Planting Amendments and Dune Maintenance

1. Fertilizer – A slow release fertilizer such as Osmocote® (analysis varies depending on release time) or an organic product such as Ocean Gro (5-5-0) that supplies a small amount of nitrogen and moderate amount of phosphorus would be beneficial. While older protocols did suggest broadcast fertilization of beach grasses, dunes are now considered environmentally sensitive buffers to aquatic habitats, and broadcast fertilizer applications in such habitats are no longer acceptable because the nutrients from such habitats often leach rapidly from there into the nearby water, causing pollution. In areas that are not used or set aside as habitat for rare, threatened, or endangered (RTE) species, it is recommended that a small amount of fertilizer be added to the hole as the plants are installed. Initial fertilization is best done at planting with a complete slow release fertilizer, such as Osmocote® 14-14-14, placed under the plant at a rate of 1.5 grams per plant. Initial fertilization may also be provided with 200 to 300 pounds of mineral 10-10-10 per acre, broadcast six weeks after planting. Other commercial fertilizers of the same analysis with a slow release formulation may also be used. Fertilizers and other amendments should not be used on dunes in or near RTE species areas, as they promote high densities of dune vegetation that are incompatible with RTE species' habitat requirements.

2. Compost/seaweed – Adding organic materials such as compost is helpful from a water-holding standpoint, but any of these materials should also be mixed in with some sand to prevent a water barrier (zone of discontinuity between different-sized pore spaces) from being created between the roots and the pure sand substrate. Similarly, if one plants a containerized shrub growing in Promix (high organic potting soil) into a hole surrounded by pure sand, this will create a discontinuous water barrier between sand and Promix. To help the plant thrive, it is important to back fill the hole with a mixture of Promix and sand (about a 50/50 ratio).

3. Terra-sorb and similar water absorbing gels – Terra-sorb is one of a suite of similar products that keep roots moist when transplanting bare-root seedlings and helps maintain water absorption to roots during dry periods. In addition, the establishment of bare-root and stem cuttings can be assisted by using fertilizer combined with water absorbing granules called hydrogel. This material is extremely water absorbent and has the ability to absorb hundreds of times its weight in water. Hydrated hydrogel combined with fertilizer can be placed in the planting hole just prior to plant placement. Absorbed water and fertilizer is then slowly released back into the root zone for use by the plant. It is good insurance and adds minimal cost to the planting. One pound of crystalline product, which costs $6.00-$7.00, added to about 30 gallons of water will treat 15,000 bare-root seedlings.

4. Mycorrhizae fungi – Mycorrhizal fungi promote plant vigor, add disease resistance, and can increase survival while improving soil for future plantings. A 3-lb. jar of Bio/Organics Mycorrhizae Inoculum will treat about 1,500 plants at a cost of $80.00. This adds about 5¢ per plant to the cost of the planting. The jury is still out on the effectiveness of the commercially produced mycorrhizal inoculant. If an additional 5¢ per plant is not a problem from a project budget standpoint, it won't hurt to add the inoculum at planting time.

Dune Maintenance

Even the best-vegetated dune will not remain that way unless a reasonable maintenance program is followed. Some considerations include:

Control of Foot and Vehicle Traffic

Primary dune vegetation cannot tolerate trampling. Traffic must be **prohibited**! However, dunes must be crossed to reach the beach. At selected sites, mechanical crossovers must be installed. Elevated walks, paved paths, and sandy surfaces are satisfactory. Walkways, except elevated ones, should be curved to reduce wind erosion. The secondary dune must also be protected from pedestrian and vehicular traffic. All walkways should be fenced to channel traffic across the dune. The front and back faces of the dune should be fenced to prevent ingress, particularly from the beach. In RTE species' habitats, symbolic (string and post) fences should be used instead of sand fences to channel public use away from sensitive vegetation or wildlife habitat. Where temporary use of sand fences is deemed necessary for public use management, adverse effects can be minimized by prompt removal. Sand fences placed for public use management in suitable rare/listed species habitat should not be allowed to become buried. They should always be removed before September 1. If natural processes do not restore beach topography to pre-installation elevation and profile, remedial mechanical re-grading to restore the pre-fencing topography should be conducted before March 15.

Vegetation Maintenance

Generally little maintenance is required after coastal plantings are performed. It is important to fertilize plantings during the first two years after plantings. This enables plantings to become established more readily. Foot traffic should also be minimized on newly planted areas, and debris should be removed on a regular basis.

Vegetation is maintained with applications of fertilizer applied as needed to keep desired density. A maximum annual application of 20 pounds of nitrogen per acre should be applied. Replanting of areas where vegetation has been destroyed is an essential annual maintenance requirement. This should be accomplished at the first window of opportunity. Woody plants need a maintenance fertilizer program beginning in the second year after planting.

Fertilizers and other amendments should not be used on dunes in or near the rare/listed species areas. Further, vegetation thinning should be conducted to maintain rare/listed species habitats within recommended targets (Table 1).

Maintenance of Dune Line

A dune system, like a chain, is no stronger than its weakest link. Consequently, to receive maximum protection from dunes, a strong and uniform dune line must be maintained in areas not occupied or set aside for RTE species. In areas being managed for protection of human infrastructure, blowouts, washouts, or other natural or human-produced damage must be repaired quickly or it will weaken the entire protective dune systems. However, sand dunes are dynamic formations. They tend to move oceanward during periods of relatively calm weather and landward after severe storms. Our task in such areas is to assist nature to maintain and restore the dunes.

Blowouts in a dune system can be repaired by placing a sand fence between the existing dune parts. One or more fences may be required. It is essential to tie the ends of the fence into the existing dune to keep the wind from whipping around the ends.

Maintenance of a uniform dune line is likely to degrade RTE species habitats over time, particularly in areas where human activities alter natural dune blowouts or overwashes. Thus, the practices described above should not be adopted in rare/listed species

areas. Instead, dune creation and management of RTE species areas should follow the approved Beach Management Plan if there is one, as well as Maslo et al. (2011). Both of these will be superseded by the forthcoming dune guidelines for use in habitats for use in rare/listed species habitats. Dune management in rare/listed species areas should be guided by the site-specific recommendations of NJDEP Beach Nesting Bird program staff.

Building the Dune with Vegetation and Fencing

Where blowing sand is available, a simple, relatively inexpensive and successful method for building dunes is to plant American beachgrass. It consists of planting strips of beachgrass parallel to the coastline. As the airborne sand moves landward, the velocity decreases. The sand falls to the surface to begin the natural cycle of dune formation. The row closest to the ocean should be at least 100 feet from the mean high tide line. If space permits, plant a 40 to 50 foot wide strip, but no less than 20 feet. Such plantings will trap windblown sand, particularly during the growing season. American beachgrass will continue to grow through the newly trapped sand. Large quantities of sand deposited on the beach by winter storms may quickly exceed the capability of the grass to trap and hold it. Some of this unstabilized sand may be blown to the backdune areas or returned to the beach and then the ocean.

Sand Fences (Snow Fence Material)

A sand fence is effective for trapping and holding sand. The material is readily available in the form of snow fence. It may be more expensive than building dunes with vegetation alone but is less expensive than using machinery. Where a sand source is available and the wind comes from the desired direction, a sand fence will build a dune much faster than vegetation alone.

To build a barrier dune in areas not occupied or set aside for RTE species, erect two parallel sand fences 30 or 40 feet apart. The fences should be roughly parallel to the water line and be as nearly as possible at a right angle to the prevailing winds.

Where this is not possible, erect a single line of fence parallel with the ocean at least 140 feet from the Mean High Tide line. Attach 30 foot long perpendicular spurs at 40 foot intervals along the water side of the fence to trap lateral drift. These spurs form pockets to trap sand as it drifts laterally along the fence.

As the pockets fill with sand, additional sets of fence can be placed over those filled units until the barrier dune has reached the desired height. As a general rule, sand will only fill to a level about three-fourths of the depth of the sand fence height.

To widen an old dune, the fence line should be erected oceanward at a distance of 15 feet from the base of the old dune.

The sand fencing configurations recommended in this section are likely to degrade RTE species habitats over time. As a result, these fencing practices should not be adopted in rare/listed species areas. Instead, dune creation and management in rare/listed species areas should follow the approved Beach Management Plan – if there is one – as well as Maslo et al. (2011). Both of these will be superseded by the forthcoming dune guidelines for use in rare/listed species habitats.

Sand Fence Specifications

Use standard 4 foot wood slatted (snow) fence. The wood should be sound and free of decay. The fence should have no broken wire or missing or broken slats. An alternate fence material is the polyvinyl type that has at least 50 percent porosity.

Wood posts for fence support should be black locust, red cedar, white cedar, or other wood of equal life or

strength. They do not need to be chemically treated. The posts should have a minimum length of 6.5 feet and a minimum diameter of 3 inches. Standard fence posts are usually 7 to 8 feet long and can be used when available and meet the minimum standards.

Four wire ties should be used to secure the fence to the wood posts. Install the fence so alternate posts will have fence on the ocean side of them. Tie wires should be no smaller than 12 gauge galvanized wire.

Posts will be set no more than 10 feet apart and at least 3 feet deep. This method makes the fence more resistant to changes in wind direction.

Sand Fence plus Vegetation

The combination of these two approaches may be more effective than either of the two alone. The sand fence should be placed as outlined above. Strips of vegetation should then be planted parallel to the fence on the landward side of the landward fence and the oceanward side of the oceanward fence as shown in Figure 3. Each strip of vegetation should be about 20 feet wide and located 10 to 15 feet from the sand fence. As the sand fills between the two fences, additional fence can be erected in the area between the fences. The area can be planted as shown in Figure 4. Such a combination can trap more windblown sand crossing the dune area than either fence or beachgrass alone. This method can produce a broader based dune than either approach alone.

Height of Dune

The length of time required to build a dune varies with weather conditions, available sand, and the method used to build the dune. If the sand fence/vegetation combination is used and ample quantities of sand are brought onto the beach by storms, 4 feet of dune elevation can be built in a season. If vegetation alone is used the dune will be no higher than the vegetation is capable of growing in a season.

The dunes' eventual maximum height, which will be influenced by the installation of additional sand fence or vegetation and available sand, is about 12 feet to 15 feet. At this height range, the wind's energy is either unable to lift the sand above this elevation or the sand is carried over the top of the dune and deposited on the back side. To maintain this height requires a vigorous maintenance program. Maintenance includes replanting, protection from traffic, fertilization, and a diversity of plant species.

Care should be taken to ensure that local residents are aware of any interference the dune height will have on their scenic vistas. This may influence the maximum height to which the dune is built.

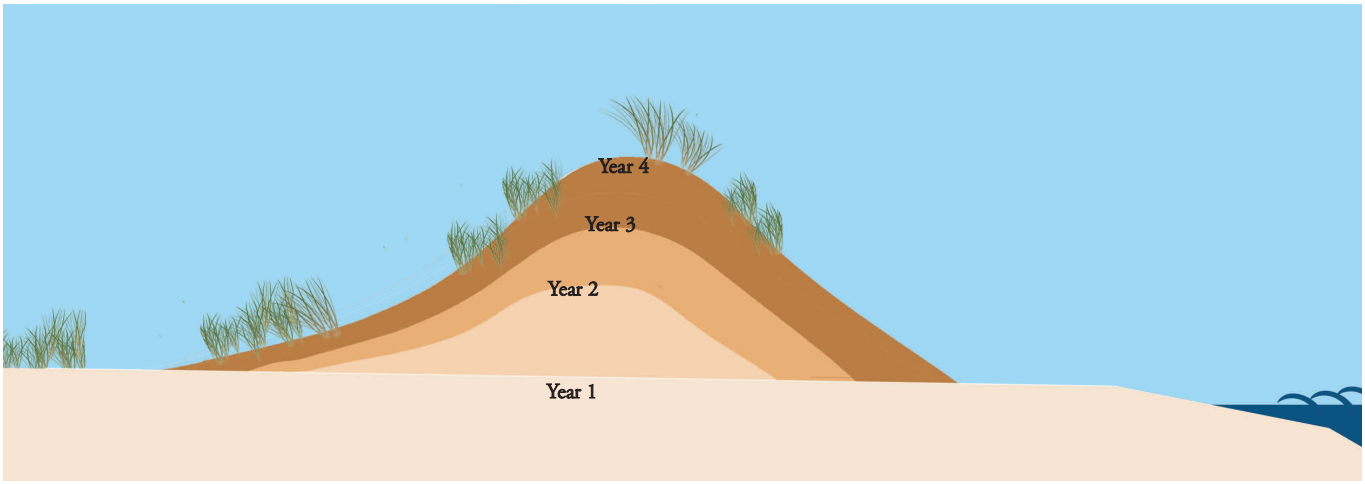

Figure 4. Dune width and height increase over time and migrate in a seaward direction (Rogers and Nash 2003).