study found, the tradeoff with farmed salmon is that it also contains much higher levels of contaminants like PCBs that are linked to increased rates of cancer and birth defects.

So wild salmon is a healthier choice. Wild salmon is a better environmental choice too. Salmon are carnivorous critters. Right now, the salmon farming industry is depleting other ocean fish stocks to feed their salmon. It takes two to four kilograms of wild fish to produce one kilogram of farmed salmon. Plus, salmon farms pollute coastal waters and can spread parasites and diseases to wild salmon populations.

Best salmon choices:
- Wild Chum
- Wild Pink
- Wild Sockeye, Coho and Chinook

Canned salmon is usually wild pink or chum, but check the label.

Next> Fishing for omega-3s
12. **Massive global study confirms preliminary Foundation work.**

   Newsletter Spring 2004

   This article is inaccurate in that the reported study did not find that farmed salmon is "high" in contaminants. This study found that farmed salmon is slightly higher in contaminants than wild salmon but not that it is high. This article does not mention the limitations to the study's design nor that other studies suggest that "wild" salmon from certain areas have higher levels of PCBs than farmed salmon.

13. **Fishing for omega-3s.**

   Undated.

   This document states, "women of childbearing age and young children should avoid the more contaminated species, including shark, swordfish and farmed salmon." The fact is, farmed salmon is not listed by either Health Canada or the U.S. EPA/FDA as a fish to avoid because of high levels of mercury or other contaminants.

14. **The so-called Canada's Seafood Guide**

   Undated.

   This document indicates that regular consumption of farmed salmon poses a "health threat" due to PCBs.

   **Note:** This document and the related web-site (www.seachoice.org) was produced with at least $500,000 from the David and Lucille Packard Foundation, based in California. The Packard foundation funds a formal strategy for "Market Intervention Tools" as part of its Marine Fisheries program for shifting consumers and retailers towards MSC-certified products, most of which are Alaskan salmon.

   As it appears, the so-called Canada's Seafood Guide is one of these tools.

15. **State of the Catch**

   Undated.

   In the report titled "State Of The Catch," a statement regarding "Toxicity Issues" is not given for only one of the 31 seafood items: farmed salmon. The page on farmed salmon would benefit from a statement to clarify that farmed salmon is low in contaminants.

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Massive global study confirms preliminary Foundation work
Wild about salmon!
by TAMARA NOWAKOWSKY

IT took three years, but a massive study on toxins in farmed salmon has finally confirmed results of a pilot study undertaken by the David Suzuki Foundation.

In 2001, a Foundation-sponsored study found that farmed salmon have levels of potentially dangerous toxins, such as PCBs and dioxin, at levels up to 10 times the amount found in wild salmon. The study was published in the science journal Chemosphere.

Unfortunately, rather than taking action on these disturbing findings and attempting to reduce contaminant levels, the salmon farming industry claimed the Foundation was engaging in “scare tactics” and disputed the findings.

In January, one of the world’s most prestigious scientific publications, the journal Science, reported similar results from a study conducted on a global scale. Researchers tested approximately two tons of farmed and wild salmon, and salmon feed, collected from fish farm wholesalers and retailers in North and South America and Europe, including Vancouver and Toronto. Their findings indicated, again, that contaminant levels are much higher in farmed salmon than in wild salmon.

And once again, the salmon farming industry has tried to claim that environmental organizations, and now scientists, are engaging in scare tactics.

“It’s sad that this industry absolutely refuses to accept any sort of responsibility for its own problems,” says Otto Langer, Director of Marine Conservation for the Foundation. “The report was extensively peer-reviewed by experts in the field. The conclusions are sound. This industry has to clean up its act.”

Industry spokespeople continue to cite U.S. Food and Drug Administration (FDA) guidelines as evidence that their product is safe. But Health Canada and FDA standards were established using data from the 1970s, at a time when technology was not able to measure chemical concentrations below 500 parts per billion. Standards were therefore set according to what was measurable at the time. Since then, much more sensitive measuring equipment has been developed and other studies have found that many contaminants, even in small amounts, can pose a health risk.

“One has to question the motives of an industry that insists on using standards that many health professionals argue are outdated and inadequate,” Mr. Langer says.

Mr. Langer points out that contaminant levels are just one more reason to avoid eating farmed salmon. Farming salmon in open netcages in the ocean causes a host of environmental problems, from water pollution to disease, to parasite transmission to wild fish. In addition, salmon are carnivores, so farmed salmon are fed pellets made from wild fish. It takes two to four kilograms of wild fish to raise one kilogram of farmed salmon.

“As currently practiced, salmon farming is an unsustainable industry that damages the marine environment and depletes wild fish stocks,” Mr. Langer says. “It’s not a solution, it’s a problem.”

See http://www.davidsuzuki.org/files/General/Newsletterspring04.pdf
Food: Is it safe?

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- Introduction
- The skinny on salmon
- Fishing for omega-3s
- Mad cows, madder consumers
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Fishing for omega-3s

Omega-3 sounds like a planet visited by Kirk and the gang from Star Trek, but Omega-3s are actually fatty acids that are great for our hearts. They are found in several different types of food, including fish, and many health experts recommend eating fish for this reason.

Unfortunately, industrial pollution in our oceans and lakes means that some fish are also high in toxins. So women of childbearing age and young children should avoid the more contaminated species, including shark, swordfish, and farmed salmon.

Some species are also being over-fished to near extinction levels. By avoiding these fish, we can help the stocks recover.

Fish to avoid:
- Shark (overfished, high mercury contamination)
- Swordfish (overfished, high mercury contamination)
- Bluefin tuna (overfished)
- Farmed salmon (PCB and dioxin contamination, pollutes coastal waters, depletes wild fish)
- Chilean sea bass (overfished)
- Orange roughy (overfished)

Good fish choices:
- Wild salmon – including most canned (high omega-3s)
- Sardines (high omega-3s)
- Oysters (high omega-3s)
- Freshwater trout (high omega-3s)
- Farmed catfish
- Black cod/sablefish
- Halibut
- Clams and mussels

Download a handy card with more good fish choices [here](http://www.davidsuzuki.org/NatureChallenge/newsletters/fishchoices/)

Vegetable sources of healthy omega-3s include:
- Flaxseeds (crushed preferably) and flaxseed oil (can be taken in liquid or capsule form, it can be added in most of your cooking including salad dressings and sauces)
- Walnuts (a quarter cup (1 ounce) supplies about two grams plant based omega-3 fatty acids, slightly more than found in 3 ounces of salmon)
- Dark leafy green vegetables such as spinach, kale, and arugula
- Canola oil, soybean oil

To find out more about Omega-3 fatty acids visit [http://www.omega-3info.com/home.htm](http://www.omega-3info.com/home.htm)


See [http://seachoice.org/profile/118/view](http://seachoice.org/profile/118/view)
Farmed Salmon

Net Cage Raised — Do Not Eat
Closed Tank Raised — Case Specific

the diagnosis

Farmed salmon raised in open net cages poses a serious threat to wild salmon and the marine environment. Because of this, farmed salmon should not be eaten. As an alternative, choose wild fish from well-managed fisheries or herbivorous farmed fish (such as tilapia or carp) from a sustainable, closed-containment system.

recommendation

Do not purchase farmed salmon raised in open net cages. This represents the vast majority available on the market.

Fish raised in closed tank operations are available in limited quantities. These systems, if properly designed, can be recommended on a case-by-case basis. Please contact the David Suzuki Foundation for up-to-date information. Even closed tank salmon should be consumed in moderation as the production of feed for farmed carnivores puts pressure on global fish stocks.

C. **About Sea Lice Research Findings**


   This "Science Bulletin" contains several inaccurate and misleading comments. In particular, this bulletin says, "the results show that lice, once transmitted to wild juvenile salmon, were transported down the migration route where they reproduced and re-infected the wild juvenile salmon. Inclusion of this second generation of lice raises the farm-origin infection pressure above natural levels for approximately 75 km of migration route resulting in a total direct and indirect contribution of sea lice that was 200,000 times greater than the natural production of sea lice…" These comments are inaccurate because the results do not show the transmission of sea lice and do not include any evidence as to the origin of what are referred to as "farm-origin" lice.

   This document states, "these data satisfy even the most conservative benchmark for proof - this is the definitive work on the issue." Considering the numerous flaws and limitations noted by senior scientists and experts, it is inappropriate to describe this research as "definitive work."

17. **Fish Farms Drive Wild Salmon Towards Local Extinction.**\(^{21}\) Undated.

   This document contains several inaccuracies and misleading comments. For example, the document states, "The scientists calculated the proportion of the annual pink salmon returns to the Broughton Archipelago that were killed by sea lice…" The use of the word "calculated" is misleading. What the researchers actually did is produce computer-generated, hypothetical predictions.

   The document states, "The estimates, made for each river in each year between 2002 and 2006, show that over 80 per cent of the runs were frequently killed by lice." The use of the word "show" is misleading in the sense that mathematical modeling does not "show" what actually occurred. The wording used gives the false impression that the computer-generated, hypothetical predictions were empirical observations.

18. **Parasites & Diseases.**\(^{22}\) Undated.

   This article states, "years of studies published in highly respected peer-reviewed journals have built a strong weight of evidence that sea lice from fish farms are responsible for significant and preventable damage to wild pink and chum salmon in B.C.’s Broughton Archipelago." This statement is inaccurate in that the research referred to shows no evidence as to the origin of the sea lice.

   This article states that sea lice are "naturally rare on juvenile wild salmon." This comment overlooks or disregards the research findings of Wertheimer et al. (2003) who found that the prevalence of sea lice on juvenile wild salmon was 2.8% for pink salmon, 4.2% for chum salmon, 8.4% for sockeye salmon and 53.2% for coho. These findings are from Alaskan waters - where there are no salmon farms.

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\(^{21}\) [http://www.davidsuzuki.org/files/Oceans/SEA_LICE_BROCHURE_FINAL.pdf](http://www.davidsuzuki.org/files/Oceans/SEA_LICE_BROCHURE_FINAL.pdf)

\(^{22}\) [http://www.davidsuzuki.org/Oceans/Aquaculture/Salmon/Sea_Lice.asp](http://www.davidsuzuki.org/Oceans/Aquaculture/Salmon/Sea_Lice.asp)
Science Bulletin
Fish Farm Link to Sea Lice
Infections on B.C. Wild Salmon Confirmed

Transmission Dynamics of Parasitic Sea Lice from Farm to Wild Salmon

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Salmon farming has been associated with sea lice infestations of wild juvenile salmon and wild salmon population declines in B.C.’s Broughton Archipelago. Despite a strong weight of evidence, the causal nature of these relationships has been highly contentious. A scientific consensus has been limited, in part, by an inability to adequately track the movement of these parasites between farmed and wild salmon.

Research Summary This peer-reviewed report looks at lice infestations on wild juvenile pink and chum salmon as they migrated past an isolated salmon farm down a long and narrow migration corridor in the Broughton Archipelago, BC (see Box 1). Mathematical models were used to analyze these data (see Box 2) and revealed juvenile salmon were initially infected with sea lice originating from two host populations: farm salmon and naturally occurring hosts. The calculations suggest the infection pressure near the farm was approximately 70 times greater than natural ambient levels and exceeded ambient levels for 30 km of migration route (see Box 3). This amounts to a total direct contribution of sea lice from the farm that was approximately 30,000 times greater than the natural production of sea lice in the length of habitat occupied by the salmon farm.

Box 1. Study Area

- Sample sites,
  - Active salmon farms

Salmon Migration Juvenile pink and chum salmon originate in freshwater streams in Knight Inlet. They must then travel south and west down the inlet toward Tribune channel and either continue down Knight Inlet or travel through Tribune Channel on their way to sea.

Sample Sites Farm A is the first salmon farm juvenile salmon would encounter along their migration and is the focus of this analysis presented here.

Data All sites were sampled within a 14-day period in May 2003 resulting in a high-resolution dataset of sea lice infection levels on juvenile pink and chum salmon as they passed an isolated salmon farm (Farm A). The non-lethal sampling of approximately 5500 fish far surpasses the sampling intensity other B.C. studies. Please refer to the source paper\(^a\) and Krkošek et al. 2005b\(^a\) for the full methodology and analysis.
Second Generation of Farm-Origin Lice Causes 
Additional Infection The results also show that lice, once transmitted to wild juvenile salmon, were transported down the migration route where they reproduced and re-infected the wild juvenile salmon. Inclusion of this second generation of lice raises the farm-origin infection pressure above natural levels for approximately 75 km of migration route resulting in a total direct and indirect contribution of sea lice that was 200,000 times greater than the natural production of sea lice in the length of habitat occupied by the salmon farm. This transport and reproduction of farm-origin lice raises the possibility for disease growth and spread to other wild salmon populations up and down the coast.

These data satisfy even the most conservative benchmark for proof - this is the definitive work on the issue.

Box 2. Louse Lifecycle and Transmission Dynamics

Life Cycle The two main stages are free-swimming planktonic larvae and attached parasites. Free-swimming larvae must attach to a host fish and the first attached stage is the copepodid (orange), which then develops through chalimus (green) and motile (blue) stages. Motile lice include sexually reproductive adults, whose progeny are released into the water column as planktonic larvae, completing the lifecycle.

Transmission Dynamics The model combines the sea lice lifecycle with interactions among farmed salmon, alternate natural hosts, and wild out-migrating juvenile salmon. The graphs illustrate how juvenile salmon, which enter the marine environment free of lice, migrate past salmon farms and are infected with sea lice. The second spike in lice is from reproduction by the farm-origin lice on the wild fish, after the wild fish have moved on past the farm.

The transmission dynamics of lice between farmed and wild juvenile salmon follow the progression shown by the thick grey arrows. Larvae are produced by farmed salmon, disperse into the surrounding environment, infect juvenile salmon, and subsequently mature and reproduce on the wild fish.
Sea Lice (Lepeophtheirus salmonis and Caligus clemensi)
Sea lice have two distinct phases in their lifecycles – planktonic and parasitic. Planktonic larvae float freely in the water and allow lice to be transmitted between wild and farmed salmon. During the second, parasitic phase, lice attach themselves to a host salmon and feed on the surface of the fish – leading to increased disease and sometimes death in their infected hosts (See Box 2).

Links to Salmon Farms
Several European studies have correlated salmon farming with sea lice infestations of wild fish. Several studies in B.C have examined this correlation and one study found that wild pink juvenile salmon were more heavily infected in salmon farming areas than in areas with no salmon farms. An additional study analyzed these relationships and discounted other non-salmon farm variables. The study described here is the first to quantify the spatial footprint of sea lice transmission from farm to wild salmon and track the subsequent farm-origin lineage of lice that infected wild salmon.

These data, due to the massive sampling effort and the unequivocal nature of the conclusions, satisfy even the most conservative benchmark for proof - this is the definitive work on the issue. Sea lice counts released by Stolt Sea Farms confirm that study captures an average farm with sea lice numbers and stocking densities well within industry norms. Therefore the resultant transmission data are to be viewed as a conservative estimate of the impact of an “average” farm in the Broughton Archipelago.

Box 3. Model Agrees With Field Data

Graph (b) shows the model’s inferred origins and spatial profiles of sea lice larvae that would be required to produce the patterns seen in the data (a). The red lines depict the location and relative abundances of planktonic larvae whose origin can be traced back to farmed salmon either directly or through one generation of lice.

Panels (a), above on the left, show actual louse abundances on juvenile pink and chum salmon as they passed Farm A, located at x=0. Points with 95% confidence bounds correspond to field data and the solid lines are the best fit of the model to the data.
Fish Farms Drive Wild Salmon Toward Local Extinction


Box 2. Sea-lice infestations frequently kill over 80 per cent of wild salmon returns

The scientists calculated the proportion of the annual pink salmon returns to the Broughton Archipelago that were killed by sea lice by combining the government salmon data with data on sea-lice infections of the juvenile salmon. The estimates, made for each river in each year between 2002 and 2006, show that over 80 per cent of the runs were frequently killed by lice. The scientists then combined the data in a mathematical model that shows the sensitivity of wild salmon populations to sea lice. As the number of adult lice per fish increases the proportion of the returning salmon run that is killed rapidly rises.
Parasites & Disease

SEA LICE

Sea-lice infestations originating from salmon farms constitute one of the most pressing threats to B.C. wild salmon — and, indeed, to wild salmon around the world. This is one reason we advocate for salmon farming to be moved to closed systems that separate farmed and wild fish. Wild salmon face many threats, so where a threat exists that we can readily control, we have a responsibility to do so.

Years of studies published in highly respected peer-reviewed journals have built a strong weight of evidence that sea lice from fish farms are responsible for significant and preventable damage to wild pink and chum salmon in B.C.’s Broughton Archipelago. In B.C., sea-lice infestations are not restricted to the Broughton Archipelago but have also occurred in the Discovery Islands. Sea-lice infections in other salmon-farming regions — including Scotland, Ireland, and Norway — have also had negative effects on wild stocks. There is sufficient reason to be concerned that the problem for B.C.’s wild fish goes beyond the well-researched Broughton Archipelago.

Precautionary action is needed and justified. We must separate the farmed and wild fish, and we need major retailers to become a positive force for changing salmon-farming practices.

What Are Sea Lice and What Role Do Salmon Farms Play?

Sea lice are natural parasites that attach to and feed on salmon, consuming mucus, skin, muscle, and blood. In high numbers, lice cause stress, osmotic failure (disturbed salt-water balance), increased susceptibility to viral or bacterial infection, and ultimately death. Sea lice are considered common and benign on adult salmon, but they are naturally rare on juvenile wild salmon. Where there are no fish farms, there are few sea lice on juvenile wild salmon, because the wild adult salmon that carry the parasite are offshore when juveniles enter the sea.

Industrial fish farms, however, create densely packed host populations dangerously near B.C.’s wild salmon rivers. Because the farmed fish are held in net pens, they are exposed to parasites that infect wild fish or other nearby farms. Sea lice infect the farmed salmon, which then amplify the parasite in the surrounding environment. In B.C., wild juvenile salmon often migrate past several salmon farms before they reach the open ocean. In the Broughton Archipelago, the wild juvenile pinks and chums are chronically exposed to high abundances of sea lice for their first two to three months of marine life.

One louse can easily kill the smallest juvenile pink or chum salmon. Juvenile pink and chum salmon do not have thick protective scales and are simply too small to tolerate lice. The juvenile salmon become infected as they migrate past the salmon farms, and many die. Since sea-lice infestations began in the Broughton Archipelago in 2001, sea lice have commonly killed over 80 per cent of the annual pink salmon returns to the area, causing a rapid four-year decline. If the sea lice infestations continue the Broughton, pink salmon are expected to collapse to one per cent of their historical abundance in a further four years, and local extinction is certain.
19. **Fish Farms Linked to Sea Lice**²³ Undated.

This article is misleading in that the reported research does not "confirm" that a B.C. fish farm is responsible for an overwhelming increase in sea lice on wild fish. The actual research findings are misreported.

20. **Declining wild salmon populations in relation to parasites from farm salmon.**²⁴ Undated.

This article states, "The results from empirical data analysis and mathematical modeling show that recurrent sea-lice outbreaks cause 33 per cent to over 99 per cent annual mortality of pink salmon on the central British Columbia coast. This statement is improper in the sense that computer-generated, hypothetical predictions do not "show" what the David Suzuki Foundation says they do. The reported data is correlative. Correlation does not show causality.

21. **Wild Salmon Mortality Caused by Fish-farm Sea Lice.**²⁵ Undated.

This article is misleading in that the reported research provides no evidence of causality nor that the observed lice originated from salmon farms.

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²³ [http://www.davidsuzuki.org/Publications/Fish_Farms_Linked_to_Sea_Lice.asp](http://www.davidsuzuki.org/Publications/Fish_Farms_Linked_to_Sea_Lice.asp)
²⁵ [http://www.davidsuzuki.org/Publications/WildSalmonMortality.asp](http://www.davidsuzuki.org/Publications/WildSalmonMortality.asp)
22. **Sea Lice From Salmon Farms Leading To Ecological Disaster**  

This article states, "an unprecedented outbreak of sea lice at salmon farms in this region decimated eight runs of pink salmon in 2001...." This statement is inappropriate since there is no empirical evidence that the very low return of wild pink salmon in 2001 was caused by sea lice from salmon farms. The return in 2001, while very low, was within the historical range. It is therefore inappropriate to describe the return for that year as an "ecological disaster."

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**Sea lice from salmon farms leading to ecological disaster**

January 28, 2003 - Broughton Archipelago, British Columbia – Negotiations to ensure the survival of wild pink salmon off the northeast coast of Vancouver Island have broken down between First Nations, conservationists, the fish-farm industry and government, because industry refuses to adequately address sea-louse outbreaks around their farms, say local First Nations and conservationists.

An unprecedented outbreak of sea lice at salmon farms in this region decimated eight runs of pink salmon in 2001 - putting them on the brink of extinction – and the fish-farm industry refuses to provide safe passage for wild salmon around their farms to help ensure their survival, the groups say.

"Unless we can provide a minimum of one safe migration route for young pink salmon as they make their way from the rivers out to sea, we can say goodbye to these vital salmon stocks, which support populations of bears, whales, other salmon species, and even the forests," says Alexandra Morton of Raincoast Research.

"Without a safe, disease-free way to sea, the salmon will be infested with lice again and they will be lost forever," she added.

Urgent action is required because pink salmon could begin their migration to sea as early as the last week of February yet industry has not developed a suitable action plan, say First Nations leaders.

"Salmon-farming companies are not welcome here. They nearly wiped out the wild pink salmon and now they are refusing to help save them," says Brian Wadhamns of the Musgamagw Twawataneuk Tribal Council (MTTC).

"This is a slap in the face for First Nations rights, title, and culture. We don’t want them in our traditional territories," he said.

Two companies, Stott Sea Farms and Heritage Aquaculture, operate 27 farms in the Broughton Archipelago, and all they need to do is leave fish pens on at least one wild salmon migration route empty from February to July.

"I don’t think that is too much to ask," said Jennifer Lash of Living Oceans Society. "All we are asking for is a minimum of one safe migration route so the few remaining pink salmon can make it to sea safely so that we have wild pink salmon here in the future."

Neither company will agree to leave fish pens empty, or follow, on even one pink-salmon migration route. Instead they want to treat the fish in their farms with a pesticide called Slice, which is put into the food pellets fed to the farm fish.

"Scientists around the world have acknowledged that treating sea-louse outbreaks with pesticides does not work," says Morton. "And using Slice will not keep wild fish swimming past the pens lice-free so this is not a solution."

Studies show that Slice can be harmful to shellfish so the possible effect on local shrimp and crabs is unknown, says Morton who is a registered professional biologist.

Representatives from local communities (like Gilford Island, Port McNeill and Alert Bay), First Nations, fishermen’s and conservation groups are trying to get the provincial and federal fisheries departments to act in the interest of wild salmon and not that of industry.

As well as the David Suzuki Foundation, Raincoast Research, Living Oceans Society, and the Musgamagw Twawataneuk Tribal Council are members of the Coastal Alliance for Aquaculture Reform (CAAR), a group of conservation and First Nations organizations dedicated to reforming the salmon-farming industry. Visit www.farmedandal soitous.org for more information.

For more information about this news release, please contact:
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26 http://www.davidsuzuki.org/Campaigns_and_Programs/Salmon_Aquaculture/News_Releases/newsaquaculture01280301.asp
New Analysis Links Salmon Farms, Sea Lice, and Broughton Pink Salmon Crash

July 20, 2004

Independent scientific report released today by David Suzuki Foundation

VANCOUVER July 20, 2004 – An independent report released today by the David Suzuki Foundation adds to and strengthens the growing body of scientific evidence linking open-netcage salmon farms, sea lice, and lethal impacts to wild pink salmon in the Broughton Archipelago.

The report is authored by lan Williams, a professional biologist with over 35 years of experience in fisheries research in BC. It reviews, and discounts, other possible factors leading to the extremely low levels of pink salmon returning in 2002 and strongly suggests that sea lice from fish farms in the area are the only remaining explanation for the severity of the observed crash.

The formerly little-known archipelago is currently the subject of heated debate, as concerned residents, scientists, local and international environmental groups, First Nations, and fishermen are again sounding the alarm about the deadly infestations of sea lice that appear to be decimating pink salmon stocks in the area.

The archipelago’s ecologically rich and extensive shoreline has traditionally provided millions of pink salmon with a high-quality nursery area. However, local residents have been observing abnormally high numbers of dead and dying juvenile pink salmon as well as extreme sea lice infestation in the area since 2001.

Sea lice from the 27 commercial open-netcage salmon farms in the archipelago – the largest concentration of farms on the BC coast – are being singled out as the most likely explanation for a striking collapse in wild stocks.

Williams’ report addresses many of the “research gaps” and counter-arguments put forward by governments and industry proponents.

“Governments have a responsibility to take precautionary action and, at a minimum, shut down open net pens in the Broughton Archipelago,” says Jay Ritchlin, marine campaigner for the Suzuki Foundation. “The scientific evidence is compelling – the report speaks for itself.”

A summary and a full report are available online at www.davidsuzuki.org/oceans

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27 http://www.davidsuzuki.org/Campaigns_and_Programs/Salmon_Aquaculture/News_Releases/newsaquaculture07200401.asp
24. **Fish farm causes sea lice abundances thousands of times higher than natural levels, new study confirms.** March 29, 2005.

This press release claims that the research reported shows that fish farms "cause" sea lice on wild salmon. The fact is, the lead researcher admitted to the Special Committee on Sustainable Aquaculture of the Legislative Assembly of British Columbia, that his data is "all correlative." Correlation is not evidence of causality.

This document states, "the results show transmission of lice from farmed salmon to migrating wild salmon." The fact is, no data is reported regarding sea lice levels at salmon farms. It is not logical to make claims about the transmission of sea lice from point "A" to point "B" without measuring point "A."³¹

25. **Government must act on new study proving sea lice deadly to wild salmon.** ³²

3 October 2006.

This document describes this research as "definitive" and "far-reaching" and "proof." In light of the flaws and limitations noted by senior scientists and experts, these descriptions of this research are misleading.

This document reports that research "proves" that sea lice are deadly to wild salmon. The problem is, the research reported does not provide "proof."

What the published paper actually reports is a computer-generated, hypothetical *prediction* of wild salmon mortality was **9 to 95 per cent**. The fact is, the research provided a prediction of very high salmon mortality as well as very high survival, such as 69 to 91 per cent *survival* for chum salmon from Knight Inlet. This document selectively reports the prediction of high mortality but not the prediction of high survival.

26. **Time running out for some of B.C.’s wild pink salmon, Study finds sea lice from fish farms put stocks at risk of extinction.**³³


This document states, "study finds sea lice from fish farms put stocks at risk of extinction." The problem is, the research reported provides no evidence that the observed sea lice were indeed from fish farms.

Data for Glendale Creek, the largest watershed in the Broughton, was excluded from the analysis reported. Wild pink salmon returns to Glendale Creek increased from 18,200 in 2002 to 662,000 in 2004. In 2006 and 2008, wild salmon returns were lower but within the historical range.

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²⁹ http://www.davidsuzuki.org/Campaigns_and_Programs/Salmon_Aquaculture/News_Releases/newsaquaculture03290501.asp
³⁰ http://www.leg.bc.ca/cmt/38thparl/session%2D2D/aquaculture/hansard/W61205a.htm Page 1026.
³² http://www.davidsuzuki.org/Campaigns_and_Programs/Salmon_Aquaculture/News_Releases/newsaquaculture10030601.asp
³³ http://www.davidsuzuki.org/latestnews/dsfnews12130702.asp
Fish farm causes sea lice abundances thousands of times higher than natural levels, new study confirms

March 29, 2006 -

VANCOUVER - A definitive new study confirming that a B.C. fish farm is responsible for an overwhelming increase in sea lice on wild fish should prompt the government to immediately remove salmon farms from B.C. waters, say members of the Coastal Alliance for Aquaculture Reform (CAAR).

"Until now, government and industry have either denied that sea lice are a problem or cared for more research," says Jay Ritchlin, marine conservation specialist with the David Suzuki Foundation. "Today's study shows that the link is undeniable - and that the situation is even worse than we had imagined."

The study is published today in the respected Proceedings of the Royal Society of London, Series B. It examines the Stolit Sea Farms-owned Doctor Islet fish farm, located in B.C.'s Broughton Archipelago.

The results show transmission of lice from farmed salmon to migrating wild salmon peaked at an intensity of 70 times greater than natural near the farm and continued to exceed natural levels for 30km along the migration route. This amounts to a total contribution of lice from the farm that was 30,000 times higher than natural.

"The Doctor Islet farm is typical of the impact open net-pen fish farms are having on wild salmon," says Chris Genovais, Executive Director of Raincoast Conservation Society. "Open net-pen fish farms are a clear and present danger to BC's wild salmon. To protect wild stocks, government must require an immediate shift to closed-tank systems."

The authors of today's far-reaching study conclude that there is an urgent need to reconsider industrialized salmon farming in wild fish habitat.

There are currently five new salmon farms pending approval in the Broughton Archipelago. These join the 28 existing farms, most of which are located directly on wild pink salmon migration routes.

"To approve these farms in light of today's study would be unfathomable," says Jennifer Lash of the Living Oceans Society. "Previous studies from Europe shows that sea lice on juvenile salmon is lethal. Now that we know fish farms are the cause of the lice outbreaks, DFO must place a moratorium on new farms and begin the removal of existing ones from the Broughton Archipelago. Too much time has been wasted already."

Environmental groups and other concerned community members continue to advocate for the immediate removal of open net pens and a shift to more sustainable forms of fish farming. Closed-tank systems address most of the disease and pollution concerns posed by open net cages.

"We have a small window of opportunity to reverse this damage - by removing open net cages and investing in sustainable, closed-tank technology," says Ritchlin. "But this window is getting smaller and smaller."

Support for this research comes from the David Suzuki Foundation, Raincoast Conservation Society, Raincoast Research Society, several National Science and Engineering Research Council (NSERC) grants, a Canada Research Chair and a Walter H. Johns Graduate Fellowship.

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Background: Transmission Dynamics of Parasitic Sea Lice from Farm to Wild Salmon, by Martin Krejci (PDF)

Additional information on this study will be made available at: www.math.ucalgary.ca/~miewis/Seal_ice/hp/Seal_IcePub.htm

Beta SP B-roll footage is available, please contact Jennifer Brown, David Suzuki Foundation, 604-732-4228, ext. 229

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Government must act on new study proving sea lice deadly to wild salmon

October 3, 2006

VANCOUVER - Governments now have all the proof they need to take action and move open net pen fish farming operations out of wild salmon areas to protect wild stocks from deadly sea lice infestations, says the David Suzuki Foundation.

"The government must act immediately to protect wild salmon," said Bill Wareham, acting director of marine conservation for the Foundation. "The scientific evidence is now irrefutable and government and industry need to pull these salmon farms out of the wild salmon migration corridors and move to closed containment systems for fish farms."

Mr. Wareham says new research released yesterday shows parasitic sea lice from fish farms kill as many as 95 per cent of juvenile wild salmon that migrate past the farmed salmon open net cages.

The study was published Monday in the prestigious Proceedings of the National Academy of Sciences in the U.S., was partly funded by the David Suzuki Foundation. The lead author, doctoral student Martin Krikosek of the University of Alberta's Centre for Mathematical Biology, says wild juvenile salmon migrate through "a cloud of sea lice" around open fish farm pens.

The study is the first to combine field surveys, experiments and mathematical modeling in one system to estimate the total impact of the farms. Its conclusions call for urgent and immediate action, says Mr. Wareham.

"The government is obliged to protect our wild salmon resource. They now have more than enough research evidence indicating that open net pen salmon farms pose a serious threat to juvenile wild salmon. It would be irresponsible not to act in face of such overwhelming evidence," he says.

The research conducted in the Broughton Archipelago on the West Coast of Vancouver Island confirms similar studies done in Norway, Scotland and Ireland showing the link between fish farms and sea lice infestations in wild stocks.

It also illustrates the need for changes in B.C.'s aquaculture industry, says Jay Ritchlin, David Suzuki Foundation marine campaign specialist.

"No question, the current management system just doesn't work," says Mr. Ritchlin. "The industry can't simply tweak their current practices, there has to be a wholesale change."

Wareham said the study is an example of how the Foundation supports independent science that examines crucial issues being ignored by government regulators.

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Report: Wild Salmon Mortality Caused by Fish-Farm Sea Lice

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Time running out for some of B.C.’s wild pink salmon

Study finds sea lice from fish farms put stocks at risk of extinction

December 13, 2007 - VANCOUVER - The B.C. and federal governments must take immediate action to prevent the local extinction of wild pink salmon from British Columbia's Broughton Archipelago, according to the David Suzuki Foundation.

A study published in the December 14 edition of the prestigious peer-reviewed scientific journal Science concludes that sea lice from salmon farms have been driving a rapid decline in pink salmon populations in the Broughton Archipelago. The scientists expect that 99 per cent of the wild pink salmon will be gone in four years from today, or two generations, if sea-lice infestations continue.

The study was conducted by a team of six biologists, fisheries scientists, and mathematicians from Dalhousie University and the University of Alberta. The team analyzed Fisheries and Oceans Canada data on the number of pink salmon returning to rivers on the central coast of British Columbia from 1970 to 2006. They then organized the data into four groups according to whether or not the populations were exposed to salmon farms before and during the sea-lice infestations, and calculated population growth rates for each group. It is the first study to demonstrate the impact of sea-lice infestations on wild salmon populations and reveal their looming extinction.

"In light of these results, it is clear that governments must take immediate precautionary action to stop open net-cage salmon farming from harming wild salmon," said David Suzuki Foundation marine conservation specialist Jay Ritchlin. "The evidence continues to be published in the most respected scientific journals, and the B.C. legislature's own Special Committee on Sustainable Aquaculture has called for a transition to closed systems. It is time to act."

Sea lice are natural parasites that feed on salmon skin, muscle, and blood. In high numbers they cause stress, osmotic failure (disturbed salt-water balance), viral or bacterial infection, and ultimately death. Numerous studies have shown that where there are no fish farms, wild juvenile salmon have almost no lice. Fish farms, however, amplify the parasite on wild salmon migration routes. In the Broughton Archipelago, the wild juvenile salmon must run an 80-kilometre gauntlet of fish farms before they make it to the open ocean.

"Recent efforts to use chemical treatment are apparently not enough for the wild fish. In Europe and South America, lice have already shown the first signs of resistance to these chemicals. Widespread use of chemical treatments just isn't good environmental policy," Ritchlin noted. "The region needs to have the source of the lice infestations removed. We must get the open net-cage salmon farms out of the way of the juvenile salmon and ultimately into closed tanks."

The report notes that the impact of fish farms is far higher than that caused by commercial fisheries. Not only are the salmon and the ecosystem at risk, so too are the economies and communities that depend on wild salmon.

The David Suzuki Foundation is a member of the Coastal Alliance for Aquaculture Reform, a nine-member coalition working to protect wild salmon, coastal ecosystems, coastal communities, and human health from destructive fish-farming practices.

- END -

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Broadcast media note: Video footage, including interviews with lead author Martin Kirkosek and co-author Alexandra Morton, as well as B-roll footage, is available through the David Suzuki Foundation

For background on sea lice, go to: www.davidsuzuki.org/Oceans/Aquaculture/Salmon/Sea_Lice.asp
For a summary of the report, go to: www.davidsuzuki.org/publications
To read the full report, go to: www.sciencemag.org/
For additional information and visuals, go to: www.math.ualberta.ca/~mloewa/Sea_Lice/protected/ or contact Matt Wright (617) 835-9395 (mwright@hassweb.org) or Julia Nechett (780) 492-0437 (julia.nechett@ualberta.ca)

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