



# Flin Flon & Creighton Green Project News

Volume 6

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## Introduction

- 2005 was the sixth year for our community-based project.
- 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.
- The summer of 2005 was cool and damp, but vegetation growth was very satisfactory - in some of the areas treated in 2000 and 2001, birch and poplar trees are now approaching three metres in height.
- The scientific and organizational background to our project is explained in Appendices 1 and 2 - below.

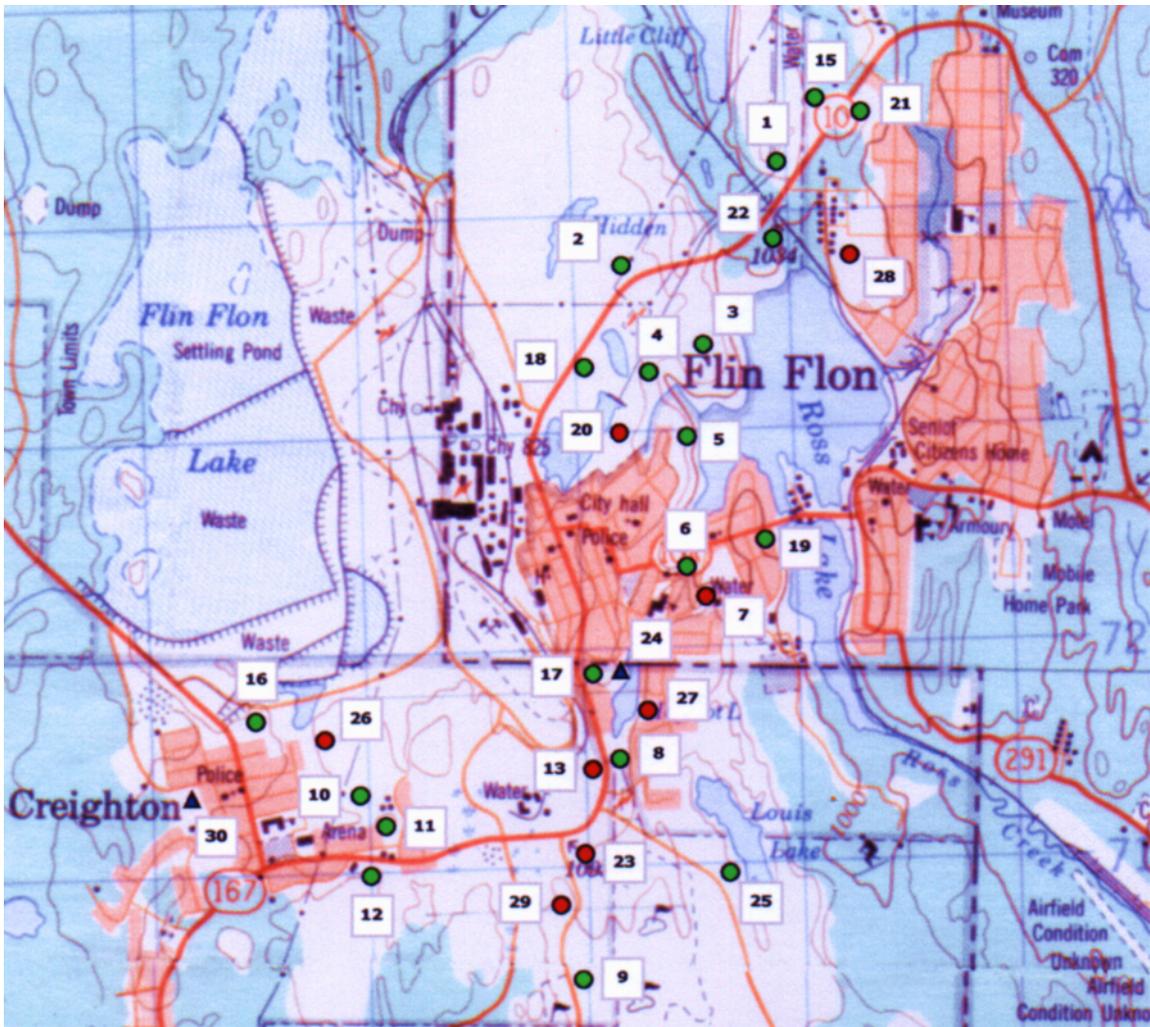
## Our Partners

We gratefully acknowledge that our project has been made possible through the generosity of our partners. Major funding for the work in 2005 came from the Northern Neighbours Foundation Inc. (Flin Flon), Hudson Bay Mining and Smelting Company Limited, and from a Canadian Tire Community Environment award. 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. Hudson Bay Exploration and Development Company Limited

supplied us with air photographs. Flin Flon and District Environment Council helped us with project administration. Home Hardware donated supplies.

### Area Treated

During a field season lasting from May 20 through September 16, 76 yards of crushed (dolomitic) limestone was spread in 8 areas for a total of 4.15 hectares (10.25 acres). The total area covered to date (2000 - 2005) is 26.73 hectares (66 acres). The total limestone used during this period has been 638.69 yards. The map shows the locations of the areas treated.



The green circles indicate areas treated 2000 through 2004. Red circles indicate areas treated in 2005. Blue triangles are new areas for 2006.

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, 27: South Hudson, 28: Roche, 29: Phantom Northwest, 30: Red Mountain.

## Personnel

The work was carried out by 577 individuals during 35 sessions (481 students in 20 sessions, and 96 members of the general public in 15 sessions). Some of our workers are shown below. On the left are Ruth Betts G5 and 6 students at our South Hudson area in June (Reminder photo), and to the right are community volunteers at our Roche area after an evening session in August.



## New Growth in Treated Areas

The areas we are treating are either totally barren, or have a few scattered tufts of the metal-tolerant grass *Agrostis stolonifera*, 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 have generally shown some signs of life (typically Manitoba maple) within a month. By August, seedlings of birch, aspen, balsam poplar, and a variety of willows appear. Although the maples tend not to over-

winter well, the others flourish, and in the second season grow to about half a metre. Some birches and poplars in our Knight, Knight North, Pizza and Hapnot areas (treated in 2000 and 2001) are now 2.6-2.9 metres high. Spruce seedlings are quite widespread in our Saskatchewan areas, as are pine - the latter are generally closely associated with parent 'relict' pines (as in the picture below left, taken in our Phantom area).



A single tamarack at our Knight area is now close to 1.5 metres high. For the first time, a red-osier dogwood was noted at our Hapnot area, and alder was noted in four of our southern areas (the one at right above, was found in our Pizza area). Understory species such as Bicknell's geranium, fireweed, corydalis, raspberry and bearberry are quite widespread, but tend to be few and far between. Although the grass *A. stolonifera* is metal-tolerant, it does far better in treated than in untreated areas. While all areas treated to date have responded positively, the results in some areas are more spectacular than in others (see 'Vegetation Score Card' - Appendix 3).

### Planting and Seeding

Although we are depending primarily on the natural 'seed rain' to do the re-vegetating for us, over the past several years we have done some small-scale experimental planting and seeding.

On June 4, local Cubs and Beavers and supporting adults planted 450 white spruce seedlings supplied by Manitoba Conservation at our Reservoir Hill and Second Valley areas. Later in June, a total of 71 spruce seedlings supplied by Saskatchewan Environment were put in at our Balsam, Triple Seven and Railroad areas. With the moist conditions, the seedlings took very well, and

had grown significantly by fall. In spite of an episode of smelter burn in the fall of 2003, most of the spruce and pine put in by the Cubs and Beavers at our Second Valley area towards the end of May of that year are surviving and have put on significant growth.

Pine and spruce cones were scattered in 17 of our areas in 2002 through 2004. Germination has taken place in all 8 of the southern (Saskatchewan) areas but in none of the northern (Manitoba) areas. Some of the pine seedlings from cones scattered by Saskatchewan Environment personnel at our Knight North area in February 2002 are now 50-70cm. high. Seedlings in the other areas are up to 15cm. high.

Although understory forbs and shrubs are found in most of our treated areas, they are generally few and far between. In July 2004 - at the suggestion of our technical consultant, Professor Keith Winterhalder - experimental transplant lines were established at four areas, and small 'gardens' at four other areas. The plants were taken from the bush on the outskirts of Flin Flon, in addition, some plants were supplied by Edgar and Mary Wright from their garden at Denare Beach. The purpose of the experiment was to determine how well the various species would take to being transplanted, and whether or not, once established, they would act as nuclei from which they would spread. At fall of 2005, the survival rate on the transplant lines (8 to 12 plugs on each line) ranged from 75% at the Phantom area to 27% at Triple Seven. Survivors included rose, wild and trailing raspberry, gooseberry and red clover. At the 'gardens', the most usual survivors included harebell, black-eyed Susan and columbine.

Supplementary documentation on our planting and seeding projects is available on request, and will shortly be posted on our web site.

### Technical Support



Botanist, Professor Keith Winterhalder from Sudbury, spent several days here during each of our first five summers, monitoring vegetation growth and soil chemistry. Most recently he had been conducting greenhouse experiments in Sudbury on soil from a number of our areas. Keith

had been in poor health for some time, and it was with regret that we heard in October of his death in Sudbury at the age of seventy. In the picture he is seen at our Hapnot area in 2001 talking to journalist Avery Ascher (at left) and Green Project co-coordinator Heather Acres.

## Photography

During our first five project years we took 977 pictures, and in 2005 we took an additional 246. These will serve as a permanent record of the project, and are being 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. At left below, students from Creighton School are treating our Knight North area in June 2001. The picture at right shows the same scene in August 2005.



## Public Relations

Articles in the daily 'Reminder' and the weekly 'Gazette' kept our project in the public's eye again in 2005. We also had coverage from our local radio station, CFAR. Articles on the Green Project appeared in the June/July issue of 'Route NORTH Roots', and in the May 6 issue of the 'Opasquia Times'. A fifth issue of our newsletter 'Green Project News' was released last April, and copies were distributed to interested parties and deposited at Flin Flon Public Library. We made posters, which were distributed to local schools. We plan to put up a new informational sign on our project at the Creighton tourist office in 2006. Our web site is at [www.greenproject.ca](http://www.greenproject.ca)

## Future Plans

We aim to treat another five hectares in 2006. Because ours is a low-cost project that relies on volunteers to do the heavy work of hauling limestone, areas must be reasonably accessible - they must also be visible, so that our volunteers - as well as members of the general public - are able to see the results of their work. Our success to date in covering the ground means that by the end of the coming season, we will have covered pretty well all of the areas that meet the above criteria. Our committee will be meeting in May to discuss the future of the Green Project - but it is possible that this may be our final year of operations.

## Additional Information

Please contact project coordinators:

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and check out our web site at: [www.greenproject.ca](http://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, the late 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 trans-formation 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 - we were able to start work in May 2000. Since then, the Green 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, Economic Development 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 as to which areas might be suitable for treatment. We then walk over the ground, and once we decide on our areas, we divide them into 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 sides of 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 Creighton<sup>1</sup>, 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 smoke from the smelter. The smoke is harmful to vegetation, so 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 plants<sup>2</sup>. 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.

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<sup>1</sup> *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.*

<sup>2</sup> *This paragraph is from information supplied by Professor Winterhalder.*

**APPENDIX 3: Vegetation Score Card - Fall, 2005**

<b>Area (&amp; Distance)*</b>	<b>Year Treated</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>Total Score</b>
1 - Balsam (1.9km)	'01	2	3	2	0	7
2 - Rk Cut (1.1km)	'01	1	1	0	0	2
3 - SecV-N (1.1km)	'00-'02	1	2	2	0	5
4 - SecV-W (0.9km)	'00,'01	0	0	0	0	0
5 - FirstA (1.0km)	'00	1	2	0	0	3
6 - Hiawa (1.1km)	'02,'04	3	2	2	0	7
7 - Grandv (1.3km)	'01,'05	1	2	0	0	3
8 - Hapnot (1.6km)	'00-'02	3	3	2	2	10
9 - Phant (2.5km)	'01-'03	2	2	2	2	8
10 - KtNor (1.7km)	'01	3	3	2	2	10
11 - Knight (1.8km)	'00	3	3	2	2	10
12 - Pizza (2.0km)	'01,'03,'04	3	3	2	2	10
13 - SoMain (1.6km)	'02,'03,'04	2	2	2	0	6
15 - Esso (2.2km)	'02,'03,'04	2	2	2	0	6
16 - CrtNor (1.6km)	'02,'03,'04	3	2	0	0	5
17 - Sup-K (1.2km)	'02	3	2	0	0	5
18 - TripSev (0.6km)	'02	1	1	0	0	2
19 - Markt (1.4km)	'02	1	2	0	0	3
20 - ResHill (0.7km)	'02,'03,'05	1	1	0	0	2
21 - Lanc (2.3km)	'03	1	1	0	0	2
22 - RailRd (1.7km)	'03	1	1	0	0	2
23 - PhantN (1.9km)	'03,'05	3	2	2	2	9
25 - Louis (2.3km)	'04	1	1	2	0	4
26 - CrtEast (1.4Kkm)	'04,'05	1	1	0	0	2
27 - SoHudson (1.5km)	'05	1	1	2	0	4
28 - Roche (1.9km)	'05	0	0	0	0	0
29 - PhantNW (2.1km)	'05	0	0	0	0	0

**A:** Vegetation density - low/medium/high, score 1/2/3.

**B:** Maximum bushy seedling height - <50cm/50-150cm/>150cm, score 1/2/3.

**C:** Two or more understory varieties present - score 2.

**D:** Self-seeded spruce/pine seedlings present - score 2.

\* Approximate distance of area from HBMS Co. stack.