

PART TWO OF TWO

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BEACH SAND AT THE BASE OF THE FOOD

Continued from last issue

Processes that add sand – Renourishment is a sea turtle's obstacle course and a seal's respite

Beaches act as nesting grounds, refuge, and spawning grounds for several kinds of animals, from turtles and seals to shorebirds, foxes and forage fishes. Seawalls and dams are directly responsible for the loss of sandy habitat through sediment blockage (seawalls and dams) and an increase in erosive force (seawalls). Dredge and fill projects, commonly known as “beach renourishment” projects, are often touted as soft solutions to the problem of sea level rise and erosion. However, the effects of renourishment projects on beach ecology are poorly studied. We do know that these projects can be disastrous for some animals, such as sea turtles. It also appears that dredge and fill projects offer a solution for other animals, such as snowy plover and elephant seals.

All six species of sea turtles in the US are protected under the Endangered Species Act of 1973—the Kemp's Ridley, Hawksbill, Loggerhead, Green, and the Leatherback—and they all depend upon beaches for their nesting grounds.

Renourishment projects are an obstacle course for nesting sea turtles. First, rapid encroachment of the sea upon newly deposited fill creates a “scarp”- or steep wall of sand up to several feet high. Second, replacement sand from nearby dredge projects substituted for natural beach sand can leave a false chemical imprint on the juvenile. If heavy equipment and vehicles do not damage nests directly, they can pack sand so densely

that struggling females discontinue nesting from sheer exhaustion, and they return to the water. Artificial illumination on developed beaches can be a final hurdle, disorienting both adult females and baby turtles that rely on the light of the moon reflected off the ocean to find their way to the sea.

Supporters of beach nourishment projects note that “dredge and fill” actually creates habitat for species such as sea turtles, snowy plover, and elephant seals. The same argument can be made for human beings. On one hand, we benefit from tons of sand dumped on the beach because it creates more towel space, and we finally get to enjoy the expense of our hard earned tax dollars. On the other hand, the “new” sand is often from a nearby dredging project, and can be a poor replacement for old sand that was stolen from the beach years ago by a development built too close to the water.

In 1999, The US Fish and Wildlife Service designated 180 miles of the West coast critical habitat area for the snowy plover, with 19 of the 28 critical areas located in California. Snowy plover are recently listed as a federally endangered species. This strikes a sad note for anyone accustomed to watching these birds rush in and out of the waves looking for food. Yet, over the last twenty years, the once severely endangered northern elephant seal has made a successful comeback and can now be seen hauled out at numerous breeding areas along the California coast. As the elephant seal population has increased, so has their need to spread out from remote island beaches to breeding sites along the mainland. In this case, renourishment must be considered for its ability to mitigate sediment loss but not as an alternative to restoration.

Processes that add sand – Renourishment and forage fish

We are only beginning to understand the potential impacts of poorly timed renourishment projects. The greatest damage may lie at the base of the food chain itself – in forage fishes. Forage fishes are the food that other fish eat. In California, grunion fill this niche. In Washington State, three different species are considered forage fishes.

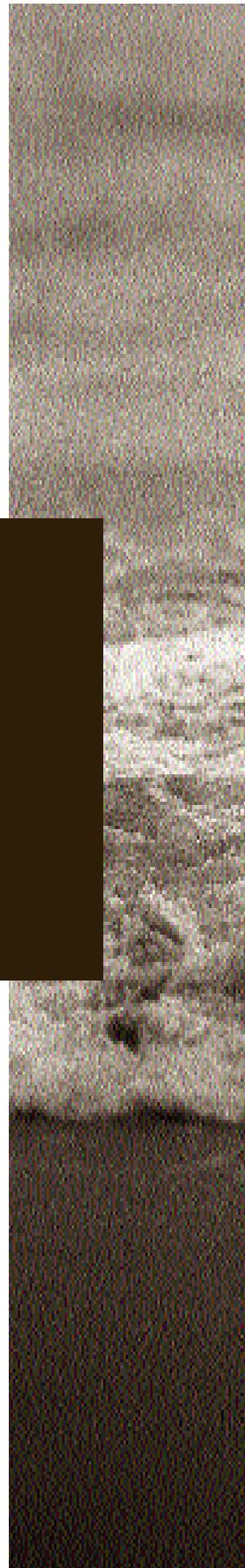
Surfrider Foundation has taken its lead on this issue from the Friends of the San Juans and the Northwest Straits Commission who are currently mapping the nearshore and beach spawning habitats of Pacific herring (*Clupea harengus pallasii*), surf smelt (*Hypomesus pretiosus*), and Pacific sand lance (*Ammodytes hexapterus*). Nicknamed “baitfish,” they sustain everything from salmon and rockfish to diving birds to marine mammals to herons—and even whales. In Delaware, horseshoe crabs also spawn on the beach. Their eggs provide nourishment to migrating shorebirds.

Surf smelt and sand lance spawn in the upper intertidal zones of mixed sand and gravel beaches, generally within a few feet of the high tide line. In the Pacific Northwest, spawning takes place year round on beaches along the San Juan Islands, and the outer coast of the Olympic peninsula. Fall and winter spawning occur along Liberty Bay and southern Puget Sound. Summer spawning occurs along the Strait of Juan de Fuca. Over 200 miles of surf smelt spawning beaches exist along Puget Sound and many sand and gravel beaches have yet to be surveyed for evidence of surf smelt spawning activity.

Each year half a million to a million or more shorebirds arrive on the bayshores of Delaware to feast on the eggs of the largest concentration of spawning horseshoe crabs along the Atlantic coast. Many of the shorebirds use this abundant supply of food to fuel the last thousand miles of their northward migration to the arctic tundra. Horseshoe crabs take 9-10 years to reach sexual maturity and can live to be 16-17 years old. In late spring and early summer mature horseshoe crabs migrate into shore to spawn. Along the Delaware Bay, peak spawning events usually occur with the high lunar tides around the full and new moons during May and June. Red knots, ruddy turnstones, sanderlings and semipalmated sandpipers all feast up on the spawn.

Beach sand is at the base of the food chain. Shoreline armoring, relic dams, and renourishment activities are major threats to the sediment budget of any developed watershed. Thus, they are major threats to ecosystem health. Sediment input from upstream supplies (rivers) and ground supplies (dunes, bluffs and cliffs) must be unrestricted if beach health is to be maintained. In addition to secondary and tertiary wastewater treatment standards, restoration of degraded sandy systems can be best achieved by restoration of sediment inputs.

Animals dependent on the beach include many endangered species, such as sea turtles and shorebirds, as well as many species at low trophic levels, such as horseshoe crabs and forage fishes.



Renourishment projects threaten the success of forage fish and horseshoe spawning grounds if they are not accurately timed to coincide with the "off-season" for breeding species. However, winter brings heavy seas to the Pacific Coast, and intense wave action can quickly drag new sand out to sea. The only way to avoid burying baitfish eggs is to know they are there in the first place.

Conclusion

The beach is an important and special place not only to people, but to the whole ecosystem. We need to be aware of the ways in which human activities jeopardize beach health, and we need to redirect national, state, and local public policy to secure clean and healthy beaches for future generations of man and animal.

Horseshoe crabs in Delaware provide important nourishment to migrating birds indirectly through their eggs. Forage fishes on both coasts provide direct nourishment to several commercially important species, including salmon and tuna, and several protected species, including dolphins and killer whales.

Research on the trophic linkages that grow from beach sand is only beginning to converge. Much more research is needed. The Surfrider Foundation is committed to raising awareness of beach sand as important habitat to marine ecosystems and to finding new avenues for research and collaboration.