

Management implications of forest dynamics, succession, & habitat relationships under differing levels of silviculture



D. MacLean, G. Forbes, K. Frego, M. Roberts, T. Erdle (UNB); M-A. Villard & M. Béland (U. de M.); C. Samson (Parks Can.) ; B. Wagner, J. Wilson (U. Maine); + 13 graduate students



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J.D. Irving, Ltd. Forest Research Advisory Committee



- ▶ “*empower the forest manager*” as decision maker
- ▶ active partnership of researchers & forest managers
 - regular 2-way communication & 2-way education
- ▶ Key elements:
 - managers involved in project selection/ design/ proposal creation
 - company buy-in/ vested interest from the outset
 - capacity to monitor/evaluate research project progress (regular graduate student updates)
 - funding leverage – multiply company research funds
 - requires company research involvement/ effort

Overall project objectives



- (a) elucidate successional dynamics and habitat value of 3 key stand types (**natural MW, PL, PCT**);
- (b) evaluate biodiversity indic. & habitat suitability (ground veg., bryophytes, birds, small mammals, American marten, northern flying squirrel);
- (c) ecologically-relevant definition of MW based on stand dynamics and habitat relationships;
- (d) forest estate modeling of zoning alternatives & bioenergy production capacity, & social, economic, environmental implications

13 Graduate student projects at **UNB**, **UdeM**

▶ PCT & biodiversity

1. **Keri LaFrance**. Effects of PCT on herbaceous plants
2. **Amy Witkowski**. Effects of PCT on forest bryophytes
3. **Julie Henderson**. Effects of PCT on small mammals

▶ Stand dynamics of MW stands

4. **Luke Amos-Binks**. Mixedwood stand dynamics in the Black Brook District from 1946–2006
5. **Amanda Colford**. Effects of spruce budworm outbreaks on stand dynamics of balsam fir–TH & red spruce–TH
6. **Bruno Chicoine**. Natural regeneration in TH & MW after partial cutting

13 Graduate student projects at UNB, UdeM

▶ Key stand structures & biodiversity

7. **Pascale Forget.** Influence of stand and landscape structure on American marten
8. **Matt Smith.** Effects of fragmentation on northern flying squirrel in southern NB
9. **Aurore Pérot.** Density as an indicator of habitat quality
10. **Samuel Haché.** Mechanisms underlying Ovenbird response to single-tree selection harvesting
11. **Jean-François Poulin.** Brown Creeper response to experimental selection harvesting

▶ Effect of alternative zoning allocations

12. **Chris Ward.** Forest zoning scenarios on a Crown license in New Brunswick
13. **Jean-François Carle.** Bioenergy production from Crown land in New Brunswick

J.D. Irving, Ltd. communication of results

1. 2-panel, 500 word posters in District offices

- What's the problem, what was done, what was found, what does it mean?

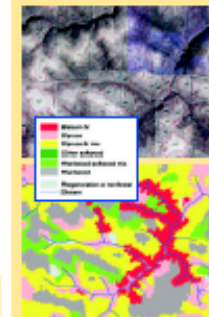
2. Science Forum for staff

3. "Irving Forest Research" Newsletter

COMPARING THE BLACK BROOK FOREST – 1945 TO PRESENT

To help design forest management

- Forest structure, such as species, age, stand size, and within stand structure like large trees or snags, determine productivity and biodiversity.
- A project conducted on the Black Brook District by researchers from the University of New Brunswick (graduate student Dave Ehrhardt and Professor Dave MacLean) and University of Idaho (Professors Bob Wagner and Jeremy Wilson) comparing how the forest changed from 1945 to 2002 turned up some not surprising.
- J.D. Irving, Limited purchased the Black Brook forest in 1945. The area is located in northwestern New Brunswick near the town of St. Leonard. Prior to that, there was a timber limit cutting, softwood, fuelwood cuts.



Aerial photographs taken by the Royal Canadian Air Force of the entire Black Brook District in 1945 were interpreted and digitized to create a GIS inventory for comparison with the current forest.



Forest landscape pattern determines habitat for wildlife species and biodiversity, and is affected by harvest and natural disturbance such as harvest, structure, fire, and insect outbreaks.

poor birch veneer harvest, natural fires and insect outbreaks, but no clear-cut or plantations.

• We compared aerial photographs taken in 1945 and an intensive forest inventory cruise conducted from 1944 to 1947, with the present forest inventory.

How did the forest change from 1945 to 2002?

1. More hardwoods

- Black Brook is well known for its spruce plantations so it surprised us to find that hardwood content increased from 10% of the District in 1945 to 25% in 2002.
- This resulted both from managing hardwoods and also from spruce bark-beetle outbreaks in the 1950s and 1970s killing spruce in mixed hardwood-spruce stands.
- Area of softwood stands stayed the same, while hardwood content declined.

2. More young stands

- In 1945 95% of the forest was older than 79 years old. The only young forest resulted from fires that spread into the District.
- The older softwood and mixedwood stands likely resulted from a severe spruce bark-beetle outbreak in the 1970s.
- By 2002 there was a mix of up to 40-year old plantations, some mid-aged stands and older hardwood, mixedwood, and softwood-elder stands.

3. Smaller stands

- In 1945 over half of the District was made up of large patches (of similar stands greater than 100ha), some being natural disturbances, and only 15% were smaller than 300ha.
- By 2002, 98% of patches were less than 100 ha, because of small harvest blocks.



Effective industry/researcher partnerships

- ▶ Co-funding of projects/ grad students
 - NSERC Industrial Post-graduate Scholarships
- ▶ Regular communication – bi-annual meetings
 - Company commitment; 5–6 staff attend
 - Grad student pres. to FRAC – real-world feedback
- ▶ Researcher interest/ commitment to making a real-world difference
- ▶ Research quality – peer reviewed publications
- ▶ Acknowledge research funders:

