WRANGELL DISTRICT - U.S. FOREST SERVICE REVEGETATION TEST PLOTS

Introduction

In 1990, the Plant Materials Center (PMC) began a cooperative revegetation study with the Wrangell District of the U. S. Forest Service. These cooperative projects provide the PMC an opportunity to test several species of revegetation plants in actual conditions that require seeding. At the same time, plant species suitable for the cooperator's revegetation needs are identified and can be included in their revegetation seed mix.

In the agreement established for this study, the PMC provided seed, travel and personnel. The Forest Service provided lodging, travel to the site, supplies at the site and personnel to assist with the layout and planting of the plots.

The Forest Service identified four locations for evaluation plots. These sites represented different revegetation conditions encountered during and after logging. One site was located on Snowberry Shotrock Road. This road provided access to a harvest unit and contained moderately compacted, gravelly soils. Two additional sites were planted on relatively recent cutbanks along Lost Joe Road and Fool's Inlet Road. These sites differed from each other in slope, aspect and soil moisture content. The fourth site occurred on wood chip waste that was used to construct the municipal shooting range.

Methods

Approximately 40 accessions were planted at each test location during June 5 - 7, 1990 (Figures 1, 2, 3 and 4). The seed was broadcast into small plots each measuring approximately 4 by 10 feet. The Forest Service's fertilizer formulation of 16.5-21.4-10.7 was applied at approximately 13 pounds per 1,000 square feet. This formulation was made by combining 67 percent by weight of 8-32-16 and 33 percent of 34-0-0. The plantings were evaluated in the fall of the seedling year and each fall for an additional three growing seasons.

Evaluations of the test plantings are qualitative based on a system which rates vigor on a scale from one to nine. One is the best rating and nine is the worst rating. When possible, this rating is determined by comparing different accessions of the same species. The rating is based on color, height, health, flowering, overall vigor and/or seed production and the evaluator's knowledge of the plant and it's expected performance.

Merion Kentucky Bluegrass *Poa pratensis*	Nugget Kentucky Bluegrass *Poa pratensis*
Banff Kentucky Bluegrass *Poa pratensis*	Park Kentucky Bluegrass *Poa pratensis*
Sydsport Kentucky Bluegrass *Poa pratensis*	Fylking Kentucky Bluegrass *Poa pratensis*
Big Bluegrass *Poa ampla*	Troy Kentucky Bluegrass *Poa pratensis*
Sherman Big Bluegrass *Poa ampla*	Canbar Canby Bluegrass *Poa canbyi*
Tundra Glaucous Bluegrass *Poa glauca*	Reubans Canada Bluegrass
Poa glauca	Gruening Alpine Bluegrass *Poa alpina*
Fults Alkali Grass *Puccinella distans*	Sodar Streambanks Wheatgrass *Agropyron riparium*
Climax Timothy *Phleum pratense*	Engmo Timothy *Phleum pratense*
Norcoast Bering Hairgrass *Deschampsia beringensis*	Beach Wildrye *Elymus arenarius*
Nortran Tufted Hairgrass *Deschampsia caespitosa*	Bluejoint Reedgrass (Delta) *Calamagrostis canadensis*
Bluejoint Reedgrass *Calamagrostis canadensis*	Sourdough Bluejoint Reedgrass *Calamagrostis canadensis*
Meadow Foxtail *Alopecurus pratensis*	Garrison Creeping Foxtail *Alopecurus*
Boreal Red Fescue *Festuca rubra*	Arctared Red Fescue *Festuca rubra*
Pennlawn Red Fescue *Festuca rubra*	Highlight Red Fescue *Festuca rubra*
Covar Sheep Fescue *Festuca ovina*	Durar Hard Fescue *Festuca*
Egan American Sloughgrass *Beckmannia syzigachne*	Alyeska Polargrass *Arctagrostis arundinaceae*
Manchar Smooth Brome *Bromus inermis*	Kenai Polargrass *Arctagrostis arundinaceae*
Carlton Smooth Brome *Bromus inermis*	Polar Brome *Bromus inermis x pumpellianus*
U.S.F.S. Mix	Caiggluk Tilesy Sagebrush *Artemisia tilesii*

Figure 1. Wrangell Shooting Range Evaluation Plot, Planted June 5, 1990.

Figure 2. Snowberry Shotrock Road Evaluation Plot

Planted June 6, 1990
Planted in a single row of 4'x 10' plots

Nugget Kentucky Bluegrass
Merion Kentucky Bluegrass
Park Kentucky Bluegrass
Banff Kentucky Bluegrass
Fylking Kentucky Bluegrass
Sydsport Kentucky Bluegrass
Troy Kentucky Bluegrass
Poa ampla Big Bluegrass painted line
Sherman Big Bluegrass
Canbar Canby Bluegrass
Tundra Glaucous Bluegrass
Poa glauca Glaucous Bluegrass line
Reubans Canada Bluegrass
Poa alpina Gruening Alpine Bluegrass
Sodar Streambank Wheatgrass
Fults Aylkali Grass
- area unplanted -
Climax Timothy
Engmo Timothy
Beach Wildrye
Norcoast Bering Hairgrass line
Nortran Tufted Hairgrass
Common Bluejoint - Sourdough origin
Delta Bluejoint - *Calamagrostis canadensis*
Sourdough Bluejoint Reedgrass
Meadow Foxtail
Garrison Creeping Foxtail line
Arctared Red Fescue
Boreal Red Fescue
Pennlawn Red Fescue
Highlight Red Fescue
Durar Hard Fescue
Covar Sheep Fescue
Egan American Sloughgrass
Alyeska Polargrass
Kenai Polargrass
Manchar Smooth Brome
Polar Brome
Caiggluk Tilesy Sagebrush
U.S.F.S. Mix

Figure 3. Lost Joe Road Evaluation Plot

Planted June 6, 1990

Uphill

Borrow Pit

Planted in single row of 4' x 10' plots

Nugget Kentucky Bluegrass
Merion Kentucky Bluegrass
Park Kentucky Bluegrass
Banff Kentucky Bluegrass
Sydsport Kentucky Bluegrass
Fylking Kentucky Bluegrass
Troy Kentucky Bluegrass
Canbar Canby Bluegrass
Skipped Three Plots
Poa ampla - Big Bluegrass
> Skip
Sherman Big Bluegrass
Reubans Canada Bluegrass
Tundra Glaucous Bluegrass
Poa ampla
Gruening Alpine Bluegrass
Sodar Streambank Wheatgrass
Fults Aylkali Grass
Climax Timothy
Engmo Timothy
Beach Wildrye
Norcoast Bering Hairgrass
Nortran Tufted Hairgrass
Calamagrostis canadensis Delta
Sourdough Bluejoint Reedgrass
Meadow Foxtail
Garrison Creeping Foxtail
Arctared Red Fescue
Boreal Red Fescue
Pennlawn Red Fescue
Durar Hard Fescue
Covar Sheep Fescue
Egan American Sloughgrass
Alyeska Polargrass
Kenai Polargrass
> Skip
Carlton Smooth Brome
Polar Brome
Manchar Smooth Brome
Artemisia - Caiggluk Tilesy Sagebrush

Figure 4. Fool's Inlet Road Evaluation Plot

Planted 6/7/90
4' x 10' Plots

Nugget Kentucky Bluegrass
Merion Kentucky Bluegrass
Banff Kentucky Bluegrass
Park Kentucky Bluegrass
> Skip
Sydsport Kentucky Bluegrass
Fylking Kentucky Bluegrass
Troy Kentucky Bluegrass
Poa ampla Big Bluegrass
Sherman Big Bluegrass
Canbar Canby Bluegrass
Reubans Canada Bluegrass
Tundra Glaucous Bluegrass
Poa glauca - Glaucous Bluegrass
USFS Mix
Gruening Alpine Bluegrass
Sodar Streambank Wheatgrass
Fults Aylkali Grass
Climax Timothy
Engmo Timothy
Beach Wildrye
Norcoast Bering Hairgrass
Nortran Tufted Hairgrass
Sourdough Bluejoint Reedgrass
Calamagrostis canadensis - Delta - Bluejoint
Common Bluejoint - Sourdough stock
Skipped for Culvert
Meadow Foxtail
Garrison Creeping Foxtail
> Skip
Arctared Red Fescue
Boreal Red Fescue
Pennlawn Red Fescue
Highlight Red Fescue
Durar Hard Fescue
> Skip
Covar Sheep Fescue
Egan American Sloughgrass
Alyeska Polargrass
Kenai Polargrass
Manchar Smooth Brome
Carlton Smooth Brome
Polar Brome
Caiggluk Tilesy Sagebrush

Plot Performance

Although the performance of the plantings varied between sites, the most notable difference occurred at the shooting range. The substrate at this site was comprised of primarily wood chips in various stages of decay mixed with a small amount of sand. From the beginning plant cover was sparse and most of the accessions died within two years (Table 1).

The clover component of the Forest Service's seed mix (alsike clover, 'Pennlawn' red fescue, 'Climax' timothy and annual rye) however, performed relatively well. The municipality used this mix to stabilize the berms of the shooting range and again the clover became well established.

The remaining plots experienced a varied history. By mid-October 1992, the plantings at Fool's Inlet had been destroyed by logging activities; evaluations had been conducted in 1990 and 1991 and results were recorded at that time (Table 2). The test plantings at Snowberry Shotrock Road remained intact until 1993 when they were destroyed shortly before evaluation (Table 3). The Lost Joe Road plantings remained undisturbed throughout the evaluation period and were evaluated for the final time in October 1993 (Table 4).

Recommendations

The original design for this study included three evaluation plots representing different conditions encountered during revegetation of logging roads. The recommendations for a broad spectrum seed mix were to be developed from the final evaluations of these plantings. Since all but Lost Joe Road test site was destroyed over the evaluation period, the recommendations are based primarily on the results from this one site. Unfortunately, some data was not recorded for a couple of the accessions at the Lost Joe Road site in 1993, however, this oversight has not influenced the seed mix recommendations.

By the time of the final evaluation, the overall performance of the various accessions had declined. The plantings are evaluated for a period of four years in order to test the hardiness of plants in the variety of climatic conditions during that time. Many of the accessions perform well during the first one or two years then decline dramatically when the fertilizer has nearly disappeared. Of particular interest are those accessions that can continue to perform well in nutrient poor conditions.

Evaluations conducted in 1992 at the Snowberry Shotrock Road site indicate that several accessions had been performing well including 'Merion' and 'Fylking' Kentucky bluegrass, Pennlawn red fescue and 'Nortran' tufted hairgrass.

Table 1. Wrangell Shooting Range		1990		1991		1992		
	Planted 6-05-90	Vigor	% Cover	Vigor	% Cover	Vigor	% Cover	
1	'Nugget' Kentucky Bluegrass	7	<10	7	<10	7	<10	1
2	'Merion' Kentucky Bluegrass	5	<10	-	-	-	-	2
3	'Banff' Kentucky Bluegrass	3	15	7	<10	-	-	3
4	'Park' Kentucky Bluegrass	1	20	7	15	7	<10	4
5	'Sydsport' Kentucky Bluegrass	3	20	7	<15	-	-	5
6	'Fylking' Kentucky Bluegrass	4	15	7	<10	5	25	6
7	'Troy' Kentucky Bluegrass	4	15	-	-	5	<10	7
8	'Service' Big Bluegrass	5	15	-	-	-	-	8
9	'Sherman' Big Bluegrass	7	10	-	-	-	-	9
10	'Canbar' Canby Bluegrass	5	15	7	<10	-	-	10
11	'Reubens' Canada Bluegrass	3	15	7	15	5	15	11
12	'Tundra' Glaucous Bluegrass	5	20	7	<10	-	-	12
13	Glaucous Bluegrass T08867	4	15	-	-	-	-	13
14	Gruening Alpine Wheatgrass	3	30	6	20	7	40	14
15	'Sodar' Streambank Wheatgrass	3	35	7	20	-	-	15
16	'Fults' Alkaligrass	7	25	-	-	-	-	16
17	'Engmo' Timothy	3	40	5	25	6	15	17
18	'Climax' Timothy	4	50	7	20	5	20	18
19	Beach Wildrye 345978	6	<10	7	<10	-	-	19
20	'Norcoast' Bering Hairgrass	4	40	6	15	7	<10	20
21	'Nortran' Tufted Hairgrass	3	30	6	<10	7	15	21
22	Bluejoint Common	6	<10	-	-	-	-	22
23	Bluejoint Delta	7	<10	-	-	-	-	23
24	'Sourdough' Bluejoint	7	<10	-	-	-	-	24
25	Meadow Foxtail	7	15	-	-	-	-	25
26	Garrison Creeping Foxtail	6	20	-	-	-	-	26
27	'Arctared' Creeping Red Fescue	3	55	5	30	6	20	27
28	'Boreal' Creeping Red Fescue	2	50	4	35	5	20	28
29	'Pennlawn' Creeping Red Fescue	5	40	5	15	5	15	29
30	'Egan' American Sloughgrass	7	<5	-	-	-	-	30
31	'Durar' Hard Fescue	4	30	5	10	7	<10	31
32	'Highlight' Sheep Fescue	5	30	5	10	6	15	32
33	'Covar' Sheep Fescue	5	40	-	-	-	-	33
34	'Manchar' Smooth Brome	5	50	-	-	-	-	34
35	'Carlton' Smooth Brome	6	30	6	<10	-	-	35
36	'Polar' Brome	4	35	-	-	-	-	36
37	'Alyeska' Polargrass	5	25	-	-	-	-	37
38	'Kenai' Polargrass	4	30	-	-	-	-	38
39	'Caiggluk' Tilesy Sage T12052	5	20	-	-	-	-	39
40	USFS*	3	75	1	70	1	65	40
41								41
42								42
43								43
44								44

* Seeded at higher rate than other plantings

Table 2. Fool's Inlet Road		September 1990		October 1991		Plots Damaged & Inaccessible		
	Planted 6-07-90	Vigor	% Cover	Vigor	% Cover	Vigor	% Cover	
1	'Nugget' Kentucky Bluegrass	2	90	3	95			1
2	'Merion' Kentucky Bluegrass	1	95	3	95			2
3	'Banff' Kentucky Bluegrass	1	90	3	95			3
4	'Park' Kentucky Bluegrass	3	80	1	98			4
5	'Sydsport' Kentucky Bluegrass	3	75	3	90			5
6	'Fylking' Kentucky Bluegrass	3	65	3	75			6
7	'Troy' Kentucky Bluegrass	2	75	buried				7
8	'Service' Big Bluegrass	3	70	3	60			8
9	'Sherman' Big Bluegrass	4	40	5	40			9
10	'Canbar' Canby Bluegrass	3	45	5	25			10
11	'Reubens' Canada Bluegrass	1	80	3	60			11
12	'Tundra' Glaucous Bluegrass	3	75	5	50			12
13	Glaucous Bluegrass T08867	2	60	buried				13
14	Gruening Alpine Wheatgrass	2	65	2	70			14
15	'Sodar' Streambank Wheatgrass	3	45	5	15			15
16	'Fults' Alkaligrass	7	<10	-	-			16
17	'Engmo' Timothy	1	70	1	80			17
18	'Climax' Timothy	3	85	3	90			18
19	Beach Wildrye 345978	-	-	-	-			19
20	'Norcoast' Bering Hairgrass	2	90	2	60			20
21	'Nortran' Tufted Hairgrass	1	98	1	90			21
22	Bluejoint Common	2	70	2	60			22
23	Bluejoint Delta	2	65	3	50			23
24	'Sourdough' Bluejoint	1	80	2	60			24
25	[1]Meadow Foxtail	-	-	-	-			25
26	[1]Garrison Creeping Foxtail	-	-	-	-			26
27	[1]'Arctared' Creeping Red Fescue	1	90	2	90			27
28	[1]'Boreal' Creeping Red Fescue	1	95	2	95			28
29	[1]'Pennlawn' Creeping Red Fescue	1	98	1	98			29
30	[1]'Egan' American Sloughgrass	3	70	buried				30
31	[1]'Durar' Hard Fescue	3	70	no rating				31
32	[1]'Highlight' Sheep Fescue	1	90		100[4]			32
33	[1]'Covar' Sheep Fescue	3	40	-	-			33
34	[1]'Manchar' Smooth Brome	3	30	-	-			34
35	[1]'Carlton' Smooth Brome	3	20	-	-			35
36	[1]'Polar' Brome	1	30	-	-			36
37	[1]'Caigguk Tilesy Sage T12052	3	15	-	-			37
38	USFS Mix	1	95		90[3]			38
39								39

[1] Overseed with USFS Mix.

[2] Although area had been logged evaluations were conducted as best as possible.

[3] No legumes in plot, may be too wet.

[4] Cover is 100%, but species appear to be mixed.

Table 3. Snowberry Shotrock Road Evaluations		September 1990		October 1991		October 1992		
	Planted 6-06-90	Vigor	% Cover	Vigor	% Cover	Vigor	% Cover	
1	'Nugget' Kentucky Bluegrass	3	50	3	40	3	60	1
2	'Merion' Kentucky Bluegrass	1	65	1	70	1	70	2
3	'Banff' Kentucky Bluegrass	3	60	3	40	3	60	3
4	'Park' Kentucky Bluegrass	2	75	2	40	2	50	4
5	'Sydsport' Kentucky Bluegrass	4	60	3	40	2	75	5
6	'Fylking' Kentucky Bluegrass	3	65	2	70	2	75	6
7	'Troy' Kentucky Bluegrass	3	60	2	70	3	60	7
8	'Service' Big Bluegrass	3	50	2	40	5	40	8
9	'Sherman' Big Bluegrass	1	75	2	70	4	50	9
10	'Canbar' Canby Bluegrass	3	65	4	40	6	20	10
11	'Reubens' Canada Bluegrass	1	80		60	5	65	11
12	'Tundra' Glaucous Bluegrass	5	65	5	30	7	25	12
13	Glaucous Bluegrass T08867	1	75	5	60	6	40	13
14	Gruening Alpine Wheatgrass	1	70	1	60	3	65	14
15	'Sodar' Streambank Wheatgrass	1	80	3	75	7	15	15
16	'Fults' Alkaligrass	3	60	5	20	-	-	16
17	'Engmo' Timothy	3	75	3	70	5	50	17
18	'Climax' Timothy	1	90	5	75	6	30	18
19	Beach Wildrye 345978	5	<10	-	-	5	<10	19
20	'Norcoast' Bering Hairgrass	1	70	2	75	3	70	20
21	'Nortran' Tufted Hairgrass	3	60	5	60	4	60	21
22	Bluejoint Common	3	20	-	-	-	-	22
23	Bluejoint Delta	5	10	-	-	-	-	23
24	'Sourdough' Bluejoint	3	25	-	-	-	-	24
25	Meadow Foxtail	2	80	4	60	5	40	25
26	Garrison Creeping Foxtail	1	95	3	75	4	50	26
27	'Arctared' Creeping Red Fescue	3	80	3	80	3	80	27
28	'Boreal' Creeping Red Fescue	2	95	2	95	2	90	28
29	'Pennlawn' Creeping Red Fescue	1	95	1	95	1	85	29
30	'Egan' American Sloughgrass	5	60	-	-	-	-	30
31	'Durar' Hard Fescue	3	75	5	65	4	60	31
32	'Highlight' Sheep Fescue	3	85	3	75	4	75	32
33	'Covar' Sheep Fescue	3	70	4	70	4	65	33
34	'Manchar' Smooth Brome	1	90	3	65	5	30	34
35	'Carlton' Smooth Brome	2	80	2	70	4	40	35
36	'Polar' Brome	3	65	3	65	3	40	36
37	'Alyeska' Polargrass	3	40	7	15	-	-	37
38	'Kenai' Polargrass	1	55	6	25	-	-	38
39	'Caiggluk' Tilesy Sage T12052	4	90	7		-	-	39
40	USFS Mix		95	1	98	1	80	40
41								41

Table 4. Lost Joe Road Evaluations		September 1990		October 1991		October 1992		October 1993		
	Planted 6-06-90	Vigor	% Cover	Vigor	% Cover	Vigor	% Cover	Vigor	% Cover	
1	'Nugget' Kentucky Bluegrass	3	75	2	70	4	50	5	30	1
2	'Merion' Kentucky Bluegrass	3	50	2	50	2	50	5	25	2
3	'Banff' Kentucky Bluegrass	3	50	3	50	3	50	5	15	3
4	'Park' Kentucky Bluegrass	3	65	2	60	3	65	5	25	4
5	'Sydsport' Kentucky Bluegrass	2	80	1	95	2	90	4	40	5
6	'Fylking' Kentucky Bluegrass	1	90	1	98	1	98	4	40	6
7	'Troy' Kentucky Bluegrass	3	75	2	50	3	80	5	15	7
8	'Service' Big Bluegrass	4	60	5	30	5	25	4		8
9	'Sherman' Big Bluegrass	3	40	3	70	3	50	3	60	9
10	'Canbar' Canby Bluegrass	3	70	-	-	7	<10	4		10
11	'Reubens' Canada Bluegrass	1	75	5	40	3	60	5	50	11
12	'Tundra' Glaucous Bluegrass	3	75	5	30	-	-	4	20	12
13	Glaucous Bluegrass T08867	1	50	1	90	1	98	5		13
14	Gruening Alpine Wheatgrass	1	50	3	35	3	20			14
15	'Sodar' Streambank Wheatgrass	1	60	3	30	5	10	-	-	15
16	'Fults' Alkaligrass	5	15	-	-	-	-	-	-	16
17	'Engmo' Timothy	2	50	1	70	7	<10	5	20	17
18	'Climax' Timothy	1	65	3	40	-	-	3	40	18
19	Beach Wildrye 345978	2	20	-	-	-	-	-	-	19
20	'Norcoast' Bering Hairgrass	2	75	1	80	3	70	4	20	20
21	'Nortran' Tufted Hairgrass	1	90	2	80	1	80	4	15	21
22	Bluejoint Delta	1	80	3	75	5	65	4	10	22
23	Sourdough Bluejoint	2	90	5	70	7	40	4	10	23
24	Meadow Foxtail	2	70	-	-	-	-	-	-	24
25	Garrison Creeping Foxtail	-	-	-	-	-	-	-	-	25
26	'Arctared' Creeping Red Fescue	2	90	2	85	2	80	3	95	26
27	'Boreal' Creeping Red Fescue	1	80	1	90	1	95	3	95	27
28	'Pennlawn' Creeping Red Fescue	1	80	2	90	1	95	3	95	28
29	'Egan' American Sloughgrass	3	60	5	10	-	-	-	-	29
30	'Durar' Hard Fescue	5	25	6	30	-	-	-	-	30
31	'Covar' Sheep Fescue	5	40	5	60	-	-	-	-	32
32	'Manchar' Smooth Brome	4	50	5	10	5	40	-	-	32
33	'Carlton' Smooth Brome	1	70	3	70	1	80	-	-	33
34	'Polar' Brome	5	40	5	30	3	50	-	-	34
35	'Alyeska' Polargrass	2	90	5	90	-	-	4	25	35
36	'Kenai' Polargrass	1	90	3	50	7	<10	3	30	36
37	'Caiggluk Tilesy Sage T12052	3	60	5	<10	7	<10	-	-	37
38	USFS Mix	3	95	2	90	1	95	no data		38
39										39
40										40

Final evaluations were conducted at the Lost Joe Road site in October 1993. At that time, 'Fylking' and 'Sydsport' Kentucky bluegrass and 'Sherman' big bluegrass were growing well. Minor differences in performance occurred between 'Norcoast' Bering hairgrass and Nortran tufted hairgrass. Nortran appears to perform slightly better than Norcoast however only Norcoast is commercially available at present. Nortran may be available in a few years. No apparent differences were noted in the performance between 'Arctared', 'Boreal' and ' Pennlawn' creeping red fescue at the Lost Joe Road site, however, Pennlawn had been performing better at the other test sites prior to disturbance.

When Nortran tufted hairgrass becomes commercially available, it will be an important addition to the Forest Service's seed mix. In the meantime, Norcoast Bering hairgrass would be an acceptable substitute. If the Forest Service determines that a bluegrass should also be added to the seed mix, then Fylking Kentucky Bluegrass appears to be the most suitable variety for the Wrangell area.