2006 VEGETATION AND RARE PLANT SURVEYS OF THE SHORE GOLD PROJECT STUDY AREA NEAR PRINCE ALBERT, SASKATCHEWAN

Draft Report

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EXECUTIVE SUMMARY

Introduction

As part of a diamond mining project proposed by Shore Gold Inc. (Shore Gold), Canada North Environmental Services (CanNorth) was retained to conduct vegetation and rare plant surveys of proposed exploration drilling sites within the Shore Gold lease. The study area is located approximately 40 km east of Prince Albert in the Fort a la Corne Provincial Forest.

The main objectives of this study were to record vegetation communities as well as rare plants that occur within the study area. This report details the results of the surveys and includes a discussion of potential impacts and mitigation measures to vegetation communities.

Results and Discussion

The vegetation survey was conducted July 20th to July 23rd, 2006. The survey included both banks of the East Ravine and West Ravine within the Shore Gold lease. All plant species and vegetation communities noted were recorded. GPS co-ordinates were taken at each survey site.

There were 139 plant species observed in the survey area during the field surveys, 134 of which were vascular plants. A burn swept through the area approximately 20 years ago; therefore, uplands are largely regenerating jack pine. No rare plants were recorded during the survey.

The main vegetation related environmental impacts from the proposed mining exploration activities include impacts to native vegetation. It is recommended that sensitive and uncommon vegetation communities in the survey area be avoided where possible. This includes communities that are associated with drainages or low-lying areas in the lease area, as well as mature woodlands. A buffer zone surrounding creeks is recommended to avoid sensitive habitat and uncommon plant communities.

1.0 INTRODUCTION

1.1 Background

Shore Gold Inc.'s (Shore Gold) Star Diamond Project is located approximately 60 km east of Prince Albert, Saskatchewan (Figure 1). Shore Gold through (KHS) Environmental Management Group Ltd. retained Canada North Environmental Services Limited Partnership (CanNorth) to complete rare plant and vegetation community surveys within the proposed diamond mine exploration lease area. CanNorth conducted previous surveys in 2005 in various areas of Shore Gold's lease (CanNorth 2006). The 2006 survey encompassed two ravines in which future exploration drilling is planned.

1.2 Study Area

The vegetation community and rare plant survey study area was located in the Shore Gold project area in the Fort a la Corne Provincial Forest. Two ravines were surveyed and will be referred to as East Ravine and West Ravine (Appendix A, Photo 1). The ravines run northwest from the North Saskatchewan River, east of the exploration site (Figure 2).

1.3 Study Objectives

The objective of this study was to determine the presence of rare plants and the types of vegetation communities inhabiting the study area. In order to meet this objective, the following tasks were carried out:

- compiled a list of rare vascular plants of the Boreal Transition Ecoregion;
- conducted a database search of rare vascular plant records in the surrounding area of the proposed mine exploration area;
- conducted a rare plant survey within the East Ravine and West Ravine areas;
- recorded vegetation communities occurring within the study area; and
- assessed impacts to any rare species or uncommon plant communities and recommended mitigation strategies.

1.4 Characterization of Ecoregion

The proposed Shore Gold mining project occurs in the La Corne Plain Landscape Area within the Boreal Transition Ecoregion of the Boreal Plain Ecozone (Acton et al. 1998;

SKCDC 2002). This ecoregion represents a transition between the grasslands to the south and the boreal forest to the north (Saskatchewan Environment 2005). The La Corne Plain occurs along the Saskatchewan River and is mainly an undulating fluvial-lacustrine plain that obscures the underlying bedrock, with gently sloping topography. Bedrock is silt and clay shale of the late Cretaceous age. Where deposits are extremely sandy, they have been reworked into dunes giving the landscape a hummocky appearance with short, steep slopes and in some places high relief. The area is covered with 100 m or more of glacial deposits. These coarse, sandy deposits are largely Brunisolic soils. Gray Luvisolic soils are common on the finer textured sands and silty deposits. Dark Gray Chernozemic and organic soils occupy about ten percent of the landscape area (Acton et al. 1998).

Forested areas of the ecoregion are characterized by the presence of jack pine (*Pinus banksiana*), trembling aspen (*Populus tremuloides*), and white spruce (*Picea glauca*) (SKCDC 2002). Vegetation is dominated by deciduous boreal forest. Pure, even-aged stands of jack pine occur on fire-prone, dry, nutrient-deficient sandy and gravely soils. Aspen may be the dominant vegetation in hilly uplands, or may occur as stunted shrubby aspen in areas occupied predominately by jack pine. White spruce may occur in a variety of habitats, but prefers north-facing slopes of river valleys and moister sites. Balsam poplar (*Populus balsamifera*) grows in imperfectly drained soils. Larch (*Larix laricina*) and black spruce (*Picea mariana*) are confined to wet places, which are less common here than elsewhere on the boreal plain. There are seven main vegetation associations in the ecoregion as a whole: agricultural land, aspen forest, mixedwood forest, jack pine forest, grasslands, peatlands, and boreal wetlands (Acton et al. 1998).

2.0 METHODS

2.1 Background Information

Table 1 provides a description of the SKCDC rankings, provincial (S) and global (G), which are assigned to every species in the province. Those of an S1, S2, or S3 ranking are considered rare (SKCDC 2006a). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) uses a system of seven ranks, which are: extinct, extirpated, endangered, threatened, special concern, data deficient, and not at risk (COSEWIC 2004).

Prior to commencing the field survey, a list of rare plants potentially occurring in the study area was obtained from a search of the Saskatchewan Conservation Data Centre's database (SKCDC 2005a; Table 2). The search was conducted within a 50 km search radius from the proposed mine exploration area. In addition, a list of known rare species was obtained for the Boreal Transition Ecoregion (SKCDC 2006b). Descriptions of plant characteristics, phenology, and habitat were obtained from various taxonomic references (Looman and Best 1987; Moss 1994; Kershaw et al. 2001).

2.2 Field Survey

To identify the majority of vascular plant species in the project area, a series of surveys that allows plants to be observed at the optimal times for identification is best (SKCDC 2006c). However, two or more rare plant surveys in a given year or over several years are not always feasible. If only one survey is to be conducted in a given year, mid-late summer is generally the best (Bizecki Robson 1998). The field survey was conducted on July 20th to July 23rd, 2006. Search effort was concentrated on the ravine slopes and around drill bases (areas that have been cleared for future drilling). UTM coordinates were recorded at each site for future location and mapping (Figures 2, 3, and 4; Table 3).

A floristic survey technique is recommended when conducting rare plant surveys (Bizecki Robson 1998; SKCDC 2006c). Each site was surveyed on foot using a random meander technique to compile a plant species list. All species were identified at a site until no more new species were found (Bizecki Robson 1998). Plant species requiring verification were collected if the population could support it, and their identification was later confirmed. All vegetation communities seen within the survey area were targeted

including upland, slope, and riparian sites within the ravine. While walking between adjacent sites, plant species were observed in an effort to identify rare species.

Species nomenclature and common names follow the "Taxa List for Vascular Plants" (SKCDC 2005b). The Flora of Alberta (Moss 1994) and Budd's Flora of the Canadian Prairie Provinces (Looman and Best 1987) were used for plant keying, identification, and in some cases naming.

If a rare plant was identified, the planned protocol was to search the site to determine the extent and status of the population. UTM co-ordinates were to be recorded and specimens collected (if the population could support this) and/or photographs taken of the specimen and habitat (Bizecki Robson 1998). Any voucher specimens were to be donated to a university herbarium and rare native plant report forms would be submitted to the SKCDC for incorporation into their provincial database.

3.0 RESULTS AND DISCUSSION

3.1 Vegetation Communities

A vascular plant species list for the study area was compiled during the field survey and is presented in Table 4 and Appendix B, Table 1. In total, 139 species were recorded, of which 134 were vascular plant species. Species richness ranged from 12 – 39 species per site. Photos of many of the vegetation communities surveyed are presented in Appendix A.

3.1.1 Upland Areas

A burn through the area approximately 20 years ago affected upland areas, resulting in a large quantity of downed woody debris (Appendix A, Photo 2). These areas were dominated by regenerating stands of jack pine approximately 3-6 m tall. The most prevalent community was jack pine/bearberry – blueberry (*Pinus banksiana / Arctostaphylos uva-ursi – Vaccinium myrtilloides*). Examples of this vegetation community include Sites E32 and W1. In some sites, white meadowsweet (*Spiraea alba*) formed a dominant understory in jack pine stands. Other common understory species included saskatoon (*Amelanchier alnifolia*), green alder (*Alnus crispa*), northern bedstraw (*Galium boreale*), and graminoids. Upland areas consisting of regenerating jack pine and some aspen were common in the area and were not considered to be communities of concern, including in terms of supporting rare plant habitat.

Aspen was another common tree species in the area, and occurred as small regenerating stands on the burned upland areas typically as aspen/prickly rose – saskatoon (*Populus tremuloides / Rosa acicularis – Amelanchier alnifolia*) communities (Appendix A, Photo 3), such as Sites E30 and W5. Richer aspen stands occurred but were not common (Appendix A, Photo 4). These stands included such species as high-bush cranberry (*Viburnum opulus*) and forbs such as agrimony (*Agrimonia striata*). Dense alder – beaked hazel (*Alnus* sp. – *Corylus cornuta*) shrubland was present in some areas near the top of the ravine (e.g., W3).

3.1.2 Ravine Slope

At the south end of the ravine, mature white spruce – horsetail/sarsaparilla (*Picea glauca – Equisetum pratense / Aralia nudicaulis*) communities dominated the slope (Appendix

A, Photo 5). This vegetation community was seen continuously from Site E9 south to Site E17 on the west bank of the East Ravine. On the east bank of the East Ravine, the mature white spruce forest community was interrupted by small areas of disturbance that contained regenerating trembling aspen (Appendix A, Photo 6) and low shrubs such as prickly rose and beaked hazel (e.g., Site E23; Appendix A, Photo 7).

3.1.3 Riparian Area

Along the entire ravine bottom, riparian and wetland areas were dominated by sedge/graminoids (e.g., Site E3; Appendix A, Photo 8) or willow (*Salix* spp.) shrubland (e.g., Site E12). Some regions of this riparian area were open with sparse shrub presence (Appendix A, Photo 9) while other areas had dense shrub cover. In some areas of the ravine, the mature white spruce vegetation communities extended to the stream edge (e.g., Sites E4 and W4; Appendix A, Photos 10 and 11).

3.2 Rare Plant Survey

Based on a database search of a 50 km area around the study area, twelve rare vascular plants could potentially occur (Table 3) (SKCDC 2005a). Potential rare plants of the study area are listed in Table 2. None of the potential rare plant species occurring in the study area or within the ecoregion are ranked as rare by COSEWIC (2006).

No provincially rare plant species were recorded during the July survey. None of the rare species recorded during 2005 surveys[1] were found in the ravine study area. Nevertheless, the survey results do not preclude that rare plant species may occur within the project area.

3.3 Vegetation Mitigation

Native vegetation will be impacted by the project, and includes direct loss from removal. If buffer zones are applied to drainages, all impacts by the project will occur in upland areas of regenerating jack pine and aspen. These vegetation communities are considered common in the area and in general less sensitive to disturbance.

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[1] The 2005 rare species located were: narrow triangle moonwort (*Botrychium lanceolatum* ssp. *angustisegmentum*), common moonwort (*Botrychium lunaria*), matricary grape-fern (*Botrychium matricariifolium*), 'Michigan' grape-fern (*Botrychium 'michiganense'*), mignan moonwort (*Botrychium minganense*), leathery grape-fern (*Botrychium multifidum*), long-bracted green orchid (*Coeloglossum viride* var. *virescens*), western wood lily (*Lilium*

Drainages, wetlands, and ravine slopes are sensitive habitats. It is recommended that any disturbance near creeks be avoided to protect sensitive habitat and uncommon plant communities. Wetland areas including fenlands and willow shrubland should also be avoided if possible, as these are also sensitive and uncommon vegetation communities in the Shore Gold lease area. It is further recommended that all ravine or bottomland habitats be avoided. Steep slopes are vulnerable to instability and this would affect sensitive vegetation in the lower parts of the ravine. There should be enough setback from steep slopes to ensure bank stability. This will not only protect drainages, but the vegetation communities and wildlife that are associated with them. Lastly, areas of mature forest should also be avoided when possible, as most of the uplands in the lease area are regenerating after a burn. In particular, the continuous band of mature white spruce forest on the west bank of the East Ravine should be avoided.

Vegetation may also be indirectly affected by the introduction of weeds brought into the area by equipment and ground disturbance, which could potentially transport foreign plant material from one location to another and disturbed soils may be colonized by weedy, non-native species. In some cases, the introduction of undesirable plant species could have a negative effect on established native plant communities or the re-establishment of native species into reclaimed areas. To minimize the introduction or spread of non-native species into the project area, equipment on the job site should be clean and free of weeds. Non-native species were observed along existing roads in the project area, and included species such as yellow sweet clover (*Melilotus officinalis*), smooth brome (*Bromus inermis*), and lamb's-quarters (*Chenopodium album*). If any site remediation is done after site exploration, efforts should be made to prevent further introduction and spread of non-native species. Similar habitats in nearby areas are heavily invaded by noxious weeds such as leafy spurge (*Euhorbia esula*), yellow toadflax (*Linaria vulgaris*), and downy brome (*Bromus tectorum*), and diligent weed monitoring would be required to ensure that these species do not become a problem in the project area (CanNorth 2006).

4.0 CONCLUSIONS

A large portion of the study area is comprised of native vegetation. The varied terrain and close proximity of the study area to the South Saskatchewan River allows a number of vegetation communities to exist. Species diversity was the highest along drainages, in richly forested areas, and in wetlands. White spruce, balsam poplar, aspen, river alder (*Alnus tenuifolia*), willows, and currants (*Ribes* spp.) were the common trees and shrubs in such sites. The forb layer was typically diverse.

During the field survey, 139 plant species were recorded in the study area. No rare plant species were recorded. The project area is predominately vegetated with species such as jack pine and aspen. Some black spruce, white spruce, balsam poplar, paper birch, and balsam fir also occur. A burn occurred in the area approximately 20 years ago. Typical shrub species of uplands include bearberry, green alder, blueberry, and saskatoon. Typical shrubs of wetter areas include river alder, Labrador tea, and willows. Beaked hazel typically occurs on ravine slopes.

Any riparian or wetland areas are sensitive to disturbance and contain uncommon vegetation communities. It is recommended that creeks in the lease area be avoided if possible in order to protect associated vegetation communities, as well as ensure the integrity of the creeks and adjacent terrain, including ravine areas. Mature forest is also uncommon in the area and should be avoided when possible. It should be noted that Shore Gold Inc. has already made efforts to avoid many of the sensitive and uncommon vegetation communities as well as rare plant sites in the area.

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TABLE 1

SKCDC rank definitions for plants.

Saskatchewan Rank	Global Rank	Status	Description
S1	G1	Extremely Rare	5 or fewer occurrences or only a few remaining individuals.
S2	G2	Rare	6 to 20 occurrences or with many individuals in fewer occurrences.
S3	G3	Rare – Uncommon	21-100 occurrences, may be rare and local throughout its range, or in a restricted range (may be abundant in some locations or may be vulnerable to extirpation because of some factor of its biology).
S4	G4	Common	Apparently secure under present conditions, typically >100 occurrences but may be fewer with many large populations; may be rare in parts of its range, especially peripherally.
S5	G5	Very Common	Demonstrably secure under present conditions, > 100 occurrences, may be rare in parts of its range, especially peripherally.
Q			Taxonomic questions or problems.
S? or G?, and _ ?			Not yet ranked, or rank questionable.
SNR			Species not ranked.
T			Rank for a specific taxon.

Sources: Vujnovic and Gould 2002; SKCDC 2006a.

TABLE 2

Potential rare vascular plants of the study area.

Scientific Name	Common Name	SKCDC Rank	Habitat
Adoxa moschatellina	Musk-root	S3/G5	Moist woods and thickets (Moss 1994); cool mossy woodlands (Looman and Best 1987). Shaded wet coulee; spruce woods at edge of ROW; wet forest under white spruce and paper birch (SKCDC 2005a).
Astragalus aboriginum	Indian Milk-vetch	S2/G5	Open areas (Moss 1994); gravel banks along rivers and slopes (Looman and Best 1987). Eroded slope, cutbank of Saskatchewan River (SKCDC 2005a).
Campanula aparinoides	Marsh Bellflower	S2S3/G5	Wet meadows and marshes (Looman and Best 1987). Wet woods and new clearing (SKCDC 2005a).
Cardamine pratensis	Cuckooflower	S2/G5	Moist meadows and swamps; also in calcareous shallow water, springs, swampy woods, calcareous meadows and thickets, wet places, and along creeks (Kershaw et al. 2001). Peaty pool in bog forests (SKCDC 2005a).
Cypripedium arietinum	Ram's-head Lady's-slipper	S1/G3	Moist coniferous woods (Looman and Best 1987). Also dry sandy jack pine woodlands. Sandy jack pine forest (SKCDC 2005a).
Erigeron strigosus	White-top fleabane	S2S3/G5	Dry open areas, fields, disturbed ground (Moss 1994). Meadow (SKCDC 2005a).
Leucophysalis grandiflora	Large White-flowered Ground-cherry	S2/G4?	Disturbed areas, open woodlands, especially on sandy soils (Looman and Best 1987). Jack pine forest on sand; sandy roadside (SKCDC 2005a).
Luzula acuminate	Hairy Wood-rush	S1S2/G5	Moist woodland, often on disturbed sites; rocky sites and clearings in forests (Kershaw et al. 2001). Moist peaty edge of beaver pond in valley bottom with *Carex vaginata, Mitella nuda,* and *Equisetum scirpoides* (SKCDC 2005a).
Rosa blanda	Smooth Wild Rose	S1S2/G5	Eastern parklands (Looman and Best 1987). Aspen woods (SKCDC 2005a).
Salix planifolia ssp. *tyrrellii*	Tyrrell's Willow	S2/G5T2	River and lakeshores, meadows, muskegs, moist coniferous woods, marl bogs, and active sand-dunes (Moss 1994). Mixedwood along clearing ROW (SKCDC 2005a).
Senecio plattensis	Prairie Ragwort	S3S4/G5	Usually dry, open places (Gleason 1952). Burned over woods; mesic grassland, sloughs, shores, woods (SKCDC 2005a).
Utricularia minor	Lesser Bladderwort	S2S3/G5	Aquatic of bogs and shallow water (Looman and Best 1987); ponds, bogs, and ditches (Moss 1994).

SKCDC Database Search Area was 50 km radius from project area. Database search conducted on May 18th, 2005.

None of these species are ranked as rare by COSEWIC (2006).

TABLE 3

Locations of study sites surveyed during the rare plant survey, July 2006.

Site	Easting[1]	Northing[1]
E1	515171	5898169
E2	515104	5898132
E3	515087	5898055
E4	515087	5898002
E5	515306	5897597
E6	515215	5897539
E7	515246	5897529
E8	515216	5897506
E9	515356	5897375
E10	515543	5897226
E11	515500	5897223
E12	515574	5897196
E13	515577	5897130
E14	515685	5897121
E15	515685	5897015
E16	515728	5896932
E17	515748	5896821
E18	515790	5896815
E19	515840	5896821
E20	515758	5896980
E21	515743	5897083
E22	515665	5897158
E23	515640	5897193
E24	515446	5897392
E25	515383	5897449
E26	515282	5897515
E27	515329	5897565
E28	515287	5897647
E29	515357	5897698
E30	515350	5897717
E31	515423	5897982
E32	515246	5898656
W1	514967	5899157
W2	514899	5897976
W3	514874	5897956
W4	515194	5897689
W5	515243	5897634
W6	515274	5897691
W7	515170	5897830
W8	515069	5897854

[1]UTM locations given in North American Datum of 1927 (NAD27), Zone 13.

TABLE 4

Plant species list from the Shore Gold survey, conducted from July 20th to 23rd, 2006.

Scientific Name	Common Name
Vascular Plants	
Achillea millefolium	common yarrow
Actaea rubra	red baneberry
Agastache foeniculum	giant hyssop
Agrimonia striata	agrimony
Agrostis sp.	-
Alnus incana ssp. *tenuifolia*	speckled alder
Alnus viridis	green alder
Amelanchier alnifolia	saskatoon
Anemone canadensis	Canada anemone
Anemone cylindrica	long-fruited anemone
Apocynum androsaemifolium	spreading dogbane
Aralia nudicaulis	wild sarsaparilla
Arctostaphylos uva-ursi	bearberry
Arnica chamissonis	leafy arnica
Artemisia campestris	sagewort wormwood
Aster ciliolatus	Lindley's aster
Astragalus americanus	American milk-vetch
Betula papyrifera	white birch
Bromus ciliatus	fringed brome
Calamagrostis canadensis	marsh reed grass
Caltha palustris	marsh-marigold
Campanula rotundifolia	harebell
Carex aquatilis	water sedge
Carex atherodes	awned sedge
Carex aurea	golden sedge
Carex bebbii	Bebb's sedge
Carex interior	inland sedge
Carex lacustris	lakeshore sedge
Carex scoparia	broom sedge
Carex sp.	sedge
Cinna latifolia	slender wood grass
Cirsium flodmanii	Flodman's thistle
Cirsium undulatum	wavy-leaved thistle
Cornus canadensis	bunchberry
Cornus sericea	red-osier dogwood
Corylus cornuta	beaked hazelnut
Deschampsia caespitosa	tufted hair grass
Disporum trachycarpum	fairybells
Elaeagnus commutata	silverberry
Elymus canadensis	Canada wild rye
Elymus trachycaulus	slender wheat grass
Elymus trachycaulus ssp. subsecundus	awned slender wheatgrass
Epilobium angustifolium	fireweed

TABLE 4

Plant species list from the Shore Gold survey, conducted from July 20th to 23rd, 2006.

Scientific Name	Common Name
Vascular Plants	
Equisetum hyemale	common scouring rush
Equisetum pratense	meadow horsetail
Equisetum scirpoides	dwarf scouring-rush
Equisetum sylvaticum	woodland horsetail
Erigeron glabellus	smooth fleabane
Erigeron philadelphicus	Philadelphia fleabane
Erysimum cheiranthoides	wormseed mustard
Festuca saximontana	rocky mountain fescue
Fragaria vesca	woodland strawberry
Fragaria virginiana	smooth wild strawberry
Galium boreale	northern bedstraw
Galium trifidum	small bedstraw
Galium triflorum	sweet-scented bedstraw
Geum aleppicum	yellow avens
Geum macrophyllum	large-leaved avens
Geum rivale	purple avens
Glyceria grandis	tall manna grass
Glycyrrhiza lepidota	wild licorice
Heracleum maximum	cow parsnip
Juncus nodosus	knotted rush
Ledum groenlandicum	common labrador tea
Liatris ligulistylis	meadow blazing-star
Linnaea borealis	twinflower
Lonicera villosa	mountain fly-honeysuckle
Lycopus asper	western water-horehound
Lysimachia ciliata	fringed loosestrife
Lysimachia thyrsiflora	tufted loosestrife
Maianthemum canadense	two-leaved Solomon's seal
Maianthemum stellatum	starflower false Solomon's-seal
Melilotus officinalis	yellow sweet-clover
Mentha arvensis	wild mint
Mitella nuda	Bishop's-cap
Monotropa uniflora	Indian-pipe
Orthilia secunda	one-sided wintergreen
Oxtropis deflexa	reflexed locoweed
Parnassia palustris	Northern grass-of-parnassus
Petasites frigidus	colt's-foot
Picea glauca	white spruce
Pinus banksiana	jackpine
Plantago major	common plantain
Platanthera obtusata	small northern bog-orchid
Poa pratensis	Kentucky bluegrass
Populus balsamifera	balsam poplar

TABLE 4

Plant species list from the Shore Gold survey, conducted from July 20th to 23rd, 2006.

Scientific Name	Common Name
Vascular Plants	
Potentilla fruticosa	shrubby cinquefoil
Prunus virginiana	red-fruited choke cherry
Ranunculus acris	tall buttercup
Ranunculus sceleratus	celery-leaved buttercup
Rhamnus alnifolia	alder-leaved buckthorn
Ribes hudsonianum	northern black currant
Ribes lacustre	bristly black currant
Ribes triste	swamp red currant
Rosa acicularis	prickly rose
Rosa woodsii	Wood's rose
Rubus chamaemorus	cloudberry
Rubus idaeus	red raspberry
Rubus pubescens	dewberry
Salix bebbiana	beaked willow
Salix candida	hoary willow
Salix exigua	sandbar willow
Salix lucida	shining willow
Salix myrtillifolia	myrtle-leaved willow
Salix pedicellaris	bog willow
Salix petiolaris	basket willow
Salix pyrifolia	balsam willow
Salix serissima	autumn willow
Salix sp.	willow
Schizachne purpurascens	purple oat grass
Scirpus microcarpus	small-fruited bulrush
Scutellaria galericulata	marsh skullcap
Senecio vulgaris	common groundsel
Shepherdia canadensis	Canada buffalo-berry
Sium suave	water parsnip
Solidago canadensis	Canada goldenrod
Solidago missouriensis	low goldenrod
Solidago multiradiata	alpine goldenrod
Sonchus arvensis	perennial sow-thistle
Stellaria longifolia	long-leaved stitchwort
Symphoricarpus albus	snowberry
Taraxicum officinale	common dandelion
Thalictrum sparsiflorum	few-flower meadow-rue
Thalictrum venulosum	veiny meadow-rue
Toxicodendron rydbergii	poison ivy
Typha latifolia	common cattail
Vaccinium myrtilloides	blueberry
Vaccinium vitis-idaea	bog cranberry
Viburnum opulus	high-bush cranberry

TABLE 4

Plant species list from the Shore Gold survey, conducted from July 20th to 23rd, 2006.

Scientific Name	Common Name
Vascular Plants	
Viola canadensis	Western Canada violet
Viola sp.	violet
Non-Vascular Plants	
Cladina rangiferina	grey reindeer lichen
Parmelia sulcata	waxpaper lichen
Peltigera canina	dog lichen
Polytrichum sp.	hair-cap moss
Ptilium crista-castrensis	knight's plume

FIGURES

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Figure 1. Study location.

Figure 2. Study area.

Figure 3. East Ravine sites, July 2006.

Figure 4. West Ravine sites, July 2006.

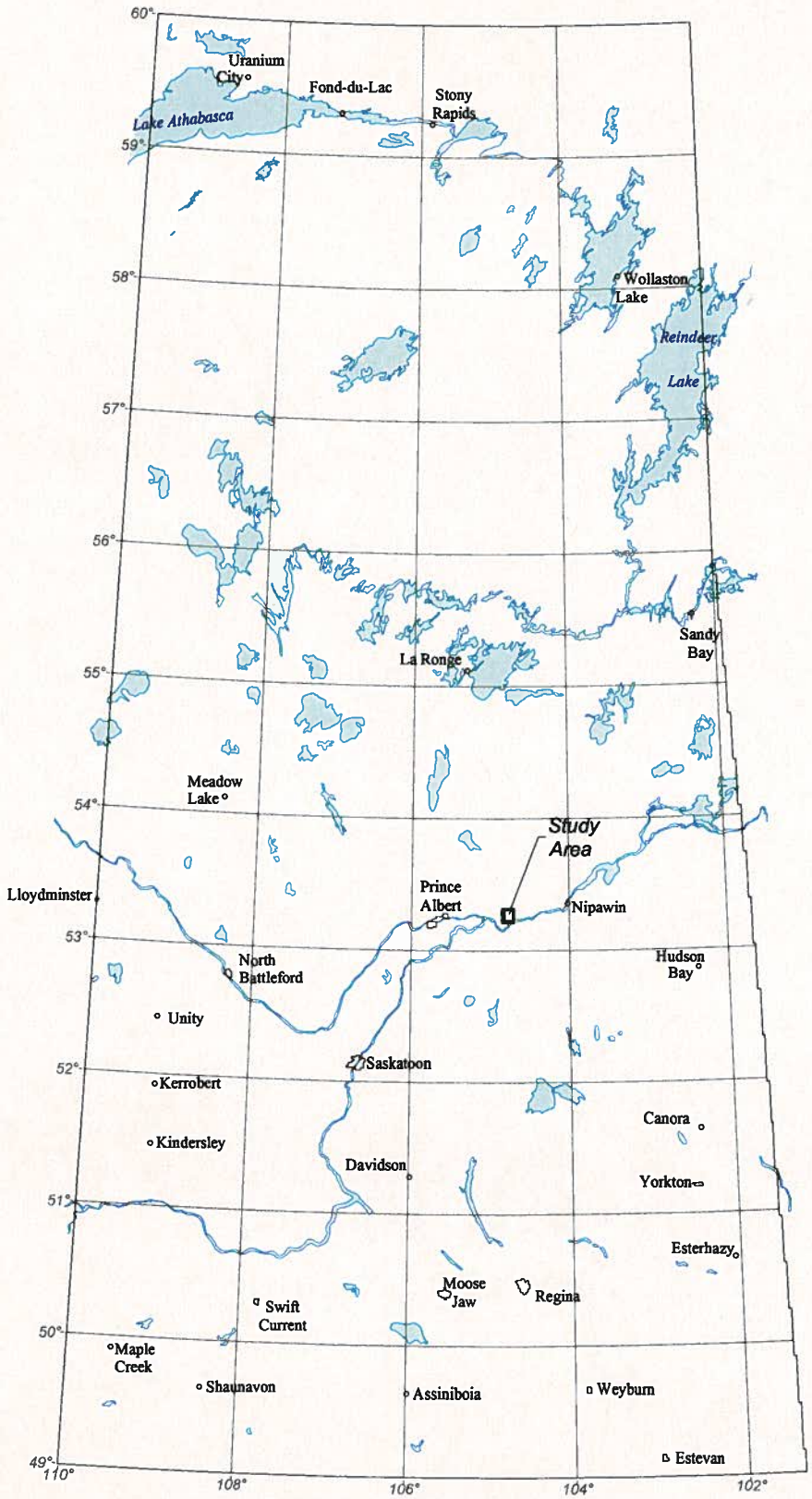

Figure 1 Study location.

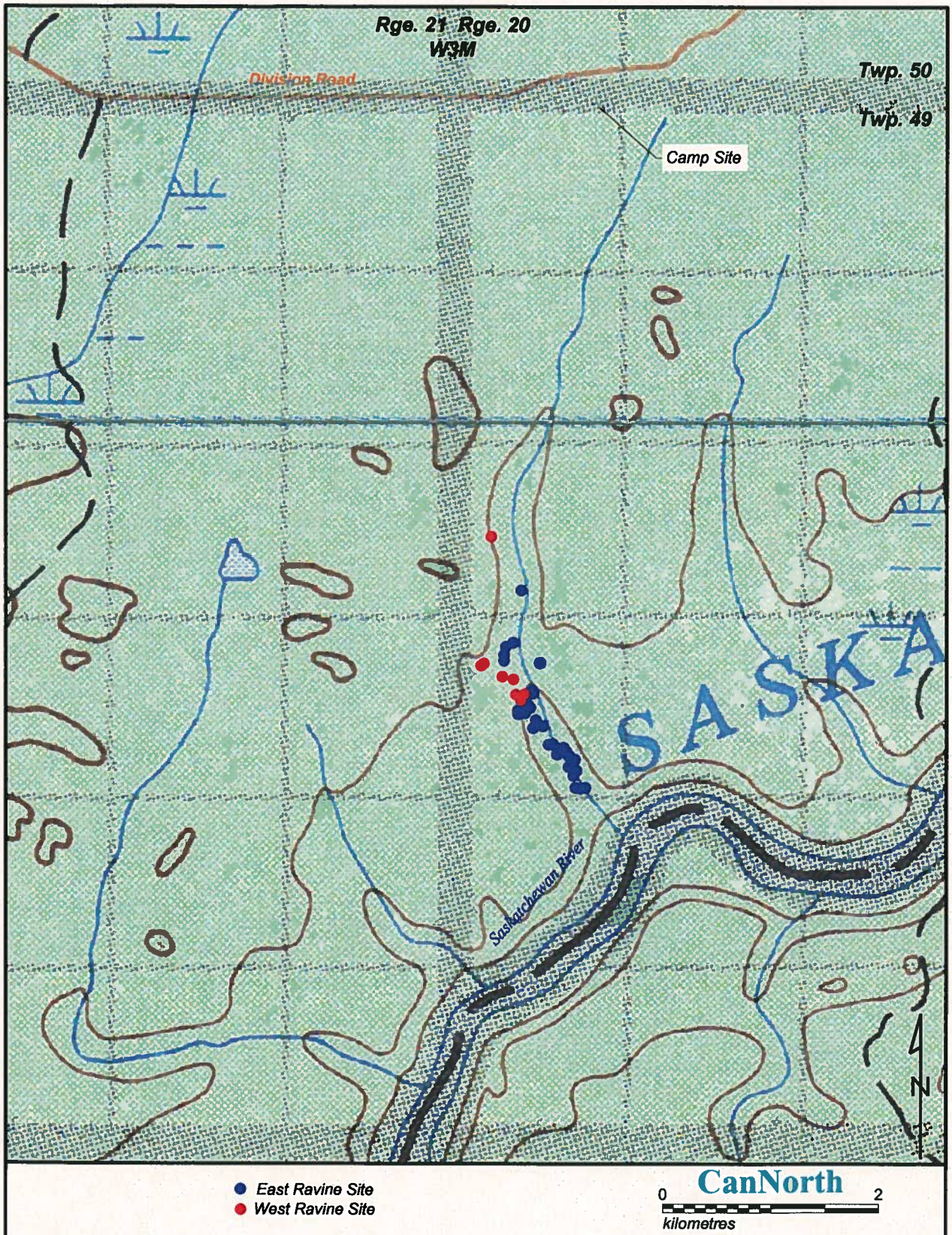

Figure 2
Study area showing the location of each study site.

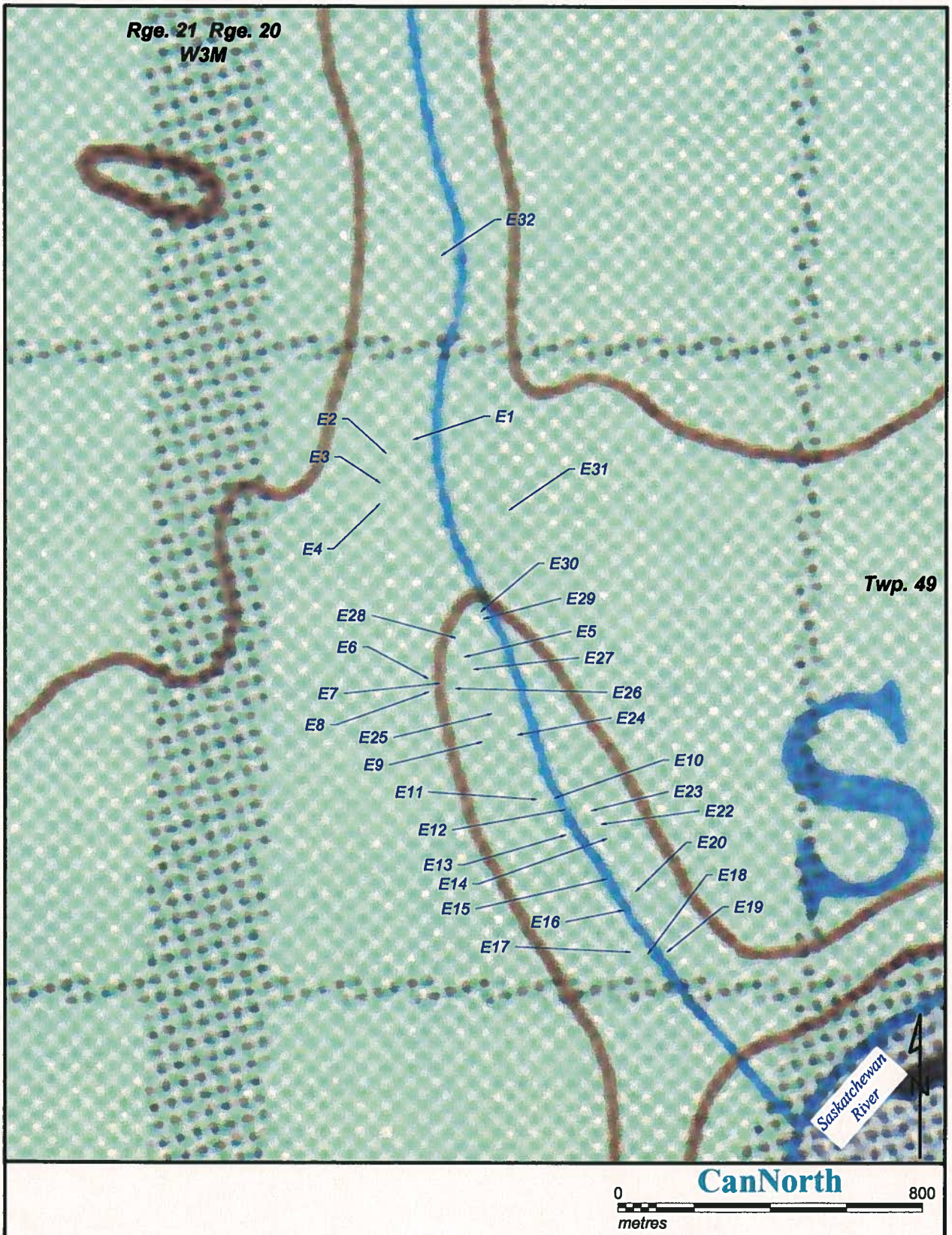

Figure 3
East Ravine sites, July 2006.

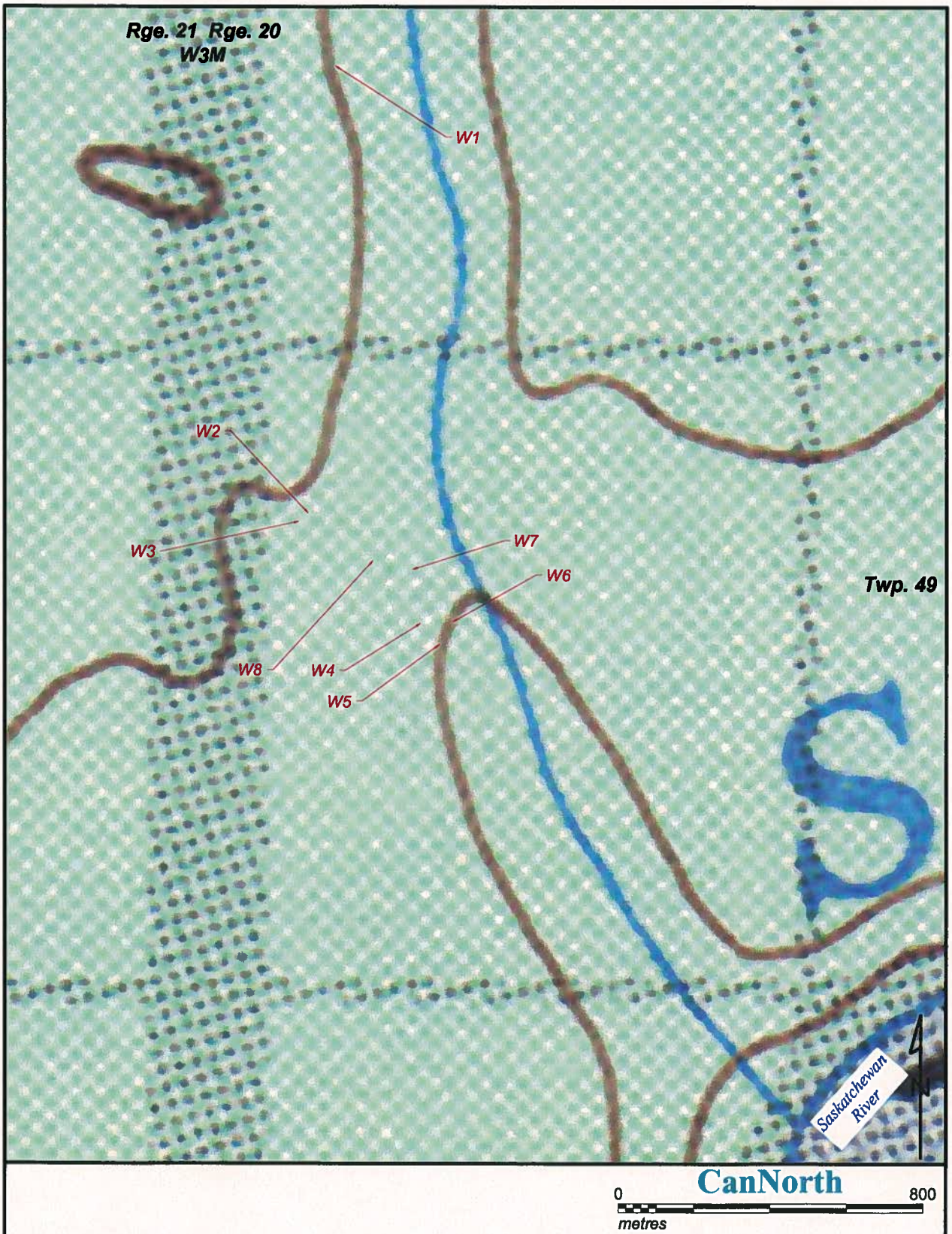

Figure 4
West Ravine sites, July 2006.

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APPENDIX A

PHOTOGRAPHS

APPENDIX A
LIST OF PHOTOGRAPHS

Photo 1. Shore Gold mine site with the West Ravine highlighted with yellow arrow and the East Ravine highlighted with red arrows.

Photo 2. Upland site on peak of ridge; jack pine regenerating after burn.

Photo 3. Upland site on peak of ridge; trembling aspen regenerated on a disturbed area around drill base.

Photo 4. Transition from trembling aspen on peak of ridge to mature white spruce on ravine slope.

Photo 5. Mature white spruce forest on steep ravine slope; between disturbed trembling aspen zone and ravine bottom.

Photo 6. Upland/slope site with trembling aspen/sarsaparilla community; regenerated after disturbance.

Photo 7. Trembling aspen/beaked hazel "shrubby" site; younger than site in Photo 6.

Photo 8. Bottom of ravine; creek bank can be seen in background.

Photo 9. Just above water's edge in transition area from disturbed trembling aspen/beaked hazel vegetation to sedge/graminoid vegetation adjacent to the creek.

Photo 10. Mature white spruce forest near bottom of ravine.

Photo 11. Mature white spruce forest extending to water's edge.

Photo 1. Shore Gold mine site with the West Ravine highlighted with yellow arrow and the East Ravine highlighted with red arrows.

Photo 2. Upland site on peak of ridge; jack pine regenerating after burn.

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Photo 10. Mature white spruce forest near bottom of ravine.

Photo 11. Mature white spruce forest extending to water's edge.

APPENDIX B

DETAILED SURVEY RESULTS

APPENDIX B
LIST OF TABLES

Table 1. Plant species occurring at each study site within the Shore Gold study area, July 2006.

APPENDIX B: TABLE 1

Plant species occurring at each study site within the Shore Gold study area, July 2006.

Genus	Specific Epithet	Common Name	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16	E17	E18	E19	E20	E21	E22	E23	E24	E25	E26	E27	E28	E29	E30	E31	E32	W1	W2	W3	W4	W5	W6	W7	W8
Achillea	*millefolium*	common yarrow	x					x						x							x			x	x	x		x	x		x			x	x					x		
Actaea	*rubra*	red baneberry							x							x							x				x	x									x					
Agastache	*foeniculum*	giant hyssop																											x													
Agrimonia	*striata*	agrimony																					x																	x		
Agrostis	*stolonifera*	redtop grass					x																					x														
Alnus	*incana ssp. tenuifolia*	speckled alder			x		x			x	x					x					x								x	x	x			x			x	x	x		x	
Alnus	*viridis*	green alder						x								x			x	x										x												
Amelanchier	*alnifolia*	saskatoon																														x		x								
Anemone	*canadensis*	Canada anemone		x	x	x	x	x	x	x		x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x		x	x						x		x	x	x
Anemone	*cylindrica*	long-fruited anemone		x																																						
Apocynum	*androsaemifolium*	spreading dogbane	x																					x										x	x	x				x		
Aralia	*nudicaulis*	wild sarsaparilla		x		x		x	x	x	x	x	x		x	x	x	x	x	x		x	x			x							x					x	x			x
Arctostaphylos	*uva-ursi*	bearberry	x			x							x		x			x				x						x	x	x				x	x	x						
Arnica	*chamissonis*	leafy arnica																																	x							
Artemisia	*campestris*	sagewort wormwood																																x		x						
Aster	*ciliolatus*	Lindley's aster																			x																					
Astragalus	*americanus*	American milk-vetch	x			x		x	x				x	x		x	x		x					x	x		x	x				x			x						x	
Betula	*papyrifera*	white birch		x							x					x				x	x	x	x	x		x		x										x		x		
Bromus	*ciliatus*	fringed brome										x		x											x	x											x					
Calamagrostis	*canadensis*	marsh reed grass				x						x																												x		
Caltha	*palustris*	marsh-marigold			x							x																										x				
Campanula	*rotundifolia*	harebell	x																										x	x				x	x	x						
Carex	*aquatilis*	water sedge			x		x							x							x																					
Carex	*atherodes*	awned sedge																											x													
Carex	*aurea*	golden sedge																									x															
Carex	*bebbii*	Bebb's sedge			x									x																												
Carex	*interior*	inland sedge					x																																			
Carex	*lacustris*	lakeshore sedge					x																																			
Carex	*scoparia*	broom sedge			x		x																																			
Carex	sp.	sedge				x	x	x	x	x	x	x	x	x				x	x	x		x	x	x	x	x	x	x		x	x	x						x	x	x	x	x
Cinna	*latifolia*	slender wood grass			x				x	x											x				x			x														
Cirsium	*flodmanii*	Flodman's thistle							x												x					x					x							x		x		
Cirsium	*undulatum*	wavy-leaved thistle			x		x							x							x																	x		x		
Cladina	*rangiferina*	grey reindeer lichen											x																													
Cornus	*canadensis*	bunchberry		x		x		x	x		x	x	x	x	x	x	x	x	x	x		x	x			x		x				x	x					x	x	x		
Cornus	*sericea*	red-osier dogwood							x		x						x		x	x				x		x											x	x		x		
Corylus	*cornuta*	beaked hazelnut			x	x		x	x	x	x	x	x	x		x	x		x		x		x	x	x		x	x		x						x		x	x	x	x	x
Deschampsia	*caespitosa*	tufted hair grass										x		x																												
Disporum	*trachycarpum*	fairybells																	x	x																						
Elaeagnus	*commutata*	silverberry																																		x						
Elymus	*canadensis*	Canada wild rye																						x	x										x	x						
Elymus	*trachycaulus*	slender wheat grass	x									x									x																					
Elymus	*trachycaulus* ssp. *subsecundus*	awned slender wheatgrass	x											x																												
Epilobium	*angustifolium*	fireweed			x	x		x	x															x				x		x		x						x	x	x	x	
Equisetum	*arvense*	common horsetail																			x					x		x				x										
Equisetum	*hyemale*	common scouring rush					x							x															x							x						
Equisetum	*pratense*	meadow horsetail		x	x	x		x	x	x	x	x	x	x	x	x	x	x			x	x	x				x	x					x				x	x	x		x	x
Equisetum	*scirpoides*	dwarf scouring-rush											x																													
Equisetum	*sylvaticum*	woodland horsetail					x																																			
Erigeron	*glabellus*	smooth fleabane					x	x				x		x					x					x	x		x	x		x						x				x	x	
Erigeron	*philadelphicus*	Philadelphia fleabane	x						x				x		x														x					x	x	x						
Erysimum	*cheiranthoides*	wormseed mustard	x																																							
Festuca	*saximontana*	rocky mountain fescue																												x												
Fragaria	*vesca*	woodland strawberry															x	x		x	x					x		x			x									x		
Fragaria	*virginiana*	smooth wild strawberry	x			x			x					x										x	x		x		x			x		x					x		x	
Galium	*boreale*	northern bedstraw	x					x	x													x	x		x	x																
Galium	*trifidum*	small bedstraw						x			x			x			x			x		x	x	x	x	x					x			x	x	x					x	

APPENDIX B: TABLE 1

Plant species occurring at each study site within the Shore Gold study area, July 2006.

Genus	Specific Epithet	Common Name	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16	E17	E18	E19	E20	E21	E22	E23	E24	E25	E26	E27	E28	E29	E30	E31	E32	W1	W2	W3	W4	W5	W6	W7	W8
Galium	*triflorum*	sweet-scented bedstraw								x		x	x			x					x																x	x		x		
Geum	*aleppicum*	yellow avens	x		x		x	x								x		x			x			x			x		x				x								
Geum	*macrophyllum*	large-leaved avens								x																																
Geum	*rivale*	purple avens												x																												
Glyceria	*grandis*	tall manna grass			x																																					
Glycyrrhiza	*lepidota*	wild licorice																		x																						
Heracleum	*maximum*	cow parsnip																																						x		
Juncus	*nodosus*	knotted rush					x																																			
Ledum	*groenlandicum*	common labrador tea			x	x							x															x		x				x				x	x			x
Liatris	*ligulistylis*	meadow blazing-star																																	x							
Linnaea	*borealis*	twinflower		x							x		x		x			x		x		x					x	x										x		x		x
Lonicera	*villosa*	mountain fly-honeysuckle		x		x		x	x	x	x	x	x	x	x		x	x	x	x		x	x	x				x		x		x	x					x			x	
Lycopus	*asper*	western water-horehound																																						x		
Lysimachia	*ciliata*	fringed loosestrife																							x	x																
Lysimachia	*thyrsiflora*	tufted loosestrife																										x						x								
Maianthemum	*canadense*	two-leaved Solomon's seal		x				x			x		x	x	x			x				x	x					x						x					x	x		
Maianthemum	*stellatum*	starflower false Solomon's-seal										x		x													x															
Melilotus	*officinalis*	yellow sweet-clover	x																x											x												
Mentha	*arvensis*	wild mint			x		x							x							x			x	x	x					x									x		
Mitella	*nuda*	Bishop's-cap										x			x							x																x				x
Monotropa	*uniflora*	Indian-pipe									x																															
Orthilia	*secunda*	one-sided wintergreen																x				x						x														
Oxtropis	*deflexa*	reflexed locoweed																											x			x										
Parmelia	*sulcata*	waxpaper lichen											x																													
Parnassia	*palustris*	Northern grass-of-parnassus			x																x							x	x													
Peltigera	*canina*	dog lichen									x											x																				
Petasites	*frigidus*	colt's-foot			x				x					x														x										x				
Picea	*glauca*	white spruce		x	x	x					x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x		x	x							x		x		x
Pinus	*banksiana*	jackpine	x			x						x	x						x	x		x	x	x			x	x		x				x	x	x		x	x		x	
Plantago	*major*	common plantain		x				x	x	x			x		x	x	x	x			x	x	x			x		x					x					x	x	x	x	x
Platanthera	*obtusata*	small northern bog-orchid											x							x																							
Poa	*pratensis*	Kentucky bluegrass			x		x					x		x							x						x		x		x			x	x		x		x		x	
Polytrichum	sp.	hair-cap moss														x																										
Populus	*balsamifera*	balsam poplar		x	x	x	x							x							x			x	x										x	x	x	x		x	x	
Populus	*tremuloides*	trembling aspen	x	x		x		x	x	x	x	x					x		x	x	x	x		x	x	x		x		x	x	x	x		x	x	x	x	x	x	x	x
Potentilla	*fruticosa*	shrubby cinquefoil		x	x	x																																		x		
Prunus	*virginiana*	red-fruited choke cherry						x											x									x		x					x	x						
Ptilium	*crista-castrensis*	knight's plume													x	x																										
Ranunculus	*acris*	tall buttercup																			x			x																		
Ranunculus	*sceleratus*	celery-leaved buttercup																								x		x							x							
Rhamnus	*alnifolia*	alder-leaved buckthorn				x				x		x															x	x			x	x					x		x			
Ribes	*hudsonianum*	northern black currant		x	x					x					x						x																x	x		x		x
Ribes	*lacustre*	bristly black currant								x															x																	
Ribes	*triste*	swamp red currant		x		x				x	x			x	x		x	x	x	x								x				x	x									
Rosa	*acicularis*	prickly rose	x		x	x		x	x	x	x		x	x	x		x	x	x		x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x		x	
Rosa	*woodsii*	Wood's rose				x																					x														x	
Rubus	*chamaemorus*	cloudberry	x																																							
Rubus	*idaeus*	red raspberry		x	x			x	x						x						x		x	x	x		x			x									x			
Rubus	*pubescens*	dewberry	x	x		x		x	x	x	x	x			x	x	x	x			x	x	x			x	x			x	x							x		x		x
Salix	*bebbiana*	beaked willow	x		x		x							x		x	x				x					x		x			x		x	x				x		x	x	
Salix	*candida*	hoary willow																			x					x	x															
Salix	*exigua*	sandbar willow					x																						x													
Salix	*lucida*	shining willow			x									x																												
Salix	*myrtillifolia*	myrtle-leaved willow																																							x	
Salix	*pedicellaris*	bog willow					x														x								x													
Salix	*petiolaris*	basket willow					x																								x											
Salix	*pyrifolia*	balsam willow					x																																			

APPENDIX B: TABLE 1

Plant species occurring at each study site within the Shore Gold study area, July 2006.

Genus	Specific Epithet	Common Name	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16	E17	E18	E19	E20	E21	E22	E23	E24	E25	E26	E27	E28	E29	E30	E31	E32	W1	W2	W3	W4	W5	W6	W7	W8
Salix	*serissima*	autumn willow												x										x																		
Salix	sp.	willow																						x				x	x													
Schizachne	*purpurascens*	purple oat grass												x																												
Scirpus	*microcarpus*	small-fruited bulrush			x		x							x							x								x													
Scutellaria	*galericulata*	marsh skullcap																																						x		
Senecio	*vulgaris*	common groundsel										x																							x							
Shepherdia	*canadensis*	Canada buffalo-berry												x			x		x			x				x		x						x	x					x		
Sium	*suave*	water parsnip																																				x				
Solidago	*canadensis*	Canada goldenrod	x									x									x			x	x	x				x	x	x		x		x						
Solidago	*missouriensis*	low goldenrod																																x	x							
Solidago	*multiradiata*	alpine goldenrod												x										x	x																	
Sonchus	*arvensis*	perennial sow-thistle			x							x		x							x						x															
Stellaria	*longifolia*	long-leaved stitchwort																		x	x															x				x	x	
Symphoricarpus	*albus*	snowberry		x																																						
Taraxicum	*officinale*	common dandelion						x													x			x																		
Thalictrum	*sparsiflorum*	few-flower meadow-rue						x		x					x							x	x																			
Thalictrum	*venulosum*	veiny meadow-rue	x	x					x					x			x						x	x	x	x	x		x			x	x						x		x	
Toxicodendron	*rydbergii*	poison ivy																																		x						
Typha	*latifolia*	common cattail																																				x				
Vaccinium	*myrtilloides*	blueberry																				x								x				x						x		
Vaccinium	*vitis-idaea*	bog cranberry				x																																				
Viburnum	*opulus*	high-bush cranberry																										x														
Vicia	*americana*	American vetch						x	x				x	x		x	x		x	x	x		x	x	x	x			x		x	x	x						x	x	x	
Viola	*canadensis*	Western Canada violet																					x		x																	
Viola	sp.	violet										x		x	x		x	x				x	x			x	x	x				x	x					x	x			x