

Dune Restoration at Fort Matanzas

By Brian Peters

Fort Matanzas National Monument is a coastal park with 100 of its 300 acres located on Anastasia Island, near St. Augustine, Fla. Anastasia, a typical barrier island with shifting inlets and unstable beaches, constitutes a natural system to protect the land and provide an equilibrium between destructive and constructive forces of the coastal environment. At the heart of this protective system is the coastal dune.

Human activities on Anastasia Island have disrupted the long term balance of nature. At Fort Matanzas, vehicle and foot traffic over a number of years has destroyed much of the anchoring vegetation, allowing wind and water to carry away the first two lines of dunes. The park staff decided that action was needed to preserve this natural resource.

The National Park Service owns the southern tip of Anastasia Island except for the intertidal zone, which is in state jurisdiction. From Matanzas Inlet to the north park boundary, the monument contains approximately one mile of ocean beachfront. The inlet is spanned by the Highway A-1-A bridge. In the 1970s the once narrow inlet has widened until high tides threatened the bridge causeway. The dunes in that area had eroded to the line of scrub in the back dunes, creating a danger of extreme high tides cutting away the dune line from the vulnerable south flank. Damaging traffic on the beach also increased, attracted by a substantial sand spit that developed and grew on the west side of the bridge.

Before starting a restoration program a little ground work was required. How much sand was being moved by the wind along the surface of the beach? Could that sand be trapped? At Fort Matanzas, wind direction is variable and unpredictable but the stronger, sand-carrying winds are most often out of the northeast. An experiment using burlap bags and plastic garbage bags was designed to determine how much sand was being moved in the winter

months. From November through January the sacks, held open toward the northeast by stakes in the sand, caught an average of one cup of sand every three days. (Information later became available that sand fence will catch approximately 16 cubic feet per linear foot of fence.) This admittedly primitive test indicated that probably enough material was being transported to justify an experimental project.

In December, 1982, a 35 foot section of sand fence was placed a few feet from, and parallel to the base of the dune line, where a steep cliff had developed. The fence was entirely buried by March of 1983. That January, with the help of Scout Explorer Post 414, 500 discarded Christmas trees were staked down at the site.

The success of those winter experiments prompted purchase of over 10,000 feet of sand fence and heavy fence posts. In the fall of 1983 a number of techniques were used and evaluated.

A single line of sand fence, placed at the base of a dune slope, will help to broaden the foundation and sometimes to raise the elevation. Placed two or three

feet in front of a "cliff," the single line fence will help slow the slumping of the cliff face, often the most devastating result of storm damage. Any organic material (i.e. grass cuttings, tree limbs, sea weed, etc.) thrown behind the fence will aid in stopping the cliff "slump." The single line of fence also can be used to build a dune by itself, but the dune is not a broad mound and shifts quite easily. The main advantage to this use of sand fence is its economy.

Fence erected in a "zig-zag" pattern is most effective for building a dune line in an open space. The fence catches sand from all directions and builds a broad base. Christmas trees are almost always used with this style because the points at the corners tend to blow out easily without extra reinforcement. The major disadvantage with the zig-zag pattern is the amount of fence required.

East of the Matanzas bridge, the old dunes had completely eroded, leaving a flat plain that could flood in an extreme tide. A perimeter dune was built using the zig-zag pattern, providing a line of protection for the previously exposed flank of the entire dune system. To fill in the flats, large "x" shapes were built of 30 foot fence sections. These x's were slow building but have gathered large mounds of very stable sand and afford prime places for planting vegetation.

Christmas trees collected by the local Boy Scout Council, when used in conjunction with the sand fence, have been very effective in anchoring sand. Many of the trees placed in late December, 1984 were completely covered by February of 1985. In starting a dune from level ground, the Christmas trees are useful as sand collection starters. In some situations they are absolutely essential. Two areas that had been washed out by a late November storm were showing no signs of filling when fence alone was used. Two parallel lines of fence, five feet apart, were then erected and the space between was filled with trees. The whole project was given a head start by using a small endloader and piling 8 inches of sand at the base of the outer fence. Three months later the gullies had filled with 30 inches of sand, bringing them back to the level of the surrounding area.

The fence used at Fort Matanzas is standard snow/sand fence, 4 feet tall with 1½ inch wooden slats, 2½ inch spaces and 13½ gauge wire. The posts are heavy iron fence poles, T-shaped in cross-

Continued on page 8



Many hands make light work. The vegetation planting work was done by YCC volunteers in cooperation with USDA Soil Conservation Service.

section. Other organizations in the area have used poles made of other designs, most of which do not hold up to the stresses of the coastal environment. Heavy wire is the easiest material to use in securing the fence to the poles. The wire fence fasteners available through GSA are inexpensive and hold well but are more difficult to manipulate.

A severe northeaster with extremely high tides in November 1984 taught us another lesson. It washed away the first 21 feet along the entire length of the dune line and took with it large sections of sand fence. The sand laden water exerted a tremendous pressure on the fences and pulled down long pieces because they were fastened together. When the fencing was repaired, long contiguous lengths of fence were replaced by separate and shorter (50') segments. In another severe storm tide, only small sections will be lost.

To make the dune system self-sustaining, sea oats (*Uniola paniculata*) were obtained from the USDA Soil Conservation Service and planted by a local 4-H group; 500 plants in April of 1983 and 1984, 1000 plants in April of 1985. Plants on the windward side of the dunes became windblown and died when their roots were exposed. The remainder of the plants were successful, estimated at 90 percent survival. Sand fence protected the plantings and was well worth the cost, since one destructive incident can cancel out many hours of hard work.

Additional dunes are beneficial to the area for their stabilizing effect and additional habitat. There may, however, be undesired results. Extended dunes may occupy what was previously beach, forcing crowded sun seekers into the dune area. This creates trails and begins the destructive cycle again. Sand dunes also can destroy critical habitat for some wildlife species. At Fort Matanzas, black skimmers, Wilson's plovers and least terns (designated by the state of Florida as a threatened species) nest on the shell strewn beaches but plant covered dunes are unsuitable as nesting areas. On the flats previously mentioned, a compromise was reached by building a protective perimeter dune and a few "x" shaped mounds, with ample area left between for nesting. In addition, the sand spit to the west of the bridge is fenced to provide protection to the nesting birds.

Sand fencing alone cannot protect this fragile habitat. Signs once posted along the top of the dune line, reading "Keep Off Dunes," were changed to read "No foot traffic on the dunes" because a large number of beach users thought the signs referred only to vehicles. Enforcement could be difficult but daily foot and vehicle patrols along the beach to maintain high visibility produce results, even on busy days. Citations are rarely used for pedestrian violations since such incidents commonly are followed by sign disappearance or other vandalism. At Fort Matanzas, lower levels of enforcement work well.

Fort Matanzas has a staff of two rangers and two maintenance people. With planning, flexibility, and volunteer help the project is not prohibitively expensive or time intensive. At Matanzas, regular patrols are maintained but the interpretive program has not been diminished; in fact it may have improved, since the rangers have shorter shifts at the Visitor Center and more varied duties.

The most important aspect of this program is that it works!

Peters is Ranger at Fort Matanzas National Monument in Florida.