Gulf of Mexico Shoreline Movement

Southern Padre Island and Brazos Island, Texas

Rio Grande (U.S./Mexico Border) to Port Mansfield Channel

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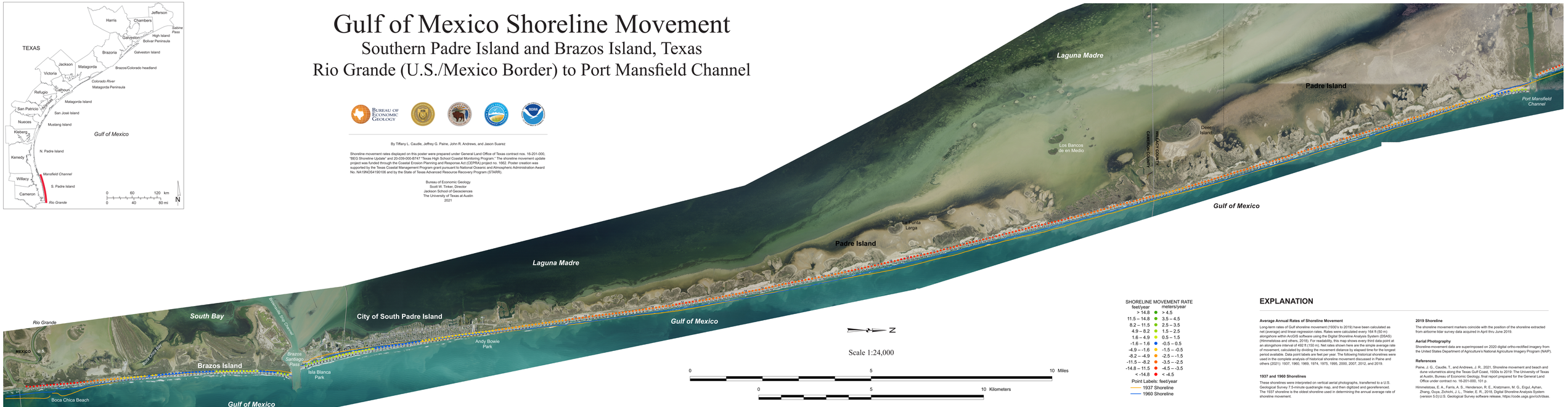

SHORELINE MOVEMENT RATE

feet/year	meters/year
> 14.8	> 4.5
11.5 – 14.8	3.5 – 4.5
8.2 – 11.5	2.5 – 3.5
4.9 – 8.2	1.5 – 2.5
1.6 – 4.9	0.5 – 1.5
-1.6 – 1.6	-0.5 – 0.5
-4.9 – -1.6	-1.5 – -0.5
-8.2 – -4.9	-2.5 – -1.5
-11.5 – -8.2	-3.5 – -2.5
-14.8 – 11.5	-4.5 – -3.5
< -14.8	< -4.5

Point Labels: feet/year

1937 Shoreline

1960 Shoreline

EXPLANATION

Average Annual Rates of Shoreline Movement

Long-term rates of Gulf shoreline movement (1930's to 2019) have been calculated as net (average) and linear-regression rates. Rates were calculated every 164 ft (50 m) alongshore within ArcGIS software using the Digital Shoreline Analysis System (DSAS) (Himmelstoss and others, 2018). For readability, this map shows every third data point at an alongshore interval of 492 ft (150 m). Net rates shown here are the simple average rate of movement, calculated by dividing the movement distance by elapsed time for the longest period available. Data point labels are feet per year. The following historical shorelines were used in the complete analysis of historical shoreline movement discussed in Paine and others (2021): 1937, 1960, 1969, 1974, 1975, 1995, 2000, 2007, 2012, and 2019.

1937 and 1960 Shorelines

These shorelines were interpreted on vertical aerial photographs, transferred to a U.S. Geological Survey 7.5-minute quadrangle map, and then digitized and georeferenced. The 1937 shoreline is the oldest shoreline used in determining the annual average rate of shoreline movement.

2019 Shoreline

The shoreline movement markers coincide with the position of the shoreline extracted from airborne lidar survey data acquired in April thru June 2019.

Aerial Photography

Shoreline-movement data are superimposed on 2020 digital ortho-rectified imagery from the United States Department of Agriculture's National Agriculture Imagery Program (NAIP).

References

Paine, J. G., Caudle, T., and Andrews, J. R., 2021, Shoreline movement and beach and dune volumetrics along the Texas Gulf Coast, 1930s to 2019: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the General Land Office under contract no. 16-201-000, 101 p.

Himmelstoss, E. A., Farris, A. S., Henderson, R. E., Kratzmann, M. G., Ergul, Ayhan, Zhang, Ouya, Zichichi, J. L., Thieler, E. R., 2018, Digital Shoreline Analysis System (version 5.0) U.S. Geological Survey software release, https://code.usgs.gov/voch/dsas.