Final Report of Data and Observations Obtained From the Delta Bison Range Evaluation Plot

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Introduction:

The North Latitude Revegetation and Seed Project at the Alaska Plant Materials Center (PMC), in 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 and government. In order to accomplish these goals, it is beneficial for the PMC to work with industry and other government agencies. Resource extraction industries and resource management agencies usually have disturbances on which these new varieties or techniques can be tested.

In order for new varieties to be released for commercial production, they must be tested throughout a region on as many soil and climatic conditions as possible.

In June, 1986, the Alaska Department of Fish and Game (ADF&G) provided the PMC with a site in the Delta Bison Range for advance testing of potential and existing revegetation grasses for ground cover and forage.

Purpose:

ADF&G needed answers to three questions; 1) what species and varieties would perform best in future seedings of the bison range; 2) species response to grazing pressure; and, 3) what species should be used on sandy soils where previous revegetation attempts failed?

History & Site Description:

A site was selected on a sandy knob in the Bison Range where previous seedings had failed. A single evaluation plot was established containing 43 different accessions. Because of the site's dry, wind-swept conditions, species adapted to wet areas and usually included in a standard evaluation plot were eliminated.

On June 10, 1986, one plot (Figure 1), was established at the site.

When subsequent evaluations occurred, at least one bison was either at the plot or was just leaving. The first casualty due to bison activity were the plot marker stakes. Heavy grazing pressure was observed on some accessions and the bison seemed to enjoy rolling on the plot. During the fall evaluation in 1987, one bold bison was very reluctant to permit access to the evaluation plot. Immediately after the evaluation was completed, the bison re-assumed ownership of the plot.

Plot evaluations occurred on September 16, 1986, June 17 and September 2, 1987, August 24, 1988 and September 19, 1989.

Plot Layout

Nugget Kentucky Bluegrass	Merion Kentucky Bluegrass
Park Kentucky Bluegrass	Banff Kentucky Bluegrass
Sydsport Kentucky Bluegrass	Fylking Kentucky Bluegrass
Poa Ampla	Troy Kentucky Bluegrass
Service Big Bluegrass	Canbar Canby Bluegrass
Sherman Big Bluegrass	Reubans Canada Bluegrass
Tundra Bluegrass	'Gruening' Alpine Bluegrass
Poa glauca T08867	Sodar Streambank Wheatgrass
Agropyron subsecundum 371698	Agropyron subsecundum Canada
Nordan Crested Wheatgrass	Agropyron violaceum
Fairway Crested Wheatgrass	Agropyron boreal
Summit Crested Wheatgrass	Agropyron yukonese
Critana Thickspike Wheatgrass	Elymus sibiricus 34560
Elymus arenarius	Elymus sibiricus 2144
Norcoast Bering Hairgrass	Nortran Tufted Hairgrass
Sourdough Bluejoint	Calamagrostis canadensis Delta
Meadow Foxtail	Arctared Red Fescue
Boreal Red Fescue	Festuca scabrella
Durar Hard Fescue	Pennlawn Red Fescue
Covar Sheep Fescue	Highlight Red Fescue
Alyeska	Manchar Smooth Brome
Tilesy Sage	Carlton Smooth Brome

Figure 1. Plot Layout

Methods:

Each plot (Figure 1), was hand-seeded with pre-measured amounts of seed. The seeding rates of each block were approximately 40 pounds per acre. Following seeding, the entire plots were fertilized with 20-20-10 fertilizer at a rate of 500 pounds per acre (100 pounds actual nitrogen, 100 pounds actual phosphorus, and 50 pounds actual potash).

After each plot was seeded and fertilized, the area was raked by hand to incorporate the seed and fertilizer.

The advanced evaluation plots are evaluated at least once a year. The accessions are rated for vigor, percent stand, and numerous other hardiness and disease-resistant related characteristics. However, we have found that vigor and percent stand give a reliable indication of how the different accessions compare with each other. The next page is an example of the evaluation sheets that will be presented in this report (Figure 2). 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 1 to 3 blocks.

3. Year of Record--the year that evaluation data was collected.

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
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Figure 2. Sample Advanced Evaluation Page.

4. Vigor--this number can range from 1 to 9. One is best and 9 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 years' 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.

Evaluations continued through 1989 and observations will continue to be made as time allows. Bison continued to graze the plot intensively. No waterfowl use could be detected on 'Tundra' Bluegrass or 'Arctared' Red Fescue. Moderate grazing occurred on 'Norcoast' Bering Hairgrass and extensive grazing was noted on Beckmannia and the surviving wheatgrasses.

Results:

A complete listing of results can be seen on Figure 3. Some results were not unexpected. Only three species highly adapted to xeric conditions survived. In addition, some Kentucky Bluegrass varieties were expected to survive but all varieties failed. Excessive bison grazing may have caused the mortality. Out of all the species of bluegrass tested, only 'Gruening' Alpine Bluegrass and 'Tundra' Glaucous Bluegrass survived. No observable grazing was noted on 'Tundra' while the alpine bluegrass showed signs of heavy grazing at each evaluation. In spite of this heavy grazing, 'Gruening' Alpine Bluegrass exhibited excellent survival and adaptation. Ten different native and introduced collections of wheatgrass were tested. Only 'Violet' Wheatgrass (a native collection) survived and exhibited good performance. Both 'Norcoast' Bering Hairgrass and 'Nortran' Tufted Hairgrass produced acceptable stands. Neither showed signs of grazing.

The bison destroyed (by rolling) most of the plot area containing the red fescue collections. Only 'Arctared' Red Fescue survived the trial period. 'Arctared' exhibited the best growth and vigor of any grass tested; however, no grazing was ever noted on the 'Arctared'. This is consistent with observations throughout the bison range.

Only one forb was tested; Tilesy Sage. This collection performed very well and may have use as a reclamation species in the area. No grazing was observed on the sage.

Delta Bison Range		9-16-86		9-02-87		9-24-88		9-19-89		
	1 Block Planted 6-10-86	vigor	% stand	vigor	% stand	vigor	% stand	vigor	% stand	
1	'Nugget' Kentucky Bluegrass	1	30	-	-	-	-	-	-	1
2	'Merion' Kentucky Bluegrass	3	10	-	-	-	-	-	-	2
3	'Banff' Kentucky Bluegrass	3	30	-	-	-	-	-	-	3
4	'Park' Kentucky Bluegrass	3	10	-	-	-	-	-	-	4
5	'Sydsport' Kentucky Bluegrass	-	-	-	-	-	-	-	-	5
6	'Fylking' Kentucky Bluegrass	1	40	3	60	-	-	-	-	6
7	'Troy' Kentucky Bluegrass	3	10	-	-	-	-	-	-	7
8	Big Bluegrass 387931	3	10	3	10	3	10	1	10	8
9	'Sherman' Big Bluegrass	-	-	3	25	-	-	-	-	9
10	'Canbar' Canby Bluegrass	3	15	-	-	-	-	-	-	10
11	'Reubans' Canada Bluegrass	5	65	-	-	-	-	-	-	11
12	'Tundra' glaucus Bluegrass	1	10	3	30	1	90	1	100	12
13	Glaucus Bluegrass T08867	1	30	1	50	-	-	-	-	13
14	Alpine Bluegrass	1	20	1	90	3	100	1	80	14
15	'Sodar' Streambank wheatgrass	5	70	-	-	-	-	-	-	15
16	Bearded wheatgrass 371698	3	50	3	20	-	-	-	-	16
17	Bearded wheatgrass 236693	3	60	-	-	-	-	-	-	17
18	'Nordan' Crested wheatgrass	1	80	-	-	-	-	-	-	18
19	'Fairway' Crested wheatgrass	1	90	-	-	-	-	-	-	19
20	'Summit' Crested wheatgrass	5	10	-	-	-	-	-	-	20
21	Violet wheatgrass T12050	1	50	3	90	3	90	3	80	21
22	Boreal wheatgrass T12048	3	75	5	70	-	-	-	-	22
23	Yukon wheatgrass T12051	1	90	1	100	-	-	-	-	23
24	'Critana' Thickspike wheatgrass	5	10	-	-	-	-	-	-	24
25	Beach wildrye 345978	-	-	1	20	3	15	1	80	25
26	Siberian wildrye 345600	1	70	5	80	5	80	-	-	26
27	Siberian wildrye 2144	3	40	-	-	-	-	-	-	27
28	'Norcoast' Bering hairgrass	1	20	3	20	1	30	1	30	28
29	Nortran Tufted hairgrass	-	-	3	20	1	50	3	50	29
30	Bluejoint	-	-	-	-	-	-	-	-	30
31	'Sourdough Bluejoint	-	-	-	-	-	-	-	-	31
32	Meadow foxtail	-	-	-	-	-	-	-	-	32
33	'Arctared' Creeping red fescue	1	40	1	60	1	80	1	100	33
34	'Boreal' Creeping red fescue	-	-	-	-	-	-	-	-	34
35	'Pennlawn' Creeping red fescue	-	-	-	-	-	-	-	-	35
36	Rough fescue 236849	1	15	-	-	-	-	-	-	36
37	'Durar' Hard fescue	-	-	-	-	-	-	-	-	37
38	'Highlight' Sheep fescue	3	25	-	-	-	-	-	-	38
39	'Covar' Sheep fescue	-	-	-	-	-	-	-	-	39
40	'Manchar' Smooth Brome	3	40	-	-	-	-	-	-	40
41	'Carlton' Smooth Brome	1	30	-	-	-	-	-	-	41
42	'Alyeska' Polar grass	-	-	-	-	-	-	-	-	42
43	Tilesy Sage T12052	-	-	1	20	1	80	1	80	43
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Figure 3.

Conclusions and Recommendations:

If the Department of Fish and Game is interested in seeding the sandy knobs located in the Bison Range three species seem adapted; 'Arctared' Red Fescue, 'Tundra' Glaucous Bluegrass, and 'Gruening' Alpine Bluegrass. However, since the intent of the range seems to be to provide feed for bison, only 'Gruening' Alpine Bluegrass offers both long-term survival and forage value. The sandy knobs are only a very small portion of the total land area within the bison range. Alpine bluegrass has been tested on other sites near the range and would quite probably prove to be a valuable addition to the seed mix presently being used. It appears that 'Gruening' Alpine Bluegrass is much more tolerant to grazing than the bluegrass that is presently being used in the mix.

As a result of these evaluations, I would like to suggest that the Department of Fish and Game plant both bluegrasses under conditions which will allow the effects of bison grazing to be evaluated. If the alpine bluegrass proves to be superior to Kentucky Bluegrass, then the present seed mix should be modified.