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Eli Nasogaluak
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Environmental Impact Review Board
204-107 Mackenzie Road
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August 23, 2012 [VIA EMAIL]

Dear Mr. Nasogaluak:

Re: Additional Information – Association of Harvested Plants with Vegetation Classes

On August 22-23, the Environmental Impact Review Board held Technical Sessions for the Review of the proposed Inuvik to Tuktoyaktuk Highway Project. During the meeting the Developer team was asked about the association of known occurrences of harvested plants in the Project study area, and the association of these harvested plants with the mapped vegetation classes as presented in the Preliminary Vegetation Report provided by KAVIK-STANTEC April 18, 2012.

The following provides information additional to the response provided at the Technical Sessions:

The vegetation classes identified in the Preliminary Vegetation Report for the Inuvik to Tuktoyaktuk Highway are appropriately based on vegetation classification completed in support of the environmental assessment of the Mackenzie Gas Project. KAVIK-STANTEC is providing this referenced document in Attachment A of this letter: *Volume 3; Part D; Section 9.3 of the Environmental Impact Statement for the Mackenzie Gas Project*.[1] This document provides summaries of species types and percent cover within each of the vegetation classes of the Tundra Ecological Zone. These include species that have been identified as being harvested in the Project study area.

[1] Imperial Oil Resource Ventures Limited. 2004. Mackenzie Gas Project Environmental Impact Statement, Volume 3: Biophysical Baseline, Part D – Terrestrial Resources, Soils, Landforms, Permafrost and Vegetation.

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Plant species known to be harvested in the Project study area are summarized in two reports already filed with the EIRB:

- *Summary of Existing Traditional Knowledge for the Inuvik to Tuktoyaktuk Highway Study Area*
- *Inuvik to Tuktoyaktuk Highway Traditional Knowledge Workshops: Inuvik and Tuktoyaktuk, February 2012*

This information is being submitted on behalf of the Developer: the Government of the Northwest Territories – Department of Transportation, Town of Inuvik and Hamlet of Tuktoyaktuk.

Sincerely,

Erica Bonhomme
Senior Consultant, Stantec Consulting Ltd.
for KAVIK-STANTEC Inc.
erica.bonhomme@stantec.com

cc. Jim Stevens, DOT

Attachment A: Volume 3; Part D; Section 9.3 of the Environmental Impact Statement for the Mackenzie Gas Project

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ATTACHMENT A:

Volume 3; Part D; Section 9.3 of the
Environmental Impact Statement for the
Mackenzie Gas Project

9.3 Baseline Conditions by Ecological Zone

9.3.1 Vegetation Classification of the Local Study Area

The vegetation in the LSA is divided into four ecological zones:

- Tundra
- Transition Forest
- North Taiga Plains
- South Taiga Plains

Each ecological zone is further divided into vegetation types. Descriptions of the vegetation types include survey site summaries, common landscape position, terrain features, geographic locations, characteristic vegetation, environmental and soil conditions. The figures associated with each vegetation type, show characteristic and indicator species.

Soils descriptions are summarized from Section 8, Soils, Landforms and Permafrost.

9.3.1.1 Tundra Ecological Zone

The Tundra Ecological Zone stretches from the Arctic coastline in the Mackenzie Delta, south to Inuvik and the boundary between the Inuvialuit Settlement Region and the Gwich'in Settlement area (see Figure 9-4). Topography is fairly level, rising from sea level in the delta to 150 m in elevation near Parsons Lake. Vegetation grows on a veneer of unfrozen organic or granular substrate overlying the permafrost boundary. In wetter areas, sedges, cotton-grasses and sphagnum moss dominate high-centred and low-centred polygons. Drier areas support ericaceous shrubs. Riparian communities include wet sedge communities and taller shrubs. Holmes Creek and Hans Creek support outliers of black spruce. On the floodplain of the Mackenzie River, shrub communities and wet sedge – cotton-grass meadows predominate. Figure 9-5 presents a landscape profile of vegetation types and landforms.

In total, 12 unique vegetation types are described in the Tundra Ecological Zone of the LSA. Table 9-4 presents the number of visual checks, ground inspections and detailed plots conducted in each of these vegetation types.

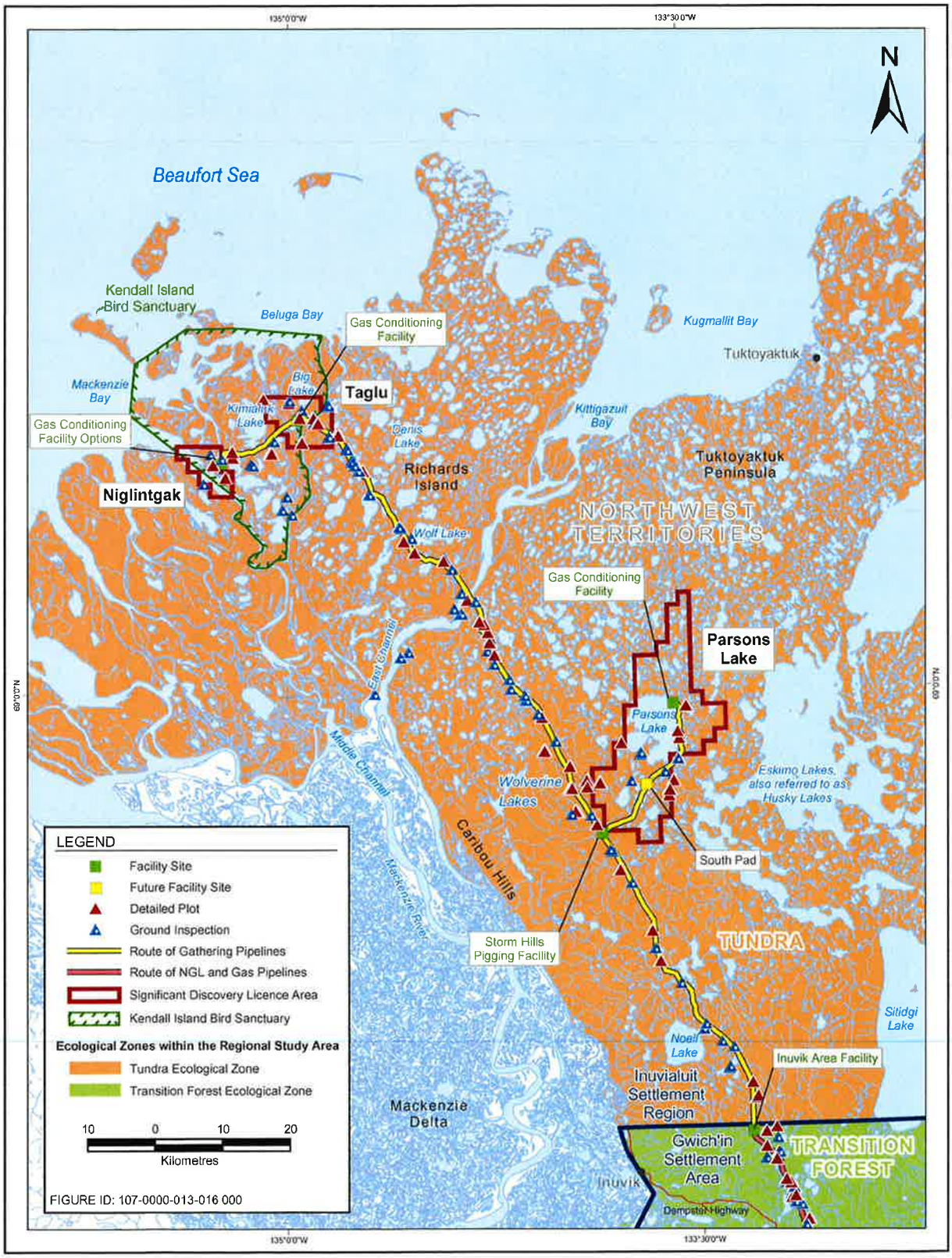


Figure 9-4: Ground and Detailed Survey Sites – Tundra Ecological Zone

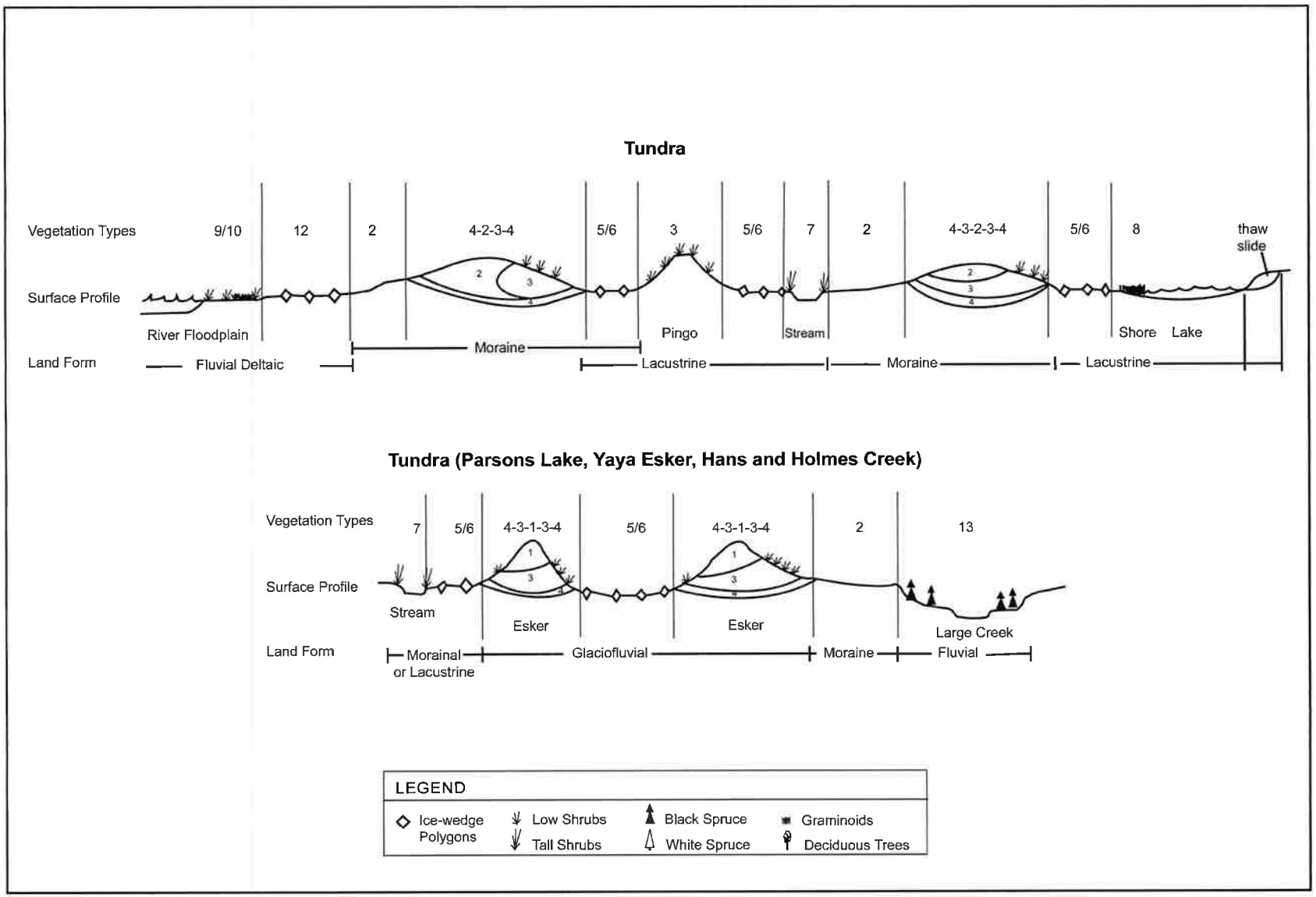


Figure 9-5: Landscape Profile of Vegetation Types and Landforms – Tundra Ecological Zone

Table 9-4: Surveys Conducted in Each Vegetation Type in the Tundra Ecological Zone

Vegetation Map Label	Mapped Vegetation Type	No. of Visual Checks	No. of Ground Inspections	No. of Detailed Plots
1	Dry saxifrage tundra	17	4	4
2	Dwarf shrub heath	126	23	10
3	Upland shrub	50	7	3
4	Cotton-grass tussock	55	9	4
5	High-centred polygons	78	10	6
6	Low-centred polygons	19	3	7
7	Riparian shrub	44	12	5
8	Riparian sedge – cotton-grass	22	8	4
9	Delta shrub	9	5	4
10	Delta sedge – cotton-grass	8	2	2
12	Delta low-centred polygons	3	3	4
13	Riparian black spruce/shrub	3	1	2
Total		434	87	55
Total %		75	15	10
NOTE: A Transition Forest Ecological Zone vegetation type 11 does not exist				

Table 9-5 presents the area in hectares and the percent area of each vegetation type and other mapped classes. The Transition Forest Ecological Zone vegetation type Th3 was also recorded in the Tundra Ecological Zone. There are five additional classes mapped in the Tundra Ecological Zone, including:

- B – nonvegetated
- S – sediment exposed in delta
- W – water
- WR – winter road
- PD – permanent disturbances

The winter road class includes the existing winter roads and the temporary winter roads that will be part of the project. Data gaps are present as a result of recent route refinements and are classified as no data.

The vegetation types are described in detail on the following pages.

Table 9-5: Area of Vegetation Types in the Tundra Ecological Zone Local Study Area

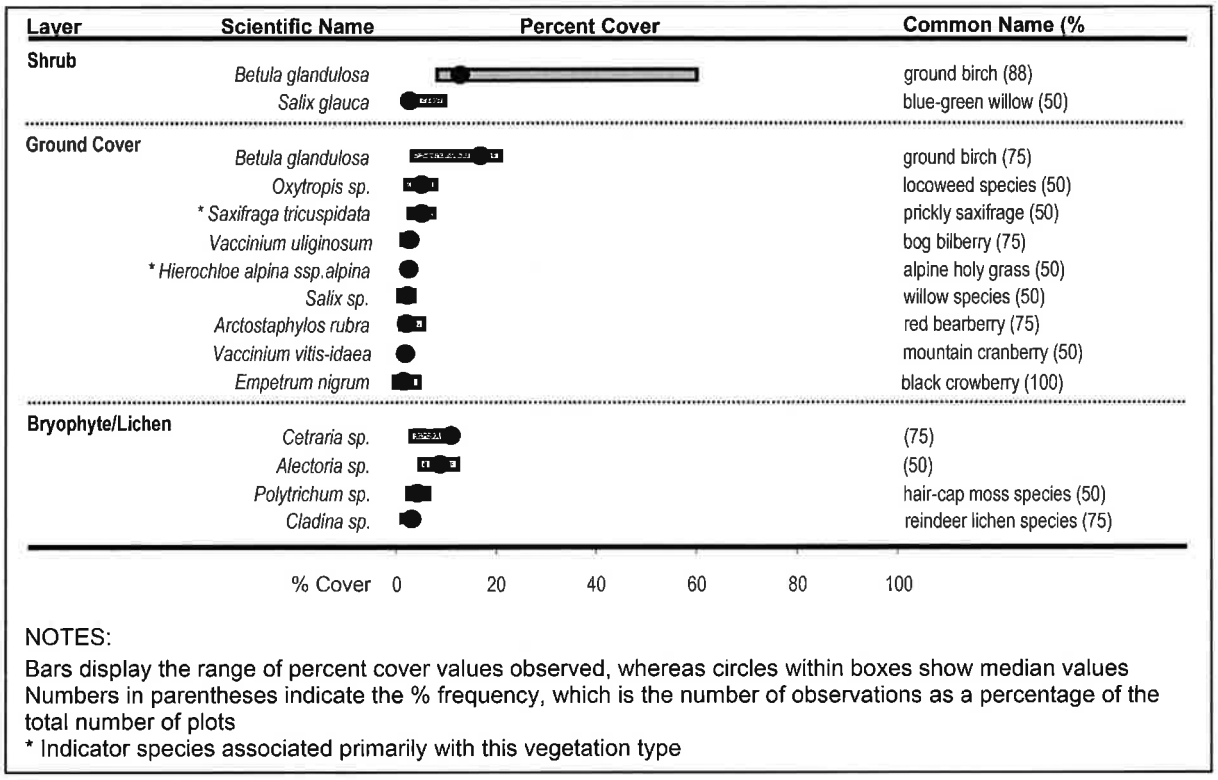
Vegetation Map Label	Mapped Vegetation Type	Area (ha)	Percent Area (%)
1	Dry saxifrage tundra	1,098	1
2	Dwarf shrub heath	15,817	21
3	Upland shrub	5,849	8
4	Cotton-grass tussock	7,191	10
5	High-centred polygons	4,049	5
6	Low-centred polygons	741	1
7	Riparian shrub	2,393	3
8	Riparian sedge – cotton-grass	502	1
9	Delta shrub	4,201	6
10	Delta sedge – cotton-grass	1,977	3
12	Delta low-centred polygons	3,498	5
13	Riparian black spruce/shrub	93	<1
Th3[a]	Black spruce/ground birch	345	<1
B	Nonvegetated	27	<1
S	Sediment exposed in delta	896	1
W	Water	21,589	29
WR	Winter road	5	<1
PD	Permanent disturbances	108	<1
ND	No data	3,506	5
Total[1]		73,885	100

NOTES:
a Transition Forest Ecological Zone vegetation type
1 Values do not add exactly to 100% because of rounding
A Transition Forest Ecological Zone vegetation type 11 does not exist

Vegetation Type 1 – Dry Saxifrage Tundra

The dry saxifrage tundra vegetation type is found on dry, upland areas on the tundra of the Tuktoyaktuk Peninsula, particularly near Parsons Lake and the North Storm Hills. It is often found on sparsely vegetated granular sites, where bare ground comprises a median percent cover of 20.8%. Total vascular species in the shrub and ground cover layer have a median of 26.3% of the surface cover and include ground birch, locoweed species, red bearberry, black crowberry, bog bilberry, mountain cranberry and willow species (see Figure 9-6). The indicator species for this vegetation type are alpine holy grass and prickly saxifrage. Haircap moss is the most common bryophyte, and *Cetraria*, *Alectoria* and *Cladina* are frequent lichens. The median percent cover for total bryophytes and lichens is 43.5%. Other plants frequently found, but with low cover values are Yukon

stitchwort – a rare species, blunt sedge, prostrate willow, and *Cladonia*, *Thamnolia* and *Stereocaulon* lichens. Sixty-nine species were found in the dry saxifrage tundra vegetation type. Four ground and four detailed plots were completed.



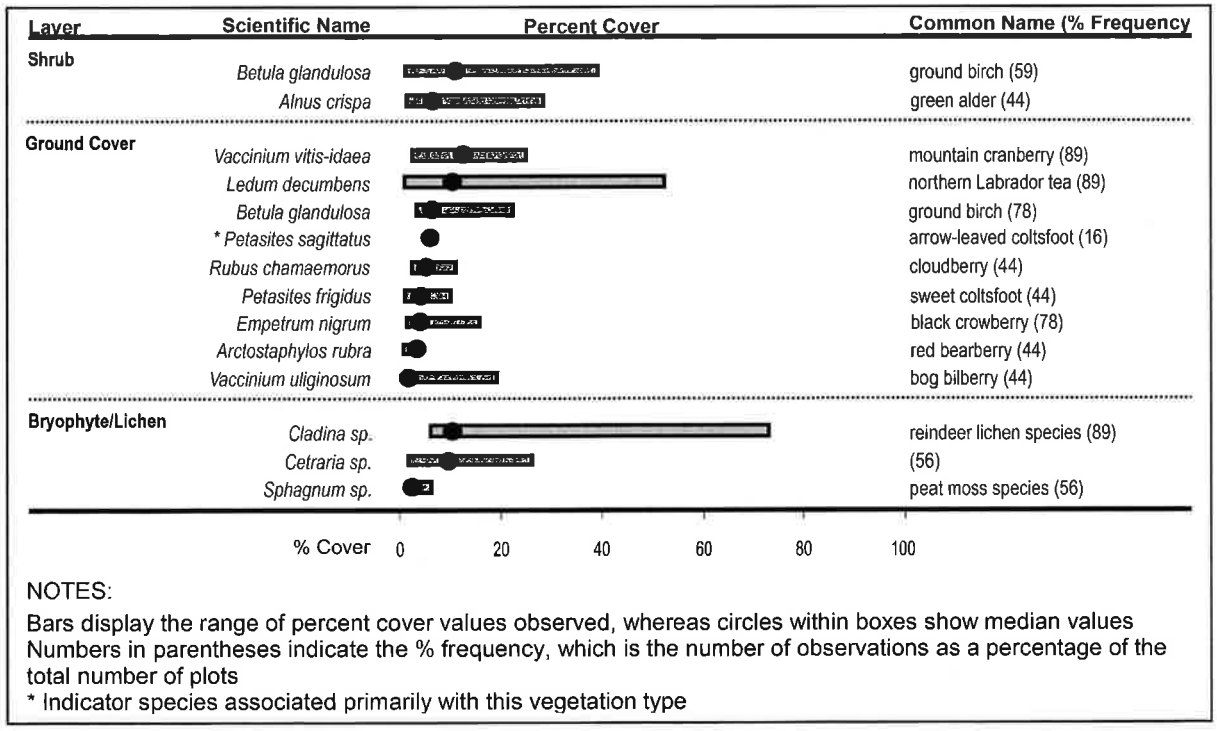
NOTES:
Bars display the range of percent cover values observed, whereas circles within boxes show median values
Numbers in parentheses indicate the % frequency, which is the number of observations as a percentage of the total number of plots
* Indicator species associated primarily with this vegetation type

Figure 9-6: Characteristic Species Composition for Vegetation Type 1

The dry saxifrage tundra vegetation type is characteristic of dry, warm soils in this ecological zone. It is common on crests and upper slopes with well-drained shallow soils with scarce organic material. These sites are associated with gravely deposits, such as the hummocky glaciofluvial outwash directly east of Parsons Lake, kames or eskers, or with weathered surfaces of poorly lithified sedimentary rocks. Signs of active cryoturbation are often visible at the surface as frost boils, small-scale patterned ground features formed by the seasonal expansion of ice lenses and the upward movement of soil during annual freeze thaw cycles. Soils are typically Orthic or Brunisolic Turbic Cryosols. In many cases though, depth to permafrost is difficult to assess in these soils as they have very little to no ice content. Soil textures are gravely sand to sandy gravel with a sandy loam to loamy sand matrix. The nutrient regime in these sites is estimated to be poor to very poor with a moisture regime ranging from xeric to subxeric. The active layer depth is greater than 30 cm.

Vegetation Type 2 – Dwarf Shrub Heath

Dwarf shrub heath is the most common tundra vegetation type on the Tuktoyaktuk Peninsula. It is widespread throughout flat and rolling terrain, in thin organic soils on crests to mid-slope positions where water does not accumulate. Dwarf shrubs make up most of the shrub and ground cover layers. These include ground birch, mountain cranberry, northern Labrador tea, green alder, black crowberry, red bearberry, and bog bilberry (see Figure 9-7). Cloudberry and sweet coltsfoot are also present. Arrow-leaved coltsfoot is an indicator species for this vegetation type. Common lichens are reindeer lichens and *Cetraria*, and peat moss is the most common bryophyte. *Peltigera* species are often associated with low cover values. The median percent cover of total bryophytes and lichens is 35.6%, which is comparable to the percent cover of total vascular species in the shrub and ground cover layer of 37.5%. One hundred and eleven species were found in the dwarf shrub heath vegetation type. Twenty-three ground inspection and 9 detailed plots were completed.



NOTES:
Bars display the range of percent cover values observed, whereas circles within boxes show median values
Numbers in parentheses indicate the % frequency, which is the number of observations as a percentage of the total number of plots
* Indicator species associated primarily with this vegetation type

Figure 9-7: Characteristic Species Composition for Vegetation Type 2

The dwarf shrub heath vegetation type is located on a variety of parent materials including glaciofluvial, morainal and colluvial. The soils are usually moderately to imperfectly drained but can be poorly drained in lower landscape positions, as the shallow permafrost table controls drainage. A veneer of peat is often present over mineral deposits, but is usually thinner than 50 cm. Sites are usually located in crest, upper to mid-slope positions but less commonly in depressions.

Permafrost features such as thermokarst subsidence or frost boils are often present. Topography is undulating with slopes up to 5%. Soils are often Terric Fibric Organic Cryosols and Orthic Eutric or Dystric Turbic Cryosols. Nutrient regime in these sites is estimated to be poor and the moisture regime ranges from mesic to hygric. The active layer depth ranges from 18 to 200 cm.

Vegetation Type 3 – Upland Shrub

Slopes on upland areas are frequently vegetated with an upland shrub vegetation type. The taller shrubs form a scattered to open canopy of ground birch, blue-green willow and green alder ranging from 0.5 to 1.5 m. Dwarf shrubs such as mountain cranberry, red bearberry and black crowberry comprise the ground cover layer (see Figure 9-8). Additional species present in the ground cover layer include sweet coltsfoot and *Spiraea beauverdiana*, with bog bilberry found in lesser amounts. Indicator species of this vegetation type are Herriot's sagewort, arrow-leaved coltsfoot and bistort. Large-flowered lousewort is also an indicator for this vegetation type. Common lichens include reindeer lichens, *Cetraria* and club lichens. Total vascular species in the shrub and ground cover layer account for the majority of surface cover with a median of 45.3%, whereas total bryophytes and lichens cover is 21.2%. Sixty-six species were found in the upland shrub vegetation type. A total of seven ground inspections and three detailed plots were completed.

The upland shrub vegetation type in the tundra occurs on morainal or lacustrine landforms with fine silty clay and loamy texture. Most sites have a hygric to subhydric moisture regime with moderate to poor drainage and fairly level to gently rolling topography. Soils might be Orthic Eutric Static and Turbic Cryosols. The upland shrub vegetation type also grows on coarse glaciofluvial sediments with coarse loamy sand to sandy loam parent material texture. There, this vegetation type is more common on the mid- to lower landscape positions where drainage is restricted by permafrost. Sites can have thermokarst subsidence or occasional but poorly developed ice-wedge polygons. A veneer of peat is often present over mineral deposits, but is usually thinner than 40 cm.

These sites have poor nutrients and a subhygric to hygric moisture regime. The active layer depth ranges from 25 to 67 cm.

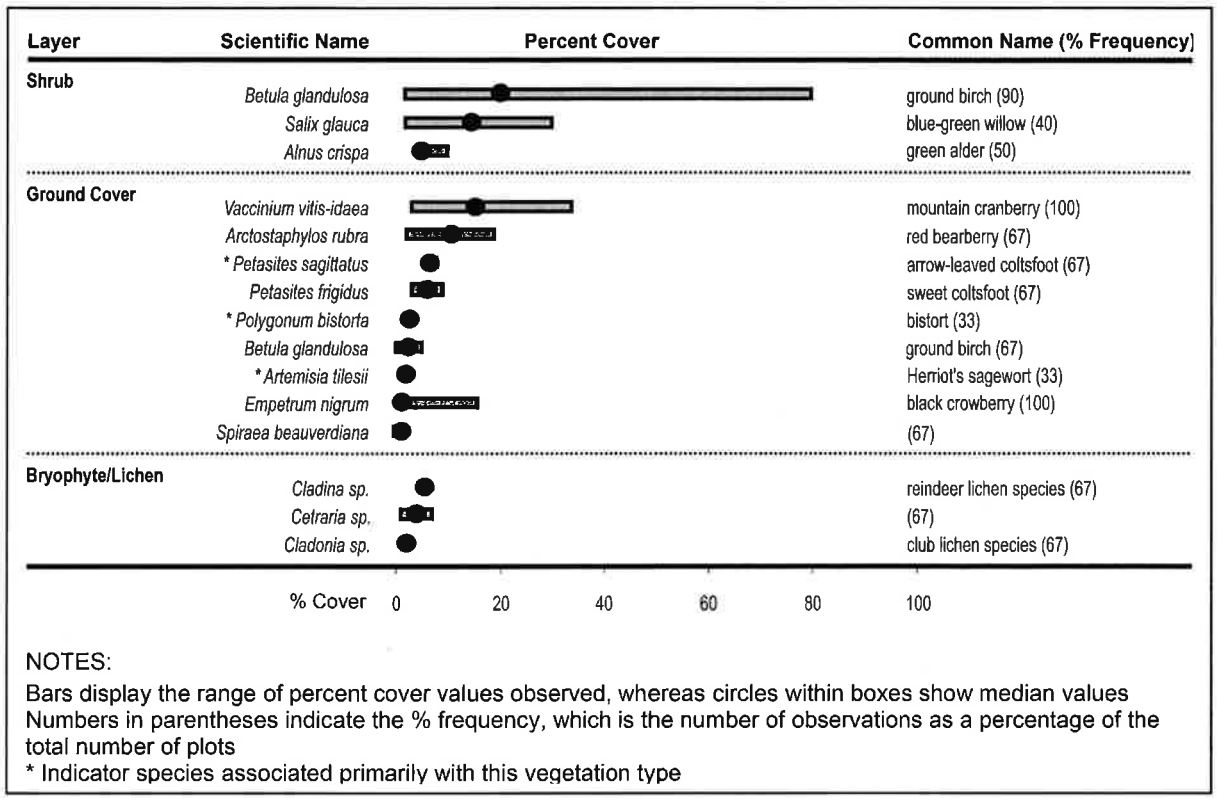
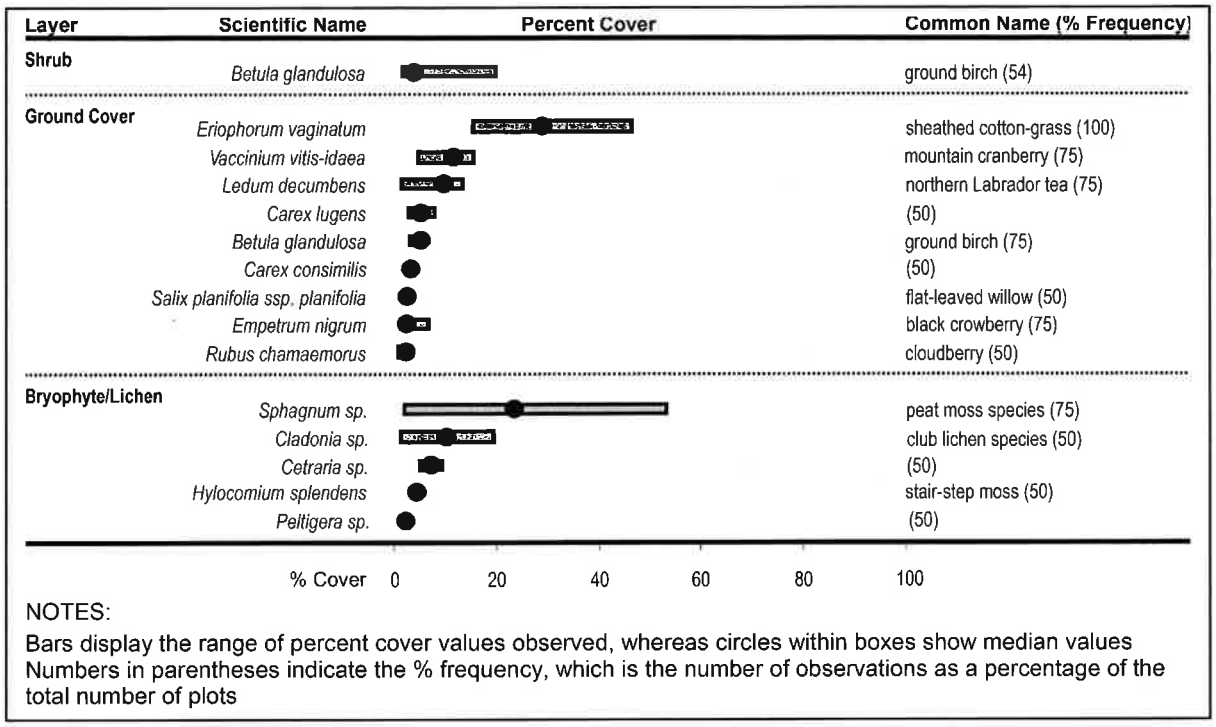


Figure 9-8: Characteristic Species Composition for Vegetation Type 3

Vegetation Type 4 – Cotton-Grass Tussock

The cotton-grass tussock vegetation type is found on lower slopes and lowlands where blanket flow of water at the permafrost surface creates hygric-subhydric soil moisture, particularly in the valley between the Storm Hills. Sheathed cotton-grass is the dominant species in this vegetation type (see Figure 9-9). It forms dense tussocks along with two sedges, *Carex lugens* and *Carex consimilis*. In between the tussocks, sphagnum species thrive, whereas shrub species are less prominent because of the high moisture levels. Ground birch, mountain cranberry, northern Labrador tea, black crowberry and flat-leaved willow occur in the lower shrub layer. *Cladonia* and *Cetraria* lichen species are sometimes present. Cloudberry is also found in the ground cover layer. Other plants frequently found with low cover values are bog bilberry and *Dactylina* species. Leatherleaf (*Chamaedaphne calyculata*) is an indicator plant of this vegetation type. Total vascular species in the shrub and ground cover layer comprise the majority of surface cover with a median percent cover of 63.8%. Total bryophytes and lichens are also present with a median percent cover of 30%, whereas total litter covers 31.5%. In total, 69 species were found in the cotton-grass tussock vegetation type. A total of nine ground inspections and four detailed plots were completed.



NOTES:
Bars display the range of percent cover values observed, whereas circles within boxes show median values
Numbers in parentheses indicate the % frequency, which is the number of observations as a percentage of the total number of plots

Figure 9-9: Characteristic Species Composition for Vegetation Type 4

The cotton-grass tussock vegetation type is located mostly within fine-textured morainal and lacustrine landscapes. Drainage is usually imperfect to poor. Peat is often present as a thin veneer over mineral deposits. Sites can be subject to inundation or permafrost, and demonstrate features such as thermokarst subsidence and frost heave. Micro-topography is often hummocky, with regional slopes less than 10%. Soils are typically either Terric Fibric or Mesic Organic Cryosols when there is more than 40 cm of organic material, or Orthic Eutric Turbic Cryosols when there is less than 40 cm of organic material at the surface. The nutrient regime in this vegetation type is typically considered to be poor with a moisture regime ranging from hygric to subhydric. The active layer depth ranges from 11 to 75 cm.

Vegetation Type 5 – High-centred Polygons

High-centred polygons are found localized in depression areas and flats on the Tuktoyaktuk Peninsula. They have large net-like patterns with high centres surrounded by water-filled troughs with ice bottoms. The centre of each polygon develops a dome of peat and is vegetated with upland species similar to the dwarf shrub heath vegetation type including northern Labrador tea, ground birch, mountain cranberry and black crowberry (see Figure 9-10). Cloudberry and red bearberry are also common. Reindeer lichens are prominent and *Cetraria* and club lichens also occur on most sites. Species frequently found with low cover values in the wetter troughs and cracks are cotton-grasses, water sedge, *Carex consimilis,*

Carex rariflora and *Carex lugens*. Total bryophytes and lichens have a high surface cover, with a median percent cover of 50%, whereas total vascular species in the shrub and ground cover layer have a lower cover of 29%. In total, 77 species were found in the high-centred polygon vegetation type. A total of 10 ground inspection and six detailed plots were completed.

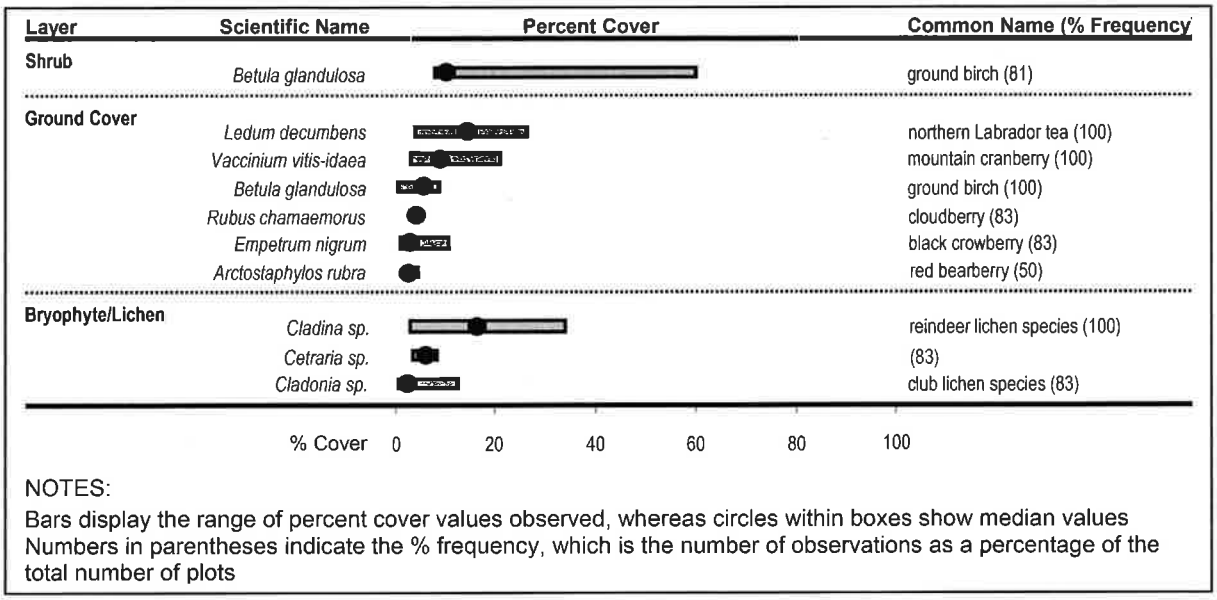


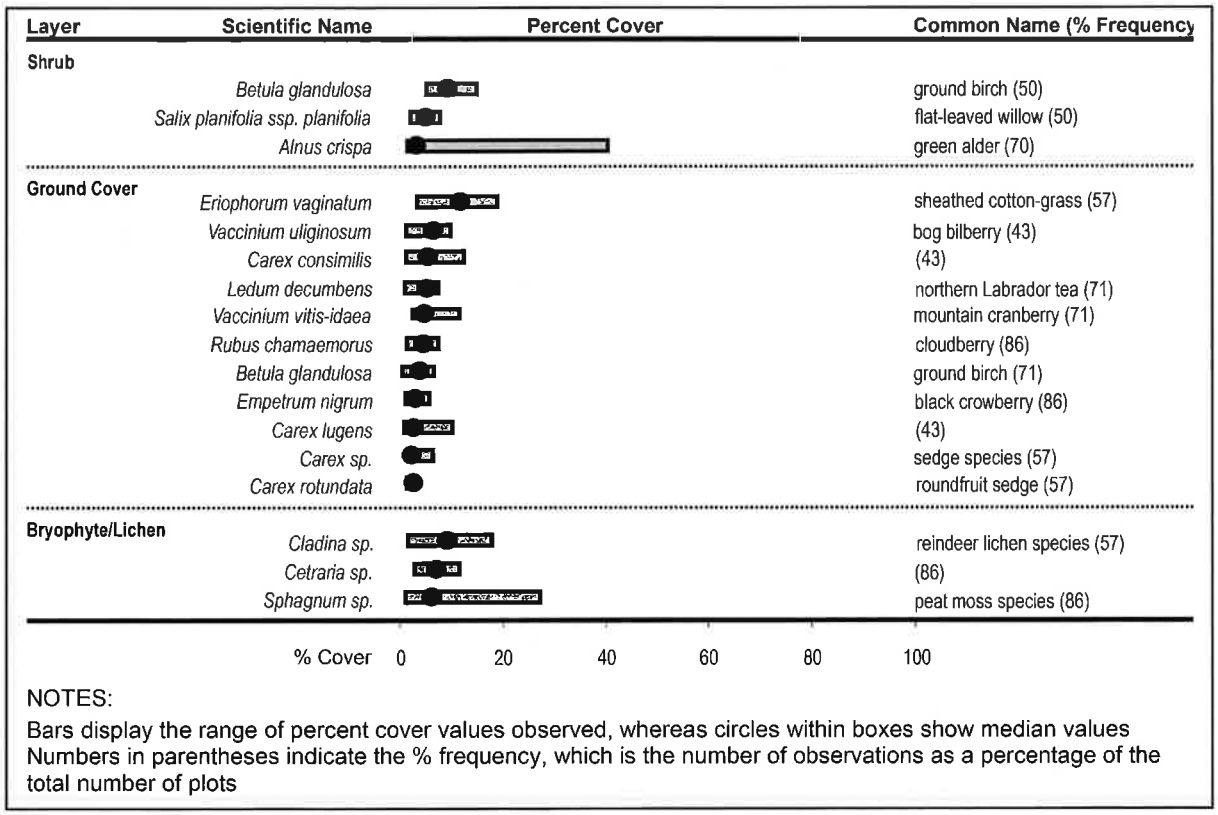
Figure 9-10: Characteristic Species Composition for Vegetation Type 5

In many high-centred polygons, a thick layer of strongly cryoturbated, mixed organic and mineral soil underlies surface peat deposits. The polygons are usually located in poorly drained areas that occupy low landscape positions such as depressions associated with thermokarst lakes or ponds, pingos, hollows or channel-like features. These sites occur in ice-rich, fine-grained soils with a silty clay loam to clay loam texture on the morainal landforms and small lacustrine basins. The organic layer on these soils is usually less than 50 cm thick. Soils are typically Terric Mesic Organic Cryosols and Orthic Dystric and Brunisolic Dystric Turbic Cryosols. In the Parsons Lake area, these vegetation types also occur on poorly drained sandy and gravely glaciofluvial landforms, mostly in depressions and low landscape positions where drainage is poor to very poor. The nutrient regime in these sites is poor, and the moisture regime ranges from subhygric to hydric. The active layer depth ranges from 29 to 40 cm.

Vegetation Type 6 – Low-Centred Polygons

This vegetation type is localized in depression areas and drained lake basins on the Tuktoyaktuk Peninsula, typically adjacent to areas of standing water. Low-Centred Polygons often occur adjacent to high-centred polygons and are usually similar in pattern size. However, the centre of the polygons are depressed, often containing pond water and are covered with wetland vegetation such as sheathed

cotton-grass, *Carex consimilis*, *Carex rotundata*, *Carex lugens* and *Carex rariflora* (see Figure 9-11). Peat moss is the dominant moss in the wet centres. Leatherleaf is an indicative plant of this vegetation type, however, it has a low percent cover value and is not represented. The drier ridges are dominated by dwarf shrub heath vegetation, including ground birch, bog bilberry, northern Labrador tea, mountain cranberry, cloudberry and black crowberry. Flat-leaved willow and green alder are also present, along with bog rosemary and red bearberry at lower cover values. Common lichen species include reindeer lichens and *Cetraria*. Total vascular species in the shrub and ground cover, comprise the majority of surface cover with a median percent cover of 39.9%, whereas total bryophytes and lichens cover only 15%. Litter and open water are also present, with total litter having a median percent cover of 17.5% and water being 12.9%. In total, 82 species were found in the low-centred polygon vegetation type. A total of three ground inspections and seven detailed plots were completed.



NOTES:
Bars display the range of percent cover values observed, whereas circles within boxes show median values
Numbers in parentheses indicate the % frequency, which is the number of observations as a percentage of the total number of plots

Figure 9-11: Characteristic Species Composition for Vegetation Type 6

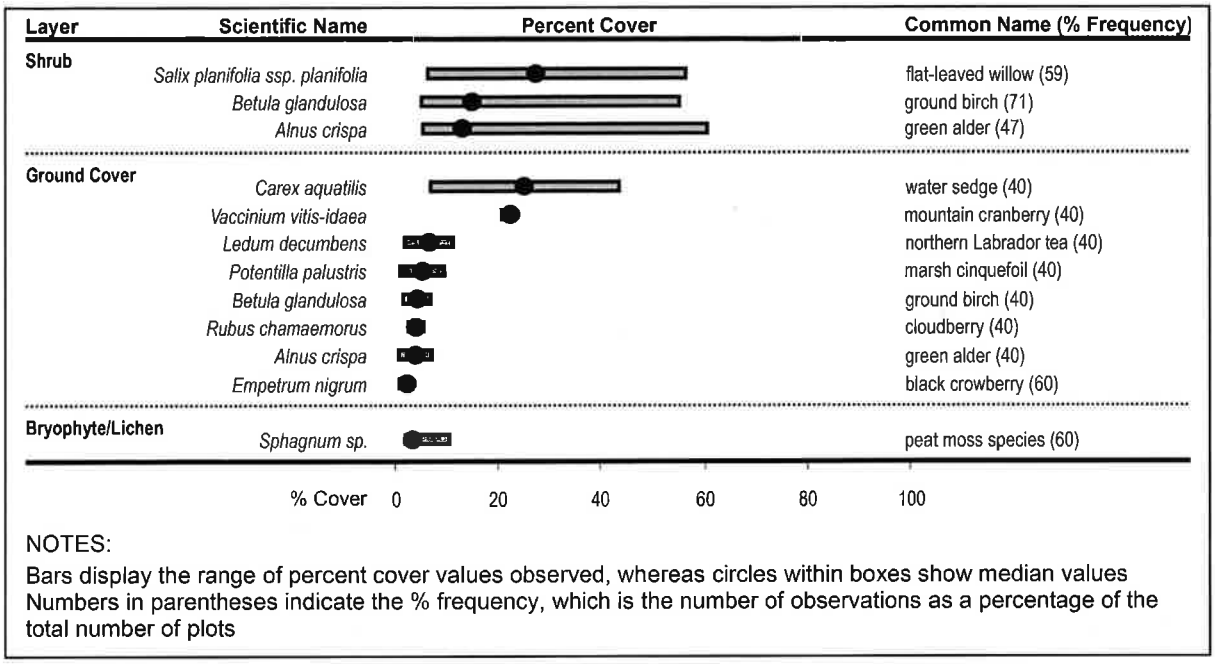
The middles of low-centred polygons are wet and are surrounded by soil ridges pushed up by ice wedges that are formed in cracks that develop during freeze-thaw cycles. Surface peat deposits are typically less than 60 cm thick, and are underlain by a thick layer of strongly cryoturbated, mixed organic and mineral soil. The polygons are usually located in poorly-drained areas that occupy low landscape positions such as depressions associated with thermokarst lakes or ponds, pingos, hollows or channel-like features, and are often mixed with or near high-centred polygons.

These sites occur in ice-rich, fine-grained soils with a silty clay loam to clay loam texture on the morainal landforms and small lacustrine basins. The organic layer on these soils is usually less than 50 cm thick. Soils are typically Terric Mesic Organic Cryosols and Orthic Dystric or Eutric Turbic Cryosols, and occasionally, Gleyed Turbic Cryosols. In the Parsons Lake area, these also occur on poorly drained sandy and gravely glaciofluvial landforms mostly in depressions and low landscape position where drainage is poor to very poor. This vegetation type is nutrient poor and has a moisture regime ranging from subhygric to hydric. The active layer depth ranges from 11 to 50 cm.

Vegetation Type 7 – Riparian Shrub

The riparian shrub vegetation type is found along streams and drainage basins in the Tuktoyaktuk Peninsula. Taller shrubs form a closed canopy of flat-leaved willow, ground birch and green alder. Common ground cover species include mountain cranberry, northern Labrador tea, black crowberry and cloudberry, with sweet coltsfoot with lower cover values (see Figure 9-12). Water sedge and marsh cinquefoil are common in areas with open water. The most common bryophyte is peat moss. The median percent cover of total vascular species in the shrub and ground cover layer is 42.5%, which is comparable to the percent cover of total litter, being 42.8%. Total bryophytes and lichens have a low median percent cover of 8.2%. In total, 81 species were found in the riparian shrub vegetation type. A total of 12 ground inspection and five detailed plots were completed.

The riparian shrub vegetation type is most common on silty sand fluvial deposits associated with the small and beaded streams. Topography is subdued and concave, with slopes up to 5%. Soils are usually moderately well to poorly drained, with a shallow permafrost table and water table near the surface. Seasonal or occasional flooding deposits fresh silt and fine sand layers on the surface of the soils. Soils are commonly Regosolic Static Cryosols and occur close to the active river channel. Peat can be present as a veneer over mineral deposits in the areas above the flooding zone. These sites have a poor to medium nutrient regime and the moisture regime ranges from hygric to hydric. The active layer depth ranges from 18 to 90 cm.



NOTES:
Bars display the range of percent cover values observed, whereas circles within boxes show median values
Numbers in parentheses indicate the % frequency, which is the number of observations as a percentage of the total number of plots

Figure 9-12: Characteristic Species Composition for Vegetation Type 7

Vegetation Type 8 – Riparian Sedge – Cotton-Grass

The riparian sedge – cotton-grass vegetation type occurs on the perimeters of small lakes and ponds, and less commonly along small streams, in the Tuktoyaktuk Peninsula. The dominant vegetation is water sedge (see Figure 9-13). Indicator species for this vegetation type include water horsetail and buck-bean. Peat moss is the most prominent nonvascular component. Total vascular species in the shrub and ground cover comprise the majority of the surface cover with a median percent cover of 62.5%. Litter is comparable to the percent cover of water, with the median percent cover of total litter being 22.5% and total water 20%. Total bryophytes and lichens have a low median percent cover of 6.4%. In total, 61 species were found in the riparian sedge – cotton-grass vegetation type. A total of eight ground inspections and four detailed plots were completed.

The riparian sedge – cotton-grass vegetation type is most common on silty sand deposits associated with the small lakes and ponds. Topography is subdued with slopes up to 5%. Soils are usually imperfectly to very poorly drained, with a shallow permafrost table. Seasonal or occasional flooding deposits fresh silt and fine sand layers on the surface of the soils and there is little to no organic material. Soils are commonly Regosolic Static Cryosols, Gleyed Static or Turbic Cryosols. Parent material textures typically range between silty clay loam and loam. These sites have a poor nutrient regime and the moisture regime ranges from subhydric to hydric. The active layer depth ranges from 15 to 45 cm.

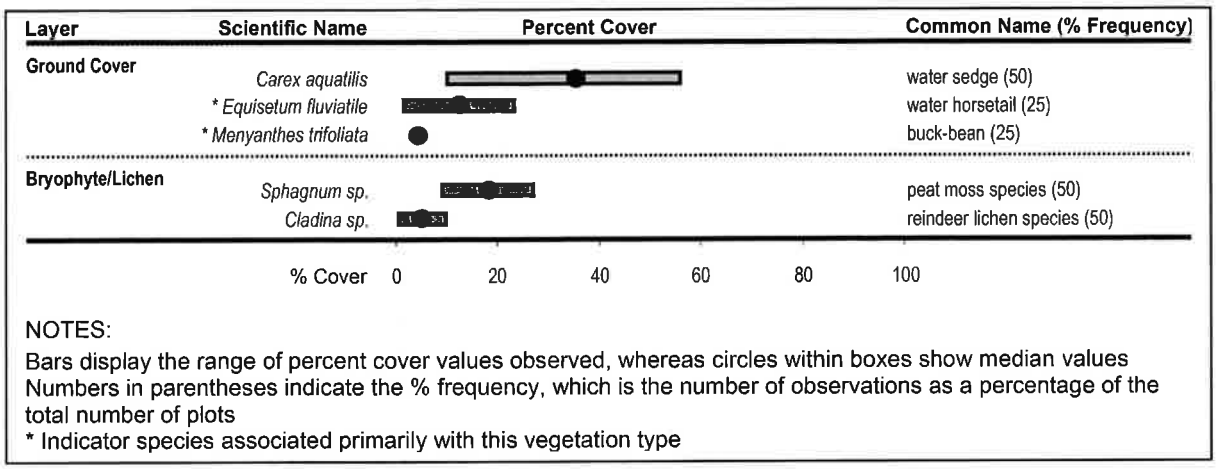


Figure 9-13: Characteristic Species Composition for Vegetation Type 8

Vegetation Type 9 – Delta Shrub

The delta shrub vegetation type occurs on floodplains and levees in the Mackenzie Delta that are frequently disturbed by floods and ice scour. The typically dense, tall shrub layer includes blue-green willow and Richardson's willow, with a ground cover layer of dwarf scouring-rush, water sedge and narrow-leaved cotton-grass (see Figure 9-14). Indicator species of this vegetation type are tufted hair grass and meadow horsetail. Fowl meadow grass, northern grass-of-Parnassus, *Castellija raupi* and *Calamagrostis stricta* are also indicators, but occur at low cover values. *Drepanocladus* is the most common bryophyte. Total vascular species in the shrub and ground cover have a high surface cover with a median percent cover of 31.8%. Ground substrates have lower median percent covers, total litter being 20% and total bryophytes and lichens 15%. In total, 56 species were found in the delta shrub vegetation type. A total of five ground inspections and four detailed plots were completed.

The delta shrub vegetation type is located on fluvial deltaic deposits associated with the lower Mackenzie Delta. Topography is typically level and soils are poorly to very poorly drained. Soils are usually Regosolic Static Cryosols. Parent material is silt to silt loam. These sites have a poor nutrient regime with a moisture regime of subhydric to hydric. The active layer depths ranges from 22 to 110 cm.

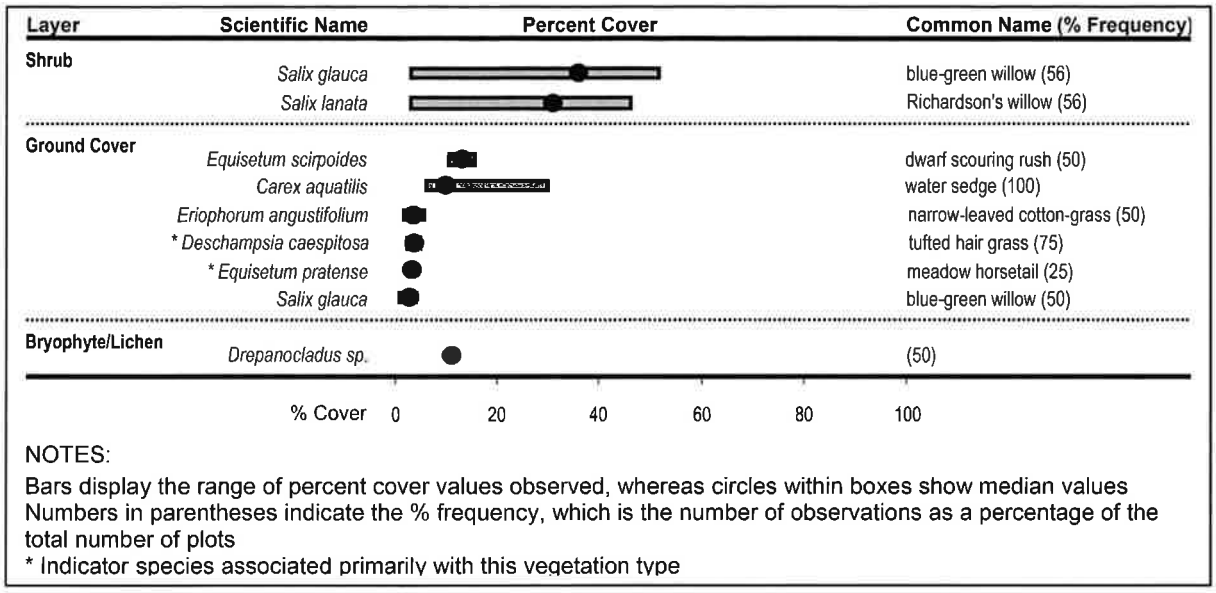


Figure 9-14: Characteristic Species Composition for Vegetation Type 9

Vegetation Type 10 – Delta Sedge – Cotton-Grass

The delta sedge – cotton-grass vegetation type is widespread on wet floodplains of the Mackenzie Delta. The dominant species in the ground cover layer are water sedge and narrow-leaved cotton-grass (see Figure 9-15). The median percent cover of surface cover for total vascular species in the ground cover layer is 25.2%. Total bare ground covers 33%, total water 31% and total litter 27%. In total, 26 species were found in the delta sedge – cotton-grass vegetation type. A total of two ground inspections and two detailed plots were completed. As at least three detailed plots are required to develop accurate descriptions (RIC 1998), these results might not be the best reflection of ecological conditions for ground cover. Data from ground inspections is adequate for description of shrub and tree layers.

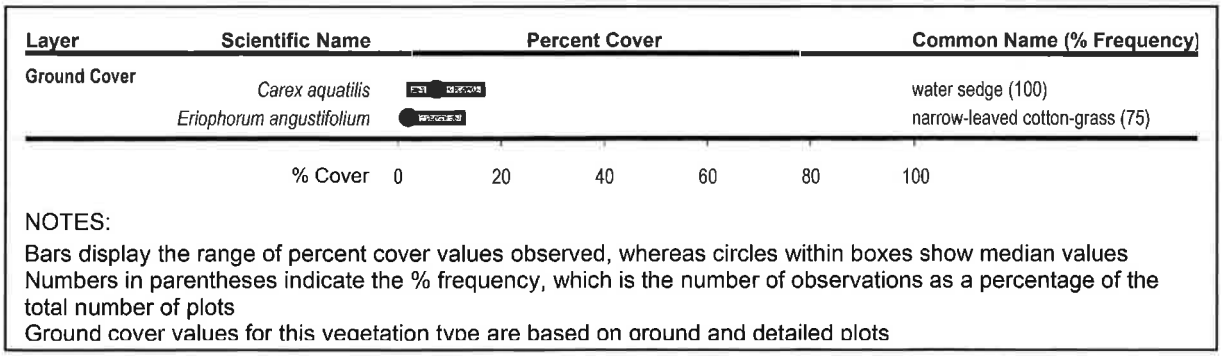


Figure 9-15: Characteristic Species Composition for Vegetation Type 10

The delta sedge – cotton-grass vegetation type is located on fluvial deltaic deposits associated with the lower Mackenzie Delta. Topography is typically level, and soils are poorly to very poorly drained. Several soil subgroups can occur depending on the type of drainage channel and proximity to the channel. Mineral soils above the level of annual inundation are typically Orthic Regosols when permafrost is deeper than 1 m. Soils are Regosolic or Gleysolic Static Cryosols if permafrost is encountered within 1 m of the surface. Parent materials are typically fluvial with silt to loamy sand textures. These sites are poor in nutrients, and their moisture regime is subhydric. The active layer depth occurs at 60 cm.

Vegetation Type 12 – Delta Low-Centred Polygons

Delta low-centred polygons are abundant on the delta and resemble tundra low-centred polygons, e.g., vegetation type 6, although the centres are wetter and subject to more flooding and siltation. The centre of each polygon is depressed and covered with lowland vegetation such as water sedge, variegated horsetail, narrow-leaved cotton-grass and sheathed cotton-grass (see Figure 9-16). Hair-like sedge is frequently found as well, though in lesser amounts. The ridges are dominated by upland vegetation such as Richardson's willow and northern white mountain avens and, to a lesser degree, red bearberry, and dwarf false asphodel. Total bryophytes and lichens comprise the majority of surface cover with a median percent cover of 65.1%, whereas total vascular species in the shrub and ground cover layer cover only 25.5%. Total litter has a median percent cover of 34.8% and total water covers 30%. In total, 54 species were found in the delta low-centred polygon vegetation type. A total of three ground inspections and four detailed plots were completed.

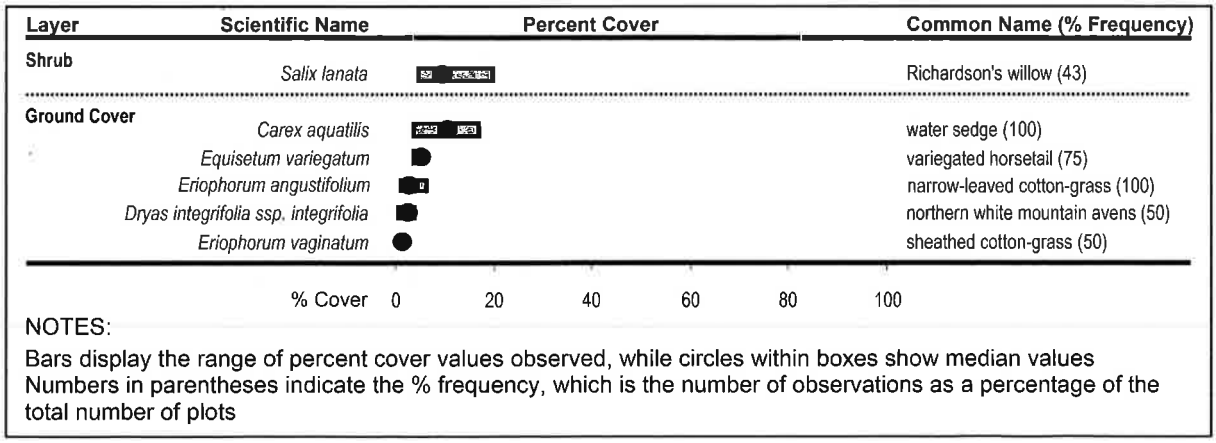


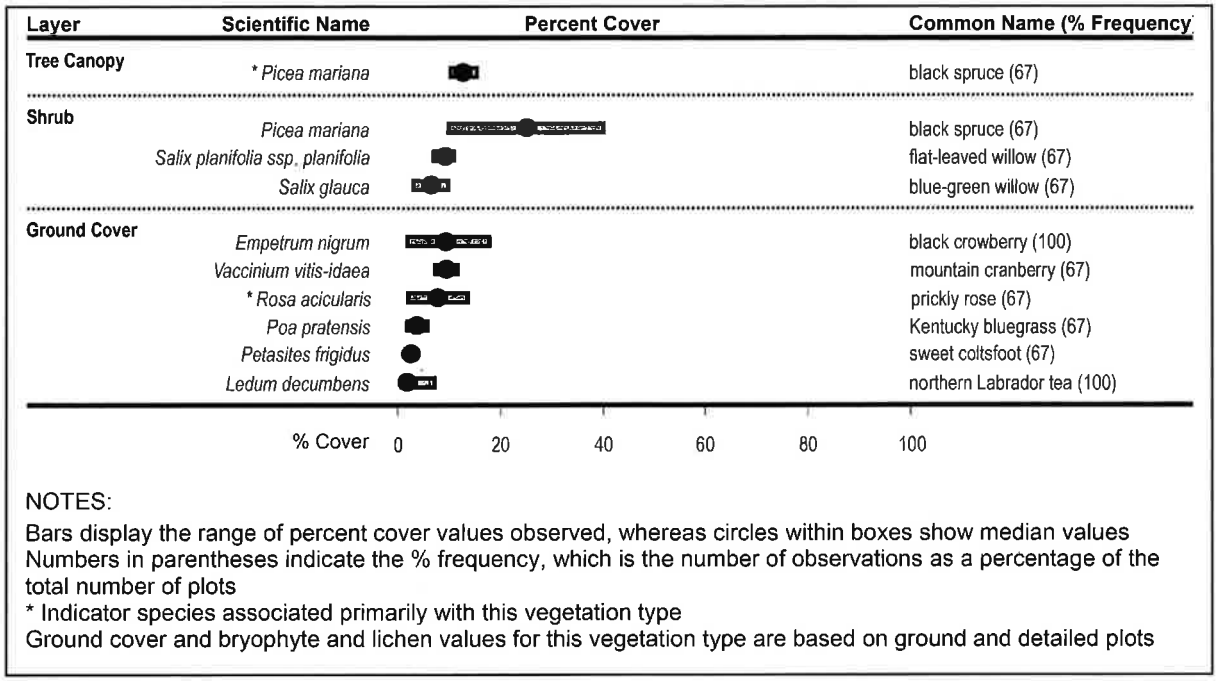
Figure 9-16: Characteristic Species Composition for Vegetation Type 12

The delta low-centred polygons are located, as their name indicates, on the floodplain of the Mackenzie Delta. The nearly flat, low-lying, broad areas are composed of recent fluvial sediments. Soils are classified most commonly as Regosolic Static Cryosols, and occasionally as Gleysolic Static Cryosols. The centres of these polygons are wet, with standing shallow water during most of the thawed season. Subtle ridges that are pushed up by ice wedges formed under the trough surround the middle of the low-centre polygons. Flooding, either by salt water during storm surges, or by fresh water as the level of the Mackenzie River fluctuates, is common. Parent material texture is silt to loamy sand. These sites have a poor to very poor nutrient regime and their moisture regime ranges from subhydric to hydric. The active layer depth ranges from 22 to 43 cm.

Vegetation Type 13 – Riparian Black Spruce/Shrub

The riparian black spruce/shrub vegetation type is located in the Holmes Creek and Hans Creek valleys. This vegetation type is the only forested tundra vegetation type, and is the northern limit of black spruce in the production area. The average tree height on the survey plots is 9.1 m tall. The shrub layer is dominated by black spruce, flat-leaved willow and blue-green willow, and ground birch with lower cover values (see Figure 9-17). The ground cover includes black crowberry, prickly rose, northern Labrador tea, mountain cranberry, Kentucky bluegrass and sweet coltsfoot. Dwarf scouring-rush and bog bilberry are also often present, but at lower cover values. Black spruce in the tree layer, and prickly rose in the ground cover layer are indicator species of this vegetation type. The total surface cover is composed mostly of bryophytes and lichens, with a median percent cover of 62.5%. Total vascular species in the tree canopy, shrub layer and ground cover have a median percent cover of 37.5% and total litter covers 15%. In total, 48 species were found in the riparian black spruce/shrub vegetation type. A total of one ground inspection and two detailed plots were completed. As at least three detailed plots are required to develop accurate descriptions (RIC 1998), these results might not be the best reflection of ecological conditions for ground cover. Data from ground inspections is adequate for description of shrub and tree layers.

This vegetation type is found exclusively along the floodplain and terraces of larger streams. Poorly developed soils on sandy to silty fluvial sediments show loamy sand to sandy texture with occasional gravely loamy sand sites. Drainage is moderately well, transitioning to poor or very poor closer to the stream. Topography is usually gently rolling to nearly level. Soils are Orthic Eutric Turbic Or Static Cryosols on the higher terraces, and Regosolic Static Cryosols on the lower terraces and floodplain. The moisture regime is mesic and the soil nutrient regime range is poor. The active layer depth occurs at 400 cm.



NOTES:
Bars display the range of percent cover values observed, whereas circles within boxes show median values
Numbers in parentheses indicate the % frequency, which is the number of observations as a percentage of the total number of plots
* Indicator species associated primarily with this vegetation type
Ground cover and bryophyte and lichen values for this vegetation type are based on ground and detailed plots

Figure 9-17: Characteristic Species Composition for Vegetation Type 13

9.3.1.2 Transition Forest Ecological Zone

The northern part of the Transition Forest Ecological Zone is a mixture of tundra vegetation and scattered, stunted spruce forest (see Figure 9-18). The uplands are laced with dense black spruce, tamarack and ground birch growing in the many shallow drainage channels that drain slopes. The southern part of the Transition Forest Ecological Zone is primarily vegetated with scattered to open spruce and birch mixedwood forest. Poorly drained mid- and lower slopes support shrub communities, shrub fens, bogs and riparian white spruce or willow communities. Figure 9-19 presents a landscape profile of vegetation types and landforms.

In total, 10 vegetation types are described in the LSA of the Transition Forest Ecological Zone. Nine of these vegetation types are unique to the Transition Forest Ecological Zone, whereas one, Tundra Ecological Zone vegetation type 3, is found in both the Transition Forest and the Tundra Ecological Zones. Table 9-6 presents the number of visual checks, ground inspections and detailed plots conducted in each of these vegetation types. The increased number of detailed plots, i.e., 20% versus the standard 10%, was necessary to accurately characterize this complex zone.