Advanced Evaluation Plantings in Northern Alaska
Cold Regions Plot Evaluation Network

Prepared by: Andrew S. Nolen
State of Alaska
Department of Natural Resources
Division of Agriculture
Plant Materials Center

September 5, 2008

Introduction:
Advanced evaluation plantings are established to evaluate the performance of accessions that have previously performed well in initial evaluation plantings. These plantings aid in the development of new varieties for many end uses. The plantings also allow comparisons of new plant material with varieties that have been traditionally used. Plant material with potential for forage, turf and conservation uses were selected for planting in several Interior Alaska locations. Plots were planted near Nome and Jim River Camp in 2003 and evaluated through 2007. Plots at Red Dog Mine, and Nome were planted in 2004 and evaluated through 2007. The plot at Franklin Bluffs plot was planted in 2005 and evaluated though 2007.

Project History:
The Alaska Plant Materials Center (PMC) has established advanced evaluation plantings throughout its history as part of the mission of developing plant material for different uses within Alaska. This particular effort was conducted as part of the larger Cold Regions Project funded by a grant from the United States Department of Agriculture, Natural Resource Conservation Service.

Plot Layout:
The initial effort on this project was to develop the plot layout which consisted of accessions with varied end uses. Native species suitable for conservation was one of the primary focuses though input from small scale agricultural producers from around the region encouraged the inclusion of forage crops for evaluation. Turf varieties were also included along with some native wild flowers. Table 1 presents the typical plot layout. Each accession was planted in 4 foot by ten foot block at a rate of 40 pounds per acre. Seed was raked in by hand to incorporate at an approximate depth of ¼ inch. Varieties with similar end uses were planted adjacent to one another to allow for better comparison. Each plot was fertilized with one application of 20-20-10 following planting. Two blocks of ‘Boreal’ red fescue were planted to result in an even number of blocks.

Table 1. Typical Plot Layout

'Park' Kentucky Bluegrass	'Alene' Kentucky Bluegrass
'Nugget' Kentucky Bluegrass	'Tundra' Glaucous Bluegrass
'Service' Big Bluegrass	'Norcoast' Bering Hairgrass
'Durar' Hard Fescue	'Nortran' Tufted Hairgrass
'Arctared' Red Fescue	'Boreal' Red Fescue
'Pennlawn' Red Fescue	'Boreal' Red Fescue
'Gruening' Alpine Bluegrass	'Andrew Bay' Large-glume Bluegrass
'Ninilchik' Puccinellia nutkaensis	'Egan' American Sloughgrass
'Alyeska' Polargrass	Meadow Foxtail (Common)
'Sourdough' Bluejoint	'Caiggluk' Tilesius Sage
'Hannas High Tech' Alfalfa	'Beaver' Alfalfa
'James' Dahurian Wild Rye	PI 345600 Siberian Wild Rye
Altai Wild Rye (Common)	Russian Wild Rye (Common)
'Kirk' Crested Wheatgrass	Slender Wheatgrass (Common)
'Wainwright' Slender Wheatgrass	'Chief' Intermediate Wheatgrass
'Manchar' Smooth Brome	'Carlton' Smooth Brome
'Climax' Timothy	'Engmo' Timothy
'Farol' Timothy	'Alma' Timothy

Some additional accessions were included at the Red Dog Mine, Franklin Bluffs and the second Nome locations because they were planted at a later time when more plant material had been added to the plot layout. These additional accessions included:

'Kenai' Polargrass	'Port Clarence' large flower speargrass
'Polar' Brome	'Solomon' Thick Spike Wheatgrass
'Max Q' Tall Fescue	'Lodorm' Needlegrass
'Paxson' Hedysarum alpinum	'Casco Cove' Beach Lovage
'King Salmon' Golden Rod	'Clam Lagoon' Beach Fleabane
Nootka Lupine (Common)	'Tok' Jakutsk Snow Parsley
'Shemya' Dusty Miller	'Kotzebue' Arctic Chamomile
Polemonium acutiflorum	'Denali' Alfalfa

The seed needed for the advance evaluation plantings were acquired from existing PMC seed stocks, Alaska Mill and Feed, and Hannas Seeds.

Plot Locations and Preparation:

The plots were replicated at sites around the region including Red Dog Mine, Nome, Franklin Bluffs and Jim River Camp. Cooperators including the Department of Transportation (DOT), Rick Wolf, and Red Dog Mine aided in the project by providing land for the plots as well as ground preparation. The soil at each plot location was prepared by removing existing vegetation if present by cultivation or blading with a dozer or loader.

Two sites were established in Nome. The first plot was located just north of town at a location of an abandoned gold mine. This site was selected with the aid of the Department of Transportation. The second site in the Nome area was selected with the

aid of Rick Wolf, a local high school teacher. This site was located off of Kougarok Road northeast of town at an old gold mine. Both of these sites were already void of vegetation due to the history of mining at each location.

Three plot locations were selected at the Red Dog Mine site north of Kotzebue with the aid of the mine's environmental staff. The mine was a great cooperator since mutual goals were evident from the beginning of the project. The PMC had a need to evaluate plant material in the unique region of the state and the mine had a need for improved revegetation varieties for conservation plantings following mining activities. Each site was located on different soil types present around the mine site. The plot near drainage ditch 4 is on siksikpuk shale. The plot on the overburden stockpile is primarily kivalina shale while the plot near the waste rock dump is on a material more closely resembling top soil. Each site was already void of vegetation from previous activities.

The Jim River Camp and Franklin Bluffs sites along the Dalton Highway were selected with the aid of DOT. The Jim River Camp plot was located in the southwest corner of the maintenance station property while the Franklin Bluffs plot was located in the middle of the old pipeline work pad. Each site was prepared by blading off existing vegetation with a loader or grader.

Planting and Evaluation:
Planting occurred at the plot in Nome just north of town on July 15, 2003. The Nome plot off of Kougarok Road was planted on June 23, 2004. The Red Dog Mine plots were planted July 12 and 13, 2004. The Jim River Camp plot was planted June 29, 2003 and Franklin Bluffs was planted June 28, 2005. At least one evaluation per year including the planting year was anticipated for each of the three years following planting.

Evaluation of the plots included an assessment of the vigor and percent stand of each accession. Vigor is a qualitative assessment and was rated on a scale of 0 to 10. A lower rating number represents a better vigor assessment with the exception of 0 which indicates no plants present. The percentage of stand formed by each accession planted was the quantitative assessment though no statistical measurements were taken.

Tables 2 through 8 present the evaluation data collected for each of the planted plots.

Table 2. Nome Plot North of Town Evaluation

	9/4/2004 Vigor	9/4/2004 % Stand	6/2/2005 Vigor	6/2/2005 % Stand	7/6/2006 Vigor	7/6/2006 % Stand	8/9/2007 Vigor	8/9/2007 % Stand
Alene Kentucky Bluegrass	1	100	3	90	4	30	0	0
Park Kentucky Bluegrass	3	30	4	90	6	20	0	0
Tundra Bluegrass	2	80	2	60	1	90	2	50
Nugget Kentucky Bluegrass	1	100	4	50	3	70	0	0
Norcoast Hairgrass	1	100	5	100	3	100	2	20
Service Big Bluegrass	1	100	6	100	0	0	2	10
Nortran Hairgrass	1	100	2	100	1	100	1	100
Durar Hard Red Fescue	3	90	2	100	8	20	3	20
Boreal Red Fescue	1	100	2	90	2	100	2	90
Arctared Fescue	1	100	1	90	1	100	1	50
Boreal Red Fescue	1	100	2	90	2	100	2	30
Pennlawn Red Fescue	2	90	2	90	2	90	1	90
Andrew Bay Bluegrass	4	30	4	20	3	70	0	0
Gruening Alpine Bluegrass	1	100	1	100	4	10	1	50
Egan American Sloughgrass	1	100	2	90	4	40	2	20
Ninilchik Alkali Grass	1	100	2	90	7	10	0	0
Meadow Foxtail	2	100	1	100	4	100	2	20
Alyeska Polargrass	1	100	1	100	1	100	1	90
Ciaggluk Tilessi Sage	3	70	1	50	2	10	2	50
Sourdough Bluejoint	3	100	3	100	1	100	1	80
Beaver Alfalfa	5	20	0	0	0	0	0	0
Hannas High Tech Alfalfa	6	10	0	0	0	0	0	0
Siberian Wildrye	1	100	1	70	3	60	2	90
James Duhorian Wild Rye	0	0	0	0	0	0	0	0
Russian Wild Rye	7	30	7	10	0	0	0	0
Altai Wild Rye	0	0	0	0	0	0	0	0
Slender Wheatgrass	2	10	2	90	0	0	0	0
Kirk Crested Wheatgrass	6	10	4	20	0	0	0	0
Chief Intermediate Wheatgrass	5	50	0	0	0	0	0	0
Wainwright Wheatgrass	2	70	4	50	4	60	2	20
Carlton Smooth Brome	3	100	2	90	7	90	5	60
Manchar Smooth Brome	3	100	1	90	2	100	2	90
Engmo Timothy	3	10	3	90	4	100	1	90
Climax Timothy	2	60	2	90	5	100	3	70
Alma Timothy	3	100	3	90	4	100	2	90
Farol Timothy	1	100	2	90	4	100	4	80

Table 3. Nome Rick Wolf Plot Evaluation

	9/9/2004 Vigor	9/9/2004 % Stand	6/2/2005 Vigor	6/2/2005 % Stand	9/15/2005 Vigor	9/15/2005 %Stand	7/6/2006 Vigor	7/6/2006 % Stand	8/8/2007 Vigor	8/8/2007 % Stand
Alene Kentucky Bluegrass	3	100	2	90	3	100	3	100	5	90
Park Kentucky Bluegrass	2	100	3	90	4	90	2	100	4	100
Tundra Bluegrass	1	100	1	80	2	90	1	100	4	30
Nugget Kentucky Bluegrass	1	100	2	90	3	60	5	70	3	70
Norcoast Hairgrass	1	100	3	70	2	80	4	100	5	90
Service Big Bluegrass	1	90	1	80	2	90	4	90	2	80
Nortran Hairgrass	1	100	2	90	2	90	1	90	2	90
Durar Hard Red Fescue	1	90	2	90	6	40	5	50	3	50
Boreal Red Fescue	1	100	3	100	2	100	4	50	2	90
Arctared Fescue	1	100	2	100	1	70	3	80	1	100
Boreal Red Fescue	2	100	2	100	2	100	3	90	2	90
Pennlawn Red Fescue	1	100	3	100	2	100	5	70	2	90
Andrew Bay Bluegrass	2	100	3	50	2	90	4	90	2	90
Gruening Alpine Bluegrass	1	100	1	100	1	100	2	100	2	100
Egan American Sloughgrass	1	100	2	90	2	100	4	60	9	10
Ninilchik Alkali Grass	2	100	2	100	4	60	6	50	0	0
Meadow Foxtail	1	100	2	100	1	100	3	100	4	100
Alyeska Polargrass	1	100	1	100	1	100	1	100	3	90
Ciaggluk Tilessi Sage	1	100	1	90	1	140	3	100	1	100
Sourdough Bluejoint	1	90	3	90	2	100	2	100	3	90
Beaver Alfalfa	2	90	9	10	9	10	0	0	0	0
Hannas High Tech Alfalfa	1	90	9	10	8	20	0	0	0	0
Siberian Wildrye	1	100	2	90	1	100	2	90	2	80
James Duhorian Wild Rye	1	100	5	50	3	50	0	0	0	0
Russian Wild Rye	2	90	7	20	0	0	0	0	0	0
Altai Wild Rye	2	70	5	50	8	40	0	0	0	0
Slender Wheatgrass	1	100	4	60	2	100	4	100	6	30
Kirk Crested Wheatgrass	1	100	6	50	4	80	5	60	0	0
Chief Intermediate Wheatgrass	2	100	3	60	2	100	4	90	0	0
Wainwright Wheatgrass	1	90	9	10	2	80	3	70	5	50
Carlton Smooth Brome	1	100	3	100	2	100	5	90	6	80
Manchar Smooth Brome	1	100	5	60	4	60	5	90	4	90
Engmo Timothy	3	100	3	80	2	90	2	100	3	90
Climax Timothy	1	100	2	90	3	80	4	100	4	70
Alma Timothy	2	100	2	90	1	100	3	100	4	80
Farol Timothy	3	100	4	90	4	60	4	100	6	50
Port Clarence Bluegrass	5	40	7	10	0	0	0	0	8	20
Kenai Polargrass	1	100	1	100	1	100	1	100	2	80
Agropyron macrorum	1	90	4	90	2	90	3	90	4	20
Polar Brome	2	100	2	90	2	100	6	20	3	80
Lodorm Needlegrass	3	60	0	0	0	0	0	0	0	0
Max Q tall Fescue	1	100	9	10	0	0	0	0	0	0
Casco Cove Beach Lovage	3	60	0	0	9	10	7	10	8	20
Paxson Eskimo Potato	2	50	0	0	5	40	7	10	2	60
Clam Lagoon Beach Fleabane	3	50	0	0	0	0	0	0	0	0
King Salmon Golden Rod	2	70	2	50	3	50	2	50	2	40
Tok Jakutsk Snow Parsley	0	0	0	0	0	0	0	0	0	0
Lupinus nootkatensis	4	50	8	10	9	30	0	0	0	0
Kotzebue Arctic Chamomile	2	100	1	90	2	90	3	90	8	20
Shemya Dusty Miller	2	50	4	20	5	20	6	10	8	20
Polemonium acutiflorum	3	60	2	50	7	20	5	60	4	30
Denali alfalfa	4	80	5	50	9	10	0	0	0	0

Table 4. Red Dog Drainage Ditch 4 Plot Evaluation

	7/7/2005 Vigor	7/7/2005 % Stand	6/27/2007 Vigor	6/27/2007 % Stand
Alene Kentucky Bluegrass	4	40	0	0
Park Kentucky Bluegrass	3	60	6	50
Tundra Bluegrass	2	60	4	20
Nugget Kentucky Bluegrass	2	40	7	10
Norcoast Hairgrass	3	20	0	0
Service Big Bluegrass	2	60	2	60
Nortran Hairgrass	2	40	3	10
Durar Hard Red Fescue	5	30	6	20
Boreal Red Fescue	6	20	0	0
Arctared Fescue	5	30	4	10
Boreal Red Fescue	7	20	5	20
Pennlawn Red Fescue	7	10	0	0
Andrew Bay Bluegrass	3	40	2	70
Gruening Alpine Bluegrass	3	60	3	70
Egan American Sloughgrass	3	10	0	0
Ninilchik Alkali Grass	0	0	0	0
Meadow Foxtail	4	20	2	50
Alyeska Polargrass	8	10	3	30
Ciaggluk Tilessi Sage	7	10	8	10
Sourdough Bluejoint	5	40	3	80
Beaver Alfalfa	0	0	0	0
Hannas High Tech Alfalfa	0	0	0	0
Siberian Wildrye	6	10	0	0
James Duhorian Wild Rye	0	0	0	0
Russian Wild Rye	0	0	0	0
Altai Wild Rye	0	0	0	0
Slender Wheatgrass	0	0	0	0
Kirk Crested Wheatgrass	0	0	0	0
Chief Intermediate Wheatgrass	5	20	0	0
Wainwright Wheatgrass	7	10	0	0
Carlton Smooth Brome	0	0	9	10
Manchar Smooth Brome	0	0	0	0
Engmo Timothy	3	40	0	0
Climax Timothy	8	10	0	0
Alma Timothy	6	20	0	0
Farol Timothy	0	0	0	0
Port Clarence Bluegrass	0	0	0	0
Kenai Polargrass	7	10	5	20
Agropyron macrorum	0	0	9	10
Polar Brome	0	0	0	0
Lodorm Needlegrass	0	0	0	0
Max Q tall Fescue	0	0	0	0
Casco Cove Beach Lovage	0	0	0	0
Paxson Eskimo Potato	0	0	0	0
Clam Lagoon Beach Fleabane	0	0	0	0
King Salmon Golden Rod	0	0	0	0
Tok Jakutsk Snow Parsley	0	0	0	0
Lupinus nootkatensis	0	0	0	0
Kotzebue Arctic Chamomile	0	0	0	0
Shemya Dusty Miller	0	0	0	0
Polemonium acutiflorum	3	60	2	80
Denali alfalfa	0	0	0	0

Table 5. Red Dog Overburden Stockpile Plot Evaluation

	7/7/2005 Vigor	7/7/2005 % Stand	6/27/2007 Vigor	6/27/2007 % Stand
Alene Kentucky Bluegrass	3	60	0	0
Park Kentucky Bluegrass	6	50	0	0
Tundra Bluegrass	1	100	0	0
Nugget Kentucky Bluegrass	6	20	0	0
Norcoast Hairgrass	5	50	0	0
Service Big Bluegrass	4	80	2	80
Nortran Hairgrass	6	60	0	0
Durar Hard Red Fescue	5	50	5	60
Boreal Red Fescue	7	20	0	0
Arctared Fescue	2	60	3	70
Boreal Red Fescue	7	20	0	0
Pennlawn Red Fescue	6	30	0	0
Andrew Bay Bluegrass	5	50	3	60
Gruening Alpine Bluegrass	4	80	3	90
Egan American Sloughgrass	3	20	0	0
Ninilchik Alkali Grass	4	60	6	30
Meadow Foxtail	0	0	9	10
Alyeska Polargrass	7	10	4	10
Ciaggluk Tilessi Sage	2	50	1	50
Sourdough Bluejoint	5	50	4	10
Beaver Alfalfa	0	0	0	0
Hannas High Tech Alfalfa	0	0	0	0
Siberian Wildrye	3	80	2	90
James Duhorian Wild Rye	0	0		
Russian Wild Rye	4	50		
Altai Wild Rye	0	0		
Slender Wheatgrass	0	0		
Kirk Crested Wheatgrass	6	10		
Chief Intermediate Wheatgrass	3	60		
Wainwright Wheatgrass	2	90		
Carlton Smooth Brome	0	0		
Manchar Smooth Brome	0	0		
Engmo Timothy	7	50		
Climax Timothy	0	0		
Alma Timothy	0	0		
Farol Timothy	0	0		
Port Clarence Bluegrass	0	0		
Kenai Polargrass	0	0		
Agropyron macrorum	2	100		
Polar Brome	8	10		
Lodorm Needlegrass	0	0		
Max Q tall Fescue	0	0		
Casco Cove Beach Lovage	0	0		
Paxson Eskimo Potato	0	0		
Clam Lagoon Beach Fleabane	0	0		
King Salmon Golden Rod	0	0		
Tok Jakutsk Snow Parsley	0	0		
Lupinus nootkatensis	0	0		
Kotzebue Arctic Chamomile	1	100		
Shemya Dusty Miller	0	0		
Polemonium acutiflorum	0	0		
Denali alfalfa	0	0		

Table 6. Red Dog Waste Rock Dump Plot Evaluation

	7/7/2005 Vigor	7/7/2005 % Stand	6/27/2007 Vigor	6/27/2007 % Stand
Alene Kentucky Bluegrass	5	50	0	0
Park Kentucky Bluegrass	6	20	0	0
Tundra Bluegrass	1	50	2	30
Nugget Kentucky Bluegrass	1	30	4	20
Norcoast Hairgrass	3	60	3	30
Service Big Bluegrass	2	50	2	60
Nortran Hairgrass	2	60	2	60
Durar Hard Red Fescue	2	80	3	70
Boreal Red Fescue	9	10	0	0
Arctared Fescue	1	60	3	40
Boreal Red Fescue	9	10	0	0
Pennlawn Red Fescue	3	40	0	0
Andrew Bay Bluegrass	3	60	2	80
Gruening Alpine Bluegrass	1	90	1	80
Egan American Sloughgrass	7	40	3	60
Ninilchik Alkali Grass	8	10	0	0
Meadow Foxtail	6	50	2	70
Alyeska Polargrass	3	50	3	60
Ciaggluk Tilessi Sage	3	20	2	40
Sourdough Bluejoint	3	50	2	100
Beaver Alfalfa	0	0	0	0
Hannas High Tech Alfalfa	0	0	0	0
Siberian Wildrye	6	40	4	80
James Duhorian Wild Rye	8	10	0	0
Russian Wild Rye	8	10	0	0
Altai Wild Rye	8	10	0	0
Slender Wheatgrass	8	10	0	0
Kirk Crested Wheatgrass	7	20	0	0
Chief Intermediate Wheatgrass	2	90	0	0
Wainwright Wheatgrass	2	90	2	90
Carlton Smooth Brome	6	50	2	70
Manchar Smooth Brome	6	50	3	60
Engmo Timothy	5	60	5	40
Climax Timothy	7	30	7	20
Alma Timothy	6	50	8	10
Farol Timothy	7	30	9	10
Port Clarence Bluegrass	7	10	2	70
Kenai Polargrass	2	80	1	100
Agropyron macrorum	6	30	3	30
Polar Brome	3	50	2	80
Lodorm Needlegrass	0	0	0	0
Max Q tall Fescue	0	0	0	0
Casco Cove Beach Lovage	0	0	0	0
Paxson Eskimo Potato	0	0	0	0
Clam Lagoon Beach Fleabane	0	0	0	0
King Salmon Golden Rod	7	20	2	60
Tok Jakutsk Snow Parsley	0	0	0	0
Lupinus nootkatensis	8	10	0	0
Kotzebue Arctic Chamomile	1	100	1	100
Shemya Dusty Miller	0	0	0	0
Polemonium acutiflorum	3	90	2	70
Denali alfalfa	5	60	0	0

Table 7. Jim River Camp Plot Evaluation

	9/23/2003 Vigor	9/23/2003 % Stand	8/31/2004 Vigor	8/31/2004 % Stand	8/16/2005 Vigor	8/16/2005 % Stand	8/8/2006 Vigor	8/8/2006 % Stand	8/21/2007 Vigor	8/21/2007 % Stand
Alene Kentucky Bluegrass	1	90	3	80	2	100	3	70	5	70
Park Kentucky Bluegrass	1	90	3	90	3	90	3	40	6	50
Tundra Bluegrass	2	90	1	100	1	50	4	50	2	80
Nugget Kentucky Bluegrass	3	70	2	70	3	90	5	60	4	50
Norcoast Hairgrass	1	90	3	80	4	50	2	50	2	40
Service Big Bluegrass	3	90	4	40	2	100	2	90	6	40
Nortran Hairgrass	6	30	2	70	3	70	3	50	3	30
Durar Hard Red Fescue	3	80	2	100	2	90	3	80	4	70
Boreal Red Fescue	1.5	90	4	60	4	50	5	40	3	60
Arctared Fescue	4	80	2	90	3	60	2	70	2	70
Boreal Red Fescue	1	95	4	60	4	50	4	40	3	60
Pennlawn Red Fescue	1	95	2	100	3	60	5	40	4	70
Andrew Bay Bluegrass	4	30	6	30	5	40	4	30	4	30
Gruening Alpine Bluegrass	2	90	3	70	4	80	3	70	4	80
Egan American Sloughgrass	5	40	5	50	0	0	0	0	0	0
Ninilchik Alkali Grass	3	70	3	70	0	0	0	0	0	0
Meadow Foxtail	1	100	5	70	4	70	3	80	5	60
Alyeska Polargrass	7	20	0	0	8	10	4	10	3	10
Ciaggluk Tilessi Sage	2	80	8	10	5	10	6	20	4	20
Sourdough Bluejoint	4	70	5	80	4	50	4	50	4	80
Beaver Alfalfa	2	70	9	10	0	0	0	0	0	0
Hannas High Tech Alfalfa	3	60	0	0	0	0	0	0	0	0
Siberian Wildrye	1	90	2	90	3	60	2	30	2	80
James Duhorian Wild Rye	5	50	9	10	0	0	0	0	0	0
Russian Wild Rye	3	70	0	0	0	0	0	0	0	0
Altai Wild Rye	7	20	9	10	0	0	0	0	0	0
Slender Wheatgrass	2	90	4	40	5	50	0	0	2	10
Kirk Crested Wheatgrass	4	70	4	60	4	70	0	0	0	0
Chief Intermediate Wheatgrass	3	50	4	30	8	20	0	0	0	0
Wainwright Wheatgrass	6	50	3	50	7	40	3	50	2	50
Carlton Smooth Brome	2	70	3	70	3	80	5	30	2	70
Manchar Smooth Brome	3	70	4	60	4	80	4	60	5	90
Engmo Timothy	2	90	3	90	2	80	0	0	3	10
Climax Timothy	2	90	5	60	4	50	5	10	6	20
Alma Timothy	2	90	5	60	7	20	0	0	6	20
Farol Timothy	2	90	4	50	4	50	7	10	0	0

Table 8. Franklin Bluffs Plot Evaluation

	6/20/2006 Vigor	6/20/2006 % Stand	8/22/2007 Vigor	8/22/2007 % Stand
Alene Kentucky Bluegrass	0	0	0	0
Park Kentucky Bluegrass	4	60	0	0
Tundra Bluegrass	2	50	5	20
Nugget Kentucky Bluegrass	4	4	6	10
Norcoast Hairgrass	3	30	5	10
Service Big Bluegrass	4	40	6	10
Nortran Hairgrass	4	40	3	10
Durar Hard Red Fescue	3	50	5	20
Boreal Red Fescue	6	30	8	10
Arctared Fescue	3	60	4	40
Boreal Red Fescue	5	30	7	10
Pennlawn Red Fescue	6	20	0	0
Andrew Bay Bluegrass	5	10	5	10
Gruening Alpine Bluegrass	3	30	3	30
Egan American Sloughgrass	0	0	0	0
Ninilchik Alkali Grass	2	60	3	50
Meadow Foxtail	0	0	0	0
Alyeska Polargrass	4	20	6	20
Ciaggluk Tilessi Sage	5	20	5	30
Sourdough Bluejoint	5	2	6	10
Beaver Alfalfa	8	10	0	0
Hannas High Tech Alfalfa	8	10	0	0
Siberian Wildrye	3	70	5	20
James Duhorian Wild Rye	6	10	0	0
Russian Wild Rye	6	20	0	0
Altai Wild Rye	6	20	0	0
Slender Wheatgrass	4	30	0	0
Kirk Crested Wheatgrass	6	20	0	0
Chief Intermediate Wheatgrass	9	10	0	0
Wainwright Wheatgrass	4	50	6	20
Carlton Smooth Brome	6	10	8	10
Manchar Smooth Brome	6	10	8	10
Engmo Timothy	7	10	9	10
Climax Timothy	8	10	9	10
Alma Timothy	8	10	0	0
Farol Timothy	8	10	0	0
Port Clarence Bluegrass	0	0	0	0
Kenai Polargrass	4	70	5	10
Agropyron macrorum	5	40	0	0
Polar Brome	6	20	7	20
Lodorm Needlegrass	4	40	0	0
Max Q tall Fescue	5	20	0	0
Casco Cove Beach Lovage	6	20	0	0
Paxson Eskimo Potato	4	20	3	10
Clam Lagoon Beach Fleabane	4	20	0	0
King Salmon Golden Rod	3	30	5	50
Tok Jakutsk Snow Parsley	0	0	0	0
Lupinus nootkatensis	7	10	0	0
Kotzebue Arctic Chamomile	4	80	5	40
Shemya Dusty Miller	9	10	0	0
Polemonium acutiflorum	5	20	0	0
Denali alfalfa	9	10	0	0

Discussion:
The advanced evaluation planting in northern Alaska performed generally well. Conditions at the individual plots varied widely in soil texture though consistency of results was reasonably maintained across the region. Impact from fire, construction activities and vehicle traffic did have an impact on a few of the plots.

The two plots in Nome had similar soil gravelly soils with fairly high organic matter content. The plot north of town was the first installed and had the longest evaluation period in the Nome area. It appeared to have been overseeded and fertilized in a reclamation effort which did not hurt the planted accessions though may have slightly skewed the results. It is assumed that revegetation mix applied contained Nortran and Arctared which could have influenced the overall stand formation of the hairgrass and red fescue blocks. This being said, turf grasses with good performance in this plot include Boreal, Arctared, and Pennlawn with Nugget and Durar thriving but not quite as well. Conservation plant materials with good vigor and stand production include Tundra, Nortran, Gruening, Alyeska, Caiggluk, Sourdough and Siberian Wildrye. Egan performed well for the first several years though lived up to its reputation as a short lived perennial. The forage grasses also did well with Engmo and Manchar rating the best. Meadow foxtail performed well for the first several years but did not persist.

The plot at Rick Wolf's place in Nome was also planted on a site that had previously been mined for gold. The cooperator is one of only two horse owners in the area and had a need for forage and hay crops to offset the cost of importing feed. Turf grasses that rated highly in this location included Arctared and Boreal. The other varieties of turf grasses did well enough for them to have potential if managed for that purpose. Conservation grasses that did well during this study include Nortran, Gruening, Andrew Bay, Alyeska, Caiggluk, Sourdough, and Kenai. All of the brome and timothy varieties formed good stands though Engmo and Polar rated the best of the forages. Native wildflowers included in this planting had some success. Kotzebue thrived quite well in the first few years spreading from seed beyond the planted area though by the last evaluation it was being out competed. King Salmon, Paxson and *Polemonium acutiflorum* also performed well though were slower to establish then the grasses.

The Red Dog Mine plots were only evaluated on the first and third years due to bad weather at the site which did not allow access in 2006. The plot at drainage ditch four was the poorest soil location of the three at the mine. Siksikpuk shale does not appear to naturally grow vegetation to a very high level of cover. This plot only had a few accessions with any measurable establishment. Park, Arctared and Boreal were the only turf varieties with performance, none of them doing exceptionally well though. Conservation grasses did not fair much better though Tundra, Nortran, Service, Andrew Bay, Caiggluk, Sourdough, Alyeska, Kenai, and Gruening did become established over the evaluation period. Of these, Sourdough, Service, Andrew Bay and Gruening rated the best. None of the forage grasses thrive either with Carlton being the only one with any plants present.

The plot on Red Dog Mines overburden stockpile rated fairly well during the first evaluation though most of the plot had been buried prior to the 2007 evaluation. Accessions with no ratings for 2007 on table 5 indicate those which were no longer present. Of the data that was able to be collected, judgments of performance on some varieties can be made. Arctared was the only turf grass with good survival. Service, Gruening, Caiggluk, and Siberian wildrye received good ratings in the conservation category with Gruening and Caiggluk doing the best.

The plot adjacent to the waste rock dump at Red Dog had the highest quality soil of the three at the site. Better establishment of most accessions occurred at this location when compared to the other two. Nugget, Durar, and Arctared were the only turf grass surviving through 2007 though none made a very dense stand. Conservation grasses that showed promise include Tundra, Service, Nortran, Gruening, Egan, Alyeska, Sourdough, Kenai, Port Clarence, *Agropyron macrourum*, and Wainwright. Gruening, Sourdough, and Kenai were the best of these. The wildflower group was the most impressive in the planting with Kotzebue thriving and spreading. King Salmon, Caiggluk, and *Polemonium acutiflorum* also showed good establishment. Forage grasses did survive though none with the exception of Carlton and Polar were very successful.

The Jim River plot had good performance of many accessions during the evaluation period. A forest fire in 2004 did impact most of the plot and some portions were damaged from what appeared to be the construction of a fire break. This did not heavily impact the overall performance of the planting. Turf grasses with good ratings include Nugget and Arctared with Boreal being a close follower. The other turf grasses did well enough that their inclusion in lawn mix would be warranted. Conservation plant materials with promise include Tundra, Norcoast, Nortran, Wainwright, Andrew Bay, Gruening, Caiggluk, Sourdough, siberian wildrye and Alyeska. Tundra and Siberian wildrye were the best of these. Forage grasses also had good performance with Carlton and Manchar bromes being the best. Engmo timothy was one on of the blocks that had impact from the fire. It is expected that it would have done well also if it had not been so heavily impacted.

The Franklin Bluffs plot had the shortest duration under evaluation of the plots in this region. It is also the furthest north planting. These two factors are likely the cause for the low stand establishment ratings of the surviving varieties. Arctared was the only turf grass with reasonable ratings. Tundra, Nortran, and Gruening were the only conservation grasses with notable vigor though survival was present on others including Service, Norcoast, Ninilchik, Alyeska, Siberian wildrye, Wainwright, and Kenai. Caiggluk, Paxson, King Salmon and Kotzebue showed promise in the wildflower group. Forage grasses did germinate and survive the first winter though none of the varieties appeared to be establishing very well.

Conclusions:

The northern region of Alaska has the shortest growing season and most extreme winter conditions when compared to other parts of the state. Plant materials that appeared best adapted to these severe conditions that were evaluated in this study include Tundra,

Arctared, Nortran, Gruening, Alyeska, Caiggluk, Kotzebue, King Salmon, Paxson, Siberian wildrye, Andrew Bay, Service, and Kenai. Egan, *Agropyron macrourum,* and *Polemonium acutiflorum,* showed promise in some locations and warrant additional evaluation. Forage plantings did not perform exceptionally well though the three brome grasses included in most of the plots as well as Engmo timothy rated the best.

Future advanced evaluation plantings in the regions should occur with a narrower focus on native plant collections from within the region. Site selection with better protection from vehicle traffic and existing vegetation would significantly improve the overall results.