

**Salmon Aquaculture Dialogue
November 29-30, 2006**

Managing Fish Health in British Columbia

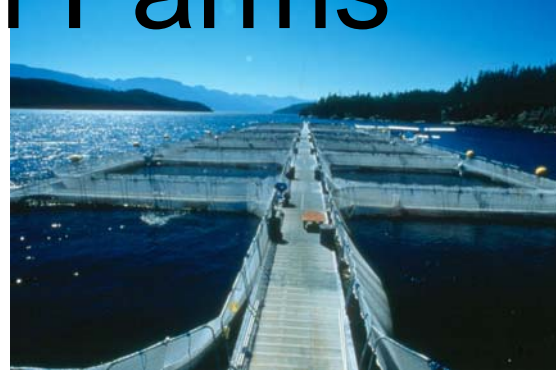
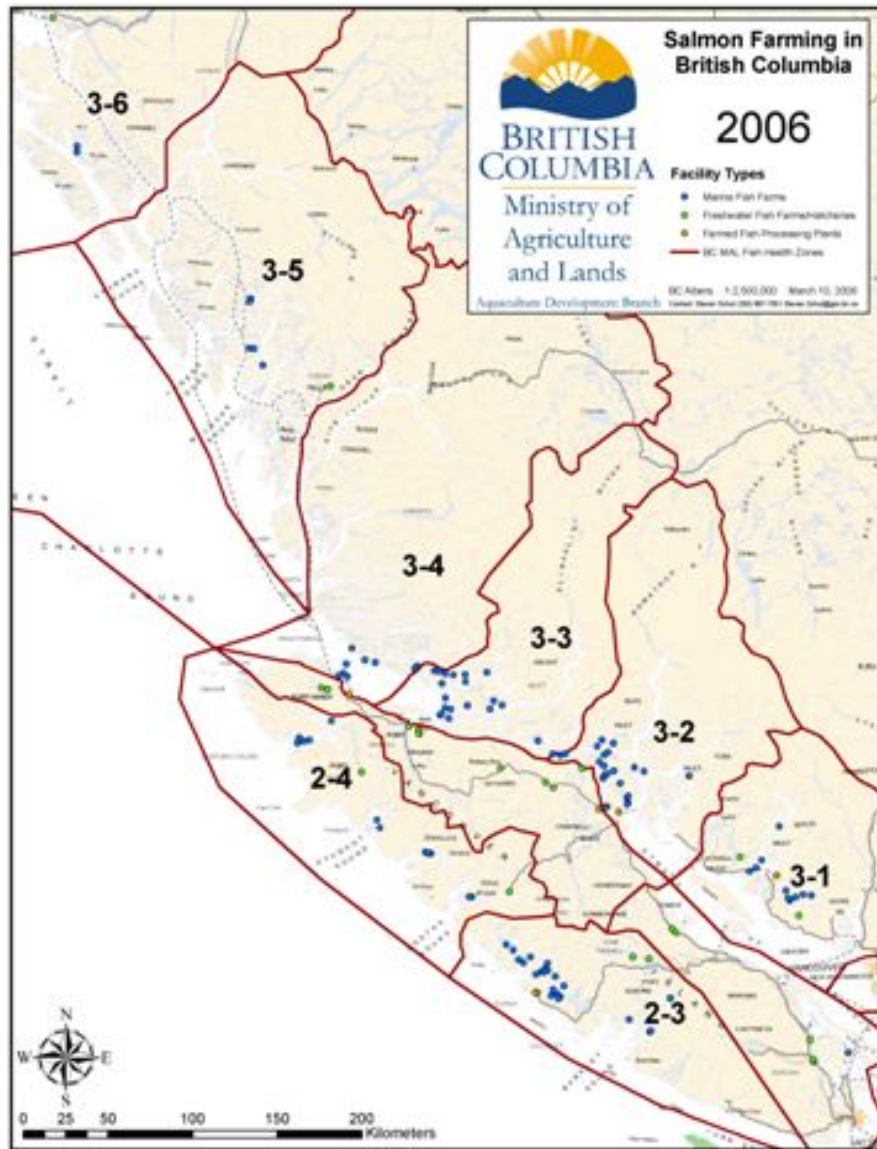
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Outline

- Farmed Salmon
 - Fish health management
 - Sea lice management
 - Therapeutant usage
- Gaps in knowledge

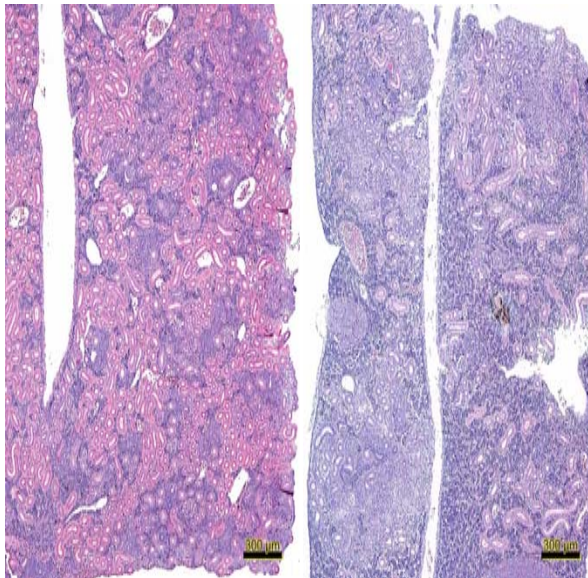
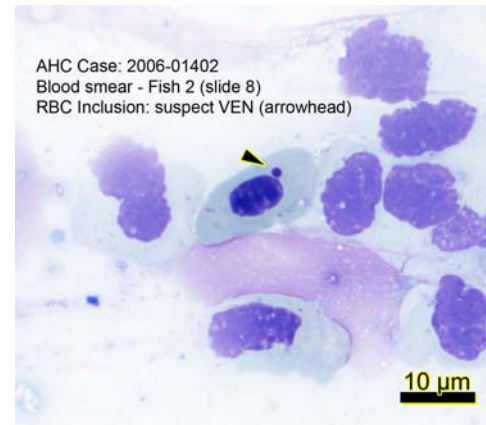
Salmon Farms



Health monitoring on salmon farms

- Monitor/Assess
 - Environment (i.e. water sampling, benthic sampling)
 - Salmon Populations (i.e. feeding rates, growth)
 - Moribund and Mortalities (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



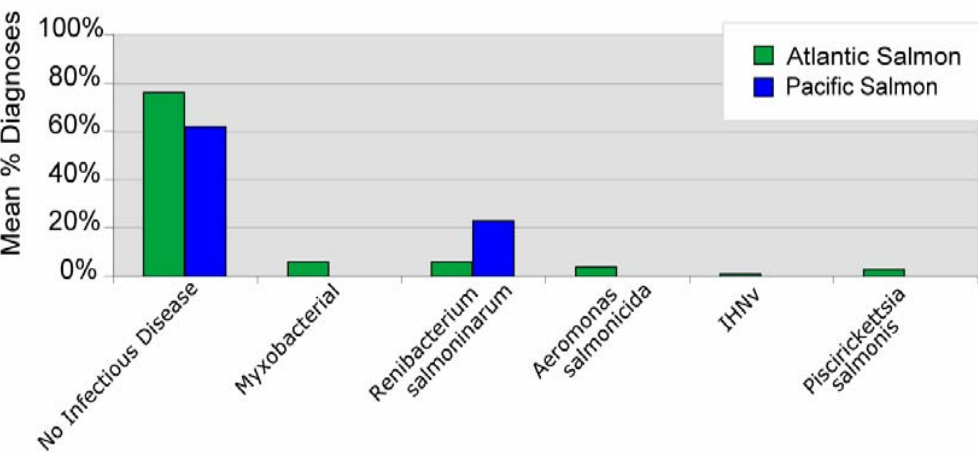
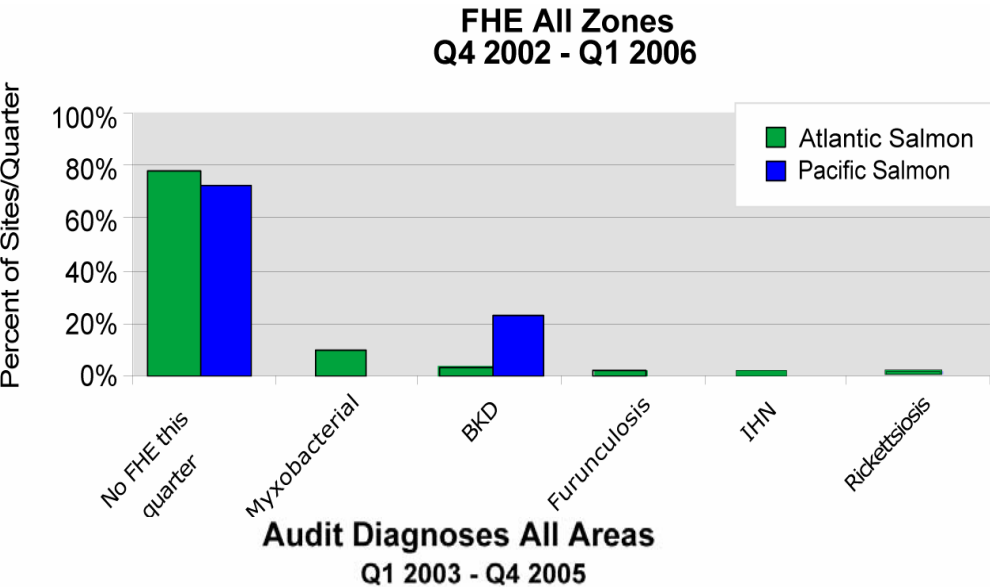
BCSFA Fish Health Database - FHD

- 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

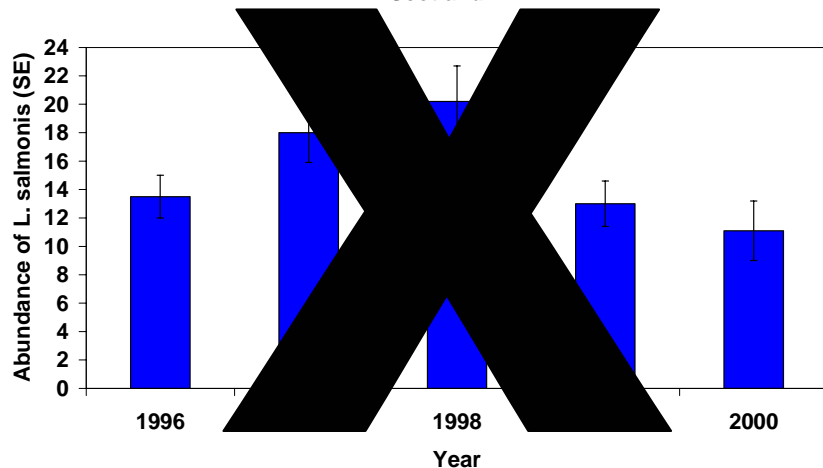
Fish Health Auditing and Surveillance Program (FHASP)



- 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



Year

Age # of
Tx in
Scotland

2

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

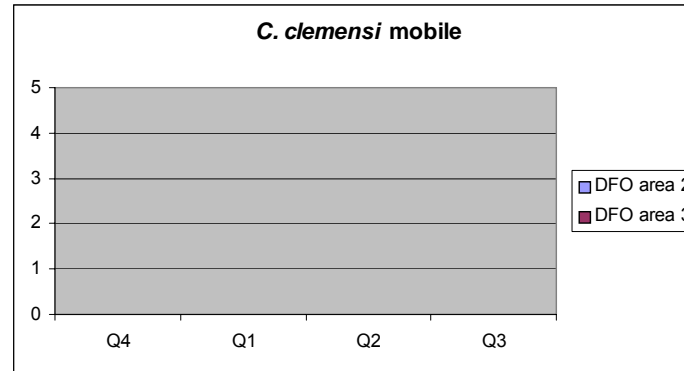
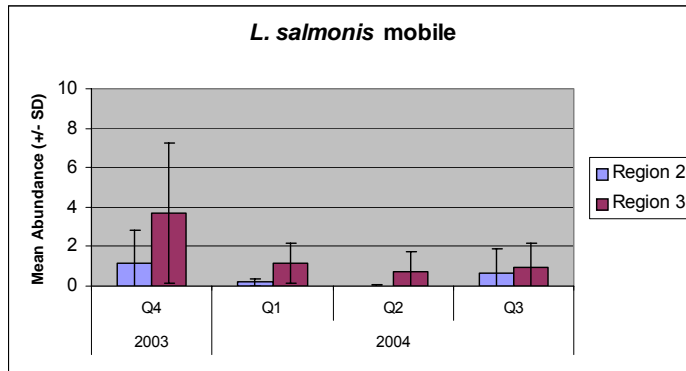
- March 2003
 - Regular sea lice monitoring by the farms in the Broughton Archipelago
- October 2003
 - Regular sea lice monitoring by all salmon farms in BC
 - Reporting to central database
 - Monthly reports summarizing sea lice abundance levels by fish health zone provided to the BCMAL
 - BCMAL website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

Sea Lice Action Plan

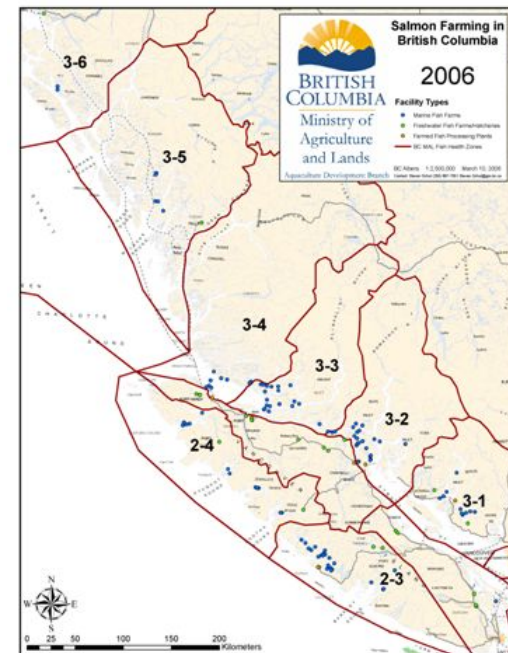
- Atlantic salmon – 3 pens 20 fish sampled -reported monthly
- Pacific salmon – 30 fish per farm - reported quarterly
- chalimus ; mobile *L. salmonis* ; mobile *C. clemensi*
- Count lice on fish and dislodged in anaesthetic bath
 - Calculate mean abundance (average # /fish)
- Treatment triggers set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



Pacific farmed salmon data



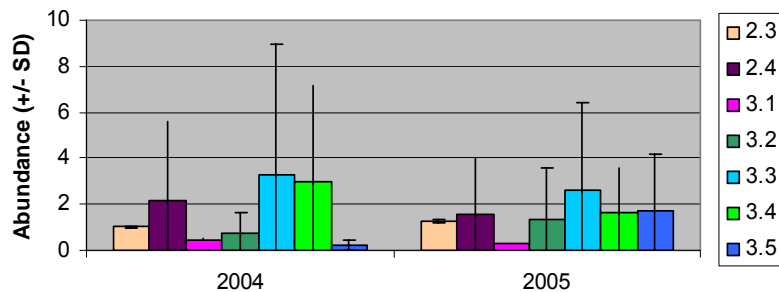
Region	Farms	Total treatments
2	11	0
3	16	0



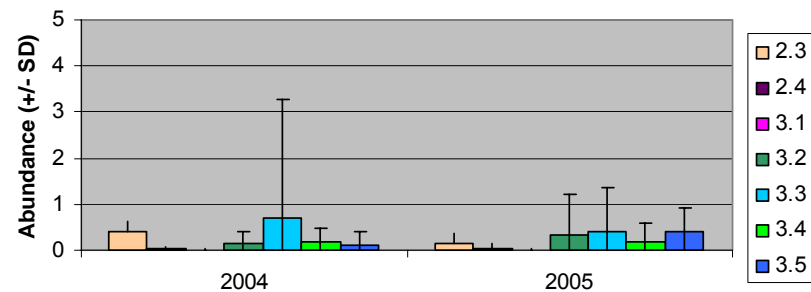
From Saksida, S., Constantine, J., Karreman, G.A., Neville, C. Sweeting, R. and R. Beamish (2006). Evaluation of sea lice, *Lepeophtheirus salmonis*, abundance levels on farmed salmon in British Columbia, Canada. In. The Proceedings from the International Symposium on Veterinary Epidemiology and Economics XI, Cairns, Australia.

Atlantic farmed salmon data

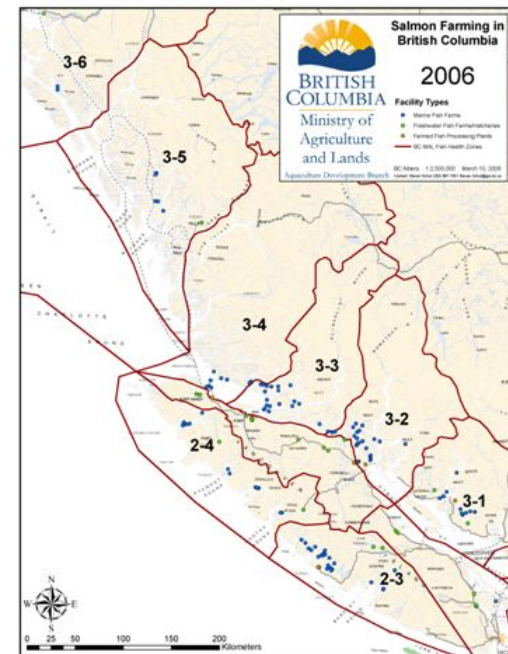
L. salmonis mobile



C. clemensi mobile



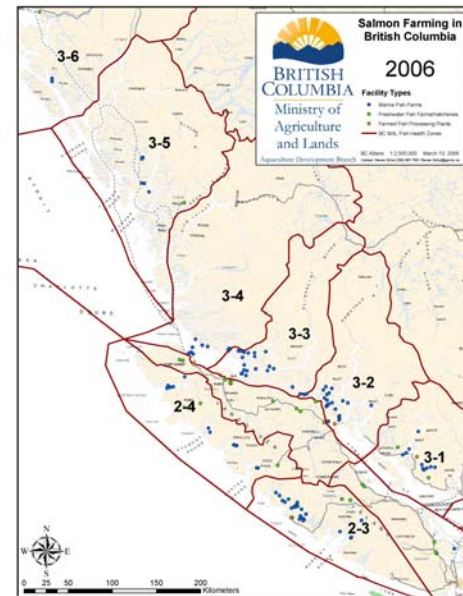
Zone	Farms	Total treatments in zone (28months)	Average treatments/ generation
2.3	12	9	0.75
2.4	13	13	1.50
3.1	7	2	0
3.2	10	15	1.50
3.3	20	36	1.75
3.4	9	14	2.40
3.5	2	3	3.00



From Saksida, S., Constantine, J., Karreman, G.A., Neville, C. Sweeting, R. and R. Beamish (2006). Evaluation of sea lice, *Lepeophtheirus salmonis*, abundance levels on farmed salmon in British Columbia, Canada. In. The Proceedings from the International Symposium on Veterinary Epidemiology and Economics XI, Cairns, Australia.

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

Wild salmon in BC

Salmon Harvests ('000 tonnes) 1996 - 2003								
Species	1996	1997	1998	1999	2000	2001	2002	2003
Chinook	0.4	1.7	1.4	0.8	0.5	0.7	1.7	2.2
Sockeye	15.5	25.3	5.1	1.7	8.5	7.2	10.1	6.3
Coho	3.4	0.8	<0.1	<0.1	<0.1	0.1	0.5	0.8
Pink	8.4	12.2	3.9	9.5	7.1	10.9	8.6	15.4
Chum	6.5	8.7	19.9	5.0	2.8	5.8	12.4	13.7
Wild Total	34.1	48.7	30.3	17.0	18.9	24.7	33.3	38.4
Farmed Salmon	27.8	36.5	42.3	49.6	49.4	68.0	84.2	72.7

- 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