

# Exotic and Invasive Alien Species Workshop Minutes

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**Exotic and Invasive Alien Species Workshop  
Minutes from January 22, 2008**

**Welcome and Opening Comments**

Shelley Pardy Moores welcomed workshop attendees to the Exotic and Invasive Alien Species Workshop and encouraged dialogue over the next two days, Ms. Pardy Moores encouraged the frank exchange of information and ideas in an effort to address issues and to learn about initiatives from across the country and around the province.

**Canada's Invasive Alien Species Strategy – Mark Richardson, Environment Canada.**

Mr. Richardson spoke on the Canadian Invasive Alien Species Strategy which Environment Canada provides a leadership and coordination role for the four federal agencies participating, detailing courses and talks developed around the topic of Invasive Alien Species. He spoke on the need for an Invasive Alien Species Strategy, noting that in the past 100 years the number of new species entering, and moving across, Canada has increased exponentially. While the total numbers of invasive alien species in Canada is unknown, many are here now only to cause problems later. In the past few decades a number of significant invasive alien species problems have increased the interest in reducing the total number entering Canada.

Mr. Richardson commented on the potential for substantial negative impact on the economy, noting that forestry, agriculture, fishery industries stand to feel the biggest impact. Invasive alien species have the potential to influence trade, with invasive species often viewed as the reason behind the favouring one country's exports over another's exports.

Specific examples of environmental (i.e. house sparrows and starlings impacting native populations; zebra mussels impacting native mussel populations) and social (i.e. alter perception of the environment; lessen overall enjoyment of nature) impacts were highlighted.

A general loss of activity in dealing with invasive alien species in Canada was noted. From the federal level down through grassroots NGO's and directly to Canadian citizens, Mark commented on a need to recognize the huge impact of IAS' in Canada, the reality that problems associated with IAS' are growing and that issues surrounding IAS' touch every Canadian.

A background on the IAS strategy, culminating with a budget of \$85 million for delivery of the strategy over 5 years was provided. The goal of the strategy is to engage Canadians to minimize risk of IAS to the environment, the economy and to society as a whole. The scope of the strategy is intended to be broad and inclusive to protect both aquatic and terrestrial environments. Outcomes are focused on reducing the introduction and spread of IAS, enabling Canadians to become involved in projects that address the threat of IAS.

Themes of the strategy include a focus on leadership and coordination across a number of sectors and jurisdictions. The guiding strategic goals include the prevention of new introductions, the detection of new invaders, a rapid response to new invaders once detected and management of established and spreading invaders through eradication, containment and/or control mechanisms.

The focus of the implementation strategy is on risk analysis and assessing an acceptable level of risk from individual invasive alien species, on sound science to adequately assess the threat of IAS, on legislation and regulations available as a management component, on national education and outreach initiatives targeted at the public, and on international cooperation.

International agencies and working groups which have lead roles in preventing the spread of invasive alien species, or who are dedicated to IAS management in a particular sector were highlighted. Details were provided on the roles and responsibilities of these organizations were provided.

In conclusion, Mr. Richardson noted that the Invasive Alien Species Strategy for Canada provides an umbrella under which change can be affected.

### **Canadian Invasive Plant Framework – Bruno Gallant, Canadian Food Inspection Agency.**

Mr. Gallant spoke about the key role that the Canadian Food Inspection Agency (CFIA) plays in the implementation of the Invasive Alien Species Strategy for Canada and on the agency's role in developing a comprehensive Canadian Invasive Plant Framework (CIPF).

A history of the CFIA and the Agency's roles and responsibilities were reviewed. The objectives of the CFIA as they relate to invasive alien species were highlighted, including the strengthening of existing plant health programs and the development and implementation of a new program for invasive alien plants. With respect to the invasive plant component, CFIA is in the process of developing related policies. Activities conducted with respect to invasive plant include, for example, weed risk assessments and surveys on certain species. One of the main initiatives with respect to invasive plants is the development of a CIPF which is led by the CFIA.

The goal of the CIPF is to establish consistent, coordinated policies and programs to prevent and minimize the impact of invasive alien plants, with the same implementation strategies as those adopted by the national IAS strategy: risk analysis, sound science, legislation and regulations, education and outreach and international cooperation. The CIPF is expected to be released in late 2008.

To provide background into invasive plants in Canada, Mr. Gallant presented on a report soon to be released regarding the status of invasive alien plants in Canada. This report

will summarize what is known about such status and to answer questions such as: what kinds of invasive plants are present in Canada?; where are they distributed?; where did they come from?; how and when did they get here? etc. A list of invasive vascular plant species in Canada was compiled which is primarily based on Wild Species 2005 database. As part of the report, information was gathered on invasive plant programs in Canada during the period 2001 to 2005 within many different organizations through a questionnaire, literature search, web search and discussions with experts.

This status report will present, for example, abundance and distribution related information. In that regard, 1,229 alien vascular plant species have been reported in Canada, representing approximately 24% of the Canadian vascular flora. Many of these plants originate in Europe and Asia following trade patterns and colonization. On average since 1600, Canadian flora has acquired 3 alien plant species per year, of which 1.2 species per year have become invasive.

Factors such as increased air and shipping travel, trade and access to foreign ecosystems contribute to the risks of introduction of invasive plants. He then noted the pathways for introduction of invasive plants, including intentional and unintentional introductions (e.g., crops or forages). Furthermore, patterns of imports of materials with potential for invasive plant introduction were examined. Over 65% of such material originates from the US. Trade data along with climatic analysis suggests that eastern Asia and southern South America are potential major new source areas for invasive plant introductions.

Potential economic, environmental and societal impacts of invasive alien species were detailed. Impacts including threats to species at risk (like the Prairie Lupine and Dun Skipper), changes in the floristic composition of ecosystems, human health problems (like allergies and dermatitis), reduced recreational use of the outdoors and the interfering of invasive species into traditional lifestyles.

Bruno ended with an overview of the process for the development of the CIPF. Workshops with Federal and Provincial partners were conducted across the country, with the intent to develop a draft CIPF with the assistance of feedback received from partners. Feedback includes, for example, information on the scope of a CIPF, prioritization of goals and implementation strategies, and invasive plants of particular concern. Consultation on a draft CIPF will be conducted at a broader scale.

Mr. Gallant addressed audience questions, noting potential means of introduction and spread of invasive plants requiring consideration of possible regulatory control mechanisms, including ornamental introductions, mail order/catalogues and the horticultural trade in general. In response to questions about the problem of managing the movement of invasive alien species across the country, *he* note the effort required within the framework to prioritize management, pathway management and regulation in particular. The necessity for a re-examination of intentional vs. unintentional introductions was stressed by the presenter.

**Invasive Alien Species Partnership Program (IASPP) - Mark Richardson,  
Environment Canada.**

Mr. Richardson spoke about the details of the Invasive Alien Species Partnership Program (IASPP), describing the federal funding program as one focused on fostering projects that help prevent, detect and manage invasive alien species in the province.

The need for such a partnership program was made evident, with invasive alien species being an ever growing problem. Environment Canada serves allocate and administer the funds to provide assistance for project start up.

Details were provided on this years funding noting that \$850,000 is available, and 200 applications have been received. Receiving 200 applicants, totaling \$700 million requested, indicates the need for more funds. From the Atlantic Provinces, 37 applications have been received.

The goal of the partnership program is to engage Canadians in actions to prevent, detect, and manage invasive alien species in order to minimize the risk to environment, the economy and society. Outcomes are focused on reducing introductions, minimizing the likelihood of spread of invasive alien species and addressing potential pathways for invasion. The program is intended to enable Canadians to become actively involved in projects that address the threat of Invasive Alien Species and to improve the understanding and awareness level amongst Canadians on the topic.

The eligibility requirements for the program were reviewed, noting the groups that applications were open to (from NGO's and community-based groups, to universities and non-federal government bodies) and detailed the funds available (\$50,000) for individual projects, with funding intended as "leverage" funding. Complete details on eligibility guidelines are found on Environment Canada's website along with a simplified application process. The funding process is becoming more competitive with projects ranked according to how they address broad program goals of engaging Canadians, how they advance the implementation of the national invasive alien species strategy and how feasible the project criteria are in terms of capacity and budget.

The characteristics of high value projects would include addressing invasion pathways, addressing specific species concerns in partnership with stakeholders, having clear environmental, economic and social benefits. Successful applications would implement activities consistent with the national strategy, integrate well with other programs, demonstrate they have secured non-federal sources of funding, display a high level of local/regional support from various partners and provide realistic deliverables.

A brief history on past funding allocations according to province and habitat type was provided. Successful projects including projects of the Pet Industry Joint Advisory Council, of the Friends of Fish Creek Provincial Park Society, the PEI Aquaculture Alliance and projects of the Canadian Weed Science Society were highlighted. Mr. Richardson noted the launch of a new online application for IASPP in November 2007

and the development of a national IAS web portal with a new Environment Canada website on invasive species pending.

### **Legislation Review – Shelley Pardy-Moores, Wildlife Division**

Ms. Pardy Moores provided an overview of the Exotic Species Education Coordination and Policy Development Project (2006-2008). A project with the aim of reviewing legislation.

Noted was the desire for the Biodiversity section of the NL Wildlife Division to forge new partnerships that would move forward the implementation of the national strategy in the province. The Newfoundland and Labrador Department of Environment with the Newfoundland and Labrador Model Forest have partnered with additional funding from IASPP on a project to conduct a legislation review, highlighting protection mechanisms available to the province to prevent the introduction and spread of IAS.

An institutional analysis was conducted to compile a list of potential pathways for invasive alien species (i.e. wildlife and pet trade) and a list of potential threats from invaders (i.e. extirpation of species). Federal and Provincial Acts were identified using key words like “indigenous” as search terms.

Of the federal acts, legislation was accessed through the Justice Canada website, with 40 Acts reviewed from Agriculture and Agrifoods Canada (ex. *Canada Seeds Act*) to Natural Resources Canada (ex. *Forestry Act*) and Transport Canada (ex. *Canada Shipping Act*).

Relevant provincial legislation was accessed from the Newfoundland and Labrador House of Assembly website. 19 Acts were reviewed including the *Newfoundland and Labrador Wild Life Act* (Department of Environment and Conservation), *Dangerous Goods and Transportation Act* (Government Services) and the *Vegetable Grading Act* (Department of Natural Resources).

Findings of the project include: most Acts were written before IAS was highlighted; national and provincial Acts are largely open to interpretation; Acts are written as they relate to a particular industry and do not have an overarching view of what is going on as a whole; problems are looked at singularly.

Existing gaps in legislation include: do not address movement between jurisdictions across Canada; legislation is old, existing before exotic and invasive alien species were a focus of concern; provincial legislation covers off animals under the Wildlife Act well, but provides little protection from exotic invasive plants; regulations and policies that could reduce accidental introductions are not in place; enforcement may be an issue; inter-agency communication and cooperation is largely lacking.

Ms. Pardy Moores noted that the project is not completed and that pathways without links have to be examined with an increase in communication between agencies so that each agency is aware of what another agency is involved with. Inconsistencies need to be

identified and an overarching approach, across sectors, needs to be implemented when dealing with exotic and invasive alien species.

**Forestry and Agrifoods Agency, Agrifoods Development Branch - Rosalind Pound, Forestry and Agrifoods Agency.**

Ms. Pound spoke from the viewpoint as the Manager of Agricultural Services of the Agrifoods Development Branch under the Department of Natural Resources, discussing the Departments perspectives, roles and responsibilities with respect to exotic and invasive alien species.

This sectors focus remains on improving the efficiency and productivity of farms while operating under *Livestock Health Regulations* and remaining vigilant over the entry of honeybees to the province, preventing/monitoring Aleutian Disease in mink and producing specific pathogen disease-free swine. The sector monitors incidents of purple loosestrife, barnyard grass, seven spotted lady beetle, sap beetle and others that occur in greenhouses, fields and open areas across the province.

It was commented that several invasive species are of concern from a monetary standpoint to the agriculture industry including blueberry maggot, Japanese beetle, Colorado potato beetle, sweet midge and sudden oak death. In general these species are thought to arrive in the province on plants, used equipment and by wind and are thought to be surviving where they wouldn't have before because of climate change.

Sightings of invaders are reported by industry producers to appropriate technicians and then to Agrifoods' Cool Climate Crop Research Centre.

In concluding, Ms. Pound stressed the need for, and importance of, increased information sharing between sectors.

**The Role of Introduced Species in Forest Reforestation – Jeff Motty, Forest Ecosystem Management Division.**

Mr. Motty spoke on the role of introduced species in forest re-forestation and provided a history of silviculture in the province (pre-1970's and since the silviculture program began in the province in 1978).

The silviculture program in the province has been delivered by the main forestry companies in the province (AbitibiBowater and Corner Brook Pulp and Paper Limited) and the Department of Natural Resources. Trees are provided by the provincial tree nurseries at Wooddale and Goose Bay. 218 million trees have been planted in NL.

A research component of the program exists which targets operational silvicultural issues and aims at the continuous improvement of silvicultural methods. This portion of the program also looks at a number of characteristics of introduced tree species and their role on the landscape. Norway spruce, Japanese and European larch have all been examined

for growth rates, likelihood of becoming invasive, likelihood of reproduction with native tree stock and success rate in various habitat types.

A number of exotic diseases have plagued the forestry industry, including white pine blister rust (which causes severe mortality in young trees), and scleroderris canker (European strain which destroys pine plantations). Additionally, a number of exotic insect pests, such as the balsam woolly adelgid (came from Nova Scotia in the 1930's and causes deformity and growth reduction in balsam fir) and most recently the European pine shoot moth (damages young red pine trees and plantations) were discussed.

The forestry industry is interested in further examining the potential impact of introduced species on native tree species (short or long term) with the goal of maintaining healthy ecosystems and sustainable forestry.

**Plant Protection Program, Newfoundland and Labrador - Gary Greenslade, Canadian Food Inspection Agency.**

Mr. Greenslade spoke on the Plant Protection Programs in NL carried out by the Canadian Food Inspection Agency. The program aims to prevent the import, export, and domestic movement of plant pests and diseases into, from and within Canada. This is done through inspection, survey, various treatments and certification for the movement of plants, plant products and other pest carriers as required by the federal *Plant Protection Act* and associated regulations.

Outlined were the program sections and individual commodities (grains/field crops, horticulture, forestry, seed potato, international phytosanitary issues) and detailed the structure and responsibilities of the program (core team and officers under a national management body responsible for legislation, program/policy development and participation in national and international forums). Further details were provided on the Newfoundland Operations Branch, noting partners and stakeholders in the program (from the agriculture industry and Marine Atlantic to the general public). Also highlighted was the support of plant health labs in the region and specific Canadian Legislation relevant to the mandate of the program. Legislation highlighted included: the *Plant Protection Act*, the *Canada Seeds Act* and the regulations associated with those Acts.

Mr. Greenslade spoke about specific legislated systems for import, export and domestic movement of plant products into, from and within Canada and provided examples of the major products that applied to Newfoundland and Labrador. Included were such products as nursery stock, offshore ornamentals, bulbs and perennials, lumber, wood packaging, soil and others. Details on pests important to the industry and preventative measures for their control were outlined. Included were inspections at border crossings, international mail, air passenger baggage and inspections at destinations. Other measures described for the control or occurrence of pests in the province were seed potato certification, education and pest management. Highlights of the Seed Potato program and the legislative measures existing to control seeds at the source were provided. Mr. Greenslade provided an overview of plant protection surveys carried out in the Province.



Also he outlined that the results of these surveys are used as part of assessments for regulatory decisions and formation of quarantine policy critical for new pest detection and control.

**Wildlife Division: Exotic and Invasive Alien Species Issues – Shelley Pardy Moores, Wildlife Division.**

Ms. Pardy Moores reviewed exotic and invasive alien species issues in the province and the Newfoundland and Labrador Wildlife Division's mandate to protect native biodiversity from IAS.

Background on the national and provincial commitment to implementing the Canadian Biodiversity Strategy was presented. The role of the biodiversity program under the provincial Wildlife Division is to inform sectors of specific regulations that are in place (i.e. landscape/horticulture business, pet trade, forestry) and are responsible for exotic species permitting, education, monitoring and database management. The biodiversity program also plays a role in developing a regional invasive plant council.

New projects under the NL Wildlife Division biodiversity program include data mining and distribution mapping of invasive plants in NL, small mammal distribution monitoring, invertebrate sampling, ongoing public awareness, the Wildlife Watchers Program and other monitoring programs.

Ms. Pardy Moores raised several concerns including: the historical/constant change in diversity (attributable to intentional and unintentional introductions); continued flow of introduced species capable of outcompeting native fauna, diluting the gene pool (or wiping out subspecies) and changing entire ecosystems; an increase in mobility in Labrador with the Trans-Labrador Highway; a lack of baseline data (for Labrador in particular); climate change leading to the establishment of populations further and further North; the reality of limited capacity for monitoring.

**Aquatic Invasive Species: Perspectives and the Role of DFO – Geoff Perry, Department of Fisheries and Oceans.**

Mr. Perry provided an overview of the Department of Fisheries and Oceans (DFO) perspectives on aquatic invasive species (AIS), noting that the Department does not have a mandate for dealing with AIS.

AIS is a global issue that has existed for some time, in Atlantic Canada since 1840, and is an emerging issue in this Newfoundland and Labrador. Mr. Perry noted that the province is able to learn from other jurisdictions (ex. Management plan for Green Crab) and that prevention remains the key for AIS. The cost of damage and control of AIS is high and once established, eradication of a species isn't really feasible.

DFO takes a federal lead on the Invasive Alien Species Strategy for Canada in many ways. The Canadian Council of Fisheries and Aquaculture Ministers (CCFAM)

developed a task group assigned to AIS, the Centre of Expertise for Aquatic Risk Assessment formed to fill in knowledge gaps, and a regional plan is being developed to forward the strategy. Prevention, early detection, rapid response and management (eradicate, contain, control, restore adapt) are the main goals of the regional plan.

Mr. Perry stated that the regulatory regime is weak. It was noted that people in the fishing industry were having difficulty dealing with invasive alien species issues due to the lack of constraints in place. Following this Mr. Perry provided examples of such legislation, like fish release regulations under the *Fishery Act* and ballast water control and management regulations under the *Canada Shipping Act*.

To control all pathways for entrance of invasive species into Canadian waters is impossible. From ballast water, hulls and live seafood movements to aquarium trade and fisheries resource stocking, the difficulties of controlling various pathways were highlighted. Examples in Placentia Bay (AIS steering committee formed in March 2007 with clear research priorities) and of many AIS monitoring programs and surveys occurring between 2005-2007 (i.e. high risk harbour studies, aquaculture site monitoring, province-wide biannual surveys of yacht clubs, shorelines and high risk ports) that have facilitated partnerships and identified capacity were identified.

DFO focuses on invasive species considered as "high priority", including oyster thief, vase and clubbed tunicate and didemnum. Of interest to DFO are such alien species as coffin box, golden star and violet tunicate and green crab and freshwater invasives such as, brown and rainbow trout, round goby and rusty crayfish.

### **Erosion Prevention Using Hydroseeding – Ken Hannaford, Department of Transportation and Works.**

Mr. Hannaford presented on erosion prevention along roadways using a hydroseeding method as an initiative of Department of Transportation and Works. Projects of the Department include highway and road construction, highway and road upgrade and associated infrastructure maintenance. One issue encountered by Transportation and Works includes surface water movement and sedimentation with the potential to affect fish habitat. This is remedied by assuming a preventative approach to ensure that sedimentation is minimized. Another issue involves slope stabilization along roadways and the use of riprap or hydroseed at sites where soil disturbance has occurred and/or has the potential to occur. The Department is careful in choosing the seed mixture included in hydroseeding mixtures. An attempt is made to use a blend that contains plants that will not self-seed and that rapidly naturalizes a disturbed area while allowing slower growing native species to readily colonize and outcompete the planted exotic species. This allows native pollinators to move in and force the planted species to succumb to an invasion of native species.

Mr. Hannaford explained that current practice along the Labrador Highway to increase slope stabilization. In areas of exposed slopes the Department of Transportation and Works has not been seeding, rather have been covering the slopes with the overburden removed during construction. The use of the overburden has been found effective in stabilizing slopes while also promoting the regeneration of native species.

As the Labrador highway is constructed, hydroseed that is being used is composed of native Labrador species, allowing delicate colonizing species to naturally regenerate along highways.

### **Caring for Our Special Places: Roles and Responsibilities Related to Exotic and Alien Invasive Species – Kristin Powell, Parks and Natural Areas Division.**

Ms. Powell outlined the roles and responsibilities of the Parks and Natural Areas Division related to exotic and alien invasive species. The mandate of the Division pertaining to operations, natural areas and environmental education were discussed. Concerns for the Division include threats to biodiversity in the form of habitat loss and invasive alien species.

No policy or management guidelines currently exist specifically for IAS under the mandate of the Parks and Natural Areas Division. However, there is a focus in the Division on avoiding and minimizing habitat disturbance so that, in keeping with *Wilderness Ecological Reserve Act*, protection can occur by very existence.

An overview of current initiatives under Parks and Natural Areas including the development of best management practice strategies with NL Hydro, the establishment of new protected areas (some in developed areas) like the Main River Proposed Waterway Park in 2005, and development of management regimes to prevent invasives from colonizing was provided.

In the future, Parks and Natural Areas will continue to set priorities according to problematic species with feasible management protocols, to monitor species and to prevent introduction through public education. Management policies for exotic and invasive alien species will continue to be developed in protected areas and initiatives will continue to be successful with increased multi-agency communication.

### **Discussion**

Mr. Hannaford provided an example of where Transportation and Works moved a portion of two roadways to avoid small plots of pitcher plant; when the road could not be moved, a small patch of pitcher plant was actually dug up and replanted.

Ms. Pardy Moores commented that there has been little interface between DFO and provincial wildlife on various aquaculture matters, while there should be.

Mr. Hannaford asked Mr. Perry if species were being found now because the incidence is up or because people are finally looking. Mr. Perry agreed that as you look for species, you'll likely find something out of the ordinary. To this he wondered what the point was in looking for a species when you aren't able to do anything about it and commented that by the time a species is problematic, it is often too late to do anything.

Ms. Pardy Moores commented that mitigation may be an option if a species is identified early enough. Mr. Perry questioned what the next step should be once a species is identified. Control may not be an option, education and prevention may be a better approach for invasive alien species.

A comment was made that one agency cannot address all vectors for introduction. Perhaps the list of priority species should be shortened while focusing efforts on a smaller number of species. Further, perhaps agencies need to assess the situation in the province and determine which priority species will deliver the "biggest bang for the buck" in terms of monitoring and control.

Dr. Hermanutz, a professor at Memorial University, wondered about the level of projected impact for each species and thought that species could be prioritized with a determination of mitigation requirements. This was followed with the comment that public education may be the key and that efforts should be allocated towards priority species.

Mr. Hannaford commented that habitat is being disturbed and often setting up a situation for invaders to settle in. Efforts should be made to minimize the impact on habitat by restricting development to particular worksites.

Mr. Richardson questioned whether we should be looking at other countries who have dealt with these issues before. A wide range of policies exist (ex. biosecurity) in other countries that are harder hitting than our country would ever be permitted to implement (i.e. very strict fines). The realization also exists that more money exists for control and monitoring, in other countries and that perhaps other countries take the issue more "seriously" because they have already seen the impact, meaning Newfoundland and Labrador could be at an advantage by taking action now. More science is required behind the policies to help develop new methods for dealing with pests in the future.

Ms. Pardy Moores proposed a couple of questions: if the berry, soil, container or equipment was the pathway for blueberry maggot and secondly, which pest was most deserving of the "biggest battle." To this Mr. Greenslade responded that used *harvesting* equipment arriving on the Island must be cleaned and free of all soil and plant debris and noted that there were no provisions for other equipment to arrive to the Island cleaned (other than harvesting equipment). As for which species to take on as the "biggest battle", Mr. Greenslade noted that risk analysis was required. Species worthy of attention were not always the quarantine species, but often the "hitchhikers" meaning a requirement to be increasingly on guard.

A final comment was that different sectors have different perspectives on most species with additive values considered by some sectors but not necessarily all. A final question was posed as to why the driving force behind invasive alien species projects and programs has to be economic, why not with Biodiversity in mind?

## **Exotic and Invasive Alien Species Workshop Minutes from January 23, 2008**

### **Welcome and Opening Comments**

Ms. Pardy Moores welcomed delegates to the second day of the workshop. The purpose of the workshop was to get an idea of what has been happening in Newfoundland and Labrador in terms of invasive species.

### **Diversity of Non-Native Arthropods in Newfoundland and Labrador – Dr. David Langor, Canadian Forest Service, Northern Forestry Center, Edmonton, AB.**

Dr. Langor defined invasive alien species as non-native species that are rapidly increasing their range and cause environmental impacts, further stating that all non-native species have the potential to be invasive. He discussed historical biotic invasions, mentioning man as being the most invasive species of all, which led to the introduction of many more species. This issue has only come forward in Canada in the last few years due to a few key species which received much attention.

To date, more than 1850 non-native terrestrial arthropods have been recorded from Canada, with expectations that this list will grow to more than 2000 species. Provincially there are 456 species, including 44 species in Labrador. Dr. Langor went on to discuss the provincial and national makeup of exotic arthropod species, and feels that there are still many invasive species to be discovered. The origin of non-native species in the province was explored, as well as points of entry into Canada and dates of introduction. Rates of introduction have been declining since the period from 1920 to 1939 when it was at its peak. It was highlighted how management in the United States affects Canada. Trophic roles of non-native arthropods in the province were explained, along with examples of successes where biological agents were used against forest insects. These agents can also be used against other insects and weeds. Hazards of using biocontrols were discussed.

Ongoing work includes the website for exotic pests ([www.exoticpests.gc.ca/default\\_eng.asp](http://www.exoticpests.gc.ca/default_eng.asp)) and development of a database associated with specimen collections, with more than 80,000 specimens processed so far.

Dr. Langor acknowledged the Canadian Forest Service, the Federal Biodiversity Information Partnership, the Biological Survey of Canada and the many taxonomists involved in this work.

Dr. Luise Hermanutz asked where the beetle originated that was used to control knapweed and thistle, while Ms. Pardy-Moores wondered if it was invasive to Newfoundland and Labrador or to Canada. Mr. Geoff Perry asked if all the invasive species still exist (they do) and mentioned that the state of taxonomy is also poor for fish species. Mr. Langor pointed out that several taxonomists have recently been hired by the Canadian Food Inspection Agency (CFIA) and Agriculture and Agri-Food Canada. Another question was whether or not species have arrived and disappeared, to which Mr. Langor responded that there have been a few.

### **Impacts of Hyperabundant Moose on Forest Regeneration in Terra Nova and Gros Morne National Park – John Gosse, Parks Canada.**

Mr. Gosse began his presentation by acknowledging the contributions of Dr. Hermanutz, Mr. Brian McLaren and Mr. Peter Deering. He provided an insight into the ecological context of moose, and explained how moose can be considered an invasive species. Management issues were discussed, and Mr. Gosse explained how the mandate of Parks Canada is being compromised through the current situation.

The relationship of moose with balsam fir and hardwoods within Terra Nova National Park (TNNP) was shown. The forest ecotype has been gradually changing to a moose-induced ecotype, sometimes referred to as ‘moose savannahs.’ Regeneration of balsam fir after insect kills has been impaired because of this relationship, and other invasives, such as coltsfoot and Canada thistle, exacerbate the problem. The secondary impacts also affect songbirds, soil chemistry, beavers and arboreal lichens. Moose exclosures have been tested to see the response of vegetation.

Mr. Gosse feels that the Parks will never revert to pre-moose conditions. Earlier research on the subject was highlighted, and options for reducing the impacts of moose were explored. He discussed the steps to be completed on the way to developing a management plan for reducing moose density in TNNP, including public consultation and the necessity of stakeholder support.

Plant growth in TNNP is still being suppressed, despite the fact that the current population for the Park is in the range of 150 moose, compared to between 6000 and 7000 animals estimated to be in Gros Morne National Park (GMNP). Forest monitoring will continue.

Ms. Leah Soper asked why it has taken so long for GMNP to come up with a plan to deal with the moose situation. She submitted a paper on the overabundance of moose during a public consultation approximately eight or nine years ago. The response at that time was that Parks Canada did not entertain culls and people wanted to see moose, which she felt was a very rigid position. Parks Canada started promoting ecological integrity but are still not addressing the moose problem. Ms. Soper feels that conditions outside the park are better than inside. Mr. Gosse responded by saying that the Parks Canada mindset has changed over the last 10 years or so. Many options are currently being considered and

they want to move forward. More focus is currently placed on ecological integrity that the public experience.

Mr. Deering said Myrtle Bateman reported in 1983 that the problem would have to be dealt with. The problem is now recognized and plans are being developed to address it. Ms. Soper stated that she would like to see the next round of public consultations be open and fair.

Mr. Frank Phillips asked if TNNP, being small and accessible, could have moose removed and excluded altogether. Mr. Gosse said those options would be considered, but that immigration would occur. An initial heavy effort would be required with suppression effort decreasing over time. Moose will eventually change their behavioral patterns as a result.

Mr. Hannaford asked if there had been any thought given to bow hunting in the parks, feeling it would be an excellent opportunity to promote this sport. Mr. Gosse said that it would be considered. Dr. Hermanutz stated that there was a huge backlash when this was tried in Point Pelee National Park, and that public perception needs to be considered. Public support is critical.

**Canada Thistle: An Invasive Alien Plant in Our “Neck of the Woods” – Jessica Humber, Memorial University Masters Candidate.**

Ms. Humber provided an overview of her research project in Gros Morne National Park (GMNP). Ms. Humber discussed disturbance within the park as a result of insects and domestic wood harvesting. She stated that balsam fir make up approximately 36% of all vegetation in GMNP, and that it undergoes intense browsing by moose, with up to 70% of stems being affected. This is a result of the high populations of moose in the Park, with densities reaching as high as 14.6/km<sup>2</sup> in some areas.

Moose are changing the makeup of plant communities. A monoculture of Canada thistle is developing in some disturbed areas of the Park, something that is not common in natural areas. It was stated that Mr. Carson Wentzell has reported that 40% of domestic cutting and 50% of insect disturbed sites have Canada thistle.

Ms. Humber discussed the role that moose play in the Canada thistle invasion, including browsing of young fir trees, acting as a vector for seed dispersal and causing ground disturbance which leads to further establishment of the plant. She profiled the Canada thistle, and stated that this plant is defined as a ‘noxious weed’ which entered North America in the 1600s. She discussed the success of the plant as an invader and how difficult it was to remove from the landscape. Incredibly, the seeds of the Canada thistle remain viable for up to 21 years!

Ms. Humber went on to show how Canada thistle may inhibit balsam fir regeneration, and possible methods of control and eradication. She discussed the outline of her project and the work that has been completed so far. Highlights included balsam fir seedling

surveys, the effects of different disturbance types, the suitability of planting balsam fir seedlings, seedling survival, and the allelopathic traits of the Canada thistle. Ms. Humber shared her preliminary conclusions, but shared that, at current population levels, moose will still control the regeneration of balsam fir in GMNP.

Ms. Lois Bateman asked if moose wander through thistle fields to access balsam fir. Ms. Humber answered by saying that she has seen moose among the thistle, but it does not appear to be a problem, and that moose typically browse balsam fir during the winter. Ms. Humber concluded with the fact that Canada thistle grows very high in GMNP, up to 185 centimeters in height.

**Impact of Introduced Red Squirrels (*Tamiasciurus hudsonicus*) on Balsam Fir (*Abies Balsamea*) Stands in Newfoundland – Kofi Boa-Antwi, Memorial University Masters Candidate.**

Mr. Boa-Antwi began by saying that the red squirrel had been introduced relatively recently, with the first occurrence near Roddickton where fishermen released them as pets. The Newfoundland Wildlife Service later introduced the red squirrel as a source of fur for trappers, and again in 1974 at the Salmonier Nature Park. The first sighting for TNNP was in 1977, and the red squirrel was well established by the early 1980s. Densities within the Park are twice that of mainland Canada.

The red squirrel has had impacts throughout its range, and it predated the cones of balsam fir trees, which was documented in 1986. Low densities of balsam fir occur in TNNP.

The questions that Mr. Boa-Antwi set out to answer with his research project were: what impacts red squirrels were having on the male and female cones of balsam fir, and whether this can affect the regeneration of these trees. He went over the approach taken to conduct this research, and provided background on the balsam fir and red squirrel, and the interactions between the two species. The results of his research shows an overall decrease in cone counts as the season progressed.

Mr. Boa-Antwi stated that the results have a number of implications. Balsam fir provides approximately 40% of the raw material for the pulp and paper industry. Red squirrels and the endangered red crossbill compete for the same resource, and animals like the great horned owl and Newfoundland marten utilize these habitats.

Mr. Robert Perry asked if there had been any exclusion experiments. Mr. Boa-Antwi said there had not. Another question was asked about whether there had been any viability assessments of the balsam fir seed. He stated that this is currently being worked on, and that insects are having an impact. Dr. Hermanutz pointed out that seed viability appears to be in the 25-50% range.

**Changes in Ecological Communities Following Introductions of the Red-Backed Vole – Brian Hearn, Natural Resources Canada.**



Dr. Hearn began his talk by providing background on the small mammals of Newfoundland, other small mammal introductions, and the Red Indian Lake (RIL) small mammal survey. This survey has been conducted annually since 1999 as a joint field project between CFS and the Fish and Wildlife Program at the College of the North Atlantic, and samples 20 sites X 300 trap nights per site for a total of 6000 trap nights per year.

The first red-backed vole (RBV) was caught at Little Grand Lake in 1999, and the first trapped at Red Indian Lake was in 2001. There has been a steady increase in the numbers of RBV's captured between 2001 and 2007, peaking in 2006 at a 16-fold increase in the biomass of small mammals; RBV's currently dominate (90%) of the trapped samples annually. Dr. Hearn discussed the unknown ecological consequences associated with the increase in small mammal biomass including the potential impact on carnivore ecology, plant regeneration and the native meadow vole. Dr. Hearn proceeded to provide a background of the Newfoundland marten and discussed its spatial requirements, including the fact that these marten are heavier and have a larger home range than marten in Quebec and Maine, USA. He concluded by stating that the RBV is well established on the Island and will likely have direct and indirect impacts on small mammals and predators, as well as other endemic species.

Mr. Phillips pointed out that Labrador marten are the same size as Newfoundland marten, to which Dr. Hearn responded by saying that the comparison between sizes of Newfoundland, Main and Quebec was based on marten populations at roughly the same latitude. Mr. Phillips went on to say that reduction in the size of a home range does not necessarily mean densities are greater. Dr. Hearn said that while this was correct, smaller home ranges would generally allow for more marten per unit space. A current radio-collaring project in the Red Indian Lake area should shed more light on this over the next two years.

Dr. Hermanutz asked about the impact of lynx. Dr. Hearn stated that they did not record any lynx-related mortalities during their 5-year study but lynx were not common in the area during that time due to relatively low hare numbers. They did record what they felt was coyote kill on marten, and more coyotes are being seen in the Red Indian Lake area. The relationship of snowshoe hare and small mammal cycles was raised.

Ms. Soper asked if fox predation differed over seasons. Dr. Hearn said there does not appear to be a seasonal aspect from their data.

A question was put forward about the origin of the red-backed vole and whether DNA samples would make it possible to pinpoint the origin. Dr. Hearn was unsure if DNA analysis would work to definitely determine the source population. There are two theories about the introduction: first, it may have arrived on a shipment of pulp chips to Stephenville; or second, it may have been a deliberate introduction into the Little Grand Lake area. The latter explanation is a real possibility as introduction of the RBV was openly discussed over a decade ago by the Marten Recovery Team as a possible recovery action for the Newfoundland marten. While this action was eventually not supported by

the Recovery Team, it was still being discussed publicly in the late 1990's around the time of the discovery of the RBV introduction. It is the unknown possible direct and indirect effects of the RBV introduction that raises concerns.

### **Mushroom Bring From Aways – Andrus Voitk, Humber Natural History Society, Mushroom Foray**

Andrus Voitk gave us a history of mushroom development, and discussed the relationship between plants (producers), animals (consumers) and fungi (decomposers). We know that mushrooms are very important, but know very little about them; most work is being done just to identify what we have. He proposed a 'Spectrum of Alienness'. Using viral illness as an example, easily seen because of the compressed life cycle, he demonstrated how easily species can spread around the world. Some specific examples of introduced mushroom species were shown.

In conclusion, Dr. Voitk stated that the import of plants and soil seems to facilitate introductions, and that humans are a major vector because of easy access to information, the ease of transport and travel. He recommended that three things be done, namely hire mycologists, enact legislation concerning the import of soil and plants, and educate the public.

Ms. Soper asked if *Amanita*, being poisonous, was ever confused with other mushrooms. Mr. Hannaford stated that mushrooms are some of the largest organisms on earth. Dr. Hermanutz pointed out that there is some work being done in parks by Dr. Faye Murrin, and that mycology has a role to play in forest management too. Mr. Michael Burzynski said that the European garlic mustard in Ontario seems to have an allelopathic effect on fungi.

### **A Management Framework for Aquatic Invasive Species – Geoff Perry, Department of Fisheries and Oceans.**

Mr. Perry's began his presentation by stating the need to develop a regional plan that is consistent with the 'Invasive Alien Species Strategy for Canada.' He proceeded to discuss management objectives and constraints, including the impossibility of controlling all pathways of introduction. Mr. Perry reviewed the broader principles involved and gave us examples of trigger species and species of concern that would be monitored. He feels that consistent monitoring and survey protocols are necessary.

The use of zoning would be used to manage movements when trigger species are discovered, and Mr. Perry explained the differences between these in terms of risk, detection, surveillance and mitigation, and provides examples of each. He then discussed management of these species, indicating that three species have been detected in the last two years, namely the golden star tunicate, violate tunicate and green crab. Mr. Perry concluded his presentation by asking how we should deal with aquatic invaders and if we should control activities related to the aquaculture industry.

Dr. Hermanutz asked if the negative, or ‘green,’ zone could be monitored once a year to confirm its negative status. Mr. Perry stated that this is currently being done through the deployment of collectors, but no invasives have been detected in this way so far. They have had success with this method of monitoring in the Maritimes.

A question was asked concerning the use of models. Mr. Perry said that the GARP modeling system is currently being utilized which predicts the suitability of habitat, but it needs quality inputs.

Another question asked why St. John’s was not included as a high risk port. Mr. Perry was unsure of the reasoning behind that.

Ms. Pardy Moores asked if there was any freshwater work being done as carp was one of the trigger species indicated in the presentation. Mr. Perry responded by saying that no freshwater work is being done, and carp was indicated because all of Canada is at risk. DFO is focused on marine issues.

### **“Eyes Across the Province” – Joy Barfoot, Memorial University Botanical Garden.**

Ms. Barfoot delivered a presentation on the invasive alien species monitoring program started by Memorial University of Newfoundland’s Botanical Garden. She provided a background on the Botanical Garden and the activities that can be enjoyed there.

Curriculums are currently being developed at the Botanical Garden which include information about invasive species, and the Government of Newfoundland and Labrador’s Department of Education is piloting a new science curriculum that should include information on invasives.

The Botanical Garden recently received funding under the Invasive Alien Species Partnership Program (IASPP), and they are using this funding to raise awareness of invasive alien species in the province. Educational material has been developed, and it is their intent to develop an invasive plant monitoring network across the province. Ms. Barfoot illustrated the role that the Botanical Garden could play in addressing the problem of invasive species.

Initiatives to raise awareness were discussed and included media interviews, articles for newsletters, and brochures. Attitudes take time to change, and she feels that the biggest challenge is getting people to recognize the problem. The Botanical Garden has also developed a list of invasive plant species that they term the ‘dirty dozen.’

Ms. Barfoot profiled the ‘Eyes Across the Province’ program where reports of invasive plant species are submitted online. She would like input from the public on the plant list, and continued with examples of invasive plants and their known locations within the province. Ms. Barfoot showed the layout of the webpage including the reporting form and ‘unwanted’ posters, and told delegates that the information collected will be used to create a map of locations, distribution and abundance.

One of the big challenges facing the program is attracting and maintaining volunteers, and she discussed the reasons why this was the case. She concluded by providing insight into the future work of the Botanical Garden.

Ms. Claudia Hanel asked for clarification on the definition of monitoring as it applies to the 'Eyes Across the Province' program, as she feels that the term implies yearly visits. Ms. Barfoot said that attempts will be made to do this. Ms. Hanel also questioned the possibility that incorrect reports may be submitted and feels that these submissions need to be confirmed. Ms. Barfoot answered that people are encouraged to submit photographs, and that horticulturalists look at these reports as well. Ms. Hanel continued that the list should be expanded to include at least thirty plants, and that there seems to be an east coast bias in the list. Were there any west coast botanists consulted, and is there still opportunity for input? Ms. Barfoot confirmed that there was still opportunity for comment, and that they are hoping to expand the program to include Labrador.

Ms. Pardy-Moores asked why cattails considered invasive and included on the list, as cattails are a native plant in the province. The answer was that it depended on your definition of invasive. This plant has spread from the west to east coast. Ms. Pardy-Moores wondered if the introduction was intentional, and it was stated that in some cases it was. Dr. Hermanutz opined that the cattail issue was a complicated one, and that it may be better to avoid using it.

The question was asked as to whether sites would be verified. Some site visits are done. Variations in local names of plants present a problem. Mr. Bruce Rodrigues asked if there was a risk of someone uprooting actual plants and sending them in, to which Ms. Barfoot responded that it was always a possibility.

Mr. Burzynski asked if there was any work being done with plant distributors to curb the spread of plants like yellow iris. Ms. Barfoot replied that this is an area that needs to be addressed. A question was asked whether stinging nettles are on the list, to which Mr. Burzynski replied that there is a native species that occurs here. It does not occur on the list. Ms. Barfoot acknowledged that the list is open for additions.

### **Development of a Provincial Invasive Alien Species Monitoring Plan – Amanda Park, Wildlife Division.**

Ms. Amanda Park delivered a presentation entitled '*Development of a Provincial Invasive Alien Species Monitoring Plan.*' She provided the rationale for developing a monitoring plan which included the limited amount of information available about exotics in this province, lack of a current strategy to deal with these species, determining the rate of expansion, and updating the list of exotic species that occur. A draft framework should be developed with the goal of monitoring "the presence, abundance, and range of exotic and invasive alien species in the province. In addition, monitoring of introduction "hot spots" will occur to aid in preventing any additional exotic arrivals. Ms. Park described these hotspots, monitoring needs and methods.

The five key activities to monitor would include occurrence, abundance, expansion, biology and impact. Generally the expense increases with each respective step. She went on to describe the tools that are already in place for monitoring, such as the Wildlife Watcher program.

In order to have an effective monitoring strategy, people need to be educated as to the extent of the program, and the message must be consistent among agencies. It will also require a long-term commitment and regular reviews. Obstacles have to be overcome including jurisdictional boundaries, definitions used, and prioritization.

Ms. Park concluded her presentation by stating that the workshop was a good first step in drawing together agencies with a common interest and towards taking a cooperative approach to addressing these issues in the future. She feels that a draft framework will be completed by March 31, 2008.

### **Discussion**

A question was put forward as to the definition of exotic, to which Ms. Pardy-Moores replied that it is a non-indigenous species, and that not all exotics are invasive.

Mr. Hannaford asked why there had been no mention of the American toad or garter snake during the workshop. A discussion ensues about the status and distribution of various species of amphibians, insects and reptiles.

A comment was made on the huge effort and cost associated with monitoring invasive species. Data mining should be considered. The CFIA has data on interceptions, in which ports they occurred, and what species and product were involved. St. John's hosts a large percentage of the introductions, and currently less than 2% of containers arriving at this port are inspected by CFIA. Someone responded that wood shipments are inspected by the CFIA and the Canada Border Service Agency, and everything must be stamped now. The province is not a big importer of wood, and there are few international flights. Pests of forestry and agriculture are being focused on.

Someone questioned whether there was as much being done as could be done. Someone responded by saying no, but that as much as possible is being done with currently available resources. More staff, surveys and taxonomists are necessary.

Dr. Hermanutz suggested that the formation of working groups is necessary for different aspects such as pathways and data mining. She liked the idea of long-term monitoring plots, and feels that most of the things coming in can be invasive. We must not be complacent, said Dr. Hermanutz. Ms. Pardy Moores asked if you would get buy in for more working groups. Dr. Hermanutz feels that once a year should be okay, and questioned what other group existed that could fill this role. Ms. Pardy Moores agreed that there was none.

The CFIA used to have interception reports on hard copy, and now they are posted online. Maps of surveys are also available.

Ms. Pardy Moores suggested that there seemed to be a general interest among everyone on some sort of monitoring program. Ms. Park will send out information. Ms. Pardy Moores asked if another meeting could be held this fall or early in 2009.

Dr. Hermanutz would like a list of who is doing monitoring. Ms. Pardy Moores said we can explore who will do what and start filling in the gaps. Someone opined that citizen science opportunities should be explored as well.

Mr. Rodrigues stated that the Wildlife Watcher program, based on community involvement, should be rolled out in the next couple of months. Other programs could be included. Ms. Pardy-Moores explained that all species are targeted but that it may give us an idea of exotics as well. Also, there was a citizen science component to the latest IASPP proposal. Another comment was made that field guides were an encouragement to public interest, and they could only help the cause. Interest is currently being gauged concerning the reestablishment of the Plant Protection Advisory Board in the province.

### **Conclusion**

Ms. Pardy Moores thanked everyone for attending the workshop and suggested that good contacts had been made and good discussion shared. Proceedings and copies of the presentations will be forthcoming, as will continued correspondence. She offered special thanks to Ms. Park for her hard work.