Salmon Aquaculture Dialogue
November 29-30, 2006

Managing Fish Health in British Columbia

Sonja Saksida BSc DVM MSc
Outline

• Farmed Salmon
  – Fish health management
  – Sea lice management
  – Therapeutant usage

• Gaps in knowledge
Salmon Farms
Health monitoring on salmon farms

• Monitor/Assess
  – Environment (i.e. water sampling, benthic sampling)
  – Salmon Populations (i.e. feeding rates, growth)
  – Moribund and Moralities (i.e. infectious disease, non-infectious +/- environmental disease)

• Manage to mitigate problems

• Fish Health Management Plans
  – condition of Aquaculture Licence
Examine moribund and mortalities to monitor health in populations
BCSFA Fish Health Database - FHD

• based on recommendations from Salmon Aquaculture Policy

• 2002 – Farm level fish mortality information reported to a central database every month

• database is operated by a third party

• quarterly reports compiled and provided to the provincial government

• reports available on the web
  (http://www.al.gov.bc.ca/ahc/fish_health/bcsfa_reports.htm)
Fish Health Auditing and Surveillance Program (FHASP)

• BC Ministry of Agriculture and Lands (BCMAL)

• Established to verify farm data

• Active surveillance
  – BCMAL fish health staff inspect farm sites and collect specimens for fish health evaluation

• 30 farms audited per quarter (>25%)
  – selected randomly
Fish Health Auditing and Surveillance Program (FHASP)

- Survival high
- Major mortality not due to infectious disease
- Farms reporting accurately
Sea lice on farmed salmon in BC – Prior to 2003

Mobile *L. salmonis* on farmed Atlantic salmon (>1yr SW) in Scotland

![Bar chart showing the abundance of *L. salmonis* in Scotland from 1996 to 2000.](image)

Revie et al 2002 Pest Management Sci 58:576-584
Sea lice Monitoring on Salmon Farms in BC – Prior to 2003

• *Lepeophtheirus salmonis* and *Caligus clemensi*

• Enumeration of sea lice - only if there was a health and welfare concern at the farm
  – Only few records

• Very few to no treatments for control of sea lice
Sea lice Monitoring on Salmon Farms in BC – Since 2003

• March 2003
  – Regular sea lice monitoring by the farms in the Broughton Archipelago

• October 2003
  – Regular sea lice monitoring by all salmon farms in BC
  – Reporting to central database
  – Monthly reports summarizing sea lice abundance levels by fish health zone provided to the BCMAL
    • BCMAL website
      (http://www.al.gov.bc.ca/ahc/fish_health/Sealice_monitoring_results.htm)
Sea Lice Action Plan

- Atlantic salmon – 3 pens 20 fish sampled - reported monthly
- Pacific salmon – 30 fish per farm - reported quarterly
- chalimus; mobile L. salmonis; mobile C. clemensi
- Count lice on fish and dislodged in anaesthetic bath
  - Calculate mean abundance (average # /fish)
- Treatment triggers set at 3 mobile L. salmonis (March – June)
Pacific farmed salmon data

<table>
<thead>
<tr>
<th>Region</th>
<th>Farms</th>
<th>Total treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>0</td>
</tr>
</tbody>
</table>

Atlantic farmed salmon data

Sea Lice Monitoring and Auditing Program

- January 2004

- Established to verify farm data

- BCMAL fish health personal

- 25% of active farms audited every quarter (50% farms in Q2 2005)
  - Random selection
Outcomes from the sea lice monitoring programs

- Farmers were accurately reporting sea lice information

- Confirmed sea lice levels very low on farmed Pacific salmon
  - No treatments
  - Mandatory monitoring and reporting stopped

- Sea lice not a significant health concern in Atlantic salmon in BC
  - Treatment levels low (≤2 from smolt to harvest)
    - Primarily provided to meet regulation requirements not for health concerns
  - Regional differences
    - Mandatory monitoring and reporting on farms in zone 3.1 stopped but random audits continue

- Reports
Therapeutant use in BC Aquaculture

• Require Veterinary Prescription

• Only method of administration - medicated feed

• Most of the antibiotics are used in fish less than 2000 grams in size (non-food fish size).

• There are no hormones or pesticides used on food fish in the BC aquaculture industry

• Treatment data collected and compiled by Health Canada, CFIA, and BCMAL

From http://www.agf.gov.bc.ca/ahc/fish_health/antibiotics.htm
Wild salmon in BC

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook</td>
<td>0.4</td>
<td>1.7</td>
<td>1.4</td>
<td>0.8</td>
<td>0.5</td>
<td>0.7</td>
<td>1.7</td>
<td>2.2</td>
</tr>
<tr>
<td>Sockeye</td>
<td>15.5</td>
<td>25.3</td>
<td>5.1</td>
<td>1.7</td>
<td>8.5</td>
<td>7.2</td>
<td>10.1</td>
<td>6.3</td>
</tr>
<tr>
<td>Coho</td>
<td>3.4</td>
<td>0.8</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>0.1</td>
<td>0.5</td>
<td>0.8</td>
</tr>
<tr>
<td>Pink</td>
<td>8.4</td>
<td>12.2</td>
<td>3.9</td>
<td>9.5</td>
<td>7.1</td>
<td>10.9</td>
<td>8.6</td>
<td>15.4</td>
</tr>
<tr>
<td>Chum</td>
<td>6.5</td>
<td>8.7</td>
<td>19.9</td>
<td>5.0</td>
<td>2.8</td>
<td>5.8</td>
<td>12.4</td>
<td>13.7</td>
</tr>
<tr>
<td>Wild Total</td>
<td>34.1</td>
<td>48.7</td>
<td>30.3</td>
<td>17.0</td>
<td>18.9</td>
<td>24.7</td>
<td>33.3</td>
<td>38.4</td>
</tr>
<tr>
<td>Farmed Salmon</td>
<td>27.8</td>
<td>36.5</td>
<td>42.3</td>
<td>49.6</td>
<td>49.4</td>
<td>68.0</td>
<td>84.2</td>
<td>72.7</td>
</tr>
</tbody>
</table>

- Spillover/Spillback of infectious diseases
  - Does they occur?
  - What are the implications?

Knowledge Gaps

• Baseline knowledge of health in the farmed and wild populations
  – Baseline knowledge in farmed populations
  – Lack baseline knowledge in wild populations

• Measurements of effect/impact (pathogen vs disease)
  – Measures to assess and manage present in farmed populations
  – Lacking in wild populations
Summary of data

Farmed Salmon
• Population data
  – Trackable populations
  – Data present (i.e. growth rates)
• Fish health data
  – Monitored and managed
  – Assess for disease (infectious/non infectious)
  – Assess mortality patterns
  – Determine Cause & Effect
• Sea lice data
  – Monitored and managed
  – Infection level
  – Assess effect & impact

Wild Salmon/Fish
• Population data
  – Less trackable populations
  – Escapement/catch data only
• Fish health data
  – Very little collected data
  – Assess only presence of pathogen NOT disease
  – Cannot assess mortality patterns
  – Cannot determined Cause & Effect
• Sea lice data
  – Select juvenile data only
  – Infection level
  – ?
Sea lice projects - ongoing

Farming Industry/Government/NGO collaborative projects

• Monitoring programs

• Assessment of the DFO/Farm data

• Oceanography studies