Appendix A:

Beach Wildrye Planting Guide

Photo: Stoney Wright (AK PMC)

Abandoned sand quarry on Adak Island, revegetated with Beach Wildrye

Beach Wildrye is a native species that is highly adapted for revegetation and erosion control on sandy and/or gravelly coastal areas, river and lake banks, and unstable dune areas.

This guide is intended to give the user ideas and techniques for using Beach Wildrye through a series of flow charts from which actual need and method of use can be determined. If Beach Wildrye has a place in your revegetation plan and you require additional information, please contact the Alaska Plant Materials Center at (907) 745-4469. Alternatively, visit the Plant Materials Center's website, at plants.alaska.gov/.

BEACH WILDRYE

Planting Guide for Alaska

By Stoney Wright

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WHAT'S IN A NAME?

Beach Wildrye is an easily identifiable grass species common throughout coastal and insular Alaska. This species (or subspecies) has been called by a number of common and scientific names. (Klebesadel 1985) listed no less than 12 common names including: dune grass, American dune grass, lyme grass, beach ryegrass, sea lymegrass, Siegle de mer, strand wheat, strand oats, wild wheat, sand-meal grass, dune wildrye, and beach wildrye.

The scientific names applied to this species are nearly as confusing as the common names. Presently, *Leymus mollis* is being used as the scientific name of the species. It has also been called *Elymus mollis, Leymus arenarius* and *Elymus arenarius. Leymus mollis* is the third scientific name the Plant Materials Center has used since starting to work with Beach Wildrye. To further muddle the issue of nomenclature, species of *Amomophilia* are at times confused with Beach Wildrye because of that genus' common name “beach grass”.

FIGURE a.2: Typical stand of Beach Wildrye on a gravel beach.

WHERE DOES IT GROW?

Beach Wildrye is the North American species or variety of the *Elymus arenarius* complex. The range of Beach Wildrye is described as being along the coast of Alaska to Greenland, south to Long Island, New York and central California, along lakes Superior and Michigan, also eastern Siberia to Japan (Hitchcock 1950). Within this range, the species occupies a specific niche, most often on sandy beaches forming belts along the shore (Hulten 1968). This includes sandy beaches along the north shore of Lake Superior (Dore 1980). The species habitat is further defined as being spits, sea beaches, tidal flats, sea cliffs and lakeshores (Welsh 1974). While usually associated with coastal dunes, the species can be found along large land lakes occupying the same relative shoreline areas as in the marine coastal areas (Klebesadel 1985).

FIGURE a.3:
Typical coastal band community of Beach Wildrye

Photos: Stoney Wright (AK PMC)

FIGURE a.4: Rock-based Beach Wildrye community in Prince William Sound

THE FIRST DECISION: DO YOU NEED BEACH WILDRYE?

If you wish to revegetate or control erosion on a coastal site or fore-dune area where drifting sand is a concern, Beach Wildrye may be the preferred species. If a pre-existing stand of Beach Wildrye needs to be recreated, it is the only solution.

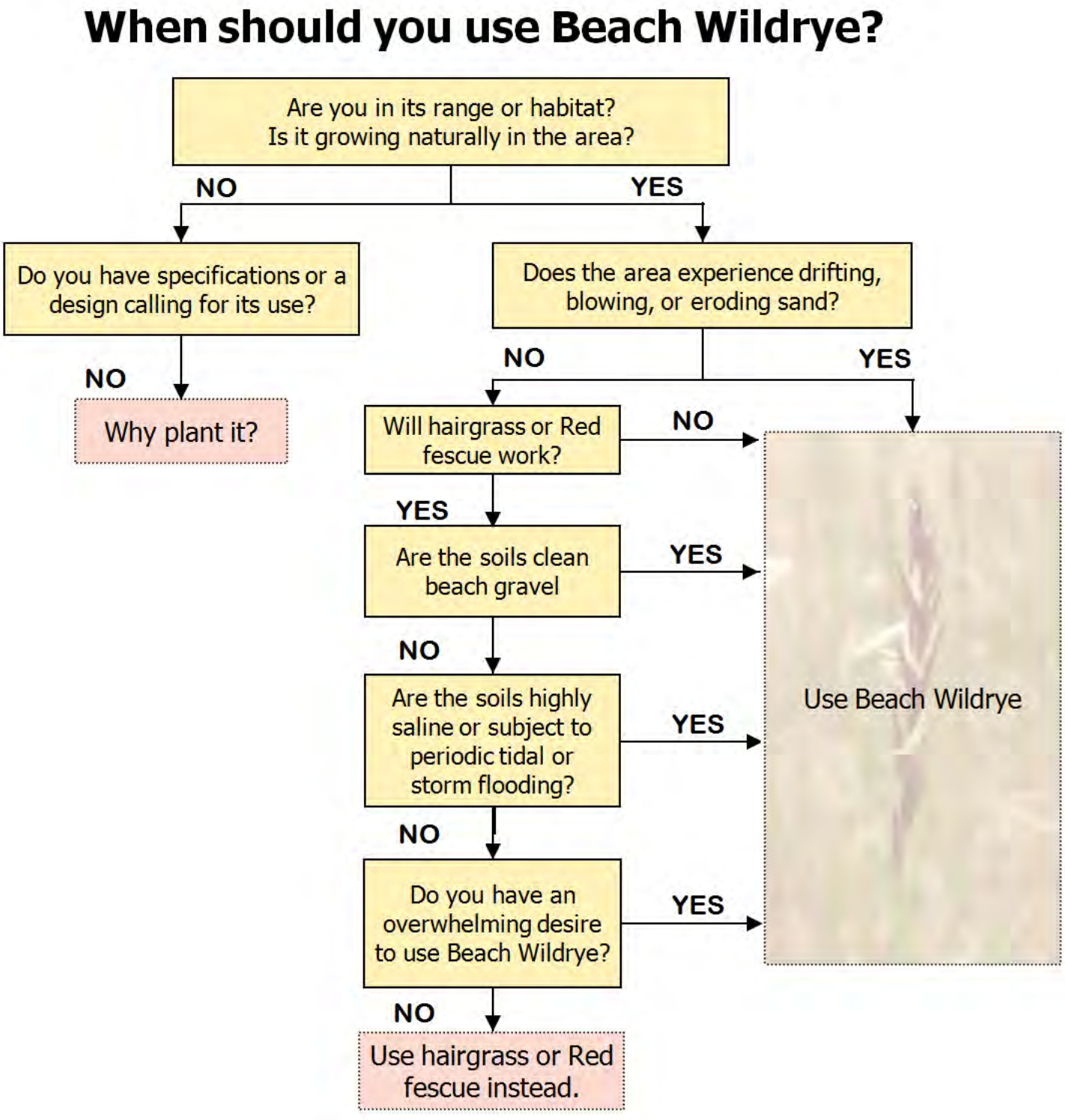

FIGURE a.5: Do you need or want Beach Wildrye?

WHAT TO PLANT: THE SECOND DECISION

Usually when planning a revegetation or erosion control project, seed comes to mind. Beach Wildrye may require a different approach. At the time of this publication's printing, Beach Wildrye seed is not commercially available. However, in 1991, two cultivars of Beach Wildrye were released for commercial production. One was developed for vegetative reproduction or transplanting (sprigging) the other for seed production.

To date, the most common method of using Beach Wildrye has been sprigging. As seed becomes commercially available, more projects will use standard seeding methods.

SEED vs.	SPRIGS
ADVANTAGES	**ADVANTAGES**
Reduced cost	Readily available
Low manpower requirements	Can be used on erosive sites
Standard method can be used	High degree of success
	Allows for layout design
	Can tolerate flooding by high tides or storm surges soon after planting
DISADVANTAGES	**DISADVANTAGES**
Slow growth	Higher manpower requirement
Low vigor	Higher costs
Short supply	
Not adapted for all sites	

Table a.1: Seed/Sprig comparisons

Once it has been determined that Beach Wildrye will be used for a revegetation project, Figure a.6 can guide the process for selecting a planting technique and address additional considerations important for planting the project.

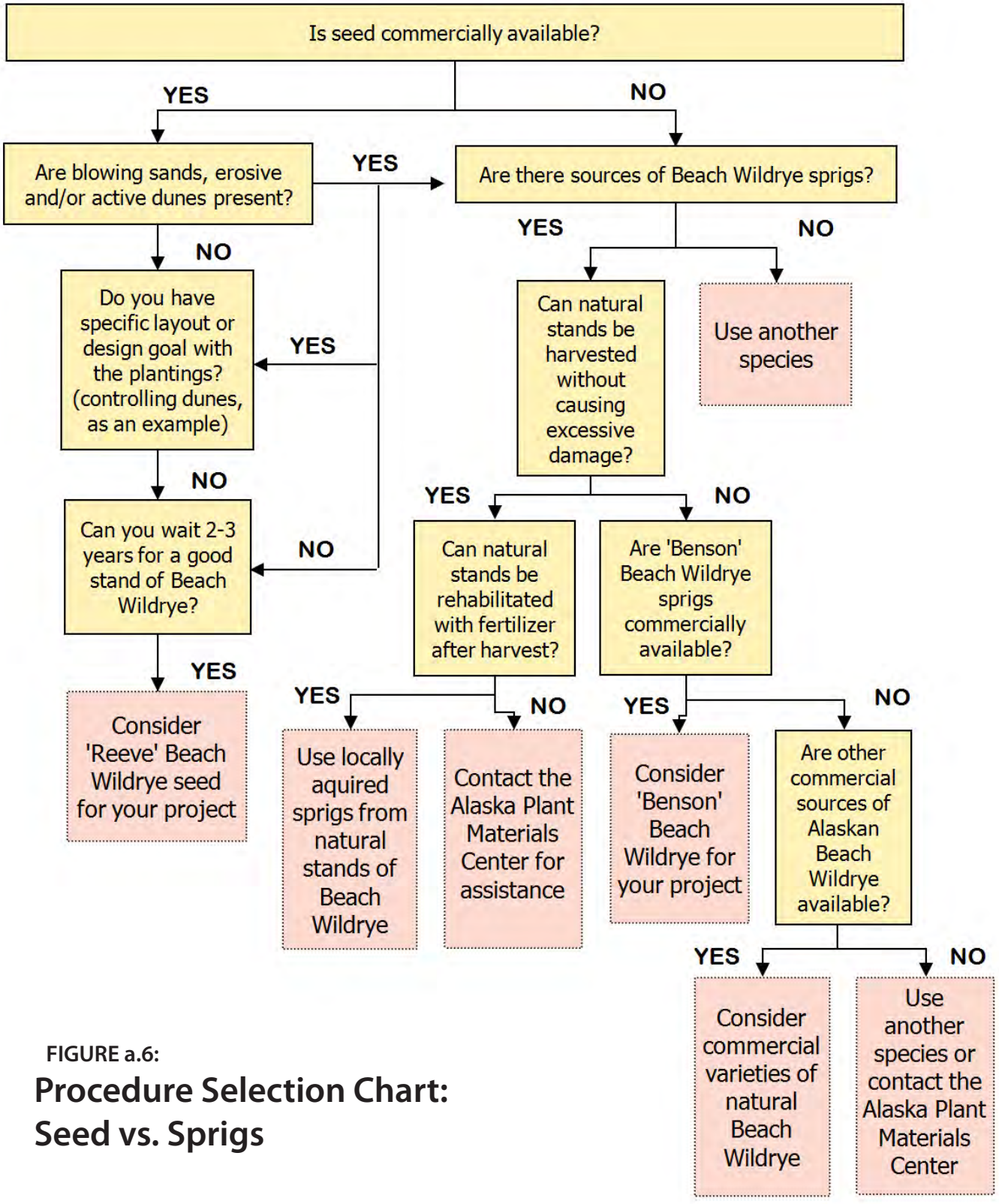

FIGURE a.6:

Procedure Selection Chart: Seed vs. Sprigs

SPRIGGING: A.K.A. TRANSPLANTING

What is a sprig?

Basically, a sprig of Beach Wildrye is the smallest division taken from a live Beach Wildrye plant that can be used to grow a new plant.

FIGURE a.7: Clump of Beach Wildrye, prior to division

Does the sprig need to have well developed roots attached?

No. A Beach Wildrye sprig will rapidly regenerate new roots.

Does the sprig need to have green leaves?

No. The above ground portion of the sprig may be dormant when transplanted. Also, if the leaves are green when transplanted, they die back after transplanting. This is not reason for concern. New growth will start from the below ground portion.

Is it necessary to trim either the leaves or the below ground portion of a sprig?

No. Simply transplant the entire sprig.

How many times can a clump of Beach Wildrye be divided?

A clump can be divided to a point where only a portion of the below ground crown and above ground leaf mass exists.

SPRIGGING: A.K.A. TRANSPLANTING

Photo: Brennan Veith Low (AK PMC)

FIGURE a.8:
Sprigs of Beach Wildrye, one year after planting at the mouth of the Kenai River

FIGURE a.9: Excavator used to harvest Beach Wildrye

FIGURE a.10: Loader used to harvest sprigs

Photos: Stoney Wright (AK PMC)

HOW ARE SPRIGS HARVESTED?

Several tools can be used to harvest Beach Wildrye sprigs. Shovels are an appropriate tool for harvesting small quantities of sprigs or for harvest in sensitive areas.

When possible, a backhoe, excavator, or front-end loader (Figures a.9 - a.11) provides a very efficient harvesting tool. With this equipment, sod blocks are dug and moved to a site where workers can easily remove sprigs by hand. The vibration and force exerted by the equipment on the sod loosens the soils, usually sand, and allows large undamaged clumps to be removed easily by hand. These are then further divided into individual sprigs for planting.

At the Alaska Plant Materials Center, Beach Wildrye is harvested with a potato digger (Figure a.12). This specialized tool is fragile and is more appropriate for use in the commercial production of Beach Wildrye than for wild harvested plants.

FIGURE a.11:
Loader preparing to lift a natural stand of Beach Wildrye for sprig harvest

Photos: Stoney Wright (AK PMC)

FIGURE a.12: A potato digger used to harvest Beach Wildrye at the Alaska Plant Materials Center

Planting can be accomplished with shovels or construction equipment. If a shovel or spade is used, simply drive the point four to six inches in the soil. Push the handle forward and slip the sprig into the slit behind the shovel. Note this is done without withdrawing the shovel or spade (Figure a.15).

It is more efficient to use machinery to open trenches, as shown in figures a.13 and a.14.

FIGURE a.13: Modified dozer blade with 'tiger teeth'

Photos: Stoney Wright (AK PMC)

FIGURE a.14: A site prepared with tiger teeth

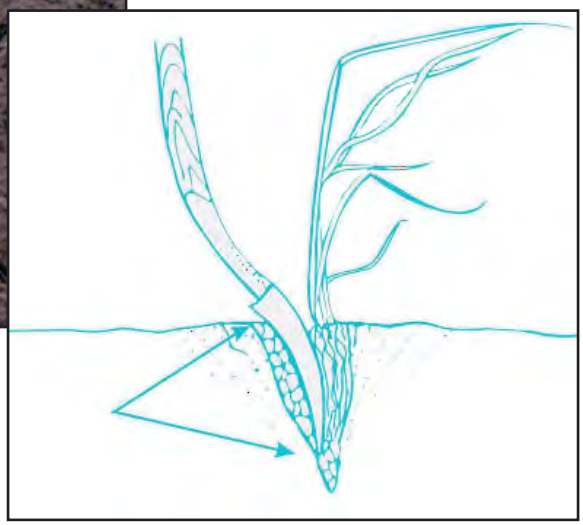

FIGURE a.15: Shovel method of planting

PLANTING

The actual planting technique is referred to as the "drop and stomp method". This technique is not described in any landscape or horticulture text, however, the technique has been proven at both Shemya AFB and Adak NAF.

The use of mechanical tree planters (Figure a.18) can be used on production ground with good results. It is unlikely that a contractor will use this type of equipment. Instead, they will rely on standard construction equipment or manual methods.

FIGURES a.16 AND a.17:
Drop (above) & stomp (below) planting method

Photos: Stoney Wright (AK PMC)

FIGURE a.18:
Mechanical tree planters can be used to plant Beach Wildrye

PLANTING

Do the sprigs need to be planted vertically?

No. Beach Wildrye sprigs can be placed in any position and will resume growth, thereby eliminating the need for careful upright planting (Wright 1990a). Negative geotropic growth resumes quickly from inverted seed blocks (Amundsen 1986) indicating haphazard and rough treatment of the sprigs is acceptable. This was verified on Shemya.

When can the sprigs be transplanted?

One major drawback usually pointed out for this species is that the window or time period for successful planting is very limited. Carlson (1991) states "American dunegrass (Beach Wildrye) must be planted when dormant". This point has been dismissed in Alaska. Table a.2 lists various planting times attempted by the Plant Materials Center. High success rates have been reported at all sites from mid May to mid September. This may be in part due to the relatively cool temperatures and cloudy conditions typical of all of the planting sites in Alaska. As a general rule in Alaska, try to complete all transplanting prior to September 1 south of the Arctic Circle, and prior to August 1 north of the Arctic Circle.

LOCATION	PLANTING DATE	SUCCESS RATE after 1 year
Shemya	5/15	98% [1]
Red Dog	6/15	99% [2]
Adak	6/23	93% [3]
Shemya	7/12	98% [1]
Adak	7/18	99% [3]
Port Clarence	7/20	70% [2]
Kuparuk	8/16	96% [4]
Adak	8/17	98% [3]
Fish Creek (Anchorage)	8/23	60% [5]
Adak	9/15	99% [3]

[1] Based on 3 replications of 300 sprigs

[2] Based on 2 replications of 50 sprigs

[3] Based on 3 replications of 100 sprigs

[4] Based on 25 sprigs, no replication

[5] Based on 50 sprigs, no replication

TABLE a.2.
Percent survival of locally collected Beach Wildrye sprigs related to time of planting (Wright et al 1987, Wright 1980a, 1990b).

Photos: Stoney Wright (AK PMC)

FIGURE a.19: A site on Shemya sprigged in May 1987

FIGURE a.20: Same Shemya site in September 1989

What spacing should be used for transplants?

In general, a 3-4 foot on center spacing is adequate. If the site is subject to severe erosion, 18 inches may be needed.

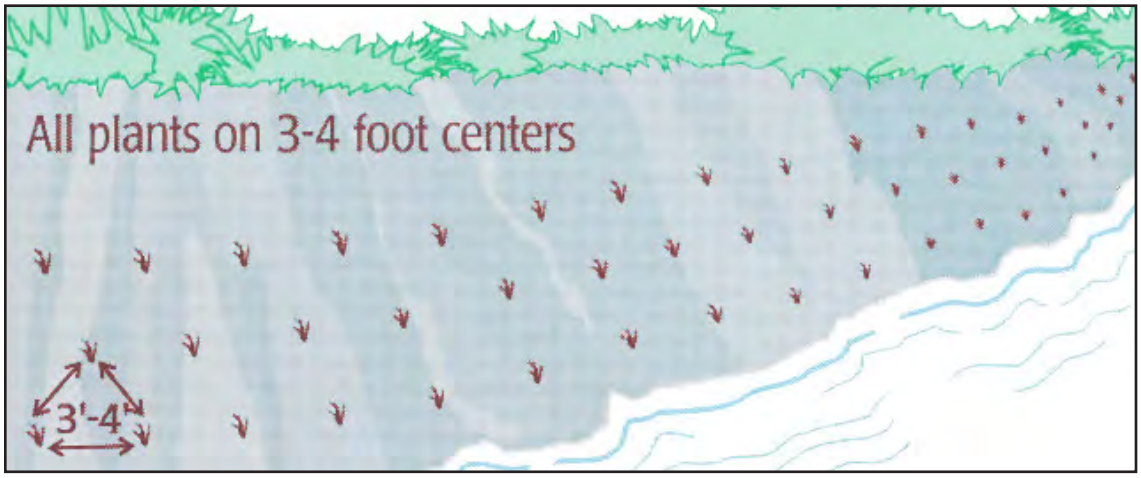

FIGURE a.21: Typical planting layout

FIGURE a.22:
A planting site on Adak in June 1989

Photos: Stoney Wright (AK PMC)

FIGURE a.23: The Adak planting site in August 1991

How long will it take to plant an acre?

The time required depends on the spacing between sprigs and how many are planted per acre.

Projects at Shemya, Port Clarence, Kasilof and Adak indicated that 400 sprigs could be dug and prepared per man-hour relatively easily and that 350 sprigs could be planted per man-hour using the drop and stomp method.

What should I expect for survival?

A well planned project planted with reasonable care can be expected to have a sprig survival rate of 90%. Figures a.19 - a.20, and a.22 - a.25 show successful plantings at three sites in Alaska.

Photos: Stoney Wright (AK PMC)

FIGURE a.24:
Adak dune restoration project in 1989, 3 months after sprigging

FIGURE a.25: Same Adak dune area in 1994, 5 years after sprigging

USING SEED TO ESTABLISH BEACH WILDRYE

Beach Wildrye as a species is notorious for not producing seed. The Plant Materials Center has expended a great deal of effort in finding a collection of Beach Wildrye that would produce commercially viable amounts of seed. By 1991 these efforts resulted in the release of 'Reeve' Beach Wildrye, a collection from Norway. This release is classified as *Leymus arenarius.* The demand for seed should be strong if it becomes commercially available, and *Leymus arenarius* can be substituted for *Leymus mollis.*

What is Beach Wildrye seed like?

Beach Wildrye seed is very large when compared to other grasses. There are 33,000 seeds per pound. For comparison, Kentucky bluegrass averages 1,500,000 seeds per pound and Red fescue averages 365,000 seeds per pound.

How is the germination & vigor?

Beach Wildrye is not known for being a species with either high seedling vigor or exceptional germination percentages for its seed. Fifty percent germination for the seed should be considered acceptable.

How about a seeding rate?

Based on the seed size and evaluation of plantings throughout Alaska, a seeding rate of 60 pounds per acre should provide an adequate stand. Remember that this is a large-seeded species, so the rate per acre may appear excessive. It is not.

When should I sow the seed?

In general, use the standard seeding recommendations as presented in Table a.3.

REGION	SOWING DATES
Southwest Alaska	May 1 - September 30
Southeast Alaska	May 1 - September 30
Southcentral Alaska	May 15 - September 1
Western Alaska	June 1 - August 15
Arctic Alaska	July 1 - August 1

TABLE a.3: Standard seeding dates in Alaska

ADDITIONAL FACTS ABOUT BEACH WILDRYE

Beach Wildrye responds to high nitrogen fertilizers. When planting sprigs or seed, rates of 500 to 600 pounds of 20% nitrogen, 20% phosphorus, and 10% potassium fertilizer give good results.

No other soil amendments are necessary.

This species will not tolerate excessive traffic (Wright 1990c). This includes foot traffic. Both natural and artificially established stands can be severely damaged by traffic that causes soil compaction.

Beach Wildrye works best in sandy or gravelly soils. Performance in organic, silt and clay soils tends to be poor.

Planting patterns must be planned. Irregular spacing can result in dunes. Uniform spacing tends to promote uniform sand deposition and therefore uniform build-up of sand.

This species does not tolerate strong competition from other grasses. Avoid using strongly rhizomatous species with Beach Wildrye sprigs. Avoid any other grass when using Beach Wildrye seed. If a grass species is used with Beach Wildrye, use light rates of Hairgrass *(Deschampsia* sp.) (less than ten pounds per acre). Broadleaf material such as Tilesy sagebrush *(Artemisia tilesii)* can be used with either seed or sprigged Beach Wildrye.

A one-acre natural stand can produce enough sprigs to establish a seven-acre site with sprigs on two - to three-foot centers.

Photo: Stoney Wright (AK PMC)

FIGURE a.26: Beach Wildrye roots and rhizomes stabilize sandy soils

COMMERCIAL AVAILABILITY OF SPRIGS & SEED

Two cultivars, 'Reeve' and 'Benson', have been released by the Alaska Plant Materials Center (Wright 1991a, 1991b). Reeve is a seed producing cultivar of *L. arenarius,* while Benson, *L. mollis,* is intended to be sold as sprigs. Presently, availability of both is limited. Contact the Plant Materials Center if you are interested in commercially producing either cultivar. If you are searching for seed for plants to use on projects, contact your local Co-operative Extension Service Office or the Alaska Plant Materials Center.

Figure a.27: Beach Wildrye along the Kenai Peninsula

CLOSING STATEMENT ABOUT USING BEACH WILDRYE & WHERE TO GET MORE INFORMATION

Beach Wildrye is an extremely effective species for use in coastal revegetation, restoration and erosion control. Due to the dynamic nature of most shorelines, prior planning is needed if planting efforts using Beach Wildrye are to succeed. Before undertaking a Beach Wildrye planting program, a call to the Alaska Plant Materials Center may prevent unnecessary surprises, (907) 745-4469.

Photo: Brennan Veith Low (AK PMC)

Figure a.28:

Beach Wildrye is very susceptible to damage by uncontrolled foot traffic. In this photograph, an eroded coastal dune has been used for a fire-pit. Protective fencing and access controls can help limit human causes of erosion.

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