

Appendix 1. Glossary of Scientific and Common Plant Species Names

Scientific Name	Common Name
<i>Acer negundo</i>	Manitoba maple
<i>Achillea millefolium</i>	common yarrow
<i>Achnatherum hymenoides</i>	Indian rice grass
<i>Agropyron dasystachyum</i>	northern wheat grass
<i>Agropyron fragile</i>	Siberian wheat grass
<i>Agropyron sibiricum</i>	Siberian wheat grass
<i>Agropyron smithii</i>	western wheat grass
<i>Agropyron trachycaulum</i>	slender wheat grass
<i>Agrostis stolonifera</i>	creeping bentgrass
<i>Ambrosia acanthicarpa</i>	bur ragweed
<i>Ambrosia psilostachya</i>	perennial ragweed
<i>Antennaria microphylla</i>	little-leaf pussytoes
<i>Antennaria parvifolia</i>	small-leave pussytoes
<i>Aristida purpurea var. longiseta</i>	Fendler threeawn
<i>Artemisia campestris</i>	field sagewort
<i>Artemisia cana</i>	silver sagebrush
<i>Artemisia frigida</i>	pasture sagewort
<i>Artemisia ludoviciana</i>	prairie sagewort
<i>Artemisia tridentata ssp. wyomingensis</i>	Wyoming big sagebrush
<i>Artemisia spp.</i>	sage
<i>Bouteloua gracilis</i>	blue grama
<i>Bromus tectorum</i>	cheatgrass
<i>Calamovilfa longifolia</i>	sand grass
<i>Carex emoryi</i>	Emory's sedge
<i>Carex foenea</i>	dryspike sedge
<i>Carex lanuginosa</i>	wooly sedge
<i>Carex obtusata</i>	blunt sedge
<i>Carex pellita</i>	wooly sedge
<i>Carex pensylvanica</i>	sunloving sedge
<i>Cenchrus longispinus</i>	mat sandbur
<i>Cerastium arvense</i>	field chickweed
<i>Chamaesyce serpyllifolia</i>	thymeleaf sandmat
<i>Chenopodium fremontii</i>	Fremont's goosefoot
<i>Chenopodium pratericola</i>	desert goosefoot
<i>Chenopodium subglabrum</i>	smooth narrow-leaved goosefoot
<i>Cirsium arvense</i>	Canada thistle
<i>Cleome serrulata</i>	bee plant
<i>Cornus sericea</i>	redosier dogwood
<i>Coryphantha vivipara</i>	cushion cactus
<i>Cryptantha fendleri</i>	Fendler's cryptanth
<i>Cyperus schweinitzii</i>	sand nut-grass
<i>Descurainia sophia</i>	flixweed
<i>Echinacea angustifolia</i>	blacksamson echinacea
<i>Elaeagnus angustifolia</i>	Russian olive
<i>Elaeagnus commutata</i>	silver-berry
<i>Elymus canadensis</i>	Canada wild rye
<i>Elymus lanceolatus ssp. lanceolatus</i>	northern wheat grass
<i>Equisetum arvense</i>	common horsetail
<i>Equisetum hyemale</i>	scouring rush
<i>Erigeron caespitosus</i>	tufted fleabane
<i>Escobaria vivipara</i>	cushion cactus
<i>Euphorbia esula</i>	leafy spurge
<i>Eurotia lanata</i>	winter fat

Scientific Name	Common Name
<i>Franseria acanthicarpa</i>	bur ragweed
<i>Fraxinus pennsylvanica</i>	green ash
<i>Glycyrrhiza lepidota</i>	wild licorice
<i>Grindelia squarrosa</i>	curlycup gumweed
<i>Helianthus annuus</i>	common annual sunflower
<i>Helianthus couplandii</i>	annual sunflower
<i>Helianthus pauciflorus ssp. subrhomboides</i>	rhombic-leaved sunflower
<i>Helianthus petiolaris</i>	prairie sunflower
<i>Helianthus subrhomboides</i>	rhombic-leaved sunflower
<i>Hesperostipa comata</i>	needle-and-thread grass
<i>Heterotheca villosa</i>	golden aster
<i>Juncus balticus</i>	wire rush
<i>Kochia scoparia</i>	Mexican-fireweed
<i>Koeleria macrantha</i>	June grass
<i>Krascheninnikovia lanata</i>	winter fat
<i>Lactuca pulchella</i>	common blue lettuce
<i>Lactuca tartarica var. pulchella</i>	common blue lettuce
<i>Lepidium densiflorum</i>	common peppergrass
<i>Leymus canadensis</i>	Canada wild rye
<i>Liatris punctata</i>	dotted blazingstar
<i>Lygodesmia rostrata</i>	annual skeleton-weed
<i>Maianthemum stellata</i>	star-flowered Solomon's seal
<i>Melilotus spp.</i>	sweet-clover
<i>Mentha arvensis</i>	wild mint
<i>Oenothera nuttallii</i>	white evening primrose
<i>Opuntia macrorhiza</i>	twistspine pricklypear
<i>Opuntia polyacantha</i>	prickly pear
<i>Oryzopsis hymenoides</i>	Indian rice grass
<i>Pascopyrum smithii</i>	western wheat grass
<i>Phalaris arundinacea</i>	reed canarygrass
<i>Phyla lanceolata</i>	lanceleaf fogfruit
<i>Plantago patagonica</i>	wooly plantain
<i>Poa palustris</i>	fowl bluegrass
<i>Poa pratensis</i>	Kentucky bluegrass
<i>Poa secunda</i>	Sandberg bluegrass
<i>Populus angustifolia</i>	narrow-leaf cottonwood
<i>Populus deltoides</i>	western cottonwood
<i>Populus fremontii</i>	Fremont cottonwood
<i>Populus tremuloides</i>	aspen
<i>Potentilla pensylvanica</i>	Pennsylvania cinquefoil
<i>Prunus americana</i>	American plum
<i>Prunus virginiana</i>	chokecherry
<i>Psoralea lanceolata</i>	lemon scurfpea
<i>Psoralidium lanceolatum</i>	lemon scurfpea
<i>Ribes oxycanthoides</i>	wild gooseberry
<i>Rosa acicularis</i>	prickly rose
<i>Rosa woodsii</i>	common wild rose
<i>Rumex venosus</i>	wild begonia / veined dock
<i>Salix amygdaloides</i>	peachleaf willow
<i>Salix bebbiana</i>	Bebb's willow
<i>Salix exigua</i>	sandbar willow
<i>Salix interior</i>	sandbar willow
<i>Salix lutea</i>	yellow willow

Scientific Name	Common Name
<i>Salix spp.</i>	willow
<i>Salsola kali</i>	Russian thistle
<i>Schizachyrium scoparium</i>	little bluestem
<i>Shinnersoseris rostrata</i>	annual skeleton-weed
<i>Smilacina stellata</i>	star-flowered Solomon's seal
<i>Solidago canadensis</i>	Canada goldenrod
<i>Solidago missouriensis</i>	Missouri goldenrod
<i>Spartina pectinata</i>	prairie cord grass
<i>Sporobolus cryptandrus</i>	sand dropseed
<i>Stipa comata</i>	needle-and thread grass
<i>Symphoricarpos occidentalis</i>	buckbrush
<i>Taraxacum officinale</i>	common dandelion
<i>Thermopsis rhombifolia</i>	golden bean
<i>Tragopogon dubius</i>	goat's beard

Common Name	Scientific Name
American plum	<i>Prunus americana</i>
annual skeleton-weed	<i>Lygodesmia rostrata</i>
annual skeleton-weed	<i>Shinnersoseris rostrata</i>
annual sunflower	<i>Helianthus couplandii</i>
aspen	<i>Populus tremuloides</i>
Bebb's willow	<i>Salix bebbiana</i>
bee plant	<i>Cleome serrulata</i>
blacksamson echinacea	<i>Echinacea angustifolia</i>
blue grama	<i>Bouteloua gracilis</i>
blunt sedge	<i>Carex obtusata</i>
buckbrush	<i>Symphoricarpos occidentalis</i>
bur ragweed	<i>Ambrosia acanthicarpa</i>
bur ragweed	<i>Franseria acanthicarpa</i>
Canada goldenrod	<i>Solidago canadensis</i>
Canada thistle	<i>Cirsium arvense</i>
Canada wild rye	<i>Elymus canadensis</i>
Canada wild rye	<i>Leymus canadensis</i>
cheatgrass	<i>Bromus tectorum</i>
chokecherry	<i>Prunus virginiana</i>
common annual sunflower	<i>Helianthus annuus</i>
common blue lettuce	<i>Lactuca pulchella</i>
common blue lettuce	<i>Lactuca tartarica</i> var. <i>pulchella</i>
common dandelion	<i>Taraxacum officinale</i>
common horsetail	<i>Equisetum arvense</i>
common peppergrass	<i>Lepidium densiflorum</i>
common wild rose	<i>Rosa woodsii</i>
common yarrow	<i>Achillea millefolium</i>
creeping bentgrass	<i>Agrostis stolonifera</i>
curlycup gumweed	<i>Grindelia squarrosa</i>
cushion cactus	<i>Coryphantha vivipara</i>
cushion cactus	<i>Escobaria vivipara</i>
desert goosefoot	<i>Chenopodium pratericola</i>
dotted blazingstar	<i>Liatris punctata</i>
dryspike sedge	<i>Carex foenea</i>
Emory's sedge	<i>Carex emoryi</i>
Fendler threeawn	<i>Aristida purpurea</i> var. <i>longiseta</i>
Fendler's cryptanth	<i>Cryptantha fendleri</i>
field chickweed	<i>Cerastium arvense</i>
field sagewort	<i>Artemisia campestris</i>
flixweed	<i>Descurainia sophia</i>
fowl bluegrass	<i>Poa palustris</i>
Fremont cottonwood	<i>Populus fremontii</i>
Fremont's goosefoot	<i>Chenopodium fremontii</i>
goat's beard	<i>Tragopogon dubius</i>
golden aster	<i>Heterotheca villosa</i>
golden bean	<i>Thermopsis rhombifolia</i>
green ash	<i>Fraxinus pennsylvanica</i>
Indian rice grass	<i>Achnatherum hymenoides</i>
Indian rice grass	<i>Oryzopsis hymenoides</i>
June grass	<i>Koeleria macrantha</i>
Kentucky bluegrass	<i>Poa pratensis</i>
lanceleaf fogfruit	<i>Phyla lanceolata</i>

Common Name	Scientific Name
leafy spurge	<i>Euphorbia esula</i>
lemon scurfpea	<i>Psoralea lanceolata</i>
lemon scurfpea	<i>Psoralidium lanceolatum</i>
little bluestem	<i>Schizachyrium scoparium</i>
little-leaf pussytoes	<i>Antennaria microphylla</i>
Manitoba maple	<i>Acer negundo</i>
mat sandbur	<i>Cenchrus longispinus</i>
Mexican-fireweed	<i>Kochia scoparia</i>
Missouri goldenrod	<i>Solidago missouriensis</i>
narrow-leaf cottonwood	<i>Populus angustifolia</i>
needle-and thread grass	<i>Stipa comata</i>
needle-and-thread grass	<i>Hesperostipa comata</i>
northern wheat grass	<i>Agropyron dasystachyum</i>
northern wheat grass	<i>Elymus lanceolatus ssp. lanceolatus</i>
pasture sagewort	<i>Artemisia frigida</i>
peachleaf willow	<i>Salix amygdaloides</i>
Pennsylvania cinquefoil	<i>Potentilla pensylvanica</i>
perennial ragweed	<i>Ambrosia psilostachya</i>
prairie cord grass	<i>Spartina pectinata</i>
prairie sagewort	<i>Artemisia ludoviciana</i>
prairie sunflower	<i>Helianthus petiolaris</i>
prickly pear	<i>Opuntia polyacantha</i>
prickly rose	<i>Rosa acicularis</i>
redosier dogwood	<i>Cornus sericea</i>
reed canarygrass	<i>Phalaris arundinacea</i>
rhombic-leaved sunflower	<i>Helianthus pauciflorus ssp. subrhomboideus</i>
rhombic-leaved sunflower	<i>Helianthus subrhomboideus</i>
Russian olive	<i>Elaeagnus angustifolia</i>
Russian thistle	<i>Salsola kali</i>
sage	<i>Artemisia spp.</i>
sand dropseed	<i>Sporobolus cryptandrus</i>
sand grass	<i>Calamovilfa longifolia</i>
sand nut-grass	<i>Cyperus schweinitzii</i>
sandbar willow	<i>Salix exigua</i>
sandbar willow	<i>Salix interior</i>
Sandberg bluegrass	<i>Poa secunda</i>
scouring rush	<i>Equisetum hyemale</i>
Siberian wheat grass	<i>Agropyron fragile</i>
Siberian wheat grass	<i>Agropyron sibiricum</i>
silver sagebrush	<i>Artemisia cana</i>
silver-berry	<i>Elaeagnus commutata</i>
slender wheat grass	<i>Agropyron trachycaulum</i>
small-leave pussytoes	<i>Antennaria parvifolia</i>
smooth narrow-leaved goosefoot	<i>Chenopodium subglabrum</i>
star-flowered Solomon's seal	<i>Maianthemum stellata</i>
star-flowered Solomon's seal	<i>Smilacina stellata</i>
sunloving sedge	<i>Carex pennsylvanica</i>
sweet-clover	<i>Melilotus spp.</i>
thymeleaf sandmat	<i>Chamaesyce serpyllifolia</i>
tufted fleabane	<i>Erigeron caespitosus</i>
twistspine pricklypear	<i>Opuntia macrorhiza</i>
western cottonwood	<i>Populus deltoides</i>
western wheat grass	<i>Agropyron smithii</i>

Common Name	Scientific Name
western wheat grass	<i>Pascopyrum smithii</i>
white evening primrose	<i>Oenothera nuttallii</i>
wild begonia / veined dock	<i>Rumex venosus</i>
wild gooseberry	<i>Ribes oxycanthoides</i>
wild licorice	<i>Glycyrrhiza lepidota</i>
wild mint	<i>Mentha arvensis</i>
willow	<i>Salix spp.</i>
winter fat	<i>Eurotia lanata</i>
winter fat	<i>Krascheninnikovia lanata</i>
wire rush	<i>Juncus balticus</i>
wooly plantain	<i>Plantago patagonica</i>
wooly sedge	<i>Carex lanuginosa</i>
wooly sedge	<i>Carex pellita</i>
Wyoming big sagebrush	<i>Artemisia tridentata ssp. wyomingensis</i>
yellow willow	<i>Salix lutea</i>

**Appendix 2. PC-ORD Output from Detrended
Correspondence Analysis of Plot Data**

Appendix 2. PC-ORD Output from Detrended Correspondence Analysis of Plot Data

***** Detrended Correspondence Analysis (DCA) *****

PC-ORD, Version 4.20

25 Nov 2002, 13:01

SAND DUNE COMMUNITIES

Number of non-zero data items: 497

Downweighting selected. Weights applied to columns, in sequential order:

0.615 0.300 0.300 0.300 0.300 0.565 0.565 0.300 0.300 0.300
1.000 0.916 0.913 0.559 1.000 1.000 0.300 0.392 0.300 0.300
0.300 0.900 0.900 0.600 1.000 0.600 0.300 1.000 1.000 1.000
0.600 1.000 1.000 1.000 1.000 1.000 0.600 1.000 0.540 1.000
1.000 1.000 0.300 0.663 0.700 1.000 1.000 0.300 0.800 1.000
0.600 0.300 0.426 1.000 1.000 1.000 1.000 0.300 0.900 0.833
1.000 1.000 1.000 1.000 1.000

Axes are rescaled

Number of segments: 30

Threshold: 0.00

Total variance ("inertia") in the species data: 6.2854

----- Axis 1 -----
0.2684242427 = residual at iteration 0
0.0854052529 = residual at iteration 1
0.0140371500 = residual at iteration 2
0.0061698658 = residual at iteration 3
0.0013625850 = residual at iteration 4
0.0006173362 = residual at iteration 5
0.0001402497 = residual at iteration 6
0.0000646825 = residual at iteration 7
0.0000148964 = residual at iteration 8
0.0000069913 = residual at iteration 9
0.0000016124 = residual at iteration 10
0.0000008443 = residual at iteration 11
0.1639871597 = residual at iteration 12
0.0244774297 = residual at iteration 13
0.0513806567 = residual at iteration 14
0.0032606893 = residual at iteration 15
0.0015779877 = residual at iteration 16
0.0002858440 = residual at iteration 17
0.0001657879 = residual at iteration 18
0.0000303903 = residual at iteration 19
0.0000178559 = residual at iteration 20
0.0000032664 = residual at iteration 21
0.0000019687 = residual at iteration 22
0.0000005150 = residual at iteration 23
0.1456906796 = residual at iteration 24
0.0234203395 = residual at iteration 25
0.0480892435 = residual at iteration 26
0.0030493103 = residual at iteration 27
0.0017713277 = residual at iteration 28
0.0002687894 = residual at iteration 29
0.0001558407 = residual at iteration 30
0.0000304978 = residual at iteration 31
0.0000175863 = residual at iteration 32
0.0000037236 = residual at iteration 33
0.0000022105 = residual at iteration 34
0.0000005672 = residual at iteration 35
0.0000004183 = residual at iteration 36
0.0000003501 = residual at iteration 37
0.2779901028 = residual at iteration 38
0.0074540768 = residual at iteration 39
0.0021347259 = residual at iteration 40
0.0006754500 = residual at iteration 41
0.0002074938 = residual at iteration 42
0.0000793746 = residual at iteration 43
0.0000260332 = residual at iteration 44
0.0000105902 = residual at iteration 45

0.0000036683 = residual at iteration 46
0.0000015326 = residual at iteration 47
0.0000005304 = residual at iteration 48
0.0119315125 = residual at iteration 49
0.0029634687 = residual at iteration 50
0.0000002078 = residual at iteration 60
0.0000211076 = residual at iteration 70
0.0018477291 = residual at iteration 80
0.0139812361 = residual at iteration 90
0.0000005091 = residual at iteration 100
0.0000062506 = residual at iteration 110
0.0000461937 = residual at iteration 120
0.0222807173 = residual at iteration 130
0.1710713655 = residual at iteration 140
0.0000009847 = residual at iteration 150
0.0000099311 = residual at iteration 160
0.0002753049 = residual at iteration 170
0.0028829316 = residual at iteration 180
0.0192794092 = residual at iteration 190
0.0000006532 = residual at iteration 200
0.0000043344 = residual at iteration 210
0.0000274861 = residual at iteration 220
0.0097351270 = residual at iteration 230
0.0000010114 = residual at iteration 240
0.0000127912 = residual at iteration 250
0.0001706528 = residual at iteration 260
0.0005976434 = residual at iteration 270
0.0020370230 = residual at iteration 280
0.1597174108 = residual at iteration 290
0.0000015046 = residual at iteration 300
0.0000147340 = residual at iteration 310
0.0000765337 = residual at iteration 320
0.0011597162 = residual at iteration 330
0.0019860768 = residual at iteration 340
0.2260046750 = residual at iteration 350
0.0954641625 = residual at iteration 360
0.0000008501 = residual at iteration 370
0.0003140370 = residual at iteration 380
0.0263471641 = residual at iteration 390
0.1734091938 = residual at iteration 400
0.0000005903 = residual at iteration 410
0.0000467348 = residual at iteration 420
0.0000296704 = residual at iteration 430
0.0007561108 = residual at iteration 440
0.0360311270 = residual at iteration 450
0.0000008192 = residual at iteration 460
0.0002691617 = residual at iteration 470
0.0133251371 = residual at iteration 480
0.0000009775 = residual at iteration 490
0.0000034115 = residual at iteration 500
0.0019896838 = residual at iteration 510
0.0212083757 = residual at iteration 520
0.0000005526 = residual at iteration 530
0.0000056518 = residual at iteration 540
0.0001769213 = residual at iteration 550
0.0478879064 = residual at iteration 560
0.0000007582 = residual at iteration 570
0.0000120228 = residual at iteration 580
0.0004150117 = residual at iteration 590
0.0002466936 = residual at iteration 600
0.0018837127 = residual at iteration 610
0.2045992166 = residual at iteration 620
0.0000096100 = residual at iteration 630
0.0000455938 = residual at iteration 640
0.0055995947 = residual at iteration 650
0.1489204913 = residual at iteration 660
0.1107899100 = residual at iteration 670
0.0000003468 = residual at iteration 680
0.0000078266 = residual at iteration 690
0.0004097962 = residual at iteration 700
0.0000001005 = residual at iteration 710

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0.0000026737 = residual at iteration 720
0.0000636807 = residual at iteration 730
0.0006091066 = residual at iteration 740
0.0165218879 = residual at iteration 750
0.0000096641 = residual at iteration 760
0.0000374746 = residual at iteration 770
0.0000017238 = residual at iteration 780
0.0000040091 = residual at iteration 790
0.0000317458 = residual at iteration 800
0.0000037804 = residual at iteration 810
0.0003344046 = residual at iteration 820
0.0202178955 = residual at iteration 830
0.0000006557 = residual at iteration 840
0.0001674164 = residual at iteration 850
0.0006750197 = residual at iteration 860
0.0000157669 = residual at iteration 870
0.0001539329 = residual at iteration 880
0.0045301383 = residual at iteration 890
0.1807350367 = residual at iteration 900
0.0000009182 = residual at iteration 910
0.0000329651 = residual at iteration 920
0.0000177802 = residual at iteration 930
0.0006978700 = residual at iteration 940
0.0364268906 = residual at iteration 950
0.0009799623 = residual at iteration 960
0.0008513225 = residual at iteration 970
0.1945322305 = residual at iteration 980
0.0000022841 = residual at iteration 990
0.0534050353 = residual at iteration 999
0.7860396504 = eigenvalue
*** BEWARE *** RESIDUAL BIGGER THAN TOLERANCE, WHICH IS 0.0000001000

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Length of gradient:      2.995
Length of segments:    0.32  0.32  0.31  0.30  0.29  0.29  0.26  0.19  0.13  0.11
Length of segments:    0.10  0.10  0.09  0.09  0.09
Length of gradient:      3.567

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Length of gradient:      4.127
Length of segments:    0.24  0.24  0.22  0.20  0.19  0.20  0.21  0.21  0.21  0.19
Length of segments:    0.19  0.19  0.20  0.22  0.22  0.21  0.17  0.15  0.15  0.16
Length of segments:    0.17
Length of gradient:      4.129

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----- Axis 2 -----
0.2091501057 = residual at iteration  0
0.0765530691 = residual at iteration  1
0.0229611807 = residual at iteration  2
0.0032644884 = residual at iteration  3
0.0007385664 = residual at iteration  4
0.0001094733 = residual at iteration  5
0.0000250289 = residual at iteration  6
0.0000037378 = residual at iteration  7
0.0000008669 = residual at iteration  8
0.0000001618 = residual at iteration  9
0.0000001470 = residual at iteration 10
0.0000001581 = residual at iteration 11
0.1715056002 = residual at iteration 12
0.0267237853 = residual at iteration 13
0.0032643846 = residual at iteration 14
0.0005265863 = residual at iteration 15
0.0000775312 = residual at iteration 16
0.0000147603 = residual at iteration 17
0.0000022521 = residual at iteration 18
0.0000004430 = residual at iteration 19
0.0000004798 = residual at iteration 20
0.0000002632 = residual at iteration 21
0.0000001324 = residual at iteration 22
0.2258998752 = residual at iteration 23
0.0052952184 = residual at iteration 24
0.0007295895 = residual at iteration 25
0.0000719962 = residual at iteration 26

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0.0000153151 = residual at iteration 27
0.0000024945 = residual at iteration 28
0.0000005695 = residual at iteration 29
0.0000002555 = residual at iteration 30
0.0000001209 = residual at iteration 31
0.1649405807 = residual at iteration 32
0.0030498444 = residual at iteration 33
0.0001900764 = residual at iteration 34
0.0000162592 = residual at iteration 35
0.0000029595 = residual at iteration 36
0.0000004602 = residual at iteration 37
0.0000002008 = residual at iteration 38
0.1445547491 = residual at iteration 39
0.0134180319 = residual at iteration 40
0.0013512193 = residual at iteration 41
0.0001006165 = residual at iteration 42
0.0000235098 = residual at iteration 43
0.0000029193 = residual at iteration 44
0.0000007032 = residual at iteration 45
0.0000002582 = residual at iteration 46
0.1190573350 = residual at iteration 47
0.0200145710 = residual at iteration 48
0.0045830240 = residual at iteration 49
0.0006001128 = residual at iteration 50
0.0000569950 = residual at iteration 60
0.0000140514 = residual at iteration 70
0.0000016084 = residual at iteration 80
0.0000006614 = residual at iteration 90
0.0000002011 = residual at iteration 100
0.1686325073 = residual at iteration 110
0.0000001987 = residual at iteration 120
0.0245861672 = residual at iteration 130
0.0128338402 = residual at iteration 140
0.0009726097 = residual at iteration 150
0.1492897719 = residual at iteration 160
0.0230942033 = residual at iteration 170
0.0347204730 = residual at iteration 180
0.0006071823 = residual at iteration 190
0.0000031297 = residual at iteration 200
0.0000002212 = residual at iteration 210
0.0000000478 = residual at iteration 220
0.6630458236 = eigenvalue

Length of gradient:      2.660
Length of segments:    0.27  0.28  0.29  0.29  0.28  0.27  0.25  0.23  0.17  0.08
Length of segments:    0.06  0.06  0.06  0.06
Length of gradient:      3.499

Length of gradient:      4.663
Length of segments:    0.11  0.11  0.12  0.14  0.19  0.23  0.25  0.25  0.24  0.24
Length of segments:    0.24  0.24  0.25  0.25  0.25  0.24  0.24  0.23  0.22  0.16
Length of segments:    0.12  0.12  0.12  0.12
Length of gradient:      4.639

----- Axis 3 -----
0.1746972799 = residual at iteration 0
0.0342275575 = residual at iteration 1
0.0056336881 = residual at iteration 2
0.0004523548 = residual at iteration 3
0.0000723316 = residual at iteration 4
0.0000058883 = residual at iteration 5
0.0000009449 = residual at iteration 6
0.0000000834 = residual at iteration 7
0.4721443057 = eigenvalue

Length of gradient:      3.666
Length of segments:    0.13  0.14  0.15  0.19  0.23  0.28  0.31  0.32  0.30  0.28
Length of segments:    0.24  0.22  0.20  0.18  0.15  0.11  0.08  0.08  0.08
Length of gradient:      3.973

Length of gradient:      3.773

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Appendix 2. PC-ORD Output from Detrended Correspondence Analysis of Plot Data

Length of segments: 0.17 0.17 0.18 0.19 0.20 0.21 0.21 0.22 0.23 0.24
 Length of segments: 0.23 0.22 0.20 0.18 0.18 0.18 0.18 0.18 0.19
 Length of gradient: 3.695

SAND DUNE COMMUNITIES
 SPECIES SCORES

N	NAME	AX1	AX2	AX3	RANKED 1 EIG=0.786	RANKED 2 EIG=0.663		
1	POPUDEL1	-37	282	387	7 PRUNVIR4	428	44 RUMEVEN6	496
2	POPUTRE2	-128	282	356	11 PRUNVIR5	424	45 FRANACA6	490
3	POPUDEL2	35	295	443	44 RUMEVEN6	405	63 ELYMCAN7	412
4	SALIAMY3	112	280	387	45 FRANACA6	402	62 ORYZHYM7	350
5	ELEACOM4	-70	149	-9	26 SALSAL6	398	30 THERRHO6	347
6	SALIAMY4	71	330	103	28 EQUIFLU6	380	6 SALIAMY4	330
7	PRUNVIR4	428	-14	177	58 AGROSMI7	370	15 ROSAWO5	308
8	SALIAMY5	77	239	101	41 LYGOROS6	361	27 HELISUB6	295
9	ARTECAN5	-67	87	395	62 ORYZHYM7	351	3 POPUDEL2	295
10	RIBEOXY5	14	262	26	50 HELIANN6	346	60 CARELAN7	292
11	PRUNVIR5	424	-15	180	63 ELYMCAN7	305	64 SPORCRY7	291
12	ELAECOM5	-27	91	-43	51 CERAARV6	296	31 TARAOFF6	289
13	SALIEXI5	-24	175	-13	33 CRYPFEN6	281	1 POPUDEL1	282
14	EUROLAN5	206	112	282	65 CALALON7	246	2 POPUTRE2	282
15	ROSAWO5	116	308	38	64 SPORCRY7	236	4 SALIAMY3	280
16	SOLIMIS6	104	197	201	57 AGRODAS7	235	52 BOUTGRA7	280
17	PLANPAT6	-425	49	370	18 ARTECAM	228	59 AGROSIB7	278
18	ARTECAM	228	94	306	40 CHENFRE6	226	37 SMILSTE6	265
19	ERIGCAE6	-67	87	395	49 LATUPUL6	215	49 LATUPUL6	265
20	POTEPEN6	-67	87	395	34 CHENSUB6	211	10 RIBEOXY5	262
21	ANTEPAR6	-67	87	395	14 EUROLAN5	206	39 SOLICAN6	249
22	LEPIDEN6	-46	70	380	46 CHRYVIL6	197	54 JUNCBAL7	249
23	ACHIMIL6	-99	96	353	42 OPUNPOL6	191	50 HELIANN6	245
24	CLEOSER6	66	184	391	53 CYPESCH7	175	61 POAPRA7	241
25	CORYMIS6	-136	111	338	35 CHENPRA6	165	8 SALIAMY5	239
26	SALSAL6	398	1	270	55 STIPCOM7	135	48 ANTIMIC6	239
27	HELISUB6	35	295	443	30 THERRHO6	134	43 OENONUT6	233
28	EQUIFLU6	380	33	364	38 ARTEFRI6	117	32 TRAGDUB6	230
29	ARTELDU6	26	137	187	15 ROSAWO5	116	47 GLYCLEP6	213
30	THERRHO6	134	347	210	4 SALIAMY3	112	16 SOLIMIS6	197
31	TARAOFF6	110	289	406	52 BOUTGRA7	112	40 CHENFRE6	197
32	TRAGDUB6	-54	230	300	56 KOELMAC7	112	36 DESC SOP6	192
33	CRYPFEN6	281	40	261	31 TARAOFF6	110	24 CLEOSER6	184
34	CHENSUB6	211	136	250	16 SOLIMIS6	104	13 SALIEXI5	175
35	CHENPRA6	165	161	329	60 CARELAN7	81	46 CHRYVIL6	168
36	DESCSOP6	-20	192	378	8 SALIAMY5	77	35 CHENPRA6	161
37	SMILSTE6	-69	265	388	48 ANTIMIC6	77	5 ELEACOM4	149
38	ARTEFRI6	117	127	319	6 SALIAMY4	71	29 ARTELDU6	137
39	SOLICAN6	-47	249	251	24 CLEOSER6	66	34 CHENSUB6	136
40	CHENFRE6	226	197	310	59 AGROSIB7	60	56 KOELMAC7	131
41	LYGOROS6	361	37	60	3 POPUDEL2	35	38 ARTEFRI6	127
42	OPUNPOL6	191	78	290	27 HELISUB6	35	14 EUROLAN5	112
43	OENONUT6	-192	233	93	47 GLYCLEP6	30	25 CORYMIS6	111
44	RUMEVEN6	405	496	182	29 ARTELDU6	26	53 CYPESCH7	110
45	FRANACA6	402	490	216	54 JUNCBAL7	17	23 ACHIMIL6	96
46	CHRYVIL6	197	168	254	10 RIBEOXY5	14	55 STIPCOM7	96
47	GLYCLEP6	30	213	189	36 DESC SOP6	-20	18 ARTECAM	94
48	ANTIMIC6	77	239	101	13 SALIEXI5	-24	12 ELAECOM5	91
49	LATUPUL6	215	265	16	12 ELAECOM5	-27	51 CERAARV6	89
50	HELIANN6	346	245	199	1 POPUDEL1	-37	9 ARTECAN5	87
51	CERAARV6	296	89	205	22 LEPIDEN6	-46	19 ERIGCAE6	87
52	BOUTGRA7	112	280	387	39 SOLICAN6	-47	20 POTEPEN6	87
53	CYPESCH7	175	110	290	32 TRAGDUB6	-54	21 ANTEPAR6	87
54	JUNCBAL7	17	249	227	61 POAPRA7	-55	42 OPUNPOL6	78
55	STIPCOM7	135	96	334	21 ANTEPAR6	-67	65 CALALON7	76
56	KOELMAC7	112	131	234	19 ERIGCAE6	-67	22 LEPIDEN6	70
57	AGRODAS7	235	57	76	9 ARTECAN5	-67	57 AGRODAS7	57
58	AGROSMI7	370	37	313	20 POTEPEN6	-67	17 PLANPAT6	49
59	AGROSIB7	60	278	87	37 SMILSTE6	-69	33 CRYPFEN6	40
60	CARELAN7	81	292	31	5 ELEACOM4	-70	58 AGROSMI7	37
61	POAPRA7	-55	241	291	23 ACHIMIL6	-99	41 LYGOROS6	37
62	ORYZHYM7	351	350	196	2 POPUTRE2	-128	28 EQUIFLU6	33

Appendix 2. PC-ORD Output from Detrended Correspondence Analysis of Plot Data

63 ELYMCAN7	305	412	128		25 CORYMIS6	-136		26 SALS KAL6	1	
64 SPORCRY7	236	291	73		43 OENONUT6	-192		7 PRUNVIR4	-14	
65 CALALON7	246	76	93		17 PLANPAT6	-425		11 PRUNVIR5	-15	

SAND DUNE COMMUNITIES

SAMPLE SCORES - WHICH ARE WEIGHTED MEAN SPECIES SCORES

N	NAME	AX1	AX2	AX3		RANKED 1			RANKED 2				
						EIG=0.786			EIG=0.663				
1	1	257	248	141		10	10		412	30	30	463	
2	2	19	225	175		14	14		412	6	6	461	
3	3	239	252	87		6	6		390	29	29	314	
4	4	206	219	104		13	13		371	31	31	310	
5	5	140	293	55		30	30		367	21	21	305	
6	6	390	461	183		34	34		362	35	35	303	
7	7	42	215	195		21	21		324	28	28	303	
8	8	235	140	252		37	37		307	26	26	300	
9	9	0	254	278		35	35		282	37	37	297	
10	10	412	15	178		29	29		263	5	5	293	
11	11	33	168	132		1	1		257	27	27	279	
12	12	46	257	369		25	25		250	25	25	265	
13	13	371	72	170		3	3		239	12	12	257	
14	14	412	0	177		8	8		235	9	9	254	
15	15	230	196	186		15	15		230	17	17	253	
16	16	119	244	101		31	31		214	3	3	252	
17	17	13	253	307		4	4		206	1	1	248	
18	18	9	119	0		23	23		182	16	16	244	
19	19	46	176	218		33	33		176	2	2	225	
20	20	92	156	261		38	38		169	4	4	219	
21	21	324	305	185		40	40		163	7	7	215	
22	22	136	128	291		26	26		150	15	15	196	
23	23	182	146	105		5	5		140	19	19	176	
24	24	110	116	316		39	39		140	11	11	168	
25	25	250	265	197		22	22		136	36	36	157	
26	26	150	300	60		28	28		130	20	20	156	
27	27	99	279	133		16	16		119	23	23	146	
28	28	130	303	119		36	36		115	8	8	140	
29	29	263	314	125		24	24		110	22	22	128	
30	30	367	463	169		32	32		99	18	18	119	
31	31	214	310	135		27	27		99	24	24	116	
32	32	99	95	63		20	20		92	38	38	114	
33	33	176	102	259		19	19		46	40	40	107	
34	34	362	21	181		12	12		46	33	33	102	
35	35	282	303	131		7	7		42	39	39	101	
36	36	115	157	181		11	11		33	32	32	95	
37	37	307	297	156		2	2		19	13	13	72	
38	38	169	114	276		17	17		13	34	34	21	
39	39	140	101	284		18	18		9	10	10	15	
40	40	163	107	273		9	9		0	14	14	0	

***** Calculations finished *****

Appendix 3. Species Code Descriptions

Code	Species	Stratum
POPUDEL1	<i>Populus deltoides</i>	Main Canopy Tree (> 5 m)
POPUTRE2	<i>Populus tremuloides</i>	Understorey Tree (> 5 m but at least 3 m shorter than overstorey trees)
POPUDEL2	<i>Populus deltoides</i>	Understorey Tree (> 5 m but at least 3 m shorter than overstorey trees)
SALIAMY3	<i>Salix amygdaloides</i>	Tall Shrub (2.5 m - 5 m)
ELEACOM4	<i>Elaeagnus commutata</i>	Medium Shrub (1 - 2.5 m)
PRUNVIR4	<i>Prunus virginiana</i>	Medium Shrub (1 - 2.5 m)
SALIAMY4	<i>Salix amygdaloides</i>	Medium Shrub (1 - 2.5 m)
ARTECAN5	<i>Artemisia cana</i>	Low Shrub (< 1 m)
ELAEOM5	<i>Elaeagnus commutata</i>	Low Shrub (< 1 m)
EUROLAN5	<i>Eurotia lanata</i>	Low Shrub (< 1 m)
PRUNVIR5	<i>Prunus virginiana</i>	Low Shrub (< 1 m)
RIBEOXY5	<i>Ribes oxycanthoides</i>	Low Shrub (< 1 m)
ROSAWO5	<i>Rosa woodsii</i>	Low Shrub (< 1 m)
SALIAMY5	<i>Salix amygdaloides</i>	Low Shrub (< 1 m)
SALIEXI5	<i>Salix exigua</i>	Low Shrub (< 1 m)
ACHIMIL6	<i>Achillea millefolium</i>	Forb / Herb
ANTIMIC6	<i>Antennaria microphylla</i>	Forb / Herb
ANTEPAR6	<i>Antennaria parvifolia</i>	Forb / Herb
ARTECAM6	<i>Artemisia campestris</i>	Forb / Herb
ARTEFRI6	<i>Artemisia frigida</i>	Forb / Herb
ARTELUD6	<i>Artemisia ludoviciana</i>	Forb / Herb
CERAARV6	<i>Cerastium arvense</i>	Forb / Herb
CHENFRE6	<i>Chenopodium fremontii</i>	Forb / Herb
CHENPRA6	<i>Chenopodium pratericola</i>	Forb / Herb
CHENSUB6	<i>Chenopodium subglabrum</i>	Forb / Herb
CLEOSER6	<i>Cleome serrulata</i>	Forb / Herb
CORYVIV6	<i>Coryphantha vivipara</i>	Forb / Herb
CRYPFEN6	<i>Cryptantha fendleri</i>	Forb / Herb
DESCSOP6	<i>Descurainia sophia</i>	Forb / Herb
EQUIHYE6	<i>Equisetum hyemale</i>	Forb / Herb
ERIGCAE6	<i>Erigeron caespitosus</i>	Forb / Herb
FRANACA6	<i>Franseria acanthicarpa</i>	Forb / Herb
GLYCLEP6	<i>Glycyrrhiza lepidota</i>	Forb / Herb
HELIANN6	<i>Helianthus annuus</i>	Forb / Herb
HELISUB6	<i>Helianthus subrhomboideus</i>	Forb / Herb
HETEVI6	<i>Heterotheca villosa</i>	Forb / Herb
LATUPUL6	<i>Lactuca pulchella</i>	Forb / Herb
LEPIDEN6	<i>Lepidium densiflorum</i>	Forb / Herb
LYGOROS6	<i>Lygodesmia rostrata</i>	Forb / Herb
OENONUT6	<i>Oenothera nuttallii</i>	Forb / Herb
OPUNPOL6	<i>Opuntia polyacantha</i>	Forb / Herb
PLANPAT6	<i>Plantago patagonica</i>	Forb / Herb
POTEPEN6	<i>Potentilla pensylvanica</i>	Forb / Herb
RUMEVEN6	<i>Rumex venosus</i>	Forb / Herb
SALSKAL6	<i>Salsola kali</i>	Forb / Herb
SMILSTE6	<i>Smilacina stellata</i>	Forb / Herb
SOLICAN6	<i>Solidago canadensis</i>	Forb / Herb
SOLIMIS6	<i>Solidago missouriensis</i>	Forb / Herb
TARAOFF6	<i>Taraxacum officinale</i>	Forb / Herb
THERRHO6	<i>Thermopsis rhombifolia</i>	Forb / Herb
TRAGDUB6	<i>Tragopogon dubius</i>	Forb / Herb
AGRODAS7	<i>Agropyron dasystachyum</i>	Graminoid
AGROSIB7	<i>Agropyron sibiricum</i>	Graminoid

Code	Species	Stratum
AGROSMI7	<i>Agropyron smithii</i>	Graminoid
BOUTGRA7	<i>Bouteloua gracilis</i>	Graminoid
CALALON7	<i>Calamovilfa longifolia</i>	Graminoid
CARELAN7	<i>Carex lanuginosa</i>	Graminoid
CYPESCH7	<i>Cyperus schweinitzii</i>	Graminoid
ELYMCAN7	<i>Elymus canadensis</i>	Graminoid
JUNCBAL7	<i>Juncus balticus</i>	Graminoid
KOELMAC7	<i>Koeleria macrantha</i>	Graminoid
ORYZHYM7	<i>Oryzopsis hymenoides</i>	Graminoid
POAPRA7	<i>Poa pratensis</i>	Graminoid
SPORCRY7	<i>Sporobolus cryptandrus</i>	Graminoid
STIPCOM7	<i>Stipa comata</i>	Graminoid

Appendix 4. Correlation Table with Literature From Within Alberta

Class	Community Type	Similar Communities and Citations	Similarity Rating ¹	Comments
Forest	<i>Populus deltoides</i> / <i>Glycyrrhiza lepidota</i> / <i>Juncus balticus</i>	<i>Populus deltoides</i> moist coulee community (Smoliak 1985)	3	Found occasionally in moist coulees (Manyberries). Share dominant overstorey species, but different site conditions (i.e. coulee vs. dunes). Detailed information not provided.
		<i>Populus tremuloides</i> / <i>Stipa spp.</i> - <i>Carex rossii</i> (Jaques 1977)	3	Found primarily in depressional areas and coulees (CFB Suffield-Middle Sandhills) where sandy soils allow deep-water percolation. Different overstorey but somewhat similar site conditions.
		<i>Populus deltoides</i> association (Jaques 1977)	2	Found on floodplains and alluvial terraces of South Saskatchewan river (CFB-Suffield).). Share dominant overstorey species, but different site conditions (i.e. floodplain and terraces vs. dunes). Detailed information not provided.
		<i>Populus X jackii</i> (Adams et al. 1997)	3	Noted this community type was related to the <i>Populus deltoides</i> community reported by Jaques (1977)
		<i>Populus tremuloides</i> (<i>Populus deltoides</i>) (Komex 1993)	2	Found on dunes/plains in 1993 in another survey of the Pakowki Sandhills. Noted isolated <i>Populus deltoides</i> found in low areas, though aspen clones reported being more common.
		<i>Populus tremuloides</i> / <i>Symphoricarpos occidentalis</i> (Adams et al. 1997)	3	Noted this community type was related to the <i>Populus tremuloides</i> / <i>Stipa spp.</i> - <i>Carex rossii</i> community reported by Jaques (1977), found in depressional areas and coulees of CFB Suffield-Middle Sandhills, in sandy soils. Different overstorey but again similar site conditions.
Shrubland	<i>Rosa woodsii</i> / <i>Sporobolus cryptandrus</i>	<i>Rosa woodsii</i> (Komex 1993)	1	Found on dunes in 1993 in another survey of the Pakowki Sandhills. Reported to occur in low area between dunes, often in association with wild licorice. Similar general community type described in previous survey of study area.
Shrubland	<i>Salix amygdaloides</i> – <i>Rosa woodsii</i> / <i>Juncus balticus</i> – <i>Sporobolus cryptandrus</i>	<i>Salix spp.</i> / <i>Stipa comata</i> association (Jaques 1977)	3	Found on floodplains and alluvial terraces of South Saskatchewan river (CFB-Suffield). Community found on coarse textured materials, though site conditions vary. Dominant <i>Salix</i> species unknown, thus some important differences.

¹ Similarity Rating: 1, identical to or very similar; 2, similar in most respects; 3, several similarities but important differences (scale from Corns 1983).

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Salix amygdaloides</i> – <i>Rosa woodsii</i> / <i>Juncus balticus</i> – <i>Sporobolus cryptandrus</i>	<i>Salix amygdaloides</i> (Komex 1993)	1	Found on dunes in 1993 in another survey of the Pakowki Sandhills. <i>Salix amygdaloides</i> found in low areas and as both tree and shrub form. Similar general community type described in previous survey of study area, however no detailed floristic or site conditions provided.
Shrubland	<i>Elaeagnus commutata</i> / <i>Glycyrrhiza lepidota</i>	<i>Elaeagnus commutata</i> (Wheatley and Bentz 2002)	3	Site described based on three reports in Central Parkland, at Dillberry Lake Provincial Park, near Rumsey and in Dry Island Buffalo Jump. Is described as occurring a low shrublands and shrubby meadows along perimeter of saline lakes, adjacent to marshes and graminoid meadows. Shares dominant species but site conditions vary considerably.
		<i>Elaeagnus commutata</i> / <i>Symphoricarpos occidentalis</i> – <i>Rosa woodsii</i> / <i>Poa palustris</i> (Wheatley and Bentz 2002)	3	Described from Central Parkland occurring near Wainwright on suberic to submesic sites with good drainage. It has a well-developed low shrub layer. Different floristic composition but occurred on sites with similar moisture and soil drainage conditions.
		<i>Elaeagnus commutata</i> Shrubland (Komex 1993)	1	Found on dunes in 1993 in another survey of the Pakowki Sandhills. Reported to occur as thickets on some north-facing slopes and at base of some dunes. Similar general community type described in previous survey of study area, however no detailed floristic or site conditions provided.
Shrubland	<i>Elaeagnus commutata</i> / <i>Artemisia ludoviciana</i> / <i>Calamovilfa longifolia</i>	<i>Elaeagnus commutata</i> (Wheatley and Bentz 2002)	3	Site described based on three reports in Central Parkland, at Dillberry Lake Provincial Park, near Rumsey and in Dry Island Buffalo Jump. Is described as occurring a low shrublands and shrubby meadows along perimeter of saline lakes, adjacent to marshes and graminoid meadows. Shares dominant species but site conditions vary considerably.
		<i>Elaeagnus commutata</i> / <i>Symphoricarpos occidentalis</i> – <i>Rosa woodsii</i> / <i>Poa palustris</i> (Wheatley and Bentz 2002)	3	Described from Central Parkland occurring near Wainwright on suberic to submesic sites with good drainage. It had a well-developed low shrub layer. Different floristic composition, but occurred on sites with similar moisture and soil drainage conditions.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Prunus virginiana</i> / <i>Calamovilfa longifolia</i>	<i>Prunus virginiana</i> shrubland (Komex 1993)	1	Found on dunes in 1993 in another survey of the Pakowki Sandhills. Reported to occur along low dune ridges and slopes. Similar general community type described in previous survey of study area, however no detailed floristic or site conditions provided.
		<i>Prunus virginiana</i> – <i>Amelanchier alnifolia</i> / <i>Agropyron trachycaulum</i> – <i>Poa pratensis</i> (Wheatley and Bentz 2002)	3	Was described for the Central Parkland, described from a site in the Blackfoot Provincial Recreation Area. Soils were not described but the site was a steep, south-facing slope. Some similar species noted and located on strong slope, but limited details otherwise.
Dwarf Shrubland	<i>Eurotia lanata</i> / <i>Stipa comata</i> – <i>Calamovilfa longifolia</i>	<i>Stipa</i> – <i>Bouteloua</i> – <i>Agropyron</i> type (Smoliak 1985)	3	Mentioned that this type is found on upland prairie, with <i>Eurotia lanata</i> as a common shrub. Very limited floristic composition provided and few site characteristics. No mention of sand as primary substrate.
Herbaceous Vegetation	<i>Salix exigua</i> / <i>Glycyrrhiza lepidota</i> / <i>Juncus balticus</i>	None described	-	-
	<i>Glycyrrhiza lepidota</i> / <i>Calamovilfa longifolia</i>	<i>Glycyrrhiza lepidota</i> (<i>Calamovilfa longifolia</i> / <i>Artemisia ludoviciana</i>) (Komex 1993)	1	Found on dunes in 1993 in another survey of the Pakowki Sandhills. Also reported to occur with wire rush (<i>Juncus balticus</i>). Similar general community type described in previous survey of study area, however no detailed floristic or site conditions provided.
Herbaceous Vegetation	<i>Glycyrrhiza lepidota</i> – <i>Artemisia</i> spp. / <i>Stipa comata</i>	<i>Glycyrrhiza lepidota</i> (<i>Calamovilfa longifolia</i> / <i>Artemisia ludoviciana</i>) (Komex 1993)	2	Found on dunes in 1993 in another survey of the Pakowki Sandhills. Also reported to occur with wire rush (<i>Juncus balticus</i>). Similar general community type described in previous survey of study area, however no detailed floristic or site conditions provided. Different dominant grass noted.
	<i>Rumex venosus</i>	None described	-	-
	<i>Oryzopsis hymenoides</i> – <i>Sporobolus cryptandrus</i>	<i>Carex foenea</i> – <i>Calamovilfa longifolia</i> – <i>Elymus canadensis</i> – <i>Oryzopsis hymenoides</i> (Fehr 1984)	3	Reported for the Wainwright sand dune area, on active blowouts. Similar site conditions and several similar species, but community composition quite different.
	<i>Stipa comata</i> – <i>Oryzopsis hymenoides</i>	<i>Carex foenea</i> – <i>Calamovilfa longifolia</i> – <i>Elymus canadensis</i> – <i>Oryzopsis hymenoides</i> (Fehr 1984)	3	Reported for the Wainwright sand dune area, on active blowouts. Similar site conditions and several similar species, but community composition quite different.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Stipa comata</i> – <i>Cyperus schweinitzii</i> – <i>Calamovilfa longifolia</i>	<i>Calamovilfa longifolia</i> – <i>Hesperostipa comata</i> (Adams et al. 1997)	2	Described from CFB Suffield. Site conditions differed because this site on fluvial slump features along the South Saskatchewan River, where a sand veneer was present. Texture loamy sand, with slopes 5-15 %. Also found on glaciofluvial outwash plain, with minimal eolian action, where texture is loamy sand and slope is 0-5%. Some similarities in site conditions and several grass species. No mention of <i>Cyperus schweinitzii</i> occurring however.
		<i>Calamovilfa longifolia</i> – <i>Artemisia</i> (Smoliak 1985)	2	Found on upland prairie, sandy soils (Manyberries). Somewhat similar community noted in general region, on sandy soils though only one dominant similar grass species.
		<i>Calamovilfa longifolia</i> – <i>Stipa comata</i> (Smoliak 1985)	2	Found on sandy soils, in coulee bottoms (Manyberries). Similar community noted in general region, on sandy soils though community in this report likely has more moisture available. No mention of <i>Cyperus schweinitzii</i> occurring.
	<i>Sporobolus cryptandrus</i> – <i>Calamovilfa longifolia</i> - <i>Oryzopsis hymenoides</i>	<i>Sporobolus cryptandrus</i> – <i>Calamovilfa longifolia</i> – <i>Koeleria macrantha</i> – <i>Carex obtusata</i> (Wheatley and Bentz 2002; Meijer and Karpuk 1999)	2	Described from Central Parkland on active dunes and blowouts at Dillberry Lake Provincial Park. Generally located on south to west-facing aspects and sparse vegetative cover. <i>Heterotheca villosa</i> may also be present. Two dominant species in this report same as those grass species found in Pakowki Sand Hills. Similar site conditions, both in respect to substrate and slope and aspect.
		<i>Calamovilfa longifolia</i> – <i>Sporobolus cryptandrus</i> sparsely vegetated active dunes (Komex 1993)	1	Found on active dunes in 1993 in another survey of the Pakowki Sandhills. Other species include <i>Helianthus couplandii</i> , golden aster, and golden bean. Similar general community type described in previous survey of study area, however no detailed floristic or site conditions provided.
Herbaceous Vegetation	<i>Artemisia cana</i> / <i>Stipa comata</i>	<i>Artemisia cana</i> / <i>Stipa comata</i> (Holcroft Weerstra 2001)	2	Described occurring along old river terraces, badlands, ravine side slopes and valley walls on a range of parent materials, but occurring most often on sandy glacial drift and alluvium.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Artemisia cana</i> / <i>Stipa comata</i> (cont.)	<i>Artemisia cana</i> – <i>Rosa woodsii</i> / <i>Calamovilfa longifolia</i> – <i>Hesperostipa comata</i> – <i>Koeleria macrantha</i> (Adams <i>et al.</i> 1997)	2	Described at CFB Suffield, on a morainal plain with eolian veneer and sand dunes. Texture was sand, with slopes ranging from 5-15 and well to rapid drainage. Quite similar site conditions, despite CFB Suffield being an eolian veneer over moraine. Vegetation composition also quite similar, with a few differing species.

**Appendix 5. Correlation Table with Literature From
Outside Alberta**

Class	Community Type	Similar Communities and Citations	Similarity Rating ²	Comments
Forest	<i>Populus deltoides</i> / <i>Glycyrrhiza lepidota</i> / <i>Juncus balticus</i>	<i>Populus deltoides</i> - (<i>Salix amygdaloides</i>) / <i>Salix (exigua, interior)</i> Woodland (Natureserve 2002)	2	This community was found widely in the central Great Plains of the United States. Stands occurred on recent alluvial materials, along rivers and streams. The soils were derived from fluvial sands, silts and clays and were poorly developed. The water table fluctuates with the level of the adjacent river or stream. <i>Populus deltoides</i> was the dominant species in this community, although <i>Salix exigua</i> and/or <i>Salix interior</i> were generally more dominant in the initial stages following a major flood event. <i>Salix amygdaloides</i> was rare to codominant. <i>Glycyrrhiza lepidota</i> may be a dominant forb where grazing and other disturbance is minimal. Community quite similar to that found at Pakowki Sandhills, although this community generally found along fluvial routes, not noted to occur in sand dune areas, although recent alluvial materials are generally coarse textured. Relatively similar floristic composition.
		<i>Populus tremuloides</i> sand type (Thorpe and Godwin 1993)	3	Forests of aspen found on upland, north-facing or lower slope positions and on more stabilized landforms. Was found to be most widespread occurring community type in Manito Sandhills (Sask.). Had rapidly to moderately well drained soils. Community different due to different overstorey species, though site conditions are very similar.
		<i>Populus tremuloides</i> (<i>Populus deltoides</i>) low areas in sand flats (Epp and Townley-Smith 1980)	2	Found on low areas in sand flats of Great Sand Hills (Sask.) where soil salinity is not high. <i>Glycyrrhiza lepidota</i> listed as understorey forb species. Noted in similar eolian landscape, though with aspen as more common than cottonwood. Similar site conditions.
		<i>Populus deltoides</i> Woodland (Epp and Townley Smith 1980)	2	Located in a region of high dunes, scattered on interdune sand flats, with no understorey vegetation (Great Sand Hills). Again, similar site conditions with common leading overstorey species. Lack of understorey vegetation quite different.

² Similarity Rating: 1, identical to or very similar; 2, similar in most respects; 3, several similarities but important differences (scale from Corns 1983).

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Forest	<i>Populus deltoides</i> / <i>Glycyrrhiza lepidota</i> / <i>Juncus balticus</i>	<i>Populus deltoides</i> / <i>Symphoricarpos occidentalis</i> Woodland (MNHP 2002)	?	Listed as G2G3/S2S3 for Montana. No information provided. Cannot assess similarity.
		<i>Populus tremuloides</i> (<i>Populus balsamifera</i>) (Coupland 1950)	3	Often dominant on leeward (east side) of dunes, as they are adapted to withstand burial of the trunk by sand (Saskatchewan). Similar eolian conditions, however dominant species different than those observed at Pakowki Sandhills.
		<i>Populus tremuloides</i> / <i>Symphoricarpos alba</i> Forest (Heidel <i>et al.</i> 2000)	3	Small, young stands found in Medicine Lake Sandhills (Montana) but did not have native understorey and growth and expansion was affected by grazing. Similar eolian conditions; however, dominant species different than those observed at Pakowki Sandhills and trees were quite mature.
		<i>Populus deltoides</i> – (<i>Salix amygdaloides</i>) / <i>Salix exigua</i> Woodland (USGS 2002a)	3	At Scotts Bluff NM (Nebraska) community was found on level to gently sloping locations, at the base of low, north-facing slopes. Soil was silty. Contained more eastern species such as <i>Fraxinus pennsylvanica</i> and <i>Acer negundo</i> . Similar leading species, but different overall floristic composition. Soil conditions also quite different.
		<i>Populus deltoides</i> – (<i>Salix amygdaloides</i>) / <i>Salix exigua</i> Woodland (USGS 2002d)	3	At Badlands National Park, in South Dakota. Was found along river and creek floodplains, pond and reservoir margins, seeps and springs in mesic draws and seeps and springs that occurred along the edge of sandhill complexes. Same leading tree species, but floristic composition and site conditions varied from those observed at Pakowki Sandhills.
		<i>Populus deltoides</i> – (<i>Salix amygdaloides</i>) / <i>Salix exigua</i> Woodland (USGS 2002b)	3	At Devil’s Tower NM (Wyoming) community was found on floodplain of river. Soil was sandy. At this location community was very small and had a high cover of invasive, exotic species. Same leading tree species, but somewhat different soil conditions (i.e. fluvial vs. eolian), although still coarse textured materials.
		<i>Populus deltoides</i> / <i>Pascopyrum smithii</i> Woodland (Jones 1998a)	3	Located in Thunder Basin National Grassland, Wyoming along Cheyenne River. Formed linear groves of trees, parallel to stream channel on alluvial materials. Same leading tree species, different understorey, and somewhat different soil conditions (i.e. fluvial vs. eolian).

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Forest	<i>Populus deltoides</i> / <i>Glycyrrhiza lepidota</i> / <i>Juncus balticus</i>	<i>Populus deltoides</i> / <i>Calamovilfa longifolia</i> Woodland (Jones 1998b)	3	Located in Thunder Basin National Grassland, Wyoming along Antelope Creek. Formed linear groves of trees, parallel to stream channel on coarse textured soils. Same leading tree species, different understorey, and somewhat different soil conditions (i.e. fluvial vs. eolian), although still coarse textured materials.
		<i>Populus deltoides</i> / <i>Symphoricarpos occidentalis</i> Woodland (Cooper et al. 2001)	3	Found along rivers on unstabilized floodplains where colonized alluvial deposits on meanders of streams and rivers. A well-developed shrub layer was typically present. Same leading tree species, but with different understorey, and somewhat different soil conditions (i.e. fluvial vs. eolian) although still coarse textured materials.
		<i>Populus deltoides</i> – (<i>Salix amygdaloides</i>) / <i>Salix exigua</i> Woodland (Faber-Langendoen, D. editor 2001)	2	Typically found along banks of streams and rivers where it developed on newly deposited alluvium. Soils were predominantly sand, though some silt, clay or loam may be present. Noted that <i>Glycyrrhiza lepidota</i> was a common forb where disturbance was low. Also noted that because of high permeability of sandy floodplain, species typical of upland prairie may invade, including <i>Artemisia</i> spp., <i>Calamovilfa longifolia</i> , <i>Heterotheca villosa</i> , <i>Poa pratensis</i> and <i>Sporobolus cryptandrus</i> . Community quite similar to that found at Pakowki Sandhills, although this community generally found along fluvial routes, not noted to occur in sand dune areas, although recent alluvial materials are generally coarse textured. Relatively similar floristic composition.
		<i>Populus deltoides</i> – (<i>Salix amygdaloides</i>) / <i>Salix exigua</i> Woodland (USGS 2002c)	3	At Agate Fossil Beds NM (Nebraska) community was found on floodplain of Niobara river. Located on level or sloping ground on banks or in old channels in the primary floodplain. Soils were fine sands and sandy loams that were somewhat poorly drained. Same leading tree species, but with different understorey, and different soil conditions (i.e. fluvial vs. eolian, poor drainage) although still coarse textured materials.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Rosa woodsii</i> / <i>Sporobolus cryptandrus</i>	<i>Elaeagnus commutata</i> – <i>Rosa woodsii</i> – <i>Symphoricarpos occidentalis</i> – <i>Prunus virginiana</i> (Epp and Townley-Smith 1980)	2	Form closed shrublands found on stabilized slip faces, typically north-facing. Shrub composition varied location to location and each shrub species may be dominant at specific sites, where at others may be co-dominant. Variable floristic composition though very similar eolian landscape and site/soil conditions.
		<i>Rosa woodsii</i> (Epp and Townley-Smith 1980)	1	Community dominant in areas where sand has been whipped off dune by strong winds, creating areas of slow sand accumulation. Very similar (general) floristic composition and very similar site conditions, being located on active sand dunes.
		<i>Rosa woodsii</i> (<i>Artemisia cana</i> / <i>Elaeagnus commutata</i>) (Coupland 1950)	2	Found in undulating to gently rolling areas between stabilized dunes. Water table typically within 8 to 12 feet of soil surface in these locations. Variable floristic composition and generally similar eolian landscape and site/soil conditions. Community occurred in Pakowki Sandhills on partially stabilized to active dunes, on leeward slopes.
		<i>Rosa woodsii</i> Temporarily Flooded Shrubland Alliance (Natureserve 2002)	3	These shrublands occurred in the foothills and plains of Montana and Idaho. Elevations ranged from 650-1700 m. Stands occurred in floodplains and on alluvial terraces along rivers and streams, on hillsides below springs and in ravines and swales where overland flow from snowmelt and summer thunderstorms provides additional moisture. Sites were flat to moderately steep. Although sites were temporarily flooded, they were well drained and did not have a shallow water table. Soils ranged from sandy loams to silt loams. Same dominant shrub species, but with different soil conditions (i.e. fluvial vs. eolian, temporary flooding) although still coarse textured materials.
		<i>Rosa woodsii</i> Shrubland (Cooper <i>et al.</i> 1999)	?	A community type listed in Beaverhead Mountain region (Montana) though it is not described with an abstract. Due to lack of information, cannot assess similarity.
		<i>Rosa woodsii</i> Shrubland (MNHP 2002)	?	Listed as G5/S5 in Montana. No description of community type given. Due to lack of information, cannot assess similarity.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Rosa woodsii</i> / <i>Sporobolus cryptandrus</i>	Grass and shrub / Sand type (Thorpe and Godwin 1993)	3	<i>Symphoricarpos occidentalis</i> was dominant shrub, as far as percent cover goes, but <i>Rosa</i> spp. and <i>Prunus virginiana</i> were present in 50% of plots in this type. Located on stabilized dunes, with rapidly drained, sandy soils. <i>Sporobolus cryptandrus</i> not listed as a prevalent species. Similar site conditions, and eolian landscape. Floristic composition variable in literature, while Pakowki <i>Rosa woodsii</i> communities quite repetitive pattern.
		<i>Rosa woodsii</i> Shrubland (Rust 1997)	?	Listed as a natural plant community in Idaho. No description of community type given, thus cannot assess similarity.
Shrubland	<i>Salix amygdaloides</i> – <i>Rosa woodsii</i> / <i>Juncus balticus</i> – <i>Sporobolus cryptandrus</i>	<i>Salix amygdaloides</i> Woodland (MNHP 2002)	?	Listed as G3/S3 for Montana but no description given. No description of community type given, thus cannot assess similarity.
		<i>Salix amygdaloides</i> / <i>Salix exigua</i> Woodland (Natureserve 2002)	3	This vegetation association occurred in riparian habitats on the Columbian Plateau in the interior Northwest and in northeastern Utah. Elevation ranges from 100-1600 m. Stands were located in overflow channels of large rivers, on narrow floodplains of small creeks and soil textures cover a wide range, with the exception of clay. This community had a moderately open overstorey canopy dominated by the small tree <i>Salix amygdaloides</i> with <i>Salix exigua</i> dominating the tall-shrub layer near the shore. Other tree species included scattered <i>Populus fremontii</i> , <i>Acer negundo</i> , <i>Populus angustifolia</i> , <i>Populus deltoides</i> and the introduced <i>Elaeagnus angustifolia</i> . Community described here found only in riparian habitats, and not eolian landscapes. Likely different moisture regime versus Pakowki region.
		<i>Salix amygdaloides</i> Woodland (Natureserve 2002)	3	The <i>Salix amygdaloides</i> woodland type was found in the Northern Rocky Mountains and potentially into parts of the western Great Plains. Stands occurred in riparian areas. The vegetation was dominated by <i>Salix amygdaloides</i> . Community described here found only in riparian habitats, and not eolian landscapes. Likely different moisture regime versus Pakowki region.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Salix amygdaloides</i> – <i>Rosa woodsii</i> / <i>Juncus balticus</i> – <i>Sporobolus cryptandrus</i> (cont.)	<i>Salix amygdaloides</i> Woodland (Faber-Langendoen, D. editor 2001; Marriott and Faber-Langendoen 2000)	3	Found in the Northern Rocky Mountains and possibly into parts of the western Great Plains. Stands occurred in riparian areas. Was documented in Black Hills at confluence of two creeks. It formed a tall-shrub stratum with <i>Salix bebbiana</i> and <i>Cornus sericea</i> and was more shrubland than woodland. Community described here found only in riparian habitats, and not eolian landscapes. Likely different moisture regime versus Pakowki region. Species composition also quite different.
Shrubland	<i>Elaeagnus commutata</i> / <i>Glycyrrhiza lepidota</i>	<i>Elaeagnus commutata</i> – <i>Rosa woodsii</i> – <i>Symphoricarpos occidentalis</i> – <i>Prunus virginiana</i> (Epp and Townley-Smith 1980)	2	Formed closed shrublands found on stabilized slip faces, typically north-facing. Shrub composition varied location to location and each shrub species may be dominant at specific sites, where at others may be co-dominant. Species composition more variable than that found at Pakowki Sandhills region, but site conditions quite similar, being stabilized eolian features.
		<i>Elaeagnus commutata</i> Shrubland (MNHP 2002)	?	Listed as G2Q/S2? For Montana. No description given thus no assessment of similarity could be made.
		<i>Rosa woodsii</i> (<i>Artemisia cana</i> / <i>Elaeagnus commutata</i>) (Coupland 1950)	2	Found in undulating to gently rolling areas between stabilized dunes. Water table typically within 8 to 12 feet of soil surface in these locations. Species composition different, though quite general, than that found at Pakowki Sandhills region, but site conditions quite similar. Depth to water table at study area was not known.
		<i>Elaeagnus commutata</i> shrubland (Epp and Townley Smith 1980)	2	Often found inhabiting blowouts away from bare sand. Pakowki Sandhills community not found in blowouts, but was found on partially stabilized sand dunes, away from active sand. Detailed description of floristic composition unfortunately not provided.
		<i>Elaeagnus commutata</i> Shrubland (Heidel et al. 2000)	2	Reported in northern Montana, east of Continental divide. Generally classified as temporarily flooded. In Medicine Lake sandhills, sites had shrub cover of 10% and grass cover of 70%. Sites were not flooded but the water table was within the rooting zone. Community described here as temporarily flooded, whereas Pakowki not likely experiencing flooding.. Likely different moisture regime versus Pakowki region.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Elaeagnus commutata</i> / <i>Glycyrrhiza lepidota</i> (cont.)	Elaeagnus commutata Shrubland Alliance (Natureserve 2002)	2	This shrub alliance was found in the northern Great Plains in a mixedgrass prairie matrix. It was dominated by mid to tall shrubs, especially <i>Elaeagnus commutata</i> . <i>Pascopyrum smithii</i> was dominant in the herbaceous layer, typically accompanied by <i>Koeleria macrantha</i> , <i>Schizachyrium scoparium</i> and <i>Hesperostipa comata</i> (= <i>Stipa comata</i>). <i>Elaeagnus commutata</i> was most abundant on flat sandy sites in southern Saskatchewan. Species composition more variable than that observed at Pakowki, though dominant species is the same. Site conditions, being somewhat more level, sandy substrates, are similar.
		<i>Elaeagnus commutata</i> / <i>Pascopyrum smithii</i> Shrubland (Natureserve 2002)	3	This association occurred in the northwestern portion of the Great Plains of the United States and Canada. Stands occurred on a variety of glacial landforms including kames, eskers and areas of till and outwash. Common on north facing slopes and sites where moisture was more abundant, including along river valley slopes. The vegetation formed open thickets within the mixed-grass prairie landscape. <i>Elaeagnus commutata</i> was generally a short to medium height shrub, although it can grow up to 5 m. <i>Pascopyrum smithii</i> not a dominant species at Pakowki Sandhills. Although substrates described in this report are coarse, they are different than eolian landforms.
Shrubland	<i>Elaeagnus commutata</i> / <i>Artemisia ludoviciana</i> / <i>Calamovilfa longifolia</i>	<i>Elaeagnus commutata</i> – <i>Rosa woodsii</i> – <i>Symphoricarpos occidentalis</i> – <i>Prunus virginiana</i> (Epp and Townley-Smith 1980)	2	Formed closed shrublands found on stabilized slip faces, typically north-facing. Shrub composition varied location to location and each shrub species may be dominant at specific sites, where at others may be co-dominant. Species composition more variable than at Pakowki Sandhills, although no mention of <i>Artemisia</i> spp. or sand grass. Site conditions quite similar however.
		<i>Elaeagnus commutata</i> Shrubland (MNHP 2002)	?	Listed as G2Q/S2? for Montana. No description given thus no similarity assessment could be made.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Elaeagnus commutata</i> / <i>Artemisia ludoviciana</i> / <i>Calamovilfa longifolia</i> (cont.)	<i>Rosa woodsii</i> (<i>Artemisia cana</i> / <i>Elaeagnus commutata</i>) (Coupland 1950)	2	Found in undulating to gently rolling areas between stabilized dunes. Water table typically within 8 to 12 feet of soil surface in these locations. Species composition different, though quite general, than that found at Pakowki Sandhills region, but site conditions quite similar. Depth to water table at Pakowki study area was not known.
		<i>Elaeagnus commutata</i> shrubland (Epp and Townley Smith 1980)	2	Often found inhabiting blowouts away from bare sand. Pakowki Sandhills community not found in blowouts, but was found on partially stabilized sand dunes, away from active sand. Detailed description of floristic composition unfortunately not provided.
		<i>Elaeagnus commutata</i> Shrubland (Heidel <i>et al.</i> 2000)	2	Reported in northern Montana, east of Continental divide. Generally classified as temporarily flooded. In Medicine Lake Sandhills, sites had shrub cover of 10% and grass cover of 70%. Sites are not flooded but the water table was within the rooting zone. Community described here as temporarily flooded, whereas Pakowki not likely experiencing flooding. Likely different moisture regime versus Pakowki region.
		<i>Elaeagnus commutata</i> Shrubland Alliance (Natureserve 2002)	2	This shrub alliance was found in the northern Great Plains in a mixedgrass prairie matrix. It was dominated by mid to tall shrubs, especially <i>Elaeagnus commutata</i> . <i>Pascopyrum smithii</i> was dominant in the herbaceous layer, typically accompanied by <i>Koeleria macrantha</i> , <i>Schizachyrium scoparium</i> and <i>Hesperostipa comata</i> (= <i>Stipa comata</i>). <i>Elaeagnus commutata</i> was most abundant on flat sandy sites in southern Saskatchewan. Species composition more variable than that observed at Pakowki, though dominant species is the same. Site conditions, being somewhat more level, sandy substrates, are similar.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Elaeagnus commutata</i> / <i>Artemisia ludoviciana</i> / <i>Calamovilfa longifolia</i> (cont.)	<i>Elaeagnus commutata</i> / <i>Pascopyrum smithii</i> Shrubland (NatureServe 2002)	3	This association occurred in the northwestern portion of the Great Plains of the United States and Canada. Stands occurred on a variety of glacial landforms including kames, eskers and areas of till and outwash. Common on north-facing slopes and sites where moisture was more abundant, including along river valley slopes. The vegetation formed open thickets within the mixed-grass prairie landscape. <i>Elaeagnus commutata</i> was generally a short to medium height shrub, although it can grow up to 5 m. <i>Pascopyrum smithii</i> not a dominant species at Pakowki Sandhills. Although substrates described in this report are coarse, they are different than eolian landforms.
Shrubland	<i>Prunus virginiana</i> / <i>Calamovilfa longifolia</i>	<i>Elaeagnus commutata</i> – <i>Rosa woodsii</i> – <i>Symphoricarpos occidentalis</i> – <i>Prunus virginiana</i> (Epp and Townley-Smith 1980)	2	Formed closed shrublands found on stabilized slip faces, typically north-facing. Shrub composition varied location to location and each shrub species may be dominant at specific sites, where at others may be co-dominant. Species composition more variable than that observed at Pakowki Sandhills, however site conditions are very similar.
		<i>Prunus virginiana</i> Shrubland (MNHP 2002)	?	Listed as G4Q/S4 in Montana. No description given thus no similarity assessment could be made.
		<i>Prunus virginiana</i> Shrubland (Heidel et al. 2000)	2	Noted to occur in small patches in Medicine Lake Sandhills, Montana. Had high shrub cover and low understorey cover, though <i>Stipa comata</i> was common understorey species. <i>Prunus virginiana</i> has a deep root system that can reach the water table in the Medicine Lake Sandhills. Elsewhere in Montana was considered a riparian community. Dominant grass different, but density of shrubs comparable to that found in Pakowki Sandhills. Site conditions very similar

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Shrubland	<i>Prunus virginiana</i> / <i>Calamovilfa longifolia</i> (cont.)	<i>Prunus virginiana</i> Shrubland Alliance (Natureserve 2002)	3	This community was typically found along streams, rivers, lakes and ponds and on terraces, or in canyons or steep gullies. Elevations ranged from 716 m to about 1600 m in Montana, Wyoming and Colorado and up to 2440 m in Nevada. In some places, the alliance occurred on side slopes of hillsides, immediately below a seep or spring. Some examples of this alliance have been placed into an intermittently or temporarily flooded hydrologic regime. Soils were usually well-developed, older and well-drained, formed in shallow to deep alluvial deposits. Community described here found only in riparian habitats, and not eolian landscapes. Very different soil conditions and different moisture regime versus Pakowki region.
		<i>Prunus virginiana</i> – (<i>Prunus americana</i>) Shrubland (Cooper <i>et al.</i> 1999)	3	Community reported in Montana at Bitter Creek Badlands, at heads of coulees feeding into badlands. Community occurred as very small, dense, linear patches. Few other species found, due to density of <i>Prunus</i> . Different species composition, as only one <i>Prunus</i> species found at Pakowki Sandhills. Site conditions also somewhat different, though likely drier than average. Density and shape of community similar.
		<i>Prunus virginiana</i> – (<i>Prunus americana</i>) Shrubland (USGS 2002d)	3	Dominantly <i>Prunus americana</i> , with some <i>P. virginiana</i> . Generally found in sloping to nearly level mesic draws and nearly level oxbows. A few stands also found at seep zone on edge of sandhills. Different species composition, as only one <i>Prunus</i> species found at Pakowki Sandhills. Site conditions also somewhat different, as dominantly a riparian community.
		Grass and shrub / Sand type (Thorpe and Godwin 1993)	3	<i>Symphoricarpos occidentalis</i> was dominant shrub, as far as percent cover goes, but <i>Rosa</i> spp. and <i>Prunus virginiana</i> were present in 50% of plots in this type. Located on stabilized dunes, with rapidly drained, sandy soils. <i>Calamovilfa longifolia</i> also listed as occurring. Species composition more variable than that observed at Pakowki Sandhills, though site conditions are quite similar.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Dwarf Shrubland	<i>Eurotia lanata</i> / <i>Stipa comata</i> – <i>Calamovilfa longifolia</i>	<i>Stipa comata</i> ASSOCIATION (Looman 1980)	3	Found to be common (with <i>Bouteloua gracilis</i>) on dry prairie. Cover of <i>Bouteloua gracilis</i> increases, gradually replacing <i>Stipa comata</i> as grazing increases. A variation of the community includes <i>Calamovilfa longifolia</i> and occurred on sandy loam or loamy sand soils. Species composition quite different, and no mention of winterfat as a shrub. Coarser textured soils, which are similar to Pakowki Sandhills.
		<i>Krascheninnikovia lanata</i> / <i>Stipa comata</i> Dwarf-Shrubland (MINHP 2002)	?	Listed as G3/S3 for Montana. No description given thus no assessment of similarity could be made.
		<i>Krascheninnikovia lanata</i> / <i>Hesperostipa comata</i> Dwarf-Shrubland (Natureserve 2002)	2	Reported in DeVelice, R. L., J. Lichthardt and P. S. Bourgeron. 1991. A preliminary classification of the plant communities of northeastern Montana. Prepared for the Montana Natural Heritage Program. Helena, MT. 144 pp. No description given thus difficult to assess, but based on community name dominant species are the same as those found in Pakowki.
		<i>Krascheninnikovia lanata</i> / <i>Bouteloua gracilis</i> Dwarf Shrub Herbaceous Vegetation (Faber-Langendoen, D. editor 2001)	3	Vegetation contained open shrub and graminoid layer. Short herbaceous layer is dominated by <i>Bouteloua gracilis</i> , <i>Echinacea angustifolia</i> and <i>Liatris punctata</i> . Found in southwestern Great Plains and Semi-desert mountains, from Colorado south to New Mexico and Arizona. Also found in Kansas. Species composition quite different, and no mention of needle-and-thread or sand grass. Located in a much more southerly region, with desert conditions.
		<i>Eurotia lanata</i> / <i>Poa secunda</i> Extremely xeromorphic dwarf-shrubland (Rust 1997)	?	Listed as natural plant community type for Idaho. No description given thus no similarity assessment could be made.
Herbaceous Vegetation	<i>Salix exigua</i> / <i>Glycyrrhiza lepidota</i> / <i>Juncus balticus</i>	<i>Salix exigua</i> Shrubland (USGS 2002a)	3	Community found along margins of North Platte River (Scotts Bluff NM) and locations on lower floodplain terrace. Occurred on recent alluvial sands with little soil development. Understorey species composition quite different, also note occasional <i>Populus deltoides</i> , thus quite different than community type found in Pakowki Sandhills.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Salix exigua</i> / <i>Glycyrrhiza lepidota</i> / <i>Juncus balticus</i> (cont.)	<i>Salix exigua</i> / Mesic Graminoids Shrubland (Faber-Langendoen, D. editor 2001)	3	Vegetation dominated by shrubs with a fairly dense ground cover (at least 30%) of mesic graminoids and forbs. <i>Juncus</i> spp. noted as a common herbaceous species. Community found on sandbars, islands and shorelines of stream channels and braided rivers. Soils are poorly developed. Primarily found in Great Plains but also parts of Rocky Mountains and Intermountain Semi-desert regions. Wyoming west to possibly Idaho, south to Utah and east to Oklahoma. Species composition comparable, but site conditions quite different. This community described mainly from riparian areas, and although they have poorly developed, coarse textured soils, they would have a greater moisture availability than sand dune region.
		<i>Salix exigua</i> Temporarily Flooded Shrubland (Faber-Langendoen, D. editor 2001)	3	Dominated by 2-4m <i>Salix exigua</i> with a moderate to high stem density. Found on recently deposited or disturbed alluvial materials, dominantly sands. Found at lower elevations throughout northwestern US and Great Plains and into Manitoba. Species composition comparable, but site conditions quite different. This community described mainly from riparian areas, and although they have coarse textured soils, they would have a greater moisture availability than sand dune region.
		<i>Salix exigua</i> Temporarily Flooded Shrubland (USGS 2002d)	3	Found along banks of several creeks. Occurred adjacent to creeks and rivers where moist sediments accumulate and adjacent to some wetland communities. Sites were nearly all level with presence of ground-water. This community described mainly from riparian areas, and was noted to have ground water present.
		<i>Salix exigua</i> Shrubland [Provisional] (USGS 2002c)	2	Found along Niobara River, Agate Fossil Beds NM in Nebraska. Found along lower floodplain terraces, with sandy loam soils that are poorly to somewhat poorly drained. <i>Juncus balticus</i> listed as an abundant species. Noted species diversity quite high. Species composition comparable, but site conditions quite different. This community described mainly from riparian areas, with somewhat poorly drained soils.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Salix exigua</i> / <i>Glycyrrhiza lepidota</i> / <i>Juncus balticus</i> (cont.)	<i>Salix exigua</i> Temporarily Flooded Shrubland (Cooper <i>et al.</i> 1999)	3	Found in Beaverhead Mountains, Montana, where it occurred on gravelly alluvial materials on floodplains and river terraces in river bottoms. Understorey species minimal due to high disturbance rate, but most common are <i>Cirsium arvense</i> , <i>Mentha arvensis</i> and <i>Phalaris arundinacea</i> . Species composition somewhat similar, but site conditions quite different. This community described mainly from riparian areas, with temporarily flooded soils.
		<i>Salix exigua</i> / Barren Seasonally flooded cold-deciduous Shrubland (Rust 1997)	?	Listed as a natural plant community for Idaho, but no description given thus no assessment of similarity could be done.
		<i>Salix exigua</i> / <i>Equisetum arvense</i> Seasonally flooded cold-deciduous Shrubland (Rust 1997)	?	Listed as a natural plant community for Idaho, but no description given thus no assessment of similarity could be done.
		<i>Salix exigua</i> / Mesic Forb Seasonally flooded cold-deciduous Shrubland (Rust 1997)	?	Listed as a natural plant community for Idaho, but no description given thus no assessment of similarity could be done.
		<i>Salix exigua</i> / Mesic Graminoid Seasonally flooded cold-deciduous Shrubland (Rust 1997)	?	Listed as a natural plant community for Idaho, but no description given thus no assessment of similarity could be done.
		<i>Salix exigua</i> / <i>Rosa woodsii</i> Seasonally flooded cold-deciduous Shrubland (Rust 1997)	?	Listed as a natural plant community for Idaho, but no description given thus no assessment of similarity could be done.
		<i>Salix exigua</i> / Barren Shrubland (MNHP 2002)	?	Listed as a natural plant community for Montana, but no description given thus no assessment of similarity could be done.
		<i>Salix exigua</i> / Mesic Graminoid Shrubland (MNHP 2002)	?	Listed as a natural plant community for Montana, but no description given thus no assessment of similarity could be done.
		<i>Salix exigua</i> Temporarily Flooded Shrubland (MNHP 2002)	?	Listed as a natural plant community for Montana, but no description given thus no assessment of similarity could be done.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Glycyrrhiza lepidota</i> / <i>Calamovilfa longifolia</i>	<i>Glycyrrhiza lepidota</i> Herbaceous Vegetation (MNHP 2002)	?	Listed as S? for Montana. No description provided thus no assessment of similarity could be done.
Herbaceous Vegetation	<i>Glycyrrhiza lepidota</i> – <i>Artemisia</i> spp. / <i>Stipa comata</i>	<i>Stipa comata</i> Association (Looman 1980)	3	Found to be common (with <i>Bouteloua gracilis</i>) on dry prairie. Cover of <i>Bouteloua gracilis</i> increases, gradually replacing <i>Stipa comata</i> as grazing increases. A variation of the community includes <i>Calamovilfa longifolia</i> and occurred on sandy loam or loamy sand soils. Very different species composition though occurs on coarse textured soils.
		<i>Stipa comata</i> – <i>Artemisia frigida</i> (Hulett et al. 1966)	2	Dominant community in Great Sand Hills (Sask.) on stabilized dunes. <i>Calamovilfa longifolia</i> is present in reported community. Species composition varies somewhat, though site conditions are quite similar. No mention of wild licorice.
		<i>Glycyrrhiza lepidota</i> Herbaceous Vegetation (MNHP 2002)	?	Listed as S? for Montana. No description provided thus no assessment of similarity could be done.
Herbaceous Vegetation	<i>Rumex venosus</i>	<i>Rumex venosus</i> Alliance (Looman 1980)	1	May be dominant on highly mobile dunes/ during early stages of development. Very limited description, although dominant species coincides, and community found in Pakowki was on active sand dune areas.
		Active Sand Dune Complex (Epp and Townley-Smith 1980)	3	<i>Rumex venosus</i> noted as occurring on active sand dune complexes, typically towards the edge of the deflation zone and on sides of dunes. No <i>Rumex venosus</i> community type noted however. Occurs under similar conditions, but authors did not describe this particular community.
Herbaceous Vegetation	<i>Oryzopsis hymenoides</i> – <i>Sporobolus cryptandrus</i>	<i>Oryzopsis hymenoides</i> Order (Looman 1980)	3	Reported as an order within the Calamovilfetea class. Very limited description, though noted to occur on coarse textured soils.
		<i>Psoralea lanceolata</i> – <i>Oryzopsis hymenoides</i> (Hulett et al. 1966)	2	Dominant community in Great Sand Hills (Sask.) on active sand dune complexes. Dominant grass similar to that found at Pakowki Sandhills, although <i>Psoralea lanceolata</i> was not found in association. Site conditions very similar.
		<i>Psoralea lanceolata</i> – <i>Oryzopsis hymenoides</i> (Epp and Townley-Smith 1980)	2	Formed a sparse cover located on edge of deflation zone away from dune. Vegetative cover found to increase as distance from deflation zone increases. Dominant grass similar to that found at Pakowki Sandhills, although <i>Psoralea lanceolata</i> was not found in association. Site conditions very similar.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Oryzopsis hymenoides</i> – <i>Sporobolus cryptandrus</i> (cont.)	<i>Oryzopsis hymenoides</i> – <i>Psoralidium lanceolatum</i> (Heidel et al. 2000)	2	In Montana, found to be restricted to slopes and crests of sand dunes recently disturbed by soil erosion. Sand dropseed was also present, often forming up to 10% cover. Found in blow-outs and is driest and earliest stage of succession (Medicine Lake Sandhills, Montana). Dominant grass similar to that found at Pakowki Sandhills, although <i>Psoralea lanceolata</i> was not found in association. Site conditions very similar.
		<i>Achnatherum hymenoides</i> Herbaceous Alliance (Natureserve 2002)	2	Stands of this alliance occurred in two distinctively different habitats (sandy areas and shale barrens) in different geographic areas. Sandy areas included 'blowouts' in the Great Plains and in arid and semi-arid dune systems in the Chihuahuan Desert, San Luis Valley, Colorado Plateau and Great Basin. Substrates are sand or shale. This alliance was characterized by a sparse to moderately dense herbaceous layer that is dominated by <i>Achnatherum hymenoides</i> (= <i>Oryzopsis hymenoides</i>). Dominant grass the same, though no mention of sand dropseed. Similar site conditions, excluding shale barrens.
		<i>Achnatherum hymenoides</i> - <i>Psoralidium lanceolatum</i> Herbaceous Vegetation (Natureserve 2002)	?	No description given thus no assessment of similarity could be made.
		<i>Oryzopsis hymenoides</i> – <i>Psoralidium lanceolatum</i> Herbaceous vegetation (MNHP 2002)	?	No description given thus no assessment of similarity could be made.
		<i>Calamovilfa longifolia</i> - <i>Achnatherum hymenoides</i> Herbaceous Vegetation (Natureserve 2002)	?	No description given thus no assessment of similarity could be made.
Herbaceous Vegetation	<i>Stipa comata</i> – <i>Oryzopsis hymenoides</i>	<i>Stipa comata</i> Association (Looman 1980)	3	Found to be common (with <i>Bouteloua gracilis</i>) on dry prairie. Cover of <i>Bouteloua gracilis</i> increases, gradually replacing <i>Stipa comata</i> as grazing increases. Occurred on sandy loam or loamy sand soils. Site conditions similar in that it occurred on coarser textured sandy soils, although not eolian particularly. Floristic composition quite different.
		<i>Psoralea lanceolata</i> - <i>Stipa comata</i> (Hulett et al. 1966)	3	Dominant community in Dundurn Sand Hills (Sask.) on stabilized dunes. Site conditions would be quite similar, but no <i>Psoralea lanceolata</i> found in Pakowki communities.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Stipa comata</i> – <i>Oryzopsis hymenoides</i> (cont.)	<i>Psoralea lanceolata</i> – <i>Oryzopsis hymenoides</i> (Epp and Townley-Smith 1980)	3	Forms a sparse cover located on edge of deflation zone away from dune. Vegetative cover found to increase as distance from deflation zone increases. Site conditions would be quite similar, but no <i>Psoralea lanceolata</i> found in Pakowki communities.
		<i>Hesperostipa comata</i> - <i>Achnatherum hymenoides</i> Herbaceous Vegetation (Natureserve 2002)	2	This grass type has been described from the Great Divide Basin in south-central Wyoming. <i>Hesperostipa comata</i> and <i>Achnatherum hymenoides</i> codominated the vegetation and <i>Pascopyrum smithii</i> was secondary species. Scattered shrubs present, primarily <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> . This type apparently has not been described outside the Great Divide Basin of south-central Wyoming. Other basins in south-central and southwestern Wyoming and the northwestern quarter of Colorado are similar in climate and geology and this association may well extend over a wide area of the two states. Species composition quite similar, though with some variation. No description of site conditions however.
		<i>Hesperostipa comata</i> Bunch Herbaceous Alliance (Natureserve 2002)	3	This grassland alliance was found on sandy soils in the intermountain steppe, Wyoming Basin, Colorado Plateau, Great Basin and Columbia Plateau. Stands typically occurred on upland sites with coarse-textured soils such as sandstone outcrop ridges in the plains, dry-sandy sites in the Columbia Basin and on dissected alluvial fans below sandstone plateaus, but not dunes. Noted to occur on coarse textured soils. However authors state that community does not occur on sand dunes, thus quite different from type found at Pakowki.
		<i>Stipa comata</i> / <i>Psoralidium lanceolatum</i> Herbaceous Vegetation (Heidel et al. 2000)	2	Found in Medicine Lake sandhills. Restricted to wind-blown sand deposits with undeveloped soils and is found on choppy dunes to rolling plains. Was thought to be a seral stage between <i>Oryzopsis hymenoides</i> / <i>Psoralidium lanceolatum</i> and <i>Pascopyrum smithii</i> - <i>Stipa comata</i> association. Grass cover was 20-40% and most was <i>Stipa comata</i> . Occurred on stabilized to partially stabilized sand dunes. Site conditions quite similar, but no <i>Psoralea lanceolata</i> found in Pakowki communities.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Stipa comata</i> – <i>Oryzopsis hymenoides</i> (cont.)	<i>Oryzopsis hymenoides</i> – <i>Psoralea lanceolata</i> Herbaceous vegetation (MNHP 2002)	?	No description given thus no similarity assessment could be made.
Herbaceous Vegetation	<i>Artemisia</i> spp. / <i>Stipa comata</i> – <i>Calamovilfa longifolia</i>	<i>Stipa comata</i> Association (Looman 1980)	3	Found to be common on dry prairie. Cover of <i>Bouteloua gracilis</i> increased, gradually replacing <i>Stipa comata</i> as grazing increased. A variation of the community includes <i>Calamovilfa longifolia</i> and occurred on sandy loam or loamy sand soils. Somewhat similar species composition, and also occurring on more coarse textured soils. Species composition could be quite variable however.
Herbaceous Vegetation		<i>Stipa comata</i> – <i>Artemisia frigida</i> (Hulett et al. 1966)	1	Dominant community in Great Sand Hills (Sask.) on stabilized dunes. <i>Calamovilfa longifolia</i> is present in reported community. Virtually identical site conditions, and floristic composition.
Herbaceous Vegetation	<i>Stipa comata</i> – <i>Cyperus schweinitzii</i> – <i>Calamovilfa longifolia</i>	<i>Stipa comata</i> Association (Looman 1980)	2	Found to be common (with <i>Bouteloua gracilis</i>) on dry prairie. Cover of <i>Bouteloua gracilis</i> increased, gradually replacing <i>Stipa comata</i> as grazing increased. A variation of the community includes <i>Calamovilfa longifolia</i> and occurred on sandy loam or loamy sand soils. Somewhat similar species composition, and also occurring on more coarse textured soils. Species composition more variable however at Pakowki Sandhills.
		<i>Stipa comata</i> – <i>Artemisia frigida</i> (Hulett et al. 1966)	2	Dominant community in Great Sand Hills (Sask.) on stabilized dunes. <i>Calamovilfa longifolia</i> is present in reported community. Virtually identical site conditions, and similar floristic composition.
		<i>Psoralea lanceolata</i> - <i>Stipa comata</i> (Hulett et al. 1966)	3	Dominant community in Dundum Sand Hills (Sask.) on stabilized dunes. <i>Calamovilfa longifolia</i> is present in reported community. Site conditions quite similar, but no <i>Psoralea lanceolata</i> found in Pakowki communities.
		<i>Stipa comata</i> – <i>Calamovilfa longifolia</i> – <i>Agropyron</i> spp. (Hulett et al. 1966)	1	Dominant community in Dundum Sand Hills (Sask.) in dune depressions and appears to be intermediate between stabilized blowouts and stabilized dunes. Virtually identical site conditions, and similar floristic composition.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Stipa comata</i> – <i>Cyperus schweinitzii</i> – <i>Calamovilfa longifolia</i> (cont.)	<i>Calamovilfa longifolia</i> - <i>Hesperostipa comata</i> Herbaceous Vegetation (Natureserve 2002)	2	This prairie sandreed grassland community type occurred in the central and northern Great Plains region of the United States. Stands occur on stabilized sand dunes, as well as in interdunal valleys, colluvial sands and, less commonly, silty terraces of intermittent streams. Soils were medium to fine sands formed either from eolian or colluvial processes. The vegetation had an open canopy, dominated by mid to tall grasses. <i>Calamovilfa longifolia</i> and <i>Hesperostipa comata</i> (= <i>Stipa comata</i>) were the most conspicuous and dominant grasses. Virtually identical site conditions, and similar floristic composition although no mention of <i>Cyperus schweinitzii</i> .
		<i>Calamovilfa longifolia</i> - <i>Hesperostipa comata</i> Grassland (Jones 1998a)	3	Found on sandy soils at an intermediate height above the river channel (Wyoming). Major species are <i>Calamovilfa longifolia</i> , <i>Stipa comata</i> and <i>Psoralea lanceolata</i> . Site conditions somewhat similar, but found dominantly along fluvial channels. No <i>Psoralea lanceolata</i> found in Pakowki communities.
		<i>Calamovilfa longifolia</i> – <i>Hesperostipa comata</i> Grassland (Jones 1998b)	3	Found on sandy soils at an intermediate height above the river channel (Wyoming). Major species were <i>Calamovilfa longifolia</i> , <i>Stipa comata</i> and <i>Psoralea lanceolata</i> . Also found on sand dunes and higher fluvial surfaces with sandy soils. Was a major community type in the area. Site conditions somewhat similar, but found dominantly along fluvial channels. No <i>Psoralea lanceolata</i> found in Pakowki communities.
		<i>Calamovilfa longifolia</i> – <i>Hesperostipa comata</i> Herbaceous Vegetation (Faber-Langendoen , D. editor 2001)	2	Vegetation had open canopy dominated by <i>Calamovilfa longifolia</i> . Stands occurred on stabilized sand dunes as well as in interdunal valleys or draws, colluvial sands and less commonly on silty terraces of intermittent streams. Soils were medium to fine sands formed from either eolian or colluvial processes. Noted occurring in central and northern Great Plains, ranging from Colorado to Nebraska and north to Wyoming and South Dakota. Site conditions very similar and floristic composition also quite similar. No mention of <i>Cyperus schweinitzii</i> however.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Stipa comata</i> – <i>Cyperus schweinitzii</i> – <i>Calamovilfa longifolia</i> (cont.)	<i>Calamovilfa longifolia</i> – <i>Hesperostipa comata</i> Herbaceous Vegetation (Cooper et al. 2001)	2	Occurred most abundantly where sandy substrates dominant, on stabilized dunes, interdunal swales and colluvial sands. Was found in Rock Creek Canyon and a few sandy outcrops in Bitter Creek Badlands area, Montana. Was highly restricted in area, occurring on mainly colluvial sands. Site conditions very similar and floristic composition also quite similar. No mention of <i>Cyperus schweinitzii</i> however.
		<i>Calamovilfa longifolia</i> – <i>Stipa comata</i> Herbaceous Vegetation (Heidel et al. 2000)	2	Found at Medicine Lake Sandhills, Montana, as a minor type. Did not appear to be a wide-spread community, occurring in small patches on low ridges and in mosaic patterns on gentle plains of Medicine Lake. Site conditions very similar and floristic composition also quite similar. No mention of <i>Cyperus schweinitzii</i> however.
Herbaceous Vegetation	<i>Sporobolus cryptandrus</i> – <i>Calamovilfa longifolia</i> – <i>Oryzopsis hymenoides</i>	<i>Calamovilfa longifolia</i> CLASS (Looman 1980)	2	Sand grass reported to be dominant in well developed sandhill prairie. Other characteristic species included <i>Elymus canadensis</i> , <i>Helianthus couplandii</i> and <i>Sporobolus cryptandrus</i> . Floristic composition somewhat similar, though with some variation. Site conditions not described in detail, though are expected to be quite similar.
		<i>Carex pennsylvanica</i> – <i>Sporobolus cryptandrus</i> – <i>Cyperus schweinitzii</i> – <i>Calamovilfa longifolia</i> on active sand (Thorpe and Godwin 1993)	3	Found on sparsely vegetated, active east/west oriented sand dunes that were rapidly drained. Soils were coarse-textured and had little to no organic matter to retain moisture. Site conditions very similar, almost identical. However floristic composition much more variable than that found at Pakowki Sandhills.
		<i>Sporobolus cryptandrus</i> – <i>Poa secunda</i> Medium-tall bunch temperate or sub-polar grassland (Rust 1997)	?	Listed as community type for Idaho but no description given. No similarity assessment could be made.
		<i>Sporobolus cryptandrus</i> medium-tall temperate or subpolar grassland with a needle-leaved or microphyllous evergreen shrub layer (Rust 1997)	?	Listed as community type for Idaho but no description given. No similarity assessment could be made.
		<i>Heterotheca villosa</i> / <i>Sporobolus cryptandrus</i> Low temperate or subpolar forb vegetation (Rust 1997)	?	Listed as community type for Idaho but no description given. No similarity assessment could be made.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Sporobolus cryptandrus</i> – <i>Calamovilfa longifolia</i> – <i>Oryzopsis hymenoides</i>	<i>Sporobolus cryptandrus</i> Shrub Herbaceous Vegetation (MNHP 2002)	?	Listed as G2/S2 for Montana but no description given. No similarity assessment could be made
		<i>Sporobolus cryptandrus</i> Herbaceous Alliance (Natureserve 2002)	3	This grassland alliance was found in the lower Salmon and Snake river canyons of Idaho, Oregon and Washington, the Columbia River in central Washington and the Green and Virgin rivers in Utah. Stands occurred on river terraces, footslopes of benches and alluvial fans. The elevation ranged from 240-1460 m. Sites are flat to gently sloping (to 30%) and occurred on all aspects. Soils were moderately deep and derived from loess and alluvium-colluvium. Surface soil texture varied from sandy loam to silt loam. Limited floristic description provided, although site conditions quite similar except for method of deposition.
		<i>Sporobolus cryptandrus</i> Shrub Herbaceous Alliance (Natureserve 2002)	3	Grasslands in this alliance were described from Montana, Idaho and New Mexico. In New Mexico, the alliance occurred in the northwestern part of the state on alluvial flats at an elevation of approximately 2140 m. Climate was semi-arid with most of the highly variable annual precipitation falling during the summer as high-intensity convective storms. Sites were nearly level. Soils are calcareous, loamy and shallow (less than 25 cm deep). Limited floristic description provided and site and climatic conditions quite different.
Herbaceous Vegetation	<i>Sporobolus cryptandrus</i> – <i>Calamovilfa longifolia</i> – <i>Oryzopsis hymenoides</i>	<i>Sporobolus cryptandrus</i> - <i>Poa secunda</i> Herbaceous Vegetation (Natureserve 2002)	3	This plant association was described for the Columbia Basin and lower Snake River, where it occurred on gentle, lower slope and river terrace positions in the valleys of the Snake and Clearwater rivers. Stands were dominated by <i>Sporobolus cryptandrus</i> . <i>Poa secunda</i> was common but varied in abundance. <i>Aristida purpurea</i> var. <i>longiseta</i> (= <i>Aristida longiseta</i>) and <i>Hesperostipa comata</i> (= <i>Stipa comata</i>) were frequently present in low abundance. Differences in site and floristic composition than what is found at Pakowki Sandhills.

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Artemisia cana</i> / <i>Stipa comata</i>	<i>Rosa woodsii</i> (<i>Artemisia cana</i> / <i>Elaeagnus commutata</i>) (Coupland 1950)	2	Found in undulating to gently rolling areas between stabilized dunes. Water table typically within 8 to 12 feet of soil surface in these locations. Species composition more variable than that found at Pakowki Sandhills, but site conditions quite similar. Depth to water table not known at Pakowki Sandhills.
		<i>Artemisia cana</i> / <i>Hesperostipa comata</i> Shrub Herbaceous Vegetation (Natureserve 2002)	1	This shrub prairie association, which generally occurred in small patches (less than 1 hectare), occurred in the northwestern Great Plains. In Montana, it was found on benches to gently inclined slopes (30% maximum recorded) in the vicinity of breaklands. Sites occurred on various parent materials, but mostly well-drained, often sandy, glacial drift and sandy alluvium. <i>Artemisia cana</i> was dominant shrub with canopy coverages to 50%, but averaging around 25%, which placed it on the cusp of being a true shrub type. Virtually identical site and floristic composition.
		<i>Artemisia cana</i> / <i>Hesperostipa comata</i> Shrub Herbaceous Vegetation (Faber-Langendoen, D. editor 2001)	1	This small patch type currently had a narrow geographic distribution, though it may be expected to occur in Saskatchewan and North Dakota. This type's affinity for well drained benches and gently inclined landforms in a primarily agricultural landscape puts it at a moderate risk for agriculture conversion. Fortunately this landform also occurred in breakland and badland environments less desirable for agriculture, thus lessening the chances of this uncommon type being converted to agriculture. Virtually identical floristic composition, though somewhat different site conditions.
		<i>Artemisia cana</i> / <i>Hesperostipa comata</i> Shrub Herbaceous Vegetation (Cooper et al. 2001)	1	In Montana, was found on benches to gently inclined slopes (30% maximum recorded) in the vicinity of breaklands. Sites occurred on various parent materials but mostly well-drained, often sandy glacial drift and sandy alluvium. Considered to be a minor type in the Bitter Creek / Frenchman Creek area in Montana, due to limited distribution of coarse textured materials. Virtually identical floristic composition, though somewhat different site conditions.

Appendix 5. Correlation table with literature from outside Alberta

Class	Community Type	Similar Communities and Citations	Similarity Rating	Comments
Herbaceous Vegetation	<i>Artemisia cana</i> / <i>Stipa comata</i> (cont.)	<i>Artemisia cana</i> / <i>Stipa comata</i> Shrub Herbaceous Vegetation (MNHP 2002)	?	Listed as natural plant community for Montana, but no description given. Rated S3 for Montana. No similarity assessment could be made.