

Final Report of Data and Observations

Obtained From the Chena Flood
Control Project Evaluation Plots
Located Near North Pole, Alaska

1985 - 1988

Presented to

U. S. Army Corps of Engineers
Alaska District

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Division of Agriculture

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Introduction:

The Conservation Plant Project at the Alaska Plant Materials Center (PMC), a section of the Alaska Department of Natural Resources, is responsible for developing new plant varieties (cultivars) for land reclamation, habitat enhancement, and erosion control. In addition to the development of new plant varieties, this project also is responsible for developing techniques for erosion control and reclamation, and to provide technical assistance to industry so that this technology is used properly. In order to accomplish these goals, it is beneficial for the PMC to work with industry. Resource extraction and construction activities usually have disturbances on which these new varieties or techniques can be tested and demonstrated.

Purpose:

Mining and Industrial Evaluation Plots are usually designed for reclamation and/or erosion control and are located in diverse geographical and ecological locations. The plots are developed in a manner consistent with the cooperators' intended final management practice, i.e., "Fertilize it once and forget about it." The practice of minimal maintenance is generally necessary for industry to eliminate costly yearly maintenance programs. Therefore, the plots are established with minimal surface preparation and are fertilized only at the time of planting. The plantings are then evaluated for their ability to survive on these harsh sites with no maintenance. Top soil is not used, and the plantings are made on the substrate that is expected to be available when reclamation occurs.

These plots also serve as an advanced evaluation of plant materials that have been selected at the PMC for their outstanding performance. In addition, the program also evaluates new techniques for planting and maintenance which may make the entire reclamation or erosion control process more cost effective.

The cooperator is allowed to set some of the parameters in the testing procedures, so that the test will provide useful data for the cooperator's particular conditions or regulatory guidelines. These plots also allow the PMC to make meaningful recommendations when similar conditions are encountered by someone other than the original cooperator. This class of evaluation plots probably provides the most important and useful information to the Conservation Plant Project.

Methods:

Advanced evaluation plots are evaluated at least once a year. The accessions are rated for vigor, percent stand, and numerous other factors such as hardiness, disease resistance, and related characteristics. However, we have found that vigor and percent stand are reliable indicators of how the different accessions compare with each other.

Figure 1 is an example of the evaluation sheet that will be presented in this report. The following numbers, followed by brief explanations, correspond to numbers on the example evaluation sheet:

1. Location and title of evaluation plot.
2. Number of evaluation blocks--This number may range from one to three blocks.
3. Year of Record--the year that evaluation data was collected.
4. Vigor--this number can range from one to nine. One is best and nine is the worst rating. If possible, this rating is determined by comparison with other accessions of the same species. The rating is based on color, height, health, flowering, and/or seed production, and on the evaluator's knowledge of the plant and its expected performance. If more than one block is planted, this number will be an average of the ratings for each block.
5. Percent Stand--this number represents the percentage of the ground that is covered by the accession. Only live plant material is included; litter from previous year's growth and other species are not included. If more than one block is planted, this number will be an average of the ratings for each block.
6. The accession that is being rated. The accession is identified by its varietal and common name or its common name and its accession number.

1	3						
	2 # of Blocks	4	5				
1	6						1
2	'Merion' Kentucky Bluegrass						2
3	'Banff' Kentucky Bluegrass						3
4	'Park' Kentucky Bluegrass						4
5	etc.						5
6							6
7							7
8							8
9							9
10							10
11							11
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49							49
50							50
51							51
52							52

Figure 1. Sample Advanced Evaluation Page.

Floodway Vegetation Plots

One advanced evaluation plot was established in the floodway on June 18, 1985. Figure 2 presents a typical layout of an advanced evaluation plot. This plot contained all 52 accessions listed in Figure 2, but the actual arrangement varied from the drawing because of space limitations at the site. Each species was seeded at a rate of 40 pounds per acre and each plot was fertilized with 20-20-10 at 450 pounds per acre.

Adjacent to the advanced evaluation plot, a second evaluation plot was established. This plot was intended to demonstrate the performance of 'Arctared' Red Fescue and 'Sourdough' Bluejoint as revegetation species. The Bluejoint was seeded at a rate of 5 pounds per acre and fertilized with 20-20-10 at a rate of 500 pounds per acre. The 'Arctared' Red Fescue was seeded at 48 pounds per acre and then fertilized with 20-20-10 at an effective rate of 500 pounds per acre.

A third evaluation block was prepared at the end of the advanced evaluation plot. This plot was simply disked and fertilized with 20-20-10 at 250 pounds per acre. The plot was left unplanted to determine the extent of natural reinvasion. Figure 3 shows the relationship of the floodway plots to each other.

Typical Plot Layout

<-----> 10' <----->	
Nugget Kentucky Bluegrass	Merion Kentucky Bluegrass
Park Kentucky Bluegrass	Banff Kentucky Bluegrass
Sydsport Kentucky Bluegrass	Fylking Kentucky Bluegrass
Poa ampla	Troy Kentucky Bluegrass
Sherman Big Bluegrass	Canbar Canby Bluegrass
Tundra Bluegrass	Reubans Canada Bluegrass
Poa glauca T08867	Poa alpina
Agropyron subsecundum 371698	Sodar Streambank Wheatgrass
Nordan Crested Wheatgrass	Agropyron subsecundum Canada
Fairway Crested Wheatgrass	Agropyron violaceum
Summit Crested Wheatgrass	Agropyron boreal
Critana Thickspike Wheatgrass	Agropyron yukonese
Fults Alkaligrass	Vantage Reed Canarygrass
Climax Timothy	Engmo Timothy
Elymus arenarius	Elymus sibiricus 34560
Nortran Tufted Hairgrass	Elymus sibiricus 2144
Norcoast Bering Hairgrass	Tufted Hairgrass
Sourdough Bluejoint	Calamagrostis canadensis Delta
Meadow Foxtail	Alopecurus geniculatus
Garrison Creeping Foxtail	Arctared Red Fescue
Boreal Red Fescue	Festuca scabrella
Beckmannia	Pennlawn Red Fescue
Durar Hard Fescue	Highlight Red Fescue
Covar Sheep Fescue	Manchar Smooth Brome
Alyeska	Carlton Smooth Brome
Tiley Sage	Pumpelly Brome

Figure 2. Typical Plot Layout

DISKED

BLUEJOINT REEDGRASS - SOURDOUGH

Calamagrostis canadensis

Seeded 5 lbs./ac.

Fertilizer 500 lbs./ac. 20-20-10

Plot size: 0.11 ac.

ARCTARED RED FESCUE

Festuca rubra

Seeded 48 lbs./ac.

Fertilizer 500 lbs./ac. 20-20-10

DISKED

DISKED AND FERTILIZED

(25 lbs. 20-20-10)

DISKED

1	21	41	47
2	22	42	48
3	23	43	49
4	24	44	50
5	25	45	51
6	26	46	52
7	27	47	53
8	28	48	54
9	29		
10	30		
11	31		
12	32		
13	33		
14	34		
15	35		
16	36		
17	37		
18	38		
19	39		
20	40		

FLOODWAY EVALUATION PLOT

PLANTED 18 JUNE 1985

Figure 3.

Silt Blanket Evaluation Plot

An additional planting site was located on the silt blanket. This plot was established to select a grass species that would be more suitable for stabilizing the site than the smooth brome that had been previously planted (Figure 4). Originally, the site had been disked and well prepared so no further site preparation was conducted before seeding. Seven species were selected for this test and were planted at the following rates:

'Arctared' Red Fescue	45 pounds per acre
Bluejoint	5 pounds per acre
'Engmo' Timothy	20 pounds per acre
'Garrison' Creeping Foxtail	26 pounds per acre
Meadow Foxtail	20 pounds per acre
Sloughgrass	10 pounds per acre

An eighth plot was fertilized but not seeded. These plots were all fertilized with 20-20-10 at 500 pounds per acre.

One final section within this site was disked only.

SILT BLANKET	ARCTARED RED FESCUE	<u>Festuca rubra</u>	← 25' →
	BLUEJOINT REEDGRASS -SOURDOUGH-	<u>Calamagrostis canadensis</u>	
	DISK AND FERTILIZE		400'
	ENGMO TIMOTHY	<u>Phleum pratense</u>	
	GARRISON CREEPING FOXTAIL	<u>Alopecurus arundinacus</u>	
	MEADOW FOXTAIL	<u>Alopecurus pratensis</u>	
	SLOUGHGRASS	<u>Beckmannia syzigachne</u>	
	DISK ONLY		
			DAM & RAMP →

Figure 4.

File-Driver Slough Plot

A wetland revegetation plot was established at Pile-driver Slough. This plot was planted with Beckmannia syzigachne seed supplied by the Alaska Plant Materials Center. The seed was applied at a rate of ten pounds per acre and then fertilized with 20-20-10 at 450 pounds per acre. This plot was planted to determine the potential of reestablishing wetland species following construction activities.

Results:

Floodway

Data were collected from the floodway advanced evaluation plot from 1985 to 1988 (Figure 5). The results have provided some very useful information.

By the final evaluation on August 23, 1988, only 26 of the original planted accessions remained. Excellent performance was recorded for 'Tundra' Glaucous Bluegrass, 'Gruening' Alpine Bluegrass, Violet Wheatgrass T12050, 'Arctared' Red Fescue and 'Alyeska' Polargrass. The following performed well: Rough Fescue 236894, 'Boreal' Red Fescue, 'Sourdough' Bluejoint, 'Norcoast' Bering Hairgrass and Big Bluegrass 387931. The remainder of the surviving accessions were rated poor and appeared to be declining.

The 'Arctared' Red Fescue and 'Sourdough' Bluejoint plots adjacent to the advanced evaluation plot, survived through 1988. Both plots produced excellent stands with at least 85% cover. The 'Sourdough', however, permitted alder and willow to become established within the stand. The 'Arctared' did not.

The third plot area which was disked and fertilized, was designed to determine the extent of natural invasion. After three years, this plot was dominated by Bluejoint and Fireweed which provided 80% to 85% total plant cover.

Silt Blanket

The plots on the silt blanket did not perform well. None of the seeded grasses were capable of competing with the smooth brome and by August, 1988, no sign of the seeded grasses remained.

Pile-Driver Slough

The attempt to reseed a disturbed wetland at the road crossing on Pile-Driver Slough was very successful. The Sloughgrass, Beckmannia syzigachne, performed very well; by 1988, large, vigorous stands of Sloughgrass existed throughout the planting site. Other native species such as Bluejoint and willow have also become established, which suggests that Sloughgrass seedings will not prevent native plants from invading a site.

Chena Flood Control Project		85		86		87		88		
1	Block of Plantings	v/10r	stand N	v/10r	stand N	v/10r	stand N	v/10r	stand N	
1	'Nugget' Kentucky Bluegrass	5	15	1	30	1	30	3	30	1
2	'Merion' Kentucky Bluegrass	1	45	3	40	3	60	5	50	2
3	'Banff' Kentucky Bluegrass	3	20	1	30	-	-	-	-	3
4	'Park' Kentucky Bluegrass	1	25	3	60	5	10	-	-	4
5	'Sydsport' Kentucky Bluegrass	1	30	3	70	3	50	3	50	5
6	'Fylking' Kentucky Bluegrass	7	10	3	20	-	-	-	-	6
7	'Troy' Kentucky Bluegrass	1	10	5	20	-	-	-	-	7
8	Big Bluegrass 387931	3	30	1	60	3	80	3	80	8
9	'Sherman' Big Bluegrass	1	60	3	20	-	-	-	-	9
10	'Canbar' Canby Bluegrass	5	10	9	15	-	-	-	-	10
11	'Reubans' Canada Bluegrass	1	70	9	10	-	-	-	-	11
12	'Tundra' glaucous Bluegrass	3	80	1	100	1	100	1	100	12
13	Glaucous Bluegrass T08867	1	60	1	100	3	100	5	80	13
14	Alpine Bluegrass 235492, 236892	1	100	1	100	1	100	1	90	14
15	'Sodar' Streambank wheatgrass	1	85	9	100	-	-	-	-	15
16	Bearded wheatgrass 371698	3	75	1	100	5	80	-	-	16
17	Bearded wheatgrass 236693	3	60	-	-	-	-	-	-	17
18	'Nordan' Crested wheatgrass	1	80	-	-	-	-	-	-	18
19	'Fairway' Crested wheatgrass	3	100	9	100	3	100	-	-	19
20	'Summit' Crested wheatgrass	1	95	7	30	-	-	-	-	20
21	Violet wheatgrass T12050	5	80	1	100	1	100	1	100	21
22	Boreal wheatgrass T12048	7	100	3	100	5	100	-	-	22
23	Yukon wheatgrass T12051	3	100	1	100	3	100	3	90	23
24	'Critana' Thickspike wheatgrass	1	100	7	100	-	-	-	-	24
25	'Fults' Alkaligrass	3	95	-	-	-	-	-	-	25
26	'Vantage' Reed Canarygrass	1	100	5	80	-	-	-	-	26
27	'Engmo' timothy	3	100	3	85	5	100	-	-	27
28	'Climax' timothy	1	100	7	10	5	100	-	-	28
29	Beach wildrye 345978	5	10	1	10	3	10	3	10	29
30	Siberian wildrye 345600	1	100	1	100	3	100	5	100	30
31	Siberian wildrye 2144	3	100	3	100	7	80	7	70	31
32	Siberian wildrye 1996	7	80	5	100	5	100	5	100	32
33	'Norcoast' Bering hairgrass	3	100	1	100	1	100	3	100	33
34	Tufted hairgrass 372690	5	70	1	100	1	100	3	70	34
35	Bluejoint	7	40	3	100	3	100	1	100	35
36	'Sourdough' Bluejoint	5	75	1	100	1	100	3	100	36
37	Meadow foxtail	1	100	5	100	-	-	-	-	37
38	Geniculated foxtail 314565	1	100	1	100	-	-	-	-	38
39	Garrison Creeping foxtail	3	85	7	80	-	-	-	-	39
40	'Arctared' Creeping red fescue	5	100	1	100	1	90	1	100	40
41	'Boreal' Creeping red fescue	3	75	1	95	1	100	3	100	41
42	'Pennlawn' Creeping red fescue	1	95	3	75	5	40	5	30	42
43	Rough fescue 236849	1	100	1	100	3	70	3	90	43
44	American Sloughgrass T12053	3	30	1	75	1	60	-	-	44
45	'Durar' Hard fescue	7	10	3	50	-	-	-	-	45
46	'Highlight' Sheep fescue	7	10	5	25	5	30	5	30	46
47	'Covar' Sheep fescue	7	10	5	10	-	-	-	-	47
48	'Manchar' Smooth Brome	1	100	7	100	5	100	7	100	48
49	'Carlton' Smooth Brome	3	100	5	100	7	100	9	100	49
50	'Alyeska' Polar grass	1	55	1	100	1	100	1	100	50
51	Telley Sage T12052	1	75	1	100	1	100	5	80	51
52	Pumpelly Brome	5	100	1	100	1	100	-	-	52

Figure 5.

Recommendations

Based on the results reported here, the following recommendations can be made:

- 1) Seedings on bare ground in the Chena Lakes area, should be seeded with mixes containing a selection of the following commercially available grasses: 'Arctared' or 'Boreal' Red Fescue, 'Tundra' Glaucous Bluegrass, 'Gruening' Alpine Bluegrass, 'Alyeska' Polargrass, 'Norcoast' Bering Hairgrass or 'Sourdough' Bluejoint.
- 2) The silt blanket planting of Smooth Brome will require yearly fertilizer applications to maintain a vigorous stand. If other grasses are desired for this site, herbicides will need to be applied to control the Brome since disking proved to be ineffective.
- 3) The choice for controlling the invasion of woody species into grass plantings, is 'Arctared' Red Fescue. Because 'Arctared' exhibits aggressive growth, the variety is not desirable for revegetation or reclamation projects where the reinvasion of native species is desired.

- 4) Sloughgrass, Beckmannia syzigachne, which is commercially available as 'Egan' American Sloughgrass, is well suited for wetland revegetation in the Chena Lakes area. This species should be used on all disturbed wet sites or sites that are periodically flooded.

Cooperators

U. S. Army Corps of Engineers

Costs

<u>Date</u>	<u>Per Diem</u>	<u>Travel</u>
05/23/85	160.00	50.00
08/07/85	80.00	-
06/10/86	80.00	-
09/16/86	80.00	-
09/01/87	80.00	50.00
08/23/88	80.00	50.00
	<u>\$ 560.00</u>	<u>\$ 150.00</u>

Total \$ 710.00