

# Building and Planting Coastal Sand Dunes: Backdune Species

## 'Atlantic' Coastal Panicgrass (*Panicum amarum* var. *amarulum*)

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Figure 22



Coastal panicgrass (Figure 22) is a warm-season bunch-like grass that is a post-stabilization species thriving from the crest of the frontal dune to inland sites. It is the only dune stabilization species that has been directly seeded onto sand dunes successfully. Potted plants and stem divisions can also be successfully established on these severe sites. The annual foliage emerges from a deep fibrous perennial root system with short lateral rhizomes. The seed is eagerly sought by doves and quail. Volunteer seedlings occasionally occur when the soil is undisturbed.

**Planting date:** March to May

**Method of establishment:** Transplant using single bare-root or containerized seedling or division; 12 to 18 inches tall, planted by hand. By seed, it can be hand broadcast/incorporated or planted using a garden seeder (single row, push-type), mechanically operated drill, or drop seeder.

**Material size:** 12 to 18 inches tall seedlings or rooted divisions

**Planting depth:** Plant tillers (sprigs) so roots are well distributed in moist soil and the crowns are covered with one-half to 1 inch soil. Pack soil.

**Plant spacing and seeding rates:** Tillers (sprigs) should be planted in rows 6 to 8 feet apart and spaced

about 18 inches apart in rows. About 5,000 tillers per acre are required for this type of planting

**Note:** In areas where the height of the vegetation is not a concern, coastal panicgrass (up to 4 ft. tall) may be seeded into the sand with a single row, garden type planter. With seed, use 5 to 8 lbs/acre drilled. The seed must be placed at a 1.5 to 2 inch depth for optimal germination. Ernst Conservation Seeds in Meadville, Pennsylvania, sells coastal panicgrass seed. For a list of commercial producers growing coastal vegetation, please see Appendix. This list will be posted/updated on the website of the USDA-NRCS Plant Materials Program at the following link: <http://www.nrcs.usda.gov/wps/portal/nrcs/publications/plantmaterials/pmc/northeast/njpmc/pub/>

For more information on 'Atlantic' coastal panicgrass consult the Plant Release and Planting Guide at the links below: <http://www.nrcs.usda.gov/Internet/FSE/PLANTMATERIALS/publications/njpmcbr12119.pdf>

<http://www.plant-materials.nrcs.usda.gov/pubs/njpmcbrpaam2.pdf>

## 'Avalon' Saltmeadow Cordgrass (*Spartina patens*)

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**Figure 23**

Although typically associated with tidal salt marshes, saltmeadow cordgrass (Figure 23) also naturally occurs in the secondary and backdune areas. Predominately inhabiting inter-dune troughs and low blow-out areas, it is dominant in these micro-sites since most other sand dune species cannot tolerate wet to saturated soil conditions. The trailing rhizomes of saltmeadow cordgrass are slender but form dense mats near the surface. It is vegetatively established on normal sites using freshly harvested stems (culms) or containerized plants on severe locations. It does not require the sand accumulation that beachgrass does and in fact will not tolerate too much deposition. It is one of the species that invades dune overwash areas after storm events.

**Planting date:** May 1 to June 15

**Method of establishment:** Transplant using 3 to 5 live stems placed bare-root or containerized; can be hand placed or planted with vegetable planter.

**Material size:**  $\geq$  12 inches.

**Planting depth:** Plant 2 inches below the nursery grown depth.

**Plant spacing:** Use 18 to 36 inch spacing, depending on the severity of the planting site.

**Note:** The origin of the 'Avalon' release is Avalon, New Jersey.

For more information on 'Avalon' saltmeadow cordgrass consult the Plant Fact Sheets at the links below:  
[http://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/njpmcrb12127.pdf](http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/njpmcrb12127.pdf)

[http://plants.usda.gov/plantguide/pdf/pg\\_sppa.pdf](http://plants.usda.gov/plantguide/pdf/pg_sppa.pdf)

## 'Dune Crest Germplasm' Coastal Little Bluestem (*Schizachyrium littorale*)

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Coastal little bluestem (Figure 24) is a native, warm-season, perennial grass that spreads by seed and short rhizomes. Found in scattered open clumps in the back dunes, it rarely forms a solid stand, but is found mixed in with other species such as partridge pea, beach heather, and beach pea. This bluestem also provides habitat for small mammals, shorebirds, and migratory birds.

**Planting date:** March to May.

**Method of establishment:** Transplant single potted plants and hand place or plant with vegetable planter.

**Material size:**  $\geq$  2 inch plug

**Planting Depth:** Place root ball 2 inches below the nursery grown depth.

**Plant spacing:** Container grown or bare-root plants should be planted on 2 to 5 foot centers on the primary dune ridge and back sides and the more stable dune and swale areas behind the primary dune. Coastal little bluestem may be interplanted with coastal panicgrass, saltmeadow cordgrass, seaside goldenrod, or partridge pea to enhance habitat diversity and conservation effectiveness.



**Figure 24. Coastal little bluestem close up.**



**Coastal little bluestem in Avalon backdune**

Coastal little bluestem is a coastal variant of the inland little bluestem. It only occurs in backdune areas where the sand has been stabilized. Because it is a bunch-type grass (unlike the three species described above), it usually occurs in open stands with bare sand between the clumps. Maximum height is 1.5 to 2 feet tall. A Mid-Atlantic ecotype was released by the USDA-NRCS, Cape May Plant Materials Center in 2007, but

although supplies have been growing with time, it is not available in large quantities through commercial nurseries.

[http://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/njpmcrb12124.pdf](http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/njpmcrb12124.pdf)

[http://plants.usda.gov/factsheet/pdf/fs\\_scli11.pdf](http://plants.usda.gov/factsheet/pdf/fs_scli11.pdf)

## 'Monarch Germplasm' Seaside Goldenrod (*Solidago sempervirens*)

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**Figure 25. Seaside goldenrod**

Seaside goldenrod (Figure 25) adds color and variety to a dune planting. This perennial forb is a major food source on the fall migration of the monarch butterfly. From its inconspicuous green basal leaves from winter into early summer arises a brilliant yellow flower cluster in early fall. Although often blamed for causing allergies, it is actually an insect-pollinated plant. Ragweed is the real culprit of these allergies.

**Date:** March 1 to May 15

**Planting Unit:** One bare-root or potted plant

**Depth:** Two (2) inches below the nursery grown

depth

**Method:** Hand placed or vegetable planter

**Size:** ≥ 12 to 18 inch stem

**Spacing:** 24 to 36 inch row spacing with plants placed 24 inches apart within a row. Plant in the backdunes where sand is stable. May be interplanted with switchgrass, coastal panicgrass, saltmeadow cordgrass, and beach pea or partridge pea.

[http://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/njpmcrb12132.pdf](http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/njpmcrb12132.pdf)

[http://plants.usda.gov/plantguide/pdf/pg\\_sose.pdf](http://plants.usda.gov/plantguide/pdf/pg_sose.pdf)

## Partridge pea (*Chamaecrista fasciculata*)

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Partridge pea (Figure 25) is a native, warm-season, annual legume. This plant reseeds itself for one to three years, but will gradually disappear without maintenance. Soil disturbance is necessary to maintain this species. This species is commonly found on backdunes, and its seeds are particularly important to wildlife because they remain in a sound condition throughout the winter into early spring.

**Planting date:** March to June

**Method of establishment:** seed

**Material size:** N/A

**Planting depth:** One half inch



**Figure 26**

**Planting rate:** Drill 4 lb/acre of scarified seed.

For more information on partridge pea consult the link below:

[http://plants.usda.gov/plantguide/pdf/pg\\_chfa2.pdf](http://plants.usda.gov/plantguide/pdf/pg_chfa2.pdf)

## Additional plants that have limited commercial availability

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The following is a list of supplemental plant species that are difficult to find from commercial sources. However, the Cape May Plant Materials Center is making an effort to eventually make these plant species more readily available from commercial sources.

### **Beach Pea (*Lathyrus maritimus*)**

Beach pea is a native, perennial, leguminous vine. It is often found interspersed with grasses on the backside of the frontal dune or in backdune areas. Its flowers vary in color from purple to magenta and are produced throughout the growing season from June to September. The primary means of spread is by rhizomes, although some seeds are produced in pea pods. This species ranges no farther south than coastal New Jersey. Only plants are available commercially; however, it has the potential to be included in dune seeding mixtures in the future.

### **Bearberry (*Arctostaphylos uva-ursi*)**

Bearberry serves a dual role on sandy soils: as a beautification plant and a critical area stabilizer. The thick, horizontal, vegetative mat and evergreen character are what make bearberry a very popular

ground cover. It is often planted around home sites, sand dunes, and sandy inland slopes. The fruit it produces is eaten by a few species of songbirds and game animals.

[http://plants.usda.gov/factsheet/pdf/fs\\_aruv.pdf](http://plants.usda.gov/factsheet/pdf/fs_aruv.pdf)

### **Beach Heather (*Hudsonia tomentosa*)**

Beach heather is a low, spreading shrubby plant with scale-like leaves that resemble a cedar tree and are densely covered with short, whitish hairs. It rarely grows over a foot tall and prefers backdune areas where the sand is stilled. Difficult to propagate from cuttings.

[http://plants.usda.gov/factsheet/pdf/fs\\_huto.pdf](http://plants.usda.gov/factsheet/pdf/fs_huto.pdf)

### **Trailing Wild Bean or Fuzzy Bean (*Strophostyles helvola*)**

Trailing wild bean is a native, annual trailing vine that has a characteristic bean flower and is leguminous. It may be instrumental in jump starting the plant successional process on dunes, even though it has a low capacity for stabilizing sand. It is being investigated for its use in a sand stabilization seed mixture.

[http://plants.usda.gov/plantguide/pdf/cs\\_sthe4.pdf](http://plants.usda.gov/plantguide/pdf/cs_sthe4.pdf)

## **Prickly pear cactus (*Opuntia compressa*)**

This is the only cactus found in New Jersey. It often forms spreading mats and in summer produces big pale yellow flowers with red centers and reddish fruits which are edible in the fall.

## **Dune wildrye (*Elymus glabriflorus*)**

Dune wildrye is a native, short-lived, upright cool-

season grass that grows in somewhat protected areas of the backdune. The seed head looks like the agricultural small-grain rye plant. It is tolerant of dry alkaline soils. Because of its good seedling vigor, it has the potential to be used as a nurse crop for dune plantings/seeding. However, a commercial seed source is not available and will need to be developed.

[http://plants.usda.gov/plantguide/pdf/pg\\_elgl3.pdf](http://plants.usda.gov/plantguide/pdf/pg_elgl3.pdf)

# Recommended Plant Specifications for Specific Coastal Species

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Using vegetative transplant materials is considered one of the most economically effective ways to obtain planting stock for restoration projects. Vegetative transplant materials are described as the production and establishment of new plants by means other than seeds. Vegetative transplant materials commonly used for coastal restoration include bare-root slips and plugs, rooted and unrooted stems, rhizomes, and stolons (runners).

When considering the use of vegetative materials for restoration projects, the following information should be considered.

### **Plant Materials**

Determining the type of plant materials needed is directly related to the plant species and the targeted restoration site. In general commonly used plant materials include:

#### **Bare-root slips or plugs**

These include a single or multi-stem plant pulled from a donor stand. Materials are usually bare-root with little or no soil remaining around the roots. Bare-root plugs should have a root mass of not less than 2 inches in diameter at the root crown with a minimum of 4 roots per plug.

#### **Rhizomes and stolons (runners)**

Rhizomes are horizontal underground stems that can send out both shoots and roots at nodes and buds. Stolons are stems that grow horizontally above the ground and may produce roots and shoots at the nodes or buds. Rhizomes and stolons should have a minimum of two nodes or buds to be considered planting material. Sprigging is a commonly used term when referring to the planting of rhizomes and stolons to establish a site.

#### **Rooted and unrooted stems**

These include above ground aerial stems that when placed in contact with the soil have the ability to root at stem nodes. Rooted and unrooted stems should have a minimum of two healthy nodes or buds to be considered planting material.

Vegetative materials for restoration are usually obtained from two types of sites, the first being an existing donor native site (wetland, dunes, etc.) and the second being from an established commercial nursery pond or field. Removing vegetative plant materials from a donor native site (wetland, dune, etc.) is not recommended but may be an option if commercial supplies are limited. Removing plants from natural sites regardless of the care taken in frequency, spacing, and location of plant removal will eventually affect the health and vigor of the donor

stand. In addition, removal without applicable permits may be in violation of state and federal regulations.

Harvesting vegetative materials from a commercial nursery site (ponds and fields) is recommended due to multiple benefits including the following:

- donor plants are usually an improved variety with proven traits
- sites are more easily accessible
- they have increased health and vigor
- less chance of insect or disease problems
- harvest numbers are more easily obtained
- will not damage or impact natural communities

In order to establish a commercial nursery site, propagation material is needed in the form of starter transplants. Starter transplants may be in any of the vegetative forms described above. Starter transplants may also be obtained from a donor native site (wetland, dune, etc.) or from an existing established commercial wetland pond or field. It is recommended that starter transplants needed for the establishment of a commercial nursery site also be obtained from an existing commercial nursery site.

To supply adequate quantities and quality of materials, donor sites need to be established for a period of time for the parental donor plants to develop adequate top growth and below-ground root mass. Most vegetatively harvested materials are harvested from the new growth of the original transplants. Plants must be viable and actively growing when removed from the donor site. In addition, plants need to be free of defects, disfiguring, sun scalding, disease, insects, insect eggs, and insect larvae or other forms of infection or infestation.

Refer to Table 3 for recommended specifications for commonly produced vegetative transplant materials for use in coastal restoration.

## Salt Hardening

If planting in an area with high salinity, it is recommended that plants be salt hardened. Salinity

hardening levels will vary according to planting site conditions. However, hardening plants to 12 parts per thousand (ppt.) is a general rule when working in brackish to lower-saline conditions. Plants should be salt hardened to a minimum level of 12 ppt for at least 14 consecutive days under ponding conditions. Plants need to stay salt hardened at the minimum salt level and the minimum hardening duration to within three weeks prior to delivery and planting.

## Shipping and Handling

Vegetative material should not be dug or harvested earlier than 48 hours prior to time of delivery. Plants should be packed for delivery in such a manner as to ensure protection against climatic, seasonal, or other injuries during transit. A variety of methods for packing includes wrapping with burlap, sphagnum moss, or paper; dipping in water absorbing gels (polymers); or a combination of materials. Special care should be taken for prompt delivery and careful handling in loading and unloading. Plants need to be transported in an enclosed truck or trailer, or they may be moved in an open trailer if sufficient wind protection (netting) is provided to prevent damage to sensitive leaves.

Plants may be cut to facilitate transportation but stems should not be cut shorter than half the normal mature plant height. Stems should not be broken or physically damaged during transport. In addition, plants should not show signs of water stress such as displaying dry wilted leaves and/or stems. Plants need to maintain their stem and leaf rigidity at all times, indicating adequate moisture and low stress. Vegetative materials should be planted within 24 hours following delivery unless proper storage conditions (wet, cool) are provided.

## Plant Form Descriptions

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**Bare root** – these are plants that are field dug with most of the native soil shaken off for easy transport to the planting site. Bare-root 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 an example below.



**2 x 2 inch plugs** – these are the nursery standard plugs generally grown in flats of 32. These plugs are rooted in a potting medium and are 2 inches deep and 2 inches across diagonally. This product is intermediate in cost between bare root and deep plugs.



**Book planters/Deep plugs** - these plugs are grown in inserts that open like a book for easy retrieval. Plugs generally range 4 to 7.5 inches deep.



**Figure 27**

Nursery-grown container stock is generally the most reliable and ecologically appropriate way to obtain plant materials for restoration projects. When obtaining container-size plant materials, following the information in Table 3 should be considered.

**Table 3**

**Recommended herbaceous species for coastal dune restoration outside of areas that support or are set aside as habitat for rare, threatened, or endangered species**

<b>Species/Planting Zone</b>	<b>Recommended Planting Material</b>	<b>Comments/Considerations</b>
<p><b>American Beachgrass</b> <i>Ammophila breviligulata</i></p> <p>Plant through dune planting area, Will persist and thrive best on frontal dune</p>	<p>Field grown bare-root culms (stems): plant only during dormant season (November to March).</p> <p>Nursery grown plugs: may be planted into June as long as some soil moisture is present,</p>	<p>Recommended plant spacing: Generally 1 to 1.5 ft. centers within a row. There should be a spacing of 1.5 ft. between rows with staggered plant spacing except where plover nesting is present or has the potential for nesting.</p> <p>Variety recommended: 'Cape' (origin: Cape Cod, Massachusetts)</p>
<p><b>Bitter Panicum</b> <b>Bitter Panicgrass</b> <i>Panicum amarum</i></p> <p>Plant on mid-upper areas of backdune,</p>	<p>Nursery grown rooted cuttings</p> <p>Dormant bare-root stems</p>	<p>Recommended plant spacing: 2 – 3 foot center. Plant with beachgrass due to soil binding abilities and to form stable dune matrix.</p> <p>Recommended planting percentage of 20% bitter panicgrass, 80% American beachgrass</p> <p>Variety recommended 'Northpa' (origin: North Carolina)</p>
<p><b>Sea Oats</b> <i>Uniola paniculata</i></p> <p>Plant on mid-upper areas of frontal and back dunes.</p>	<p>Plant rooted containerized material for best success,</p>	<p>Currently not available for planting in New Jersey. However, a cold-tolerant variety may be available in the future.</p>
<p><b>Coastal Panicgrass</b> <i>Panicum amarum var amarulum</i></p> <p>Plant on dune crest to backdune areas.</p>	<p>Dormant bare root propagules</p> <p>Nursery grown plugs or containers</p> <p>Seed may be drilled between rows of vegetatively planted beachgrass. Seed should be place 1.5" to 2.0" in depth.</p>	<p>Recommended plant spacing: 2 foot centers.</p> <p>Drill seed at 5 to 8 lbs./ac.-1.5 to 2.0 inches deep in the sand</p> <p>Variety recommended: Atlantic</p> <p>Origin: Virginia</p>
<p><b>Saltmeadow Cordgrass</b> <i>Spartina patens</i></p> <p>Mid to upper areas of frontal and backdune, as well as coastal bay shorelines</p>	<p>Dormant bare root propagules from November to March only</p> <p>Plant nursery grown plugs or containers,</p>	<p>Recommended plant spacing: 2 to 3 foot centers interspersed with American beachgrass</p> <p>Recommended variety: Avalon</p> <p>Origin: New Jersey</p>

Species/Planting Zone	Recommended Planting Material	Comments/Considerations
<p><b>Coastal Little Bluestem</b> <i>Schizachyrium littorale</i></p> <p>Plant on backdune areas only. Will not tolerate accumulating sand.</p>	<p>Plant nursery grown plugs or containers.</p>	<p>Plant on three foot centers interspersed with American beachgrass, coastal panicgrass, and saltmeadow cordgrass.</p> <p>Selection recommended: Dune crest germplasm</p> <p>Origin: New Jersey, Delaware</p>
<p><b>Seaside Goldenrod</b> <i>Solidago sempervirens</i></p> <p>Upper areas of frontal dune and backdune</p>	<p>Plant nursery grown plugs or containers.</p>	<p>Plant plugs of nursery grown material. Successful seeding has not been accomplished yet.</p> <p>Selection recommended: monarch germplasm</p> <p>Origin: New Jersey, Delaware</p>
<p><b>Partridge Pea</b> <i>Chamaecrista fasciculata</i></p> <p><b>Trailing Wild Bean</b> <i>Strophostyles helvola</i></p> <p><b>Beach Pea</b> <i>Lathyrus maritima</i></p> <p>Dune crest and backdune</p>	<p>These species are most likely only available commercially as seed.</p> <p>Limited availability</p>	<p>These species should be interplanted in the backdune area to increase plant diversity and improve soil health as they are leguminous, nitrogen fixing plants. Seeding techniques haven't completely been worked out yet.</p>

## Environmental Considerations

In or near rare, threatened, or endangered species habitats, beach management goals supporting recreation and tourism and providing storm and flood protection to human communities and infrastructure need to be balanced with the need for maintenance of habitat for rare/listed species. As noted earlier in this manual, Section 7(a)(2) of the ESA requires federal agencies that authorize, fund, or carry out specific projects (such as projects that implement recommendations in the Manual) to consult with the U.S. Fish and Wildlife Service if a proposed action may affect any federally listed species. Section 9 of the Act applies to both federal and non-federal activities and prohibits unauthorized taking of listed species. This includes significant habitat modification or degradation that results in the killing or injury of listed wildlife by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Consequently, in areas that support or are set

aside as habitat for rare, threatened, or endangered species, dune plantings should only be undertaken when clearly needed for storm protection and, when needed, should be designed to avoid the creation of over-stabilized dunes and the encroachment of dense vegetation into the high beach zone. Dune plantings should avoid creating cover, den sites, or perches for predators in both foredune and backdune areas. For example, woody species should not be planted in or near habitats for rare/listed species. Managers planning dune restoration projects in such areas should contact the Endangered and Non-Game Species Program (ENSP) and the U.S. Fish and Wildlife Service early in the planning process to develop and implement appropriate Beach Management Plans (BMP) for these areas, including the nature and densities of the plants used in the dune restoration or enhancement project.