Risk and Precaution: Salmon Farming

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Minimal Risk and the Precautionary Approach

Justice Cohen’s Recommendations 18 and 19
Cohen Recommendation 18

“If at any time between now and September 30, 2020, the Minister of Fisheries and Oceans determines that net-pen salmon farms in the Discovery Islands pose more than a minimal risk of serious harm to the health of migrating Fraser River sockeye salmon, he or she should promptly order that those salmon farms cease operations.”
Cohen Recommendation 19

“On September 30, 2020, the Minister of Fisheries and Oceans should prohibit net-pen salmon farming in the Discovery Islands unless he or she is satisfied that such farms pose at most a minimal risk of serious harm to the health of migrating Fraser River sockeye salmon. ...”
Some Key Risks

- Risk of introduction of exotic pathogens,
- Risk of amplification of exotic or endemic pathogens and parasites, and
- Risk of pathogen mutation to higher levels of virulence.
Defining *Minimal Risk*

- **Minimal**
  - As small as possible?
  - Very small or negligible?

- **Risk**
  - Must be a quantity
  - Probability
Operational Difficulties

• Unanticipated surprises are commonplace:
  – Biomagnification of persistent organic pollutants
  – CFC’s as catalysts in stratospheric chemistry
  – Methyl mercury from river dam development
  – Global Warming $\rightarrow$ Complex Climate Change

• How to calculate the probability of a surprise?
Aquaculture Impact Context

**Anticipated Problems**
- *Parasites and infectious agents*
- Alien species
- Impacts on sea mammals
- Effluent pollution

**Complexities**
- Convoluted ecosystem dynamics
- Delayed behavioural changes
- Unpredictable evolutionary changes
Some Anticipated Evolutionary Changes

• Resistance to Slice: Virtually bound to happen, but uncertainty over when and whether alternatives could be found in time.

• Promotion of virulence, especially for influenza-related ISA virus, but how frequently? Probability of impact on any one of ≥ 7 Pacific salmon and trout, plus char, herring, oolichan, etc.?
Alternative Approach

• Focus on qualitative assessment of viability of the evidence of serious harm.

• New Question:

  “Does the viability of the available evidence exceed some appropriate minimal threshold above which a reasonable person might view the risk of serious or irreversible harm as greater than minimal?”
Precautionary Principle: Rio Declaration

• “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”
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Lack of Full Scientific Certainty

• Canadian Chamber of Commerce
• Suggests that this phrase can be taken to imply

“that there is still a need for sufficient scientific data to establish that a plausible threat exists for the possibility of serious or irreversible harm.”
European Union Guidance

“It [the precautionary principle] covers cases where scientific evidence is insufficient, inconclusive or uncertain and preliminary scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the high level of protection chosen by the EU.”
“In determining what constitutes a sufficiently sound or credible scientific basis, the emphasis should be on providing a sound and credible case that a risk of serious or irreversible harm exists. ‘Sufficiently sound’ or credible scientific basis should be interpreted as a body of scientific information – whether empirical or theoretical – that can establish reasonable evidence of a theory’s validity including its uncertainties and that indicates the potential for such a risk.”
Other Considerations

Relative cost of the proposed precautionary measures vs. associated losses of the perceived threat.
Cohen’s Recommendation 14

- Interim recommendations requiring no further evidence:
  - Licence duration not to exceed one year.
  - No new licences
  - No increase in production under an existing licence.
- Low-cost measures → no need for further evidence.
Cohen’s Recommendations 18 and 19

Higher-cost measures (removal of farms)

Higher threshold of evidence
(implicit in conditional implementation pending Minister’s assessment of evidence existing at later dates)
Potential Categories of Evidence

0. Vague anxiety.
1. Evidence from other, similar instances of such damage having occurred.
2. Early warning signs, including international experience in highly similar circumstances.
3. Context-specific correlational or epidemiological evidence.
4. Additional evidence from controlled experiments demonstrating a potential causal mechanism.
5. Occurrence of serious or irreversible harm with clear evidence of the causal mechanism.
0. Vague Anxiety

Mountain Travel

Aquaculture Context

• It’s never been done before. I’m a little anxious.
5. Serious Irreversible Harm

Mountain Travel

Technological Innovation

• Extinction of Atlantic Salmon from Lake Ontario
• Climate Change?
1. Somewhat Similar Instances

Mountain Travel

Aquaculture

- Smallpox in North America
- Dutch Elm Disease
2. Specific Early Warning Signs

**Mountain Travel**

- Unusual Local Conditions: Potential for Increased Avalanche Risk
  - Areas in the Rockies, Columbias, and Northwest

**Aquaculture**

- Novel Sea Lice Infestations
- Slice Resistance
- Sea Lice as Vectors for ISAV
- RT PCR Evidence of ISAV
- ...
3. Correlational Evidence

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<th>Mountain Travel</th>
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| ![Mountain Travel Image](image) | • Global Control-Impact Study (Ford and Myers)  
• Lower PRV Prevalence in Chilko vs. Lower Fraser (Miller et al.) |
4. Evidence of Causal Mechanism

Mountain Travel

Aquaculture

• ...

[Image of snow-covered terrain with a shovel]
Speaking for the Salmon General Agreement*
February 27, 2013

• Three criteria ... [that] would indicate more than minimal risk:

A. Evidence of the presence of the infectious agent in both farmed and wild species.

B. Evidence that the infectious agent can be transmitted from farmed to wild salmon. This evidence could be correlative.

C. Evidence that the infectious agent causes disease in wild fish, such as tissue damage or impaired performance. ... could also be correlative though confirmatory experimental evidence ... preferred.

*Not unanimous
Fish Farm Impacts

• Threats to wild Pacific salmonids from aquaculture-related pathogens and parasites.