

NATIVE PERENNIAL GRASSES FOR REVEGETATION AT POINT REYES NATIONAL SEASHORE

A Report

For

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Point Reyes National Seashore
Point Reyes, CA 94956

DAVID AMME
Open Space Management Specialist
1314 Curtis Street, Berkeley, California 94702
415—526-9257

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INTRODUCTION

Point Reyes National Seashore is an important preserve of California's native dune and prairie habitats. It has a rich resource of native perennial grass seed and plant material that can be used in revegetation and erosion control projects within the Park. Introducing native perennial grasses into the disturbed environment early in the process of revegetation encourages long-range site stability. They are useful in stabilizing disturbed slopes, cuts, trails, gullies and sand dunes. The accompanying list of native perennial grasses of Point Reyes National Seashore is presented with cultural and management information to aid the manager in planning for future revegetation projects.

Seeding and Planting Practices

The optimum time to seed and plant native perennial grasses is in the fall. Fall and winter moisture and temperatures are favorable for plant establishment and for vigorous spring growth. The seed should be buried or covered to prevent animal predation and desiccation. Raking seed into the ground or covering seed with a light mulch or screened soil is recommended. Seeding by hand and hydromulching over the seed is an excellent technique for even seeding and good coverage. Drilling is the preferred method for large areas. Liner material requires deeply moist soil at the time of planting. The sand dune rhizomatous grasses may be planted deeper than the liner root crown to assure rhizome contact with moist sand. Seeding native perennial grasses after a prescribed fire is a useful technique in establishing stable grassland habitat and controlling the invasion of undesirable weeds and shrubs.

Fertility is an important factor in the establishment of perennial grasses. Generally, perennial grasses respond best to nitrogen fertilizers. On bare soil sites or sites that have few weedy exotic annuals, nitrogen fertilizer the first fall is encouraged. Where heavy weed competition exists during establishment a nitrogen fertilizer may best be applied the following season.

Seeding Rates and Mixes

Seeding rates for erosion control and revegetation projects vary widely. They depend on seed purity, seed size, seed germination characteristics, the type of site, fertility and the purpose of the project. Heavy seeding rates for quick ground cover increases intraspecific competition which for a perennial grass will greatly reduce the chance of survival over summer drought. Typical recommended seeding rates tend

to be higher than needed. Experience in the literature has demonstrated that the best eventual stand can be had from moderate amounts of seed sown on a well prepared seedbed. For temperate coastal sites in California, seeding rates of perennial grass species and mixes vary between 12 and 24 pounds per acre. Seeding with a mix of two or three species of native perennial grasses is a good technique to increase plant establishment over a variety of microsites and conditions. Seeding perennials with annuals should be done with great care. Annual fescue (Zorro Fescue, *Vulpia megulura*) is an excellent annual to mix with native perennial grasses for seeding projects. Because Zorro Fescue is a very small seed it should not be seeded at rates higher than 2-4 pounds per acre in seed mixes with native perennial grasses.

The following are examples of seed mixes and rates for revegetation projects for coastal sites. This assumes 70-80% pure live seed (PLS). Higher seeding rates will be required for lower PLS percentages. Often sites may need only one or two species. For example, a flat clay soil site may require a 50/50 mix of *Bromus carinatus* and *Elymus glaucus* (10-12 lbs each).

Bare soils, thin soils and harsh sites

<i>Stipa pulchra</i>	5-8 pounds/acre
<i>Hordeum brachyantherum</i>	3-6
<i>Danthonia californica</i>	2-4
Zorro Fescue	1-2

Developed disturbed soils, clays

<i>Bromus carinatus</i>	5-10
<i>Hordeum brachyantherus</i>	3-5
<i>Elymus glaucus</i>	2-4
<i>Danthonia californica</i>	2-4

Moist sites, thin or developed soils

<i>Festuca rubra</i>	4-8
<i>Deschampsia holciiformis</i>	4-8
<i>Agrostis diegoensis</i>	2-5
<i>Hordeum brachyantherum</i>	2-4

Management

Many seeded perennials do not fully develop until the second or third season. In ungrazed areas, the most restrictive factors in plant establishment are first-year competition of resident annual grasses and weeds, and moisture limitations during the critical dry summer. The best method to insure successful establishment of a perennial grass seeding project is to mow the annual grass and weed competition the first spring. In some cases this may have to be done two or three times the spring growing season. This enables the smaller perennial seedlings to get enough light for establishment before summer dormancy takes place. The following year the perennials will be well established and conspicuous. Prescribed burns should not be attempted for at least two years after initial seeding.

NATIVE PERENNIAL BUNCH GRASSES

Hordeum brachyantherum, Meadow Barley. Collection dates: Early to mid June.

Description and habitat: This is a common short-lived perennial that grows in moist swales and on moist sunny slopes. It persists with light to moderate year-long grazing. It grows quickly from seed and develops fully the first season.

Revegetation uses: Meadow Barley is an excellent nurse crop for other perennial grasses on harsh sites. As a seeded grass it has excellent tolerance to a variety of sites from fast drained sandy soil to adobe clays. It reseeds itself the first year. It is an excellent grass for seeding disturbed sites such as gullies or cut-and-fill slopes.

Management: Meadow Barley is tolerant to mowing or grazing in late winter and early spring. It can be mowed after seed production but mowing the resulting regrowth will be harmful to the plant's vigor.

Hordeum californicum, Coastal Meadow Barley. Collection dates: June

Description and habitat: This species is closely related to the common Meadow Barley. It grows on the dryer wind-blown coastal flats and bluffs. It has a prostrate habit and its flowering heads are shorter than typical Meadow Barley.

Revegetation uses: This grass is more drought tolerant and tolerant to windy sites than Meadow Barley. It is most appropriate for restoration on the Point Reyes bluffs near the ocean. Excellent for seeding near and on trails where it is tolerant to some compaction and treading.

Management: Tolerant to 4 inch mowing year long.

Bromus carinatus, California Brome. Collection dates: May and June

Description and habitat: California Brome is a common short-lived perennial that grows on deep soil flats and valleys. It reduces in cover with year-long grazing but persists and spreads with intermittent grazing. There are many ecotypes of California Brome at Point Reyes including at least two varieties on dunes and stabilized dunes. It is a prolific seed producer.

Revegetation uses: Brome is an all-purpose seeded grass for sandy and clayey grassland soils. It is an excellent grass to plant after prescribed burns to compete with Coyote Bush invasion. The large seed is attractive to wildlife.

Management: Where there is excess weed and annual grass competition the seeded area should be mowed at a 4"+ height the first spring. It can be mowed in the late summer and fall. Note: Planted together, both the Meadow Barley and Brome can be mowed after seed set but just when the exotic weedy composites are bolting and beginning to flower. This management will gradually eliminate noxious weeds such as Yellow Star Thistle and Picris from the meadow use areas surrounding Park parking lots.

Stipa pulchra, Purple Needlegrass. Collection dates: Early May to June.

Description and habitat: This long-lived perennial grass is common on sunny slopes with thin to clayey soils. At Point Reyes National Seashore the best stands are on Bolinas Ridge and the Olema Valley.

Revegetation uses: Purple Needlegrass is excellent for seeding harsh sites on cut-and-fill slopes, gullies and disturbed soils. It is good to seed in combination with the Meadow Barley. *Stipa* is well adapted to liner production and planting on critical sites.

Management: On productive soils, Purple Needlegrass will benefit from early spring mowing like the Brome. On harsher sites, little or no management is needed.

Elymus glaucus, Blue Wild Rye. Collection dates: Late June and early July.

Description and habitat: This large long-lived grass is common on grassland clayey soils with coyote bush and open woodland. Like Brome there are at least two ecotypes of Blue Wild Rye on stabilized dunes and deep prairie soil sites at Point Reyes. It is intolerant to year-long grazing.

Revegetation uses: Where grazing is not allowed, Blue Wild Rye is one of the best grasses to seed for wildlife cover purposes. It is useful around enclosed stock ponds and inside fenced riparian zones. Once it is established in an area it tends to increase slowly in cover. It will increase with fall prescribed burns. Blue Wild Rye is an excellent climax grass to introduce in open valley bottoms with Meadow Barley and Brome.

Management: It is tolerant to early spring mowing the first year after establishment only. Thereafter it is best to mow or burn in the fall.

Deschampsia holciformis, Tufted Hair Grass. Collection dates: July and August.

Description and habitat: This is a very common long-lived bunchgrass on moist prairie soils at Point Reyes and on Bolinas Ridge. It is tolerant to light year-long grazing and responds best with some grazing each year. Tufted Hair Grass is ideally adapted for liner production and planting.

Revegetation uses: Tufted Hair Grass is best seeded and planted in moist prairie or meadow areas near the coast.

Management: Spring mowing for seeded areas is recommended the first year after establishment if tall weeds are a problem.

Danthonia californica, California Oat Grass. Collection dates: June.

Description and habitat: California Oat Grass is found on typical prairie soils both on the Point and on Bolinas Ridge. This long-lived low bunchgrass with low flowering culms is very tolerant to grazing and in some cases will dominate the grassland. It is not a prolific seeder and takes many years to reestablish in areas that have been tilled. An important ecological feature of this grass is the cleistogamous seed produced under the sheaths of the flowering stem. The stem is easily broken and carried by animals, wind and moving water.

Revegetation uses: Although it is expensive to collect large quantities of seed, Oat Grass is a valuable species. Seed longevity and the seedling shade tolerance enable the plant to germinate and establish when the conditions are right. A good method of seeding Oat Grass is spreading the flowering culms that have been collected by raking the hay. Oat Grass is very tolerant to treading and is an ideal grass for maintenance of trails and parking lot high-use areas.

Management: Oat Grass will establish best with mowing or compaction. It is tolerant to year-long grazing and spreads with deferred grazing.

Festuca californica, California Fescue. Collection dates: June.

Description and habitat: California Fescue is a large, coarse ornamental bunchgrass that grows on north and east slopes in open grassland or among more dense shrublands. It is tolerant to filtered light and needs well-drained soil that is more moist than typical *Stipa* or *Danthonia* sites.

Revegetation uses: California Fescue is a good grass to introduce as liners on steep well-drained soils. It is recommended for stabilizing north and east facing slides and slumps. Liner and larger gallon can plants can be planted in the bottoms of deep-soil gullies where there large size will trap debris and slow water movement.

Management: Little management is required for California Fescue except for spot mowing or cutting tall-growing noxious weeds the first spring after seeding.

Calamagrostis nutkaensis, Sand Reed Grass. Collection dates: August.

Description and habitat: This large coarse bunchgrass develops short rhizomes and lanky stolons. Sand Reed Grass is found on moist sunny slopes surrounding Drake's Bay and among Bishop Pines in partial shade. Though it grows near California Fescue, they never grow together. Sand Reed Grass is tolerant to clay soils but requires extra moisture. It grows near seeps, in gullies and in filtered light.

Revegetation uses: As a planted liner it is excellent to control soil erosion near the coastal bluffs and hills. It is good for wet slumps and slides.

Management: Sand Reed Grass requires little management to improve establish.

Festuca rubra, Red Fescue. Collection dates: Late May and early June.

Description and habitat: Though this grass spreads by rhizomes it is included in the bunchgrass section of this discussion because of its similarity to bunchgrasses. At Point Reyes it is found on the coastal bluffs and surrounding Drake's Bay above the high tide line. It grows in deep or rocky soils rich in organic matter. It is not tolerant to clay or adobe soils. It is intolerant to year-long grazing.

Revegetation uses: The native Red Fescue is an excellent all-purpose revegetation grass useful in seed mixes on cut-and-fill slopes. On bare slopes it is best seeded with the Meadow Barley and Purple Needlegrass. It is a good substitute grass for perennial rye (*Lolium perenne*) on moist slopes. It is well adapted to liner production and planting. Liner plants are good for stabilizing inner slopes of slides and gullies where they form an erosion resistant sod.

Management: Red Fescue seeding establishment is enhanced by mowing the first spring. Late summer or early fall mowing or raking will enhance its spread.

Other Perennial Bunchgrasses

Poa unilateralis, Coastal Bluff Bluegrass. Collection dates: June.

This small bunchgrass which inhabits the coastal bluffs can be used for revegetation of disturbed areas on rocky, hard soils. Because of early summer dormancy it is not adapted for liner production or planting.

Festuca idahoensis, Idaho Fescue. Collection dates: Late June to July.

This medium height bunchgrass inhabits rocky soils along Bolinas Ridge. It is adapted to both seeding and liner production and planting. Idaho Fescue is good for revegetating old roads and cut slopes on Bolinas Ridge.

NATIVE PERENNIAL RHIZOMATOUS GRASSES

Elymus triticoides, Creeping Wildrye.

Description and habitat: Wildrye is a tall spreading grass found on moist bottom lands at Point Reyes and in Olema Valley. Very rarely does it produce viable seed.

Revegetation uses: This grass is best used as planted liners in valley bottoms. Introduced liner stock spreads rapidly and large areas can be revegetated quickly in this manner.

Management: Creeping Wildrye will decrease and gradually disappear with spring and summer mowing or grazing. Early mowing in spring for weed control the first year is recommended. Late mowing in the fall or fall burning will enhance its spread and vigor.

Elymus pacificus, Pacific Shore Grass

Description and habitat: This low to medium height grass exists on low mounds and stabilized sand dunes near the prairie grassland edge. It rarely produces seeding culms. It grows in pure stands and is relished by cattle. Its rhizomatous nature and short stature enables it to persist in these areas.

Revegetation uses: This grass is best used as planted liners near coastal dune areas. Its stature and form make it adaptable for planting as a meadow grass in sandy soils. This grass can be planted in areas where the exotic Ice Plant has been removed.

Management: Little management is necessary for this grass after planting. If allowed, Ice Plant and European Beachgrass can out-compete this grass.

Elymus mollis, American Dune Grass.

Description and habitat: This tall dune grass exists in several populations on the Point Reyes foredunes. Like Creeping Wildrye it does not produce much viable seed. Much of the range of this grass could have been reduced by competition from the planted European Beachgrass (*Ammophila arenaria*). It is not resistant to year-long grazing.

Revegetation uses: This grass is an excellent native dune grass for dune stabilization. It is a viable replacement for the exotic Ice Plant and European Beachgrass in the sand dune areas. Like the preceding grasses, it is best propagated by cuttings and planted as liners. Established plants spread quickly.

Management: Competition from European Dune grass and Ice plant should be discouraged.

Poa douglasii, Dune Bluegrass.

Description and habitat: This is a low-growing dioecious dune grass that exists primarily in the fore and middune areas of Pt. Reyes. Viable seed is a rare occurrence. Dune Bluegrass is just one component of the rich dune flora that has been replaced by the tenacious European Dunegrass.

Revegetation uses: This grass is another useful native dune grass for dune stabilization. It is best used on the higher and warm south-facing slopes of the dunes. It needs to be introduced as liner stock.

Management: Dune Bluegrass needs no special management except for controlling the European Beachgrass and exotic Ice Plant.

Agrostis diegoensis, Bentgrass. Collection dates: July.

Description and habitat: Bentgrass grows in moist swales and valleys often on the north and east facing slopes. It is not resistant to heavy year-long grazing.

Revegetation uses: This grass can be planted as seed or liners on road cuts and cut-and-fill slopes where there is sufficient soil development and moisture. As a seeded grass it is best used in a mix with other native perennial grasses such as Red Fescue and Meadow Barley.

Management: Mowing the first spring after seeding is recommended.