

Palm Deaths Accelerating on Florida Coast; Likely Cause Is Rising Seas

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Palm trees on Florida's west coast appear to be dying more rapidly than in previous years because of sea level rise tied to global warming.

University of Florida scientists who began monitoring a large coastal study area in North Florida in 1992 reported widespread deaths of palms and other trees in low-lying coastal areas in the past. But the latest survey of the waterfront area along the Gulf of Mexico reveals new and unsettling numbers: Of 88 large, mature palms that died at the rural Levy County site between 1992 and 2005, 66 percent, or 58, have died since 2000.

“When we (counted) last year, the change we observed was an increase in the loss of mature trees,” said Smriti Bhotika, a UF doctoral student in

interdisciplinary ecology.

In a project led by UF botany Professor Jack Putz, researchers in 1992 tagged and counted all trees and seedlings on 13 nearby, 400-square-meter plots on forested islands on the coast at Waccasassa Bay State Preserve. They returned periodically to note changes to the tree populations, correlating them with measurements of local tidal flooding and salinity.

The researchers reported not only dying palms, southern red cedars and other species, but also the lack of tree seedlings on the lowest plots in a 1999 paper in the journal *Ecology*. They attributed some of the problems to the 1993 Storm of the Century and droughts but said rising sea level is the primary cause of the coastal forest decline.

Scientists agree that seas are rising, and this rise will accelerate as the earth warms, although predictions differ widely as to the rate of rise. The phenomenon is tied to the thermal expansion of water as well as the melting of glaciers and ice sheets.

In the latest research, Bhotika and UF zoology doctoral student Larisa Grawe DeSantis inventoried the trees on the same 13 sites. They were surprised to discover the surge in deaths of the mature palms – those 2 feet or greater in height — in part because mature palms are among the hardiest of Florida’s coastal trees.

“They’re more salt tolerant, they’re less affected by wind damage from storms and they do better in periods of low water due to drought,” Bhotika said. “They are the last tree we observe remaining before the forest converts to salt marsh.”

A five-year drought between 1998 and 2002 could have contributed to the deaths, but no major hurricanes have made landfall in the area

recently. Studies by Kim Williams, an associate professor of biology at California State University in San Bernardino, linked the failure of new trees to grow to increasing salt levels. She said she suspects that increasing salt hastens the death of older trees as well.

“Since sea level rise has already eliminated tree regeneration in stands that were lost, these stands will not recover until sea level falls again, if it ever does,” she said in an e-mail.

Putz said there is no indication of an acceleration in the global sea level rise of about 7.5 millimeters, or slightly over a quarter of an inch, since 2000 — nor is the study site on land that is subsiding, a common coastal problem. That said, the land in this region is very low, and as-yet-unpublished research by another UF graduate student indicates that it descends toward the water in series of wide step-like terraces. What appears to have happened, Putz said, is that seas rose to a point where they reached the “next” terrace and more palm trees.

Williams said low groundwater levels tied to the 1998-2002 drought may also have contributed. Drought means palms wind up coping with more saltwater and less freshwater, said Grawe DeSantis, who co-authored the study with Bhotika. Many scientists believe global warming could increase bouts of extreme droughts and wet periods such as those caused by El Niño and La Niña patterns.

“If you have less rainfall during periods of drought associated with La Niña events, and the coastal forests are being flooded more frequently, they’re experiencing more salt water and subsequently greater salinity stress,” she said.

Although the study area is tiny when compared to the entire west coast of Florida, much of the coast’s topography is similar, Putz said. Not only that, but contrasting the relatively pristine and unpopulated study area,

other parts of the coast could actually suffer more from sea level rise, because of salt water intrusion caused by overpumping of groundwater.

As a result, Putz said, it's likely palm deaths are accelerating up and down the coast. "In most of the U.S., it's really hard to see the impacts of global warming," he said. "Along this coast, it's not hard to see at all."

Bhotika will present the results of the newest survey on Monday at the Ecological Society of America's annual meeting in Memphis, Tenn.

Source: University of Florida

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