



New Brunswick Sea Lice Management

A Report on Sea Lice Management from 2009 to August 2011

Prepared by Atlantic Canada Fish Farmers Association

The New Brunswick salmon farming industry leads in salmon production in Atlantic Canada with a farm gate value of up to \$280 million, representing the province's largest cash crop. Salmon farming is a significant employer in coastal and rural communities throughout the region. For instance, in Charlotte County almost 20 per cent of the workforce is employed in aquaculture. New Brunswick salmon farming companies are all family-owned, and two of the largest producers also operate in Nova Scotia and/or Newfoundland. No one is more committed to finding a sustainable solution than these farm operators, working hand-in-hand with partners at the federal and provincial levels.

The men and women of Atlantic Canada's aquaculture industry have a proud history of marine stewardship and have always prided themselves on farming Canadian waters with care.

Like all farmers, salmon farmers are steward of their animals and must take all measures to care for their health and wellbeing. Preventing disease and parasites is the priority. The three Bay Management System implemented in New Brunswick in 2006 (See addendum 1 for a map of the Bay Management Areas) not only supports improved environmental management but it also provided the basis to improve management practices aimed at reducing sea lice prevalence. This includes:

- Reducing stocking density on the farms
- Mandatory fallowing of production sites; to help break the life cycle of the sea louse
- Ensuring only salmon born in a single year are present at each farm site and within each management area; this prevents older farmed salmon, which may have already been exposed to the parasite, from transferring it to incoming smolts

Salmon farmers use treatment products as a last resort only. However, like other farmers, they rely on the professional advice of veterinarians who have access to approved products when their animals are infected with disease or threatened by parasites.

The following report provides an overview of the challenges faced by salmon farmers in New Brunswick in sea lice management since 2009; processes that have been followed to support the implementation of an integrated pest management plan for sea lice management and an overview of the sea lice population in the bay management areas of New Brunswick from 2009 to 2011. The overview of the sea lice populations provided in this report are reported monthly by Bay Management Area and represent the average sea lice count for adult female lice, which are arguably the most critical life stage to control and the life stage generally reported by other jurisdictions.

BACKGROUND

Sea lice are a naturally occurring ecto-parasitic crustacean that can weaken the fish and increase their susceptibility to potentially fatal secondary infections. Sea lice cannot be eliminated from wild salmon or other wild sources; therefore, salmon farmers have developed management practices to reduce the likelihood and severity of infestation.

Beginning in 2008, New Brunswick farmers observed a reduced efficacy to the single sea lice treatment product registered for use in Canada (SLICE). Since that time, New Brunswick salmon farmers have worked with the federal and provincial governments and scientists to develop effective tools for controlling sea lice and to promote overall fish health management. These tools are intended to complement farm management practices already in place.

However, farmers' efforts to make real and lasting progress have been very difficult. Lack of advancement is largely a result of the inability to make progress in achieving regulatory approvals for a full suite of treatment options - fundamental to an effective Integrated Pest Management approach. In addition, timely authorizations have also not been available to support the use of products under alternative delivery methods, such as well boats (which result in a 75 per cent reduction in the quantity of product required for each treatment).

Managing sea lice is complex due to influences by both biological factors and environmental conditions. Sea lice numbers are impacted by a variety of factors including salinity and water temperatures. In addition to issues impacting access to treatment options, records maintained by salmon farmers show that water temperatures in New Brunswick waters were 2 degrees centigrade above historical levels in both 2009 and 2010.

As a result, an increase in the prevalence of sea lice in the Bay of Fundy was observed in both 2009 and 2010.

ACCESS TO SEA LICE CHEMOTHERAPEUTANTS

There are a range of compounds available internationally for sea lice management. These include:

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|-----------------------|---------------------|
| 1. Avermectins: | SLICE, Ivermectin |
| 2. Chitin Inhibitors: | Calicide |
| 3. Organophosphates: | Salmosan |
| 4. Pyrethroids: | AlphaMax, Excis |
| 5. Hydrogen Peroxide: | Interox Paramove 50 |

All of these products have been available for many years in other jurisdictions including Norway, the UK and Chile. In the USA, Maine has used Excis, Avermectins and Interox Paramove 50. Extensive research is therefore, available to provide the necessary data to support Canadian risk assessments through Health Canada, in support of Emergency Drug Releases / Emergency Registrations pending local monitoring and surveillance data collection to support full registrations of the products. Local research, monitoring and surveillance are being done to support Canadian product registrations; however, EDRs / ERs or scientific permits must be granted to enable this field work to be conducted.

Access to a variety of compounds is critical since many products are not effective on all life stages of the sea louse or under all environmental conditions.

Health Canada's Pest Management Regulatory Agency, responsible for authorizing the use of bath treatment products through an Emergency Registration, only does so for periods of up to one year. This process must be repeated annually pending full registration of the product in Canada – which has required scientific research and monitoring to support the application.

Products that have received limited Emergency Registration in Canada include:

ALPHAMAX[®]

In 2009, the NB Department of Agriculture and Aquaculture obtained emergency access to ALPHAMAX[®] for trials in an Bay Management Area 2A area where SLICE[®] resistance was most evident. This emergency access was in place for the period July to October, 2009 and was conditional upon a comprehensive monitoring and surveillance program. This work was designed and/or conducted by the Department of Fisheries and Oceans, Environment Canada, the NB Department of Agriculture and Aquaculture and the NB Department of Environment.

All field research and scientific monitoring conducted on ALPHAMAX[®] in 2009 indicated that this product posed little to no risk to the marine environment or to non-target species when used as prescribed.

A second approval was granted in 2010 for the period October to December 31, 2010 in well boats only. It too was conditional upon a second comprehensive monitoring and surveillance program. Due to restriction on use, this product was used on an extremely limited basis in BMA 1 only. Preliminary results on scientific field trials once again indicate that this product poses little to no risk to the marine environment or to non-target species.

SALMOSAN[®]

SALMOSAN[®] was previously registered and administered on New Brunswick farms in the 1990s; however, the registration lapsed when SLICE was introduced. SALMOSAN[®] was approved for use in November 2009. Approval was also subject to scientific monitoring; to date sediment and water quality testing has shown little to no impact as a result of SALMOSAN[®] treatments.

Approval for the use of Salmosan through well boat treatments was granted in August 2010. However in 2010, PMRA imposed a limit of 2800 grams per day on Salmosan; treatment for approximately 2 net pens per day. This restriction has meant that on-farm sea lice cannot be eliminated; lice left in untreated pens re-infect those already treated. That ultimately means more treatments are required and that low levels of residue chemical remain in the marine environment which can contribute to earlier onset of resistance to SALMOSAN[®].

A second application for access for SALMOSAN[®] was submitted to PMRA in September 2010 in advance of the October 15, 2010 expiration. However, due to the timing of the approval (November 4, 2010) and conditions that had to be met prior to use, many salmon farms had no sea lice treatment product available for several weeks at a time when water temperatures remained high and new generations of sea lice were developing. This resulted in a significant increase in sea lice populations and impact to farm fish health.

INTEROX PARAMOVE[®] 50

INTEROX PARAMOVE[®] 50 is hydrogen peroxide - benign in the environment as it degrades quickly to water and oxygen. This product is relatively effective on all stages of sea lice; however, it is not recommended for use when water temperatures exceed 12 degrees. The product is most effective and economical when administered in well boats.

Approval for use was received June 11, 2010; product was received for use on June 26, 2010. However by this time, water temperatures in the areas with the highest sea lice populations were already 14 plus degrees. Therefore, treatment protocols had to be adjusted resulting in lower efficacy rates.

CALICIDE®

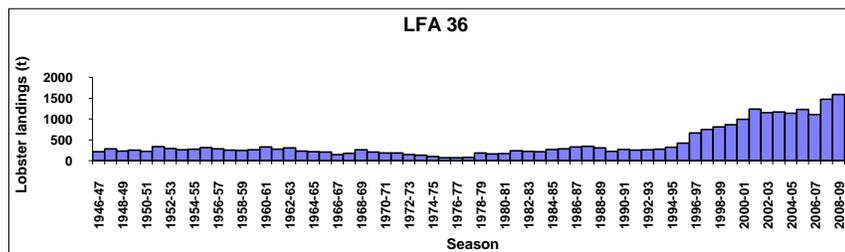
CALICIDE® is an in-feed treatment and use is approved through Health Canada, Veterinary Drug Directorate. However, because CALICIDE® only affects early stages of sea lice, to be effective it must be used in conjunction with bath treatments that affect later stages of the sea louse.

Until the re-registration of this product with Health Canada’s Veterinary Drug Directorate is complete, CALICIDE® can only be accessed through an Emergency Drug Release; therefore, it is difficult to access in a timely manner. By the time the application for use is approved, the lice will have passed the juvenile stage for which CALICIDE® is effective.

NON TARGET SPECIES

All field research and scientific monitoring conducted on ALPHAMAX® indicates that this product poses little to no risk to the marine environment or to non-target species when used as prescribed. To date, sediment and water quality testing has shown little to no impact as a result of SALMOSAN® treatments. The data from 2009 and early 2010 research have been reported publically by federal and provincial researchers. Preliminary 2010 data has been shared with fishery and conservation organizations at meetings and is available on the ACFFA website.

There have been no significant changes in the landings for the traditional fishing sector over the past 5 years and lobster landings have increased steadily over time (see data below on lobster harvests in LFA 36 located in southwest New Brunswick).



There is no scientific evidence that sea lice from farmed salmon have had a negative impact to wild species populations in New Brunswick.

SEA LICE POPULATIONS ON FARMED SALMON 2009 - 2011

2009

During the late summer of 2009, SLICE® was the only authorized treatment available to farmers in Bay Management Area 1 until November when they gained access to SALMOSAN®. ALPHAMAX® was only available in BMA 2A.

Traditionally winter, when water temperatures drop, is a time when sea lice will die naturally and there is seldom a new set of lice on a farm from December to March. However, the winter of 2009/2010 saw higher than normal water temperatures. This factor, combined with the higher than normal lice loads left on the fish because of inadequate treatments in the fall of 2009, made it critical that the industry

take aggressive action in March / April of 2010 to prevent lice populations from escalating and to safeguard the health of salmon stocks.

2010

All of the salmon farming companies worked together to prepare a coordinated treatment strategy that included synchronized treatments and establishing treatment thresholds in each Bay Management Area. However, this aggressive treatment plan could not be fully implemented because SALMOSAN® was the only product available until early July.

Lice populations in Bay Management Area 1 became very high through the summer where second year fish were located. This was due to higher than normal water temperatures (2 degrees C), the inability to fully utilize INTEROX PARAMOVE®50 and restrictions on the use of SALMOSAN® and later ALPHAMAX®.

Salmon farmers invest in well boat technology; ultimately 3 well boats are available for use in New Brunswick. Well boats support the use of INTEROX PARAMOVE®50, increased treatment efficacy and a significant reduction in the quantity of treatment product required for each treatment.

2011

Sea lice populations up to the current month seem to indicate that access to timely treatment options has enabled salmon farmers to control this parasite. However; it remains critical to ensure that a fully operational integrated pest management plan is implemented and supported by regulator including access to a suite of treatment products. Having access to a variety of treatment products does not mean increased use of chemotherapeutants; it means that the correct product is used strategically to obtain optimal results resulting in a decrease in the number of treatments required and product used.

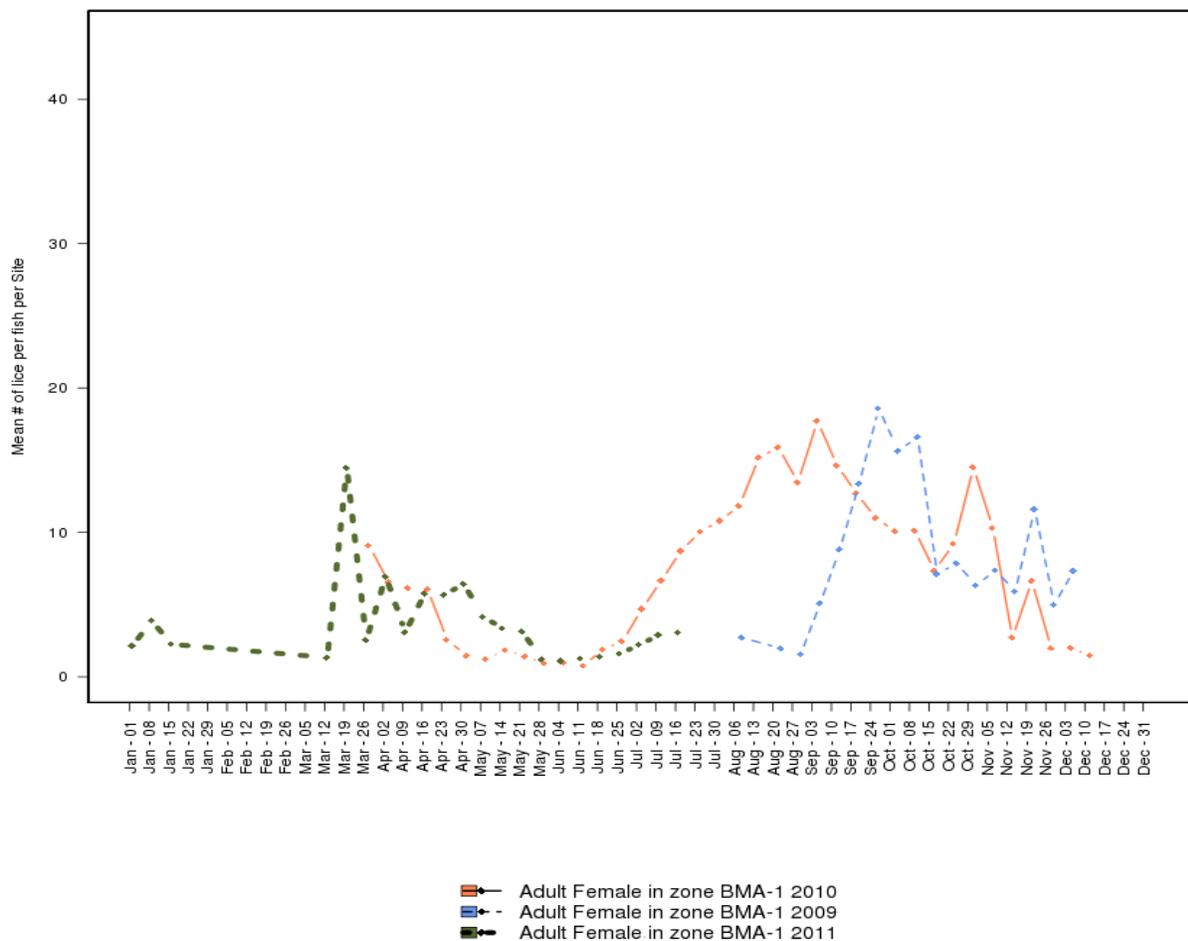
TREND ANALYSIS BY BAY MANAGEMENT AREA

In 2010, the Atlantic Canada Fish Farmers Association, on behalf of the New Brunswick salmon farming industry worked with the Atlantic Veterinary College at the University of PEI to develop a data base to house the on farm sea lice data that could be used to support improved sea lice management and to provide regulators with reports on fish health management.

While there has been a significant effort to include data from 2009, not all data entry for that year has been complete. 2009 data is not available for BMA 3A or 3B.

The following charts are provided for each bay management area and contain the average count, by month, for adult female *Lepeoptherius salmonis* sea lice. These lice are considered the most critical to the management of sea lice populations within a salmon farm. Information specific to the management area is provided on each chart.

Mean # of Lice Per Fish by BMA for Year 2011, 2010, 2009 for BMA(s) BMA-1



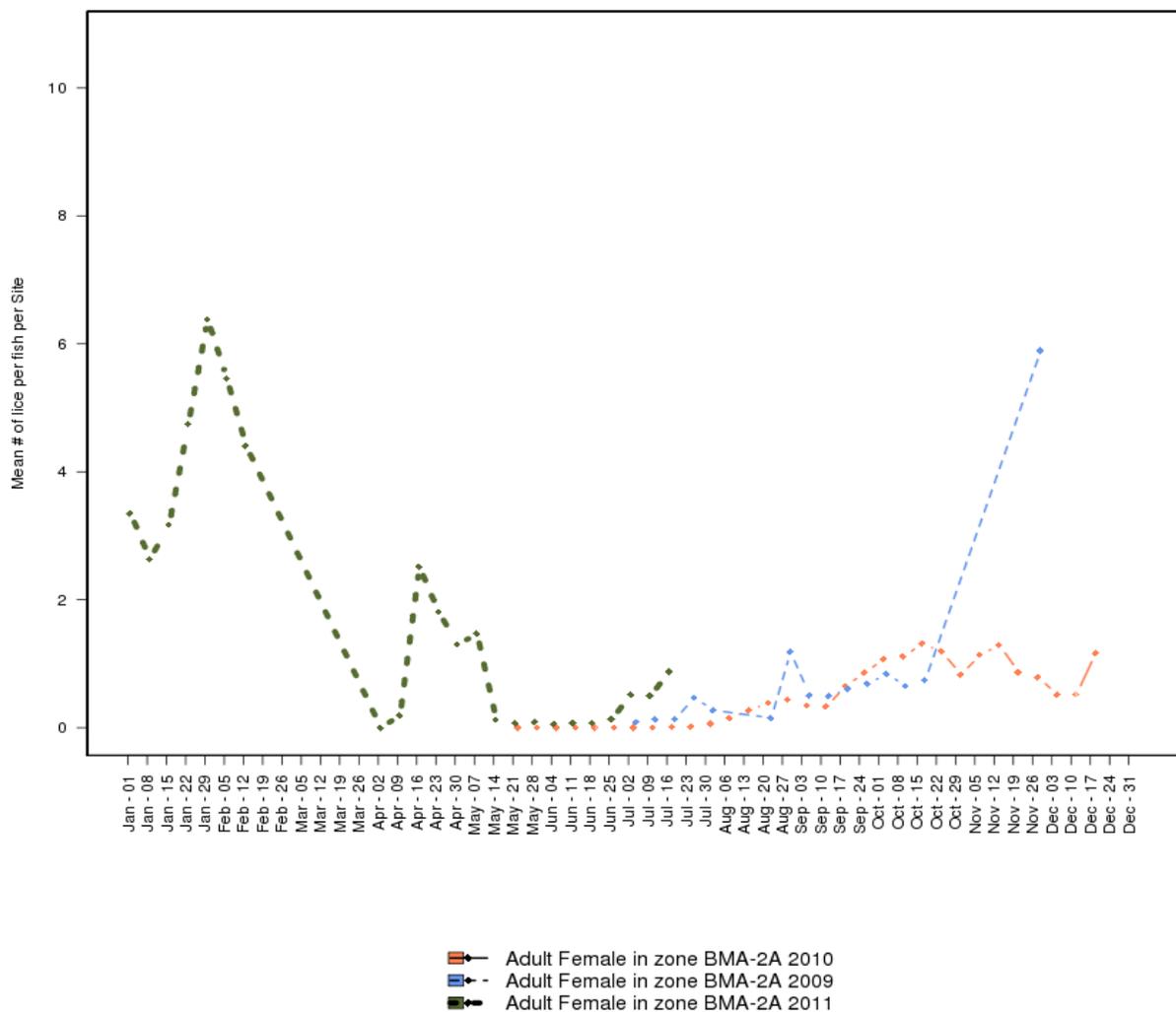
Trend Analysis:

2009 – The only product available for treatment is SLICE; farms are just being stocked

2010 - Counts coming into the spring are reasonable and pose no threat to farm fish health or other species. Treatments in spring bring numbers down; however, lice numbers begin to increase in late June because approvals for use of hydrogen peroxide and access to well boat were delayed. Water temps increase (2 degrees C higher than historical high) causing lice numbers to increase. Treatments using reduced levels of hydrogen peroxide and Salmosan administered through to October; but efficacy reduced due to restrictions on use (water temps and regulatory). Full concentration of hydrogen peroxide used in November; numbers are drastically reduced.

2011 – Increased lice count in March is normal; timely treatment using hydrogen peroxide results in significant drop and numbers are being maintained well below 5.

Mean # of Lice Per Fish by BMA for Year 2011, 2010, 2009 for BMA(s) BMA-2A



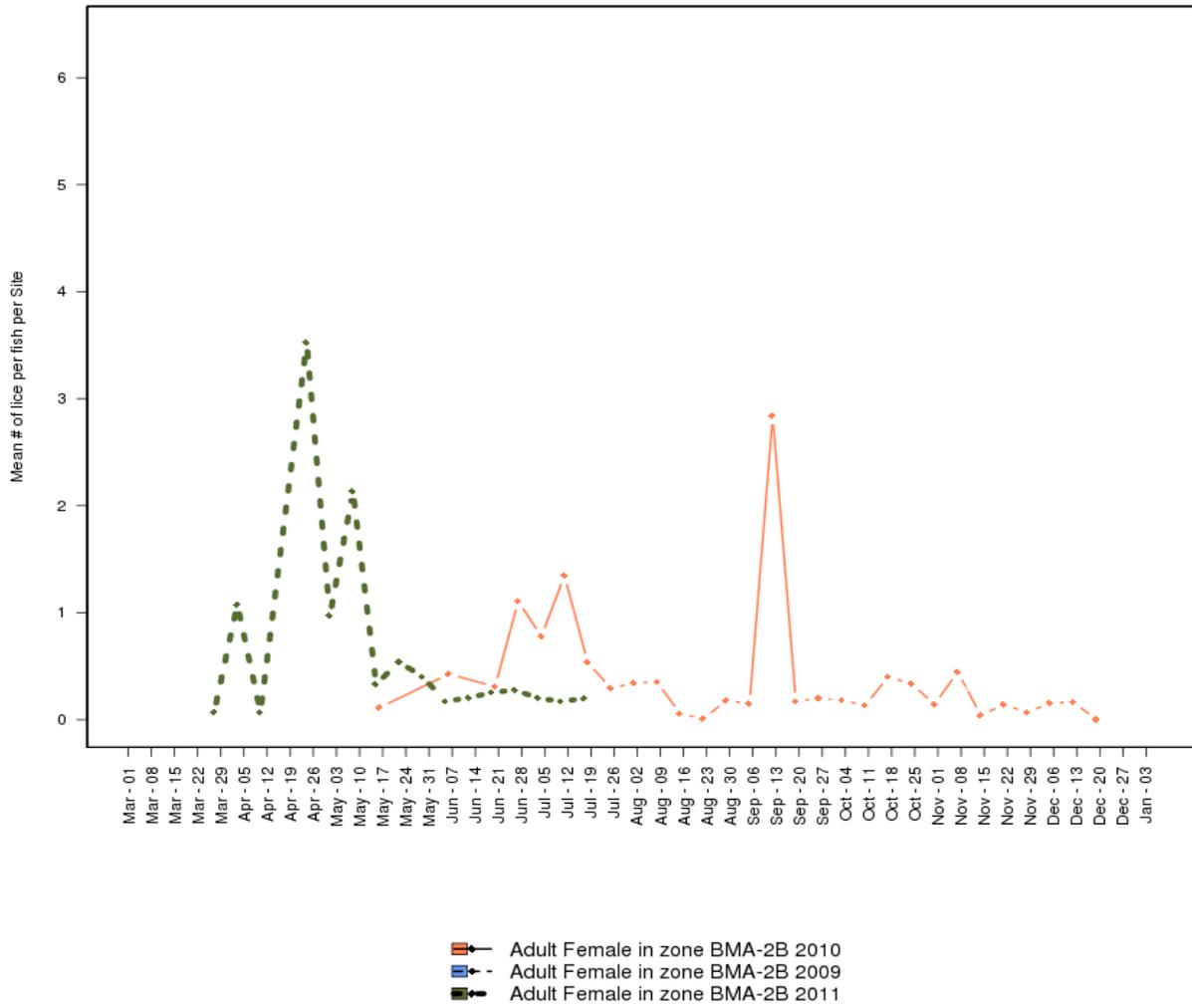
Trend Analysis:

2009 – Approval to use AlphaMax on a trial basis beginning in June 2009; numbers maintained at low level; spike in October occurred because fish were being harvested so no treatment was conducted on the remaining farm

2010 – First year smolts were being entered into this BMA in 2010; lice counts maintained at low level

2011 – Counts spike in the spring which is a normal trend with treatments planned and conducted using hydrogen peroxide; timely application results in maintaining lice number at 1 or less

Mean # of Lice Per Fish by BMA for Year 2011, 2010, 2009 for BMA(s) BMA-2B



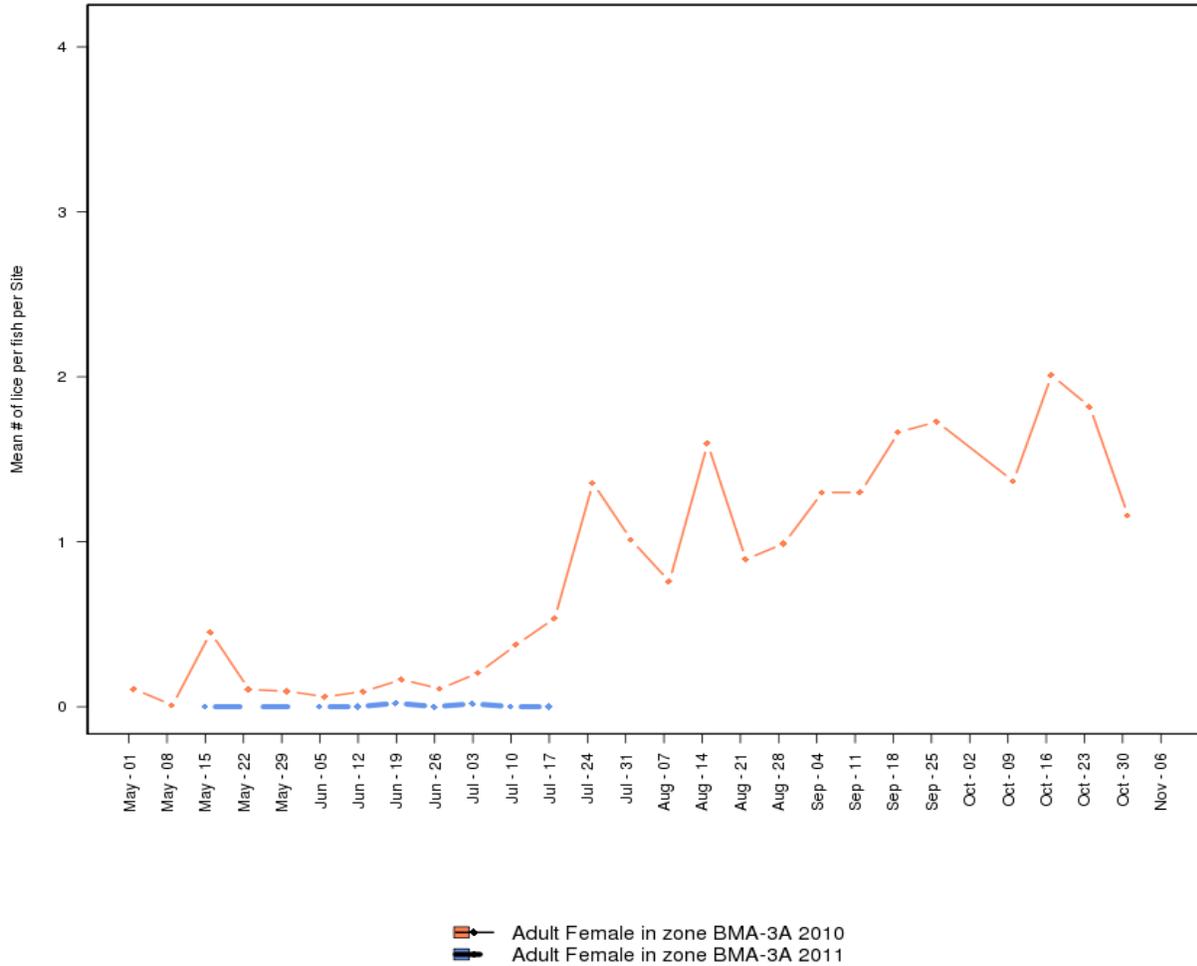
Trend Analysis:

2009 – No fish stocked in this area

2010 – Water temps are cooler in this area; first year smolts managed through use of hydrogen peroxide and/or Salmosan

2011 – Counts spike in the spring which is a normal trend; spring treatment using hydrogen peroxide; timely application results in maintaining lice numbers well below 1

Mean # of Lice Per Fish by BMA for Year 2011, 2010 for BMA(s) BMA-3A



Trend Analysis:

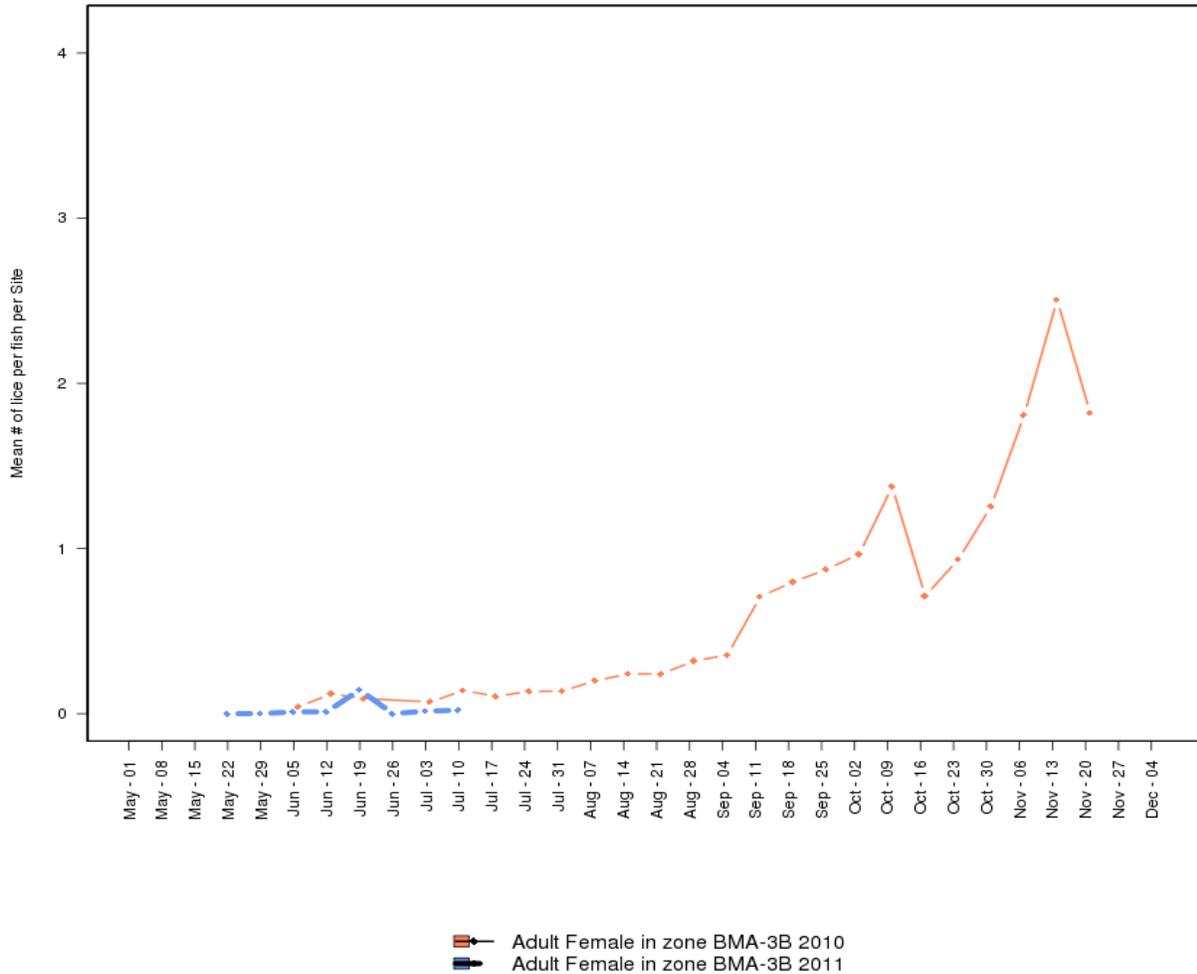
Data for this area was not requested; however, what data has been placed into the Decision Support System is provided FYI

2009 – No data available

2010 – Water temps are cooler in this area; stocks managed through use of hydrogen peroxide and/or Salmosan

2011 – Counts remain low

Mean # of Lice Per Fish by BMA for Year 2011, 2010 for BMA(s) BMA-3B



Trend Analysis:

Data for this area was not requested; however, what data has been placed into the Decision Support System is provided FYI

2009 – Data not available

2010 – Water temps are cooler in this area; stocks managed through use of hydrogen peroxide and/or Salmosan

2011 – Counts remain low

ADDENDUM 1 –
NB BAY MANAGEMENT AREA MAP

