

Oregon Parks and Recreation Commission

November 19, 2009

Agenda Item: 10

Information

Topic: Planning Update – Cape Lookout State Park

Presented by: Ron Campbell

Historic Shoreline Erosion, Loss of Park Facilities and Efforts to Stabilize the Shoreline

Cape Lookout State Park in Tillamook County is one of Oregon's most popular coastal parks, offering beach access, a full range of camping amenities and spectacular hiking on the cape. For several decades, the ocean shoreline that fronts the developed area of the park north of the cape has been receding, causing OPRD to abandon or relocate some of the park facilities and to artificially stabilize a reach of shoreline that fronts most of the campground. Major shoreline erosion has been sporadic, mostly occurring during the more intensive winter storm events set up by intermittent weather patterns known as "El Nino" and "La Nina".

Major winter storms, especially successive storms, tend to alter the normal seasonal pattern of beach sand displacement within a littoral cell. (A littoral cell is a beach segment located between two headlands.) Under normal conditions, beach sand is displaced southward during the summer, driven by waves from the northwest. During the winter, sand is moved northward, driven by waves from the southwest. Over a period of several years to a few decades, the net transport of beach sand within the littoral cell tends to be balanced. In the more intensive winter storms, waves from the southwest tend to be larger, transporting larger volumes of beach sand northward than are replaced by summer waves. This leads to a sand deficit at the southern end of the cell, such as where the park facilities are located. When the extent of the beach is reduced by sand removal, storm wave energy that is normally dissipated as waves break on the beach reaches farther inland causing the dunes to erode and the shoreline to retreat landward. Once the beach is changed in this way, waves generated during normal winter storm activity may continue to erode these "hot spots" that were set up by the major storms.

Until the El Nino of 1982-83, a wide sandy beach existed along the park shoreline, and there had been no documentation of significant erosion of the high natural dunes. However, during the 1960's a log seawall supported by vertical I-beams was constructed along the shoreline fronting most of the campground area, which suggests that this reach of shoreline had been susceptible to previous phases of storm wave erosion. The northward shift of sand during the 1982-83 El Nino greatly reduced the expanse of beach fronting the park, allowing storm waves to attack the dunes while causing the seawall to begin failing at its south end. In subsequent years, continued failure of the wall, coupled with loss of the dunes, progressed northward until the wall was completely destroyed and finally eliminated after the storms of the late 1990's. Shoreline retreat and damages to the park resulting from storms during the successive winters of 1997-98 and 1998-99 caused OPRD to abandon and remove 25 campsites, an amphitheater and 2 restroom buildings that were either damaged or would be at risk of total loss in subsequent storm seasons.

Between 1999 and 2000, an experimental artificial dune fronted by a cobblestone revetment, designed to mimic natural conditions, were constructed along the reach of shoreline formerly protected by the seawall. The dune was constructed of sand bags covered with a layer of sand planted with native beach grass. A berm of natural beach cobble was placed against the dune to dissipate wave energy. The cobblestone revetment is dynamic, being displaced over time by wave action, and now needs to be replaced after performing well for nearly 10 years. Unless the cobblestone is replaced, the artificial dune will be undermined by storm wave action and will fail. Preparations are now underway to replace the cobblestone.

While the shoreline fronting most of the campground has been stabilized by the artificial dune and revetment, shoreline retreat has continued elsewhere in the park. In the winter of 2007-08, excessive shoreline retreat occurred along the narrow spit north of the campground where the park's three main sewage drainfields are located. One of the drainfields was irreparably damaged and had to be abandoned, and another is now at risk of being destroyed in the upcoming winter storm season. The natural dune height through this area has been reduced to a point where the spit may soon be breached by wave overwash. A project is now underway to relocate the entire drainfield system to a safe location away from the shoreline.

What do we know about future risks to the park?

In assessing past trends and future risks to park facilities, staff reviewed studies of the park's receding shoreline conducted by the Department of Geology and Mineral Industries (DOGAMI), and other reports produced by DOGAMI that provide indicators of potential future erosion and related hazards. Staff also examined historic aerial photos and surveyed the current shoreline position to determine the extent of shoreline retreat over several decades. These data indicate that natural rebuilding of the beach and dunes, which usually follows a period of erosion, is not occurring along the park shoreline. According to DOGAMI scientists, because of the extent of erosion that has taken place, it appears doubtful that this reach of shoreline may ever fully recover, particularly when one considers the affects of climate change and rising sea levels.

Since the early 1980's, the rate of shoreline retreat has averaged 3 to 6 feet per year along the section of shoreline fronting the campground and day use area. Erosion has been sporadic, with major changes occurring in the more intensive storms. This trend reflects the imbalance in seasonal net transport of sand and resulting "hot spot" erosion discussed above. Until the artificial dune and revetment were constructed to protect a portion of this reach, a more rapid erosion rate was occurring along the now-protected reach.

South of the artificial dune, shoreline retreat is undermining the group tent camp parking lot and reducing the size of the picnic area. At the current average erosion rate, shoreline retreat could reach the picnic shelter in as few as 15 years, and the corner of the day use parking lot in as few as 23 years. However, as discussed elsewhere in this report, one or more major storm events could cause much more rapid shoreline retreat.

The north end of the campground (Loop A/B) is at risk where it extends beyond the artificial dune and onto the spit. The remaining natural dune in this area will continue to be reduced in height as the shoreline recedes landward, increasing the likelihood of waves overwashing into the campground. Near the north end of the campground, the natural dune height has been reduced to as low as 25 feet elevation, only 4 feet higher than a low point in the artificial dune where wave overwash now occurs occasionally in winter storms. As the past has shown, major shoreline retreat can occur in a single storm, such as the storm of March 2-3, 1999. A storm of this magnitude could breach this natural dune.

DOGAMI has modeled the extent of possible erosion in unusual, but potentially catastrophic events. Scenarios representing conditions of tidal elevation, storm surge and peak wave height, runup and frequency have been developed to determine low, moderate and high risk zones based on the likelihood of waves of different heights occurring offshore. The “high-risk” zone is based on a storm event occurring under conditions similar to the March 1999 storm, which produced waves reaching 47 feet in height that washed into Loop A/B and caused considerable damage. This scenario represents conditions also referred to as a “50-year storm.” According to DOGAMI, this scenario could cause erosion as far inland as 275 feet from the current shoreline. The “moderate risk” zone is based on a more unusual but more catastrophic storm event, with waves up to 52 feet in height causing erosion as far inland as 430 feet from the current shoreline. This scenario represents conditions also referred to as a “100-year storm.” The “low risk” zone represents extremely rare conditions resulting from an off-shore earthquake occurring simultaneously with a 100-year storm, which could cause erosion as far as 475 feet from the current shoreline.

Where Do We Go From Here?

Preparations are now underway to address the most immediate needs for protecting facility investments and keeping the park in operation. Construction of the new drainfield and replacement of the cobblestone revetment are in progress. For the longer term, a planning process is needed to determine what changes to the park should be implemented over time to adjust to the changing park landscape and avoid further damages and related costs while continuing to offer safe and enjoyable recreation opportunities that are suitable for the park setting. Staff intend to initiate a master planning process for the park in the upcoming calendar year. To begin, staff will convene a core team to establish a set of objectives for the park’s future. The planning process that will follow will include a more thorough examination of the risks related to coastal hazards and assessment of costs and benefits of retaining, redesigning, removing or relocating various facilities. Redesign of the park will also be guided by the opportunities and constraints related to assessments of the natural, cultural and scenic resources and regional recreation trends. The plan will set out a phased implementation strategy, identifying short term and longer term projects for removing or relocating facilities that are at risk. OPRD’s mandated master planning process will be followed in formulating the plan, involving the public, adopting the plan and obtaining land use approval.

Action requested: None.

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