



Flin Flon and Creighton

Green Project News

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Introduction

- We have successfully completed the fourth year of an initial five-year community-based plan.
- Our purpose is to accelerate the re-vegetation of barren areas in and around our communities by the application of crushed limestone.
- Because of the ruggedness of our terrain, it is not feasible to do the work by machine, so we use people-power, namely students from local schools, and adult volunteers.
- 2003 has been our best year to date in terms both of the area treated and new vegetation growth.
- The scientific and organizational background to our project are explained in Appendices 1 and 2 - below.

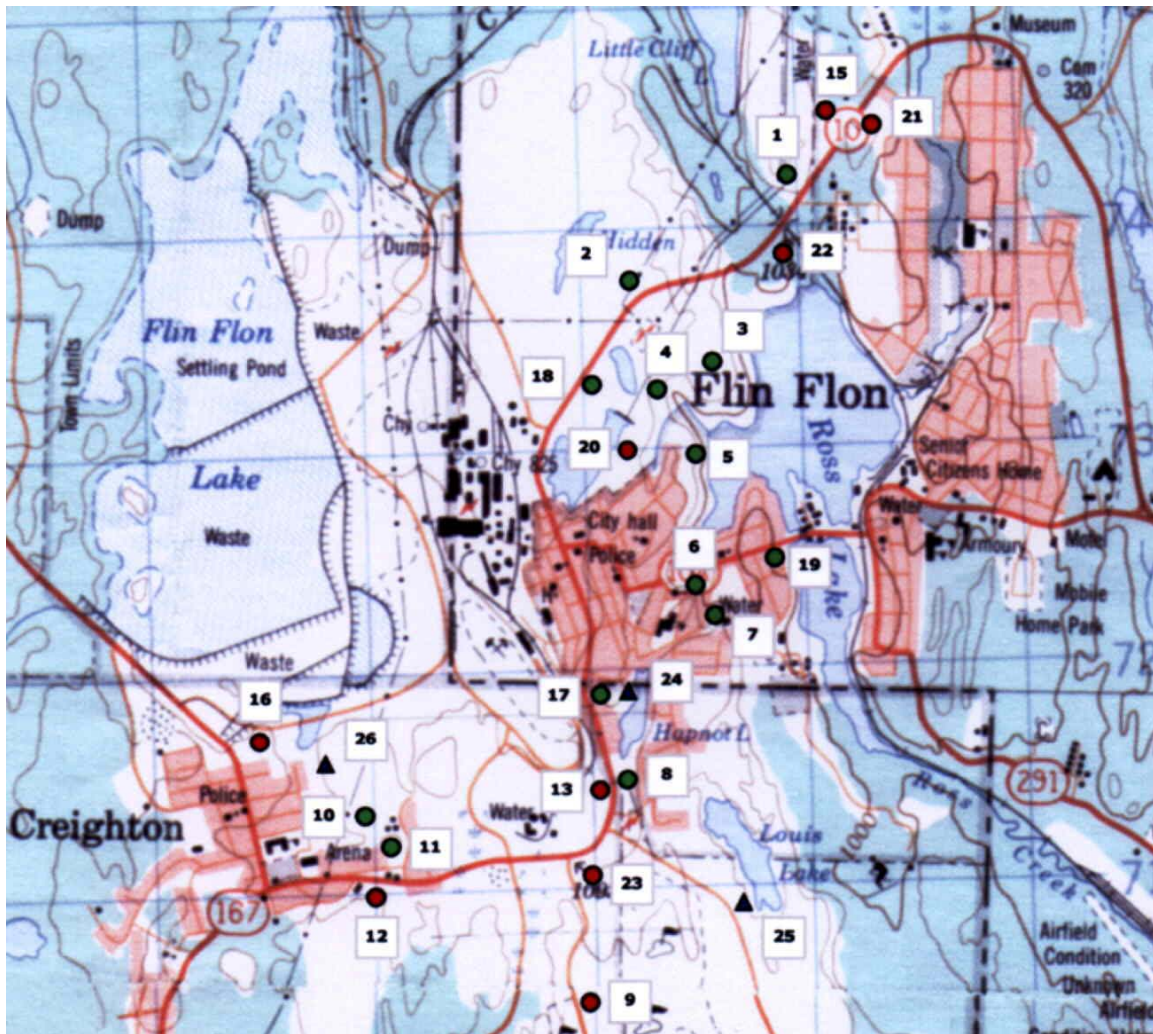
Our Partners

We gratefully acknowledge that our project has been made possible through the generosity of our partners. Major funding for the work in 2003 came from Manitoba Conservation - Sustainable Development Innovation Fund, and Hudson Bay Mining and Smelting Company Limited. Donations were made by Super-K Convenience Store, and Buz and Sarah Trevor. The City of Flin Flon and the Town of Creighton hauled the limestone to the areas to be treated. Flin Flon School Division and its Youth Mentor Program, and Creighton School

Division supplied the bulk of our workforce. Manitoba Industry Trade and Mines, and Hudson Bay Exploration and Development Company Limited lent us air photographs. Flin Flon and District Environment Council helped us with project administration. Home Hardware and Gateway Drive-in donated supplies.

Area Treated and Personnel

During a field season lasting from May 21 through September 25, 130.4 yards of crushed (dolomitic) limestone was spread in 9 areas for a total of 5.39 hectares (13.3 acres). The total area covered to date (2000-2003) is 18.72 hectares (46.2 acres). The map shows the locations of the treated areas. Red circles are areas treated in 2003. Blue triangles indicate new areas for 2004. (Area names are as follows: 1: Balsam, 2: Rock Cut,



3: Second Valley North, 4: Second Valley West, 5: First Avenue, 6: Hiawatha, 7: Grandview, 8: Hapnot, 9: Phantom, 10: Knight North, 11: Knight, 12: Pizza, 13: South Main, 15: Esso, 16: Creighton North, 17: Super K, 18: Triple Seven, 19: Market, 20: Reservoir Hill, 21: Lancaster, 22: Railroad, 23: Phantom North, 24: Hapnot North, 25: Louis, 26: Creighton East).

The work in 2003 was carried out by 584 individuals during 36 sessions (408 students in 15 sessions, 46 Royal Canadian Army Cadets in 2 sessions, and 130 members of the general public in 19 sessions). Some of our workers are shown below. On the left are grade one McIsaac students at Reservoir Hill in June, and on the right are adult volunteers at the Lancaster area in August.



New Growth in Treated Areas

The areas needing treatment are either totally barren, or have a few scattered tufts of the metal-tolerant grass *Agrostis capillaris*, and a few stunted 'relict' poplars, birches, and willows. Original organic topsoil is commonly entirely absent, or where present is thin. The ground surface is a combination of bare rock outcrop, and sandy or silty gravel with a variable content of pebbles and boulders. Areas treated in May and early June of each project year generally show some signs of life within a month (typically Manitoba maple). By August, seedlings of birch, aspen, balsam poplar and a variety of willows appear. Although the maples tend not to over-winter well, the other seedlings flourish, and in the second season grow to about half a metre. Some birches in the 'Pizza' area (which was treated in 2001) were

160cm. high in the fall of 2003. In some areas, scattered spruces tend to appear in the second year. Flowering plants such as Bicknell's geranium, fireweed, corydalis, etcetera are found here and there. Although the grass *Agrostis capillaris* is metal-tolerant, it does far better in treated than in untreated areas. All our areas have responded positively to the treatment, but results have been most spectacular in those farthest from the smelter complex (see Appendix 3 - below). The picture below left shows seedlings in the Hiawatha area in September 2003 - the area had been treated in October 2002. To the right is a dense cluster of birch seedlings in the Creighton North area in July 2003 - the area had been treated in October 2002.



Because of higher than normal precipitation in late June and early July, followed by prolonged periods of warm weather, 2003 was our best growing season to date.

Planting, Seeding, and Scarification

Although we depend primarily on the natural 'seed rain' to do the re-vegetating for us, we have done some small-scale experimental planting and seeding. The survival rate of spruce, pine, tamarack, and alder seedlings planted in ten small plots in September 2001 (see 'Green Project News', 2002) is close to one hundred percent, with the alder doing particularly well. White ash seedlings put in at these plots are surviving at our Phantom area, but have shown no significant growth since 2002. Poppy seeds scattered at the Phantom area by a member of the golf club in August 2001 germinated, and were in bloom in early July 2002. By August 2003, the area covered by these poppies was significantly greater than before. A mixture of wild and garden seeds was scattered in three of our areas in the fall of 2002 (see

'Green Project News', 2002). Of these, only the poppy seeds scattered at the Hapnot area seem to have germinated. Additional pine seedlings from cones scattered by Saskatchewan Environment personnel at our Knight North area in 2002 (see 'Green Project News', 2002) appeared in 2003. In April 2003, we scattered more pine and spruce cones (supplied by Saskatchewan Environment) in ten of our areas. In October, pine seedlings from these cones were noted in four of the areas, and spruce in one. On May 31, the local Cubs and Beavers planted 240 pine and 250 white spruce seedlings supplied by Manitoba Conservation and Saskatchewan Environment at our Second Valley area. The seedlings took very well, and the pines in particular almost doubled in size over the summer. During September and early October, the pines turned red-brown, and we shall be anxious to note their condition once the snow clears.

The plots scarified in October 2002 (see 'Green Project News', 2002) and treated with crushed limestone, showed significant new grass growth by mid-summer 2003. There was no significant growth in the adjacent plots that had not been treated. It appears therefore that scarification alone does not produce the hoped-for results.

Photography

During our first three project years we took 527 pictures, and in 2003 we took 224. These will serve as a permanent record of the project, and will be used for public relations purposes. Pairs of 'before and after' pictures illustrate in a dramatic way how effective the limestone treatment is proving to be - for example, the picture below left was taken at our Knight area shortly after treatment in 2000. The picture to the right is the same scene in August, 2003.



Technical Support

Botanist Professor Keith Winterhalder from Sudbury spent five days here in August checking over our treated areas. He made an inventory of plant types, and collected soil samples for analysis. We expect a technical report on his findings shortly. Copies of reports on his earlier visits (in 2000 through 2002) are available for inspection at Flin Flon Public Library.

Public Relations

Articles in the daily Flin Flon 'Reminder' and the weekly Creighton 'Gazette' kept our project in the public's eye in 2003. We also had coverage from our local radio station, and cable TV channel. An article on the project appeared in the spring issue of Bearskin Airlines' in-flight magazine 'Bear Country'. Articles also appeared in the November issue of 'Treelines' - newsletter of the Saskatchewan Forestry Association, the December issue of Saskatchewan Environment's 'Environment Newsline', and in the December 17 issue of the Prince Albert 'Northern Visitor'. Professor Winterhalder read a paper on the project at the 'Mining and the Environment' meeting at Laurentian University in Sudbury in May. An article has been submitted for inclusion in the 2004 edition of the 'Flin Flon Visitors' Guide', which is put out by Greenstone Community Futures Development Corporation. Presentations on the project have been given to a number of local groups, and in January a presentation was made at a meeting of the Kelsey Chapter of the Associations of Professional Engineers and Geoscientists of Manitoba and Saskatchewan in The Pas. You are reading the fourth issue of 'Green Project News' - copies are distributed to interested parties, and deposited at Flin Flon Public Library. Our new web site is at www.greenproject.ca

Future Plans

We aim to treat another five hectares in 2004 - new areas for this season will be Hapnot North, Louis, and Creighton East (see the map - above). An outdoor informational sign on our project is to be installed at the Creighton Tourist Office in the spring. One item on the agenda of our Committee's spring meeting will be a preliminary discussion on our second five year plan (2005-2009).

Additional Information

Please contact any of the following committee members:

Heather Acres: (204) 681-3427 (work) or 687-4319 (home),
E-mail: heathera@mb.sympatico.ca

Dave Price: (204) 687-4317 (work and home),
E-mail: dpprice@mb.sympatico.ca.

or contact our technical consultant :

Professor Keith Winterhalder: (705) 674-7905,
E-mail: wintergreen@sympatico.ca.

or check out our web site at: www.greenproject.ca

APPENDIX 1: Organizational background and procedures

In the late 1960s and early '70s, botanists at Laurentian University - among them our technical consultant, Professor Keith Winterhalder - found that the application of crushed limestone to the barren acidified and metal-contaminated soils around Sudbury led to the regeneration of vegetation. A major program of limestone application since then has led to a transformation of the Sudbury landscape.

In the early 1990s, Rena Gummerson and later Cathy Hynes of the Creighton /Denare Beach Economic Development Committee contacted Professor Winterhalder to see if he might be interested in helping to set up a re-vegetation program in our area. This resulted in his first visit up here in 1994. In 1999, Heather Acres and Clarence Pettersen of Flin Flon School Division thought that re-vegetation would be a good project for their Youth Mentor Program. Hudson Bay Mining and Smelting Company Limited and the Flin Flon Economic Development Commission provided funding to bring

Professor Winterhalder up here in October 1999. He spoke to a number of groups and generated a high level of interest and enthusiasm. As a result, the decision was made to establish the Green Project. A committee was formed, and planning meetings were held in March and April 2000. Through the generosity of McKeen's Trucking - who donated 130 yards of crushed limestone - the Green Project was able to commence its field operations in May 2000. Since then, the Project has become an affiliate of the Flin Flon and District Environment Council.

Present members of the committee are: Flin Flon School Division - Youth Mentor Program, Creighton School Division, City of Flin Flon, Town of Creighton, Flin Flon and District Environment Council, Hudson Bay Mining and Smelting Company Limited, Manitoba - Industry Trade and Mines, and Saskatchewan Environment.

The first stage in planning our field operations involves checking out maps and air photographs. From these we get a general idea of which areas might be suitable for treatment. We then walk over the ground, and once we decide on our areas, we mark out 50 x 50 metre squares. The crushed limestone is then trucked in and dumped as close as possible to the squares. We mark out the squares with rope. Our volunteers fill their pails at the dump, then spread the limestone in a strip between a pair of 'moving ropes'. As each strip is filled, we move the ropes and continue in this way until the whole square is covered.

APPENDIX 2: Environment and Science

In and around the communities of Flin Flon and Creighton¹, there are large areas with little or no vegetation. Old tree stumps show that these areas were once forested.

In the 1920s and '30s when our communities and the smelter complex were first established, many trees were cut for fuel and lumber. Others were cut to make fire-breaks, or were burned in forest fires. As production from the Flin Flon and other mines increased, so did the amount of sulphur dioxide

¹ Flin Flon and Creighton are situated on either side of the Manitoba/Saskatchewan boundary about 600 kilometres north of the Canada/US border. A large copper-zinc ore body was discovered at Flin Flon in 1915, and production - which started in 1930 - continues to the present day.

smoke from the smelter. Because the smoke was harmful to vegetation, the forest was not able to recover. The increasing acidity and metal content of the soil meant that only a very few hardy types of plant were able to survive. As the plants died, the thin topsoil washed away.

High levels of metals such as copper and zinc in the soil are toxic to plants². This toxicity is accentuated by acidity, which makes the metals more soluble, and therefore more accessible. When seeds germinate in metal-contaminated soil, growth stops immediately on contact with the toxic soil solutions. The carbonate ion in the limestone tends to neutralize soil acidity, thus making the metals less soluble, and less toxic. Another component of the limestone, calcium, contributes to reducing soil toxicity by competing with zinc ions for uptake by plant roots. Calcium ions also have a strengthening effect on the plasma membranes in the root cells. This membrane is responsible for determining what is absorbed by the roots.

Since the early 1970s, Hudson Bay Mining and Smelting Co., Limited has spent hundreds of millions of dollars to improve technology at the smelter complex, with the result that emissions of sulphur dioxide and metal oxide dust are now significantly reduced. The natural vegetation is slowly starting to recover. Our project will accelerate this recovery.

² This paragraph is from information supplied by Professor Winterhalder.

APPENDIX 3: Area vegetation ratings at fall 2003

Area (& Distance)*	Year Treated	A	B	C	D	E	F	Total Score
Balsam (1.9km)	'01	1	-	2	1	1	0	5
Rk Cut (1.1km)	'01	1	0	-	0	0	0	1
SecV-N (1.1km)	'00-'02	1	-	2	1	0	0	4
SecV-W (0.9km)	'00,'01	1	0	-	0	0	0	1
FirstA (1.0km)	'00	1	-	2	0	0	0	3
Hiawa (1.1km)	'02	1	-	2	0	0	0	3
Grandv (1.3km)	'01	1	-	2	0	0	0	3
Hapnot (1.6km)	'00-'02	1	-	2	1	1	1	6
Phant (2.5km)	'01-'03	1	-	2	0	1	1	5
KtNor (1.7km)	'01	1	-	2	1	1	1	6
Knight (1.8km)	'00	1	-	2	1	1	1	6
Pizza (2.0km)	'01,'03	1	-	2	1	1	1	6
SoMain (1.6km)	'02,'03	1	-	2	0	0	0	3
Esso (2.2km)	'02,'03	1	-	2	0	0	0	3
CrtNor (1.6km)	'02,'03	1	-	2	1	0	1	5
Sup-K (1.2km)	'02	1	-	2	0	0	0	3
TripSev (0.6km)	'02	1	0	-	0	0	0	1
Markt (1.4km)	'02	1	-	2	0	0	0	3
ResHill (0.7km)	'02,'03	1	0	-	0	0	0	1
Lanc (2.3km)	'03	0	0	-	0	0	0	0
RailRd (1.7km)	'03	0	0	-	0	0	0	0
PhantN (1.9km)	'03	1	-	2	0	0	0	3

A: Improved grass cover / quality.

B: Two to four bushy seedlings noted per 50x50m. square (score 1).

C: Five or more bushy seedlings noted per 50x50m. square (score 2).

D: One or more bushy seedling 50cm. or more high.

E: Two or more herb and/or sedge varieties present.

F: Self-seeded spruce seedlings present.

* Approximate distance of area from HBMS Co. stack.