

FINAL REPORT ON THE EVALUATION  
OF  
HERBACEOUS SPECIES AT  
THREE GOLD MINES NEAR NOME, ALASKA  
1989 - 1992

PREPARED BY  
STONEY J. WRIGHT  
STATE OF ALASKA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF AGRICULTURE  
ALASKA PLANT MATERIALS CENTER

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## Introduction:

The North Latitude Revegetation and Seed Production 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 new 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 industries 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 cooperator's 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. Topsoil 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 Plant Materials Center.

### Methods:

During the week of June 19, 1989, 48 accessions of advance test plant material were planted on three different sites. Plot layout and species planted are shown in Figure 1. Each plot was hand-seeded with pre-measured amounts of seed. The seeding rates of each plot were approximately 40 pounds per acre. Following seeding, the entire plots were 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.

All three plots were established on mine spoil with varying amounts of fines and degrees of compaction. All three were considered to be harsh sites for vegetation establishment.

Figure 1. Typical Plot Layout

Nugget Kentucky Bluegrass	Merion Kentucky Bluegrass
Park Kentucky Bluegrass	Banff Kentucky Bluegrass
Sydsport Kentucky Bluegrass	Fylking Kentucky Bluegrass
<i>Poa ampla</i>	<i>Poa alpina</i>
Sherman Big Bluegrass	<i>Agropyron subsecundum</i>
Tundra Glaucous Bluegrass	<i>Agropyron violaceum</i>
<i>Poa glauca</i> T08867	<i>Agropyron boreal</i>
<i>Agropyron subsecundum</i> 371698	<i>Agropyron yukonese</i>
Nordan Crested Wheatgrass	Vantage Reed Canarygrass
Fairway Crested Wheatgrass	Engmo Timothy
Summit Crested Wheatgrass	Russian Wildrye
Critana Thickspike Wheatgrass	Nortran Tufted Hairgrass
Climax Timothy	<i>Calamagrostis canadensis</i>
<i>Elymus arenarius</i>	<i>Alopecurus geniculatus</i>
Norcoast Bering Hairgrass	Arctared Red Fescue
Sourdough Bluejoint	<i>Festuca scabrella</i>
Meadow Foxtail	Pennlawn Red Fescue
Garrison Creeping Foxtail	Highlight Red Fescue
Boreal Red Fescue	Manchar smooth brome
Egan American Sloughgrass	Carlton smooth brome
Durar Hard Fescue	Kenai Polargrass
Covar Sheep Fescue	Alyeska Polargrass
Tilesey Sagebrush	Polar Brome

Advanced evaluation plots are usually 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 2 is an example of the evaluation sheets that will be presented in this report and can be found on page five. The following numbers, followed by brief explanations, correspond to numbers on the example 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 it's 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 it's varietal and common name or it's common name and it's accession number.



## Results:

By September 14, 1989, most of the accessions in the evaluation plots had germinated and produced measureable stands. The plots were again evaluated on September 6, 1990, and as expected, some accessions had winterkilled. One plot (Alaska Gold Dredge #5) was destroyed by the mining operation. By September 1, 1992, few (mostly native species) remained in the plots. These sites were not evaluated during 1991 because funds for travel were restricted.

By the final evaluation on September 1, 1992, only the Anvil and Windfall mines were evaluated. 'Tundra' bluegrass, 'Gruening' alpine bluegrass, two Alaskan collections of wheatgrass; 'Sourdough' bluejoint, 'Norcoast' and 'Nortran' hairgrass, and tiley sagebrush performed the best. 'Arctared' and 'Boreal' red fescue both exhibited excellent performance as well.

Other accessions that performed well were 'Nugget' and 'Merion' Kentucky bluegrass and big bluegrass 387931. Figure 4 shows percent cover and vigor for each accession during the evaluation period.

Complete evaluation notes are listed in Figures 3 through 5.



Figure 3.

	Alaska Gold Dredge #5 Planted 6-20-89	1989		DESTROYED			
		Vigor	% Strand				
1	'Nugget' Kentucky Bluegrass	3	40				1
2	'Merion' Kentucky Bluegrass	2	70				2
3	'Banff' Kentucky Bluegrass	3	40				3
4	'Park' Kentucky Bluegrass	1	85				4
5	'Sydsport' Kentucky Bluegrass	2	60				5
6	'Eylik' Kentucky Bluegrass	3	70				6
7	Big Bluegrass 387931	1	80				7
8	'Sherman' Big Bluegrass	2	75				8
9	'Tundra' Glaucous Bluegrass	2	60				9
10	Glaucous Bluegrass T08867	1	75				10
11	Alpine Bluegrass 235492, 1009	1	40				11
12	'Sodar' Streambank Wheatgrass	-	-				12
13	Bearded Wheatgrass 371698	-	-				13
14	Bearded Wheatgrass 236693	-	-				14
15	'Nordan' Crested Wheatgrass	1	30				15
16	'Fairway' Crested Wheatgrass	3	20				16
17	'Summit' Crested Wheatgrass	-	-				17
18	'Violet' Wheatgrass T12050	5	10				18
19	'Boreal' Wheatgrass T12048	3	10				19
20	'Critana' Thickspike Wheatgrass	-	-				20
21	'Vantage' Reed Canarygrass	3	20				21
22	'Engmo' Timothy	2	40				22
23	'Climax' Timothy	1	75				23
24	Beach Wildrye 365978	-	-				24
25	Bozoiisky Russian Wildrye	3	10				25
26	'Noroast' Sering Hairgrass	3	40				26
27	'Noctran' Tufted Hairgrass	1	60				27
28	Bluejoint	3	10				28
29	'Sourdough' Bluejoint	1	30				29
30	Meadow Foxtail	1	50				30
31	Garrison Creeping Foxtail	5	15				31
32	'Arctared' Creeping Red Fescue	5	20				32
33	'Boreal' Creeping Red Fescue	2	70				33
34	'Pennlawn' Creeping Red Fescue	1	60				34
35	Rough Fescue 236849	3	50				35
36	American Sloughgrass T12053	1	70				36
37	'Highlight' Sheep Fescue	3	50				37
38	'Kenai' Polargrass	1	70				38
39	'Manchar' Smooth Brome	3	30				39
40	'Carlton' Smooth Brome	1	50				40
41	'Alyeska' Polargrass	3	50				41
42	'Caiggluk' Tilesy Sagebrush	1	50				42
43	Polar Brome	3	75				43
44	Pumpelly Brome	4	20				44
45							45
46							46
47							47
48							48
49							49





### Conclusions and Recommendations:

The conclusions drawn in this report are based on non-replicated plots and apply most specifically to the local micro climate found at the mines.

Many species or varieties do survive in various degrees in the Nome area and may be considered for inclusion in seed mixes. The data obtained from this study suggests that the following commercially available species and varieties may be included in a seed mix:

- 1) 'Tundra' Glaucous Bluegrass
- 2) 'Norcoast' Bering Hairgrass
- 3) 'Sourdough' Bluejoint
- 4) 'Boreal' Red Fescue
- 5) 'Arctared' Red Fescue
- 6) 'Nortran' Tufted Hairgrass
- 7) 'Alyeska' Polargrass

As stated earlier, there are many commercially available species or varieties other than those tested. It would be impossible to test each and every one. The species and varieties being tested by the PMC were considered at the time the plots were established, to be the hardiest and most readily available species and varieties, and therefore the most likely to be used by someone attempting erosion control or reclamation seedings. A land user may elect to use other varieties, but these should be equal or superior to those listed or in a mix containing a large proportion of the listed species or varieties.

It is also recommended that evaluations occur on sites in the Nome area which have wetter soils. The sites used for this report favored dry land species. Undoubtedly, species included in the evaluation program that were adapted to wetter soil conditions would have performed much better at sites where wet soils would have been encountered.