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14 May 2009

Dr. David Suzuki, Founder  
The David Suzuki Foundation  
Suite 219, 2211 West 4th Avenue  
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Dr. Suzuki,

**RE: Salmon Aquaculture, Contaminants in Farmed Salmon, and Sea Lice**

Further to my previous letters, I am writing to reiterate my concerns and my opinions about the information that you provide to the public regarding salmon aquaculture and specifically, about contaminants in farmed salmon, and sea lice.

As before, I am writing as a concerned member of the public. This is an open letter.

**Salmon Aquaculture**

The David Suzuki Foundation advises consumers to "buy wild" and avoid farmed salmon.<sup>1,2,3</sup> In the North American market, more than 90 per cent of 'wild' salmon is Alaskan.<sup>4</sup>

The fact is, about one third of 'wild' Alaskan salmon is actually *ranch*ed salmon.<sup>5</sup> Ranch

ed salmon are hatched in plastic trays. They are grown in tanks, fed pellets and raised in net pens before being released into the open ocean. The dichotomy that you present between farmed vs. 'wild' salmon is flawed in the sense that it overlooks or disregards ranch

ed salmon.

Both Alaska and British Columbia are growing salmon. B.C. harvests about 22 million farmed salmon every year. In 2008, Alaska harvested about 45 million ranch

ed salmon, twice as many as the number of farmed salmon grown in B.C..<sup>6</sup>

In my opinion, the question that we should be asking is what is the best way to grow salmon in each unique ecosystem. Answering this question requires sound research that is objective and impartial and that is reported accurately and comprehensively.

On the basis of my analysis of the 26 items listed in the attached document, it is clear to me that most of the David Suzuki Foundation's information about salmon farming is selective and negative. For example:

- In the on-line article titled, "Lessons About Farmed Salmon Every Canadian Should Know," all five of the messages about farmed salmon are negative.<sup>7</sup> This article doesn't mention any of the positive aspects of salmon farming such as the fact that it avoids over-fishing, the by-catch of fish from endangered stocks of wild salmon and endangered whales, and the drain of ocean-ranching on the food chain and the carrying capacity of the Pacific ecosystem.
- The David Suzuki Foundation has drawn attention to marine mammal deaths at salmon farms - and rightly so - but little or nothing is said about the same problem in commercial fisheries. According to the Alaska Fisheries Science Centre, since 1999, at least 17 whales have been killed in Alaskan fisheries.<sup>8</sup> Three of those were endangered

species (a humpback, a sperm whale and a fin whale). The Alaska Fisheries office reports that five humpback whales have been killed in Alaskan salmon fisheries since 2001 alone.<sup>9</sup> Why does the public hear nothing from the David Suzuki Foundation about endangered whales killed in Alaskan fisheries?

- The David Suzuki Foundation has drawn attention to the carotenoid pigments and the fish meal/fish oil used in feed for farmed salmon yet you do not mention that the same issues are relevant to starter feed for ranched salmon. Your foundation also doesn't mention the carmine used to produce some artificial shellfish made from MSC-certified Alaskan pollock. Carmine is derived from the dried and ground guts of the cochineal, a beetle-like insect from South America.<sup>10</sup>

Salmon farming, ocean-ranching and the commercial salmon fishery all have pros and cons. And yet, generally speaking, the David Suzuki Foundation tends to say only bad things about farmed salmon and only good things about 'wild' salmon but not the good things about farmed salmon nor the bad things about 'wild.' In this way, it seems to me that the information provided by the David Suzuki Foundation is selective.

UBC Policy notes that integrity among scholars is to maintain and enhance the value of impartiality that universities offer.<sup>11</sup> As it appears to me, the information that you provide with regards to salmon aquaculture, is not impartial because you present 'wild' salmon in an overly positive light and farmed salmon in an overly negative light.

### **Contaminants in Farmed Salmon**

As I noted in my previous letter, the David Suzuki Foundation says that farmed salmon is "high" in PCBs and should be avoided especially by women of childbearing age and young children.<sup>12,13,14</sup> The seafood guide promoted by your foundation suggests that regular consumption of farmed salmon poses a "health threat" because of PCBs.<sup>15</sup>

You sent a form letter (attached) in which you thanked your supporters for helping you "to uncover the fact that B.C. farmed salmon is heavily contaminated with PCBs and other toxins." The problem is, as I pointed out in my previous letter, you did not uncover what you said you did. The study on which you based your claim (Easton et al., 2002) used an extremely small sample size (four 'wild' salmon vs. four farmed salmon), unconventional data presentation and selective reporting of the findings.<sup>16,17,18,19</sup> Mercury levels were *higher in wild salmon* than in farmed. In fact, they were nearly twice as high.<sup>20</sup>

On the basis of the information that I will outline ahead, I believe that when you claim that farmed salmon is high in contaminants and should be avoided by women of childbearing age and young children, you are mistaken. Here's why:

1. Studies clearly show that farmed salmon is not high in PCBs.<sup>21,22</sup> According to data compiled by Harvard researchers, tuna and sardines have higher levels of PCBs than farmed salmon.<sup>23</sup>
2. At Idaho University, Dr. Ronald Hardy estimated the average, yearly PCB intake at about 30 units for farmed salmon, 300 units for chicken, 700 units for milk and about 2,400 units for beef.<sup>24</sup> Clearly, farmed salmon is not a major source of exposure to PCBs compared to other foods.

3. Farmed salmon is especially low in mercury. Wild halibut has 20 times more mercury than farmed salmon.<sup>25</sup> Tuna has even higher mercury levels than halibut.<sup>26</sup> According to a study reported by the International Pacific Halibut Commission, halibut from certain regions of Alaska has 45 times as much mercury as has been reported in farmed salmon.<sup>27</sup> Halibut that may be high in mercury *isn't* labelled.

If public health is your concern, it would make more sense to raise awareness about mercury in wild fish rather than about PCBs in farmed salmon.

4. The world's leading health authorities to not advise that farmed salmon is high in contaminants and do not advise that it should be avoided. On the contrary:
  - Health Canada says, "consuming farmed salmon does not pose a health risk to consumers."<sup>28</sup>
  - In the U.K., the Scientific Advisory Committee on Nutrition and the Committee on Toxicity recommends, "Everyone should eat at least two portions of fish a week, including one portion of oily fish." The U.K. experts say, "The advice on farmed salmon is the same."<sup>29</sup>
  - The European Food Safety Authority says, "with respect to their safety for the consumer there is no difference between wild and farmed fish."<sup>30</sup>
  - The U.S. Institute of Medicine recommends that females who are or may become pregnant or who are breastfeeding can safely consume 12 ounces of fish per week. Farmed salmon is not excluded from the recommended fish.<sup>31</sup>
5. Fish is an excellent source of omega-3 fatty acids. According to the U.S. Institute of Medicine, farmed Atlantic salmon is *higher* in omega-3s than any other fish.<sup>32</sup> As I mentioned in a previous letter, researchers from the U.B.C. Department of Paediatrics have found that Vancouver infants of well-educated mothers are born with deficiency in omega-3s because their mothers didn't get enough while pregnant.<sup>33</sup> I believe that this situation is not helped by the fact that the David Suzuki Foundation tells women of childbearing age to avoid farmed salmon.

## **Sea Lice**

The David Suzuki Foundation claims that its research shows that sea lice originating from salmon farms are causing high levels of mortality among juvenile salmon in the wild, and putting their populations at risk of extinction.<sup>34,35,36</sup> For example, the David Suzuki Foundation reports, "up to 95 per cent of wild juvenile pink and chum salmon are dying from sea lice infections in coastal British Columbia."<sup>37</sup> The David Suzuki Foundation also reports, "sea-lice infestations frequently kill over 80 per cent of wild salmon returns."<sup>38</sup> When you make these claims, I believe that you are mistaken. Here's why:

1. In the sea lice research that the David Suzuki Foundation reports, the published prediction of mortality due to sea lice was actually a very wide range, from **9 to 95 per cent**.<sup>39</sup> The fact is, the published paper actually predicted both high mortality *and high survival*. For example, the published paper reports a prediction of 69 to 91 per cent *survival* of juvenile wild chum salmon from Knight Inlet. The David Suzuki Foundation selectively publicizes the prediction of high mortality but not the prediction of high survival.<sup>40,41,42,43</sup>

2. In stark contrast to the claims of the David Suzuki Foundation, wild salmon returns and studies suggest that salmon farming and wild salmon populations can co-exist sustainably in the Broughton. Here's the evidence:

- In 2000, *after 13 years of salmon farming in the Broughton*, **3.1 million** wild pink salmon returned to spawn in the area. According to Fisheries and Oceans Canada (DFO), this exceptionally *high* return was roughly eight times the historical average and *higher* than all previous returns observed in the past 50 years.<sup>44</sup>
- The marine survival of the wild pink salmon offspring of 2002 was estimated at 34 per cent, an unprecedented *high*.<sup>45</sup>
- In 2004, the return of wild pink salmon to Glendale Creek - the largest watershed in the Broughton - was *the third highest return* since 1953.<sup>46</sup>

Clearly, the computer-generated, hypothetical prediction that sea lice from salmon farms are putting wild pink salmon at risk of extinction is at odds with these facts. Indeed, if 34 per cent of the offspring of 2002 survived, it is mathematically impossible that "up to 95 per cent" are being killed by sea lice from salmon farms.

3. In 2000, the return of wild pink salmon to the Broughton Archipelago was extremely low: 147,000 fish. Extremely low returns also followed extremely high returns in the 1970s and 1980s. Wild pink salmon returns are known to vary widely from year to year. In Alaska, for example, the return of pink salmon in 2006 was less than 10 per cent of the average, the lowest return since 1975.<sup>47,48</sup>
4. The David Suzuki Foundation claims that sea lice from salmon farms are putting wild pink salmon in the Broughton Archipelago at risk of extinction. As mentioned earlier, the largest watershed in the Broughton is Glendale Creek. According to DFO data, wild pink salmon returns to the Glendale *increased* from about 16,000 in 2002 to about 668,000 two years later.<sup>49</sup> In the analysis on which the extinction prediction is based, data for Glendale Creek was excluded.<sup>50</sup> The sea lice researchers say that they excluded Glendale data because Glendale Creek has a spawning channel and yet they did not exclude the Kakweikan which also has a spawning channel.<sup>51</sup> Dr. Brian Riddell and others indicate that hatchery-born juvenile salmon are no less susceptible to sea lice than those which are not hatchery-born.<sup>52</sup> The exclusion of Glendale data, therefore, appears to be unjustified.
5. Sea lice are found on many species of wild fish, including herring, rockfish and sticklebacks.<sup>53,54</sup> A method to determine whether a sea louse originated from wild fish or from a fish farm, is under development but currently does not exist.<sup>55,56</sup> In the meantime, there is no way to tell where sea lice originate. It follows that the many claims made about "farm-origin sea lice," "fish farm lice," "farm-induced sea lice" and "sea lice from salmon farms," are unsubstantiated.
6. The David Suzuki Foundation says that sea lice are rare on juvenile wild salmon.<sup>57</sup> And yet, an Alaskan scientist reportedly found that approximately 25 per cent of juvenile pink salmon had sea lice, ranging from one to six lice per fish.<sup>58,59</sup> Another group of Alaskan scientists found that the prevalence of sea lice on juveniles was about 3 - 4 per cent for pinks and chums, 8 per cent for sockeye and 53 per cent for coho. These findings are from Alaska where there are no salmon farms.<sup>60</sup>
7. The David Suzuki Foundation says "sea lice infestations frequently kill over 80 per cent of wild salmon returns."<sup>61</sup> And yet, studies from the 1960s - when there

were no salmon farms - found that between 59 and 77 per cent of juvenile salmon die within the first 40 days after entering the ocean from their natal streams.<sup>62</sup>

8. The David Suzuki Foundation says that its research shows that sea lice from salmon farms *cause* high levels of juvenile salmon mortality in the wild.<sup>63</sup> According to Hansard transcripts, the lead sea lice researcher, Dr. Martin Krkosek, admitted in a public hearing of the B.C. government that his data is "all correlative."<sup>64</sup> As we know, a correlation is not evidence of causality.
9. Senior scientists and experts have noted serious flaws in the sea lice research funded and publicized by the David Suzuki Foundation: inadequate baseline data, inadequate quality assurance, selective use and reporting of data, flawed assumptions and misreporting.<sup>65,66,67,68,69,70</sup>

The Science Bulletin of the David Suzuki Foundation reports, "These data, due to the massive sampling effort and the unequivocal nature of the conclusions, satisfy even the most conservative benchmark for proof...."<sup>71</sup> According to the lead sea lice researcher, the "massive sampling effort" was conducted over 14 days of fieldwork. That's hardly a "massive effort" by the standards of the scientific community. Moreover, according to the company that operates one of the salmon farms studied, there were *no fish at the farm* during part of the data collection.<sup>72</sup>

10. According to Canadian government data, when all watersheds in the Broughton Archipelago are considered, wild pink salmon populations are actually *increasing*. Twenty scientists from the U.S., Canada and Europe, have endorsed this view.<sup>73</sup>

I believe that if the David Suzuki Foundation and others would accurately report the actual, computer-generated, hypothetical predictions of both high mortality *and high survival*, and how these predictions were manufactured in Edmonton using highly selective data and flawed assumptions, British Columbia would not have the sea lice controversy that we do today.

In closing, I earnestly request that you to make amends for the selective and inaccurate information that you have publicized regarding salmon aquaculture, contaminants in farmed salmon, and sea lice. The attached document provides a list of 26 items of on-line information that I believe to contain inaccurate and/or misleading information.

In particular, I reiterate my appeal of 9 April 2009 that you retract your flawed advice that women of child bearing age and young children should avoid farmed salmon. I also appeal to you to retract your bogus claim that wild pink salmon are at risk of extinction by sea lice from salmon farms. Specifically, I appeal to you to set the record straight and publicly clarify:

- a) Your research does not show that farmed salmon is high in contaminants,
- b) Your research does not show that sea lice originating from salmon farms are causing high levels of mortality among juvenile salmon in the wild.

Thank you for considering my opinions and my appeal to you. You may reach me at [vivian.krause@mac.com](mailto:vivian.krause@mac.com) or at 604.618.8110.

Sincerely,

Vivian Krause

## SOURCES

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ANADROMOUS FISH COMMISSION, September 2003

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<sup>62</sup> Parker, R.R. 1968. Marine mortality schedules of pink salmon of the Bella Coola river, central British Columbia. J. Fish. Res. Bd. Canada, 25(4) 757-794.

<sup>63</sup> <http://www.davidsuzuki.org/Publications/WildSalmonMortality.asp>

<sup>64</sup> <http://www.leg.bc.ca/cmt/38thparl/session%2D2/aquaculture/hansard/W61205a.htm> Page 1026.

<sup>65</sup> Fisheries and Oceans Canada. 2006 State-of-Knowledge Presentation for the Special Committee on Sustainable Aquaculture of the Legislature of British Columbia. 30 November 2006. [http://www.pac.dfo-mpo.gc.ca/sci/aquaculture/sok/document\\_e.pdf](http://www.pac.dfo-mpo.gc.ca/sci/aquaculture/sok/document_e.pdf)

<sup>66</sup> Brooks, K.M. 2005. The effects of water temperature, salinity, and currents on the survival and distribution of the infective copepodid stage of sea lice (*Lepeophtheirus Salmonis*) originating on Atlantic salmon farms in the Broughton Archipelago of British Columbia Canada. Reviews in Fisheries Science, 13: 177-204.

<sup>67</sup> Brooks. 2006. A critical review of Krkosek et al. (2006) Epizootics of wild fish induced by farm fish. [http://www.salmonfarmers.org/pdfs/critical\\_review\\_of\\_Krkosek.pdf](http://www.salmonfarmers.org/pdfs/critical_review_of_Krkosek.pdf)

<sup>68</sup> Groves, D. (2006) Sea lice and Krkosek et al. 2006. An analysis presented to the BC Government Special Committee on Sustainable Aquaculture. 27 October 2006.

<sup>69</sup> McVicar. 2005. Scientific critique of the publication by Krkosek et al. (2005) Transmission dynamics of parasitic sea lice from farm to wild salmon. Proceedings of the Royal Society. <http://72.14.253.104/search?q=cache:dmyGWUx2HEIJ:www.cnr.uidaho.edu/fish510/PDF/Sea%2520Lice%2520review.doc+%22Scientific+critique+of+the+publication+by+Krkosek+et+al.%22&hl=en&ct=clnk&cd=1&client=safari>

<sup>70</sup> [http://www.al.gov.bc.ca/ahc/fish\\_health/Sealice/AAVBC\\_sealice\\_comments.pdf](http://www.al.gov.bc.ca/ahc/fish_health/Sealice/AAVBC_sealice_comments.pdf)

<sup>71</sup> [http://www.davidsuzuki.org/files/Oceans/Krkosek\\_lice\\_brochure\\_Final\\_2005-03-29.pdf](http://www.davidsuzuki.org/files/Oceans/Krkosek_lice_brochure_Final_2005-03-29.pdf)

<sup>72</sup> Brooks, K.M. 2005. The effects of water temperature, salinity, and currents on the survival and distribution of the infective copepodid stage of sea lice (*Lepeophtheirus Salmonis*) originating on Atlantic salmon farms in the Broughton Archipelago of British Columbia Canada. Reviews in Fisheries Science, 13: 177-204. See pg. 182.

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