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FILE REPORT 54

Continuation of the Vegetation Succession Component of the Black Sturgeon Boreal Mixedwood Project

S. Walsh

Natural Resources Canada
Ressources naturelles Canada
Canadian Forest Service
Service canadien des forêts

Ontario
Ministry of Natural Resources
Ministère des Richesses naturelles

This file report is an unedited, unpublished report submitted as partial fulfilment of NODA/NFP Project #4038, "Partial cutting in boreal mixedwoods: Evaluation of harvesting operations, site disturbance and damage to residual trees and advance growth".

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NODA File Report #
NODA Project # 4038A
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CONTINUATION of the VEGETATION SUCCESSION COMPONENT of the BLACK STURGEON BOREAL MIXEDWOOD PROJECT

Work on the vegetation succession component of the Black Sturgeon Boreal Mixedwood Project (BSBMP) continued through fiscal year 1996-97, and comprised additional field data collection, dataset compilation and harmonization, and some preliminary descriptive data analyses. Familiarization with the BSBMP in general, and the vegetation component in particular, was achieved in spring 1996 by reviewing documentation, existing datasets, and maps of the study blocks. As well, a reconnaissance tour of the area was completed early in June. We walked through several of the treated blocks and thereby gained an understanding of the layout of all the vegetation survey plots in relation to each other and to all other research plots. It was particularly useful to complete this tour before the vegetation was fully leafed out, since it was much easier to see the layout of the blocks and to locate the vegetation plots. For an overview of the BSBMP, the reader should obtain a copy of J.B. Scarratt's Black Sturgeon Boreal Mixedwood Project Establishment Report.

Plot Location Information

The location of each vegetation survey plot (including control blocks, but excluding patch cut blocks) was accurately recorded using a Global Positioning System (GPS) unit. The readings collected in the study area were differentially corrected against base station data recorded in Thunder Bay. The corrected data are accurate to within 5 meters, and have been used to map the vegetation plots.

Maps of the GPS coordinates for plots in Stand 1 and Stand 2 are attached. At present, spatial coverage of the study area is limited to the vegetation plot locations, and main roads and water courses. Additional spatial data (e.g., boundaries of study blocks, access roads through each stand) will be acquired in the near future. For now, these maps clearly illustrate the relative layout of vegetation plots within treatment blocks.

In addition to the GPS location information, each plot was re-marked using red flagging tape at the plot centre and the four corners. Short (18 inch) angle aluminum stakes were replaced by taller (36 inch) red angle aluminum stakes in the 4 corners of all plots. The combination of flagging and stakes improved the visibilty of the plots, especially in tall and dense regenerating vegetation.

Disturbance Assessments

During the reconnaissance trip, plots that were located within site preparation treatment areas were surveyed to assess levels of disturbance. Post-harvest disturbance assessments were completed in summer 1995, but some of the plots were subsequently site prepared as well. In 1996, the degree of disturbance resulting from site preparation treatments was assessed on treated sites. This disturbance assessment incorporated one new class, undisturbed duff, but otherwise used the same classes as were employed in 1995. The '96 disturbance classes were:

1. Undisturbed duff
2. Disturbed duff:
    2a. Exposed mineral soil (mineral soil exposed by harvesting operations)
    2b. Duff removed (part of duff layer removed, but mineral soil not exposed)
    2c. Duff compressed (little or no duff removed, but is compressed by passage of harvesting equipment)
3. Slash:
    3a. Slash < 30cm in depth (ie., slash accumulated up to 30 cm thickness)
    3b. Slash > 30 cm in depth (ie., slash accumulated to greater than 30 cm thickness)
4. Trees removed (# of newly harvested stumps)
5. Mineral soil exposed due to windfall (mineral soil exposed by uprooted trees)

For the disturbance assessments, the 10m x 10m plots were divided into four 5m x 5m quadrats. Within each of these quadrats, the percent cover by each of the disturbance classes was estimated and recorded. Mean cover values for each class will be calculated for each 10m x 10m plot in subsequent data analyses.

Vegetation Survey

In 1996, vegetation surveys were completed in both stands 1 and 2, but only in the treated blocks. The control blocks were not sampled for vegetation this year since they were surveyed most recently in 1995 and have not changed significantly since then. (Note: the patch cut blocks have not been sampled since the preharvest survey; they have been excluded from the vegetation succession study).

As in previous years, vegetation sampling involved the identification of all species located within the boundaries of a 10m x 10m plot, and an ocular estimation of the percentage of the plot's area covered by each species. Species' cover estimates were recorded within 7 strata: 1) dominant trees; 2) secondary trees; 3) tall shrubs (2 - 10m); 4) low shrubs (0.5 - 2m); 5) dwarf shrubs (0 - 0.5m); 6) herbs (including graminoids and ferns); and 7) mosses and lichens. Cover estimates ranged from 0.1 to 100%. A convention was established to use 0.1% cover when species were present but were not very abundant, and 0.5% cover for species that had an abundance greater than a mere presence, but were still less than a full 1% of the plot. Specimens of unknown species were collected from outside the plots, pressed and dried for identification in the lab.

Vegetation surveys in stand 1 and stand 2 were completed from late June to mid-July. Because the 2 surveyors employed this summer were skilled in vegetation survey techniques, an average of 3-4 plots per person per day were sampled. The 2 surveyors worked independently, but cross-checked (calibrated) their cover estimations and plant identifications on a regular basis, especially at the beginning of the season, but periodically throughout the sampling period.

Photography

Photographic documentation of vegetation change in each of the plots was continued by taking photos from the same location as in previous years (i.e., from the plot corner closest to the centre line and to the front of the block). All photographs (slide format) have been labelled with plot and date information, and are currently stored by K. Baldwin at Great Lakes Forestry Centre (GLFC). Although there are some gaps in the collection (due to poor slide quality; no photos due to rainy conditions), there is ample illustration of vegetation change in many of the plots over the 3 years since harvest.

Data Recording and Storage

Vegetation data from summer 1996 were entered into computer files for storage and analyses. The data entry and verification was facilitated by a FoxPro data entry program (FECENTRY, created by K. Lawrence, GLFC) which was designed for vegetation data of the type collected at BSBMP, as well as for site, soil and forest mensuration data. The program was designed so that data checking can be done if data are entered twice. The second entries are compared against the first entries and any differences are reported. This provides a very efficient way of identifying and correcting data entry errors.

In keeping with the BSBMP data standards, the 1996 vegetation data have been converted from FoxPro format to Excel format. In Excel, these data are compatible with all previous years' vegetation data. For now, separate datasets for each of stands 1 and 2, and for each year of sampling, are being maintained due to their large sizes. In Excel format, each dataset comprises a listing of species, one per line, with associated siteid, layer code, and percent cover value; in this format, some of the datasets have more than 2000 records. The datasets will be merged as necessary, as the analyses proceed.

The data files are currently located with K. Baldwin, at GLFC. Backup copies of the files have been provided to J.B. Scarratt to be kept in the BSBMP data repository. File names are as follows:

VEG93S1.dbf, VEG93S2.dbf - vegetation data for stand 1 and stand 2 respectively in 1993
VEG94S1.dbf, VEG94S2.dbf - vegetation data for stand 1 and stand 2 respectively in 1994
VEG95S1.dbf, VEG95S2.dbf - vegetation data for stand 1 and stand 2 respectively in 1995
VEG96S1.dbf, VEG96S2.dbf - vegetation data for stand 1 and stand 2 respectively in 1996

The format of these files allows them to be used in either Excel or FoxPro software packages. Coding conventions for all of the datasets are as follows:

Field name	Description
SITEID	A 5 digit code, e.g., 10309 1st digit - stand number: 1 ("Camp 7") or 2 (airstrip) 2nd,3rd digit - block number: 01 to 14 (stnd 1) or 01 to 07 (stnd 2) 4th,5th digit - plot number: 01 to 05 (A1 to A5) or 06 to 10 (B1 to B5) Note that the siteid may be altered to include the year of sampling, by adding 2 digits at the start to represent the year (e.g., 93, 94, 95, 96; 9310309)
SPECIES	A 7 letter acronym comprised of the 1st four letters of the genus name + the 1st three letters of the species name, eg., POPUTRE for *POPUlus TREmuloides* (trembling aspen). A species list is attached, giving the 7 letter acronyms, full latin names, and common names (if available) for species recorded in the 1996 vegetation survey.
LAYER	A 2 digit code, as follows: 01 - dominant canopy 02 - secondary canopy 03 - tall shrubs (2 to 10 meter height) 04 - low shrubs (0.5 to 2 meter height) 05 - dwarf shrubs (up to 0.5 meter height) 06 - herbs (including ferns, graminoids) 07 - mosses, lichens
% COVER	A 2 character field, with values ranging from .1, .5, 01-09, 10-99, representing the absolute value of the cover estimate.

Data Manipulation and Analysis

General descriptive summaries are currently being processed. These will take the form of mean % cover and frequency occurrence summaries for a range of common species, stratified by block and by treatment. Beyond the preliminary descriptive work, efforts will be ongoing to study the successional trends (if any) that are being played out in the Black Sturgeon Boreal Mixedwood study area.

Vegetation Plot Summary

Following is a summary of the vegetation sampling history for all blocks and plots in the BSBMP. The initial sampling (pre-harvest) was completed in 1993. Control blocks are being sampled at less frequent intervals than harvested blocks because the vegetation change is not as rapid in the undisturbed condition. Twelve new plots were established in 1995 (2 per 6 cutover blocks) to provide equal representation (3 plots each) of treated (site prep.) and untreated (no site prep.) conditions within the cutover blocks. The relative location of the new plots is indicated by their siteid - 10175 is located approximately half way between plots 7 and 8 in stand 1, block 1; 10185 is located approximately half way between plots 8 and 9 in stand 1, block 1; in stand 1, block 14, 11485 and 11489 are both located between plots 8 and 9 with 11489 being closest to plot 9. The "distrb" columns indicate when and where disturbance assessments were completed.

BSBMP **STAND 1** VEGETATION SURVEY SUMMARY							
Siteid	Reference PSP	1993	1994	1995		1996	
		veg	veg	veg	distrb	veg	distrb
10101	A1	x	x	x	x	x	
10104	A4	x	x	x	x	x	
10107	B2	x	x	x	x	x	
10175				xs[1]		x	x
10185				xs		x	x
10109	B4	x	x	xs	x	x	x
10201	A1	x	x	x	x	x	
10204	A4	x	x	x	x	x	
10207	B2	x	x	x	x	x	
10210	B5	x	x	x	x	x	
10301	A1	x	x	x	x	x	
10305	A5	x	x	x	x	x	
10306	B1	x	x	x	x	x	
10309	B4	x	x	x	x	x	
10401	A1	x		x			
10405	A5	x		x			
10406	B1	x		x			
10410	B5	x		x			
10502	A2	x	x	x	x	x	
10505	A5	x	x	x	x	x	
10507	B2	x	x	x	x	x	
10509	B4	x	x	x	x	x	

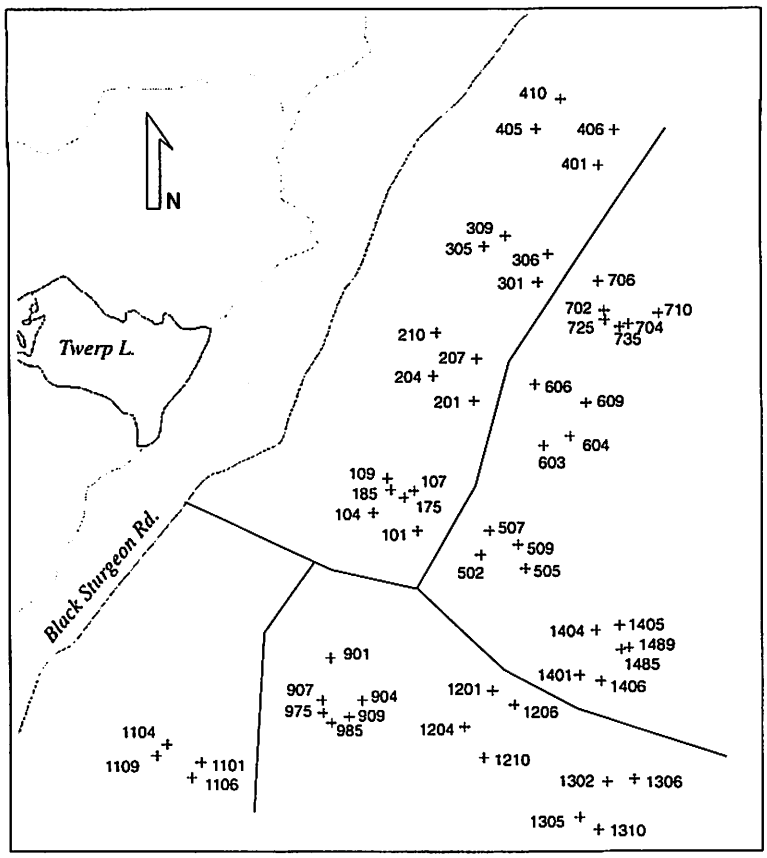
[1] s indicates plot was site prepared

Siteid	Reference PSP	1993	1994	1995		1996	
		veg	veg	veg	distrb	veg	distrb
10603	A3	x		x	considered to be		
10604	A4	x		x	untreated control block		
10606	B1	x		x			
10609	B4	x		x			
10702	A2	x	x	x	x	x	
10725				xs		x	x
10735				xs		x	x
10704	A4	x	x	xs	x	x	x
10706	B1	x	x	x	x	x	
10710	B5	x	x	x	x	x	
Block 8 (Patch Cut)	abandoned after harvesting; no vegetation surveys after precut survey						
10901	A1	x	x	x	x	x	
10904	A4	x	x	x	x	x	
10907	B2	x	x	x	x	x	
10975				xs		x	x
10985				xs		x	x
10909	B4	x	x	xs	x	x	x
Block 10 (Patch Cut)	abandoned after harvesting; no vegetation surveys after precut survey						
11101	A1	x	x	x	x	x	
11104	A4	x	x	x	x	x	
11106	B1	x	x	x	x	x	
11109	B4	x	x	x	x	x	
11201	A1	x	x	x	x	x	
11204	A4	x	x	x	x	x	
11206	B1	x	x	x	x	x	
11210	B5	x	x	x	x	x	
11302	A1	x		x			
11305	A5	x		x			
11306	B1	x		x			
11310	B5	x		x			
11401	A1	x	x	x	x	x	
11404	A4	x	x	x	x	x	
11406	B1	x	x	x	x	x	
11485				xs		x	x
11489				xs		x	x
11410	B5	x	x	xs	x	x	x

BSBMP **STAND 2** VEGETATION SURVEY SUMMARY							
Siteid	Reference PSP	1993	1994	1995		1996	
		veg	veg	veg	distrb	veg	distrb
20101	A1	x	x	x	x	x	
20125				xs		x	x
20135				xs		x	x
20104	A4	x	x	xs	x	x	x
20106	B1	x	x	x	x	x	
20109	B4	x	x	x	x	x	
20201	A1	x	x	x	x	x	
20204	A4	x	x	x	x	x	
20206	B1	x	x	x	x	x	
20209	B4	x	x	x	x	x	
20301	A1	x	x	x	x	x	
20304	A4	x	x	x	x	x	
20306	B1	x	x	x	x	x	
20309	B4	x	x	x	x	x	
20401	A1	x	x	x	x	x	
20404	A4	x	x	x	x	x	
20406	B1	x	x	x	x	x	
20409	B4	x	x	x	x	x	
20502	A2	x		x			
20504	A4	x		x			
20506	B1	x		x			
20509	B4	x		x			
20602	A2	x	x	x	x	x	
20604	A4	x	x	x	x	x	
20607	B2	x	x	x	x	x	
20675				xs		x	x
20685				xs		x	x
20610	B5	x	x	xs	x	x	x
Block 7 (Patch Cut)	abandoned after harvesting; no vegetation surveys after precut survey						

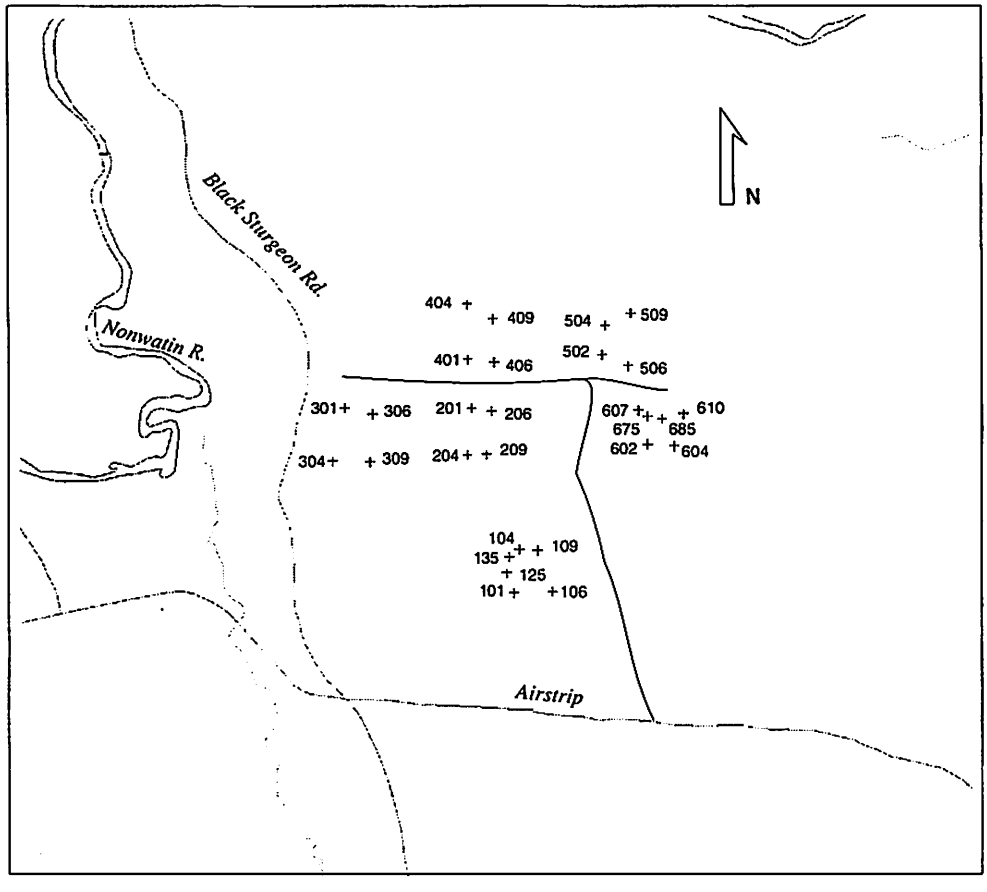
Vegetation Plots in BSBMP Stand 1 - Mapped Using Geo-corrected Coordinates

(plotted numbers indicate block and plot numbers)



Vegetation Plots in BSBMP Stand 2 - Mapped Using Geo-corrected Coordinates

(plotted numbers indicate block and plot numbers)



SPECIES LIST
Black Sturgeon Vegetation Survey 1996

Acronym	Species name	Common name
TREES:		
Abiebal	*Abies balsamea*	balsam fir
Betupap	*Betula papyrifera*	white birch
Picegla	*Picea glauca*	white spruce
Picemar	*Picea mariana*	black spruce
Pinuban	*Pinus banksiana*	jack pine
Poputre	*Populus tremuloides*	trembling aspen
SHRUBS:		
Acerspi	*Acer spicatum*	mountain maple
Alnucri	*Alnus crispa*	green alder
Alnurug	*Alnus rugosa*	speckled alder
Amelspp	*Amelanchier* species	serviceberries
Cornsto	*Cornus stolonifera*	red-osier dogwood
Corycor	*Corylus cornuta*	beaked hazel
Dierlon	*Diervilla lonicera*	bush honeysuckle
Gaulhis	*Gaultheria hispidula*	creeping snowberry
Ledugro	*Ledum groenlandicum*	Labrador tea
Linnbor	*Linnaea borealis*	twinflower
Lonican	*Lonicera canadensis*	Canada fly honeysuckle
Lonihir	*Lonicera hirsuta*	hairy honeysuckle
Prunpen	*Prunus pensylvanica*	pin cherry
Ribegla	*Ribes glandulosum*	skunk currant
Ribehir	*Ribes hirtellum*	wild gooseberry
Ribeoxy	*Ribes oxyacanthoides*	bristly wild gooseberry
Ribespp	*Ribes* species	
Ribetri	*Ribes triste*	wild red currant
Rosaaci	*Rosa acicularis*	prickly wild rose
Rubuida	*Rubus idaeus*	wild red raspberry
Rubupub	*Rubus pubescens*	dwarf raspberry
Salibeb	*Salix bebbiana*	Bebb's willow
Salidis	*Salix discolor*	pussy willow
Salispp	*Salix* species	
Sambpub	*Sambucus pubens*	elderberry
Sorbame	*Sorbus americana*	American mountain ash
Sorbdec	*Sorbus decora*	showy mountain ash
Vaccang	*Vaccinium angustifolium*	low sweet blueberry
Vaccmyr	*Vaccinium myrtilloides*	velvet leaf blueberry
Vibuedu	*Viburnum edule*	squashberry

Acronym	Species name	Common name
HERBS:		
Actarub	*Actaea rubra*	red baneberry
Anapmar	*Anaphalis margaritacea*	pearly everlasting
Anemqui	*Anemone quinquefolia*	wood anemone
Apocand	*Apocynum androsaemifolium*	spreading dogbane
Aralnud	*Aralia nudicaulis*	wild sarsaparilla
Astecil	*Aster ciliolatus*	ciliolate aster
Astemac	*Aster macrophyllus*	large-leaved aster
Astespp	*Aster* species	
Chryleu	*Chrysanthemum leucanthemum*	oxeye daisy
Clemver	*Clematis verticillaris*	purple virgin's bower
Clinbor	*Clintonia borealis*	blue bead lily
Convspi	*Convolvulus spithamaeus*	low bindweed
Copttri	*Coptis trifolia*	goldthread
Corncan	*Cornus canadensis*	bunchberry
Corysem	*Corydalis sempervirens*	pink corydalis
Dracpar	*Dracocephalum parviflorum*	American dragonhead
Dryospi	*Dryopteris spinulosa*	spinulose wood fern
Epilang	*Epilobium angustifolium*	fireweed
Epilgla	*Epilobium glandulosum*	northern willow herb
Erigcan	*Erigeron canadensis*	Canada fleabane
Fragves	*Fragaria vesca*	woodland strawberry
Fragvir	*Fragaria virginiana*	common strawberry
Galetet	*Galeopsis tetrahit*	hemp-nettle
Galitri	*Galium trifolium*	fragrant bedstraw
Gerabic	*Geranium bicknellii*	Bicknell's cranesbill
Gleched	*Glechoma hederacea*	ground-ivy
Goodpub	*Goodyera pubescens*	downy rattlesnake plantain
Gymndry	*Gymnocarpium dryopteris*	oak fern
Hiergro	*Hieracium gronovii*	hairy hawkweed
Hierpra	*Hieracium pratense*	field hawkweed
Hypeper	*Hypericum perforatum*	common St. Johnswort
Lactcan	*Lactuca canadensis*	wild lettuce
Lactspp	*Lactuca* species	
Lycoann	*Lycopodium annotinum*	stiff clubmoss
Lycoluc	*Lycopodium lucidulum*	shining clubmoss
Lycoobs	*Lycopodium obscurum*	ground pine
Maiacan	*Maianthemum canadensis*	wild lily-of-the-valley
Melalin	*Melampyrum lineare*	cow wheat
Mitenud	*Mitella nuda*	naked mitrewort
Moneuni	*Moneses uniflora*	one-flowered wintergreen
Polycil	*Polygonum cilinode*	fringed bindweed

Acronym	Species name	Common name
Pyrosec	*Pyrola secunda*	one-sided pyrola
Pyrospp	*Pyrola* species	
Pyrovir	*Pyrola virens*	green pyrola
Streros	*Streptopus roseus*	rose twisted stalk
Taraoff	*Taraxacum officinale*	common dandelion
Triebor	*Trientalis borealis*	starflower
Trifpra	*Trifolium pratense*	red clover
Violadu	*Viola adunca*	sand violet
Violren	*Viola renifolia*	kidney-leaved violet
Violspp	*Viola* species	
GRAMINOIDS:		
Calacan	*Calamagrostis canadensis*	blue-joint grass
Careaen	*Carex aenea*	
Caredew	*Carex dewiana*	
Carehou	*Carex houghtonii*	
Carelax	*Carex laxiflora*	
Carespp	*Carex* species	
Cinnlat	*Cinna latifolia*	drooping wood reed
Cinnspp	*Cinna* species	
Grasssp	Grass species	
Oryzasp	*Oryzopsis asperifolia*	rough mountain rice
Poasalt	*Poa saltuensis*	two-rayed poa
Schipur	*Schizachne purpurascens*	false melic grass
MOSSES and LICHENS:		
Bracsal	*Brachythecium salebrosum*	
Bracspp	*Brachythecium* species	
Bryuspp	*Bryum* species	
Cladmit	*Cladina mitis*	- reindeer lichens
Cladran	*Cladina rangiferina*	
Cladste	*Cladina stellaris*	
Cladchl	*Cladonia chlorophaea*	- cup / club lichens
Cladcon	*Cladonia coniocraea*	
Cladgra	*Cladonia gracilis*	
Dicrfus	*Dicranum fuscescens*	- broom mosses
Dicrmon	*Dicranum montanum*	
Dicrpol	*Dicranum polysetum*	
Dicrsco	*Dicranum scoparium*	
Dicrspp	*Dicranum* species	

Acronym	Species name	Common name
Drepunc	*Drepanocladus uncinatus*	sickle moss
Hylospl	*Hylocomium splendens*	stair-step moss
Mniucus	*Mnium cuspidatum*	
Peltpol	*Peltigera polydactyla*	
Peltspp	*Peltigera* species	
Plaglae	*Plagiothecium laetum*	
Pleusch	*Pleurozium schreberi*	Schreber's moss
Polycom	*Polytrichum commune*	hair cap moss
Ptilcri	*Ptilium crista-castrensis*	plume moss
Ptilpul	*Ptilidium pulcherrimum*	
Rhyttri	*Rhytidiadelphus triquetrus*	shaggy moss