SCHOLARSHIPS & GRANT APPLICATIONS: What it takes to be successful

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September 21, 2010

OUTLINE

1. SCHOLARSHIPS & GRANTS
   - Applying – general points

2. SCHOLARSHIPS
   - Academic record
   - Letters of reference

3. SCHOLARSHIPS & GRANTS
   - Your academic C.V.
   - Proposal

4. SUMMARY

1. SCHOLARSHIPS & GRANTS Applying – general points

APPLY - BE ELIGIBLE

FIND OUT WHATS AVAILABLE:

Scholarships:
www.gradstudies.ualberta.ca/awardsfunding/
Department Grad Handbook

Grants:
Departmental Research Coordinator: Sarah Gooding
Faculty Research Facilitator: Mariska Span-Smeelen
Supervisor
Fellow grad students
Look at acknowledgements in theses/papers/talks

1. SCHOLARSHIPS & GRANTS Applying – general points

- target your application
- find out about the adjudication process
- carefully follow timelines
- inform your references & proof-readers about these

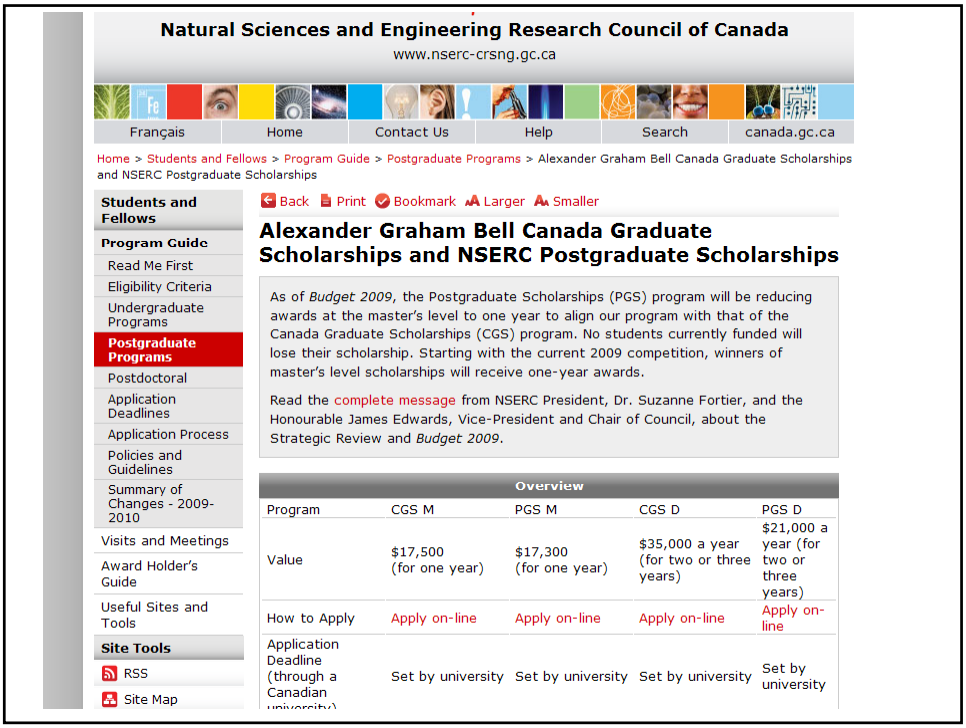
1. SCHOLARSHIPS & GRANTS Applying – general points

Application preparation:

CAREFUL ATTENTION TO DETAIL
CLARITY
CONCISENESS

Find out how it will be reviewed

Have at least one other person proof-read it



Natural Sciences and Engineering Research Council of Canada
www.nserc-crsng.gc.ca

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Home > Students and Fellows > Program Guide > Postgraduate Programs > Alexander Graham Bell Canada Graduate Scholarships and NSERC Postgraduate Scholarships

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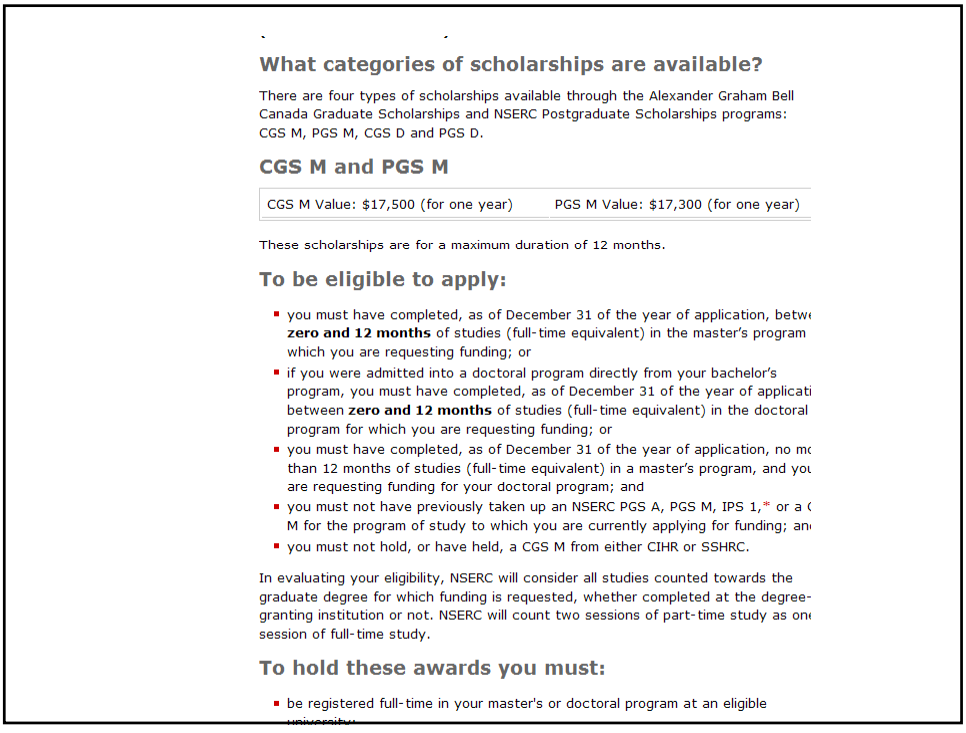
Alexander Graham Bell Canada Graduate Scholarships and NSERC Postgraduate Scholarships

As of *Budget 2009*, the Postgraduate Scholarships (PGS) program will be reducing awards at the master's level to one year to align our program with that of the Canada Graduate Scholarships (CGS) program. No students currently funded will lose their scholarship. Starting with the current 2009 competition, winners of master's level scholarships will receive one-year awards.

Read the complete message from NSERC President, Dr. Suzanne Fortier, and the Honourable James Edwards, Vice-President and Chair of Council, about the Strategic Review and *Budget 2009*.

Overview

Program	CGS M	PGS M	CGS D	PGS D
Value	$17,500 (for one year)	$17,300 (for one year)	$35,000 a year (for two or three years)	$21,000 a year (for two or three years)
How to Apply	Apply on-line	Apply on-line	Apply on-line	Apply on-line
Application Deadline (through a Canadian university)	Set by university	Set by university	Set by university	Set by university



What categories of scholarships are available?

There are four types of scholarships available through the Alexander Graham Bell Canada Graduate Scholarships and NSERC Postgraduate Scholarships programs: CGS M, PGS M, CGS D and PGS D.

CGS M and PGS M

CGS M Value: $17,500 (for one year)	PGS M Value: $17,300 (for one year)

These scholarships are for a maximum duration of 12 months.

To be eligible to apply:

- you must have completed, as of December 31 of the year of application, betwe **zero and 12 months** of studies (full-time equivalent) in the master's program which you are requesting funding; or
- if you were admitted into a doctoral program directly from your bachelor's program, you must have completed, as of December 31 of the year of applicati between **zero and 12 months** of studies (full-time equivalent) in the doctoral program for which you are requesting funding; or
- you must have completed, as of December 31 of the year of application, no mo than 12 months of studies (full-time equivalent) in a master's program, and you are requesting funding for your doctoral program; and
- you must not have previously taken up an NSERC PGS A, PGS M, IPS 1,* or a (M for the program of study to which you are currently applying for funding; an
- you must not hold, or have held, a CGS M from either CIHR or SSHRC.

In evaluating your eligibility, NSERC will consider all studies counted towards the graduate degree for which funding is requested, whether completed at the degree-granting institution or not. NSERC will count two sessions of part-time study as one session of full-time study.

To hold these awards you must:

- be registered full-time in your master's or doctoral program at an eligible university

FGSR Award Administration

- How award decisions are made
- Winning an Award
- Accepting an Award
- Declining an Award
- Renewing an Award
- Terminating an Award

For more information on FGSR award policies, see the Award Winner's Handbook and Section 3 of the Graduate Program Manual.

What makes an Award Winner?

The FGSR "A Winning Profile" report provides a snapshot of graduate students who have won prestigious awards administered by the FGSR.

The report is provided as a guide for both departments and students when considering applications for FGSR awards.

A Winning Profile

Note: Decisions by the FGSR's Graduate Scholarship Committee are not mandated by this report and may differ from the content presented.

Establishing Graduate Awards

Find out how you can establish a graduate award at the University of Alberta.

SSHRC Winners' Profile

See our report comparing successful UofA scholarship applications submitted to SSHRC during the 2004 and 2005 competitions (both the doctoral and master's level).

SSHRC Comparison 2004 vs 2005

Selection Criteria

CGS/PGS applicants are evaluated and selected according to the criteria in the following categories:

- **Academic excellence**
  - Academic record
  - Scholarships and awards held
  - Duration of previous studies
- **Research ability or potential**
  - Quality of contributions to research and development
  - Relevance of work experience and academic training to field of proposed research
  - Significance, feasibility, and merit of proposed research, and justification for location of tenure
  - Ability to think critically
  - Ability to apply skills and knowledge
  - Judgment
  - Originality
  - Initiative and autonomy
  - Enthusiasm for research
  - Determination and ability to complete projects within an appropriate period of time
- **Communication, interpersonal and leadership abilities**
  - The ability or potential to communicate scientific concepts clearly and logically in written and oral formats. For example, this could include:
    - quality of the application's presentation;
    - participation in preparing publications; and
    - awards for oral presentations or papers.
  - Professional and relevant extracurricular interactions and collaborations. For example, this could include:
    - mentoring;
    - teaching;
    - supervisory experience;
    - project management;
    - chairing committees;

- Ability to apply skills and knowledge
- Judgment
- Originality
- Initiative and autonomy
- Enthusiasm for research
- Determination and ability to complete projects within an appropriate period of time

- **Communication, interpersonal and leadership abilities**
  - The ability or potential to communicate scientific concepts clearly and logically in written and oral formats. For example, this could include:
    - quality of the application's presentation;
    - participation in preparing publications; and
    - awards for oral presentations or papers.
  - Professional and relevant extracurricular interactions and collaborations. For example, this could include:
    - mentoring;
    - teaching;
    - supervisory experience;
    - project management;
    - chairing committees;
    - organizing conferences and meetings; and
    - elected positions held.

Selection Criteria Weightings

	CGS/PGS M (percent)	CGS/PGS D (percent)
Academic excellence	50	30
Research ability or potential	30	50
Communication, interpersonal and leadership abilities	20	20

Julie Payette-NSERC Research Scholarships

disadvantage in the selection process.

Review Procedures

University Review

The NSERC scholarship liaison officer at each Canadian university is responsible for coordinating the university review of CGS and NSERC PGS applications. The university review committee ranks each master's and doctoral scholarship application within one of the following ten broad discipline categories:

- Engineering A
- Engineering B
- Electrical engineering and computing sciences
- Mathematical sciences
- Physics and astronomy
- Chemistry
- Earth sciences and ecology
- Cellular and molecular biology
- Life sciences A
- Life sciences B

The university then submits to NSERC lists of the ranked applicants it recommends for a scholarship. Each university is assigned an overall quota of scholarship applications that it may forward to NSERC. It is up to each university to decide how it will distribute the quota (i) between master's and doctoral scholarship applicants; and (ii) among the ten categories listed above.

NSERC Review

NSERC scholarships and fellowships selection committees review all applications they receive (whether sent directly to NSERC or through the university review process). The committees recommend scholarships for the applicants they consider to have the best qualifications, according to the selection criteria described in the following section and within the limit of available awards.

Selection Criteria

CGS/PGS applicants are evaluated and selected according to the criteria in the

http://www.acabiodiversity.ca/

The program supports research in fields of biodiversity, conservation biology and ecology, and research on management of flora and fauna all broadly construed; all kinds of organisms are covered. Applications can deal with the study of Alberta's flora and fauna at any biological level, but such studies should be directly anchored in the real world. Thus, for example, experimental laboratory studies dealing with beetle chromosomes, must be tied directly to that organism in nature. Impact-type studies, such as those involving human-induced environmental change will be considered, but such manipulations must be process oriented and related to flora and fauna change.

Geographic Area of Focus:
Alberta ONLY

Value:
Typical awards average about $10,000, with the maximum award being $20,000. Efficiency in budgeting is viewed favourably by reviewers and adjudicators, and project approvals are evolving towards a higher number of lower budget awards.

Funding Period:
Grants are a one-time payment and are awarded for 2-year periods, commencing April 1 of the granting year. Applicants will be notified of grant decisions by April 1 of the granting year. On expiry, any unspent funds are recalled by the Grant Program.

Specific Funding Conditions:
Funds may be used to pay direct costs of research such as employment of student assistants, travel support, rental of equipment, field subsistence, purchase of supplies and incidentals, and other research-related expenses for the student engaged in the research. Funds cannot be used for salary for the grantee, or to purchase a single piece of equipment exceeding $500 in value. (see Application Instructions for more details).
The *ACA Grants in Biodiversity* will not pay overhead.
Capital Equipment Purchases are expected to become property of ACCRU or ACA at the end of the student's graduate program.

Reporting:
Successful applicants are required to submit annual reports together with a digital photo related to the research.

General Assessment Criteria:
Applications will be adjudicated on the basis of: 1) research merit; 2) reasonable budget; and 3) ability of the applicant to conduct the proposed project.

Assessment Process:
Choosing recipients is straightforward, but competition for awards is keen. Applications are forwarded to three reviewers for assessment. Applications are adjudicated on the basis of scholarly merit, efficiency and impact of research problem, reasonable budget, feasible research and adherence to terms of reference. Final adjudication is made in mid to late February by the Grant's Adjudication Committee, which is comprised of professors from each of the Universities of Alberta, Calgary and Lethbridge and representatives selected by the ACA.

2. SCHOLARSHIPS Academic record

'first class' standing:

3.5 (7.5 on 9 point) is *minimum*

B (8 on old scale) = 'average' for grad courses

marks more important for MSc

explain if there were special circumstances (or your references can do this)

2. SCHOLARSHIPS Academic record

NSERC Master's level

50% Academic excellence (=transcript)
30% research ability
20% communication, interpersonal & leadership

NSERC Doctoral level

30% Academic excellence (=transcript)
50% research ability
20% communication, interpersonal & leadership

2. SCHOLARSHIPS Letters of reference

LETTERS OF REFERENCE:

You can help your referees by giving them:

- **enough time**
- **where to send it**
- **a stamped envelope**
- **transcripts**
- **copy of your application**
- **copy of your c.v.**

3. Scholarships & Grants: YOUR ACADEMIC C.V.

Previous Scholarships/Awards/Grants:

- be clear (scholarship vs research grant)
- be correct (name, amount)
- obscure? give amount, note if institutional, national, international

Research productivity:

- CLEAR and CORRECT
- (submitted, published, accepted, refereed, conference, invited talk)
- use sub-categories
- don't double-dip
- put in everything you can but don't stretch it

3. Scholarships & Grants: YOUR ACADEMIC C.V.

"Other evidence of achievement":

CLEAR / CORRECT / CONCISE

DON'T REPEAT

SHOW SIGNIFICANCE OF YOUR WORK

Past research experience that isn't found elsewhere

3. Scholarships & Grants: Proposal

TARGETED APPROPRIATELY

FORMAT/STYLE (subheadings, fonts)
follow the rules!

Scientific questions & Significance
Methods (understandable)

TIME LINE / PROGRESS!!!!!

REMEMBER YOUR AUDIENCE
relevance
hypotheses/objectives

Application Instructions

General Instructions

If you are not using the form-fillable application, then ensure your application is in black ink, of letter quality. Ensure you complete both Part A and Part B and provide copies as outlined on the application form. Typing must be single-spaced, with no more than 6 lines per inch. Font size must be at least 12 pts. Condensed type is unacceptable. Applications for the *ACA Grants in Biodiversity* must be written by students and NOT by their supervisors. Submissions not adhering to these standards and those outlined below will be rejected.

Please do not submit any supplementary material, such as resumes, statements as to why the research should be funded, additional pages, etc. This material is not forwarded to reviewers and is not part of the decision-making process.

Ensure the original application and the photocopies are single-sided. The Program has greatly reduced the amount of paper used in the application process over the last few years, and we hope to improve this even more in the future. In the meantime, double-sided applications do not save paper as they usually get re-copied and they can cause some of your information to be missed when they are electronically scanned.

If you have applied in the past, do not make reference to previous applications. Material submitted in previous years is not available to reviewers or the Adjudication Committee.

Applicants are advised to review the background of this grant program, and also the mission and values of our sponsor, the Alberta Conservation Association. Ensure the proposal shows a good connection between the possible results and benefit to Alberta citizens, anglers, hunters and conservationists.

Applications for the ACA Grants in Biodiversity must be written by students or post-doctoral fellows, and NOT by their supervisors.

RESEARCH PROPOSAL

Research proposal details begin on page B-2 of the application form and 2 additional freeform pages only are allowed for this section. These pages must be single-spaced, with no more than 6 lines per inch. Font size must be at least 12 pts. Condensed type is unacceptable. Please make sure that your name is added to the top of both of the additional pages and that the pages are consecutively numbered to fit into the full application form. All margins must be at least 1 inch in width. Please also ensure that your name is entered into the space provided on each of the other pages.

If you are using the form-fillable PDF, please note that the PDFs will not allow formatting (such as italics) - the reviewers and adjudicators are aware of this. The form will expand to include freeform pages; as you are typing, hitting TAB will cause the form to flow onto the next page.

We often receive questions regarding the literature section of the research proposal. There are no strict guidlines for this section, but it is suggested you treat this section like a mini-literature review. You need to show you are aware of the key research that relates to the proposed project, and how your project will build on or use this existing knowledge. Space is limited, so only the highlights of the literature would be expected (and enough of a citation so someone familiar with the field will know what research you are talking about).

BUDGET

We want a detailed budget that deals ONLY with this proposal. Thus, the total budget for this proposal cannot exceed $20,000. Funds may be used to pay direct costs of research such as employment of student assistants, travel support, rental of equipment, field subsistence, purchase of supplies and incidentals, and other research-related expenses for the student engaged in the research. Funds cannot be used for salary for the grantee or to purchase a single piece of equipment exceeding $500 in value. Ownership of capital equipment reverts to ACCRU/ACA when the student graduates. **The *ACA Grants in Biodiversity* will not pay overhead.**

In preparing your budgets, remember he grant is a one time payment, but is awarded for a two year duration. Also, for projects that span multiple provinces, the *ACA Grants in Biodiversity* will only fund the proportion of the study that occurs in Alberta; the application should include the whole budget and provide a sub-estimate of the proportion that is Alberta based.

Budgets Must Be Itemized Under the Following Subheadings:

Costs of Assistants:

Proposed Rate: Grantees may use their grant funds to employ assistants (on a full-time or part-time basis) when they are required to do research for which the grant was awarded. We follow NSERC recommendations for a minimum salary of

4. SUMMARY

CONSIDER THE ADJUDICATION PANEL

- **THEIR EXPERTISE**
- **THEIR TIME CONSTRAINTS**
- **THEIR EYESITE**

eg. General Awards Competition: each member reviews

~ 150 applications (30 - 50 hours over 4 to 6 weeks)
assesses each application according to a prescribed scale
(1 = marginal, 4 = outstanding)

Research productivity

Greene, D.F., S.E. Macdonald, S. Haeussler, S. Domenicano, J. Noël, K. Jayen, I. Charron, S. Gauthier, S. Hunt, T. Gielau, Y. Bergeron, and L. Swift. Patterns, causes and effects of post-fire organic layer depth on tree recruitment across the Canadian boreal forest. Canadian Journal of Forest Research

Macdonald, S.E. and T.E. Fenniak. Understory plant communities of boreal mixedwood forests in western Canada: natural patterns and response to variable-retention harvesting. Forest Ecology and Management

Macrae, M.L., I.F. Creed, S.E. Macdonald, and K.J. Devito. 2006. Relation of soil nitrogen distribution and surface and ground water nitrogen concentrations in harvested and unharvested portions of an aspen-dominated catchment in the Boreal Plain. Canadian Journal of Forest Research 36: 2090-2103.

MacIsaac, D.A.. P.G. Comeau, and S.E. Macdonald. 2006. Gap dynamics of regeneration following harvest of aspen stands. Canadian Journal of Forest Research 36: 1818-1833

Macdonald S. E. 2004. Effects of partial retention during post-fire salvage harvesting on vegetation communities in the boreal mixedwood forest region of northeastern Alberta, Canada. submitted

Thomas, B.R. and S. E. Macdonald. 2004. Early selection for enhanced CO_2 biofixation and growth in fast growing poplar plantations. Report for Partners: AOSTRA – Alberta Energy; Alberta-Pacific Forest Industries Inc.; Daishowa-Marubeni International Ltd.; Mobil Oil Canada; Suncor Energy Inc.; Syncrude Canada Ltd. March 16, 2004. 17 pp.

Peters, V.S., S.E. Macdonald, and M.R.T. Dale. 2006. The importance of initial *versus* delayed regeneration of white spruce in boreal mixedwood succession. Canadian Journal of Forest Research 36: 1597-1609.

Macdonald, S.E., B. Eaton, C.S. Machtans, C. Paszkowski, S. Hannon, S. Boutin. 2006. Is forest close to lakes ecologically unique? Analysis of vegetation, small mammals, amphibians, and songbirds. Forest Ecology and Management 223: 1-17.

Harper, K.A., L. Mascarúa-López, S.E. Macdonald, and P. Drapeau. Interaction of edge influence from multiple edges: examples from narrow corridors. Plant Ecology

Shepherd, L., F. Schmiegelow, S.E. Macdonald. Managing fire for woodland caribou in Jasper and Banff National Parks. Rangifer

Macdonald: Composition and biodiversity of the understory plant community in the mixedwood boreal forest. Université Laval. (Invited Talk) February 3, 2005.

Keystone processes in boreal mixedwood regeneration and succession. Umea University, Umea, Sweden. May 2004.

Peters, V.S., S.E. Macdonald and M.R.T. Dale. 2006. Patterns of initial versus delayed regeneration of white spruce in boreal mixedwood succession. Ecological Society of America 91st Annual Meeting, Aug. 6 – 11, 2006. Memphis, Tennessee, USA.

Chávez, V. and S.E. Macdonald. 2006. Spatial patterns of understory plant diversity in the mixed-wood boreal forest of Alberta. Ecological Society of America 91st Annual Meeting, Aug. 6 – 11, 2006. Memphis, Tennessee, USA.

Macdonald, S.E. 2006. Understory plant communities in managed boreal mixedwoods. "Sustaining Canada's forests: building momentum", Sustainable Forest Management Network 4th International Conference, June 20-22, 2006, Edmonton, Alberta, Canada.

Chávez-Varela, V. and S.E. Macdonald. 2006. Understory plant composition patterns in mixedwood stands in the mixedwood boreal forest of Alberta. "Sustaining Canada's forests: building momentum", Sustainable Forest Management Network 4th International Conference, June 20-22, 2006, Edmonton, Alberta, Canada.

Refereed Journal Publications:

1. Greene, D.F., S.E. **Macdonald**, S. Haeussler, S. Domenicano, J. Noël, K. Jayen, I. Charron, S. Gauthier, S. Hunt, T. Gielau, Y. Bergeron, and L. Swift. Patterns, causes and effects of post-fire organic layer depth on tree recruitment across the Canadian boreal forest. Canadian Journal of Forest Research (accepted September 2006).
2. **Macdonald**, S.E. and T.E. Fenniak. Understory plant communities of boreal mixedwood forests in western Canada: natural patterns and response to variable-retention harvesting. Forest Ecology and Management (accepted August 2006).
3. Macrae, M.L., I.F. Creed, S.E. **Macdonald**, and K.J. Devito. 2006. Relation of soil nitrogen distribution and surface and ground water nitrogen concentrations in harvested and unharvested portions of an aspen-dominated catchment in the Boreal Plain. Canadian Journal of Forest Research 36: 2090-2103.
4. MacIsaac, D.A.. P.G. Comeau, and S.E. Macdonald. 2006. Gap dynamics of regeneration following harvest of aspen stands. Canadian Journal of Forest Research 36: 1818-1833
5. Peters, V.S., S.E. **Macdonald**, and M.R.T. Dale. 2006. The importance of initial *versus* delayed regeneration of white spruce in boreal mixedwood succession. Canadian Journal of Forest Research 36: 1597-1609.
6. **Macdonald**, S.E., B. Eaton, C.S. Machtans, C. Paszkowski, S. Hannon, S. Boutin. 2006. Is forest close to lakes ecologically unique? Analysis of vegetation, small mammals, amphibians, and songbirds. Forest Ecology and Management 223: 1-17.

Manuscripts submitted to refereed journals:

Harper, K.A., L. Mascarúa-López, S.E. **Macdonald**, and P. Drapeau. Interaction of edge influence from multiple edges: examples from narrow corridors. Plant Ecology (August 2006: revised and returned to journal following favorable reviews).

Macdonald S. E. Effects of partial retention during post-fire salvage harvesting on vegetation communities in the boreal mixedwood forest region of northeastern Alberta, Canada. Forest Ecology and Management (submitted May 2006)

Invited Talks:

Composition and biodiversity of the understory plant community in the mixedwood boreal forest. Université Laval. February 3, 2005.

Keystone processes in boreal mixedwood regeneration and succession. Umea University, Umea, Sweden. May 2004.

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Keystone processes in boreal mixedwood regeneration and succession. Umea University, Umea, Sweden. May 2004.

Unrefereed reports and papers:

Thomas, B.R. and S. E. **Macdonald**. 2004. Early selection for enhanced CO_2 biofixation and growth in fast growing poplar plantations. Report for Partners: AOSTRA – Alberta Energy; Alberta-Pacific Forest Industries Inc.; Daishowa-Marubeni International Ltd.; Mobil Oil Canada; Suncor Energy Inc.; Syncrude Canada Ltd. March 16, 2004. 17 pp.

Conference Presentations:

Peters, V.S., S.E. **Macdonald** and M.R.T. Dale. 2006. Patterns of initial versus delayed regeneration of white spruce in boreal mixedwood succession. Ecological Society of America 91st Annual Meeting, Aug. 6 – 11, 2006. Memphis, Tennessee, USA. Oral presentation.

Chávez, V. and S.E. **Macdonald**. 2006. Spatial patterns of understory plant diversity in the mixed-wood boreal forest of Alberta. Ecological Society of America 91st Annual Meeting, Aug. 6 – 11, 2006. Memphis, Tennessee, USA. Oral presentation.

Macdonald, S.E. 2006. Understory plant communities in managed boreal mixedwoods. "Sustaining Canada's forests: building momentum", Sustainable Forest Management Network 4th International Conference, June 20-22, 2006, Edmonton, Alberta, Canada. Oral presentation.

We will utilize thinning trials conducted in lodgepole pine or lodgepole pine – spruce stands by Millar-Western Forest Industries (also being used by M. Reid). In the first year 4 commercial thinned stands and 4 salvage thinned stands will be sampled and compared to unthinned stands of appropriate composition and density which are scheduled for future thinning. These stands can then serve as the controls initially and also as the pre-thinning control for monitoring in subsequent years. In each stand 20 permanent sampling points will be established in a stratified random fashion (stratified by residual density). Sampling is described below.

Canopy composition and productivity will be assessed in 3.99 m circular plots centered at each sampling point. Tree density to species and snag density will be counted in each plot; two representative trees per plot will be cored for assessment of recent diameter growth. Each tree and snag in the plot will be placed in a diameter size class. Each tree will be permanently tagged for monitoring of mortality. Canopy cover will be quantified using a convex spherical densiometer. In addition, for thinned stands the relative basal area of each tree species will be quantified using stratified random samples along transects through each stand (Leach & Givnish 1999). Cover of understory vascular plants (to species) will be assessed in 1.78 m circular plots centered at each sampling point. In these sample plots shrub stem density and sapling density (to species) will be counted and height will be determined for each sapling and shrub species to assess vertical stratification (see Halpern et al. 1999). Downed coarse woody material will be quantified using a line intercept method (8 m long segments bisecting the tree plot). For each piece encountered the diameter at the intersect point and at the base, and length, will be measured, and decay class recorded. Sampling of downed coarse woody material will also be done to provide a baseline for determination of decomposition rates over the long term. Samples of permanently tagged logs will be taken for mass-density, and nitrogen, phosphorous, and carbon analysis. In addition, fresh logs which were placed in thinned (and unthinned control) stands in 1996 (by M. Reid) will be re-sampled to assess the impact of thinning on decomposition.

Spot measurements of soil moisture will be made several times during the growing season using time domain reflectometry. Nutrient availability will be assessed using resin bags incubated at each sample location for the entire growing season. Light will be quantified through the analysis of hemispherical photographs, using HEMIPHOT software (ter Steege 1993). Pictures will be taken at different heights above ground level to compare lgiht received by different vegetation layers. We will also calculate the gap light index (GLI), which calculates the contribution of a gap to the light regime of any given point in the understorey (Canham et al. 1990), and beam enrichment (Canham et al. 1994).

Alaback, P.B. and F.R. Herman. 1988. Can. J. For. Res. 18: 1522-1530.
Canham, C.D. J.S. Denslow, W.J. Platt, J.R. Runkle, T.A. Spies, and P.S. White. 1990. Can. J. For. Res. 20: 620-631.
Canham, C.D., Finzi, A.C., Pacala, S.W. and Burbank, D.H. 1994. Can. J. For. Res. 24:337-349.
Constabel, A. J. and V.J. Lieffers. 1996. Can. J. for. Res. 26: 1008-1014.
Goldberg, D.E., and T.E. Miller. 1990. Ecology 71: 213-225.
Grace, J.B. 1999. Perspecitves in Plant Ecology, Evolution and Systematics. 2: 1-28.
Halpern, C.B., S.A. Evans, C.R. Nelson, D. McKenzie, D.A. Liquori. 1999. Northwest Sci. 73: 27-44.
Harper, K.A. 1999. PhD Thesis. Ren.Res. U of Alberta.
Leach, M.K. & Givnish, J.T. 1999. Ecological Monographs 60(3):353-374.
North, M., J. Chen, G. Smith, L. Krakowski, J. Franklin. 1996. Northwest Science 70: 24-35.
Parsons, W.F.J., D.H. Knight, and S.L. Miller. 1994. Ecological applications 4: 354-362.
Rose, C.R. and P.S. Muir. 1997. Ecological applications 7: 209-217.
Schoonmaker, P. and A. McKee. 1988. Forest Science 34: 960-979.
ter Steege, H. 1993. Tropenbos Documents 3. Netherlands.

Background: Reduction of stand density through thinning or other treatments will likely result in an increase in mineral nutrients, water and light availability for the forest understory vegetation (**1, 2**). Relationships between the amount of canopy openness, the spatial distribution of forest gaps induced by selective thinning or, at the other extreme, dispersed vs. aggregated Green-Tree Retention patterns (**3**) and the abundance and diversity of understory vegetation are still controversial and complex.

Objectives: This proposal will examine the effects of commercial thinning and understory retention on forest structure, composition, and understory plant biodiversity in the western boreal forest. Specific objectives are to:

- evaluate the role of changes in above- (light) versus below- (water, nutrients) ground resources on composition and diversity of understory plants;
- assess the influence of the treatments on forest dynamics and structure (mortality, recruitment and evolution of coarse woody material, development of understory trees, shrubs and non-woody plants);

Methods: ***Experimental design:*** Cover of understory vascular plants (to species) will be assessed in 1.78 m circular plots centered at each sampling point. In these sample plots shrub stem density and sapling density (to species) will be counted and height will be determined for each sapling and shrub species to assess vertical stratification (**4**). Downed coarse woody material will be quantified using a line intercept method (8 m long segments bisecting the tree plot).

Field sampling: Spot measurements of soil moisture will be made several times during the growing season using time domain reflectometry. Nutrient availability will be assessed using resin bags incubated at each sample location for the entire growing season. Light will be quantified through the analysis of hemispherical photographs, using HEMIPHOT software (**5**). Pictures will be taken at different heights above ground level to compare light received by different vegetation layers.

Analysis: Poisson regression and Analysis of variance will be used to compare treated stands to the appropriate control for the following parameters: tree density, basal area and volume, tree growth, canopy cover, rates of mortality, snag density, coarse woody material density and volume, shrub and sapling stem density and height, understory species richness, evenness and dominance (**6, 7**), understory cover by vegetation class (herbs, graminoids, shrubs, prostrate shrubs), light, soil moisture and nutrient availability. Richness will be examined at two scales: average number of species in each stand type (treated vs untreated), mean number of species per plot.

Significance: The work will provide a comprehensive understanding of the influence of these intensive forest management treatments on understory plant diversity and on forest structure and composition, as relevant to wildlife habitat quality. It will provide forest managers with data sets on which to base management decision, and with which to predict the future development of sites subjected to these management treatments.

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