Government of Newfoundland and Labrador
Department of Fisheries and Aquaculture

Overview of Aquatic Invasive Species (AIS)

Prepared for

The Exotic and Invasive Species Workshop-Corner Brook- January 22-23, 2008

Prepared by

Derek Mouland
Shellfish Aquaculturist

PROJECT:

Monitoring program for the prevention, detection and management of Aquatic Invasive Species (AIS) in Newfoundland and Labrador.

MANDATE:

The Aquaculture Branch is responsible for the development of an environmentally and economically sustainable aquaculture industry. In order to achieve this, the Branch:

- Provides environmental and biological monitoring for finfish and shellfish sectors;
- Maintains the Code of Containment for the salmonid sector;
- Provides direct support to increase production;
- Providing support for professional development for farm managers and workers;
- Implements a comprehensive fish health program for the entire aquaculture industry;
- Provides market intelligence and assistance; and
- Attracts investment into the industry.

POLICY AND LEGISLATION:

DFA does not have regulations in place that targets (AIS). However, under section 4(6)(g) and (h) of the Aquaculture Act “The minister may (g) specify measures to be taken to prevent the escape of aquatic animals and the development and spread of disease and parasites and to minimize the risk of damage to the environment or other aquaculture facilities; (h) specify measures to be taken to minimize risk to other aquaculture facilities”.

RATIONALE:

AIS have caused huge impacts on the environment, industry and economies in other jurisdictions, and DFA does not want them to become established in NL. Mussel aquaculture is a major contributor to rural economies and this industry is expected to expand in the near future as seen in other areas. Introductions of high risk AIS could have a major negative impact on or even devastate commercial industry.

- The objective is to Monitor mussel sites near areas that are 'at risk' for AIS on the island portion of NL. The ultimate goal is to prevent, detect and manage AIS on shellfish farms.
- Provide industry and public with information about AIS and the problem they cause in mussel aquaculture.
- Continue to survey, identify and catalogue existing biofouling organisms and identify other AIS when they appear (i.e. especially tunicates) in areas at risk. These would include high risk ports of entry themselves and areas with high shipping traffic that are located within or near existing aquaculture facilities.
- Identify a time-line of AIS introduction and establishment.
- Provide and establish a rapid response plan when other AIS have been detected.
- **Main goal rapid response plan:**
    - Develop a "Framework" (i.e. a structured procedure that outlines steps to be followed to allow the early detection of AIS species incursions and to mitigate and/or eradicate)
    - Conduct AIS monitoring and determine the best response when found
    - Develop mitigation to control and/or eradicate

- Develop AIS management and mitigative strategies for existing and new invasive species.
- Provide bio-security measures and mitigation for further invasive species avoidance.

CONCERNS:

- The primary concern of the Aquaculture Branch of the DFA is the potential impact of AIS on the aquaculture. AIS pose a serious problem for aquaculture operations in this province. It is for this reason that monitoring has focused on existing mussel farms in and near areas at risk. Eight sentinel sites have been selected to represent the regions of the island that are at risk.
- A number of key pathways have been identified as likely vectors for AIS introductions. In NL, attention is focused on areas at risk from shipping (domestic and international), commercial and recreational boating and shellfish transfers. It is anticipated that once an AIS is introduced in any one location, it would spread along the coastline by international and commercial fishing vessels, cargo and ferry services, commercial and recreational boating and shellfish seed and product transfers.
- DFA has been monitoring biofouling species on mussel farms since 2003 under the EBMP and one of the best defences to the introduction of an invasive species is early detection. In order to achieve this goal DFA has been monitoring sentinel sites since 2005 for presence of AIS, educating the industry about invasive species in other jurisdictions and gathering baseline information on biofouling species. DFA has been implementing bio-security protocols by disinfecting vessels, transportation vehicles and containers, and on-site sampling gear.
- Bio-security will continue as is, incorporating all mussel growing sites and movements of vessels and equipment, within the province and into and out of the province.
- Sampling of 'species specific' collectors for tunicates is done every eight weeks, running from April to December. At sampling time, collectors are taken up and the marine organisms that have settled on them are sampled and identified. Data will be catalogued to show baseline of biofouling, seasonality, prevalence and distribution of AIS.
- This information is critical in building the baseline database of biofouling marine organisms around NL. Some areas have higher levels of shipping and boating traffic than others such that some areas are more 'at risk' than others. Some sites currently being monitored include: Piccadilly Bay in Port au Port Bay, near the high traffic port of Stephenville; Merasheen Island in Placentia Bay, near the shipping lanes of Placentia Bay approaching the Come By Chance Oil Refinery and the Transhipment station at Arnold's Cove, as well as high boating traffic.
- Risk assessments and a rapid response plan are under continuous development by DFA and DFO. (1) Methods have been issued to direct the response. (2) Equipment with which to respond. (3) The capability and resources to carry out the response.
- DFA has implemented mitigative and management strategies to the mussel growers of Placentia Bay, NL to deal with the recent discovery of the 'Golden Star Tunicate' late in 2006. This strategy was implemented to prevent the spread of tunicates by mussel transfers from a region that has been deemed positive to a region that is negative. The mitigation includes the incorporation of an additional piece of on-site equipment, a brine hopper/conveyer containing a super saturated

brining solution at a concentration of 300 ppt (30% salt solution). DFA has already conducted preliminary brine tests and the effects of brining on shelf life from mussels sampled from Placentia Bay, NL.

- DFA has coordinated project activities and communicated with industry stakeholders, other government agencies, academia and the public. The issue of AIS is a large and complicated one such that DFA is not the only agency in NL addressing it. DFO is conducting its own monitoring program that focuses on ports at risk that deal with shipping. In addition, the Newfoundland Aquaculture Industry Association (NAIA) has developed a program to address AIS through education and public awareness. All three groups are working collaboratively toward the common goal to address AIS. DFA has communicated directly with and has assisted DFO and NAIA to ensure that projects do not overlap and are in fact complementary to one another.
- The main target stakeholders are the mussel growers and other industry supporters including academia, government and non-government agencies.

DFA's EXPERIENCE WITH AIS:

- Visits to PEI in 2004, 2006 and 2007 for tunicate workshops and conferences that included in-situ studies and laboratory observations of AIS species impacting Atlantic Canada.
- In 2005 to present, DFA deployed AIS 'species specific' collectors for tunicates on 8 sentinel mussel farms representing regions in areas considered 'at risk' to the introductions of AIS. The areas targeted included the monitoring of such pathways as large volumes of ship traffic, commercial boat movement and shellfish transfers. A region that was surveyed and targeted the three pathways was Placentia Bay, Newfoundland and Labrador (NL).
- Fact sheets, updates and reports relating to AIS such as tunicates to all stakeholders including industry, academia and other government agencies.
- Industry and public awareness through notices and presentations about AIS and its impacts on aquaculture.
- In 2006, the department assisted DFO's Harbour Monitoring Program in areas at risk to the introduction of AIS.
- In 2007, the department coordinated two DFO funded AIS dive surveys in Placentia Bay where the 'Golden Star Tunicate' was identified and confirmed;
- DFA's Environmental Biological Monitoring Program (EBMP), AIS and Shellfish Health monitoring programs for mussel farms near areas at risk for AIS.
- DFA's bio-security measures that are implemented to treat and disinfect infrastructure and cultured stock prior to import and again upon arrival in this province.
- Island wide AIS dive surveys were conducted in collaboration by DFO/DFA/MUN.
- Inter-governmental I& T committees issue permits and licenses to import live fish or shellfish into or out of the province, to collect fish or shellfish stock from wild sources and to transport live fish or shellfish prior to processing and/or sale of fish or shellfish products.
- To implement the management of AIS, the provincial and federal governments, along with industry and academia have created an AIS steering committee to make recommendations on AIS matters in this province.
- Upon identification and confirmation of AIS species, participants from varying fields of expertise are assembled as an 'AIS Expert Panel' to provide biological, technical and mitigative response to address the AIS of concern.
- Distribution of AIS ID cards and sheets to industry, academia, non-government agencies and the public.
- 'Golden Star Tunicate' found in Placentia Bay in December 2006. DFA/DFO implemented risk analysis and mitigation in the spring of 2007 dealing with the single vector of spread with cultured mussel movements from a positive area to a negative area.
- 'European Green Crab' found in Placentia Bay August 2007. Following confirmation of Green Crab, an AIS survey was conducted in Placentia Bay for distribution and prevalence for all possible AIS in that region. Following the Placentia Bay AIS survey, an Island wide AIS survey was conducted in

collaboration by DFO/DFA/MUN. Risk analysis was completed, but only recommendations for mitigation have been presented but not conducted.

- 'Violet Tunicate' found in Belleoram, Fortune Bay in October 2007. After confirmation another survey was conducted in the region for percent cover and prevalence of the Violet Tunicate. The survey results indicated that this tunicate is confined to the initial area where found, and is thought to have not spread any further. Risk analysis completed, but only recommendations for mitigation has been presented not conducted.

SUSTAINABILITY:

This project will continue to monitor for early detection and confirmation of AIS in NL. This early detection will give DFA, the industry and other stakeholders an opportunity to enable a rapid response plan to address the problem and then enable steps to be taken toward management and mitigation and possibly eradication. In this way the negative impacts of AIS, as seen in other jurisdictions, can be avoided or minimized and the future benefits of the mussel aquaculture industry to rural NL can be preserved.

ENVIRONMENTAL RESPONSIBILITY:

Species specific collectors for tunicates are constructed from non-leaching, schedule 80 PVC material and are deployed on existing licensed aquaculture sites at culture depth. No impacts on environment were observed.

Bio-security measures are implemented to prevent spread of AIS from site to site were developed with Provincial Fish Health officials and are conducted off site, on land, prior to site visits. Disinfectant used (Virkon and State Formula 362 no rinse disinfectant) are highly diluted (1%). All samples taken from the collectors are properly handled, specimens preserved and all discard properly disposed of.

AQUATIC INVASIVE SPECIES: ITS IMPACT ON MARINE AND FRESHWATER ECOSYSTEMS

The introduction and spread of non-native species in marine and freshwater environments is a world-wide problem that is increasing in frequency. Aquatic Invasive Species (AIS) are introduced through various pathways including: ballast water from shipping, as hitch hikers on boat hulls/trailers and in shellfish transfers. AIS can cause extensive damage to marine and freshwater ecosystems and the economies which they depend upon.

Through its Aquatic Invasive Species Monitoring Program, introduced in 2005, the Department of Fisheries and Aquaculture (DFA), in collaboration with Fisheries and Oceans Canada (DFO), has identified and confirmed four aquatic invasive species to date.

1) The Coffin Box Ectoproct was found in Merasheen Island, Placentia Bay in 2005.

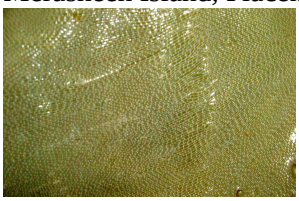

Photo by Derek Mouland, DFA

It grows on kelp and has devastated kelp beds on both the west and southwest coasts of Newfoundland. Since 2005, this species has been found island-wide including coastal Labrador.

2) The Golden Star Tunicate was found in the Argentia, Placentia Bay in 2006.

Photo by Terri Baines, DFO

In the Maritime Provinces, this colonial tunicate is one of four species of tunicate that has had minimal impact on the mussel aquaculture industry. Its potential impact in Newfoundland and Labrador is unknown and DFA has worked with the federal government to restrict movement of tunicates with mussel transfers.

3) The Violet Tunicate was first discovered in Belloram, Fortune Bay in 2007.

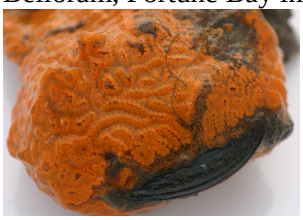

Photo by Luis A. Solórzano (Californiabiota.com)

This colonial tunicate has had both an ecological and economical impact on the mussel aquaculture industry in the Maritime Provinces. DFA is working, in collaboration with DFO and the Newfoundland and Labrador Aquaculture Industry Association, to assess the potential impact in Newfoundland and Labrador and to provide strategies to mitigate and possibly eradicate these two species of tunicates.

4) The European Green Crab was first discovered in North Harbour, Placentia Bay in 2007.

Photo by Derek Mouland, DFA

This particular species preys upon small wild and cultured bi-valve shellfish such as soft shell clams, bar clams, surf clams, oysters and mussels. The European Green Crab will aggressively compete with other crabs and lobster for food and there is evidence it will prey upon juvenile lobsters. This crab may also cause damage to eels. Its potential impact in Newfoundland and Labrador is unknown since it has only recently been discovered.

The Department of Fisheries and Aquaculture works with the federal government and the fishing industry to ensure the impact of AIS on Newfoundland and Labrador's marine and freshwater ecosystems is minimal. DFA continues to be vigilant in AIS monitoring, risk assessments and providing information to industry to ensure the Province is prepared for new AIS introductions.