



Review of Sea Lice Management Oct. 1, 2003 thru Sept. 30, 2004

The Ministry of Agriculture, Food and Fisheries has been actively monitoring the status of sea lice infections on BC salmon farms over the past year. In 2003/04, the protocols for sea lice management were integrated into the Fish Health Program. Monitoring of lice levels was conducted through the Provincial Auditing and Surveillance Program and industry sampling and reporting as outlined in the Fish Health Management Plan requirements. Industry information has been posted monthly on the Ministry website.

Based on findings from 2003/04, the province has developed the following approach for sea lice management in 2005.

- Continued mandatory sea lice monitoring – as a requirement of Fish Health Management Plans
- Continued auditing by fish health staff of farms for compliance with reporting requirements and verification of industry reporting
- Support of sea lice research programs under the auspices of the B.C. Aquaculture Research and Development Committee

1.0 Sea Lice Monitoring in 2004

In 2004, requirements for sea lice monitoring were extended beyond the Broughton Archipelago to include the entire industry. There are two components to the monitoring program: industry on farm sampling and reporting and MAFF audit of these procedures. As part of all operating farms' Fish Health Management Plans, the Ministry of Agriculture, Food and Fisheries requires monthly sea lice sampling and reporting of aggregate monthly data by fish health zone. This sampling was increased to twice a month during spring (March to June) outward migration of wild, juvenile salmon. The industry on-farm sampling program is based on internationally accepted standards for sea lice monitoring.

During each quarter, MAFF fish health staff audited 25% of all active Atlantic salmon sites and 6.25% of active Pacific salmon sites. These sites were randomly chosen. Sea lice sampling was conducted on site at the same time as industry sampling and the same protocols were used so the results of sea lice counts within the site could be compared. Not all sites are sampled by MAFF; thus the sea lice abundance data is difficult to compare with the overall industry abundance reported on the website. However, statistical comparison of within site averages indicates that the independently reported data from the industry is valid (Section 2.1). For additional information on

protocols used in 2003/04 please see 2004 Sea Lice monitoring program at:
http://www.agf.gov.bc.ca/fisheries/health/sealice_MS_2004.htm
http://www.agf.gov.bc.ca/fisheries/health/Sealice_monitoring_results.htm

2.0 Industry Monitoring and Reporting

All farms are required to sample monthly for sea lice and report monthly to the private BCSFA Database which in turn provides aggregate monthly reports to MAFF by specific fish health zones/areas. In 2003/04, action levels for control of sea lice were set at 3 mobile lice (March to July) and 6 mobile lice (July to March); once this level was reached, action to reduce lice levels was to be taken. Action included treatment of stocks or harvesting. The industry information is collected on a per site basis and managed through their database. Information on lice abundance, as well as environmental parameters that can affect lice levels, is evaluated and supports individual company area management plans for sea lice control on farmed fish.

A working group of fish health experts and veterinarians responsible for management of aquaculture stocks has been established to evaluate the information collected and assess the effectiveness of the control measures taken. MAFF participates in this committee to enable the Province to ensure that policies and program initiatives are based on sound science.

Industry's reports are provided monthly to MAFF. The reports are broken down by age or yearclass of fish; this breakdown has been developed on the findings of the studies conducted over the last two years.

2.1 MAFF Sea Lice Auditing

In order to ensure that reported lice numbers and breakdown of the various developmental stages of sea lice on farmed fish are accurate, MAFF fish health staff randomly selects a sub-sample of active farms to audit. The audits are done in conjunction with each of the selected farms' routine sea lice monitoring. Farm staff and MAFF staff inspect and count lice numbers on a sample of fish from the same pen during the same sampling period; these average numbers can then be compared to determine if farm staff are accurately counting and identify the sea lice for reporting. Comparing the two "sampler" results of the numbers of lice counted on different fish from the same pen, plus observing lice identification procedures, allows for validation of the reported information. This protocol allows the ministry to verify that sea lice sampling is completed in a scientifically valid manner.

It should be noted this represents a compliance audit and provides only a "snapshot" of farms at time of the audit. Given the variation that occurs in lice numbers on a farm by farm basis, the abundance estimates provided from the

MAFF audits are not meant to be compared to the abundance estimates provided by the industry, as the industry samples all sites.

3.0 Synopsis of Sea Lice Results from 2004

The following is a synopsis of the conclusions from the 2004 audit program based on the information provided by the aquaculture sector, the MAFF audits, an in-depth review of the information with the fish health technical review committee and review of the scientific literature. This information is used in two ways; to inform industry when management action must be taken and to enable a provincial response if necessary.

- **Sea lice infections vary with fish age class and length of time in sea water.** This has been documented in other farming jurisdictions and was reported in previous reviews of sea lice data. Farmed fish do not have sea lice when entered into saltwater as smolt. Infestation with lice happens through natural infection from a marine source of the parasite. The longer fish are maintained in saltwater the more likely they are to be exposed to lice and become infected. For this reason, intervention and control of lice on younger fish is less likely than for older stocks. This is why the data are separated and reported by “age” or “yearclass” When calculating the “age” or “yearclass” of fish, it must be recognized that farms are not static and as fish grow, numbers of farms sampled in each yearclass will vary accordingly. Thus when interpreting data one must consider the changing status of the age of the farm in conjunction with the lice levels.
- **Infection with sea lice fluctuates with in-migration of infected wild stock.** Sea lice are a naturally occurring parasite of wild fish. Data collected from wild stocks show that returning adult salmon can be infected with extremely high numbers of sea lice. This is likely part of the natural life history of this parasite with its native host. Concurrent with the inward migration of wild salmon, salmon farms experience a net influx of sea lice from wild sources and subsequent fluctuations in abundance of lice. The source of infection is from wild stock and, while the timing can vary by area and timing of the migration, generally lice levels on farms will increase in the late summer and fall (Sept. to Dec.).
- **Environmental conditions can affect the occurrence and level of infection on farms.** Information on environmental conditions and their impact on lice survival and reproduction has been documented world wide. The two most important factors are temperature and salinity. In general, higher temperature and salinities favour the survival and reproduction of sea lice; lower temperature and salinity do not. Clearly

the information collected from farms over the last year follows this trend. These factors can, and likely do, result in annual variation in lice infection rates of both wild and farmed fish and contribute to the intensity of infection. In addition, abundance of sea lice can fluctuate dramatically within and between farms. Sampling protocols have been designed to establish “maximum” abundance estimates on a farm basis and account for, where possible, variation in lice levels within pens and between fish.

3.1 Breakdown of Results by Zone/Sub zone for 2003/04

As of November 2003, all salmon farm sites must have a Fish Health Management Plan. These plans are a condition of licence and as such are enforceable. All companies must provide MAFF with a plan for approval. The sea lice monitoring program is required as part of the Fish Health Management Plan.

Based on the results from the data collected in 2004, the following is a synopsis of sea lice management in each zone/sub zone (Appendix 1 or http://www.agf.gov.bc.ca/fisheries/health/sealice_MS_2004.htm). A map of the zones is found at <http://www.agf.gov.bc.ca/fisheries/health/fhasp.htm>

Zone 2 Sub zone 3

Due to the occurrence of IHN on the west coast of Vancouver Island in 2002/2003, numbers of operating Atlantic salmon farm sites were reduced in 2004. However results from sampling are consistent with the findings in other areas – fish in sea water less than one year have fewer sea lice when compared to fish within the same area that are closer to harvest. Moreover, the overall levels of lice in zone 2.3 were below recommended levels for action¹. The average for the farms were 0.43 (yearclass 1 fish) and 1 (yearclass 2 fish) [Table 1].

Seasonally, there was a trend towards increased lice levels in yearclass one fish in the summer months (as temperatures increase). Historical information from farm monitoring supports this trend and treatment, if required, generally occurs during summer months. In the Fall, during the in-migration of wild salmon there is a rise in lice levels on farms associated with increased infection pressure from natural lice infestation. Influence of environmental conditions and local oceanography as well as migration patterns for wild adult stocks will affect the timing and need for control measures.

¹ In March to July, the recommended level was 3 mobile lice; for the remainder of the year, the recommended action level was 6 mobile lice per fish.

Zone 2-4

When examining the graphs in Appendix 1 and on the MAFF website, it must be remembered that because of the separation of data into “yearclass” (Yearclass 1 fish are 0 – 365 days in saltwater; Yearclass 2, 366 days+ in saltwater), the number of farms (n) will shift between the two graphs. For example, in zone 2-4, there were 4 yearclass 1 and 4 yearclass 2 farms operating in February. In March, there were 3 yearclass 1 and 5 yearclass 2 farms. Given that older fish tend to carry more lice and with the change in numbers of farms, any interpretation changes in the abundance estimates must take this into consideration. While this yearclass separation allows for easier examination of the information, management of lice on farms is based on all farm and environmental information.

Similar to zone 2.3, lice levels, on average, were below recommended levels for action the entire year. There was an increase in lice levels in March as a result in unexpected delays in harvesting the stocks. Action was taken to ensure levels decreased during migration period (March – July).

Zone 3-1

Levels of sea lice on Atlantic salmon farms in this area were consistently low. There was no obvious seasonal variation in lice levels. However, based on historical farm observations, increasing lice levels during warmer summer months could be expected and in other years treatment for lice control has been necessary.

Zone 3-2

Like zone 2-3, recent occurrence of IHN had reduced the number of active farms in this area in 2002/2003; hence the majority of data collected in 2003/04 is on Yearclass 1 fish. The data are consistent with observations from other zones. Lice numbers for yearclass 1 fish are lower for the first year the fish are entered into sea water. Older fish do have higher lice levels. Historical observation indicates that lice levels can increase significantly in the fall, particularly in yearclass 2 fish, during wild adult in migration. Only one farm was operating at this time and it reported a problem with significant lice infestation in the fall and exceeded the threshold of 6 mobile lice. Given the net lice infection level is from the wild, any action taken to reduce lice levels must take into account all factors (environmental conditions, timing of migration, oceanography etc) to maximize the efficacy of actions taken.

Zone 3-3

In the Broughton Archipelago Lice numbers followed the seasonal trend of increasing abundances in late fall due to natural infestation from returning wild adult salmon. As with other areas, control of lice levels depends upon local oceanography, timing of migrations and environmental conditions as the net flux of infection is from outside the farms.

Comparison of information on lice levels between 2003 and 2003/04 is possible due to studies that were ongoing on farms in the area. Table 2 shows that during Quarter 1 (January until March), abundances of lice on farms in the Broughton were very similar between years. However in Quarter 2 of 2004, notable increases in lice levels were seen compared to 2003. This was reported by farms operating in the area as well as on wild fish in studies conducted by the Department of Fisheries and Oceans at the same time. While the information to fully understand the dynamics of sea lice infestation in this area are not yet fully understood, wild stock abundance, environmental and oceanographic conditions and other factors that influence the occurrence of sea lice on both wild and farmed fish were clearly different from the previous year. Numbers of farms actively operating within the Broughton were the same: 13 to 14 sites in 2003 and 13 to 15 sites in 2004 and production levels had not increased. Studies were and are ongoing to examine the risk factors associated with sea lice infestations between and within wild and farmed fish populations. Actions were taken to manage and reduce the lice levels in this area during the migration of juvenile salmon.

Zone 3-4

Numbers of farms operating in Zone 3-4 in 2003/04 were reduced due to control measures implemented to manage IHN. Like Zone 3-2, most of the data for 2003/04 were derived from yearclass 1 fish.

Zone 3-5.

Due to the low numbers of Atlantic salmon farm sites operating and the limited timing of sample collection, no observations can be made about sea lice levels in Zone 3-5.

Pacific Salmon

Farms producing Pacific salmon (Chinook and Coho) were also required to sample and report numbers of sea lice. Examination of the data indicates that farmed Pacific salmon are not subject to the same infestation levels as Atlantic salmon. Farms never reached the recommended levels for management action during the study period. A trend toward increased levels of lice in the fall, particularly on yearclass 2 fish, is consistent with the net

influence of lice from a natural source, similar to that seen with Atlantic salmon. Given these findings, Pacific producers will not be required to report sea lice monitoring data; however they will continue to monitor lice during routine handling events and the details of this monitoring will be subject to audit. For additional information see Protocols for Sea Lice Monitoring 2004/05 at http://www.agf.gov.bc.ca/fisheries/health/sealice_MS_2004.htm

Results from MAFF Audit in 2004

MAFF sea lice audit program was initiated in January 2004. The audit was conducted as described above. Results from the comparison of area and site data are provided in Appendix 2 Tables 1 - 4.

The intent of the program was to audit 25% of the active Atlantic salmon farms and 6.25% of the Pacific salmon farms per quarter. Hence the number of sites sampled per quarter varies with the number of sites active within any one zone/sub zone. As of the end of Quarter 2 (June 2004) a total of 19 farms (10 in Q1 and 9 in Q2) had been audited and a total of 1010 fish examined for sea lice.

Comparison of the lice level counts in each area showed no significant difference when counts were conducted by the MAFF sampler versus the farm sampler for all areas and lice life stages except for *Caligus sp.* in zone 3-3 during quarter 1. (Appendix 2, Table 1 & 2). For the *Caligus* counts in zone 3-3, quarter 1, the median number of *Caligus* counted for both MAFF and farm sampler was zero, however, the mean for the MAFF sampler was slightly higher.

Comparison of the within farm lice level counts was also conducted (Appendix 2, Table 3 & 4). There were no significant differences between counts performed by the MAFF samplers and farm samplers at each farm site.

Table 1. Quarterly Average Abundance of Sea Lice (*Lepeophtheirus salmonis*) per Zone²

Year	Quarter	Year class	Zone	Mobile	Female	Caligus
2003	4	1	2-3	0.19	0.05	0.00
2004	1	1	2-3	0.29	0.17	0.03
2004	2	1	2-3	0.80	0.52	0.99
2004	3	1	2-3	2.11	0.66	0.64
Average				0.85	0.35	0.42
2003	4	2	2-3	2.90	1.40	0.01
2004	1	2	2-3	2.12	1.07	0.00
2004	2	2	2-3	0.31	0.22	0.58
2004	3	2	2-3	No data	No data	No data
Average				1.01	0.53	0.28
2003	4	1	2-4	1.28	0.48	0.00
2004	1	1	2-4	1.08	0.24	0.03
2004	2	1	2-4	0.37	0.09	0.00
2004	3	1	2-4	2.10	0.61	0.04
Average						
2003	4	2	2-4	1.48	0.76	0.03
2004	1	2	2-4	5.78	2.29	0.03
2004	2	2	2-4	1.10	0.53	0.01
2004	3	2	2-4	2.10	0.17	0.00
Average				2.62	0.94	0.02
2003	4	1	3-1	0.61	0.39	0.00
2004	1	1	3-1	0.30	0.00	0.00
2004	2	1	3-1	0.16	0.02	0.02
2004	3	1	3-1	0.48	0.20	0.03
Average				0.39	0.15	0.01
2003	4	2	3-1	1.19	0.80	0.00
2004	1	2	3-1	0.76	0.43	0.00
2004	2	2	3-1	1.06	0.70	0.02
2004	3	2	3-1	0.73	0.84	0.01
Average				0.94	0.70	0.01
2003	4	1	3-2	1.01	0.45	0.06
2004	1	1	3-2	0.32	0.09	0.48
2004	2	1	3-2	0.79	0.19	0.27
2004	3	1	3-2	0.74	0.24	0.10
Average				0.71	0.24	0.23

² Averages are calculated based on aggregate data. Variation in number of farms will result in increased standard error and larger confidence intervals.

2003	4	2	3-2	8.52	3.20	0.51
2004	1	2	3-2	2.10	1.10	0.60
2004	2	2	3-2	1.67	0.26	0.21
2004	3	2	3-2	1.14	0.55	0.12
Average				3.37	1.28	0.36
2003	4	1	3-3	1.75	0.52	0.68
2004	1	1	3-3	0.96	0.27	0.75
2004	2	1	3-3	2.15	0.41	0.55
2004	3	1	3-3	2.14	0.54	0.12
Average				1.75	0.44	0.53
2003	4	2	3-3	6.68	2.65	3.25
2004	1	2	3-3	4.71	2.42	1.87
2004	2	2	3-3	5.28	2.38	0.57
2004	3	2	3-3	2.00	1.10	0.18
Average				4.67	2.14	1.47
2003	4	1	3-4	1.44	0.91	0.70
2004	1	1	3-4	3.65	1.30	0.45
2004	2	1	3-4	8.56	3.01	0.12
2004	3	1	3-4	0.42	0.03	0.12
Average				3.52	1.31	0.35
2003	4	2	3-4	1.55	0.27	0.02
2004	1	2	3-4	3.32	1.22	0.03
2004	2	2	3-4	2.60	1.17	0.00
2004	3	2	3-4	1.51	0.47	0.02
Average				2.25	0.78	0.02
2004	2	1	3-5	0.10	0.00	0.00
2004	3	1	3-5	0.28	0.05	0.00
Average				0.19	0.25	0.00

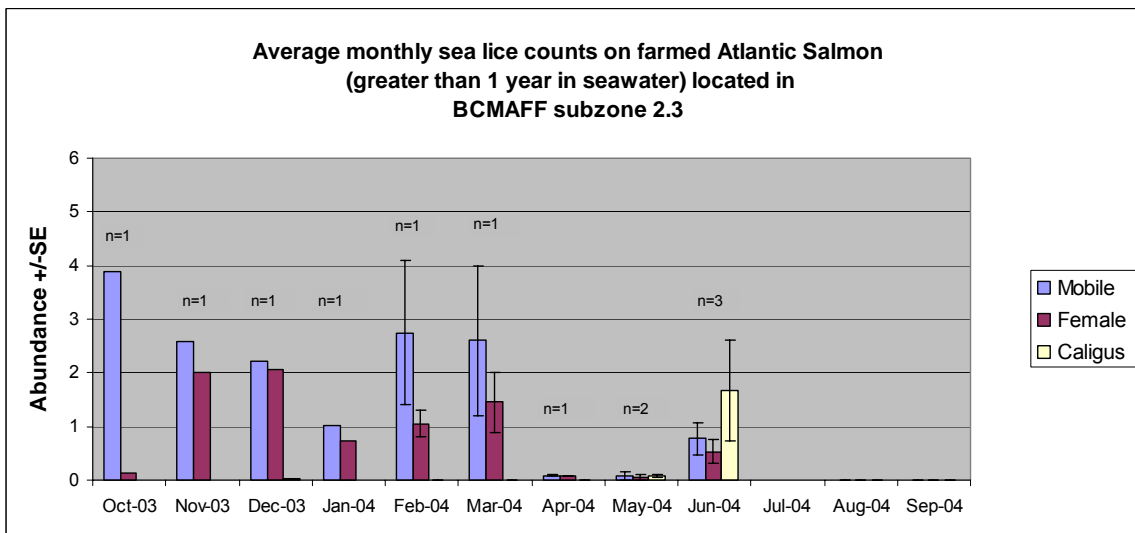
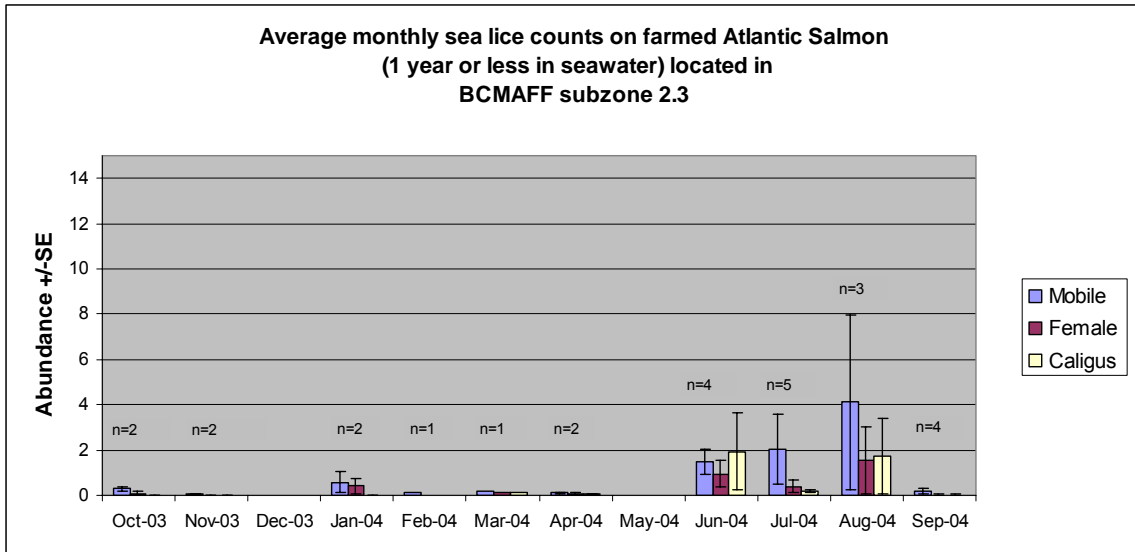
Table 2. Quarterly Average Abundance of Sea Lice (*Lepeophtheirus salmonis*) In Zone 3.3³

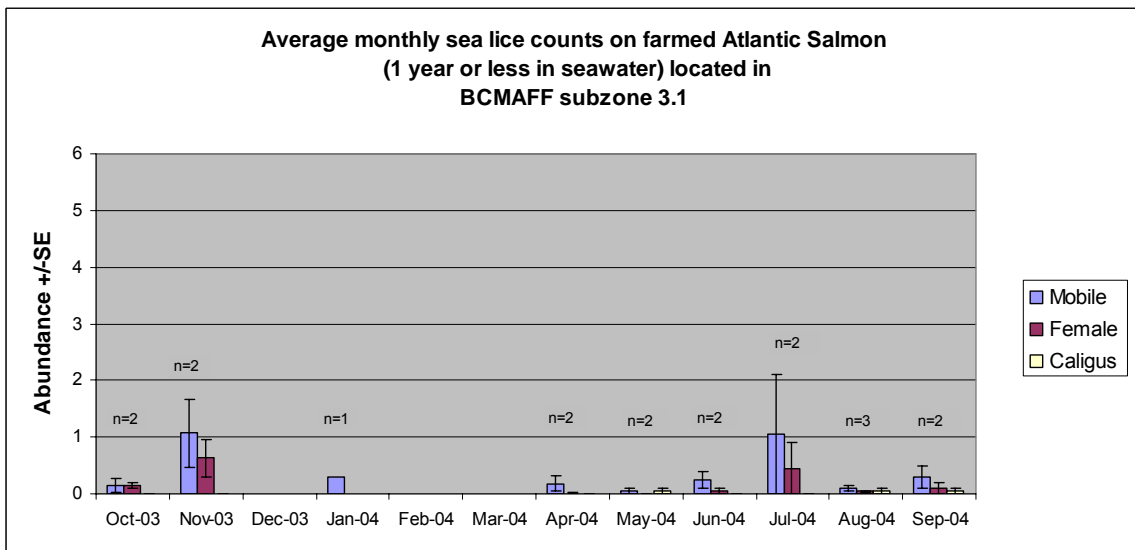
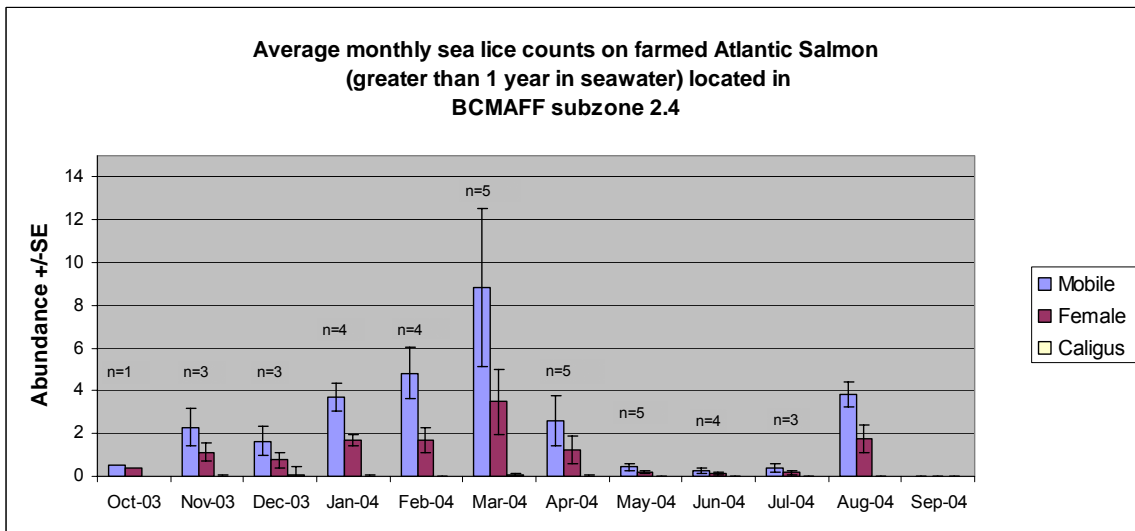
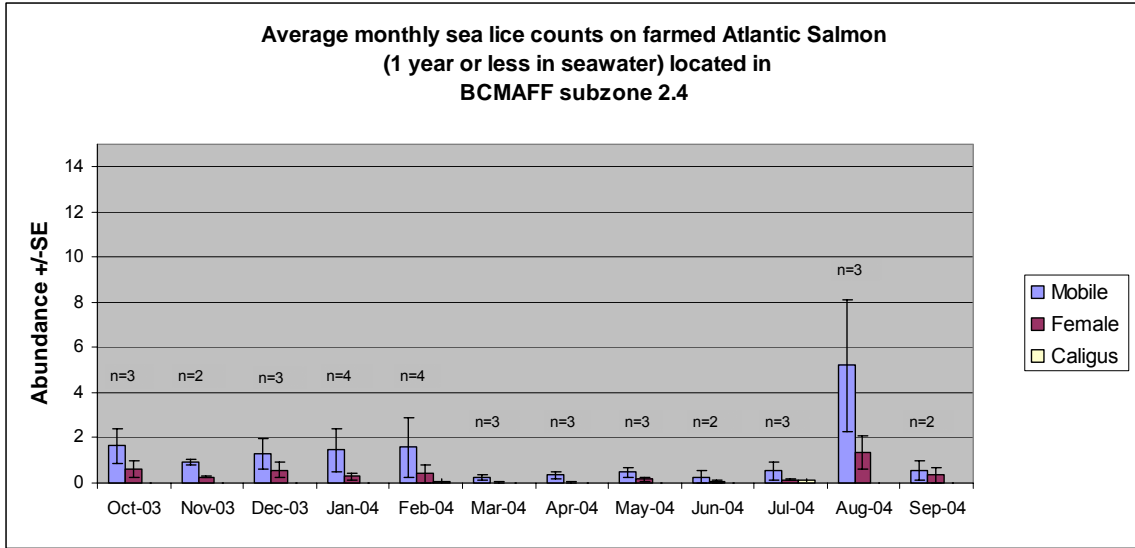
Year	Quarter	Yearclass	Mobile	Female	N⁴
2003	1 (Jan-Mar)	1	0.74	0.04	5
	2 (Apr-Jun)	1	0.7	0.08	7
	1 (Jan-Mar)	2	6.13	2.42	8
	2 (Apr-Jun)	2	1.28	0.59	7
2004	1 (Jan-Mar)	1	0.96	0.27	5
	2 (Apr-Jun)	1	2.15	0.41	4
	1 (Jan-Mar)	2	4.71	2.42	8
	2 (Apr-Jun)	2	5.28	2.38	11

³ There were differences in definition of yearclass that would result in variation in averages.

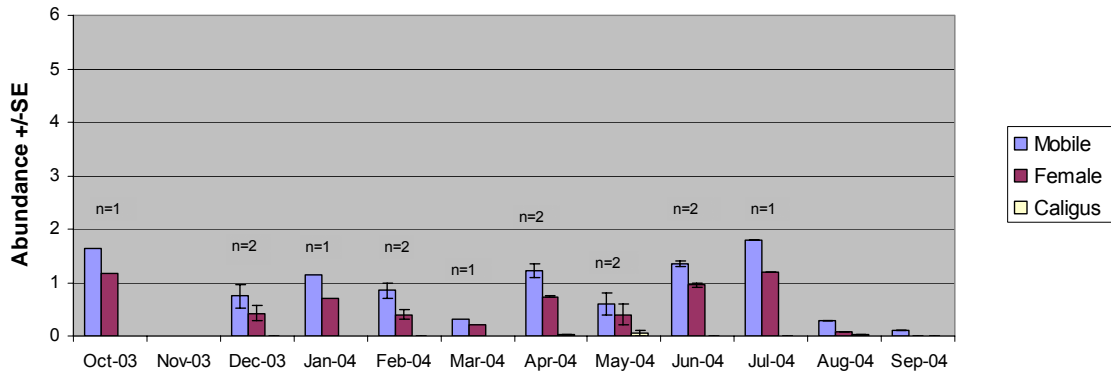
⁴ Note that to determine the number of farms operating per year, must account for the “quarter” in which farms were operating as well as the yearclass.

Appendix 1

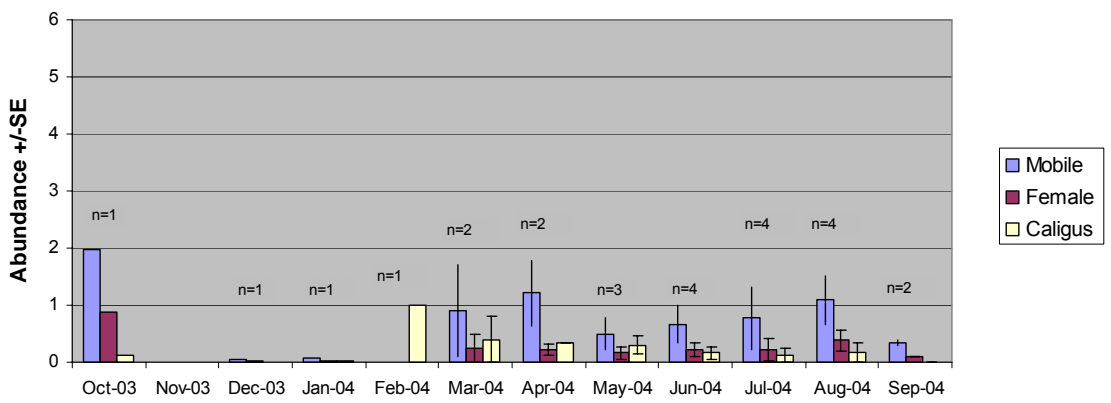




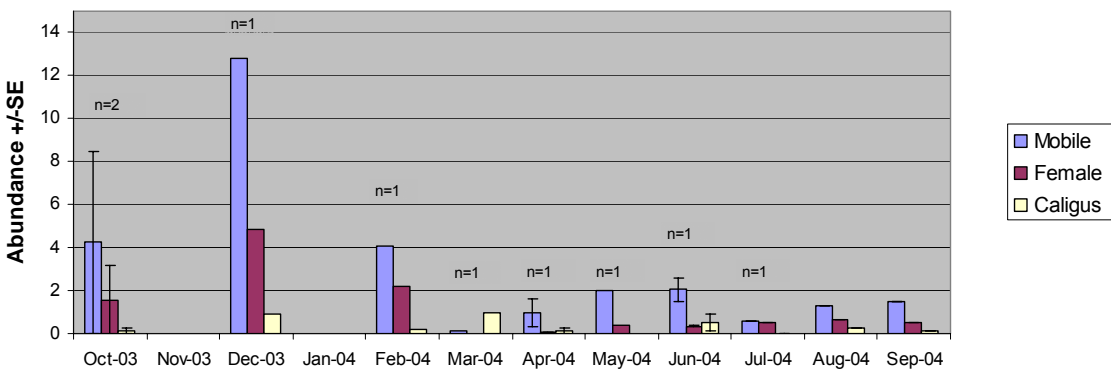
**Average monthly sea lice counts on farmed Atlantic Salmon
(greater than 1 year in seawater) located in
BCMAFF subzone 3.1**

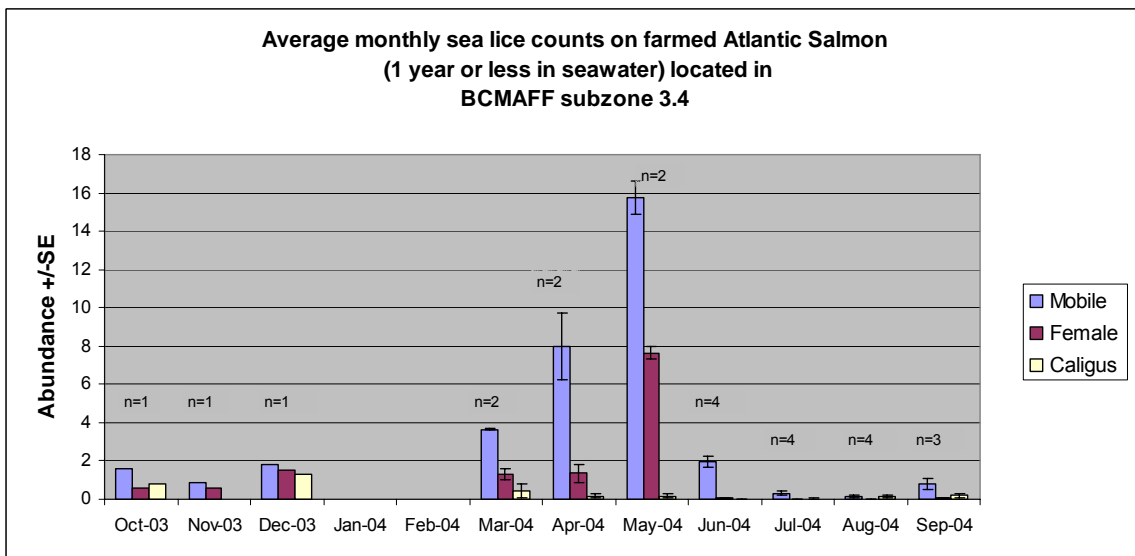
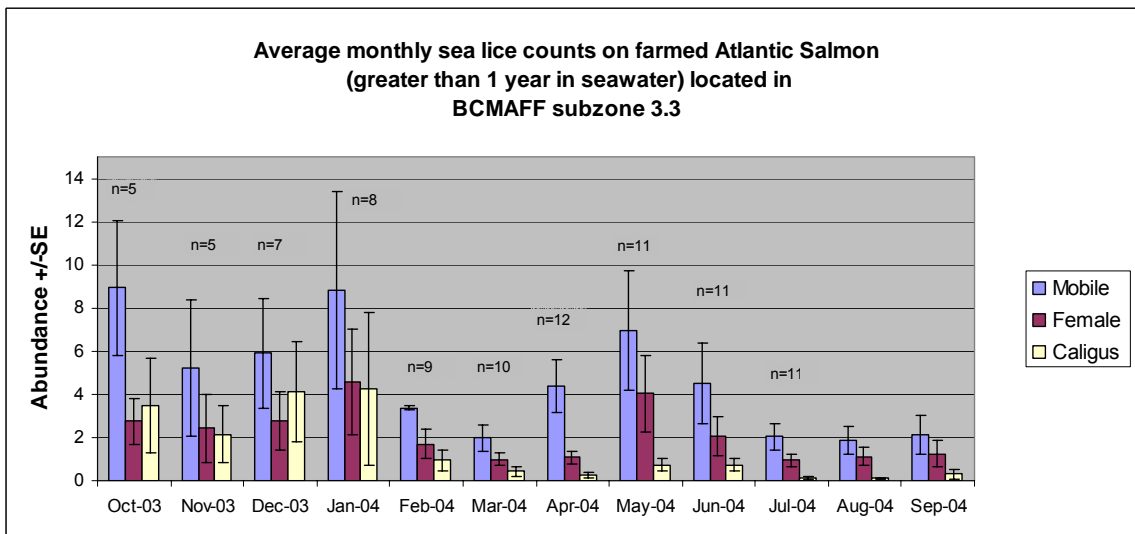
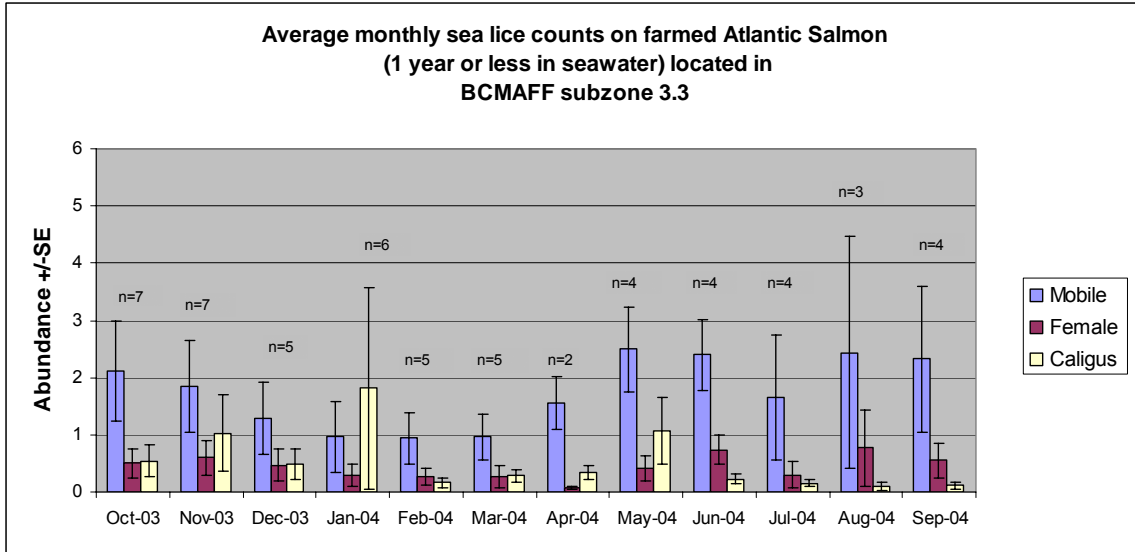


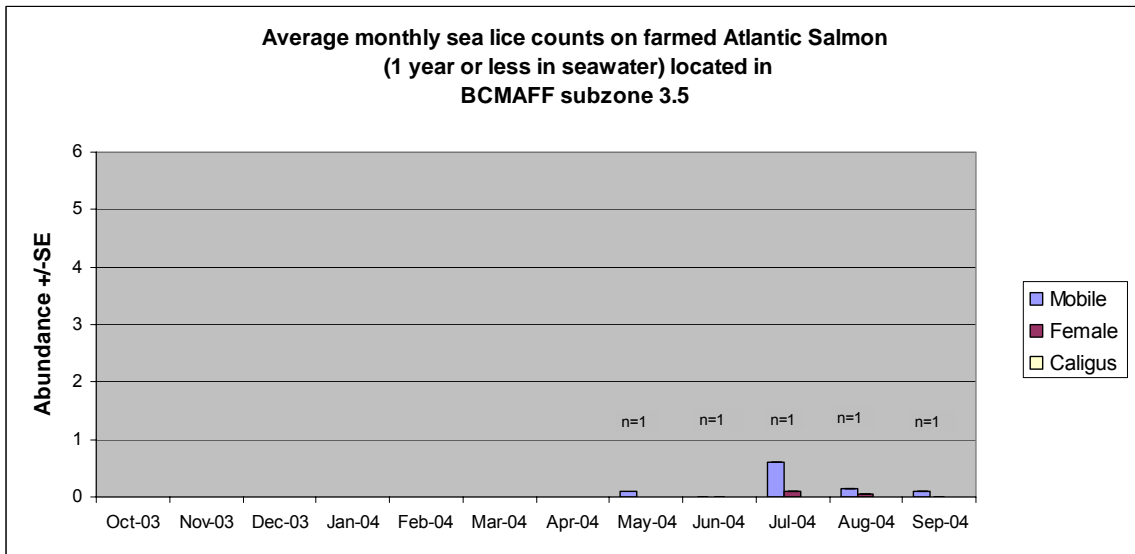
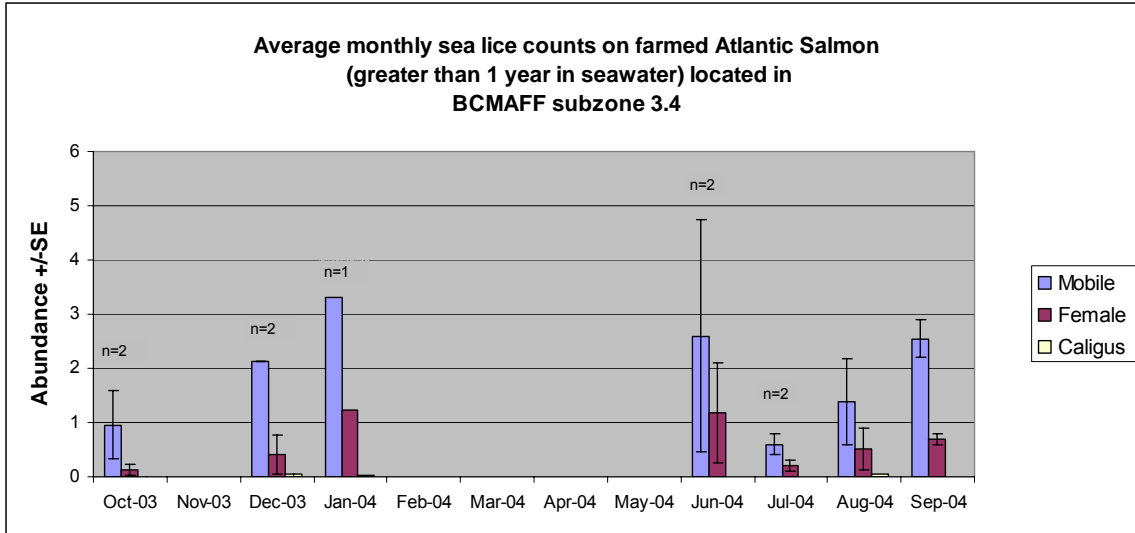
**Average monthly sea lice counts on farmed Atlantic Salmon
(1 year or less in seawater) located in
BCMAFF subzone 3.2**



**Average monthly sea lice counts on farmed Atlantic Salmon
(greater than 1 year in seawater) located in
BCMAFF subzone 3.2**







Appendix 2

Table 1: Zone/Subzone summary of BCMAFF sea lice audit program for Atlantic salmon farms for 2004 quarter 1

Year Quarter		N (# of farms audited)	Lice (species/ stage)	BCMAFF Mean (SE)	Farmers Mean (SE)	P values	Comments
Zone	Subzone						
2	3	2	Mobile ¹	2.32 (0.41)	2.65 (0.46)	0.59	NSD
			Female ²	1.07 (0.18)	1.10 (0.24)	0.91	NSD
			Caligus sp ³	0.15 (0.06)	0.10 (0.04)	0.47	NSD
2	4	1	Mobile ¹	4.57 (0.59)	4.67 (0.57)	0.90	NSD
			Female ²	1.87 (0.31)	1.23 (0.28)	0.13	NSD
			Caligus sp ³	0.00 (0.00)	0.03 (0.10)	n/a	MAFF level zero, cannot perform test
3	1	0	Mobile ¹ Female ² Caligus sp ³				No sites audited
3	2	2	Mobile ¹	1.07 (0.21)	1.10 (0.22)	0.91	NSD
			Female ²	0.47 (0.12)	0.42 (0.10)	0.71	NSD
			Caligus sp ³	0.32 (0.09)	0.27 (0.10)	0.69	NSD
3	3	2	Mobile ¹	2.59 (0.49)	2.71 (0.44)	0.85	NSD
			Female ²	1.85 (0.36)	2.01 (0.35)	0.75	NSD
			Caligus sp ³	0.75 (0.24)	0.21 (0.07)	0.00	MAFF mean value higher than farms; median values are equal at 0.
3	4	1	Mobile ¹	2.27 (0.37)	2.97 (0.46)	0.24	NSD
			Female ²	1.43 (0.19)	1.97 (0.35)	0.19	NSD
			Caligus sp ³	0.23 (0.08)	0.40 (0.18)	0.41	NSD
3	5	0	Mobile ¹ Female ² Caligus sp ³				No sites audited.
¹ Mobile - <i>Lepeophtheirus salmonis</i> (all preadults and adult stages – including females) ² Female – <i>Lepeophtheirus salmonis</i> (adult females with and without egg strands) ³ <i>Caligus sp</i> – all preadult and adult stages							

Table 1 shows the number of farms audited in each zone/subzone during the quarter and a summary the mean sea lice levels of *Lepeophtheirus salmonis* and *Caligus* species mobile stages enumerated during the audits in the each zone/subzone. P values obtained from the statistical comparison of the BCMAFF and Farmer means are also provided. NSD (no significant difference) denotes $p > 0.05$.

Table 2: Zone/Subzone summary of BCMAFF sea lice audit program for Atlantic salmon farms for 2004 quarter 2

Year Quarter		N (# of farms audited)	Lice (species/ stage)	BCMAFF Mean (SE)	Farmers Mean (SE)	P values	Comments
Zone	Subzone						
2	3	1	Mobile ¹ Female ² Caligus sp ³	0.07 (0.05) 0.07 (0.05) 0.00 (0.00)	0.03 (0.03) 0.03 (0.03) 0.00 (0.00)	0.56 0.56 n/a	NSD NSD Cannot perform test where means = zero
2	4	1	Mobile ¹ Female ² Caligus sp ³	0.87 (0.21) 0.63 (0.18) 0.00 (0.00)	0.53 (0.17) 0.33 (0.12) 0.07 (0.05)	0.23 0.18 n/a	NSD NSD Cannot perform test where means = zero.
3	1	1	Mobile ¹ Female ² Caligus sp ³	0.07 (0.05) 0.00 (0.00) 0.00 (0.00)	0.00 (0.00) 0.00 (0.00) 0.00 (0.00)	n/a n/a n/a	Cannot perform tests where means = zero.
3	2	1	Mobile ¹ Female ² Caligus sp ³	1.40 (0.25) 1.23 (0.22) 0.07 (0.05)	1.07 (0.19) 0.97 (0.17) 0.00 (0.00)	0.29 0.34 n/a	NSD NSD Cannot perform test where means = zero.
3	3	2	Mobile ¹ Female ² Caligus sp ³	0.46 (0.10) 0.03 (0.03) 0.40 (0.16)	0.44 (0.10) 0.00 (0.00) 0.36 (0.14)	0.90 n/a 0.80	NSD Cannot perform test where means = zero. NSD
3	4	1	Mobile ¹ Female ² Caligus sp ³	1.77 (0.32) 0.00 (0.00) 0.00 (0.00)	2.07 (0.33) 0.00 (0.00) 0.00 (0.00)	0.51 n/a n/a	NSD Cannot perform tests where means = zero.
3	5	0	Mobile ¹ Female ² Caligus sp ³				No sites audited.
<p>4 Mobile - <i>Lepeophtheirus salmonis</i> (all preadults and adult stages – including females) 5 Female – <i>Lepeophtheirus salmonis</i> (adult females with and without egg strands) 6 <i>Caligus sp</i> – all preadult and adult stages</p>							

Table 2 shows the number of farms audited in each zone/subzone during the quarter and a summary the mean sea lice levels of *Lepeophtheirus salmonis* and *Caligus* species mobile stages enumerated during the audits in the each zone/subzone. P values obtained from the statistical comparison of the BCMAFF and Farmer means are also provided. NSD (no significant difference) denotes $p > 0.05$.

Table 3: Farm level appraisal of BCMAFF sea lice audit program for Atlantic salmon farms for 2004, quarter 1.

Year Quarter		# farms audited	Lice (species/ stage)	BCMAFF compared to Farmers		Comments
Zone	Subzone			# SD	#NSD	
2	3	2	Mobile ¹	0	2	
			Female ²	0	2	
			Caligus sp ³	0	2	
2	4	1	Mobile ¹	0	1	
			Female ²	0	1	
			Caligus sp ³	0	1	
3	1	0	Mobile ¹ Female ² Caligus sp ³			No sites audited.
3	2	2	Mobile ¹	0	2	
			Female ²	0	2	
			Caligus sp ³	0	2	
3	3	2	Mobile ¹	0	2	
			Female ²	0	2	
			Caligus sp ³	0	2	
3	4	1	Mobile ¹	0	1	
			Female ²	0	1	
			Caligus sp ³	0	1	
3	5	0	Mobile ¹ Female ² Caligus sp ³			No sites audited.
¹ Mobile - <i>Lepeophtheirus salmonis</i> (all preadults and adult stages – including females) ² Female – <i>Lepeophtheirus salmonis</i> (adult females with and without egg strands) ³ <i>Caligus sp</i> – all preadult and adult stages						

Table 3 shows the number of farms within each zone/subzone where the amount of lice (mobile stages) counted by BCMAFF was significantly different (SD) or not significantly different (NSD) from levels counted by the farming company personnel during a sea lice audit as determined by the Kruskal-Wallis Analysis of Variance and the level of significance is set at ($\alpha = 0.05$).

Table 4: Farm level appraisal of BCMAFF sea lice audit program for Atlantic salmon farms for 2004, quarter 2.

Year Quarter		# farms audited	Lice (species/ stage)	BCMAFF compared to Farmers		Comments
Zone	Subzone			# SD	#NSD	
2	3	1	Mobile ¹ Female ² Caligus sp ³	0 0 n/a	1 1 n/a	Caligus values are too similar to compare with this test.
2	4	1	Mobile ¹ Female ² Caligus sp ³	0 0 0	1 1 1	
3	1	1	Mobile ¹ Female ² Caligus sp ³	0 n/a n/a	1 n/a n/a	Female and Caligus values are too similar to compare with this test.
3	2	1	Mobile ¹ Female ² Caligus sp ³	0 0 0	1 1 1	
3	3	2	Mobile ¹ Female ² Caligus sp ³	0 0 0	1 1 1	
3	4	1	Mobile ¹ Female ² Caligus sp ³	0 n/a n/a	0 n/a n/a	Female and Caligus values are too similar to compare with this test.
3	5		Mobile ¹ Female ² Caligus sp ³			No farms audited
4		Mobile - <i>Lepeophtheirus salmonis</i> (all preadults and adult stages – including females)				
5		Female – <i>Lepeophtheirus salmonis</i> (adult females with and without egg strands)				
6		<i>Caligus sp</i> – all preadult and adult stages				

Table 4 shows the number of farms within each zone/subzone where the amount of lice (mobile stages) counted by BCMAFF was significantly different (SD) or not significantly different (NSD) from levels counted by the farming company personnel during a sea lice audit as determined by the Kruskal-Wallis Analysis of Variance and the level of significance is set at ($\alpha = 0.05$).

