

## 6. BUILDING AND PLANTING COASTAL SAND DUNES: Dune Vegetation-General

### Introduction

Vegetation plays a vital role in dune formation and stabilization. On windy days sand grains get picked up by the wind and blow around. When those airborne sand grains hit an object they stop blowing and fall to the ground. Thus the leaves of the beach grass and other plants on a dune act as collectors for blowing sand. Once on the ground, the grass blades help protect the sand from the breeze so the sand grains tend to stay where they land and start to pile up, forming a dune. As the plants grow they send out lots of roots and rhizomes that further trap and stabilize the sand, helping to make the dune stronger and more resistant to erosion. As a result, dune plants are a key component of an effective dune restoration plan.

Many native coastal plant species play a major role in the formation of sand dunes and also protect shoreline areas from erosion. These plants often produce foliage and deep root systems that assist in the formation of a sand dune over time. The foliage of these species reduces wind velocity and filters sand from the wind, and their deep root systems help to anchor dunes to their foundation. For example, as filtered sand piles up around dune plant species, new roots develop on the buried stems and new shoots emerge from the sand's surface. The end result is a dense mat of vegetation which anchors the dune below its surface and traps more windblown sand.

There are generally three zones of vegetation that form on coastal dunes. Each of these zones is exposed to different levels of soil salinity which determine the types of plant species that occur within each zone. The frontal dune zone, which occurs closest to the ocean, contains several grasses and other herbaceous plants that are able to tolerate high exposures to salt spray. The back dune zone is located behind the frontal zone and supports trees, shrubs, and vines as well as grasses and other herbaceous plants. These species generally have lower salt tolerance. Farthest from the ocean is the maritime forest zone, which supports pines and hardwoods.

Along much of our highly developed coastline, we generally don't see all three dune zones. We generally see one or maybe two zones such as in constructed dunes (berms) that have a trapezoidal shape which has a front, a wide crest (top) and a sloping backdune.

### **A Word about American Beachgrass**

American beachgrass (*Ammophila breviligulata*) is currently the species which is most often utilized in dune plantings in New Jersey and elsewhere in the North East. Unfortunately, this species has very specific growth requirements and tends to thrive best in actively accreting sands in the frontal dune. After a few years, when the sand has become stabilized, the *Ammophila breviligulata* usually dies, yielding to other species that provide long-term dune coverage, if present, or leaving bare sand if no alternative "volunteer" species have colonized the area or been planted there in the interim. Coastal communities with fixed sand dune maintenance and replenishment budgets often choose the short-term convenience of working

with one species, over long-term ecologically correct approaches. However, it is short sighted to plant only American beachgrass (*Ammophila breviligulata*). Unfortunately, the ease by which American beachgrass planting units establish and its low cost and short-term effectiveness have made it difficult to persuade landowners and municipalities to consider the use of other plant species for sand dune restoration. However, over the past 25-30 years or so, it has been observed that throughout its native range beachgrass is susceptible to decline after three to six years especially when established on dredged sand in ACOE beach replenishment projects. In response to this problem, the Cape May Plant Materials Center of the USDA-Natural Resources Conservation Service has been focusing on testing and releasing to the commercial nursery industry additional plant species for diversifying sand dunes plantings rather than relying on the traditional beachgrass monocultures. In addition, work is being done to make NJ local ecotypes of beachgrass available commercially in the future to broaden genetics beyond the single clone of 'Cape'.

### **An Idealized Dune Planting**

**American beachgrass** (*Ammophila breviligulata*) is best adapted in the foredune where sands are constantly shifting and occasional overwash occurs. Interplanting other adapted species on the backside of the foredune, provides a seed source of additional plants to assist in the successional process. These species may include grasses such as; **bitter panicgrass** (*Panicum amarum*), **coastal panicgrass** (*Panicum amarum* var. *amarulum*), **switchgrass** (*Panicum virgatum*), **saltmeadow cordgrass** (*Spartina patens*), **coastal little bluestem** (*Schizachyrum scoparium* var. *littoralle*), **dune wildrye** (*Elymus virginicus*) and forbs such as **seaside goldenrod** (*Solidago sempervirens*), **partridge pea** (*Chamaecrista fasciculata*), **evening primrose** (*Onethera humifusa*), **beach pea** (*Lathyrus japonicus*), **trailing wild bean** (*Strophostyles helvola*). Many of these plant species are available from specialized nurseries as potted and/or bareroot plants. (See Plant Selection Sections of this document) Seeding techniques are also being developed for many of these species. For instance, coastal panicgrass (*Panicum amarum* var. *amarulum*) has been successfully seeded between rows of beachgrass on beach replenishment projects in the Mid-Atlantic coast. Within three to five years, coastal panicgrass dominates much of the backdunes and provides the primary stabilization where beachgrass has lost vigor.

For dunes where adequate width is achieved (greater than 100 feet) and some salt spray protection is afforded, shrubs such as **bayberry** (*Myrica pensylvanica*), **beach plum** (*Prunus maritima*) **winged sumac** (*Rhus copallina*) and **Groundsel** (*Baccharis halimifolia*) can be added for long-term stabilization. These species are generally planted as containerized material. Shrubs need not be planted on a tight spacing as the herbaceous plants but rather scattered throughout the planting area in more natural groupings to provide a seed source.

Sand dune restoration is not as simple as establishing a native community of plants, but involves managing the sand budget (the ocean gives it and takes it away). True coastal dune restoration must consider the natural dynamics of this ecosystem, The plant species inhabiting certain niches have evolved and adapted to these locations, and require specific environmental conditions to survive establishment and persist.

## RECOMMENDED PLANT SPECIES

### Choosing and Acquiring Plant Materials

When choosing plant materials, consider using plant releases developed by the USDA-NRCS Plant Materials Program. These plant releases have been tested and found to establish successfully along the Mid-Atlantic Coast. If NRCS plant releases are not available, generally commercial growers can be found that produce the desired species you need. For a list of commercial producers growing coastal vegetation please see Appendix. For a complete list of plant vendors please consult the **Seed & Plant Vendors Guide** at the following website address: **(to be determined)**

Although a fair number of plant species occurs in natural dune systems, a smaller subset of those species is commercially available for projects. These are the species that we'll focus on in this document. Once the primary vegetation is established, natural recruitment will take place and increase plant diversity over time. However, it is most important to first establish those keystone plant species to provide stabilization and vegetative cover to catch sand and jump start the successional process. These commercially available species includes:

#### Frontal Dune Species (\* limited commercial availability)

- American beachgrass (*Ammophila breveligulata*)
- Bitter panicgrass (*Panicum amarum*)\*
- Sea oats (*Uniola paniculata*)\* are indigenous south of NJ in MD and VA. A cold tolerant variety is being developed by the Cape May Plant Materials Center and will be available to growers for propagation in the Mid Atlantic region in the next couple of years. This release will have application for the Maryland Delaware, and southern NJ coast eventually.

#### Secondary (backdune) Species (\* limited commercial availability)

- coastal panicgrass (*Panicum amarum var amarulum*)
- saltmeadow cordgrass (*Spartina patens*)
- coastal little bluestem (*Schizachrium littoralle*)\*
- Seaside goldenrod (*Solidago sempervirens*)\*
- beach pea (*Lathyrus maritima*)\*

### Plant Form Descriptions



**Bareroot** – these are plants that are field dug with most of the native soil shaken off for easy transport to the planting site. Bareroot materials are generally cheaper than pot grown material, however they show decreased survival especially when planted later than recommended. American beachgrass is commonly planted as bare root stems (culms) but is increasingly available as plugs. (see below)



**2" x 2" plugs** – these are the nursery standard plugs generally grown in flats of 32. These plugs are rooted in a potting medium and are 2" deep and 2" across diagonally. This product costs about \$0.70/plant from commercial nurseries.



**Book planters/Deep plugs**- these plugs are grown in inserts that open like a book for easy retrieval. We used a plug 4 to 7.5 inch in length.