

Average Mortality Rate (Quarter 1 - 2010)					
Fish Health SubZone	Species	Life stages	# Fish Group	# Site	Rate
All Zones	Atlantic salmon	"Early"	17	13	5.17%
2-3	Atlantic salmon	"Later"	13	12	1.08%
2-4	Atlantic salmon	"Later"	12	12	0.48%
3-1 + 3-2	Atlantic salmon	"Later"	18	18	0.91%
3-3	Atlantic salmon	"Later"	23	17	9.82%
3-4 + 3-5	Atlantic salmon	"Later"	12	12	0.30%
All Zones ⁴	Atlantic salmon	"Later"	78	71	3.41%
All Zones	Pacific salmon	"Early"	76	13	0.46%
All Zones	Pacific salmon	"Later"	17	10	1.12%

Notes

1 Rate figures are aggregate weighted averages (agreed to with BC MAL April 25, 2003)

2 Definitions for lifestages:

"Early"	Eyed Egg -->	Alevin / Larvae / Fry -->	Pre-smolt (= parr)
"Later"	Smolt -->	Grow-out / Harvest (= immature adult) -->	Broodstock --> Spent/Post-Spawn (public facilities)

3 The following participants' data are in the system for this quarter

<ul style="list-style-type: none"> Creative Salmon Grieg Seafoods Marine Harvest Canada Mainstream Canada 	<ul style="list-style-type: none"> Middle Bay Omega Pacific Saltstream Engineering Totem Oysters Yellow Island Aquaculture Freshwater Fisheries Society of BC (some data in the system) 	<ul style="list-style-type: none"> Fisheries and Oceans Canada
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4 This field has been added to encompass a small number of later lifestage Atlantic salmon (e.g., broodstock) raised in areas other than the subzones shown above.

Fish Health Events (Quarter 1 - 2010)						
Fish Health SubZone	Species	Life Stage	Veterinary Diagnosis	Count of Fish Health Events ^{1,2,3}		
				New	Ongoing/Recurring	Relapsing
All	Atlantic Salmon	"Early"	Aeromonas salmonicida Infection	1	0	0
All zones ⁵	Atlantic Salmon	"Later"				
2-3	Atlantic Salmon	"Later"	Lepeophtheirus Infection	3	2	0
			Myxobacterial Infection	2	0	0
			Viral Haemorrhagic Septicemia Virus Infection	3	3	0
			Aeromonas salmonicida Infection	2	1	0
			Piscirickettsia salmonis Infection	0	2	0
2-4	Atlantic Salmon	"Later"	Lepeophtheirus Infection	6	0	0
			Myxobacterial Infection	3	1	0
3-1 + 3-2	Atlantic Salmon	"Later"	Lepeophtheirus Infection	0	1	0
			Renibacterium salmoninarum Infection	0	1	0
3-3	Atlantic Salmon	"Later"	Myxobacterial Infection	4	1	0
			Lepeophtheirus Infection	0	1	0
			Viral Haemorrhagic Septicemia Virus Infection	0	1	0
3-4 + 3-5	Atlantic Salmon	"Later"	Vibrio (Listonella) Infection	1	0	0
			Renibacterium salmoninarum Infection	1	0	0
			Lepeophtheirus Infection	2	1	0
All zones	Pacific Salmonids	"Early"	Renibacterium salmoninarum Infection	1	1	0
			Saprolegnia	1	0	0
All zones	Pacific Salmonids	"Later"	Renibacterium salmoninarum Infection	0	1	0

1 Reporting reflects life stage rather than water type. See notes 1 - 2 of Average Mortality Rate report.

2 Counts of veterinary diagnosis are based on FISH GROUP (not site); more than one fish group may exist at a site

3 Fish Health Events reflect the following categories:

New First time occurrence; new event

Ongoing/recurring Repeat or ongoing occurrence from previous calendar quarter

Relapsing Repeat occurrence from calendar quarter at least two quarters preceding the current one

4 "Case worked up but no diagnosis" category requires workup and management steps taken, e.g., further investigation, husbandry change etc.

5 This field has been added to encompass a small number of later lifestage Atlantic salmon (e.g., broodstock) raised in areas other than the subzones shown above.

Mortality Rates by Cause (Quarter 1 - 2010) ^{1,2}

Early Life stages

Fish Health SubZone	Species	# Fish Groups	Background Mortality	Systems Related	Fresh	Culls / Quality Control
All Zones	Atlantic salmon	17	2.56%	0.01%	1.17%	1.44%
All Zones	Pacific salmon	76	0.29%	0.03%	0.00%	0.14%

Mortality Rates by Cause (Quarter 1 - 2010)

Later Life stages

Fish Health SubZone	Species	# Fish Groups	Environmental	Fresh "Silvers"	Handling / Transport	Matures	Old	Poor Performers	Predators
All Zones	Atlantic salmon	78	0.04%	0.48%	0.16%	1.06%	0.20%	1.34%	0.08%
2-3	Atlantic salmon	13	0.24%	0.14%	0.25%	0.03%	0.07%	0.21%	0.13%
2-4	Atlantic salmon	12	0.00%	0.06%	0.13%	0.00%	0.15%	0.02%	0.12%
3-1 + 3-2	Atlantic salmon	18	0.00%	0.20%	0.08%	0.00%	0.08%	0.10%	0.10%
3-3	Atlantic salmon	23	0.01%	1.29%	0.23%	3.55%	0.46%	4.13%	0.02%
3-4 + 3-5	Atlantic salmon	12	0.00%	0.07%	0.03%	0.00%	0.08%	0.02%	0.00%
All Zones	Pacific salmon	17	0.00%	0.33%	0.01%	0.13%	0.29%	0.12%	0.24%

Notes

- 1 See notes for Average Mortality Rate report
- 2 Sum of individual Proportional Mortality Rates reconciles to Average Mortality Rate to 0.005% (rounding errors)

Quarter 1 (Jan/Feb/Mar) 2010 – Summary*

BCMAL Health Audit Results (Quarter 1, 2010)		
Fish Health Sub-zone	Species	Veterinary Diagnosis / Conclusion * summarised for all audit cases of Q1
2.3	Atlantic salmon	4 - cause of death not apparent, +1 "other" (e.g. in one case, a laboratory test found a brain parasite in 1 carcass. 1 – furunculosis
2.4	Atlantic salmon	4 - cause of death not apparent/no significant lesions
3.1 + 3.2	Atlantic salmon	5 - cause of death not apparent/no significant lesions
3.3	Atlantic salmon	2 - cause of death not apparent, +1 "other" (e.g. in one case, a laboratory test found a brain parasite in 1 carcass. 1 - mouth rot (filamentous myxobacteriosis) 1 – skin ulcers 1 –bacterial kidney disease
3.4 + 3.5	Atlantic salmon	5 - cause of death not apparent/no significant lesions
Zone 2	Pacific salmon	1 - cause of death not apparent/no significant lesions
Zone 3	Pacific salmon	1 - cause of death not apparent/no significant lesions
Total Cases for Q1		27

The Ministry of Agriculture and Lands (BCMAL) sampled 121 salmon carcasses for diagnostic testing during the first calendar quarter (Q1) of 2010. Health audits were conducted on 27 of the 64 active salmon farms, representing 42% of the marine salmon farms in British Columbia.

Each fish sampled was tested for four Reportable pathogens of concern:

- viral haemorrhagic septicaemia virus (VHSV),
- infectious haematopoietic necrosis virus (IHNV),
- infectious salmon anaemia virus (ISAV),
- infectious pancreatic necrosis virus (IPNV),
- and the Notifiable pathogen, *Piscirickettsia salmonis*.

Each fish sampled was also tested for the presence of bacteria within the kidney using standard techniques.

Histopathology was also performed on organs collected from each carcass sampled. The pathologist described any lesions of note and assigns a potential or probable cause of death for each fish.

The table above shows, in BC's Atlantic salmon: most frequently in Q1 the cause of death in fresh carcasses was "not apparent / no significant lesions" despite the numerous lab tests performed. In other words, infectious diseases were not evident in most cases. Other farm-level veterinary diagnoses made in Q1 include: furunculosis, bacterial mouth rot, bacterial kidney disease, and skin ulcers. Further to BCMAL findings, the reports submitted by the BCSFA aquaculture industry showed not only furunculosis and bacterial kidney disease, but also VHS and *Piscirickettsia* infections.

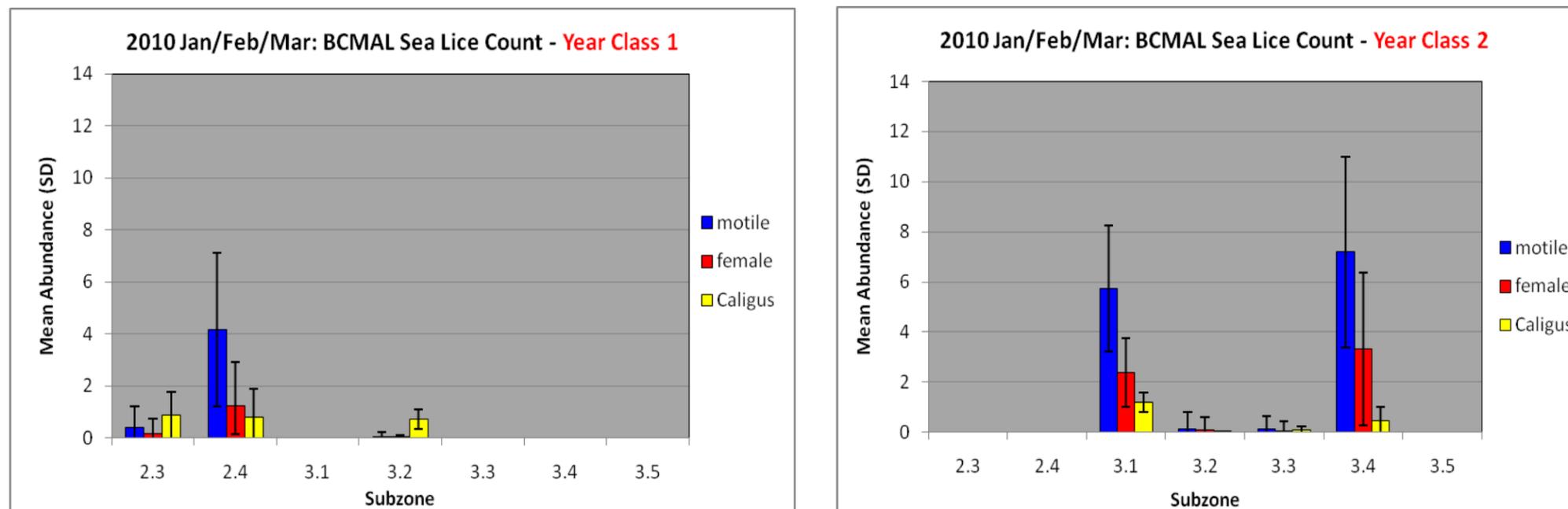
In Pacific salmon, the corresponding industry reports for Q1 showed their fish health events as: Bacterial Kidney Disease (and a fungal infection in fresh water fry).

There was no evidence of emerging disease, or change in distribution or frequency of natural background disease of BC salmon – diseases common to both wild and farmed salmon. The disease occurrence on farms was low, and industry reported two additional fish health events that BCMAL did not detect in its „snapshot“ audits.

For each of the farms visited, compliance with Health Management Plans (HMPs) was verified. For more information and statistical analysis of health audits, please see BCMAL's Annual Reports.

** This quarterly report information, although timely, should be considered preliminary until a corresponding annual report is published.*

Quarter 1 (Jan/Feb/Mar) 2010 – Summary*



The Ministry of Agriculture and Lands (BCMAL) examined 840 live fish for sea lice during the first calendar quarter (Q1) of 2010.

Sea lice audits were conducted on 14 of the 57 active Atlantic salmon farms, representing 25% of the Atlantic salmon farms in British Columbia.

The lice audits enable the evaluation of operational and technical aspects of the aquaculture industry's lice-counting procedure. BCMAL's lice counts also allow a comparative evaluation of the lice abundance reported by industry. In quarter 1, the BCMAL audit (versus industry-reported abundance) differed in two of the comparisons of motile 'salmon louse' (*Lepeophtheirus*): BCMAL's 'snapshot' audit count was higher in sub-zone 3.4 (year class 2) than industry reported, and the BCMAL snapshot was lower than industry reported in sub-zone 3.2 (year class 1). Also, for the 'herring louse' (*Caligus*), the industry reported greater abundance in sub-zone 3.2 than BCMAL counted.

The bar charts above show BCMAL's audit data for Quarter 1, 2010 – for both young Atlantic salmon and older salmon; "Year Class 1 and 2" respectively. Two things are noteworthy in Q1 2010:

- 1) Early in Q1, although the average abundance of lice in some regions (or sub-zones) of the BC coast was greater than 3 motile lice per fish, the action required of farms was: a) to monitor lice more closely by counting twice per month instead of just once; and b) the farms must plan to reduce their lice abundance (to below 3 motiles per fish either by medical control or priority harvest) by March 1st. This was achieved in all coastal sub-zones by March 1st except in sub-zone 3.4 where harvesting of large fish at some farm(s) continued into mid-March. The abundance ranges seen above are typical of the winter calendar quarter 1.
- 2) The presence of *Caligus* (the 'herring louse') on farmed Atlantic salmon is common during the winter months in a number of coastal regions. The *Caligus* lice are quite transient, as are their hosts of origin - the wild herring and pilchard. As herring congregate near shorelines and outside farms, the *Caligus* often transfer onto the farmed salmon.

In the sub-zones where no results are shown (e.g. sub-zone 3.4, year class 1), the explanation is that either:

- the computerized random selection chose a Year Class 1 audit instead of Year Class 2 audit, or vice versa (for a sub-zone), or
- there were no active farms of a particular year class during that time in that region, or
- environmental conditions, weather, or resource issues were not amenable to allow an audit, or
- no lice were found on the live fish in that sub-zone audit.

No changes from historic lice patterns were of concern in this quarter. For each of the farms visited, compliance with Health Management Plans was verified. For more detailed information and statistical analysis of lice audits, please see BCMAL's latest Annual Report.

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