WETLAND REVEGETATION PROJECTS IN ALASKA

USING ADAPTED SPECIES HAVING COMMERCIALLY AVAILABLE SEED

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INTRODUCTION

An estimated 170 million acres of land have been classified as wetland in Alaska and are subject to regulations governing development.Based on the assumption that 45.3% (Dahl, 1990) of Alaska's land surface is wetland, the odds of a project impacting this land form are nearly one in two.

Rehabilitation of disturbed wetlands will become increasingly important as future development occurs throughout the state.

Rehabilitating damaged wetlands in Alaska is a relatively new art. However, the Alaska Plant Materials Center has been working with wetland rehabilitation since 1980. This report will deal with three case studies involving the rehabilitation of damaged wetlands with seeded species. Full function of the wetland was not measured, however the attempt was to reestablish known wetland vegetation species by means of standard revegetation techniques.

The Plant Materials Center, however, is working with transplanting techniques and other methods of rehabilitating or restoring damaged wetlands. Seeding still seems to be the least expensive and most readily acceptable method to achieve a vegetative cover on disturbed wetland. While not always an appropriate method of re-establishing vegetation on a wetland, seeding has become a standard method in revegetation of disturbed land. Using species classified as being facultative or as an obligate certainly adds to the potential effectiveness of a seeding.

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The studies outlined in this report relied on the commercially available cultivars or soon to be available cultivars. Of all the cultivars adapted for use in Alaska, the following have been reported to have some potential in wetland reclamation.

'Egan' American sloughgrass, *Beckmannia syzigachne*, was released by the Alaska Plant Materials Center in 1990 as a wetland rehabilitation cultivar (Wright, 1991a). This is the state's first cultivar developed solely for wetland restoration. Additionally, the species has wildlife benefits by providing forage and seed for waterfowl.

'Arctared' red fescue, *Festuca rubra*, was released in 1965 as a revegetation species showing extreme hardiness throughout Alaska (Hodgson, 1978). The overly aggressive, sod-forming nature of this species often makes this cultivar unacceptable in reclamation. However, the cultivar is outstanding for erosion control. The Arctared was cooperatively developed by the University of Alaska Agricultural Experiment Station and the USDA.

'Kenai' polargrass, *Arctagrostis latifolia*, is a variety recommended for forage and revegetation from the central interior to southern portions of Alaska (Mitchell, 1987). This species also has potential for use as a reclamation species on wet areas in portions of Alaska. Kenai was developed by the Alaska Agriculture and Forestry Experiment Station at Palmer, Alaska.

'Alyeska' polargrass, *Arctagrostis latifolia*, is a cultivar developed by the University of Alaska Agricultural Experiment Station. The prime purpose for this cultivar is revegetation in interior and western Alaska (Mitchell, 1979). The species is adapted to moderately wet areas.

'Sourdough' bluejoint, *Calamagrostis canadensis*, is a cultivar with a wide range of adaptability. The species occurs throughout Alaska on both dry and wet sites. Sourdough was developed by the University of Alaska Agricultural Experiment Station for revegetation in northern latitudes (Mitchell, 1979).

'Norcoast' Bering hairgrass, *Deschampsia beringensis*, was released in 1981 by the University of Alaska Agricultural Experiment Station as a forage and revegetation grass in northern areas. Norcoast is recommended for revegetation use in coastal regions of western Alaska to southwestern Alaska and possibly in the northern maritime regions (Mitchell, 1985).

'Caiggluk' tilesy sagebrush, *Artemisia tilesii*, was developed and released by the Alaska Plant Materials Center in 1989 as a reclamation species. This forb has a wide range of adaptations throughout Alaska (Wright, 1991b).

'Tundra' glaucous bluegrass, *Poa glauca*, was originally collected in Arctic Alaska. The cultivar was released by the University of Alaska Agricultural Experiment Station for revegetation in extreme northern areas with severe environmental conditions (Mitchell, 1979).

'Gruening' alpine bluegrass, *Poa alpina*, was released in 1989 by the Alaska Plant Materials Center for revegetation of disturbed lands (Wright, 1991c). This species is adapted to dry upland sites and mineral soils. Performance on these sites has been very good throughout Alaska.

Table 1 indicates whether the cultivar is readily available and it's status as a wetland species.

Table 1. Potential Species for Use in Wetland Revegetation (*Derived from Reed, 1986).

Common Name	Scientific Name	Cultivar	Status*	Availa-bility
Polargrass	*Arctagrostis latifolia*	Alyeska	Facultative Wetland	Good
Polargrass	*Arctagrostis latifolia*	Kenai	Facultative Wetland	Scarce
American sloughgrass	*Beckmannia syzigachne*	Egan	Obligate	Good
Bluejoint	*Calamagrosti s canadensis*	Sourdough	Facultative	Fair
Hairgrass	*Deschampsia beringensis*	Norcoast	Facultative	Excellent
Red Fescue	*Festuca rubra*	Arctared	Facultative Upland	Excellent
Glaucous bluegrass	*Poa glauca*	Tundra	Upland	Scarce
Tilesy sagebrush	*Artemisia tilesii*	Caiggluk	Upland	Scarce
Alpine bluegrass	*Poa alpina*	Gruening	Upland	Fair

Study Site

This report will deal with three case histories of three different types of disturbances on wetland that required some form of revegetation.

COMINCO RED DOG MINE SITE

The Red Dog site is roughly 200 feet from the coastline of the Chukchi Sea and 1/4 mile north of the port facility. The disturbed area requiring restoration was a small, four-acre disposal pit located on NANA Regional Corporation property. The site was opened but never used for solid waste disposal. The U. S. Army Corps of Engineers and U. S. National Park Service stipulations required the site to be rehabilitated. Due to the site's location in a wetland area and proximity to the sea coast, excess water was a significant problem in restoration. In addition to surface fresh water, the site was also subject to occasional storm surges causing brackish conditions in the area. Prior to seeding in 1988, the area was graded and contoured to the best possible condition using a D-6 class dozer. Variations in seasonal water depths and different elevations, made it important to develop a revegetation plan containing four native seed mixes. Only two seed mixes appropriate for high moisture areas are discussed in this report (Table 2).

Table 2. Red Dog Port Site Seed Mixes.

Mix #	Species	Percent of Mix By Weight
1	Norcoast Bering Hairgrass	50
1	Arctared Red Fescue	30
1	Egan American Sloughgrass	15
1	Caiggluk Tilesy Sagebrush	5
2	Tundra Glaucous Bluegrass	40
2	Arctared Red Fescue	30
2	Alyeska Polargrass	30

Both mixes were seeded at a rate of 43 pounds per acre. Fertilizer (20-20-10) was applied at a rate of 450 pounds per acre. All seeding and fertilization was conducted with hand operated equipment (Wright, 1990).

KENAI RIVER SLOUGH

In 1989, the Alaska Plant Materials Center was asked to assist in restoring a wetland disturbance covering approximately .25 acres. This disturbance was the result of an illegal fill. A plan was prepared by the PMC and accepted by the U. S. Army Corps of Engineers and Alaska Department of Fish and Game. The plan relied entirely on species native to the area and adapted to saturated soil on sites where prolonged seasonal flooding may occur.

The area was seeded with the mix in Table 3 at a rate of 30 pounds per acre and fertilized at a rate of 500 pounds of 20-20-10 per acre (Wright, 1992).

Table 3. Kenai River Seed Mix.

Species	Percent by Weight
Egan American Sloughgrass	50
Sourdough Bluejoint	25
Norcoast Bering Hairgrass	25

The site was evaluated in September 1989, August 1991 and 1992. During the September, 1989 site visit the entire site was under one meter of water due to flooding of the Kenai River. This condition lasted for approximately 15 days.

LEWIS RIVER SITE

The Alaska Department of Fish and Game and Unocal requested the assistance of the Alaska Plant Materials Center in restoring a site adjacent to the Lewis River damaged during cleanup of a fuel spill. On July 3, 1990, the site was visited and a rehabilitation plan was developed for the one-acre site.

Damage to the site was superficial and, for the most part, a result of surface excavation from the cleanup activities. The site was fall seeded on August 21, 1990 at a rate of 30 pounds per acre.

Table 4. Lewis River Seed Mix.

Species	Percent by Weight
'Egan' American Sloughgrass	33
'Norcoast' Bering Hairgrass	50
'Sourdough' Bluejoint	04
'Gruening' Alpine Bluegrass	13

After seeding, the area was fertilized with 450 pounds of 20-20-10 fertilizer per acre.

This site was evaluated on September 11, 1991 and again on August 25, 1992. By 1992, the area was supporting nearly a 100% vegetation cover. Based on a cursory evaluation, the cover was estimated as being roughly 80% hairgrass, 15% sloughgrass, and less than 3% bluejoint. The remainder consisted of invading species. The stand appeared vigorous and healthy.

RESULTS AND CONCLUSIONS

The seeded species presently being used in Alaska for wetland rehabilitation seem to be performing well. At the Red Dog site, the original sedge communities have been temporarily replaced with grasses. Reinvasion of the original community is occurring and expected to continue. The sites at Kenai and the Lewis River were originally grass shrub communities and the seeded species appear quite natural. Some reinvasion is also occurring on these sites. 'Arctared' red fescue was avoided in all three seedings because of it's very agressive sod-forming nature. It was felt that reinvasion of other native species would be precluded by 'Arctared'.

Table 5. Success of Wetland Seedings.

Site	% Cover in 1992	Composition	Vigor	Native Reinvasion
Red Dog	90	60% Sloughgrass 30% Hairgrass 10% Tilesy Sage	Excellent	Sedges Cotton Grass Some Willow
Lewis River	99	15% Sloughgrass 80% Hairgrass <3% Bluejoint	Very Good	Sedges Willow
Kenai	98	75% Sloughgrass 20% Hairgrass 5% Bluejoint	Excellent	Forbs Sedge

Based on the performance of Egan American sloughgrass in these studies, the cultivar should become very important in wetland rehabilitation. This species' non-aggressive growth habit will not prevent reinvasion of other native plant material. Also, this species is reported to be used extensively by waterfowl. Until sedge and cotton grass seed becomes commercially available in Alaska, Egan sloughgrass is the only truly obligative wetland species available in quantity. This cultivar should be considered for use in all wetland rehabilitative situations until sedges and cotton grass become commercially available. Additional studies are presently being conducted with Egan American sloughgrass in Canada, South Dakota and Utah in an attempt to determine the cultivar's value in temperate regions.

Norcoast hairgrass grows well on saturated soils. While the species is not reported to be as significant in waterfowl habitat as sloughgrass, it is nonetheless an important species for wetland rehabilitation.

The performance of Alyeska polargrass was very good at the Arctic site and should also be considered for inclusion in revegetation mixes.

Sourdough bluejoint, while in limited supply and costly, in small amounts of seed could be used in wetland rehabilitation mixes.

The mix suggested in Table 6 seems to be suitable for Alaska's disturbed wetlands for the near future or until more highly adapted or specialized species become commercially available.

Table 6. A Potential Wetland Seed Mix.

Species	Percent By Weight
Egan American Sloughgrass	55
Norcoast Bering Hairgrass	35
Sourdough Bluejoint	5
Alyeska Polargrass	5

The mix listed in Table 6 will perform well if broadcast seeded at a rate of 30 pounds per acre. Drill seeding could halve this seeding rate. Fertilizer rates can be developed specifically for local conditions, but 450 to 500 pounds of 20-20-10 seems to work well.

This report weighs the term "rehabilitation" with respect to total wetland reclamation. This author is not convinced that all the factors in a disturbed wetland can be recreated by artificial means. However, some components such as vegetative cover can be matched or temporarily replaced with appropriate commercially available species. Until additional wetland species become available, this author believes this represents the best available technology to superficially reclaim a wetland in Alaska.

Editorial Note:

A major criticism of wetland restoration is the cost and techniques needed in wetland restoration. Much of the criticism associated with wetland rehabilitation and restoration is based on the fact that many techniques being proposed seem to be punitive and not cost effective. Developing plant material and techniques that are inexpensive and practical is the key to acceptance of wetland reclamation. When this occurs, wetland values will be accepted and reclamation will be accepted as a standard cost of doing business. Until then, the wetland issue will remain nothing more than an issue.

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