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Storm Perceptions, Impacts, and Recovery of Coastal Households

The Nature Conservancy

Highlights

Residential property damage from Hurricane Michael, which hit Florida in October 2018, was extensive. Over two-thirds (68%) of residents surveyed reported high property damage—with nearly one-third reporting major damage or total ruin. Residents reported damage to landscaping (68%), roofs (44%), interiors (20%), and walls (19%).

Hardened shorelines are costly and offer little additional benefits in hurricane protection. Storm damage was similar across hardened shorelines and vegetated shorelines; however, the average cost of repair was nearly five times greater for hardened shorelines than vegetated shorelines ($14,117 and $2,937, respectively). Hardened shorelines were also more costly to maintain—at $1,094/year versus $312/year for vegetated shorelines.

Bulkheads and seawalls were broadly perceived as more severely damaged and not fully recovered. Compared with nature-based shorelines, more survey respondents perceived bulkheads and seawalls as majorly damaged or ruined and less likely to be fully recovered.

OVERVIEW

Hurricanes are one of the deadliest natural hazards in the United States, and they can have lasting impacts on coastal communities. Coastlines are typically armored with hardened infrastructure to protect them. This "armoring" of the coastlines, also referred to as shoreline hardening, typically involves the installation of artificial materials like concrete seawalls, bulkheads, or revetments for coastal protection. Hardening shorelines often degrades coastal ecosystems and reduces green space along the coastline. Increasingly, studies have demonstrated that green space and natural and nature-based features (NNBF) can also protect coastal areas during storms and typical flooding events—without degrading the natural environment. However, very few of these studies have occurred at spatial scales relevant to coastal residents. Therefore, we conducted household surveys of Florida Panhandle residents to assess the perceived and experienced impacts of Hurricane Michael, as well as the potential role of NNBF in storm protection and recovery.

RESEARCH OBJECTIVES

1. Quantify the storm impacts and recovery at a parcel-level scale relevant for waterfront coastal residents.
2. Assess broader community perceptions of storm impacts and the role of NNBF.

METHODS

We surveyed 327 residents in the Florida Panhandle between December 2019 and February 2020, about 14 to 16 months after Hurricane Michael made landfall. All residents lived within 1 km from the coast in Bay, Gulf, and Franklin Counties. The survey consisted of 67 questions that covered the following major categories: a) *Household Property Damage & Recovery*, b) *Household Health Impacts & Recovery*, c) *Community Shoreline Impacts & Recovery*, and d) *Ecosystem Impacts & Recovery*. A primary focus of our study was to compare survey responses across residents with armored and NNBF shorelines.

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FINDINGS

Overall, our survey found that most residents rated their homes as at least moderately damaged by the storm. The highest prevalence of damage was among homes directly on the water. Notably, damages were similar among homes with NNBF versus hardened shorelines. However, hardened shorelines were reported to cost significantly more to repair or replace; the average cost of repair was nearly five times greater for hardened shorelines than for vegetated shorelines ($14,117 and $2,937, respectively; Figure 1). NNBF shorelines may be more resilient, as they have the natural ability to grow back after a storm, resulting in lower repair costs. These low repair costs make NNBF shorelines attractive and cost-effective options for individual shoreline protection.

The survey also asked questions about shoreline damages, both along public and privately owned shorelines, within their community. Residents generally perceived bulkheads and seawalls as the most damaged and least recovered shoreline type (Figure 2) within their communities. By contrast, marshes and riprap were perceived as the least damaged and the most recovered. Residents also generally perceived marshes as effective at protecting coastlines against storm waves and inundation. However, bulkheads and other armoring solutions remain the most common structures along residential shorelines throughout the region. Our survey suggests that residents generally recognize the benefits of NNBF as resilient and cost-effective strategies for coastal protection. These structures also provide environmental benefits, such as wildlife habitat and water quality improvements, unlike traditional hardened shorelines.

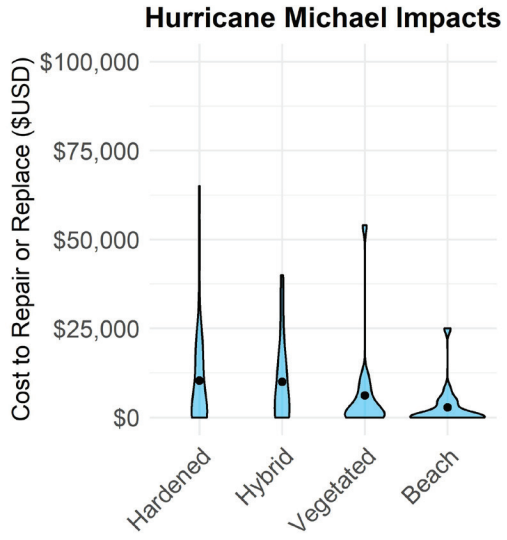

Figure 1. Reported costs to repair or replace residential shorelines after Hurricane Michael by shoreline type. The shaded blue areas represent the distribution of costs for each shoreline type. The width of blue area represents the proportion of responses across the range of cost values shown on the vertical axis. Mean reported cost is displayed by the black dot within each distribution.

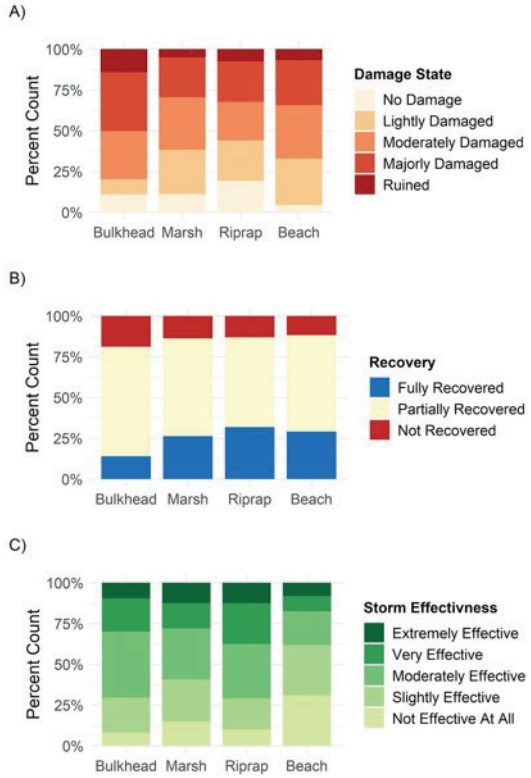

Figure 2. Overall perceptions of community shorelines among 327 coastal residents. A) Damage received by community shorelines B) Recovery of community shorelines C) Effectiveness of shoreline storm protection