Final Report on the Evaluation of Advanced Herbaceous Conservation Species at Fort Richardson, Anchorage, Alaska 1983 - 1986

Prepared by

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April, 1987

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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 cooperate with state and federal agencies and private industry. Often cooperators are able to provide disturbances on which these new varieties or techniques can be tested and demonstrated.

Purpose:

Mining and industrial evaluation plots, a group of plots which includes the Ft. Richardson 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 management practices for most large-scale revegetation plans, 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 existing substrate.

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 test provides useful data for the cooperator's particular situation. These plots also make it possible for 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

An old recharge pit was selected for hydroseeded and handseeded test plots. The substrate was predominately gravel with a small amount of fines and the floor of the pit was highly compacted. The area had been left exposed for many years but few plants had invaded. Balsam poplar was the most common species at the site.

Before any seeding could occur, the substrate had to be scarified. This was accomplished with a sheeps foot compactor which created numerous microsites for seed to germinate and become established.

On June 1, 1983, 50 accessions of advance test plant material were planted (Figure 1). Each plot, was handseeded with pre-measured amounts of seed. The seeding rates of each plot were approximately 40 pounds per acre. Following seeding, the entire block of plots was fertilized with 20-20-10 fertilizer at a rate of 450 pounds per acre (90 pounds actual nitrogen, 90 pounds actual phosphorus, and 45 pounds actual potash). After each plot was seeded and fertilized, the area was raked by hand to incorporate the seed and fertilizer.

A hydroseeded evaluation planting was also established along the banks of the recharge pit. Thirty two 50 by 50 foot plots were planted with 29 accessions of grass and three grass mixes (Figure 2). Fertilizer (20-20-10) was incorporated into the hydroseed slurry and applied to each plot at the rate of 450 lb./a. The seeding rate for each block was 40 pounds per acre. The hydroseeded plots were intended to test promising accessions of grass from the PMC evaluations against commercial grass varieties and seed mixes.

The 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 3 is an example of the evaluation sheets that will be presented in this report.

Typical Plot Layout

Figure 1.

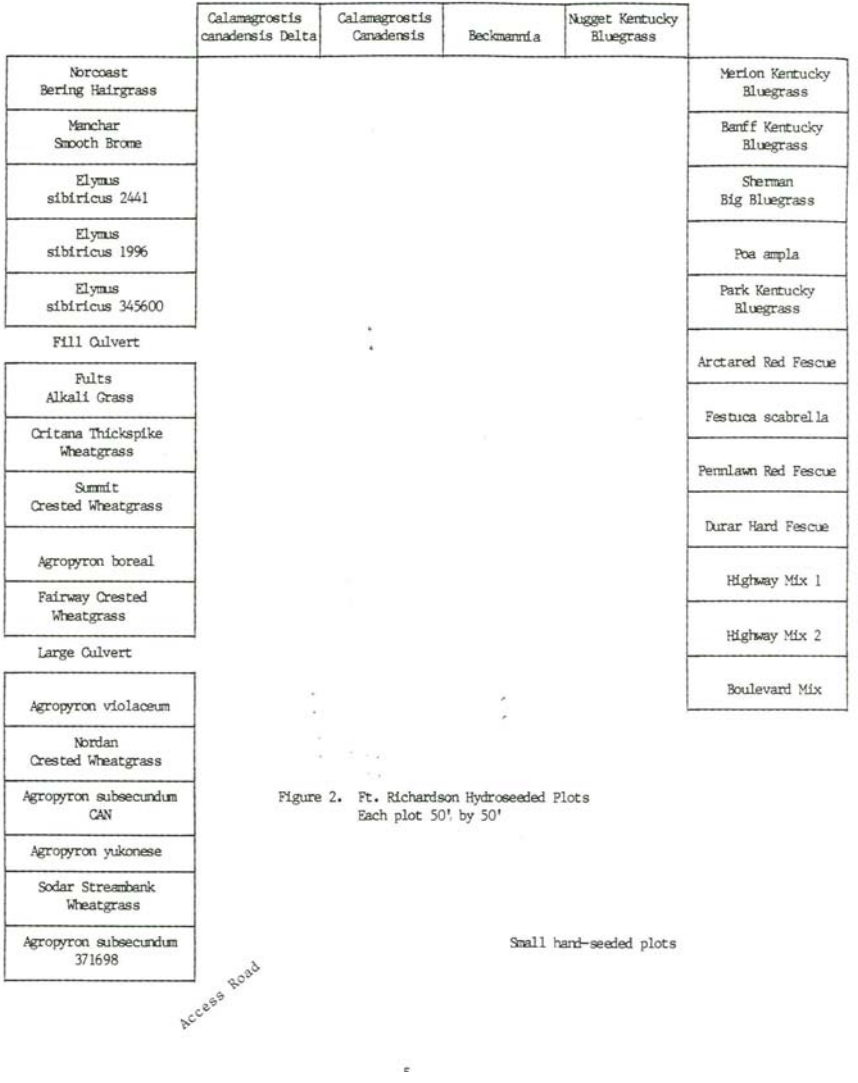

Figure 2. Ft. Richardson Hydroseeded Plots
Each plot 50' by 50'

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
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Figure 3. Sample Advanced Evaluation Page.

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.

Results

By September 27, 1983, most accessions had germinated and produced measurable stands. Four accessions; Fult's Alkaligrass, 'Norcoast' Bering Hairgrass, Tufted Hairgrass 372690 and 'Alyeska' Polargrass failed to germinate. Evaluations in May, 1984, showed that some species had winterkilled and by September 25, 1984, some of the weaker survivors had also died.

Several accessions were performing well when the final evaluations occurred on September 29, 1986. Rough Fescue 236849 and 'Fylking' Kentucky Bluegrass performed the best throughout the evaluation period. Other accessions that performed well included Siberian Wildrye 345600 and 2144, Alpine Bluegrass, Boreal Wheatgrass, and 'Arctared' and 'Pennlawn' Red Fescue (Figure 4).

'Nugget' Kentucky Bluegrass performed much poorer than we expected. This poor performance suggests that the site was exceptionally dry and if conditions had been more moist, 'Nugget' would have performed much better.

The hydroseeded plots never became established. Some grass may have started to germinate immediately, but dry weather shortly after the hydroseeding probably killed any young seedlings. When the weather turned wet again, the fertilizer in the hydroseeding slurry encouraged a heavy growth of native weeds. The weeds probably then out-competed any grass seedlings that germinated at the later time.

Figure 4. Fort Richardson Evaluations.

Fort Richardson		83		84		85		86		
	1 Block of Plantings									
1	'Nugget' Kentucky Bluegrass	7	10	7	30	5	25	7	20	1
2	'Merion' Kentucky Bluegrass	7	20	3	90	7	10	7	15	2
3	'Banff' Kentucky Bluegrass	5	50	7	30	3	60	5	50	3
4	'Park' Kentucky Bluegrass	5	60	1	90	5	70	5	20	4
5	'Sydsport' Kentucky Bluegrass	3	50	5	40	5	50	7	10	5
6	'Fylking' Kentucky Bluegrass	1	75	1	70	1	80	3	75	6
7	'Troy' Kentucky Bluegrass	3	30	7	40	5	60	3	60	7
8	Big Bluegrass 387931	3	50	3	50	7	45	5	30	8
9	'Sherman' Big Bluegrass	1	60	3	70	7	40	5	40	9
10	'Canbar' Canby Bluegrass	3	70	5	60	5	30	5	50	10
11	'Reubans' Canada Bluegrass	7	75	–	–	–	–	–	–	11
12	'Tundra' glaucus Bluegrass	9	70	–	–	–	–	–	–	12
13	Glaucus Bluegrass T08867	1	80	5	70	7	15	5	70	13
14	Alpine Bluegrass 235492, 236892	3	60	1	50	1	60	3	40	14
15	'Sodar' Streambank wheatgrass	5	80	3	50	3	90	3	80	15
16	Bearded wheatgrass 371698	5	70	1	85	3	60	5	40	16
17	Bearded wheatgrass 236693	5	60	7	20	3	50	5	30	17
18	'Nordan' Crested wheatgrass	1	85	–	–	–	–	–	–	18
19	'Fairway' Crested wheatgrass	3	90	–	–	–	–	–	–	19
20	'Summit' Crested wheatgrass	1	90	–	–	–	–	–	–	20
21	Violet wheatgrass T12050	5	50	5	10	5	30	3	40	21
22	Boreal wheatgrass T12048	7	50	3	80	3	70	3	75	22
23	Yukon wheatgrass T12051	5	60	3	70	5	40	4	60	23
24	'Critana' Thickspike wheatgrass	5	75	–	–	–	–	–	–	24
25	'Fults' Alkaligrass	–	–	–	–	–	–	–	–	25
26	'Vantage' Reed Canarygrass	5	35	7	10	7	10	7	10	26
27	'Engmo' timothy	3	40	5	60	7	20	5	30	27
28	'Climax' timothy	1	75	5	70	5	30	5	70	28
29	Beach wildrye 345978	9	5	–	–	–	–	–	–	29
30	Siberian wildrye 345600	3	50	1	100	5	40	3	50	30
31	Siberian wildrye 2144	1	75	3	100	6	25	1	80	31
32	Siberian wildrye 1996	5	40	7	60	3	60	3	60	32
33	'Norcoast' Bering hairgrass	–	–	–	–	–	–	–	–	33
34	Tufted hairgrass 372690	–	–	–	–	–	–	–	–	34
35	Bluejoint	7	10	–	–	–	–	–	–	35
36	'Sourdough Bluejoint	7	10	–	–	–	–	–	–	36
37	Meadow foxtail	3	75	–	–	–	–	–	–	37
38	Geniculated foxtail 314565	1	90	5	60	–	–	–	–	38
39	Garrison Creeping foxtail	3	40	7	20	7	25	7	20	39
40	'Arctared' Creeping red fescue	5	75	3	85	3	75	3	75	40
41	'Boreal' Creeping red fescue	3	75	3	90	5	75	5	60	41
42	'Pennlawn' Creeping red fescue	5	60	3	95	3	80	3	75	42
43	Rough fescue 236849	1	80	1	100	1	80	1	90	43
44	American Sloughgrass T12053	7	10	–	–	–	–	–	–	44
45	'Durar' Hard fescue	5	25	5	60	5	60	3	75	45
46	'Highlight' Sheep fescue	3	70	3	90	5	75	4	60	46
47	'Covar' Sheep fescue	5	25	5	40	7	45	5	40	47
48	'Manchar' Smooth Brome	1	60	7	70	5	30	3	75	48
49	'Carlton' Smooth Brome	3	60	5	90	4	35	5	60	49
50	'Alyeska' Polar grass	–	–	–	–	7	10	–	–	50
51	Tellesy Sage T12052									51
52										52

Conclusions and Recommendations

The accessions that exhibited superior performance reflect the specific micro-climatic conditions found at the recharge pit. The non-replicated plot has identified those accessions that are particularly well suited for this dry, well-drained, gravelly site.

'Arctared' and 'Pennlawn' Red Fescue and 'Fylking' Kentucky Bluegrass are the only commercially available varieties that performed well. Of those three varieties, 'Arctared' is the one that we would recommend as a component for a seed mix for large-scale revegetation of a dry, gravelly site. 'Arctared' has exhibited an average to superior performance at other test sites.

The other accessions that performed well include Alpine Bluegrass which was released in early 1987 as 'Gruening' Alpine Bluegrass. 'Gruening' will not be available commercially for at least two years.

This site showed the importance of creating microsites by scarifyig the substrate prior to seeding. Most of the seed that germinated in the hand-seeded plot, germinated in the small plots treated by the sheep's foot compactor.

In the future, hydroseeding should be delayed until the end of June when the summer rains usually begin.

APPENDIX

Fort Richardson

Date	Activity	Travel	Per Diem	Other
06/01/83	Plant	0	0	816.00
09/27/83	Evaluate	0	0	0
05/30/84	Evaluate	0	0	0
09/25/84	Evaluate	0	0	0
08/30/85	Evaluate	0	0	0
09/29/86	Evaluate	0	0	0

Total $816.00