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Dr. David Suzuki, Founder
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Dr. Suzuki,

RE: Farmed Salmon and Salmon Aquaculture

While I worked in the salmon farming industry, I advocated dialogue and partnership between the industry and the David Suzuki Foundation, and other environmental organizations.

I continue to believe that the David Suzuki Foundation has an important role to play in bringing about positive change and accountability in government, society and industry.

Recently, I reviewed the brochure entitled, "Canada's Seafood Guide," and "Ten Recommendations for Sustainable Fisheries on the B.C. Coast", and "State of the Catch" which the David Suzuki Foundation distributed at the "Fish Forever" event on 3 April 2007.

In relation to farmed salmon and salmon aquaculture, I am writing to express my opinions and concerns, and to ask questions.

I am writing to you as a member of the public.

I would appreciate it if you would clarify the issues that I raise in this letter for the Special Committee on Sustainable Aquaculture of the Legislature of British Columbia. I am copying this letter to the Committee.

Farmed Salmon, Contaminants and Human Health

The **SeaChoice** brochure entitled, "**Canada's Seafood Guide**" indicates that regular consumption of farmed salmon (Atlantic or Chinook), poses a "health threat" from PCB, dioxins or pesticides. Based on what I present in this letter, I believe that this is untrue.

Including wild or farmed salmon in a balanced diet could actually contribute towards saving human lives.

Cardiovascular disease causes approximately 8 million heart attacks per year in Canada and the United States, causing nearly 1 in 3 deaths and costing \$US 410 billion dollars¹. Consuming fish on a weekly basis reduces the risk of coronary death by as much as 36%² yet the average yearly per capita consumption of salmon is less than 2 kg.

¹ The Heart and Stroke Foundation of Canada, The American Heart Association.

Salmon - *wild or farm-raised* - is one of the few foods that most people should eat more of, not less. Yet, for more than five years, in both Canada and abroad, you have told the public that farmed salmon contain high levels of PCBs and should not be eaten:

- In 2001, even before the Easton et. al study was published, the David Suzuki Foundation's Summer Newsletter stated "study shows BC's farmed salmon contain high levels of contaminates³."
- In 2002, your letter of 21 May 2002 stated "B.C. farmed salmon is heavily contaminated with PCBs and other toxins."
- In 2004, your Spring Newsletter stated "farmed salmon (also) contain high levels of contaminants, like PCBs and dioxins."⁴
- Your web-page⁵ "The Skinny on Salmon" says "farmed salmon contain far more toxins than wild salmon" and "wild salmon is a healthier choice."

The Australian press reported on 19 October 2006 that you said⁶:

"You know what a farmed salmon is, its filled with toxic chemicals."

"Good Science"?

On 21 May 2002, you wrote:

"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 a part of your everyday lives. There is science in the plan, of course. All campaigns at the David Suzuki Foundation begin with good science."

In my opinion, based on the information that I will outline in this letter, the notion that wild salmon is a "healthier choice" and that farmed salmon is "full of toxic chemicals," is not based on good science, Dr. Suzuki.

As I understand, the Easton et al. study and the Hites et al. study are the basis for the above statements.

According to your foundation, the Hites et al. study is a replication of the Easton et al. study, which was funded by the David Suzuki Foundation and, from what I can tell, the Lazar Foundation⁷.

² Mozaffarian, D. and E.B. Rimm. Fish Intake, Contaminants, and Human Health. JAMA, 18 October 2006. Vol. 296(15). 1885-1899

³ http://www.davidsuzuki.org/files/DSF_Summer_Final.pdf Page 5.

⁴ <http://www.davidsuzuki.org/files/General/Newsletterspring04.pdf> Page 4.

⁵ http://www.davidsuzuki.org/pvw370829/wol/challenge/newsletter/feb2004_food/salmon.asp

⁶ <http://www.news.com.au/dailytelegraph/story/0,22049,20605914-5005941,00.html>

⁷ http://lazarfoundation.org/recipients/index_html?grantcycle=2000&b_start:int=30

Criticism of the Easton and Hites studies of contaminants in farmed salmon

The Easton et al. study, funded and publicized by the David Suzuki Foundation, used an extremely small sample size (8 fish), unconventional data presentation and selective reporting of the findings. The following criticisms were noted by several scientists.^{8,9,10,11}

- The whole fish were analyzed, including the inedible parts, known to be higher in contaminants. This skewed the observed contaminant concentrations to higher values in both wild and farmed salmon.
- In Table 2, the TEQ is provided based upon lipid concentration instead of upon the fresh weight of the fish tissue, thereby inflating the PCB values in both wild and farmed salmon.
- Rather than the conventional manner of reporting the results in parts per million (ppm), the PCB concentrations were reported in parts per trillion (ppt), making the numbers seem much larger: eg. 51,216 ppt instead of 0.051 ppm.
- Mercury levels were higher (nearly twice as high) in wild than farmed salmon but were not discussed in the paper.

It appears to me that Hites et al. skewed their sample towards lower contaminant levels for wild salmon and higher levels for farmed salmon by:

- Omitting both farm-raised Pacific salmon and wild Atlantic salmon, found previously to have lower and higher contaminant levels among farmed and wild salmon, respectively. No wild salmon was sampled from the Puget Sound, shown in previous studies to have higher PCB levels than Alaskan salmon.
- Pink and chum salmon were sampled though they are rarely found in grocery stores in the form of fresh fillets. These species are more planktivorous and ingest less PCBs than the more carnivorous sockeye and Chinook salmon.

Because the sampling of both wild and farmed salmon was skewed, the research findings are not representative of either wild or farmed salmon as a whole. For this reason, it seems to me that generalities about differences between farmed and wild salmon based on the studies by Easton et. al and Hites et al., are unwarranted.

In reporting the research findings, it appears to me that Hites et al. did not follow standard scientific practices:

- The authors state that they "analyzed over 2 metric tons of farmed and wild salmon." The authors may have collected 2 metric tons but the quantity analyzed was undoubtedly only a small fraction of that.

⁸ <http://listproc.ucdavis.edu/archives/seafood/log0203/0041.html>

⁹ <http://listproc.ucdavis.edu/archives/seafood/log0401/0005.html>

¹⁰ <http://listproc.ucdavis.edu/archives/seafood/log0401/0009.html>

¹¹ http://www.lib.noaa.gov/docaquanoaa_matrix_program_reports/12_hugh-mitchell.pdf

- The calculation of the number of "safe meals" was apparently done using an unconventionally large, 8 oz portion size instead of the conventional 3 oz or 5 oz size. The effect of this on the calculation of the number of "allowable meals" was to reduce it by more than half. No confidence intervals are given for the number of "allowable meals."
- The authors use red bars to denote farm-raised salmon and green for wild. This conjures visual associations of stopping consumption of farm-raised salmon and continuing or going ahead with consumption of wild salmon.
- The paper reports on contaminants in both wild and farm-raised salmon yet the title mentioned only contaminants in farmed salmon.

Rick Nichols wrote in October 2006¹²:

"Sometimes, though, it's not the food marketers that confuse science, it's scientists themselves. Let us travel back to 2004, when the journal *Science* published a paper by an environmental research group underwritten by the Pew Trust. It suggested that farmed salmon was so laced with cancer-causing PCBs and dioxin that eating more than a serving a month was to risk catastrophe. It caused a panicky retreat from farmed salmon. But its findings have been widely criticized. It might have been a wake-up call about environmental threats, but its scary Henny-Penny assessment of threats to human health - especially in light of salmon's considerable health benefits - seems widely overblown in retrospect."

Kenneth Green of the Fraser Forum noted¹³:

"Hites et al. draw a great deal of attention to one particular food - farmed salmon - and single it out for consumption advisories. But the study lacks a rationale for selecting health standards, lacks context, and lacks an awareness of trade-offs, all of which are key elements in enabling people to manage their risks based on reason and logic."

In an editorial on 15 January 2004, the London Times described the Hites et al. study as:

"a sorry saga of flawed science, selective research and hidden commercial bias. That it was allowed into the pages of the apparently respectable journal **Science** is inexplicable. This worldwide promotion by an organization with a vested interest in undermining farmed Atlantic salmon in favor of the wild Alaskan variety, is a scandal."

Dr. Peter Howgate, a British scientist wrote a critique of the study, concluding¹⁴:

"do I smell campaign behind this paper?... it seems to me this study was initiated as part of such a campaign rather than to objectively examine the risk to human health of contaminants in fish."

¹² Nichols, R. *The scales tip in favor of fish - for now*. 26 October 2006.

http://www.philly.com/mld/philly/entertainment/columnists/rick_nichols/

¹³ <http://www.rppi.org/salmon.pdf>

¹⁴ <http://listproc.ucdavis.edu/archives/seafood/log0401/0009.html>

Writing an article entitled, "To panic or not to panic? Farmed Salmon: Anatomy of a False Scare", Sandy Szwarc stated¹⁵:

... "An ulterior motive may be at work. As a less expensive, more tender and less fishy-tasting product with year-round availability, farmed salmon has superseded demand for wild salmon.... Facing competition from aquaculture, the wild salmon industries of California, British Columbia, and Alaska have allied themselves with environmental groups to promote wild salmon as the healthier and environmentally-friendly choice".

PCB intake from farmed salmon in comparison with other foods

Despite the modest increase in farmed salmon consumption in recent years, average consumption remains extremely low at less than 2 kg per person per year in both Canada and the United States. In comparison, the average per capita consumption in Canada is approximately 57.7 kg of red meat and 36.7 kg of poultry¹⁶.

Based on PCB levels reported by Hites et al., Dr. Ronald Hardy of Idaho University calculated the average yearly intake of PCBs from various sources, and states¹⁷:

"Even if Americans doubled their intake of farmed salmon, the contribution of this consumption on total yearly PCB intake would still be 40 - 80 times less than the amount from beef. No matter how the data is calculated and no matter who's PCB values for salmon are used, the amount of PCBs contributed to the diet from farmed or most wild salmon is truly insignificant in the context of overall PCB intake of the average American."

<u>Average Yearly PCB Intake</u>	
Beef:	2,401 units
Milk:	716 units
Poultry:	306 units
Pork:	199 units
Farmed salmon:	30 units
Source: Hardy, 2005.	

If the exposure of the public to PCBs in food is the real concern of the David Suzuki Foundation, wouldn't it make more sense to advise the public to consume less beef, poultry, pork and milk - not less farmed salmon?

PCBs in farmed salmon: Inconsequentially Higher Not High

Setting aside for a moment the fact that skewed sampling disqualifies generalizations based on the research findings of Hites et al., it appears to me that Hites et al. and the David Suzuki Foundation inaccurately represent the research findings by characterizing the observed PCB concentrations in farmed salmon as *high*.

While factually correct, based on the Hites et al. data (notwithstanding the unrepresentative sampling) that farmed salmon contained *higher* amounts of PCBs than wild salmon, it is incorrect to say that farmed salmon contain *high* amounts of PCBs.

Indeed, Easton et al. and Hites et al. did find that levels of PCBs were roughly ten times higher in farmed salmon than in wild. Had the ten-fold difference been between 5.0 ppm and 0.5 ppm, or between 0.5 ppm and 0.05 ppm, it would have been important.

¹⁵ <http://www.cei.org/pdf/3998.pdf>

¹⁶ <http://www40.statcan.ca/101/cst01/famil102d.htm>

¹⁷ <http://www.ftai.com/articles/Farmed%20Salmon%20Contam%20Hardy.pdf>

The action level (tolerable level) for PCBs in fish is 2.0 ppm in both Canada and the U.S.

The ten-fold difference in the PCB levels between farmed and wild salmon was:

- between 0.051 ppm and 0.0053 ppm in the study by Easton et al.
- between 0.0366 ppm and 0.0048 ppm in the study by Hites et al..

Since the concentrations of PCBs in both wild and farmed salmon were so much lower than the action level of 2.0 ppm, the ten-fold difference in PCB levels between farmed and wild salmon is inconsequential to human health.

The level of PCBs is as high in both sardines (0.04 ppm) and tuna (0.045 ppm in light tuna and 0.1 ppm in Albacore tuna)¹⁸.

Exposure to PCBs from fish is likely greater from tuna than from farmed salmon since average consumption is higher for tuna than for farmed salmon.

The point here is that the *relative* levels of contaminants alone are not an appropriate criteria for recommending one food over another - especially when it comes to fish which vary very widely across species and source locations. The appropriate way to evaluate the contaminant risk of any food is by the *absolute* levels of contaminants in relation to the health benefits, and in keeping with standards set by health authorities.

An Analogy: Mercury in Alaskan Wild Halibut vs. Farmed Salmon

Wild halibut contains 20 - 25 times as much mercury as farmed salmon¹⁹. In fact, some Alaskan wild halibut contains 45 times as much mercury as farmed salmon²⁰.

Wild halibut contains 50% of the EPA/FDA's action level for mercury whereas farmed salmon contains only 3% of the FDA's action level of PCBs. Moreover, mercury exposure from seafood is clearly associated with increased health risks whereas PCB intake from typical consumption of seafood is not.

Even though Alaskan Wild Halibut contains at least 20 times as much mercury as farmed salmon, it would be unwarranted to state that Alaskan Wild Halibut contains a *high* level of mercury (a moderate level, yes, but not a high level), and it would be unwarranted to advise the public to substitute farmed salmon for Alaskan wild halibut because of *high* levels of mercury.

<u>Mercury Content (ppm)</u>	
Tilefish	1.450
Shark	0.988
Swordfish	0.976
King Mackerel	0.730
Orange roughy	0.554
Canned Tuna	0.353
Lobster	0.310
Halibut	0.252
Fresh/frozen salmon	0.014
Canned salmon	undetected
EPA Action Level: 0.500	
Source: EPA/FDA, Feb 2006	

¹⁸ Mozaffarian, D. Fish Intake, Contaminants, and Human Health: Evaluating the Risks and the Benefits. Part 2. Health Risks and Optimal Intakes. *Cardiology Rounds*. November 2006 Volume 10(9).

¹⁹ <http://www.cfsan.fda.gov/~frf/sea-mehg.html>

²⁰ Dykstra, C.L. 2003. Methyl mercury and heavy metal contaminant levels in Alaskan Halibut. IPHC Report of Assessment and Research Activities. <http://www.iphc.washington.edu/halcom/pubs/rara/2003rara/2k308RARA.pdf>

By the same principle, it is unwarranted to recommend that people substitute wild salmon for farmed salmon.

This raises another point: If the real concern of the David Suzuki Foundation is the effects on public health of exposure to contaminants from fish, wouldn't it make more sense to raise public awareness about mercury in wild fish, rather than about PCBs in farmed salmon?

For that matter, previous studies have also found that exposure to contaminants from fresh water fish is four times higher than from ocean fish²¹.

Half a Meal of Farmed Salmon Per Month?

The section on Farmed Salmon on the web-site of Sustainable Seafood Canada (www.seachoice.org) provides an e-link to the page on the web-site of the Environmental Defense in the United States, entitled, "How Many Meals Of This Fish Can I Safely Eat Per Month?" For farmed salmon, the "maximum number of meals that can safely be eaten per month" is half a meal for adults and older children, and for younger children, zero meals.

<http://www.oceansalive.org/eat.cfm?subnav=healthalerts>

This recommendation is out of line with health authorities in Canada, Europe and the United States.

Fisheries and Oceans CANADA states at its web-site:

"Eating farmed salmon does not pose a health risk. Claims that eating farm salmon can cause health risks such as cancer can unnecessarily frighten people and prevent them from enjoying the benefits of eating fish. Fish and seafood are an important part of a healthy and balanced diet."

"Scientific studies indicate that trace amounts of PCBs (polychlorinated biphenyls) in both farmed and wild salmon are well within acceptable limits and similar to the amounts found throughout our food supply - in beef, chicken, pork and dairy products."

The **European Food Safety Authority** states in its "FAQ":

"Is consumption of farmed fish less safe than wild fish?"

There are no consistent differences between wild and farmed fish both in terms of safety and nutritional contribution. (An exception is Baltic salmon where farmed Baltic salmon is less contaminated than that caught from the wild.) Species, season, location, diet, lifestage and age all have a major impact on both the nutrient and contaminant levels of fish. These levels vary broadly within species and between species in both wild and farmed fish.

²¹ Sechter, A. et al. Intake of dioxins and related compounds from food in the U.S. population. J. of Toxicology and environmental health, Part I, 63:1-18, 2001. <http://www.ejnet.org/dioxin/dioxininfood.pdf>

Is European fish more contaminated than North American fish?

In a scientific paper published about one year ago and a follow-up paper of the same authors published in May this year (Hites et al., 2004, Foran et al., 2005 (the authors indeed suggested that North American salmon was less contaminated than European salmon. However, the authors did not take into account the seasonal, location, and fish's diet, lifestage and age factors which vary widely. When taking these factors into account, no consistent differences in contaminant levels could be observed between European and North American fish, including salmon."

In the UK, a joint Committee of the Scientific Advisory Committee on Nutrition and the Committee on Toxicity issued a report in 2004 entitled, "Advice on Fish Consumption: Benefits and Risks". The report recommends: "Everyone should eat at least two portions of fish a week, including one portion of oily fish. A portion is 140g.

The FQA states:

"Is the advice on eating farmed salmon different to other types of oily fish?"

No, the advice on farmed salmon is the same – that is that girls or women who might have a baby one day and women who are pregnant or breastfeeding shouldn't eat more than two portions a week. Women who aren't going to get pregnant in the future, boys and men can eat up to four portions a week. A portion is 140g."

"Should I eat oily fish when I'm pregnant or breastfeeding?"

You should eat oily fish when you're pregnant or breastfeeding because this could help your baby's development. In general, the advice for pregnant and breastfeeding women is the same as for girls and women who might have a baby one day that is that you shouldn't eat more than two portions of oily fish a week."

Two 140 g portions of oily fish per week is equal to a 14.56 kg per year. In Canada, the average yearly consumption of all fish is 9.38 kg²².

In October 2006, the U.S. Institute of Medicine issued a report, "Seafood Choices: Balancing Benefits and Risks.", The report concludes:

"... females who are or may become pregnant or who are breastfeeding, and for children up to 12 years of age:

- "May benefit from consuming seafood, especially those with relatively higher concentrations of EPH and DHA";
- "Can reasonably consume two 3-ounce (cooked) servings (or age-appropriate servings) but can safely consume 12 ounces per week";

Farmed salmon is among the fish that women and children may benefit from consuming and can safely consume 2 - 4 servings per week of approximately 3 ounces. That could be as many as 8 - 12 meals per month of farmed salmon - not half a meal.

²² <http://www40.statcan.ca/l01/cst01/famil102d.htm>

Associating Farmed Salmon with Increased Risk of Cancer

The 2007 brochure by the Coastal Alliance for Aquaculture Reform, of which the David Suzuki Foundation is a member, states:

"... a 2005 study in the Journal of Nutrition found cancer risks from toxic contaminants (dioxins and PCBs) in farmed salmon outweighed potential benefits, especially for young consumers and women of child-bearing age. The study indicates that "farmed salmon contain levels of 13 fat-soluble persistent organic pollutants that are on average ten times higher than those found in wild salmon. The most recent research published in the Journal of the American Medical Association (October 2006) encourages the overall consumption of seafood for its health benefits. However, the study still provides evidence showing the rate of cancer risk is three times higher for farmed salmon consumption than wild salmon."

I question whether the above notion that farmed salmon poses increased risk of cancer is warranted given that the sampling in the Hites et al. study on which this risk analysis is based, is skewed. As I said earlier, the differences in contaminant levels found by Hites et al. may not apply to farmed and wild salmon in general.

An important point not mentioned by the Coastal Alliance for Aquaculture Reform is that consuming salmon - wild or farmed, confers a great decrease in the risk of cardiovascular disease.

Dr. Dariush Mozaffarian, of the Harvard School of Public Health, has estimated that weekly consumption of farmed or wild salmon would result in 7,125 fewer deaths per 100,000 lifetimes due to cardiovascular disease.²³ For both farmed and wild salmon, benefits in terms of cardiovascular disease outweigh cancer risks at any age by more than 100-fold.

Targeting Pregnant Women with Advice to Avoid Farmed Salmon

I am particularly concerned that The David Suzuki Foundation and the Coastal Alliance for Aquaculture Reform appear to specifically target pregnant women and young children with the message to avoid or severely limit consumption of farm-raised salmon.

Appendix II of "State of the Catch", seems to me to imply that the public should disregard the dietary recommendations of Health Canada, the Canadian Food Inspection Agency and the US Food and Drug Administration in favour of following what you refer to as "more precautionary approach and advice." Appendix II states:

"Young children, pregnant or nursing mothers, and women of childbearing age should avoid fish with listed mercury concerns in favour of fish without toxicity warnings. Other people should limit consumption of fish with mercury concerns to one or two meals per month."

I find it odd that the only fish in the entire guide, "State of the Catch", for which a statement of "toxicity issues" is not given, is farmed salmon.

²³ Mozaffarian, Fish Intake, Contaminants, and Human Health: Evaluating the risks and the benefits Part 2 - Health Risks and Optimal Intakes. Cardiology Rounds, November 2006, Volume 10(9).

Based on their meta-analysis of the risks and benefits of fish intake, Mozaffarian and Rimm of Harvard Medical School, and Harvard School of Public Health, concluded:

"Based on the strength of evidence and potential magnitudes of effect, the benefits of modest fish consumption (1-2 servings/week) outweigh the risks among adults and, excepting a few selected fish species, among women of childbearing age. Avoidance of modest fish consumption due to confusion regarding risks and benefits could result in thousands of excess CHD (cardiovascular disease) deaths annually and suboptimal neurodevelopment in children."

On the basis of what I have presented here, it seems to me that farmed salmon is indeed, a wholesome food. I have not found scientific justification to support the position of the David Suzuki Foundation that farmed salmon poses a "health threat."

I do not see sound scientific grounds for advising that the maximum number of safe meals of farmed salmon is half a meal per month for adults and older children and zero meals for younger children. On the contrary, health authorities in Canada, the United States and Europe recommend eating oily fish - including farmed or wild salmon - on a weekly basis. This goes for pregnant women and young children as well.

Salmon Aquaculture: Canada's Farming and Alaska's Ranching

In your literature, the David Suzuki Foundation equates salmon aquaculture with salmon farming when in fact there are two main forms of salmon aquaculture:

- Salmon farming as practiced in Canada, Chile, Norway, Scotland and elsewhere
- Salmon ranching as practiced in Alaska

Both Alaska and Canada are involved in salmon aquaculture as a way to provide salmon, employment and economic growth, but Alaska and Canada have gone about salmon aquaculture in different ways.

Salmon farming had many problems in the early years. In British Columbia, more than 1.5 million salmon escaped. Salmon were found in 77 rivers and at least 600 made it all the way to Alaska. Reportedly, approximately 5,000 seals and sea lions were shot or drowned, tangled in nets. Disease and waste management protocols and regulations were not in place. The public became outraged. The industry responded with better technology and farming practices resulting in major reductions in escapes, marine impacts, and antibiotic usage.

While the David Suzuki Foundation has drawn much attention to the problems of salmon farming, the industry's progress and improvement has not been acknowledged.

Moreover, salmon farming offers several advantages over the wild salmon fishery:

- No risk of over-fishing
- No release of billions of young hatchery born salmon into the wild
- No by-catch

None of these advantages seem to be acknowledged by the David Suzuki Foundation.

Salmon Ranching in Alaska

According to the recent report, "The Great Salmon Run"²⁴ sponsored by the World Wildlife Fund, approximately 38% of Alaskan 'wild' salmon are born in a plastic tray as are farmed salmon. In 2006, Alaska's hatcheries and ocean-ranching accounted for \$US 59 million, 21% of the value of the Alaskan wild salmon harvest²⁵.

Alaska's hatcheries release into the wild approximately 1.5 billion salmon per year. In Prince William Sound, about half of the sockeye and more than 90% of the pinks and chums are the product of aquaculture hatcheries and ocean ranching. In essence, Alaska is using the communal 'pasture' of the Pacific Ocean, as a salmon ranch.

In reporting on the 2006 report of Alaska's salmon enhancement program, Laine Welch told her radio listeners on 15 April 2007, in Alaska²⁶:

"Don't ever refer to it as "farming" - but homegrown fish are Alaska's largest agricultural crop. Instead, call it "ocean ranching."

In their paper, "Why farm salmon outcompete fishery salmon," Eagle, Naylor and Smith of Stanford University write:

"While there is some factual support for the view that Alaska's salmon fisheries are ecologically sustainable, it is clear that they are neither economically nor politically sustainable. This lack of economic and political sustainability will ultimately diminish the ecological sustainability of commercial fishing. As prices have dropped, catches have remained high. Further, the use of hatcheries to supplement commercial catches has increased during this period, and it is foreseeable that future economic downturns will lead to even greater reliance on hatcheries. Finally, marginal businesses are less likely to improve environmental performance than profitable businesses. As fishing becomes less and less economically viable, it is almost certain that environmental regulations will be more and more contested."

Loss of Wild Salmon Biodiversity due to Alaska's Salmon Ranching

The University of Alaska, Anchorage states in its report, "Evaluating Alaska's Ocean-Ranching Salmon Hatcheries: Biologic and Management Issues"²⁷:

"Alaska has been successful in augmenting the salmon harvest, but in accomplishing this, the question of whether salmon biodiversity has been adequately protected is unanswered.... "In the comprehensive salmon plan for Prince William Sound, one of the recommendations is that the proportion of hatchery salmon straying into wild stock streams must remain below 2% of the wild stock escapement over the long term. This recommendation is obviously not being followed. Straying of hatchery fish in Prince William Sound and Southeast is a major concern that is not being adequately addressed and needs to be brought fully into the light..."

²⁴ <http://www.worldwildlife.org/trade/salmonreport.cfm>

²⁵ <http://www.sf.adfg.state.ak.us/FedAidPDFs/fmr07-04.pdf>

²⁶ http://www.alaskajournal.com/stories/041507/fis_20070415035.shtml

²⁷ <http://www.tu.org/atf/cf/%7B0D18ECB7-7347-445B-A38E-65B282BBBD8A%7D/AKhatcheries.pdf>

Dr. Steven Kolmes of the University of Portland states:

"... if hatchery fish return as adults to spawn with wild salmon, they produce offspring that are genetically diluted and less suited to the environment of the stream in which they reproduce.... wild fish possess resistance to the diseases and parasites of the stream where their population evolved, and in terms of distance, current, water temperature, and other factors, they are physiologically suited to the freshwater migration they face as they leave the ocean. Hatchery salmon pose a threat to this fine-tuned local evolution."

Feed

Feed fed to the 95% of hatchery smolts that don't survive, is essentially wasted. Once in the wild, hatchery-released smolts from Alaskan hatcheries and ocean-ranching consume approximately 567,000 MT of wild prey; this is then not available for the truly wild salmon and other wild fish²⁸.

Dr. Steven Kolmes of the University of Portland states:

""Salmon hatcheries collectively form an often-overlooked industrial giant that is now more than a century old... as hatcheries release millions of juvenile salmon for their migration to the sea, hatchery fish compete with the wild fish migrating to the ocean. At times, there simply is not enough food to nourish all of the young fish, producing mortality among both wild and hatchery fish."

The University of Alaska, Anchorage states:

"There is significant concern over competition for resources between hatchery and wild salmon stocks. Based on a review of the scientific literature and discussions with biologists, geneticists, and fishery managers about protecting salmon biodiversity, the potential impacts of extensive ocean ranching appear to pose a great concern for the ocean's carrying capacity. This may become the most important issue for assessing risks to wild salmon populations, especially for those with comparatively small numbers of individuals. It will likely become a higher risk than loss or change in genetic diversity due to hatchery practices."

Waste

According to Eagle, Naylor and Smith of Stanford University²⁹:

"Although not well-publicized, salmon fishing has significant environmental externalities. The processing of fishery salmon in Alaska creates huge quantities of effluent - offal and other fish parts. Several coastal areas in Alaska have been listed as impaired under the Clean Water Act due to the large quantities of untreated waste (over 1.5 million tons in Alaska each year) dumped by fish processors directly into the marine environment..."

²⁸ Robson, P.A. *Salmon Farming. The Whole Story*. Heritage House. pg. 101.

²⁹ Eagle, J. R. Naylor, W. Smith. 2003. *Hy farm salmon outcompete fishery salmon*. Marine Policy. <http://pangea.stanford.edu/research/Oceans/GES205/fish.pdf>

The Juneau Development Council states³⁰:

“Approximately 60% of the salmon harvested in Alaska is used for human consumption when the fish is canned, fresh or frozen. The remaining 40% is waste (head , fins, viscera, etc.). If salmon are harvested for roe (eg. chums) as much as 90% of the fish by weight is waste. Historically, the waste products are dumped back into the ocean.²”

Duff Mitchell, of Kake Tribal & Foods, told the Alaska Salmon Task Force in 2003³¹:

“... we use the pollution and other “unclean” issues when we differentiate our salmon from farmed. Why should we talk out of both sides of our mouths? ... The reason waters around plants are polluted is that there is already too much grinding going on. When rotten fish particulates float to the surface, it is nature’s way of telling you that what you are doing is wrong.³”

A Marketing Perspective

Considering that salmon is one of the few foods that most people should eat more of (not less!), and considering that salmon farming has improved substantially in recent years, it had puzzled me that the David Suzuki Foundation continues to advise against consuming farmed salmon and oppose salmon farming as currently practiced.

In particular, the David Suzuki Foundation's insistence on so-called "closed containment technology" has not made sense to me given that such a transition would make salmon farming far more energy intensive, increasing carbon emissions equivalent to putting thousands of additional cars on the road! It has not made sense to me that the David Suzuki Foundation proposes an environmentally flawed "solution".

As such, the position of the David Suzuki Foundation on salmon aquaculture had been inexplicable to me - until recently. Over the past few months, I have looked at the work of environmental organizations in the United States and Canada, from a marketing perspective, and within the context of the global salmon market. It appears to me that environmental organizations play an important role in improving the market for Alaskan wild salmon by:

- Measuring brand resonance and developing brand strategy with market research
- Facilitating product differentiation and brand positioning
- Developing brand identity, image, associations and awareness
- Providing brand elements (eg. the MSC, FishWise, and SeafoodSafe logos)
- Building brand equity by leveraging the credibility of scientists and pediatricians
- Providing a strong brand voice through co-ordinated media relations.
- Demarketing farmed salmon, shifting market demand to Alaskan wild salmon.

By positioning farmed salmon as "unsafe and unsustainable", environmental organizations facilitate the product differentiation and the current brand positioning for Alaskan wild salmon as "safe and sustainable".

³⁰ <http://www.jedc.org/salmon/byproduct-primer.pdf>

³¹ <http://www.jedc.org/salmon/byproduct-primer.pdf>

The Alaskan Context

Facing stiff competition from farmed salmon, the value of Alaskan wild salmon collapsed by 75% (adjusted for inflation) from \$1.2 billion (1988) to \$185 million (2002) as consumer and retail demand shifted from wild salmon to farm-raised salmon³².

The Alaska Fisheries Office stated³³:

"There is ample feedback from the market that Alaska salmon continues to fall well short of the fine quality of farmed Atlantic salmon.... The process of extracting the fish - often leading to a violent and stressful death for the salmon - does not compare to the method of harvest in a controlled salmon farm where the fish are gently slaughtered. The great distance from fishing grounds to processors, coupled with the often antiquated cooling equipment aboard Alaska's fishing vessels, increases the bacterial degradation of the flesh.... Under the current model for prosecuting, processing and distributing the wild Alaska salmon to the market, it is destined to the status of an inferior product in the eyes of the market."

In 2002, Alaskan economist, Dr. Gunnar Knapp stated several times, "the real problem is the current management system.... the current management system creates conditions that are idiotic from any objective point of view about how to run an industry."³⁴

According to Dr. Gunnar Knapp, some of the problems facing the Alaskan wild salmon industry in the 1990s, were (and in some cases, still are):

- More than 75% of the Alaskan harvest is the low-priced pink and chum species. The highest-priced Chinook salmon is less than 2 percent of the Alaskan catch³⁵.
- Approximately 90% of Alaskan wild salmon gets frozen or canned whereas 90% of farmed salmon is sold fresh. To many consumers, the big difference is whether salmon is canned, frozen, or fresh, not whether its farmed or wild.
- Over-production of Alaskan hatchery pink and chum salmon, over-production of Russian and Japanese 'wild' salmon, decline in consumption of all canned goods, over-capitalization, the strong U.S. dollar and the weak Japanese Yen.

In 2003, the former Alaskan Governor announced a \$US 50 million "Salmon Industry Revitalization Plan," and a "new way of marketing." The Environment News Service headlined the news, "Wild Alaska Spends \$US 50 Million to Beat Farmed Salmon."³⁶

Whereas quality and management issues were the *real*, root problems, the State of Alaska focused on improving the *perceived* value of Alaskan wild salmon - relative to farmed salmon. Differentiating Alaskan salmon from farmed salmon is central to the marketing strategy for the Alaska wild salmon brand.

³² http://www.iser.uaa.alaska.edu/iser/people/knapp/Knapp_World_Salmon_Market_Trends_Nov_15_2006.pdf

³³ http://www.dced.state.ak.us/oed/seafood/pub/Fishing_Ind_Strat_Concepts.pdf

³⁴ <http://www.iser.uaa.alaska.edu/iser/people/knapp/Knapp%20Salmon%20Presentation%2001.pdf>, 91,95.

³⁵ http://www.iser.uaa.alaska.edu/iser/people/knapp/Knapp_UAA50YEARS_Salmon_Lecture.pdf

³⁶ <http://www.ens-newswire.com/ens/apr2003/2003-04-21-04.asp>

The Hites et al. Study : The Turning Point for Alaskan Wild Salmon

Between 2003 and 2006, the value of Alaskan wild salmon nearly doubled, from \$US 160 million to over \$US 300 million³⁷. The Alaska Seafood Marketing Institute reported that the ex-vessel value of Alaskan wild salmon increased 23% in 2004 alone.

According to Steve Wilhelm of the Puget Sound Business Journal, the turning point for Alaska wild salmon came with the publication and publicity of the Hites et al. study in January 2004. Following its publication, imports of farmed salmon declined sharply.

On 9 January, David O. Carpenter, co-author of the Hites et al. study told the Seattle Post Intelligencer and CBS³⁸:

“We hope it does not turn people away from fish, we hope it turns people away from farmed salmon.”

On 9 January 2004, the day the study was published, the former Governor of Alaska, Frank Murkowski, issued a press release stating:

“... it is important to note that this study is not telling people not to eat fish. It is telling them to eat more wild Alaskan salmon.”

On 8 January 2004, the day *before* the study was published, Environmental Defense issued a press release stating³⁹:

“Environmental Defense praises new study on farmed salmon contaminants... Environmental Defense has long advised consumers to choose wild salmon from Alaska, rather than farmed salmon...”

On 8 January 2004, the David Suzuki Foundation issued a press release stating⁴⁰:

“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.”

According to the Free Press Editorial, and as reported to the European Parliament, Dr. David O. Carpenter stated on 10 September 2004:

“There may be some legitimacy in saying the reason they (Pew) chose to fund this study was that they had another agenda well beyond the health effect.”

Without the Hites et al. study and its publicity which promoted the fallacy that wild salmon is healthier than farmed salmon, it would seem that the dramatic improvement in market demand for Alaskan wild salmon, would have not have occurred.

³⁷ http://www.iser.uaa.alaska.edu/iser/people/knapp/Knapp_World_Salmon_Market_Trends_Nov_15_2006.pdf

³⁸ http://seattlepi.nwsourc.com/local/155971_salmon09.html

³⁹ <http://www.oceansalive.org/mediacenter.cfm?subnav=release&ContentID=3480>

⁴⁰ http://www.davidsuzuki.org/campaigns_and_programs/salmon_aquaculture/news_releases/newsaquaculture01080401.asp

The Alaska Seafood Marketing Institute and Environmental Organizations

The Alaska Seafood Marketing Institute has acknowledged working with environmental organizations and "conservations funders"⁴¹ with "lots of private foundation money."⁴²

In 2002, Ray Riutta, the Executive Director of the Alaska Seafood Marketing Institute (ASMI) wrote in answer to the question, "Why ASMI doesn't bash farmed salmon"⁴³:

"... As to attacking farm salmon directly, there is more to the issue than you may realize. And ASMI does a lot more behind the scenes than you are probably aware of."

"In our case, it is far more credible to leave the attack to third parties, such as environmental groups and newspaper columnists, then it is for us to come out and do it ourselves. We can then leverage that information with a marketing campaign pointing out the positive aspects of our fish using the bad things about farmed fish as our points of difference. And that is exactly what we are doing."

"... we are helping the people that sell our products or use them in restaurants understand the differences in wild and farmed fish, which includes showing them the material that is being generated by the environmentalists and the media. "We also have been working with a number of environmental groups and media for several years now pointing out the purity and sustainability of our salmon, which helps them make their points about the difference in wild verses farmed fish."

"We will emphasize the many good things (purity, health benefits, environmentally friendly, sustainable runs, small family businesses) about our fish and leave it to others to emphasize the bad things about farmed fish. This is a position that is strongly endorsed by our board, half of whom are harvesters ... and is constantly reviewed to be sure it is the best way to conduct our business."

Several suppliers of Alaskan wild salmon provide e-links from their web-sites to the brochure, "**Why You Shouldn't Eat Farmed Salmon**" of the David Suzuki Foundation:

- Big Blue Fisheries: <http://www.alaskasmokedfish.com/links.html>
- Desire Fish Company: <http://www.desirefish.com/farmed.html>
- Rose Fisheries: <http://www.rosefisheries.com/links.html>
- Salmon Guy Seafoods: <http://www.salmonguy.com/links.htm>
- Vital Choice Seafoods: <http://www.vitalchoice.com/faq.cfm#28>

Vital Seafoods states in its FQA:

"Is it true that some farmed fish is dangerous to eat? We'll leave that up to you to decide. According to **the David Suzuki Foundation**, farmed salmon can be dangerous to eat..."

⁴¹ <http://ufa-fish.org/update/01/070901.htm>

⁴² <http://ufa-fish.org/update/01/051101.htm>

⁴³ <http://ufa-fish.org/update/02/120602.htm>

Demarketing Farmed Salmon

Demarketing is defined as "discouraging consumers from buying."⁴⁴ According to renowned marketing expert, Philip Kotler, "the aim is not to destroy demand, but only to reduce or shift it."⁴⁵

Environmental organizations, including the David Suzuki Foundation, demarket farmed salmon by:

- Saying "Don't eat/buy farmed salmon"
- Saying "Substitute wild Alaskan salmon for farmed salmon" and "Substitute Arctic char or rainbow trout for farmed salmon"
- Red-listing farmed salmon and green-listing Alaskan wild salmon
- Recommending that the maximum number of safe meals of salmon per month is half a meal for men, women and older children, and zero meals for young children

The web-page of the David Suzuki Foundation, entitled, "What You Can Do Personally" states:

"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... Phone your local hospitals and ask whether farmed salmon is served to patients.... If you attend a banquet, ask before accepting the salmon."

http://www.davidsuzuki.org/salmon_aquaculture/what_you_can_do/personally.asp

While environmental organizations in British Columbia, including the David Suzuki Foundation, do not explicitly promote Alaskan wild salmon, the work to demarket farmed salmon contributes directly to improving the market for Alaskan wild salmon. Several business analysts and journalists have noted this.

In the North American market, approximately 90% of wild salmon is Alaskan wild salmon. Promoting wild salmon is tantamount to promoting Alaskan wild salmon.

From environmental issues to contaminants: a demarketing strategy shift?

SeaWeb's report, "The Marketplace for Sustainable Seafood" presents research from March 2001 which found that only 18% of the general public would entirely give up eating farm-raised Atlantic salmon if they found out that it was raised in a manner that was harmful to the environment. On the other hand, 57% of the public had avoided a particular fish because of food safety concerns⁴⁶.

As far as I can tell, the issue of contaminants in farmed salmon was raised for the

⁴⁴ <http://www.moneyglossary.com/?w=Demarketing>

⁴⁵ Kotler, P. and G. Armstrong. 2006. *Principles of Marketing*. 11th Ed. Pearson Prentice Hall.

⁴⁶ SeaWeb. *The Marketplace for Sustainable Seafood*. Note: If only people who consume salmon are considered, 28% would entirely avoid eating farmed salmon if informed that it is raised in a manner that harms the environment.who actually consume salmon are considered)

first time in the David Suzuki Foundation's Spring Newsletter in 2001. It states:

"...most troubling to some scientists, including one who conducted research for the Foundation (Dr. Easton), is the potential danger (of farmed salmon) to human health."⁴⁷

IMPACS paper by Suzanne Hawkes and Liz Scanlon states:⁴⁸

"health is the most compelling argument against farmed salmon."

“Safe Salmon”: Blue Oceans Marketing Strategy?

It appears to me that the work to create the belief that farm-raised salmon is unsafe is an application of “Blue Oceans” marketing strategy in which uncontested market space (eg. a market for “safe salmon”) is created and the traditional cost/benefit analysis and competition is made irrelevant; if farm-raised salmon is unsafe, whatever benefits it offers (omega-3 fatty acids, affordability, quality, freshness) become irrelevant in the consumer’s mind.

By raising the issue of contaminants in farm-raised salmon - albeit in the flawed manner that I have described, it appears to me that environmental organizations and the associated scientists have shifted public dialogue away from discussions of over-fishing.

Rather than beating the competition (in this case, farmed salmon) to exploit existing consumer demand for fresh salmon, and rather than growing the salmon category as a whole, the Blue Oceans Strategy is to make the competition irrelevant by creating demand for a product that supposedly, the competition doesn’t offer: “Safe Salmon”.

Experts, including Alaskans, have advised against what they have referred to as "bad science" and "misinformation".

Alaskan economist, Dr. Gunnar Knapp, of the University of Alaska Anchorage, advised⁴⁹:

"Attacking farmed fish - doing it ourselves or letting others do it - is a risky strategy for wild fish... Attacking farmed fish based on bad science is especially risky."

Dr. Bruce Babcock and Dr. Quinn Weninger of Iowa State University advised⁵⁰:

“Recent attacks against the salmon farming industry, primarily by environmental groups, may scare consumers away from farmed and toward wild salmon. However, if scare tactics are based on misinformation, it is unlikely they will have lasting impacts.”

⁴⁷ <http://www.davidsuzuki.org/files/DSFspringv5.pdf> Page 8.

⁴⁸ http://www.impacs.org/files/CommCentre/Strategic_Communications

⁴⁹ http://www.iser.uaa.alaska.edu/iser/people/knapp/Knapp_UAA50YEARS_Salmon_Lecture.pdf

⁵⁰ <http://www.agmrc.org/NR/rdonlyres/31605EB8-63F8-44AB-94B8-4ED381A28BA1/0/qualitysalmon.pdf>

From what I have observed, it appears to me that collectively, environmental organizations worsen production and market conditions for farmed salmon by:

- Demanding higher cost production technologies (eg. closed containment)
- Limiting production volume (eg. moratoriums)
- Restricting consumer access (eg. boycotts and Purchasing Policies)
- Opposing organic certification of farmed salmon.

Pacific Star Seafoods states⁵¹:

By tilting the table away from farmed fish and providing an economic advantage to wild stock fisheries, we can (put) more emphasis on preserving a way of life and a cultural heritage belonging to us all.

"Closed Containment" Technology

Closed containment technology would not make salmon farming more sustainable but it would increase production costs, thereby helping to close the price gap between wild and farmed salmon, making wild salmon more cost-competitive. Price and availability are the most significant barriers to purchasing and consuming fresh wild salmon.

Ecotrust states⁵²:

"Get salmon farming out of the oceans. Moving the farms to enclosed ponds would force the industry to pay more of the true costs of farming, leveling the economic playing field for coastal fishing communities."

What about the "true costs" of Alaska's salmon ranching to the "wild salmon ecosystem" of the Pacific Ocean?

Ecotrust is described on its web-site as "writ large, a bi-national, bioregional shadow government and economic development agency" with "a central project of promoting wild salmon (vs. farmed salmon) as the best tool for its conservation economy."

From the information posted at the grants database of the Moore Foundation, it appears that Ecotrust is the second largest grant recipient from the \$US 190 million "Wild Salmon Ecosystems" Initiative, and has received at least \$US 4,711,481 since 2002.

Opposition to Organic Certification

The opposition to organic certification of farm-raised salmon by environmental organizations, including the Coastal Alliance for Aquaculture Reform and the "Pure Salmon Campaign", echoes the position of the Alaskan wild salmon industry:

"If the farmed salmon industry gets an organic label and we don't, they've won."

- Dal Albrecht of the Yukon River Drainage Fisheries Association⁵³.

⁵¹ <http://www.pacificstarseafoods.com/faq.html>

⁵² http://www.sectionz.info/Issue_1/Z1_Salmon.pdf

⁵³ <http://www.dced.state.ak.us/oed/seafood/pub/forum99.pdf>

SeaWeb's "Antifarming Campaign"

As part of the \$US 190 million dollar "Wild Salmon Ecosystems" Initiative of the Gordon and Betty Moore Foundation, SeaWeb was granted \$US 560,000. Outcomes expected for the grant were originally stated at www.moore.org as:

- "Identification of antifarming audience and issues"
- "Integration of aquaculture science messages into antifarming campaign"
- "Standardization of antifarming messaging tool-kit"
- "Creation of an earned media campaign"
- "Co-ordination of media for antifarming ENGOs"

According to the 990-PF filed with the Internal Revenue Service by the Gordon and Betty Moore Foundation, the purpose of the \$US 560,000 grant to SeaWeb was:

"To provide a high quality tool-kit and coordination infrastructure for use by ENGOs in their campaigns to shift consumer and retailer demand away from farmed salmon."⁵⁴

Over roughly the same time period that SeaWeb was funded by the Moore Foundation to co-ordinate "antifarming ENGOs" (April 2004 - April 2006), the Gordon and Betty Moore Foundation granted substantial funding to environmental organizations working in British Columbia, including \$US 4,332,848 to the Vancouver Aquarium for research on salmon migration (February 2004 - November 2006), and \$US 550,000 to Raincoast Conservation Foundation (August 2003 - August 2006) for sea lice research and other projects. Thus, it appears to me that the funding for the Vancouver Aquarium's juvenile salmon migration research and funding for Raincoast's sea lice research is not independent of the funding for SeaWeb's "antifarming campaign".

Funding to SeaWeb

SeaWeb's resources are significant. According to documents filed with the IRS, SeaWeb's revenues for 2001 - 2005 were \$US 16,008,958. **SeaWeb** was the fourth largest grant recipient of the Conservation and Science Program of the David and Lucille Packard Foundation, in 2005/2006. This program made a total of 244 grants for \$US 129,879,627. The Monterey Bay Aquarium, the Energy Foundation and the Resources Law Group received larger grants than SeaWeb, for \$US 35.7 million, \$US 13.1 million and \$US 12.1 million, respectively.

SeaWeb was also granted \$US 150,000 from the Rockefeller Brothers Fund "for its work on sustainable salmon aquaculture," \$US 9,000 from the Lazar Foundation, "for public opinion research on attitudes toward wild and farmed salmon"⁵⁵ and \$US 4.2 million from The Pew Charitable Trust⁵⁶. The same foundation (Pew) also granted \$US 2.67 million to Dr. David O. Carpenter to conduct and publicize the Hites et al. study.

⁵⁴http://moore.org/cms/uploadedFiles/2004%20Moore%20Fndn_990PF_complete.pdf
Page 76 (at the bottom) of 250. Statement 16A.

⁵⁵ http://lazarfoundation.org/recipients/index.html?grantcycle=2000&b_start:int=90

⁵⁶ http://pewtrusts.org/search/search_item.cfm?grant_id=4084
http://pewtrusts.org/search/search_item.cfm?grant_id=3805

Sea Lice Research: Part of the "Antifarming Campaign?"

The sea lice research by Krkosek, Lewis and Volpe was publicized by SeaWeb on 29 March 2005, during the time (April 2004 and April 2006) that SeaWeb was under contract to "integrate aquaculture 'science' messages into the antifarming campaign.

John Volpe and Alexandra Morton are profiled at SeaWeb as photographers⁵⁷⁵⁸:

The press release of 27 September 2006 by the University of Alberta states that the research by Krkosek, Lewis and Volpe was funded "primarily by the National Research Council of Canada and the Natural Sciences and Engineering Research Council of Canada. Further support came from the David Suzuki Foundation, the Canadian Sablefish Association and the British Columbia Wilderness Tourism Association".

The National Research Council of Canada and the Natural Sciences and Engineering Research Council of Canada are members of Canada's Tri-Council on Integrity in Research and Scholarship which states in information posted on its web-site⁵⁹:

"...researchers must formulate sound research questions, design rigorous protocols and methodologies, meticulously collect data, and *impartially* analyze their findings. They must communicate research results objectively and comprehensively..."

It seems to me that research that is part of an "antifarming campaign", is not impartial.

I am concerned that a number of statements by Krkosek, Lewis and Volpe do not appear to me to be warranted by their research findings:

"This is the smoking gun. There is no ambiguity in the data whatsoever. It's very, very definitive... it's clean and it's conclusive."⁶⁰

"Although the study was conducted in British Columbia, the results apply globally."⁶¹

"This paper brings our understanding of farm-origin sea lice and Pacific wild salmon to the point where we know there is a clear severe impact."⁶²

"...sea lice from fish farms kill wild salmon....up to 95% of wild juvenile salmon are dying."⁶³

"Sea lice production from the farm we studied was four orders of magnitude - 30,000 times - higher than natural."⁶⁴ - John Volpe, BBC 29 March 2005

"Science is showing us that in every area that salmon farms operate there is depression in runs, so runs are declining."⁶⁵

⁵⁷ http://www.marinephotobank.org/photoalbum/profile_johnvolpe.php

⁵⁸ http://www.marinephotobank.org/photoalbum/profile_alexandramorton.php

⁵⁹ <http://www.nserc.ca/pubs/intback.htm>

⁶⁰ <http://www.math.ualberta.ca/~mlewis/news/SeaLice/GlobeMail%20TeamLinksFarmedFish.htm>

⁶¹ http://www.math.ualberta.ca/~mlewis/SeaLice/SeaLiceSept-06/PNAS_Press_Release_website.pdf

⁶² http://www.math.ualberta.ca/~mlewis/SeaLice/SeaLiceSept-06/PNAS_Press_Release_website.pdf

⁶³ http://www.math.ualberta.ca/~mlewis/SeaLice/SeaLiceSept-06/PNAS_Press_Release_website.pdf

⁶⁴ <http://news.bbc.co.uk/2/hi/science/nature/4391711.stm>

⁶⁵ <http://en.epochtimes.com/news/7-2-9/51484.html>

"Truth Squads" in an "Antifarmed Salmon Effort"

The David Suzuki Foundation has participated in the IATP's "Go Wild" Campaign, based in Minneapolis, Minnesota. The IATP states that:

"The 'Go Wild' Campaign works with retailers and restaurant buyers to break the cheap farmed fish habit" "so wild fish will be more widely distributed."

The Pacific Coast Federation of Fisherman's Associations (PCFFA) refers to "Farmed and Dangerous" in a strategy paper as a part of a "truth squad" in an "antifarmed salmon effort." The PCFFA states⁶⁶:

"...certainly keeping the pressure on salmon farmers with truth squads will help to open more markets for wild salmon."

The PCFFA is headquartered in San Francisco, California - in the same office building as the Gordon and Betty Moore Foundation.

The Funding of the David Suzuki Foundation and its programs

According to your Annual Reports from fiscal 2001 to fiscal 2005/2006, as posted at www.davidsuzuki.org, the David Suzuki Foundation had a total of nearly \$39 million (\$38,996,689) in revenue during that time, of which \$17.6 million (\$17,635,868) has been received from foundations. Since fiscal 2001, the percentage of your total revenue from foundations was 46%, decreasing from a high of 62.6% in 2001, to 34.3% in 2005.

The David Suzuki Foundation has listed the Moore Foundation, the Packard Foundation the Rockefeller Brothers Fund and the Hewlett Foundations as each having contributed "more than \$5,000" or "more than \$10,000." In fact, according to these foundations, they have granted the David Suzuki Foundation much more than that, as follows:

<u>American Foundations</u>	<u>Grants</u>
The William and Lucille Hewlett Foundation	\$US 1,065,000
The Gordon and Betty Moore Foundation	\$US 450,000
The Bullitt Foundation	\$US 220,000
The Pew Charitable Trusts	\$US 181,000
The Rockefeller Brothers Fund	\$US 170,000

It appears from the above, that the David Suzuki Foundation has been granted substantial funding from these American foundations.

According to information available in the grants database at www.packard.org, **SeaChoice ("Canada's Seafood Guide")** was funded with grants for \$US 175,000 to the Canadian Parks and Wilderness Society from the Conservation and Science program of the David and Lucille Packard Foundation, based in Los Altos, California. The same foundation also granted \$US 225,000 for the "Farmed and Dangerous" campaign, \$US 250,000 for the "Pure Salmon campaign, \$US 95,750 to Ecotrust, and

⁶⁶ <http://www.pcffa.org/fn-may03.htm>

grants to the following organizations that work or have worked in partnership with the Alaska Seafood Marketing Institute:

The World Wildlife Fund	\$US 5,902,925
The Marine Stewardship Council	\$US 3,437,900
The Chef's Collaborative	\$US 246,150
Environmental Defense	\$US 1,500,000

The Conservation and Science program also granted \$US 350,000 for the FishWise point of sale labelling program, and \$US 400,000 for Blue Ocean Institute's Sea to Table program. Both programs green-list Alaskan wild salmon and red-list farmed salmon and provide "Consumption Advisories" based on the Hites et al. study.

Based on the observations and information that I have mentioned above, it appears to me that some funding to the David Suzuki Foundation and some of its programs (eg. SeaChoice and the "Farmed and Dangerous campaign") is not independent of substantial funding to improve the market for Alaskan wild salmon.

Summary

I find it difficult, Dr. Suzuki, to reconcile your involvement in IATP's "Go Wild" campaign of which the stated purpose is "to break the cheap farmed fish habit" and the PCFFA's "antifarmed salmon effort" and SeaWeb's "antifarming campaign," with the statements by the David Suzuki Foundation that you are campaigning to "reform" salmon farming.

The David Suzuki Foundation shows on its web-site that Human Health is one of your program areas. Based on the information and observations that I have presented in this letter, I do not see how demarketing farmed salmon helps to protect human health. I can see how demarketing farmed salmon improves the market for Alaskan wild salmon.

For the reasons outlined in this letter, it appears to me that the David Suzuki Foundation over-states the sustainability of wild salmon while understating the sustainability of salmon farming. It looks to me as if, Dr. Suzuki, you have sided with the ranchers.

When it comes to salmon, Alaska believes its got the real thing. At this point, it seems to me that getting the David Suzuki Foundation and other environmental organizations to approve of salmon farming would be like getting the marketing department of Coke to promote Pepsi.

Of the two salmon aquaculture approaches (ranching and farming), it seems to me that on the whole, salmon farming is actually the more sustainable and precautionary alternative: the risks of farming are more confined, and controllable, and arguably, there is less uncertainty associated with farming than with Alaska's salmon ranching. The stated mission of the David Suzuki Foundation is "to work through science and education to protect the diversity of nature." What is the David Suzuki Foundation doing about the risks to wild Pacific salmon that are posed by Alaska's salmon ranching?

Rather than so-called "closed containment" for salmon farms, what about enclosed containment for all cultured, hatchery salmon? Wouldn't it be best for the truly wild Pacific salmon to convert from salmon ranching to salmon farming?

At the World Salmon Summit in 2003, Jan Konigsberg, formerly the director of the Salmonid Biodiversity program of Trout Unlimited, in Alaska, stated:

“Just as banning of salmon farming was driven by the self-interest of the commercial fishery so is the *misleading and deceptive marketing* of Alaska’s salmon as wild and sustainable. Hatchery-dependent fisheries, by definition, are neither wild nor self-sustaining. Therefore, encouraging consumers to avoid farmed salmon and opt instead for Alaska salmon materially supports Alaska’s salmon-ranching program, which poses a far greater threat to Alaska’s salmon biodiversity than does salmon farming. MCS (Marine Stewardship Council) disputes that salmon ranching is a significant problem and they have refused to respond to the concerns raised by Trout Unlimited (TU). TU’s entreaties to the State of Alaska have also been rejected: The director of Alaska Seafood Marketing Institute told TU *My concern is that the farmed salmon producers might pick up your message and run with it.*”

Konigsberg concluded that presentation by saying⁶⁷:

"As long as the salmon business, which of course is embedded in the larger world of business, drives fisheries management, there will be little impetus for change. We have a choice to make about how we value salmon. As long as we reduce (the genetic code to a USP code), the less likely we will manage for salmon biodiversity and the more likely all salmon will be conceived in a bucket."

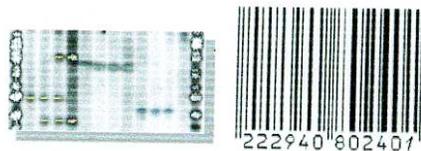


Figure 21.3. Coho genetic code and Coho bar code.

Please see also the Op-Ed by Jan Konigsberg, "Alaska Markets Salmon At Its Peril", published in the Anchorage Daily News, 22 August 2001. (Copy attached).

Regarding the observations that I have presented in this letter, I have several questions:

1. Does the presentation and dissemination of the research findings by Easton et al., Hites et al. and Krkosek, Lewis and Volpe, conform to the principles and policies for scientific conduct of Canada's Tri-Council on Integrity in Research and Scholarship, and the U.S. Office of Research Integrity?
2. Which are or were the environmental organizations working with the Alaska Seafood Marketing Institute?
 - Is the David Suzuki Foundation one of the environmental organizations that was or is working with the Alaska Seafood Marketing Institute?
 - Have materials by the David Suzuki Foundation been used as described by the Executive Director of the Alaska Seafood Marketing Institute?

⁶⁷ http://www.sfu.ca/cstudies/science/summit/pdf/Summit_proceedings.pdf

3. Regarding SeaWeb's "Antifarming Campaign":

- Is the David Suzuki Foundation one of the "ENGOs" that the Gordon and Betty Moore Foundation referred to as an "antifarming ENGO"?
- Is the sea lice research one of the "aquaculture science messages" that SeaWeb integrated into its "antifarming campaign"?
- Has the David Suzuki Foundation or any of its grantees participated in:
 - "Identification of antifarming audience and issues"
 - "Standardization of antifarming messaging tool-kit"
 - "Co-ordination of media for antifarming ENGOs"
- Is the media coverage about sea lice, posted on the web-site of the Lewis Research Group part of SeaWeb's "earned media campaign"?
<http://www.math.ualberta.ca/~mkrkosek/media.htm>

In closing, I would like to leave you with a quote from an award-winning essay by a group of Alaskan high school students⁶⁸:

"There are negative impacts of commercial fishing as well, although they are not generally discussed in fish farming arguments. These risks include the cost to fresh water habitat by removing salmon carcasses from the ecosystem, hooking mortality and net dropout (estimated to between 10% - 20% of total harvest), "ghost nets," pollution from processing plants (which is considerably higher than organic pollution from salmon farms), and adverse marine mammal interactions.

Overall, these risks are not great, however, they are actually as serious a risk, or even more of a risk than the affects of fish farming, which can be controlled more readily." "The main point we are making is this: Whether we want to admit it or not the wild salmon populations are decreasing and soon they will be wiped out unless we do something about it. If you ask fisherman how their catches have been going the last few years they will say that they have decreased. Sadly there is little we can do to help the wild salmon populations directly. Reducing fishing seasons and catch limits, and closing off major spawning areas all help, but they aren't enough.

By supporting aquaculture and not holding it back, we can save the wild salmon populations faster and more productively than we have ever imagined possible. Additional benefits of the aquaculture of salmon would be to increase Alaska's share of the global salmon market, ensuring a steady year-around income from salmon exports, and stabilizing market prices by making top quality Alaska fish available fresh year around."

- Robert Anderson, Colleen Fisk, Lucas Kovtynovich, Joanne Pelletier, Dayton Will

I will appreciate your response to my observations, opinions, concerns and questions.

I can be reached at vivian.krause@mac.com or at 604.219.5905.

Sincerely,
Vivian Krause

⁶⁸ <http://seagrant.uaf.edu/nosb/papers/2005/apex-salmon.html>

Ads imperil Alaska salmon markets

By Jan Konigsberg

(Anchorage Daily News Published: August 22, 2001)

With the value of Alaska's commercial salmon harvest declining from an all-time high of \$768 million in 1988 to a mere \$275 million in 2000, the state of Alaska has been eager to recoup market share for its salmon. Accordingly, various state officials have been appealing to consumers by advertising Alaska's salmon as sustainably managed and as naturally organic. They tout Alaska's salmon as wild and its salmon habitat as pristine; they certify that fisheries are sustainably managed; and they warrant that public agencies work together to conserve salmon ecosystems. While making for good ad copy, these assertions are misleading and less than truthful:

Pristine habitat? Yes and no. Although considerable salmon habitat remains pristine in Alaska, much is not pristine. Extensive logging, particularly on federal and private lands, has degraded habitat on hundreds of streams and also affected near-shore marine waters. Road culverts block or impede fish passage on hundreds of salmon streams. Urban, suburban and rural development throughout the state has threatened many salmon populations and in some cases, particularly in Anchorage and Juneau, several populations have gone extinct. Since there have been no systematic, toxicological studies of salmon going to market, there is no way to be sure that some salmon have not been bioaccumulating toxins while feeding.

Sustainable management? Not quite. Alaska may have strong salmon management laws and policies on the books. Yet, what's "on-the-books" doesn't necessarily correspond to what's going on "in-the-field." For example, the law requires that road culverts not impede fish passage, but this law is seldom enforced. Moreover, there is simply insufficient data to know the status of Alaska's thousands of genetically distinct and uniquely adapted salmon populations and, therefore, it is not possible to know how well or how poorly managed they may be. Nor do we know whether salmon managers have been allowing enough salmon upstream to spawn and die in order to furnish the ecosystem with enough nutrients to ensure those ecosystems are optimally organic.

Agency cooperation? Hardly! Within state government, agencies have dissimilar, if not conflicting, missions with only the Department of Fish and Games subordinated to the conservation of salmon and their ecosystems. Historically, there has also been a lack of cooperation and coordination between federal and state agencies, especially on the Tongass National Forest, where the Forest Service until recently did not agree to the states fish habitat permitting authority. Perhaps the most revealing consequence of the lack of agency cooperation and coordination was the wreck of the Exxon Valdez, with its collateral damage to fish and wildlife.

Wild salmon? Who's kidding whom?! In some fisheries, hatchery-produced salmon account for more than 70 percent of the harvest, with more than a third of last years statewide commercial harvest being hatchery-produced. There is mounting evidence that hatchery-produced salmon have adverse impacts on wild salmon that are produced naturally.

While the Alaska salmon-marketing campaign fails the science test, it is true nonetheless that Alaska's salmon seem to have fared better than their brethren to the south. Yet, Alaska's salmon face many of the same threats. Indeed, the greatest threat facing Alaska's wild salmon is the belief that what decimated salmon runs everywhere else can't happen here. This creates a false sense of security among the public-at-large and especially among decision-makers. When state officials pat themselves on the back for maintaining good habitat and great management, then the Legislature cannot but underfund salmon management as well as scoff at those who believe our salmon are in trouble not only in the marketplace, but also in the wild. Alaska markets salmon at its peril: misleading advertising will eventually shrink rather than expand future markets as well as forgo the opportunity to build public support to ensure salmon conservation, essential to make today's hype tomorrows reality!

Jan Konigsberg directs the Alaska Salmonid Biodiversity Program for Trout Unlimited.