

1993 INITIAL REPORT
ALYESKA RESORT REVEGETATION
TEST PLOTS

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INTRODUCTION

In 1992, at the request of Seibu Alaska/Alyeska Resort in Girdwood, PMC agronomists began consulting with the resort's mountain projects manager regarding revegetation on ski slopes and mountain construction sites. During late summer, the PMC assisted resort personnel in identifying and collecting seed of native plants for future sowing. In 1993, three revegetation test plots were established: one on the lower mountain near the new Alyeska Prince Hotel, the second at mid-mountain, and the third near the top of the mountain. These sites were selected to represent the range of climatic zones present at Alyeska Resort. Furthermore, the sites are located in areas unlikely to be disturbed by further construction in the next few years, allowing their evaluation into 1996 and possibly 1997.

This report summarizes work in progress. A final report will be prepared at the end of the evaluation period.

METHODS

Each of the three rectangular test plots measures 16'x 72', and contains 36 4' x 8' subplots. Each of 35 subplots was planted with a different species of grass known to have reclamation potential. The remaining subplot was planted with a broadleaf forb (see figure 1).

The lower mountain plot, at an elevation of approximately 300 feet, is located about 200 yards south of the base of the newly constructed Chair 7, adjacent to the new Alyeska Prince Hotel. This area was cleared in 1992 as part of the ski run leading down to the hotel. The site is gravelly mineral soil with exposed rocks and pieces of woody organic material. The surrounding area was hydroseeded with grass, but a buffer was left unseeded surrounding the plot to minimize competition with the test species. While the plot is mostly level, the mountain rises steeply to the southeast, lending an overall northwest aspect to the site. The dominant plant community here is Sitka spruce with alder, *Rubus* sp., *Ribes* sp., and *Vaccinium* sp., understory. Figure 2 illustrates the plot orientation in relation to terrain features.

The mid-mountain plot, at an elevation of 1,350 feet, lies on top of a small ridge above the ski run known as the "Waterfall". Nearby construction necessitated moving the initial site location to eliminate disturbance. The site was scarified down to mineral soil the first week of July 1993, several days before sowing. This site is approximately at treeline. Surrounding vegetation includes *Vaccinium* sp., dwarf birch, forbs, grasses, sedges, mosses and lichens (see figure 2).

1 'Nugget' Kentucky Bluegrass	19 'Merion' Kentucky Bluegrass
2 'Park' Kentucky Bluegrass	20 'Fylking' Kentucky Bluegrass
3 'Service' Big Bluegrass	21 'Gruening' Alpine Bluegrass
4 'Sherman' Big Bluegrass	22 <i>Agropyron subsecundum</i>
5 'Tundra' Glaucous Bluegrass	23 'Engmo' Timothy
6 T08867 <i>Poa glauca</i>	24 'Nortran' Tufted Hairgrass
7 #371698 <i>Agropyron subsecundum</i>	25 <i>Calamagrostis canadensis</i>
8 'Nordan' Crested Wheatgrass	26 <i>Alopecurus geniculatus</i>
9 'Summit' Crested Wheatgrass	27 'Arctared' Red Fescue
10 'Climax' Timothy	28 <i>Festuca scabrella</i>
11 'Reeve' Beach Wildrye	29 'Pennlawn' Red Fescue
12 'Norcoast' Bering Hairgrass	30 'Highlight' Red Fescue
13 'Sourdough' Bluejoint	31 'Manchar' Smooth Brome
14 Meadow Foxtail	32 'Carlton' Smooth Brome
15 'Garrison' Creeping Foxtail	33 'Polar' Brome
16 'Boreal' Red Fescue	34 'Kenai' Polargrass
17 'Egan' American Sloughgrass	35 'Alyeska' Polargrass
18 'Durar' Hard Fescue	36 'Caiggluk' Tilesy Sagebrush

Figure 1.
Alyeska Resort Plot Layout
(not to scale)

I. Lower Mountain. Elevation 300 Feet.

To base, Chairlift 7

Ski trail

from top

of Chair 7

18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19

Up mountain

II. Mid-Mountain. Elevation 1,350 Feet.

To "EZ" ski trail

To Mex's Mountain

18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19

To "Waterfall" ski trail

III. Upper Mountain. Elevation 2,750 Feet.

To "Spirit Quad" lift building

To Roundhouse

To Mt. Alyeska

18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19

Figure 2. Test Plot Orientation

I. Lower Mountain. Elevation 300 Feet.



Up mountain

II. Mid-Mountain. Elevation 1,350 Feet.



To "Waterfall" ski trail

III. Upper Mountain. Elevation 2,750 Feet.



Figure 2. Test Plot Orientation

The upper mountain plot, at an elevation of 2,750 feet, lies on a leveled ridge 50 feet north of the lift building at the top of the "Spirit Quad". This area was leveled and cleared in 1989 during construction of the ski lift facility. Soils are gravelly with fines in between surface pebbles. Most of the area above this site is bare rock with ice and snow remaining year around. Below the site, undisturbed soils are covered with sedges, grasses, forbs, mosses and lichens. The growing season here is extremely short, lasting from approximately July 1 to the middle of September (see figure 2).

Each 4'x 8' subplot was sown with seed of the appropriate species at a rate of approximately 40 pounds per acre. After sowing, the plots were raked lightly and then broadcast fertilized with 20-20-10 at a rate of 750 pounds per acre. No further fertilization will be done throughout the evaluation period. The lower mountain plot was sown on July 1, 1993. The mid-mountain and upper mountain plots were sown on July 8, 1993.

DATA

Seedling year evaluation of the three plots was conducted on September 3, 1993. Seedling year evaluation weighs more heavily factors such as germination and ground cover. Subsequent year's evaluations will factor in maturity, vigor and winter survival as well as ground cover.

Table 1 lists the evaluation ratings for each species in each of the three plots.

Lower Mountain Plot		Mid-Mountain Plot		Upper Mountain Plot	
	Score		Score		Score
'Kenai' Polargrass	2	'Nortran' Tufted Hairgrass	3	'Nortran' Tufted Hairgrass	4
'Climax' Timothy		'Grueing' Alpine Bluegrass	4	'Climax' Timothy	
Meadow Foxtail		'Kenai' Polargrass		'Fylking' Kentucky Bluegrass	
<i>Alopecurus geniculatus</i>	3	<i>Alopecurus geniculatus</i>	5	'Merion' Kentucky Bluegrass	
'Fylking' Kentucky Bluegrass		'Nugget' Kentucky Bluegrass		'Norcoast' Bering Hairgrass	
'Merion' Kentucky Bluegrass		'Park' Kentucky Bluegrass		'Nugget' Kentucky Bluegrass	
'Nugget' Kentucky Bluegrass		'Polar' Brome		'Park' Kentucky Bluegrass	
'Park' Kentucky Bluegrass				'Polar' Brome	
'Pennlawn' Red Fescue		'Arctared' Red Fescue	7	<i>Alopecurus geniculatus</i>	6
'Polar' Brome		<i>Calamagrostis canadensis</i>		'Alyeska' Polargrass	
'Durar' Hard Fescue	5	'Climax' Timothy		'Kenai' Polargrass	
'Garrison' Creeping Foxtail		'Fylking' Kentucky Bluegrass			
<i>Poa glauca</i> T08867		'Garrison' Creeping Foxtail		'Engmo' Timothy	7
		Meadow Foxtail		<i>Festuca scabrella</i>	
'Carlton' Smooth Brome	7	'Merion' Kentucky Bluegrass		'Garrison' Creeping Foxtail	8
<i>Festuca scabrella</i>		'Nordan' Crested Wheatgrass		'Manchar' Smooth Brome	
'Highlight' Red Fescue		'Pennlawn' Kentucky Bluegrass		Meadow Foxtail	
'Manchar' Smooth Brome				'Pennlawn' Kentucky Bluegrass	
'Nordan' Crested Wheatgrass		<i>Festuca scabrella</i>	8	'Sourdough' Bluejoint	
'Sourdough' Bluejoint		'Manchar' Smooth Brome			
<i>Agropyron subsecundum</i>	9	<i>Agropyron subsecundum</i>	9	<i>Agropyron subsecundum</i>	9
<i>Agropyron subsecundum</i> #371698		<i>Agropyron subsecundum</i> #371698		<i>Agropyron subsecundum</i> #371698	
'Alyeska' Polargrass		'Alyeska' Polargrass		'Arctared' Red Fescue	
'Arctared' Red Fescue		'Boreal' Red Fescue		'Boreal' Red Fescue	
'Boreal' Red Fescue		'Caiggluk' Tilesy Sagebrush		'Caiggluk' Tilesy Sagebrush	
'Caiggluk' Tilesy Sagebrush		'Carlton' Smooth Brome		<i>Calamagrostis canadensis</i>	
<i>Calamagrostis canadensis</i>		'Durar' Hard Fescue		'Carlton' Smooth Brome	
'Egan' American Sloughgrass		'Egan' American Sloughgrass		'Durar' Hard Fescue	
'Engmo' Timothy		'Engmo' Timothy		'Egan' American Sloughgrass	
'Grueing' Alpine Bluegrass		'Highlight' Red Fescue		'Grueing' Alpine Bluegrass	
'Norcoast' Bering Hairgrass		'Norcoast' Bering Hairgrass		'Highlight' Red Fescue	
'Nortran' Tufted Hairgrass		<i>Poa glauca</i> T09967		'Nordan' Crested Wheatgrass	
'Reeve' Beach Wildrye		'Reeve' Beach Wildrye		<i>Poa glauca</i> T08867	
'Service' Big Bluegrass		'Service' Big Bluegrass		'Reeve' Beach Wildrye	
'Sherman' Big Bluegrass		'Sherman' Big Bluegrass		'Service' Big Bluegrass	
'Summit' Crested Wheatgrass		'Sourdough' Bluejoint		'Sherman' Big Bluegrass	
'Tundra' Glaucous Bluegrass		'Summit' Crested Wheatgrass		'Summit' Crested Wheatgrass	
		'Tundra' Glaucous Bluegrass		'Tundra' Glaucous Bluegrass	

Key

- 1 - Good germination, 80-100% ground cover
- 2 - Good germination, 60-80% ground cover
- 3 - Good germination, 40-60% ground cover
- 4 - Good germination, light ground cover

- 5 - 40-60% germination, very light ground cover
- 6 - 25-40% germination, young seedlings
- 7 - 10-25% germination, young seedlings
- 8 - < 10% germination
- 9 - No germination

Table 1

Seedling Year Evaluation - Revegetation Test Plots, Alyeska Resort

RESULTS AND DISCUSSION

The lower mountain plot was sown on July 1, 1993, one week earlier than the mid and upper mountain plots. As expected, the longer growing season and milder temperatures at the lower plot allowed the grasses to achieve a greater degree of maturity and cover more ground than the upper elevation plots. However, at evaluation time on September 3, grasses at the mid and upper mountain plots appeared to be only one to two week old seedlings. Examination of weather records for Alyeska Resort indicates that 0.77" of rain fell between July 2 and July 7. From July 8 until the middle of August, virtually no rain fell. It appears seeds sown on July 8 at the upper elevation plots lay dormant over a month before soil moisture supplies were sufficient to induce germination. Seventeen or more species failed to germinate in each of the three plots, primarily due to the dry conditions. It is expected that some of these varieties may overwinter as dormant seed and germinate in the spring of 1994.

Two pasture varieties, 'Climax' timothy and meadow foxtail, and one revegetation variety, 'Kenai' polargrass, performed well at the lower mountain plot. 'Nortran' tufted hairgrass, another variety bred for revegetation projects, performed best at mid and upper mountain. Kenai also grew well at mid-mountain, but rated a score of only 6 at the upper mountain plot. All four Kentucky bluegrasses, along with *Alopecurus geniculatus*, did well on all plots, but it is expected that some of these cultivars will winterkill. 'Polar' brome, an Alaskan bred hay variety, also got off to a good start on all three plots. 'Gruening' alpine bluegrass did well at mid-mountain but failed to germinate at the lower and upper mountain plots.

It is important not to over analyze the evaluation data during the seedling year. Some species take longer to germinate than others, and winterkill can eliminate or reduce the vigor of some of the varieties that did well initially. Several years of evaluation are necessary to produce meaningful results.