

Appendix C

VEGETATION AND RARE PLANT SURVEY REPORTS

RARE AND ENDANGERED VASCULAR PLANTS SURVEY

Property :

Bog 524 (NB-DNR Inventory)
Lease # 9

Applicant/Proponent:

Scotts Canada Ltd. (Heveco)
156 Covedell Road
Tabusintac, NB
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I hereby certify having completed the field work and produced the report describing the situation on this property.



Hélène Gautreau-Daigle, BSc



Jean-Yves Daigle, PhD

Sept 2, 2016
Date

2016-09-02
Date

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1.0 INTRODUCTION

Among the vascular plants considered rare or endangered in the province of New Brunswick, several species are known to inhabit bogs. The New Brunswick Department of the Environment and Local Government therefore requires that all peatland development projects be preceded by a botanical survey to assess the presence or absence of rare or endangered vascular plant species and to document the plant communities present on the peatland. This requirement aims to protect species at risk and conserve plant diversity in the province.

This report documents a rare and endangered vascular plants survey requested by Mr. René Duguay, Site Manager, Scotts Canada Ltd in conjunction with the Bog 524 (Heveco) development project. Field work was conducted by H el ene Gautreau-Daigle and Dr. Jean-Yves Daigle, wetland consultants, in August, 2016. A first survey was carried out on the site over 3 days in June to search specifically for the Southern twayblade *Listera australis*, which is described in a separate report submitted on July 18th, 2016.

2.0 SITE DESCRIPTION

Bog 524 in the NB-DNR Inventory is an extensive ombrotrophic bog located 2 km southeast of Tabusintac, Northumberland County, off Route 11 at Covedell (47°18'00"N and 64°59'12"W). Access is from Covedell Road. Peat extraction activities have been taking place on the bog since 1962 by Heveco Ltd.. The company was acquired by Scotts Canada in 2014 with 240 ha presently open for extraction. The projected expansion includes conversion of block-cut surfaces to vacuum harvesting and opening natural areas for vacuum harvesting and vegetation borrow areas for future peatland restoration, as per the Peatland 524 Development project 2016 EIA, Development Plan Maps 2A and 2B.

Several areas located all over the bog totalling approximately 360 ha are slated for development in the next five years and beyond. Most of the projected development areas are either covered with natural vegetation or are old block-cut areas. Numerous ponds occur mainly in the central area of the bog, which has several raised domes.

3.0 METHODOLOGY

The field survey method used is described in *A Guide to Environmental Impact Assessment in New Brunswick. Appendix 2: Recommended Methods for the Surveying of Vascular Plants at Risk (Rare, Threatened, Regionally Endangered or Endangered) for EIA or Similar Studies* by the New Brunswick Department of the Environment. The list of rare and vulnerable vascular plant species was obtained from the document *General Status of Wildlife in New Brunswick : Vascular plants*, version 2010 (GSWNB) by the New Brunswick Department of Natural Resources. Rare species information was also obtained from a Data Report for the area produced by the Atlantic Conservation Data Centre (ACCDC) which is included in Appendix A.

The present rare plant survey took place on August 2nd, 3rd, and 9th, 2016. The survey was conducted on foot on day 1 and with a Bombardier Snow Cat for transportation on days 2 and 3. Actual distance covered was approximately 25 km and survey time was 21 hours per person by two persons. Transportation, coordinated by site Resource Manager Jean-Luc David, greatly facilitated access to the survey sites and helped to cover the terrain more effectively.

All sectors with natural vegetation which are projected for development were surveyed in order to search for rare or vulnerable plant species and conduct an inventory of the vascular flora. The survey paths are illustrated in Appendix B, Figure 1.

A number of photographs illustrate several of the sectors and habitats which were surveyed; these are located in Appendix B and are presented in the same general order as the descriptions in section 4.0.

4.0 DESCRIPTION OF VEGETATION ON SECTORS TO BE DEVELOPED

4.1 Sector 1a (58.48 ha)

Located near the southeast edge of the bog, this sector slopes gently in a northwesterly direction from a dome which straddles sectors 1a and 1b. Terrain is open flat to hummocky with a dense cover of low to medium ericaceous shrubs and scattered stunted black spruce thickets. There are few ponds. The southern edge has tall ericaceous shrub cover on relatively dry ground; there is no wet lagg area as is often the case near bog margins. Main shrub species are black huckleberry (*Gaylussacia baccata*), sheep laurel (*Kalmia angustifolia*), leatherleaf (*Chamaedaphne calyculata*), Labrador tea (*Ledum groenlandicum*) and rhodora (*Rhododendron canadense*). Main tree species are black spruce (*Picea mariana*), with larch (*Larix laricina*) and occasional white and jack pines (*Pinus strobus* and *P. banksiana*). Herb cover is sparse in the dense shrubs with mostly white and tussock cotton-grasses (*Eriophorum angustifolium* and *E. vaginatum*) and cloudberry (*Rubus chamaemorus*), while around ponds, white beak-rush (*Rhynchospora alba*), tawny cotton-grass (*Eriophorum virginicum*), horned bladderwort (*Utricularia cornuta*), round-leaved and narrow-leaved sundews (*Drosera rotundifolia* and *D. intermedia*) are the most frequent species on sphagnum ground cover.

4.2 Sector 1b (38.66 ha)

Located adjacent to and southeast of sector 1a, sector 1b is on the edge of the bog and has 2-3 m cliffs along its southern edge which borders Tabusintac Bay. Sloping gently in a southeasterly direction, most of the area has dense ericaceous shrub cover similar in composition to sector 1a, with either large expanses of flat terrain covered with low shrubs or hummocky areas with low to medium shrubs. Notable in this sector is the presence of two bog birch shrubs (*Betula pumila*), which is a rare but secure species. Herbs are similar to sector 1a as is vegetation around the few ponds, except for the presence of a small colony of Five-nerve cotton-grass (*Eriophorum tenellum*), an uncommon species, at the edge of one pond. A few non-bog species such as bunchberry (*Cornus canadensis*), fireweed (*Epilobium angustifolium*) and dusty miller (*Artemisia stelleriana*) grow near the cliff edges.

4.3 Sector 2 (37.37 ha)

This sector is located in the northeastern part of the bog and has a dome in its northeastern part, from which terrain slopes down gently in all directions. The large relatively dry dome area has dense low ericaceous shrub cover and much lichen ground cover. Away from the dome, shrubs are low to medium height with black spruce thickets. Main shrubs are of the same species as described in previous sectors. One bog birch shrub was also found in this sector. Herbs are generally sparse and are of similar species composition as previous sector. There are numerous ponds and area around these is generally wet and densely covered with low shrubby vegetation, comprised mostly of leatherleaf, dwarf huckleberry (*Gaylussacia dumosa*) and bog-rosemary (*Andromeda glaucophylla*), with white beak-rush, horned bladderwort and narrow-leaved sundew, often extending into the water. Tawny cotton-grass is also common but less abundant. All ponds have very little aquatic vegetation limited to bullhead lily.

4.4 Sector 9b (24.88 ha)

Located on the western side of the bog, a dome straddles this sector and adjacent sector 9a. Terrain slopes down westwards very noticeably from the dome towards a wide wet area which borders a narrow stream which flows all along the western side of the sector. The wet area is very soft and unstable and is covered with tall dense rhodora and sweet gale (*Myrica gale*) thickets nearer the stream, which has no aquatic vegetation. There are few ponds. The eastern side is densely covered with low to medium ericaceous shrubs with stunted black spruce thickets and terrain is dry, with much lichen ground cover. Shrub and herb composition is similar to previous sectors, except for the presence of a small colony of chamisso's cotton-grass (*Eriophorum chamissonis*) on a wet patch, a rare but secure species.

4.5 Sector 9a (17.21 ha)

This sector is adjacent to 9b, its eastern side bordering an actively harvested area. Terrain slopes very gently eastwards from the dome with dense low ericaceous shrub cover, sparse herbs and dry ground with much lichen. Shrub and herb composition is similar to previous sectors. There are several ponds, some of which are quite large, in the central area. Vegetation is similar to that around pools in other sectors. These are surrounded by wet terrain, again with similar shrub cover. On the eastern side, terrain is hummocky with low to medium shrub cover and black spruce thickets.

4.6 Sector 10 (21.53 ha)

Located adjacent to and south of sector 13 south, the northern part of this sector is on a dome which straddles both sectors. Terrain slopes down gently towards the south and east. Terrain is generally dry and dominant vegetation is a cover of low to medium ericaceous shrubs with scattered stunted black spruce thickets and sparse herbs. Shrubs and herbs are similar to those found on other sectors. There are no ponds.

4.7 Sector 13 north (11.64 ha)

This sector is located on the western side of the bog to the north and is separated from the developed area to the east by a strip of bog on private property. Terrain is

generally dry and hummocky, with dense low to medium ericaceous shrub cover and sparse herb cover, all of similar species as previously described, with scattered black spruce trees and shrub thickets. There are very few small ponds and these also are similar to those in other sectors.

4.8 Sector 13 south (6.18 ha)

This sector is separated from sector 13 north by a stream and associated wet area which has unstable terrain. From the stream, terrain rises to a dome which straddles this and adjacent sector 10. Terrain is generally dry and vegetation cover is dense low to medium height ericaceous shrubs, as in sector 13 north; species composition is also the same. There are no ponds.

4.9 Sector 14 (19.52 ha)

Located on the west side, adjacent to the central area of the bog which has many ponds and wet unstable terrain, this sector also has several ponds and generally wet flat terrain. Vegetation is mostly low dense ericaceous shrubs with scattered spruce thickets and sparse herbs. General species composition is similar to other sectors, however next to some larger ponds, there are sparse deer grass (*Trichophorum cespitosus*) lawns with several colonies of northern yellow-eyed grass (*Xyris montana*), an uncommon species which was not found elsewhere on the bog. Other vegetation is similar to that of other ponds all over the bog.

4.10 Sector 15 (12.02 ha)

Located northwest of a private conservation area on the eastern side of the bog, this sector has several areas of wet terrain dispersed across it but only a few pools. Terrain is hummocky and slopes down gently in a northwesterly direction and vegetation is mostly dense ericaceous low to medium shrubs with scattered black spruce thickets, the wet areas having ground to low shrubs. Shrub and herb species composition is largely the same as elsewhere, with the addition of water bulrush (*Schoenoplectus subterminalis*), a common aquatic plant, in some of the ponds.

4.11 Sector 18 (23.28 ha)

Located in the center of the bog this sector has flat hummocky generally wet terrain and a few ponds, some large, in the central area. Vegetation is here again dominated by a dense cover of low to medium ericaceous shrubs with scattered black spruce thickets. Dwarf huckleberry is a major constituent near the ponds along with the other aforementioned shrub species. Herbs in and around the ponds is also similar to most other ponds, with the addition of water bulrush.

* Low shrubs: includes low shrubs (0.1-0.5 m) and ground shrubs (<0.1 m).

* Medium shrubs: 0.5-1.5 m

* Tall shrubs: >1.5 m

From: *The Canadian Wetland Classification System*

A list of all vascular plants which were observed per sector during the site visits is located in Appendix C, while the relative abundance per species is located in Appendix D.

5.0 RESULTS

The majority of vascular plants in the study area were found to be common species, readily identifiable in the field; however, some specimens were collected in order to confirm identification. All unknowns were ruled out as rare or endangered species.

ACCDC Data Report 5572 for Tabusintac, NB shows the 5 km buffer around the study area contains records of 15 rare and/or protected vascular plant species, 9 of which occur in salt marshes and 6 occurring in bogs. Five of the species occurring in bogs were observed during the survey, as described below.

- 1- Bog, low or swamp birch (*Betula pumila*)
 - Found in sectors 1b and 2
 - According to ACCDC report: Prov. Rarity rank: S3 Prov.GS rank: 4 Secure
 - According to GSWNB: Secure (2001)

- 2- Russet, rusty or chamisso's cotton-grass (*Eriophorum chamissonis* or *russeolum*)
 - Found in sector 9b
 - According to ACCDC report: Prov. Rarity rank: S3 Prov.GS rank: 4 Secure
 - According to GSWNB: Secure (2007)

- 3- White-fringed orchid *Platanthera blephariglottis*
 - Found in sector 1a and northwest of 1a, outside areas to be developed
 - According to ACCDC report: Prov. Rarity rank: S3 Prov.GS rank: 4 Secure
 - According to GSWNB: Secure (2005)

- 4- Cloudberry or bake-apple (*Rubus chamaemorus*)
 - Found in all sectors
 - According to ACCDC report: Prov. Rarity rank: S3 Prov.GS rank: 4 Secure
 - According to GSWNB: Secure (2003)

- 5- Northern yellow-eyed-grass (*Xyris montana*)
 - Found in sector 14
 - According to ACCDC report: Prov. Rarity rank: S3 Prov.GS rank: 4 Secure
 - According to GSWNB: Secure (2001)

All of these species are presently considered uncommon but secure in the province, according to GSWNB and ACCDC. None of the species listed in the ACCDC report 100 km limit around the study area were observed.

SRANK Subnational (Provincial) Rarity Rank of taxon (from ACCDC report):

SX Extinct or extirpated in province

SH Historically occurring but currently undetected in province

S1 Extremely rare in province

S2 Rare in province

S3 Uncommon in province

S4 Widespread, common and apparently secure in province

S5 Widespread, abundant and demonstrably secure in province
SE Exotic in province
SA Accidental, infrequent and outside of range within province
SNA Ranking not applicable in province
SNR Not yet assessed in province

6.0 CONCLUSION

According to the information gathered during the rare and endangered plant survey held on Bog 524, an ombrotrophic peatland located near Tabusintac, Northumberland County, NB, on August 2nd, 3rd, and 9th, 2016, none of the species at risk listed in the *General Status of Wildlife in New Brunswick : Vascular plants* were found to be present. Five of the species listed in the ACCDC data report 5 mile buffer around the study area were observed on the bog, however, all of these are presently considered uncommon but secure. Essentially all other vascular plant species observed are common and typical of ombrotrophic bogs. Presence of the endangered species Southern twayblade *Listera australis* was confirmed in an earlier survey in June 2016 in the forest adjacent to the northern edge of the bog. The survey results for this species are in a separate report.

7.0 REFERENCES

- Atlantic Conservation Data Centre, 2016. Data Report 5572, Tabusintac, NB.
- Hinds, H.R. 2000. Flora of New Brunswick. Biology Dept., University of New Brunswick. Robinson and Greenwood Graphic Design Ltd., Fredericton, NB.
- New Brunswick Department of Environment (2007). A Guide to Environmental Impact Assessment in New Brunswick. Appendix 2: Recommended Methods for the Surveying of Vascular Plants at Risk (Rare, Threatened, Regionally Endangered or Endangered) for EIA or Similar Studies
- New Brunswick Department of Natural Resources. (2010). General Status of Wildlife in New Brunswick : Vascular plants.
- Warner, BG and CDA Rubec, editors, 1997. The Canadian Wetland Classification System, Second Edition. Wetlands Research Centre, University of Waterloo, Waterloo, ON.

APPENDIX A

**ATLANTIC CANADA CONSERVATION DATA CENTRE
DATA REPORT 5572: TABUSINTAC, NB**

PREPARED 6 JULY 2016

APPENDIX B

FIGURE AND PHOTOS

RARE AND ENDANGERED VASCULAR PLANTS SURVEY

BOG 524

TABUSINTAC, NORTHUMBERLAND CO., NB

APPENDIX B: FIGURE AND PHOTOS
RARE AND ENDANGERED VASCULAR PLANTS SURVEY

Bog 524

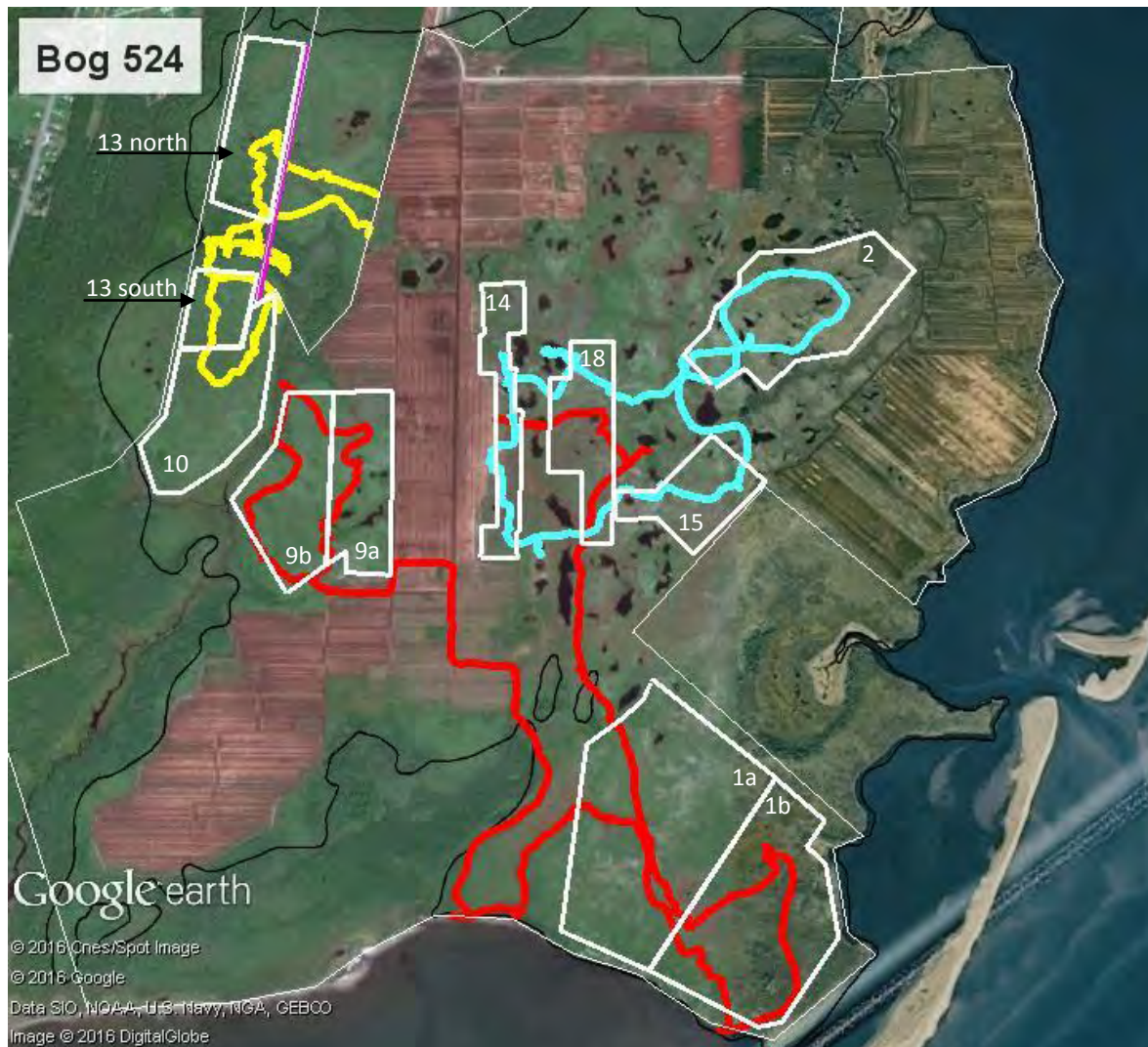


Figure 1: Map showing sectors to be developed (white polygons) and survey paths for day 1 (yellow), day 2 (red) and day 3 (blue).



Figure 2: Sector 1a showing dense ericaceous shrub cover.



Figure 3: White fringed orchid *Platanthera breviligulata* was found in sector 1a and northwest of sector 1a outside areas to be developed.



Figure 4: Sector 1b showing dense shrub vegetation to the edge of the cliff on Tabusintac Bay.



Figure 5: One of two bog birch *Betula pumila* shrubs found on sector 1b.



Figure 6: Sector 9b showing dense ericaceous shrubs with scattered black spruce thickets.



Figure 7: Dense rhodora thicket on unstable ground bordering a stream on the western edge of sector 9b with sector 10 in the background.



Figure 8: Pond on sector 9a with surrounded by dense shrub vegetation.



Figure 9: View of sector 10 showing a uniform dense low to medium shrub cover.



Figure 10: Sector 13 south showing sloping shrub-covered terrain looking towards the dome.



Figure 11: Sector 14 showing wet terrain near a pond with sparse ground shrubs and prominent sphagnum.



Figure 12: Sparse deer grass lawn with northern yellow-eyed-grass *Xyris montana* in bloom on wet terrain in sector 14 (tiny yellow flowers).

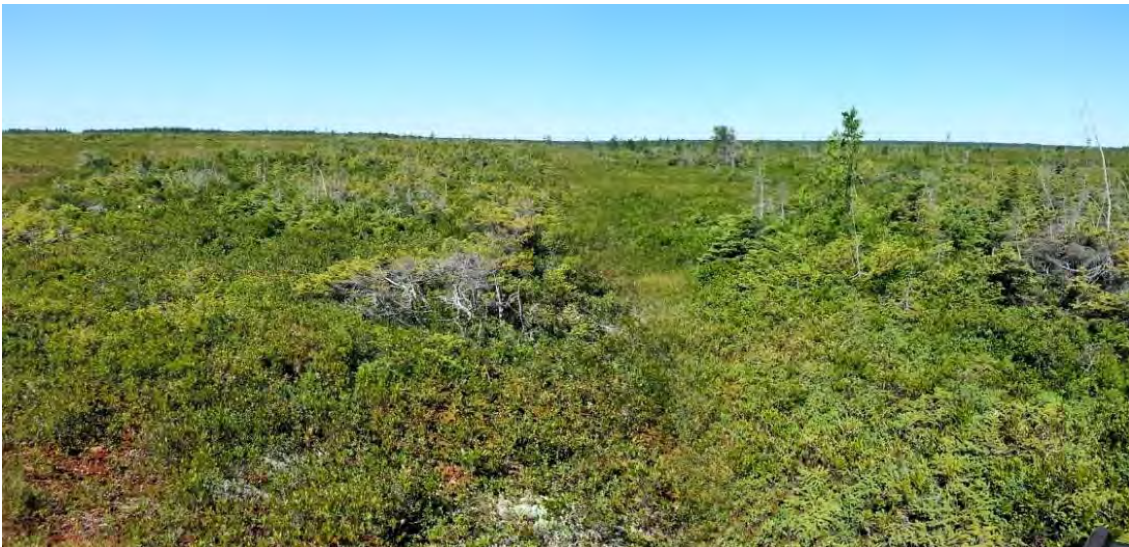


Figure 13 : Sector 15 showing dense ericaceous shrubs and black spruce thickets on hummocky terrain.

APPENDIX C

LIST OF VASCULAR PLANTS OBSERVED PER SECTOR TO BE DEVELOPED

RARE AND ENDANGERED VASCULAR PLANTS SURVEY

BOG 524

TABUSINTAC, NORTHUMBERLAND CO., NB

Sectors	1a	1b	2	9a	9b	10	13N	13S	14	15	18
<i>Sarracenia purpurea</i>	x	x	x	x	x	x	x	x	x	x	x
<i>Schoenoplectus subterminalis</i>										x	x
<i>Thuja occidentalis</i>							x			x	x
<i>Trichophorum cespitosum</i>	x	x	x	x		x	x	x	x	x	x
<i>Utricularia cornuta.</i>	x	x	x	x			x		x	x	x
<i>Vaccinium angustifolium</i>	x	x	x	x	x	x	x	x		x	
<i>Vaccinium oxycoccos</i>	x	x	x	x	x		x		x	x	x
<i>Viburnum nudum</i>		x		x	x					x	x
<i>Xyris montana</i>									x		

** A large quantity of white fringed orchid *Platanthera breviligulata* (>150 individuals) was observed northwest of sector 1a.

P: Probably present but overlooked and included with *Gaylussacia baccata*.

APPENDIX D

LIST OF VASCULAR PLANTS OBSERVED AND THEIR RELATIVE ABUNDANCE

RARE AND ENDANGERED VASCULAR PLANTS SURVEY

BOG 524

TABUSINTAC, NORTHUMBERLAND CO., NB

APPENDIX D

**LIST OF VASCULAR PLANTS OBSERVED AND THEIR RELATIVE ABUNDANCE
RARE AND ENDANGERED VASCULAR PLANTS SURVEY**

Bog 524

This list includes all of the vascular plant species observed during the survey. The abundance of each species is indicated according to the following criteria:

- a - Rare at this site; only one or two populations observed *
- b - Three or more populations observed; mostly scattered
- c - Uncommon at this site, but found occasionally throughout
- d - Observed consistently throughout, but coverage may not be large
- e - Commonly found throughout, often with considerable coverage

Scientific Name	Common Name	Relative Abundance
<i>Acer rubrum</i>	Red maple	c
<i>Andromeda glaucophylla</i>	Bog-rosemary	d
<i>Arethusa bulbosa</i>	Swamp-pink, arethusa	a
<i>Artemisia stelleriana</i>	Dusty miller	a
<i>Betula papyrifera</i>	Paper or white birch	b
<i>Betula populifolia</i>	Grey birch	b
<i>Betula pumila</i>	Bog, low or swamp birch	a
<i>Calamagrostis canadensis</i>	Blue-node	a
<i>Calopogon tuberosus</i>	Grass-pink	a
<i>Chamaedaphne calyculata</i>	Leatherleaf	e
<i>Cornus canadensis</i>	Bunchberry	a
<i>Cypripedium acaule</i>	Pink lady's slipper	b
<i>Drosera intermedia</i>	Narrow-leaved sundew	c
<i>Drosera rotundifolia</i>	Round-leaved sundew	d
<i>Empetrum nigrum</i>	Black crowberry	d
<i>Epilobium angustifolium</i>	Fireweed	a
<i>Eriophorum angustifolium</i>	White or tall cotton-grass	d
<i>Eriophorum chamissonis or russeolum</i>	Russet, rusty or chamisso's cotton-grass	a
<i>Eriophorum tenellum</i>	Five-nerve cotton-grass	a
<i>Eriophorum vaginatum</i>	Tussock cotton-grass	d
<i>Eriophorum virginicum</i>	Tawny cotton-grass	d
<i>Gaylussacia baccata</i>	Black huckleberry	e
<i>Gaylussacia dumosa</i>	Dwarf or bog huckleberry	d
<i>Kalmia angustifolia</i>	Sheep laurel	e
<i>Kalmia polifolia</i>	Pale or bog laurel	d

<i>Larix laricina</i>	Larch or tamarack	d
<i>Ledum groenlandicum</i>	Labrador tea	d
<i>Maianthemum trifolium</i>	Three-leaved false solomon's seal	a
<i>Myrica gale</i>	Sweet gale	e
<i>Nemopanthus mucronata</i>	Mountain-holly	d
<i>Nuphar variegata</i>	Bullhead-lily	c
<i>Osmunda cinnamomea</i>	Cinnamon fern	a
<i>Photinia melanocarpa</i>	Black chokeberry	c
<i>Picea mariana</i>	Black spruce	e
<i>Pinus banksiana</i>	Jack or scrub pine	c
<i>Pinus strobus</i>	White pine	d
<i>Platanthera breviligulata</i>	White fringed orchid	b
<i>Rhododendron canadense</i>	Rhodora	e
<i>Rhynchospora alba</i>	White beak-rush	d
<i>Rubus chamaemorus</i>	Bakeapple or cloudberry	d
<i>Sarracenia purpurea</i>	Pitcher-plant	d
<i>Thuja occidentalis</i>	Eastern white cedar	b
<i>Trichophorum cespitosum</i>	Deer-grass	d
<i>Schoenoplectus subterminalis</i>	Water or swaying bulrush	b
<i>Utricularia cornuta.</i>	Horned bladderwort	d
<i>Vaccinium angustifolium</i>	Lowbush or late sweet blueberry	c
<i>Vaccinium oxycoccos</i>	Small or bog cranberry	d
<i>Viburnum nudum</i>	Wild-raisin	c
<i>Xyris Montana</i>	Northern yellow-eyed-grass	a

* In this list, "Rare" applies only to the abundance of a particular species in the area surveyed and thus can be applied to a common species which was only observed once or twice in the survey area.

**SURVEY FOR THE RARE AND ENDANGERED VASCULAR PLANT SPECIES
LISTERA AUSTRALIS (SOUTHERN TWAYBLADE)**

Property :

Bog 524 (NB-DNR Inventory)

Lease # 9

Applicant/Proponent:

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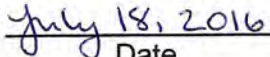
I hereby certify having completed the field work and produced the report describing the situation on this property.



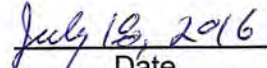
Hélène Gautreau-Daigle, BSc



Jean-Yves Daigle, PhD



Date



Date

1.0 INTRODUCTION

This report documents a survey to determine the presence or absence of the southern twayblade *Listera australis*, a herb which is on the rare and endangered plant list in the province of New Brunswick. This survey was requested by Mr. René Duguay, Site Manager, Scotts Canada Ltd (Heveco), in conjunction with the Bog 524 development project.

The survey was conducted as one of the requirements of the environmental impact assessment requested by the New Brunswick Department of the Environment and Local Government (ELG) for the bog development project.

Field work was conducted by H  l  ne Gautreau-Daigle and Dr. Jean-Yves Daigle, wetland consultants, on June 23, 24 and 27th, 2016.

2.0 SITE DESCRIPTION

Bog 524, in the NB-DNR Inventory, is an ombrotrophic bog located 2 km southeast of Tabusintac, Northumberland County, off Route 11 at Covedell (47°18'00"N and 64°59'12"W). Access is from Covedell Road. Peat extraction activities have been taking place on the bog since 1962 by Heveco Ltd.. The company was acquired by Scotts Canada in 2014 with 240 ha presently open for extraction. The projected expansion includes conversion of block-cut surfaces to vacuum harvesting and opening natural areas for vacuum harvesting and vegetation borrow areas for future peatland restoration, as per the Peatland 524 Development project 2016 EIA, Development Plan Maps 2A and 2B.

Several areas, located all over the bog, are slated for development in the next five years and beyond, totalling approximately 360 ha. Most of the projected development areas of the bog are either covered with rather dense low to medium-high ericaceous shrubs with stunted black spruce *Picea mariana* and larch *Larix laricina* shrubs and trees or are old block-cut areas, which do not have habitat suitable to the southern twayblade. Several areas, however, are near to or adjacent to the bog-forest transition area and a desk estimate indicated approximately 15 km along this bog-forest edge could potentially have suitable habitat.

3.0 METHODOLOGY

Since the present survey concerned only *Listera australis*, the survey method was adapted to finding this particular species.

Habitat:

Belonging to the Orchid family, southern twayblade typically grows on a carpet of sphagnum mosses, often accompanied by the herbs three-leaved false Solomon's seal *Maianthemum trifolia*, three-seeded sedge *Carex trisperma*, few-flowered sedge *Carex pauciflora* and white-fringed orchid, *Platanthera blephariglottis*. Ericaceous shrub cover typically occurs in patches and tree cover, consisting mainly of black spruce *Picea mariana*, is fairly open.

According to provincial authorities on the subject, southern twayblade has mostly been observed near the margins of ombrotrophic peat bogs, where the open bog to surrounding forest transition was fairly abrupt. It has generally been found within a 10 meter zone, either in

the bog or the surrounding woods and has not been found beyond this transition area further into the bog.

Survey timing:

The survey window in NB for this plant is considered to be between mid-June and no later than mid-July, however, specific timing may vary according to location and climatic conditions in a given year. Survey timing is critical, since the plant is difficult to detect in the best of conditions and it virtually disappears by mid-July.

Field experience with the plant, which is considered mandatory, was obtained in 2012 and 2013 following contacts with Maureen Toner (ELG) and Stuart Lusk (DNR), provincial authorities on the subject. Several southern twayblade specimens were observed in late May, 2012 and in late June, 2013 in Kent County, NB.

During the present survey, several plants, which in past experience have been seen to bloom at approximately the same time as southern twayblade, such as three-leaved false Solomon's seal and pink lady's slipper, were observed to be in bloom, thus suggesting that survey timing was appropriate.

Survey procedure:

According to the development plan map (June, 2016) provided by René Duguay, there appeared to be approximately 15 km of potential habitat which needed to be field verified. These were located along the northern edge of the bog, all along the western side and along the western part of the southern edge. The bog ends in peat cliffs all along the eastern side, with no suitable habitat.

The survey was conducted on foot over three days, following the route shown in Figure 1. Actual distance covered was approximately 11 km and survey time was 21 hours per person by two persons. Transportation by tractor on days 1 and 2 and by Bombardier Snow Cat on day 3, coordinated by site Resource Manager Jean-Luc David, greatly facilitated access to the survey sites.

During the survey, bog-forest transition habitat was verified for appropriate-looking vegetation assemblages. When present, these were searched closely by following meandering paths and searching closely near the ground. In these areas dominant herbs were three-leaved false Solomon's seal and three-seeded sedge *Carex trisperma*, with frequent occurrences of pink lady's slipper *Cypripedium acaule*. Ericaceous shrub cover was sparse or patchy and tree canopy, consisting of black spruce and larch, was relatively open. The ground cover in all areas consisted of a carpet of sphagnum mosses and ground was very wet.

4.0 RESULTS

On day 1 of the survey, the northern forest-bog edge was explored and found to have much suitable habitat within the forest only. Careful search turned up four specimens of the southern twayblade in full bloom. These were located in a clearing within the woods, 30 meters from the bog edge, on a wet sphagnum moss carpet with abundant three-leaved false Solomon's seal and sparse rhodora *Rhododendron canadense* and sheep laurel *Kalmia angustifolia*.

Surrounding trees consisted of black spruce and larch *Larix laricina*. All southern twayblade specimens occurred within a three-foot radius. Location coordinates were provided to ELG as per requirement. Figure 2 shows a close-up of the general area where the sightings were made and Figures 3 to 5 show specimens and their habitat.

On day 2, the survey path followed the southwestern and southern edges of the bog. Very little suitable habitat was found to occur. Forests surrounding the bog were found to be dry with mostly sparse upland ground vegetation, such as bunchberry *Cornus canadensis*, american starflower *Trientalis borealis*, goldthread *Coptis trifolia* and wild lily-of-the-valley *Maianthemum canadense*. Trees were very large indicating generally well-drained conditions. Black spruce and larch were the dominant species, with few deciduous species, such as grey birch *Betula populifolia*. The bog-forest transition areas were densely covered with medium to tall ericaceous shrubs with little or no sphagnum cover in many places. No southern twayblade observations were made.

On day 3, the northwestern bog edge was explored. The bog-forest transition areas consisted of dense medium to tall ericaceous shrub vegetation with no suitable southern twayblade habitat. The adjacent forest was found to be generally dry with sparse upland ground vegetation and tall coniferous trees, as seen on day 2, with very little wet patches conducive to the presence of southern twayblade. No observations of the plant were made.

5.0 CONCLUSION

A survey on foot of all potentially suitable habitat in the bog-forest transition areas of the proposed development areas of Bog 524, an ombrotrophic peatland located near Tabusintac, Northumberland Co., NB, was carried out on June 23, 24 and 27th, 2016. This survey revealed the presence of the southern twayblade *Listera australis* in the forest adjacent to the northern edge of the bog. Four specimens in full bloom were found approximately 30 meters from the bog edge on a wet forest site. A 50m buffer zone around the site is indicated on Figures 1 and 2 to show location. All other survey areas along the western and southern edges of the bog were mostly found to be devoid of suitable habitat and no further southern twayblade observations were made. The Atlantic Canada Conservation Data Report (ACCDC) for the Tabusintac area indicated the closest sighting at 54 km south of Bog 524.

6.0 REFERENCES

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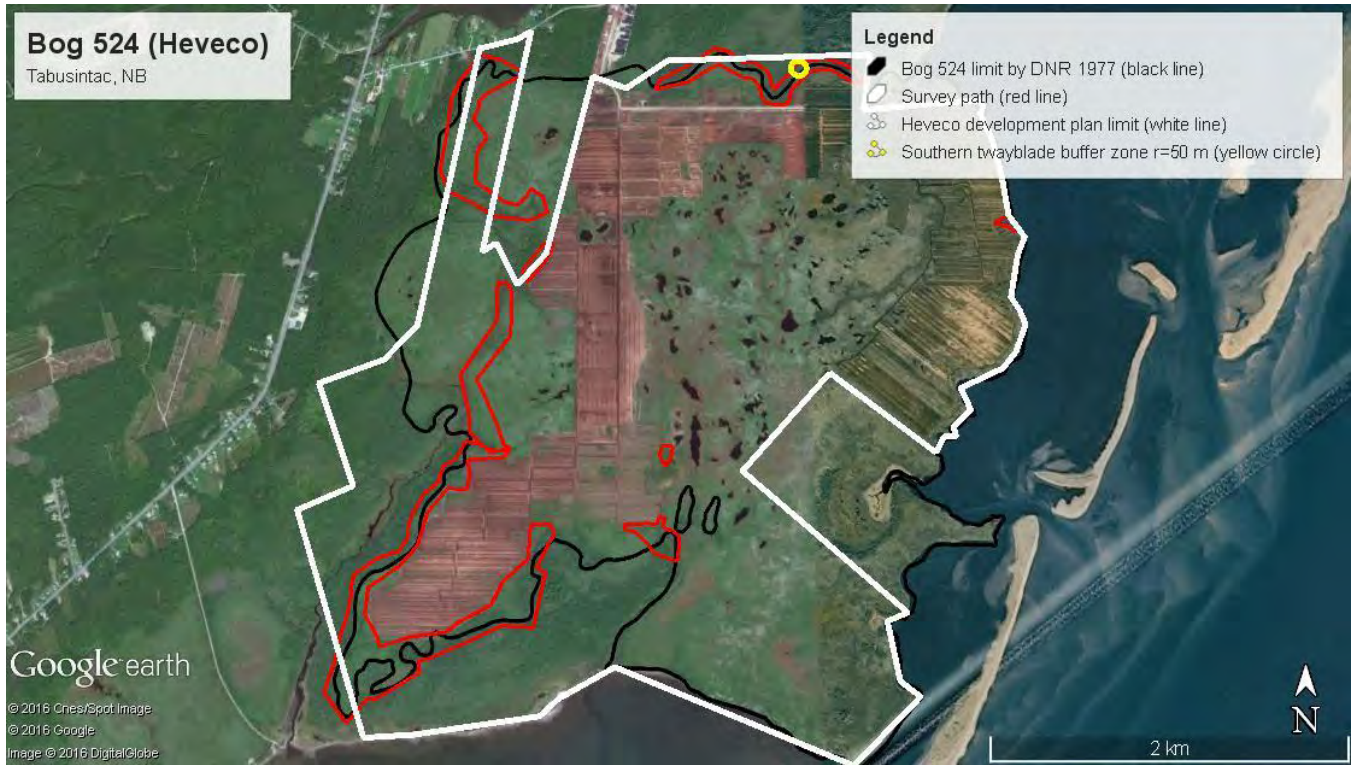


Figure 1: Map showing bog limit, development plan limit, survey path and location of southern twayblade sighting (Google Earth 2011 background).

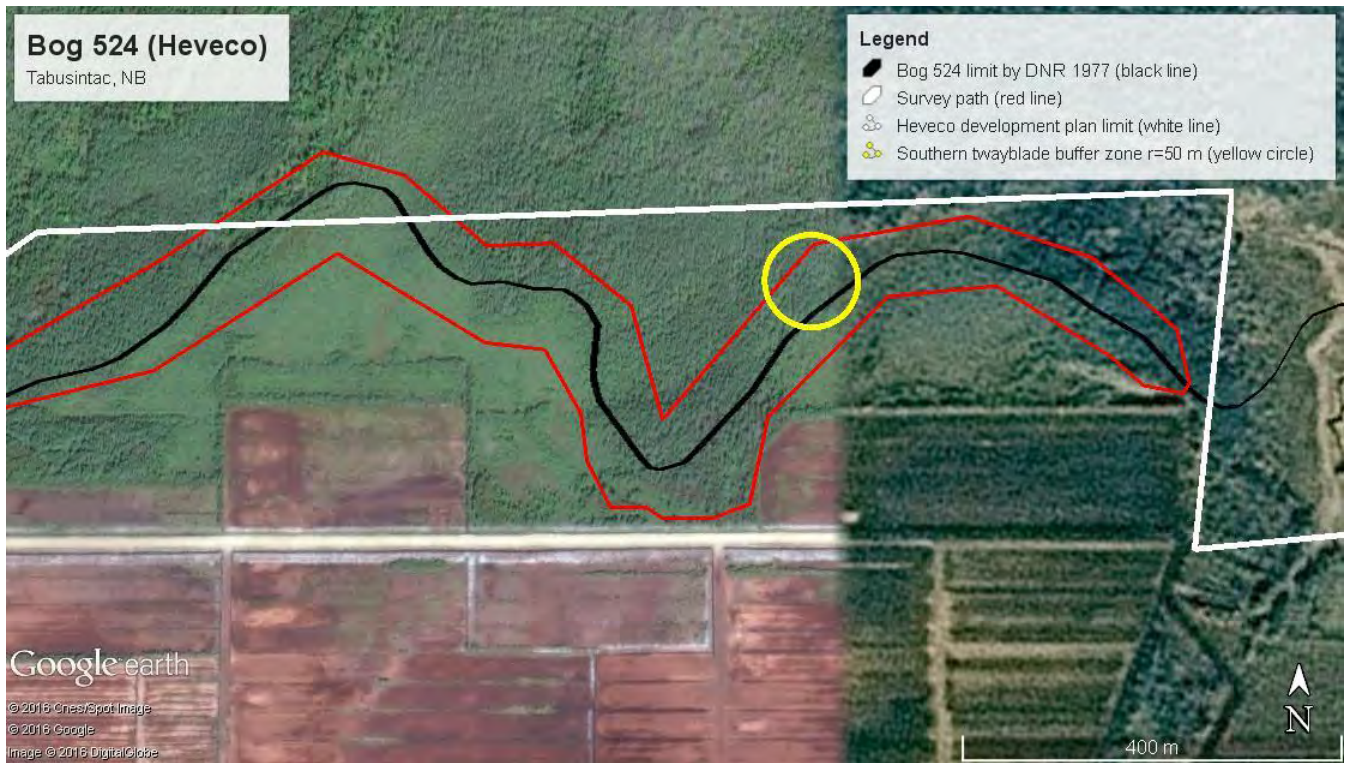


Figure 2: Close-up of the northern area of the bog-forest transition area where the southern twayblade was sighted.



Figure 3: Southern twayblade specimen showing flowers in full bloom.



Figure 4: Single southern twayblade flower showing typical shape of lip petal (scale: 8 mm between lines).



Figure 5: Single southern twayblade specimen showing surrounding habitat.

