

## Rare Species at PolyMet East

### Site #1: *Botrychium simplex* site #1

**GPS location:** 15T 0580100, UTM 5274406

**Principal Botanist:** Gary Walton

**Species:** *Botrychium simplex*

**Habitat:** Weedy roadside, sparse sapling jackpine.

**Associated species:** *Pinus banksiana*, *Danthonia spicata*, *Fragaria virginiana*, *Hieracium cespitosum*, *Antennaria neglecta*, *Solidago juncea*.

**Phenology:** Maturing sporophore.

**Population size:** 1 frond.

**Date:** July 7, 2004

### Site #2: *Botrychium simplex* site #2

**GPS location:** 15T 0579953, UTM 5274374

**Principal Botanist:** Gary Walton

**Species:** *Botrychium simplex*

**Habitat:** Weedy roadside, young sparse jackpine.

**Associated species:** *Pinus banksiana*, *Danthonia spicata*, *Oryzopsis asperfolia*, *O. pungens*, *Antennaria neglecta*, *Solidago hispida*, *Erigeron strigosus*.

**Phenology:** Mature sporophores.

**Population size:** 2 fronds.

**Date:** July 7, 2004

### Site #3: *Botrychium* species site #1

**GPS location:** 15T 0579943, UTM 5274373

**Principal Botanist:** Gary Walton

**Species:** Various morphs of *Botrychium matricariifolium* including one resembling *B. hesperium*.

**Habitat:** Weedy roadside, sparse young jackpine.

**Associated species:** *Pinus banksiana*, *Danthonia spicata*, *Oryzopsis asperfolia*, *O. pungens*, *Antennaria neglecta*, *Solidago hispida*, *Erigeron strigosus*.

**Phenology:** Mature sporophores.

**Population size:** 16 fronds of *B. matricariifolium*, 1 of plant resembling *B. hesperium*.

**Date:** July 7, 2004

### Site 4: *Botrychium* species site #2

**GPS location:** 15T 057839, UTM 5273833

**Principal Botanist:** Gary Walton

**Species:** Various morphs of *Botrychium matricariifolium*.

**Habitat:** Weedy roadside with scrubby saplings.

**Associated species:** *Fragaria virginiana*, *Antennaria neglecta*, *Pinus banksiana*, *Alnus crispa*, *Betula papyrifera*, *Danthonia spicata*.

**Phenology:** Mature sporophores.

**Population size:** About 15 fronds.

**Date:** July 9, 2004

### Site #5: *Caltha natans* #1

**GPS location:** 15T 0579248, UTM 5274130

**Principal Botanist:** Gary Walton

**Habitat:** Pond-like water-filled ditch on north side of Dunka Road.

**Associated species:** *Potamogeton epihydrus*, *Calamagrostis canadensis*, *Carex rostrata*.

**Phenology:** All plants sterile.

**Population size:** 5 small patches.

**Date:** July 7, 2004

**Site #6: *Caltha natans* #2**

**GPS location:** 15T 0579205, UTM 5274171

**Principal Botanist:** Gary Walton

**Habitat:** Shallow channel in marsh.

**Associated species:** *Calamagrostis canadensis*, *Scirpus cyperinus*, *Carex brunnescens*, *C. retrorsa*, *Viola pallens*, *Eupatorium maculatum*, *Glyceria grandis*.

**Phenology:** Flowering and fruiting. Some flowers pink.

**Population size:** Several patches from 1 to 3 ft<sup>2</sup> each.

**Date:** July 9, 2004

**Site #7: *Caltha natans* #3**

**GPS location:** 15T 0579177, UTM 5273818

**Principal Botanist:** Gary Walton

**Habitat:** Desiccating beaver pond.

**Associated species:** *Ranunculus gmelinii*.

**Phenology:** Sterile plants.

**Population size:** 4 small plants.

**Date:** July 10, 2004

**Site #8: *Caltha natans* #4**

**GPS location:** 15T 0579604, UTM 527324

**Principal Botanist:** Gary Walton

**Habitat:** Shore of shallow pond. Water about 1-2 feet .

**Associated species:** *Glyceria borealis*, *G. grandis*, *Utricularia vulgaris*.

**Phenology:** Flowering and fruiting.

**Population size:** 5 patches about 6 ft<sup>2</sup> each and one at about 75 ft<sup>2</sup>.

**Date:** July 10, 2004

**Site #9: *Caltha natans* #5**

**GPS location:** 15T 0579942, UTM 5273209

**Principal Botanist:** Gary Walton

**Habitat:** Small pool of open water in shallow marsh.

**Associated species:** *Glyceria borealis*, *Equisetum fluviatile*.

**Phenology:** Sterile plants.

**Population size:** 2 small plants.

**Date:** July 10, 2004

**Site #10: *Caltha natans* #6**

**GPS location:** 15T 0579192, UTM 5273993

**Principal Botanist:** Gary Walton

**Habitat:** Slow moving intermittent stream in alder swamp. Less than 1 foot deep.

**Associated species:** *Alnus rugosa*, *Calamagrostis canadensis*, *Impatiens capensis*, *Aster puniceus*.

**Phenology:** Sterile plants.

**Population size:** 3 small plants.

**Date:** July 16, 2004

**Site #11: *Caltha natans* #7**

**GPS location:** 15T 0580476, UTM 5273780

**Principal Botanist:** Gary Walton

**Habitat:** Beaver canal connected to Partridge River.

**Associated species:** *Calamagrostis canadensis*, *Spiraea alba*, *Juncus effusus*, *Salix planifolia*, *Callitriche verna*.

**Phenology:** Sterile plants.

**Population size:** Scattered over a 20 ft<sup>2</sup> area.

**Date:** July 17, 2004

**Site #12: *Caltha natans* #8**

**GPS location:** 15T 0580427, UTM 5275529

**Principal Botanist:** Gary Walton

**Habitat:** Mudflat on bank of Partridge River.

**Associated species:** *Myrica gale*, *Spiraea alba*, *Alisma plantago-aquatica*, *Alnus rugosa*, *Bidens cernua*, *Carex lacustris*, *Cicuta bulbifera*, *Ranunculus gmelinii*.

**Phenology:** Flowering and fruiting.

**Population size:** About ½ ft<sup>2</sup>.

**Date:** July 25, 2004

**Site #13: *Caltha natans* #9**

**GPS location:** 15T 0580420, UTM 5275584

**Principal Botanist:** Gary Walton

**Habitat:** Mudflat on bank of Partridge River.

**Associated species:** *Torreyochloa pallida*, *Myrica gale*, *Spiraea alba*, *Alisma plantago-aquatica*, *Alnus rugosa*, *Bidens cernua*, *Carex lacustris*, *C. brunnescens*, *Cicuta bulbifera*, *Ranunculus gmelinii*, *Callitriche verna*, *Potentilla norvegica*, *Impatiens capensis*.

**Phenology:** Flowering and fruiting.

**Population size:** 11 small plants.

**Date:** July 25, 2004

**Site #14: *Caltha natans* #10**

**GPS location:** 15T 0577045, UTM 5272974

**Principal Botanist:** Gary Walton

**Habitat:** Shallow, slow moving water at base of beaver dam.

**Associated species:** *Calamagrostis canadensis*, *Impatiens capensis*.

**Phenology:** Flowering and fruiting.

**Population size:** 30 ft<sup>2</sup>.

**Date:** July 30 and August 1, 2004

**Site #15: *Caltha natans* #11**

**GPS location:** 15T 0579202, UTM 5273299

**Principal Botanist:** Gary Walton

**Habitat:** Mudflat of intermittent stream that flows into the Partridge River.

**Associated species:** *Callitriche verna*, *Carex lacustris*, *C. tenera*, *Calamagrostis canadensis*.

**Phenology:** Sterile plants.

**Population size:** 19 small plants (about ½ ft<sup>2</sup> each).

**Date:** July 31, 2004

**Site #16: *Caltha natans* #12**

**GPS location:** 15T 0579114, UTM 5273245  
**Principal Botanist:** Gary Walton  
**Habitat:** Old beaver canal.  
**Associated species:** *Sparganium* sp., *Callitriche verna*, *Eleocharis intemedica*.  
**Phenology:** Seedlings.  
**Population size:** 36 seedlings and one slightly larger plant.  
**Date:** July 31, 2004

**Site #17: *Caltha natans* #13**

**GPS location:** 15T 0579020, UTM 5273141  
**Principal Botanist:** Gary Walton  
**Habitat:** Mudflat in old channel of Partidge River.  
**Associated species:** *Callitriche verna*, *Sagittaria* sp., *Glyceria borealis*, *Carex stricta*.  
**Phenology:** Seedlings.  
**Population size:** 31 seedlings.  
**Date:** July 31, 2004

**Site #18: *Eleocharis nitida* #1**

**GPS location:** 15T 0579613, UTM 5274266  
**Principal Botanist:** Gary Walton  
**Habitat:** In wet ditch on north side of Dunka Road. Full sun most of day.  
**Associated species:** *Carex interior*, *C. scoparia*, *Aster lanceolatus*, *Calamagrostis canadensis*  
**Phenology:** In flower and with immature fruit.  
**Population size:** Densely covering an area 21 feet by 6 feet.  
**Date:** July 7, 2004

**Site #19: *Eleocharis nitida* #2**

**GPS location:** 15T 0578841, UTM 5274049  
**Principal Botanist:** Gary Walton  
**Habitat:** In wet ditch on north side of Dunka Road. Full sun most of day.  
**Associated species:** *Glyceria striata*, *Scirpus atrovirens*, *Aster puniceus*, *A. lanceolatus*, *Scirpus hudsonianus*, *Euthamia graminifolia*, *Equisetum arvense*.  
**Phenology:** In flower and with immature fruit.  
**Population size:** 4 feet by 5 feet patch.  
**Date:** July 9, 2004

**Site #20: *Eleocharis nitida* #3**

**GPS location:** 15T 0578939, UTM 5274078  
**Principal Botanist:** Gary Walton  
**Habitat:** In wet ditch on north side of Dunka Road. Full sun most of day.  
**Associated species:** *Carex interior*, *Glyceria striata*, *Alnus rugosa*, *Aster puniceus*, *Scirpus hudsonianus*, *Euthamia graminifolia*.  
**Phenology:** In flower and with immature fruit.  
**Population size:** 12 feet by 20 feet patch.  
**Date:** July 9, 2004

**Site #21: *Eleocharis nitida* #4**

**GPS location:** 15T 0578376, UTM 5273891  
**Principal Botanist:** Gary Walton  
**Habitat:** In wet ditch on north side of Dunka Road. Full sun most of day.  
**Associated species:** *Calamagrostis canadensis*, *Aster* sp. *Scirpus* sp.

**Phenology:** In flower and with immature fruit.  
**Population size:** 25 feet by 4 feet patch.  
**Date:** July 9, 2004

**Site #22: *Eleocharis nitida* #5**

**GPS location:** 15T 05782303, UTM 5273743  
**Principal Botanist:** Gary Walton  
**Habitat:** In wet area between railroad grades. Full sun.  
**Associated species:** *Typha latifolia*, *Scirpus atrovirens*, *Equisetum arvense*, *Juncus effusus*, *Thelypteris palustris*, *Carex aurea*.  
**Phenology:** In flower and with immature fruit.  
**Population size:** 4 ft<sup>2</sup> patch.  
**Date:** July 9, 2004

**Site #23: *Eleocharis nitida* #6**

**GPS location:** 15T 0578770, UTM 5273849  
**Principal Botanist:** Gary Walton  
**Habitat:** Wet ditch on south of railroad grade. Full sun.  
**Associated species:** *Scirpus hudsonianus*, *S. atrovirens*, *Carex interior*, *C. rostrata*, *Drosera rotundifolia*.  
**Phenology:** In flower and with immature fruit.  
**Population size:** 3 feet by 12 feet plus two small outlying clumps.  
**Date:** July 10, 2004

**Site #24: *Eleocharis nitida* #7 and *Juncus vaseyi* #1**

**GPS location:** 15T 0578994, UTM 5274052  
**Principal Botanist:** Gary Walton  
**Habitat:** Damp soil in low area on south side of Dunka Road. Full sun.  
**Associated species:** *Carex leptalea*, *C. gracillima*, *Viola novae-angliae*, *Picea mariana* (saplings), *Alnus rugosa*, *Fragaria virginiana*.  
**Phenology:** In flower and with immature fruit.  
**Population size:** *E. nitida* is 30 feet by 6 feet. *J. vaseyi* consists of 5 small clumps.  
**Date:** July 13, 2004

**Site #25: *Eleocharis nitida* #8**

**GPS location:** 15T 0580111, UTM 5274370  
**Principal Botanist:** Gary Walton  
**Habitat:** Low wet area on south side of Dunka Road.  
**Associated species:** *Panicum* sp., *Salix pyrifolia*, *Solidago uliginosa*, *Calamagrostis canadensis*, *Viola pallens*.  
**Phenology:** In flower and with immature fruit.  
**Population size:** 5 ft<sup>2</sup>.  
**Date:** July 13, 2004

**Site #26: *Eleocharis nitida* #9 and *Juncus vaseyi* #2**

**GPS location:** 15T 0580311, UTM 5274428

**Principal Botanist:** Gary Walton

**Habitat:** Low wet area on south side of Dunka Road.

**Associated species:** *Scirpus atrovirens*, *Panicum* sp., *Equisetum arvense*, *Viola pallens*, *Platanthera hyperborea*, *Liparis loeselii*, *Eleocharis acicularis*, *Carex aurea*.

**Phenology:** Both species in flower and with immature fruit.

**Population size:** *E nitida* consists of two patches at 15 feet by 3 feet and 6 feet by 12 feet. *J. vaseyi* consists of a single small clump.

**Date:**

**Site #27: *Eleocharis nitida* #10**

**GPS location:** 15T 0580537, UTM 5274497

**Principal Botanist:** Gary Walton

**Habitat:** Patch in muddy soil on south side of Dunka Road.

**Associated species:** *Scirpus atrovirens*, *Juncus brevicaudatus*, *J. effusus*, *Equisetum fluviatile*, *Viola novae-angliae*, *V. pallens*, *Alnus crispa*, *Salix petiolaris*, *S. pyrifolia*, *Dryopteris cristata*.

**Phenology:** In flower and with immature fruit.

**Population size:** 6 feet by 3 feet patch.

**Date:** July 17, 2004

**Site #28: *Eleocharis nitida* #11**

**GPS location:** 15T 0578574, UTM 5273840

**Principal Botanist:** Gary Walton

**Habitat:** Shallow broad ditch on north side of railroad grade.

**Associated species:** *Carex interior*, *Scirpus hudsonianus*, *Danthonia spicata*, *Drosera rotundifolia*, *Lycopodium imundatum*, *Euthamia graminifolia*.

**Phenology:** In flower and with immature fruit.

**Population size:** Scattered over a 60 feet by 12 feet area.

**Date:** July 17, 2004

**Site #29: *Geocaulon lividum* #1**

**GPS location:** 15T 0579914, UTM 5275296

**Principal Botanist:** Gary Walton

**Habitat:** On *Pleurozium* moss hummock at base of mature black spruce. Sunny much of day. Dry.

**Associated species:** *Picea mariana*, *Ledum groenlandicum*, *Vaccinium oxycoccus*, *Smilacina trifolia*, *Lycopodium annotinum*, *Gaultheria hispidula*.

**Phenology:** Flowering.

**Population size:** 6 stems.

**Date:** July 2, 2004

**Site #30: *Geocaulon lividum* #2**

**GPS location:** 15T 0579917, UTM 5275196

**Principal Botanist:** Gary Walton

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. Some Sphagnum moss. Dry and sunny.

**Associated species:** *Picea mariana*, *Vaccinium myrtilloides*, *V. oxycoccus*, *V. vitis-idaea* ssp. *minus*, *Smilacina trifolia*, *Carex disperma*, *Ledum groenlandicum*, *Gaultheria hispidula*, *Lycopodium annotinum*, *Larix laricina* (seedlings)

**Phenology:** Most non-fruiting, a few stems with unripe fruit.

**Population size:** 30 stems.

Date: July 7, 2004

**Site #31: Geocaulon lividum #3**

**GPS location:** Bounded by these coordinates: 15T 0579973, UTM 5275222; 15T 0579991, UTM 5275232; 15T 0579986, UTM 5275228; 15T 0579981, UTM 5275237; 15T 0579968, UTM 5275247; 15T 0579966, UTM 5275242; 15T 0579983, UTM 5275220; 15T 0579989, UTM 5275215.

**Principal Botanist:** Gary Walton

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. Some *Sphagnum* moss. Dry and patchy sun. More *Smilacina trifolia* than #2.

**Associated species:** *Picea mariana*, *Vaccinium myrtilloides*, *V. oxycoccus*, *V. vitis-idaea* ssp. *minus*, *Smilacina trifolia*, *Carex disperma*, *C. trisperma*, *Ledum groenlandicum*, *Gaultheria hispidula*, *Lycopodium annotinum*, *Larix laricina* (seedlings), *Cypripedium acaule*, *Coptis groenlandica*, *Monotropa uniflora*.

**Phenology:** Most sterile but some in flower or with unripe fruit.

**Population size:** About 150 stems over a large area.

Date: July 7, 2004

**Site #32: Geocaulon lividum #4**

**GPS location:** 15T 0580049, UTM 5275273

**Principal Botanist:** Gary Walton

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. Some *Sphagnum* moss. Dry and patchy sun.

**Associated species:** *Picea mariana*, *Gaultheria hispidula*, *Vaccinium vitis-idaea* ssp. *minus*, *Monotropa uniflora*, *Smilacina trifolia*, *Cypripedium acaule*, *Carex disperma*.

**Phenology:** Some stems with unripe fruit.

**Population size:** 15 stems.

Date: July 7, 2004

**Site #33: Geocaulon lividum #5**

**GPS location:** 15T 0580117, UTM 5275237

**Principal Botanist:** Gary Walton

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. Dry and patchy sun.

**Associated species:** *Picea mariana*, *Gaultheria hispidula*, *Ledum groenlandicum*, *Smilacina trifolia*, *Vaccinium myrtilloides*.

**Phenology:** Some plants with unripe fruit.

**Population size:** 30 stems.

Date: July 7, 2004

**Site #34: Geocaulon lividum #6**

**GPS location:** 15T 0578915, UTM 5274567

**Principal Botanist:** Gary Walton

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. A bit moist compared to previous sites.

**Associated species:** *Picea mariana*, *Smilacina trifolia*, *Ledum groenlandicum*, *Vaccinium myrtilloides*, *Lycopodium annotinum*, *Gaultheria hispidula*, *Carex trisperma*, *Calamagrostis canadensis*.

**Phenology:** Some plants in flower.

**Population size:** About 150 stems.

Date: July 9, 2004

**Site #35: Geocaulon lividum #7**

**GPS location:** 15T 0578066, UTM 5273644

**Principal Botanist:** Gary Walton

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce.

**Associated species:** *Picea mariana*, *Ledum groenlandicum*, *Smilacina trifolia*, *Gaultheria hispidula*, *Carex disperma*.

**Phenology:** Some plants with flowers.

**Population size:** 40 stems.

**Date:** July 18, 2004

**Site #36: *Geocaulon lividum* #8**

**GPS location:** 15T 0578778, UTM 5274431

**Principal Botanist:** Gary Walton

**Habitat:** In *Sphagnum* moss hummocks under black spruce.

**Associated species:** *Picea mariana*, *Carex trisperma*, *Ledum groenlandicum*, *Smilacina trifolia*, *Lycopodium annotinum*.

**Phenology:** Non-flowering.

**Population size:** 45 stems.

**Date:** July 18, 2004

**Site #37: *Geocaulon lividum* #9**

**GPS location:** 15T 0578489, UTM 5274251

**Principal Botanist:** Gary Walton

**Habitat:** *Sphagnum* and *Pleurozium* moss hummocks under black spruce.

**Associated species:** *Picea mariana*, *Ledum groenlandicum*, *Cornus canadense*, *Gaultheria hispidula*, *Lycopodium annotinum*, *Carex trisperma*.

**Phenology:** Some plants with unripe fruit.

**Population size:** 51 stems.

**Date:** July 18, 2004

**Site #38: *Geocaulon lividum* #10**

**GPS location:** 15T 0580251, UTM 5275268

**Principal Botanist:** Gary Walton

**Habitat:** *Sphagnum* and *Pleurozium* moss hummocks under black spruce. Part shade.

**Associated species:** *Picea mariana*, *Vaccinium angustifolium*, *Smilacina trifolia*, *Carex trisperma*, *Chamaedaphne calyculata*, *Gaultheria hispidula*.

**Phenology:** 1 fruiting stem.

**Population size:** 6 stems.

**Date:** July 25, 2004

**Site #39: *Juncus vaseyi* # 3**

**GPS location:** 15T 0579384, UTM 5273693

**Principal Botanist:** Gary Walton

**Habitat:** Low wet area on south side of railroad grade.

**Associated species:** *Scirpus hudsonianus*, *Parnassia palustris*, *Gentiana andrewsii*, *Euthamia graminifolia*.

**Phenology:** With mature fruit.

**Population size:** 3 clumps.

**Date:** July 31, 2004

**Site #40: *Ranunculus gmelinii* #1**

**GPS location:** 15T 0579177, UTM 5273818

**Principal Botanist:** Gary Walton



**Habitat:** Mud of desiccating pond.  
**Associated species:** *Caltha natans*.  
**Phenology:** In flower.  
**Population size:** 6 ft<sup>2</sup>.  
**Date:** July 10, 2004

**Site #41: *Ranunculus gmelinii* #2**

**GPS location:** 15T 0578157, UTM 5274684  
**Principal Botanist:** Gary Walton  
**Habitat:** On muddy soil of desiccating beaver canal by Partridge River.  
**Associated species:** *Carex aquatilis*, *Callitriche verna*.  
**Phenology:** In flower.  
**Population size:** Scattered over a 200 ft<sup>2</sup> area.  
**Date:** July 15, 2004

**Site #42: *Ranunculus gmelinii* #3**

**GPS location:** 15T 0580477, UTM 5273772  
**Principal Botanist:** Gary Walton  
**Habitat:** In beaver canal (about 1.5 feet deep) by Partridge River. Floating in water.  
**Associated species:** *Caltha natans*, *Cicuta bulbifera*, *Carex rostrata*, *Potentilla palustris*.  
**Phenology:** Flowering.  
**Population size:** 5 ft<sup>2</sup>.  
**Date:** July 17, 2004

**Site #43: *Ranunculus gmelinii* #4**

**GPS location:** 15T 0580620, UTM 5274785  
**Principal Botanist:** Gary Walton  
**Habitat:** In a water-filled channel in drowned conifer swamp.  
**Associated species:** *Sparganium glomeratum*, *Calamagrostis canadensis*, *Salix pyrifolia*.  
**Phenology:** In flower and fruit.  
**Population size:** 200 ft<sup>2</sup>.  
**Date:** July 23, 2004

**Site #44: *Ranunculus gmelinii* #5**

**GPS location:** 15T 05780427, UTM 5275529  
**Principal Botanist:** Gary Walton  
**Habitat:** Mudflat, organic silty soil, along Partridge River.  
**Associated species:** *Caltha natans*, *Alisma plantago-aquatica*, *Bidens cernua*, *Carex lacustris*, *Cicuta bulbifera*, *Myrica gale*, *Alnus rugosa*, *Spiraea alba*.  
**Phenology:** In flower and fruit.  
**Population size:** One-half foot square.  
**Date:** July 25, 2004

**Site #45: *Ranunculus gmelinii* #6**

**GPS location:** 15T 0577778, UTM 5272723  
**Principal Botanist:** Gary Walton  
**Habitat:** Desiccating pool in isolated sedge marsh in conifer forest.  
**Associated species:** *Sparganium glomeratum*, *Torreyochloa pallida*, *Galium tinctorum*, *Potamogeton epiphydris*, *Bidens cernua*, *Veronica scutellaria*, *Glyceria grandis*, *Carex rostrata*.  
**Phenology:** In flower and fruit.

**Population size:** Scattered plants amounting to about 50 ft<sup>2</sup>.

**Date:** July 30 and August 1, 2004

**Site #46: *Ranunculus gmelinii* #7**

**GPS location:** 15T 0579007, UTM 5273121

**Principal Botanist:** Gary Walton

**Habitat:** Mudflat by Partridge River.

**Associated species:** *Callitriche verna*, *Sagittaria* sp., *Glyceria grandis*, *Torreyochloa pallida*.

**Phenology:** In flower and fruit.

**Population size:** 16 ft<sup>2</sup>.

**Date:** July 31, 2004

**Site #47: *Ranunculus lapponicus* #1**

**GPS location:** Bounded by these coordinates: 15T 0579051, UTM 5274833; 15T 0579050, UTM 5274833; 15T 0579055, UTM 5274833; 15T 0579053, UTM 5274841

**Principal Botanist:** Gary Walton

**Habitat:** Sphagnum hummocks and along edges of sphagnum hummocks. In black spruce stand (DBH from 2 to 6 inches, overstory cover about 60%) with tag alder.

**Associated species:** *Picea mariana*, *Alnus rugosa*, *Carex leptalea*, *C. brunnescens*, *Glyceria striata*, *Smilacina trifolia*, *Gaultheria hispidula*, *Vaccinium oxycoccus*, *Ledum groenlandicum*, *Dryopteris cristata*, *Equisetum arvense*, *E. sylvaticum*

**Phenology:** Non-flowering plants only.

**Population size:** 5 clumps about 0.5 ft<sup>2</sup> to 1.5 ft<sup>2</sup> each.

**Date:** July 2, 2004

**Site #48: *Ranunculus lapponicus* #2**

**GPS location:** 15T 0578699, UTM 5274647

**Principal Botanist:** Gary Walton

**Habitat:** Growing through Sphagnum hummocks and along sides of hummocks under sparse black spruce and moderate cover of tag alder.

**Associated species:** *Picea mariana*, *Alnus rugosa*, *Salix pyrifolia*, *Ledum groenlandicum*, *Equisetum sylvaticum*, *Gaultheria hispidula*, *Calamagrostis canadensis*, *Cornus canadense*, *Rubus pubescens*, *Carex vaginiflora*. *Petasites sagittatus* found nearby.

**Phenology:** In flower and fruit.

**Population size:** Distributed over a 400 ft<sup>2</sup> area.

**Date:** July 13, 2004

**Site #49: *Ranunculus lapponicus* #3**

**GPS location:** 15T 0578386, UTM 5274640

**Principal Botanist:** Gary Walton

**Habitat:** Under black spruce (about 50% overstory cover) with tag alder and growing in and along Sphagnum hummocks and in small muddy areas between hummocks.

**Associated species:** *Picea mariana*, *Alnus rugosa*, *Larix laricina*, *Ledum groenlandicum*, *Lycopodium annotinum*, *Carex trisperma*, *Vaccinium oxycoccus*, *Listera cordata*, *Equisetum sylvaticum*, *Calamagrostis canadensis*, *Gaultheria hispidula*, *Smilacina trifolia*.

**Phenology:** Non-flowering.

**Population size:** 12 feet by 16 feet patch.

**Date:** July 13, 2004

**Site #50: *Ranunculus lapponicus* #4**

**GPS location:** 15T 0580362, UTM 5274755

**Principal Botanist:** Gary Walton

**Habitat:** In and along Sphagnum hummocks in a moist channel surrounded by somewhat drier black spruce stand. Tag alder dominant woody cover at about 60%.

**Associated species:** *Alnus rugosa*, *Picea mariana*, *Carex disperma*, *C. trisperma*, *Aster puniceus*, *Rubus strigosus*, *R. pubescens*, *Stellaria calycantha*, *Trientalis borealis*, *Ribes triste*.

**Phenology:** In flower and fruit.

**Population size:** 20 feet by 12 feet area.

**Date:** July 15, 2004

**Site #51: *Ranunculus lapponicus* #5**

**GPS location:** 15T 0580367, UTM 5274797

**Principal Botanist:** Gary Walton

**Habitat:** In and along Sphagnum hummocks in a moist channel surrounded by somewhat drier black spruce stand. Tag alder dominant woody cover at about 60%. Black spruce scarce.

**Associated species:** *Alnus rugosa*, *Aster puniceus*, *Calamagrostis canadensis*, *Viola pallens*, *Equisetum sylvaticum*, *Picea mariana*, *Trientalis borealis*, *Dryopteris carthusiana*, *Carex trisperma*.

**Phenology:** Fruiting.

**Population size:** 10ft<sup>2</sup>

**Date:** July 15, 2004

**Site #52: *Ranunculus lapponicus* #6**

**GPS location:** 15T 0580752, UTM 5274933

**Principal Botanist:** Gary Walton

**Habitat:** In and along Sphagnum hummocks. Tag alder dominant woody cover, black spruce sparse.

**Associated species:** *Alnus rugosa*, *Picea mariana*, *Carex paupercula*, *C. trisperma*, *Equisetum sylvaticum*, *Ledum groenlandicum*, *Gaultheria hispidula*, *Calamagrostis canadensis*.

**Phenology:** Non-flowering.

**Population size:** Sparse in a 5 feet by 8 feet area.

**Date:** July 15, 2004

**Site #53: *Ranunculus lapponicus* #7**

**GPS location:** 15T 0579296, UTM 5275173

**Principal Botanist:** Gary Walton

**Habitat:** On and along Sphagnum hummock in mixed white cedar, tamarack, and black spruce. Cover is sparse but shields from sun much of day.

**Associated species:** *Thuja occidentalis*, *Larix laricina*, *Picea mariana*, *Alnus rugosa*, *Ledum groenlandicum*, *Lycopodium annotinum*, *Gaultheria hispidula*, *Calamagrostis canadensis*, *Carex disperma*, *Equisetum sylvaticum*, *Cornus canadense*, *Vaccinium oxycoccus*, *Trientalis borealis*,

**Phenology:** Flowering and fruiting

**Population size:** 8 foot by 4 foot patch.

**Date:** July 18, 2004

**Site #54: *Sparganium glomeratum* #1**

**GPS location:** 15T 0578375, UTM 5274623

**Principal Botanist:** Gary Walton

**Habitat:** Shallow pool in *Sphagnum* at edge of black spruce swamp.

**Associated species:** *Eleocharis palustris*, *Carex brunnescens*, *Scirpus cyperinus*, *Calamagrostis canadensis*.

**Phenology:** Sterile plants. Old achenes found in mud.

**Population size:** 35 feet by 15 feet.

**Date:** July 13, 2004

**Site #55: *Sparganium glomeratum* #2**

**GPS location:** 15T 0578588, UTM 5273896  
**Principal Botanist:** Gary Walton  
**Habitat:** Desiccating beaver pond.  
**Associated species:** *Sparganium chlorocarpum*, *Glyceria grandis*, *G. canadense*.  
**Phenology:** Fruiting.  
**Population size:** 3 fruiting stems.  
**Date:** July 16, 2004

**Site #56: *Sparganium glomeratum* #3**

**GPS location:** 15T 0577653, UTM 5273406  
**Principal Botanist:** Gary Walton  
**Habitat:** Water-filled ditch along railroad tracks. Water about 1.5 feet deep.  
**Associated species:** *Sparganium natans*, *Glyceria borealis*, *Eleocharis palustris*, *Utricularia vulgaris*, *Potamogeton epihydris*.  
**Phenology:** Fruiting.  
**Population size:** 9 fruiting stems.  
**Date:** July 17, 2004

**Site #57: *Sparganium glomeratum* #4**

**GPS location:** 15T 0577636, UTM 5273331  
**Principal Botanist:** Gary Walton  
**Habitat:** Water-filled ditch along railroad tracks. Water about 1.5 feet deep.  
**Associated species:** *Juncus* sp. (sterile plants), *Typha latifolia*, *Utricularia vulgaris*.  
**Phenology:** Fruiting and flowering.  
**Population size:** 2 flowering stems and 27 fruiting stems.  
**Date:** July 17, 2004

**Site #58: *Sparganium glomeratum* #5**

**GPS location:** Bounded by these coordinates: 15T 0580406, UTM 5274525; 15T 0580392, UTM 5274517; 15T 0580406, UTM 5274509, wp 579 to 581  
**Principal Botanist:** Gary Walton  
**Habitat:** Edge of marsh with active beaver colony. Growing in muddy soil along shore and into water.  
**Associated species:** *Calla palustris*, *Carex interior*, *Alnus rugosa*, *Salix petiolaris*.  
**Phenology:** Fruiting and flowering plus many sterile shoots.  
**Population size:** 18 fruiting stems, 4 flowering stems.  
**Date:** July 23, 2004

**Site #59: *Sparganium glomeratum* #6**

**GPS location:** 15T 0580563, UTM 5274563  
**Principal Botanist:** Gary Walton  
**Habitat:** Edge of marsh with active beaver colony. Growing in muddy soil along shore and into water.  
**Associated species:** *Calla palustris*, *Torreyochloa pallida*, *Glyceria canadense*.  
**Phenology:** Fruiting.  
**Population size:** 3 fruiting stems.  
**Date:** July 23, 2004

**Site #60: *Sparganium glomeratum* #7**

**GPS location:** 15T 0580620, UTM 5274785

**Principal Botanist:** Gary Walton

**Habitat:** In muddy channel through *Sphagnum* at north end of active beaver colony. Appears to have once been a conifer swamp.

**Associated species:** *Ranunculus gmelinii*, *Calamagrostis canadensis*, *Salix pyrifolia*, *Carex comosa*, *C. brunnescens*, *Chamaedaphne calyculata*, *Ledum groenlandicum*.

**Phenology:** Fruiting.

**Population size:** 1 fruiting stem and many sterile stems.

**Date:** July 23, 2004

**Site #61: *Sparganium glomeratum* #8**

**GPS location:** 15T 0577778, UTM 5272723

**Principal Botanist:** Gary Walton

**Habitat:** Desiccating pool in isolated sedge marsh in conifer forest.

**Associated species:** *Ranunculus gmelinii*, *Torreyochloa pallida*, *Galium tinctorum*, *Potamogeton epihydrys*, *Bidens cernua*, *Veronica scutellaria*, *Glyceria grandis*, *Carex rostrata*.

**Phenology:** Fruiting.

**Population size:** 1 fruiting stem and several scattered sterile stems.

**Date:** July 30 and August 1, 2004

**Site #62: *Torreyochloa pallida* #1**

**GPS location:** 15T 0580752, UTM 5274933

**Principal Botanist:** Gary Walton

**Habitat:** Beaver canal connected to Partridge River.

**Associated species:** *Lemna minor*, *Carex aquatilis*, *Chamaedaphne calyculata*, *Myrica gale*.

**Phenology:** Flowering.

**Population size:** Sparse.

**Date:** July 15, 2004

**Site #63: *Torreyochloa pallida* #2**

**GPS location:** 15T 0580563, UTM 5274563

**Principal Botanist:** Gary Walton

**Habitat:** Edge of marsh with active beaver colony. Growing in muddy soil along shore and into water.

**Associated species:** *Calla palustris*, *Torreyochloa pallida*, *Glyceria canadense*.

**Phenology:** Flowering.

**Population size:** Sparse.

**Date:** July 23, 2004

**Site #64: *Torreyochloa pallida* #3**

**GPS location:** 15T 0579899, UTM 5274351

**Principal Botanist:** Gary Walton

**Habitat:** Desiccating pool on north side of Dunka Road.

**Associated species:** *Glyceria borealis*, *Scirpus cyperinus*, *Equisetum fluviatile*, *Salix lucida*.

**Phenology:** Flowering.

**Population size:** Sparse.

**Date:** July 23, 2004

**Site #65: *Torreyochloa pallida* #4**

**GPS location:** 15T 0580420, UTM 5275584

**Principal Botanist:** Gary Walton

**Habitat:** Mud flat along Partridge River.

**Associated species:** *Caltha natans*, *Alisma plantago-aquatica*, *Bidens cernua*, *Carex lacustris*, *Cicuta bulbifera*, *Myrica gale*, *Alnus rugosa*, *Spiraea alba*, *Potentilla norvegica*, *Carex aquatilis*, *Callitriche verna*, *Impatiens capensis*.

**Phenology:** Flowering.

**Population size:** 25 ft<sup>2</sup>.

**Date:** July 25, 2004

**Site #66: *Torreyochloa pallida* #5**

**GPS location:** 15T 0577778, UTM 5272723

**Principal Botanist:** Gary Walton

**Habitat:** Desiccating pool in isolated sedge marsh in conifer forest.

**Associated species:** *Sparganium glomeratum*, *Ranunculus gmelinii*, *Galium tinctorum*, *Potamogeton epihydris*, *Bidens cernua*, *Veronica scutellaria*, *Glyceria grandis*, *Carex rostrata*.

**Phenology:** In flower.

**Population size:** Dense patch about 100 ft<sup>2</sup>.

**Date:** July 30 and August 1, 2004

**Site #67: *Torreyochloa pallida* #6**

**GPS location:** 15T 0579007, UTM 5273121

**Principal Botanist:** Gary Walton

**Habitat:** Mudflat by Partridge River.

**Associated species:** *Callitriche verna*, *Sagittaria* sp., *Glyceria grandis*, *Ranunculus gmelinii*.

**Phenology:** In flower.

**Population size:** 50 ft<sup>2</sup>.

**Date:** July 31, 2004

**Site #68: *Torreyochloa pallida* #7**

**GPS location:** 15T 0578795, UTM 5272891

**Principal Botanist:** Gary Walton

**Habitat:** Muddy bank on Partridge River.

**Associated species:** *Alnus rugosa*, *Equisetum arvense*, *Mimulus ringens*, *Ranunculus pensylvanicus*, *Spiraea alba*, *Thalictrum dasycarpum*.

**Phenology:** Flowering.

**Population size:** 3 feet by 4 feet.

**Date:** July 31, 2004

**Site #69: *Torreyochloa pallida* #8**

**GPS location:** 15T 0578832, UTM 5272869

**Principal Botanist:** Gary Walton

**Habitat:** Mudflat in Partridge River.

**Associated species:** *Eleocharis intermedia*, *Callitriche verna*, *Sparganium chlorocarpum*, *Carex rostrata*.

**Phenology:** Flowering.

**Population size:** 500 ft<sup>2</sup>.

**Date:** July 31, 2004

**Site #70: *Pomroy* #1**

**GPS location:** 15T 0577104E, UTM 5273110

**Principal Botanist:** Deborah Pomroy

**Species:** *Botrychium* spp.

**Habitat:** Along Dunka Road, roadside.

**Date:** July 18-23, 2004

**Site #71: Pomroy #2**

**GPS location:** 15T 0577257, UTM 5273221

**Principal Botanist:** Deborah Pomroy

**Species:** *Botrychium spp.*

**Habitat:** Along Dunka Road, roadside.

**Date:** July 18-23, 2004

**Site #72: Pomroy #3**

**GPS location:** 15T 0576511, UTM 5272864

**Principal Botanist:** Deborah Pomroy

**Species:** *Botrychium spp.*

**Habitat:** Along Dunka Road, roadside.

**Date:** July 18-23, 2004

**Site #73: Pomroy #4**

**GPS location:** 15T 0577447, UTM 5274887

**Principal Botanist:** Deborah Pomroy

**Species:** *Geocaulon lividum.*

**Habitat:** Black spruce swamp.

**Phenology:** Fruiting.

**Date:** July 8, 2004

**Site #74: Pomroy #5**

**GPS location:** 15T 0576767, UTM 5274034

**Principal Botanist:** Deborah Pomroy

**Species:** *Scirpus pedicellatus, Sparganium glomeratum.*

**Habitat:** *Scirpus* found along paths, roads, and road ditches, *Sparganium* found at edge of pond, in shallow water.

**Date:** *Sparganium* on July 18, 2004.

**Site #75: Pomroy #6**

**GPS location:** 15T 0576726, UTM 5273944

**Principal Botanist:** Deborah Pomroy

**Species:** *Scirpus pedicellatus, Sparganium glomeratum.*

**Habitat:** Edge of pond, in shallow water.

**Phenology:** Flowering and fruiting.

**Date:** *Sparganium* on July 18, 2004, *Scirpus* on July 23, 2004

**Site #76: Pomroy #7**

**GPS location:** 15T 0575929, UTM 5272608

**Principal Botanist:** Deborah Pomroy

**Species:** *Scirpus pedicellatus.*

**Habitat:** Along winter trail through black spruce swamp.

**Phenology:** Flowering.

**Date:** July 18, 2004

**Site #77: Pomroy #8**

**GPS location:** 15T 0577363, UTM 5273288  
**Principal Botanist:** Deborah Pomroy  
**Species:** *Scirpus pedicellatus*.  
**Habitat:** Along paths, roads, and road ditches.

**Site #78: Pomroy #9**

**GPS location:** 15T 0575745, UTM 5272355  
**Principal Botanist:** Deborah Pomroy  
**Species:** *Scirpus pedicellatus*.  
**Habitat:** Along paths, roads, and road ditches.

**Site #79: Pomroy #10**

**GPS location:** 15T 0575759, UTM 5272889  
**Principal Botanist:** Deborah Pomroy  
**Species:** *Scirpus pedicellatus*.  
**Habitat:** Along paths, roads, and road ditches.

**Site #80: Pomroy #11**

**GPS location:** 15T 0575726, UTM 5272933  
**Principal Botanist:** Deborah Pomroy  
**Species:** *Scirpus pedicellatus*.  
**Habitat:** Along paths, roads, and road ditches.

**Site #81: Pomroy #12**

**GPS location:** 15T 0575696, UTM 5272995  
**Principal Botanist:** Deborah Pomroy  
**Species:** *Scirpus pedicellatus*.  
**Habitat:** Along paths, roads, and road ditches.

**Site #82: Pomroy #13**

**GPS location:** 15T 0575640, UTM 5273076  
**Principal Botanist:** Deborah Pomroy  
**Species:** *Scirpus pedicellatus*.  
**Habitat:** Along paths, roads, and road ditches.

**Site #83: Pomroy #14**

**GPS location:** 15T 0575589, UTM 5273178  
**Principal Botanist:** Deborah Pomroy  
**Species:** *Scirpus pedicellatus*.  
**Habitat:** Along paths, roads, and road ditches.

**Site #84: Pomroy #15**

**GPS location:** 15T 0576784, UTM 5274402  
**Principal Botanist:** Deborah Pomroy  
**Species:** *Scirpus pedicellatus*.  
**Habitat:** Along paths, roads, and road ditches.



**Site #85: Pomroy #16**

**GPS location:** 15T 0574634, UTM 5272419

**Principal Botanist:** Deborah Pomroy

**Species:** *Sparganium glomeratum*.

**Habitat:** In roadside ditches and/or ponds adjacent to the Dunka Road.

**Site #86: Pomroy #17**

**GPS location:** 15T 0576748, UTM 5272962

**Principal Botanist:** Deborah Pomroy

**Species:** *Sparganium glomeratum*.

**Habitat:** In roadside ditches and/or ponds adjacent to the Dunka Road.

**Site #87: Pomroy #18**

**GPS location:** 15T 0574818, UTM 5272322

**Principal Botanist:** Deborah Pomroy

**Species:** *Sparganium glomeratum*.

**Habitat:** In roadside ditches and/or ponds adjacent to the Dunka Road.

**Site #88: Pomroy #19**

**GPS location:** 15T 0577429, UTM 5274474

**Principal Botanist:** Deborah Pomroy

**Species:** *Viola novae-angliae*.

**Habitat:** In clearing along a forest road junction.

**Associated species:** *Eleocharis intermedia*, *Callitriche verna*, *Sparganium chlorocarpum*, *Carex rostrata*.

**Phenology:** Flowering.

**Date:** July 23, 2004

**Site #89: Johnson-Groh Polymet 1**

**Latitude and longitude:** N47°36.976', W91°58.553

**General Location:** FS Road 108B

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** middle of old logging road, partial to full sun

**Associated species:** *Fragaria virginiana*, *Danthonia spicata*, *Diphasiastrum tristachyum*, *Vaccinium* sp., *Diervilla lonicera*, *Abies balsamea* (seedling), *Cornus*, *Rubus pubescens*, *Maianthemum canadense*, *Salix* sp., *Trientalis borealis*, *Aster macrophyllus*, *Lotus corniculatus*, *Betula papyrifera*, *Hieracium aurantiacum*, *Hieracium kalmii*, *Anaphalis margaritacea*

**Population size:** 179 *B. simplex*

**Phenology:** full height, close to dehiscing.

**Date:** 2 July 2004

**Notes:** there are likely many more plants in vicinity of populations 1- 6

**Site #90: Johnson-Groh Polymet 2**

**Latitude and longitude:** N47° 37.025', W91° 58.507'

**General Location:** FS Road 108B

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** side of old logging road road, full sun

**Associated species:** *Fragaria virginiana*, *Viola* sp., *Polytrichum commune*, *Anaphalis margaritacea*, *Salix* sp., *Sphagnum* sp., *Cornus canadensis*, *Luzula* sp., *Aster macrophyllus*, *Solidago* sp., *Hieracium aurantiacum*, *Epilobium angustifolium*, *Athyrium filix-femina*, *Calamagrostis canadensis*

**Population size:** 2 large *B. matricariifolium*

**Phenology:** full height, not yet dehisced

**Date of Observation:** 2 July 2004

**Notes:** there are likely many more plants in vicinity of populations 1- 6

**Site #91: Johnson-Groh Polymet 3**

**Latitude and longitude:** N47° 37.042', W091° 58.389'

**General Location:** FS Road 108B

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** side of road, full sun

**Associated species:** *Fragraria virginiana*, *Achillea millefolium*, *Toxicodendron radicans*, *Rubus idaeus*, *Hieracium aurantiacum*, *Hieracium kalmii*, *Cerastium* sp., *Viola* sp., *Salix* sp., *Cornus canadensis*, *Lathyrus ochroleucus*

**Population size:** 32 *B. simplex*, 1 *B. michiganense*

**Phenology:** full height, close to dehiscing

**Date:** 2 July 2004

**Notes:** there are likely many more plants in vicinity of populations 1- 6

**Site #92: Johnson-Groh Polymet 4**

**Latitude and longitude:** no satellite reception, ~ 10 m east of Polymet 3

**General Location:** FS Road 108B

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** middle of road, full sun

**Associated species:** *Fragraria virginiana*, *Salix* sp., *Diervilla lonicera*, *Trifolium pratense*, *Betula papyrifera*, *Hieracium aurantiacum*, *Anaphalis margaritacea*, *Cerastium* sp., *Viola* sp., *Poa pratensis*

**Population size:** 1 *B. simplex*

**Phenology:** full height, close to dehiscing

**Date of Observation:** 2 July 2004

**Notes:** there are likely many more plants in vicinity of populations 1- 6

**Site #93: Johnson-Groh Polymet 5**

**Latitude and longitude:** N47° 37.061', W091° 58.379'

**General Location:** FS Road 108B

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** *B. multifidum* south edge of road, full sun; *B. simplex*, center of road, full sun

**Associated species:** *Cornus canadensis*, *Viola* sp., *Fragraria virginiana*, *Diervilla lonicera*, *Anaphalis margaritacea*, *Betula papyrifera*, *Poa pratensis*, *Trifolium pratense*, *Lathyrus ochroleucus*

**Population size:** 1 *B. multifidum*, 3 *B. simplex*

**Phenology:** *B. multifidum* young leaf, last year's leaf still present

**Date:** 2 July 2004

**Notes:** there are likely many more plants in vicinity of populations 1- 6

**Site #94: Johnson-Groh Polymet 6**

**Latitude and longitude:** N47° 37.079', W091° 58.326'

**General Location:** population at the end of drivable forest service road, intersection of FS Road 108 and 108c

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** old logging road, population spread over three m along south side of road

**Associated species:** *Cornus stolonifera*, *Fragraria virginiana*, *Hieracium aurantiacum*, *Anaphalis margaritacea*, *Erigeron* sp., *Vaccinium* sp., *Trifolium*, *Equisetum sylvaticum*, *Diervilla lonicera*, *Rubus idaeus*, *Achillea millefolium*, *Aster macrophyllus*,

**Population size:** 11 *B. simplex*, one *B. simplex* across road ~7 m away

**Phenology:** full height, close to dehiscent

**Date:** 2 July 2004

**Notes:** there are likely many more plants in vicinity of populations 1- 6

#### **Site #95: Johnson-Groh Polymet 7**

**Latitude and longitude:** N47° 36.378', W091° 58.538' to N47° 36.467', W091° 58.309'

**General Location:** Between Dunka Road and railroad west of forest road 108

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** gravelly ridge between railroad and the south side of Dunka Road, sunny

**Associated species:** *Bromus inermis*, *Fragaria virginiana*, *Rubus idaeus*, *Hieracium aurantiacum*, *Equisetum sylvaticum*, *Tragapogon dubius*, *Solidago gigantea*, *Potentilla norvegica*, *Rubus pubescens*, *Chrysanthemum leucanthemum*

**Population size:** 69 *B. simplex*, 29 *B. matricarifolium*, 3 *B. multifidum*, 4 *B. pallidum*, 4 *B. michiganese*

**Phenology:** full height, most dehiscent, few senescing

**Date:** 3 July 2004

**Notes:** plants are likely distributed in similar habitats throughout length of Dunka Road and railroad right-of-way

#### **Site #96: Johnson-Groh Polymet 8**

**Latitude and longitude:** N47° 36.392', W091° 58.485' extending 66 m west to N47° 36.375', W091° 58.533'

**General Location:** Between Dunka Road and railroad west of forest road 108

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** gravelly ridge between railroad and the south side of the road

**Associated species:** *Castilleja coccinea*, *Ophioglossum pusillum*, *Chrysanthemum leucanthemum*, *Poa pratensis*, *Bromus inermis*, *Fragaria virginiana*, *Rubus pubescens*, *Trifolium pratensis*, *Liparis loeselii*, *Platanthera hyperborea*, *Equisetum hymale*, *Hieracium aurantiacum*

**Population size:** 450 *B. simplex*, 22 *B. multifidum*

**Phenology:** *B. simplex* = full height, most dehiscent, few senescing; *B. multifidum/rugulosum* = plants very young, last year's leaf still present

**Date:** 3 July 2004

**Notes:** large population of *Ophioglossum* (>350 plants); plants are likely distributed in similar habitats throughout length of Dunka Road and railroad right-of-way

#### **Site #97: Johnson-Groh Polymet 9**

**Latitude and longitude:** N47° 36.375', W091° 58.533'

**General Location:** North of Dunka Road across from Polymet 7 and 8, west of Forest Service road 108

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** gravelly ridge between the north side of Dunka Road and the forest, open ditch with thick *Bromus*, plants adjacent to *Alnus*.

**Associated species:** *Poa pratensis*, *Bromus inermis*, *Hieracium aurantiacum*, *Anaphalis margaritacea*, *Agrostis stolonifera*, *Taraxacum officinale*, *Equisetum pratense*, *Fragaria virginiana*, *Alnus* sp.

**Population size:** 76 *B. simplex*

**Phenology:** plants are full height, most dehiscent

**Date of Observation:** 3 July 2004

**Notes:** habitat appears patchy, but likely extends in patches along Dunka Road

#### **Site #98: Johnson-Groh Polymet 10**

**Latitude and longitude:** N47° 36.006', W092° 00.182'

**General Location:** Walton's population A (pop 2 on maps); north side of Dunka Road in ditch  
**Principal Botanist:** Cindy Johnson-Groh  
**Habitat:** ditch open grass gravelly, growing on edge and inside of *Alnus* thicket and in *Populus* forest; thick leaf litter  
**Associated species:** *Aster macrophyllus*, *Fragaria virginiana*, *Corylus cornuta*, *Rubus pubescens*, *Rubus idaeus*, *Achillea millifolium*, *Diervilla lonicera*, *Aralia nudicaulis*, *Carex* sp., *Populus tremuloides*, *Alnus* sp.  
**Population size:** 33 *B. simplex*, 20 *B. matricariifolium*  
**Phenology:** *B. matricariifolium* sporangia yellow not releasing  
**Date:** 4 July 2004  
**Notes:** relocated population discovered by Walton; searched woods north of site for 1 hour; plants only found on edge of *Populus* forest south into ditch

#### **Site #99: Johnson-Groh Polymet 11**

**Latitude and longitude:** N47° 37.301', W091° 57.129'  
**General Location:** Logging road 109  
**Principal Botanist:** Cindy Johnson-Groh  
**Habitat:** old logging road, open to partially shaded; forest = *Acer rubrum*, *Betula papyrifera*, *Pinus banksiana*, *Alnus* sp.  
**Associated species:** *Fragaria virginiana*, *Aster macrophyllus*, *Plantago major*, *Galium boreale*, *Diervilla lonicera*, *Taraxacum officinale*, *Trientalis borealis*, *Pteridium aquilinum*, *Lathyrus ochroleucus*, *Epilobium angustifolium*, *Chrysanthemum leucanthemum*, *Salix* sp., *Achillea millefolium*,  
**Population size:** 5 *B. simplex*, 3 *B. multifidum*  
**Phenology:** plants are full height, beginning to dehisce  
**Date:** 5 July 2004  
**Notes:** there are likely many other populations along FS Road 109 as the habitat appears to be good

#### **Site #100: Johnson-Groh Polymet 12**

**Latitude and longitude:** N47° 37.328', W091° 57.132'  
**General Location:** Logging road 109  
**Principal Botanist:** Cindy Johnson-Groh  
**Habitat:** old logging road, open to partially shaded; forest = *Acer saccharum*, *Betula papyrifera*, *Pinus banksiana*, *Populus balsamifera*  
**Associated species:** *Fragaria virginiana*, *Hieracium aurantiacum*, *Castilleja coccinea*, *Taraxacum officinale*, *Rubus idaeus*, *Betula papyrifera*, *Anaphalis margaritacea*, *Solidago* sp., *Salix* sp.,  
**Population size:** 1 *B. simplex*, 6 *B. multifidum*, 2 *B. michigense*?  
**Phenology:** plants are full height, beginning to dehisce  
**Date:** 5 July 2004  
**Notes:** there are likely many other populations along FS Road 109 as the habitat appears to be good

#### **Site #101: Johnson-Groh Polymet 13**

**Latitude and longitude:** N47° 37.564', W091° 56.964'  
**General Location:** Logging road 109  
**Principal Botanist:** Cindy Johnson-Groh  
**Habitat:** old logging road, open to partially shaded; forest = *Acer rubrum*, *Pinus banksiana*, *Salix* sp., *Populus tremuloides*, *Alnus* sp.  
**Associated species:** *Chrysanthemum leucanthemum*, *Fragaria virginiana*, *Hieracium aurantiacum*, *Anaphalis margaritacea*, *Achillea millifolium*, *Rubus pubescens*, *Lactuca* sp., *Aster macrophyllus*  
**Population size:** 16 *B. simplex*  
**Date:** 5 July 2004

**Notes:** there are likely many other populations along FS Road 109 as the habitat appears to be good

**Site #102: Johnson-Groh Polymet 14**

**Latitude and longitude:** N47° 34.345', W091° 57.091'

**General Location:** Logging road 109

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** old logging road, open to partially shaded; forest = *Betula papyrifera*, *Pinus banksiana*,

**Associated species:** *Hieracium aurantiacum*, *Aster macrophyllus*, *Ranunculus* sp., *Pteridium aquilinum*, *Fragaria virginiana*, *Salix* sp., *Achillea millifolium*, *Potentilla* sp., *Rubus pubescens*, *Chrysanthemum leucanthemum*, *Solidago* sp.

**Population size:** 1 *B. multifidum*, 5 *B. matricarifolium*

**Date:** 5 July 2004

**Notes:** plot extends 26 m north, 1 *B. matricarifolium* 9 m north,

1 *B. matricarifolium* 26 m north;

**Site #103: Johnson-Groh Polymet 15**

**Latitude and longitude:** N47° 36.888', W091° 57.112'

**General Location:** Walton's population 1 (map B) near FS Road 109

Population A located south of junction of FS Road 109 and Dunka Road

Population B located west of junction of FS Road 109 and Dunka Road

Population C located 50 m west of junction of FS Road 109 and Dunka Road

Population D located east of junction of FS Road 109 and Dunka Road

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** roadside ditch, open, growing on gravelly shoulder of road

**Associated species:** *Fragaria virginiana*, *Equisetum arvense*, *Melilotus officinalis*, *Tragapogon dubius*, *Anaphalis margaritacea*, *Pteridium aquilinum*, *Hieracium aruanticum*, *Poa pratensis*, *Lathyrus ochroleucus*, *Salix* sp., *Solidago* sp., *Carex* sp., *Tanacetum vulgare*, *Rubus idaeus*,

**Population size:** A: 20 *B. simplex*, 2 *B. matricarifolium*, 2 *B. multifidum*

B: 11 *B. simplex*, 1 *B. matricarifolium*

C: 177 *B. simplex*, 1 *B. matricarifolium*

D: 8 *B. simplex*

**Date:** 5 July 2004

**Notes:** same area as Walton pop 1 (map B); area documented by Walton was destroyed by logging activity; populations discovered in this survey were in areas nearby that were undisturbed

**Site #104: Johnson-Groh Polymet 16**

**Latitude and longitude:** N47° 35.988', W092° 00.179'

**General Location:** South of Walton population 2 (map A) in power line right-of-way

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** open, high moss coverage, scattered young trees, lots of large rocks

**Associated species:** *Fragaria virginiana*, *Cladonia* (lichen), *Pleurozium* (moss), *Chrysanthemum leucanthemum*, *Lactuca* sp., *Lathyrus ochroleucus*, *Trifolium pratensis*, *Rubus idaeus*, *Anaphalis margaritacea*, *Cirsium* sp., *Dantonina spicata*, *Bromus inermis*, *Vicia americana*, *Athyrium felix-femina*, *Epilobium angustifolium*, *Salix* sp., *Polytrichum commune* (moss), *Poa pratensis*, *Maianthemum canadense*, *Acer rubrum*, *Abies balsamea*, *Corylus cornuta*, *Larix laricina*, *Pteridium aquilinum*

**Population size:** 181 *B. simplex*, 238 *B. matricarifolium*, 209 *B. michiganense*, 79 *B. matricarifolium/michiganense*, 4 *B. multifidum*, 27 *B. pallidum*, 1 *B. dissectum*

**Date:** 6 July 2004

**Notes:** this area is extremely rich with *Botrychium* of all species; area searched (50m x 10 m) had >750 individuals discovered in 3 hours search

**Site #105: Johnson-Groh Polymet 17**

**Latitude and longitude:** N47° 36.293', W091° 58.923'

**General Location:** north side of road in ditch between Dunka Road and swamp, west of FS Road 109

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** road ditch, steep, most plants on lower portion adjacent to *Salix*

**Associated species:** *Rubus idaeus*, *Fragaria virginiana*, *Equisetum sylvaticum*, *Poa pratensis*, *Chrysanthemum leucanthemum*, *Salix* sp., *Carex* sp., *Taraxacum officinale*, *Cirsium* sp., *Solidago* sp.,

**Population size:** 356 *B. multifidum*, 49 *B. simplex*, 4 *B. dissectum*, 2 *B. pallidum*, 3 *B. matricarifolium/michiganense*, 8 *B. michiganense*

**Date:** 6 July 2004

**Notes:** *B. pallidum* and *B. matricarifolium* are found on ditch shoulder, *B. simplex*, *B. dissectum* and *B. multifidum* are at bottom on ditch near *Salix*; area searched = ~ 32m x 5m

**Site #106: Johnson-Groh Polymet 18**

(point 1 of railroad point survey)

**Latitude and longitude:** N47° 36.745', W091° 57.491'

**General Location:** railroad right-of-way, on south side of tracks where railroad bends southeast away from Dunka Road

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** dry slopes adjacent to railroad, open to partially shaded edge of *Populus balsamifera* stand just beyond clear cut

**Associated species:** *Rubus idaeus*, *Asarum canadense*, *Fragaria virginiana*, *Cirsium* sp., *Dryopteris cristata*, *Pyrola* sp., *Abies balsamea*,

**Population size:** 7 *B. simplex*, 38 *B. matricarifolium*, 18 *B. michiganense*, 15 *B. matricarifolium/michiganense*, 3 *B. pallidum*, 1 *B. multifidum*, 22 unknown (narrow linear pinnae, probably *B. pallidum*),

**Date:** 7 July, 2004

**Notes:** searched 10 minutes – first point on railroad point-survey

**Site #107: Johnson-Groh Polymet 19**

(point A of Forest Service Road 108 point survey)

**Latitude and longitude:** N47°36.519', W091°58.276'

**General Location:** center of forest service road 108, south end near Dunka Road

**Principal Botanist:** Cindy Johnson-Groh

**Habitat:** open to shaded forest road, grassy, plants on center of road into edge of woods

**Associated species:** *Populus tremuloides*, *Pinus banksiana*, *Fragaria virginiana*, *Cornus canadensis*, *Rubus pubescens*, *Aster macrophyllus*, *Lotus corniculatus*, *Hieracium aurantiacum*, *Anaphalis margaritacea*

**Population size:** 4 *B. simplex*, 3 *B. multifidum*

**Date:** 7 July, 2004

**Notes:** searched for 10 minutes, first point on forest road 108 point-survey

## *Caltha natans* sites at PolyMet East

Gary B. Walton

August 9, 2004



*Caltha natans* (Floating Marsh Marigold) found at Site 2.

### *Caltha natans* #1

**GPS location:** 15T 0579248, UTM 5274130

**Habitat:** Pond-like water-filled ditch on north side of Dunka Road.

**Associated species:** *Potamogeton epihydrus*, *Calamagrostis canadensis*, *Carex rostrata*.

**Phenology:** All plants sterile.

**Population size:** 5 small patches.

**Date:** July 7, 2004

### *Caltha natans* #2

**GPS location:** 15T 0579205, UTM 5274171

**Habitat:** Shallow channel in marsh.

**Associated species:** *Calamagrostis canadensis*, *Scirpus cyperinus*, *Carex brunnescens*, *C. retrorsa*, *Viola pallens*, *Eupatorium maculatum*, *Glyceria grandis*.

**Phenology:** Flowering and fruiting. Some flowers pink.

**Population size:** Several patches from 1 to 3 ft<sup>2</sup> each.

**Date:** July 9, 2004

### *Caltha natans* #3

**GPS location:** 15T 0579177, UTM 5273818

**Habitat:** Desiccating beaver pond.

**Associated species:** *Ranunculus gmelinii*.

**Phenology:** Sterile plants.

**Population size:** 4 small plants.

**Date:** July 10, 2004

**Caltha natans #4**

**GPS location:** 15T 0579604, UTM 527324  
**Habitat:** Shore of shallow pond. Water about 1-2 feet .  
**Associated species:** *Glyceria borealis*, *G. grandis*, *Utricularia vulgaris*.  
**Phenology:** Flowering and fruiting.  
**Population size:** 5 patches about 6 ft<sup>2</sup> each and one at about 75 ft<sup>2</sup>.  
**Date:** July 10, 2004

**Caltha natans #5**

**GPS location:** 15T 0579942, UTM 5273209  
**Habitat:** Small pool of open water in shallow marsh.  
**Associated species:** *Glyceria borealis*, *Equisetum fluviatile*.  
**Phenology:** Sterile plants.  
**Population size:** 2 small plants.  
**Date:** July 10, 2004

**Caltha natans #6**

**GPS location:** 15T 0579192, UTM 5273993  
**Habitat:** Slow moving intermittent stream in alder swamp. Less than 1 foot deep.  
**Associated species:** *Alnus rugosa*, *Calamagrostis canadensis*, *Impatiens capensis*, *Aster puniceus*.  
**Phenology:** Sterile plants.  
**Population size:** 3 small plants.  
**Date:** July 16, 2004

**Caltha natans #7**

**GPS location:** 15T 0580476, UTM 5273780  
**Habitat:** Beaver canal connected to Partridge River.  
**Associated species:** *Calamagrostis canadensis*, *Spiraea alba*, *Juncus effusus*, *Salix planifolia*, *Callitriche verna*.  
**Phenology:** Sterile plants.  
**Population size:** Scattered over a 20 ft<sup>2</sup> area.  
**Date:** July 17, 2004

**Caltha natans #8**

**GPS location:** 15T 0580427, UTM 5275529  
**Habitat:** Mudflat on bank of Partridge River.  
**Associated species:** *Myrica gale*, *Spiraea alba*, *Alisma plantago-aquatica*, *Alnus rugosa*, *Bidens cernua*, *Carex lacustris*, *Cicuta bulbifera*, *Ranunculus gmelinii*.  
**Phenology:** Flowering and fruiting.  
**Population size:** About ½ ft<sup>2</sup>.  
**Date:** July 25, 2004



**Caltha natans #9**

**GPS location:** 15T 0580420, UTM 5275584

**Habitat:** Mudflat on bank of Partridge River.

**Associated species:** *Torreyochloa pallida*, *Myrica gale*, *Spiraea alba*, *Alisma plantago-aquatica*, *Alnus rugosa*, *Bidens cernua*, *Carex lacustris*, *C. brunnescens*, *Cicuta bulbifera*, *Ranunculus gmelinii*, *Callitriche verna*, *Potentilla norvegica*, *Impatiens capensis*.

**Phenology:** Flowering and fruiting.

**Population size:** 11 small plants.

**Date:** July 25, 2004

**Caltha natans #10**

**GPS location:** 15T 0577045, UTM 5272974

**Habitat:** Shallow, slow moving water at base of beaver dam.

**Associated species:** *Calamagrostis canadensis*, *Impatiens capensis*.

**Phenology:** Flowering and fruiting.

**Population size:** 30 ft<sup>2</sup>.

**Date:** July 30 and August 1, 2004

**Caltha natans #11**

**GPS location:** 15T 0579202, UTM 5273299

**Habitat:** Mudflat of intermittent stream that flows into the Partridge River.

**Associated species:** *Callitriche verna*, *Carex lacustris*, *C. tenera*, *Calamagrostis canadensis*.

**Phenology:** Sterile plants.

**Population size:** 19 small plants (about ½ ft<sup>2</sup> each).

**Date:** July 31, 2004

**Caltha natans #12**

**GPS location:** 15T 0579114, UTM 5273245

**Habitat:** Old beaver canal.

**Associated species:** *Sparganium* sp., *Callitriche verna*, *Eleocharis intemedica*.

**Phenology:** Seedlings.

**Population size:** 36 seedlings and one slightly larger plant.

**Date:** July 31, 2004

**Caltha natans #13**

**GPS location:** 15T 0579020, UTM 5273141

**Habitat:** Mudflat in old channel of Partridge River.

**Associated species:** *Callitriche verna*, *Sagittaria* sp., *Glyceria borealis*, *Carex stricta*.

**Phenology:** Seedlings.

**Population size:** 31 seedlings.

**Date:** July 31, 2004

**Juncus vaseyi and Eleocharis nitida sites at PolyMet East**

Gary B. Walton

August 4, 2004



**Above:** *Juncus vaseyi* seeds from specimen collected at PolyMet East rare plant survey site.

**Left:** Specimen of *Juncus vaseyi* inflorescence collected at PolyMet East rare plant survey site.



**Above:** *Eleocharis nitida* achenes from specimen collected at PolyMet East rare plant survey site.

**Left:** *Eleocharis nitida* at PolyMet East rare plant survey site.

**Eleocharis nitida #1**

**GPS location:** 15T 0579613, UTM 5274266

**Habitat:** In wet ditch on north side of Dunka Road. Full sun most of day.

**Associated species:** *Carex interior*, *C. scoparia*, *Aster lanceolatus*, *Calamagrostis canadensis*

**Phenology:** In flower and with immature fruit.

**Population size:** Densely covering an area 21 feet by 6 feet.

**Date:** July 7, 2004

**Eleocharis nitida #2**

**GPS location:** 15T 0578841, UTM 5274049

**Habitat:** In wet ditch on north side of Dunka Road. Full sun most of day.

**Associated species:** *Glyceria striata*, *Scirpus atrovirens*, *Aster puniceus*, *A. lanceolatus*, *Scirpus hudsonianus*, *Euthamia graminifolia*, *Equisetum arvense*.

**Phenology:** In flower and with immature fruit.

**Population size:** 4 feet by 5 feet patch.

**Date:** July 9, 2004

**Eleocharis nitida #3**

**GPS location:** 15T 0578939, UTM 5274078

**Habitat:** In wet ditch on north side of Dunka Road. Full sun most of day.

**Associated species:** *Carex interior*, *Glyceria striata*, *Alnus rugosa*, *Aster puniceus*, *Scirpus hudsonianus*, *Euthamia graminifolia*.

**Phenology:** In flower and with immature fruit.

**Population size:** 12 feet by 20 feet patch.

**Date:** July 9, 2004

**Eleocharis nitida #4**

**GPS location:** 15T 0578376, UTM 5273891

**Habitat:** In wet ditch on north side of Dunka Road. Full sun most of day.

**Associated species:** *Calamagrostis canadensis*, *Aster* sp. *Scirpus* sp.

**Phenology:** In flower and with immature fruit.

**Population size:** 25 feet by 4 feet patch.

**Date:** July 9, 2004

**Eleocharis nitida #5**

**GPS location:** 15T 05782303, UTM 5273743

**Habitat:** In wet area between railroad grades. Full sun.

**Associated species:** *Typha latifolia*, *Scirpus atrovirens*, *Equisetum arvense*, *Juncus effusus*, *Thelypteris palustris*, *Carex aurea*.

**Phenology:** In flower and with immature fruit.

**Population size:** 4 ft<sup>2</sup> patch.

**Date:** July 9, 2004

**Eleocharis nitida #6**

**GPS location:** 15T 0578770, UTM 5273849

**Habitat:** Wet ditch on south of railroad grade. Full sun.

**Associated species:** *Scirpus hudsonianus*, *S. atrovirens*, *Carex interior*, *C. rostrata*, *Drosera rotundifolia*.

**Phenology:** In flower and with immature fruit.

**Population size:** 3 feet by 12 feet plus two small outlying clumps.

**Date:** July 10, 2004

**Eleocharis nitida #7 and Juncus vaseyi #1**

**GPS location:** 15T 0578994, UTM 5274052

**Habitat:** Damp soil in low area on south side of Dunka Road. Full sun.

**Associated species:** *Carex leptalea*, *C. gracillima*, *Viola novae-angliae*, *Picea mariana* (saplings), *Alnus rugosa*, *Fragaria virginiana*.

**Phenology:** In flower and with immature fruit.

**Population size:** *E. nitida* is 30 feet by 6 feet. *J. vaseyi* consists of 5 small clumps.

**Date:** July 13, 2004

**Eleocharis nitida #8**

**GPS location:** 15T 0580111, UTM 5274370

**Habitat:** Low wet area on south side of Dunka Road.

**Associated species:** *Panicum* sp., *Salix pyrifolia*, *Solidago uliginosa*, *Calamagrostis canadensis*, *Viola pallens*.

**Phenology:** In flower and with immature fruit.

**Population size:** 5 ft<sup>2</sup>.

**Date:** July 13, 2004

**Eleocharis nitida #9 and Juncus vaseyi #2**

**GPS location:** 15T 0580311, UTM 5274428

**Habitat:** Low wet area on south side of Dunka Road.

**Associated species:** *Scirpus atrovirens*, *Panicum* sp., *Equisetum arvense*, *Viola pallens*, *Platanthera hyperborea*, *Liparis loeselii*, *Eleocharis acicularis*, *Carex aurea*.

**Phenology:** Both species in flower and with immature fruit.

**Population size:** *E nitida* consists of two patches at 15 feet by 3 feet and 6 feet by 12 feet. *J. vaseyi* consists of a single small clump.

**Date:**

**Eleocharis nitida #10**

**GPS location:** 15T 0580537, UTM 5274497

**Habitat:** Patch in muddy soil on south side of Dunka Road.

**Associated species:** *Scirpus atrovirens*, *Juncus brevicaudatus*, *J. effusus*, *Equisetum fluviatile*, *Viola novae-angliae*, *V. pallens*, *Alnus crispa*, *Salix petiolaris*, *S. pyrifolia*, *Dryopteris cristata*.

**Phenology:** In flower and with immature fruit.

**Population size:** 6 feet by 3 feet patch.

**Date:** July 17, 2004

**Eleocharis nitida #11**

**GPS location:** 15T 0578574, UTM 5273840

**Habitat:** Shallow broad ditch on north side of railroad grade.

**Associated species:** *Carex interior*, *Scirpus hudsonianus*, *Danthonia spicata*, *Drosera rotundifolia*, *Lycopodium imundatum*, *Euthamia graminifolia*.

**Phenology:** In flower and with immature fruit.

**Population size:** Scattered over a 60 feet by 12 feet area.

**Date:** July 17, 2004

**Juncus vaseyi # 3**

**GPS location:** 15T 0579384, UTM 5273693

**Habitat:** Low wet area on south side of railroad grade.

**Associated species:** *Scirpus hudsonianus*, *Parnassia palustris*, *Gentiana andrewsii*, *Euthamia graminifolia*.

**Phenology:** With mature fruit.

**Population size:** 3 clumps.

**Date:** July 31, 2004

**Botrychium sites at PolyMet East**

Gary B. Walton, Field Botanist

August 3, 2004



***Botrychium matricariifolium* (Daisy-leaf Moonwort) as found in its natural habitat.**

**Botrychium simplex site #1**

**GPS location:** 15T 0580100, UTM 5274406

**Species:** *Botrychium simplex*

**Habitat:** Weedy roadside, sparse sapling jackpine.

**Associated species:** *Pinus banksiana*, *Danthonia spicata*, *Fragaria virginiana*, *Hieracium cespitosum*, *Antennaria neglecta*, *Solidago juncea*.

**Phenology:** Maturing sporophore.

**Population size:** 1 frond.

**Date:** July 7, 2004

**Botrychium simplex site #2**

**GPS location:** 15T 0579953, UTM 5274374

**Species:** *Botrychium simplex*

**Habitat:** Weedy roadside, young sparse jackpine.

**Associated species:** *Pinus banksiana*, *Danthonia spicata*, *Oryzopsis asperfolia*, *O. pungens*, *Antennaria neglecta*, *Solidago hispida*, *Erigeron strigosus*.

**Phenology:** Mature sporophores.

**Population size:** 2 fronds.

**Date:** July 7, 2004

**Botrychium species site #1**

**GPS location:** 15T 0579943, UTM 5274373

**Species:** Various morphs of *Botrychium matricariifolium* including one resembling *B. hesperium*.

**Habitat:** Weedy roadside, sparse young jackpine.

**Associated species:** *Pinus banksiana*, *Danthonia spicata*, *Oryzopsis asperfolia*, *O. pungens*, *Antennaria neglecta*, *Solidago hispida*, *Erigeron strigosus*.

**Phenology:** Mature sporophores.

**Population size:** 16 fronds of *B. matricariifolium*, 1 of plant resembling *B. hesperium*.

**Date:** July 7, 2004

**Botrychium species site #2**

**GPS location:** 15T 057839, UTM 5273833

**Species:** Various morphs of *Botrychium matricariifolium*.

**Habitat:** Weedy roadside with scrubby saplings.

**Associated species:** *Fragaria virginiana*, *Antennaria neglecta*, *Pinus banksiana*, *Alnus crispa*, *Betula papyrifera*, *Danthonia spicata*.

**Phenology:** Mature sporophores.

**Population size:** About 15 fronds.

**Date:** July 9, 2004

## *Geocaulon lividum* sites at PolyMet East

Gary B. Walton, Field Botanist

August 3, 2004



*Geocaulon lividum* (Northern Commandra) with flowers as found in its natural habitat.

### *Geocaulon lividum* #1

**GPS location:** 15T 0579914, UTM 5275296

**Habitat:** On *Pleurozium* moss hummock at base of mature black spruce. Sunny much of day. Dry.

**Associated species:** *Picea mariana*, *Ledum groenlandicum*, *Vaccinium oxycoccus*, *Smilacina trifolia*, *Lycopodium annotinum*, *Gaultheria hispidula*.

**Phenology:** Flowering.

**Population size:** 6 stems.

**Date:** July 2, 2004

### *Geocaulon lividum* #2

**GPS location:** 15T 0579917, UTM 5275196

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. Some *Sphagnum* moss. Dry and sunny.

**Associated species:** *Picea mariana*, *Vaccinium myrtilloides*, *V. oxycoccus*, *V. vitis-idaea* ssp. *minus*, *Smilacina trifolia*, *Carex disperma*, *Ledum groenlandicum*, *Gaultheria hispidula*, *Lycopodium annotinum*, *Larix laricina* (seedlings)

**Phenology:** Most non-fruiting, a few stems with unripe fruit.

**Population size:** 30 stems.

**Date:** July 7, 2004



**Geocaulon lividum #3**

**GPS location:** Bounded by these coordinates: 15T 0579973, UTM 5275222; 15T 0579991, UTM 5275232; 15T 0579986, UTM 5275228; 15T 0579981, UTM 5275237; 15T 0579968, UTM 5275247; 15T 0579966, UTM 5275242; 15T 0579983, UTM 5275220; 15T 0579989, UTM 5275215.

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. Some *Sphagnum* moss. Dry and patchy sun. More *Smilacina trifolia* than #2.

**Associated species:** *Picea mariana*, *Vaccinium myrtilloides*, *V. oxycoccus*, *V. vitis-idaea* ssp. *minus*, *Smilacina trifolia*, *Carex disperma*, *C. trisperma*, *Ledum groenlandicum*, *Gaultheria hispidula*, *Lycopodium annotinum*, *Larix laricina* (seedlings), *Cypripedium acaule*, *Coptis groenlandica*, *Monotropa uniflora*.

**Phenology:** Most sterile but some in flower or with unripe fruit.

**Population size:** About 150 stems over a large area.

**Date:** July 7, 2004

**Geocaulon lividum #4**

**GPS location:** 15T 0580049, UTM 5275273

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. Some *Sphagnum* moss. Dry and patchy sun.

**Associated species:** *Picea mariana*, *Gaultheria hispidula*, *Vaccinium vitis-idaea* ssp. *minus*, *Monotropa uniflora*, *Smilacina trifolia*, *Cypripedium acaule*, *Carex disperma*.

**Phenology:** Some stems with unripe fruit.

**Population size:** 15 stems.

**Date:** July 7, 2004

**Geocaulon lividum #5**

**GPS location:** 15T 0580117, UTM 5275237

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. Dry and patchy sun.

**Associated species:** *Picea mariana*, *Gaultheria hispidula*, *Ledum groenlandicum*, *Smilacina trifolia*, *Vaccinium myrtilloides*.

**Phenology:** Some plants with unripe fruit.

**Population size:** 30 stems.

**Date:** July 7, 2004

**Geocaulon lividum #6**

**GPS location:** 15T 0578915, UTM 5274567

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce. A bit moist compared to previous sites.

**Associated species:** *Picea mariana*, *Smilacina trifolia*, *Ledum groenlandicum*, *Vaccinium myrtilloides*, *Lycopodium annotinum*, *Gaultheria hispidula*, *Carex trisperma*, *Calamagrostis canadensis*.

**Phenology:** Some plants in flower.

**Population size:** About 150 stems.

**Date:** July 9, 2004

**Geocaulon lividum #7**

**GPS location:** 15T 0578066, UTM 5273644

**Habitat:** On *Pleurozium* moss hummocks under mature black spruce.

**Associated species:** *Picea mariana*, *Ledum groenlandicum*, *Smilacina trifolia*, *Gaultheria hispidula*, *Carex disperma*.

**Phenology:** Some plants with flowers.

**Population size:** 40 stems.

**Date:** July 18, 2004

**Geocaulon lividum #8**

**GPS location:** 15T 0578778, UTM 5274431

**Habitat:** In *Sphagnum* moss hummocks under black spruce.

**Associated species:** *Picea mariana*, *Carex trisperma*, *Ledum groenlandicum*, *Smilacina trifolia*, *Lycopodium annotinum*.

**Phenology:** Non-flowering.

**Population size:** 45 stems.

**Date:** July 18, 2004

**Geocaulon lividum #9**

**GPS location:** 15T 0578489, UTM 5274251

**Habitat:** *Sphagnum* and *Pleurozium* moss hummocks under black spruce.

**Associated species:** *Picea mariana*, *Ledum groenlandicum*, *Cornus canadense*, *Gaultheria hispidula*, *Lycopodium annotinum*, *Carex trisperma*.

**Phenology:** Some plants with unripe fruit.

**Population size:** 51 stems.

**Date:** July 18, 2004

**Geocaulon lividum #10**

**GPS location:** 15T 0580251, UTM 5275268

**Habitat:** *Sphagnum* and *Pleurozium* moss hummocks under black spruce. Part shade.

**Associated species:** *Picea mariana*, *Vaccinium angustifolium*, *Smilacina trifolia*, *Carex trisperma*, *Chamaedaphne calyculata*, *Gaultheria hispidula*.

**Phenology:** 1 fruiting stem.

**Population size:** 6 stems.

**Date:** July 25, 2004

**Ranunculus gmelinii sites at PolyMet East**

Gary B. Walton

August 5, 2004



**Ranunculus gmelinii (Small Yellow Water Crowfoot) found near the Partridge River.**

**Ranunculus gmelinii #1**

**GPS location:** 15T 0579177, UTM 5273818

**Habitat:** Mud of desiccating pond.

**Associated species:** *Caltha natans*.

**Phenology:** In flower.

**Population size:** 6 ft<sup>2</sup>.

**Date:** July 10, 2004

**Ranunculus gmelinii #2**

**GPS location:** 15T 0578157, UTM 5274684

**Habitat:** On muddy soil of desiccating beaver canal by Partridge River.

**Associated species:** *Carex aquatilis*, *Callitriche verna*.

**Phenology:** In flower.

**Population size:** Scattered over a 200 ft<sup>2</sup> area.

**Date:** July 15, 2004

**Ranunculus gmelinii #3**

**GPS location:** 15T 0580477, UTM 5273772

**Habitat:** In beaver canal (about 1.5 feet deep) by Partridge River. Floating in water.

**Associated species:** *Caltha natans*, *Cicuta bulbifera*, *Carex rostrata*, *Potentilla palustris*.

**Phenology:** Flowering.

**Population size:** 5 ft<sup>2</sup>.

**Date:** July 17, 2004

**Ranunculus gmelinii #4**

**GPS location:** 15T 0580620, UTM 5274785

**Habitat:** In a water-filled channel in drowned conifer swamp.

**Associated species:** *Sparganium glomeratum*, *Calamagrostis canadensis*, *Salix pyrifolia*.

**Phenology:** In flower and fruit.

**Population size:** 200 ft<sup>2</sup>.

**Date:** July 23, 2004

**Ranunculus gmelinii #5**

**GPS location:** 15T 05780427, UTM 5275529

**Habitat:** Mudflat, organic silty soil, along Partridge River.

**Associated species:** *Caltha natans*, *Alisma plantago-aquatica*, *Bidens cernua*, *Carex lacustris*, *Cicuta bulbifera*, *Myrica gale*, *Alnus rugosa*, *Spiraea alba*.

**Phenology:** In flower and fruit.

**Population size:** One-half foot square.

**Date:** July 25, 2004

**Ranunculus gmelinii #6**

**GPS location:** 15T 0577778, UTM 5272723

**Habitat:** Desiccating pool in isolated sedge marsh in conifer forest.

**Associated species:** *Sparganium glomeratum*, *Torreyochloa pallida*, *Galium tinctorum*, *Potamogeton epihydricus*, *Bidens cernua*, *Veronica scutellaria*, *Glyceria grandis*, *Carex rostrata*.

**Phenology:** In flower and fruit.

**Population size:** Scattered plants amounting to about 50 ft<sup>2</sup>.

**Date:** July 30 and August 1, 2004

**Ranunculus gmelinii #7**

**GPS location:** 15T 0579007, UTM 5273121

**Habitat:** Mudflat by Partridge River.

**Associated species:** *Callitriche verna*, *Sagittaria* sp., *Glyceria grandis*, *Torreyochloa pallida*.

**Phenology:** In flower and fruit.

**Population size:** 16 ft<sup>2</sup>.

**Date:** July 31, 2004

**Ranunculus lapponicus sites at PolyMet East**

Gary B. Walton

August 3, 2004



**Ranunculus lapponicus (Lapland Buttercup) as it occurs in its natural habitat.**

**Ranunculus lapponicus #1**

**GPS location:** Bounded by these coordinates: 15T 0579051, UTM 5274833; 15T 0579050, UTM 5274833; 15T 0579055, UTM 5274833; 15T 0579053, UTM 5274841

**Habitat:** Sphagnum hummocks and along edges of sphagnum hummocks. In black spruce stand (DBH from 2 to 6 inches, overstory cover about 60%) with tag alder.

**Associated species:** *Picea mariana*, *Alnus rugosa*, *Carex leptalea*, *C. brunnescens*, *Glyceria striata*, *Smilacina trifolia*, *Gaultheria hispidula*, *Vaccinium oxycoccus*, *Ledum groenlandicum*, *Dryopteris cristata*, *Equisetum arvense*, *E. sylvaticum*

**Phenology:** Non-flowering plants only.

**Population size:** 5 clumps about 0.5 ft<sup>2</sup> to 1.5 ft<sup>2</sup> each.

**Date:** July 2, 2004

**Ranunculus lapponicus #2**

**GPS location:** 15T 0578699, UTM 5274647

**Habitat:** Growing through Sphagnum hummocks and along sides of hummocks under sparse black spruce and moderate cover of tag alder.

**Associated species:** *Picea mariana*, *Alnus rugosa*, *Salix pyrifolia*, *Ledum groenlandicum*, *Equisetum sylvaticum*, *Gaultheria hispidula*, *Calamagrostis canadensis*, *Cornus canadense*, *Rubus pubescens*, *Carex vaginiflora*. *Petasites sagittatus* found nearby.

**Phenology:** In flower and fruit.

**Population size:** Distributed over a 400 ft<sup>2</sup> area.

**Date:** July 13, 2004

**Ranunculus lapponicus #3**

**GPS location:** 15T 0578386, UTM 5274640

**Habitat:** Under black spruce (about 50% overstory cover) with tag alder and growing in and along Sphagnum hummocks and in small muddy areas between hummocks.

**Associated species:** *Picea mariana*, *Alnus rugosa*, *Larix laricina*, *Ledum groenlandicum*, *Lycopodium annotinum*, *Carex trisperma*, *Vaccinium oxycoccus*, *Listera cordata*, *Equisetum sylvaticum*, *Calamagrostis canadensis*, *Gaultheria hispidula*, *Smilacina trifolia*.

**Phenology:** Non-flowering.

**Population size:** 12 feet by 16 feet patch.

**Date:** July 13, 2004

**Ranunculus lapponicus #4**

**GPS location:** 15T 0580362, UTM 5274755

**Habitat:** In and along Sphagnum hummocks in a moist channel surrounded by somewhat drier black spruce stand. Tag alder dominant woody cover at about 60%.

**Associated species:** *Alnus rugosa*, *Picea mariana*, *Carex disperma*, *C. trisperma*, *Aster puniceus*, *Rubus strigosus*, *R. pubescens*, *Stellaria calycantha*, *Trientalis borealis*, *Ribes triste*.

**Phenology:** In flower and fruit.

**Population size:** 20 feet by 12 feet area.

**Date:** July 15, 2004

**Ranunculus lapponicus #5**

**GPS location:** 15T 0580367, UTM 5274797

**Habitat:** In and along Sphagnum hummocks in a moist channel surrounded by somewhat drier black spruce stand. Tag alder dominant woody cover at about 60%. Black spruce scarce.

**Associated species:** *Alnus rugosa*, *Aster puniceus*, *Calamagrostis canadensis*, *Viola pallens*, *Equisetum sylvaticum*, *Picea mariana*, *Trientalis borealis*, *Dryopteris carthusiana*, *Carex trisperma*.

**Phenology:** Fruiting.

**Population size:** 10ft<sup>2</sup>

**Date:** July 15, 2004

**Ranunculus lapponicus #6**

**GPS location:** 15T 0580752, UTM 5274933

**Habitat:** In and along Sphagnum hummocks. Tag alder dominant woody cover, black spruce sparse.

**Associated species:** *Alnus rugosa*, *Picea mariana*, *Carex paupercula*, *C. trisperma*, *Equisetum sylvaticum*, *Ledum groenlandicum*, *Gaultheria hispidula*, *Calamagrostis canadensis*.

**Phenology:** Non-flowering.

**Population size:** Sparse in a 5 feet by 8 feet area.

**Date:** July 15, 2004

**Ranunculus lapponicus #7**

**GPS location:** 15T 0579296, UTM 5275173

**Habitat:** On and along Sphagnum hummock in mixed white cedar, tamarack, and black spruce. Cover is sparse but shields from sun much of day.

**Associated species:** *Thuja occidentalis*, *Larix laricina*, *Picea mariana*, *Alnus rugosa*, *Ledum groenlandicum*, *Lycopodium annotinum*, *Gaultheria hispidula*, *Calamagrostis canadensis*, *Carex disperma*, *Equisetum sylvaticum*, *Cornus canadense*, *Vaccinium oxycoccus*, *Trientalis borealis*,

**Phenology:** Flowering and fruiting

**Population size:** 8 foot by 4 foot patch.

**Date:** July 18, 2004

## *Sparganium glomeratum* sites at PolyMet East

Gary B. Walton

August 5, 2004



*Sparganium glomeratum* (Clustered Bur-reed).

### *Sparganium glomeratum* #1

**GPS location:** 15T 0578375, UTM 5274623

**Habitat:** Shallow pool in *Sphagnum* at edge of black spruce swamp.

**Associated species:** *Eleocharis palustris*, *Carex brunnescens*, *Scirpus cyperinus*, *Calamagrostis canadensis*.

**Phenology:** Sterile plants. Old achenes found in mud.

**Population size:** 35 feet by 15 feet.

**Date:** July 13, 2004

### *Sparganium glomeratum* #2

**GPS location:** 15T 0578588, UTM 5273896

**Habitat:** Desiccating beaver pond.

**Associated species:** *Sparganium chlorocarpum*, *Glyceria grandis*, *G. canadense*.

**Phenology:** Fruiting.

**Population size:** 3 fruiting stems.

**Date:** July 16, 2004



**Sparganium glomeratum #3**

**GPS location:** 15T 0577653, UTM 5273406

**Habitat:** Water-filled ditch along railroad tracks. Water about 1.5 feet deep.

**Associated species:** *Sparganium natans*, *Glyceria borealis*, *Eleocharis palustris*, *Utricularia vulgaris*, *Potamogeton epihydris*.

**Phenology:** Fruiting.

**Population size:** 9 fruiting stems.

**Date:** July 17, 2004

**Sparganium glomeratum #4**

**GPS location:** 15T 0577636, UTM 5273331

**Habitat:** Water-filled ditch along railroad tracks. Water about 1.5 feet deep.

**Associated species:** *Juncus* sp. (sterile plants), *Typha latifolia*, *Utricularia vulgaris*.

**Phenology:** Fruiting and flowering.

**Population size:** 2 flowering stems and 27 fruiting stems.

**Date:** July 17, 2004

**Sparganium glomeratum #5**

**GPS location:** Bounded by these coordinates: 15T 0580406, UTM 5274525; 15T 0580392, UTM 5274517; 15T 0580406, UTM 5274509, wp 579 to 581

**Habitat:** Edge of marsh with active beaver colony. Growing in muddy soil along shore and into water.

**Associated species:** *Calla palustris*, *Carex interior*, *Alnus rugosa*, *Salix petiolaris*.

**Phenology:** Fruiting and flowering plus many sterile shoots.

**Population size:** 18 fruiting stems, 4 flowering stems.

**Date:** July 23, 2004

**Sparganium glomeratum #6**

**GPS location:** 15T 0580563, UTM 5274563

**Habitat:** Edge of marsh with active beaver colony. Growing in muddy soil along shore and into water.

**Associated species:** *Calla palustris*, *Torreyochloa pallida*, *Glyceria canadense*.

**Phenology:** Fruiting.

**Population size:** 3 fruiting stems.

**Date:** July 23, 2004

**Sparganium glomeratum #7**

**GPS location:** 15T 0580620, UTM 5274785

**Habitat:** In muddy channel through *Sphagnum* at north end of active beaver colony. Appears to have once been a conifer swamp.

**Associated species:** *Ranunculus gmelinii*, *Calamagrostis canadensis*, *Salix pyrifolia*, *Carex comosa*, *C. brunnescens*, *Chamaedapne calyculata*, *Ledum groenlandicum*.

**Phenology:** Fruiting.

**Population size:** 1 fruiting stem and many sterile stems.

**Date:** July 23, 2004

**Sparganium glomeratum #8**

**GPS location:** 15T 0577778, UTM 5272723

**Habitat:** Desiccating pool in isolated sedge marsh in conifer forest.

**Associated species:** *Ranunculus gmelinii*, *Torreyochloa pallida*, *Galium tinctorum*, *Potamogeton epihydris*, *Bidens cernua*, *Veronica scutellaria*, *Glyceria grandis*, *Carex rostrata*.

**Phenology:** Fruiting.

**Population size:** 1 fruiting stem and several scattered sterile stems.

**Date:** July 30 and August 1, 2004

**Torreyochloa pallida sites at PolyMet East**

Gary B. Walton

August 5, 2004



**Torreyochloa pallida (Pale Manna Grass)**  
**specimen from Partridge River. Greatly**  
**enlarged.**

**Torreyochloa pallida #1**

**GPS location:** 15T 0580752, UTM 5274933

**Habitat:** Beaver canal connected to Partridge River.

**Associated species:** *Lemna minor*, *Carex aquatilis*, *Chamaedaphne calyculata*, *Myrica gale*.

**Phenology:** Flowering.

**Population size:** Sparse.

**Date:** July 15, 2004

Gary B. Walton  
August 4, 2004  
*Torreyochloa pallida*

**Torreyochloa pallida #2**

**GPS location:** 15T 0580563, UTM 5274563

**Habitat:** Edge of marsh with active beaver colony. Growing in muddy soil along shore and into water.

**Associated species:** *Calla palustris*, *Torreyochloa pallida*, *Glyceria canadense*.

**Phenology:** Flowering.

**Population size:** Sparse.

**Date:** July 23, 2004

**Torreyochloa pallida #3**

**GPS location:** 15T 0579899, UTM 5274351

**Habitat:** Desiccating pool on north side of Dunka Road.

**Associated species:** *Glyceria borealis*, *Scirpus cyperinus*, *Equisetum fluviatile*, *Salix lucida*.

**Phenology:** Flowering.

**Population size:** Sparse.

**Date:** July 23, 2004

**Torreyochloa pallida #4**

**GPS location:** 15T 0580420, UTM 5275584

**Habitat:** Mud flat along Partridge River.

**Associated species:** *Caltha natans*, *Alisma plantago-aquatica*, *Bidens cernua*, *Carex lacustris*, *Cicuta bulbifera*, *Myrica gale*, *Alnus rugosa*, *Spiraea alba*, *Potentilla norvegica*, *Carex aquatilis*, *Callitriche verna*, *Impatiens capensis*.

**Phenology:** Flowering.

**Population size:** 25 ft<sup>2</sup>.

**Date:** July 25, 2004

**Torreyochloa pallida #5**

**GPS location:** 15T 0577778, UTM 5272723

**Habitat:** Desiccating pool in isolated sedge marsh in conifer forest.

**Associated species:** *Sparganium glomeratum*, *Ranunculus gmelinii*, *Galium tinctorum*, *Potamogeton epihydricus*, *Bidens cernua*, *Veronica scutellaria*, *Glyceria grandis*, *Carex rostrata*.

**Phenology:** In flower.

**Population size:** Dense patch about 100 ft<sup>2</sup>.

**Date:** July 30 and August 1, 2004

**Torreyochloa pallida #6**

**GPS location:** 15T 0579007, UTM 5273121

**Habitat:** Mudflat by Partridge River.

**Associated species:** *Callitriche verna*, *Sagittaria* sp., *Glyceria grandis*, *Ranunculus gmelinii*.

**Phenology:** In flower.

**Population size:** 50 ft<sup>2</sup>.

**Date:** July 31, 2004

**Torreyochloa pallida #7**

**GPS location:** 15T 0578795, UTM 5272891

**Habitat:** Muddy bank on Partridge River.

**Associated species:** *Alnus rugosa*, *Equisetum arvense*, *Mimulus ringens*, *Ranunculus pensylvanicus*, *Spiraea alba*, *Thalictrum dasycarpum*.

**Phenology:** Flowering.

**Population size:** 3 feet by 4 feet.

**Date:** July 31, 2004

**Torreyochloa pallida #8**

**GPS location:** 15T 0578832, UTM 5272869

**Habitat:** Mudflat in Partridge River.

**Associated species:** *Eleocharis intermedia*, *Callitriche verna*, *Sparganium chlorocarpum*, *Carex rostrata*.

**Phenology:** Flowering.

**Population size:** 500 ft<sup>2</sup>.

**Date:** July 31, 2004

## Exhibit A

### RARE PLANT SPECIES SURVEY

#### Northmet Project Polymet Mining Corporation

##### 1. Need and Purpose

This rare plant survey to be performed for Barr Engineering, Inc. and Polymet Mining Corporation will provide field data regarding the presence or absence of certain Minnesota Department of Natural Resources (MnDNR) state-listed rare plant species and sensitive plant species identified by the U.S. Forest Service at the Northmet project area (Figure 1). Information gathered by this rare plant survey will assist in the completion of an Environmental Impact Statement necessary for the permitting process for developing an open-pit mine approximately six miles south of Babbitt, Minnesota. Information on the presence, location, population size, and habitat of state-listed rare plant species and species of concern to the U.S. Forest Service is needed in order to facilitate mining plans to minimize potential impacts of mining to those species, and to satisfy requirements of the U.S. Forest Service for exploratory drilling operations.

Several species of rare plants given priority in the search include various species of grapefern and moonwort (*Botrychium* spp.), quill spikerush (*Eleocharis nitida*), Lapland buttercup (*Ranunculus lapponicus*), small yellow water crowfoot (*Ranunculus gmelinii*), and pale false mannagrass (*Torreyochloa pallida*). St. Lawrence grapefern (*Botrychium rugulosum* Wagner, Jr.) and Pale moonwort (*Botrychium pallidum* Wagner, Jr) are listed as “Threatened Species” by the MnDNR. Pale moonwort (*Botrychium pallidum*) and *Botrychium oneidense* are listed as “Endangered Species” by the MnDNR. Prairie moonwort (*B. campestre*) and *B. simplex* are listed as “Species of Special Concern” by the MnDNR. Several rare and sensitive species have been recently discovered near the Northmet site including: *Botrychium simplex*, *Botrychium matricii-folium*, *Eleocharis nitida*, *Torreyochloa pallida*, *Ranunculus gmelinii*, and *R. lapponicus*. Other rare plant species may also be present on the site.

##### 2. Site Description

The Northmet site occupies approximately 2,000 acres of land located in St. Louis County, Minnesota near Babbitt. The site is under active forest management including numerous forest roads and possibly some clear-cut areas. Exploratory drilling operations have been conducted on the site in the past, evidence of which may still be apparent. Habitats on the site include a mix of large wetland complexes and upland forests. There is one stream system apparent stream systems present on the site. Access to the site must be obtained through the Cliffs Erie former LTV Steel Mining Company facility. From the security gate at Cliffs Erie, the Northmet site is arrived at by proceeding east along the Dunka Road to the site.

##### 3. Methods and Procedures

A target plant species list, search protocol, and documentation protocol have been developed.

##### 3A) Target List and its Development

A search of the Minnesota Department of Natural Resources Natural Heritage Inventory database has been conducted, rare species that have been identified in the area will be included on the target list along with rare species known to be present in such habitats present on the site and

sensitive species identified by the U.S. Forest Service. Previous botanical surveys of the site have identified the presence of the species listed in Paragraph 1 in the vicinity of the Northmet site. A preliminary review of aerial photographs and topographic maps showed the presence of potential habitat for one or more state-listed species in addition to the species already mentioned. These could include other species of moonworts and it is possible that one or more species are present. Trails through brushy or wooded areas, shallow water bodies, and forested, shrub, and grassy wetlands may be potential habitat for other listed species.

Based on the habitat types present in combination with previously known occurrences of other listed species within the general area, a target list of species has been developed. This target list includes species most likely to be found in the survey area but any species on the MnDNR list of endangered, threatened, special concern, or tracked species along with those listed as sensitive species by the U.S. Forest Service Superior Forest Region 9 discovered during the survey will be documented.

### Target List

1. St. Lawrence grapefern (*Botrychium rugulosum* Wagner, Jr.)
2. Clubspur orchid (*Platanthera clavellata* Michaux)
3. Floating marsh marigold (*Caltha natans* Pallas)
4. Sooty beakerush (*Rhynchospora fusca* Linnaeus)
5. Quill spikerush (*Eleocharis nitida*)
6. Pale false mannagrass (*Torreyochloa pallida*)
7. Lapland buttercup (*Ranunculus lapponicus*)
8. Small yellow water crowfoot (*Ranunculus gmelinii*)

### Habitat and Phenological Table of Some Target Species

<u>Species</u> <u>Time</u>	<u>Habitat</u>	<u>Best Search</u>
1. St. Lawrence Grapefern	Grassy, brushy areas	Early spring, August
2. Floating Marsh Marigold	Slow streams, pools	All season
3. Lapland Buttercup	Black spruce/cedar swamps	All season
4. Neat Spikerush	Moist sandy soil	Late June onward
5. Sooty Beakerush	Moist sphagnum or peat	July

### **3B) Search Protocol**

Searches will be intensely focused on likely habitats identified from aerial photographs, topographic maps, and wetland maps. The site will first be searched using widely spaced transects. Smaller habitat types located within major vegetation cover types will be intensely searched to locate any rare plant species that may occur in them at times appropriate for their known phenologies

Search intensity varies depending upon the cover type and any previous knowledge of that type to harbor rare species. Uniform upland cover types are typically searched in a cursory fashion using broad sweeping transects but microhabitats, mapped or unmapped, within them are sought out as these may be sites for rare species. Microhabitats within uniform cover types include tree tip-ups, moist depressions, small clearings, and mossy logs and rocks. Uniform lowland or wetland cover

types are searched more intensely partly because minute topographic changes may also mean drastic differences in soil and water chemistry which in turn affects the species composition. Transition zones between cover types or where bodies of water contact other cover types are also examined more carefully as the changes in topography, soil types, and lighting may provide micro-habitats for certain rare species. Some rare species are seral and so disturbed sites such as trails, clearings, and barrens will be examined.

### **3C) Search Timing**

Searches for rare species will begin in late June or early July and continue through August of 2004. Two search phases may be required over the growing season to adequately cover all likely habitats for rare species at times consistent with their phenologies. Pale Moonwort is an ephemeral fern species most easily found in late May to early June. Chances for discovering it are greatly reduced after about June 20 when the fronds begin to yellow and wither and the associated vegetation overtops it. Most other moonworts are also visible at the same time of year. St. Lawrence Grapefern produces semi-evergreen fronds (usually 1 frond per year per plant) that can be found after snowmelt. Fronds typically deteriorate by July. The distinctive shape of this grapefern's pinnae ("leaflets") and unique characters of the leaf margins make it possible to identify St. Lawrence Grapefern from fragmentary remains. Fully formed new fronds of St. Lawrence Grapefern can be found again in August. Tubercled orchid is in full flower in July. Because correct identification of orchids depends upon mature flowers it is essential to search for this orchid species and others at the appropriate times.

Other rare species on the target list have phenologies overlapping with the main species of concern. Sedges and rushes generally are in flower or fruit from mid-July onward as are many species of orchids. The characteristic leaves of Floating Marsh Marigold and Lapland Buttercup make them identifiable throughout the growing season with or without flowers.

- Phase One: From late June through July  
Survey of any likely wetland habitat identified for Floating Marsh Marigold, Lapland Buttercup, rare orchids, sedges, and rushes.  
Identification and preliminary search of likely St. Lawrence Grapefern habitat.  
Report findings within 4 weeks after completion of the field survey.
- Phase Two: Through August (if needed)  
Search of previously identified St. Lawrence Grapefern habitat.  
Report findings within 4 weeks after completion of the field survey.

At least one field meeting with a Barr representative will be needed during the survey time period.

### **3D) Documentation Protocol**

Rare species located and identified will be documented in the following manner:

- a) The site boundaries will be flagged with fluorescently colored flagging tape. The date, abbreviated species name, and investigator's initials will be written on each piece of flagging tape in permanent ink. In the case of single, scattered, or small patches of plants wire markers will also be placed near each.
- b) Location of rare species will be documented with latitude and longitude, UTM, or other known coordinates using a Global Positioning System as well as with standard quarter-quarter section legal descriptions.



- c) Photographs of rare species and their habitat will be taken.
- d) Data on phenology, habitat, associated species, population size, and condition will be collected.
- e) When appropriate, a voucher specimen will be collected and deposited in a recognized herbarium.
- f) In cases of uncertain identifications, researchers and authorities of the particular taxa in question will be contacted to assist in species identification.
- g) All discoveries of listed species will be immediately reported to representatives of Barr Engineering.

#### **4) Deliverables**

Preliminary reports will be provided within four weeks following the completion of each phase of the field survey. The report will include a listing of rare species found; latitude and longitude coordinates for each siting; photographs of all rare species found; and data on their phenology, population size and condition. A final report documenting the findings of the botanical survey will be provided within 4 weeks following the completion of the Phase 2 survey if it is needed. The report will include all information described in Paragraph 3.

#### **5) Compensation**

Compensation for the services described will be time and expenses based on the billing rates included herein. Labor will be billed at a rate of \$50/hour for Gary Walton, \$35/hour for Kiff Samuelson, and \$20/hour for Laura Novitzky. Expenses will be billed based on actual expenses documented with receipts. Mileage will be paid at the prevailing federal rate of \$0.345/mile. It is anticipated that the Phase 1 survey of the project area shown on Figure 1 (approximately 1,000 acres) will require approximately 10-15 field days for the team of two to complete.