

APPENDIX A

**Ground Reference Data for the
Badami Vegetation/Land Cover Map**

MAP

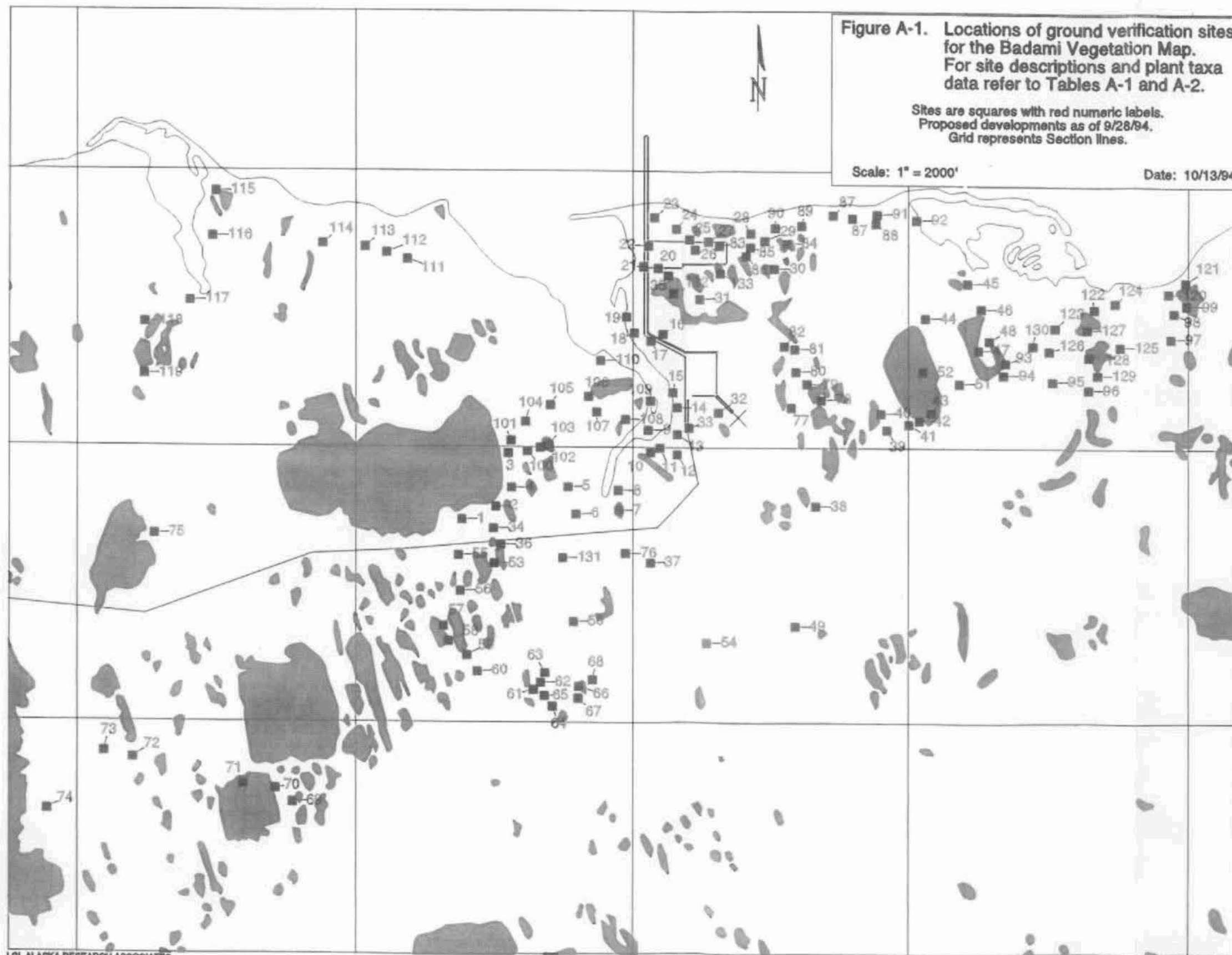


Table A-1. Descriptions of ground reference sites used to determine vegetation/land cover categories for the Badami Vegetation/Land Cover Map. Data were collected 6-9 August 1994. Sites locations are depicted on Figure A-1 and vascular plant species lists for selected sites are presented in Table A-2.

SITE #	FIELD ID #	VEGETATION & LAND COVER CATEGORY	FIELD DESCRIPTION ¹
1	1	Va	Moist HCPs with small poorly developed strangmoor and wettish microsities in polygon centers; wet troughs; a few frost boils in polygon centers.
2	2	Va	A few small wet/moist strangmoor patches just west of pond.
3	3	XIa	Wet mud, some elevated areas with light-colored lichen cover.
4	4	Vd	Moist HCPs with very high, dry centers, almost reticulate patterned-ground with bare peat and lichens.
5	5	Vd	Dry reticulate creek bank (old stream terrace).
6	6	Va	Mostly moist HCPs with a few wettish, shallow LCPs, almost uniform vegetation cover, LCPs prominent at base of creek terrace.
7	7	Va	Typical moist tundra, not saline tundra.
8	8	IIIb & Va	Thin layer of wet saline tundra (10-15 m wide) at immediate creek edge. Moist/wet HCPs with large wet troughs just up from creek.
9	9	IXh	Saline tundra on east edge of island, open gravel on west side.
10	10	Va	Much as Site 8 with large areas of standing dead vegetation, abundant <i>Arctagrostis</i> and <i>Poa</i> (light tone on photo).
11	11	Va	Moist/wet, flat, shallow LCPs with small strangmoor. Vegetation as Site 8, but with fewer forbs, more sedges and less grass, more typical sedge tundra. Bordering on wet in the polygon basins, truly wet in some microsities (strangmoor troughs).
12	12	IIIb	Very wet strangmoor at pond edge with some aquatic microsities.
13	13	Va	Moist flat-topped polygons.
14	14	Va	Much as Site 8, moist/wet non-patterned ground, but fewer forbs.
15	15	Xa	Gravel at creek edge.
16	16	XIa	Wet mud.
17	17	Va	Moist HCPs with large wet troughs, driftwood scattered about, some <i>Poa arctica</i> dominated HCPs.
18	18	Va	A few HCPs with dry, saline coastal barren vegetation and driftwood, probably not large enough to map.
19	19	IIIb	Wet saline tundra.
20	20	Va	Moist flat-topped polygons with lots of wet microsities, small, poorly developed strangmoor in polygon centers.
21	21	Va	Moist flat-topped polygons with driftwood, otherwise indistinguishable from Site 20. Species as in Site 8 except site is marginally wetter. Sporadic storm surges here? Lower in elevation than Sites 20 or 22.
22	22	Va	Typical moist flat-topped polygons with slightly wettish troughs.
23	23	Va	Deteriorating, sandy, partially vegetated HCPs grading into beach sand.
24	24	IIIb	Moist HCPs with deep troughs, <i>Carex subspathacea</i> in troughs. Ecotonal to Site 25.
25	25	IIIb	Wet saline tundra around pond.

Table A-1. Continued...

SITE #	FIELD ID #	VEGETATION & LAND COVER CATEGORY	FIELD DESCRIPTION ¹
26	26	XIc	Partially vegetated moist/wet strangmoor, salt-killed from storm surges. Lots of open peat (dark tone) in troughs, and crustose lichens (light tone) on ridges.
27	27	IXi	Salt-killed strangmoor (light tone on photograph), dry, saline coastal barrens vegetation..
28	28	IVa	Mixed moist/wet strangmoor with species similar to Site 8.
29	29	IVa	Mixed moist/wet, flat LCPs with some strangmoor in the basins, species much as Site 17.
30	30	Va	Moist HCPs as at TERA camp with some open peat and lichens, <i>Salix pulchra</i> and <i>S. rotundifolia x phlebophylla</i> are prominent.
31	31	Va	Partially vegetated HCP ridge with lichens on peat.
32	32	Va	Moist HCPs, with wet troughs, some LCPs (flat) and some small strangmoor in polygon centers.
33	33	Va	Moist flat-topped polygons.
34	34	Va	Moist/wet strangmoor (moist dominated) grading to dark-toned wet/moist strangmoor (wet dominated) to the west surrounding small pond.
35	35	III d	Wet/moist strangmoor (wet dominated).
36	36	Va	Moist/wet strangmoor (moist dominated), (light tone on photo).
37	37	Va	Moist flat-topped polygons.
38	38	Vd	Moist/dry HCPs, <0.5 m relief, with dark peat and light lichen areas. These polygons form a higher terrace (and bank) above the drained lake basin to the east and north.
39	39	Ve	Moist flat-topped polygons with small strangmoor and frost boils.
40	40	III d	Wet (saturated) sparsely vegetated peat next to pond.
41	41	Vd	Moist/dry almost reticulate patterned bank.
42	42	III a	Wet/moist graminoid/forb meadow, species similar to Site 8.
43	43	III a	<i>Arctophila</i> bed which has become terrestrial. Lake much drier than on photo, some <i>Carex aquatilis</i> on higher areas (lighter tone on photo).
44	44	IVa	Moist HCPs, much greater than 0.5 m relief (troughs about 1.3 m deep).
45	45	III b	Wet saline tundra among and around ponds. Light toned areas on photo are drier.
46	46	IXi	HCPs with dry, saline coastal barrens vegetation.
47	47	IXi	Flat-topped polygons with dry, saline coastal barrens vegetation.
48	48	IXb	Non-saline ridge.
49	49	Va	Moist HCPs, some with dark, dry, peat centers and wet troughs.
50	50	IXb	Dry creek terrace with gravel substrate and flat-topped polygons.
51	51	Vd	Moist/dry HCPs, similar to Site 38, light toned troughs are wetter than the dark, peat-covered polygon centers.
52	52	XIa	Wet mud.
53	53	IVa	Moist HCPs with peat covered centers between pond to the west and two "wet mud" ponds to the east. Dark areas of wet/moist strangmoor (wet dominated) on east side of pond.
54	54	Va	Moist flat-topped polygons.

Table A-1. Continued...

SITE #	FIELD ID #	VEGETATION & LAND COVER CATEGORY	FIELD DESCRIPTION ¹
55	55	IVa	Wet/moist strangmoor (dark tone on photo) (wet dominated). Some HCPs with open peat/lichen centers mixed in with the strangmoor directly to the south towards a pair of ponds.
56	56	IVa	Mixed moist HCPs and wet/moist strangmoor (wet dominated). Some HCPs have open peat/lichen centers.
57	57	IVa	Wet strangmoor.
58	58	IVa	Open peat/lichen HCPs with <i>Delphinium brachycentrum</i> .
59	59	IVa	Moist HCPs. Flat LCPs and strangmoor to the south.
60	60	IVa	Begins to change here to moist HCPs with conspicuous wet troughs.
61	61	IVa	Wet (dingy orange on photo), linear, non-patterned ground south of dark line of wet/moist strangmoor.
62	62	IVa	Wet LCPs.
63	63	IXb	Dry, flat creek terrace.
64	64	Vd	Reticulate creek bank, rather moist and lush.
65	65	IVa	Wet graminoid/forb meadow.
66	66	Vd	Moist flat-topped polygons with a bit of open peat/lichen and <i>Eriophorum vaginatum</i> tussocks.
67	67	IVa	Wet LCPs.
68	68	IVa	Wet strangmoor.
69	69	IVa	Linear lobe of moist/wet strangmoor (moist dominated and light tone) grading to the west into darker, linear wet/moist strangmoor (wet dominated).
70	70	IVa	Flat, moist lakeshore (light tone on photo).
71	71	IIb	<i>Arctophila</i> bed.
72	72	IIb	Aquatic tundra grading quickly to wet/moist strangmoor (wet dominated) to the west.
73	73	III d	Mixed moist/wet HCPs and LCPs, >0.5 m relief.
74	74	III d	Large moist mounds (old islands) surrounded by wet and aquatic basins. Located in old lake bed (probably old <i>Arctophila</i> bed). Flat moist/wet HCPs/LCPs with small strangmoor to the north, along shore of drained lake basin.
75	75	IIb	Aquatic non-patterned ground at lake shore with light toned (wet) non-patterned ground at immediate lakeshore.
76	76	Va	Inland extent of wet saline tundra along creek edge. From here inland <i>Carex aquatilis</i> , <i>Arctophila</i> etc. take over. Scattered <i>DuPontia fisheri</i> among the low growing saline tundra.
77	77	Ia	Wet mud.
78	78	III d	Small patch of aquatic <i>Carex</i> tundra.
79	79	III d	Wet/moist strangmoor (wet dominated).
80	80	III d	Wet/moist strangmoor (wet dominated) with frost boils. Lighter toned area to the south is the same but strangmoor is moist dominated.
81	81	Va	Flat, moist polygons with <i>Carex/Salix</i> cover.
82	82	Vd	Moist HCPs, >0.5 m relief, with open peat/lichen centers.
83	83	III d	Salt-killed moist/wet strangmoor, partially vegetated with dry, saline coastal barrens vegetation.

Table A-1. Continued...

SITE #	FIELD ID #	VEGETATION & LAND COVER CATEGORY	FIELD DESCRIPTION ¹
84	84	IIIId	This group of ponds/wet mud has very small patches of wet saline vegetation around the edges.
85	85	XIc	Wet/moist strangmoor (salt-killed) with very small patches of wet and dry saline vegetation and normal tundra vegetation.
86	86	IIIId	No saline vegetation around any of the ponds to the south of this point.
87	87	BS	Horseshoe-shaped beach coves.
88	88	Va	Typical moist flat-topped polygons.
89	89	Va	Moist HCPs, >0.5 m relief, dominated by <i>Poa arctica</i> etc.
90	90	IVa	Small patch of dry, partially barren saline vegetation on strangmoor which grades into beach sand.
91	91	Va	Bluff, 7 to 8 feet elevation.
92	92	IXh	Wet saline tundra, partially vegetated.
93	93	IXi	Dry, saline coastal barrens vegetation, partially vegetated.
94	94	Va	Typical moist/wet graminoid/forb meadow.
95	95	IXc	Darker tone is more vegetated wet gravel, light tone to the south is higher, drier, less vegetated gravel.
96	96	XIc	Salt-killed, partially barren wet/moist strangmoor with no real salt tolerant species.
97	97	Va	Lobe of moist HCPs with some open peat/lichen areas.
98	98	Va	Typical moist/wet graminoid/forb meadow.
99	99	IIIb	Wet saline tundra all around perimeter of this pond complex.
100	101	Va	Narrow strip of wet sedge tundra adjacent to drained portion of lake (<i>Carex aquatilis</i> , <i>Dupontia fisheri</i>).
101	102	XIa	Barren mud at east end of large lake.
102	103	Va	Moist sedge tundra on mixed HCPs and LCPs.
103	104	Ia	Dry pond.
104	105	IIIa	Strangmoor and discontinuous LCP rims, wet sedge tundra.
105	106	IVa	Predominately HCPs and moist tundra, mixed with lesser amounts of LCPs and wet sedge tundra (darker tones on photo).
106	107	Vd	Reticulate patterned hill side sloping to tidal area.
107	108	Va	Wet sedge tundra, non-patterned slope. Excellent growth (light tone on photo).
108	109	Va	Mostly HCPs, some LCPs of moist/wet sedge tundra.
109	110	IIIb	Wet saline tundra (dark tone), limited dry, saline coastal barrens (ash gray on photo).
110	111	BS	Gravel beach.
111	112	Xc	Badami #1 wellsite. Bare peat and gravel, approximately 5 feet above the tundra.
112	113	IVa	HCP and LCP mixed complex, mostly drier HCPs with open peat/lichens.
113	114	Va	Low, flat HCPs, moist sedge, dwarf shrub tundra.
114	115	Va	HCPs with thermokarst troughs. Fairly dry with some bare peat. Troughs are mostly wet.
115	116	Va	50% bare peat but mostly above strand line, fairly dry, well-drained HCPs.

Table A-1. Continued...

SITE #	FIELD ID #	VEGETATION & LAND COVER CATEGORY	FIELD DESCRIPTION ¹
116	117	Vd	HCPs with troughs >0.5 m deep. Dry tops, dwarf shrubs and lichens. Tops may have 50% bare peat with or without lichens.
117	118	IIIb	Wet saline tundra around lagoon, concentrated on east side near spit, absent on west and south banks. Wet saline tundra occurs at the upper end of lagoon along shorelines where <i>Puccinellia phryganodes</i> beds are 5-20 feet wide.
118	119	IIIc	Very wet strangmoor (dark on photo), 40% bare peat.
119	120	IIIc	Wet strangmoor, very little bare ground, dense <i>Carex aquatilis</i> . Not as wet as Site 119.
120	150	IIIb	Dark square-shaped pond, wet saline tundra, light spot in center is driftwood log.
121	151	IXe	Large stands of <i>Elymus arenarius</i> .
122	152	IVa	Small patch of dry saline coastal barrens vegetation (light toned area) grading to partially barren wet saline tundra at pond edge.
123	153	IXi	Dry, saline coastal barrens vegetation.
124	154	IXh	Patchy wet saline tundra only around ponds and wet mud.
125	155	XIa	Very patchy wet saline tundra (a few scattered plants at pond edges).
126	156	Va	Small patches of wet saline tundra at channel banks.
127	157	IXi	Small patches of wet saline vegetation around pond.
128	158	Xa	Small patches of wet saline vegetation around pond.
129	159	IIIa	No wet saline vegetation around pond.
130	160	IXi	Dry, partially barren river bar with coastal barrens vegetation grading to lighter toned grassy river bar to the south.
131	161	Va	Inland extent of saline vegetation along the creek.
132	162	Ia & IIb	Large deep lake with <i>Arctophila</i> surrounding it.
133	163	Ia	Shallow pond with sparse emergent <i>Carex</i> .

¹Abbreviations: HCP—High-Centered Polygons
LCP—Low-Centered Polygons

Table A-2. Vascular plant taxa identified at selected ground reference sites in the Badami area. Data were collected 6-9 August 1994. For site locations, see Figure A-1; for site descriptions, see Table A-1.

Species	Site ¹																		
	1	8	12	17	18	23	24	26	27	31	37	38	43	45	48	50	55	61	64
<i>Alopecurus alpinus</i>		X		X											X				
<i>Arctagrostis latifolia</i>	X		X	X							X	X			X				X
<i>Arctophila fulva</i>													X						
<i>Arnica frigida</i>																X			
<i>Artemisia arctica</i>					X	X										X			
<i>Aster sibiricus</i>																X			
<i>Astragalus alpinus</i>																X			X
<i>Astragalus umbellatus</i>															X				X
<i>Calamagrostis deschampsoides</i>		X																	
<i>Cardamine hyperborea</i>												X							
<i>Cardamine pratensis</i>		X																	
<i>Carex aquatilis</i>	X	X	X	X		X	X	X			X	X	X		X		X	X	
<i>Carex atrofusca</i>	X	X		X						X							X		
<i>Carex bigelowii</i>	X											X							X
<i>Carex chordorrhiza</i>																		X	
<i>Carex glareosa</i>		X																	
<i>Carex maritima</i>																			
<i>Carex membranacea</i>												X			X				X
<i>Carex misandra</i>	X		X	X				X		X	X	X				X	X		
<i>Carex rariflora</i>			X																
<i>Carex rotundata</i>	X		X									X					X	X	
<i>Carex saxatilis</i>												X					X	X	
<i>Carex subspathacea</i>		X					X							X					
<i>Carex ursina</i>					X	X	X		X										
<i>Carex vaginata</i>																	X		
<i>Cassiope tetragona</i>	X											X							X

A-8

A-9

Species	Site ¹																		
	1	8	12	17	18	23	24	26	27	31	37	38	43	45	48	50	55	61	64
<i>Cerastium beeringianum</i>		X		X				X							X	X			
<i>Chrysanthemum integrifolium</i>	X																		
<i>Chrysosplenium tetrandrum</i>		X																	
<i>Cochlearia officinalis</i>					X	X									X				
<i>Draba</i> sp.		X						X								X			
<i>Dryas integrifolia</i>	X									X		X				X	X		X
<i>Dupontia fischeri</i>	X	X		X		X	X	X						X	X				
<i>Epilobium latifolium</i>																X			
<i>Erigeron humilis</i>																X			
<i>Eriophorum angustifolium</i>	X	X	X	X	X	X	X	X			X	X		X	X		X		
<i>Eriophorum russeolum</i>			X														X	X	
<i>Eriophorum scheuchzeri</i>				X															
<i>Eriophorum vaginatum</i>	X	X									X	X							
<i>Eutrema edwardsii</i>		X																	
<i>Festuca brachyphylla</i>				X				X							X	X			
<i>Hierochloe pauciflora</i>				X		X				X					X				
<i>Juncus biglumis</i>								X				X			X				
<i>Luzula arctica</i>	X	X		X								X				X	X		X
<i>Luzula tundricola</i>																X			X
<i>Melandrium apetalum</i>			X					X							X		X		
<i>Minuartia arctica</i>	X											X				X			X
<i>Minuartia rubella</i>												X							
<i>Oxyria digyna</i>																X			
<i>Oxytropis nigrescens</i>																X			X
<i>Papaver lapponicum</i>															X				X
<i>Papaver macounii</i>	X											X				X			
<i>Parnassia kotzebuei</i>														X		X			
<i>Pedicularis capitata</i>																			X
<i>Pedicularis kanei</i>	X	X								X									

Species	Site ¹																		
	1	8	12	17	18	23	24	26	27	31	37	38	43	45	48	50	55	61	64
<i>Pedicularis sudetica</i>	X		X														X		
<i>Petasites frigidus</i>		X																	
<i>Poa arctica</i>		X	X	X		X	X							X	X	X			X
<i>Poa glauca</i>																X			
<i>Polemonium boreale</i>		X																	
<i>Polygonum bistorta</i>	X											X							X
<i>Polygonum viviparum</i>	X	X	X	X						X	X	X			X	X	X		X
<i>Potentilla biflora</i>	X															X			
<i>Potentilla hyparctica</i>																X			
<i>Primula borealis</i>														X					
<i>Puccinellia andersonii</i>					X	X			X					X					
<i>Puccinellia phryganodes</i>		X			X				X										
<i>Pyrola grandiflora</i>												X							
<i>Ranunculus nivalis</i>		X																	
<i>Sagina intermedia</i>																X			
<i>Salix arctica</i>			X	X						X	X						X		
<i>Salix lanata</i>																X			X
<i>Salix ovalifolia</i>			X	X	X	X	X	X		X				X	X				
<i>Salix pulchra</i>	X	X	X	X						X	X	X					X		
<i>Salix reticulata</i>	X									X		X				X	X		X
<i>Salix rotundifolia</i> x <i>phlebophylla</i> ²	X	X	X	X						X		X			X	X			X
<i>Saussurea angustifolia</i>												X							X
<i>Saxifraga bronchialis</i>																X			
<i>Saxifraga caespitosa</i>		X													X	X			
<i>Saxifraga cernua</i>	X	X	X	X				X						X	X				X
<i>Saxifraga foliolosa</i>	X	X	X	X															
<i>Saxifraga hieracifolia</i>		X		X								X				X			X
<i>Saxifraga hirculus</i>		X	X	X							X	X		X	X	X	X		
<i>Saxifraga oppositifolia</i>	X											X				X			

Species	Site ¹																		
	1	8	12	17	18	23	24	26	27	31	37	38	43	45	48	50	55	61	64
<i>Saxifraga punctata</i>	X	X	X									X							X
<i>Sedum rosea</i>		X												X					
<i>Senecio atropurpureus</i>												X			X				
<i>Senecio resedifolius</i>				X												X			
<i>Silene acaulis</i>	X											X				X			X
<i>Stellaria laeta</i>		X		X								X			X				
<i>Stellaria humifusa</i>		X			X	X			X					X					
<i>Trisetum spicatum</i>																X			
<i>Vaccinium vitis-idaea</i>												X							
<i>Valeriana capitata</i>		X																	

A-12

Species	Site ¹																	
	71	74	83	96	98	102	104	106	107	108	112	113	114	115	116	118	119	130
<i>Alopecurus alpinus</i>																		X
<i>Arctagrostis latifolia</i>												X		X				X
<i>Arctophila fulva</i>	X	X																
<i>Artemisia arctica</i>		X		X										X	X			X
<i>Artemisia borealis</i>				X														
<i>Astragalus umbellatus</i>								X										
<i>Braya pilosa</i>				X														
<i>Cardamine pratensis</i>					X													
<i>Carex aquatilis</i>		X		X	X	X	X		X	X	X	X	X	X		X	X	
<i>Carex atrofusca</i>				X														
<i>Carex bigelowii</i>								X										
<i>Carex maritima</i>																		X
<i>Carex misandra</i>		X		X		X					X			X	X			
<i>Carex rotundata</i>																	X	
<i>Carex saxatilis</i>																X		
<i>Carex ursina</i>			X															
<i>Cassiope tetragona</i>								X										
<i>Cerastium beeringianum</i>			X	X														X
<i>Chrysosplenium tetrandrum</i>					X													
<i>Cochlearia officinalis</i>			X											X				
<i>Deschampsia caespitosa</i>																		X
<i>Draba cinerea</i>		X																
<i>Dryas integrifolia</i>								X			X	X		X	X			
<i>Dupontia fischeri</i>			X	X	X													X
<i>Epilobium latifolium</i>																		X
<i>Eriophorum angustifolium</i>		X	X		X		X				X	X	X				X	
<i>Eriophorum scheuchzeri</i>		X																
<i>Eriophorum vaginatum</i>																X		

A-13

Species	Site ¹																	
	71	74	83	96	98	102	104	106	107	108	112	113	114	115	116	118	119	130
<i>Festuca brachyphylla</i>		X																
<i>Hierochloa pauciflora</i>				X						X								
<i>Juncus biglumis</i>				X														
<i>Luzula arctica</i>															X			
<i>Luzula tundricola</i>														X				
<i>Melandrium apetalum</i>		X	X	X	X													
<i>Oxyria digyna</i>		X																
<i>Oxytropis nigrescens</i>																		X
<i>Pedicularis kanei</i>												X			X			
<i>Pedicularis sudetica</i>		X															X	
<i>Poa arctica</i>		X		X	X				X	X		X	X	X				
<i>Poa glauca</i>																		X ³
<i>Polygonum viviparum</i>										X								
<i>Potentilla hyparctica</i>														X				
<i>Primula borealis</i>			X															X
<i>Puccinellia andersonii</i>			X	X														X
<i>Ranunculus pallasii</i>		X																
<i>Sagina intermedia</i>																		X
<i>Salix arctica</i>					X													
<i>Salix ovalifolia</i>				X										X				X
<i>Salix pulchra</i>		X				X			X	X		X	X		X			
<i>Salix reticulata</i>		X				X			X									
<i>Salix rotundifolia</i> x <i>phlebophylla</i> ²								X					X		X			X
<i>Saussurea angustifolia</i>								X										
<i>Saxifraga cernua</i>		X			X					X								
<i>Saxifraga foliolosa</i>		X																
<i>Saxifraga hieracifolia</i>		X																
<i>Saxifraga hirculus</i>		X		X	X				X	X		X						X
<i>Sedum rosea</i>																		X

Species	Site ¹																		
	71	74	83	96	98	102	104	106	107	108	112	113	114	115	116	118	119	130	
<i>Silene acaulis</i>								X											X
<i>Stellaria laeta</i>		X													X				
<i>Stellaria humifusa</i>			X																X
<i>Trisetum spicatum</i>																			X

¹Cross reference to Site # on Table A-1.

²A hybrid taxon in the Badami area (see text).

³Viviparous.