



Summary of Forest Pest Conditions in New Brunswick in 2011 and Outlook for 2012

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January 2012

Introduction:

Outbreaks of minor and major forest pests occasionally occur and cause variable amounts of growth loss and tree mortality. Besides affecting the natural forest, outbreaks can adversely affect high-value reforestation and tree improvement programs, from nurseries to seed orchards, to plantations and thinned stands. Thus, long-term forest management plans are constantly under threat of possible compromise from unwanted pest outbreak. In addition to timber losses, major effects can be caused to non-timber values such as terrestrial and aquatic wildlife habitat, recreational sites and aesthetics.

Besides native pests, today's global economy brings increased risk from the accidental introduction of insects and diseases from around the World. Such introductions could not only cause direct impacts on natural forests and the environment, but also indirect economic impacts through regulations placed on domestic, national, or international movement of goods. These trade issues can negatively affect the ability of small and large companies to be competitive in local and global markets. For all these reasons, it is necessary to know about the status of forest pests and the threats they pose.

Monitoring and forecasting the status of forest pests requires the use of different techniques that reflect survey objectives, pest population levels, the pest's biology, and knowledge of relationships between numbers of pests and damage. For some pests these are well established; for others these are not. Aerial surveys provide the means to map damage in various categories to assess the extent and severity of outbreak over vast areas.

For some insects, surveys can be conducted to establish population levels by sampling appropriate locations for eggs or egg masses, depending on the female's egg laying habits. Surveys of larvae can be conducted during the insect's active feeding period, or during periods when they are inactive, such as in the over-wintering stage. Surveys of pupae to estimate insect population levels are less common.

Special odours or scents, called pheromones, are given off by female insects to attract males of the same species for mating. In recent years, the identification and artificial synthesis of sex pheromones for a number of forest insects has led to the use of pheromone-baited traps as a technique to monitor these pests. This is especially true when populations are very low and not detectable by traditional survey sampling intensity for other life stages. Because these artificial lures are often very potent, they sometimes offer the opportunity to detect subtle increases that might not be as easily detected by the other means. In other instances, they might still be under development and results have to be interpreted with caution. Depending on trap catch thresholds or yearly trends, these surveys could result in the implementation of other methods to forecast levels of damage expected the ensuing year.

One of the cornerstones of DNR's pest monitoring program is the use of pheromone traps for the early detection of changes in population levels of many softwood and hardwood forest pests, before they increase to potential outbreak status. It is important, however, to be aware that the number of insects captured in a trap is greatly influenced by the type of lure used, its concentration, the trap design and the insect species itself. Therefore, a moth count considered to be biologically significant for one species may be insignificant for another by several orders of magnitude. Consequently, the absolute number of insects in a trap is not as important as the trends between years and over time.

Pests of Softwoods:

Spruce Budworm: Since 1997, there has been an irregular though gradual increasing trend of populations in New Brunswick as indicated by annual changes in moth catches in the pheromone trapping survey. The highest counts tend to be in the northern part of the Province and this trend has gained more attention in light of the increasing outbreak in Québec, which had elevated populations on the Gaspé Peninsula in 2010.

In 2011, the pheromone trapping survey was modified to better define local areas in northern New Brunswick where budworm numbers might be higher than surrounding areas. This was done to provide background information for examining the possibility of initiating a program of "Anticipatory Action" or early intervention should this option be deemed worth implementing in 2012 or 2013. It was not completely surprising, but moth counts up to 321 were encountered. Trap catches in the hundreds of moths have not been recorded since before the operational pheromone trapping survey was adopted in 1997 towards the end of the last outbreak in the Province. Although these trap catch numbers are of concern, defoliation is still not forecast for 2012.

In 2011, the over-wintering larvae survey was also modified and more plots were sampled in the northern area. There were 11 positive plots all with very low numbers (1-4 larvae per plot); yet, this is the most positive plots since 1995 when the outbreak was collapsing. Although there is a bias in putting more plots where it is expected that populations are rising, these data might still be indicative of localized increasing populations.

Jack Pine Budworm: Defoliation by jack pine budworm in New Brunswick has not been reported since 1983; however, monitoring had been conducted annually at a network of pheromone traps since 1997. Overall, the survey results up to 2010 had indicated that jack pine budworm populations remained at very low levels throughout the zones being monitored. In 2011, no pheromone trapping survey was conducted due to staff reductions and other priorities.

Hemlock Looper: In 2010, the maximum pheromone trap catch had reached its second lowest level since this monitoring system began and the mean trap catch reached its lowest point. In 2011, there was a slight increase in the maximum trap catch but the mean trap catch almost doubled from the previous year. These numbers, however, are well within the range of previous data and hence no defoliation is expected in 2012. Nonetheless, yearly increases and trend analyses are worth doing to ensure prompt detection of an outbreak and decision-making because this insect can kill trees in a single year.

Whitemarked Tussock Moth: Despite an unexpected 'jump' in pheromone trap catches in 2010 no defoliation was forecast for 2011 and none was detected. In 2011, there was another increase in pheromone trap catches. Unfortunately resources were not available to do egg mass searching; hence, the possibility of localized defoliation for 2012 is unknown.

Rusty Tussock Moth: No defoliation was expected in 2011, and none was detected. However, trap catches again increased slightly following an apparent increasing trend since 2008. Nonetheless, these numbers do not suggest any threat of defoliation for 2012

Balsam Twig Aphid: Populations peaked in 1992 and fell to a low point in 1995 after which they increased for three consecutive years, decreased for two years and rebounded to a new high level in 2001. The following decline halted in 2004 and 2005 followed by three years with higher populations once again, though lower than the previous peaks. Since 2008, populations have declined and in 2011 they approximated the low level of 1995. It remains unclear whether there will be a few years of low populations or whether they will again increase like the period from 1996 to 2001.

Balsam Gall Midge: In 2010, balsam gall midge was detected on fir branches at 94% of the plots which surpassed the peaks of the last two "outbreaks" (i.e., 61% in 1990 and 71% in 1998) which declined somewhat precipitously after three years. Overall, the survey data indicated that gall midge populations would likely remain high for yet another year. In 2011, there appeared to be only a minor decrease in populations and it is now anticipated that a decline might occur in 2012 if the previous two trends repeat again.

Balsam Woolly Adelgid: Symptoms of attack on balsam fir, especially gouty tops, are noticeable in southern New Brunswick where local tree mortality, severe in some cases, has been reported in recent years. Although galling and distorted tops are common, we have yet to encounter any area suffering from stem attack – a condition that is more

associated with tree mortality. A survey that rated adelgid damage at 83 stands in 2002 was again repeated in 2010. The incidence or percentage of trees with damage remained the same or was lower in 76 (92%) of the stands, suggesting that adelgid populations dropped over that time frame allowing for a degree of recovery.

Brown Spruce Longhorn Beetle: The BSLB was confirmed present in Nova Scotia in the spring of 2000 and it was subsequently revealed that it had been present at least since 1990, but had mistakenly been misidentified as a similar native species. Eradication actions, under the leadership of the Canadian Food Inspection Agency (CFIA) under the federal *Plant Protection Act*, were initiated in 2000. As a result of the continued expansion of the infested area in NS, in 2006, the CFIA switched to a 'slow-the-spread' policy with regulated movement of specified high-risk spruce materials along with annual surveys and research.

In 2011, there were 21 positive sites, of which 6 were new, and raised the total to 64 positive sites outside the regulated area since 2007. **Most significantly was the finding of BSLB in New Brunswick for the first time in 2011.** The CFIA had placed traps at 211 sites in New Brunswick including 5 in Kouchibouguac National Park on the east coast of the Province. One of these traps caught a single adult female beetle. It is speculated that this likely originated from firewood brought into the Park by a visitor from (or who had visited) Nova Scotia. Plans for 2012 have yet to be developed though meetings will be held between the CFIA, Parks Canada, NB Department of Natural Resources and industrial partners this winter to examine the implications of surveys and research conducted this past summer. Since 2007, the New Brunswick forest industry has maintained a self-imposed moratorium on regulated spruce materials coming from the Containment Area within Nova Scotia.

Scleroderris Canker of pine: The European race of Scleroderris was once thought to occur at about a dozen sites in New Brunswick, but newer testing methods used by the CFS confirmed only three sites to be positive. These occur in north-western New Brunswick within a few kilometres of each other. Two sites contain Scots pine and the other contains red pine. In 2008, dead trees and trees with dead and dying tops were easily seen at the second site (Scots pine). At the third site, the red pine looked remarkably healthy. Quarantine regulations are in place under the federal *Plant Protection Act* administered by the CFIA. No specific survey was conducted in 2010 or 2011.

Sirococcus Shoot Blight on red pine: *Sirococcus conigenus* is a fungal disease affecting primarily red pine. Years with wet weather in May and June often result in intensification of symptoms (branch dieback and, after successive attacks, tree mortality). In 2011, observations of stands with many symptomatic trees were reported in parts of southern New Brunswick, especially in the Blissville/Shin Creek area. However, no detailed surveys were conducted.

Balsam Fir Sawfly: Balsam Fir Sawfly is a native insect found in southern Canada and northern United States. Its main host is balsam fir. The larvae feed on older needles leading to reduced volume increment, weakened trees and sometimes tree mortality. Younger-aged trees are most heavily damaged and this is especially important in stands thinned to enhance their volume. In New Brunswick, it has never been recorded at large outbreak levels. Elsewhere, historic outbreaks have tended to be small, and collapsed within five years due to natural controls. The exception has been an unprecedented 20-year outbreak on the Island of Newfoundland where they resorted to aerial control using a naturally occurring virus in the form of a registered insecticide called Abietiv™.

In 2010, defoliation by balsam fir sawfly was noticed in southern New Brunswick on roadside balsam fir trees over an unexpectedly large area well beyond where it had been seen in 2009. Also, during the aerial survey 530 ha of defoliation were mapped from the air. These observations led to an egg survey throughout an area roughly 115 km x 30 km south of Sussex. At each site, defoliation was also recorded, including some damage by other insects and disease that could not be separated out. When all observations were combined, damage caused by the sawfly was detected over an interpolated total gross area of 278 300 ha. The infested area fell within Crown Timber License 7, managed by J.D. Irving, Limited (JDI), and also included parts of Fundy Model Forest; Fundy National Park; J.D. Irving, Limited freehold land; and

small private landowners. Based on egg survey data in 2010, detectable populations occurred over a total area of about 181 800 ha, representing an infestation of unprecedented size in New Brunswick.

There are no chemical insecticides currently registered for use against this insect and the most-commonly used forestry insecticide *Bacillus thuringiensis* (Bt) does not affect sawfly larvae. There is, however, as noted above a federally-registered biological insecticide (i.e., Abietiv™) based on a balsam fir sawfly virus (*NeabNPV*) that is available and was used in Newfoundland from 2006-2009. This virus naturally occurs in balsam fir sawfly populations, only replicates inside its host, only affects sawfly larvae and does not affect humans, animals or other insects.

After considering various options, Government decided to conduct a limited aerial biological control program using Abietiv™ over an area up to 10 000 ha in 2011. This option was taken: (i) to allow the opportunity for the majority of the outbreak to collapse or increase naturally; (ii) to evaluate the product and gather data on desired application rates and biological information not available under local conditions; and (iii) to provide a “bridge” year to deal with governmental procedures and gauge public concerns in the event a larger operational program might be needed in 2012 or beyond. After some initial planning and iterations the plan was modified due to field observations of stand types and road accessibility for assessment. The final total area of Crown Land that was treated amounted to 7 282 ha. All these areas were located on Crown Land. J.D. Irving, Limited also contracted (separately) to have control applied on some of their freehold land.

During the summer, while monitoring the control program, it was noticed that many of the larvae in the untreated as well as treated plots were showing signs of disease. An egg survey conducted in the Autumn of 2011 indicate a significant decrease in the overall extent and severity of infestation expected for 2012. Control action is not anticipated in 2012.

Pests of Hardwoods:

European Gypsy Moth: The European Gypsy moth is an exotic forest pest regulated by the CFIA under the federal *Plant Protection Act*. Currently, nine counties and the municipalities of Miramichi and Bouctouche are quarantined. Pheromone trap catches increased in 2011 throughout southern New Brunswick, but not at levels high enough to expect defoliation in 2012. A number of pheromone trapping sites outside the regulated areas were positive for gypsy moth adults, similar to past years. An egg mass search confirmed the presence of new egg masses for a second consecutive year in Rogersville, which is currently outside of the regulated area. Egg mass searching within the known infested area showed an overall increase in mean egg-mass density, but not sufficient to expect defoliation in 2012.

Forest Tent Caterpillar: In 2011, the total area defoliated by forest tent caterpillar rose to about 7 500 ha in areas around Bathurst. This compares to ~2 000 ha of defoliation mapped in 2010 at a number of sites in north-eastern New Brunswick and south-central New Brunswick. Pheromone trap catches in 2011 suggest an increase in forest tent caterpillar populations throughout most of New Brunswick, particularly in the eastern half of the Province. However, it is still unknown if there is enough of a tent caterpillar population to cause an increase in defoliation in 2012.

Large Aspen Tortrix: Outbreaks of this insect occur periodically throughout the range of its preferred host, trembling aspen. High populations are rare in the Maritimes and when they do occur they are usually associated with localized outbreaks of short duration. In 2010, small pockets of defoliation caused by large aspen tortrix were observed in western New Brunswick in the vicinity of Woodstock and near Florenceville. In 2011, the total area of defoliation was mapped over 785 ha near Canterbury and Meductic in south-central New Brunswick.

Butternut Canker: This disease was first confirmed present in New Brunswick by the CFS in 1997, and they eventually confirmed its presence at a total of 18 locations. Since the retirement of the forest pathologist at the CFS-Atlantic Forest

Research Centre in 2009, there have been no more reports made of this disease. Butternut is not a major component of our native forests, nor is it of major economic importance, but the disease could pose a threat to our natural forest biodiversity. In 2005, butternut trees were put on the Endangered List under the Canadian *Species at Risk Act*, partly because of the presence of butternut canker.

Hickory Tussock Moth: This insect is found from Nova Scotia to the North Carolina Mountains, Ontario, Wisconsin, and Texas. The caterpillars feed on the leaves of several hardwoods, including: ash, elm, oak, willow and others; but hickories, walnut and butternut are preferred. Populations may occasionally cause local defoliation but do not persist long and control is usually not necessary; hence, the insect is not regarded locally as a pest of concern to the forest industry. The main concern is due to the numerous hairs on the caterpillar's body (and pupae) that cause allergic reactions such as itchy rashes to some people who handle them, especially children.

In 2010, this insect was reported on hardwoods (especially birch) at many locations in south-central New Brunswick. In 2011, numerous enquiries were again received, but this year's reports seemed to be more numerous and extensive in distribution (e.g., Yoho Lake, Kingsclear, Bear Island, Keswick Ridge, Nackawic, Douglas to Mactaquac to Woodstock, Bloomfield north-west of Woodstock, Florenceville and Hartland). Similar increases in prominence were reported in Nova Scotia and Maine.

Assessments in Plantations and Thinnings:

Regional DNR staff conducted pest assessments in a sub-set of high-value plantations and thinned stands on Crown Land in each of DNR's four Administrative Regions, as well as general surveillance of forest pests around the Province. The most common damage encountered was caused by white pine weevil (white pine, Norway spruce, white spruce); balsam gall midge (balsam fir); pitch nodule maker (jack pine), and birch leaf miner (white birch), though, in general Crown plantations and thinnings are in very good health.