

Coastal survey finds more short-term erosion

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Sea cliff erosion near Gleneden Beach, Ore.

A new assessment of shoreline change along the Pacific Northwest coast from the late 1800s to present found that while the majority of beaches are stable or slightly accreting (adding sand), many Oregon beaches have experienced an increase in erosion hazards in recent decades.

Since the 1960s, 13 of the 17 beach "littoral cells" – stretches of beach

between rocky headlands and major inlets – in Oregon have shifted, either from a pattern of accretion to one of [erosion](#), or to an increased amount of erosion, or they have built up less than in the past. Some of the hardest hit areas along the coast include the Neskowin littoral cell between Cascade Head and Pacific City, and the Beverly Beach littoral cell between Yaquina Head and Otter Rock, where [shoreline change](#) rates have averaged more than one meter of erosion a year since the 1960s.

The assessment is part of a series led by the U.S. Geological Survey to study shoreline change in the nation's coastal regions to more comprehensively monitor coastal erosion and land loss.

Peter Ruggiero, an Oregon State University coastal hazards specialist and lead author on the report, said the findings provide baseline data to analyze future impacts of climate change, [sea level rise](#) and storms on the Northwest's shorelines, he added.

"In a general sense, Oregon has faced much more erosion in the short term than has southwest Washington, which has seen more accretion as a result of sediments from the Columbia River and jetties at the mouth of the Columbia and at Gray's Harbor," said Ruggiero, an associate professor in OSU's College of Earth, Ocean, and Atmospheric Sciences.

"The Columbia has less of an influence on Oregon, and many of the state's beaches have a relatively limited sediment supply," Ruggiero added. "The buildup and loss of sand on our beaches is a natural process, but one that can be heavily influenced by human behavior and changes in climate."

On a short-term basis, the study found that on average Northwest shorelines are "progradational" or growing at a rate of 0.9 meters a year. However, about 44 percent of the more than 9,000 transects the

researchers studied were eroding.

Rob Thieler, a USGS scientist and leader of the agency's coastal assessment effort, said these findings illustrate the variability of the Northwest shoreline and the factors that shape it.

"These new results help place [coastal erosion](#) in the Northwest into a local as well as national context that helps us understand how different coastlines function and which are the most vulnerable," he said.

The lack of new sand has become a recent pattern among many beaches in Oregon, especially south of Tillamook Head because rivers are not delivering significant amounts of sand – and many estuaries trap the sediment before it reaches the ocean.

The Tillamook County area of Oregon is identified as one of the worst areas for erosion. The risk of land loss is significant from higher waves and rising sea levels, Ruggiero noted. Farther south, the impacts from these phenomena are partially countered by plate tectonics, he said.

"Over the long term, much of the shoreline is lifting because of plate tectonics," said Ruggiero. "Along Oregon's central coast, the uplift is only about a millimeter a year, while [sea level](#) rise has been about 2-3 mm per year. South of Coos Bay, however, the land is rising faster than the sea level is rising."

Jonathan Allan, a researcher with the Oregon Department of Geology and Mineral Industries and a co-author on the report, said the Northwest coast has some "hot spots" where erosion has been significant and bluffs have failed, threatening houses.

"The beaches at Gleneden Beach and Neskowin, for example, contain coarse sand, which contrasts with the finer-grained beaches along much

of the Oregon coast," Allan said. "These beaches tend to be steeper and reflective of breaking wave energy, which makes them more dynamic. When coupled with the development of rip current embayments, it often results in hotspot erosion, which leads to the development of hazards when homes are placed too close to the beach.

"The issue is further complicated because at Neskowin, they have lost very large volumes of sand over the past 15 years, bringing the hazard even closer to the homes," he added.

Ruggiero has been working with Tillamook County leaders and the Neskowin Coastal Hazards Committee on a response plan to erosion and climate change impacts. He and his colleagues are working to create new models predicting local impacts of sea level rise, and also incorporating socio-economic variables.

"It is important to look not only at the physical processes of sea level rise and inundation," Ruggiero said, "but also to realistically look at the human dimension, including the cost of adaptation. Tillamook County has been actively addressing these issues."

The USGS assessment focused on open-ocean sandy shores and did not look at Washington beaches along stretches of the Olympic Peninsula, Puget Sound or in Hood Canal because little data are available in those regions. But Ruggiero noted that many of the beaches in central and southern Washington were stable or adding sand, instead of eroding.

More information: The study, "National Assessment of Shoreline Change: Historical Shoreline Change Along the Pacific Northwest Coast," is available online at: pubs.usgs.gov/of/2012/1007/. Authors include Peter Ruggiero, OSU; Meredith G. Kratzmann, Emily A. Himmelstoss, and David Reid, USGS; Jonathan Allan, DOGAMI; and George Kaminsky, Washington Department of Ecology.

Provided by Oregon State University

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