



Fundy Model Forest

~Partners in Sustainability~

Report Title: Community- Level Biodiversity of Silvicultural and Natural Forests in Greater Fundy Ecosystem

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Year of project: 1994

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File Name: Biodiversity_1994_Freedman_Community_Level_Biodiversity_of_Silvicultural_and_Natural_Forests_in_Greater_Fundy_Ecosystem

***The Fundy Model Forest...
...Partners in Sustainability***

“The Fundy Model Forest (FMF) is a partnership of 38 organizations that are promoting sustainable forest management practices in the Acadian Forest region.”

Atlantic Society of Fish and Wildlife Biologists
Canadian Institute of Forestry
Canadian Forest Service
City of Moncton
Conservation Council of New Brunswick
Fisheries and Oceans Canada
Indian and Northern Affairs Canada
Eel Ground First Nation
Elgin Eco Association
Elmhurst Outdoors
Environment Canada
Fawcett Lumber Company
Fundy Environmental Action Group
Fundy National Park
Greater Fundy Ecosystem Research Group
INFOR, Inc.
J.D. Irving, Limited
KC Irving Chair for Sustainable Development
Maritime College of Forest Technology
NB Department of the Environment and Local Government
NB Department of Natural Resources
NB Federation of Naturalists
New Brunswick Federation of Woodlot Owners
NB Premier's Round Table on the Environment & Economy
New Brunswick School District 2
New Brunswick School District 6
Nova Forest Alliance
Petitcodiac Sportsman's Club
Red Bank First Nation
Remsoft Inc.
Southern New Brunswick Wood Cooperative Limited
Sussex and District Chamber of Commerce
Sussex Fish and Game Association
Town of Sussex
Université de Moncton
University of NB, Fredericton - Faculty of Forestry
University of NB - Saint John Campus
Village of Petitcodiac
Washademoak Environmentalists



**Community Level Biodiversity of Silvicultural
and Natural Forests in the Greater Fundy
Ecosystem from Bill Freedman**



COMMUNITY-LEVEL BIODIVERSITY OF SILVICULTURAL AND NATURAL FORESTS IN THE GREATER FUNDY ECOSYSTEM

from

Bill Freedman,
Department of Biology and
School for Resource and Environmental Studies,
Dalhousie University.

SUMMARY OF PROJECT

Our integrated research program is examining and comparing the community-level biodiversity of natural forests and an age-series of silvicultural forests in the vicinity of Fundy National Park. We are focusing on determining the population size and species composition of communities of the following wild life: birds, amphibians, arthropods, and vegetation (examined separately for trees, shrubs, ground vegetation, arboreal epiphytes, and the seed bank).

GOALS AND ACCOMPLISHMENTS

Our goals for the fiscal year of 1994-1995 were stated in our previous research application to the Fundy Model Forest. These goals, and our actual accomplishments, include the following:

(1) Complete analysis of data and write up studies of birds, amphibians, and invertebrates in about 18 stands, so as to allow an evaluation of animal biodiversity values of natural- and silvicultural-forest habitats.

* Ruth Waldick has defended her M.Sc. thesis on amphibians, and two manuscripts are in preparation for submission to refereed scientific journals.

* Jack Julian had defended his Honours B.Sc. thesis on ground beetles. Results of his study will be incorporated into a future, integrated paper on this overall biodiversity project.

* Greg Johnson has completed all of his M.Sc. fieldwork on breeding bird communities, and his data analysis is well advanced. I expect that this thesis will be defended by the springtime, and several papers will be submitted to refereed journals soon afterwards. (Greg took four months off from his thesis research during the summer, to work on the Woodley & Freedman project on cavity-nesting birds.)

* Minga O'Brien has completed all of her M.Sc. fieldwork on stream invertebrates, and her data analysis is proceeding rapidly. I expect that her thesis will be defended by early summer, and one paper will be submitted to a refereed journal soon afterwards.

(2) Complete the analyses of vegetation and habitat data for about 20 stands, to provide habitat data for animal studies, and to describe plant biodiversity in natural- and silvicultural-forest habitats.

* Tracy Fleming did the last of the fieldwork towards her M.Sc. thesis on habitat and carbon dynamics, and her laboratory and data analyses are proceeding rapidly. Her first priority was to supply the habitat data needed by the students studying animal communities, and this has been done. I expect that this thesis will be defended by early summer, and 1-2 papers will be submitted to a refereed journal soon afterwards.

* Bill Freedman managed to enter all of his ground vegetation data into spreadsheets, but the bum has not made much progress with the actual mathematical analyses. Bill has spent almost all of the past six months of his research time completing the second edition of his book, *Environmental Ecology* (published this November), working as an editor for an encyclopedia of science, and preparing a Canadian textbook in environmental science. However, Bill has a 6-month sabbatical starting this January, and plans to complete the data analysis and prepare a manuscript for submission to a refereed journal next summer.

(3) Perform additional amphibian-related fieldwork in at least six stands.

* This fieldwork was successfully completed, with two research assistants doing the work under the supervision of Ruth Waldick and myself. Because of the timing, these results were not incorporated into Ruth's thesis, but they will be integrated into the papers that Ruth is now preparing.

(4) Perform field surveys of epiphyte communities in plantations and natural forest.

* I accepted a new graduate student, Cam Vienotte, to do this work, but she was not able to begin her studies until October, 1994. Cam and my Research Associate Dr. Wolfgang Maass spent three weeks from late October to mid-November doing fieldwork for this study. However, the surveys proceeded more slowly than we initially expected, and it appears that about two months of additional fieldwork will be required to complete the fieldwork for this study. I expect that this additional work will begin at the beginning of May, 1995, and that Cam will complete her thesis by January, 1995.

June, 1994. "The Greater Fundy Ecosystem. Conceptual Plan for an Ecologically Sustainable Landscape." First International Symposium of Ecosystem Health and Medicine: Integrating Science, Policy, and Management. Ottawa, Ontario.

Freedman, B. August, 1994. "Ecologically sustainable systems." Sustainable Fisheries Symposium, Canadian Aquatic Resources Section of the American Fisheries Society. Halifax, Nova Scotia.

Freedman, B. October, 1994. "Biodiversity objectives for forestry. Perspectives of an ecologist." Model Forest Network, Annual Meeting. Sussex, N.B.

Freedman, B. November, 1994. "Plant communities in natural and managed forests in the Greater Fundy Ecosystem." Greater Fundy Ecosystem Workshop, Alma, N.B.

* Students associated with Bill Freedman also made presentations based on their studies, as follows:

Waldick, R. and B. Freedman. May, 1984. "The effects of converting natural forest to tree plantations on amphibian populations in New Brunswick." Second International Conference on Science and the Management of Protected Areas, Halifax, Nova Scotia.

Johnson, G. and B. Freedman. November, 1994. "Effects of forestry on breeding-bird communities in the vicinity of Fundy National Park" Greater Fundy Ecosystem Workshop, Alma, N.B.

O'Brien, M. and B. Freedman. November, 1994. "Effects of clear-cutting and plantation establishment on stream ecology in the vicinity of Fundy National Park." Greater Fundy Ecosystem Workshop, Alma, N.B.

Waldick, R. and B. Freedman. November, 1994. "Implications of forestry-associated habitat conversions for amphibians." Greater Fundy Ecosystem Workshop, Alma, N.B.

Fleming, T. and B. Freedman. November, 1994. "Biomass and carbon storage in mixed-wood natural forests and conifer plantations in the vicinity of Fundy National Park." Greater Fundy Ecosystem Workshop, Alma, N.B.

**COMMUNITY-LEVEL BIODIVERSITY
OF SILVICULTURAL AND NATURAL FORESTS
IN THE GREATER FUNDY ECOSYSTEM**

**A Progress Report on Research
funded in part by the
Fundy Model Forest**

from

**Bill Freedman,
Department of Biology and
School for Resource and Environmental Studies,
Dalhousie University.**

March 15, 1996

**RESEARCH UNDERTAKEN WITH SUPPORT FROM THE FUNDY MODEL
FOREST**

Since 1993, the Fundy Model Forest has contributed key funding to our integrated research program that is examining and comparing the community-level biodiversity of natural forests and an age-series of silvicultural forests in the vicinity of Fundy National Park (the Greater Fundy Ecosystem). Our work has focussed on determination of species composition and diversity of communities of the following wild life: birds, amphibians, arthropods, and vegetation (examined separately for trees, shrubs, ground vegetation, arboreal epiphytes, and the seed bank), and streams.

All of the fieldwork from this initial phase of our research has been completed. We are now writing and defending graduate theses, and preparing manuscripts for submission to scientific journals.

GOALS AND ACCOMPLISHMENTS

Our goals and accomplishments for the fiscal year of 1995-1996 included the following:

- (1) Complete analysis of data and write up studies of birds,

amphibians, and invertebrates in about 18 stands, so as to allow an evaluation of animal biodiversity values of natural- and silvicultural-forest habitats.

* Ruth Waldick has defended her M.Sc. thesis on amphibians in silvicultural habitats and natural forests, and we are in the late stages of preparation of a manuscript for submission to a scientific journal.

* Minga O'Brien defended her M.Sc. thesis on invertebrates in streams in silvicultural habitats and natural forests in the Greater Fundy Ecosystem. She is in the initial stages of preparation of a manuscript for submission to a scientific journal.

* Greg Johnson has completed all of his M.Sc. fieldwork on breeding bird communities, and will defend his thesis in the spring of 1996. Greg's progress was delayed when he did non-thesis work in the Fundy Model Forest last summer on the Woodley & Freedman project on cavity-nesting birds (also partially funded by the FMF).

(2) Complete the analyses of vegetation and habitat data for about 20 stands, to provide habitat data for animal studies, and to describe plant biodiversity in natural- and silvicultural-forest habitats.

* Tracy Fleming will defend her M.Sc. thesis in April, 1996 on habitat and carbon dynamics in 20 stands. This thesis was written with a view to easily extracting a journal manuscript, so a submission will be made soon afterwards.

* Cam Vienotte has completed her fieldwork on ground vegetation and epiphytic lichens and bryophytes in silvicultural habitats and natural forests in the Greater Fundy Ecosystem. Her thesis will be defended this summer, and will result in two manuscripts for scientific journals.

(3) Other relevant progress and accomplishments.

* Bill Freedman wrote or co-authored several papers, posters, or abstracts based in part on work done in the FMF, and partially funded by the FMF. These should be listed by the FMF in their own progress reports.

Freedman, B., V. Zelazny, D. Beaudette, T. Fleming, S. Flemming, G. Forbes, G. Johnson, and S. Woodley. 1996. *Biodiversity Implications of Changes in the Quantity of Dead Organic Matter in Forests*. Environmental Reviews (submitted; 94 pp. literature

review)

- Freedman, B. 1996. *Studies of forestry practices and avian communities in the Maritime Provinces*. Workshop on the Ecology and Conservation of Landbirds in the Boreal Forest. Workshop on the Ecology and Conservation of Landbirds in the Boreal Forest, University of Quebec at Montreal, Montreal, Que. (abstract)
- Fleming, T. and B. Freedman. 1995. *Biomass and carbon storage in mixed-wood natural forests and conifer plantations in the vicinity of Fundy National Park*. pp. 12-15 in: *Proceedings of the Workshop on Landscape Health in the Greater Fundy Ecosystem*. Cooperative Wildlife Research Unit, University of New Brunswick, Fredericton, N.B.
- Fleming, T.L. and B. Freedman. 1995. *Carbon storage in natural forests and conifer plantations near Fundy National Park, New Brunswick*. Conservation of Northern Forests. Responsible Stewardship for the Future. Toronto, Ont. (poster)
- Freedman, B. 1995. *The Greater Fundy Ecosystem Project - Scientific research towards the management of Fundy National Park and its surrounding landscape*. Commitment 2000 - Getting There. 1995 Federal-Provincial Parks Conference, White Point, Nova Scotia. (abstract)
- Freedman, B. 1995. *Biodiversity and forestry. Perspective of an ecologist*. Proceedings: Annual Meeting of the Model Forest Network, Sussex, N.B., October 1994. (abstract)
- Freedman, B., H. Beach, S. Woodley, G. Forbes, D. Clay, and C. Staicer. 1995. *The Greater Fundy Ecosystem. Co-operative Research and Monitoring Towards an Ecologically Sustainable Landscape*. Ecological Monitoring and Assessment Network, National Meeting, Jan. 16-19, 1995, Burlington, Ont. (poster)
- Freedman, B., W. Maass, and C. Veinotte. 1995. *Plant communities in natural and managed forests in the vicinity of Fundy National Park*. pp. 16-17 in: *Proceedings of the Workshop on Landscape Health in the Greater Fundy Ecosystem*. Cooperative Wildlife Research Unit, University of New Brunswick, Fredericton, N.B.
- Freedman, B. and C. Staicer. 1995. *The Greater Kejimikujik Ecosystem. A Conceptual Framework for*

- Ecological Monitoring and Research In and Around Kejimikujik National Park.* pp. 7-14 in: *Kejimikujik Watershed Studies, Workshop Proceedings, Oct. 21-23, 1992.* Environment Canada, Atlantic Region, Dartmouth, N.S.
- Johnson, G. and B. Freedman. 1995. *Effects of forestry on breeding bird communities in the Greater Fundy Ecosystem.* pp. 55-58 in: *Proceedings of the Workshop on Landscape Health in the Greater Fundy Ecosystem.* Cooperative Wildlife Research Unit, University of New Brunswick, Fredericton, N.B.
- O'Brien, M. and B. Freedman. 1995. *Effects of clear-cutting and plantation establishment on stream ecology in the vicinity of Fundy National Park.* pp. 10-11 in: *Proceedings of the Workshop on Landscape Health in the Greater Fundy Ecosystem.* Cooperative Wildlife Research Unit, University of New Brunswick, Fredericton, N.B.
- O'Brien, M. and B. Freedman. 1995. *Some effects of clearcutting and road-building on streams in the vicinity of Fundy National Park, New Brunswick.* Conservation of Northern Forests. Responsible Stewardship for the Future. Toronto, Ont. (poster)
- Woodley, S. and B. Freedman. 1995. *Towards ecosystem management: The Greater Fundy Ecosystem Project.* pp. 93-97 in: *Coordinating Research and Management to Enhance Protected Areas.* IUCN - The World Conservation Union, Gland, Switzerland.
- Waldick, R. and B. Freedman. 1995. *Implications for amphibians of forestry-associated habitat conversions.* pp. 43-46 in: *Proceedings of the Workshop on Landscape Health in the Greater Fundy Ecosystem.* Cooperative Wildlife Research Unit, University of New Brunswick, Fredericton, N.B.
- Woodley, S. and B. Freedman. 1995. *The Greater Fundy Ecosystem Project. A case study in ecosystem management.* The George Wright Forum, 12: 7-14.
- Woodley, S. and B. Freedman. 1995. *Interim report on the relationship between intensive forest management and cavity-nesting birds.* pp. 59-61 in: *Proceedings of the Workshop on Landscape Health in the Greater Fundy Ecosystem.* Cooperative Wildlife Research Unit, University of New Brunswick, Fredericton, N.B.
- Freedman, B. 1994. *Ecologically sustainable systems.* p. 30 in: *Managing Now for the 21st Century; Food,*

Recreation, and Diversity. American Fisheries Society, 124th Annual Meeting, Halifax, N.S., Aug. 21-25, 1994. (abstract)

Freedman, B., S. Woodley, and J. Loo. 1994. *Forestry practices and biodiversity*, with particular reference to the Maritime Provinces of eastern Canada. *Environmental Reviews*, 2: 33-77.

Freedman, B., S. Woodley, C. Staicer, and G. Forbes. 1994. *The Greater Fundy Ecosystem: Conceptual Plan for an Ecologically Sustainable Landscape.* pp. 35 in: *1st International Symposium of Ecosystem Health and Medicine.* June 19-23, Ottawa, Ontario. (abstract)

Woodley, S., B. Freedman, G. Johnson, and F. Lavender. 1994. *Forestry practices and cavity-nesting birds.* Annual Meeting of the Model Forest Network, Sussex, N.B., Oct. 3-7, 1994. (poster)

SUMMARY

We have now completed all fieldwork for the initial phase of our research in the Greater Fundy Ecosystem and Fundy Model Forest. Two theses have been successfully defended, and another two will be finished by this summer. Several papers have been published or submitted to refereed journals, and others have been presented at conferences and workshops.

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