Review & Evaluation of FEMA's Coastal Flood Risk Study

Topographic Elevation Data Technical Memorandum (Deliverable 2.1)
Task Order #1778-01

September 3, 2020 | 13134.201.R2.Rev0

Baird.
Innovation Engineered.

baird.com

Review & Evaluation of FEMA's Coastal Flood Risk Study

Topographic Elevation Data Technical Memorandum (Deliverable 2.1)
Task Order #1778-01

Prepared for: Prepared by:

Jeremy McBryan, PE, CFM
Palm Beach County
301 North Olive Avenue, 11th Floor
West Palm Beach, FL 33401
jmcbryan@pbcgov.org

W.F. Baird & Associates Ltd.
For further information, please contact
Dave Swigler
dswigler@baird.com
www.baird.com

Moffatt & Nichol

13134.201.R2.Rev0

Z:\Shared With Me\QMS\2020\Reports_2020\13134.201.R2.Rev0_PBC FEMA Review - DEM Evaluation - 2020-09-03 FINAL (Del 2.1).docx

Revision	Date	Status	Comments	Prepared	Reviewed	Approved
Rev # A	04/22/2020	DRAFT	County Review	AEW	LC	DS
Rev # B	08/20/2020	DRAFT	County Comments	AEW	LC	DS
Rev # 0	09/03/2020	FINAL		DS	GT	DS

Executive Summary

In fiscal year 2013, the Federal Emergency Management Agency (FEMA) initiated the Coastal Risk Flood Study Project for the South Florida Study Area (Coastal Study). The Coastal Study was intended to better define flood risks within South Florida by utilizing updated coastal storm surge models, erosion and hazard analyses, digital elevation models, and geographic information systems technologies data to update the digital Flood Insurance Rate Maps and Flood Insurance Study reports for Broward, Miami-Dade, Monroe, and Palm Beach Counties. BakerAECOM was contracted by FEMA to undertake the Coastal Study.

The topographic data, used by BakerAECOM for Palm Beach County, in the development of the digital elevation model (DEM) for the Coastal Study was compiled from various datasets. The data collection dates ranged from 2001 to 2007. The resulting DEM had a 10-foot grid and is herein referred to as Southwest Florida Topo-Bathy (SWFLTB) DEM. In 2016, the U.S. Army Corps of Engineers (USACE) produced a 10-foot grid Light Detection and Ranging (LiDAR) model for portions of the barrier islands within Palm Beach County, which was later used in the creation of the USACE DEM, along with the SWFLTB DEM data for the creation of the updated Flood Insurance Rate Maps (FIRM)s. During the same timeframe, the U.S. Geological Survey conducted an extensive LiDAR survey for all of Palm Beach County based on a 2-foot grid; herein referred to as PBC DEM.

- Coastal Study – SWFLTB DEM
- Updated FIRMs – USACE DEM
- 2016/2017 Palm Beach County LiDAR for comparison – PBC DEM

The purpose of Task 2.1 *Topographic Elevation Data Evaluation* is to evaluate the difference in elevations for the DEMs used for the Coastal Study and the FIRM mapping with that of the 2016/2017 Palm Beach County LiDAR and to assess the appropriateness of the methods used by FEMA to stitch together data from multiple sources when creating the Coastal Study DEM. This task only considers the area overlap among the datasets that fall within the boundaries of Palm Beach County, and more specifically within the updated coastal FIRM panels. The methods used by FEMA to stitch together or compile the various datasets within the study area of this task appears to be acceptable. For elevation comparison, the three DEMs were converted to the same horizontal and vertical datums prior to analysis.

There is a total of approximately 92,935 acres contained within the Palm Beach County coastal FIRM panels, not including the surface water area. Within the coastal FIRM panels, areas were examined for elevation differences of 0.5 feet or greater and 1 foot or greater between the PBC DEM and SWFLTB DEM and between the PBC DEM and USACE DEM. Based on the accuracy of FEMA FIRMs and survey tolerances of the data used in this analysis, a deviation of 0.5 feet or greater was deemed to be large enough to possibly affect mappings of flood zone of the updated FIRMs.

- Differences of less than +/-0.5 feet between the DEM's were documented for 73.6% of the coastal FIRM panel area when comparing the PBC DEM to the SWFLTB DEM; 59.0% within incorporated boundaries and 14.6% within unincorporated boundaries. Similar trends were identified when comparing the PBC DEM to the USACE DEM.
- The USACE DEM, which incorporated more recent survey data, exhibited better agreement with PBC DEM.

Elevation differences outside of FEMA's special flood hazard areas (SFHA) have limited, if any, influence on the updated FIRM maps. Elevation differences between the PBC DEM and the SWFLTB DEM as well as the PBC DEM and the USACE DEM were compared within the footprints of the FEMA's mapped Changes Since Last FIRM (CSLF). The footprints of the CSLF were estimated at 11,509 acres as compared to 92,934 acres within the coastal FIRM panels. Within the CSLF footprints (Table E.1), the following was determined:

- Incorporated boundaries represented 83.9% (9,659 acres) of the area included in the CSLF footprints; unincorporated boundaries represented 16.1% (1,850 acres) of the area.
- Differences of less than +/-0.5 feet between the DEM's were documented for 78% of the CSLF footprints when comparing the PBC DEM to the SWFLTB DEM; 65.0% within incorporated boundaries and 12.9% within unincorporated boundaries. Similar trends but with increased agreement for differences less than +/-0.5 feet (as noted above) were identified when comparing the PBC DEM to the USACE DEM.
- Difference of greater than 0.5 feet between DEM's were documented for 22.0% of the CSLF footprints when comparing the PBC DEM to the SWFLTB DEM; with the PBC DEM being above the SWFLTB DEM for 15.0% (1,732 acres) of the area and below for 7.0% (804 acres) of the area.

Table E.1: PBC DEM minus SWFLTB DEM within CSLF Footprints

PBC DEM minus SWFLTB DEM	Incorporated (acre)	Unicorporated (acre)	Total (acre)	Incorporated (%)	Unincorporated (%)	Total (%)
PBC ≥ 1.0 foot above	509	112	621	4.4%	1.0%	5.4%
PBC 0.5 to 1.0 feet above	964	147	1,111	8.4%	1.3%	9.7%
PBC < 0.5 feet above/below	7,486	1,487	8,973	65.0%	12.9%	78.0%
PBC 0.5 to 1.0 feet below	473	66	539	4.1%	0.6%	4.7%
PBC ≥ 1.0 feet below	227	38	265	2.0%	0.3%	2.3%
Total	9,659	1,850	11,509	83.9%	16.1%	100.0%
PBC above	1,473	259	1,732	12.8%	2.3%	15.0%
PBC below	700	104	804	6.1%	0.9%	7.0%

Based on the DEM comparisons, inclusion of the PBC DEM in FEMA's coastal study would help address the following:

- Differences may have expanded (overestimated) the inland extents of the SFHA mapped by FEMA in the central portion of the County. The DEM comparisons indicated that the PBC DEM was approximately 0.5 to 1.0 feet above the SWFLTB DEM west of the Lake Worth Lagoon. The differences (FIRM panels 0393, 0581, 05983, 0591, 0593, 0781, 0783, 0791, and 0793) extended approximately 15.5 miles between 45th Street, West Palm Beach and East Ocean Avenue, Boynton Beach. The differences appear to be inherent to the 2007 Florida Department of Emergency Management LiDAR data used by FEMA to generate the DEM in this area and therefore may be attributed to data collection techniques (e.g. flight lines, airframes, sensors, equipment).
- Differences may have limited (reduced) the inland extents of the SFHA mapped by FEMA in the southern portion of the County. The data used by FEMA in the creation of the SWFLTB DEM changed from the 2007 Florida Department of Emergency Management to the 2001 Palm Beach County LiDAR and resulted in an apparent vertical offset. The differences (FIRM panels 1159, 1178, and 1179) indicated that the PBC DEM was approximately 0.5 to 1 foot below the SWFLTB DEM.
- Larger differences (e.g. greater than 1 foot) appear to be due in part to the occurrence of construction and development during the time between the capture of the SWFLTB DEM in 2007 and the PBC DEM in 2016/17. Differences identified by the DEM comparisons may also be attributed in part to post-processing of the survey data and gridding methods. LiDAR survey data is processed to eliminate buildings, trees, and other obstructions to represent "bare earth" (i.e. ground elevations). Post-processing techniques, gridding methods, and technological advances in data collection since 2007 may account for some of the differences identified herein. A location-by-location analysis (which was beyond the scope of work) is necessary to evaluate whether these differences with respect to updated base flood elevations (BFEs) would affect/alter the mapping of flood zones shown in FEMA's preliminary FIRM panels.

Table of Contents

Tables

Figures

1. Background

In fiscal year 2013, the Federal Emergency Management Agency (FEMA) initiated the Coastal Risk Flood Study Project for the South Florida Study Area (Coastal Study). The results of the Coastal Study were overlaid onto an updated DEM created using the 2016 USACE LiDAR to create updated digital Flood Insurance Rate Maps and Flood Insurance Study (FIS) reports for Broward, Miami-Dade, Monroe, and Palm Beach Counties. The Coastal Study was intended to better define flood risks within South Florida by utilizing updated ground elevation and topographic data, new climatological data, improved computing resources, coastal storm surge models, erosion and hazard analyses, and improvements in geographic information systems (GIS) technologies to improve coastal mapping accuracy. BakerAECOM was contracted by FEMA to undertake the Coastal Study.

The topographic dataset used by FEMA for the development of the Coastal Study utilized Two Florida Department of Emergency Management LiDAR Models from 2007, along with various other sources. The updated LiDAR from the USACE was not completed in time to be included in the Coastal Study Analysis but was included in the mapping. Additional LiDAR from the U.S. Geological Survey (USGS) was conducted for the full limits of Palm Beach County during late 2016 and early 2017. This data was not used for the Coastal Study nor the creation of the updated FIRMs and FISs. The differences between these three datasets are discussed herein.

2. Introduction

The purpose of this task is to evaluate the difference in elevations for the actual digital elevation model (DEM) used for the Coastal Study and the DEM used for the creation of the FIRMs and FISs with that of the 2016/2017 Palm Beach County LiDAR. The topographic data used for the creation of the Coastal Study was not the same topographic data used in the mapping of the new FIRMs. This task only considers the area of overlap between the three datasets that fall within the boundaries of Palm Beach County, and more specifically within the updated Coastal FIRM Panels.

3. Data Files

3.1 BakerAECOM Southwest Florida Topo-Bathy DEM

The DEM used in the Coastal Study, compiled by BakerAECOM, is represented by the Southwest Florida Topo-Bathy (SWFLTB) DEM. The SWFLTB DEM is labeled "FINAL_DEMS_01202016 (Received 2020-03-02)" in tiled ASCII Raster Text files. It covers the entire coastal area of southern Florida (Figure 3.1). The data, as received from BakerAECOM, have a horizontal resolution of 10 ft with elevations measured in meters. The DEM was compiled from several different input datasets with varying ranges of accuracy, resolution, and dates of collection. The input data and process used to derive this DEM are detailed in the BakerAECOM Report *Technical Approach – Topographic/Bathymetric Digital Elevation Model, Task Order 99 – South Florida Insurance Study,* Version 4.0 (March 2016).

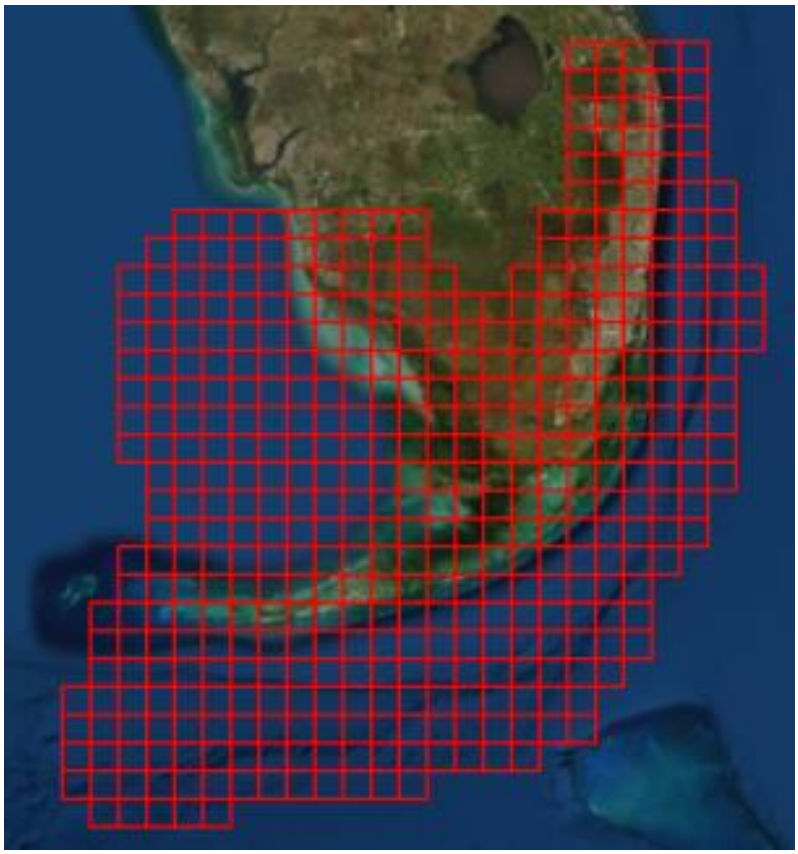


Figure 3.1: Extent of SWFLTB DEM Tiles

Several primary sources were compiled to create the Palm Beach County portion of the SWFLTB DEM. They are as follows:

- Two Florida Department of Emergency Management LiDAR Models
  - 2007 Palm Beach County, FL LiDAR (Figure 3.2) – collected between July 2007 and January 2008 with a vertical accuracy of .29 feet at a 95% confidence interval (CI).
  - 2007 Herbert Hoover Dike Project, FL LiDAR (Figure 3.3) – collected between September 2007 and January 2008 with a vertical accuracy of .6 feet at a 95% CI.

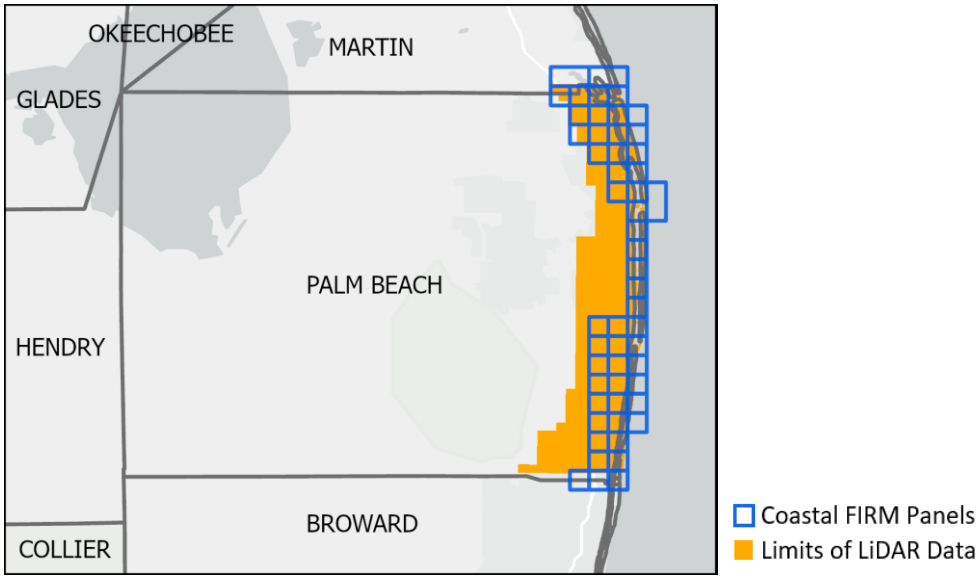


Figure 3.2: Extent of 2007 Palm Beach County, FL LiDAR with Coastal FIRM Outlines

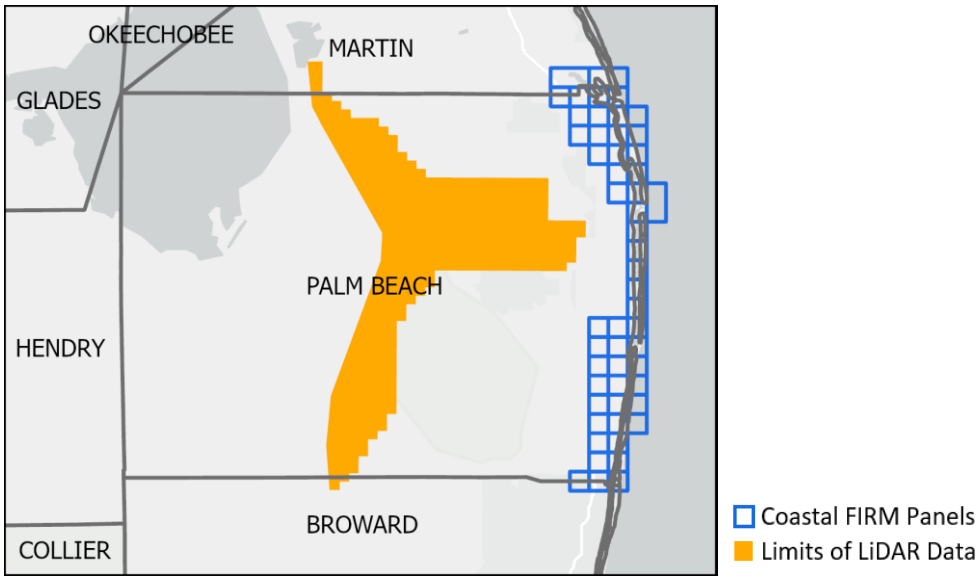


Figure 3.3: Extent of 2007 Herbert Hoover Dike Project, FL LiDAR with Coastal FIRM Outlines

- The 2001 Palm Beach County, Florida LiDAR (Figure 3.4) – referred to as "supplemental data" in the report.
  - Has a calendar date of 2001
  - Is comprised of three separate datasets

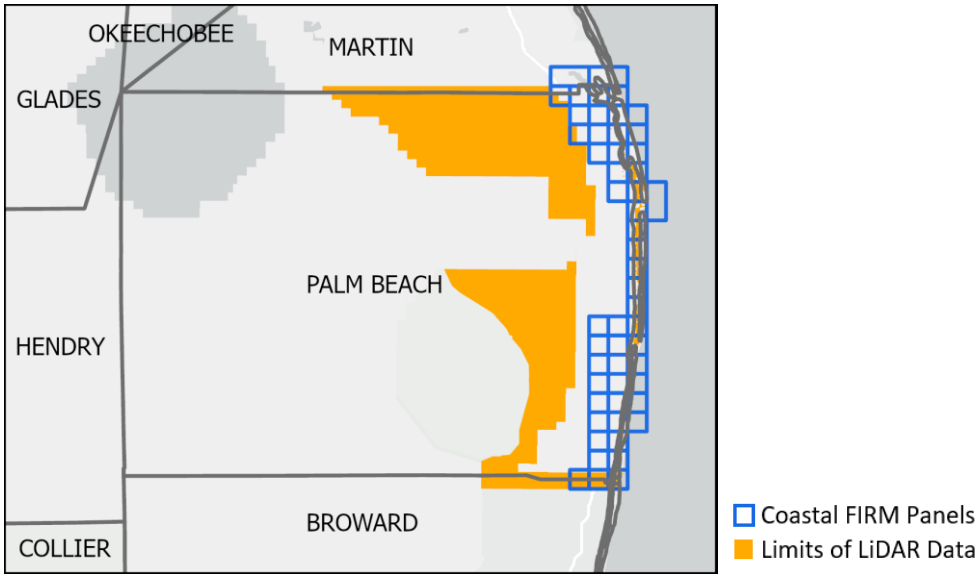


Figure 3.4: Extent of 2001 Palm Beach County, Florida LiDAR with Coastal FIRM Outlines

The data for the remaining area covered by the SWFLTB DEM are as follows, but they are outside of the FIRM Panels and have no impact on this analysis.

- USGS National Elevation Data 10 Meter DEMs
- South Florida Composite Topography 50-foot DEM
  - The bulk of this area appears to be comprised of the Loxahatchee National Wildlife Refuge area.
  - Both of these datasets were used as a “last resort” when other datasets were unavailable.

At the boundaries of the individual datasets used to create the SWFLTB DEM, there are apparent break lines due to the varying capture dates of the data (Figure 3.5). The capture dates of the input datasets range from 2001 to January 2008. The highest accuracy LiDAR input data that comprises most of the area closest to the coastline were flown in 2007. It is important to note the data for the SWFLTB DEM included bathymetric data.

In Figure 3.5, highlights an example of development between capture dates and its influence on the SWFLTB DEM. Only a portion of a newer residential development is represented in the DEM due to the time between capture dates of the constituent datsetsets. The red polygon represents an area of the development not included in the DEM. Many of the larger differences identified in the DEM analysis (Section 5), are the due to development and construction that has taken place since the capture of the older input elevation models.

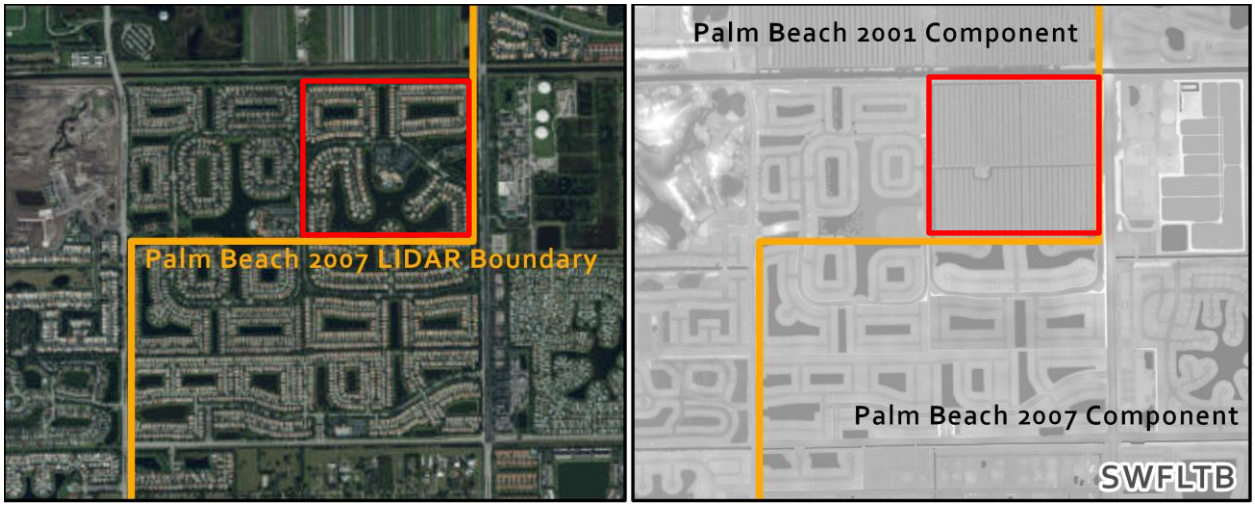


Figure 3.5: Pictorial Representation of SWFLTB DEM Data Variance (Left panel – Aerial Image; Right Panel – SWFLTB DEM)

3.1.1 Appropriateness of Data Compilation

No gaps between datasets were found within the area being assessed in this task within the SWFLTB DEM compiled or "stitched together" by BakerAECOM. Based on our analysis of the information contained within the BakerAECOM Report *Technical Approach,* no obvious errors were found in the horizontal reprojections/ transformations or vertical transformations. Transformations are conversions between datums and necessarily introduce some amount of error, the magnitude of which are dependent upon the input and output datum, the specific location, and the transformation equation used. Vertical transformation errors tend to be relatively small, in the range of a few centimeters.

The only direct manipulation of input data done by BakerAECOM appears to be where breaklines were created between the DEM and the Bathymetry portions of the surface. These break lines occur at the shore and around some of the inland waterways, not along the edges of varying datasets. Breaklines are used to define interpolation of data sets in order to more accurately reflect actual conditions. For example, the vertical face of a bulkhead or seawall may not be represented in a DEM without a breakline to help define the top of the structure and the bottom of the structure.

The differences at the edges are common in comparing elevation surfaces done over different areas due to different survey controls and varying degrees of resolution and accuracy requirements. Even within the same data collection project, calculating a surface solution for different coverage areas will result in edge mismatches, when all the input data is the same. Therefore, the data compilation within the study area of this task appears to be acceptable.

3.1.2 Coordinate Reference Systems

The horizontal datum for the data is HARN Florida East, Ft, NAD 83. The Vertical datum for the data is the North American Vertical Datum of 1988 (NAVD88). Note: though the BakerAECOM report states that the vertical data is referenced in feet; however, inspection of the dataset delivered to Moffatt & Nichol suggested that the vertical data was in meters. The vertical units were converted to feet assuming a conversion of 3.28084 feet per meter for the analysis presented herein.

3.2 USACE LiDAR DEM

The 2016 USACE LiDAR (Figure 3.6), delivered as “Final_PB_Topo.gdb”, was used to create the USACE DEM used in the development of the updated FIRMs and FISs. The USACE DEM, developed by FEMA, is the 2007 Florida Department of Emergency Management LiDAR used by BakerAECOM supplemented with the 2016 USACE LiDAR along the barrier islands. The 2016 USACE LiDAR was roughly used to represent the barrier islands east of state road A1A and the 2007 Florida Department of Emergency Management LiDAR was used to represent elevations to the west. Figure 3.6 shows the extents of the 2016 USACE LiDAR information. The remainder of the project area matches the SWFLTB DEM. The USACE LiDAR data has a vertical accuracy of 0.31 feet (9.5 cm) and a horizontal accuracy of 3.28 feet (1 meter) at a 95% CI. Appendix A highlights the change in elevation from the SWFLTB DEM used in the modeling to the USACE DEM used for mapping.

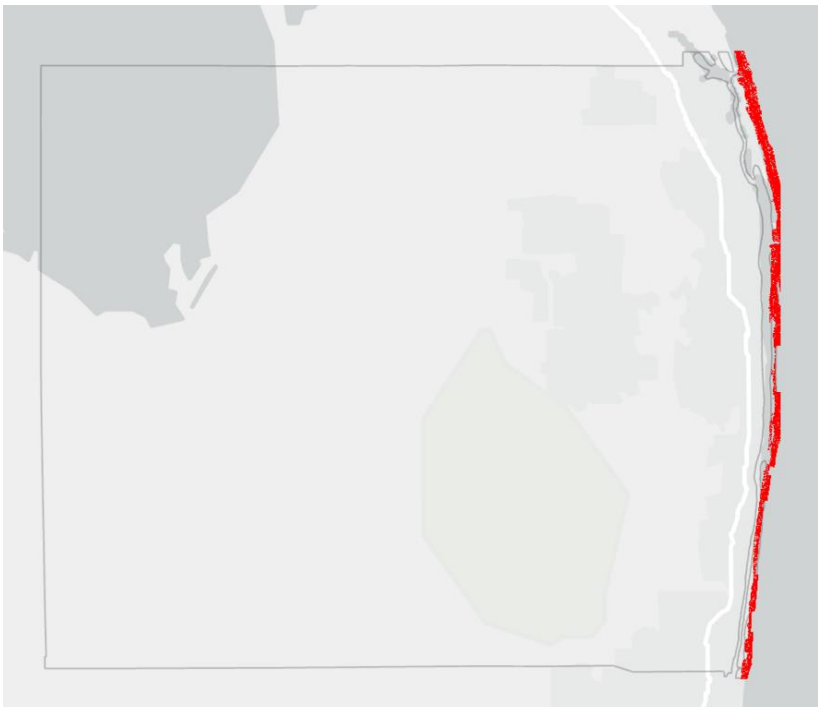


Figure 3.6: Pictorial Representation of Limits of 2016 USACE LiDAR

3.2.1 Coordinate Reference Systems

The horizontal datum for the data is State Plane Florida East FIPS 0901, Ft, NAD 83. The Vertical datum for the data is NAVD88 in feet.

3.3 Palm Beach County LiDAR DEM

The 2016/2017 USGS topography LiDAR, represented herein by the Palm Beach County (PBC) DEM, was developed by Dewberry. The data were collected between December 20, 2016 and March 10, 2017 and cover the entire county except for Lake Okeechobee in the northwest corner of the County (Figure 3.7). The DEM has a 2-foot horizontal resolution. The data are seamless and derived from measurements taken during a 3-month time period from a single source, providing more uniform accuracy than when multiple sources are used. The LiDAR measures water surface elevations but does not include any bathymetric data. For additional

information regarding the DEM creation, refer to *Palm Beach County Lidar Report – Report Produced for the U.S. Geological Survey* by Dewberry, dated June 14, 2018.

Figure 3.7: Limits of PBC DEM

Per the Dewberry Report, the LiDAR vertical accuracy is as follows:

> *For the Palm Beach County LiDAR Project, the tested root mean square error in the z direction (RMSEz) of the classified lidar data for checkpoints in non-vegetated terrain equaled 0.16 ft (4.9 cm) compared with the 10 cm specification; and the NVA [Non-vegetated Vertical Accuracy] of the classified lidar data computed using RMSEz x 1.9600 was equal to 0.31 ft (9.4 cm), compared with the 19.6 cm specification. For the Palm Beach County LiDAR Project, the tested VVA [Vegetated Vertical Accuracy] of the classified lidar data computed using the 95th percentile was equal to 0.59 ft (18 cm) compared with the 29.4 cm specification*.

3.3.1 Coordinate Reference Systems

The horizontal datum for the project is North American Datum of 1983 with the 2011 Adjustment NAD 83 (2011) Florida State Plane East. The Vertical datum for the project is North American Vertical Datum of 1988 (NAVD88). Horizontal units are in U.S. Survey Feet, vertical units are in U.S. Survey Feet. Geoid 12B was used to convert ellipsoid heights to orthometric heights.

4. Process

4.1 DEM Conversions

To limit the analysis to Palm Beach County and to limit the working data, the tiles that fell within the boundary of Palm Beach County were extracted from the SWFLTB DEM dataset. The USACE DEM was already limited to Palm Beach County. Finally, the PBC DEM files that overlapped the selected SWFLTB and USACE DEM tiles previously identified were selected and included in the initial analysis (Figure 4.1 and Figure 4.2). This ensured that the area of analysis included all areas of overlap between the three datasets within Palm Beach County. The datasets were further pared down to show only the DEM files within the limits of the coastal FIRM panels of Palm Beach County (Figure 4.3).

Data were then pre-processed using the Geospatial Data Abstraction Library (GDAL). GDAL is a command line open source raster and vector translator library to allow for easier handling of large datasets. Additional information on the process can be found at https://gdal.org/.

The SWFLTB DEM tiles were mosaicked into a single raster and transformed into the NAD 1983 HARN State Plane Florida East FIPS 0901 (US Feet). GDAL was used to perform all these functions in one step utilizing the Warp command. Transformation was necessary to ensure the data from the SWFLTB DEM was compatible with the USACE and PBC DEMs since it was in a different coordinate system in its native form.

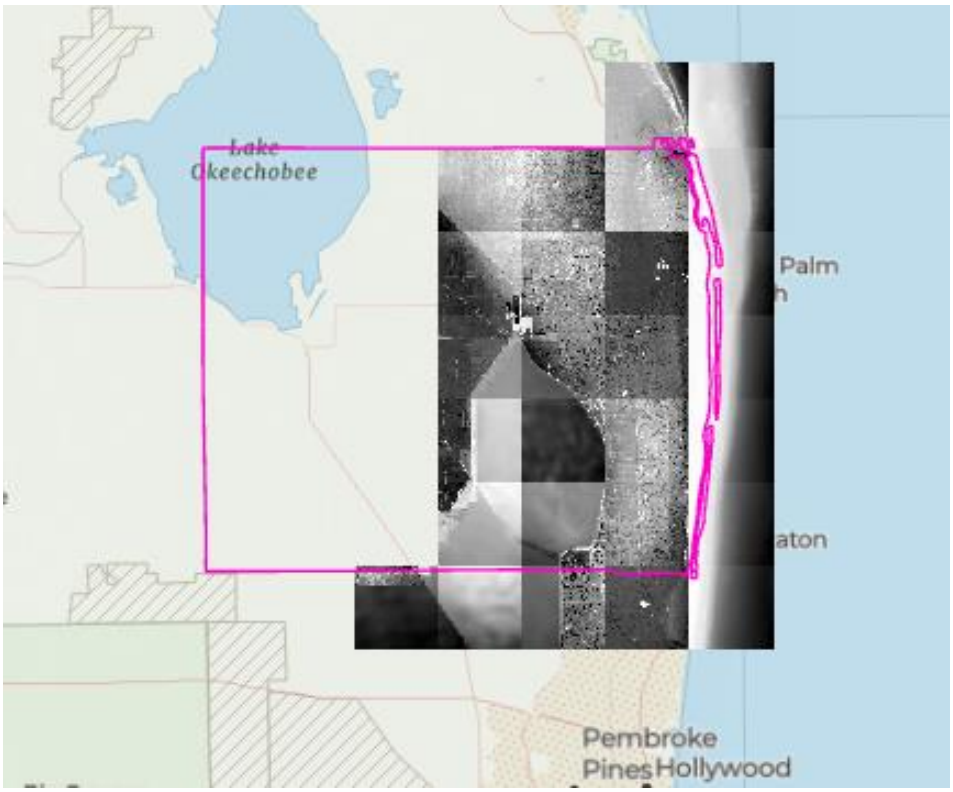


Figure 4.1: Limits of Palm Beach County with SWFLTB DEM Tiles

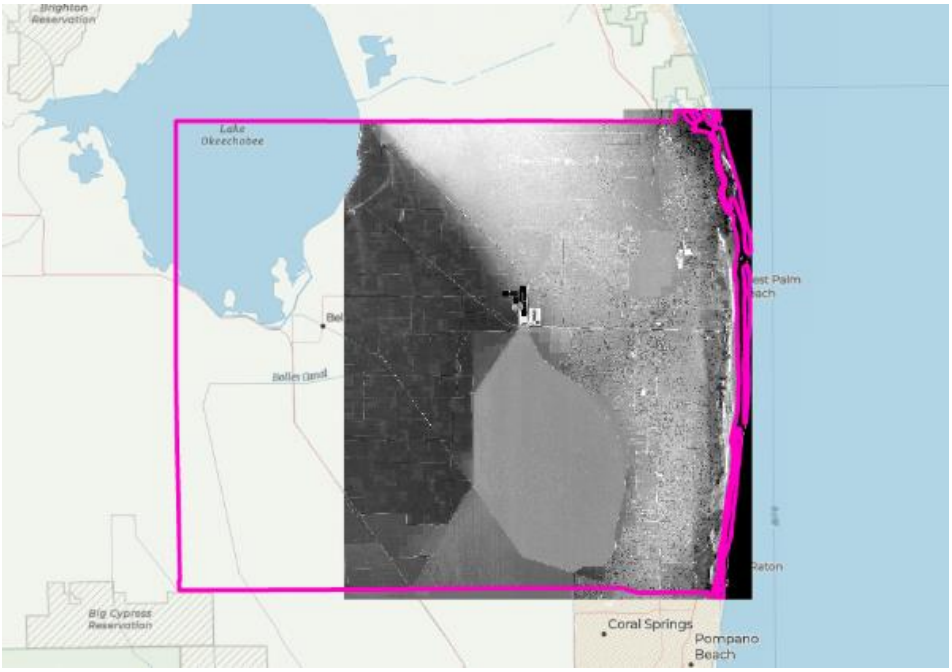


Figure 4.2: Limits of Palm Beach County with PBC DEM Tiles

Figure 4.3: Outline of Palm Beach County Coastal FIRM Panels

The PBC DEM files were then further refined for comparison with the other DEMs by resampling. The 2-foot grid cell resolution of the PBC DEM was resampled at a 10-foot grid to match the resolution of the SWFLTB and USACE files using the Lanczos resampling algorithm included with GDAL. The translated files were re-projected to the NAD 1983 HARN State Plane Florida East FIPS 0901 (US Feet) coordinate reference system and mosaicked into a single raster and elevation units were converted from meters to feet. All these functions were performed in one step using the GDAL Warp command.

The re-projected and resampled data were spot checked for horizontal accuracy. Both the mosaics lined up well with each other, with the USACE DEM, and with the reference orthophotography and when checked against linear features like road and canal intersections, there was no perceptible shift or offset that resulted from the resampling.

4.2 DEM Analysis

The process of comparing the SWFLTB DEM with the PBC DEM was performed utilizing the ArcGIS Pro Spatial Analyst module using a simple raster math operation that subtracted the value of SWFLTB DEM mosaic from the PBC DEM mosaic value on a cell-by-cell basis. The operation was performed a second time subtracting the USACE DEM from the PBC DEM utilizing the same approach. The resulting rasters contain only areas of overlap between the compared datasets within the Palm Beach County FIRM boundaries.

Zonal statistic tools were used to perform a detailed comparison look at elevation differences for areas that overlap the FIRM panels. In addition, the comparison tool was used to compare the difference between incorporated and unincorporated areas. Figure 4.4 shows the elevation differences between the PBC DEM and SWFLTB DEM, as well as shows the boundaries of the Coastal FIRM limits within Palm Beach County. The “white” shaded areas on the map represent differences of 0.5 feet or less. The varying shades of “teal” show where the PBC DEM is above than the SWFLTB DEM, while the “tan” shades show where it is below. It should be noted that darker “teal” shaded areas are shown within interior water bodies (i.e. Loxahatchee River, Lake Worth Lagoon, Intracoastal Waterway, canals, etc.) because the PBC DEM did contain limited bathymetric survey data and the DEM within the water bodies was not representative of actual elevations. Appendix B shows FIRM panel by FIRM panel results of the PBC DEM and SWFLTB DEM comparison, while Appendix C shows the FIRM panel by FIRM panel results of the PBC DEM minus the USACE DEM.

The figures in Appendix B and C also show the Primary Frontal Dune (PFD) line as provided by FEMA. Per FEMA, “the primary frontal dune zone is defined in 44 CFR Section 59.1 of the NFIP [National Flood Insurance Program] regulations. The primary frontal dune represents a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes that occur immediately landward and adjacent to the beach. The primary frontal dune zone is subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune zone occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.” PFDs establish the minimum landward limit of the Coastal High Hazard Area (CHHA) or V zones on the FIRMS. PFDs are not required to be continuous along the length of the studied shoreline. The PFDs shown herein were included in BakerAECOM's FIRM database submission to FEMA as part of the Coastal Study. A review of the primary frontal dune and how it was defined will be evaluated as part of Task 5 – *Storm Surge, Wave Model, and Flood Map Evaluation*.

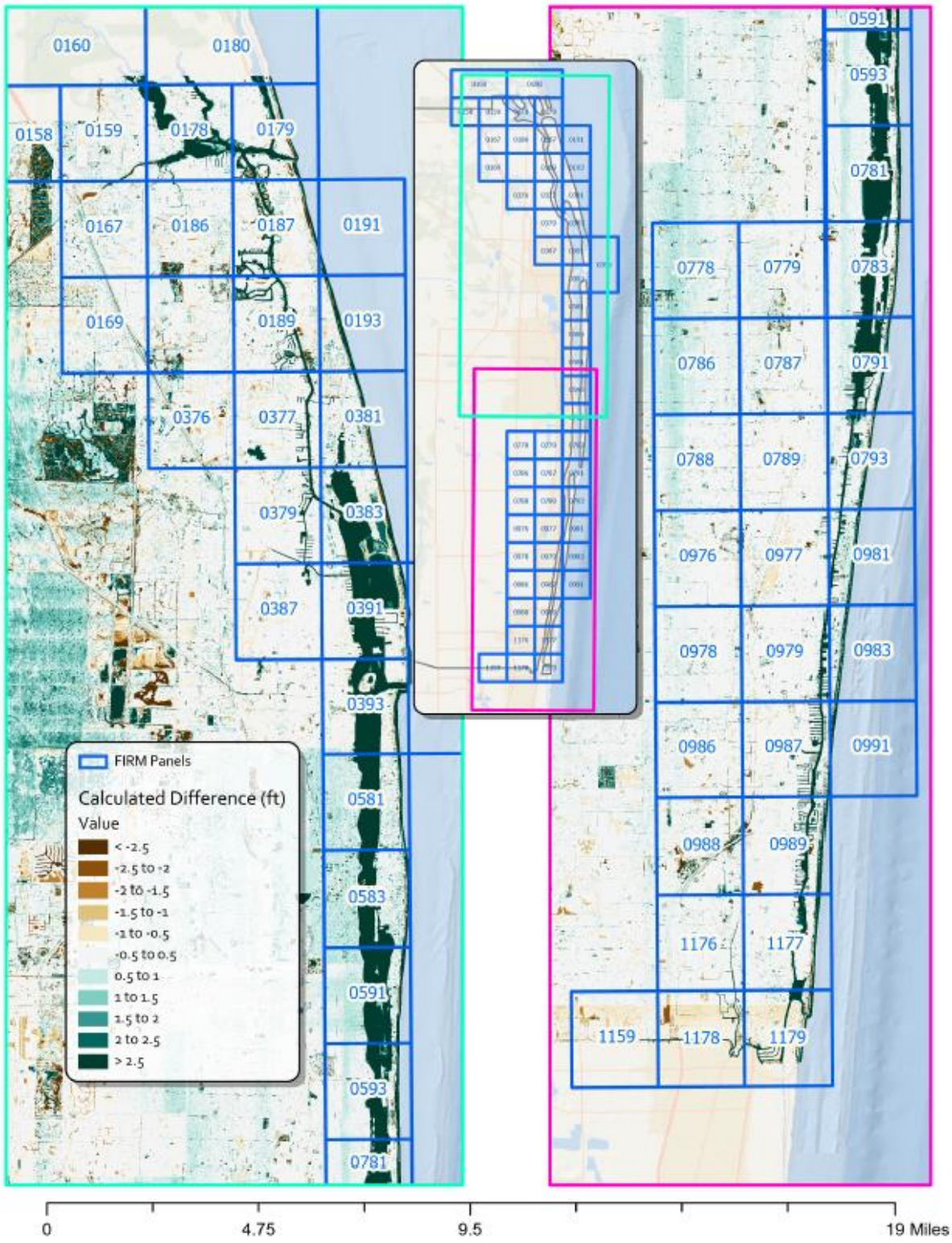


Figure 4.4: DEM Comparison with FIRM Panels: PBC DEM minus SWFLTB DEM

5. Results

5.1 DEM Comparisons

The PBC DEM was compared to the DEM's developed by FEMA (SWFLTB and USACE DEM's) to quantify the differences between them both within (incorporated boundaries) and outside (unincorporated boundaries) municipal boundaries of the County. The differences are presented in terms of acreage for four elevations ranges with respect to each of FEMA DEM's being compared.

- PBC DEM ≥ 1.0 feet above FEMA's DEM
- PBC DEM 0.5 to 1.0 feet above FEMA's DEM
- PBC DEM < 0.5 feet above/below FEMA's DEM (assumed vertical tolerance of survey data)
- PBC DEM 0.5 to 1.0 feet below FEMA's DEM
- PBC DEM ≥ 1.0 feet below FEMA's DEM

There is a total of 92,934 acres contained within the Palm Beach County Coastal FIRM panels, not including the surface water area. Comparison of the PBC DEM and the SWFLTB DEM are shown with overlays of FEMA's coastal FIRM panels (Figure 4.4) and municipal boundaries (Figure 5.1). Comparison of the DEM's resulted in the following.

- **PBC DEM minus SWFLTB DEM** (Table 5.1):
  - Incorporated boundaries represented 78.5% (72,918 acres) of the area included in the Coastal FIRM panels; unincorporated boundaries represented 21.5% (20,016 acres) of the area.
  - Differences of less than +/-0.5 feet between the DEM's were documented for 73.6% of the Coastal FIRM panel area; 59.0% within incorporated boundaries and 14.6% within unincorporated boundaries.
  - Differences of greater than 0.5 feet between DEM's were documented for 26.3% (24,501) of the coastal FIRM panel areas; with the PBC DEM being above the SWFLTB DEM for 18.6% (17,319 acres) of the area and below for 7.7% (7,182 acres) of the area.
  - In the central portion of the County, differences indicated that the PBC DEM was approximately 0.5 to 1.0 feet above the SWFLTB DEM west of the Lake Worth Lagoon. The differences (FIRM panels 0393, 0581, 05983, 0591, 0593, 0781, 0783, 0791, and 0793) extended approximately 15.5 miles between 45th Street, West Palm Beach and East Ocean Avenue, Boynton Beach. The differences appear to be inherent to the 2007 Florida Department of Emergency Management LiDAR data used by FEMA to generate the DEM in this area and therefore may be attributed to data collection techniques (e.g. flight lines, airframes, sensors, equipment). These differences may have expanded (overestimated) the inland extents of the SFHA mapped by FEMA.
  - In the southern portion of the County, the data used by FEMA in the creation of the SWFLTB DEM changed from the 2007 Florida Department of Emergency Management to the 2001 Palm Beach County LiDAR and resulted in an apparent vertical offset. The differences (FIRM panels 1159, 1178, and 1179) indicated that the PBC DEM was approximately 0.5 to 1 foot below the SWFLTB DEM. These differences may have limited (reduced) the inland extents of the SFHA mapped by FEMA.
  - Larger differences (greater than 1 foot) appear to be due in part to the occurrence of construction and development during the time between the capture of the SWFLTB DEM in 2007 and the PBC DEM in 2016/17.
  - Differences may also be attributed to post-processing of the survey data and gridding methods. LiDAR survey data is processed to eliminate buildings, trees, and other obstructions to represent "bare earth" (i.e. ground elevations). Post-processing techniques, gridding methods, and technological advances in data collection since 2007 may account for some of the differences shown herein.

- **PBC DEM minus USACE DEM** (Table 5.2):
  - Similar trends were identified when comparing the PBC DEM to the USACE DEM.
  - As discussed in Section 3.2, the USACE DEM was updated with USACE data collected in 2016. The updated USACE data was roughly used to represent the barrier islands east of state road A1A, while the data to the west was consistent with the data used to generate the SWFLTB DEM. The barrier islands are mostly contained by incorporated boundaries.
  - The differences of less than +/-0.5 feet between the DEM's increased to 59.5% within incorporated boundaries for the USACE DEM from 59.0% for the SWFLTB DEM. The improved agreement with the USACE DEM is attributed to the inclusion of updated USACE data to represent the barrier islands.

Table 5.1: PBC DEM minus SWFLTB DEM within Coastal FIRM panels

PBC DEM minus SWFLTB DEM	Incorporated (acre)	Unincorporated (acre)	Total (acre)	Incorporated (%)	Unincorporated (%)	Total (%)
PBC ≥ 1.0 foot above	4,488	1,353	5,841	4.8%	1.5%	6.3%
PBC 0.5 to 1.0 feet above	7,914	3,564	11,478	8.5%	3.8%	12.4%
PBC < 0.5 feet above/below	54,872	13,561	68,433	59.0%	14.6%	73.6%
PBC 0.5 to 1.0 feet below	3,544	968	4,512	3.8%	1.0%	4.9%
PBC ≥ 1.0 feet below	2,100	570	2,670	2.3%	0.6%	2.9%
Total	72,918	20,016	92,934	78.5%	21.5%	100.0%
PBC above	12,402	4,917	17,319	13.3%	5.3%	18.6%
PBC below	5,644	1,538	7,182	6.1%	1.7%	7.7%

Table 5.2: PBC DEM minus USACE DEM within Coastal FIRM panels

PBC DEM minus USACE DEM	Incorporated (acre)	Unincorporated (acre)	Total (acre)	Incorporated (%)	Unincorporated (%)	Total (%)
PBC ≥ 1.0 foot above	4,172	1,331	5,503	4.5%	1.4%	5.9%
PBC 0.5 to 1.0 feet above	7,340	3,560	10,900	7.9%	3.8%	11.7%
PBC < 0.5 feet above/below	55,334	13,595	68,929	59.5%	14.6%	74.2%
PBC 0.5 to 1.0 feet below	3,915	971	4,886	4.2%	1.0%	5.3%
PBC ≥ 1.0 feet below	2,157	559	2,716	2.3%	0.6%	2.9%
Total	72,918	20,016	92,934	78.5%	21.5%	100.0%
PBC above	11,512	4,891	16,403	12.4%	5.3%	17.7%
PBC below	6,072	1,530	7,602	6.5%	1.6%	8.2%

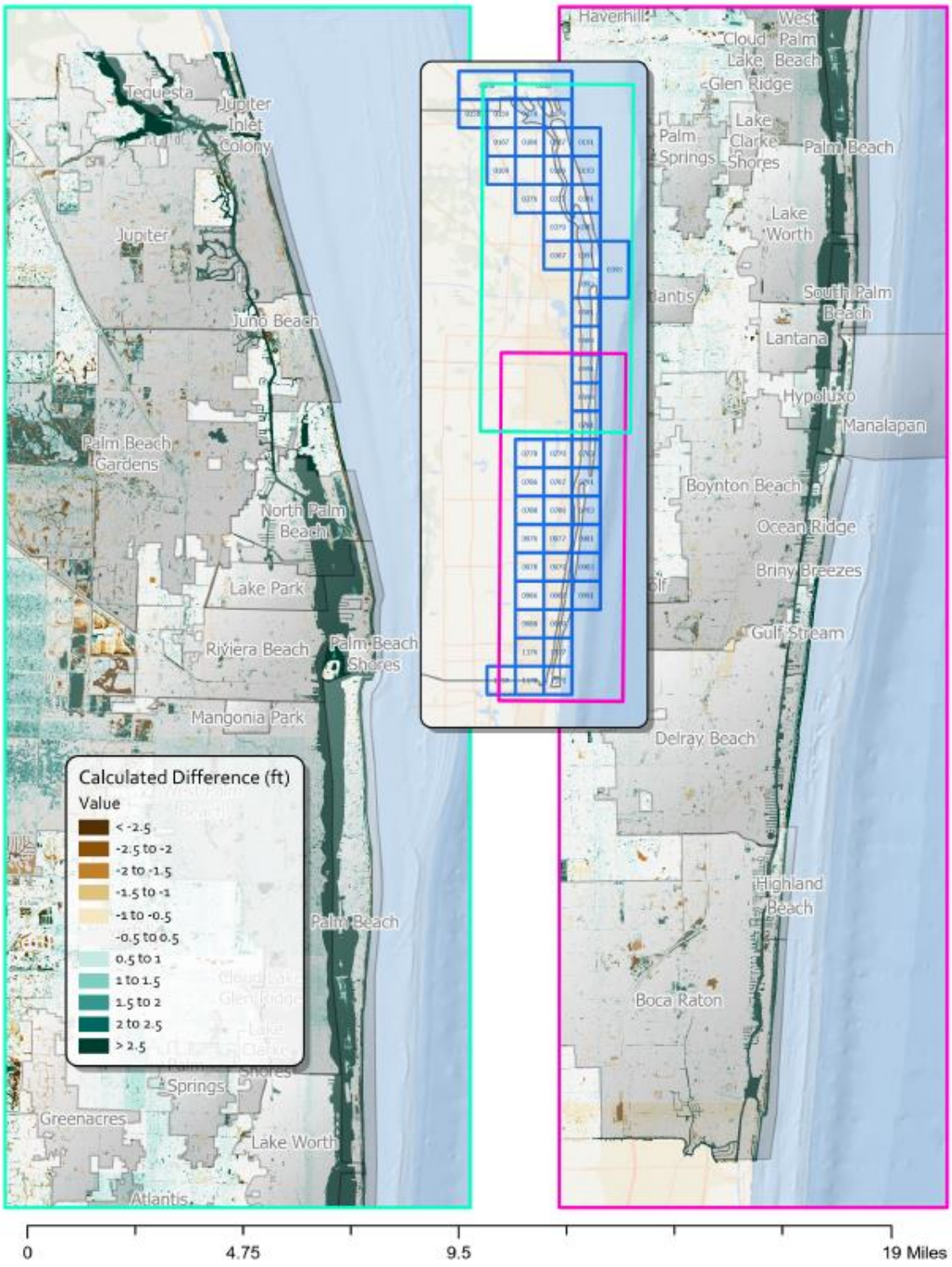


Figure 5.1: DEM Comparison with Municipal Boundaries: PBC DEM minus SWFLTB DEM

Elevations differences outside of FEMA's special flood hazard areas (SFHA) have limited, if any, influence on the updated FIRM Maps. As an additional method of comparison, elevation differences between the PBC DEM and the SWFLTB DEM as well as the PBC DEM and the USACE DEM were compared within the footprints of the FEMA's mapped Changes Since Last FIRM (CSLF). The footprints of CSLF was estimated at 11,509 acres as compared to 92,934 acres within the coastal FIRM panels.

Figure 5.2 shows the mapped CSLF for Palm Beach County as reported by FEMA. Note the gray areas designate no change in zone; however, this map does not specify if any Base Flood Elevations (BFEs) were updated within an existing zone. Appendix D contains enlarged views of the elevation differences along the Palm Beach County coastline for the PBC DEM minus the SWFLTB DEM, as well as the PBC DEM minus the USACE DEM, with a comparison to the CSLF map. Comparison of the DEM's within the footprints of the CSLF resulted in the following.

- **PBC DEM minus SWFLTB DEM** (Table 5.3):
  - Incorporated boundaries represented 83.9% (9,659 acres) of the area included in the CSLF footprints; unincorporated boundaries represented 16.1% (1,850 acres) of the area.
  - Differences of less than +/-0.5 feet between the DEM's were documented for 78% of the CSLF footprints; 65.0% within incorporated boundaries and 12.9% within unincorporated boundaries.
  - Difference of greater than 0.5 feet between DEM's were documented for 22.0% of the CSLF footprints; with the PBC DEM being above the SWFLTB DEM for 15.0% of the area and below for 7.0% of the area.
- **PBC DEM minus USACE DEM** (Table 5.4):
  - Similar trends were identified when comparing the PBC DEM to the USACE DEM.
  - The differences of less than +/-0.5 feet between the DEM's increased to 65.6% within incorporated boundaries for the USACE DEM from 65.0% for the SWFLTB DEM. The improved agreement with the USACE DEM is a direct reflection of the limits of the updated USACE data for the County's barrier islands used in creating the USACE DEM.

Table 5.3: PBC DEM minus SWFLTB DEM within CSLF Footprints

PBC DEM minus SWFLTB DEM	Incorporated (acre)	Unicorporated (acre)	Total (acre)	Incorporated (%)	Unincorporated (%)	Total (%)
PBC ≥ 1.0 foot above	509	112	621	4.4%	1.0%	5.4%
PBC 0.5 to 1.0 feet above	964	147	1,111	8.4%	1.3%	9.7%
PBC < 0.5 feet above/below	7,486	1,487	8,973	65.0%	12.9%	78.0%
PBC 0.5 to 1.0 feet below	473	66	539	4.1%	0.6%	4.7%
PBC ≥ 1.0 feet below	227	38	265	2.0%	0.3%	2.3%
Total	9,659	1,850	11,509	83.9%	16.1%	100.0%
PBC above	1,473	259	1,732	12.8%	2.3%	15.0%
PBC below	700	104	804	6.1%	0.9%	7.0%

Table 5.4: PBC DEM minus USACE DEM within CSLF Footprints

PBC DEM minus USACE DEM	Incorporated (acre)	Unicorporated (acre)	Total (acre)	Incorporated (%)	Unincorporated (%)	Total (%)
PBC ≥ 1.0 foot above	484	108	592	4.2%	0.9%	5.1%
PBC 0.5 to 1.0 feet above	887	144	1,031	7.7%	1.3%	9.0%
PBC < 0.5 feet above/below	7,552	1,495	9,047	65.6%	13.0%	78.6%
PBC 0.5 to 1.0 feet below	515	66	581	4.5%	0.6%	5.0%
PBC ≥ 1.0 feet below	221	37	258	1.9%	0.3%	2.2%
Total	9,659	1,850	11,509	83.9%	16.1%	100.0%
PBC above	1,371	252	1,623	11.9%	2.2%	14.1%
PBC below	736	103	839	6.4%	0.9%	7.3%

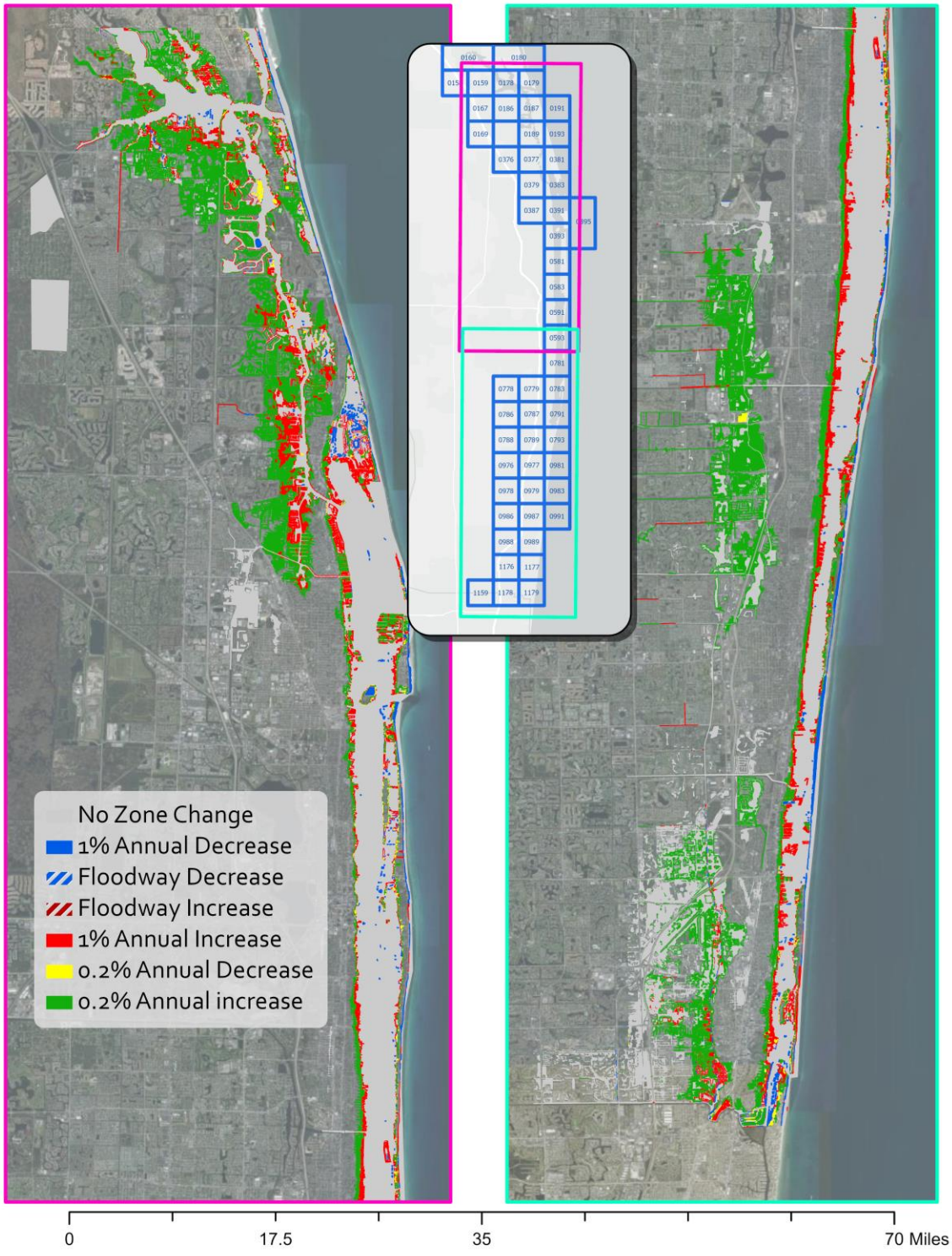


Figure 5.2: FEMA's mapped CSLF: Palm Beach County

The BFEs, not accounted for in the mapped CSLF, are estimated by FEMA at 1-foot increments and are determined based on the storm surge (stillwater and wave setup), erosion, runup, and overland wave propagation. During large storm surge events, surge and waves push inland from the natural coastline. The overland wave heights are determined based on the stillwater elevations, starting wave conditions, ground elevation, and obstructions in the inland area. This information is generally determined utilizing data from FEMA's Wave Height Analysis for Flood Insurance Studies (WHAFIS) transects. Figure 5.3 shows the WHAFIS transect lines within Palm Beach County used in FEMA's mapping overlain on the DEM comparison of the PBC DEM and SWFLTB DEM. Appendix D also provides enlarged views of the elevation differences along the WHAFIS transect lines.

After review of the DEM comparisons, the mapped CSLF, and the WHAFIS transect lines, transect 148 was selected for further analysis to convey differences between the DEM's and how they may relate to FEMA's preliminary FIRM panels.

- It was found that areas had undergone significant redevelopment between the data collection times of the two DEMs (SWFLTB DEM and PBC DEM) as can be seen in Figure 5.4 and Figure 5.5.
- Figure 5.6 shows the profile cut along the entire length of the Transect 148. Except for the areas of development and the lack of bathymetry data in the PBC DEM, the two profiles are in acceptable agreement given that the difference in elevations are less than the accuracy tolerances for the DEM's. In the areas of development, the PBC DEM was above the SWFLTB DEM but FEMA's mapped CSLF indicated an increased flood hazard.
- Review of preliminary FIRM panel (Figure 5.7) for FEMA's updated study and the effective (current) FIRM panel indicated that the flood risk increased in the areas of development as the BFE increased to +7 feet, NAVD88 from +4 feet, NAVD88. FEMA's mapping of the flood zones in this instance appears to correctly reflect the defined BFE with respect of the DEM's as well as the mapped CSLF.

This type of analysis would be necessary on a location-by-location (e.g. parcels and individual structures) basis to evaluate whether differences identified by DEM comparisons with respect to updated BFE would affect/alter the mapping of flood zones shown in FEMA's preliminary FIRM panels. Location specific differences, if documented to be above FEMA's defined BFE by a flood elevation certificate signed by a Florida professional land surveyor, could be addressed as a letter of map revision (LOMR) issued by FEMA.

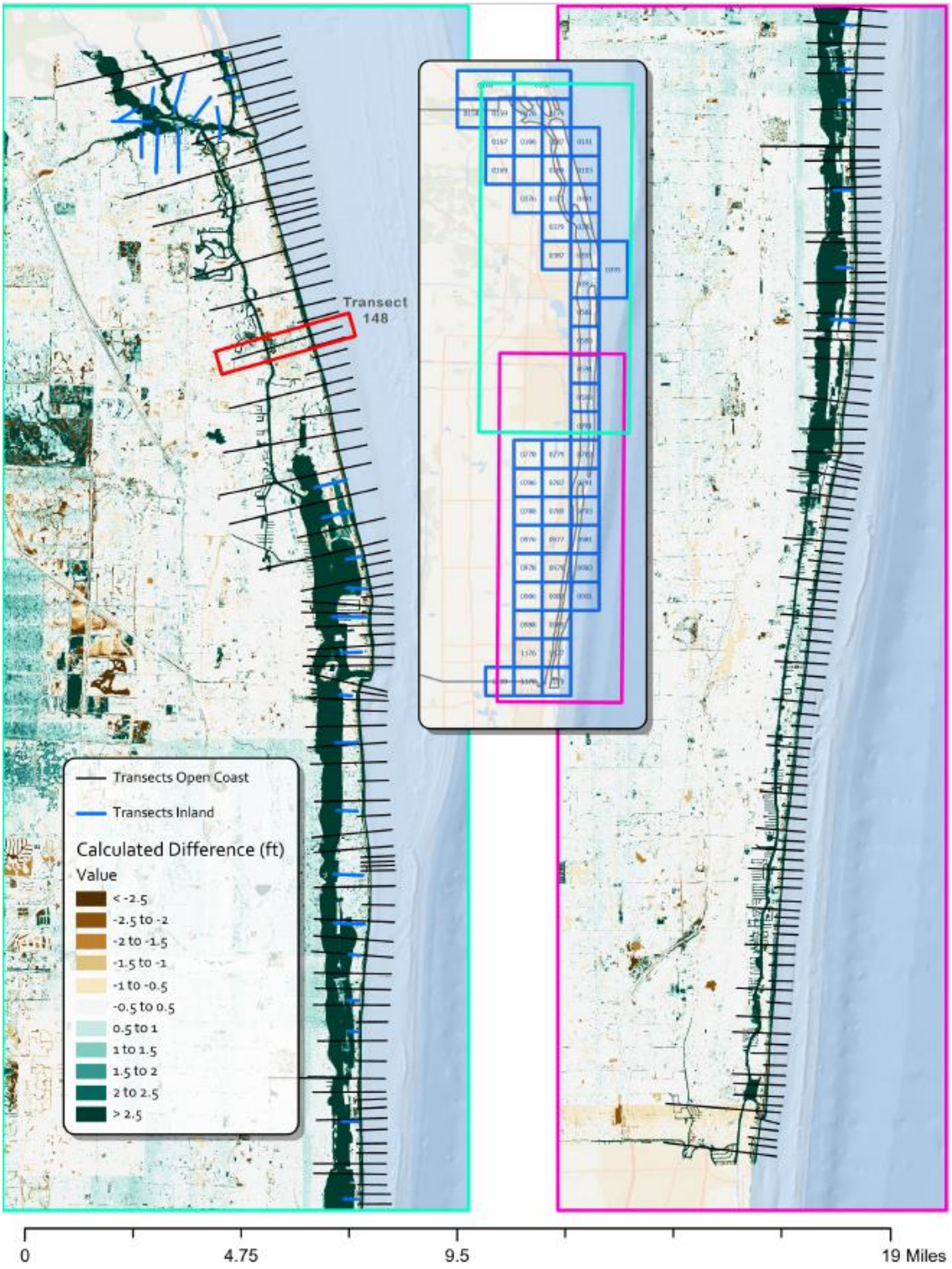


Figure 5.3: DEM Comparison with WHAFIS Transects: PBC DEM minus SWFLTB DEM

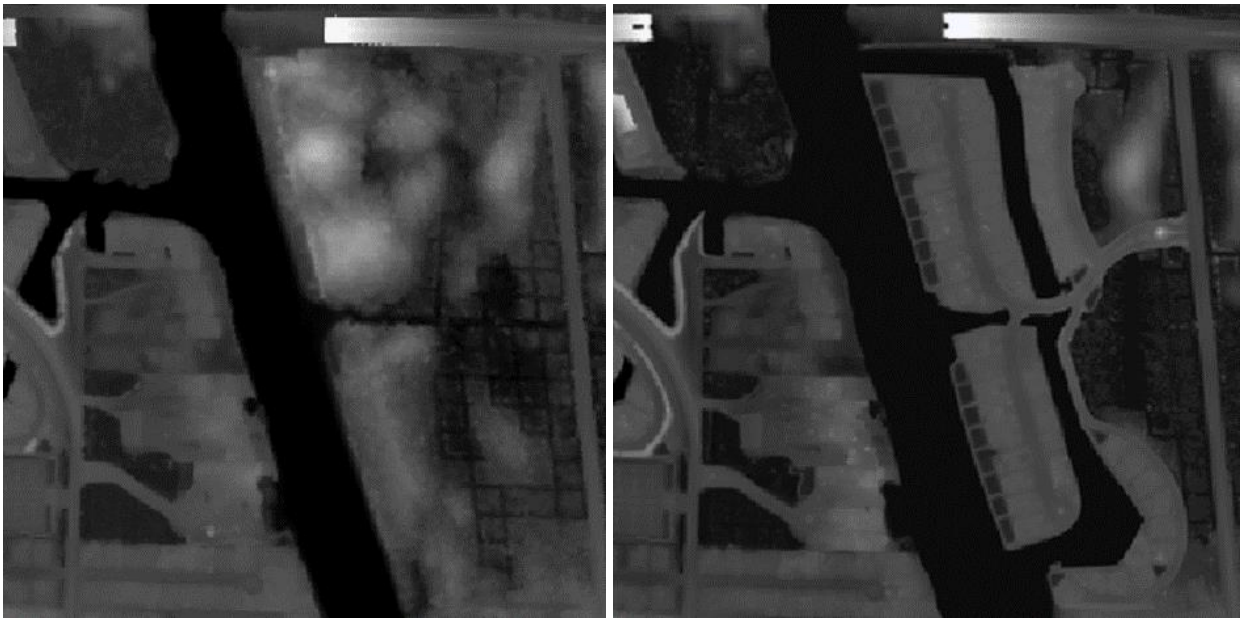


Figure 5.4: Area of Development along Transect 148: SWFLTB DEM (Left) vs. PBC DEM (Right)

Figure 5.5: Area of Development along Transect 148: 2005 Aerial (Left) vs. 2017 Aerial (Right)

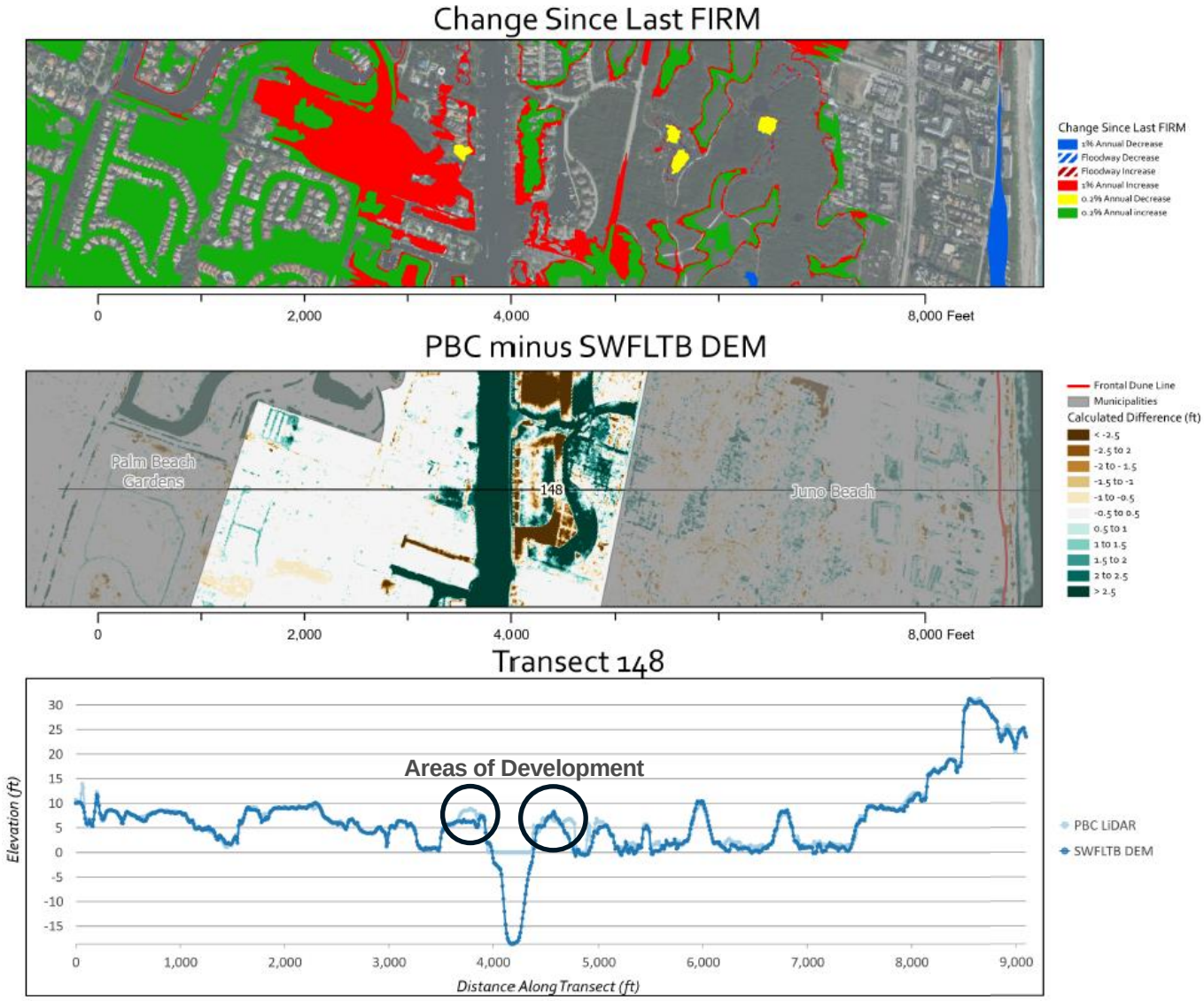


Figure 5.6: Comparison of Elevations and CSLF Map along WHAFIS Transect 148

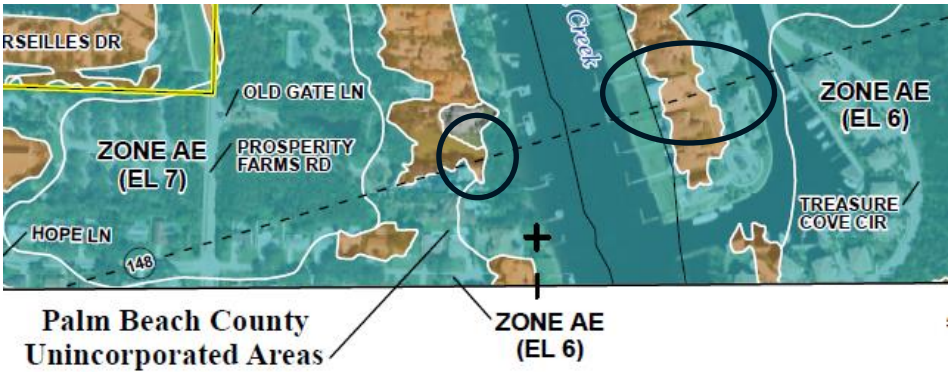


Figure 5.7: FEMA preliminary FIRM panel (0189)

5.2 Benchmarks

Since the analysis demonstrated localized areas of grade differences greater than the six-inch tolerance, the SWFLTB, USACE, and PBC DEMs were compared to the Palm Beach County Benchmark Data provided by the County on February 29, 2020, within the FIRM boundaries. It was found the PBC DEM deviates less from the provided benchmarks than the SWFLTB DEM or USACE DEM.

- PBC DEM – Benchmark average difference: 0.84 ft; Standard deviation: 3.41ft
- USACE DEM – Benchmark average difference: 1.26 ft; Standard deviation: 4.31 ft
- SWFLTB DEM – Benchmark average difference: 1.24 ft; Standard deviation: 4.32 ft

These are all large deviations, but it indicates the PBC DEM is slightly more accurate that the SWFLTB DEM or USACE DEM. Benchmark data points were originally provided with the 2016/2017 Palm Beach County LiDAR that are in much closer agreement with the PBC DEM. The standard deviation from these benchmarks was 0.13 ft. Elevations within the PBC DEM at the locations of the benchmarks were associated with the elevation of the 10-foot grids, not a single point, thus contributing to this deviation.

6. Conclusion

Multiple datasets were used to create the DEMs utilized by the Coastal Study and for the development of the updated preliminary FIRMs. Outlined in this report are the input behind these datasets and how each was applied. The various DEMs used were as follows:

- Coastal Study – SWFLTB DEM
- Updated FIRMs – USACE DEM
- 2016/2017 Palm Beach County LiDAR for comparison – PBC DEM.

No gaps between datasets were found within the area being assessed in this task within the SWFLTB DEM compiled by BakerAECOM. Based on our analysis of the information contained within the BakerAECOM Report *Technical Approach,* no obvious errors were found in the horizontal reprojections/transformations or vertical transformations. The methods used by BakerAECOM to stitch together various datasets in the creation of the SWFLTB DEM for use in the Coastal Study appear to be acceptable.

Within the coastal FIRM panels, areas were examined for elevation differences of 0.5 feet or greater and 1 foot or greater between the PBC DEM and SWFLTB DEM and between the PBC DEM and USACE DEM. Based on the accuracy of FEMA FIRMs and survey tolerances of the data used in this analysis, a deviation of 0.5 feet or greater was deemed to be large enough to possibly affect mappings of flood zone of the updated FIRMs. Of the 92,934 acres contained with the coastal FIRM panels,

- Incorporated boundaries represented 78.5% (72,918 acres) of the area included in the coastal FIRM panel area; unincorporated boundaries represented 21.5% (20,016 acres) of the area.
- Differences of less than +/-0.5 feet between the DEM's were documented for 73.6% of the coastal FIRM panel area when comparing the PBC DEM to the SWFLTB DEM; 59.0% within incorporated boundaries and 14.6% within unincorporated boundaries. Similar trends were identified when comparing the PBC DEM to the USACE DEM.
- As discussed in Section 3.2, the USACE DEM was updated with USACE data collected in 2016. The updated USACE data was roughly used to represent the barrier islands east of state road A1A, while the data to the west was consistent with the data used to generate the SWFLTB DEM. The barrier islands are mostly contained by incorporated boundaries. Accordingly, differences of less than +/-0.5 feet between the DEM's increased to 59.5% within incorporated boundaries for the USACE DEM from 59.0% for the SWFLTB DEM. The USACE DEM, which incorporated more recent data, exhibited better agreement with PBC DEM.

Elevation differences outside of FEMA's special flood hazard areas (SFHA) have limited, if any, influence on the updated FIRM Maps. As an additional method of comparison, elevation differences between the PBC DEM and the SWFLTB DEM as well as the PBC DEM and the USACE DEM were compared within the footprints of the FEMA's mapped Changes Since Last FIRM (CSLF). The footprints of the CSLF were estimated at 11,509 acres as compared to 92,934 acres within the coastal FIRM panels. Within the CSLF footprints (Table 6.1),

- Incorporated boundaries represented 83.9% (9,659 acres) of the area included in the CSLF footprints; unincorporated boundaries represented 16.1% (1,850 acres) of the area.
- Differences of less than +/-0.5 feet between the DEM's were documented for 78% of the CSLF footprints when comparing the PBC DEM to the SWFLTB DEM; 65.0% within incorporated boundaries and 12.9% within unincorporated boundaries. Similar trends but with increased agreement for differences less than +/-0.5 feet (as noted above) were identified when comparing the PBC DEM to the USACE DEM.
- Differences of greater than 0.5 feet between DEM's were documented for 22.0% of the CSLF footprints when comparing the PBC DEM to the SWFLTB DEM; with the PBC DEM being above the SWFLTB DEM for 15.0% (1,732 acres) of the area and below for 7.0% (804 acres) of the area.

Table 6.1: PBC DEM minus SWFLTB DEM within CSLF Footprints

PBC DEM minus SWFLTB DEM	Incorporated (acre)	Unicorporated (acre)	Total (acre)	Incorporated (%)	Unincorporated (%)	Total (%)
PBC ≥ 1.0 foot above	509	112	621	4.4%	1.0%	5.4%
PBC 0.5 to 1.0 feet above	964	147	1,111	8.4%	1.3%	9.7%
PBC < 0.5 feet above/below	7,486	1,487	8,973	65.0%	12.9%	78.0%
PBC 0.5 to 1.0 feet below	473	66	539	4.1%	0.6%	4.7%
PBC ≥ 1.0 feet below	227	38	265	2.0%	0.3%	2.3%
Total	9,659	1,850	11,509	83.9%	16.1%	100.0%
PBC above	1,473	259	1,732	12.8%	2.3%	15.0%
PBC below	700	104	804	6.1%	0.9%	7.0%

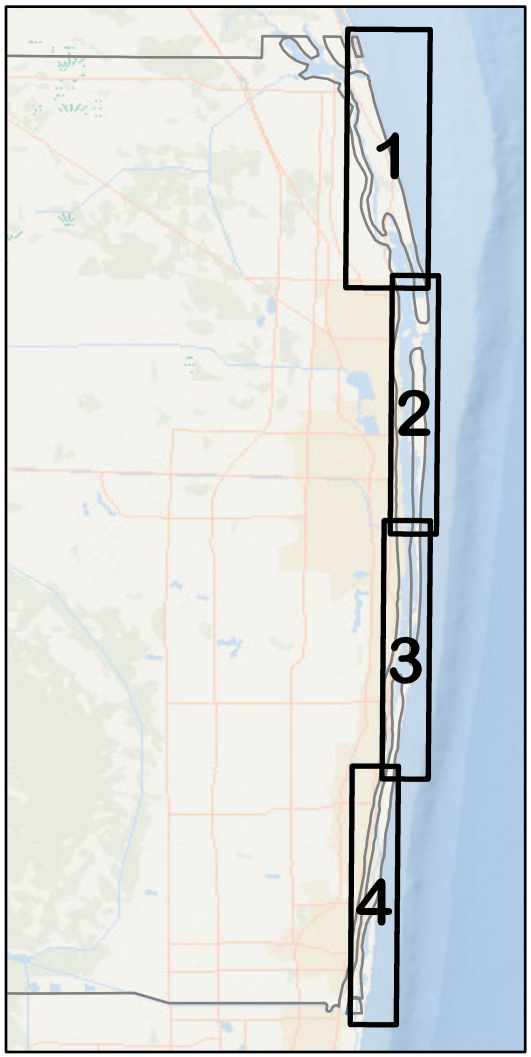
Based on the DEM comparisons, inclusion of the PBC DEM in FEMA's coastal study would help address the following.

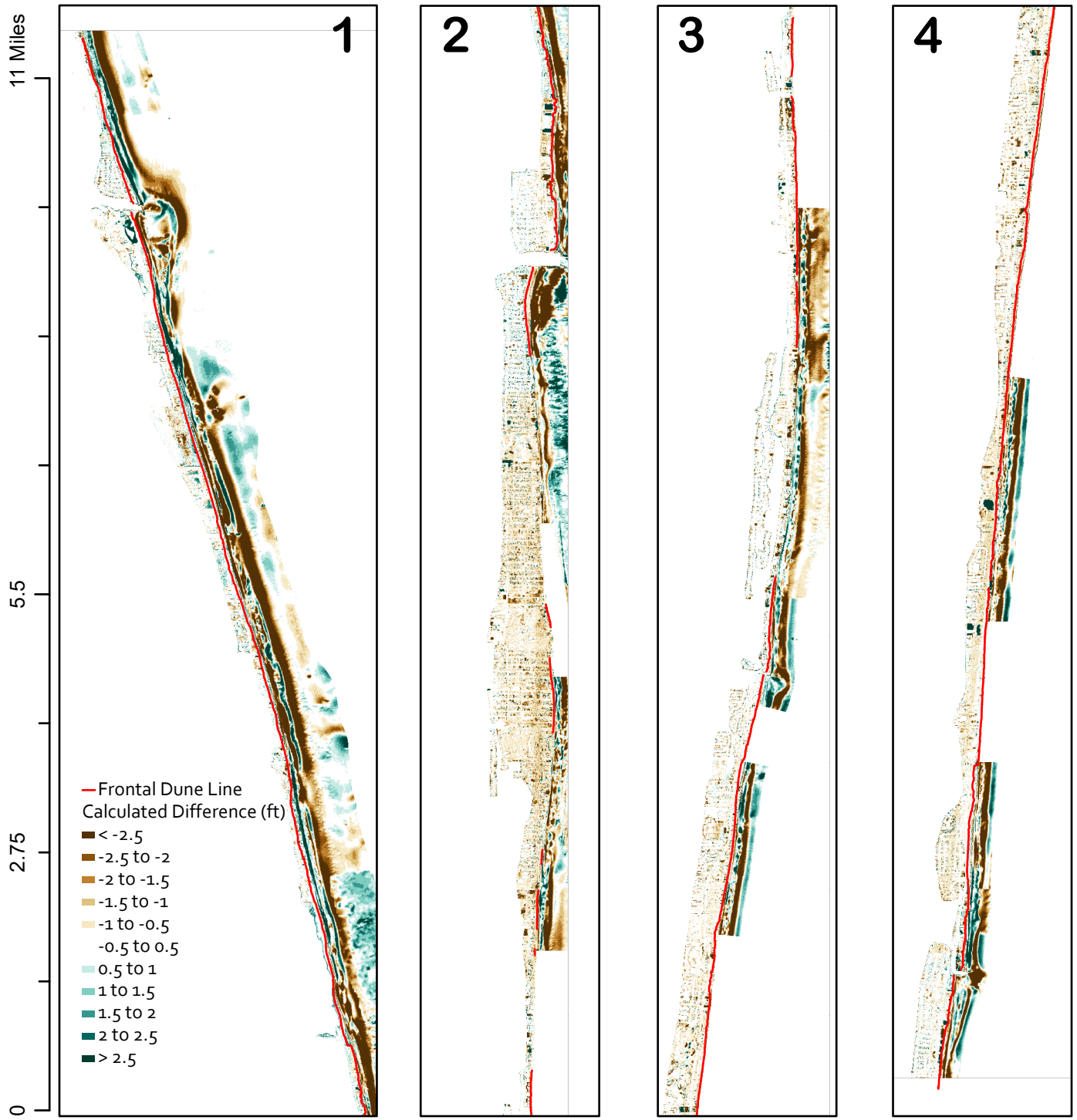
- Differences may have expanded (overestimated) the inland extents of the SFHA mapped by FEMA in the central portion of the County. The DEM comparisons indicated that the PBC DEM was approximately 0.5 to 1.0 feet above the SWFLTB DEM west of the Lake Worth Lagoon. The differences (FIRM panels 0393, 0581, 05983, 0591, 0593, 0781, 0783, 0791, and 0793) extended approximately 15.5 miles between 45th Street, West Palm Beach and East Ocean Avenue, Boynton Beach. The differences appear to be inherent to the 2007 Florida Department of Emergency Management LiDAR data used by FEMA to generate the DEM in this area and therefore may be attributed to data collection techniques (e.g. flight lines, airframes, sensors, equipment).
- Differences may have limited (reduced) the inland extents of the SFHA mapped by FEMA in the southern portion of the County. The data used by FEMA in the creation of the SWFLTB DEM changed from the 2007 Florida Department of Emergency Management to the 2001 Palm Beach County LiDAR and resulted in an apparent vertical offset. The differences (FIRM panels 1159, 1178, and 1179) indicated that the PBC DEM was approximately 0.5 to 1 foot below the SWFLTB DEM.
- Larger differences (e.g. greater than 1 foot) appear to be due in part to the occurrence of construction and development during the time between the capture of the SWFLTB DEM in 2007 and the PBC DEM in 2016/17. Differences identified by the DEM comparisons may also be attributed in part to post-processing of the survey data and gridding methods. LiDAR survey data is processed to eliminate buildings, trees, and other obstructions to represent "bare earth" (i.e. ground elevations). Post-processing techniques, gridding methods, and technological advances in data collection since 2007 may account for some of the differences identified herein. A location-by-location analysis (which was beyond the scope of work) is necessary to evaluate whether these differences with respect to updated BFE would affect/alter the mapping of flood zones shown in FEMA's preliminary FIRM panels.

Appendix A

SWFLTB DEM minus USACE DEM

Palm Beach County Elevation Model Comparison SWFLTB DEM minus USACE DEM



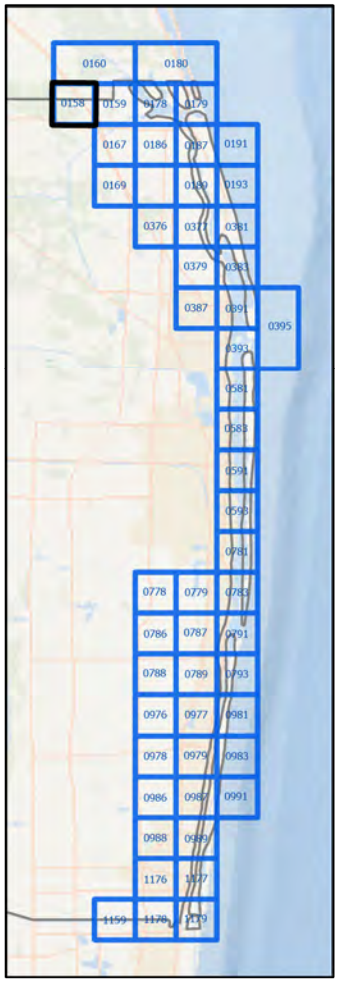


Appendix B

PBC DEM minus SWFLTB DEM by FIRM Panel

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0158



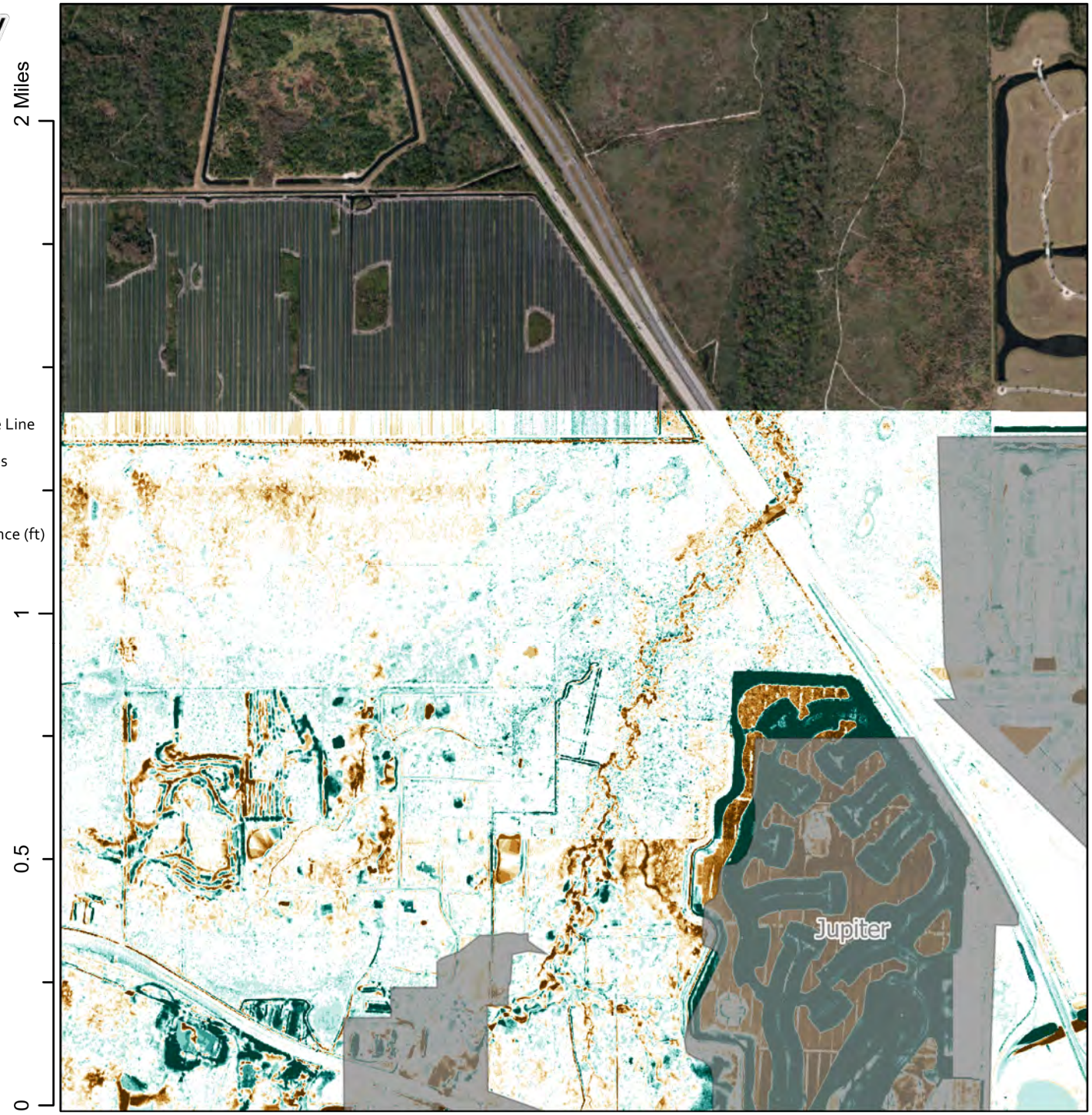
Frontal Dune Line

Municipalities

FIRM Panels

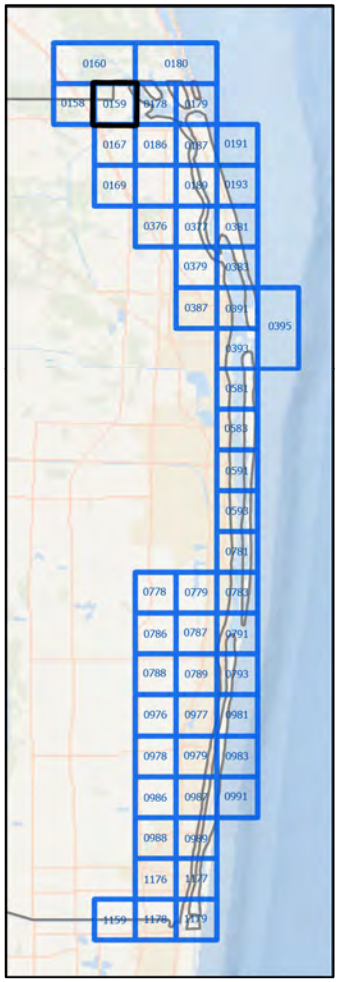
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

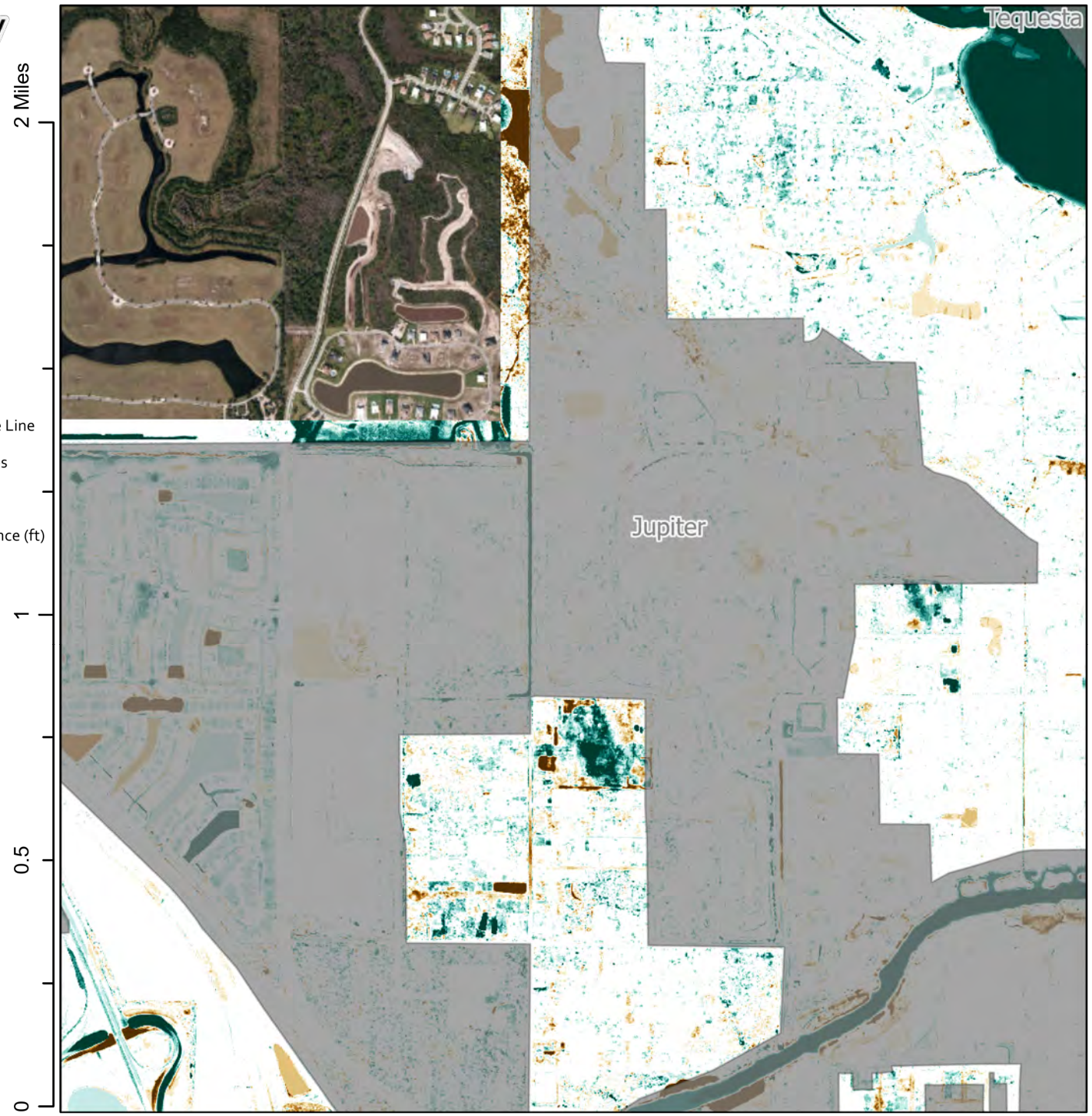
FIRM Panel: 0159



- Frontal Dune Line
- Municipalities
- FIRM Panels

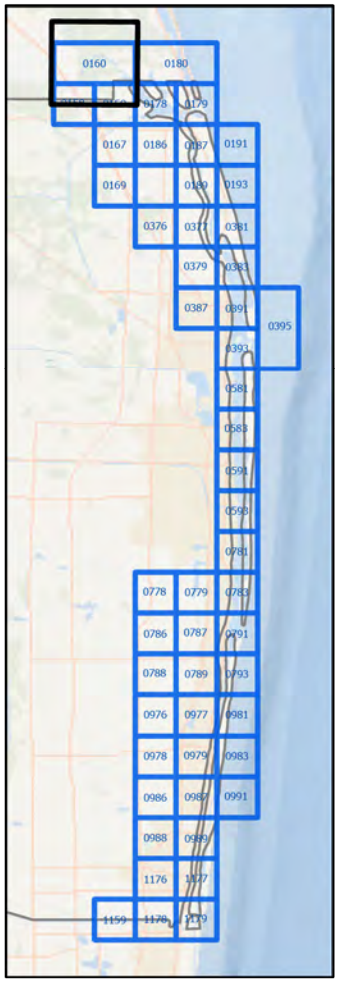
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0160



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

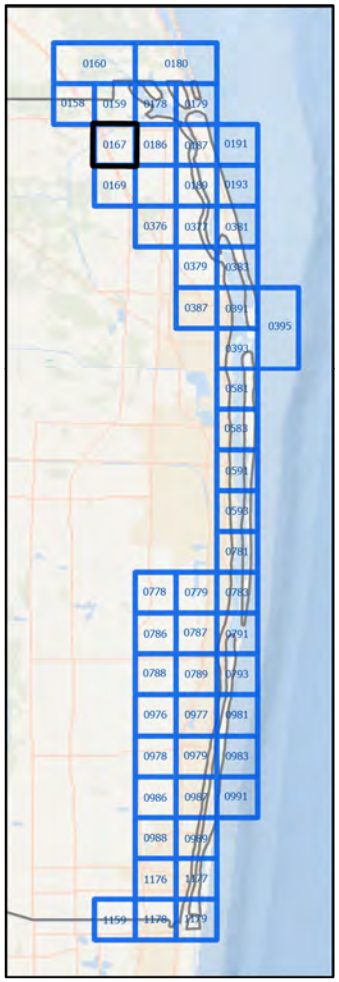
4 Miles

0 1 2

Tequesta

Jupiter

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM FIRM Panel: 0167



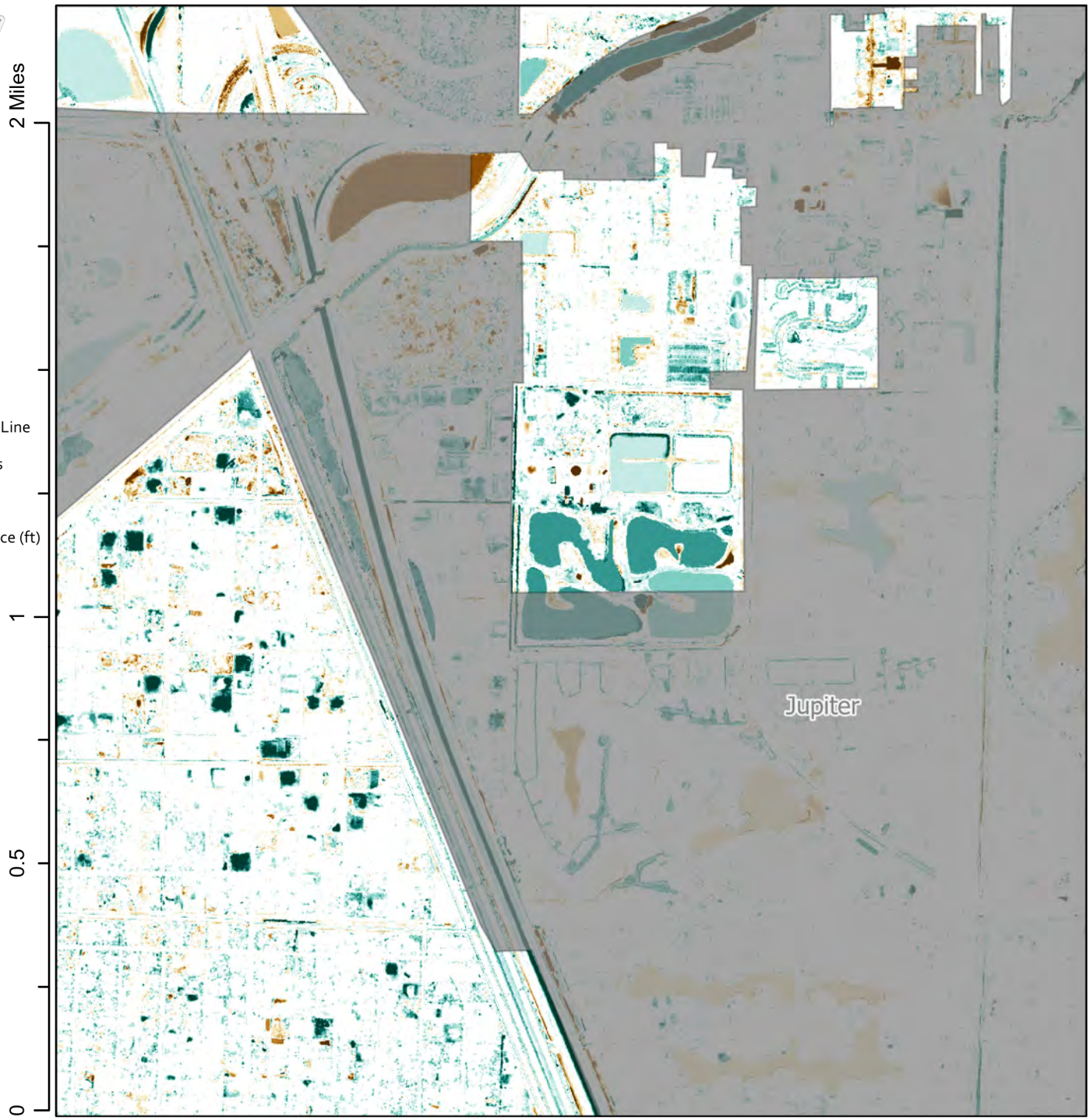
Frontal Dune Line

Municipalities

FIRM Panels

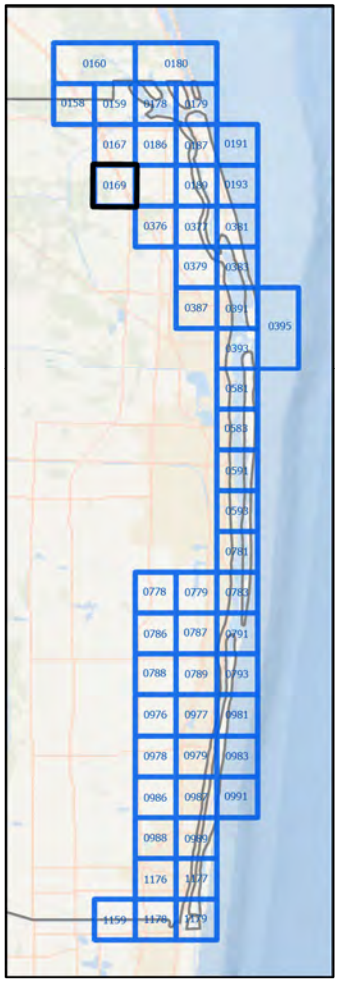
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0169



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

0

0.5

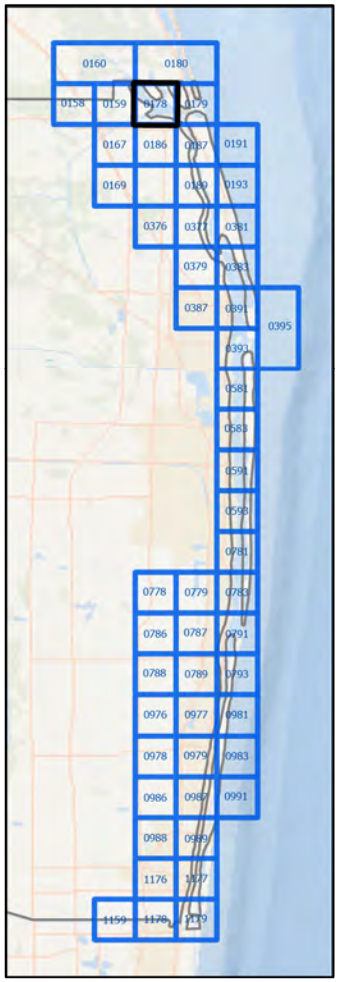
1

Palm Beach Gardens

Jupiter

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

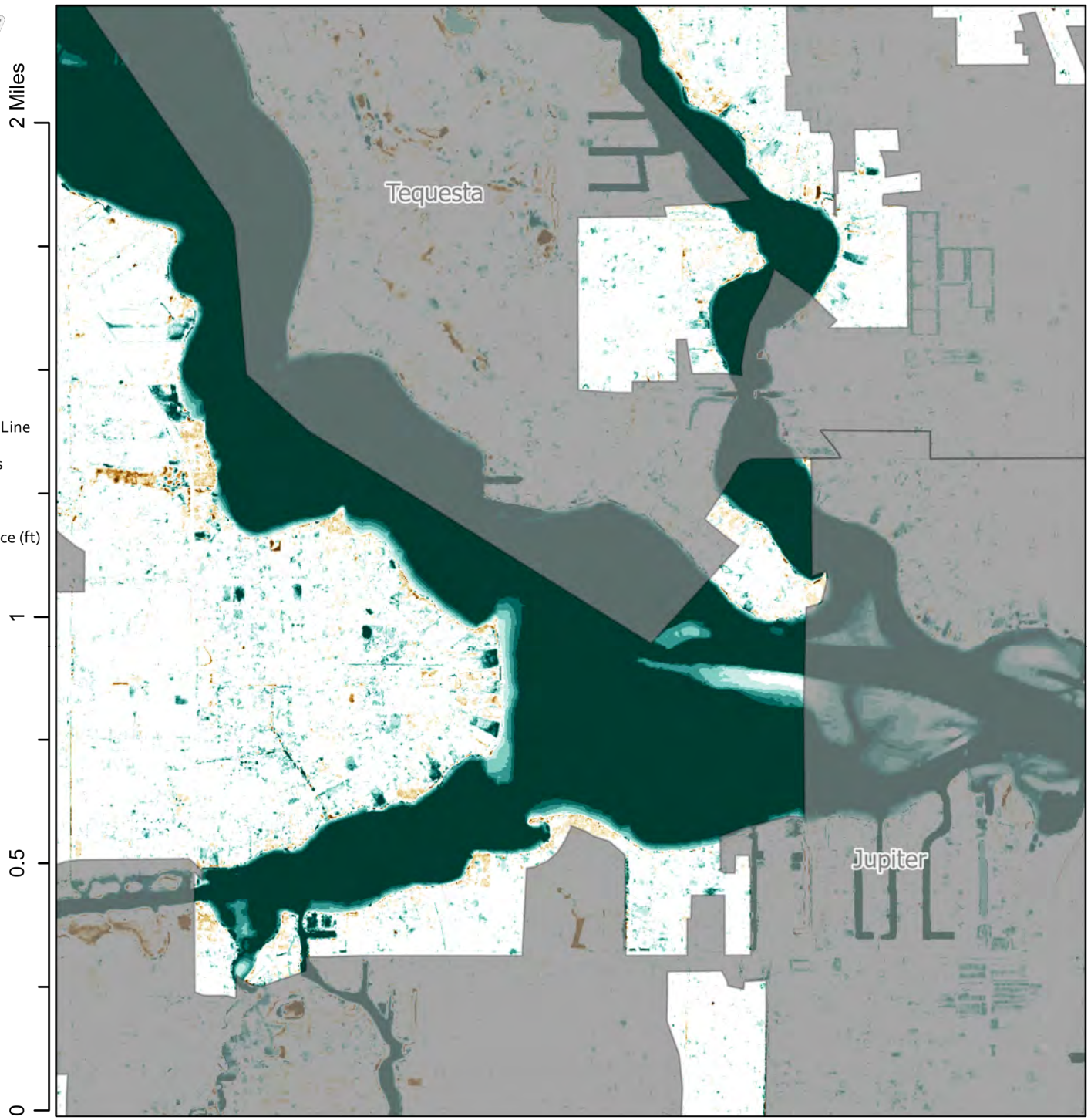
FIRM Panel: 0178



- Frontal Dune Line
- Municipalities
- FIRM Panels

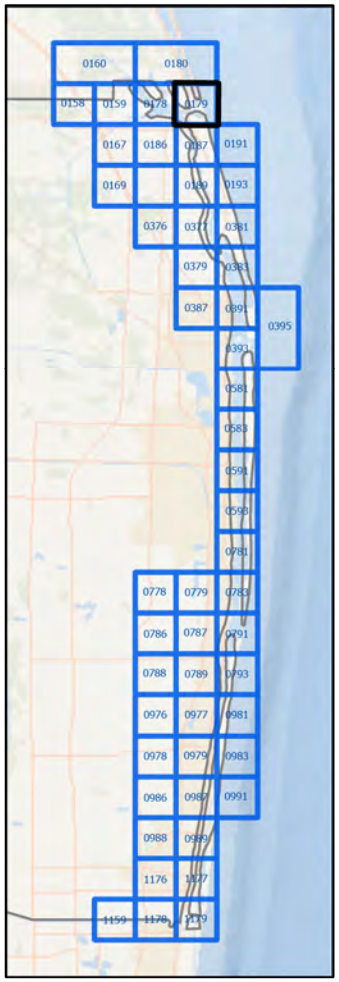
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0179



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

0

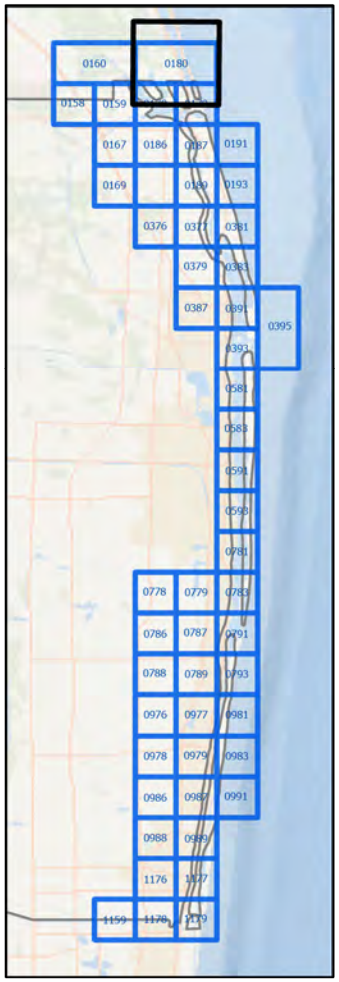
Tequesta

Jupiter

Jupiter Inlet Colony

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0180



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

4 Miles

0 1 2

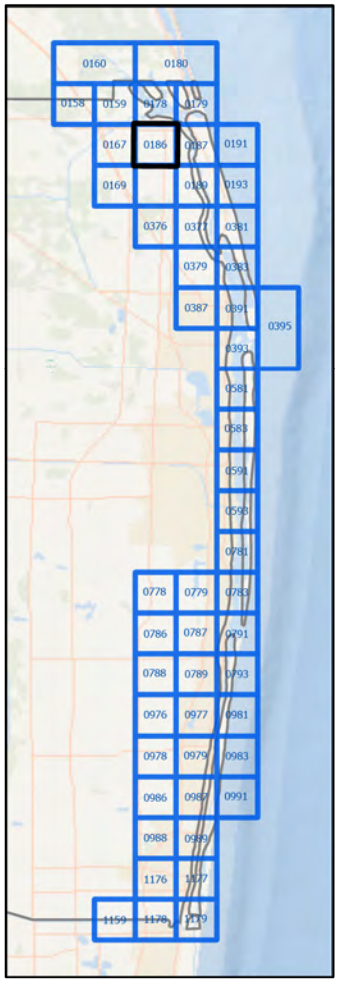
Tequesta

Jupiter

Jupiter Inlet Colony

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

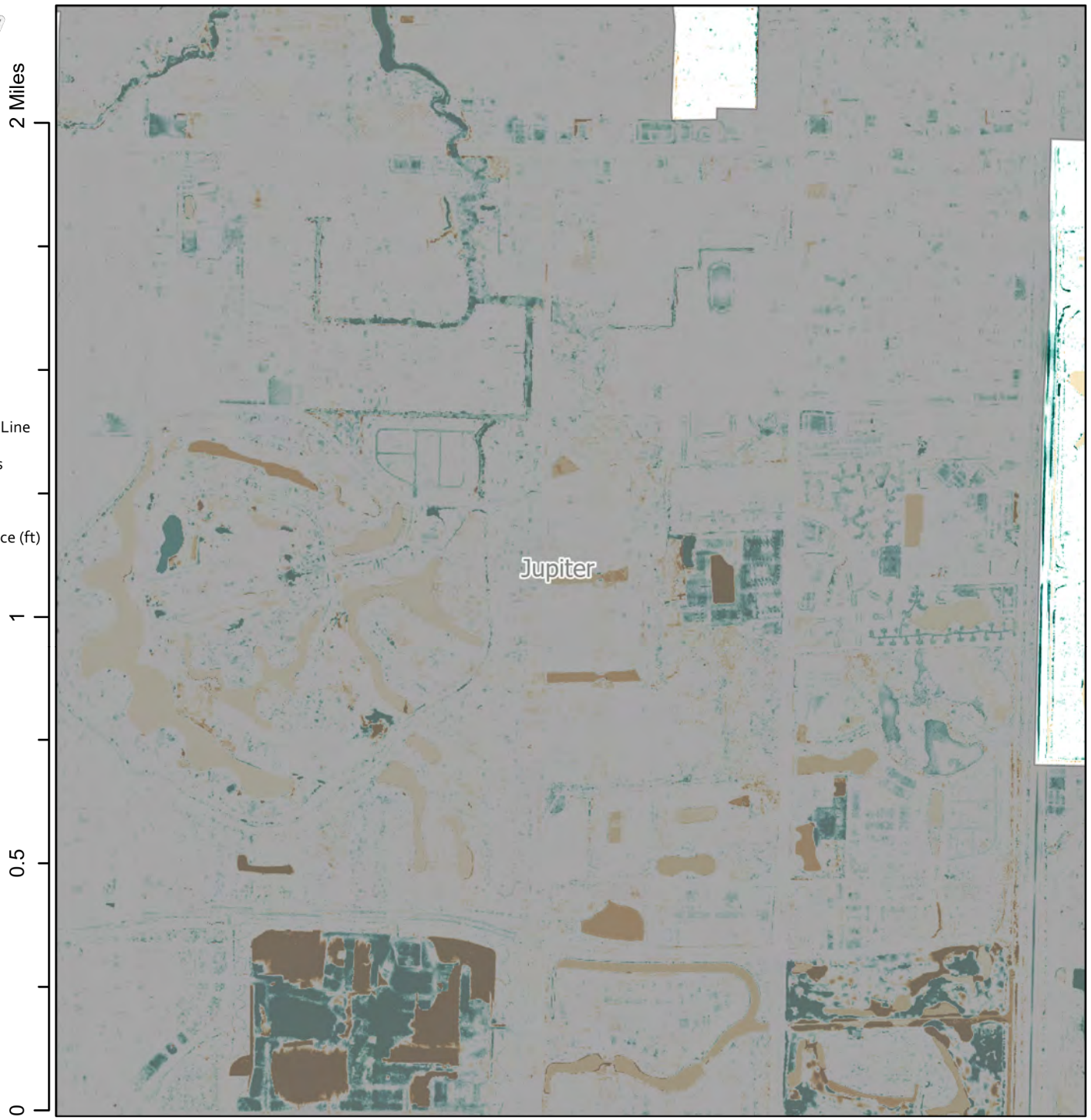
FIRM Panel: 0186



- Frontal Dune Line
- Municipalities
- FIRM Panels

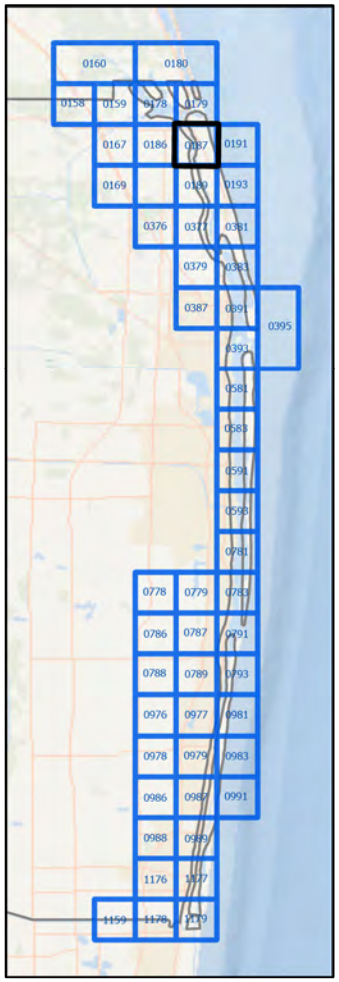
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

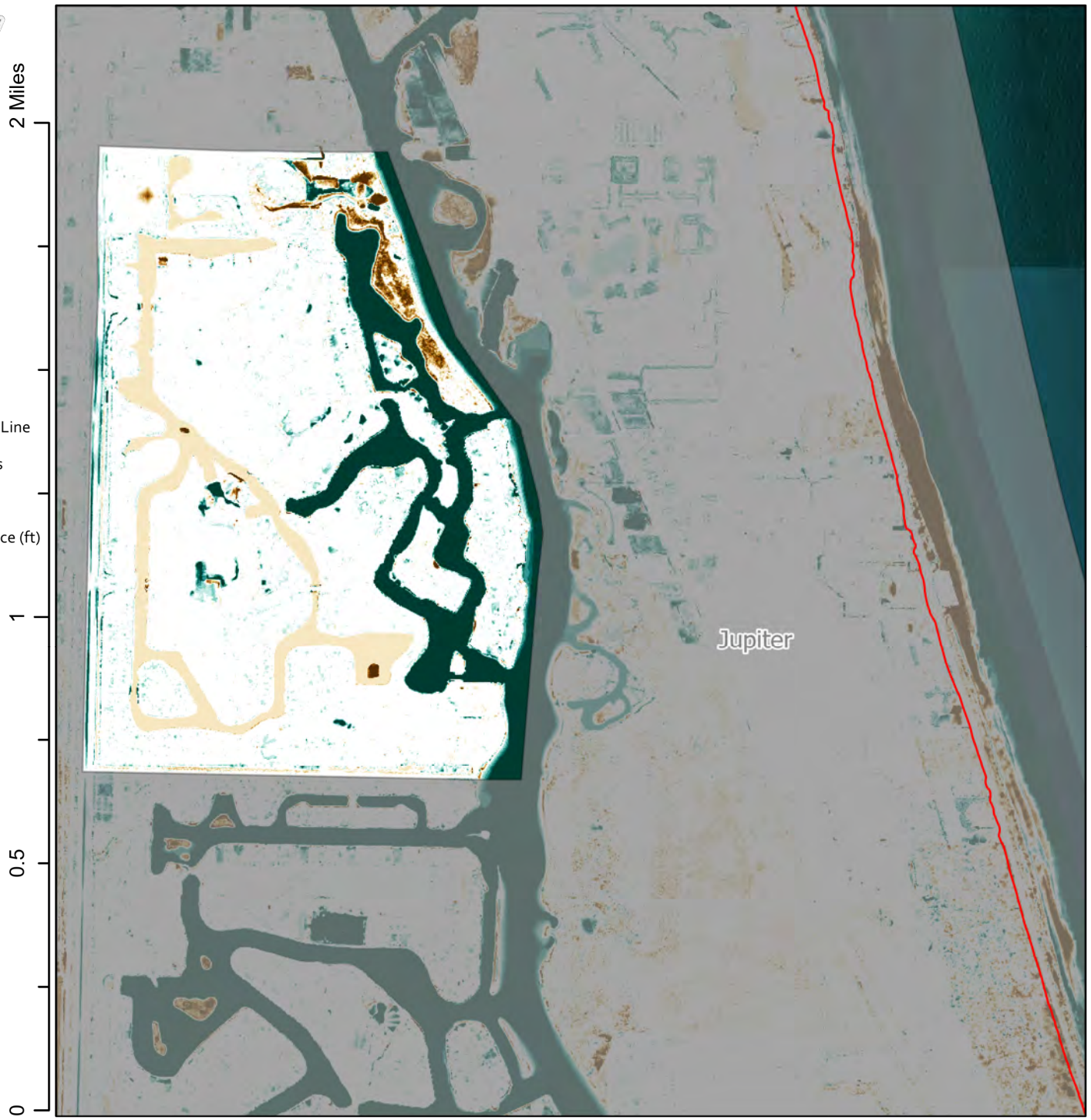
FIRM Panel: 0187



- Frontal Dune Line
- Municipalities
- FIRM Panels

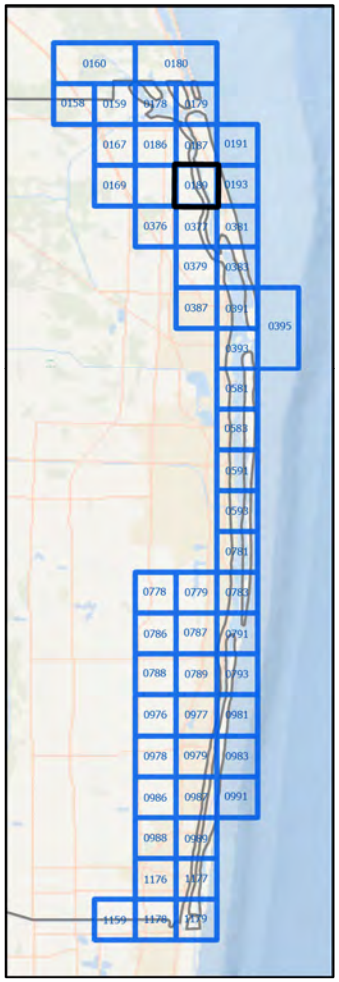
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

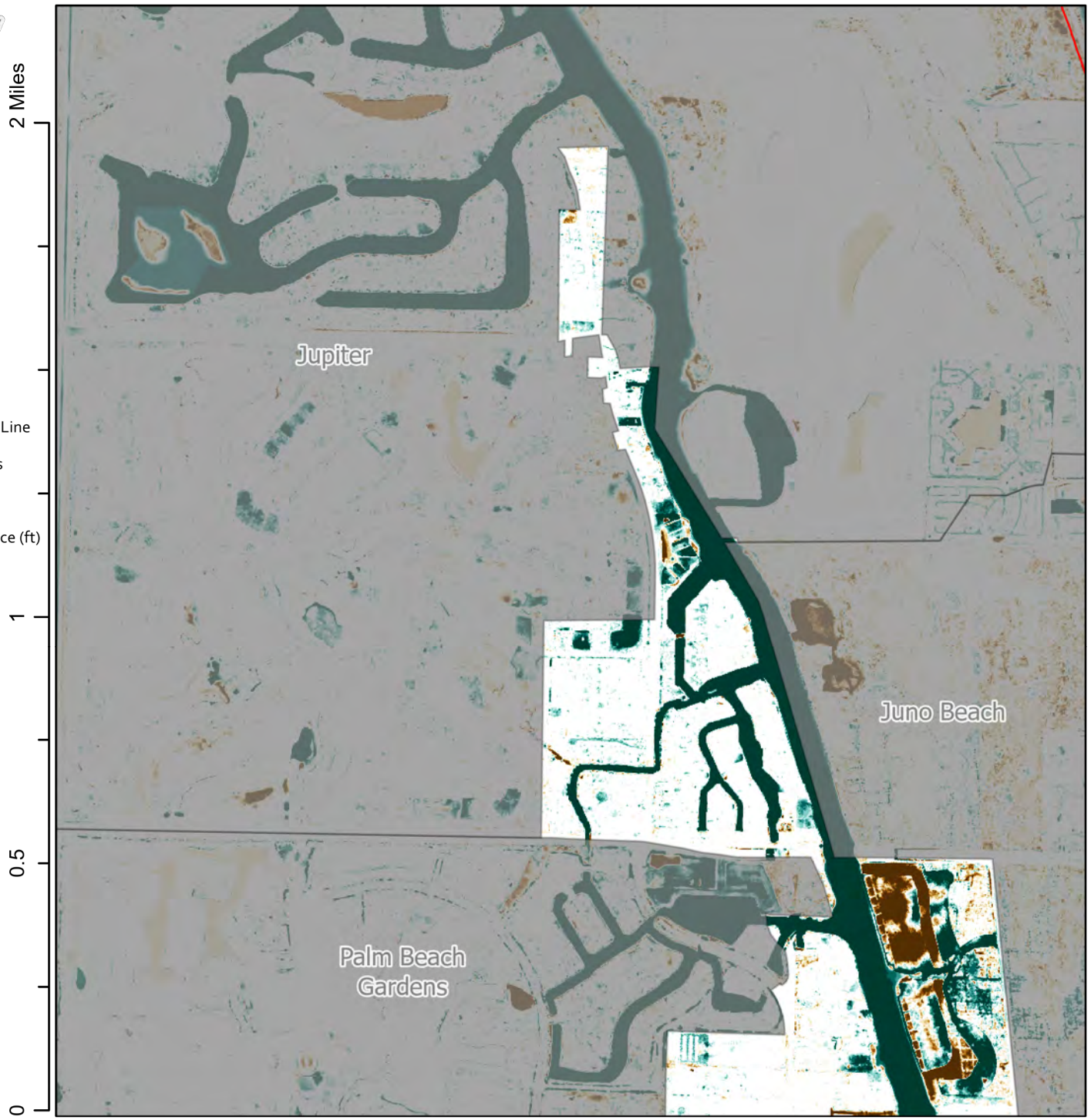
FIRM Panel: 0189



- Frontal Dune Line
- Municipalities
- FIRM Panels

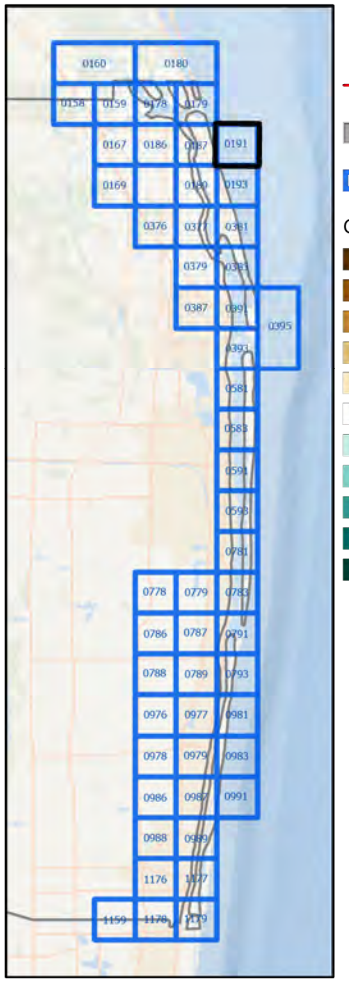
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0191



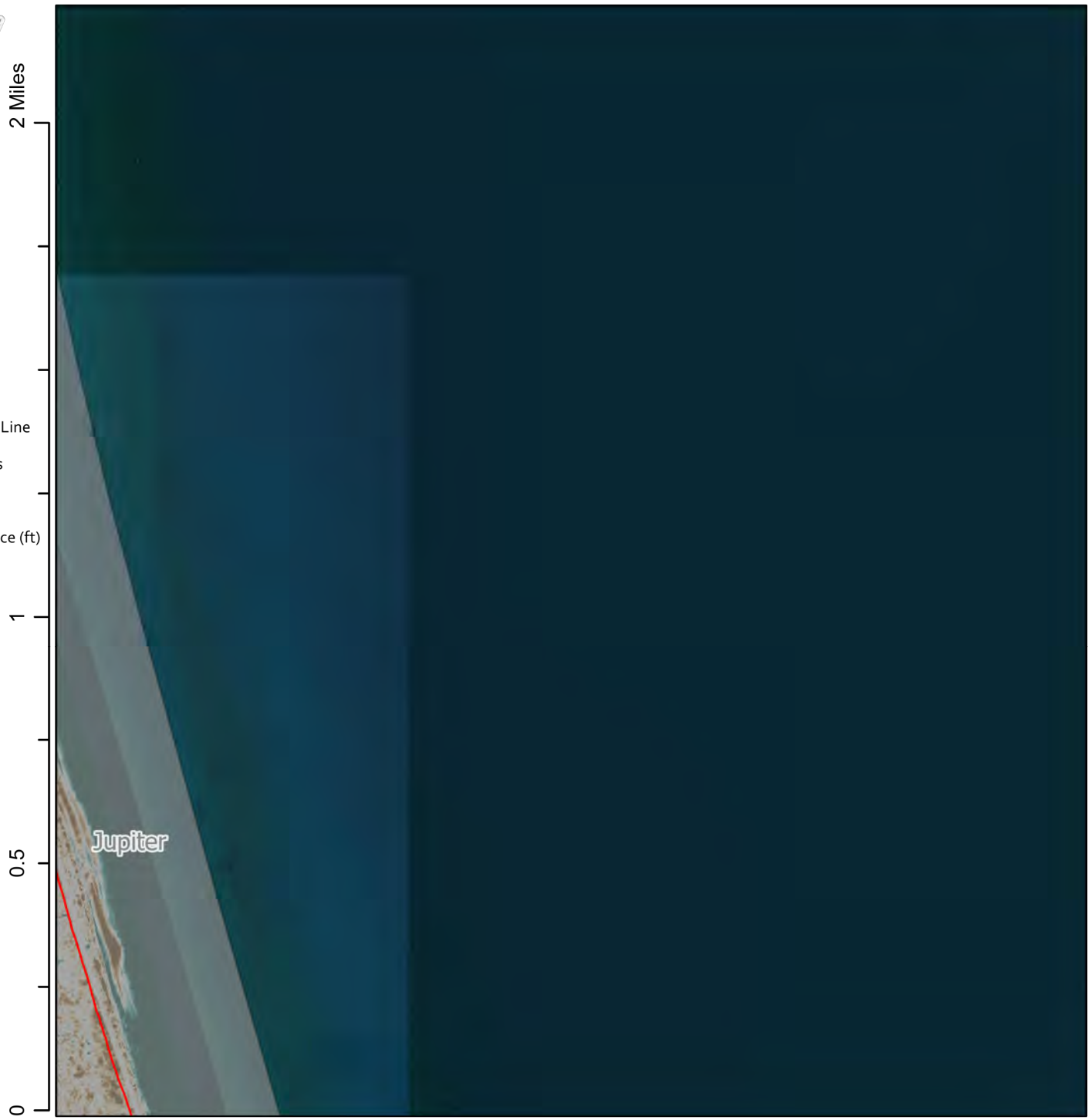
Frontal Dune Line

Municipalities

FIRM Panels

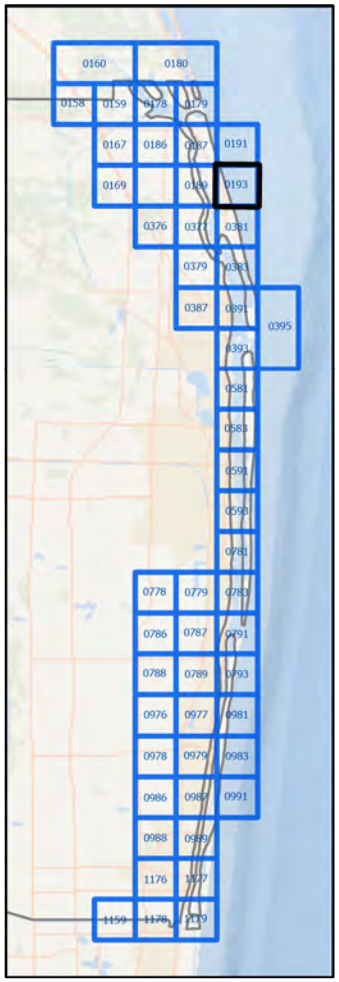
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

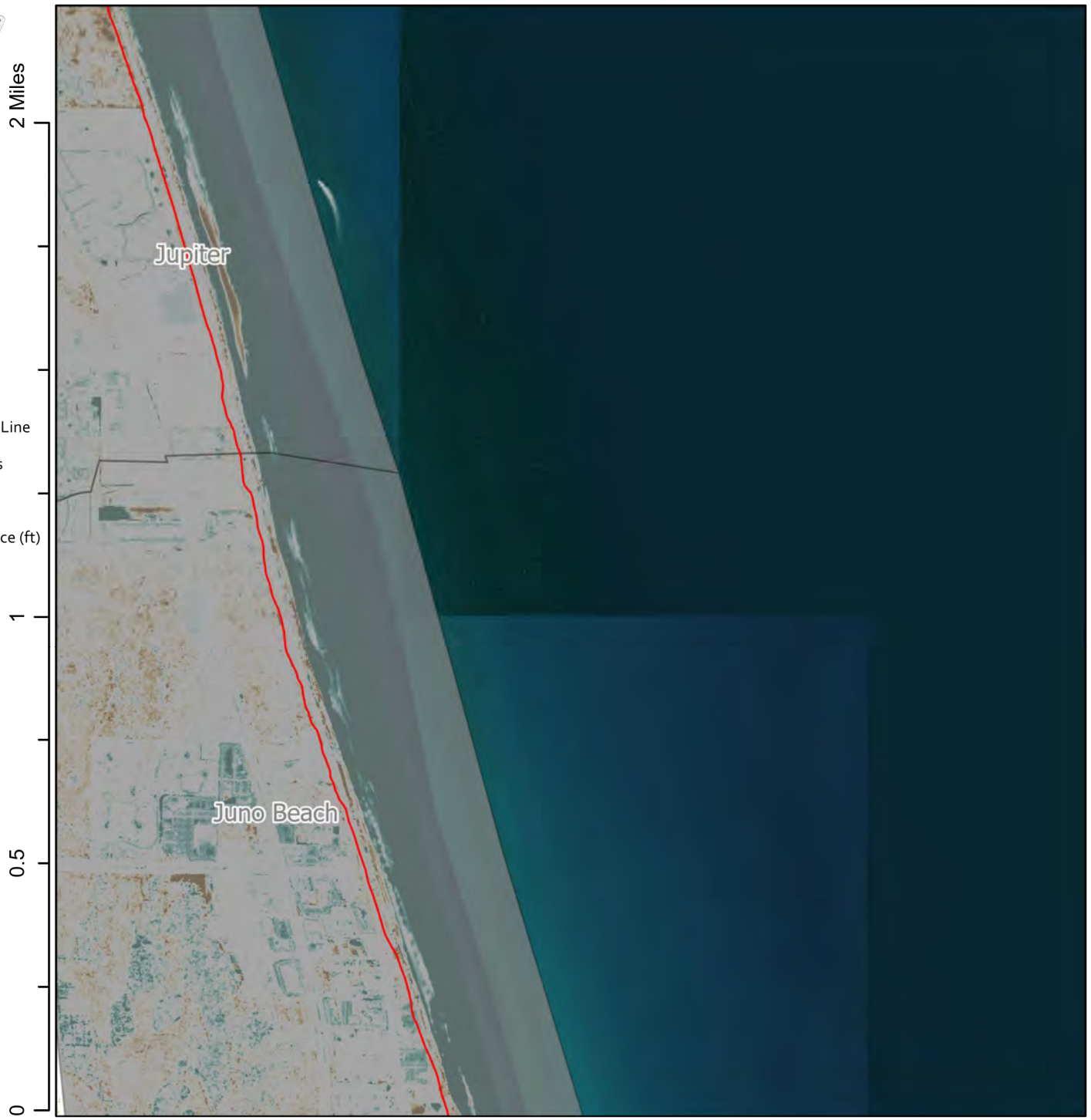
FIRM Panel: 0193



- Frontal Dune Line
- Municipalities
- FIRM Panels

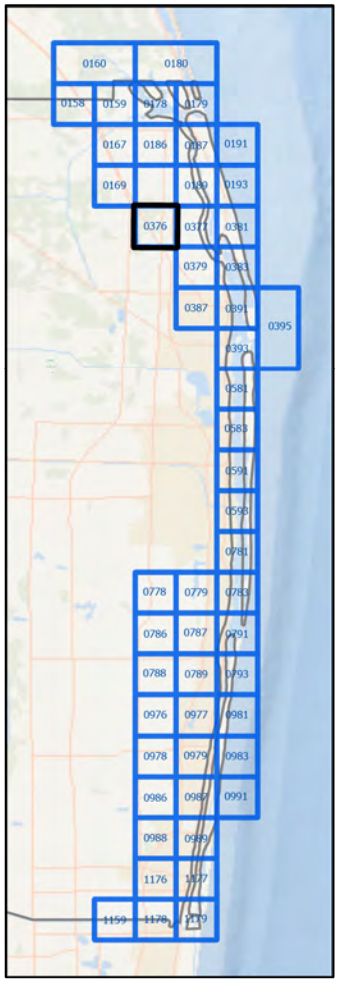
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

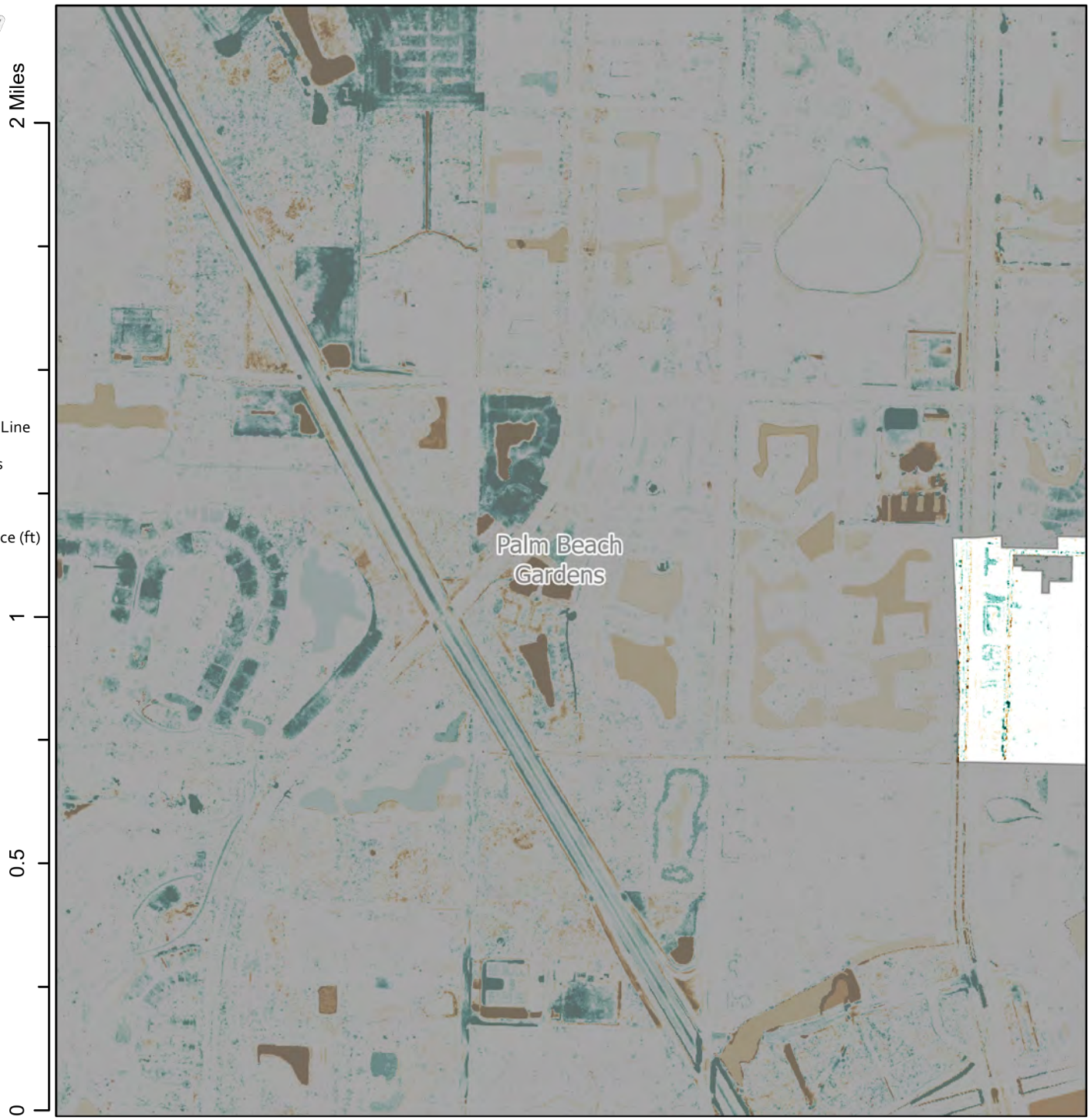
FIRM Panel: 0376



- Frontal Dune Line
- Municipalities
- FIRM Panels

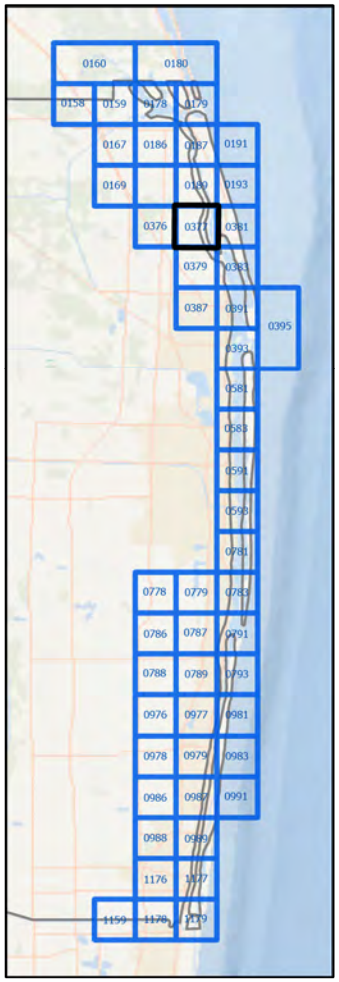
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0377



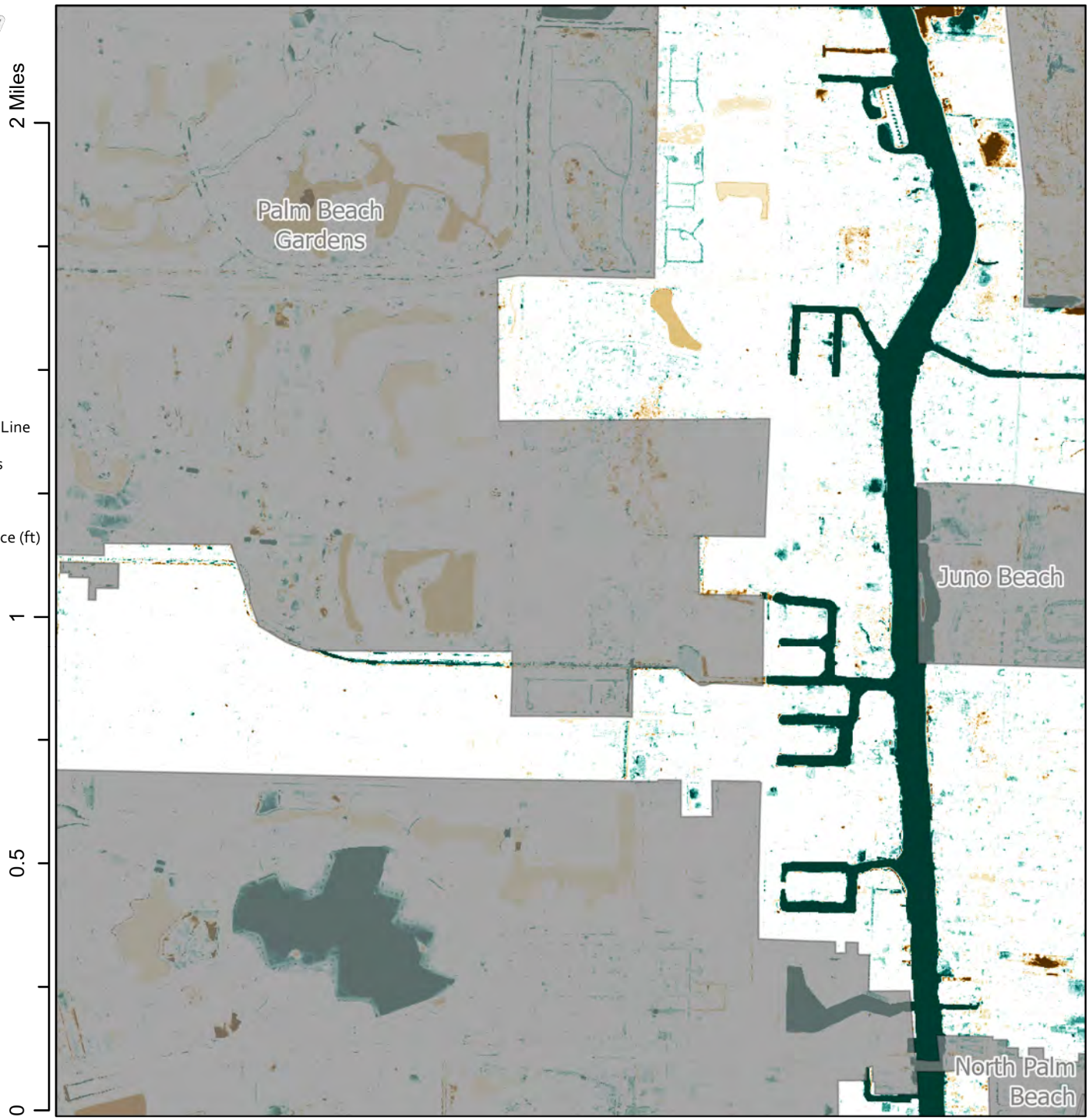
Frontal Dune Line

Municipalities

FIRM Panels

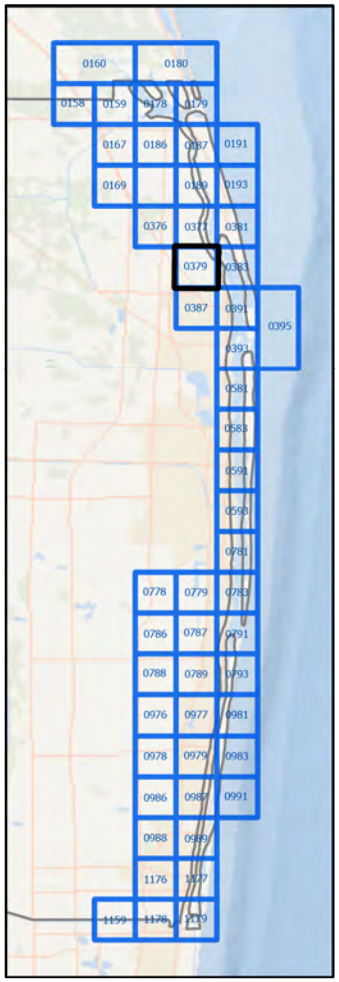
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

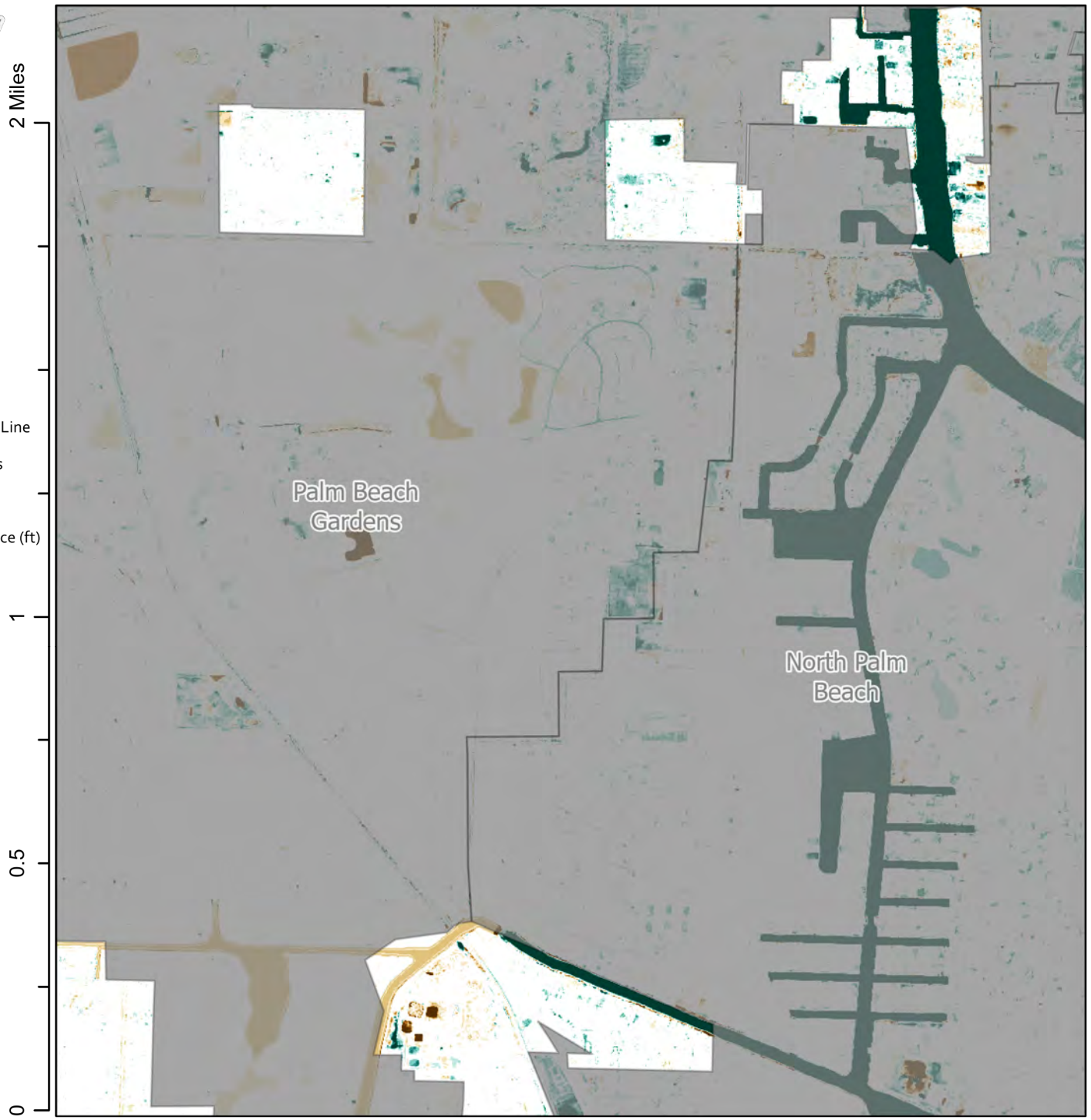
FIRM Panel: 0379



- Frontal Dune Line
- Municipalities
- FIRM Panels

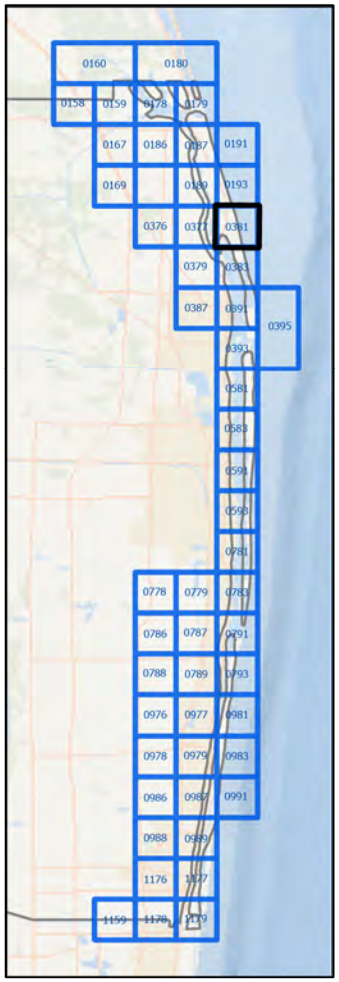
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0381



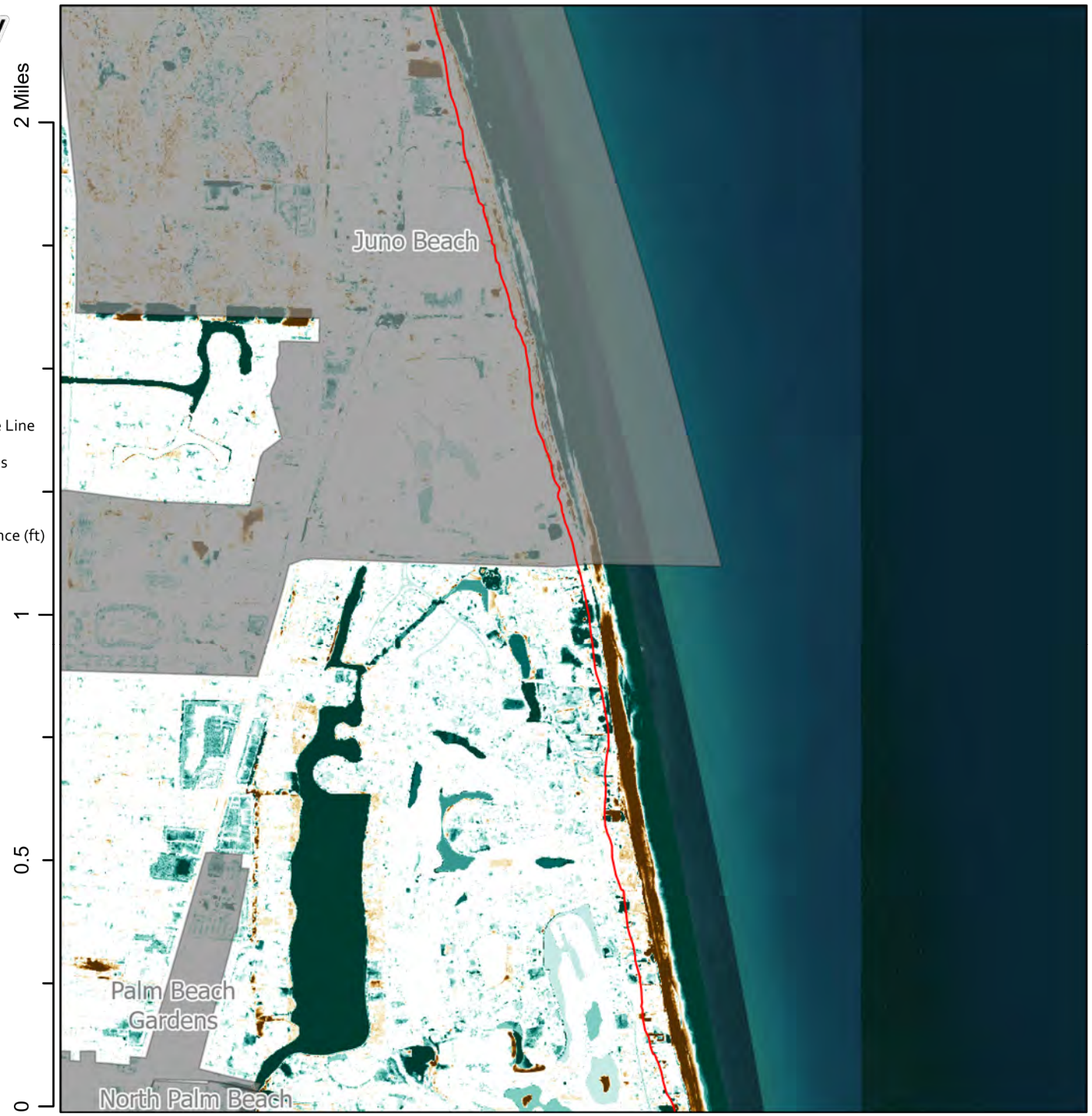
Frontal Dune Line

Municipalities

FIRM Panels

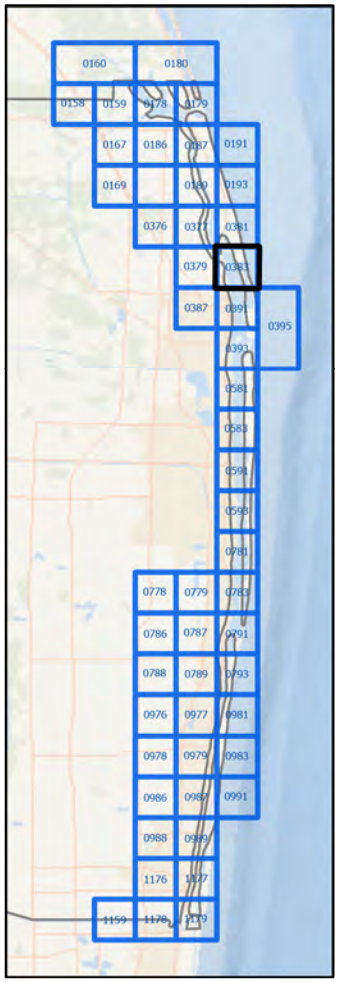
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0383



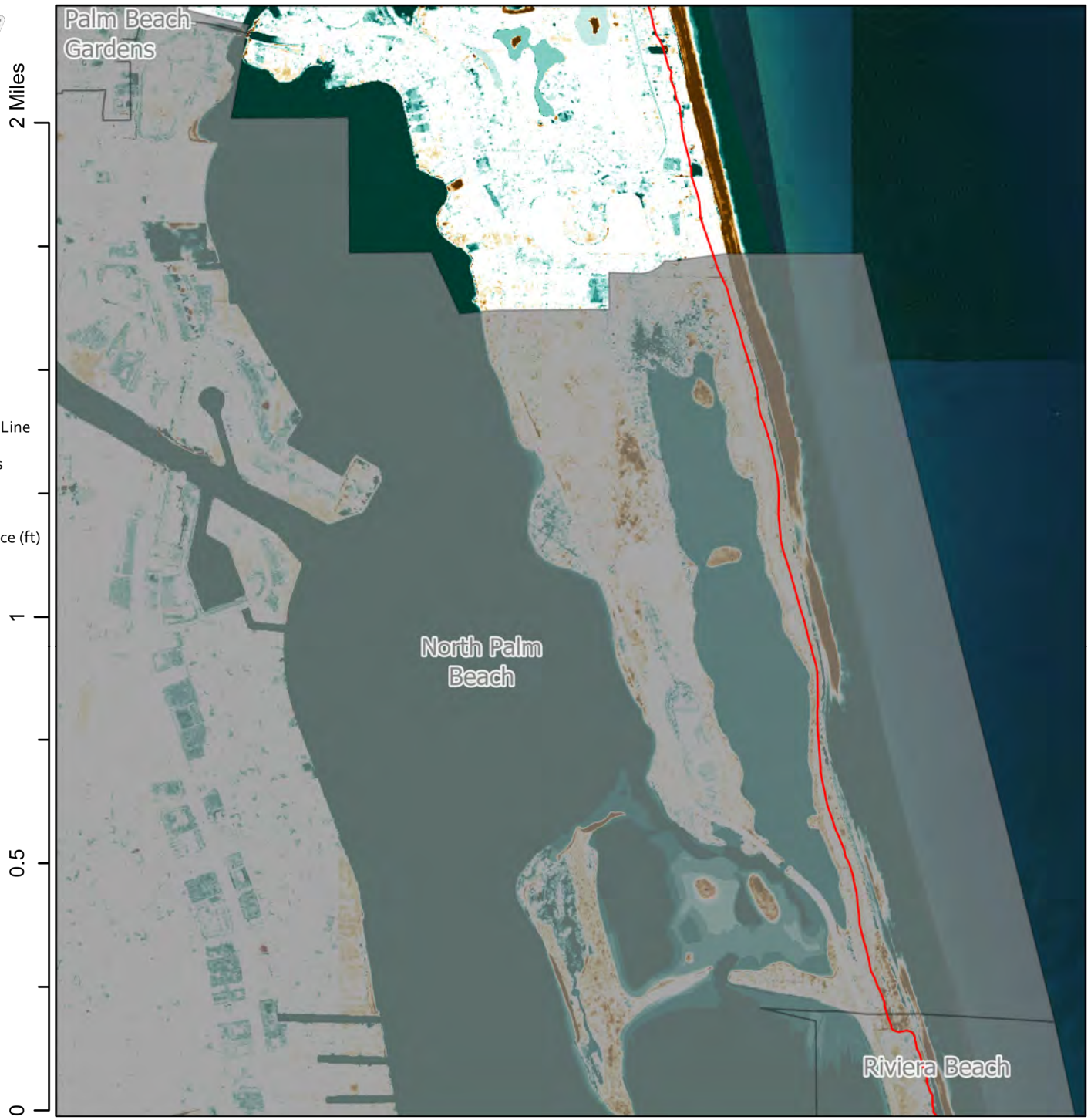
Frontal Dune Line

Municipalities

FIRM Panels

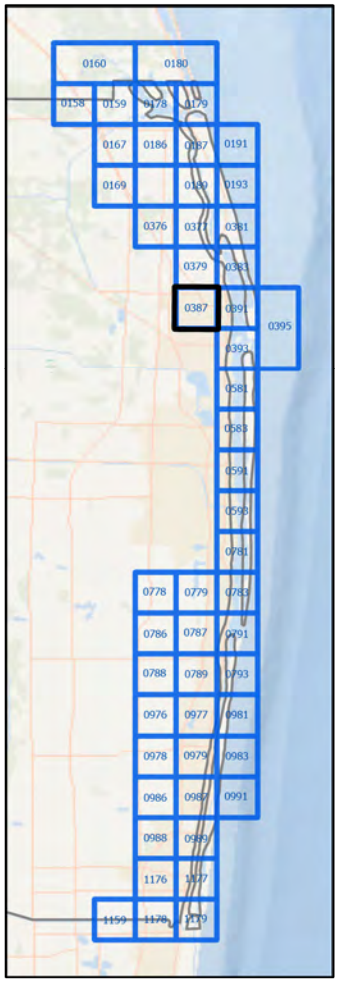
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0387



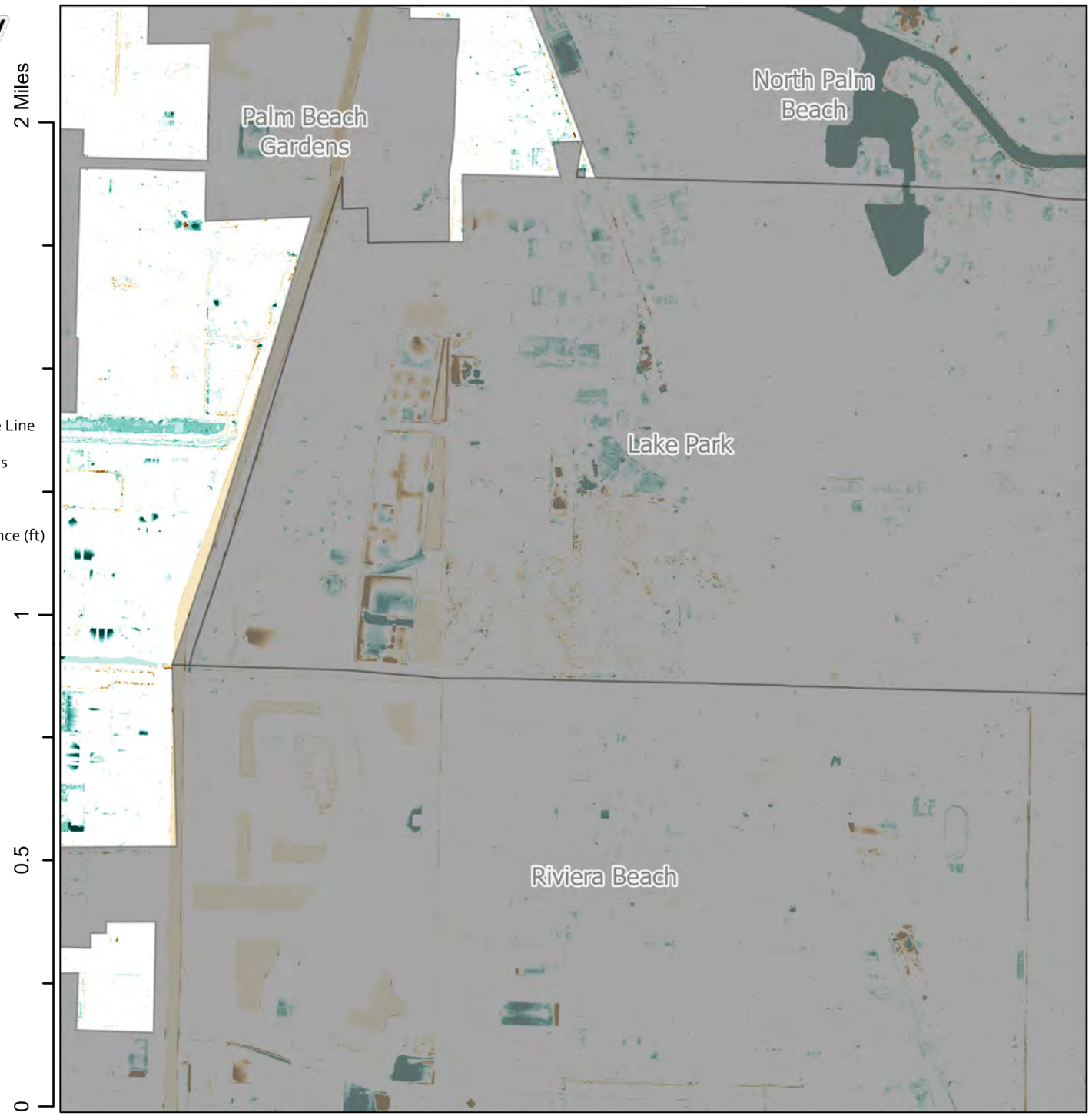
Frontal Dune Line

Municipalities

FIRM Panels

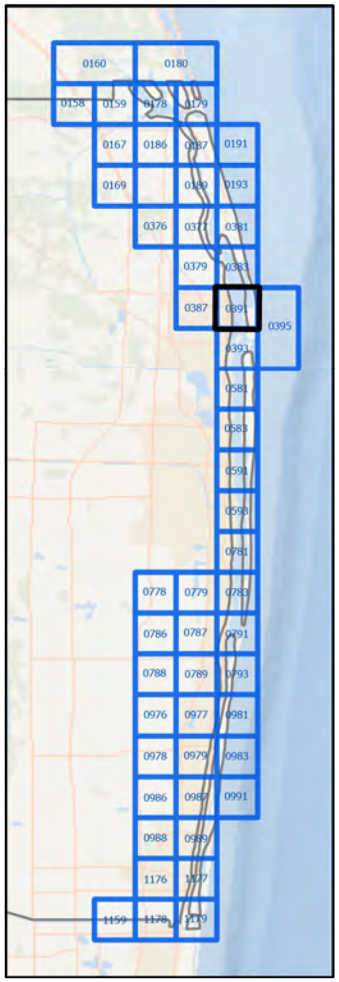
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

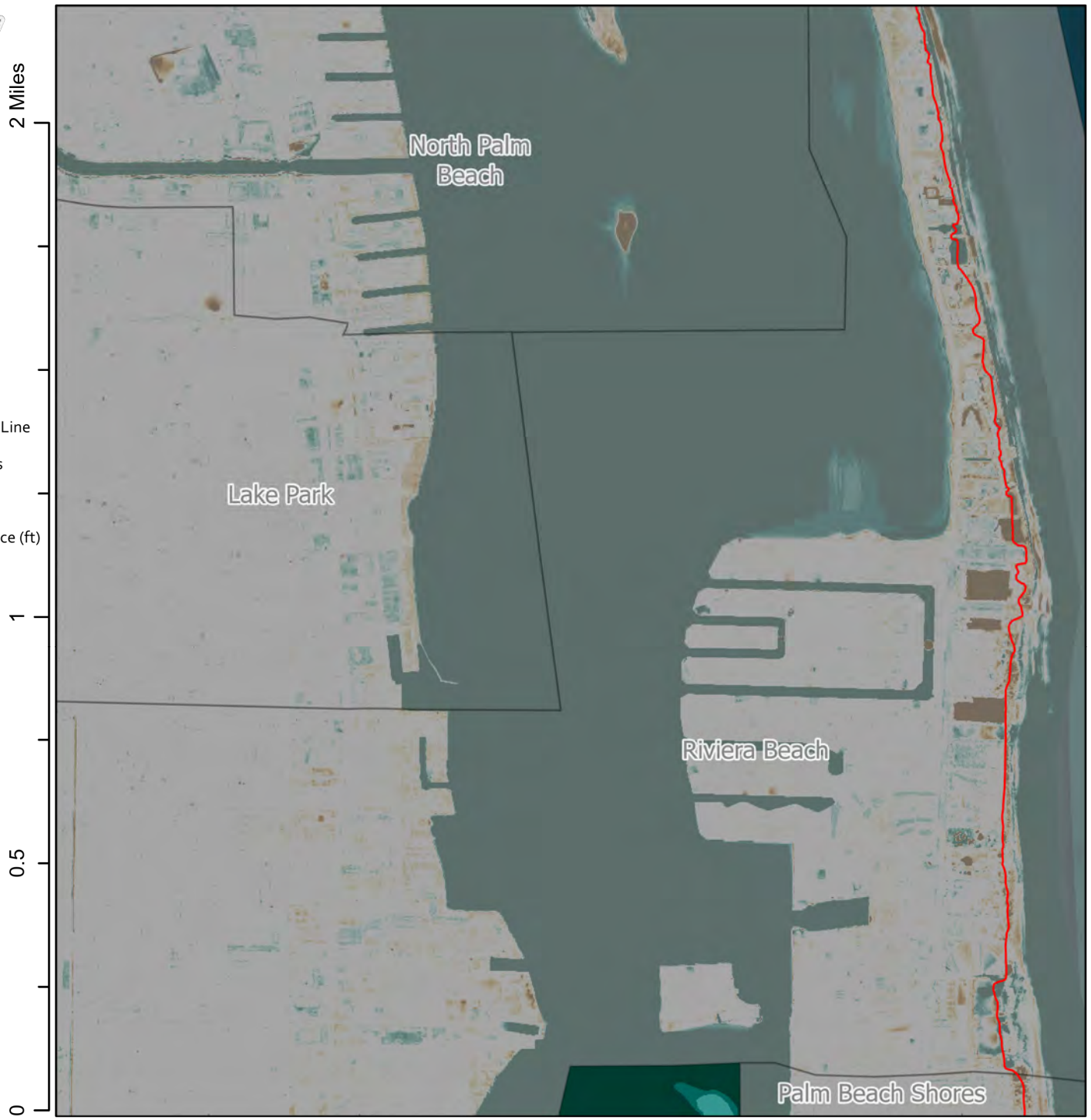
FIRM Panel: 0391



- Frontal Dune Line
- Municipalities
- FIRM Panels

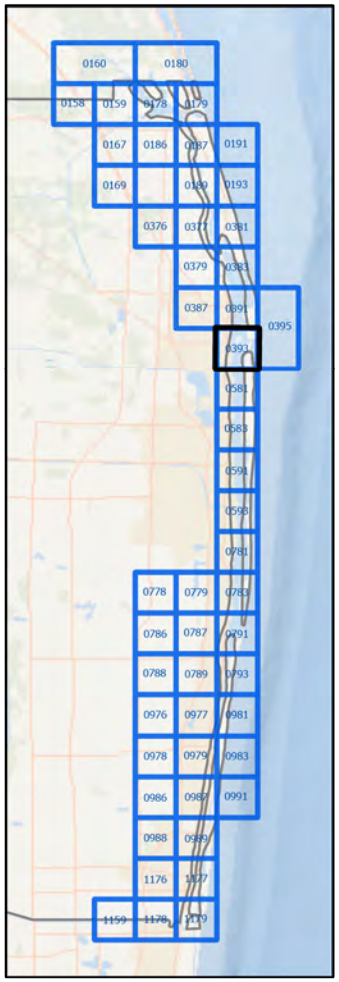
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

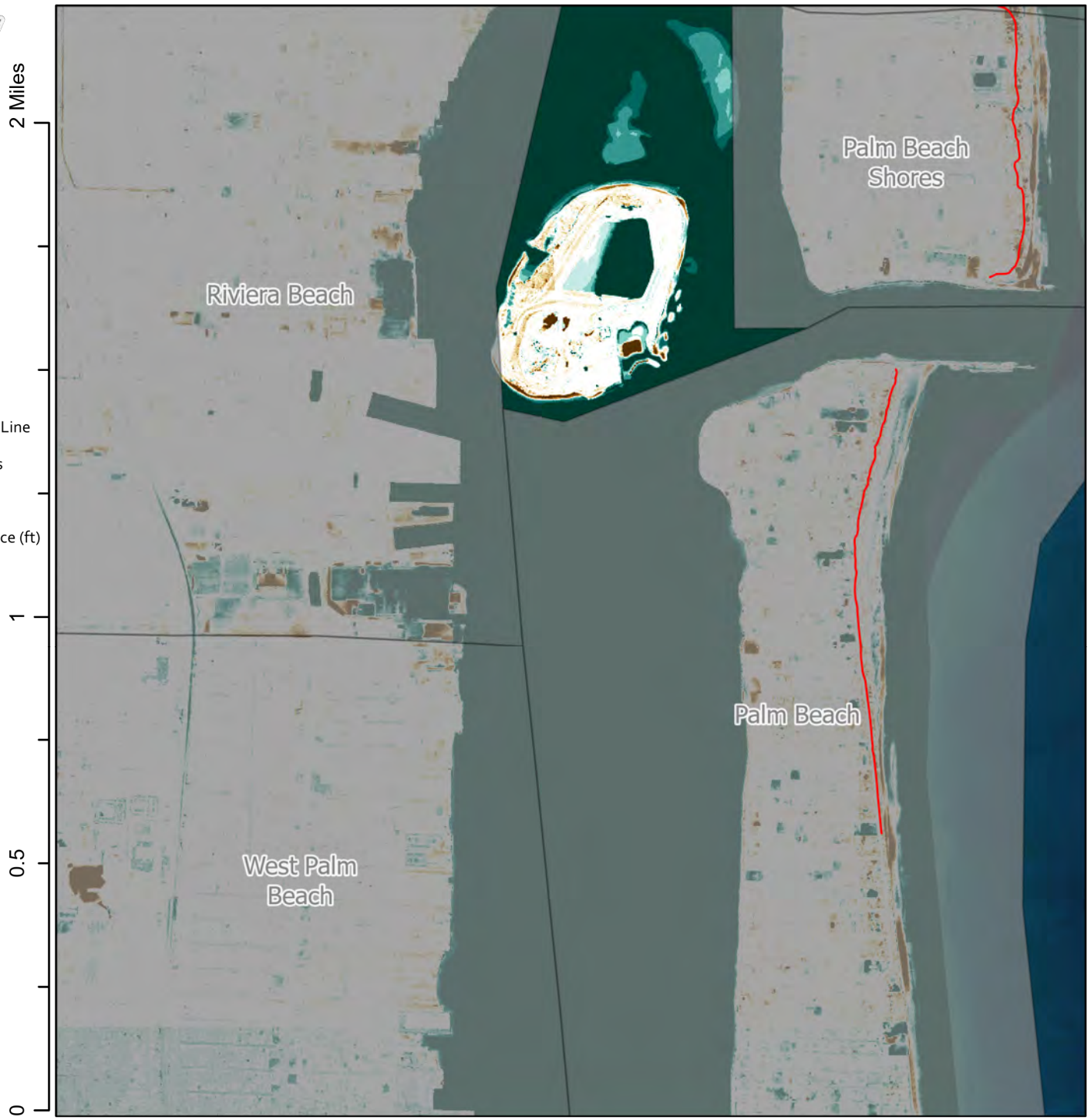
FIRM Panel: 0393



- Frontal Dune Line
- Municipalities
- FIRM Panels

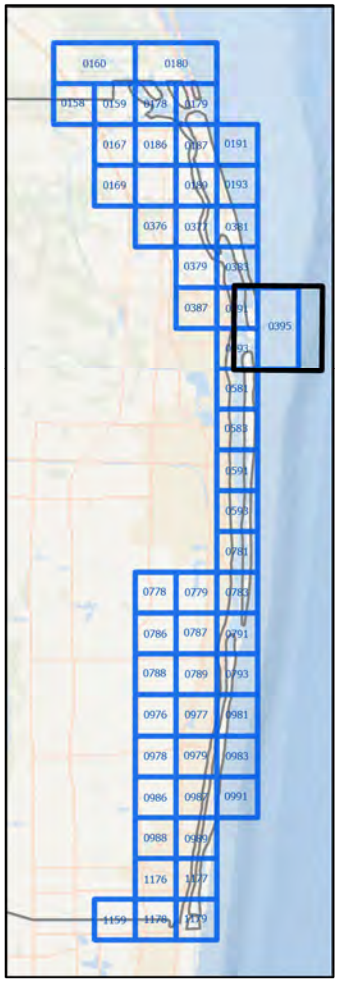
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0395



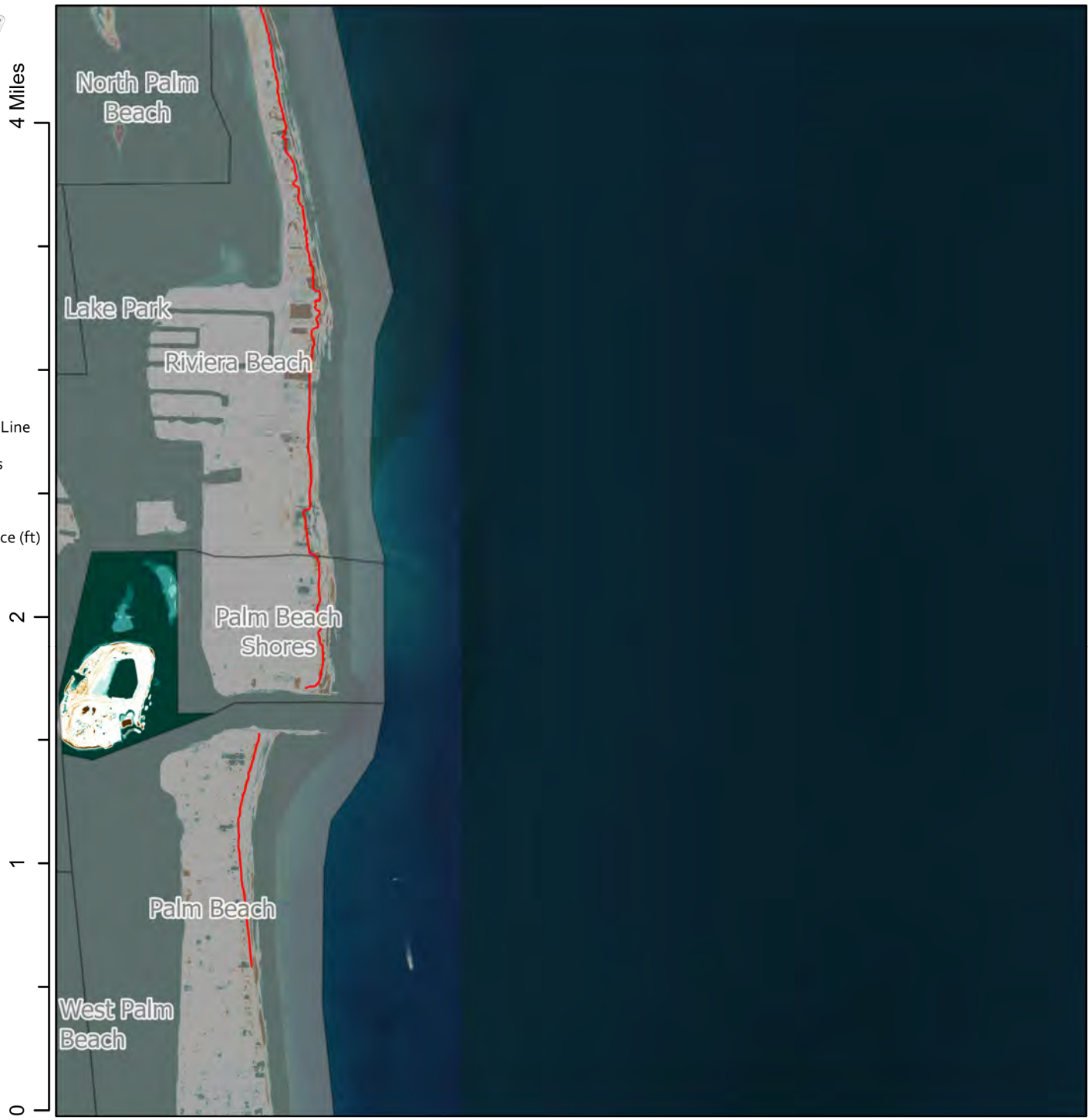
Frontal Dune Line

Municipalities

FIRM Panels

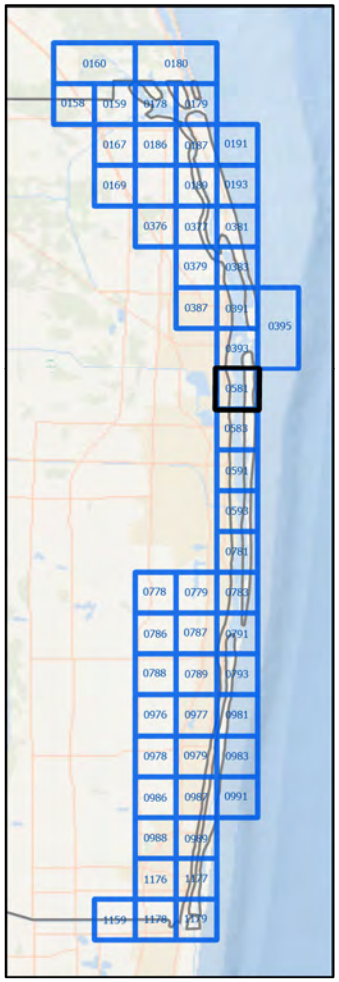
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

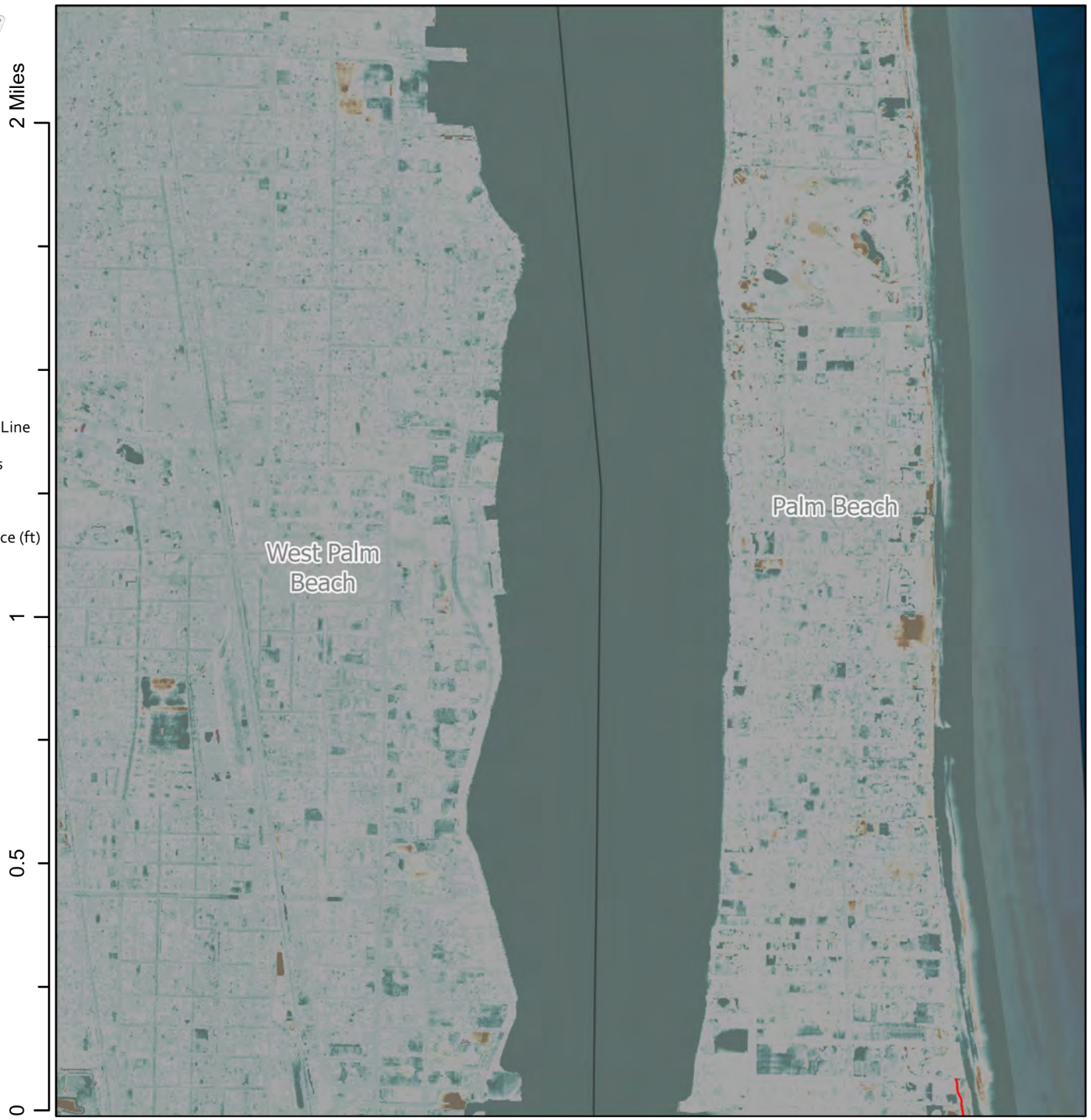
FIRM Panel: 0581



- Frontal Dune Line
- Municipalities
- FIRM Panels

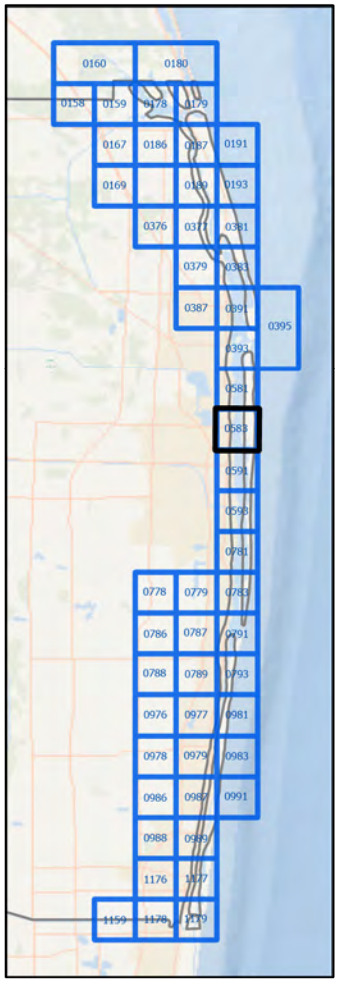
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

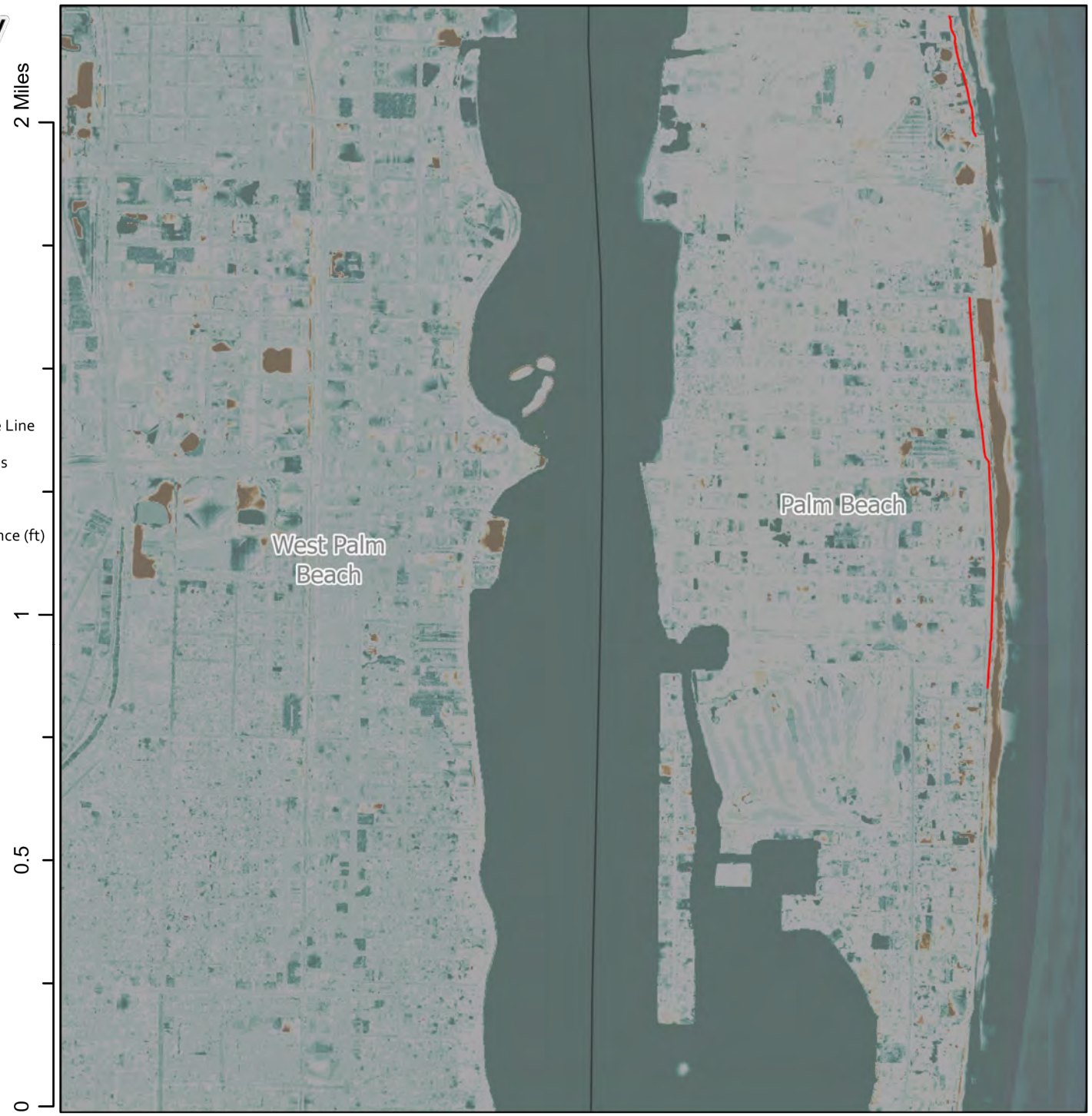
FIRM Panel: 0583



- Frontal Dune Line
- Municipalities
- FIRM Panels

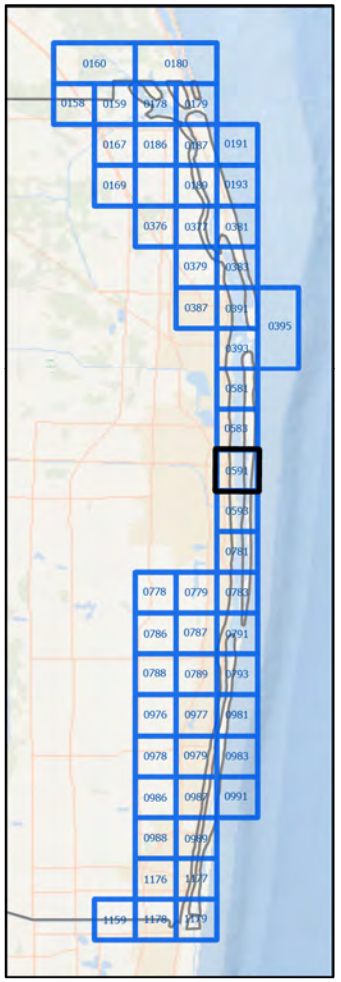
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

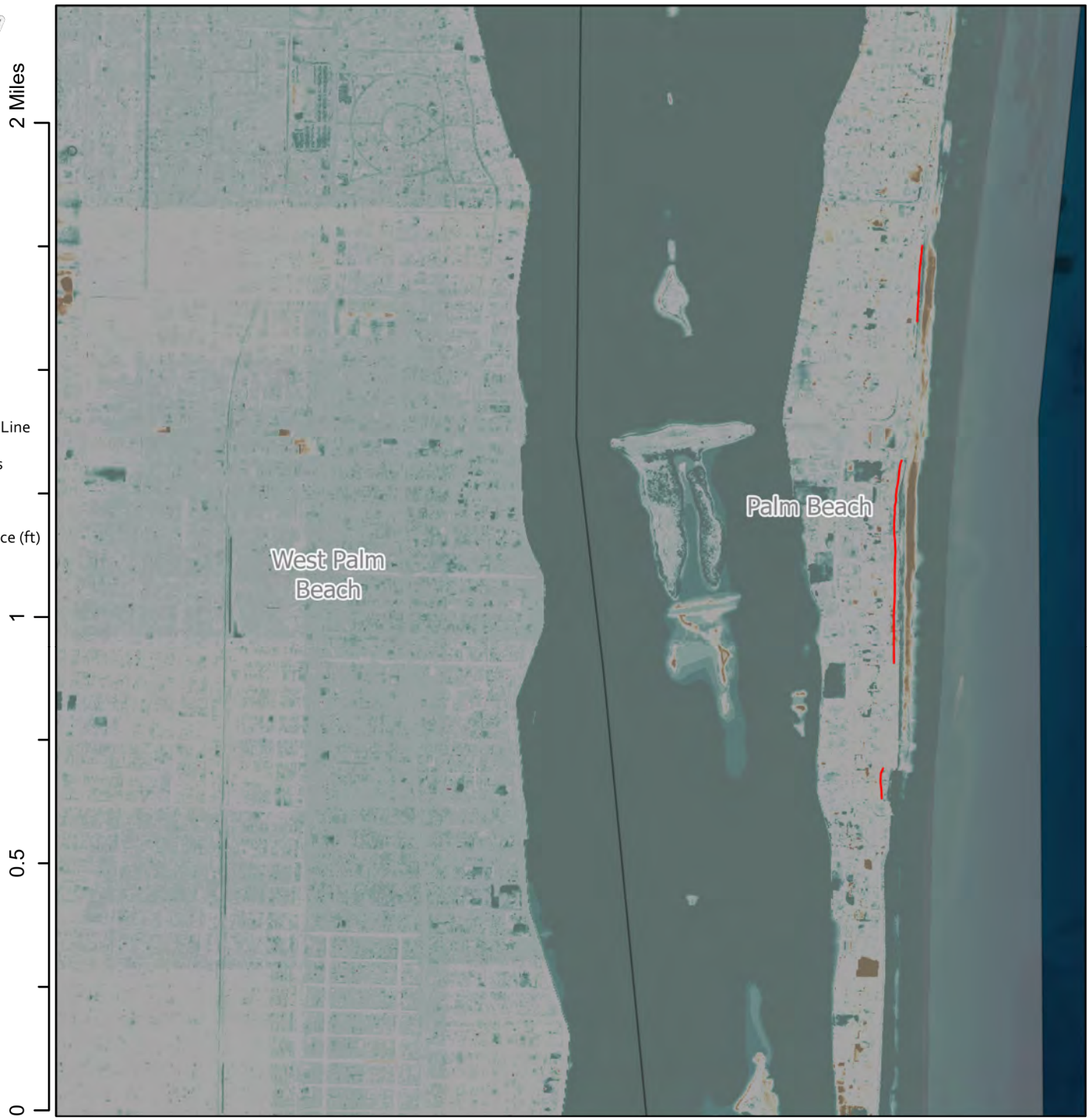
FIRM Panel: 0591



- Frontal Dune Line
- Municipalities
- FIRM Panels

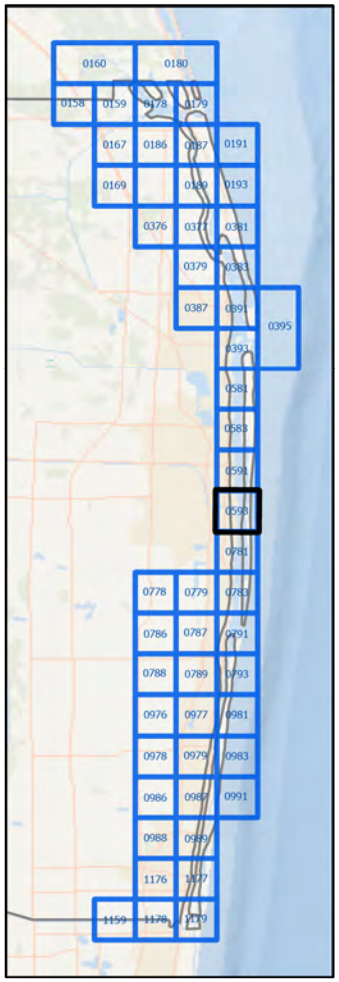
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0593



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

0

0.5

1

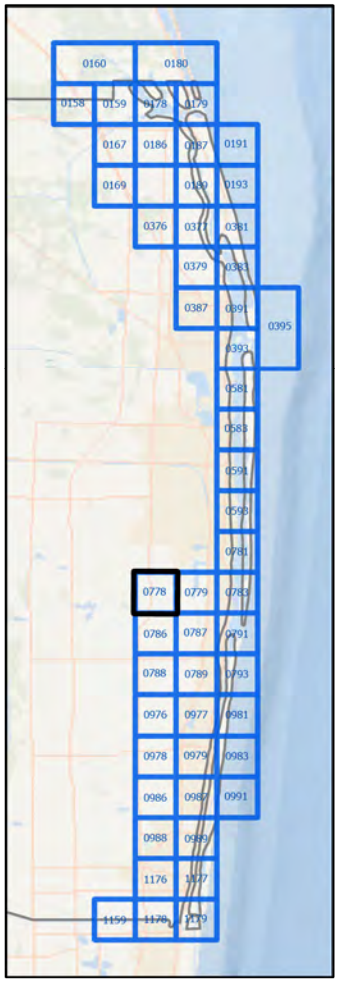
West Palm Beach

Palm Beach

Lake Worth

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

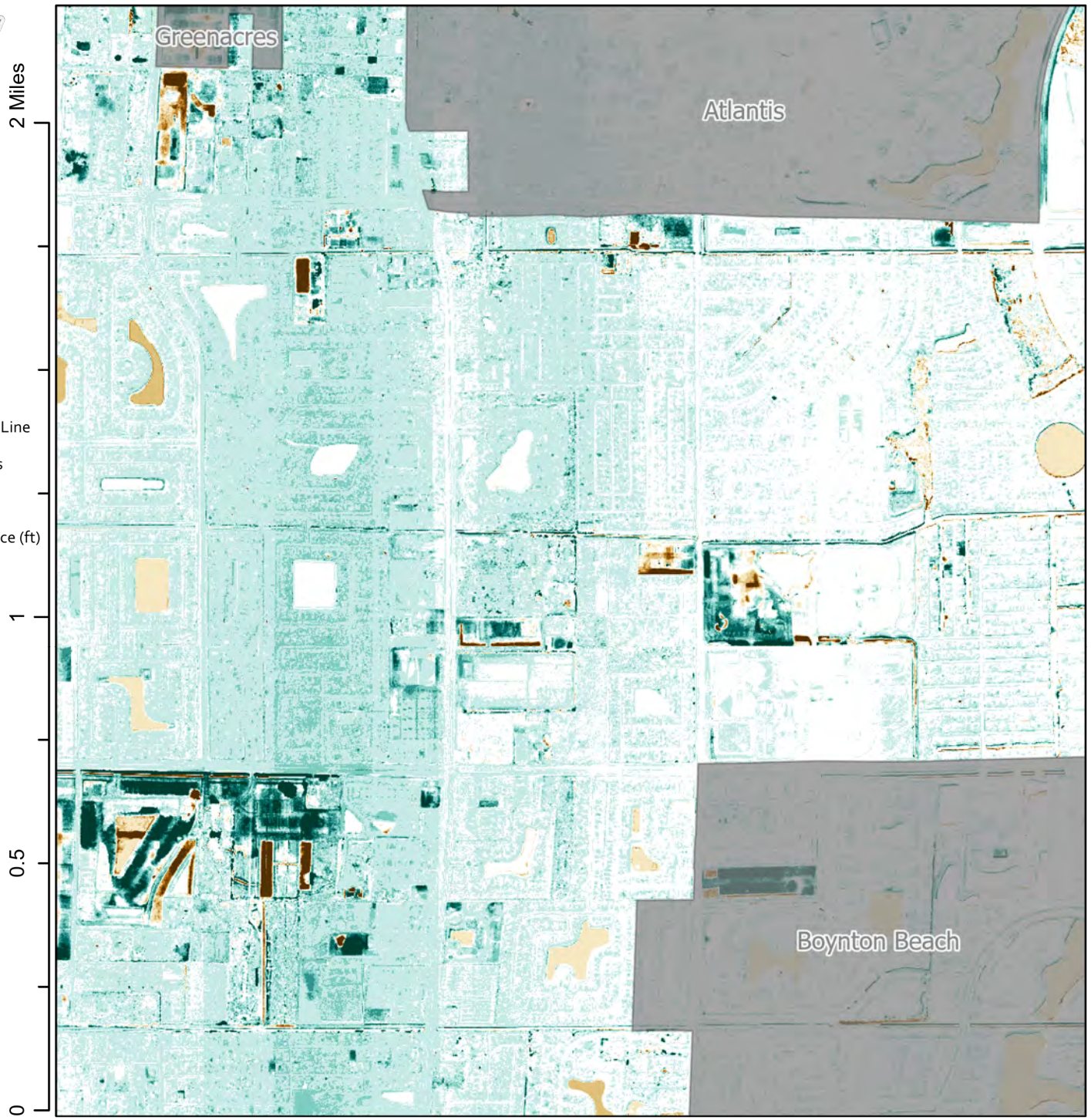
FIRM Panel: 0778



- Frontal Dune Line
- Municipalities
- FIRM Panels

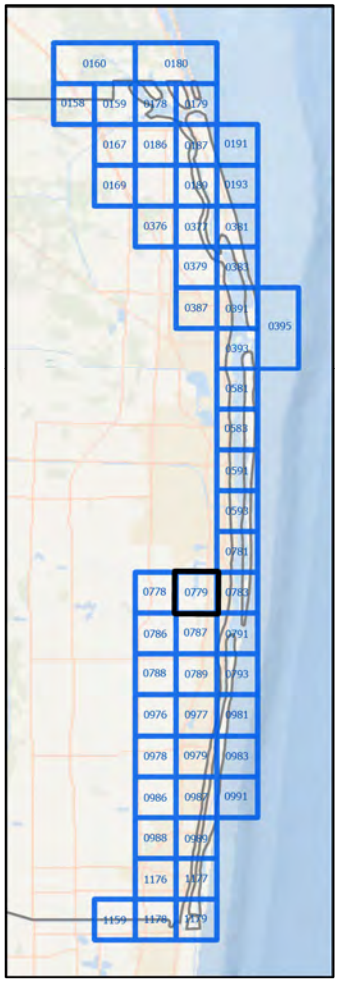
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

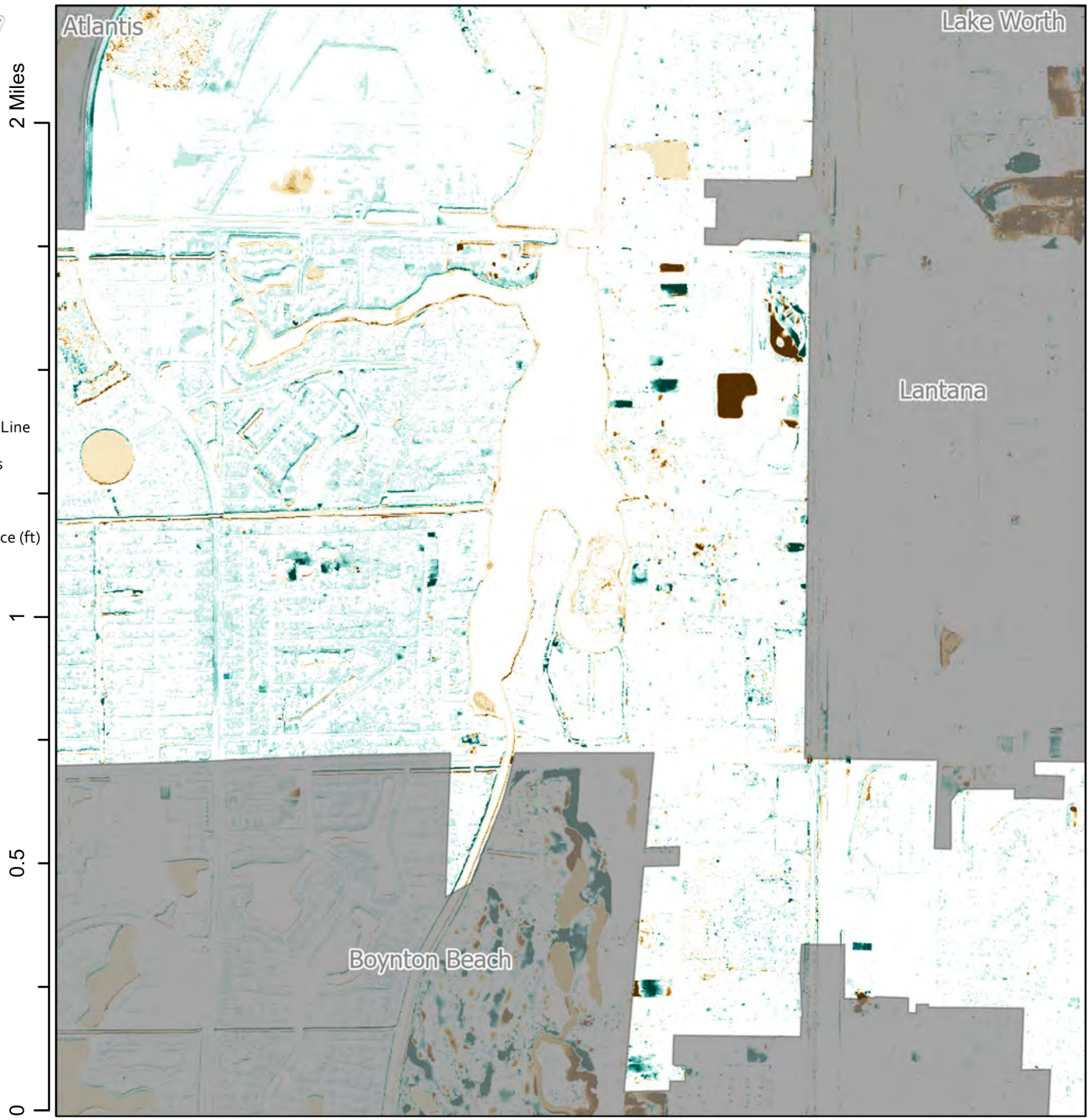
FIRM Panel: 0779



- Frontal Dune Line
- Municipalities
- FIRM Panels

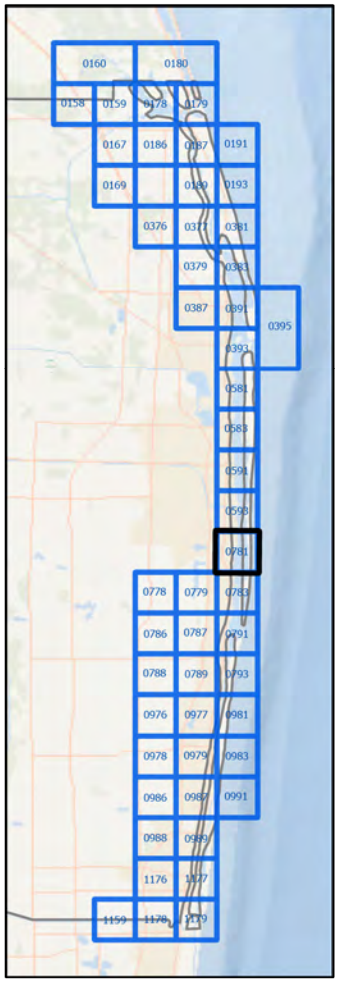
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

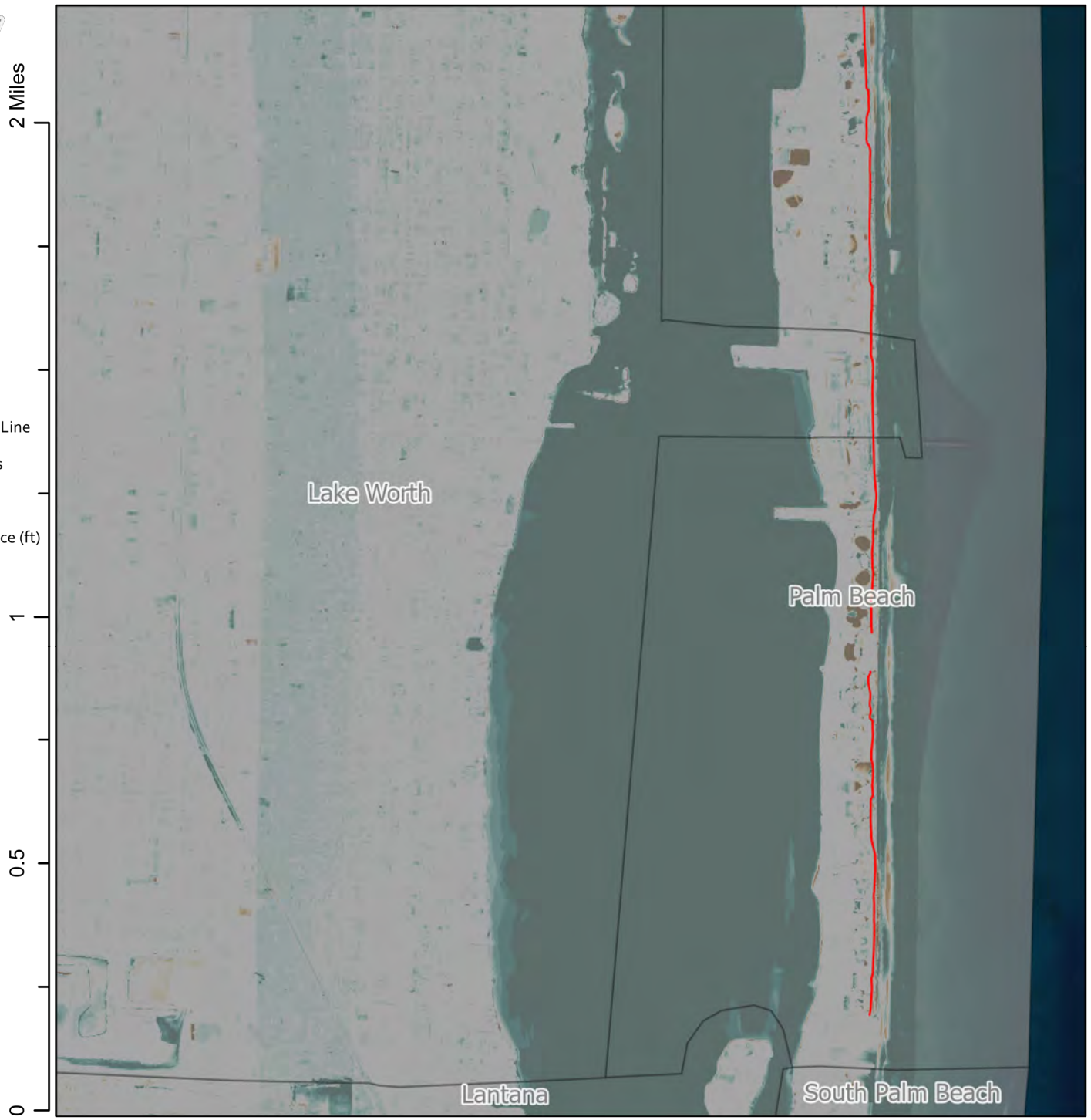
FIRM Panel: 0781



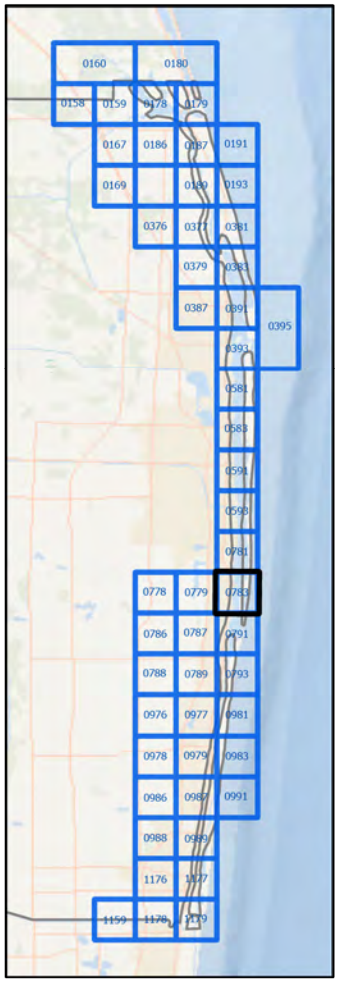
- Frontal Dune Line
- Municipalities
- FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM FIRM Panel: 0783



Frontal Dune Line

Municipalities

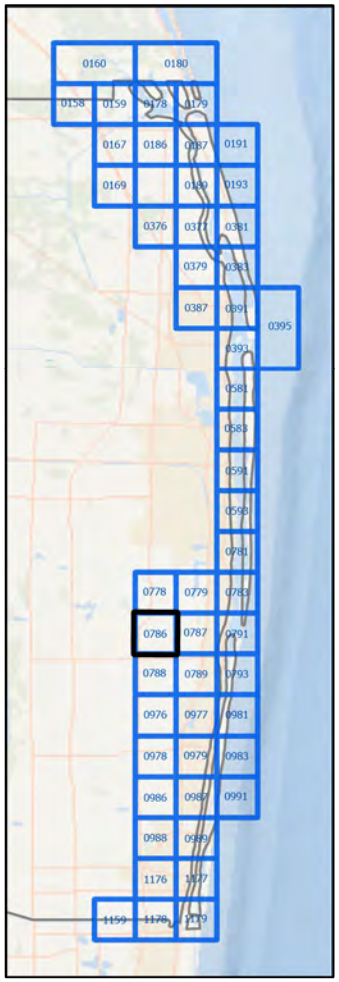
FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

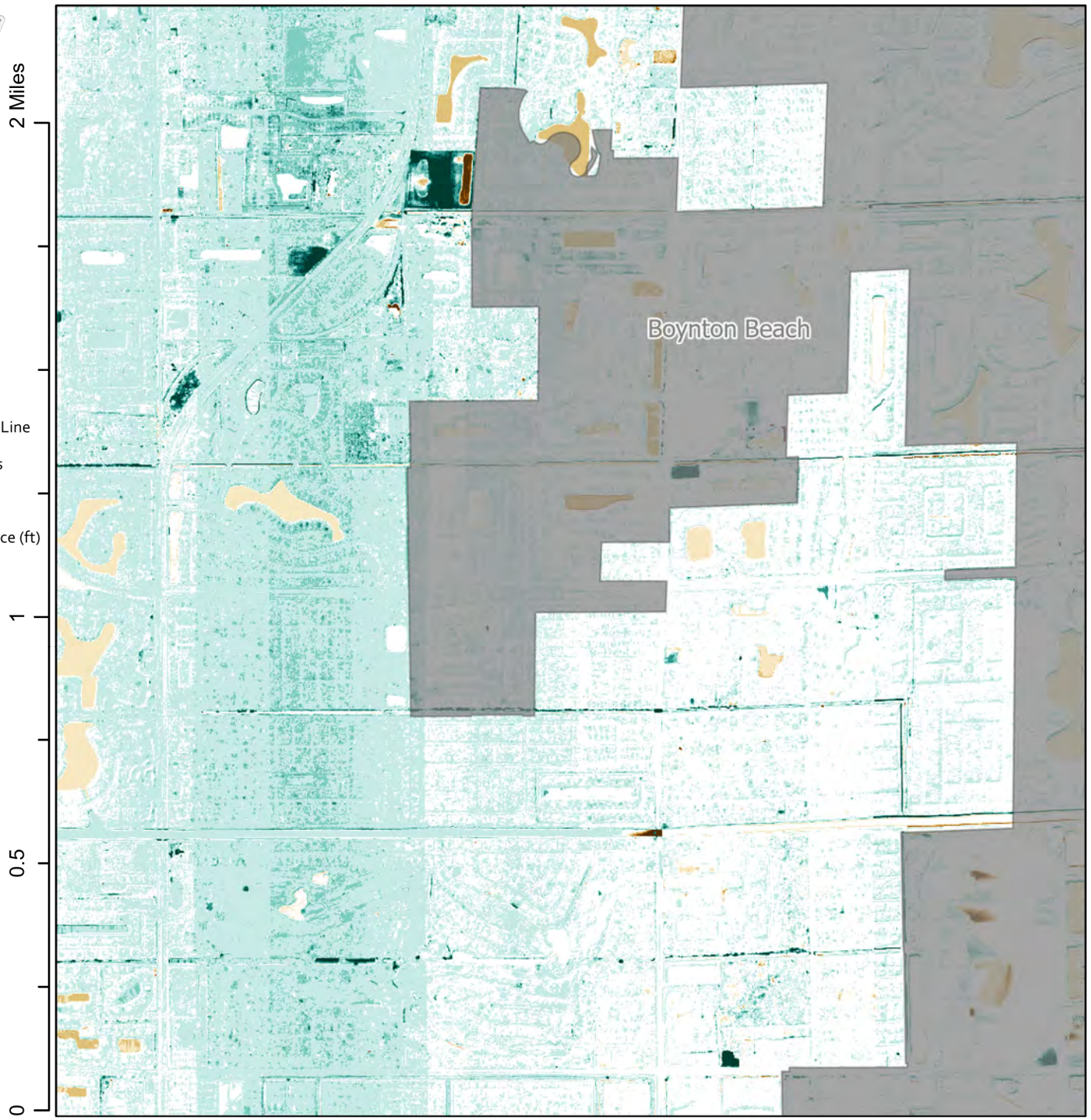
FIRM Panel: 0786



- Frontal Dune Line
- Municipalities
- FIRM Panels

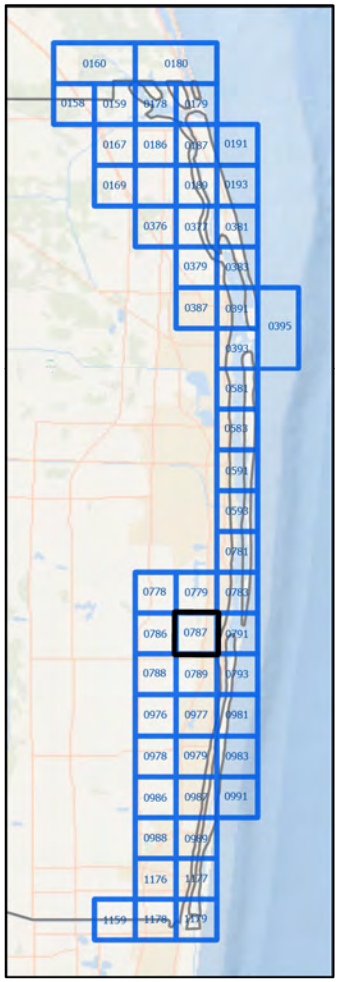
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

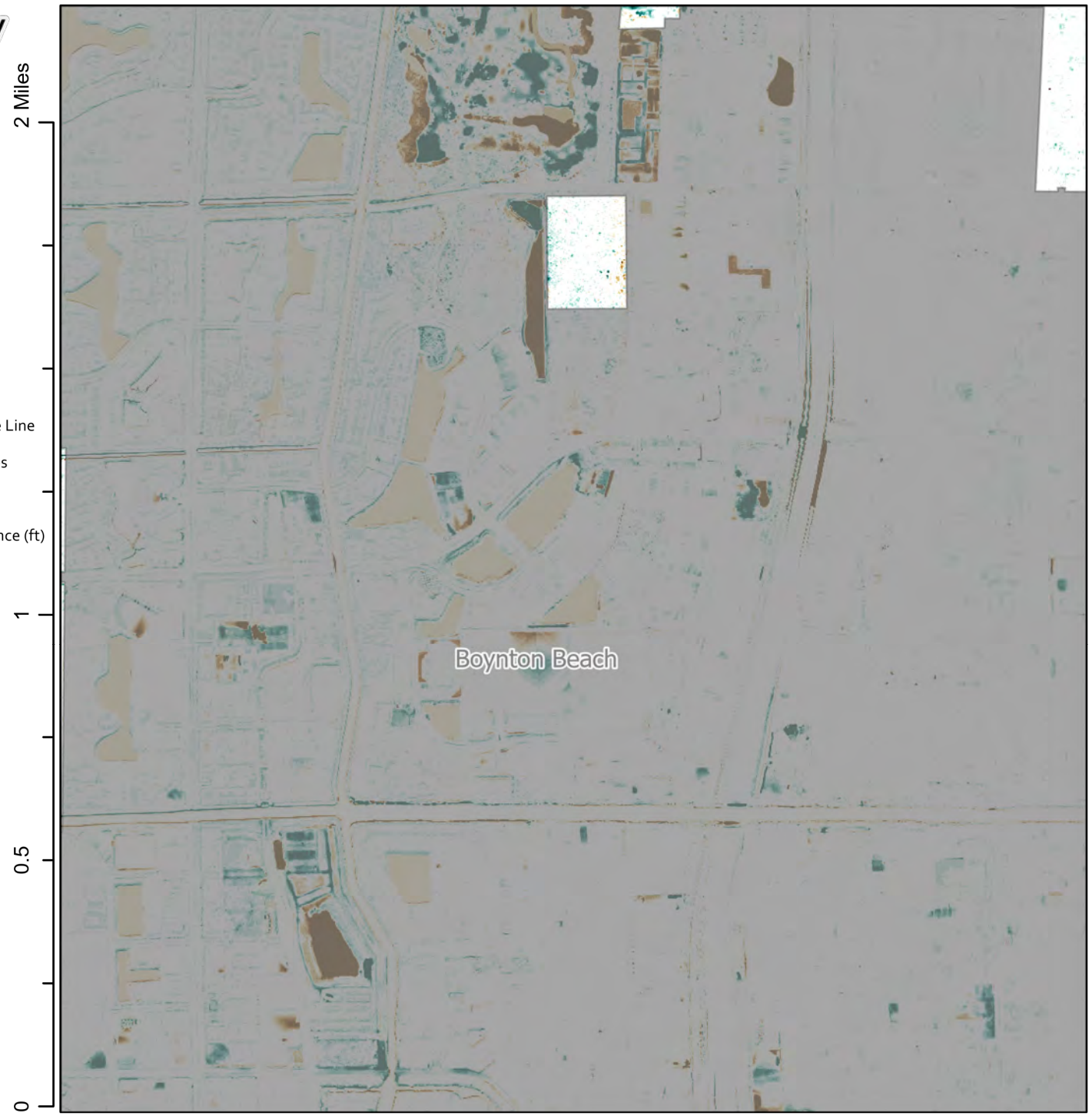
FIRM Panel: 0787



- Frontal Dune Line
- Municipalities
- FIRM Panels

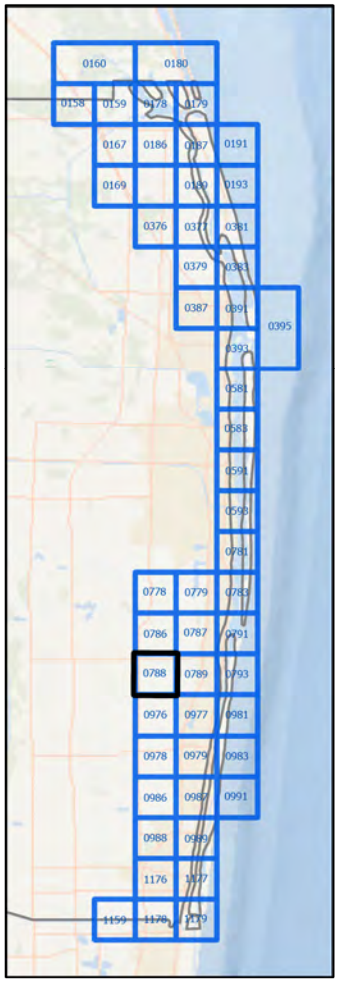
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0788



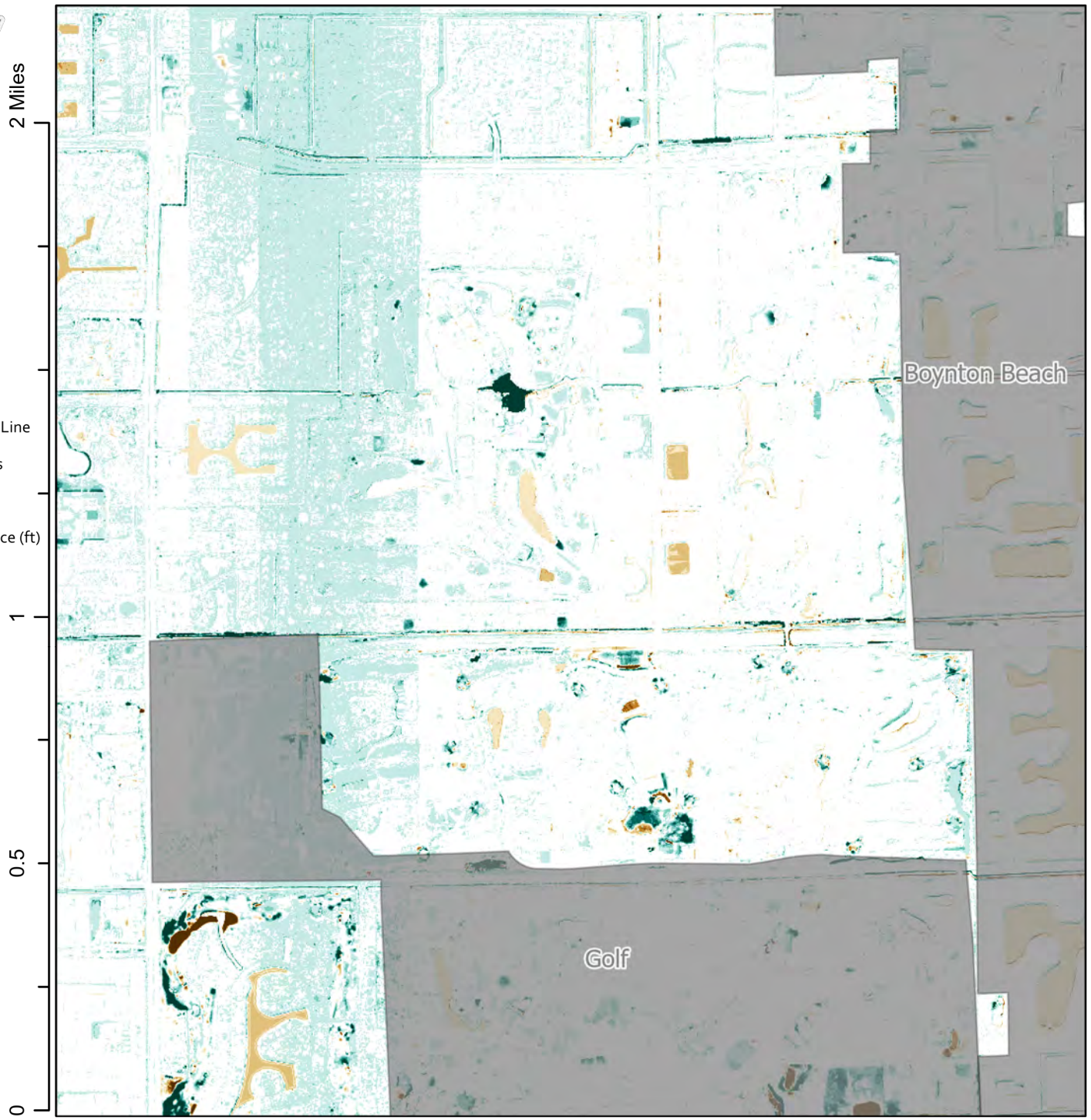
Frontal Dune Line

Municipalities

FIRM Panels

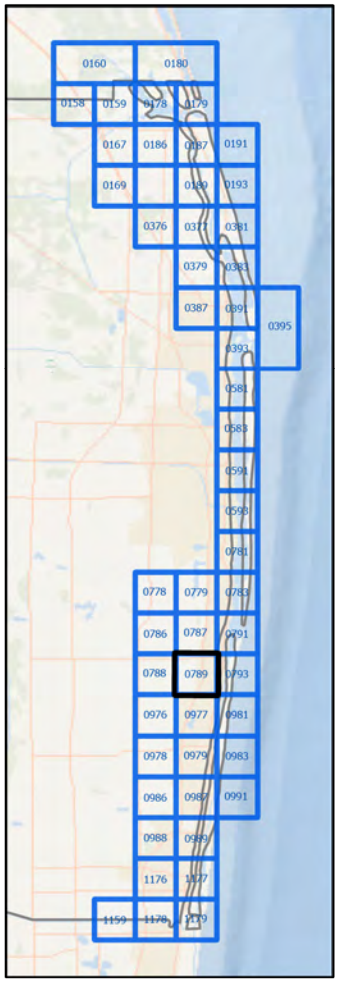
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

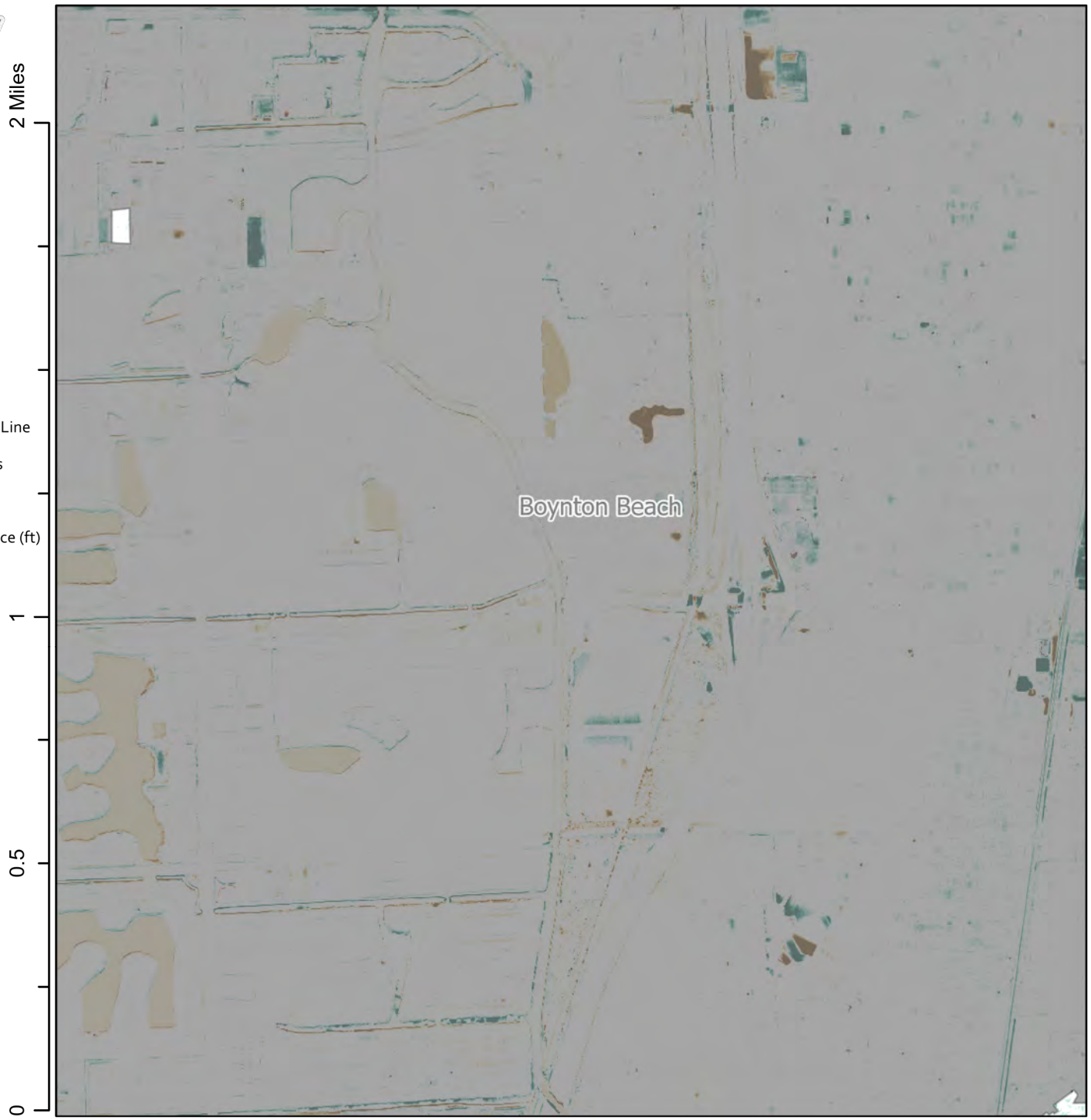
FIRM Panel: 0789



- Frontal Dune Line
- Municipalities
- FIRM Panels

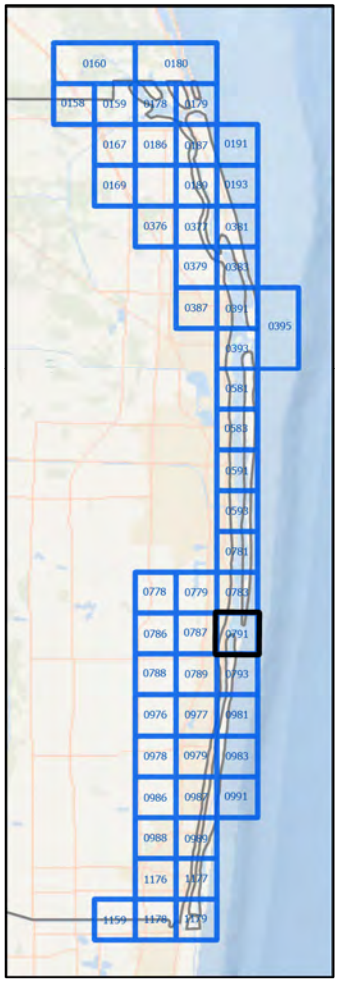
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

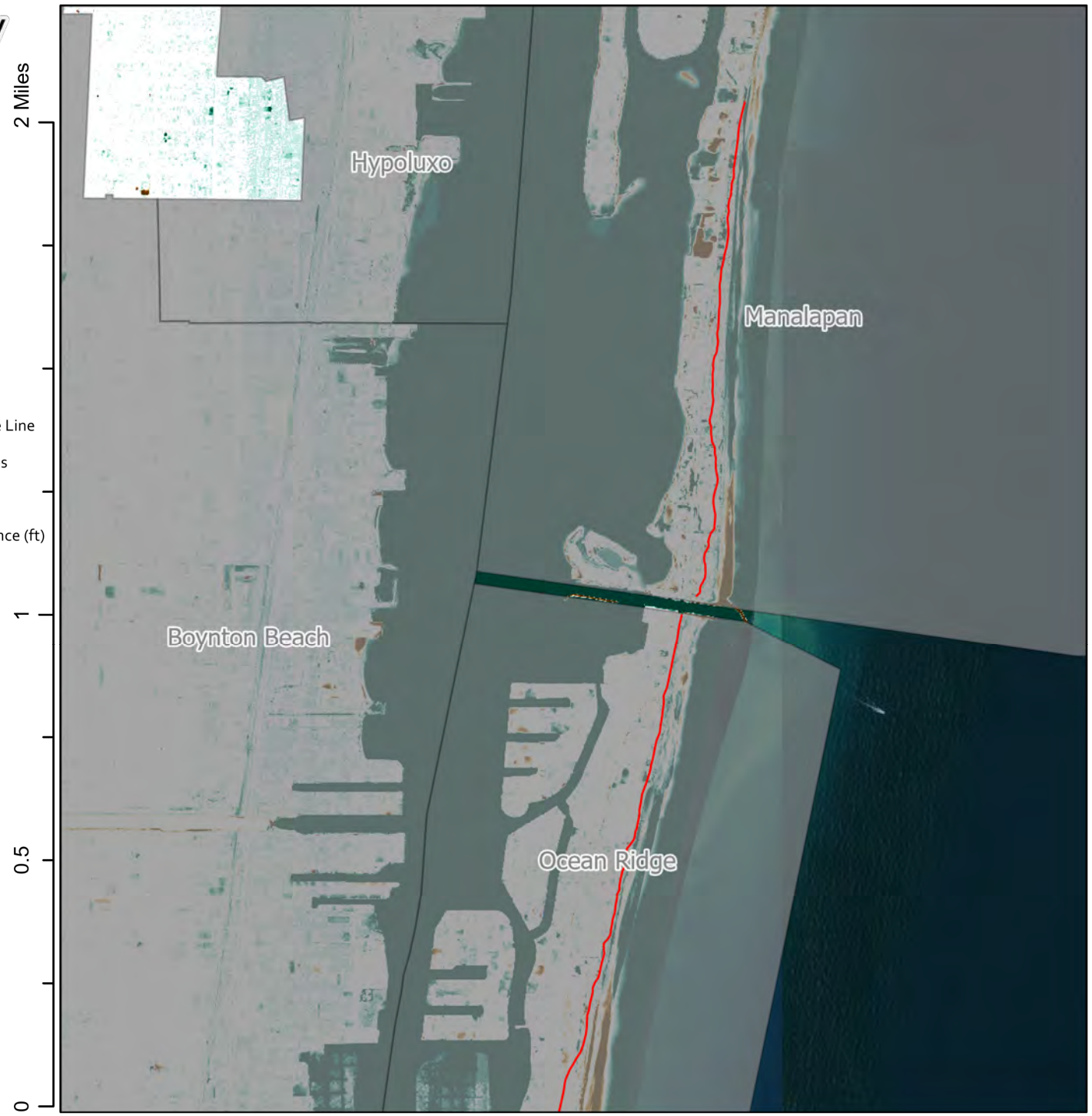
FIRM Panel: 0791



- Frontal Dune Line
- Municipalities
- FIRM Panels

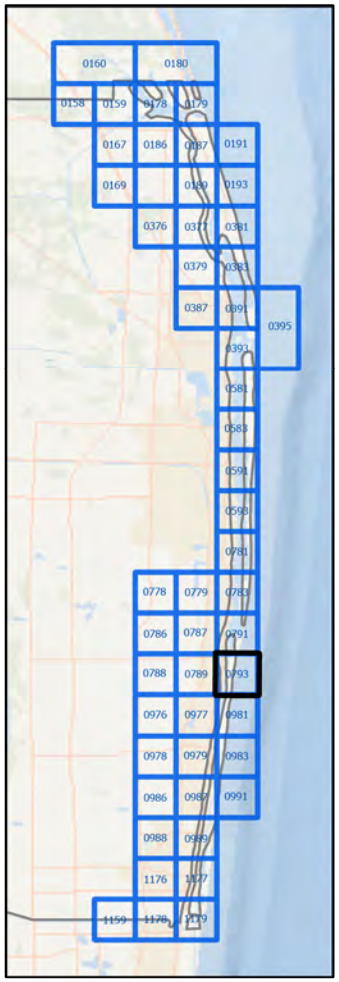
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

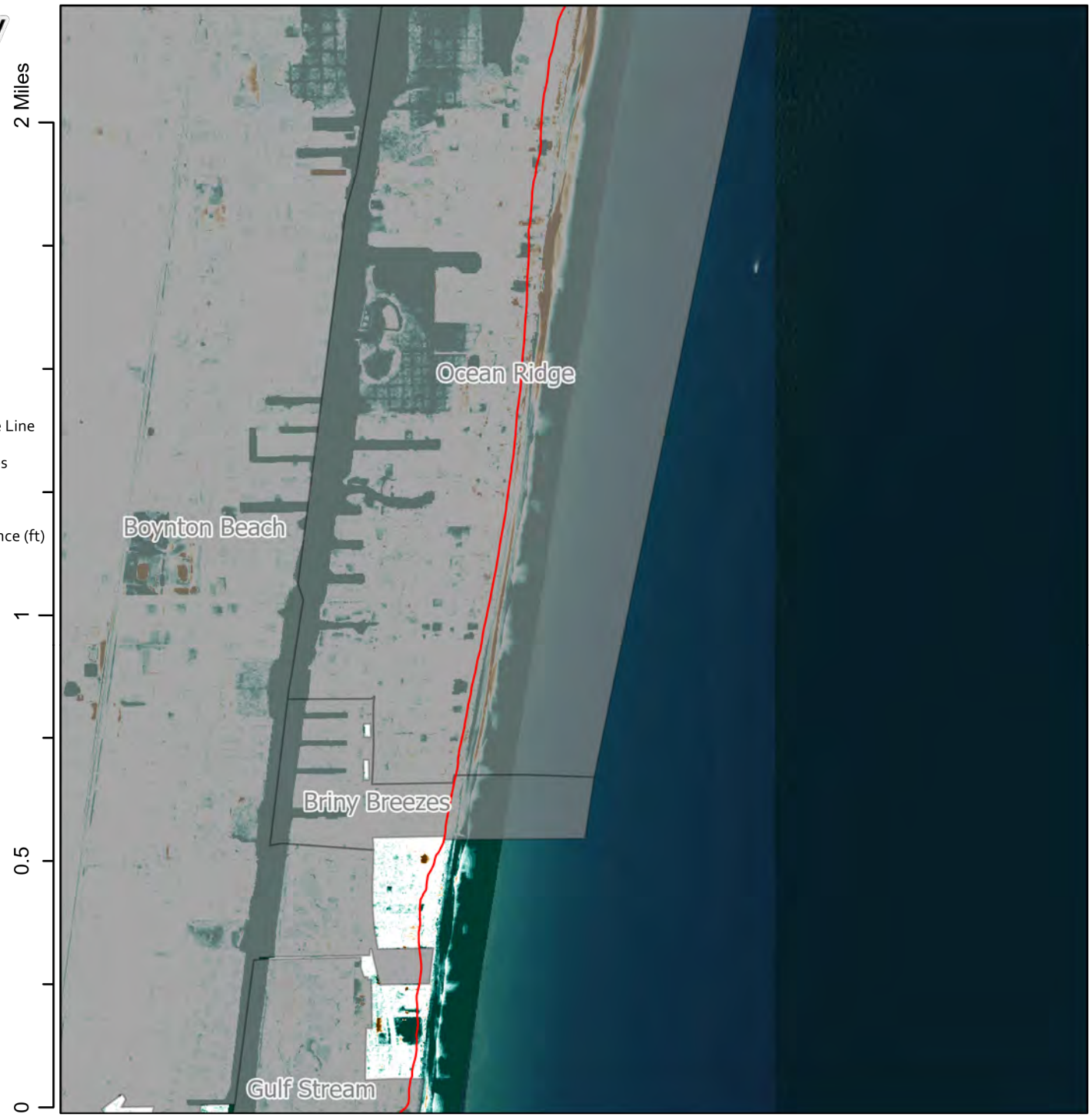
FIRM Panel: 0793



- Frontal Dune Line
- Municipalities
- FIRM Panels

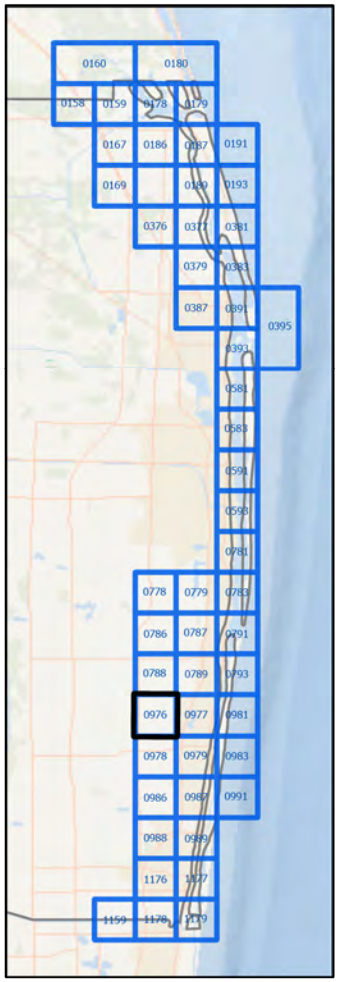
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

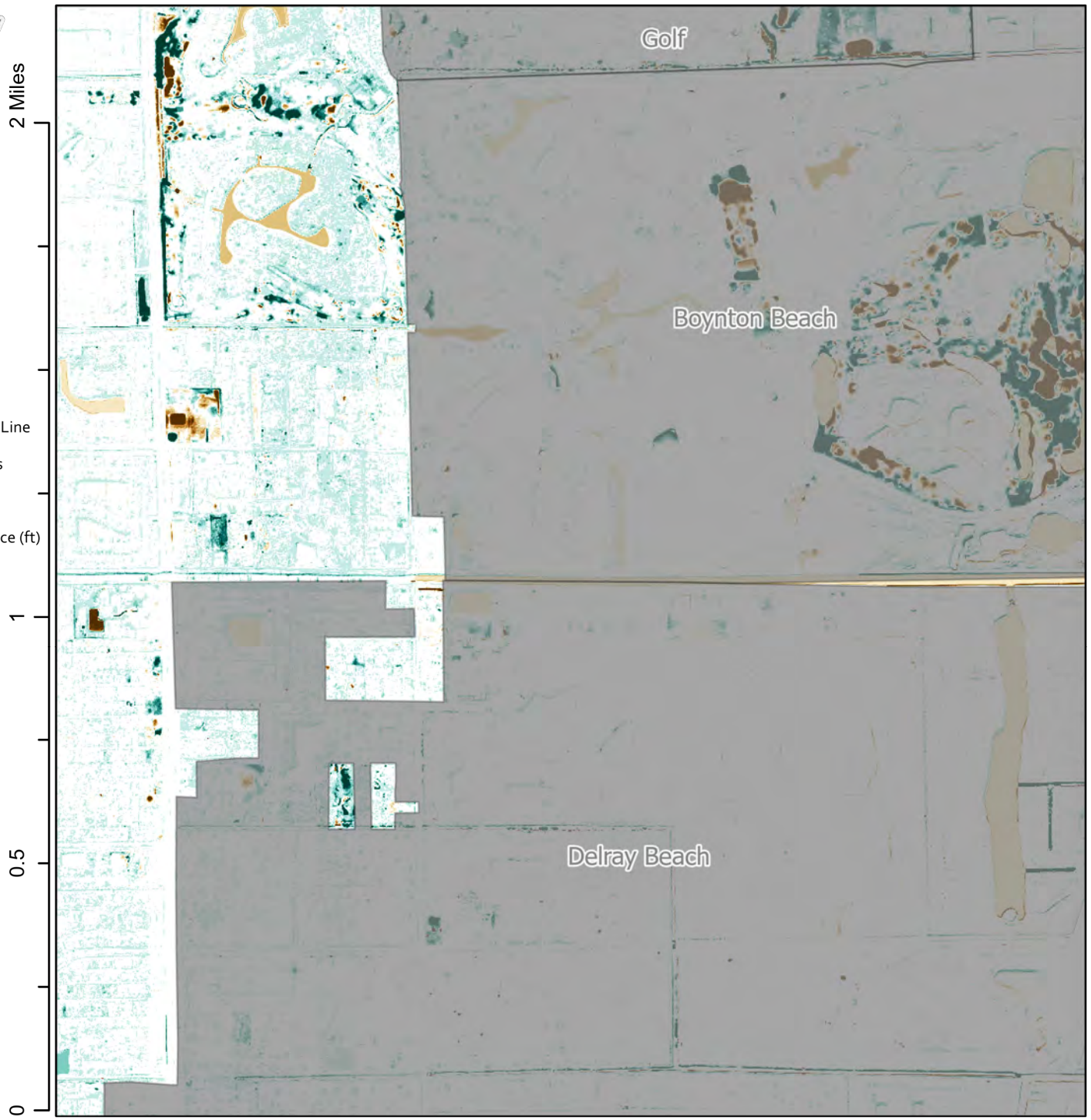
FIRM Panel: 0976



- Frontal Dune Line
- Municipalities
- FIRM Panels

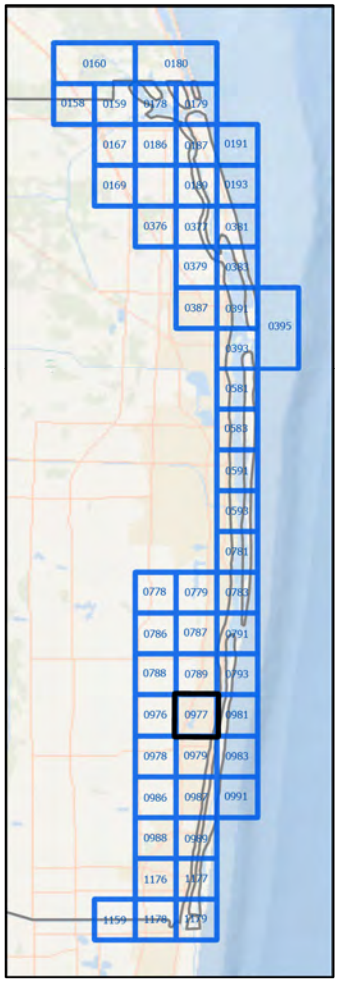
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

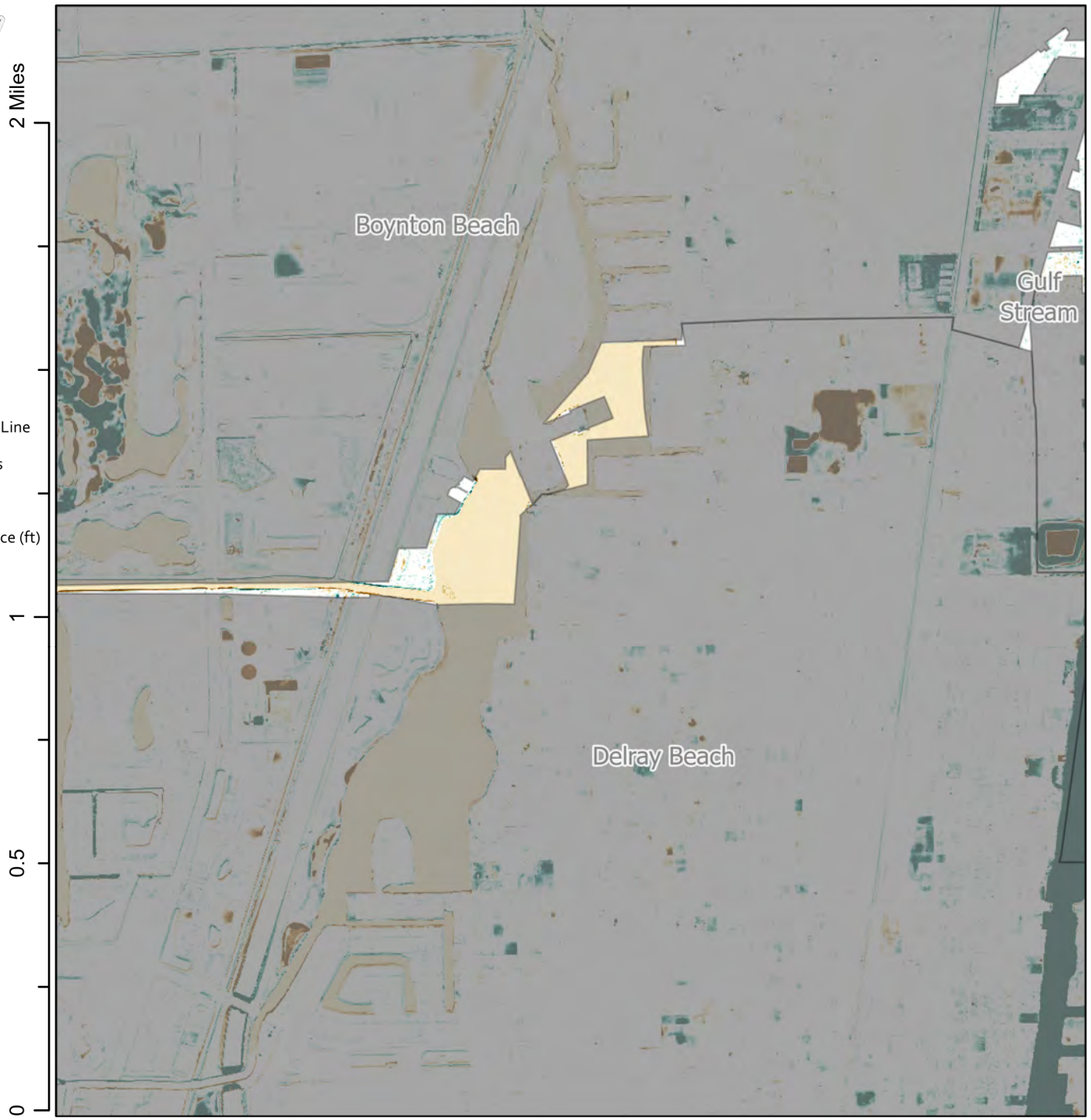
FIRM Panel: 0977



- Frontal Dune Line
- Municipalities
- FIRM Panels

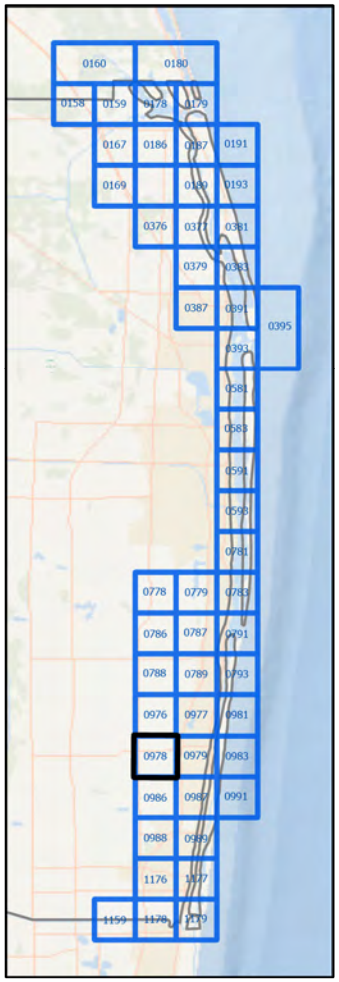
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

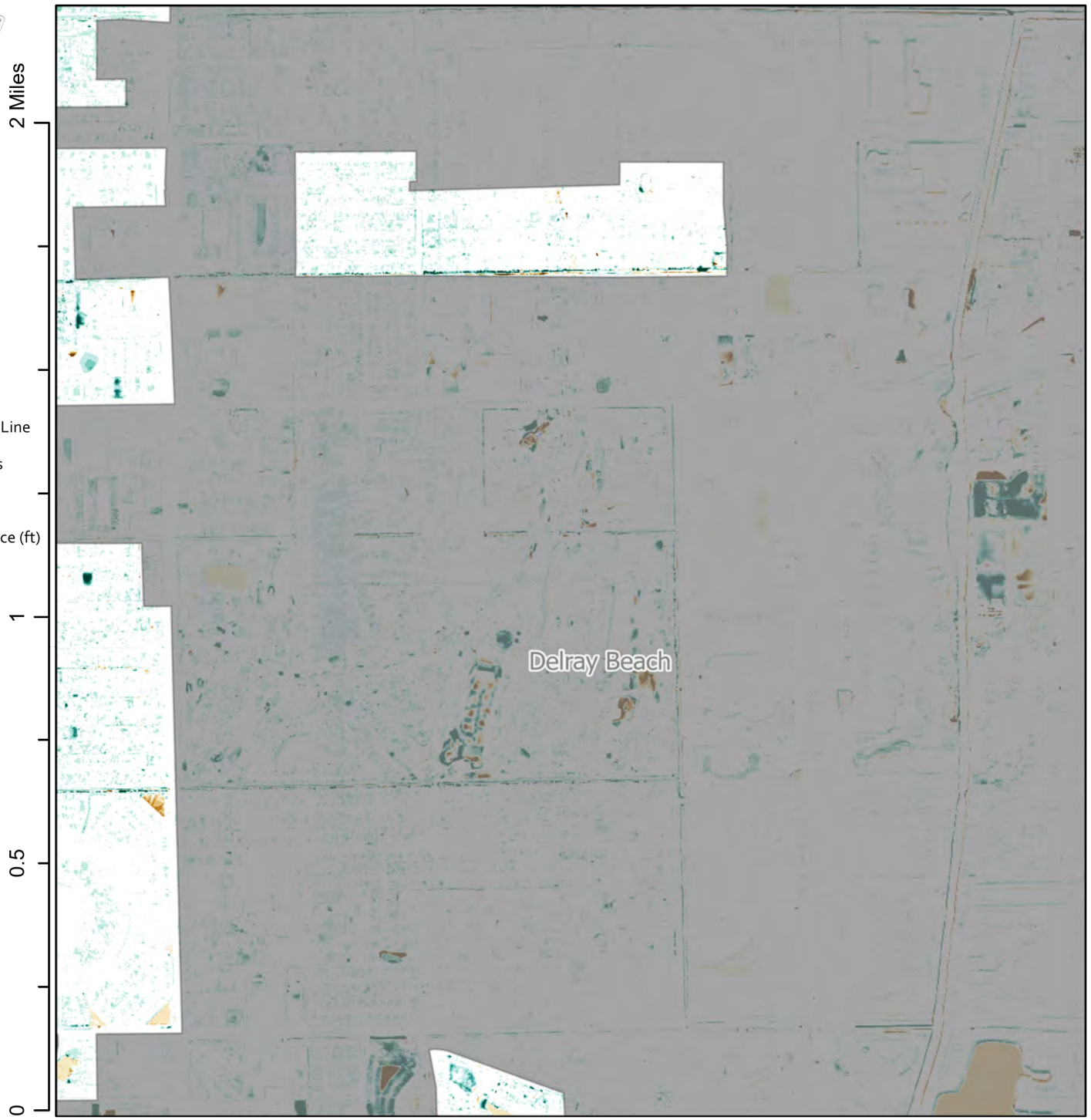
FIRM Panel: 0978



- Frontal Dune Line
- Municipalities
- FIRM Panels

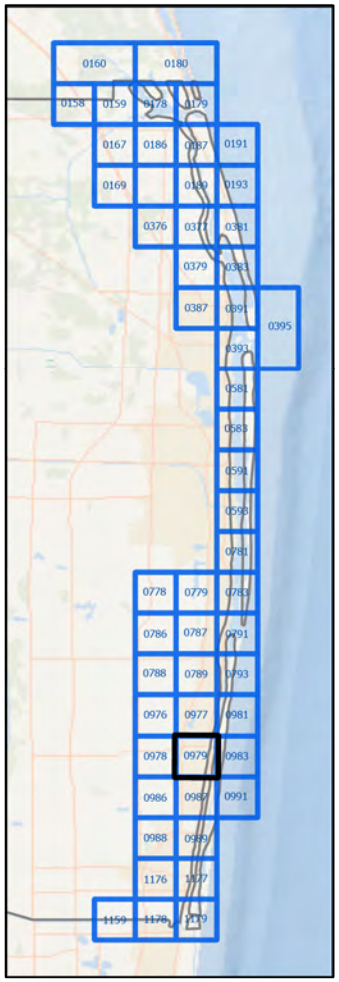
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0979



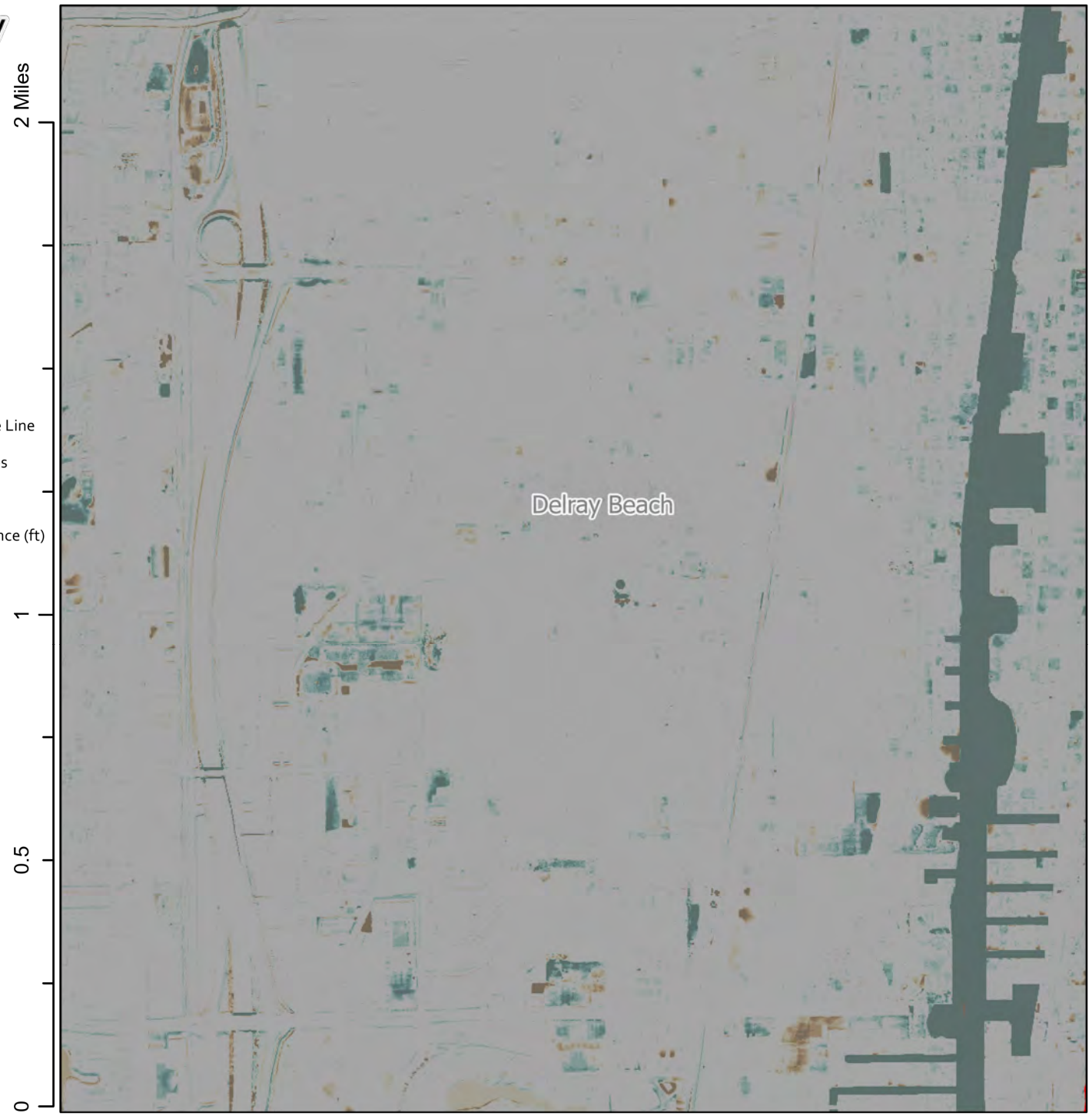
Frontal Dune Line

Municipalities

FIRM Panels

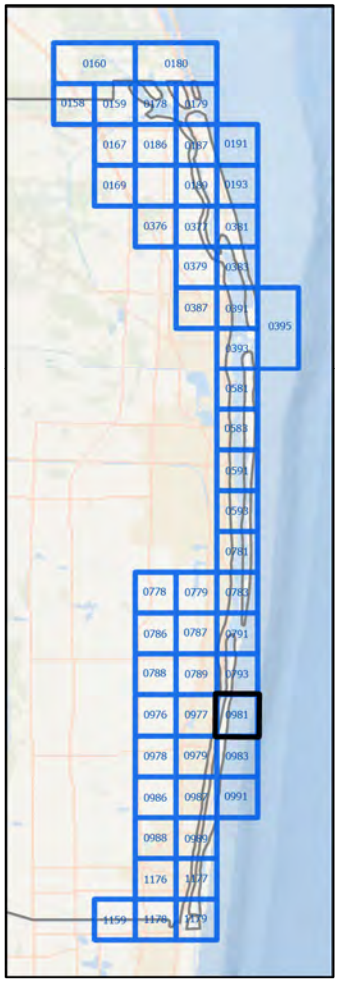
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0981



Frontal Dune Line

Municipalities

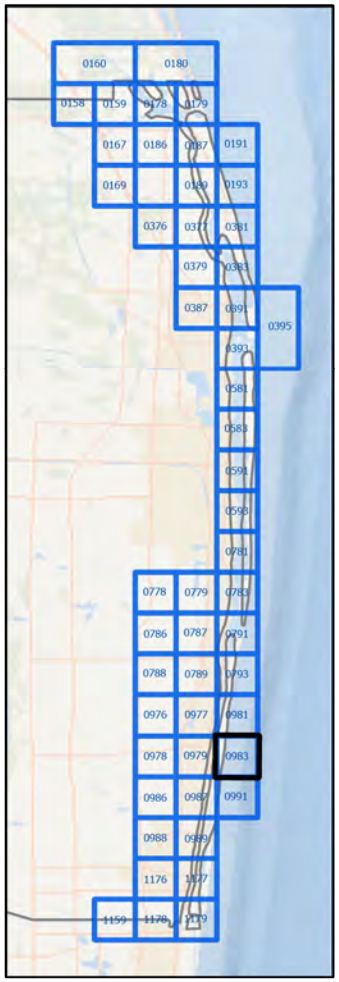
FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0983



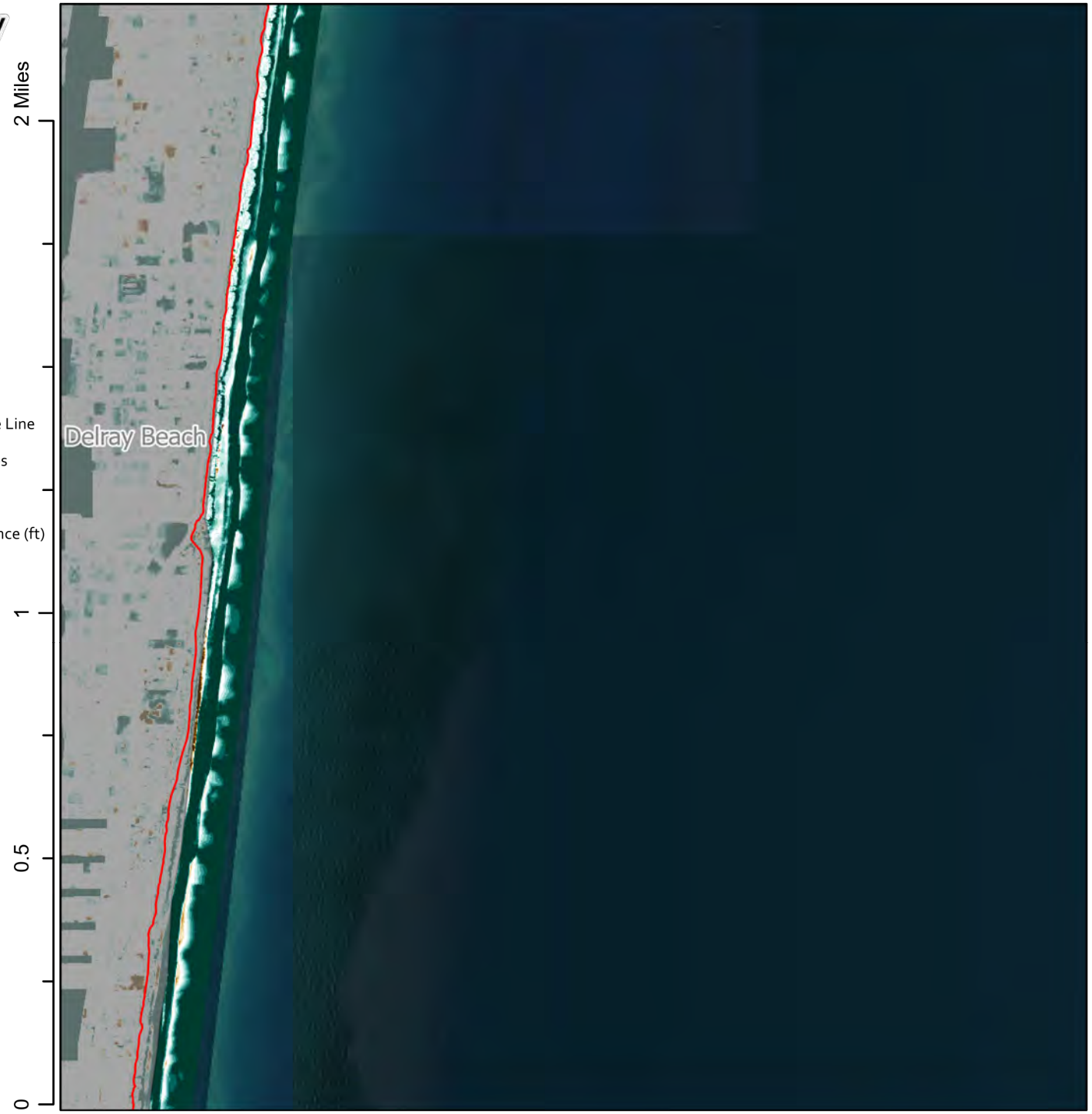
Frontal Dune Line

Municipalities

FIRM Panels

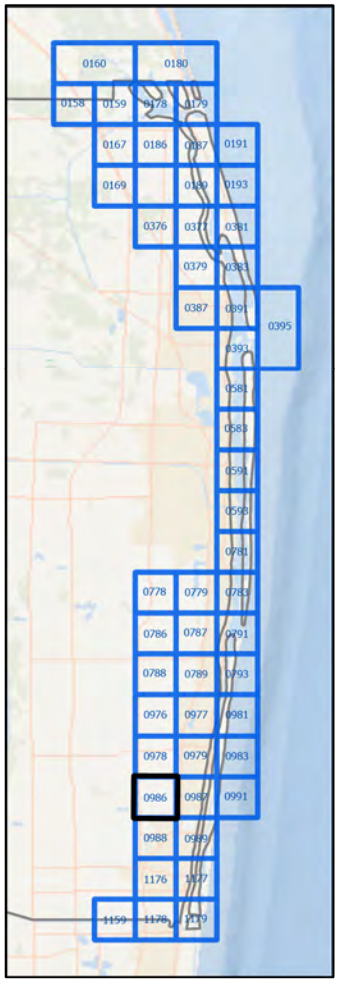
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0986



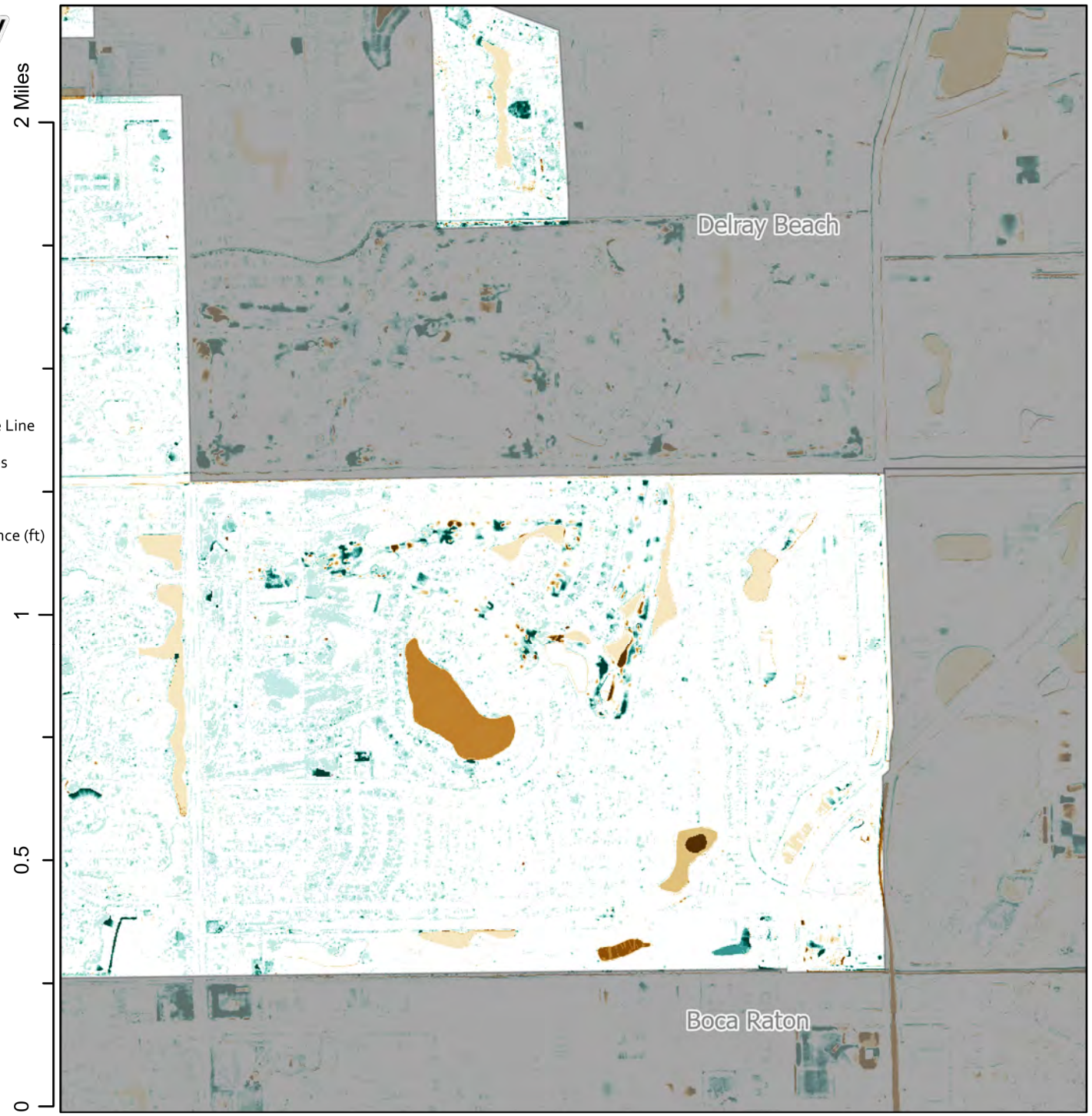
Frontal Dune Line

Municipalities

FIRM Panels

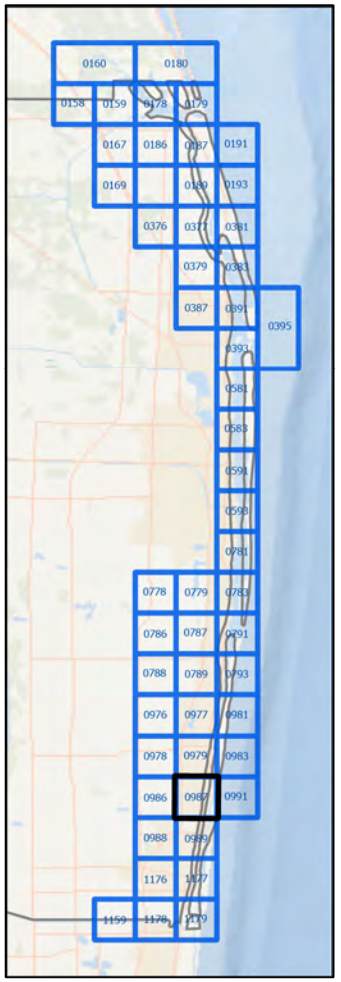
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0987



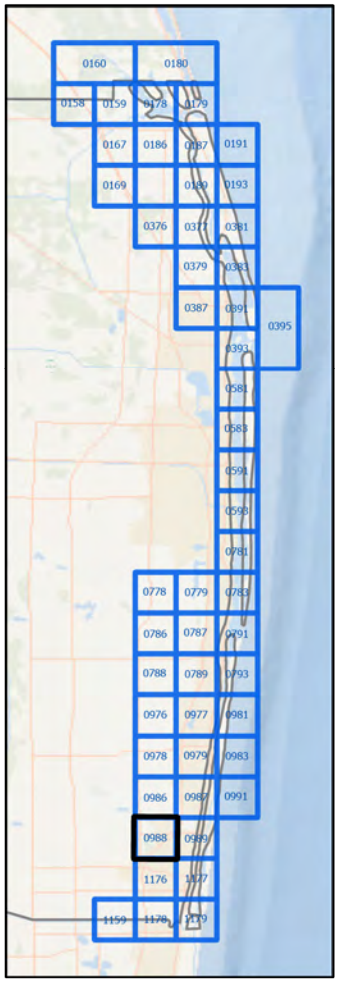
- Frontal Dune Line
- Municipalities
- FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 0988



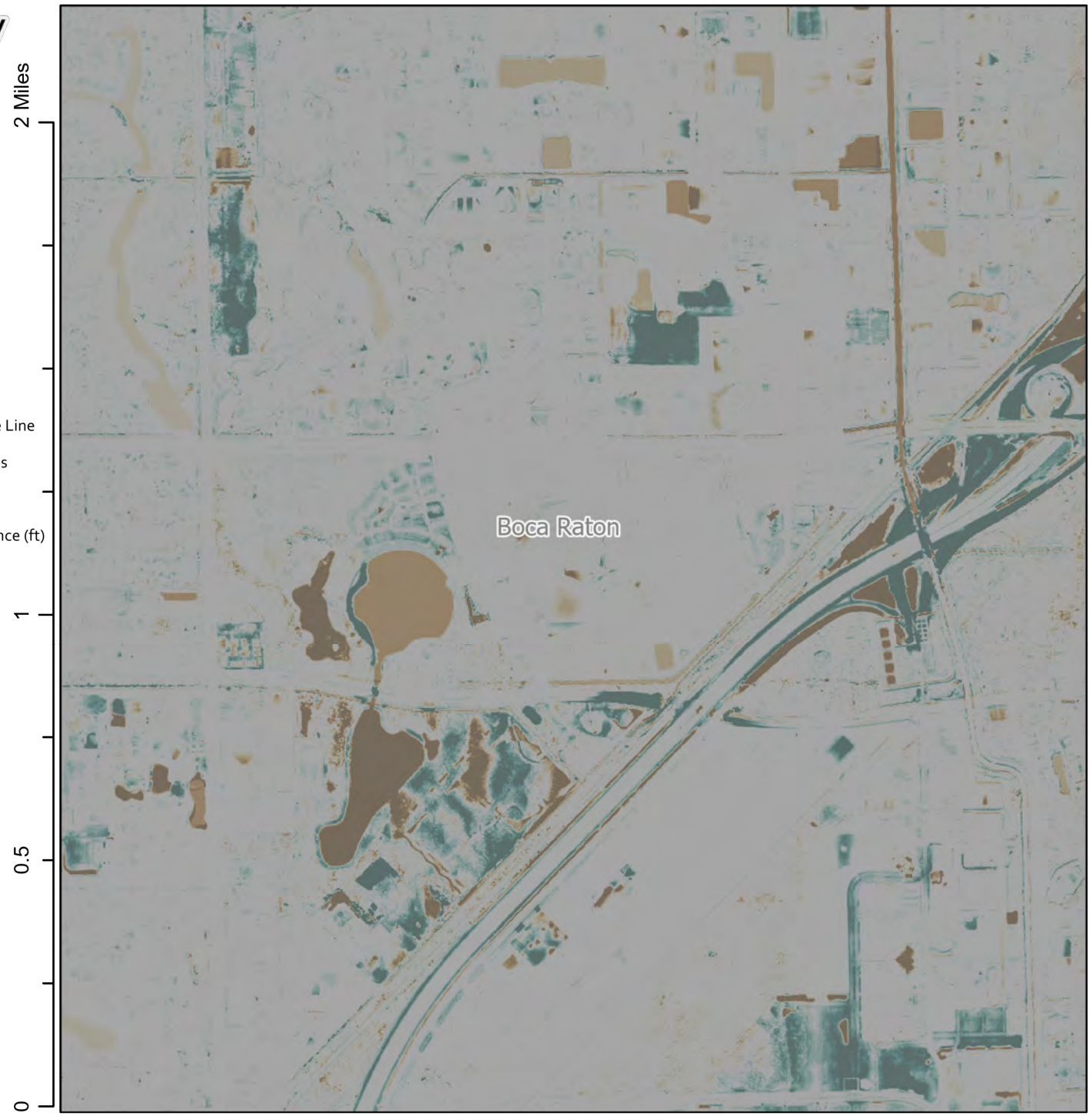
Frontal Dune Line

Municipalities

FIRM Panels

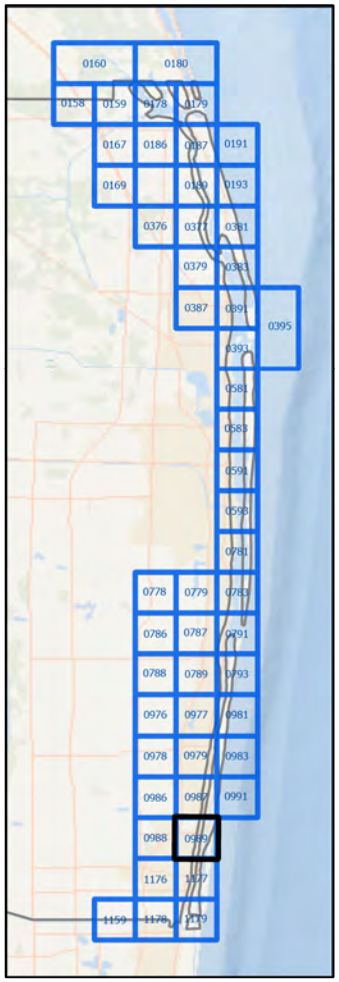
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

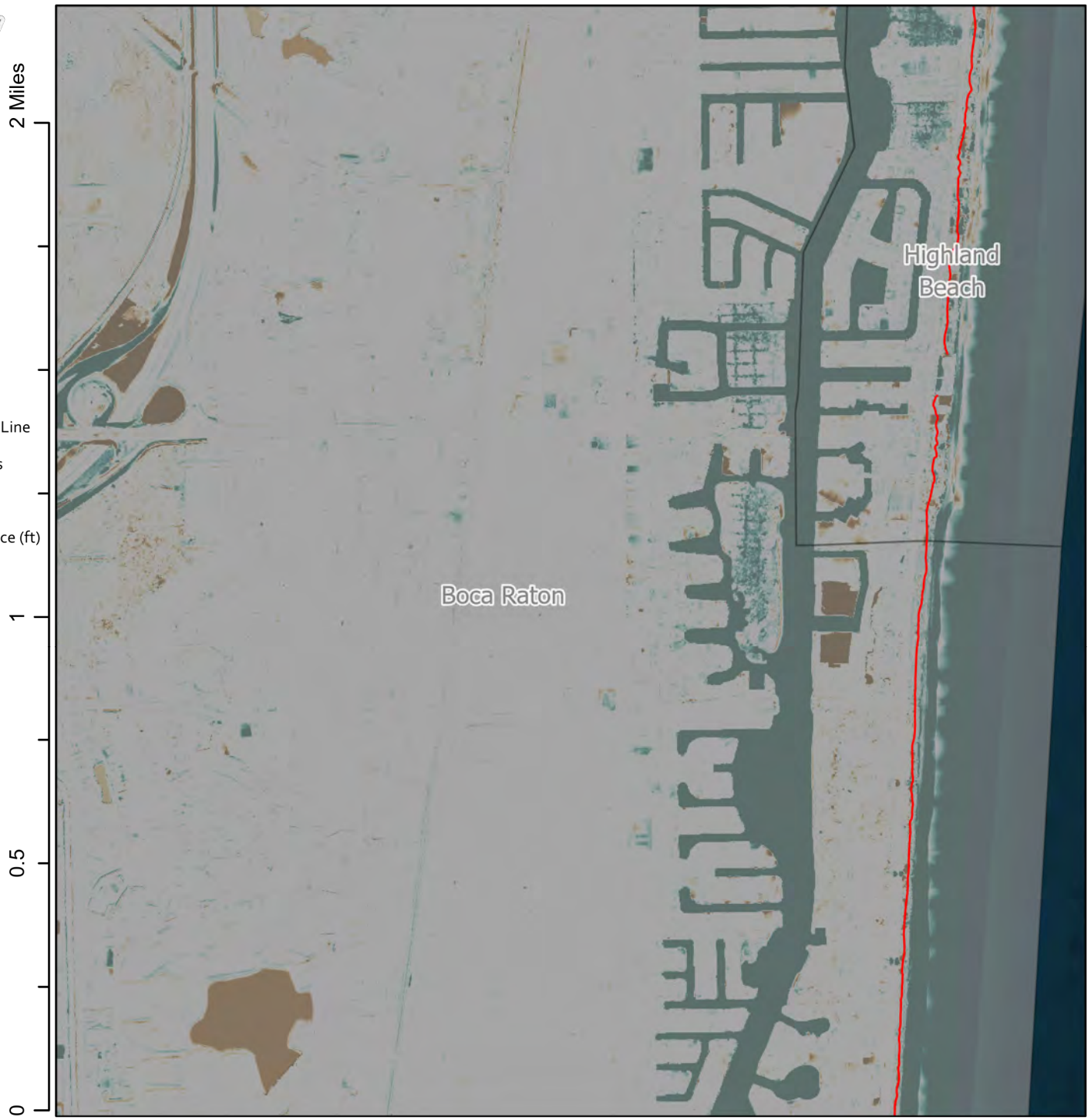
FIRM Panel: 0989



- Frontal Dune Line
- Municipalities
- FIRM Panels

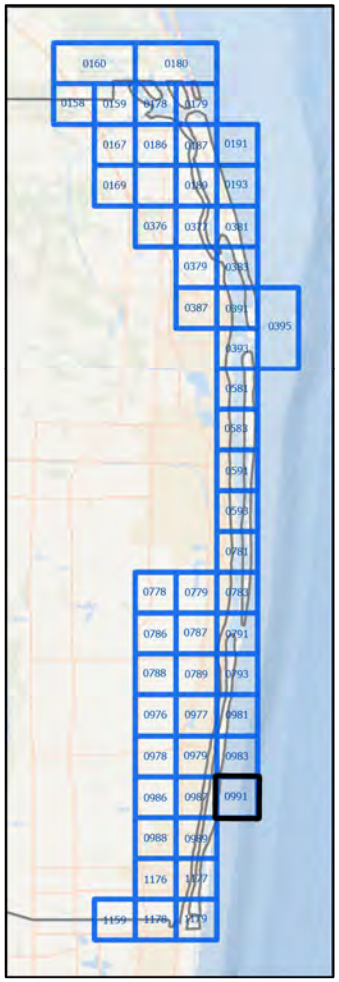
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

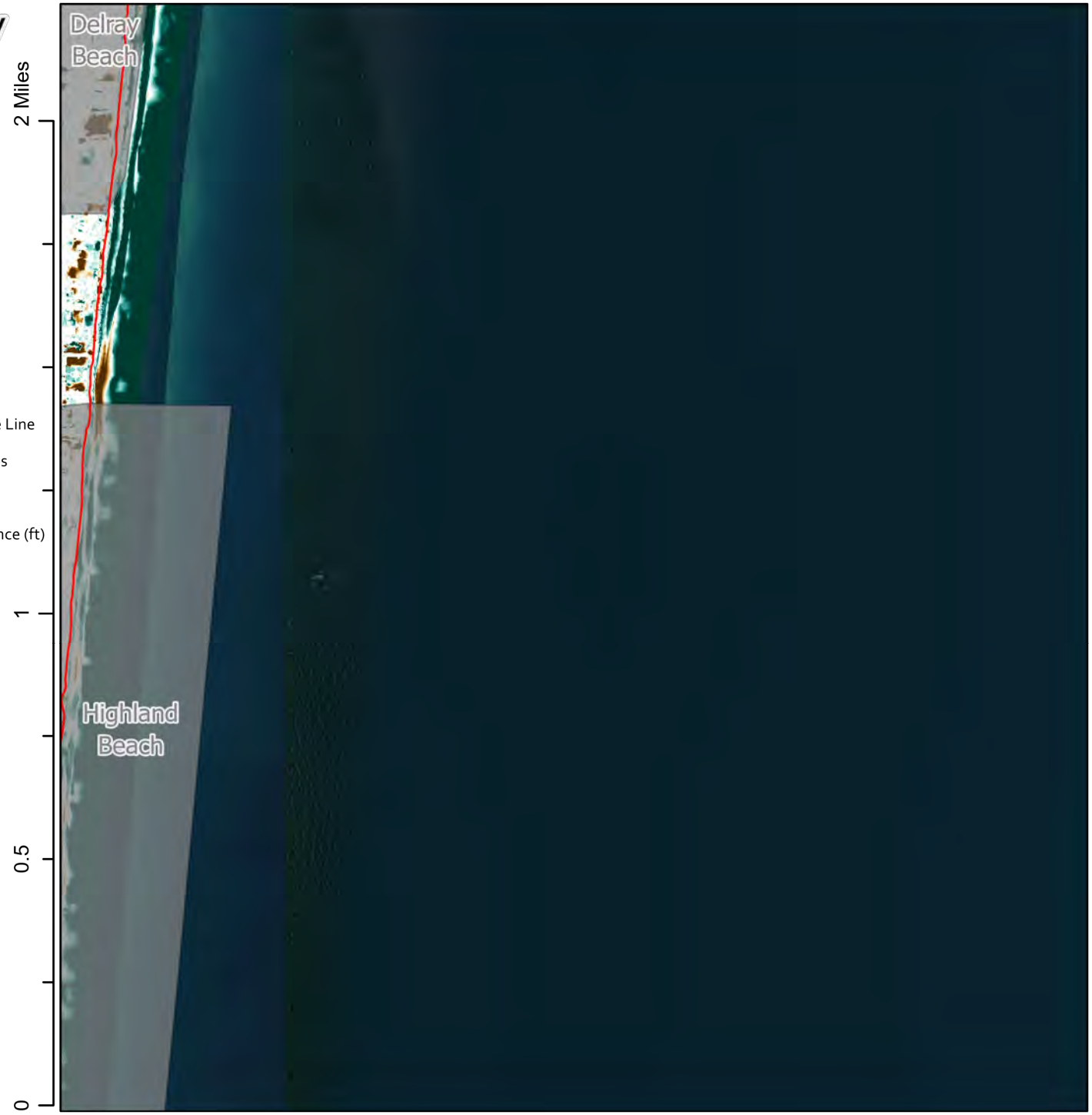
FIRM Panel: 0991



- Frontal Dune Line
- Municipalities
- FIRM Panels

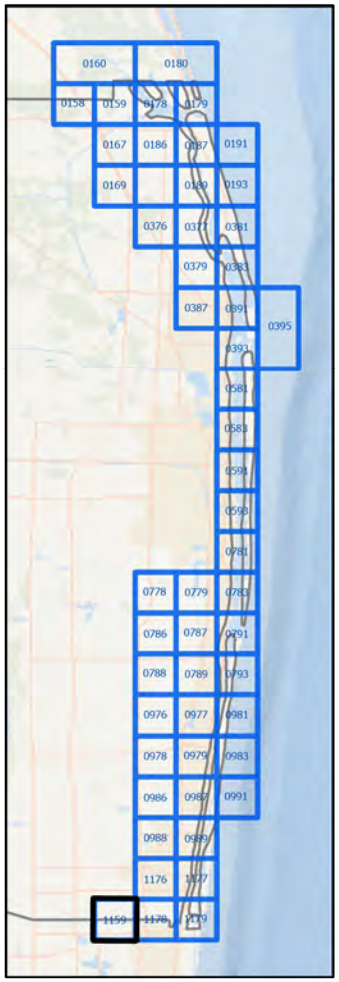
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 1159



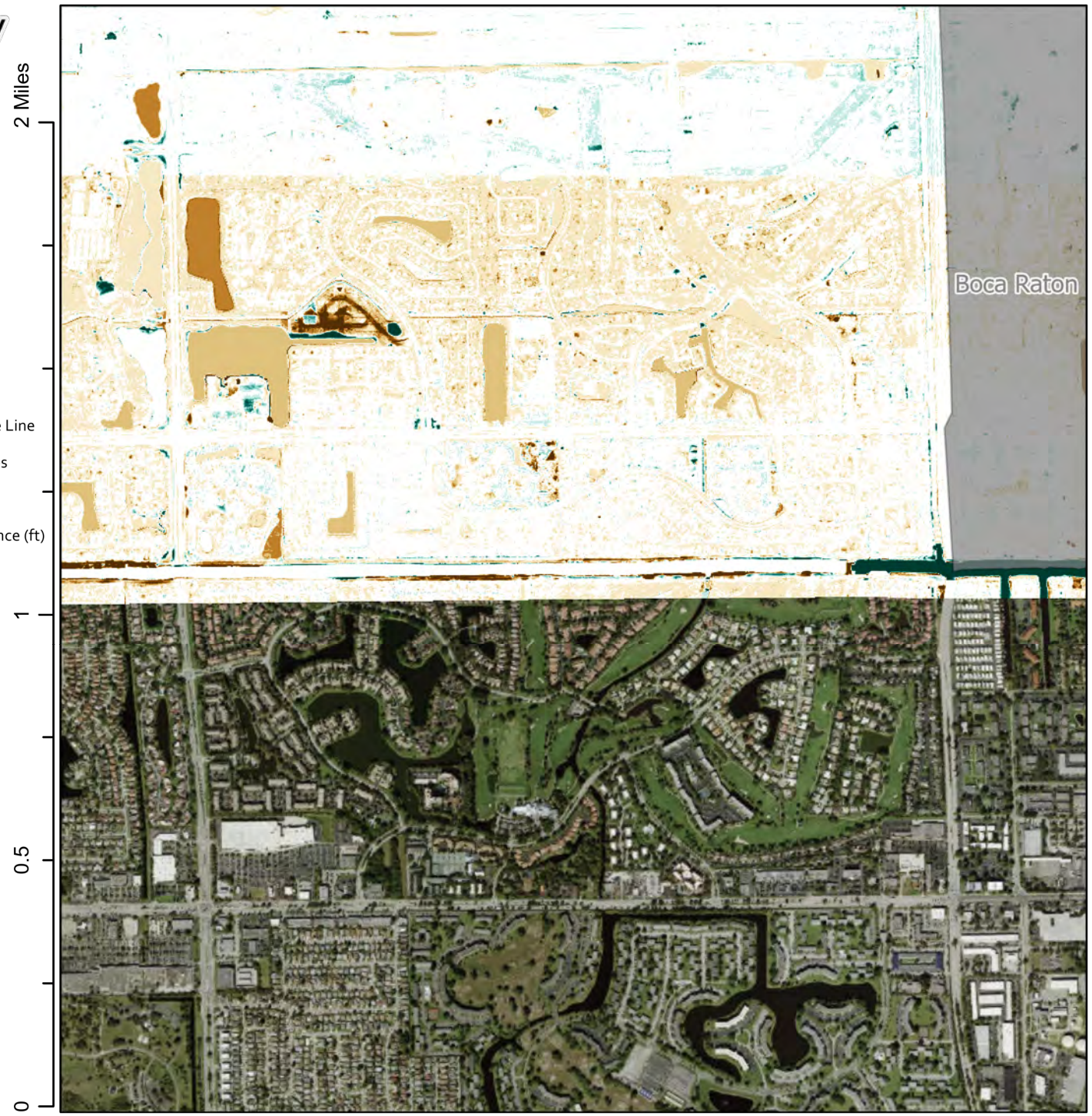
Frontal Dune Line

Municipalities

FIRM Panels

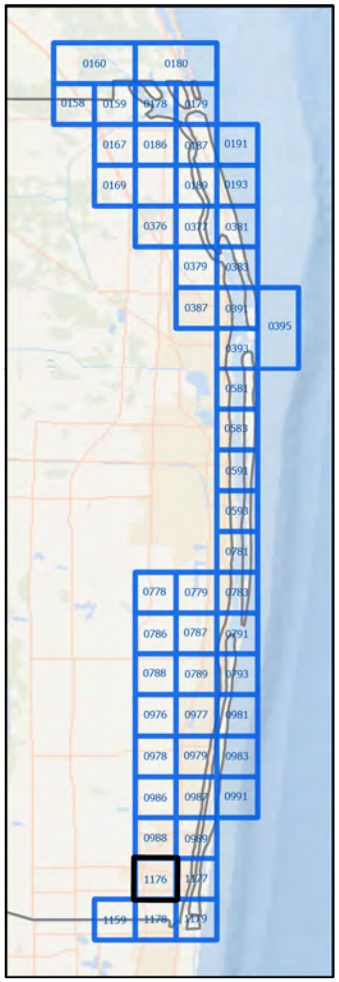
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 1176



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

0

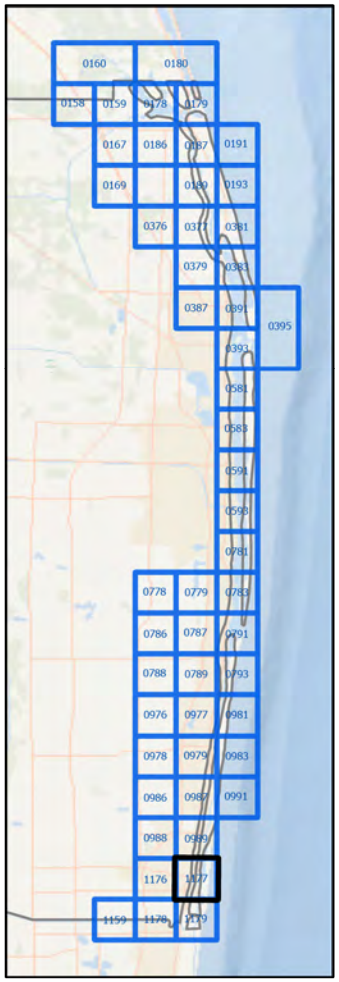
0.5

1

Boca Raton

Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

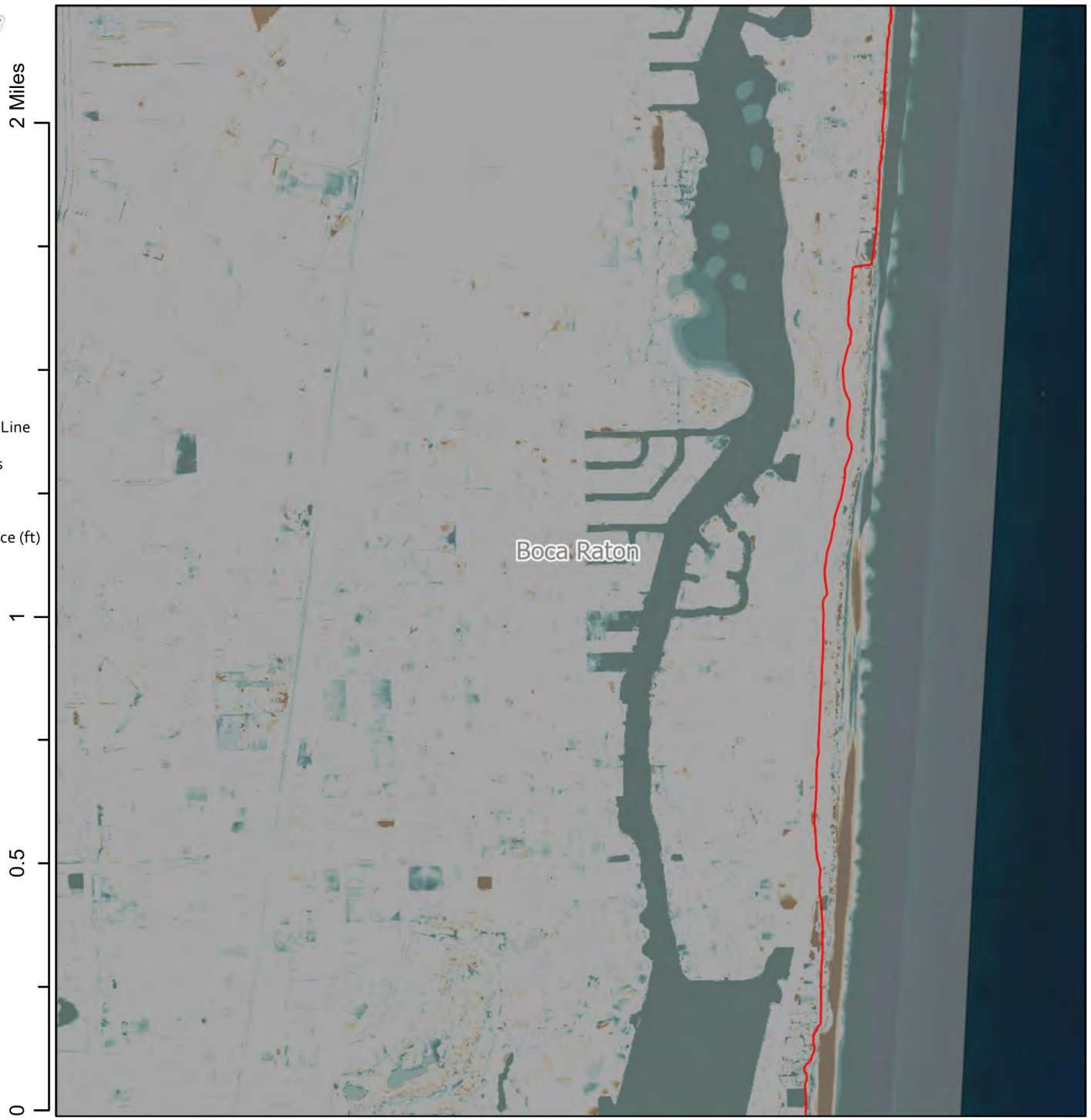
FIRM Panel: 1177



- Frontal Dune Line
- Municipalities
- FIRM Panels

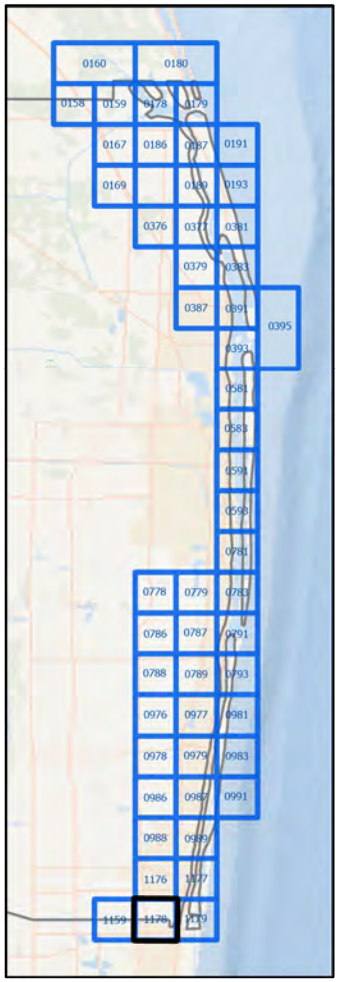
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 1178



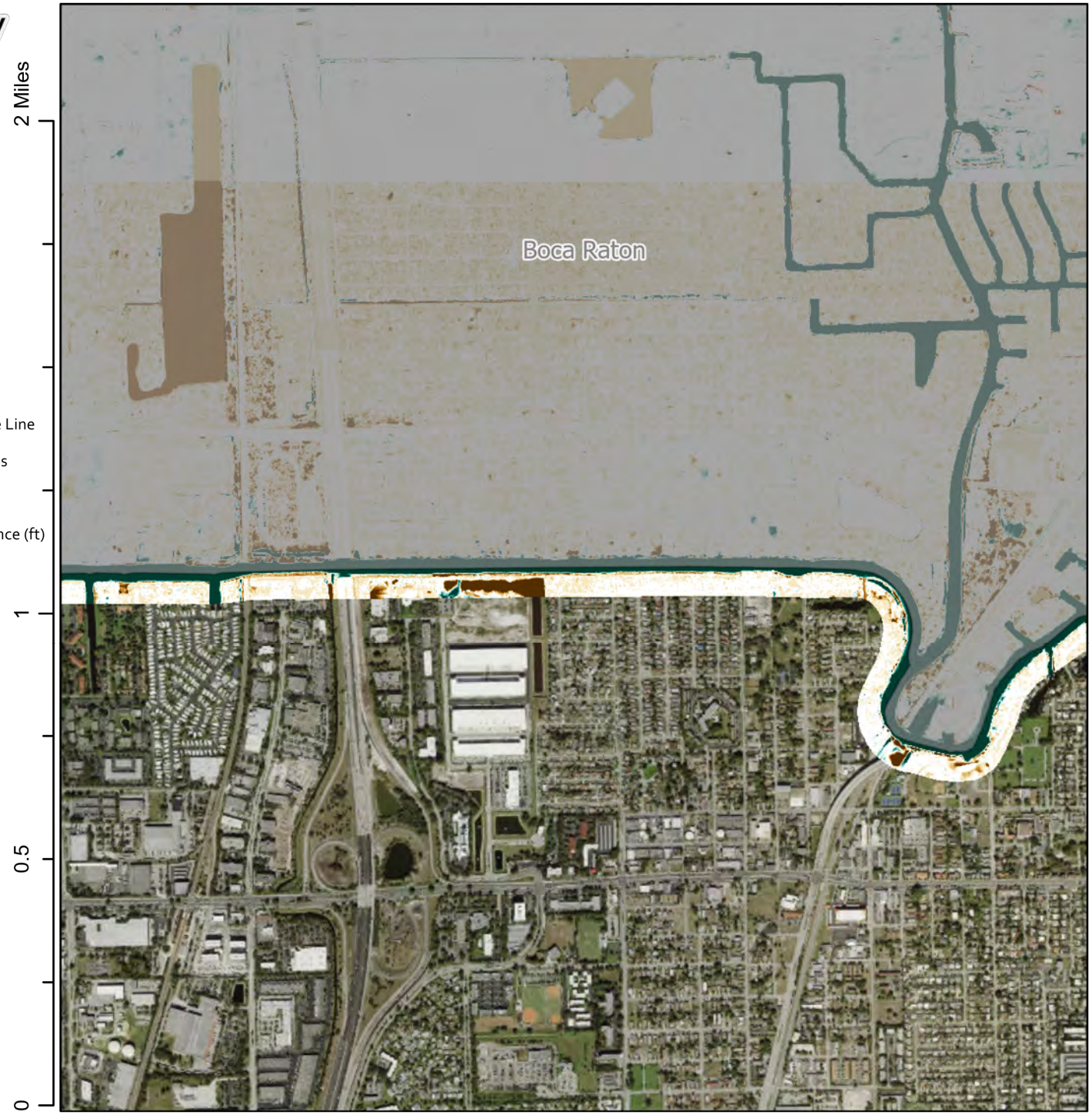
Frontal Dune Line

Municipalities

FIRM Panels

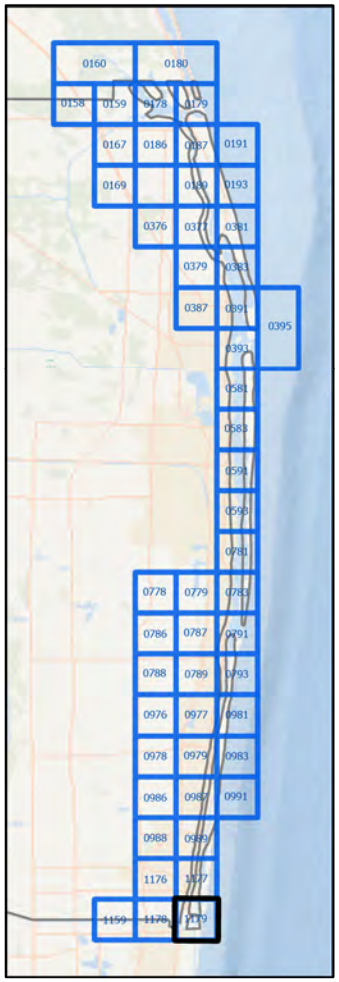
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus SWFLTB DEM

FIRM Panel: 1179



- Frontal Dune Line
- Municipalities
- FIRM Panels

Calculated Difference (ft)

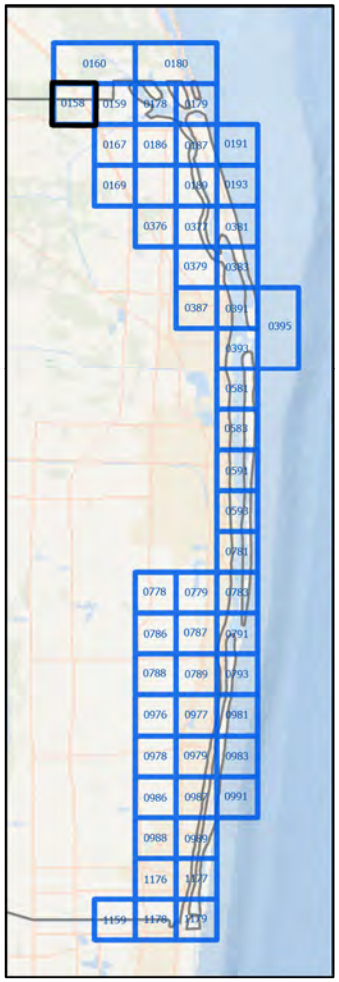
- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

Appendix C

PBC DEM minus USACE DEM by FIRM Panel

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

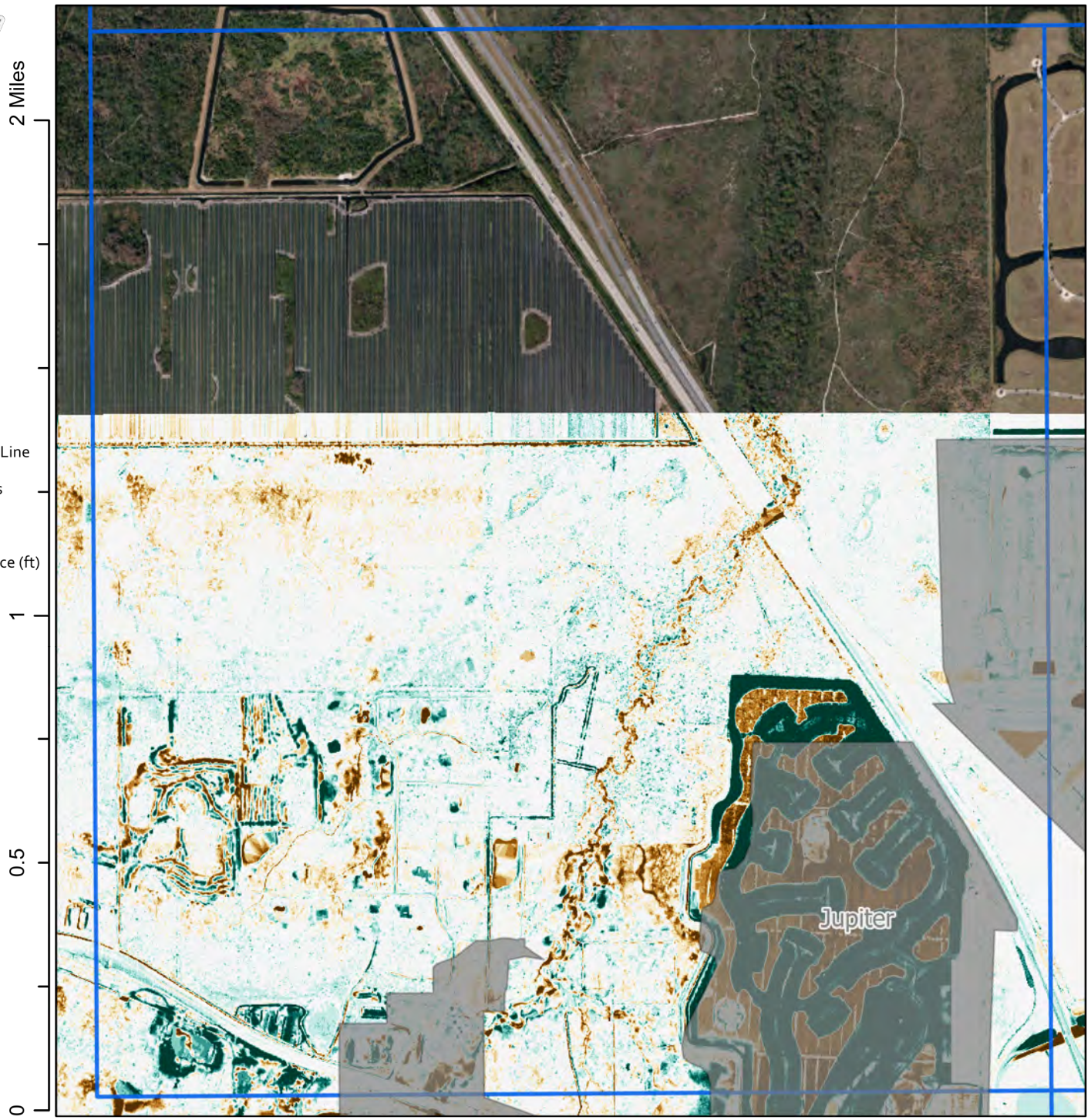
FIRM Panel: 0158



- Frontal Dune Line
- Municipalities
- FIRM Panels

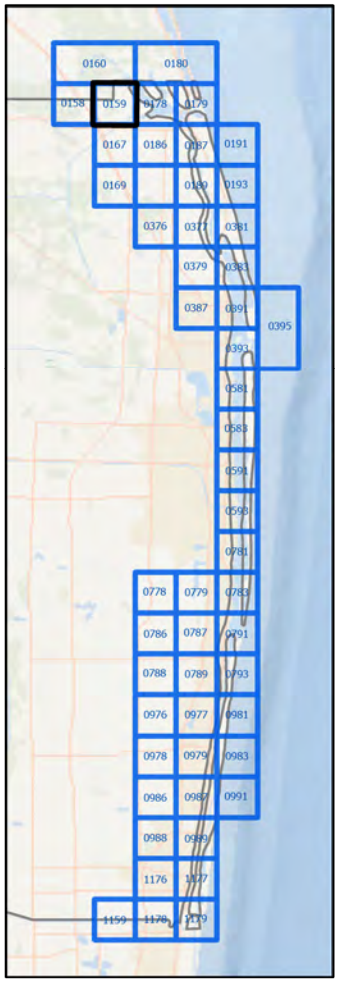
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0159



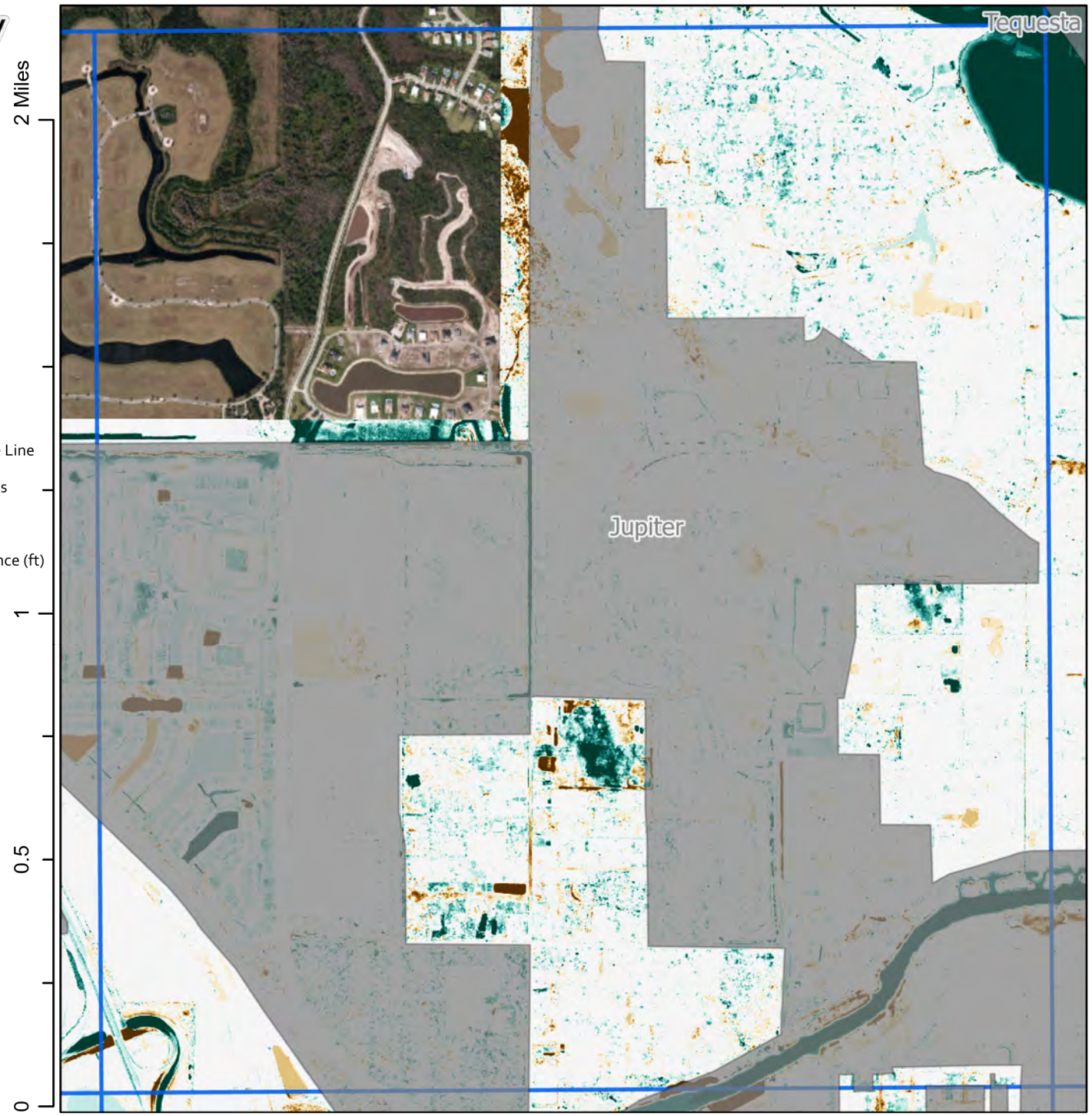
Frontal Dune Line

Municipalities

FIRM Panels

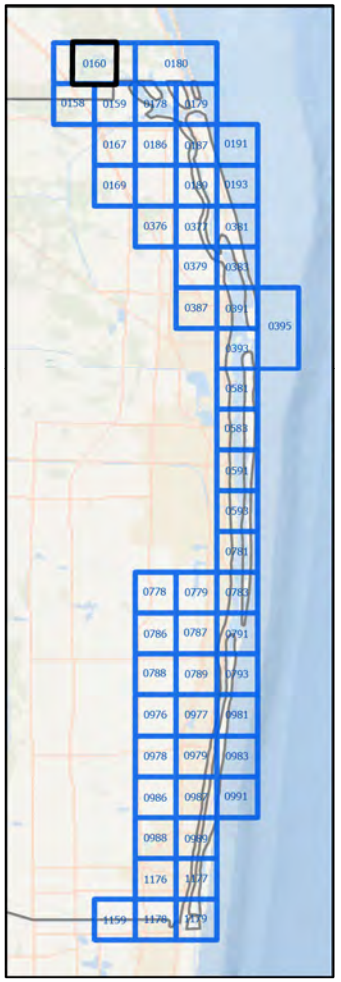
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0160



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

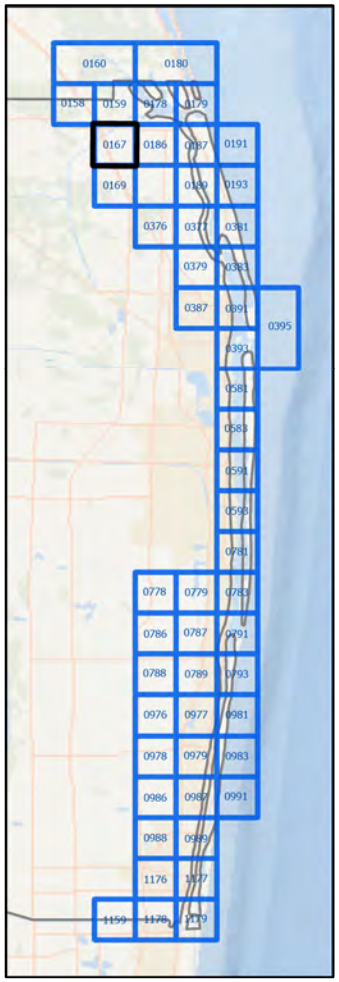
1

0.5

0

Jupiter

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM FIRM Panel: 0167



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

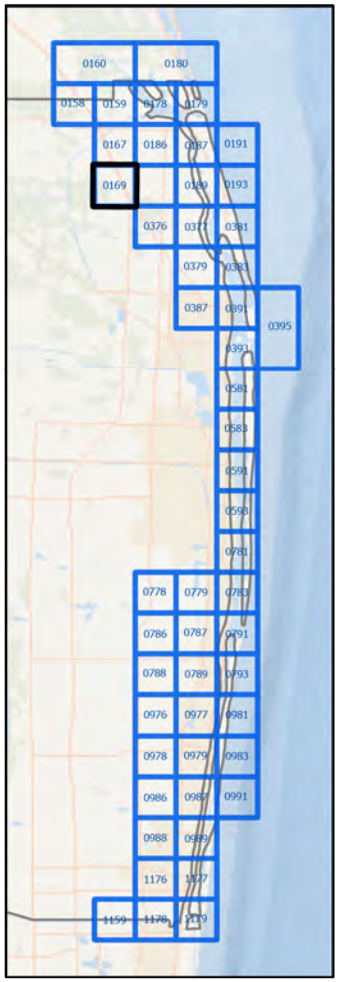
0.5

0

Jupiter

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0169



Frontal Dune Line

Municipalities

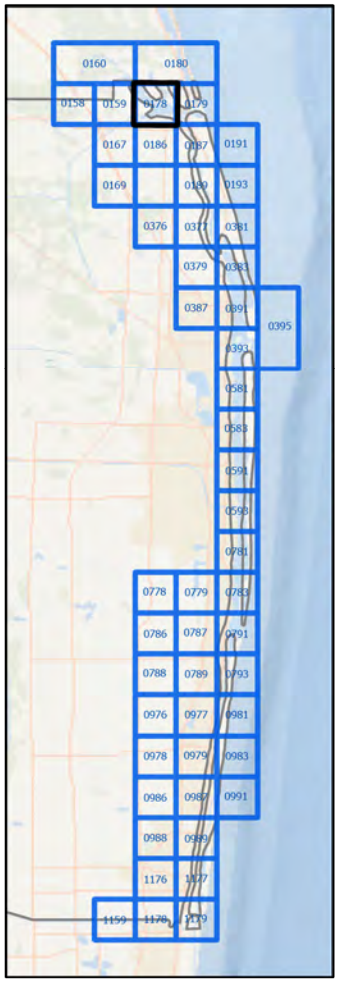
FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

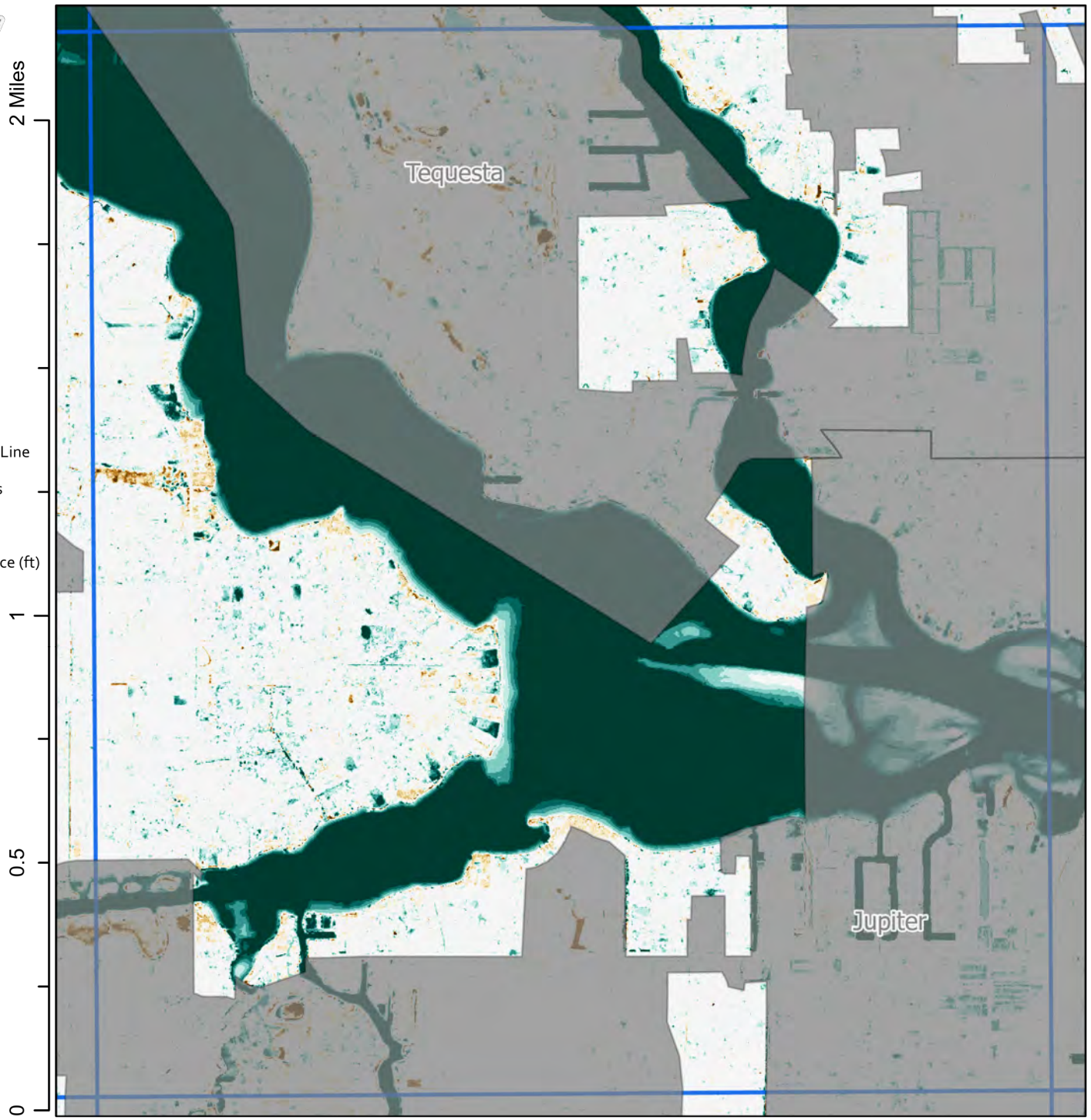
FIRM Panel: 0178



- Frontal Dune Line
- Municipalities
- FIRM Panels

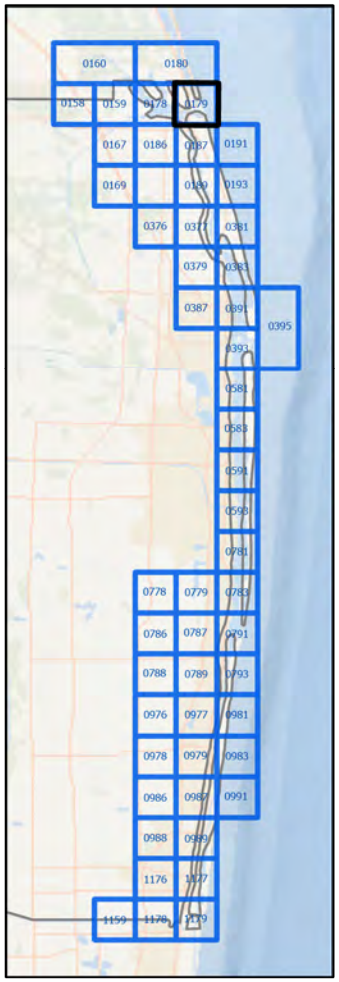
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0179



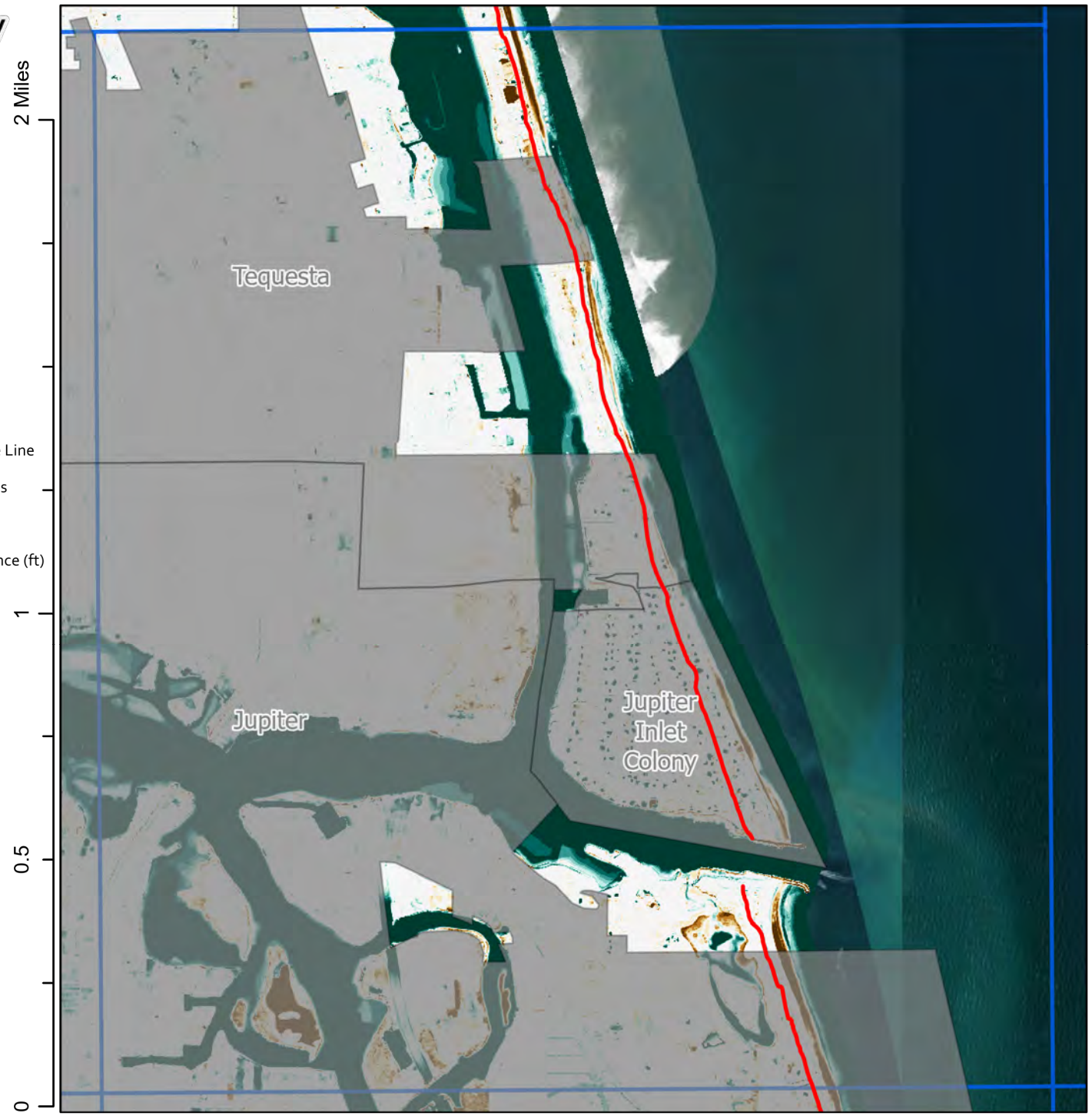
Frontal Dune Line

Municipalities

FIRM Panels

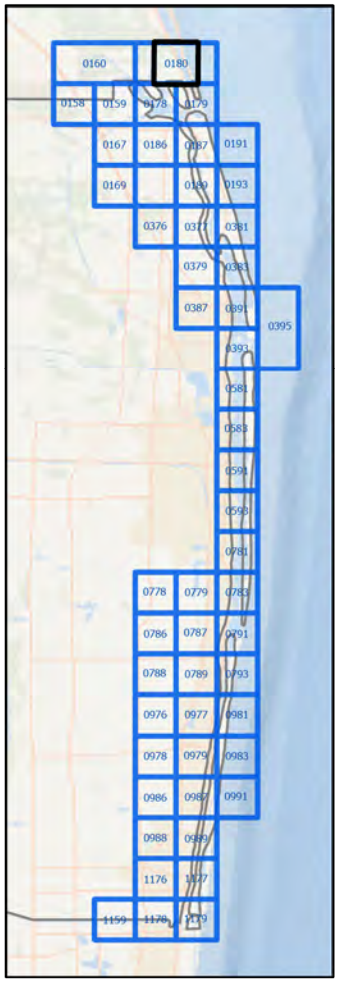
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0180



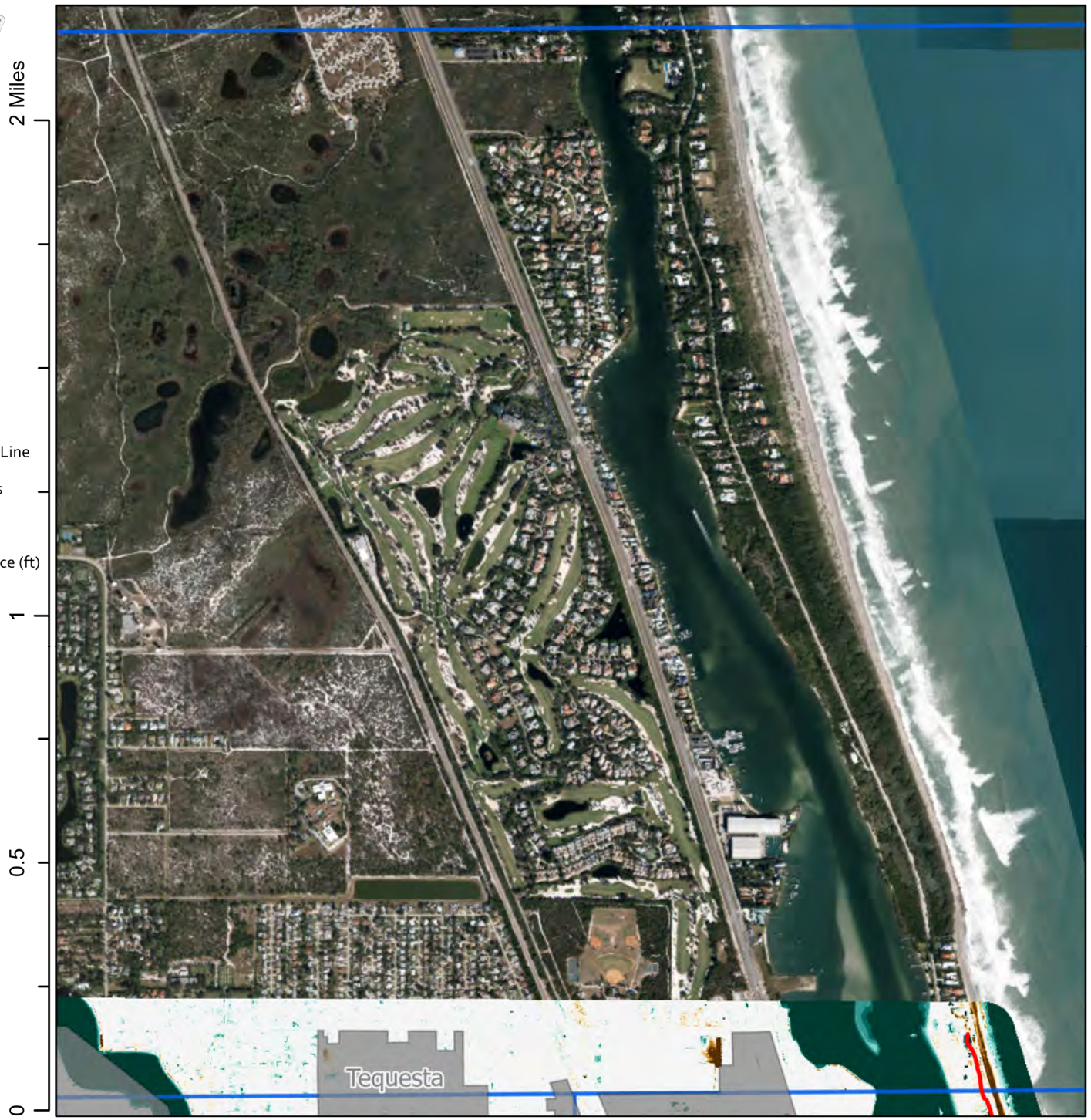
Frontal Dune Line

Municipalities

FIRM Panels

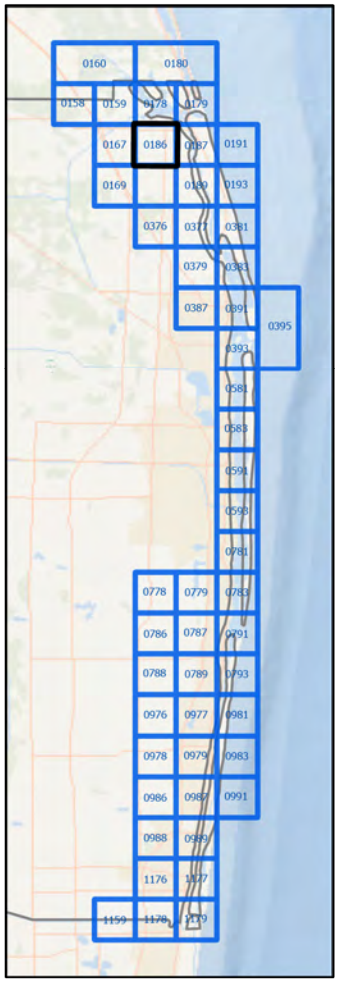
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0186



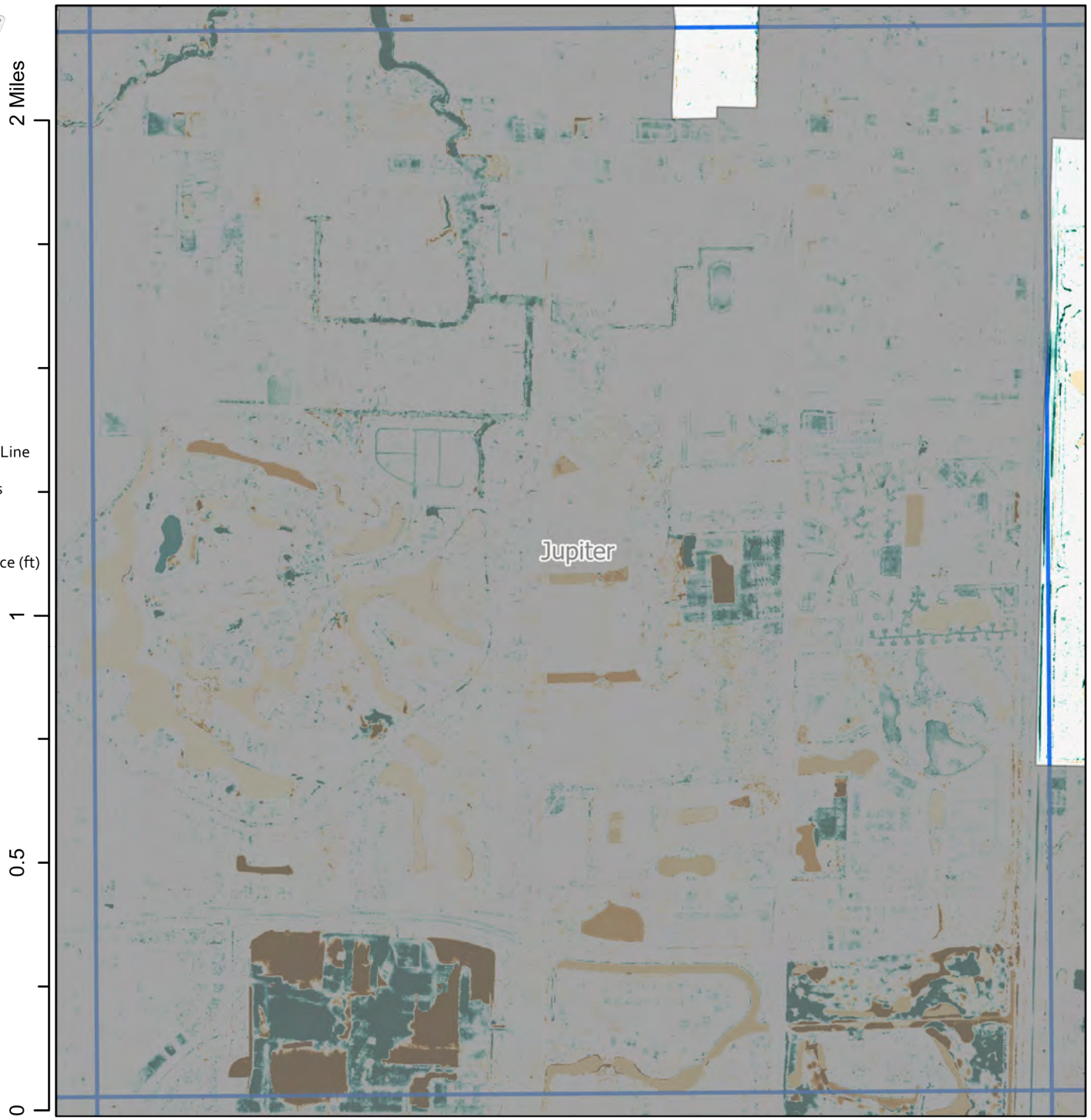
Frontal Dune Line

Municipalities

FIRM Panels

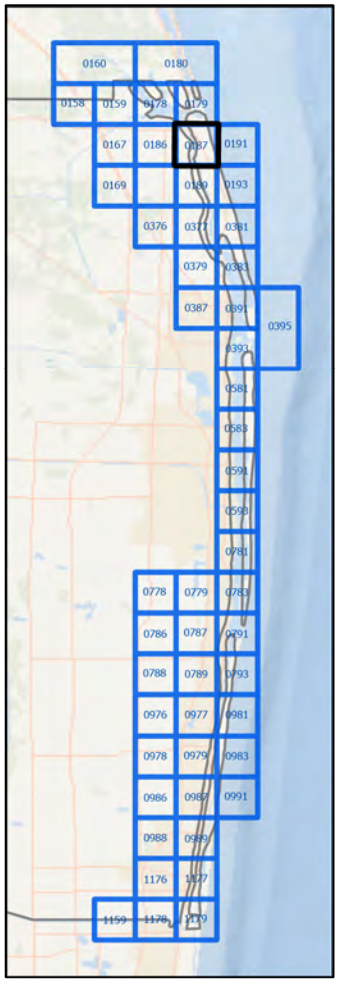
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

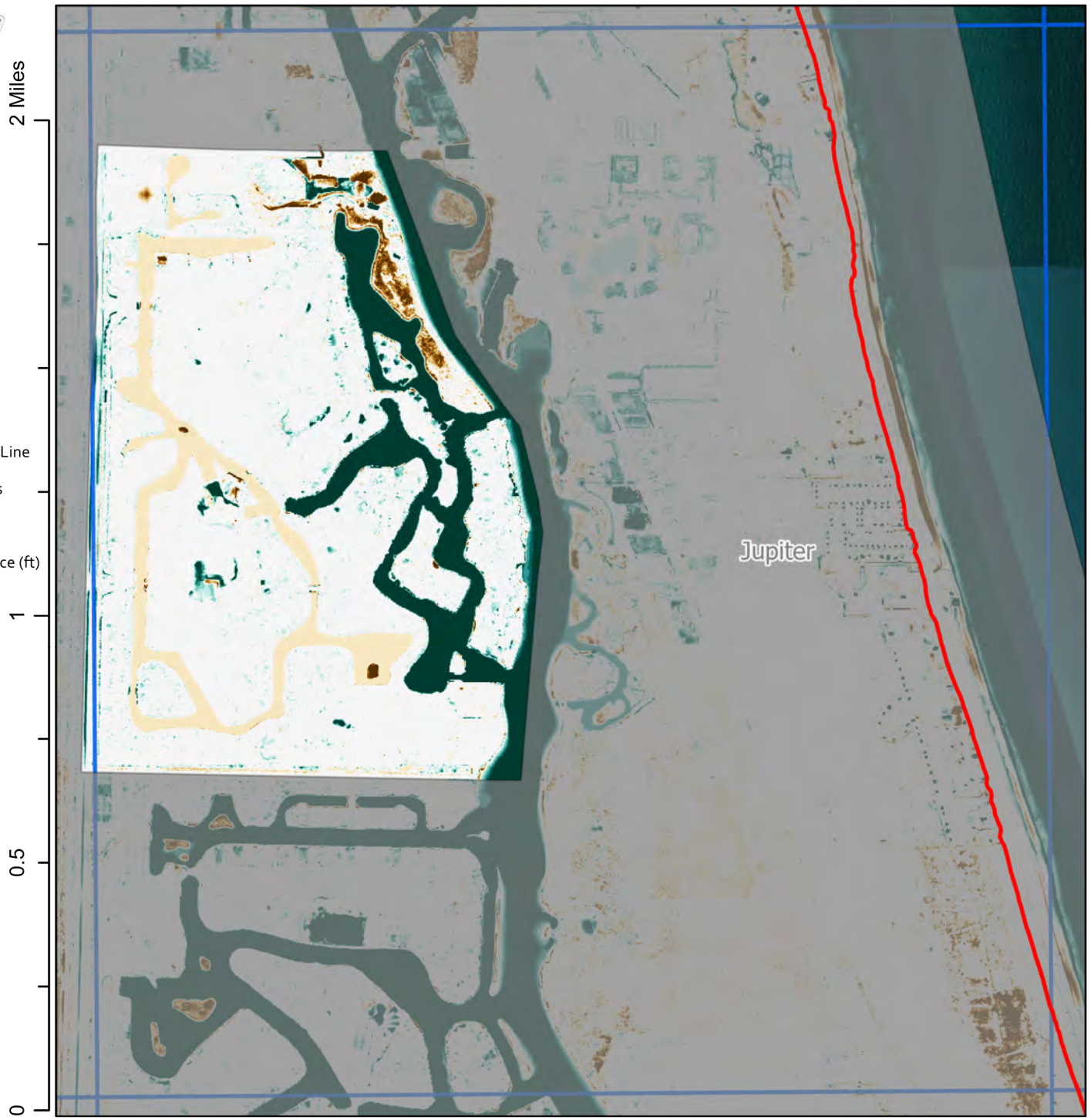
FIRM Panel: 0187



- Frontal Dune Line
- Municipalities
- FIRM Panels

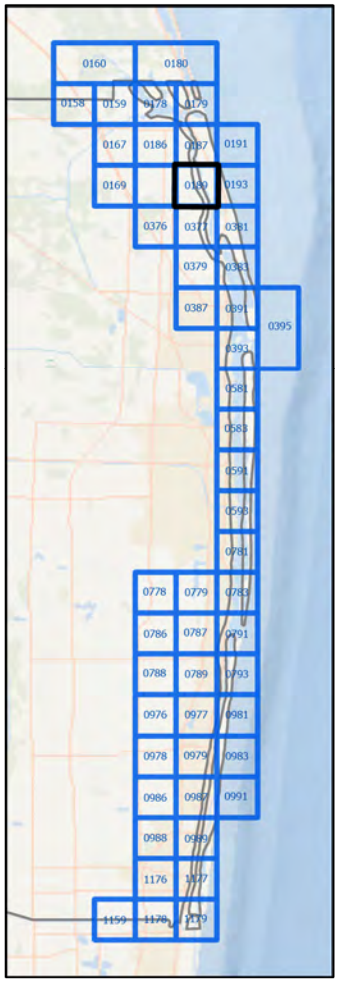
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0189



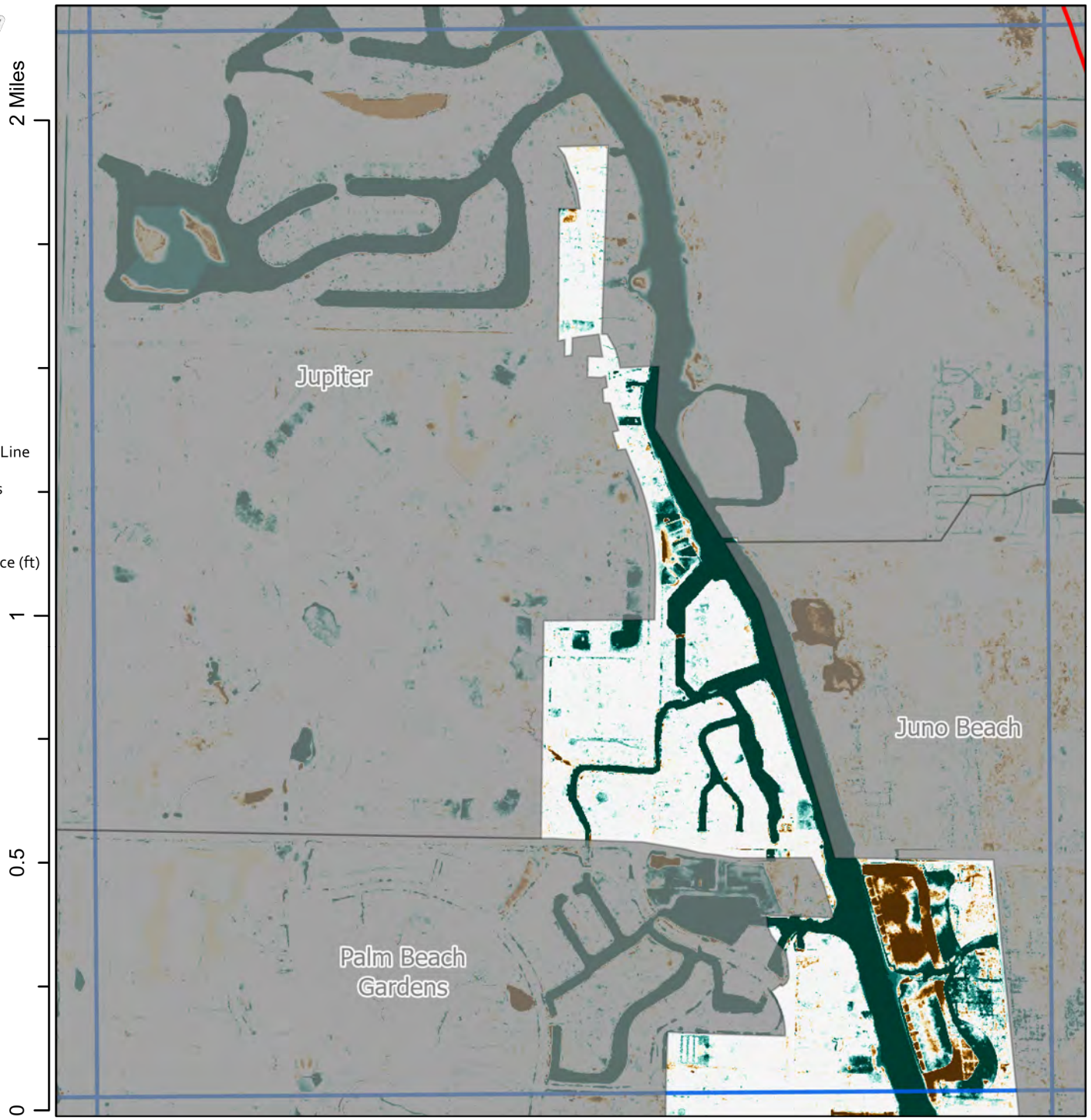
Frontal Dune Line

Municipalities

FIRM Panels

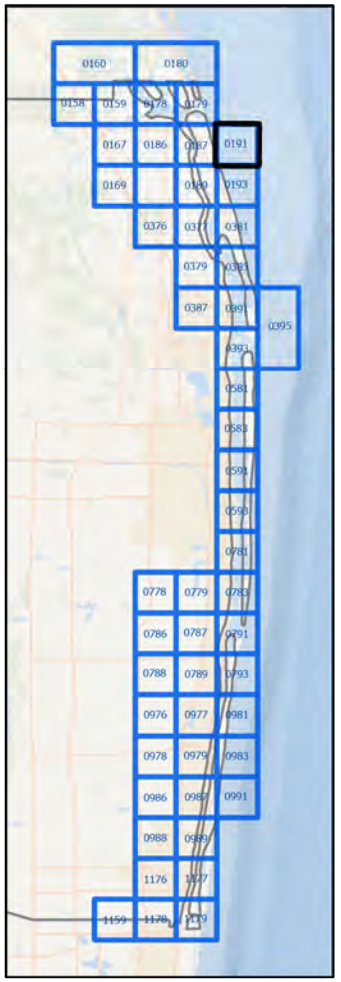
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0191



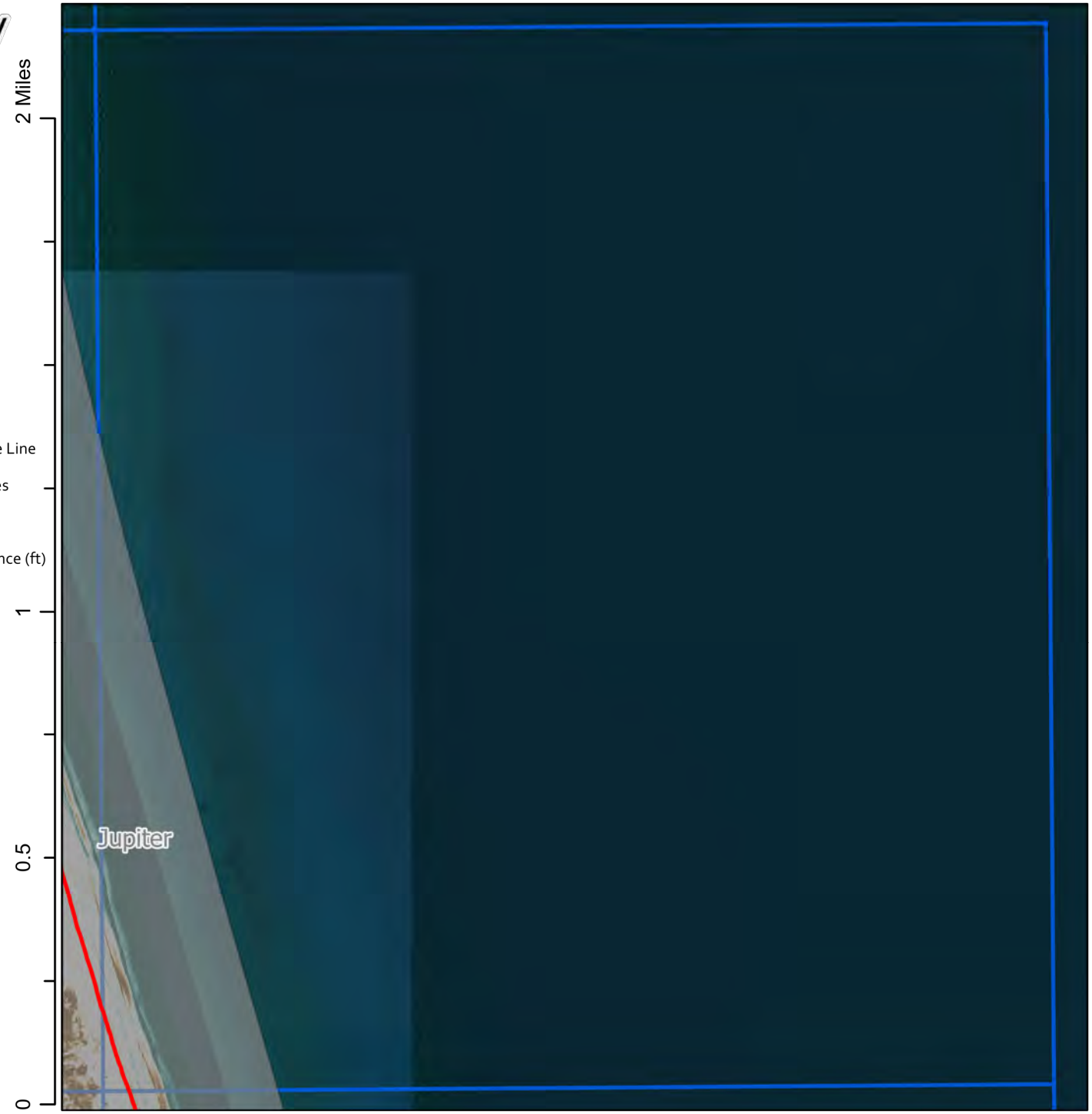
Frontal Dune Line

Municipalities

FIRM Panels

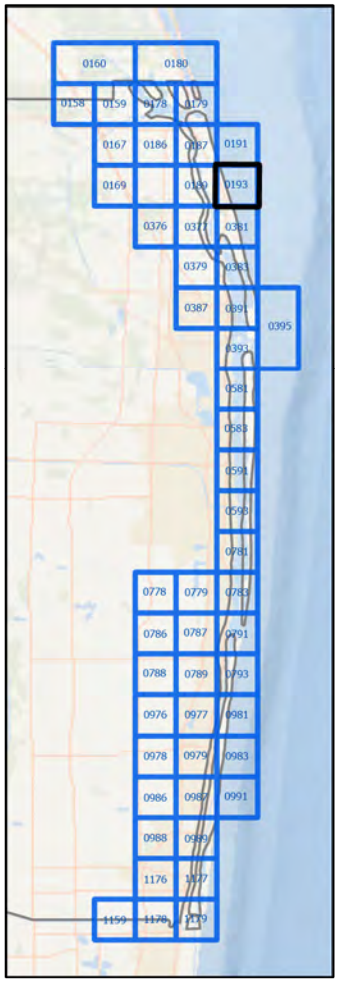
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0193



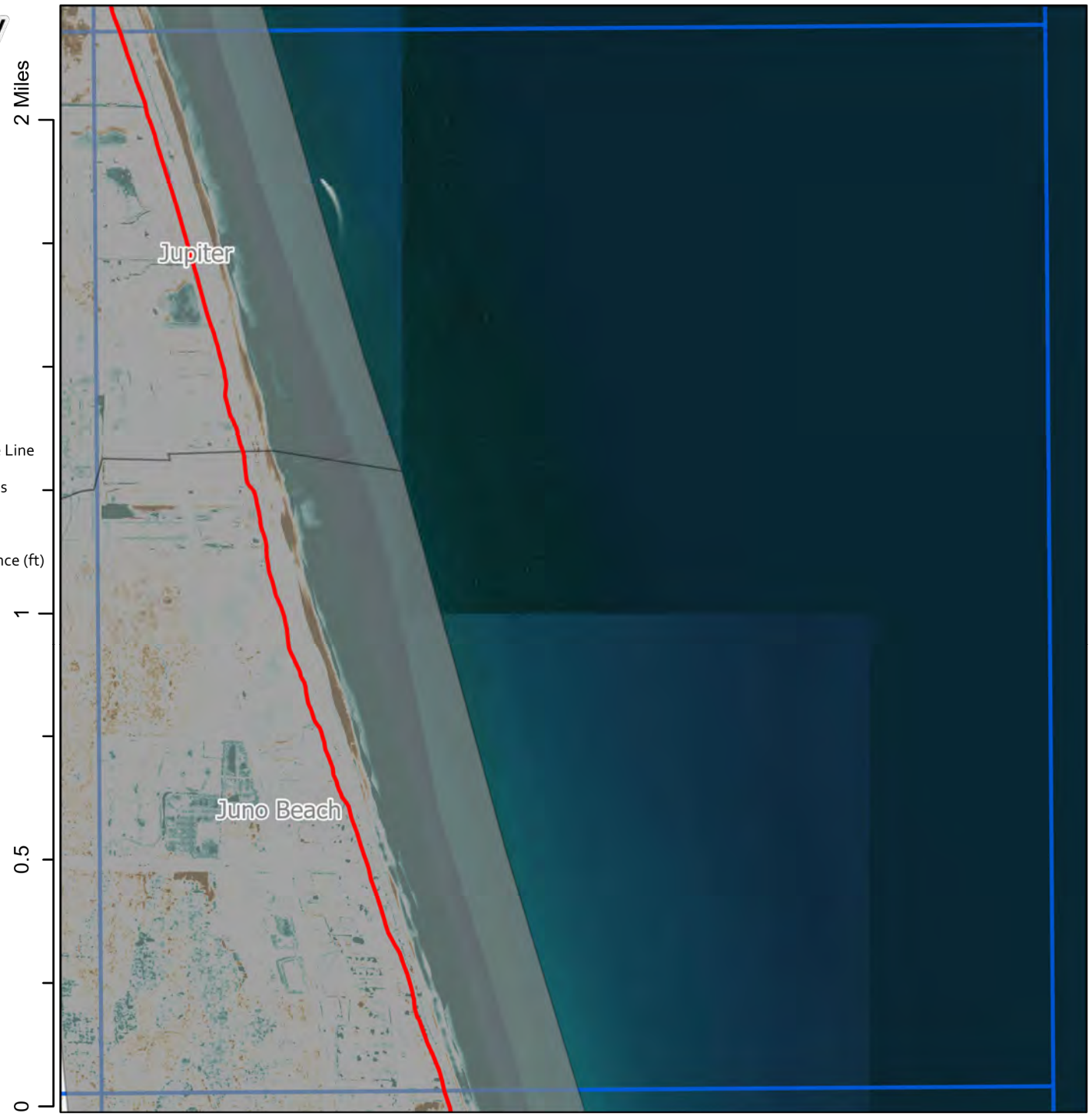
Frontal Dune Line

Municipalities

FIRM Panels

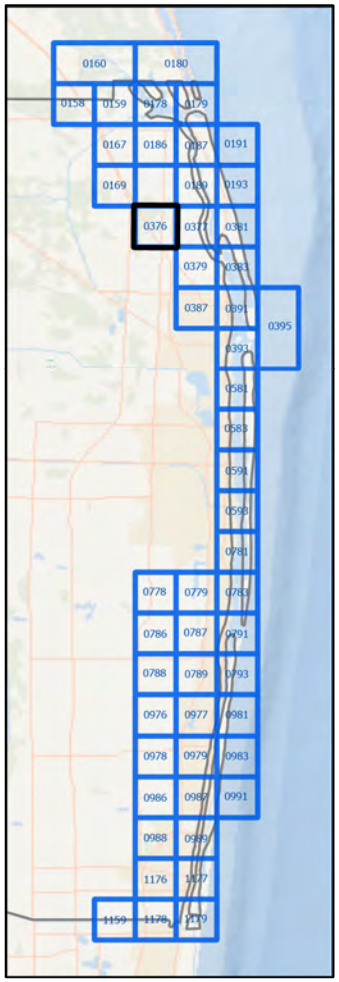
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0376



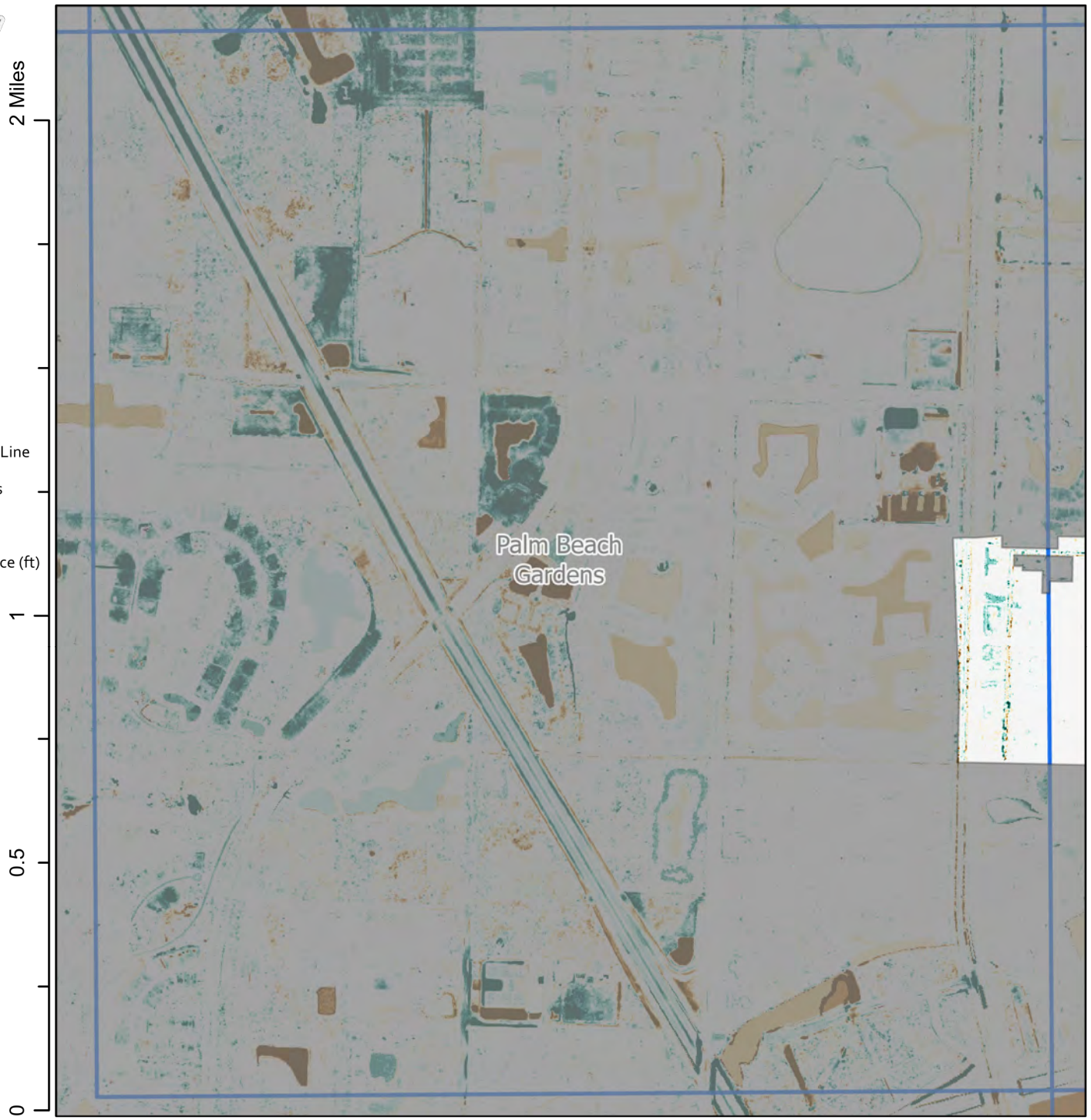
Frontal Dune Line

Municipalities

FIRM Panels

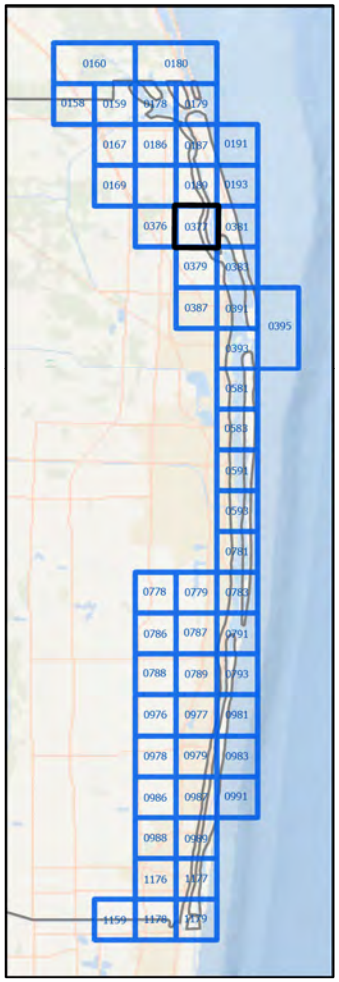
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0377



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

0

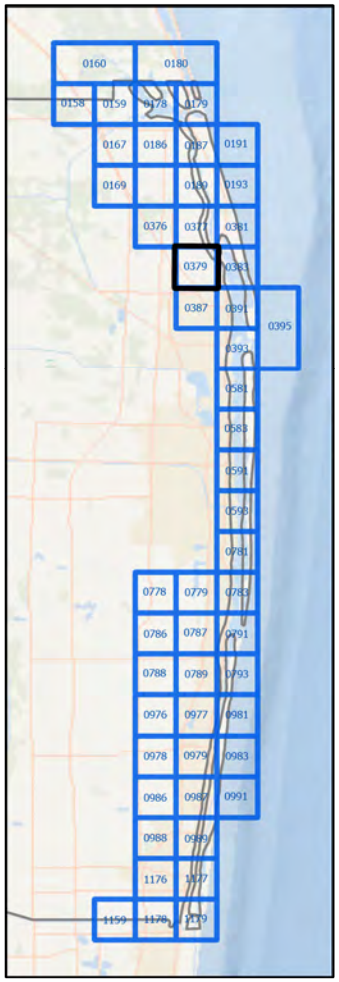
Palm Beach Gardens

Juno Beach

North Palm Beach

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0379



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

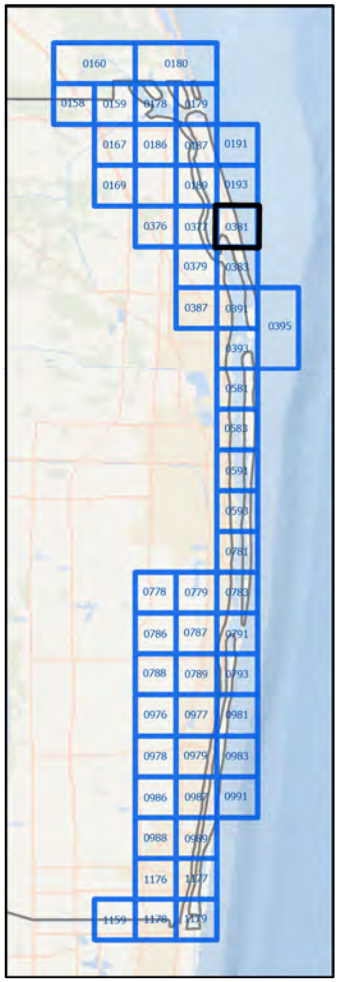
0

Palm Beach Gardens

North Palm Beach

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0381



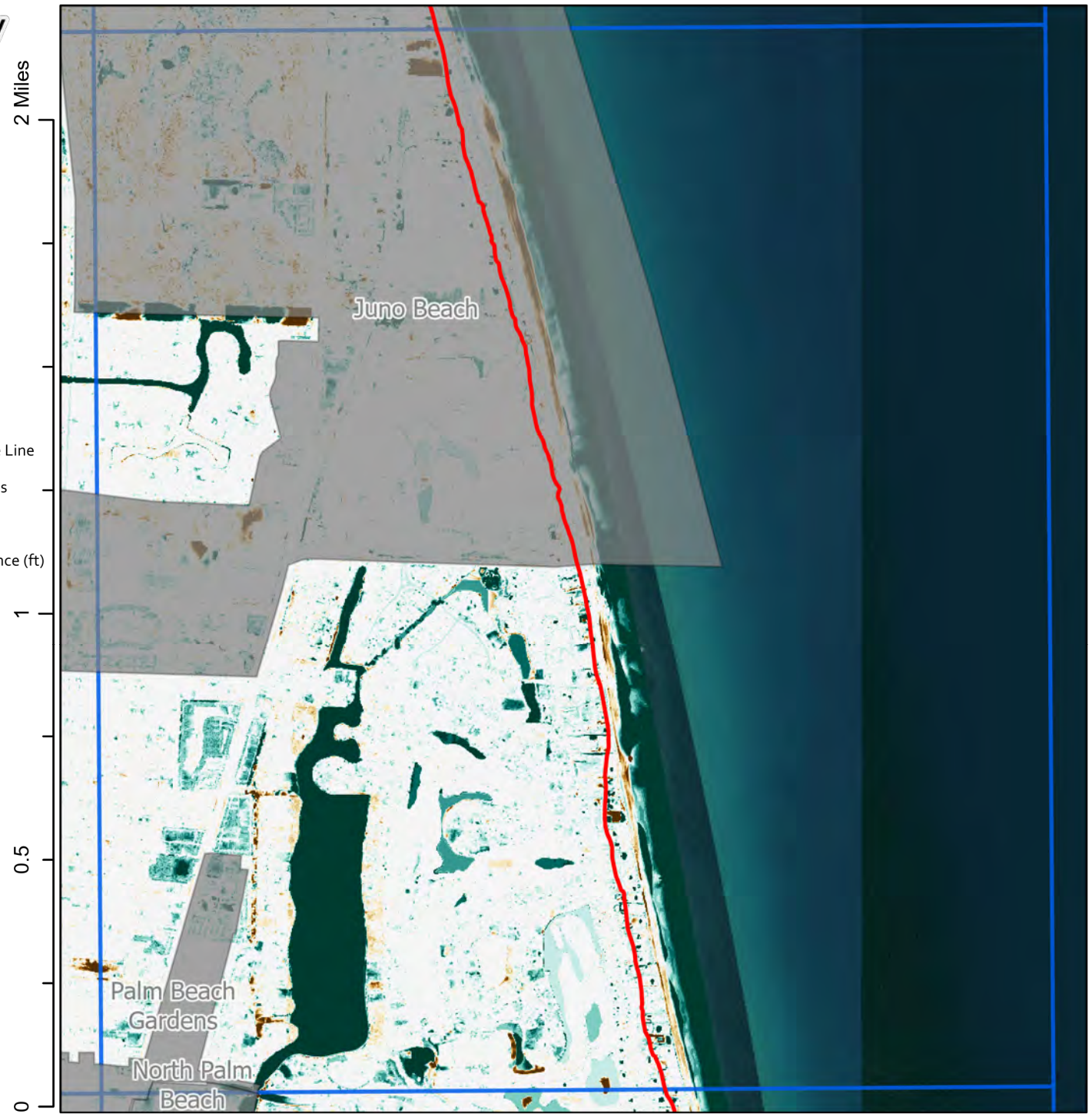
Frontal Dune Line

Municipalities

FIRM Panels

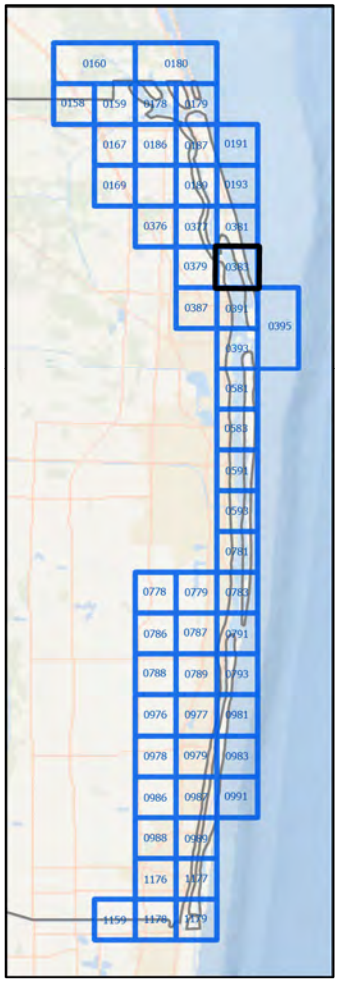
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0383



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

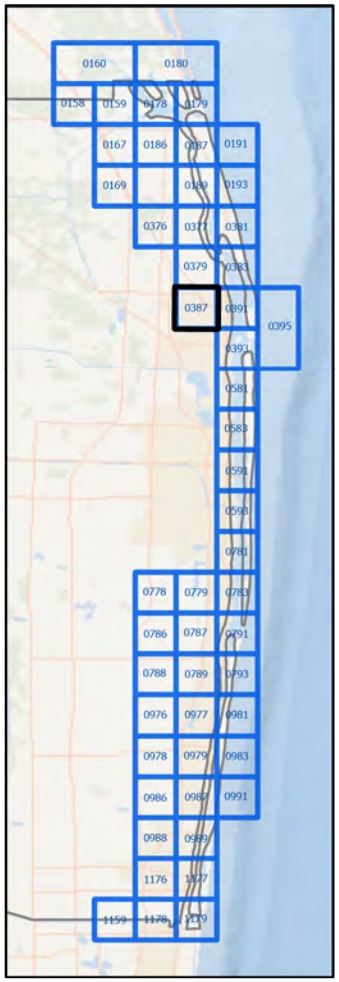
0

Palm Beach Gardens

North Palm Beach

Riviera Beach

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM FIRM Panel: 0387



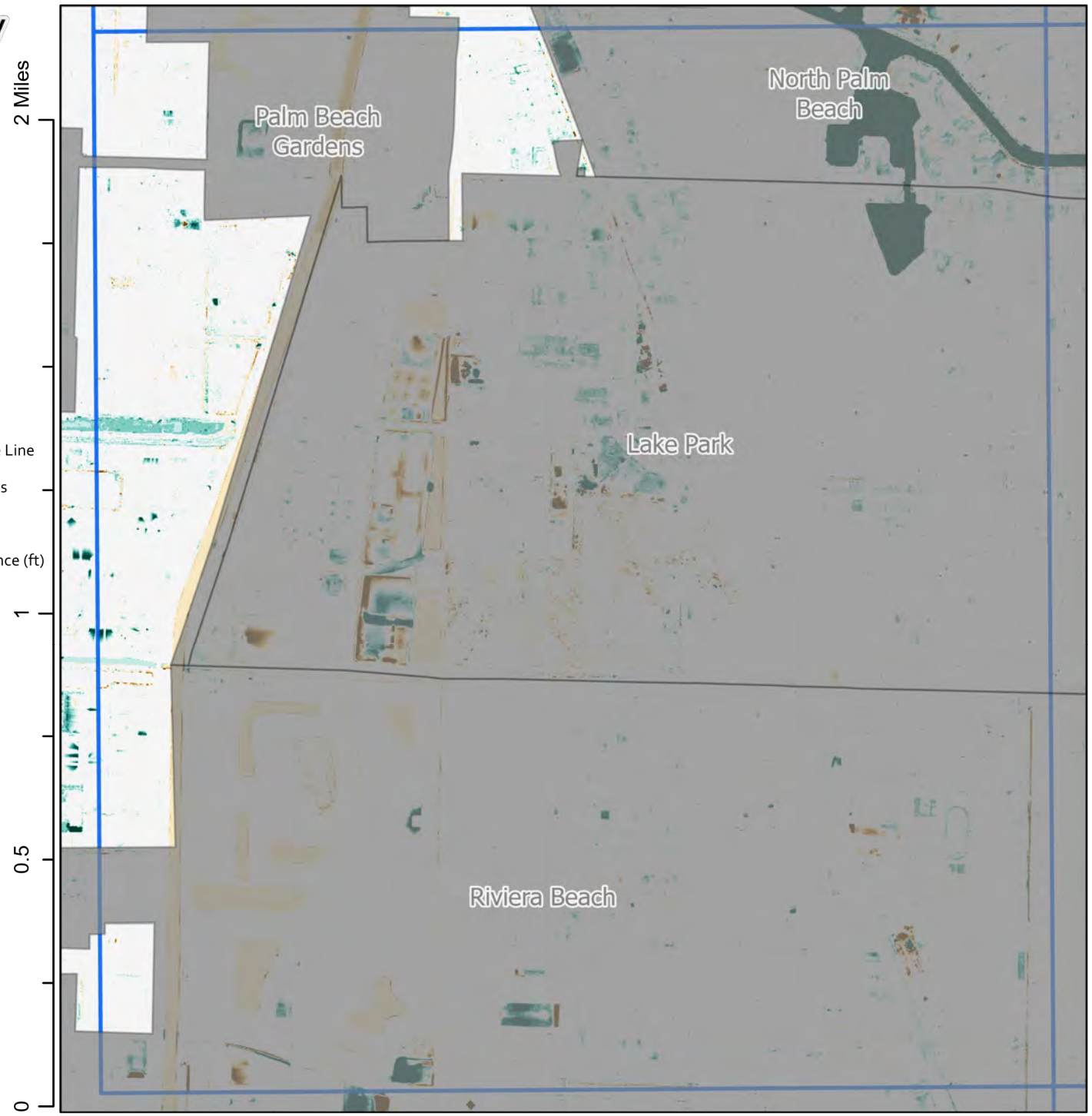
Frontal Dune Line

Municipalities

FIRM Panels

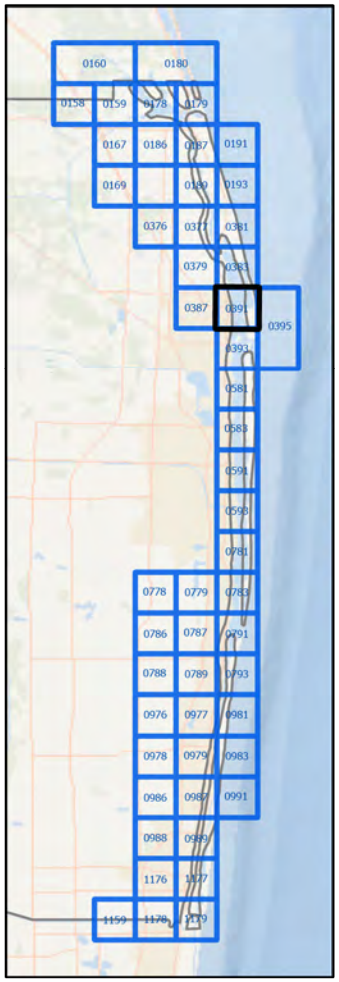
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0391



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

0

North Palm Beach

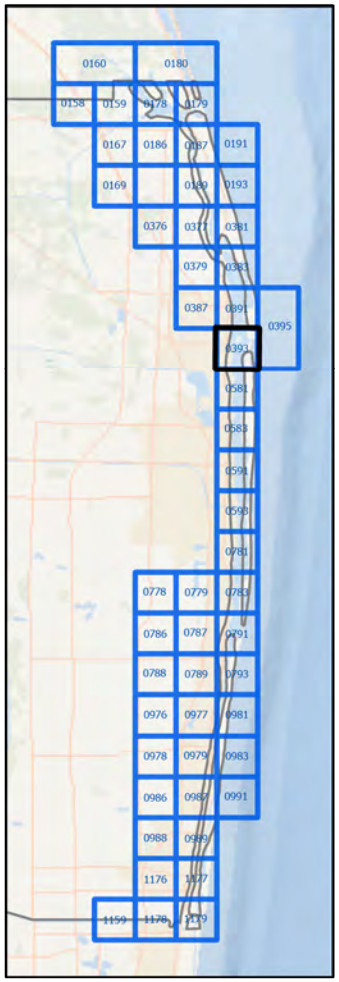
Lake Park

Riviera Beach

Palm Beach Shores

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0393



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

0

Riviera Beach

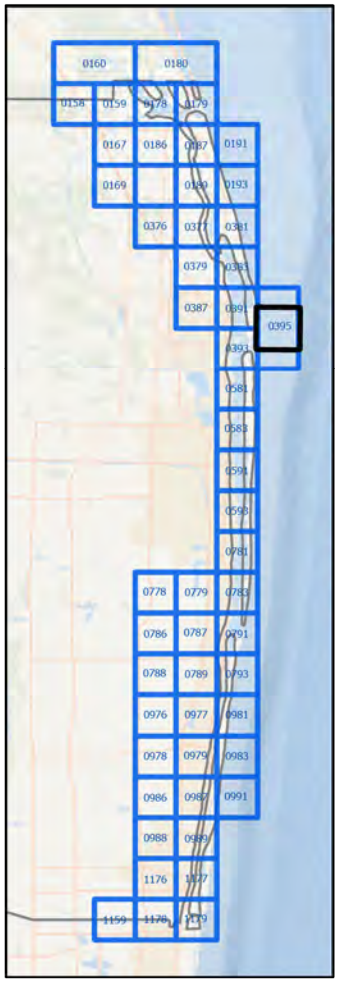
Palm Beach Shores

Palm Beach

West Palm Beach

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0395



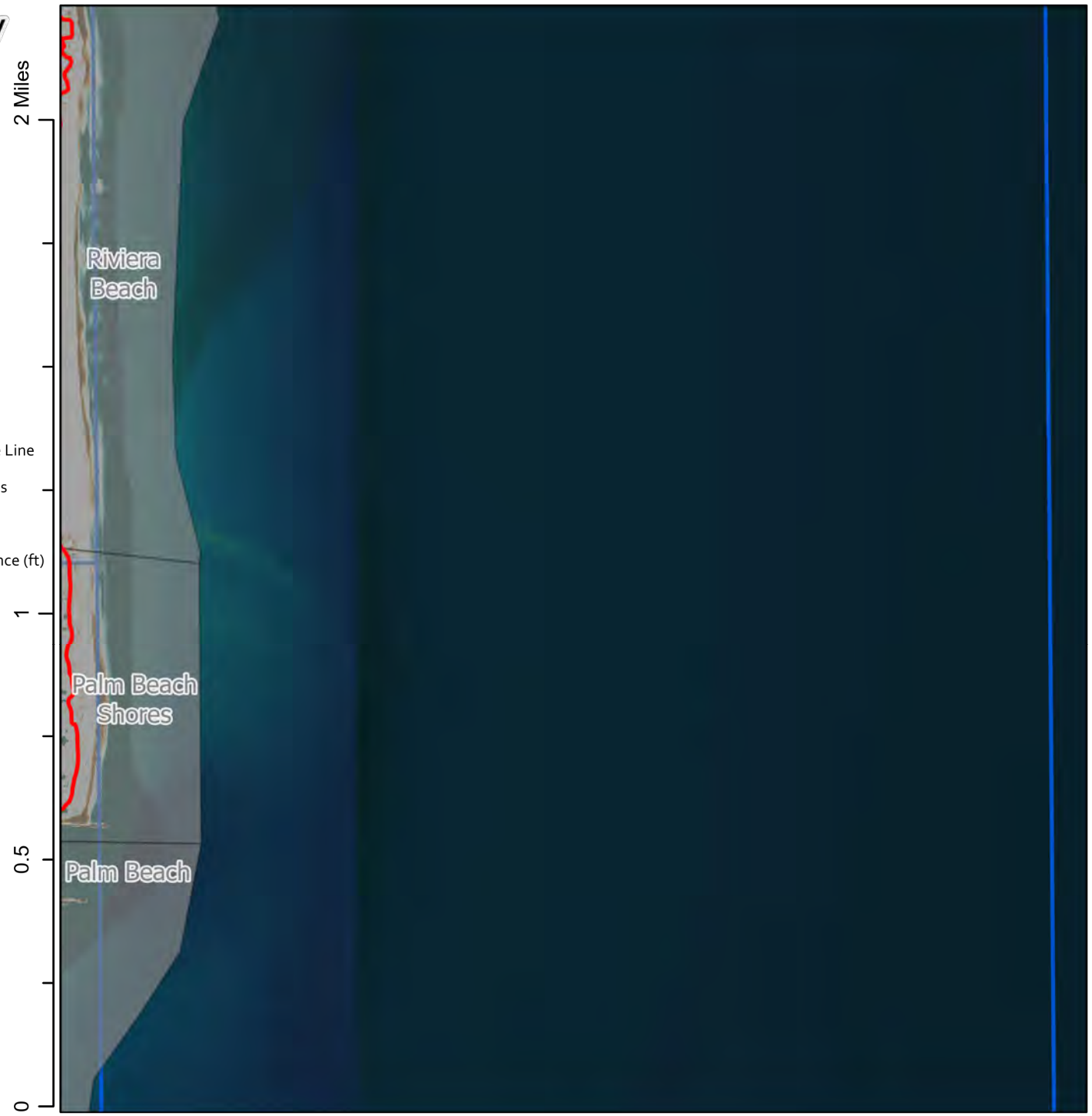
Frontal Dune Line

Municipalities

FIRM Panels

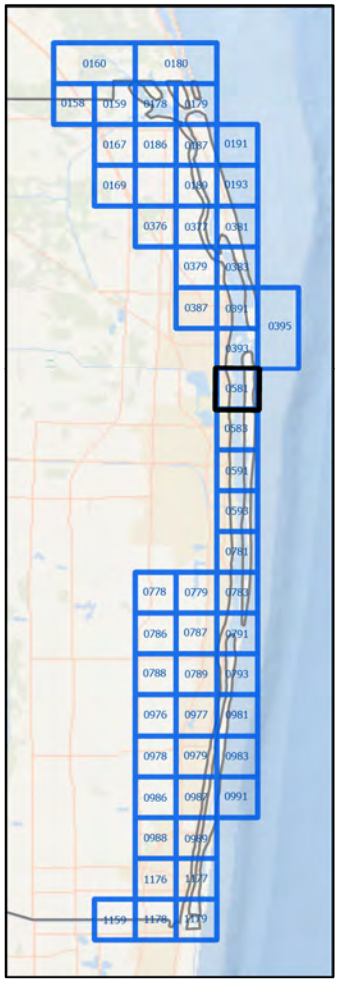
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0581



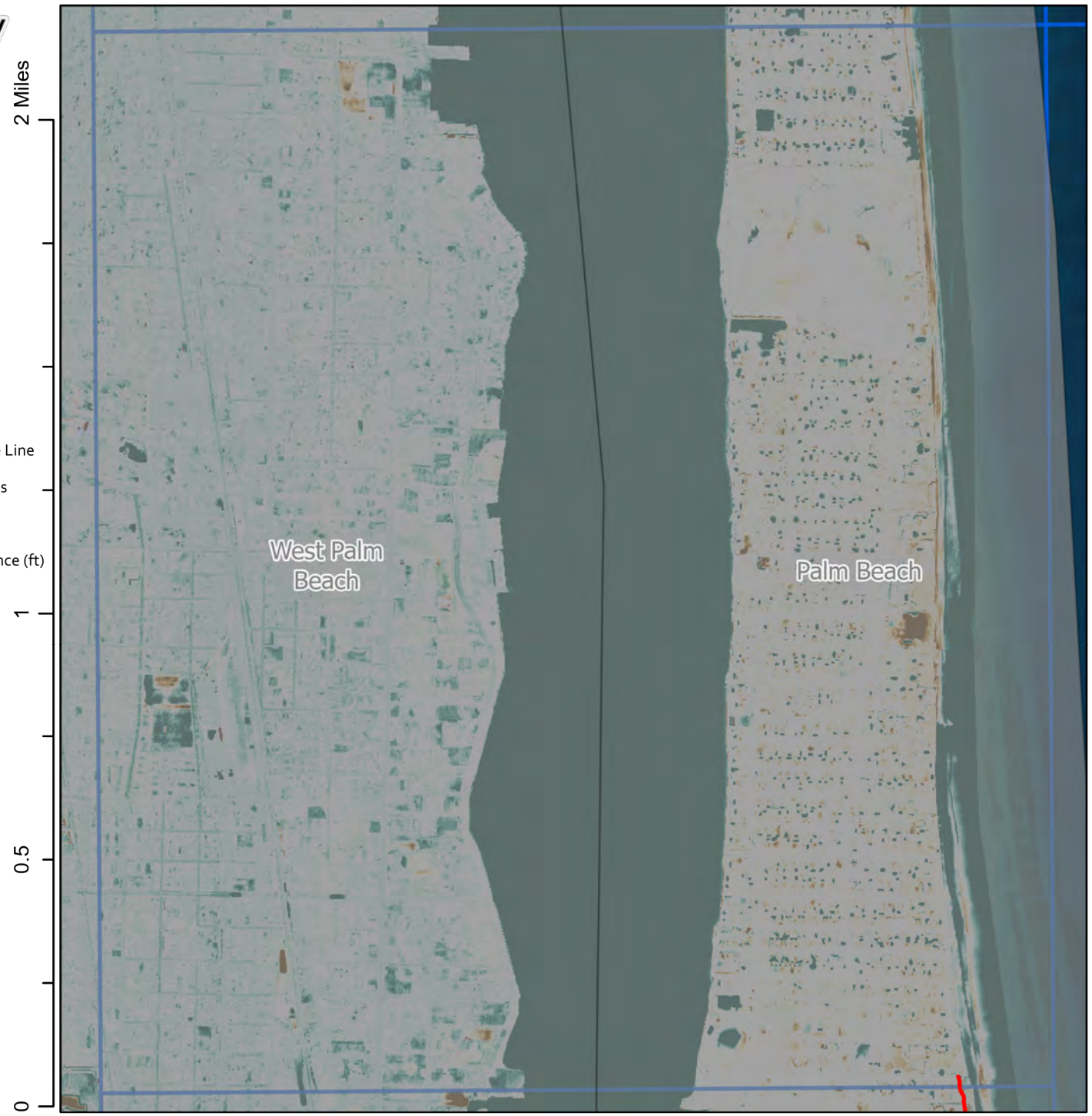
Frontal Dune Line

Municipalities

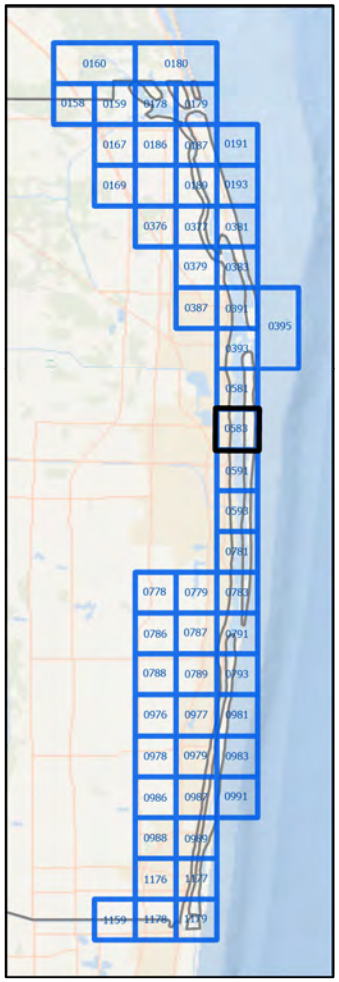
FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM FIRM Panel: 0583



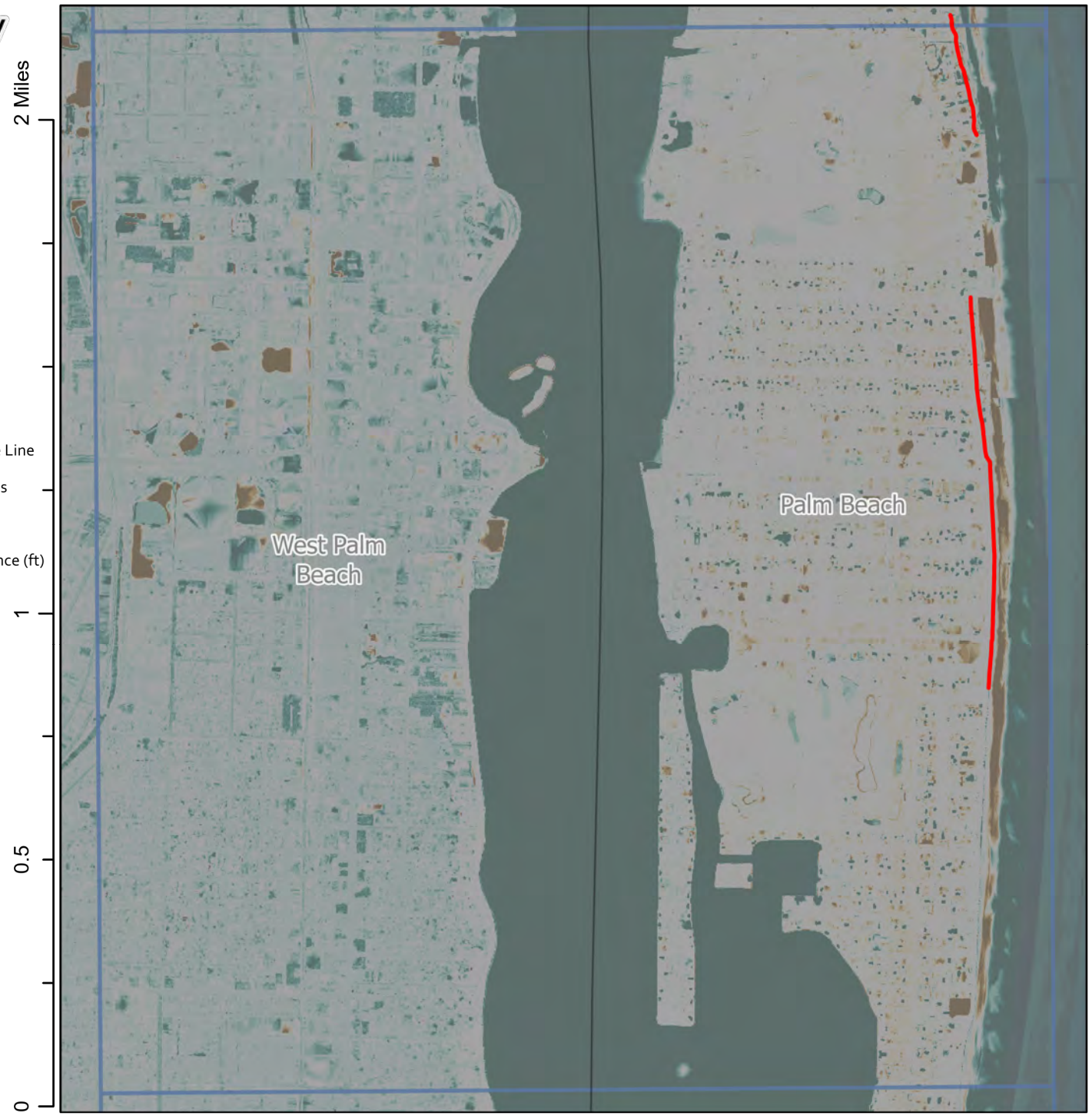
Frontal Dune Line

Municipalities

FIRM Panels

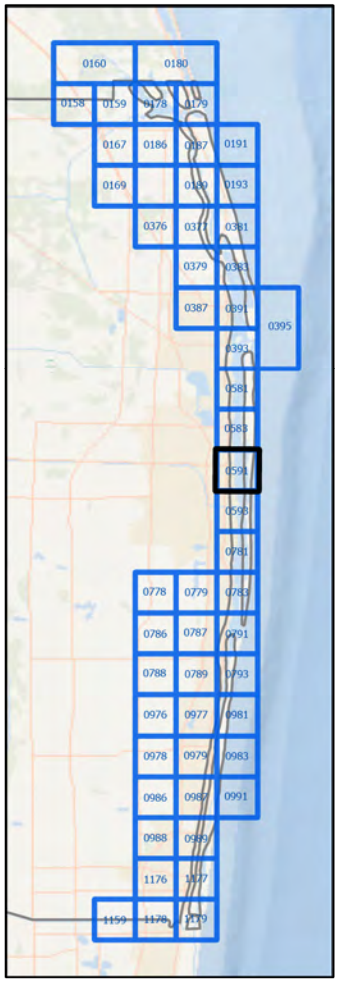
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0591



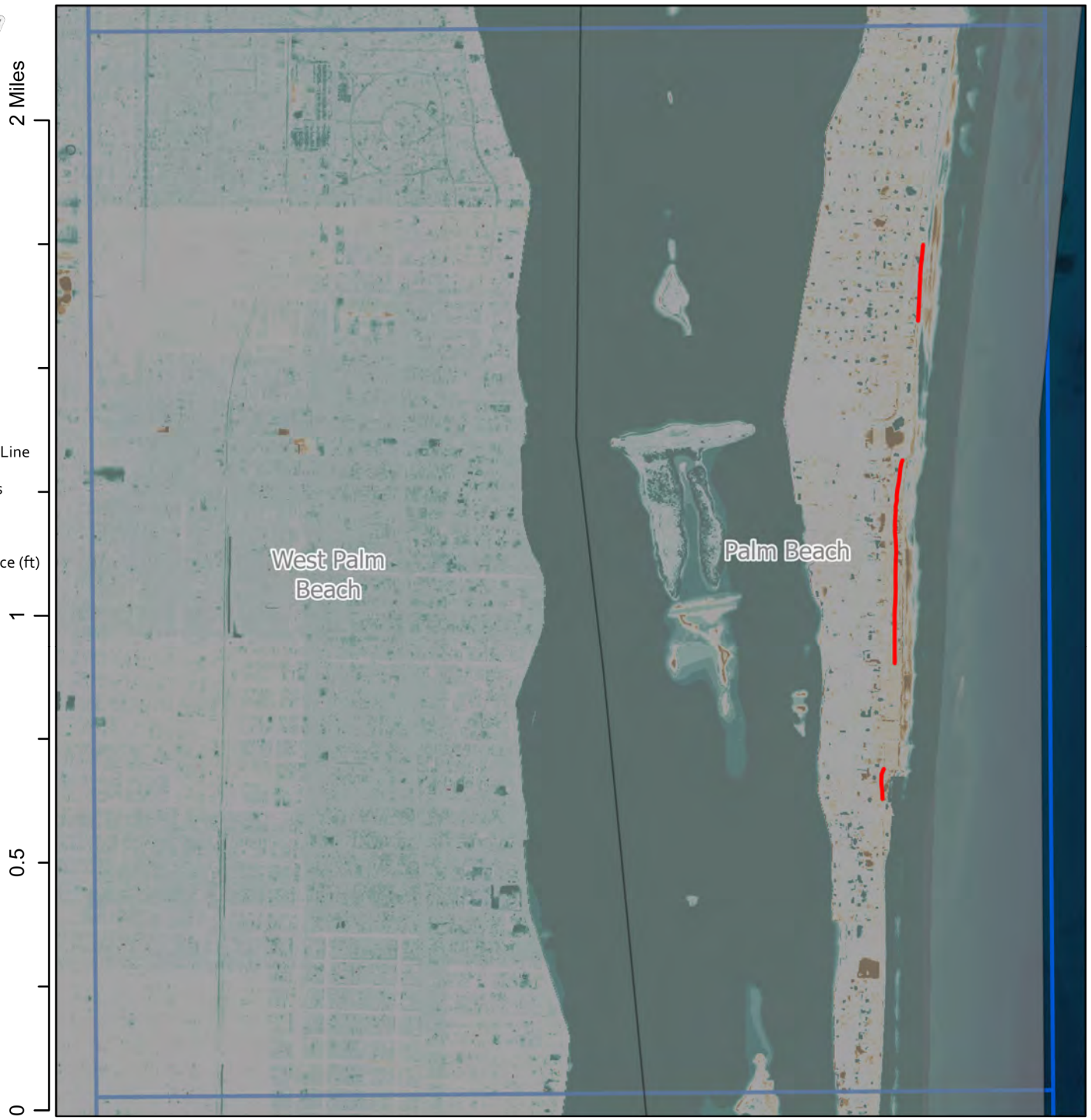
Frontal Dune Line

Municipalities

FIRM Panels

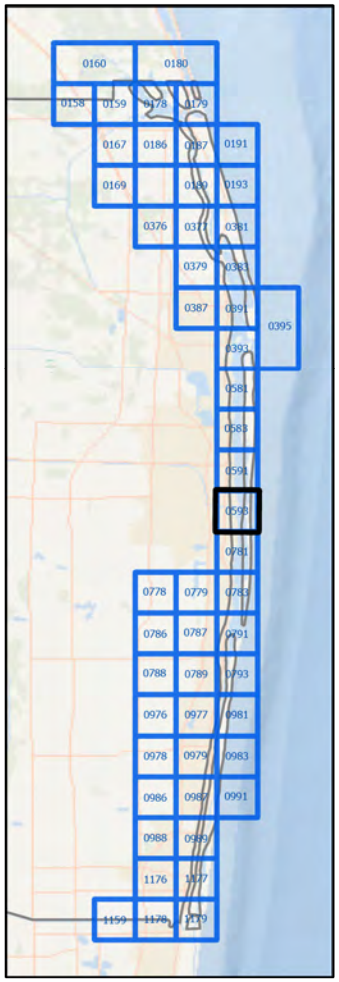
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0593



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

0

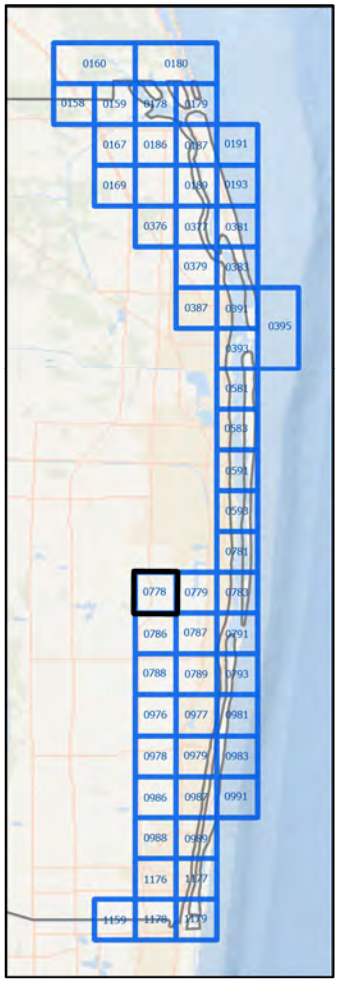
West Palm Beach

Palm Beach

Lake Worth

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

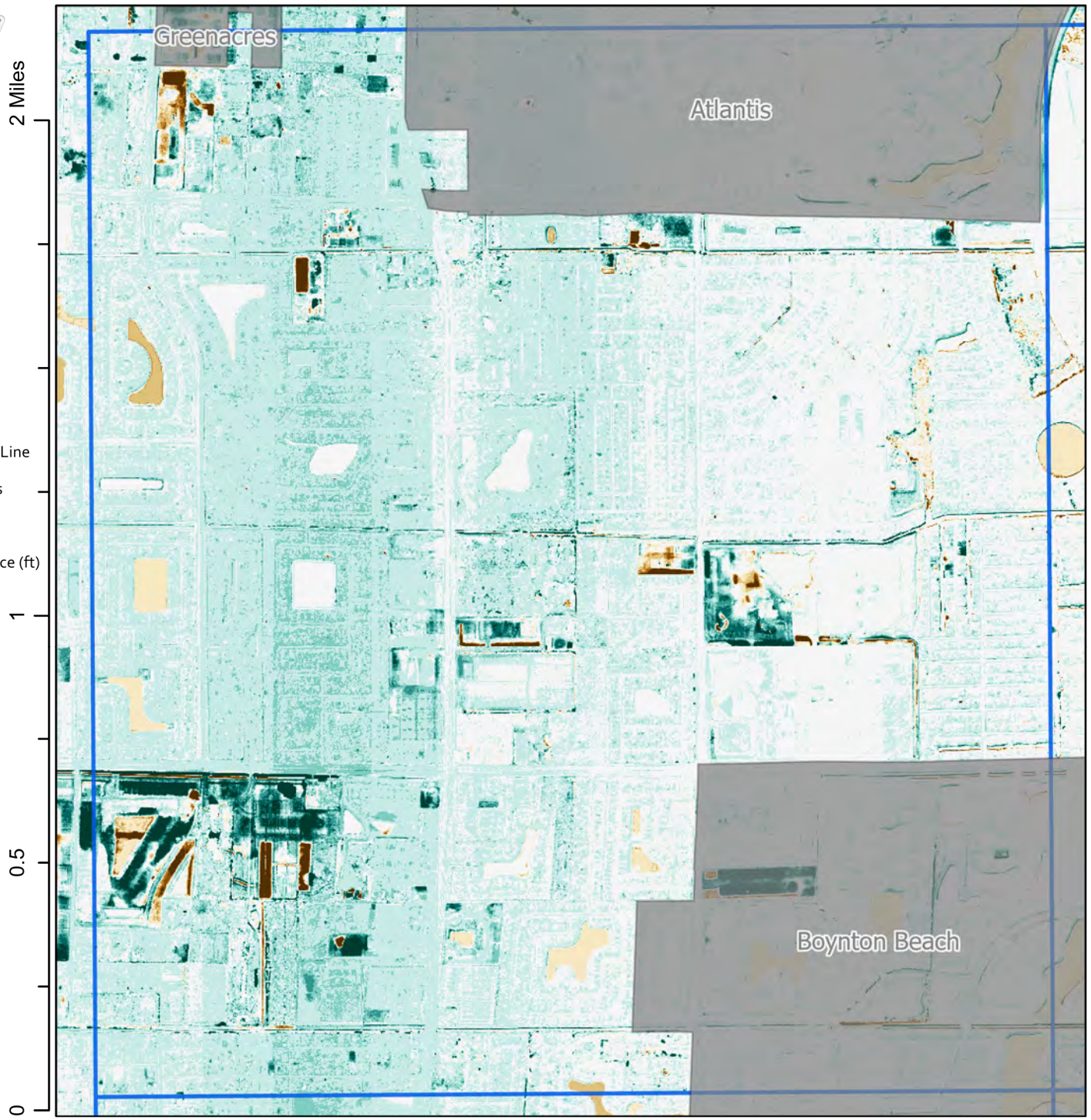
FIRM Panel: 0778



- Frontal Dune Line
- Municipalities
- FIRM Panels

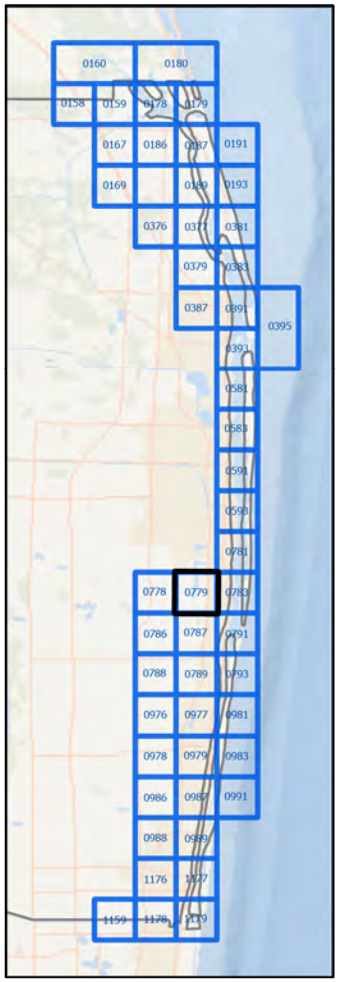
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0779



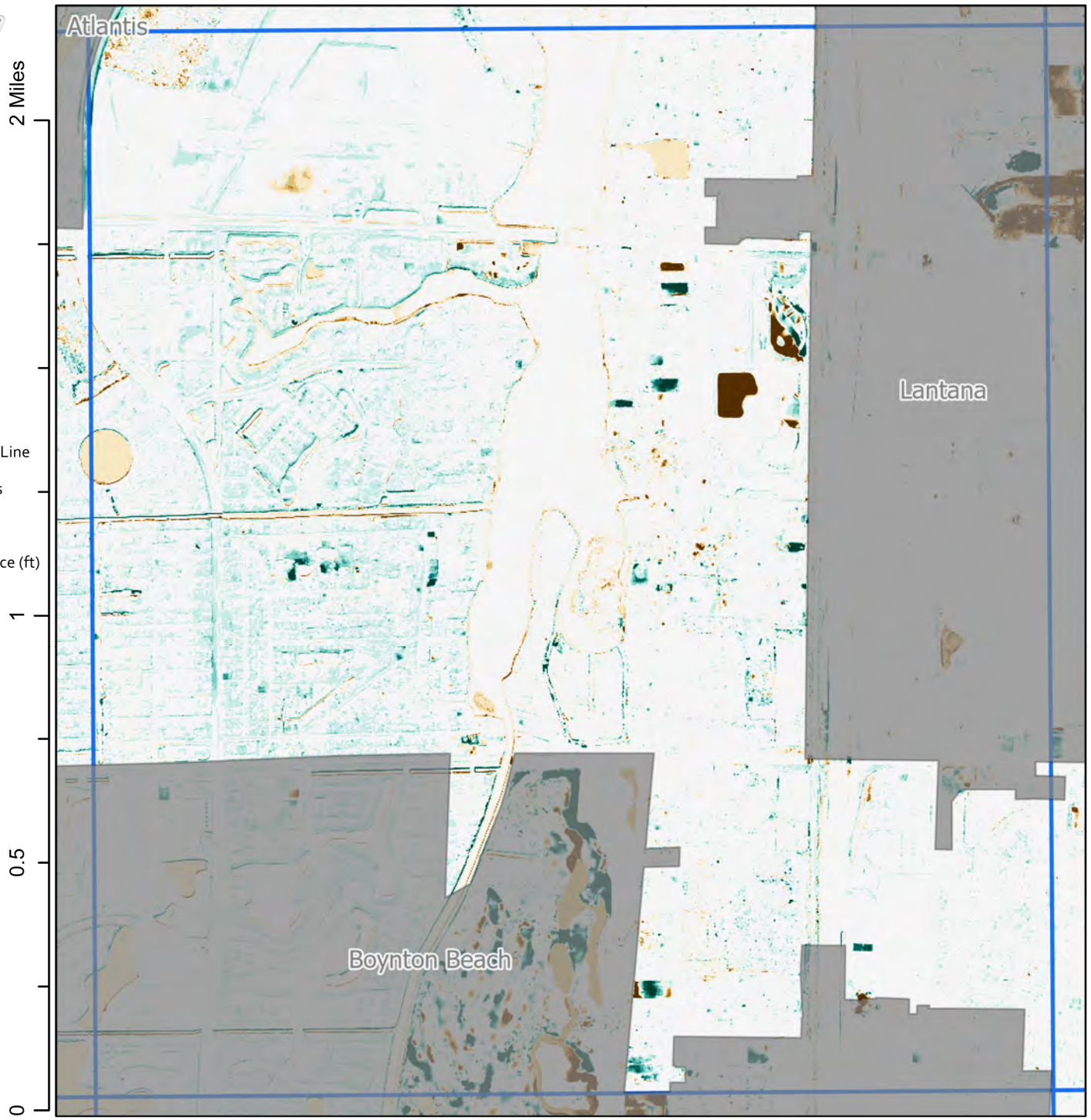
Frontal Dune Line

Municipalities

FIRM Panels

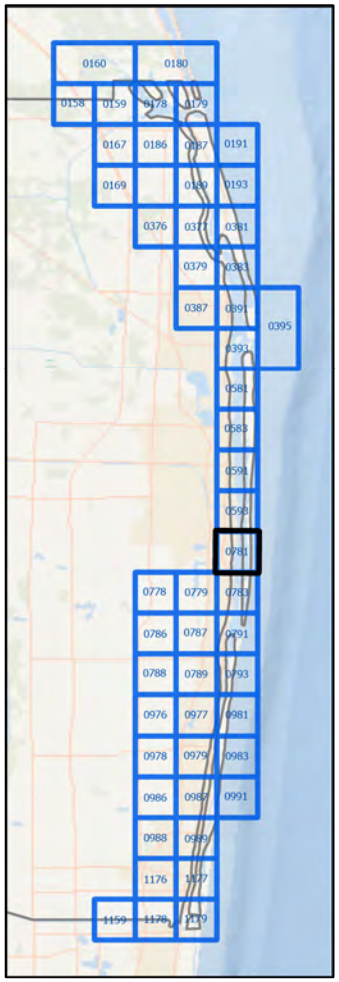
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0781



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

0

Lake Worth

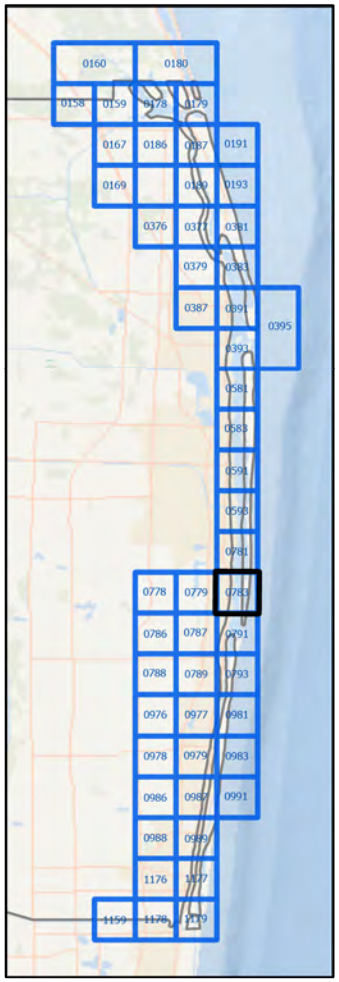
Palm Beach

Lantana

South Palm Beach

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0783



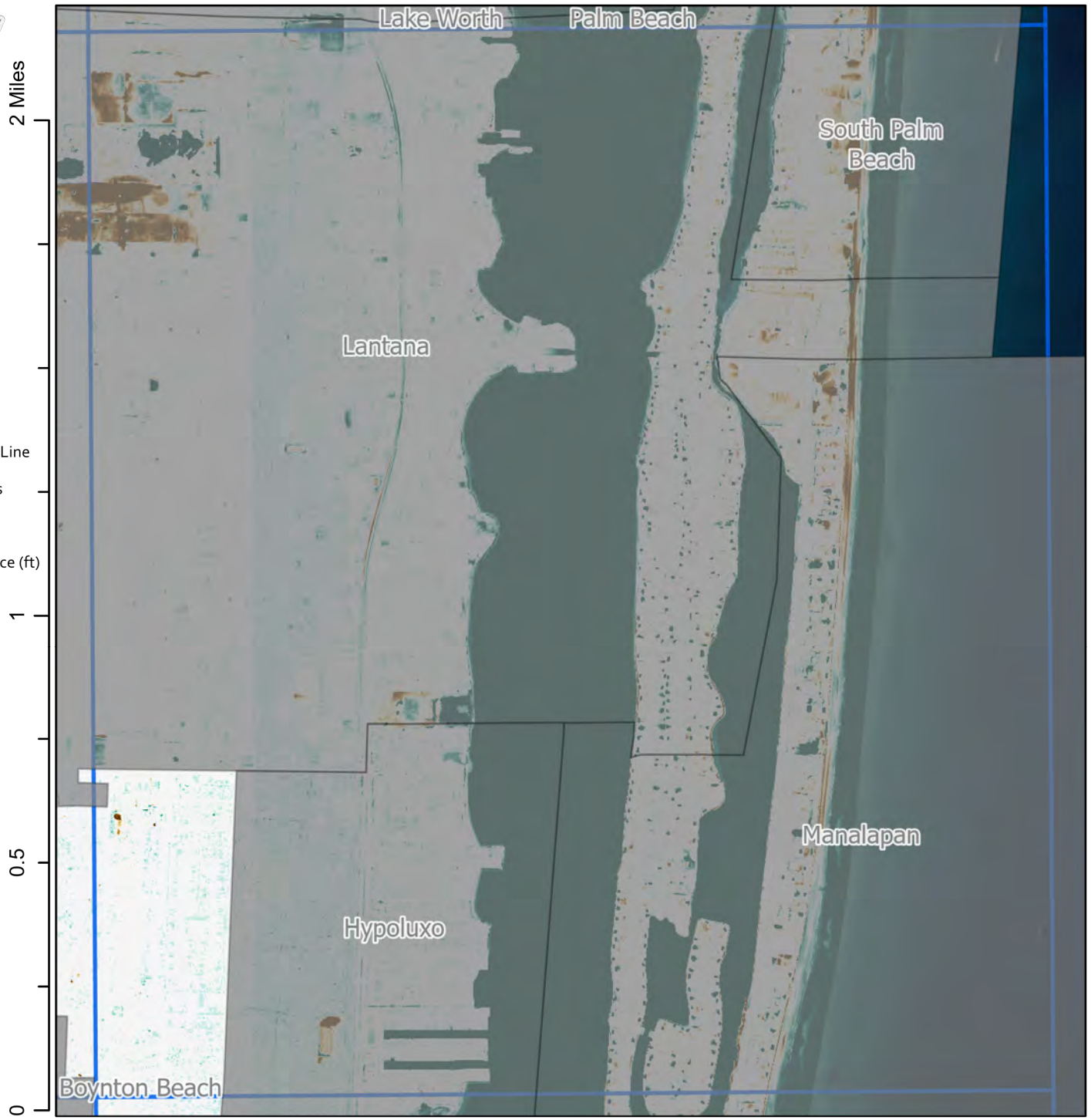
Frontal Dune Line

Municipalities

FIRM Panels

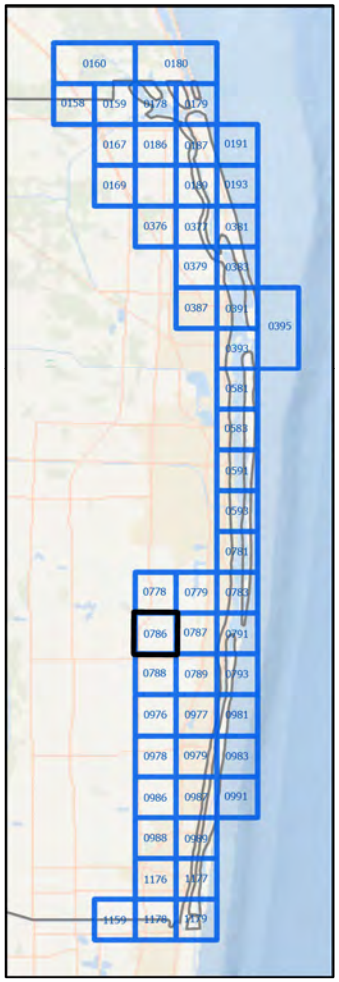
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0786



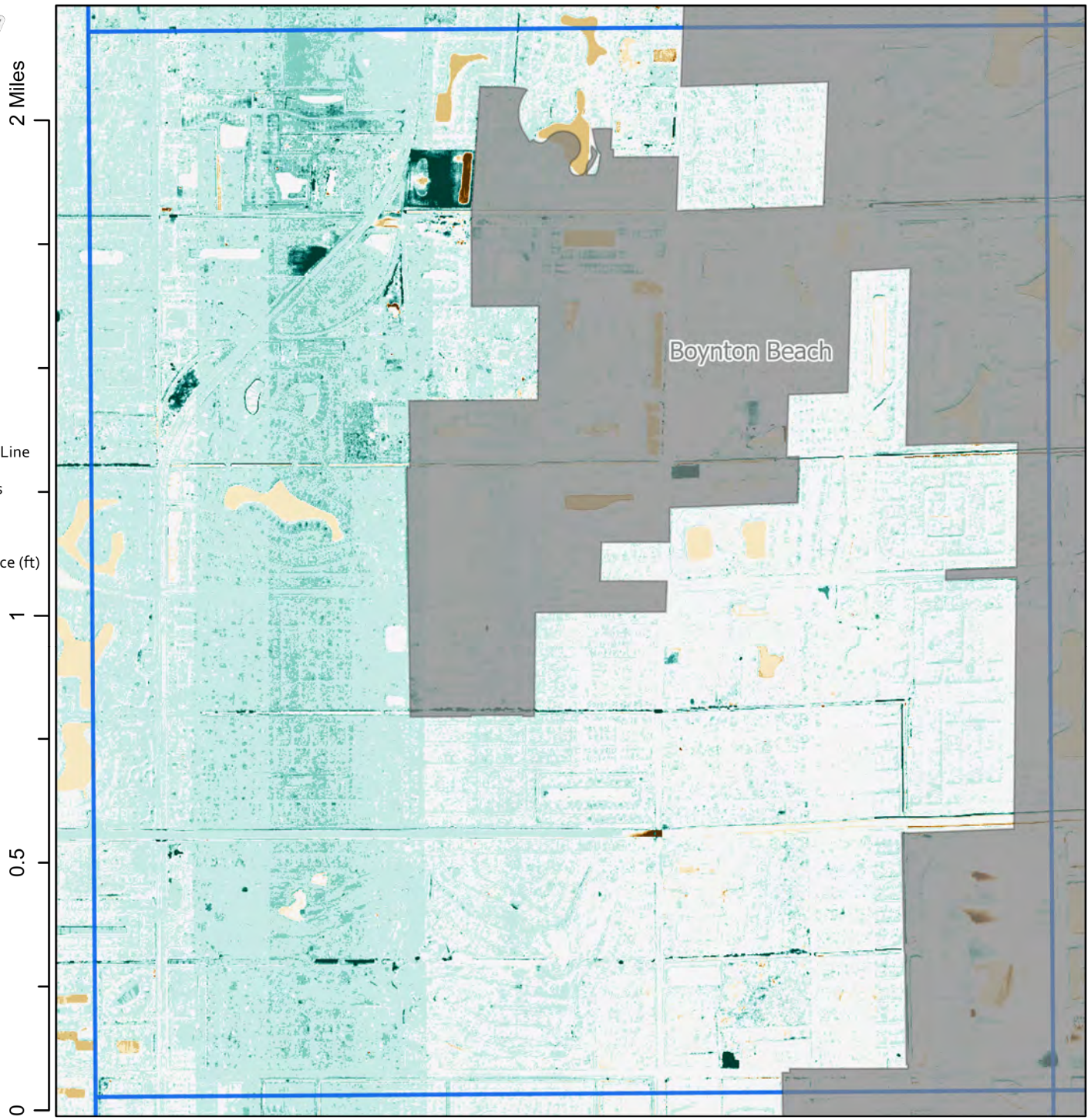
Frontal Dune Line

Municipalities

FIRM Panels

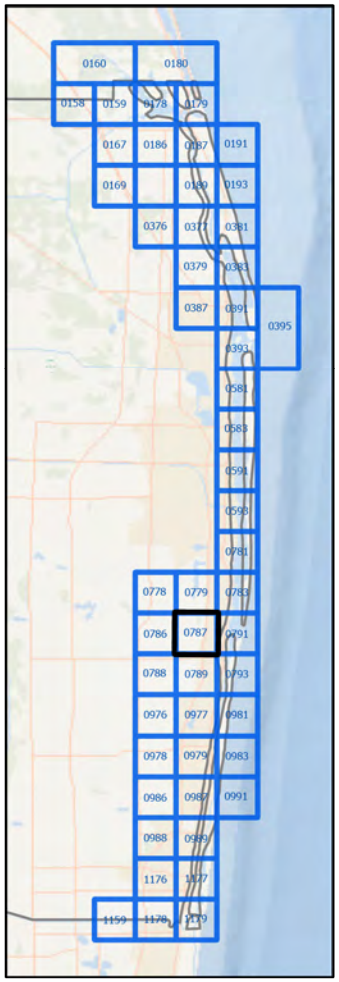
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

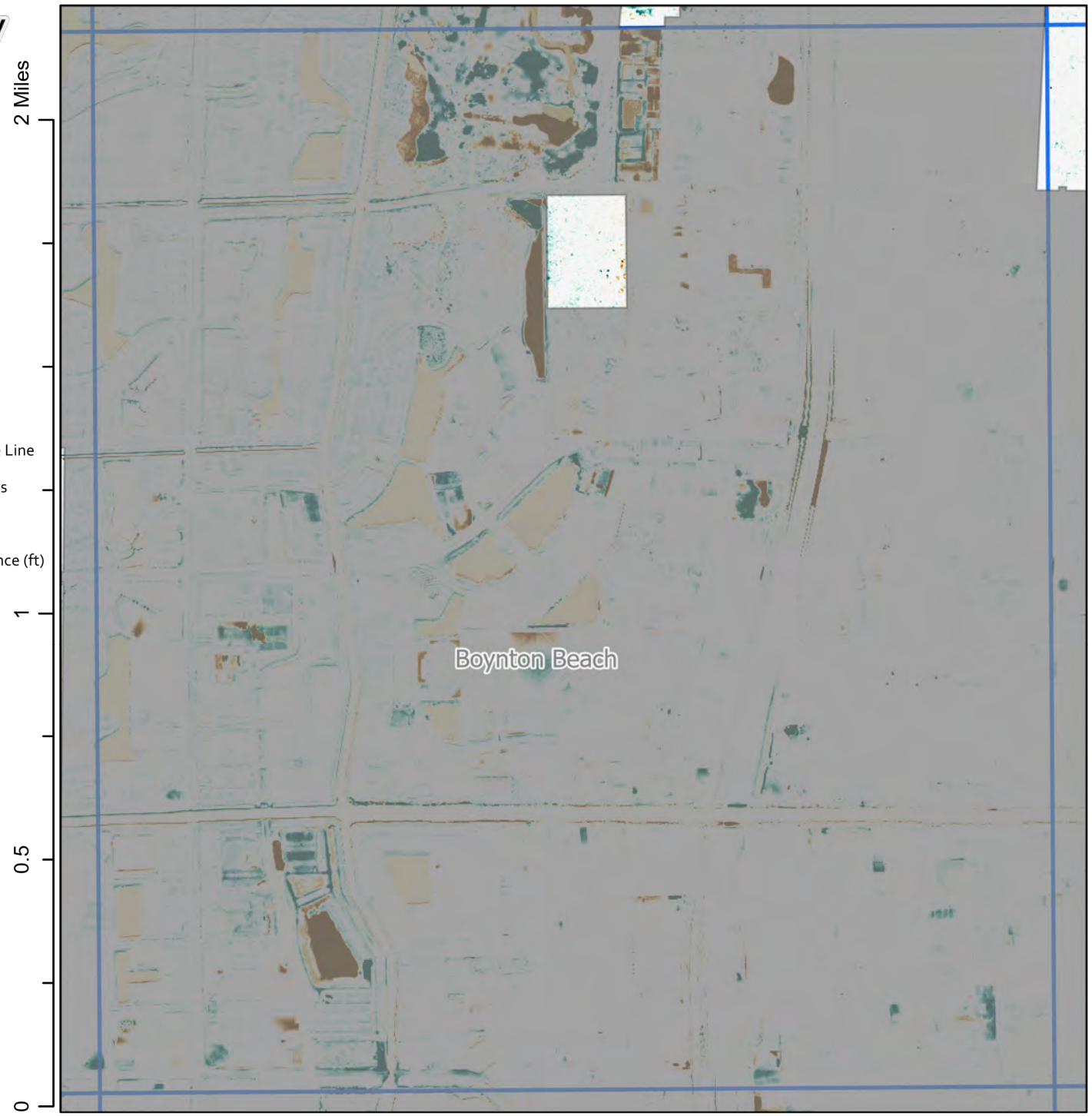
FIRM Panel: 0787



- Frontal Dune Line
- Municipalities
- FIRM Panels

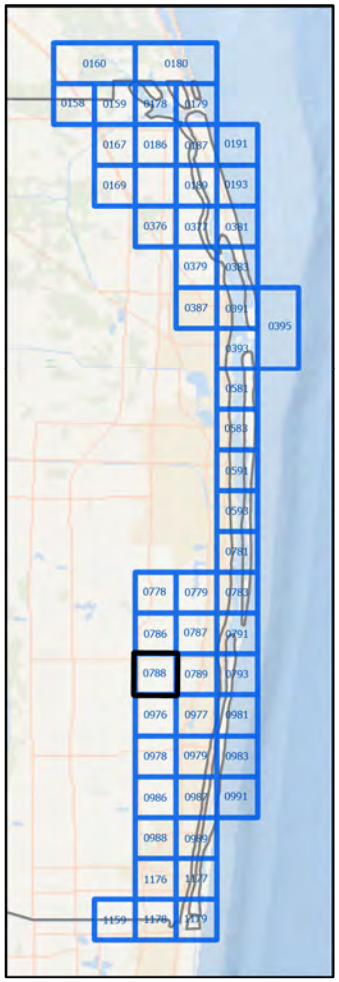
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0788



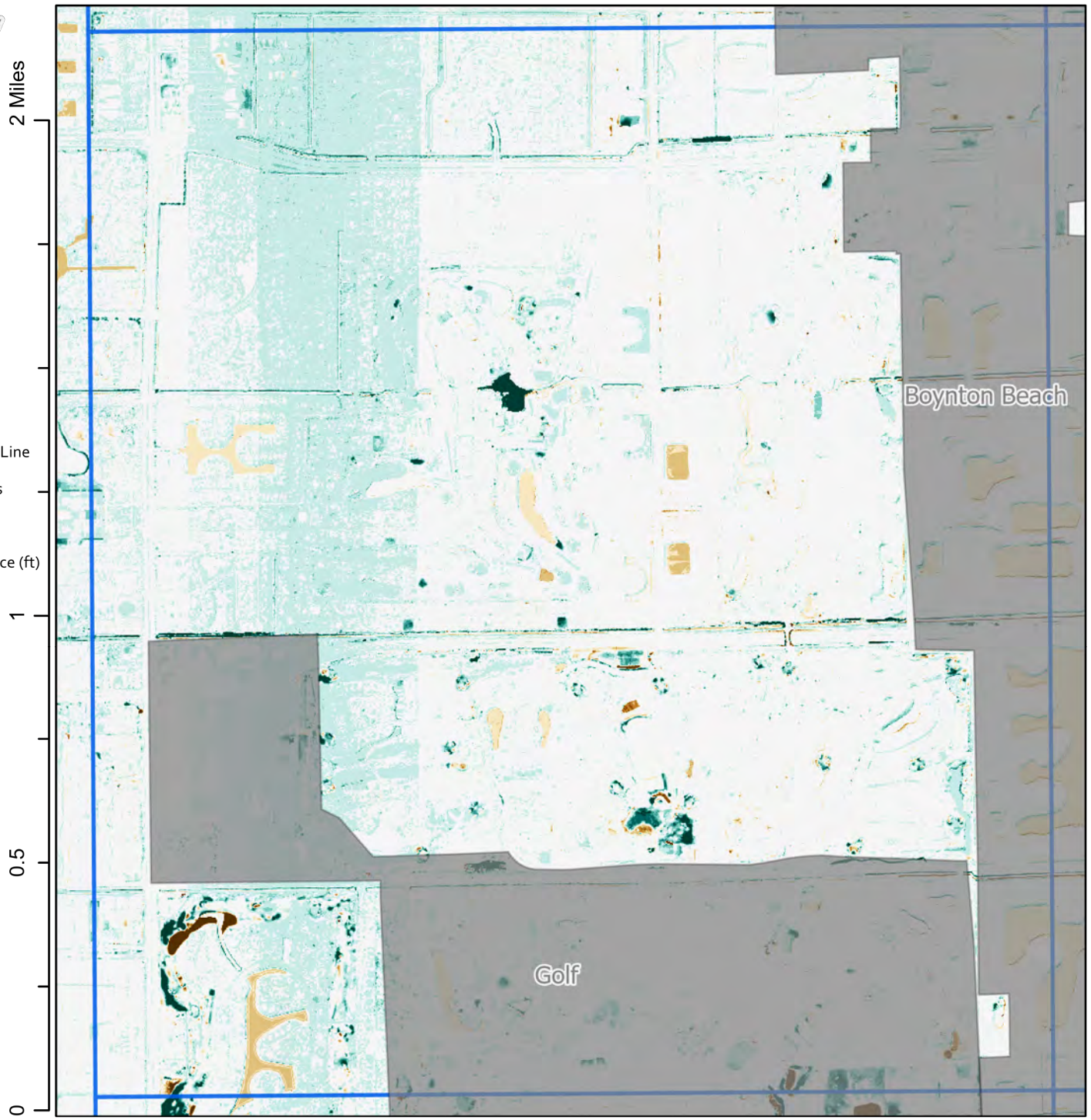
Frontal Dune Line

Municipalities

FIRM Panels

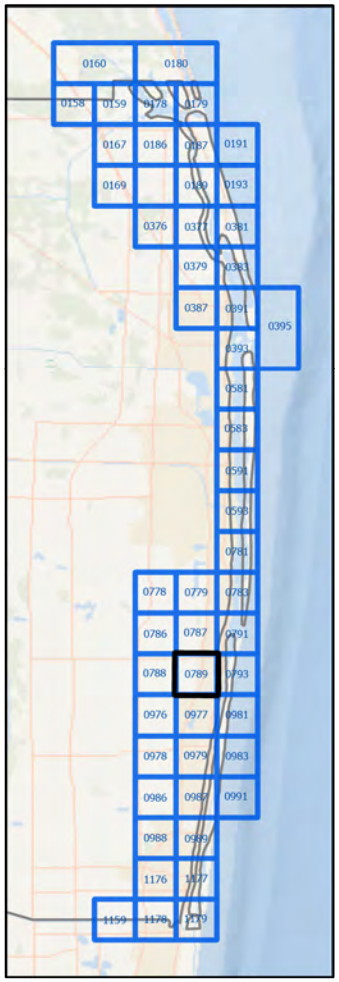
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0789



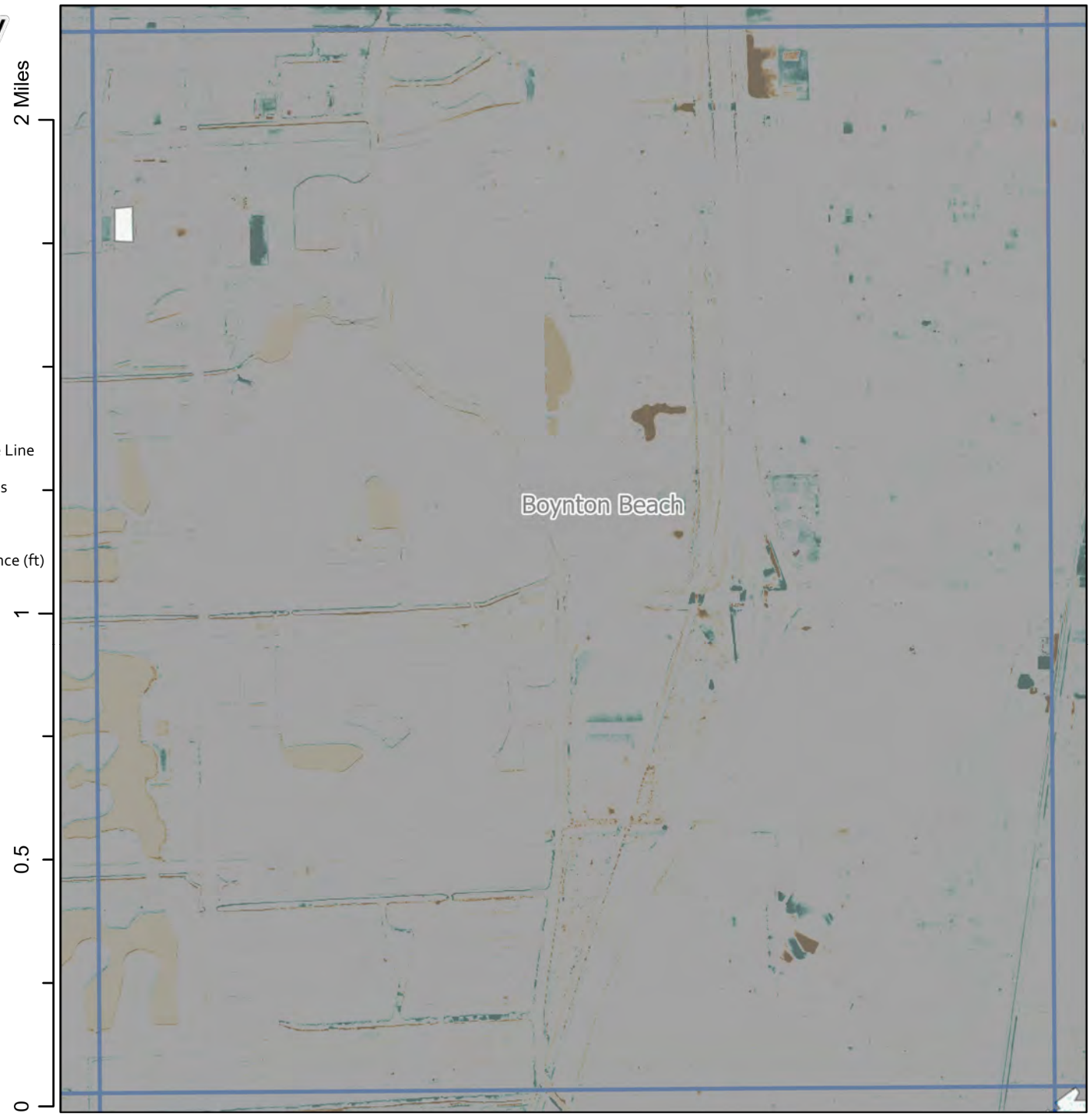
Frontal Dune Line

Municipalities

FIRM Panels

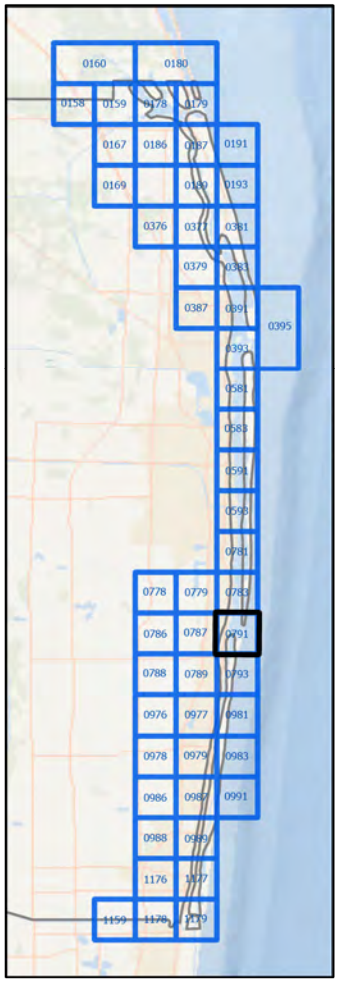
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0791



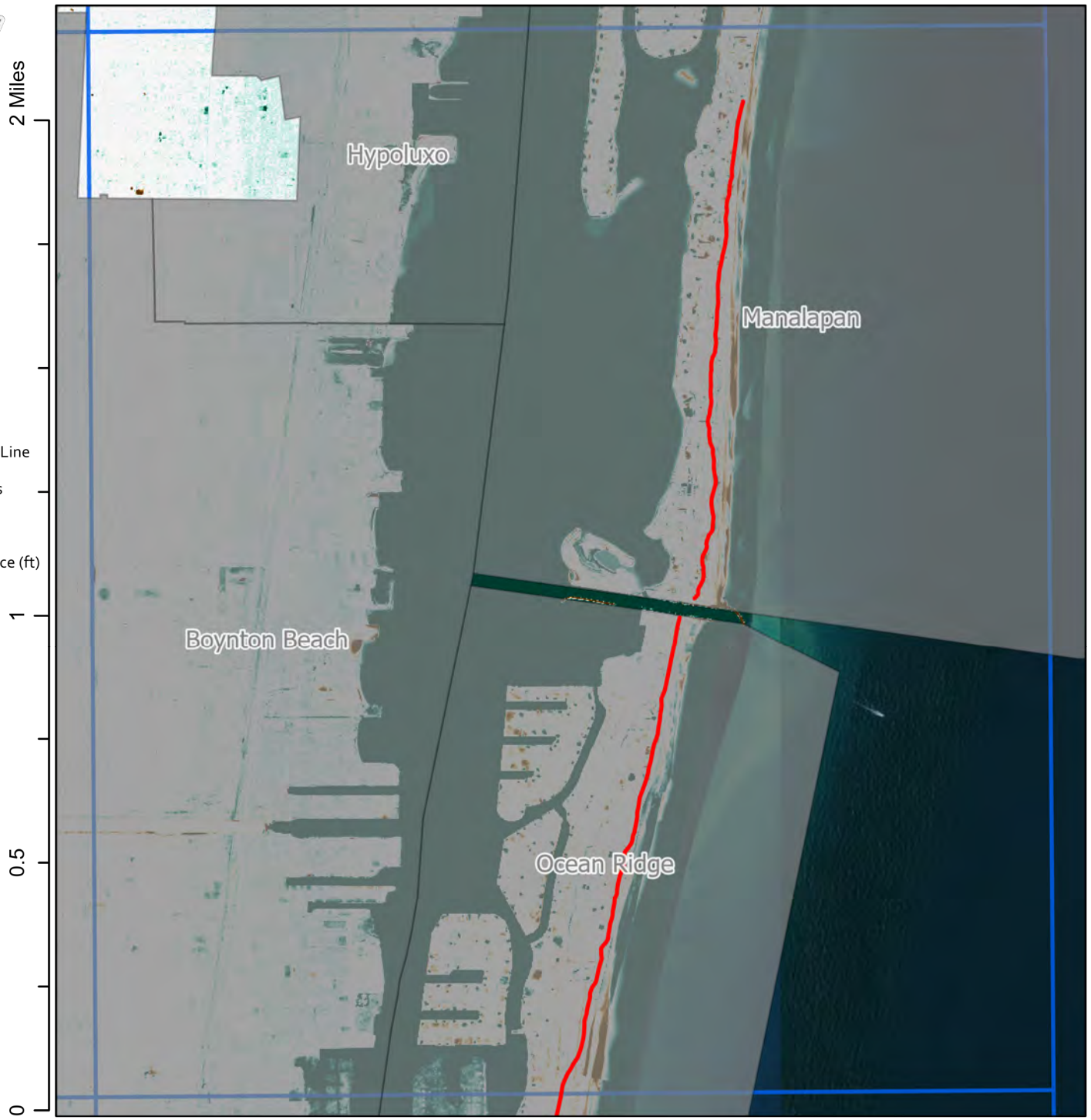
Frontal Dune Line

Municipalities

FIRM Panels

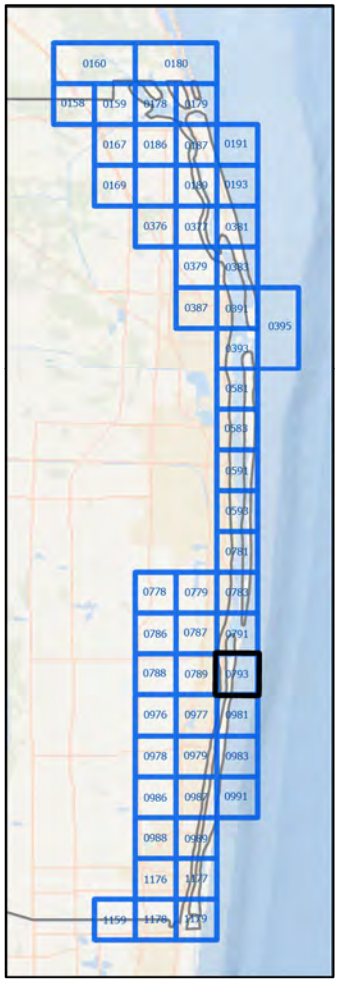
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0793



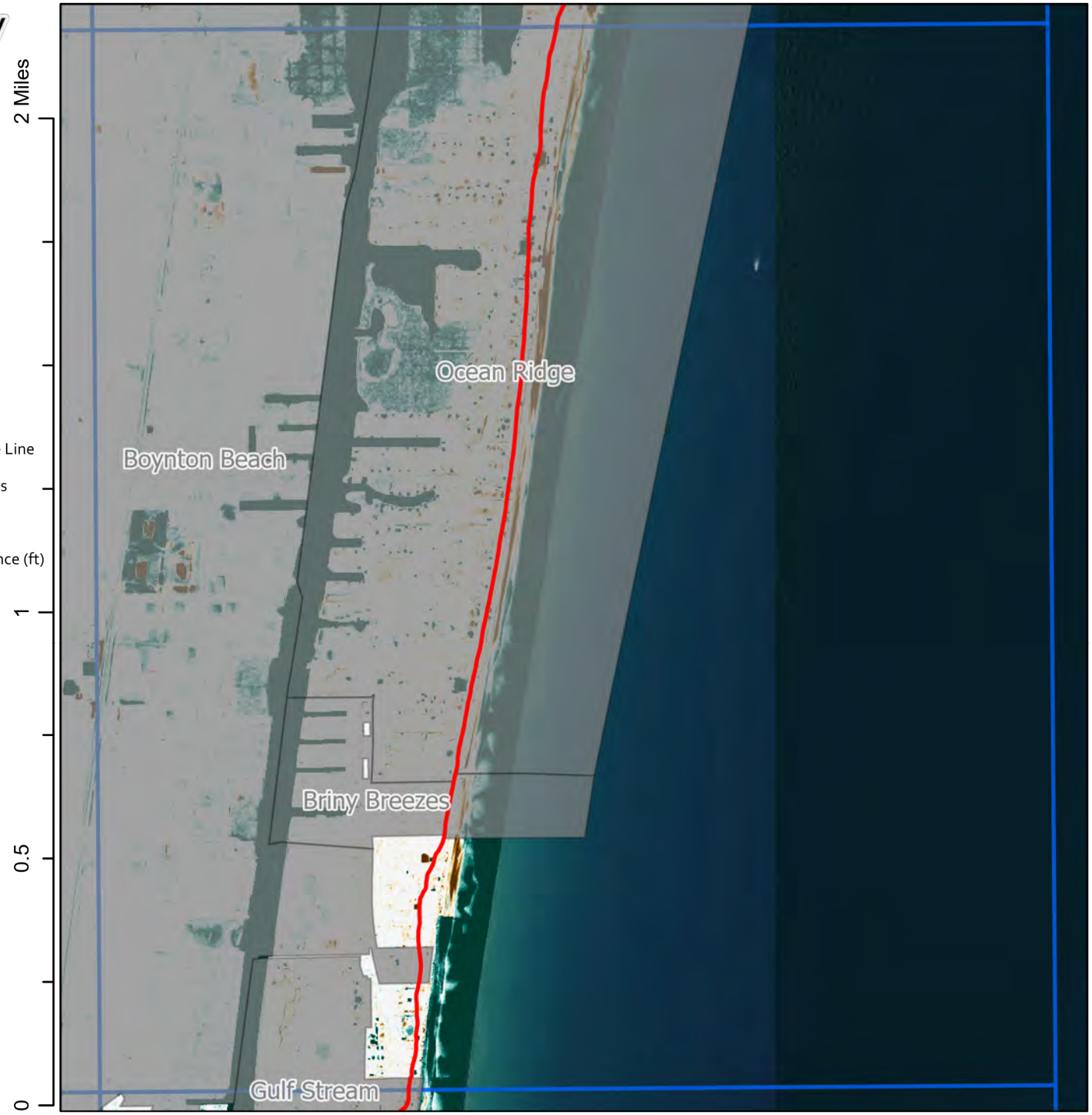
Frontal Dune Line

Municipalities

FIRM Panels

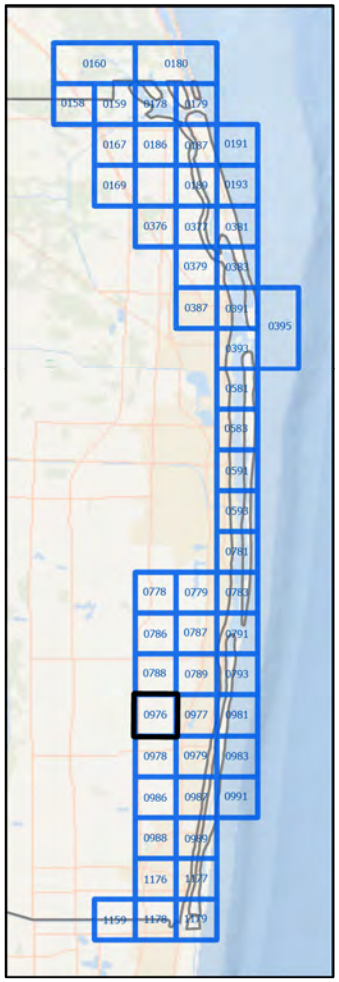
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

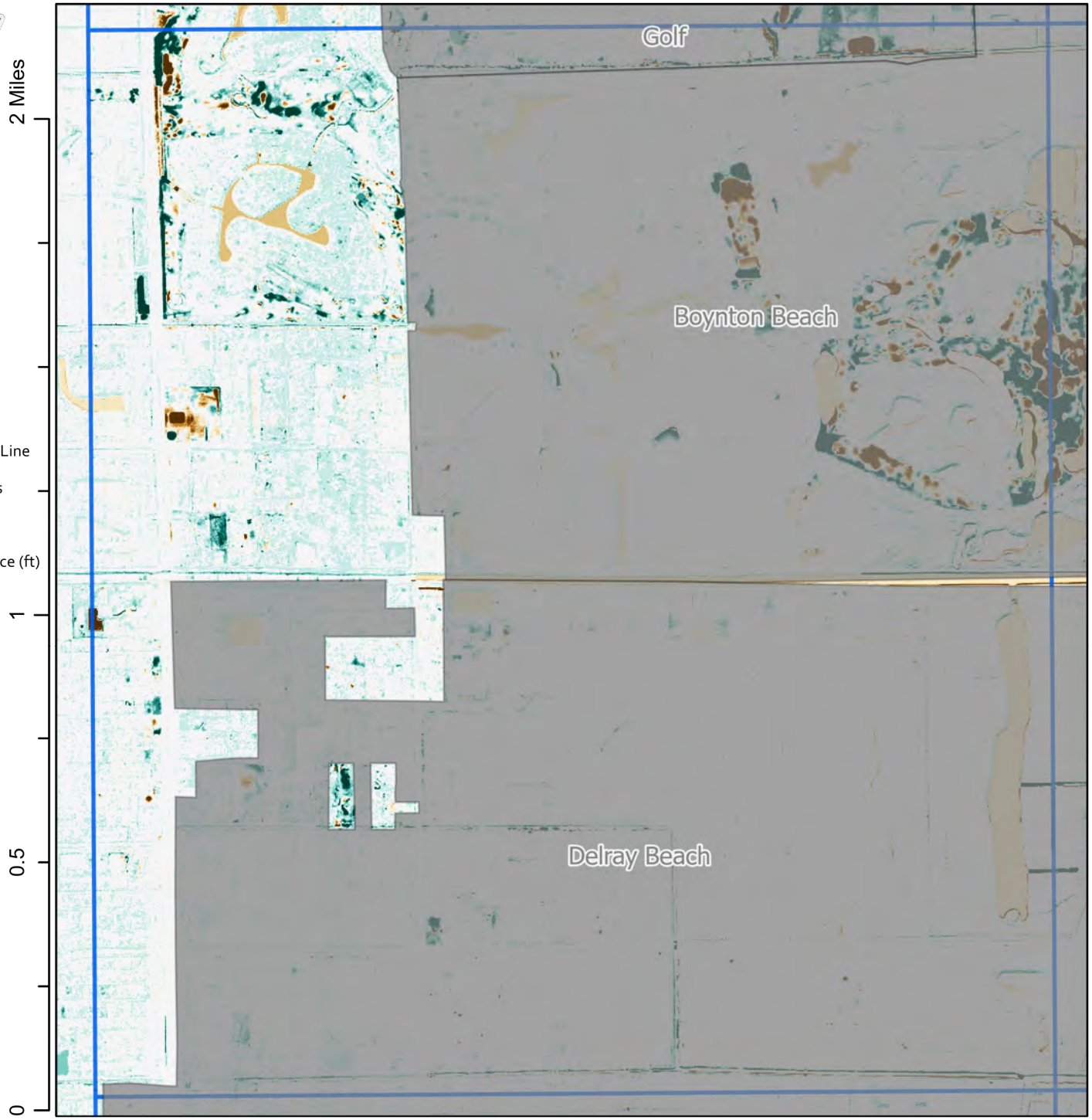
FIRM Panel: 0976



- Frontal Dune Line
- Municipalities
- FIRM Panels

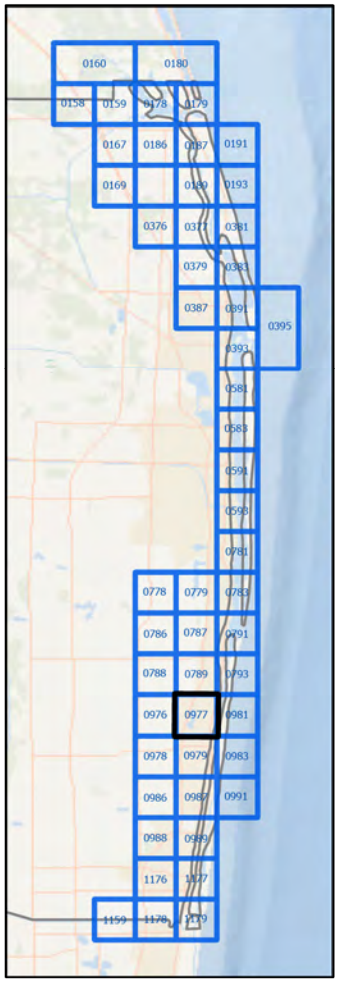
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0977



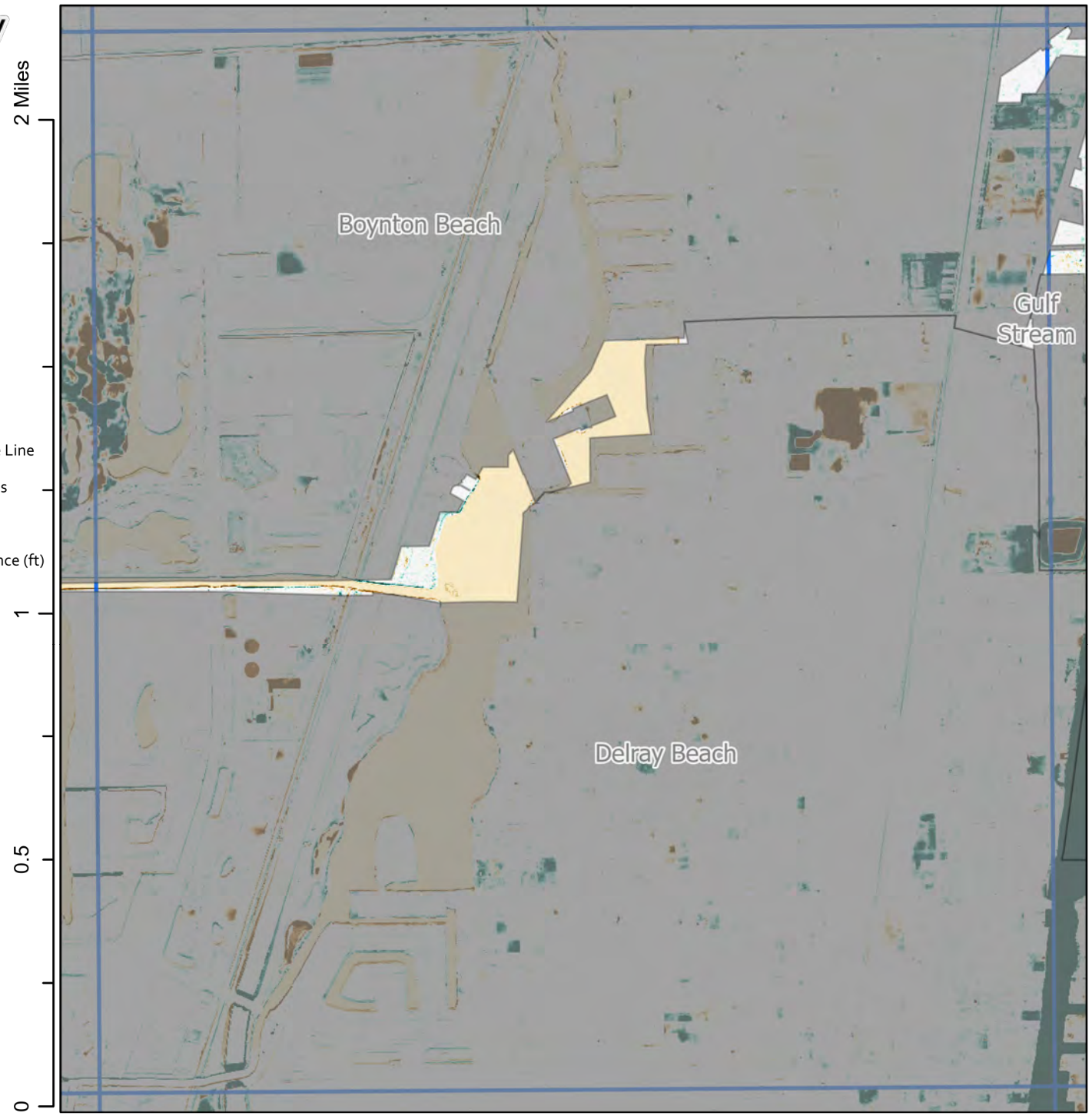
Frontal Dune Line

Municipalities

FIRM Panels

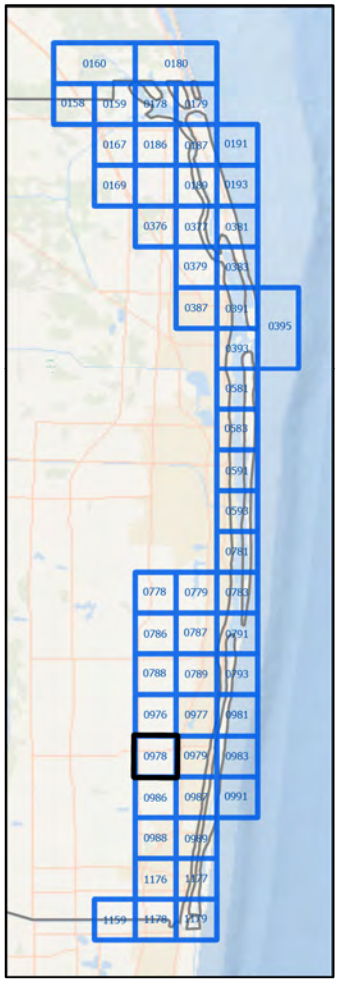
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0978



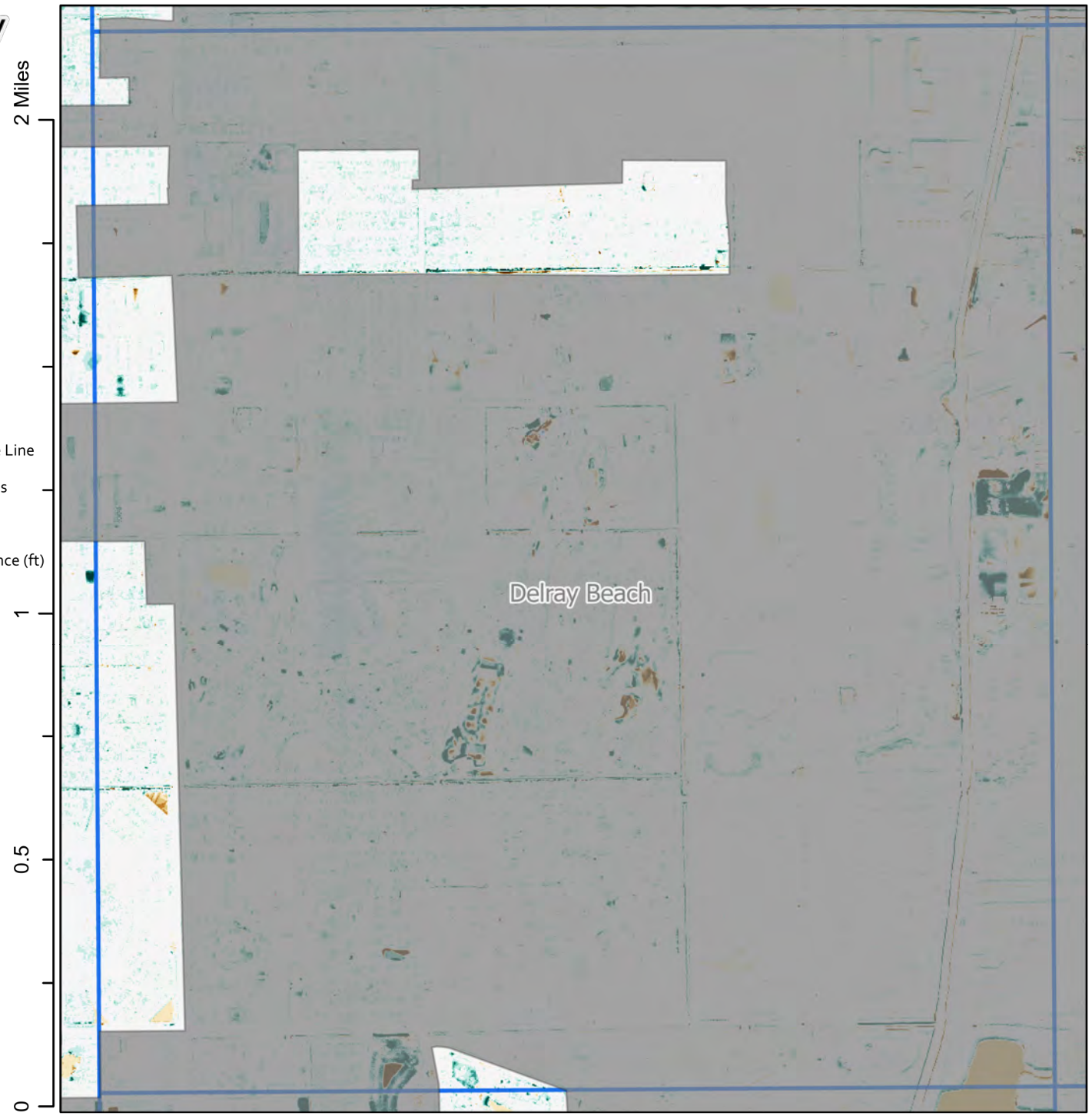
Frontal Dune Line

Municipalities

FIRM Panels

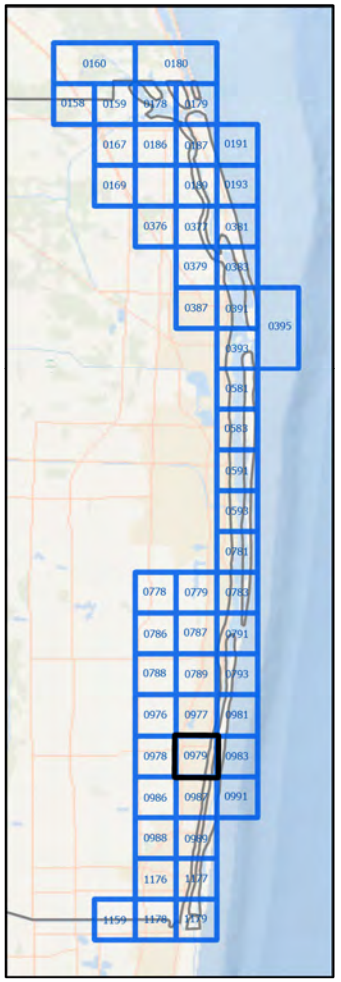
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0979



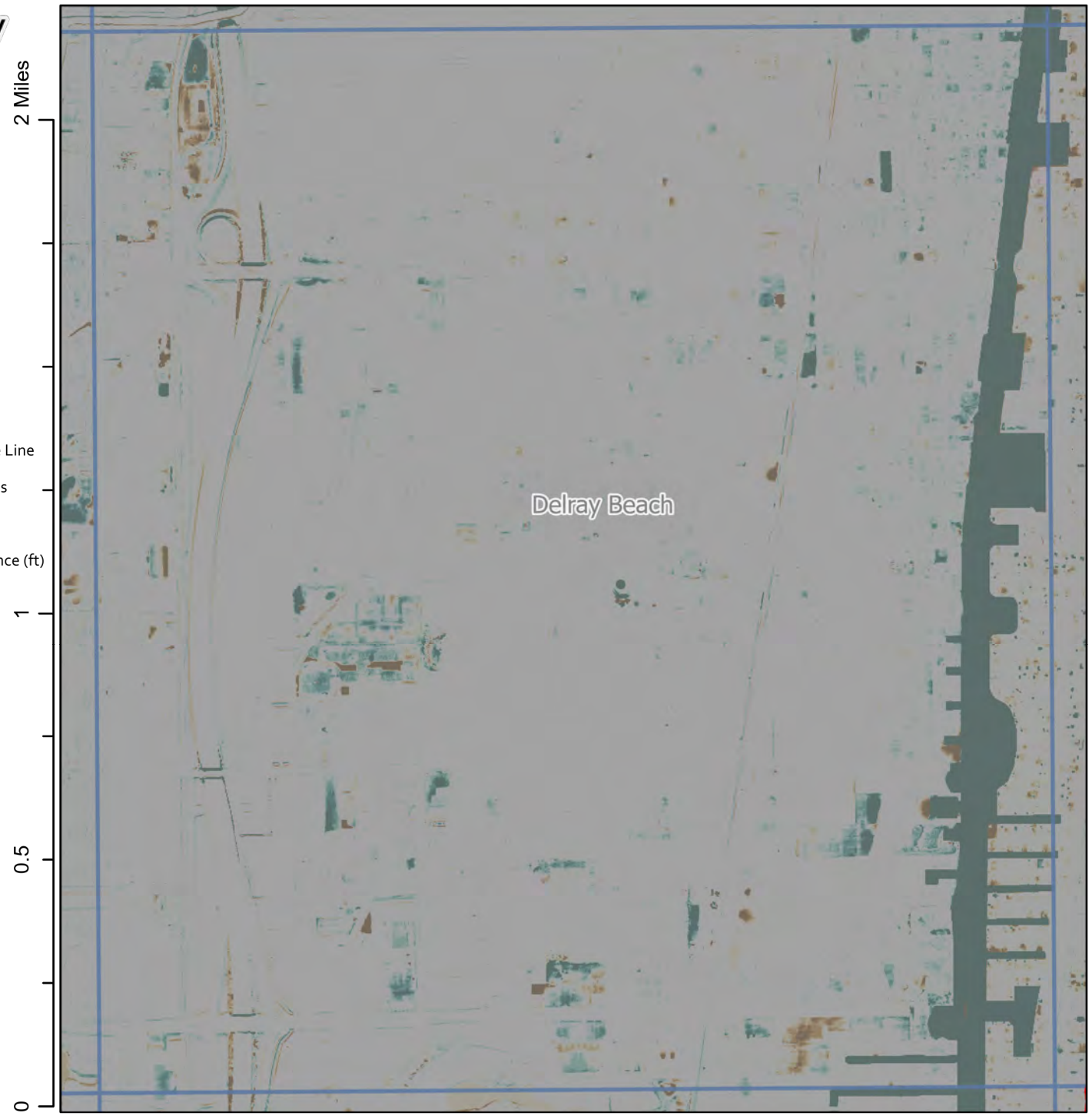
Frontal Dune Line

Municipalities

FIRM Panels

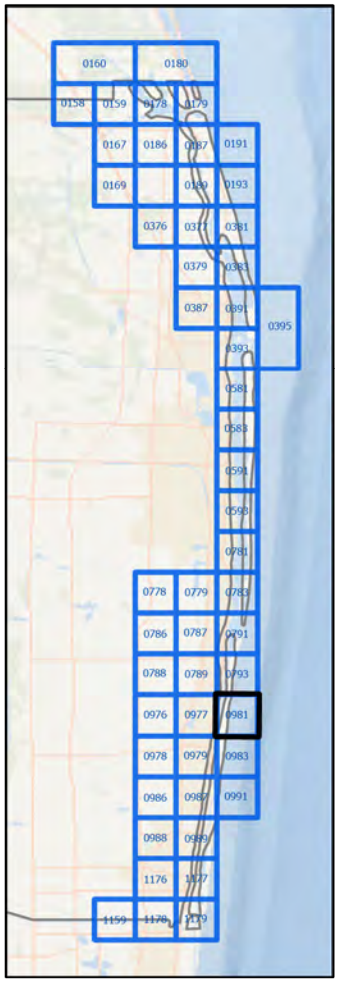
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0981



Frontal Dune Line

Municipalities

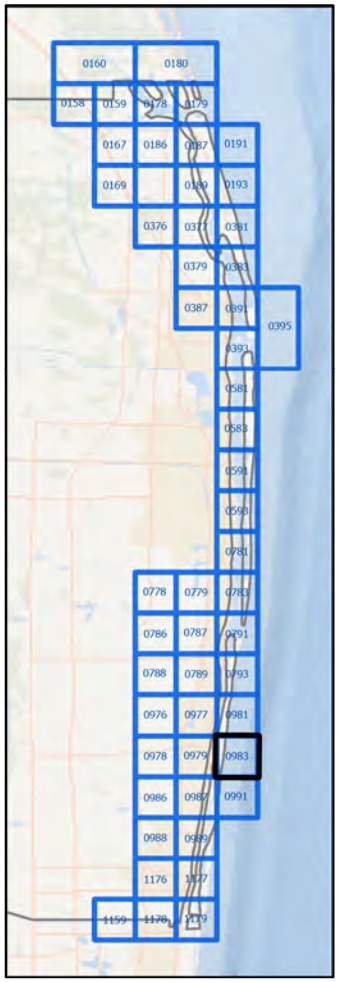
FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0983



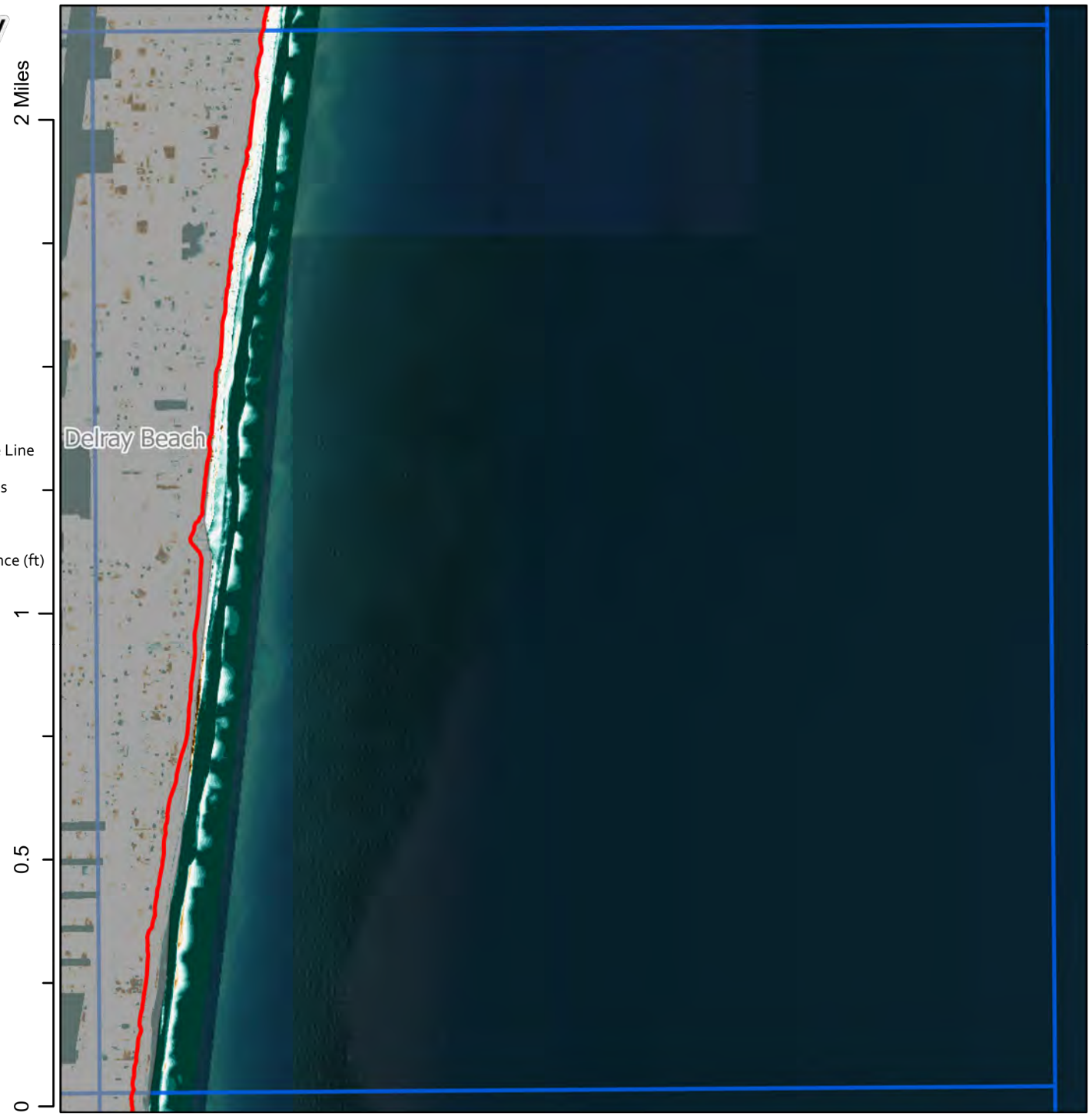
Frontal Dune Line

Municipalities

FIRM Panels

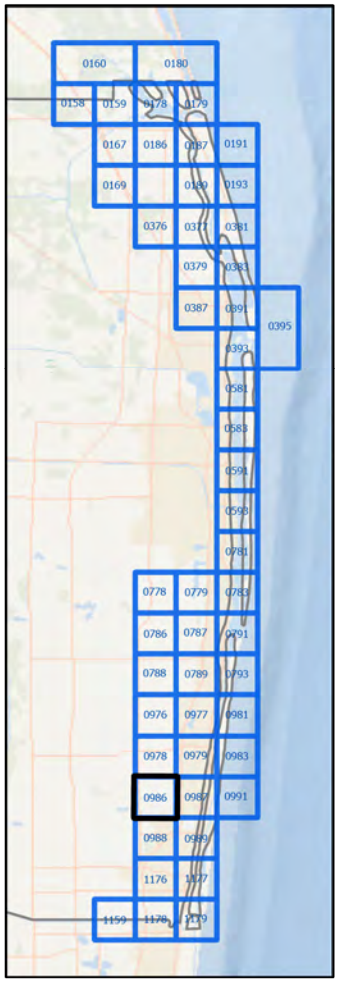
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0986



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

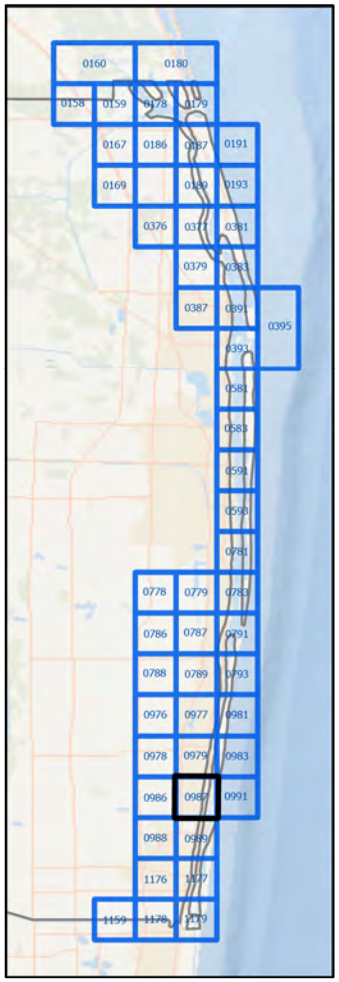
0

Delray Beach

Boca Raton

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0987



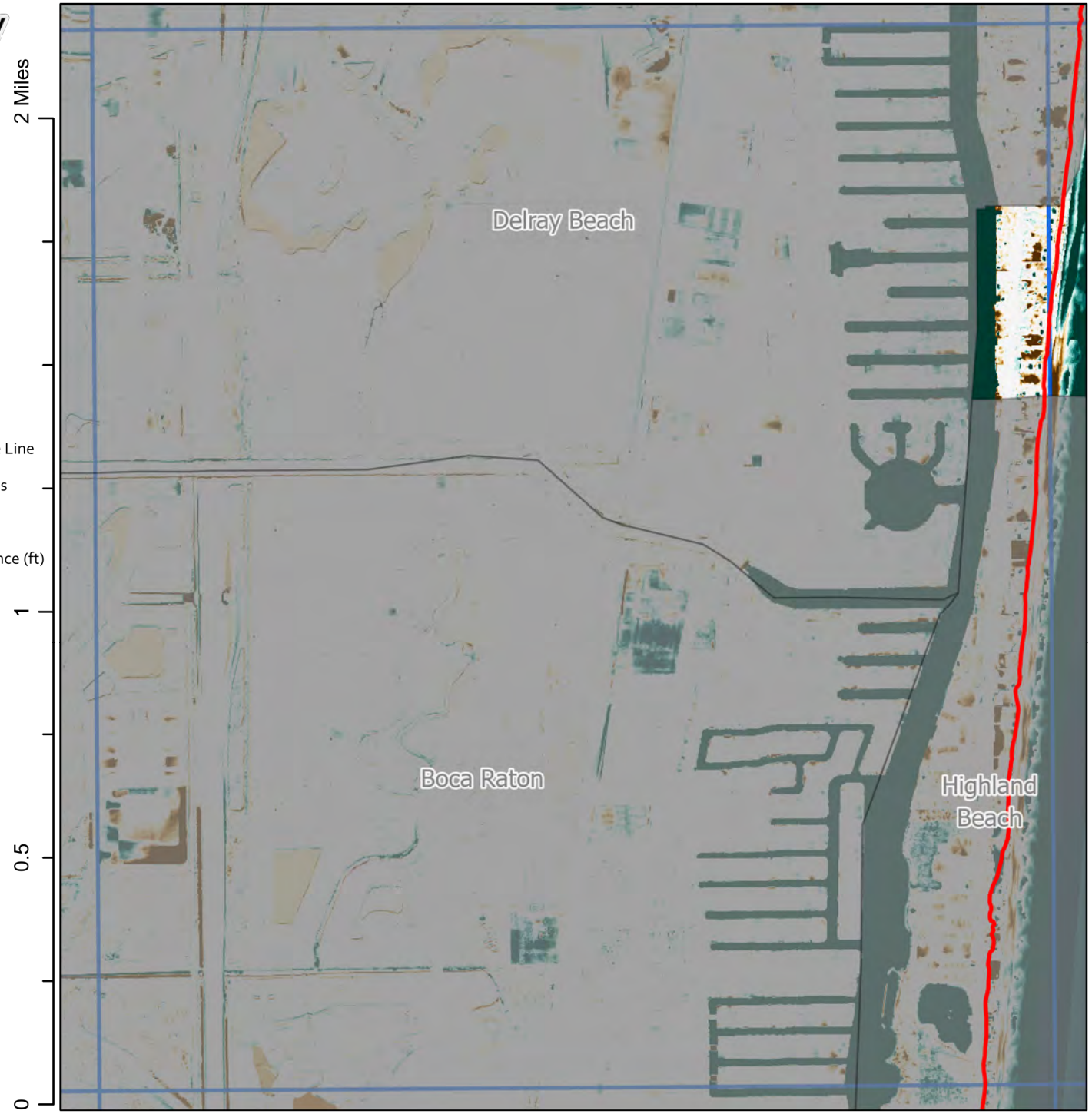
Frontal Dune Line

Municipalities

FIRM Panels

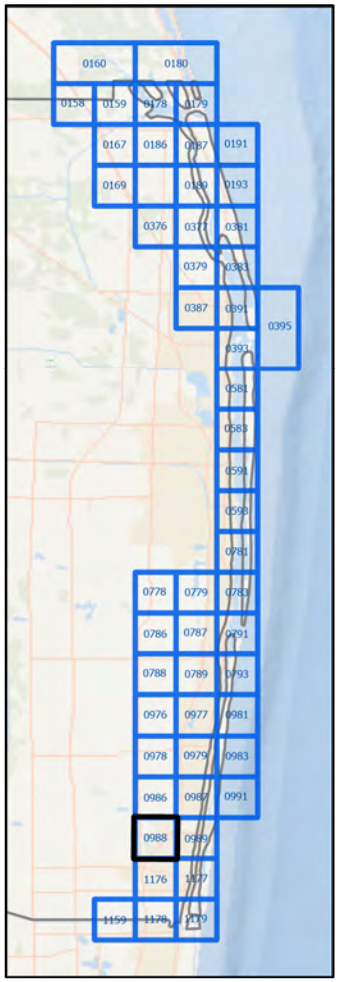
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

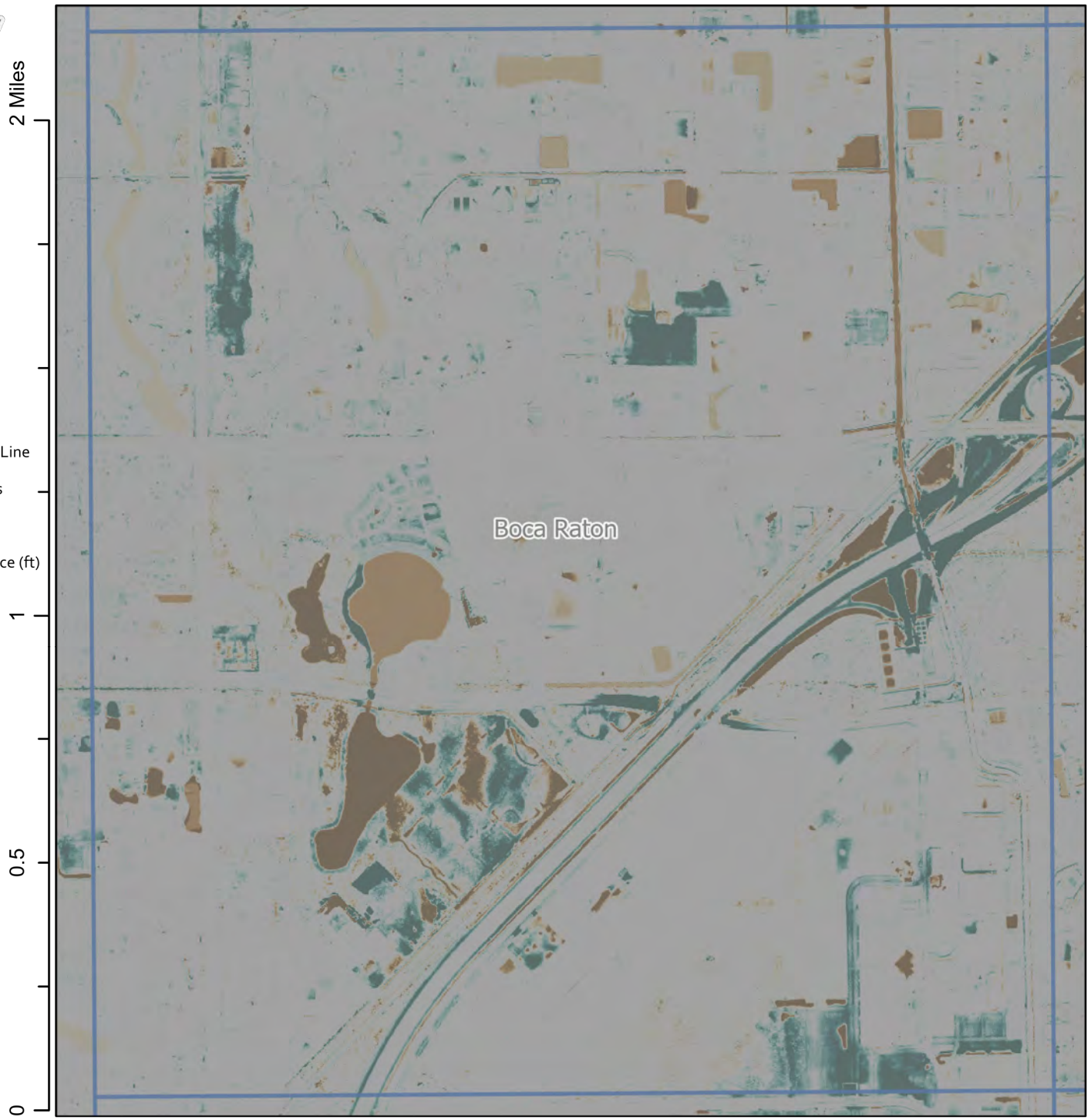
FIRM Panel: 0988



- Frontal Dune Line
- Municipalities
- FIRM Panels

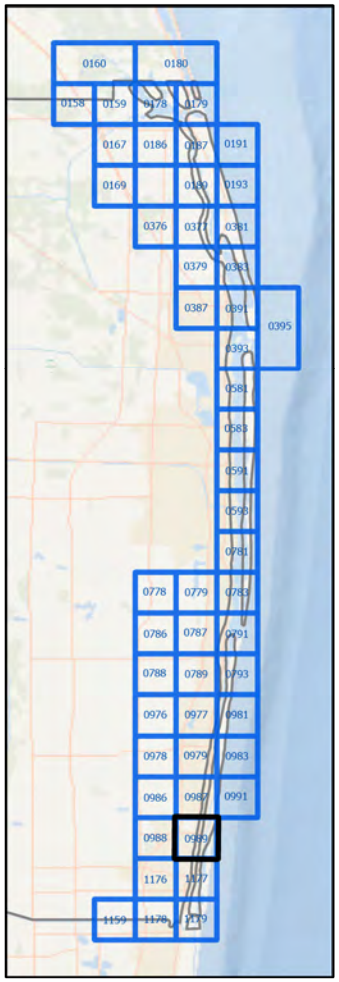
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

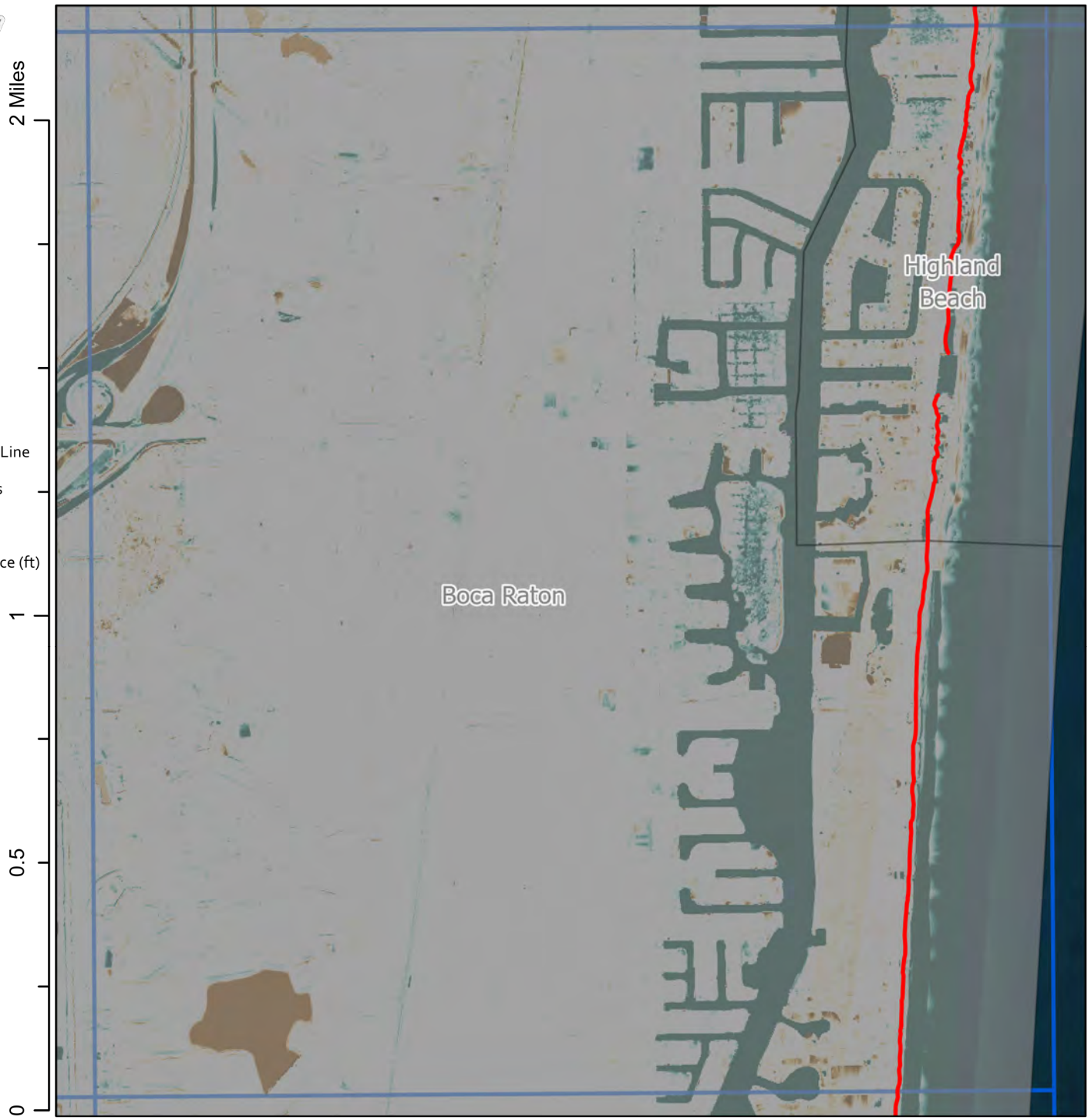
FIRM Panel: 0989



- Frontal Dune Line
- Municipalities
- FIRM Panels

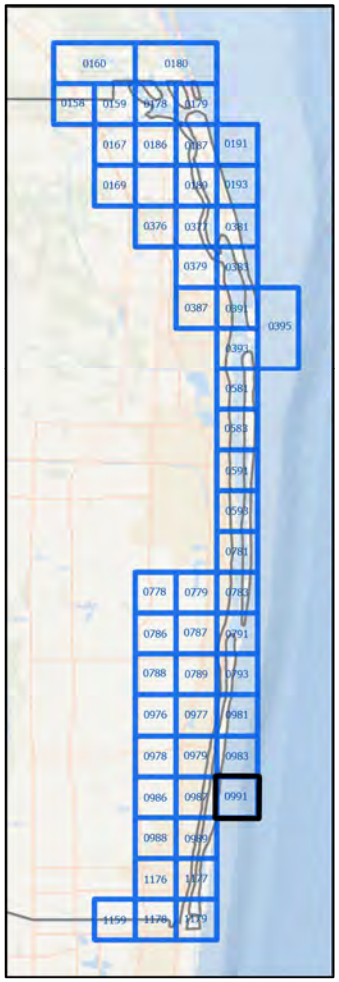
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 0991



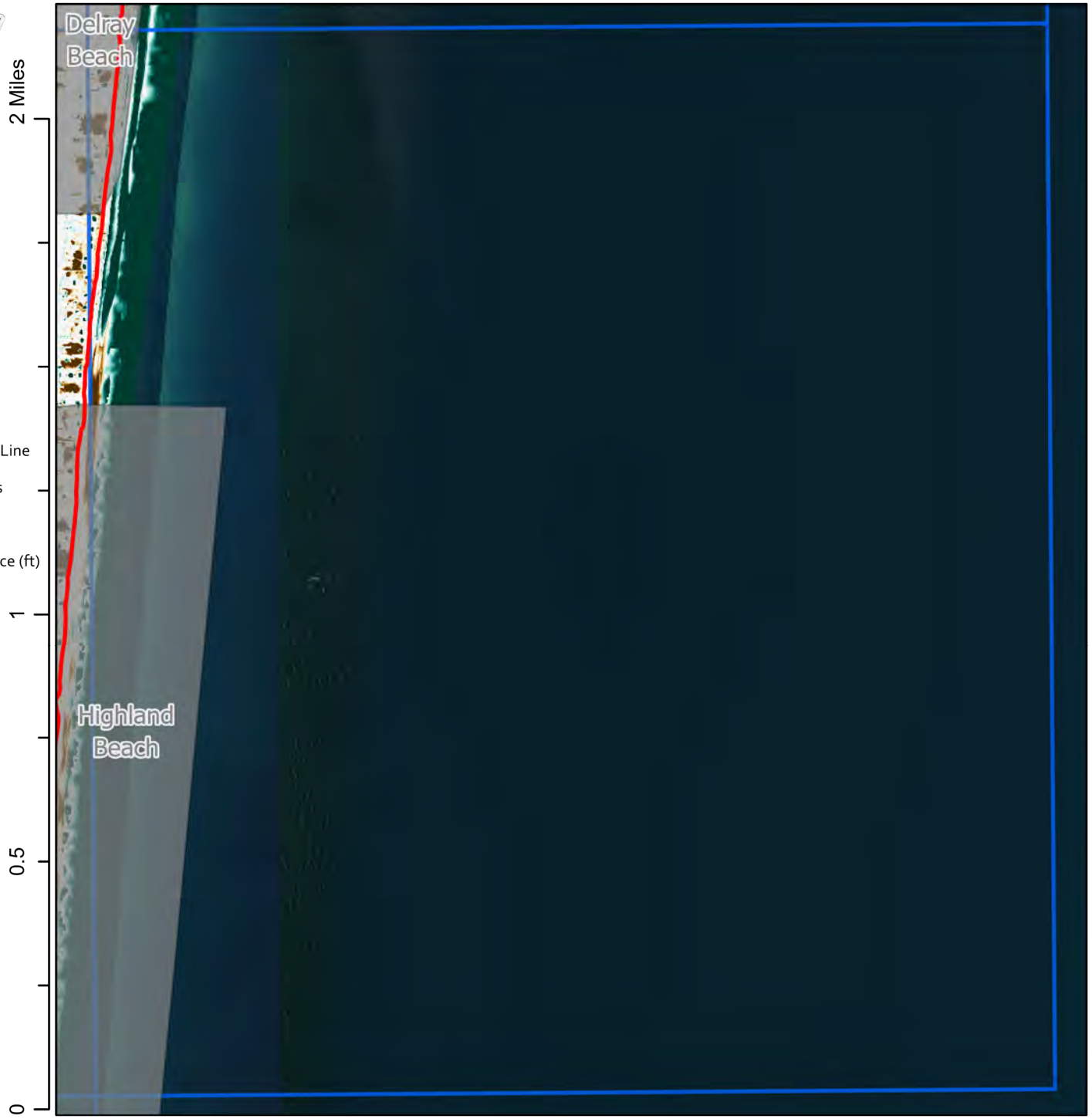
Frontal Dune Line

Municipalities

FIRM Panels

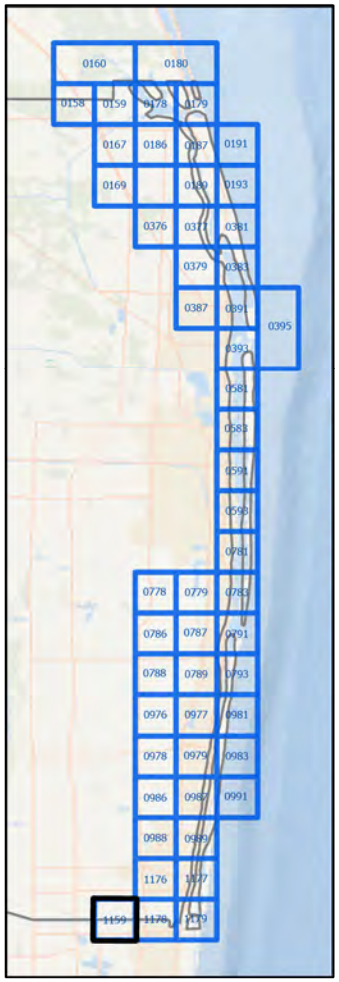
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 1159



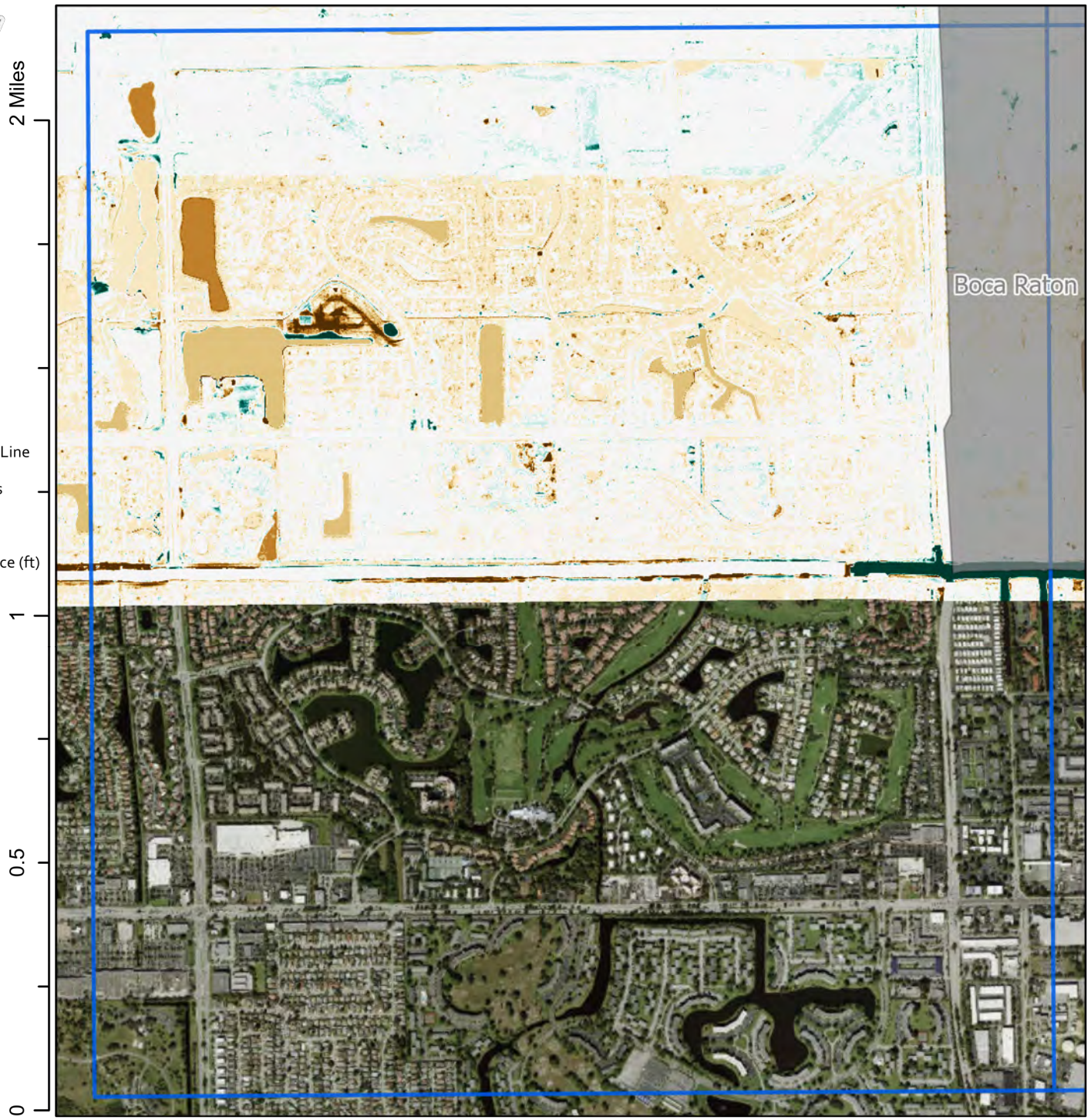
Frontal Dune Line

Municipalities

FIRM Panels

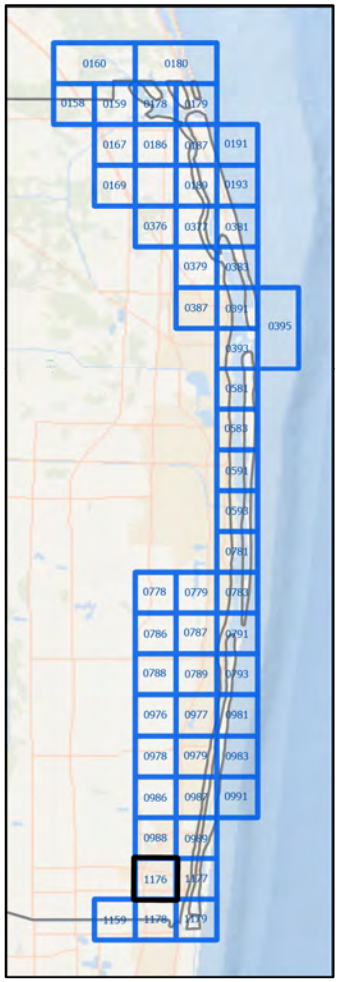
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 1176



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

0

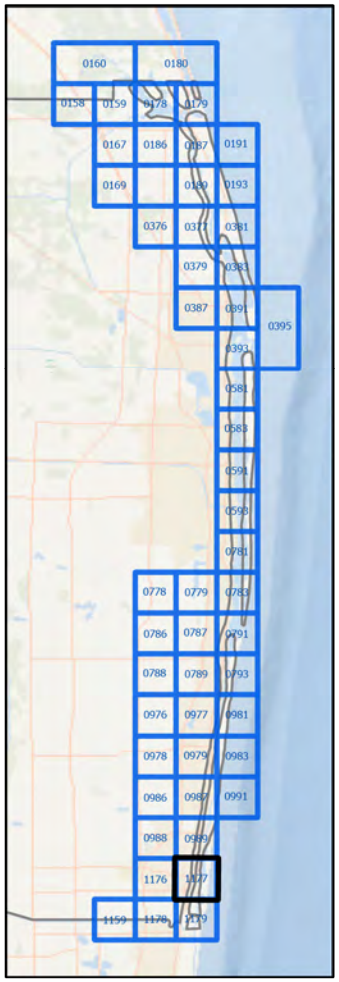
0.5

1

Boca Raton

Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 1177



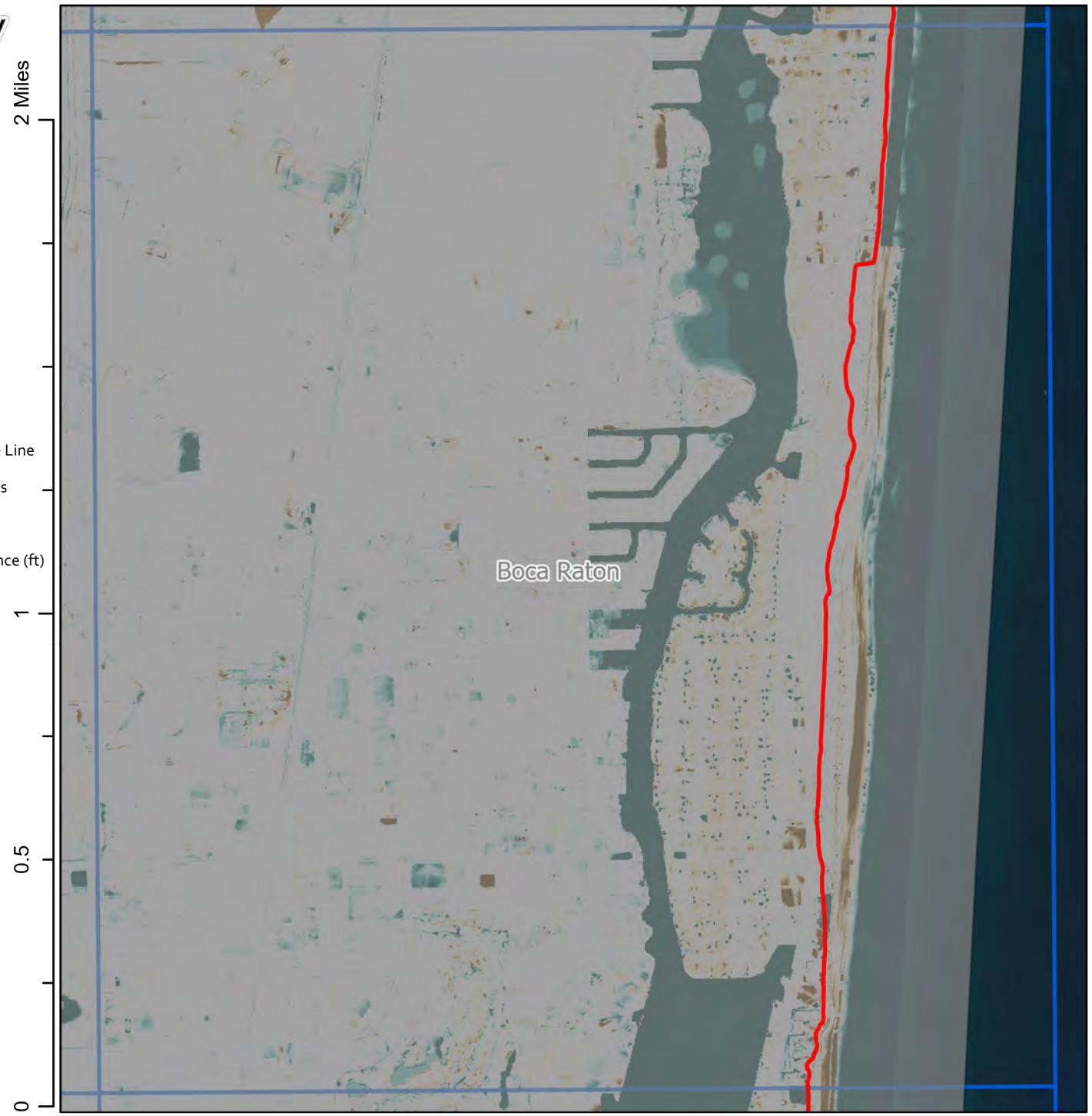
Frontal Dune Line

Municipalities

FIRM Panels

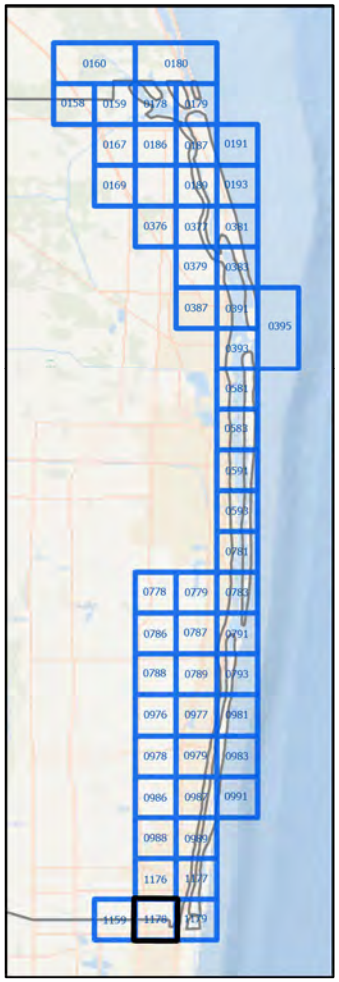
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 1178



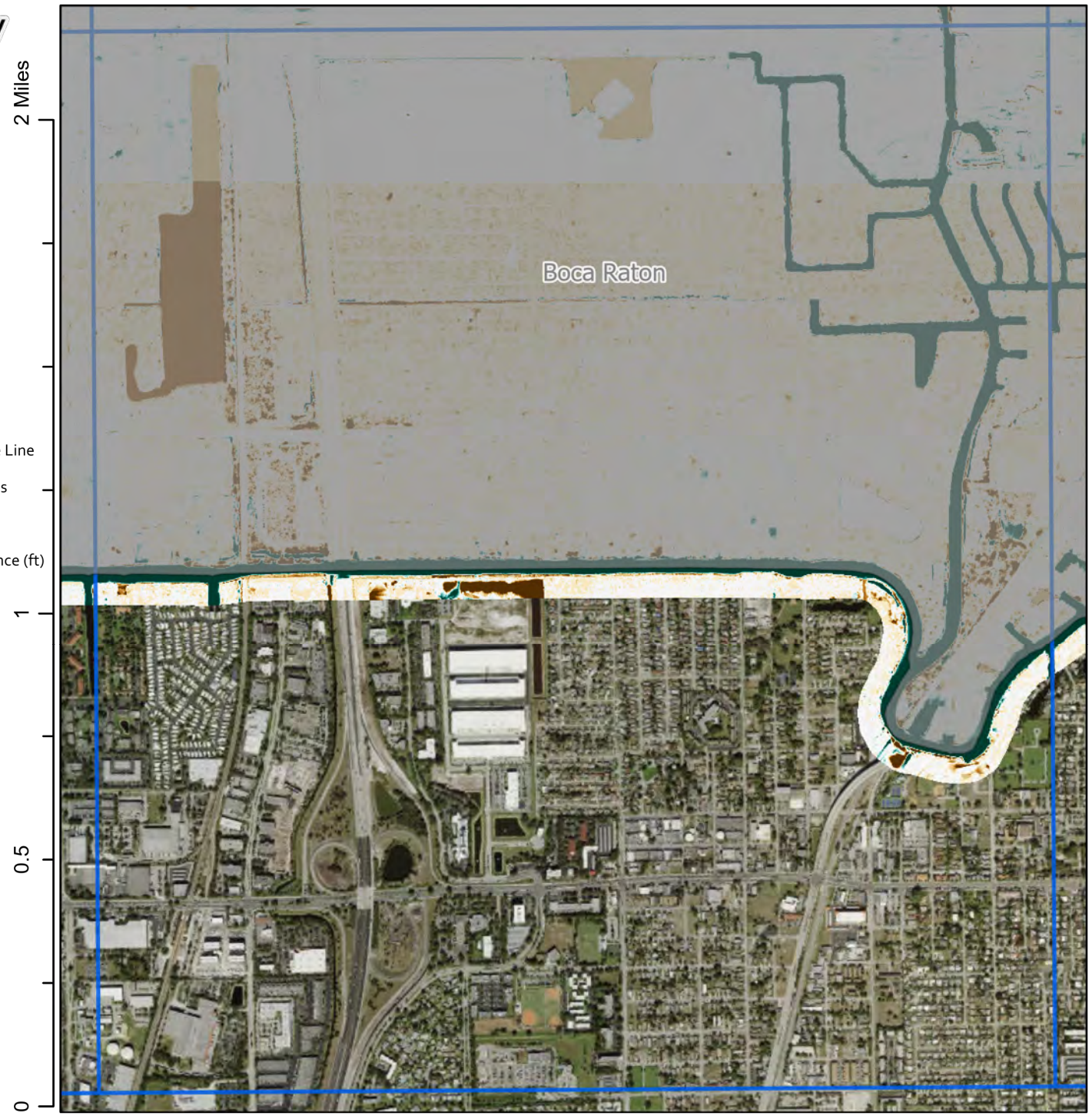
Frontal Dune Line

Municipalities

FIRM Panels

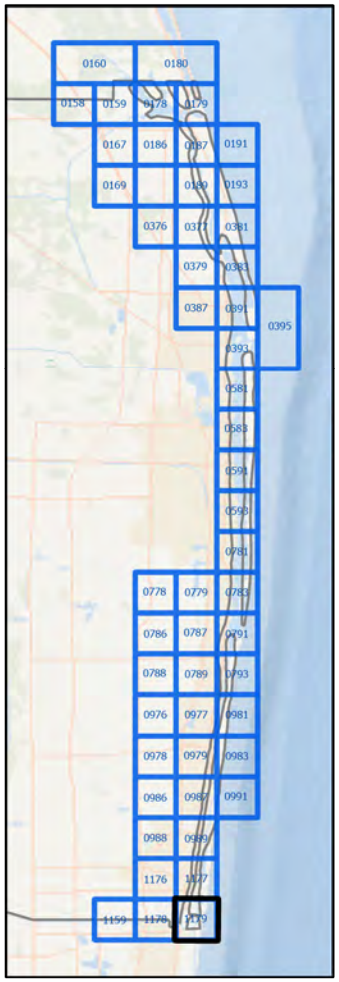
Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5



Palm Beach County Elevation Model Comparison PBC LiDAR minus USACE DEM

FIRM Panel: 1179



Frontal Dune Line

Municipalities

FIRM Panels

Calculated Difference (ft)

- < -2.5
- -2.5 to -2
- -2 to -1.5
- -1.5 to -1
- -1 to -0.5
- -0.5 to 0.5
- 0.5 to 1
- 1 to 1.5
- 1.5 to 2
- 2 to 2.5
- > 2.5

2 Miles

1

0.5

0

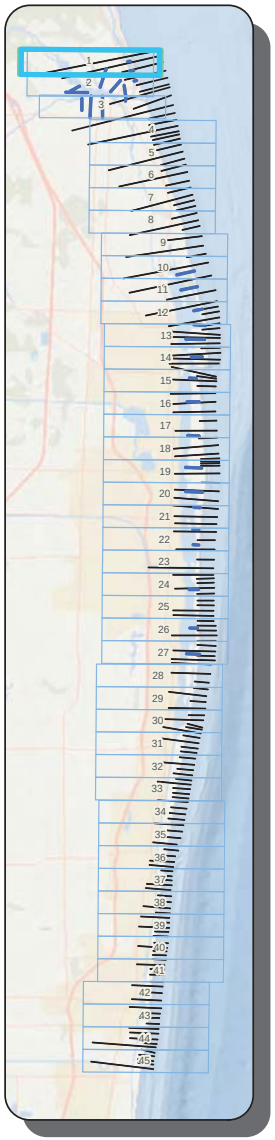
Boca Raton

Appendix D

Palm Beach County WHAFIS Transects

Transect View

Page: 1



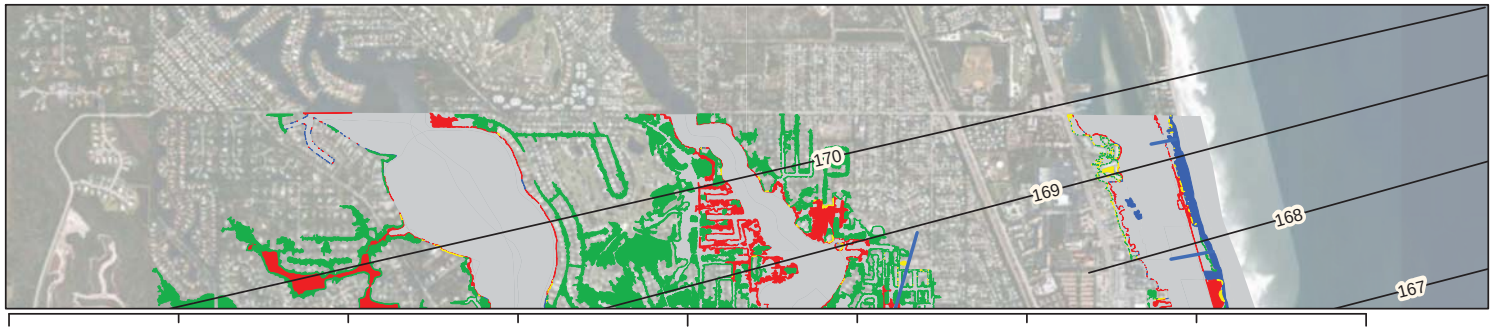
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

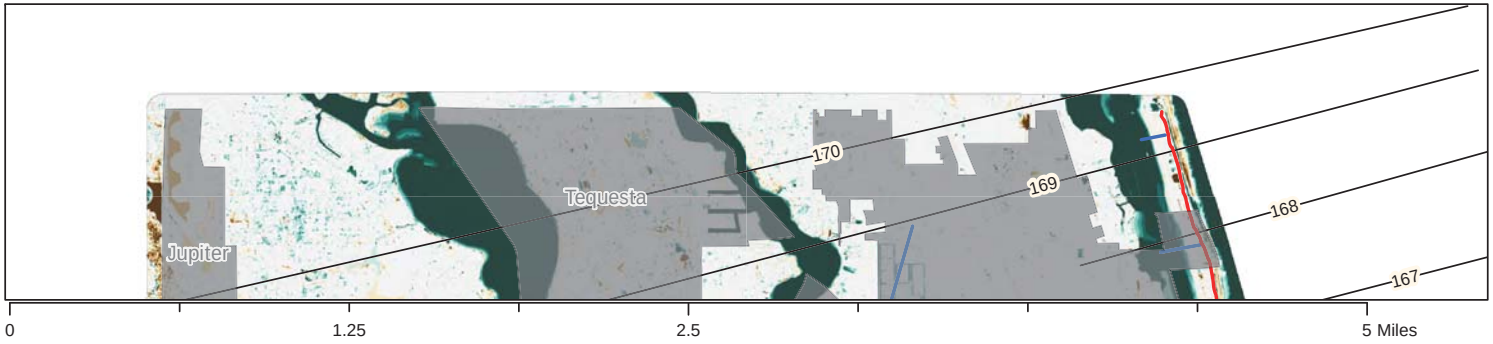
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

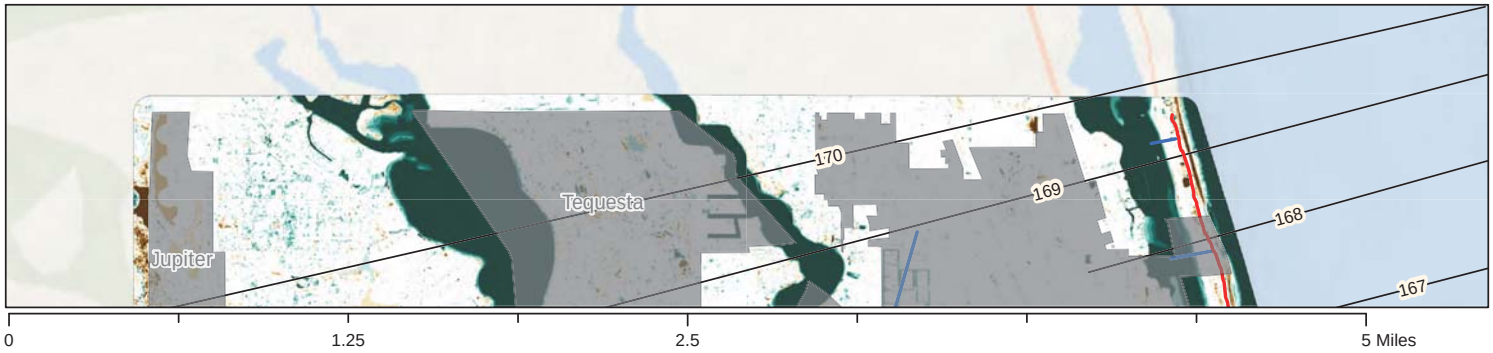
Change Since Last FIRM



PBC minus SWFLTB DEM

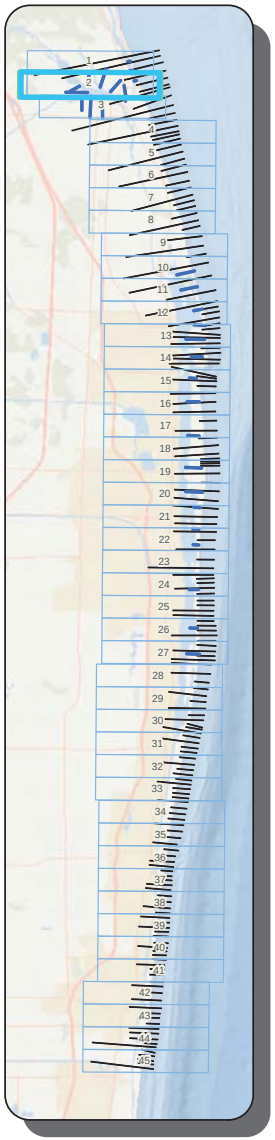


PBC minus USACE



Transect View

Page: 2



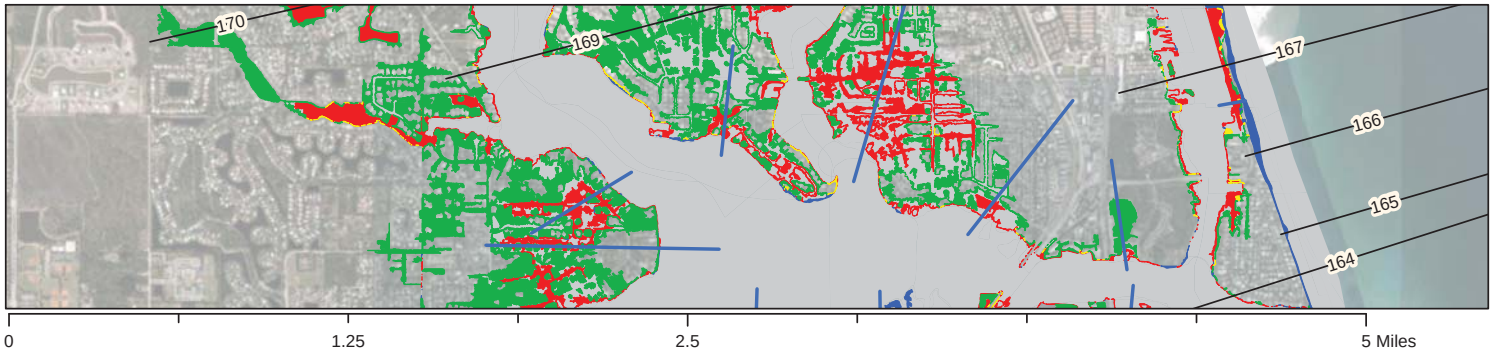
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

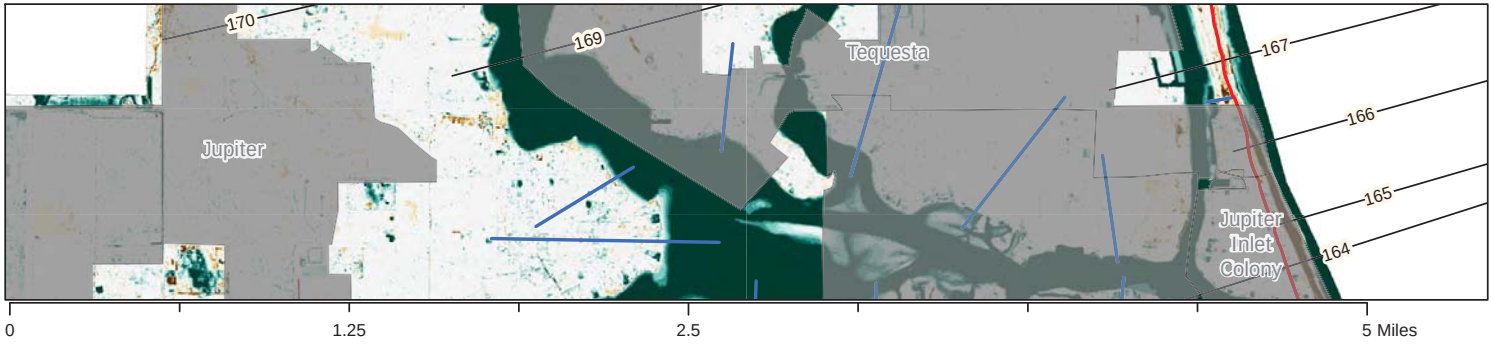
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

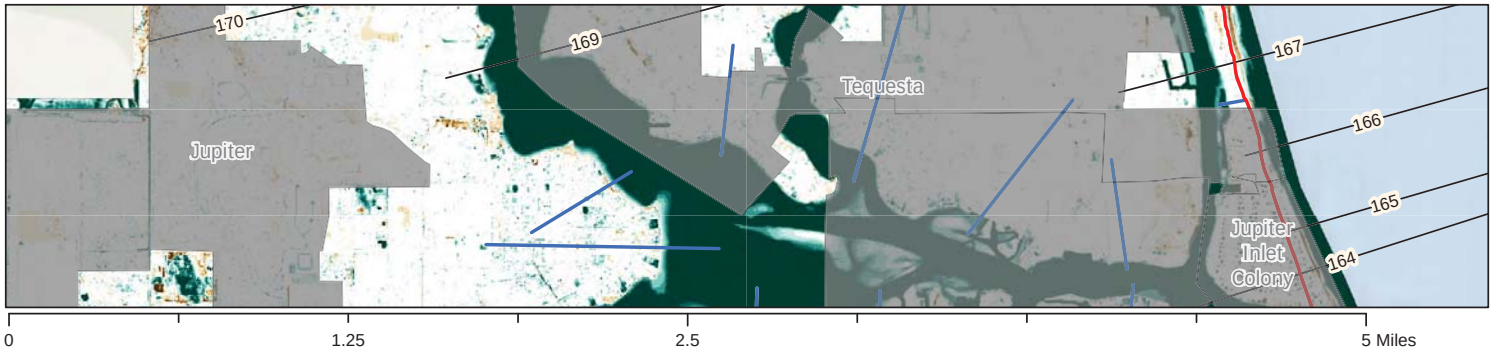
Change Since Last FIRM



PBC minus SWFLTB DEM

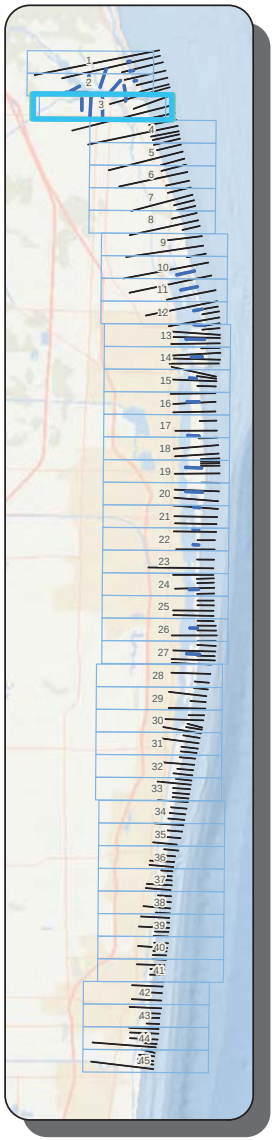


PBC minus USACE



Transect View

Page: 3

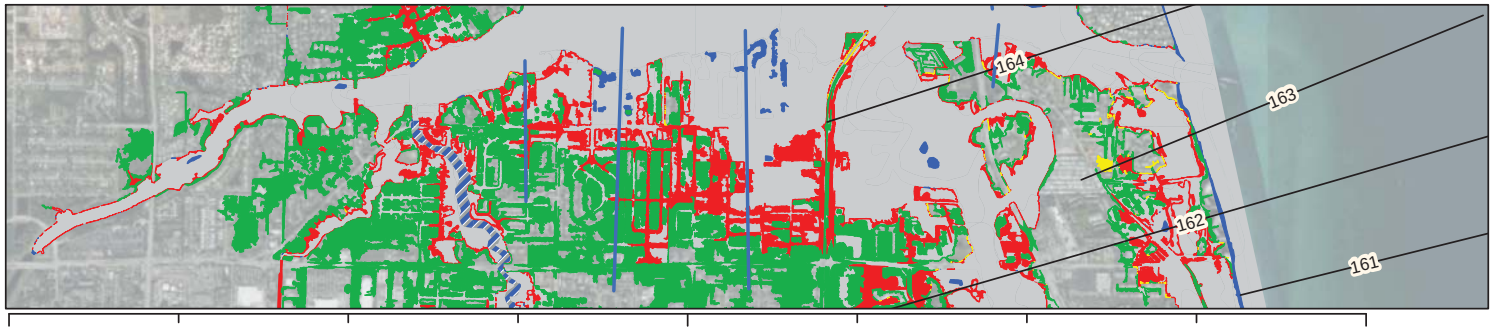


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

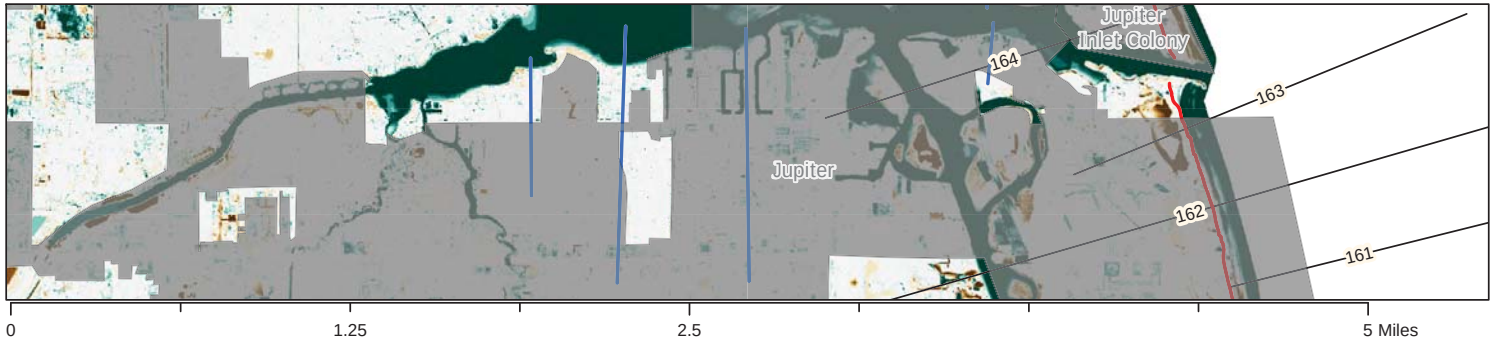
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

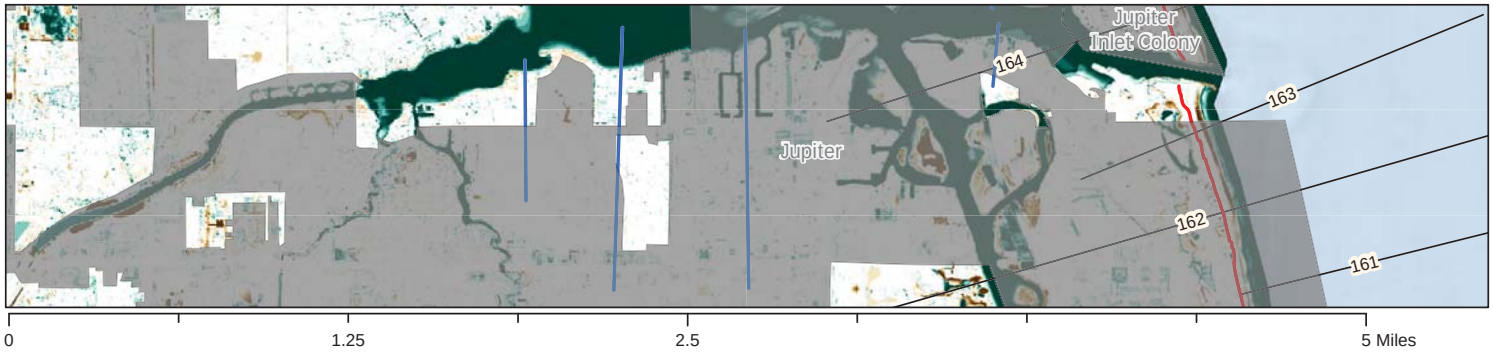
Change Since Last FIRM



PBC minus SWFLTB DEM

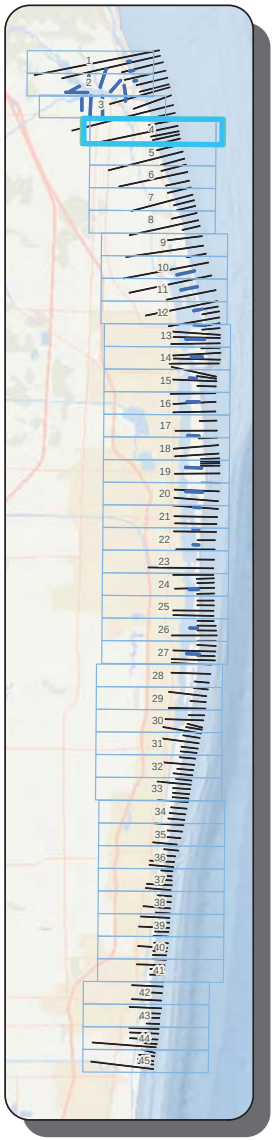


PBC minus USACE



Transect View

Page: 4



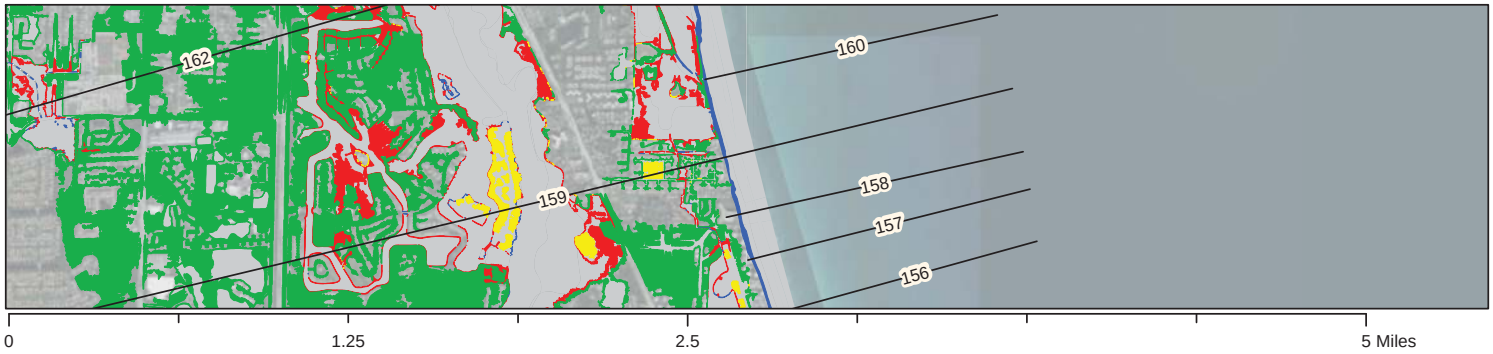
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

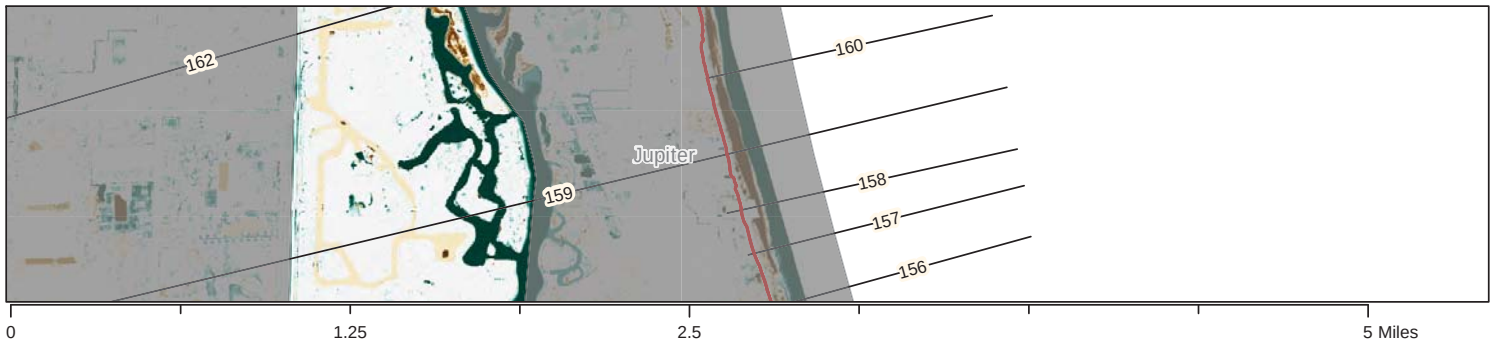
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

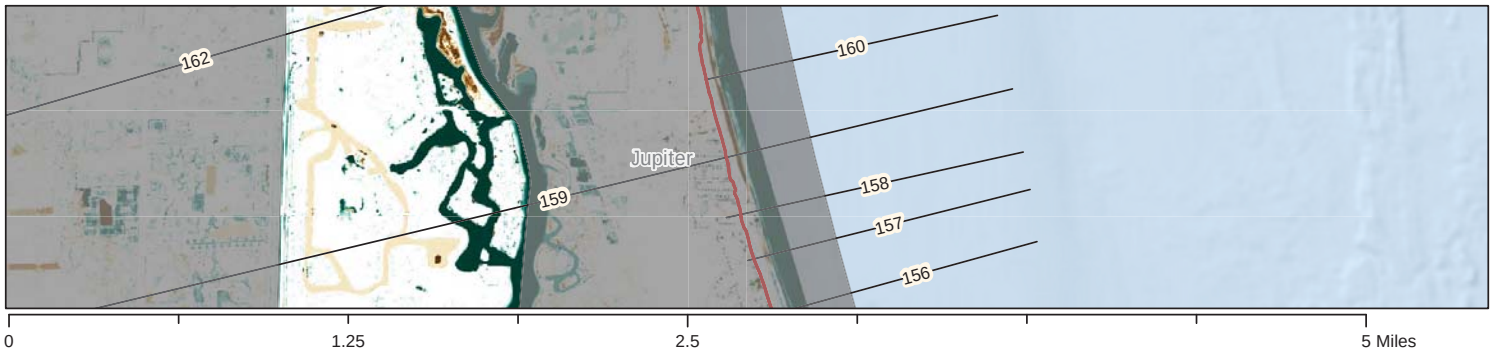
Change Since Last FIRM



PBC minus SWFLTB DEM

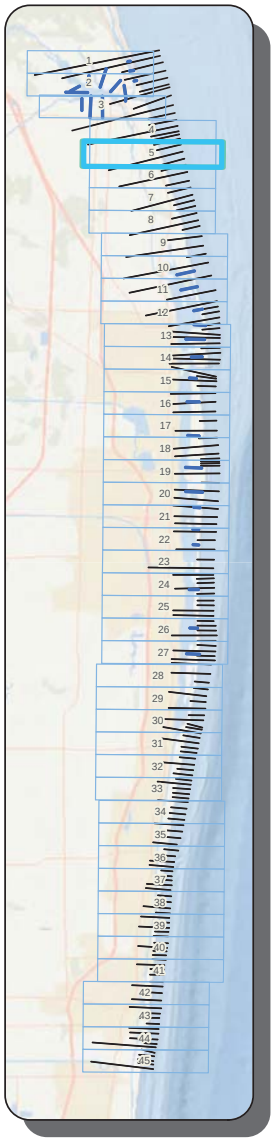


PBC minus USACE



Transect View

Page: 5



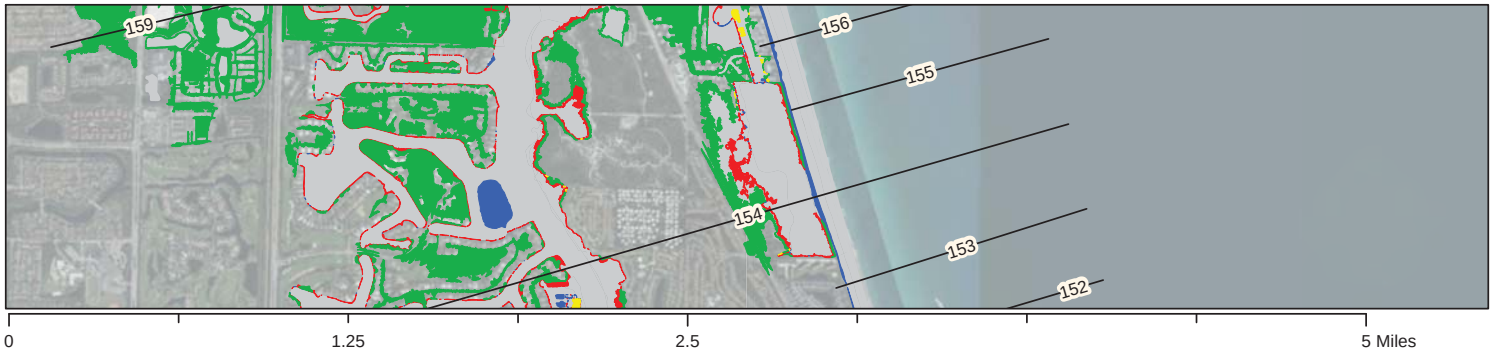
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

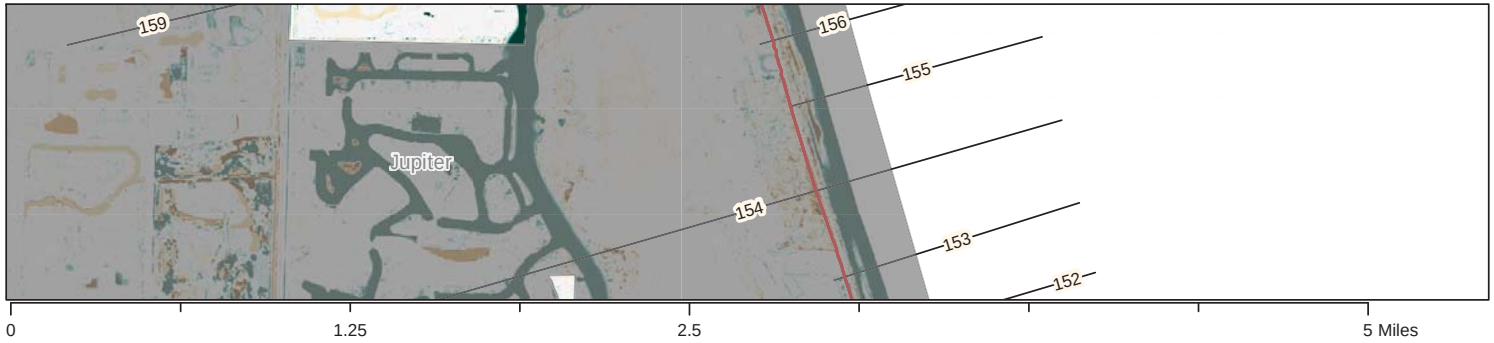
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

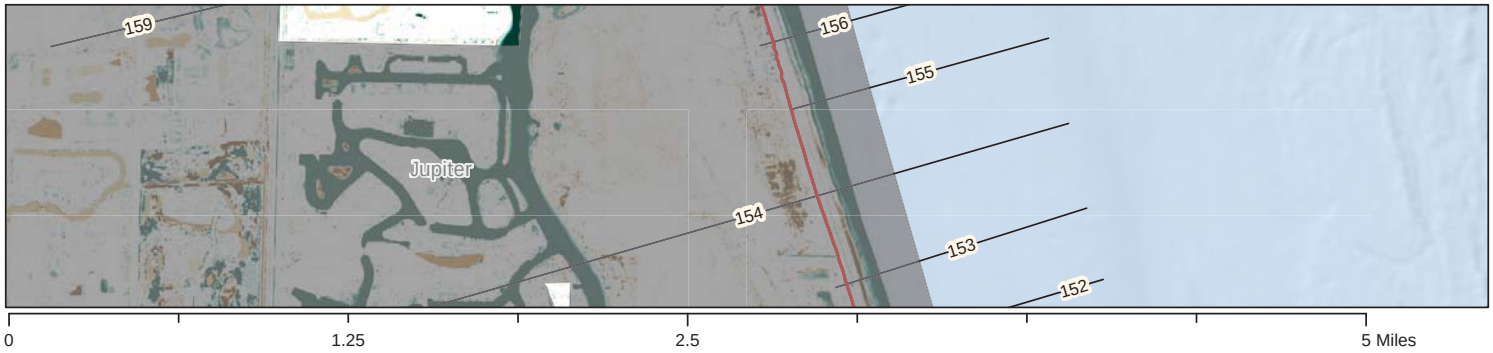
Change Since Last FIRM



PBC minus SWFLTB DEM

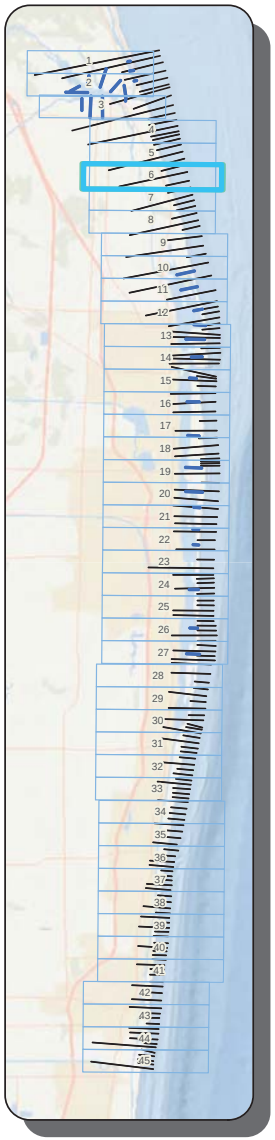


PBC minus USACE



Transect View

Page: 6

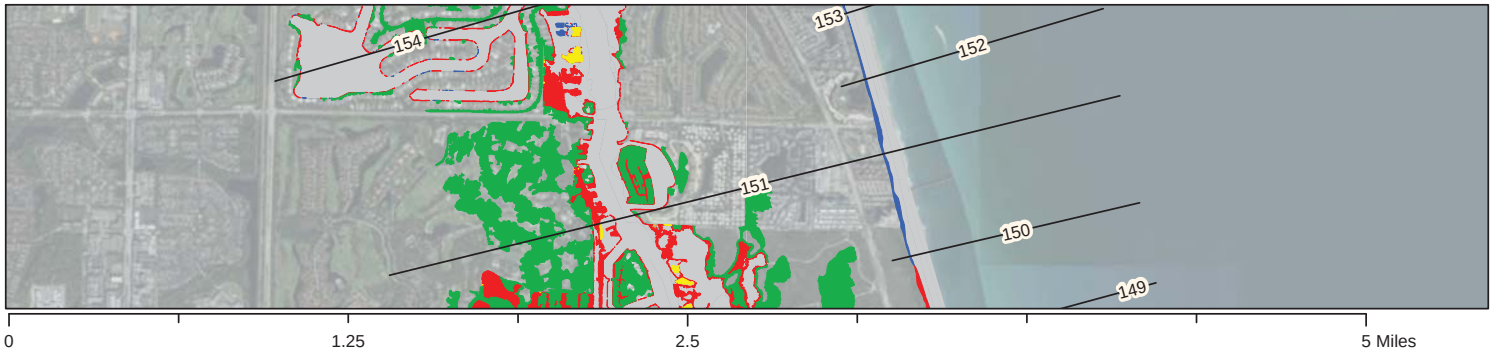


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

- Frontal Dune Line
- Municipalities

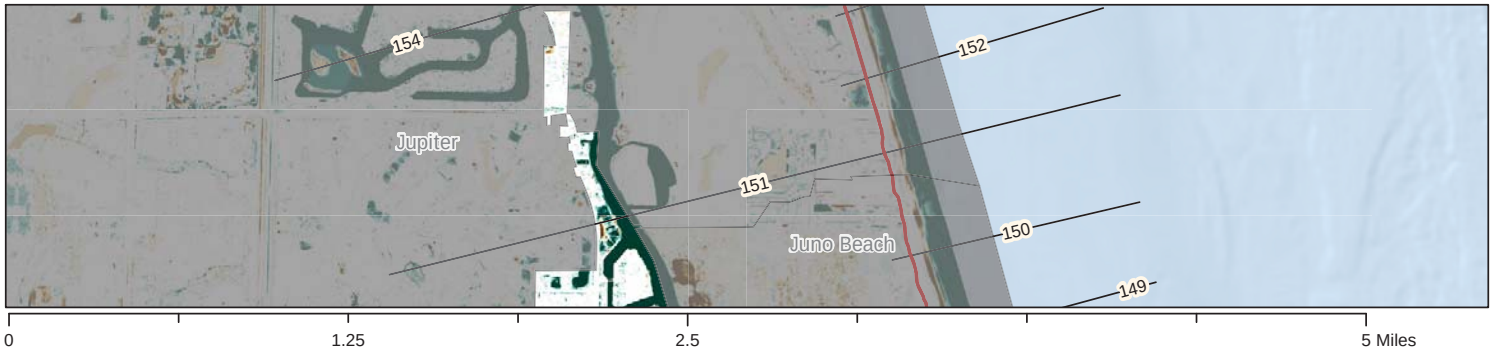
Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM



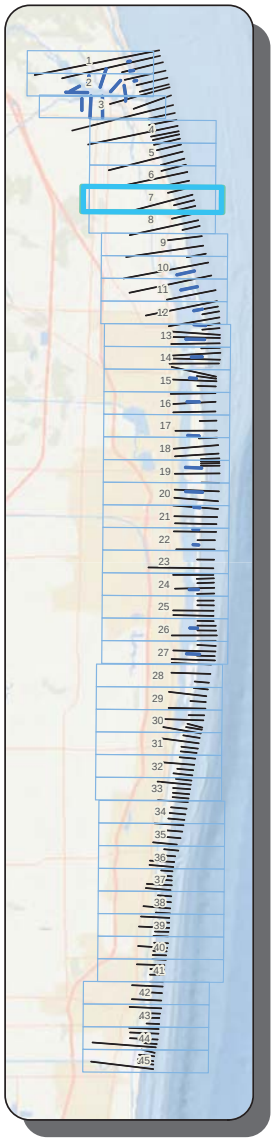
PBC minus SWFLTB DEM

PBC minus USACE



Transect View

Page: 7

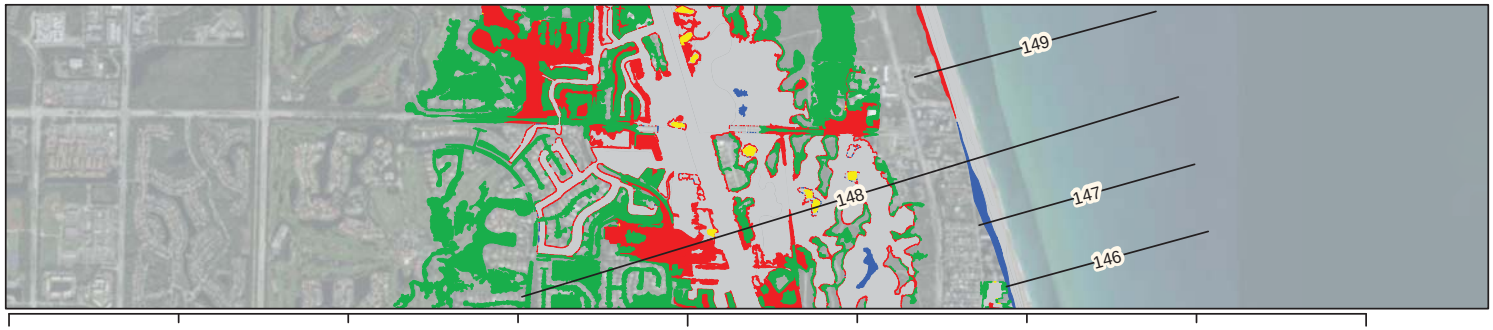


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

- Frontal Dune Line
- Municipalities

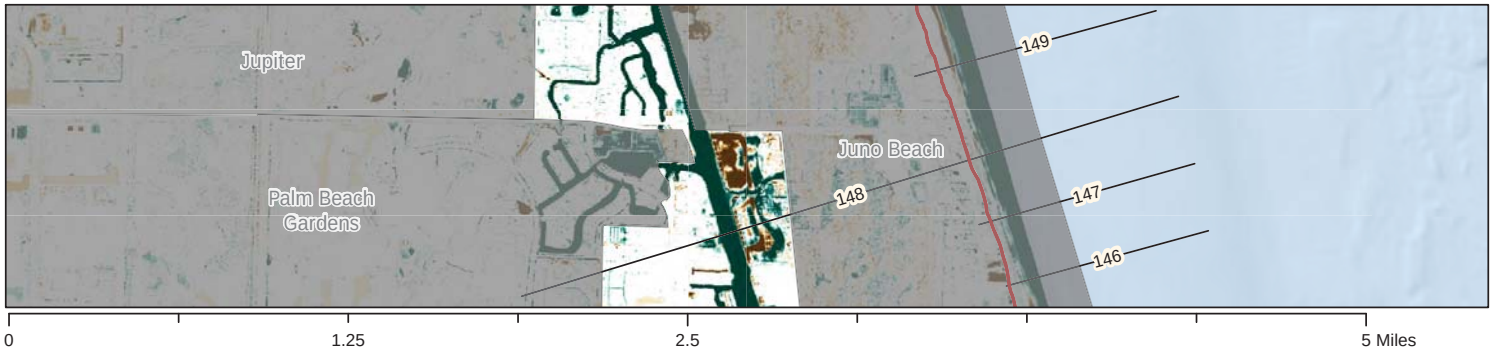
Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM



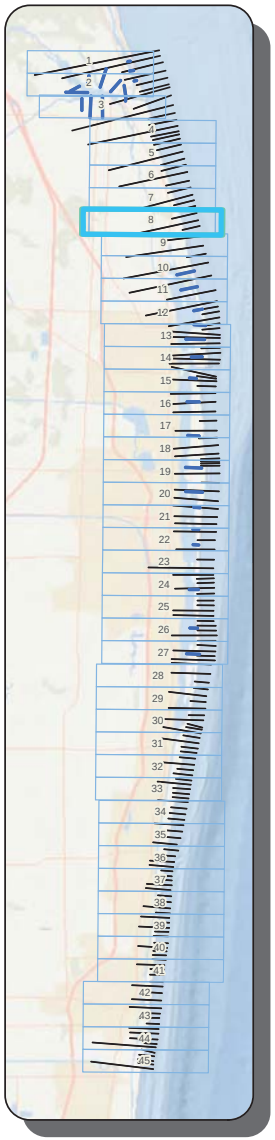
PBC minus SWFLTB DEM

PBC minus USACE



Transect View

Page: 8

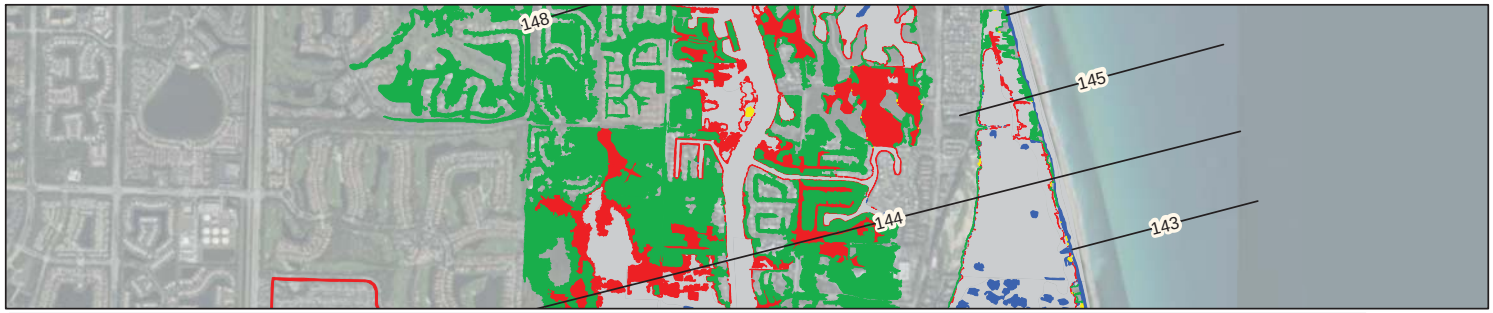


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

- Frontal Dune Line
- Municipalities

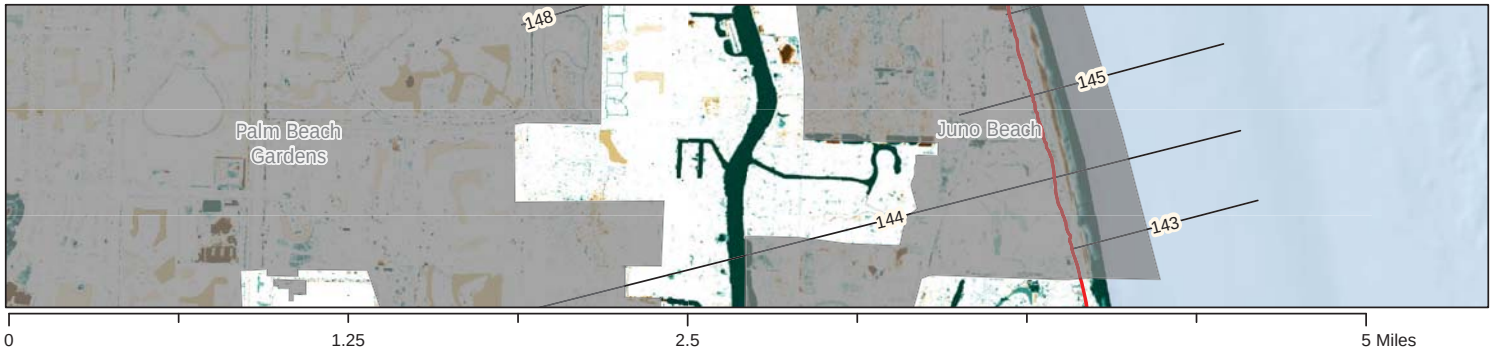
Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM



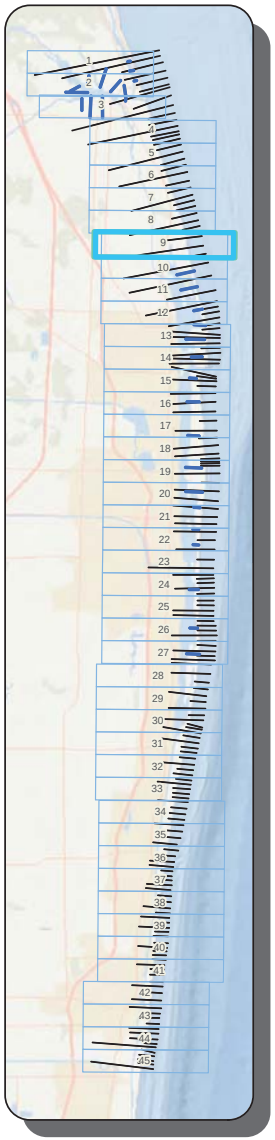
PBC minus SWFLTB DEM

PBC minus USACE



Transect View

Page: 9



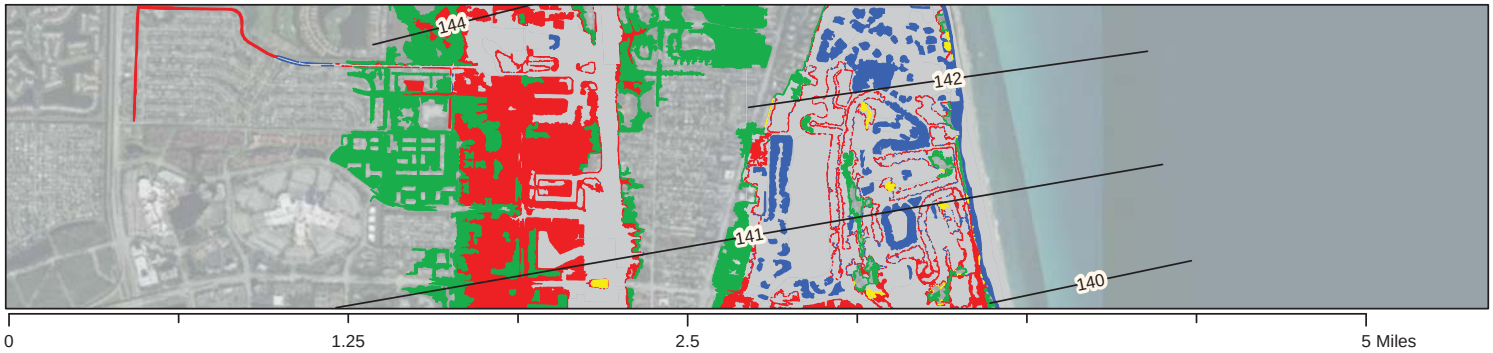
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

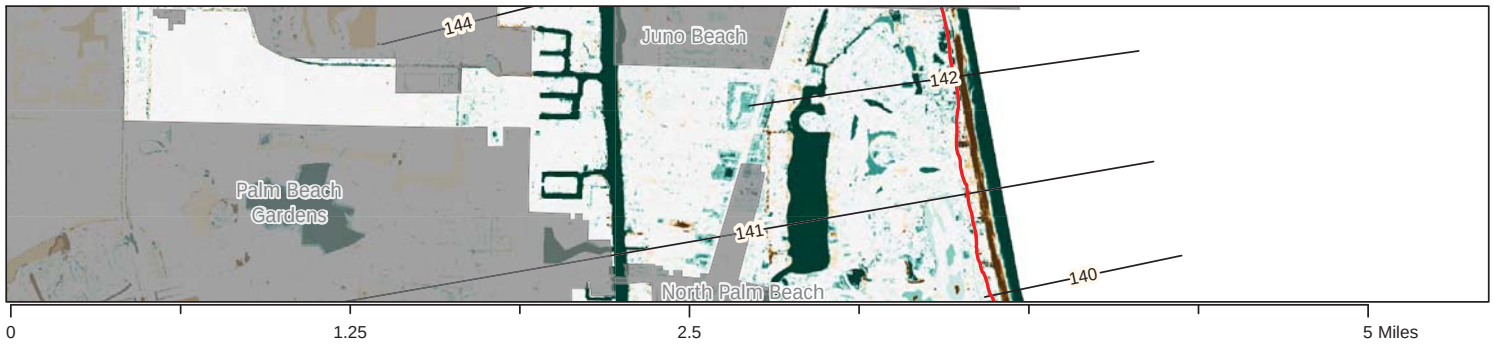
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

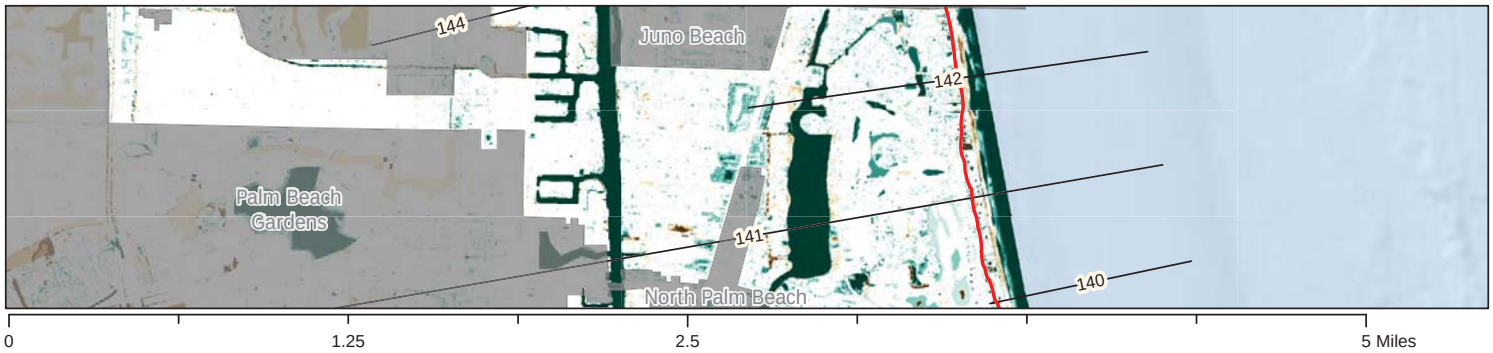
Change Since Last FIRM



PBC minus SWFLTB DEM

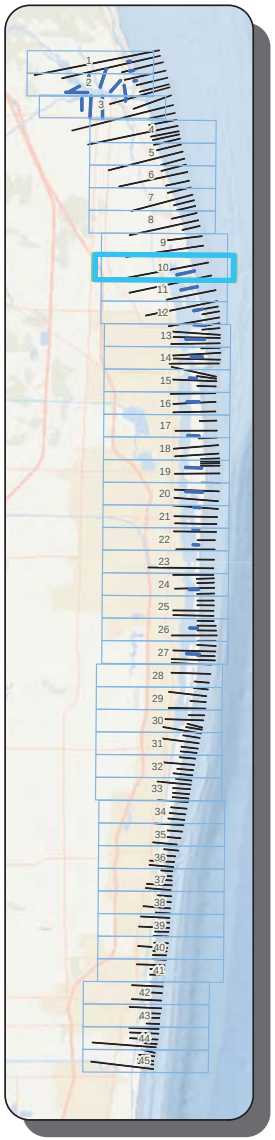


PBC minus USACE



Transect View

Page: 10



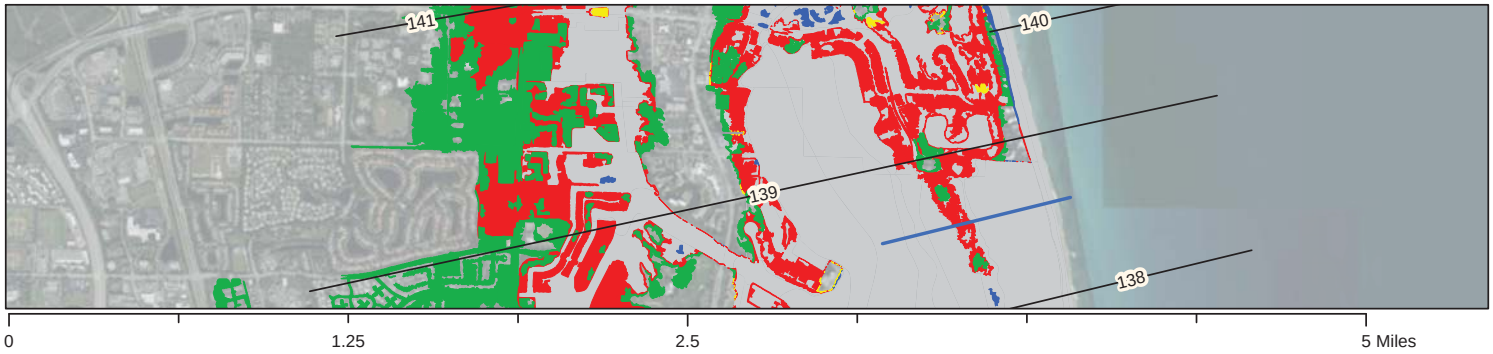
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

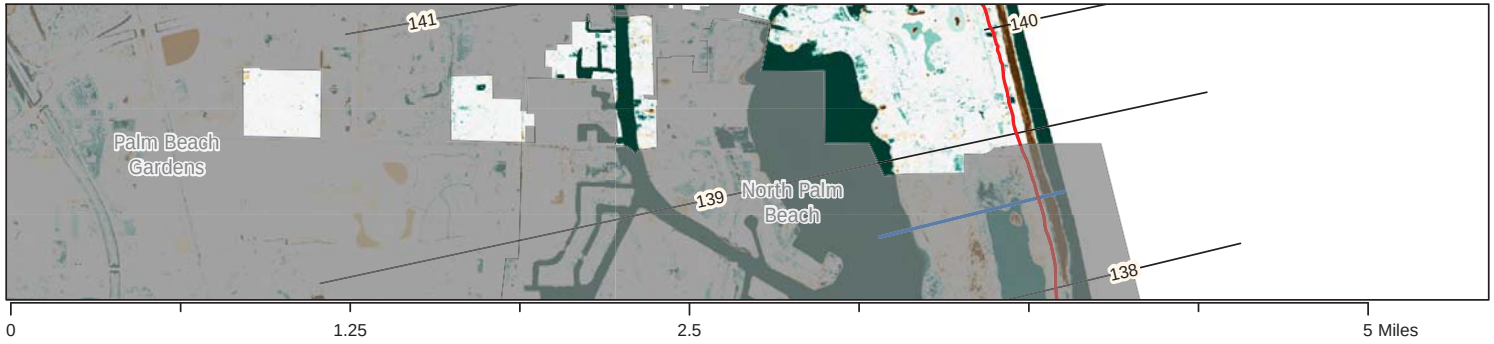
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

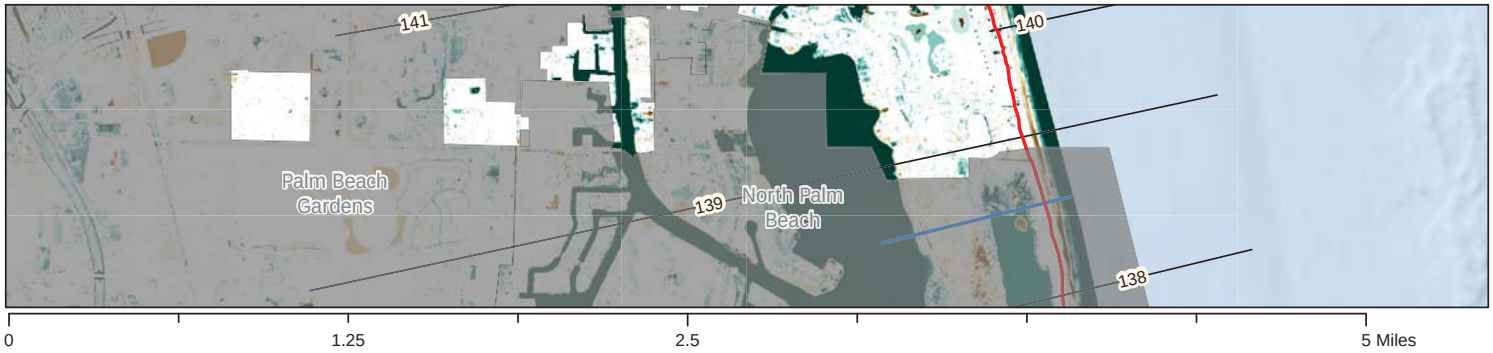
Change Since Last FIRM



PBC minus SWFLTB DEM

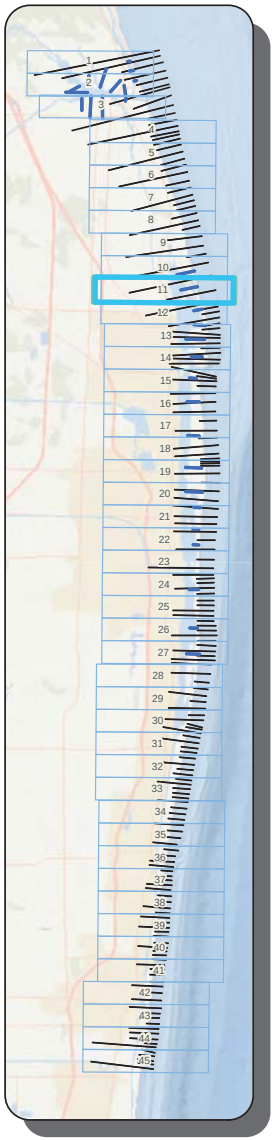


PBC minus USACE



Transect View

Page: 11



Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

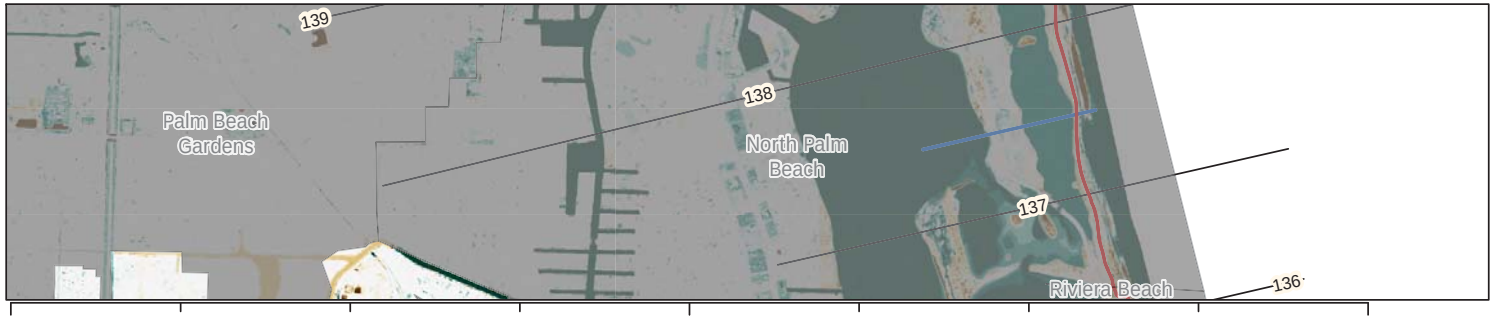
Frontal Dune Line

Municipalities

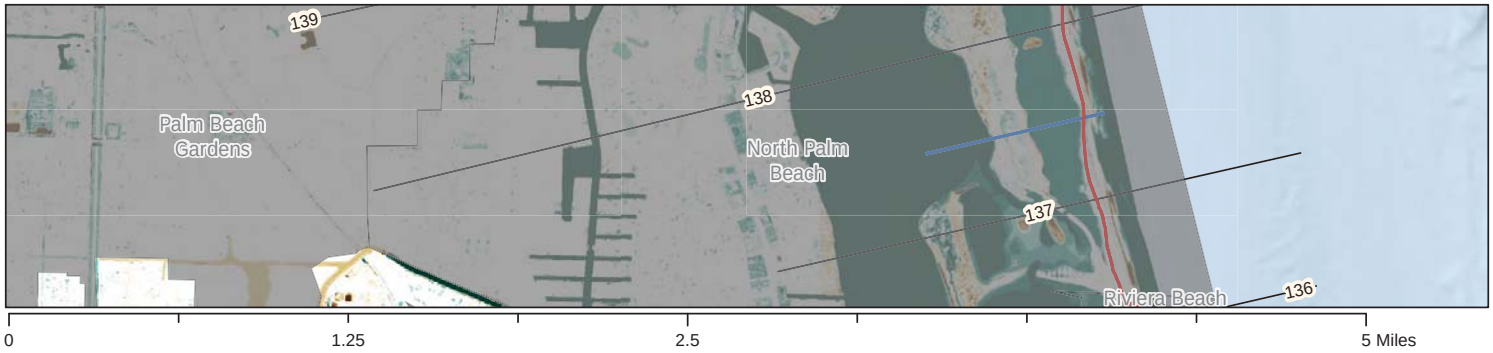
Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM

PBC minus SWFLTB DEM

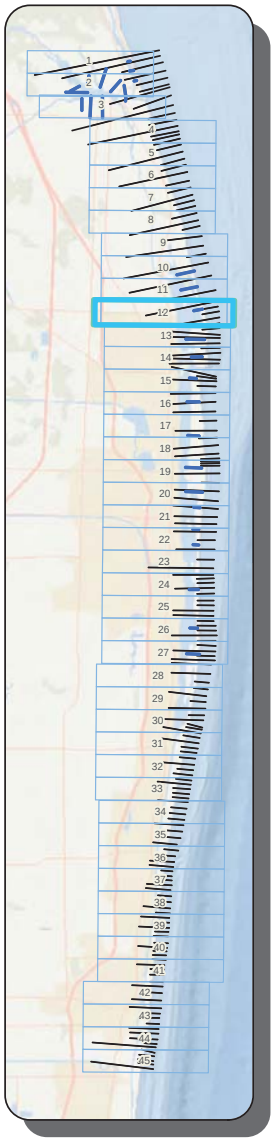


PBC minus USACE



Transect View

Page: 12



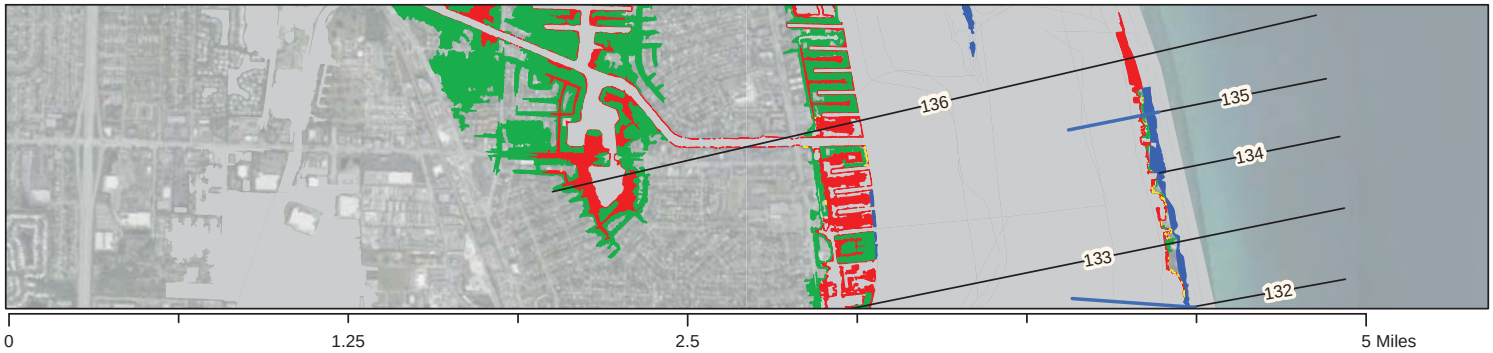
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

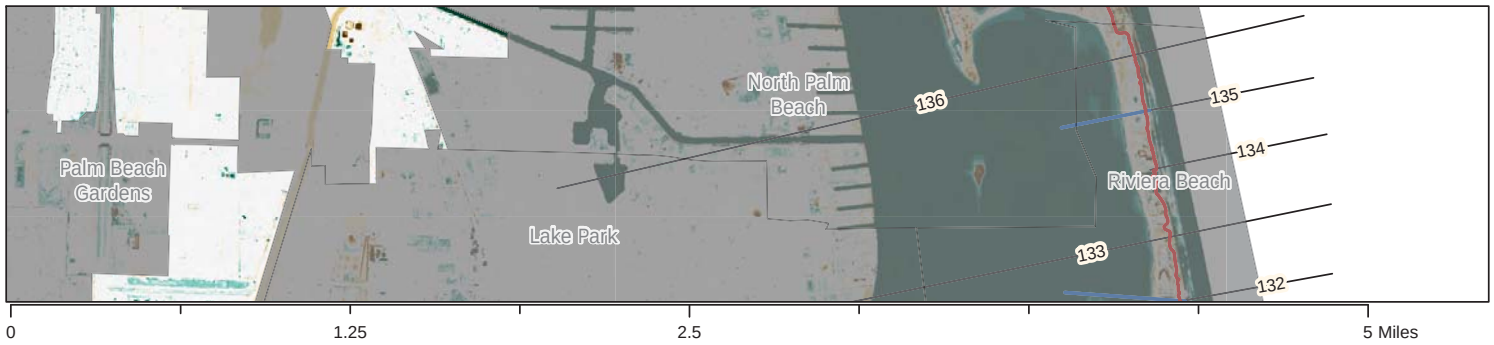
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

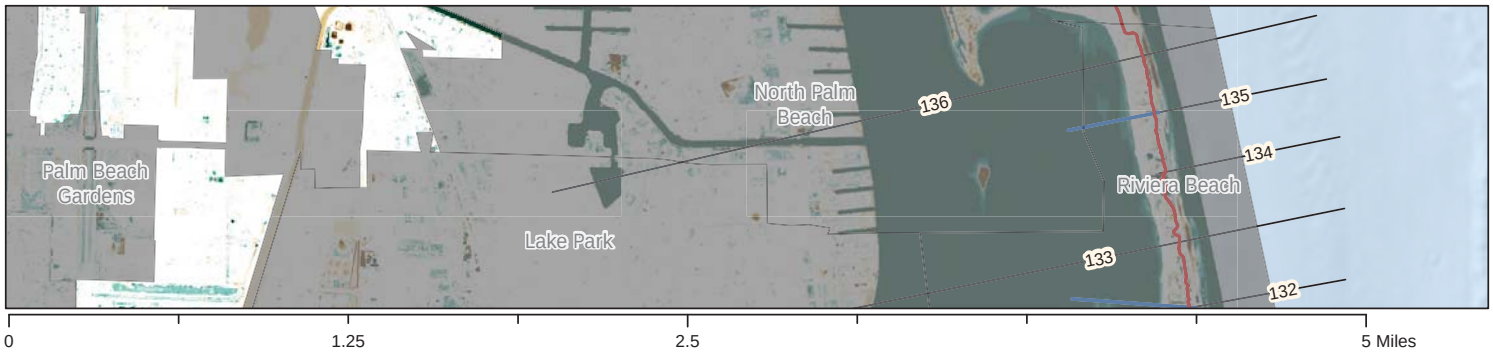
Change Since Last FIRM



PBC minus SWFLTB DEM

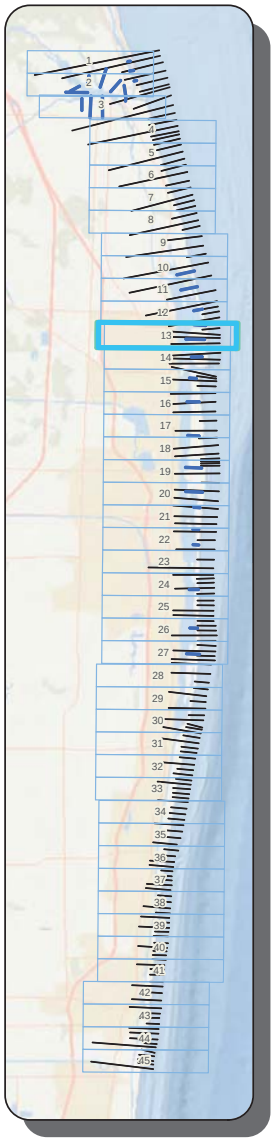


PBC minus USACE



Transect View

Page: 13



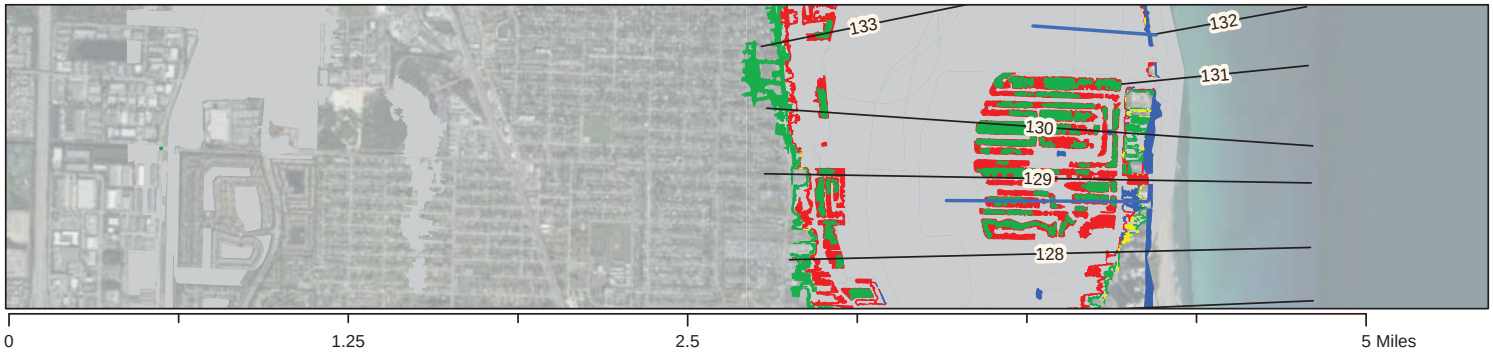
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

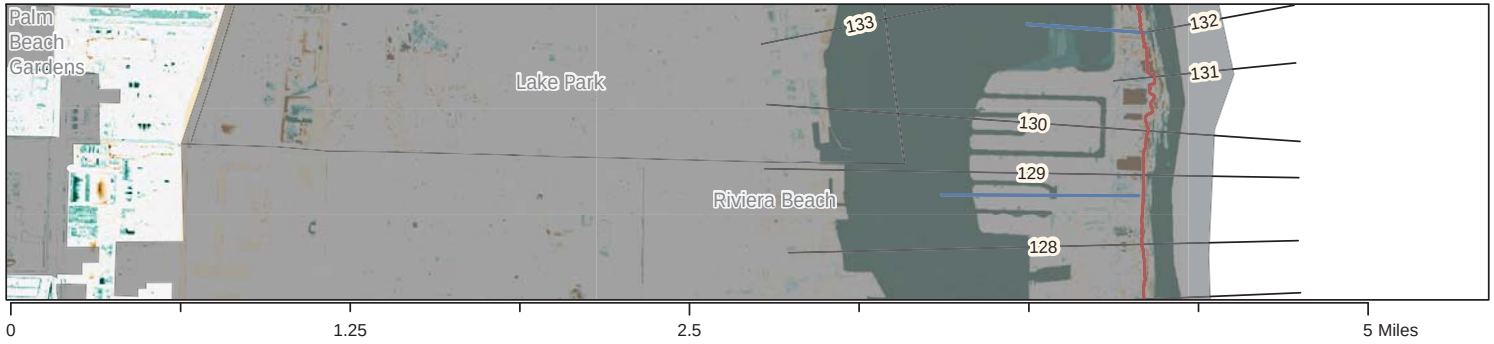
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

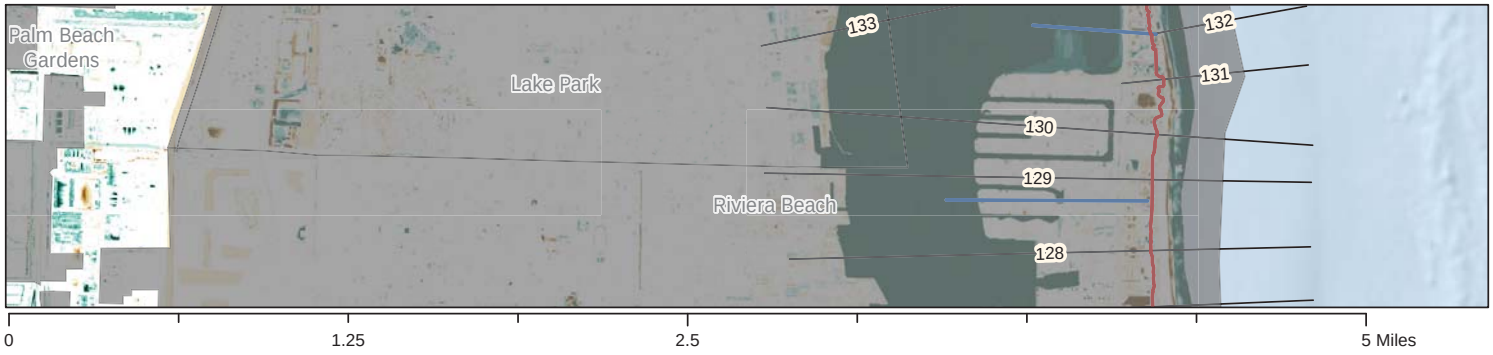
Change Since Last FIRM



PBC minus SWFLTB DEM

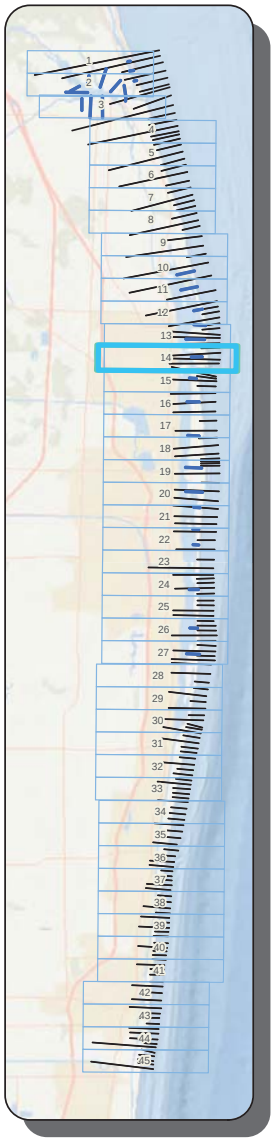


PBC minus USACE



Transect View

Page: 14

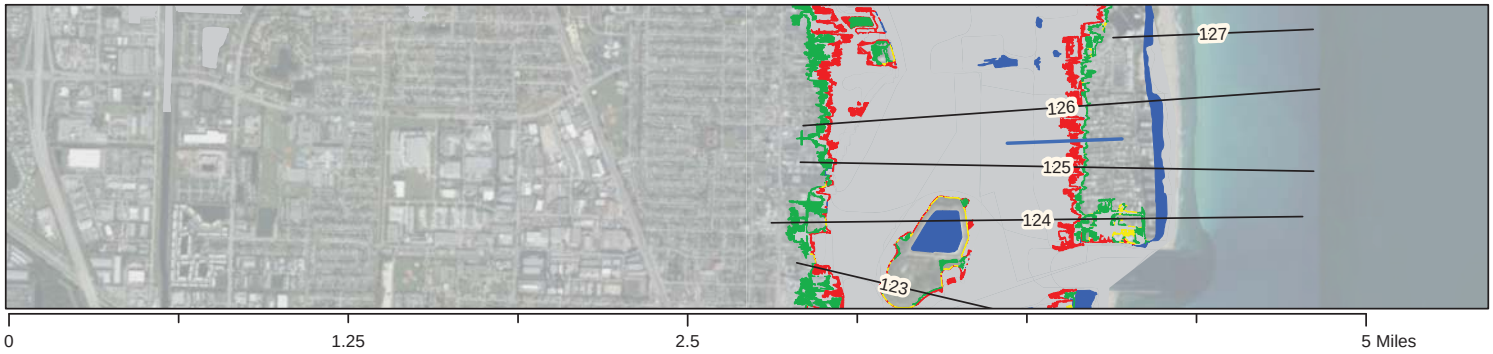


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

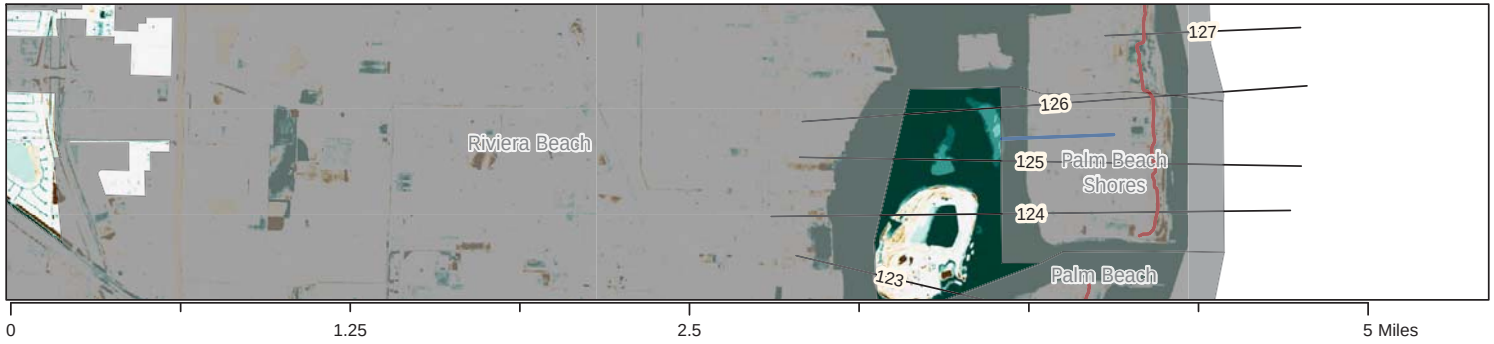
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

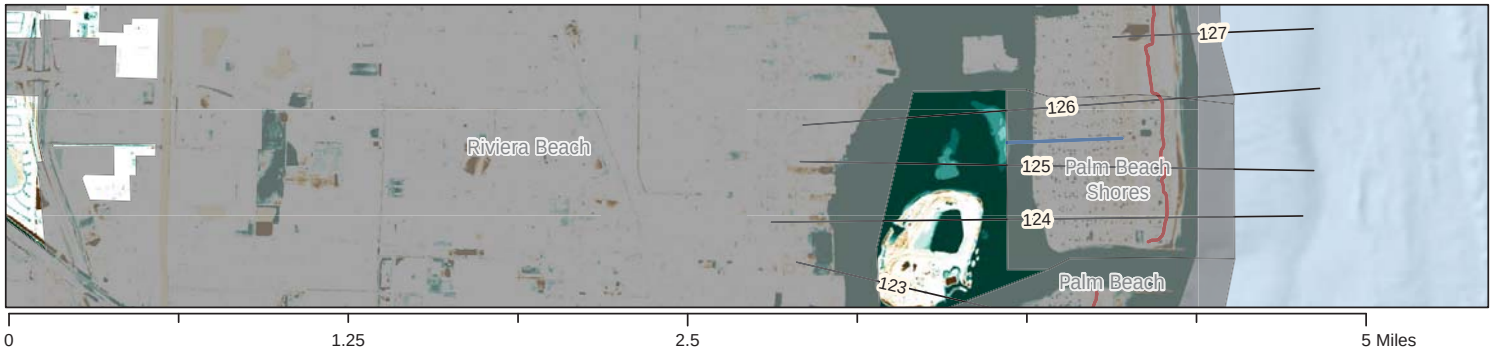
Change Since Last FIRM



PBC minus SWFLTB DEM

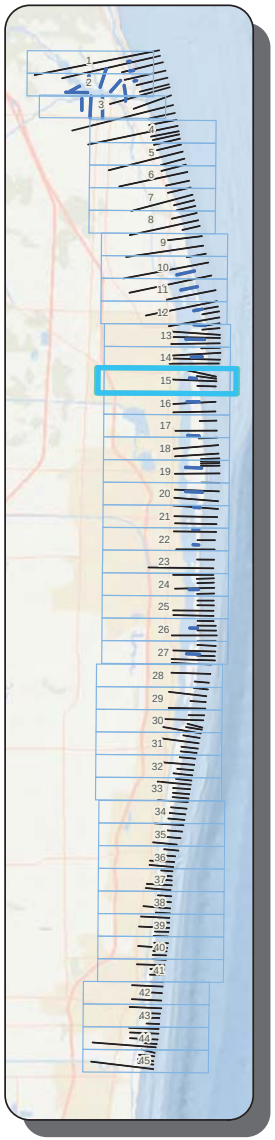


PBC minus USACE



Transect View

Page: 15

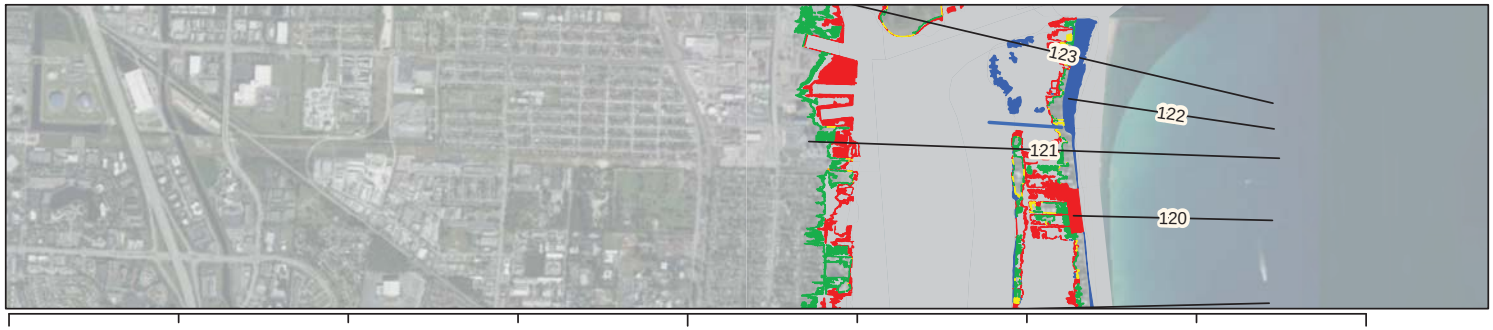


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

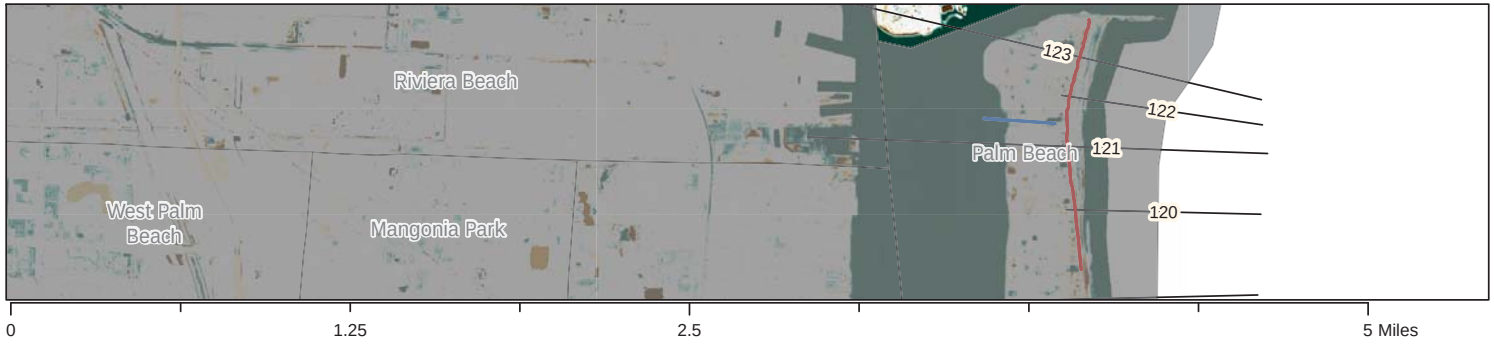
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

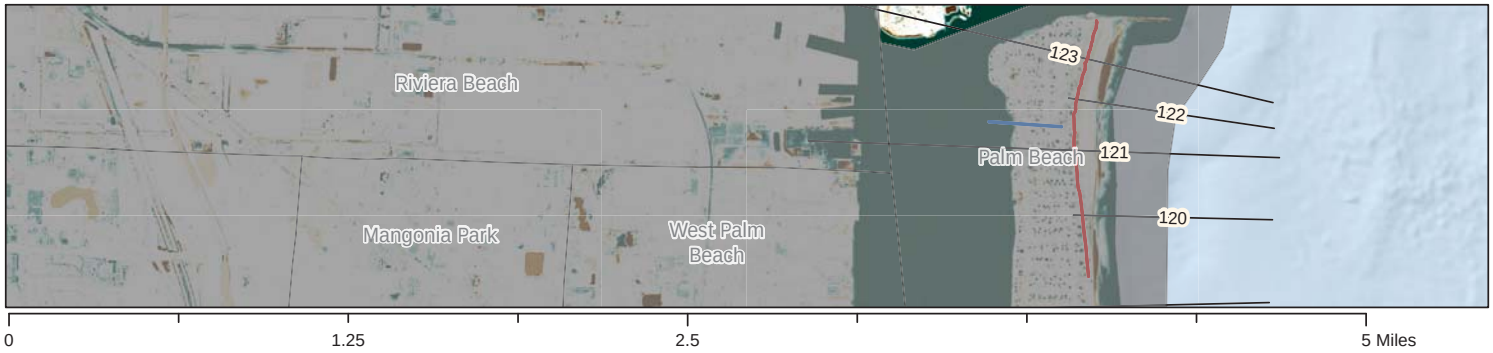
Change Since Last FIRM



PBC minus SWFLTB DEM

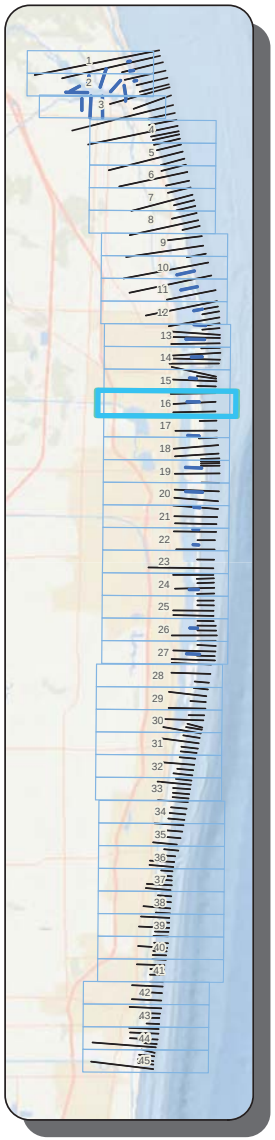


PBC minus USACE



Transect View

Page: 16



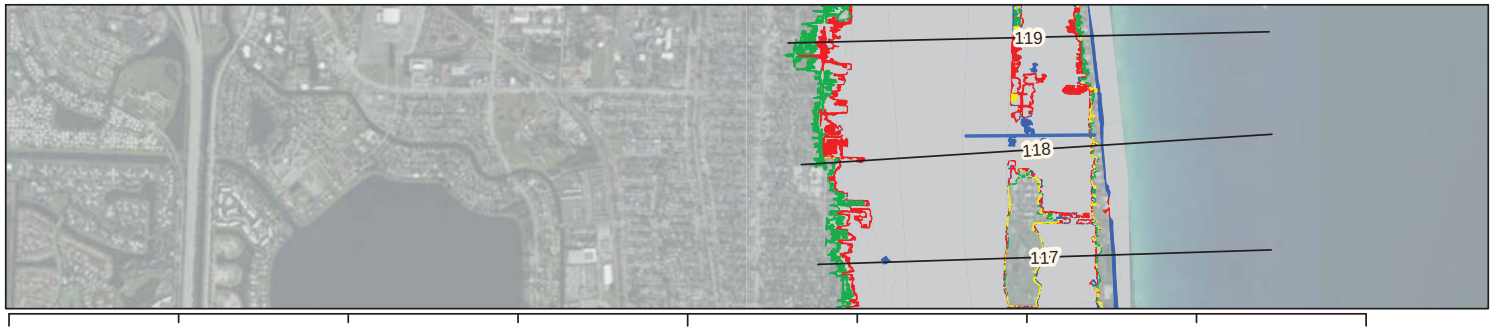
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

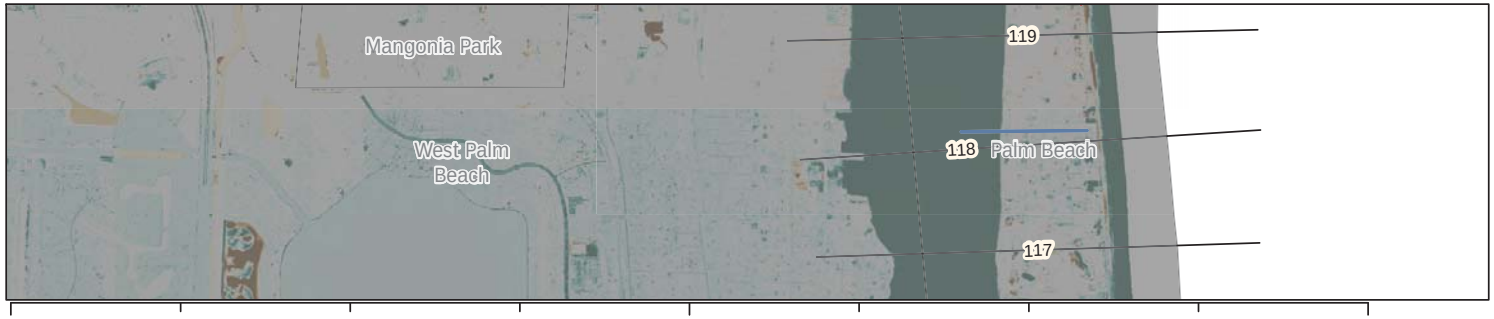
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

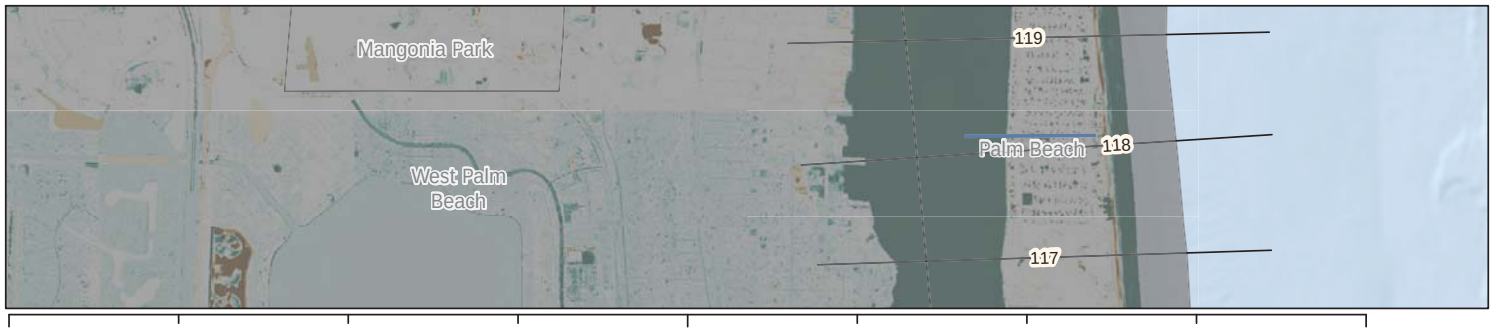
Change Since Last FIRM



PBC minus SWFLTB DEM

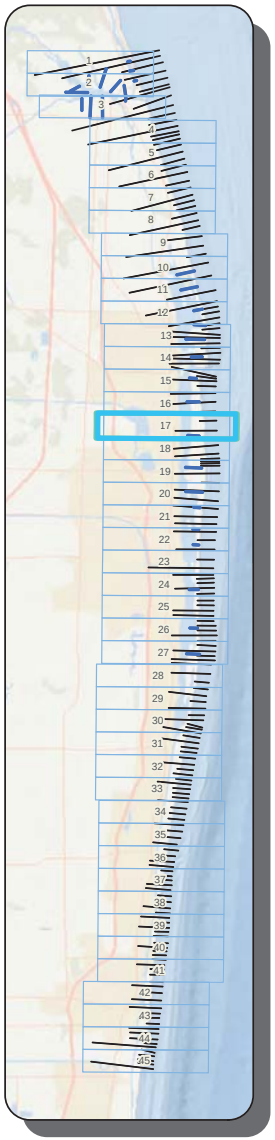


PBC minus USACE



Transect View

Page: 17

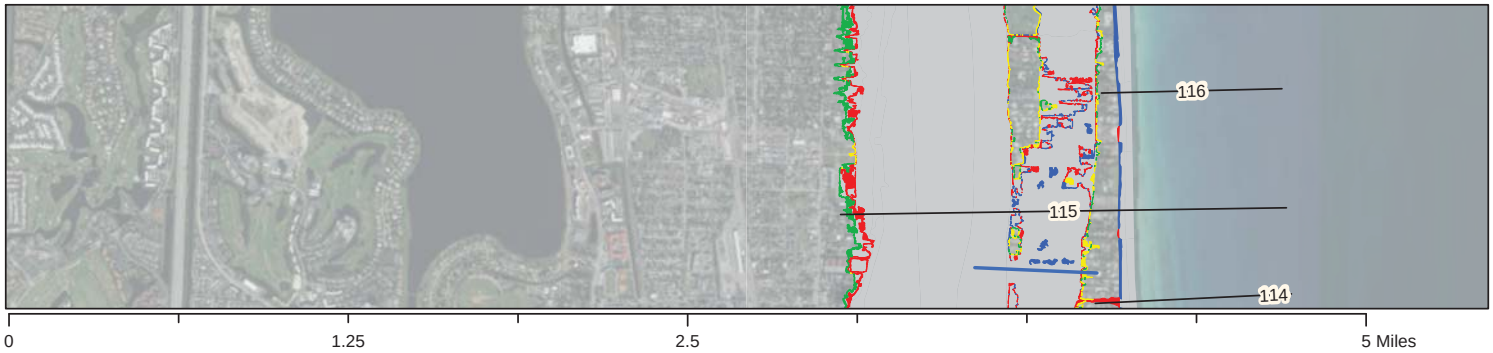


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

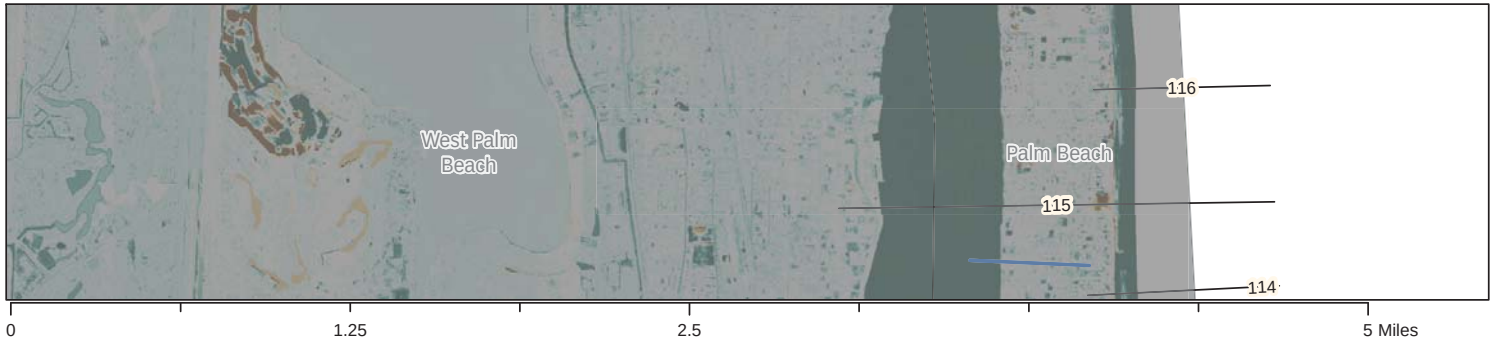
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

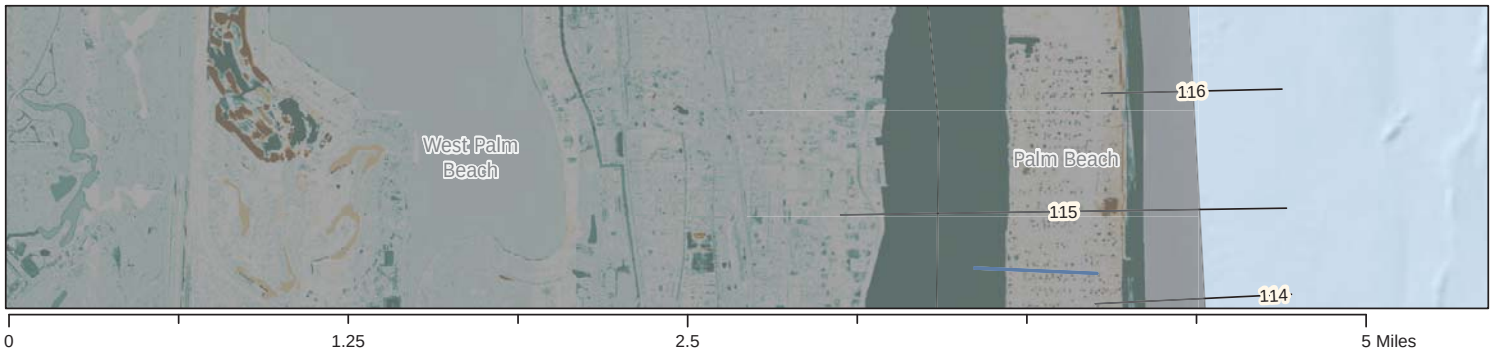
Change Since Last FIRM



PBC minus SWFLTB DEM

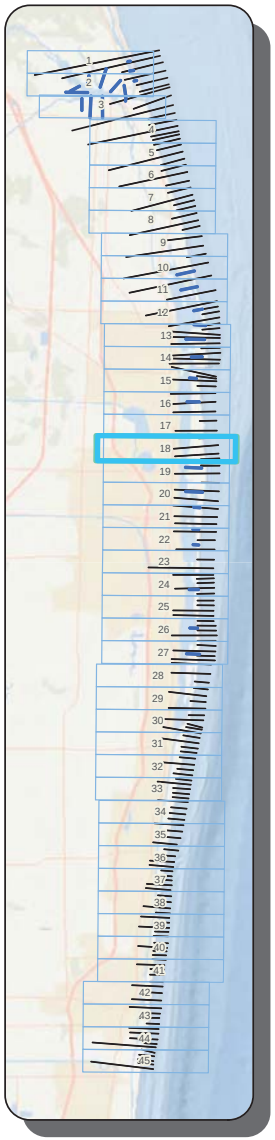


PBC minus USACE



Transect View

Page: 18



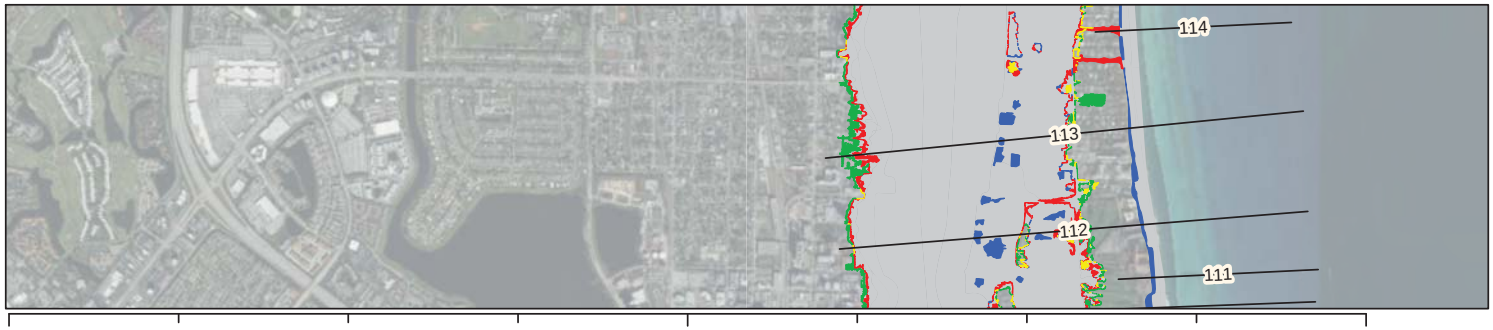
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

Municipalities

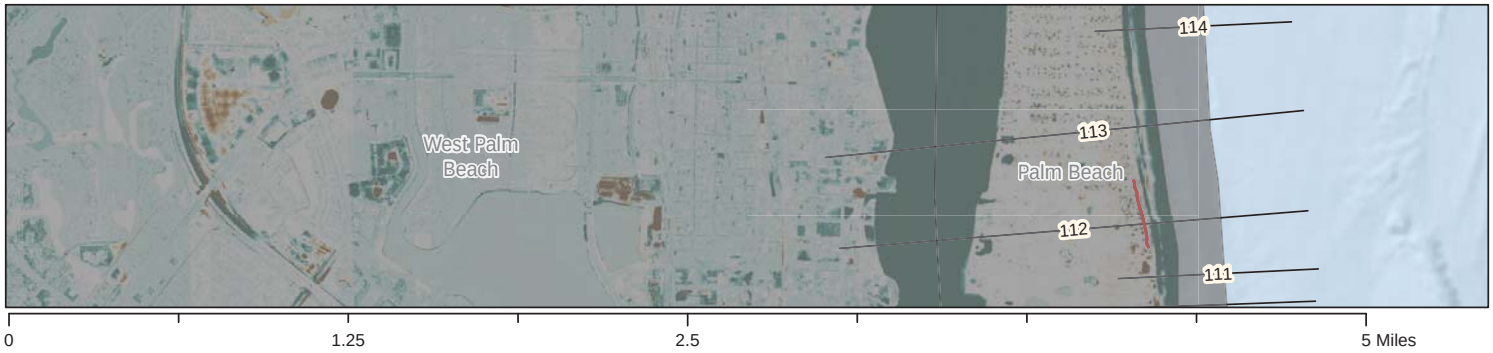
Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM



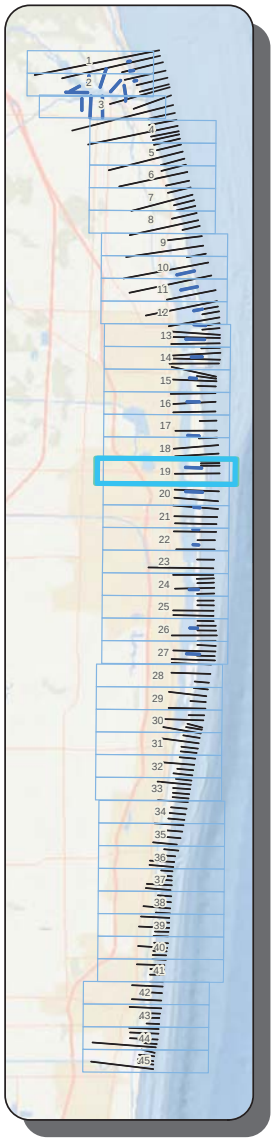
PBC minus SWFLTB DEM

PBC minus USACE



Transect View

Page: 19



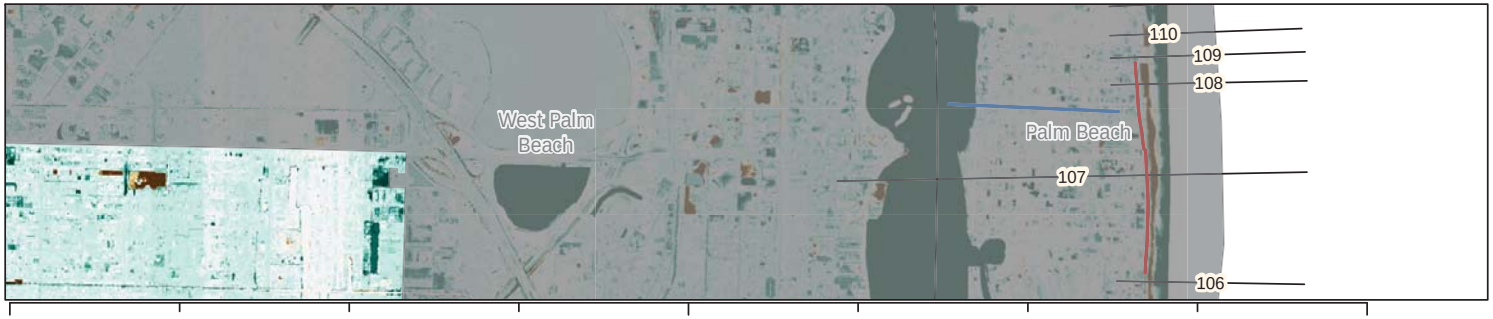
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

- Frontal Dune Line
- Municipalities

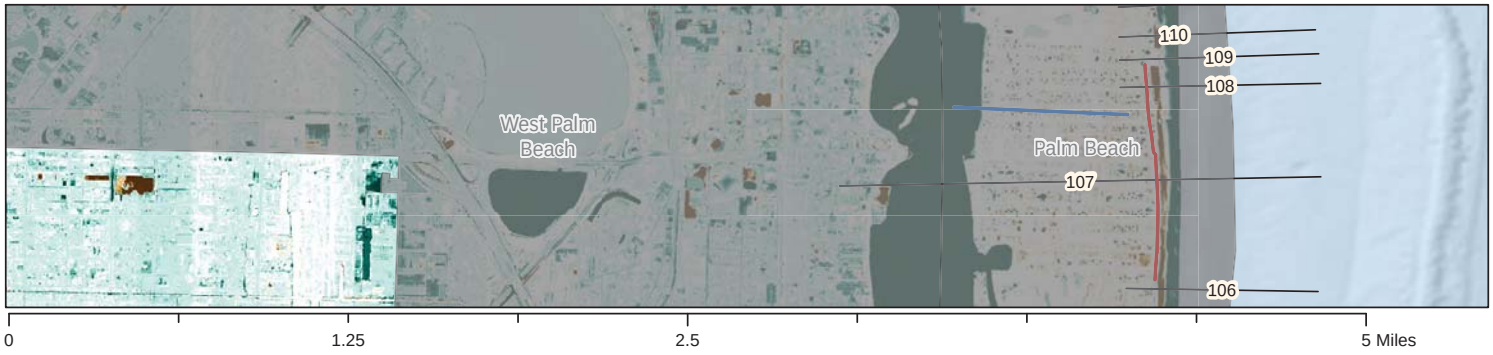
Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM

PBC minus SWFLTB DEM

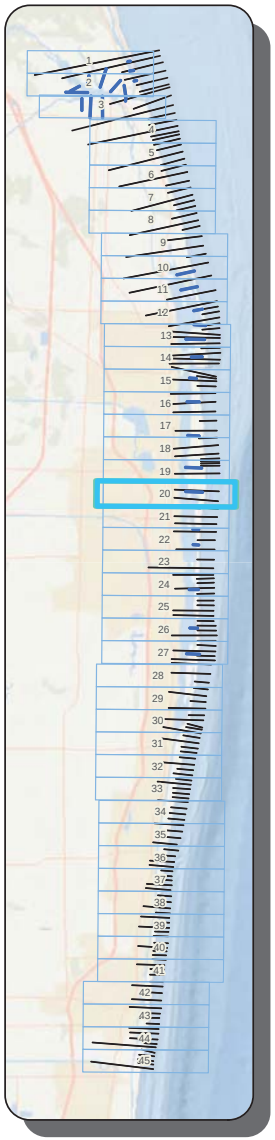


PBC minus USACE



Transect View

Page: 20

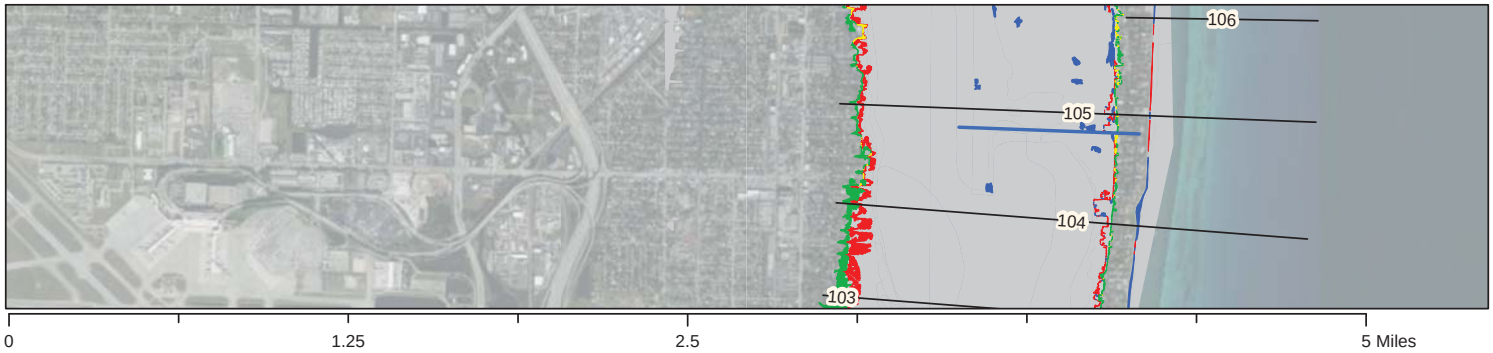


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

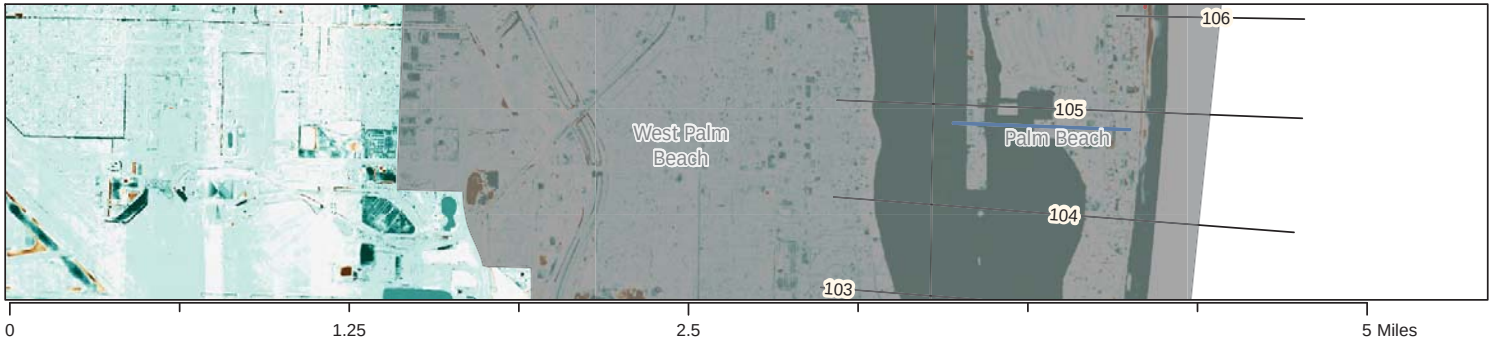
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

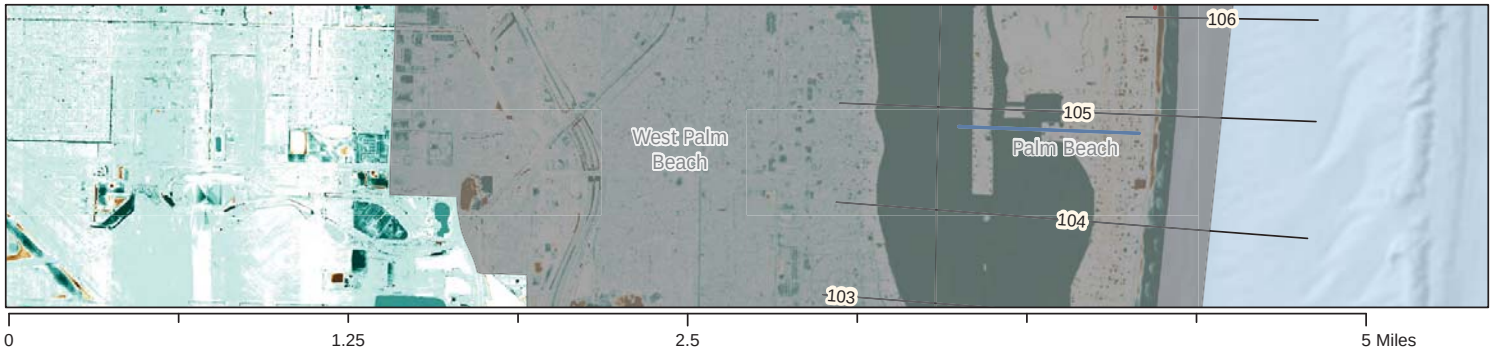
Change Since Last FIRM



PBC minus SWFLTB DEM

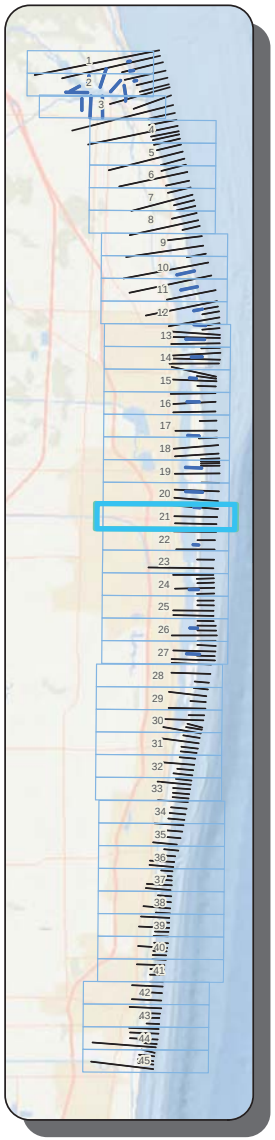


PBC minus USACE



Transect View

Page: 21

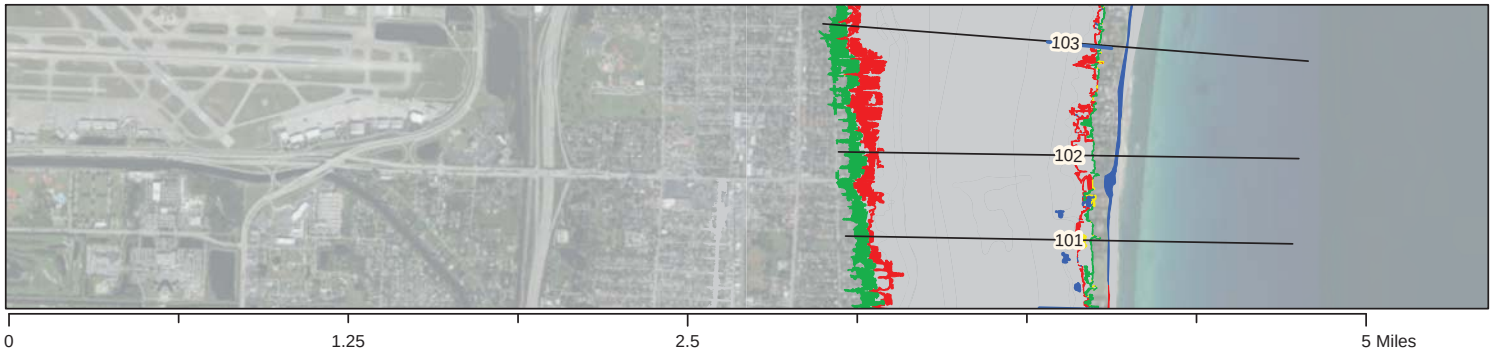


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

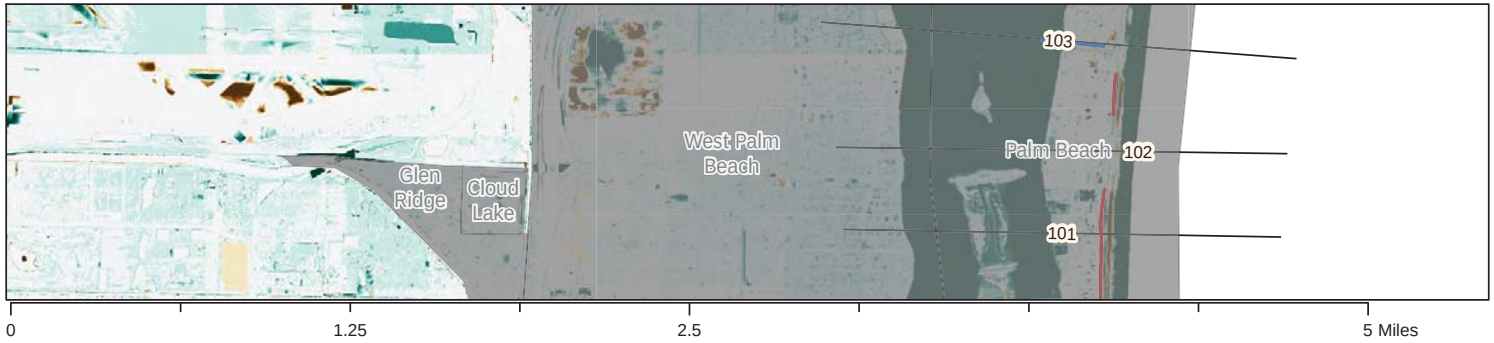
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

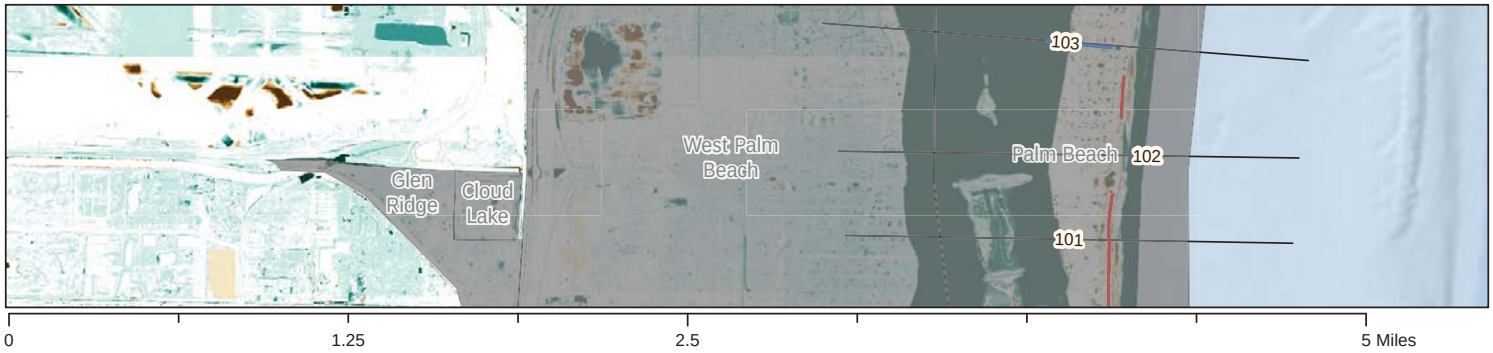
Change Since Last FIRM



PBC minus SWFLTB DEM

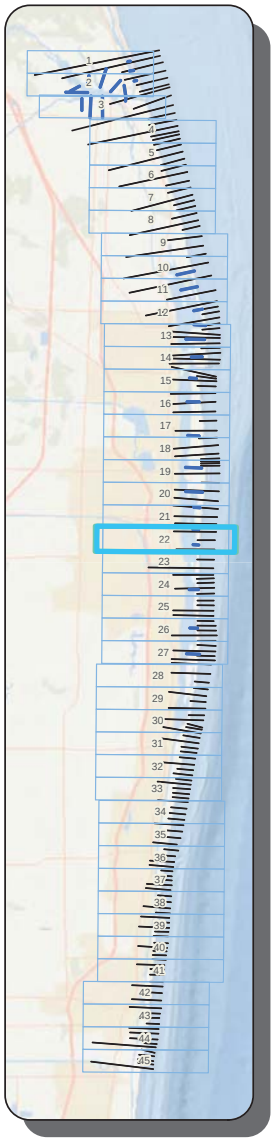


PBC minus USACE



Transect View

Page: 22



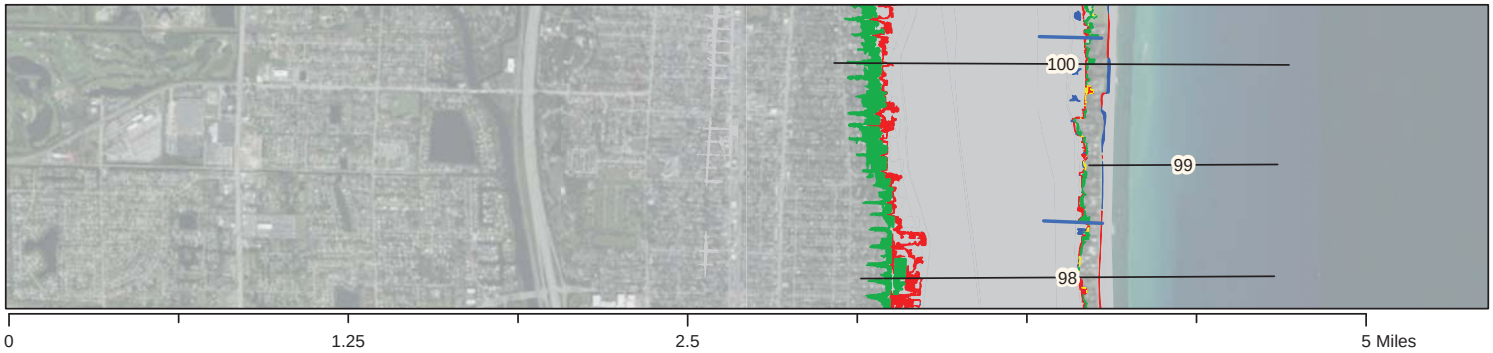
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

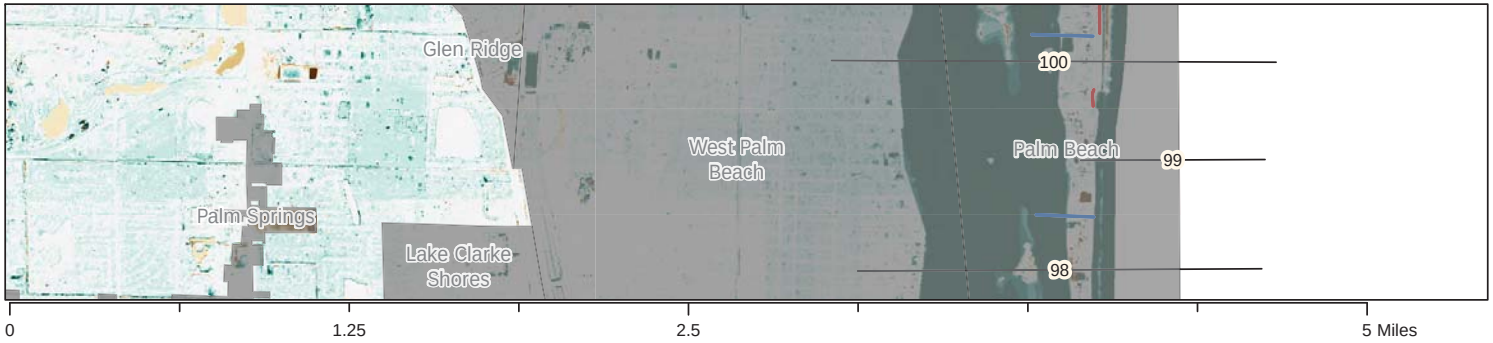
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

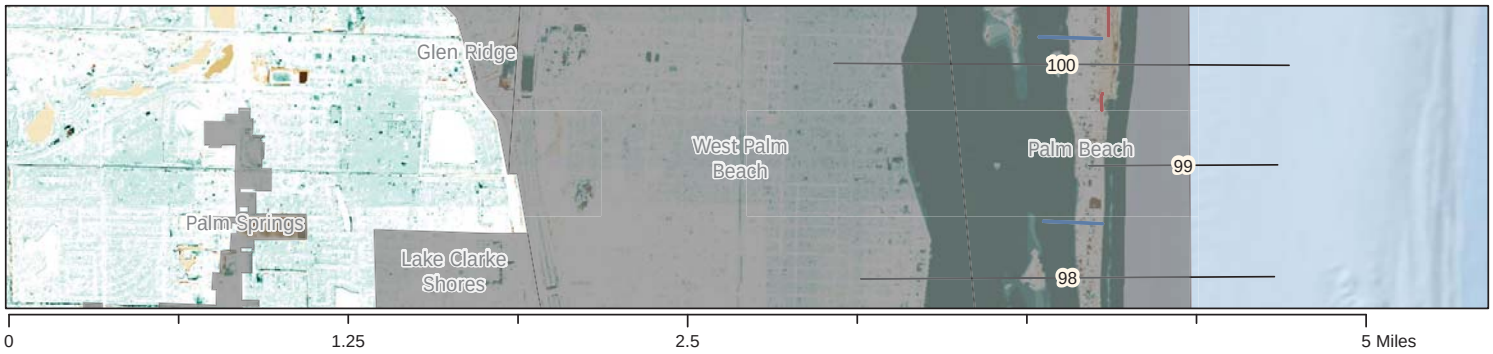
Change Since Last FIRM



PBC minus SWFLTB DEM

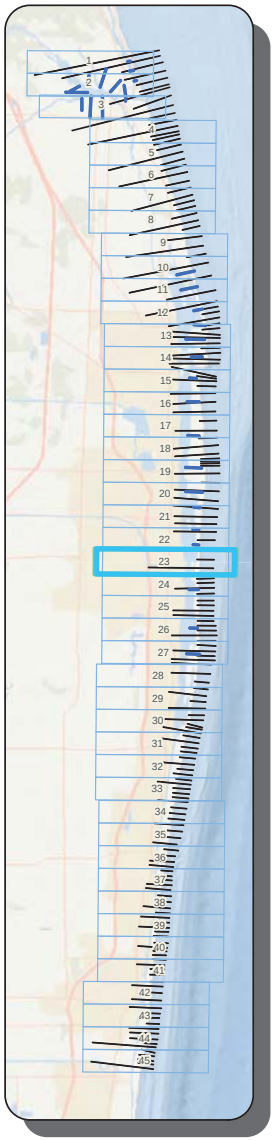


PBC minus USACE



Transect View

Page: 23

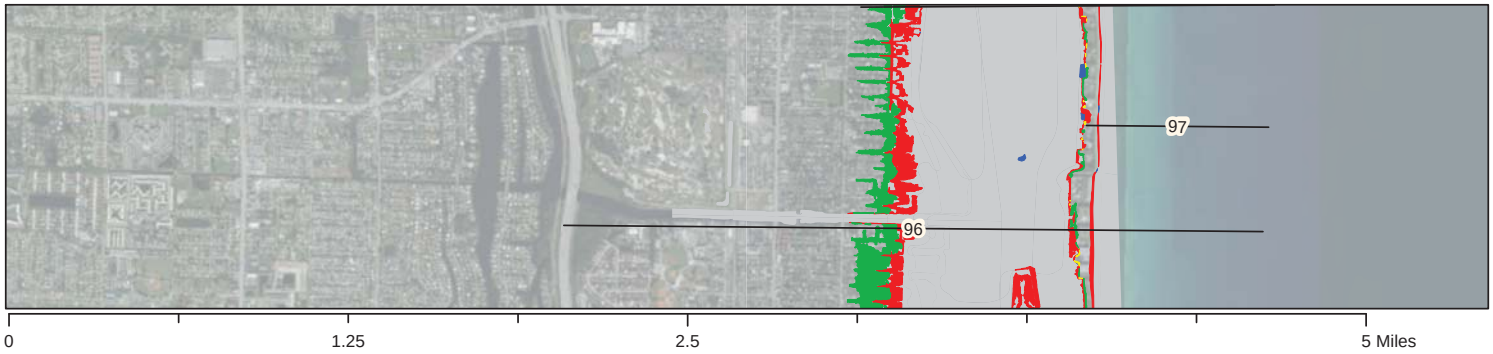


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

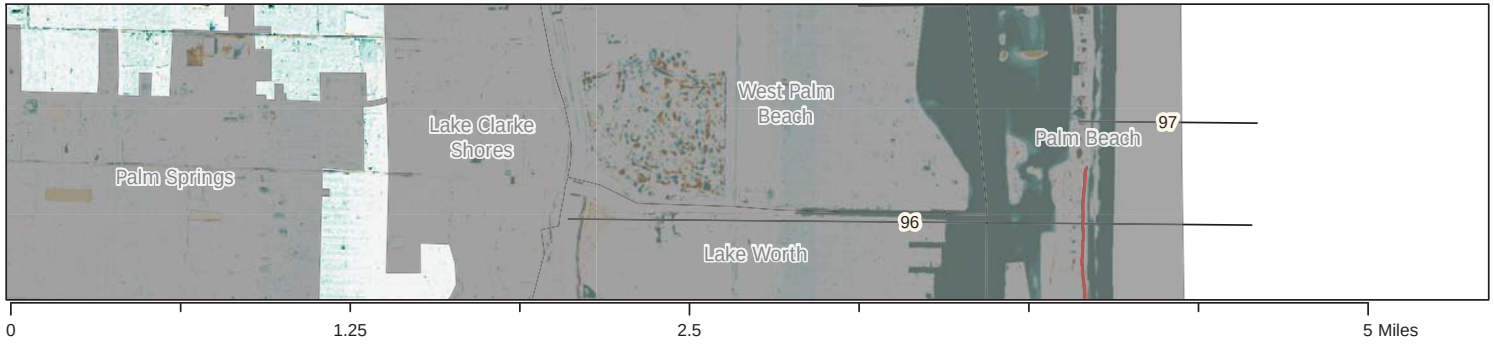
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

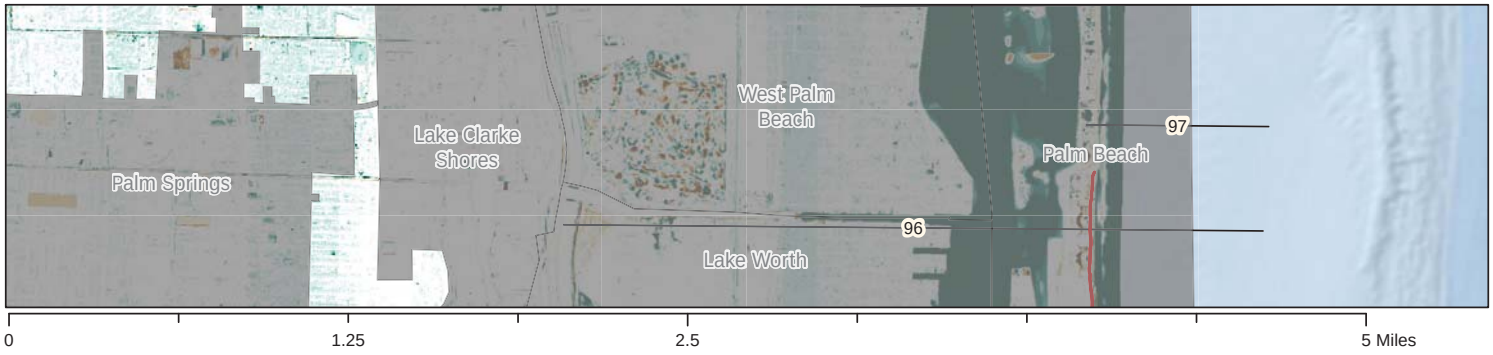
Change Since Last FIRM



PBC minus SWFLTB DEM

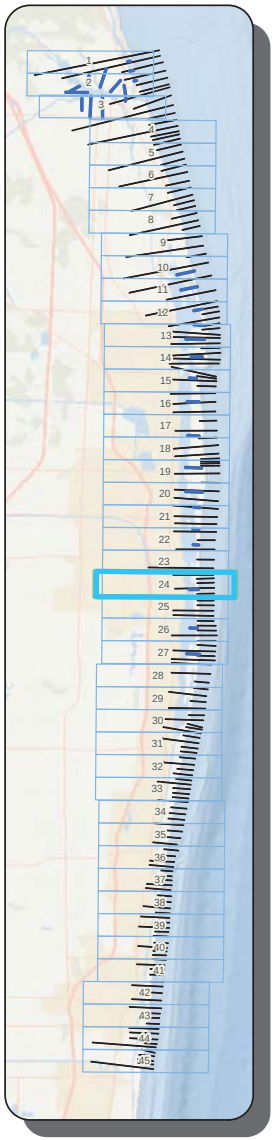


PBC minus USACE



Transect View

Page: 24

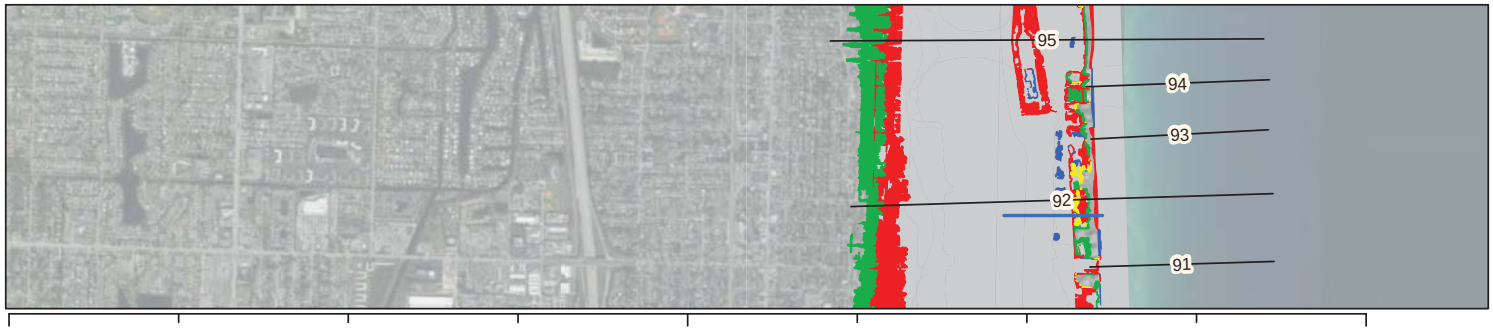


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

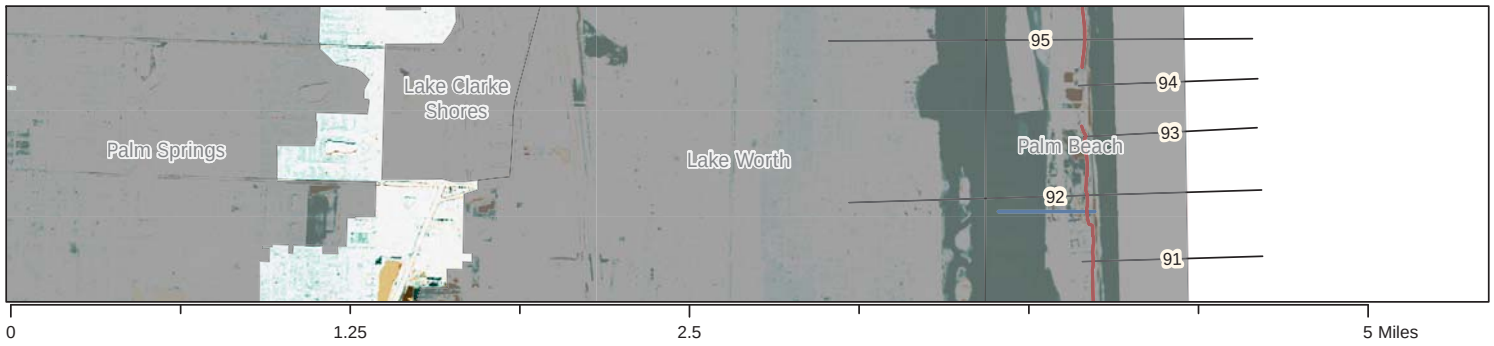
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

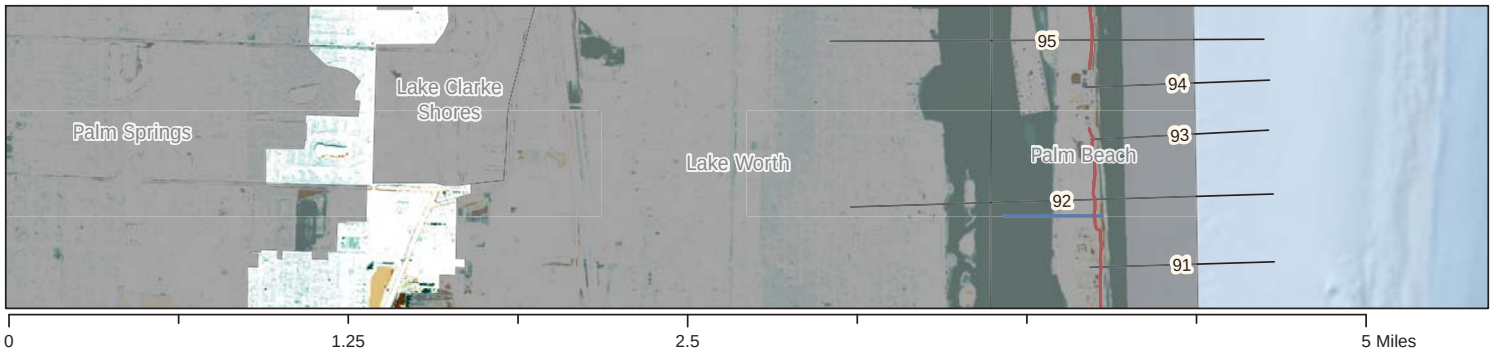
Change Since Last FIRM



PBC minus SWFLTB DEM

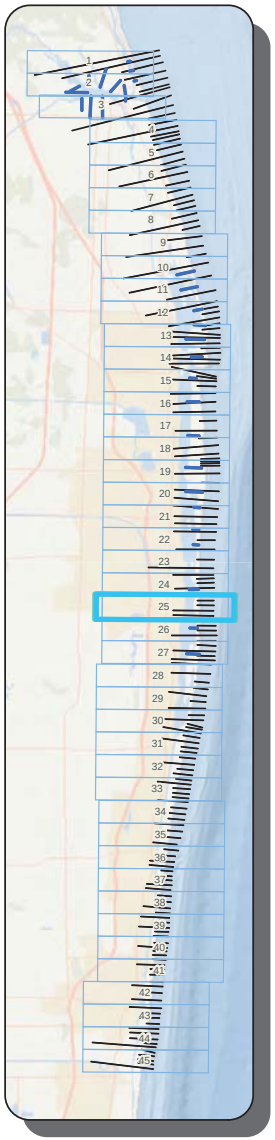


PBC minus USACE



Transect View

Page: 25

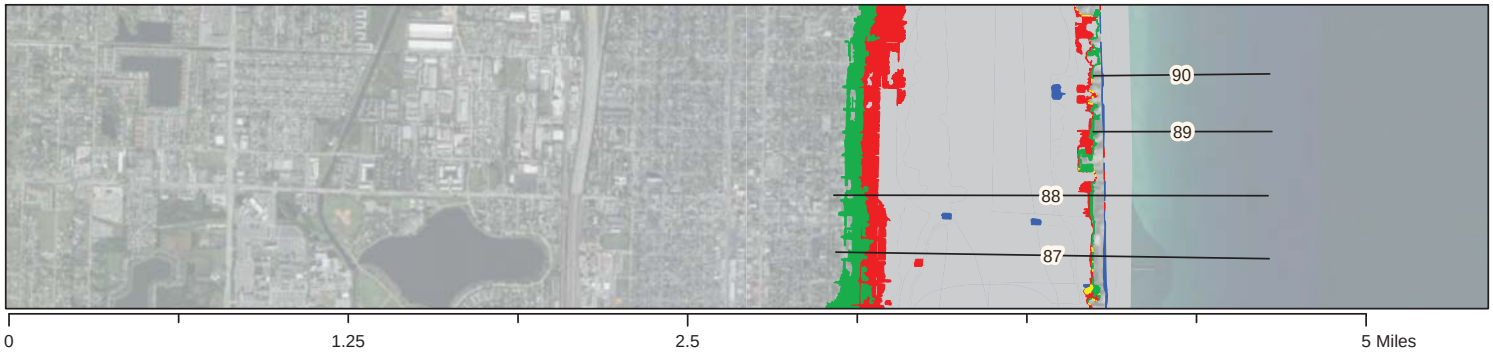


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

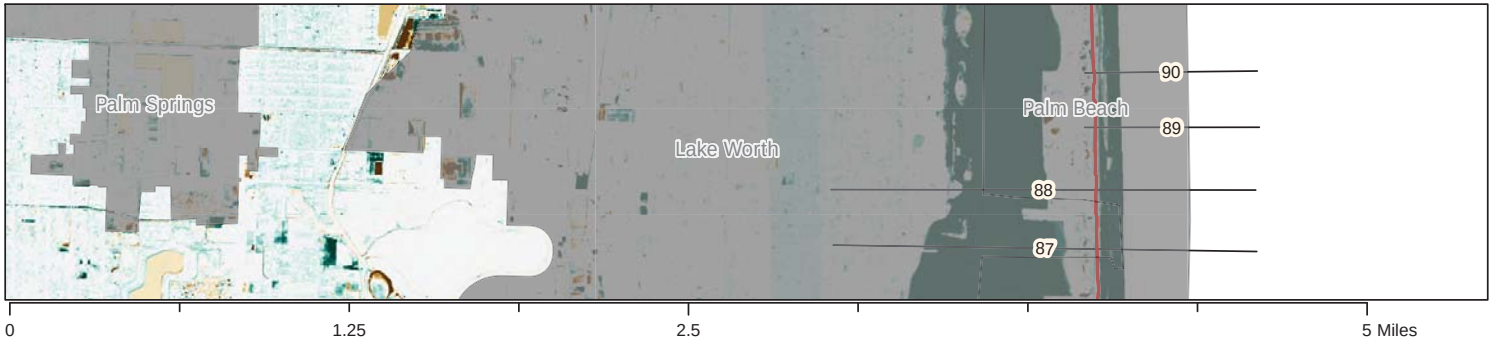
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

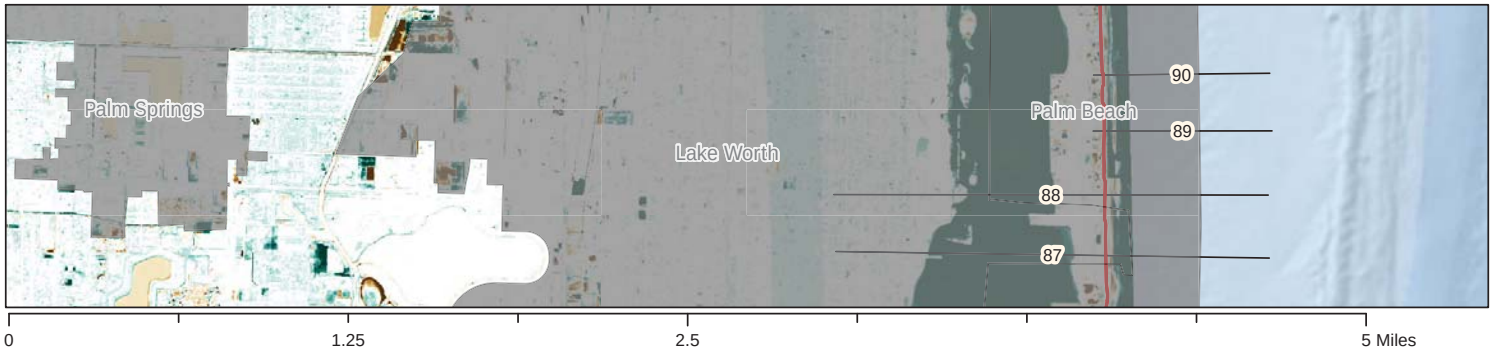
Change Since Last FIRM



PBC minus SWFLTB DEM

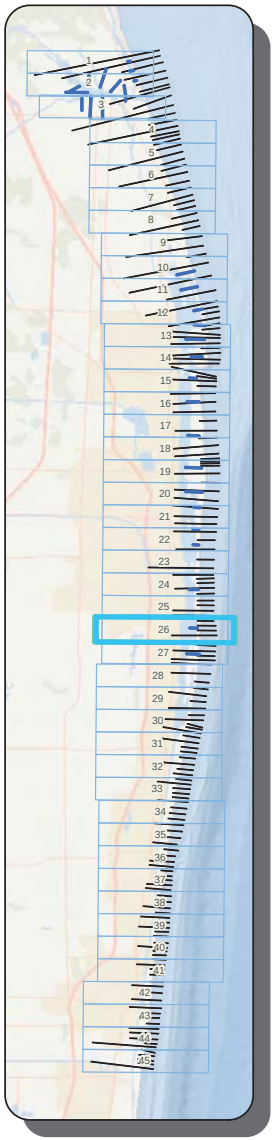


PBC minus USACE



Transect View

Page: 26



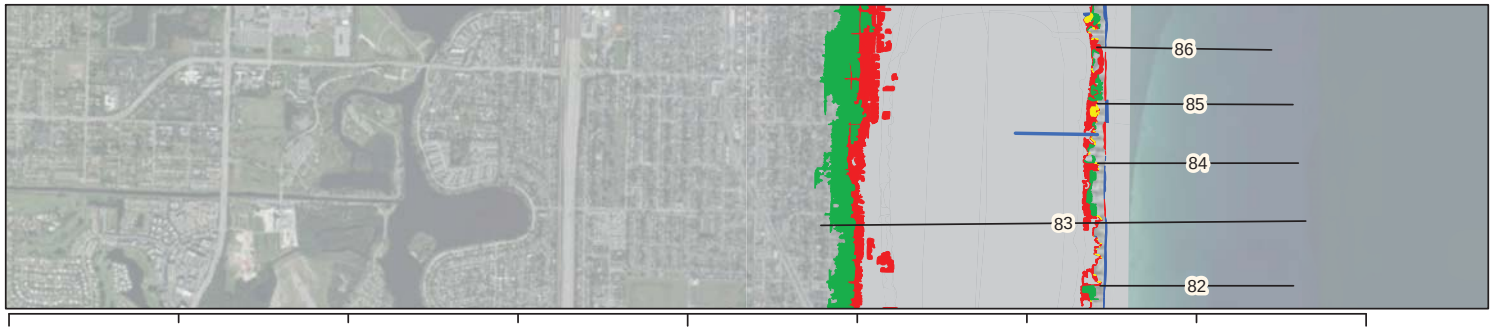
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

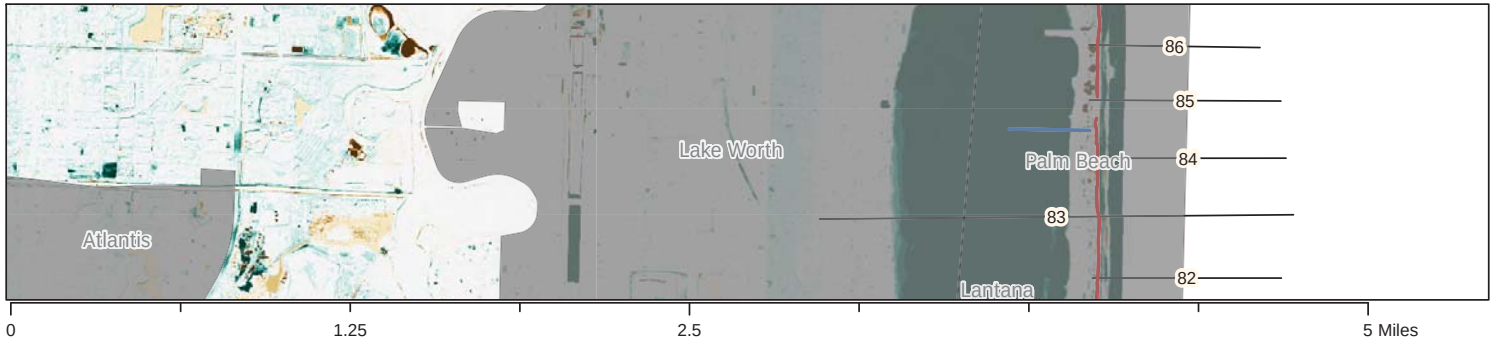
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

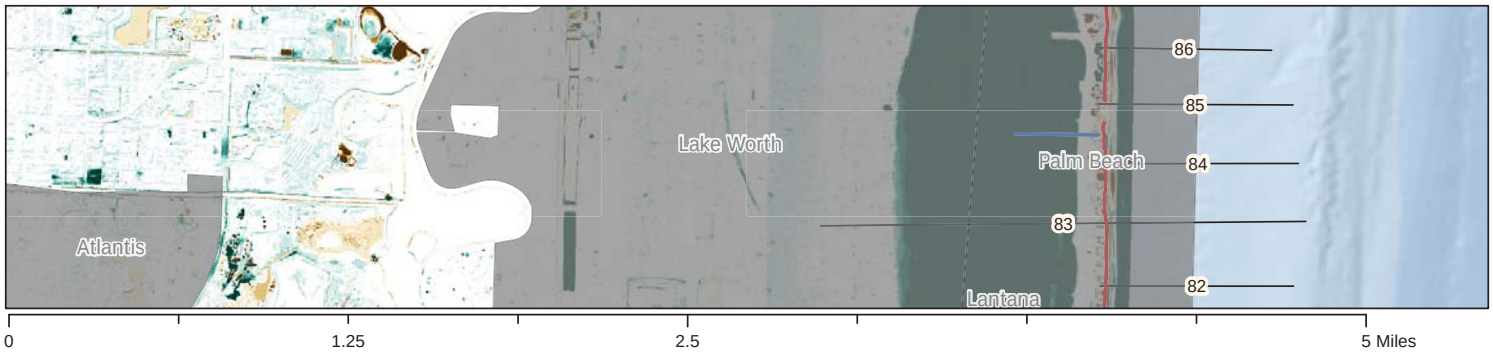
Change Since Last FIRM



PBC minus SWFLTB DEM

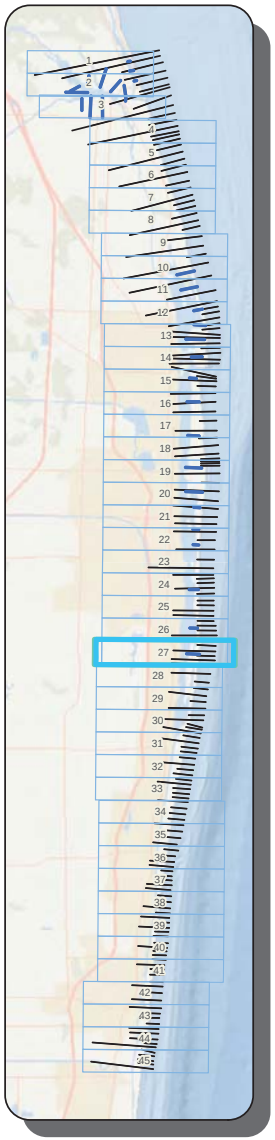


PBC minus USACE



Transect View

Page: 27

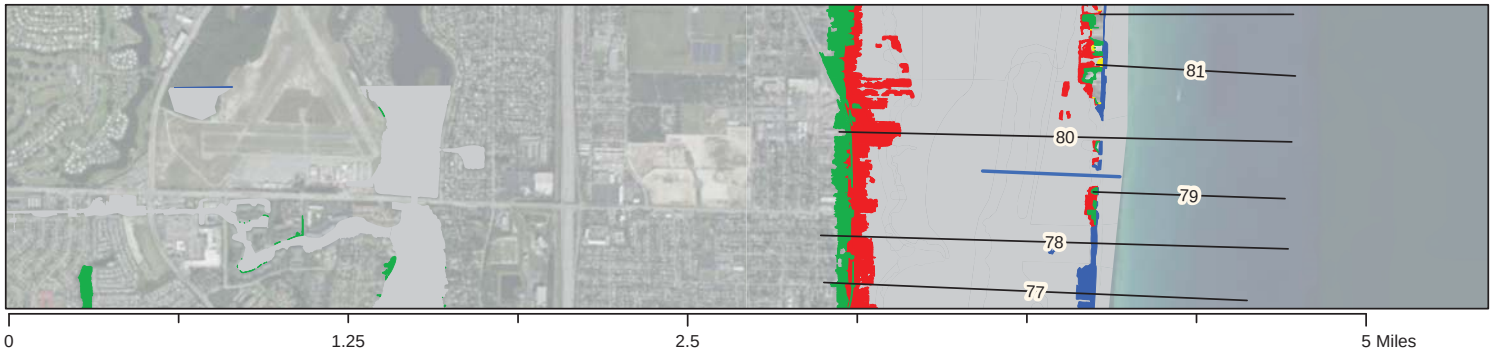


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

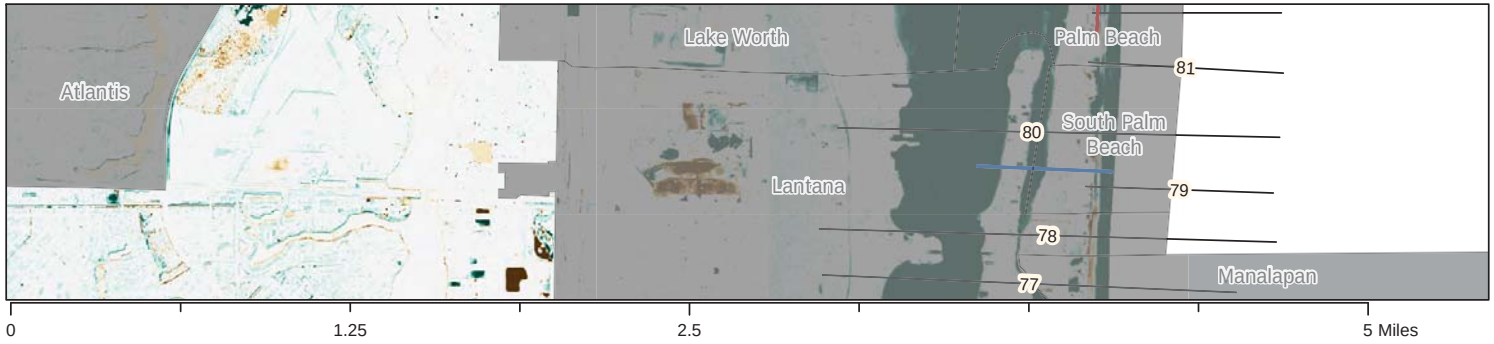
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

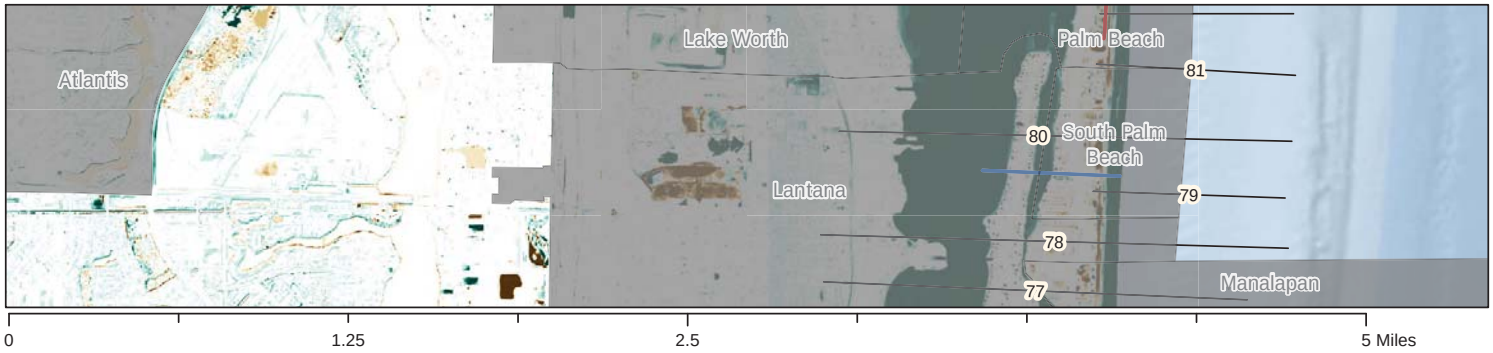
Change Since Last FIRM



PBC minus SWFLTB DEM

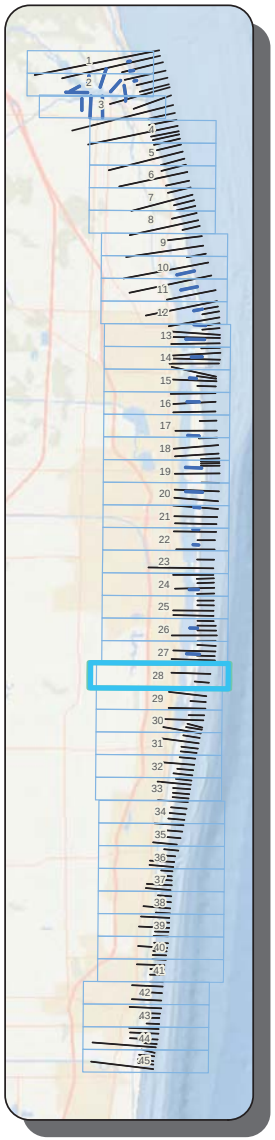


PBC minus USACE



Transect View

Page: 28

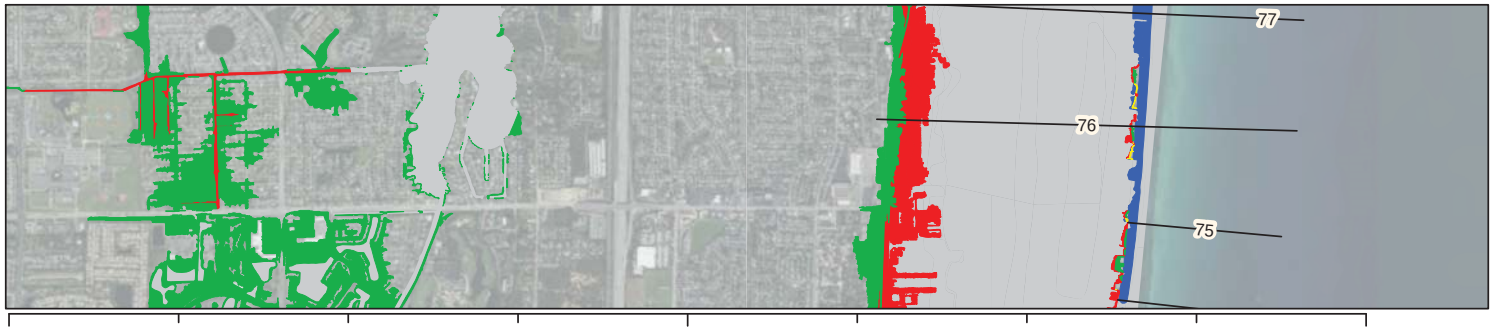


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

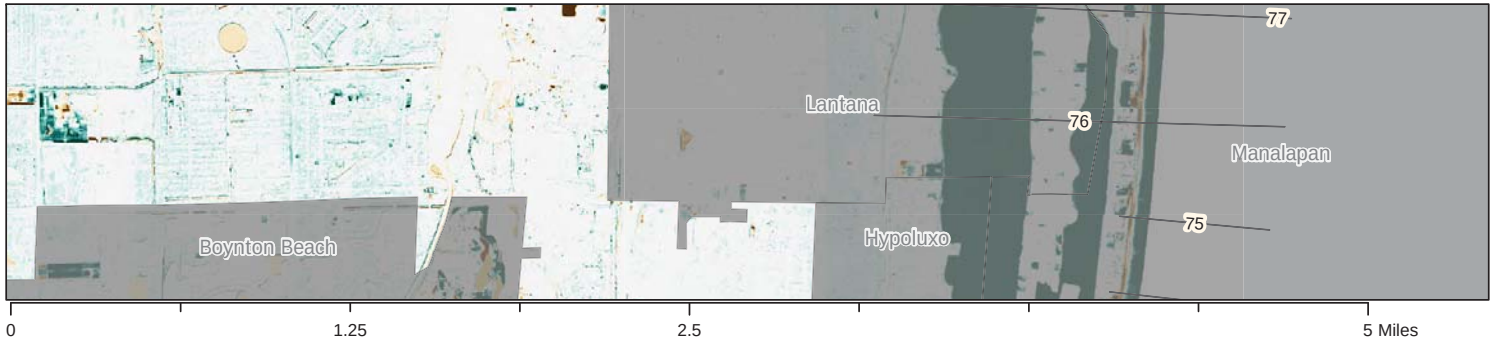
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

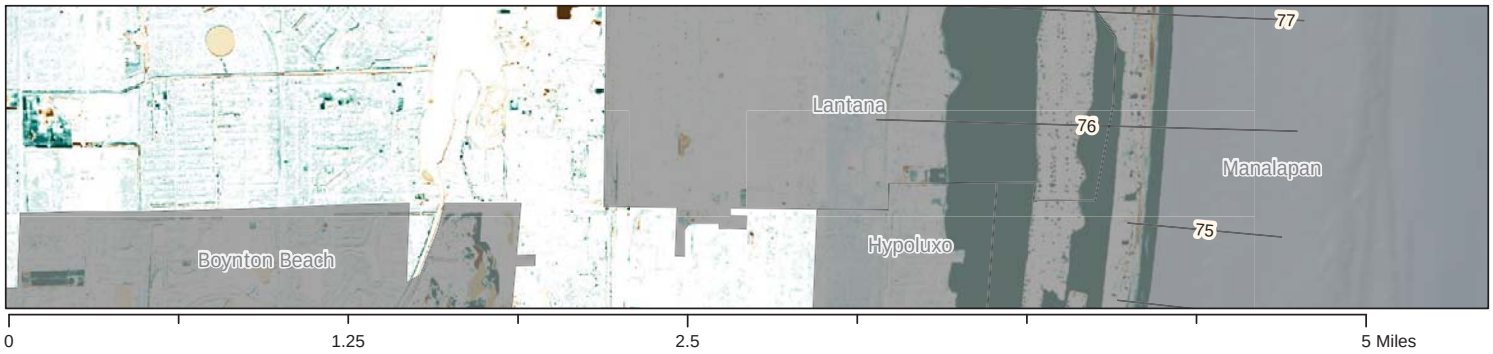
Change Since Last FIRM



PBC minus SWFLTB DEM

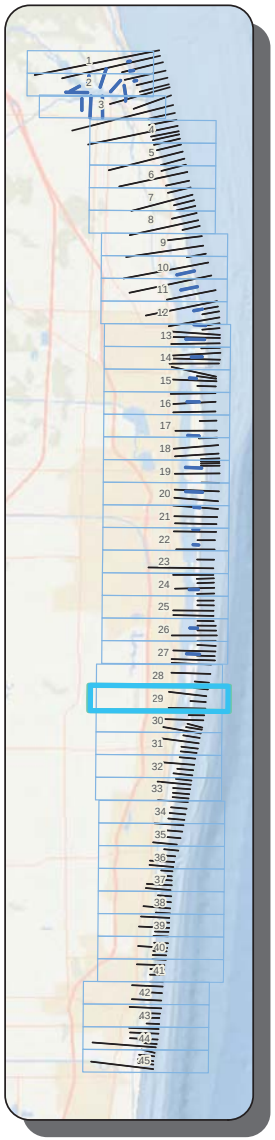


PBC minus USACE



Transect View

Page: 29



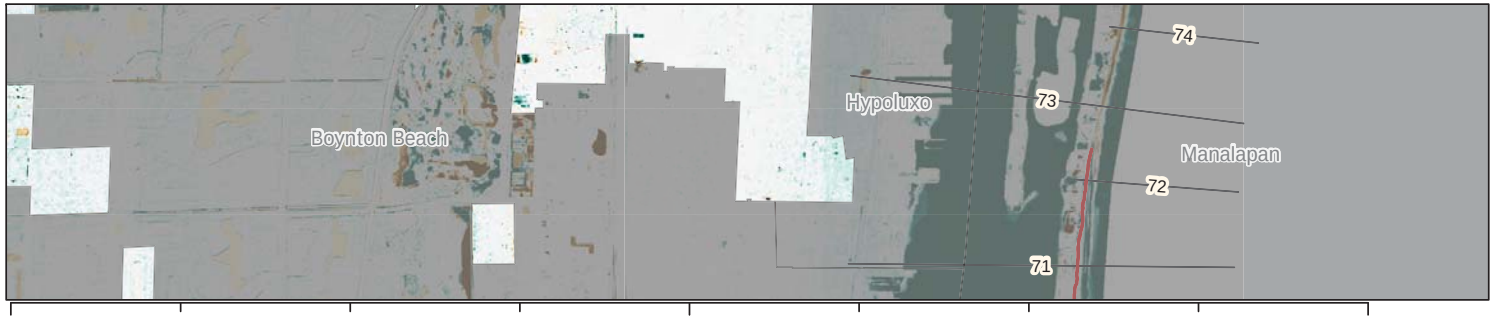
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

- Frontal Dune Line
- Municipalities

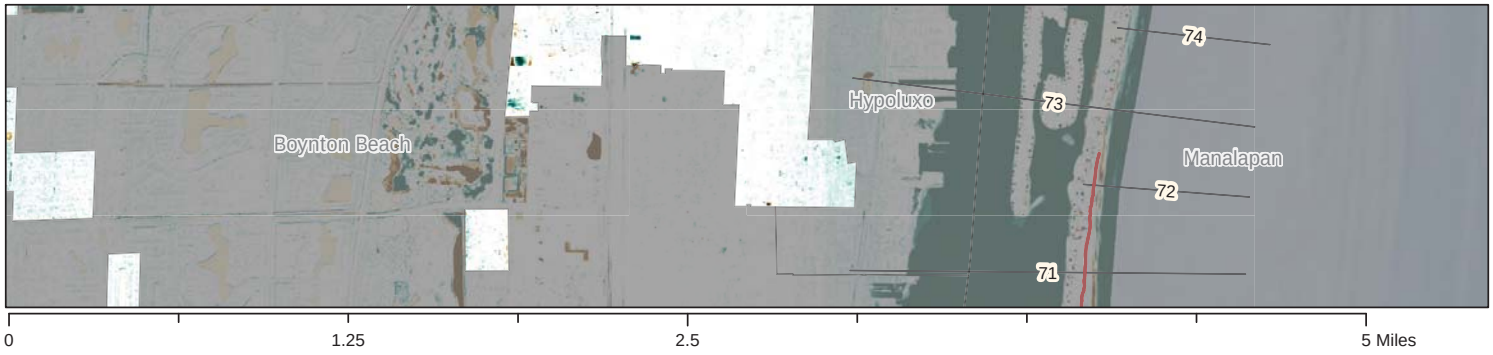
Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM

PBC minus SWFLTB DEM

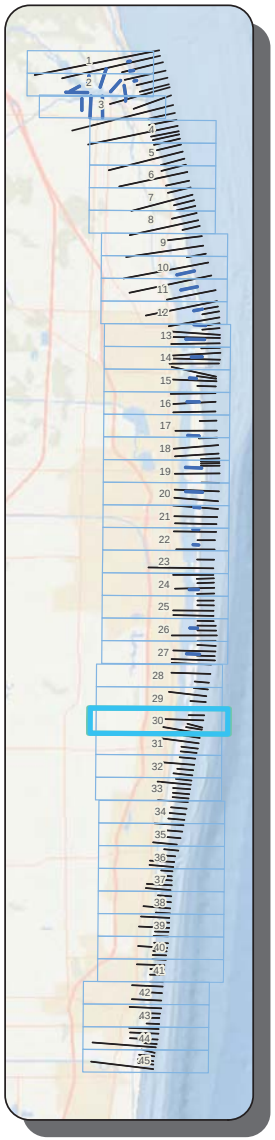


PBC minus USACE



Transect View

Page: 30

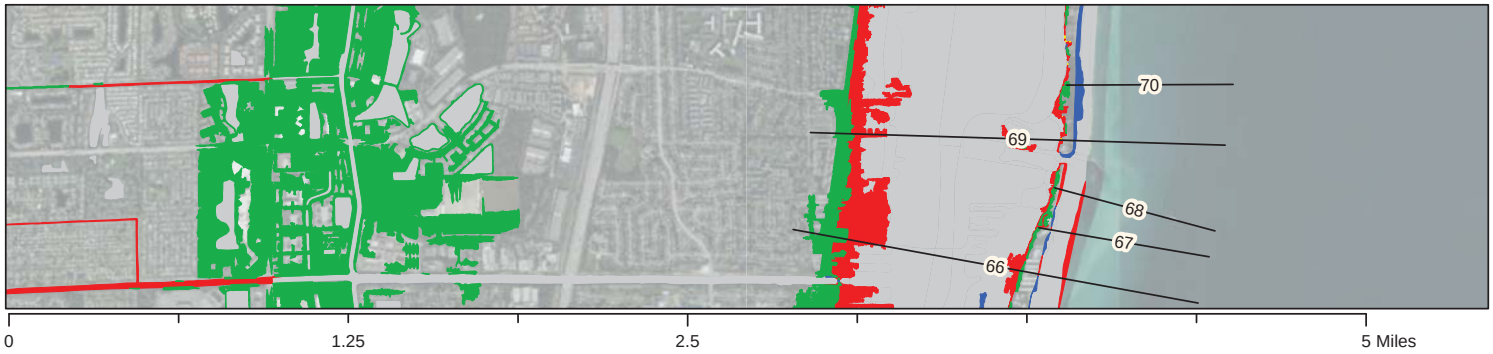


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

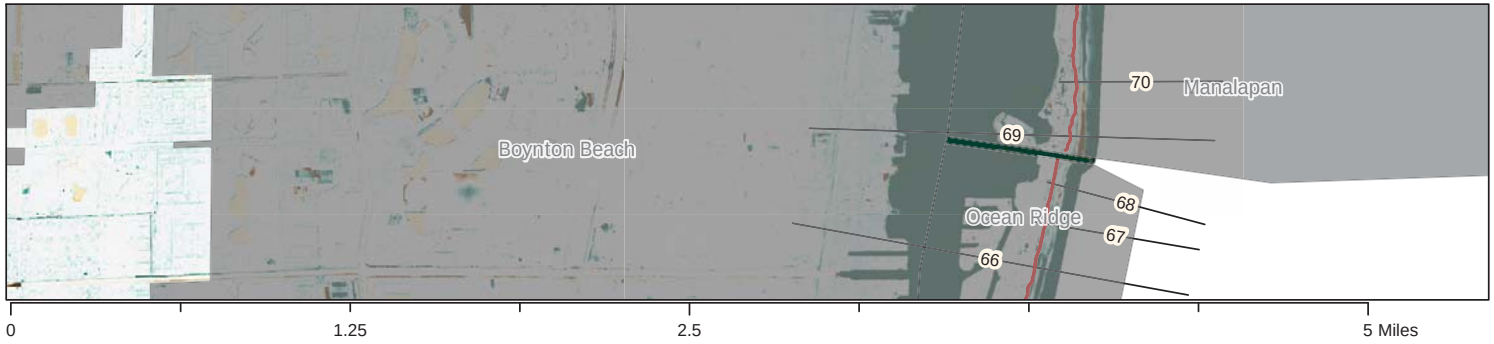
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

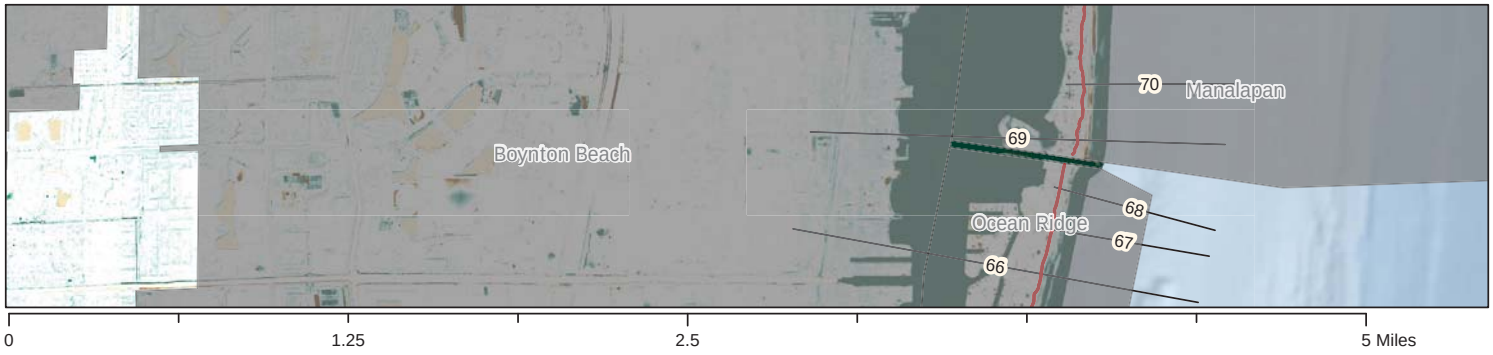
Change Since Last FIRM



PBC minus SWFLTB DEM

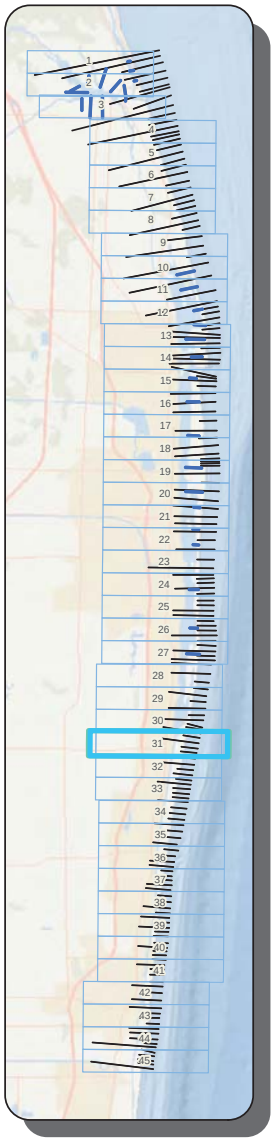


PBC minus USACE



Transect View

Page: 31

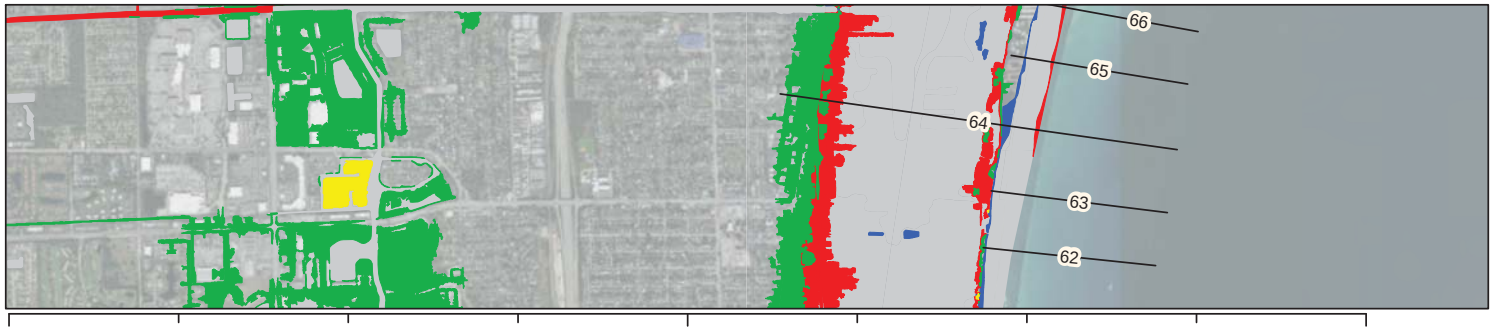


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

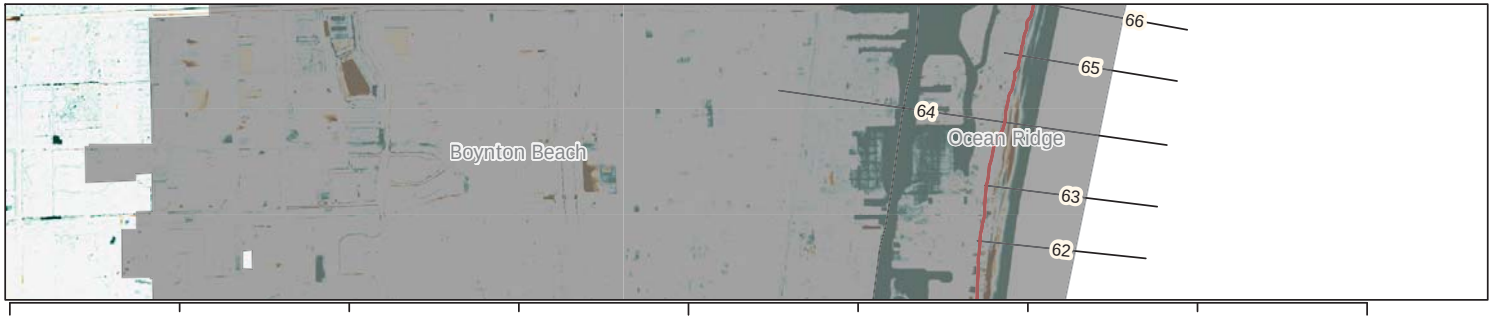
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

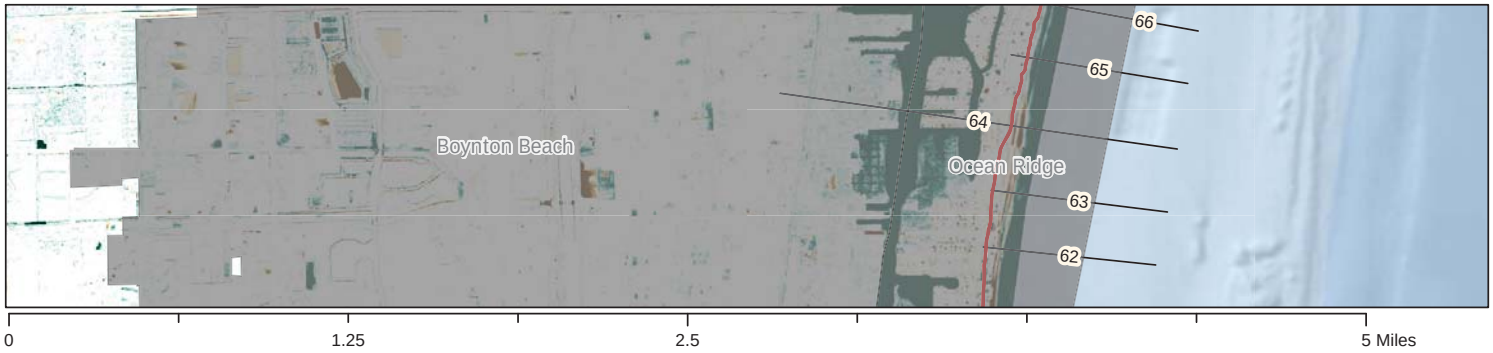
Change Since Last FIRM



PBC minus SWFLTB DEM

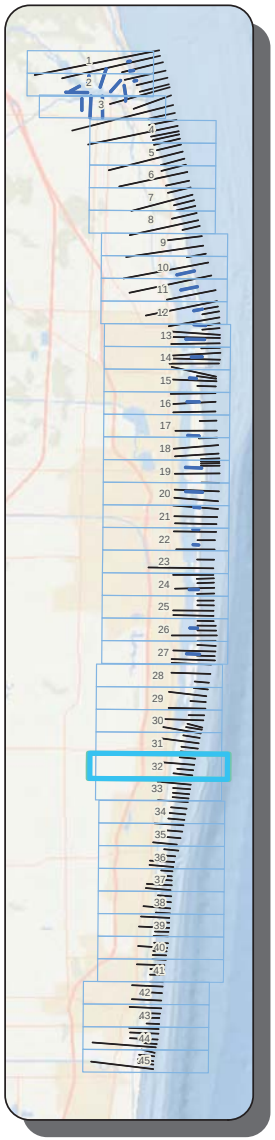


PBC minus USACE



Transect View

Page: 32

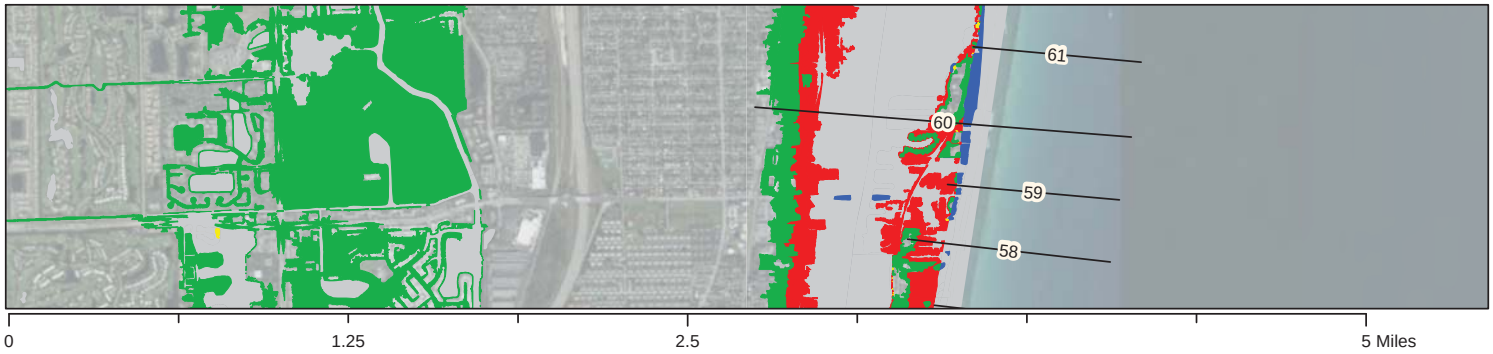


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

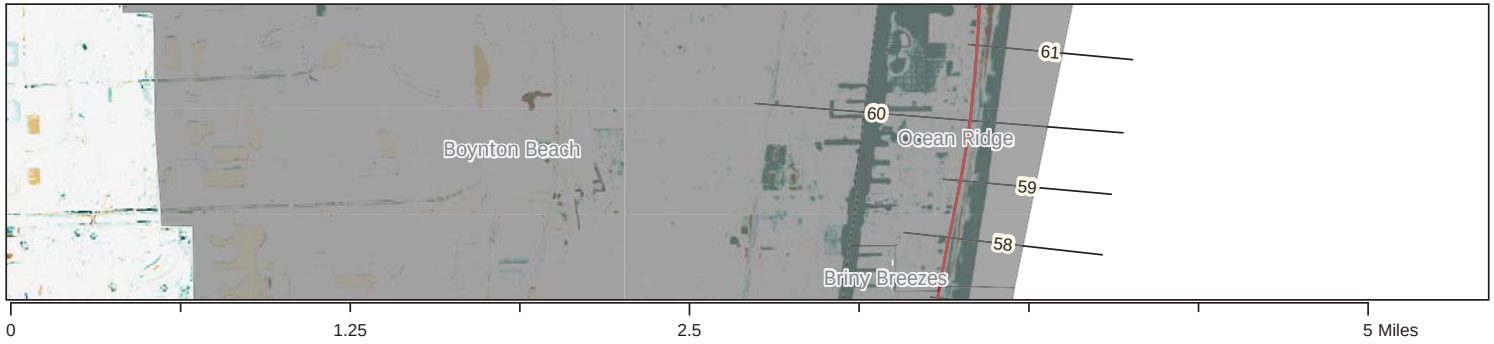
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM



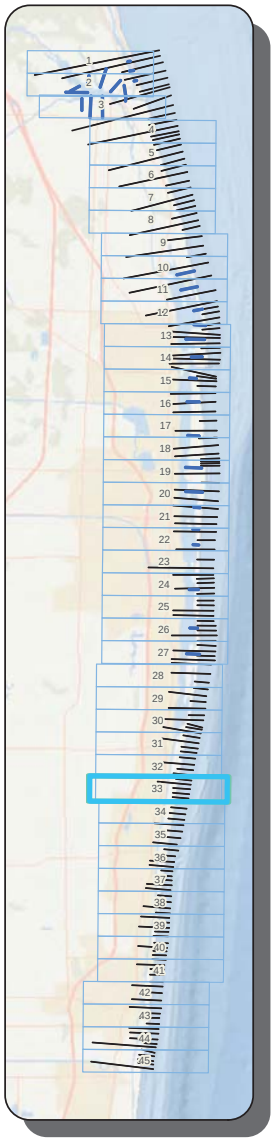
PBC minus SWFLTB DEM



PBC minus USACE

Transect View

Page: 33



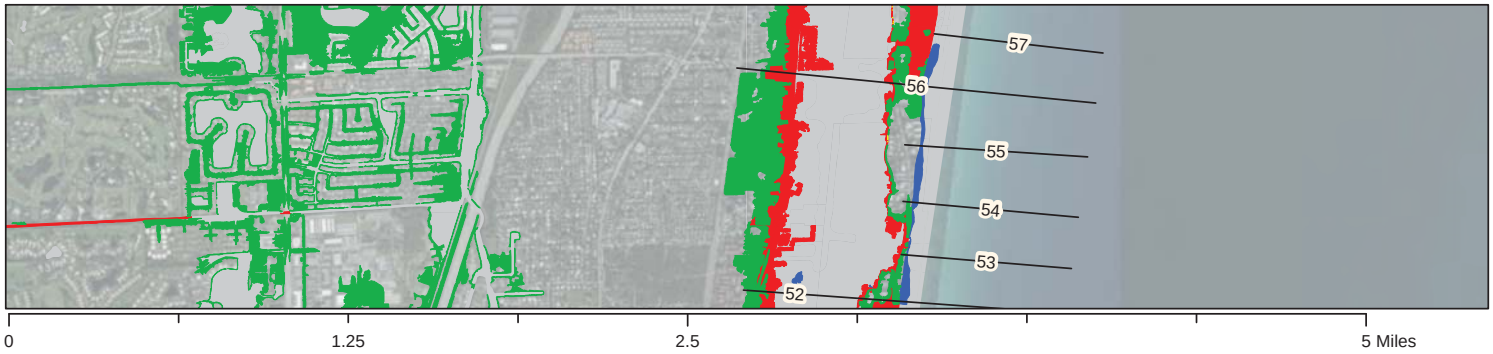
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

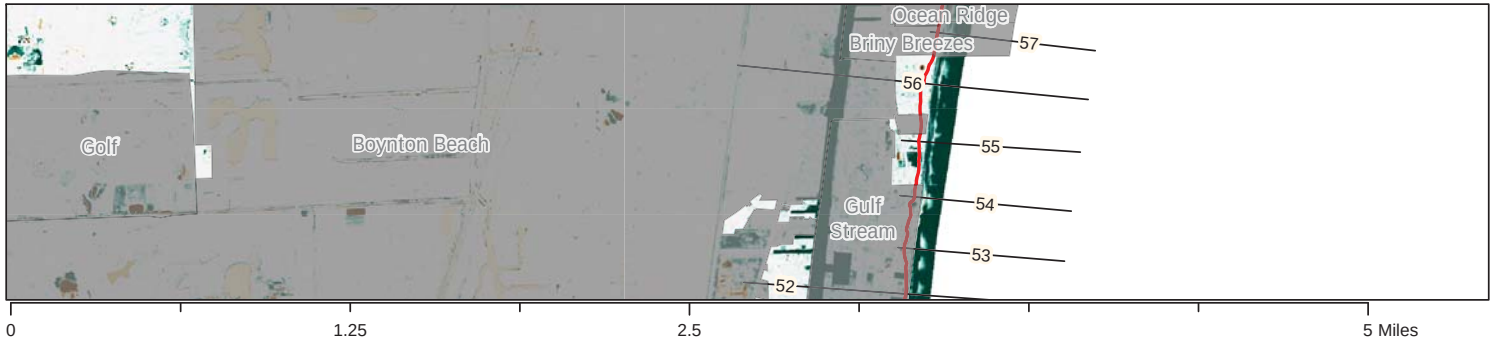
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

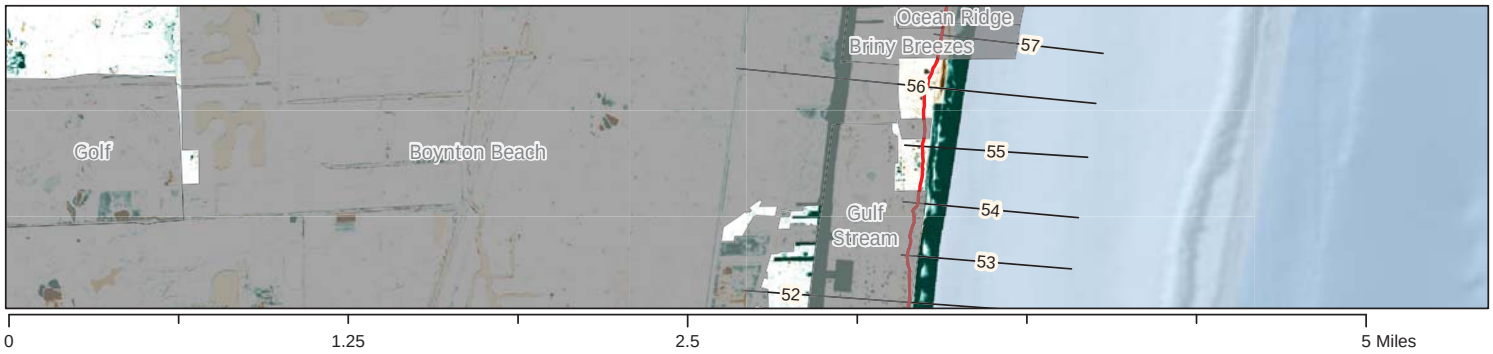
Change Since Last FIRM



PBC minus SWFLTB DEM

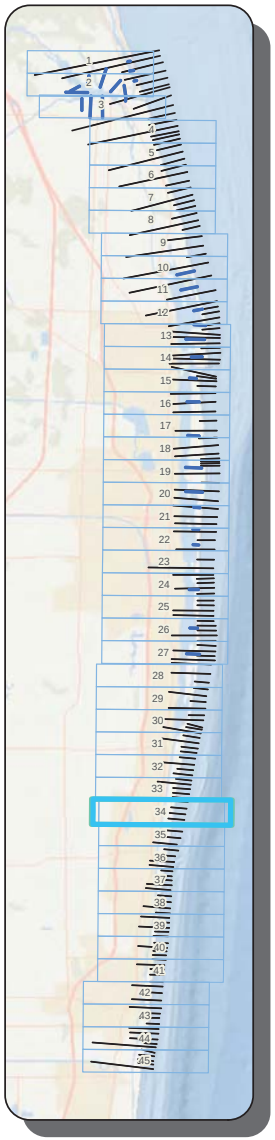


PBC minus USACE



Transect View

Page: 34



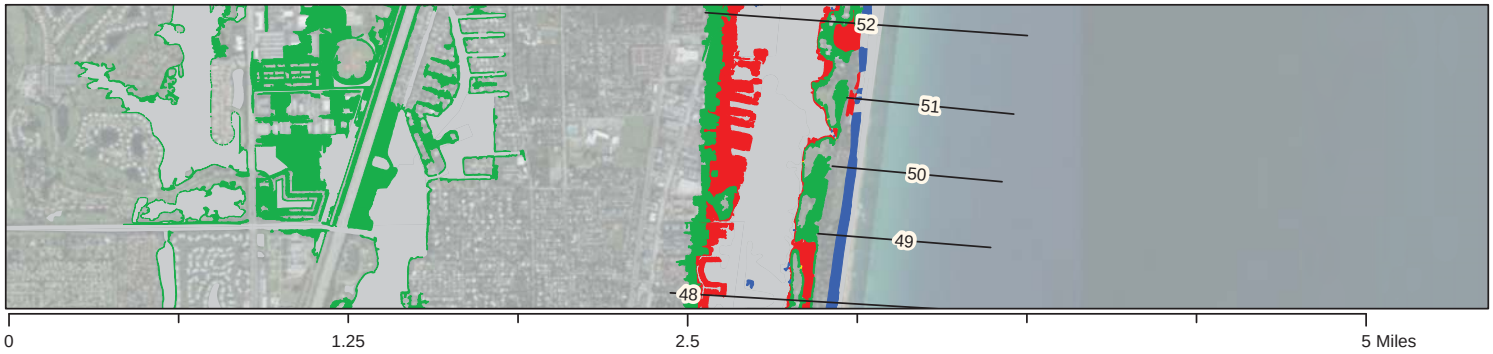
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

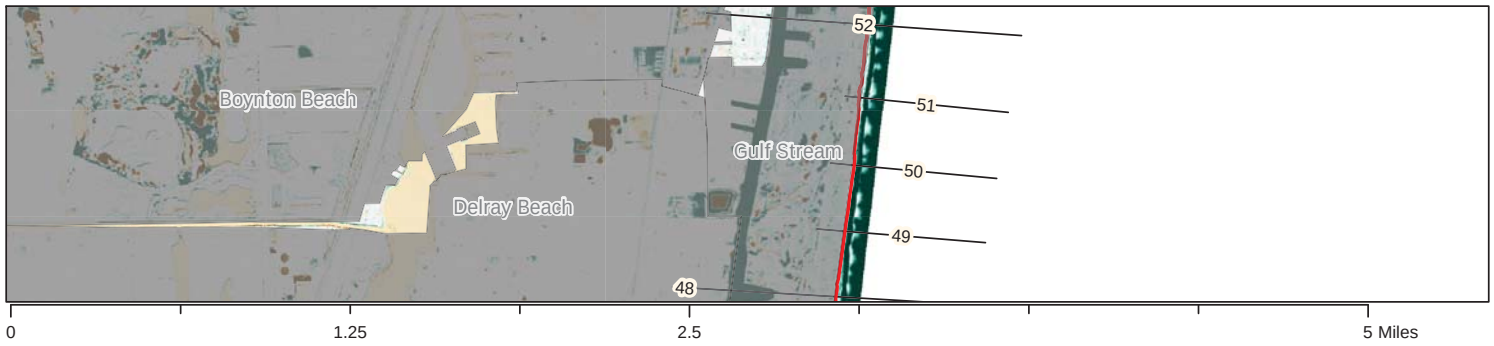
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM



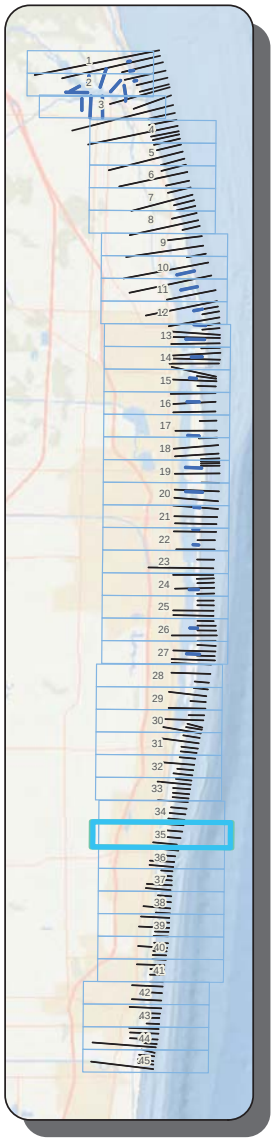
PBC minus SWFLTB DEM



PBC minus USACE

Transect View

Page: 35



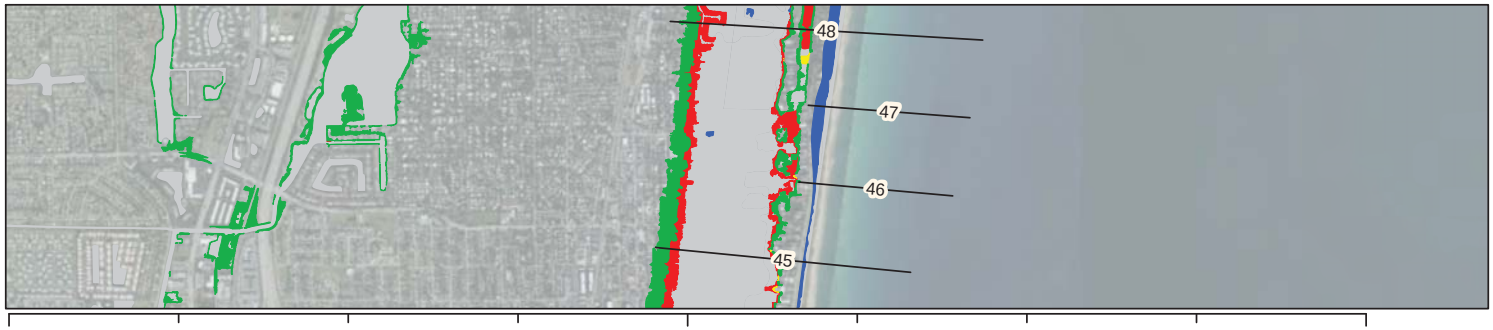
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

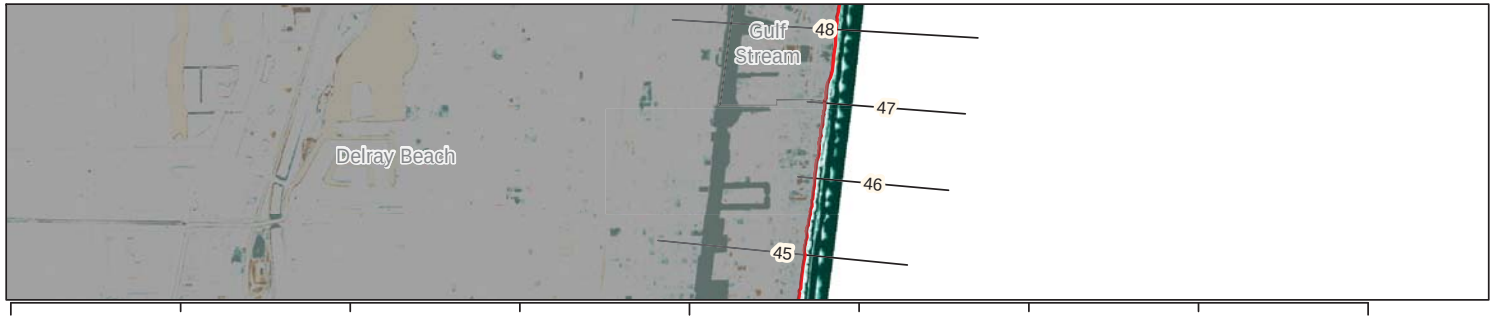
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

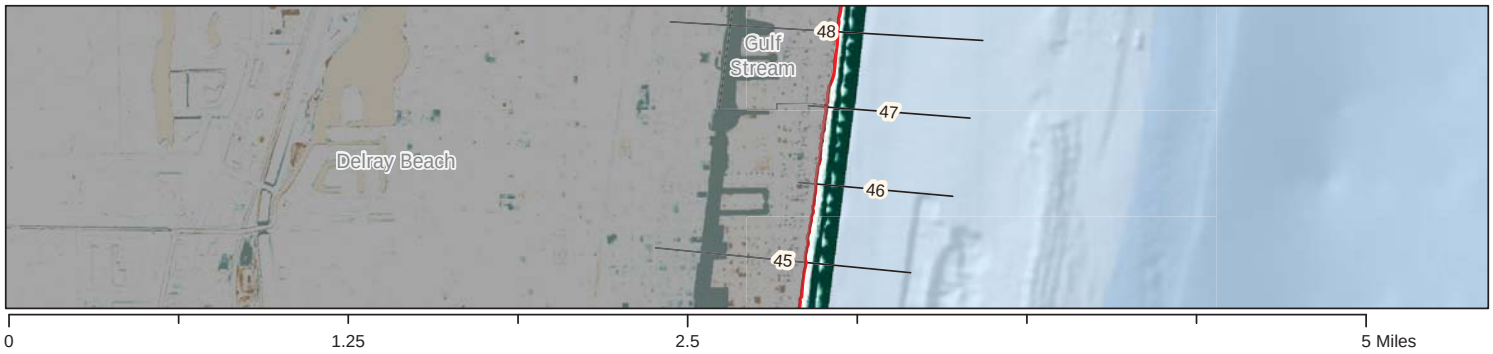
Change Since Last FIRM



PBC minus SWFLTB DEM

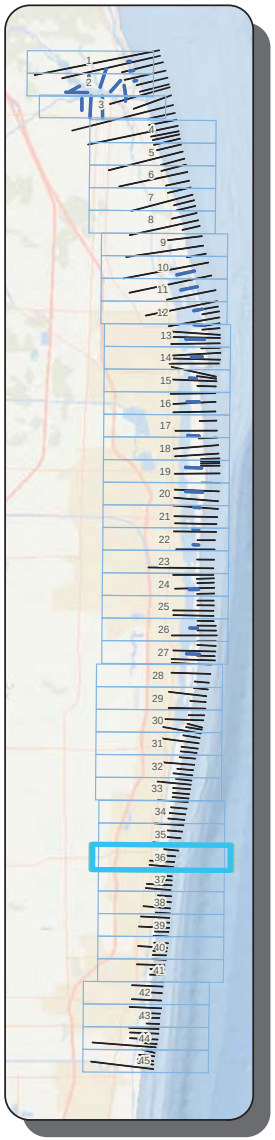


PBC minus USACE



Transect View

Page: 36

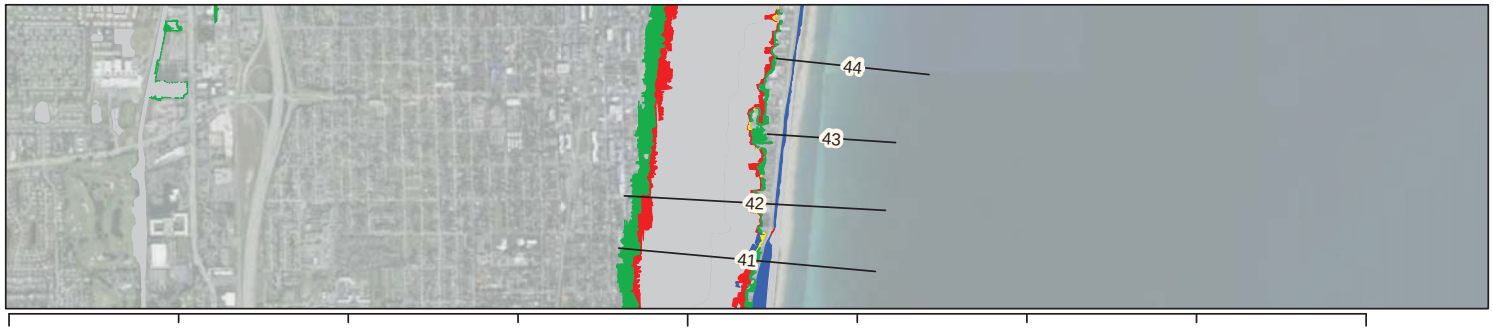


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

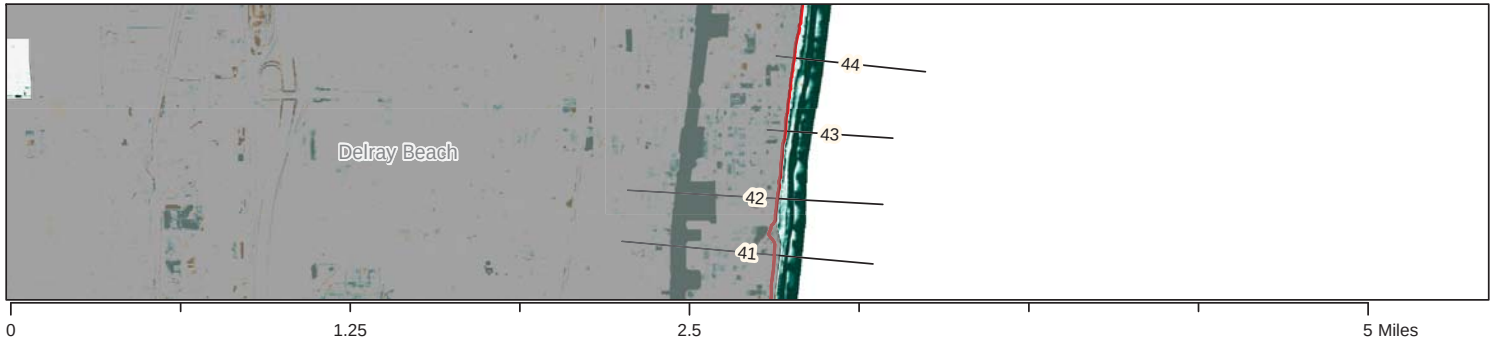
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

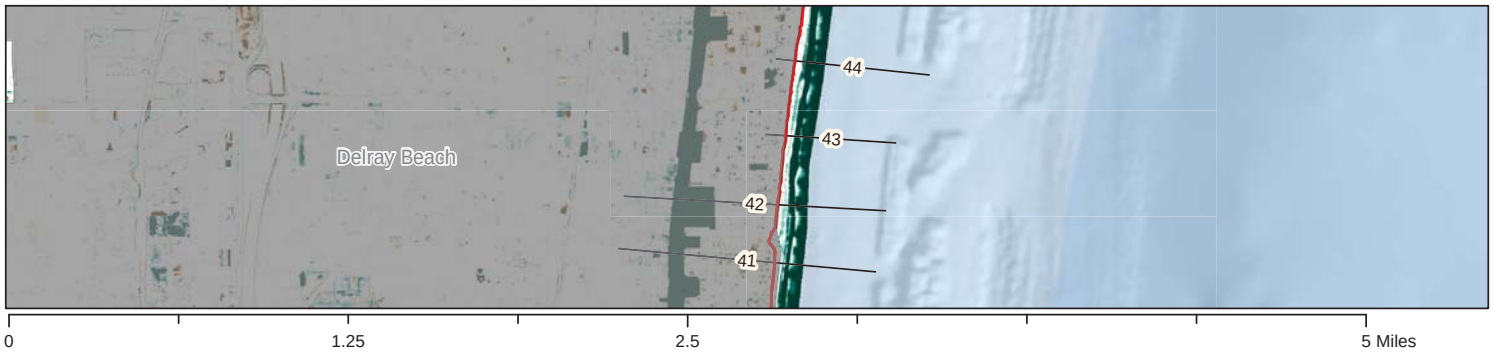
Change Since Last FIRM



PBC minus SWFLTB DEM

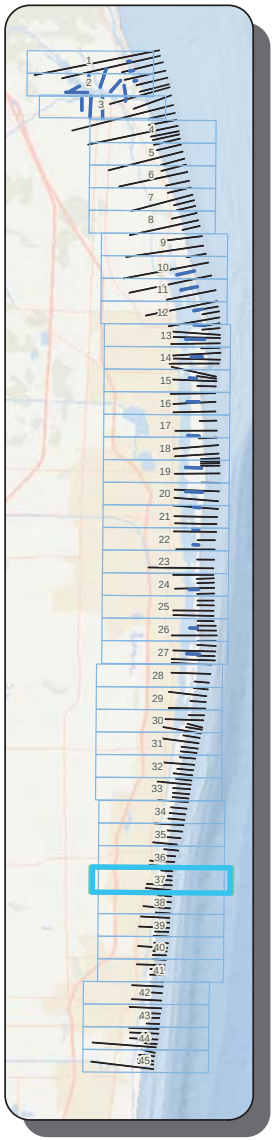


PBC minus USACE



Transect View

Page: 37



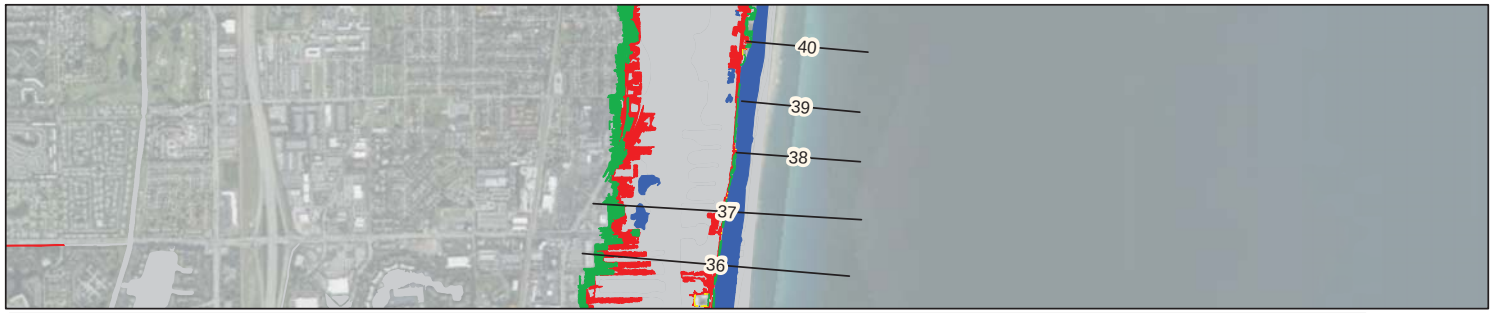
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

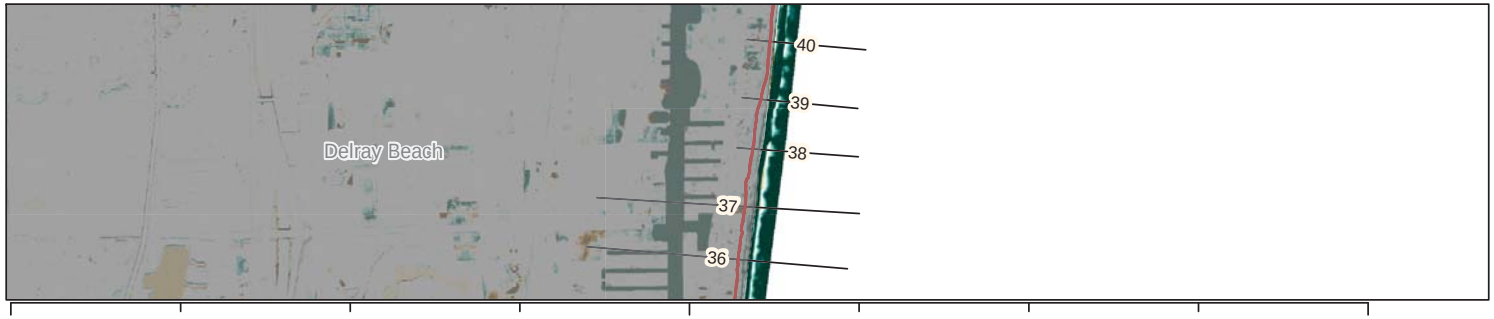
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

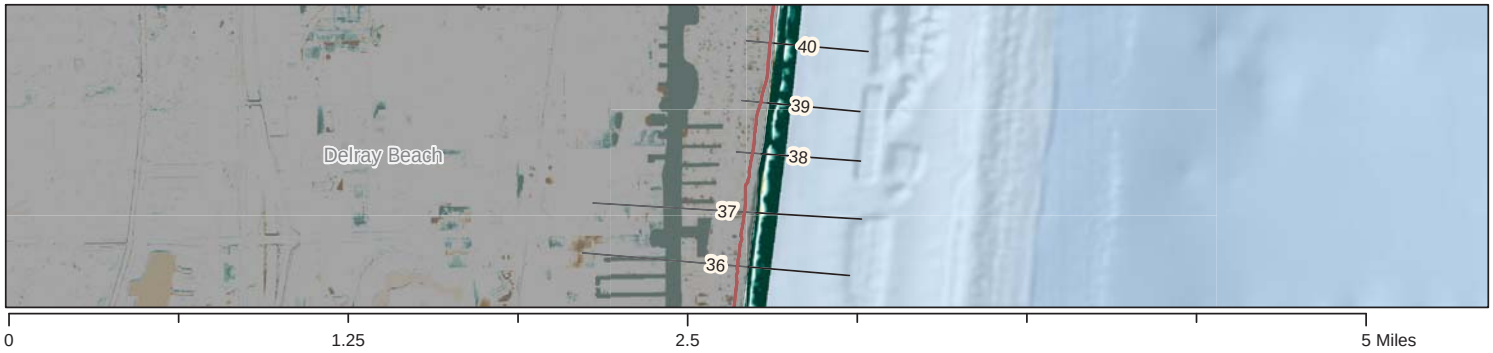
Change Since Last FIRM



PBC minus SWFLTB DEM

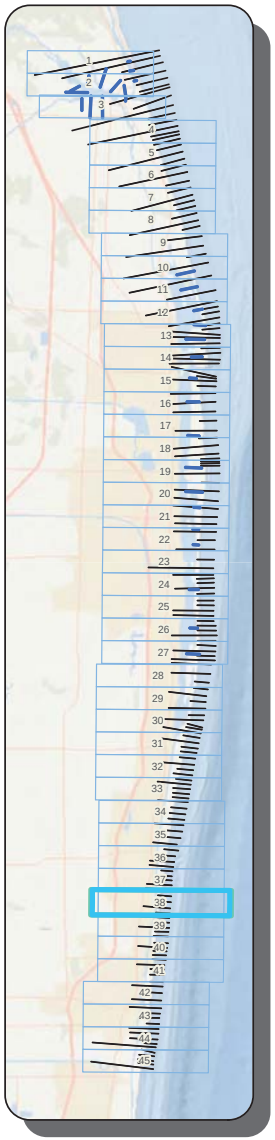


PBC minus USACE



Transect View

Page: 38



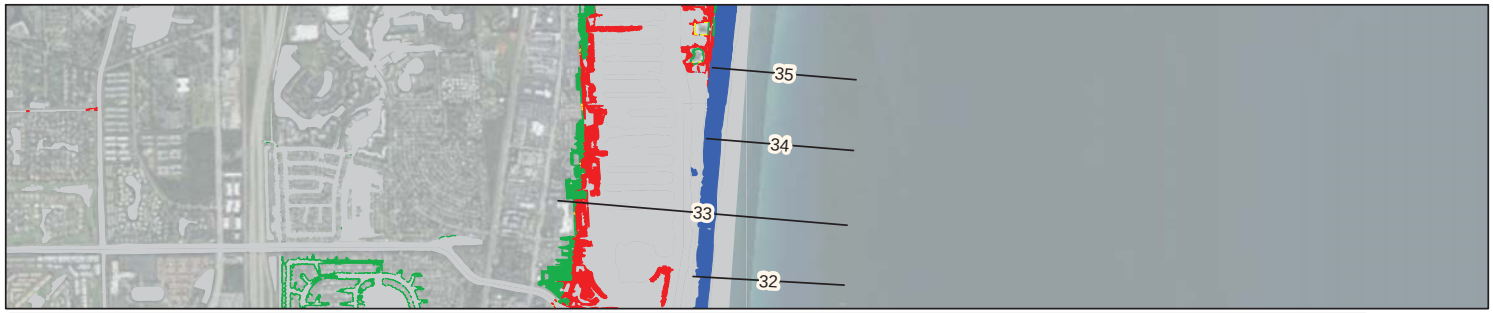
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

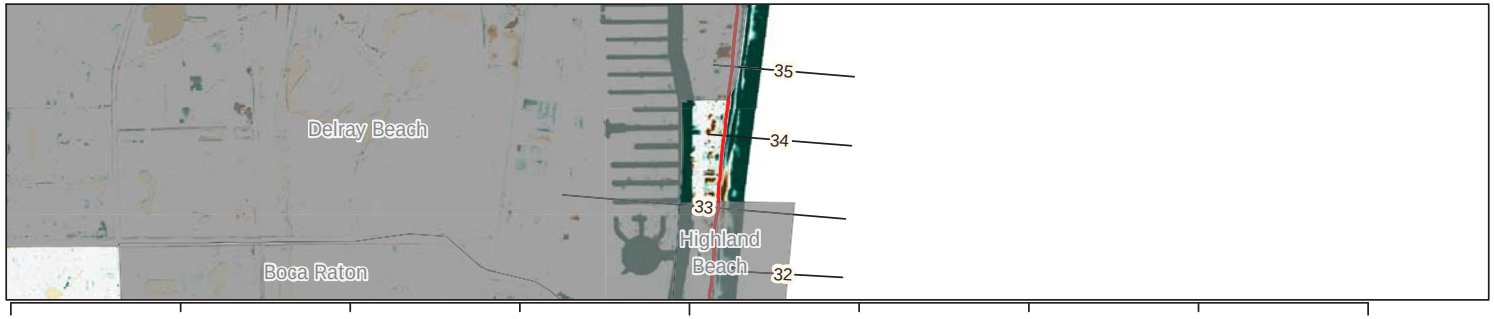
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

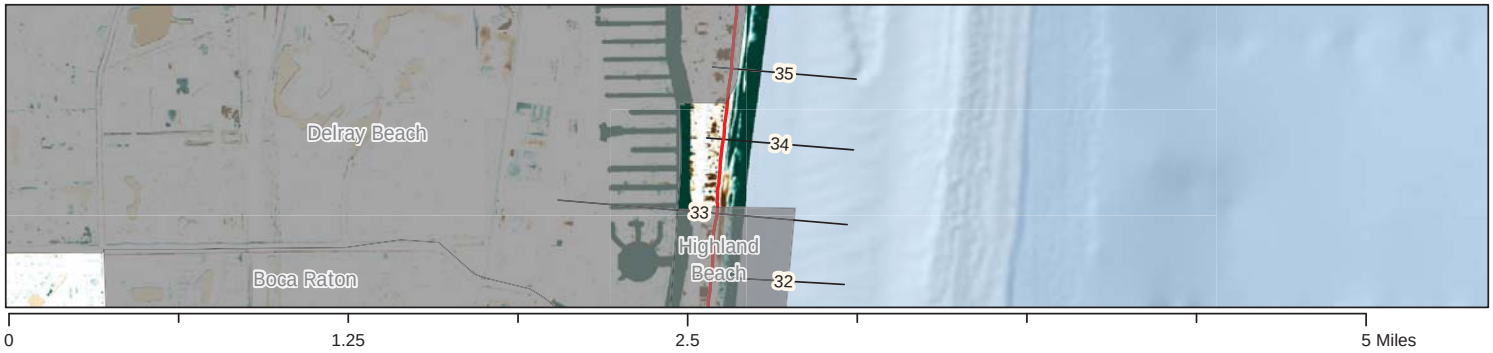
Change Since Last FIRM



PBC minus SWFLTB DEM

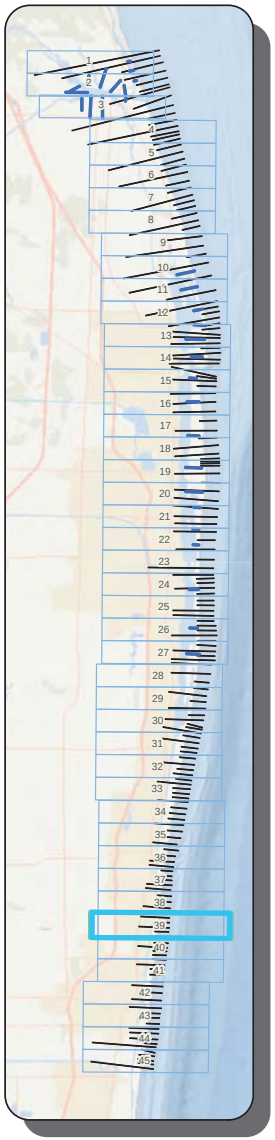


PBC minus USACE



Transect View

Page: 39

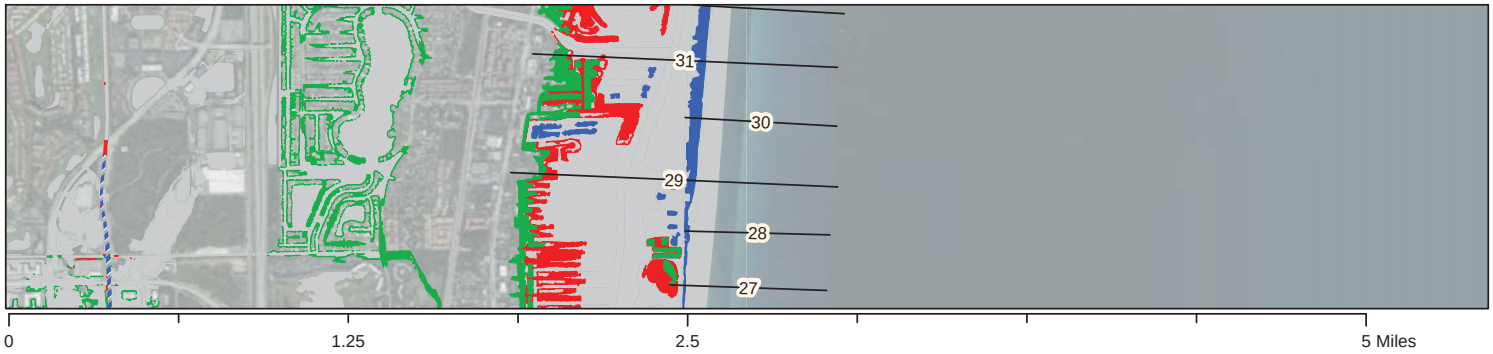


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

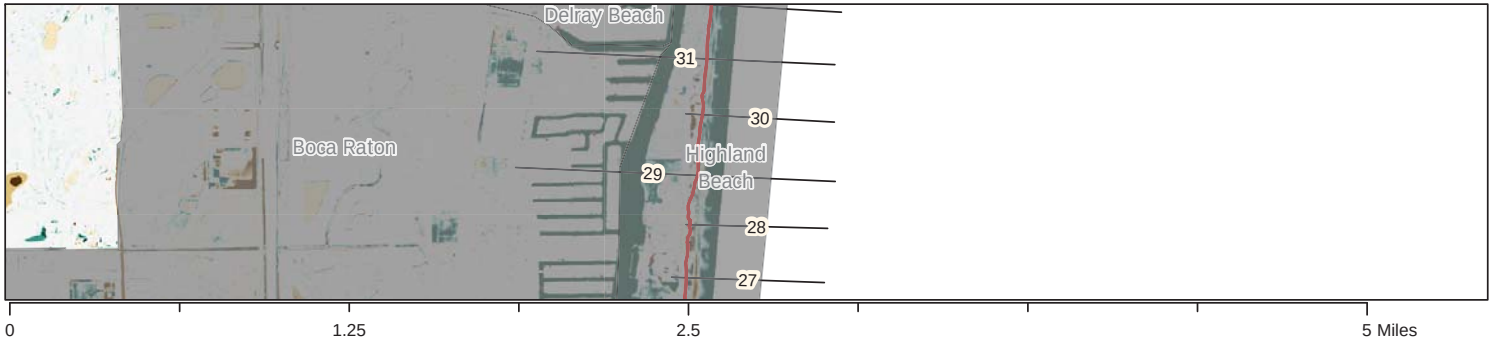
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

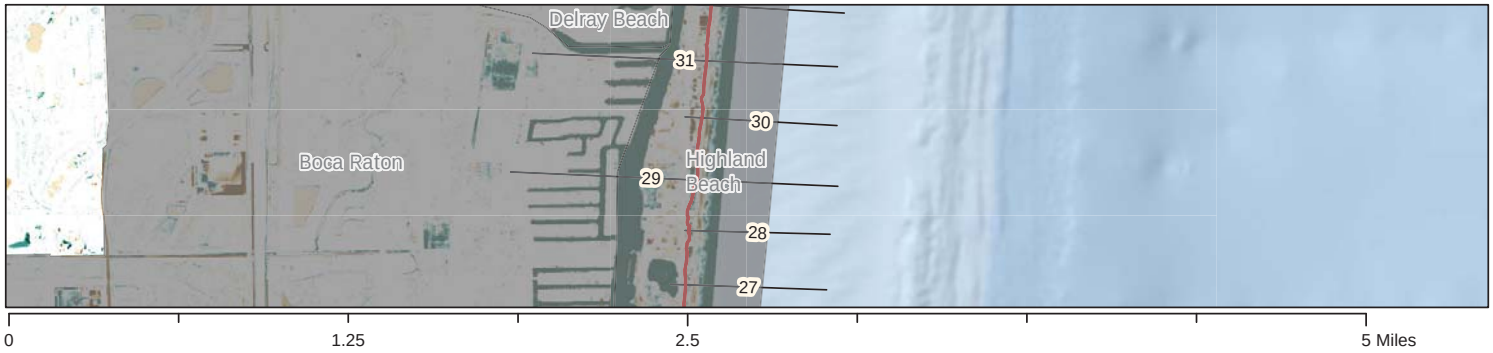
Change Since Last FIRM



PBC minus SWFLTB DEM

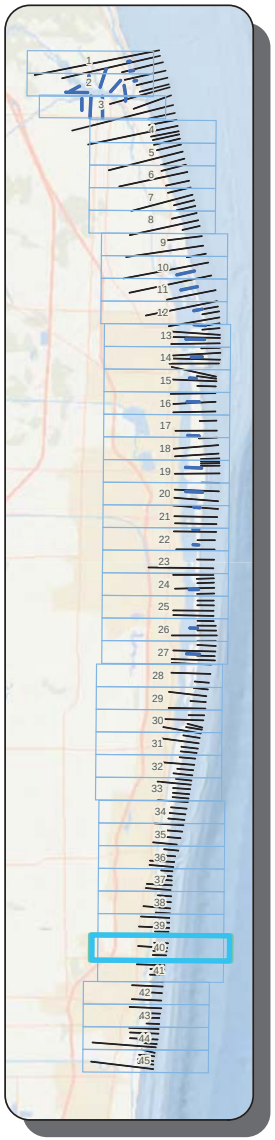


PBC minus USACE



Transect View

Page: 40



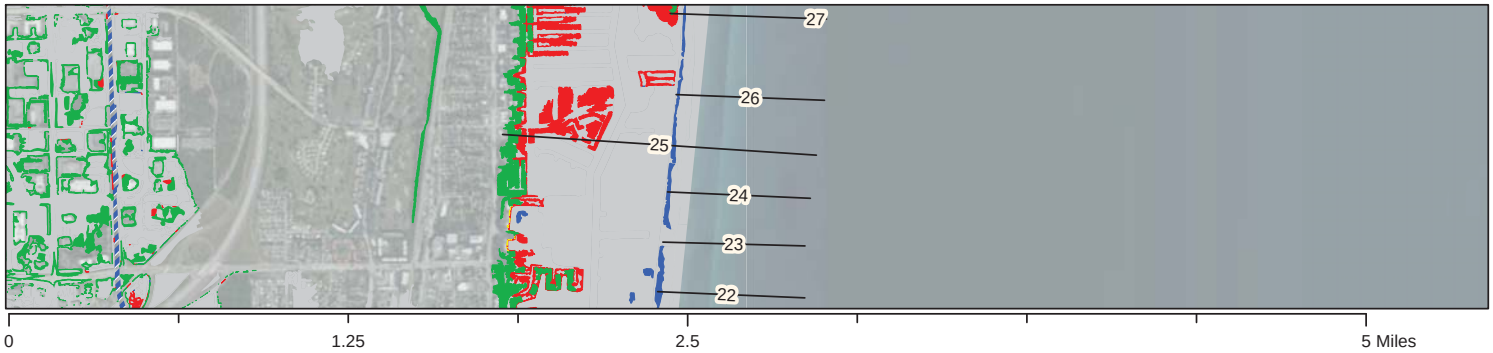
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

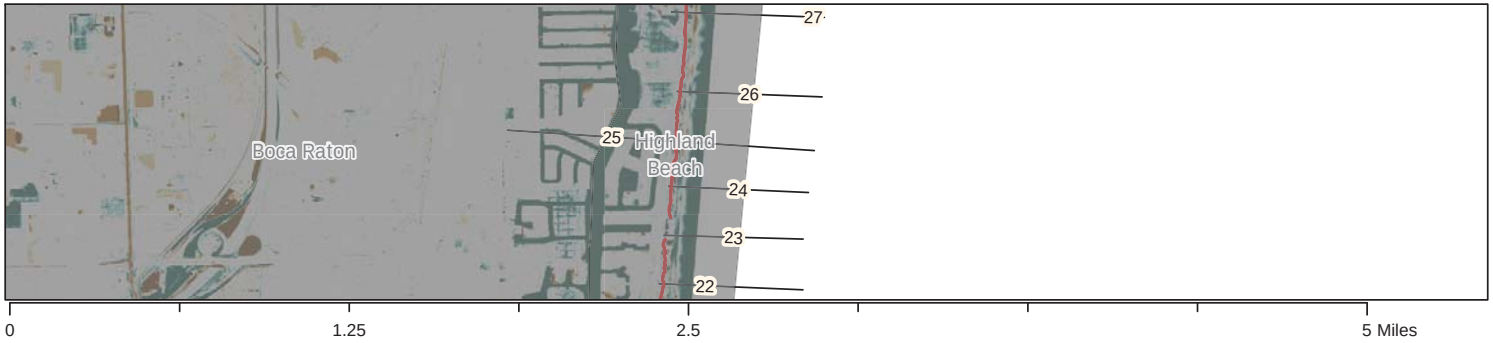
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

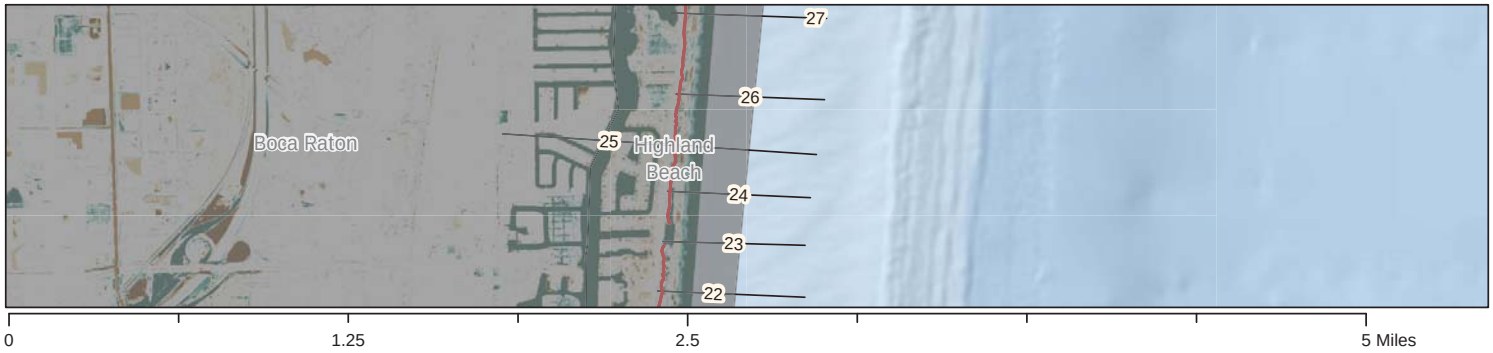
Change Since Last FIRM



PBC minus SWFLTB DEM

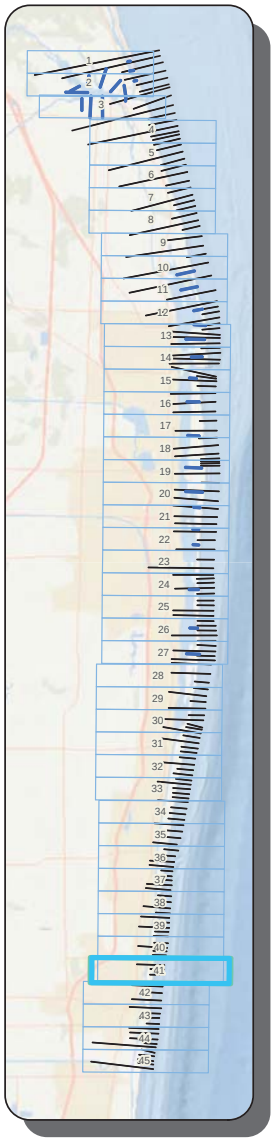


PBC minus USACE



Transect View

Page: 41



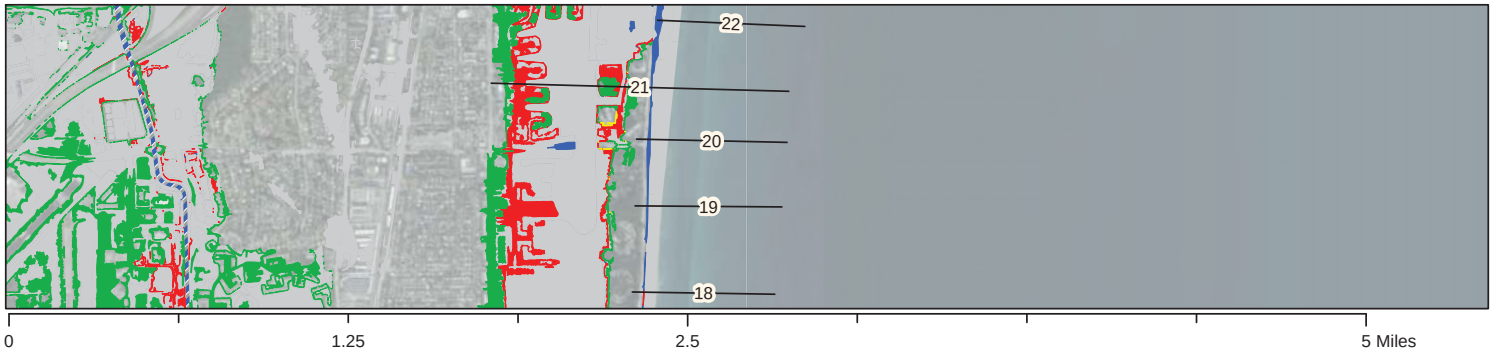
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

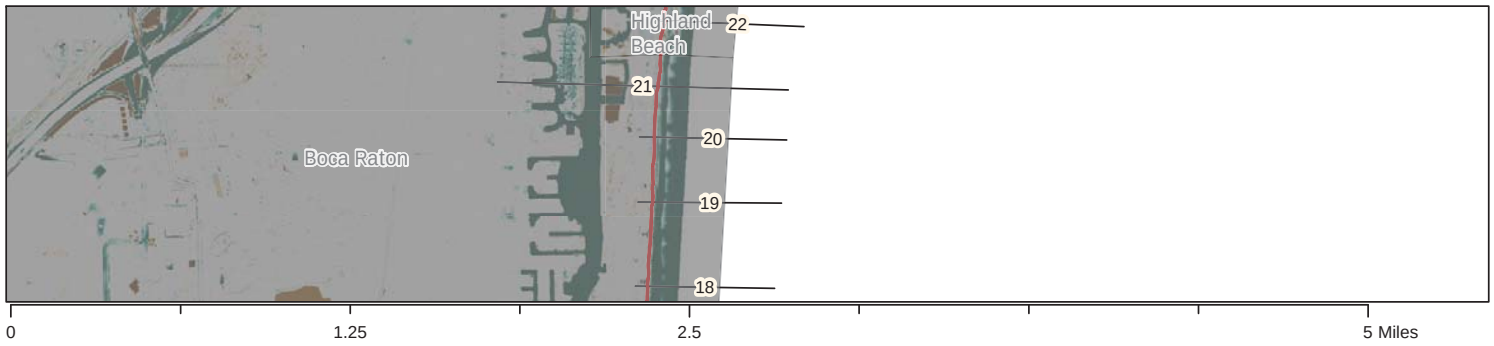
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

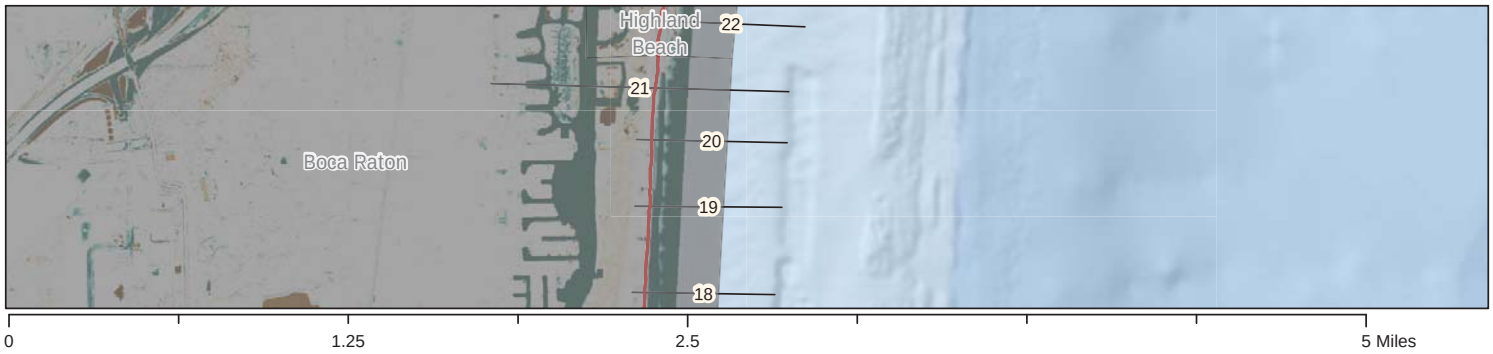
Change Since Last FIRM



PBC minus SWFLTB DEM

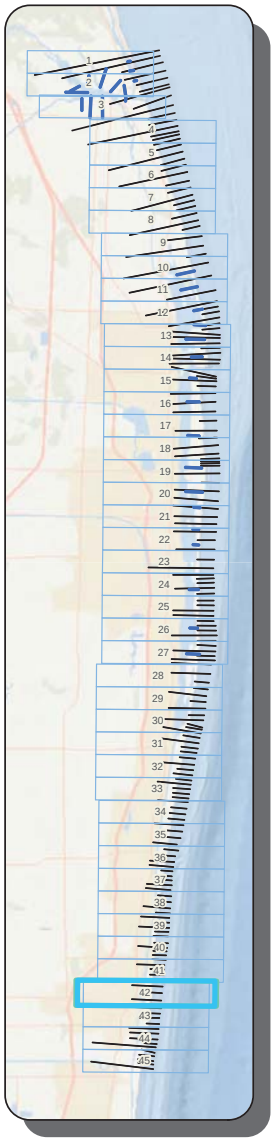


PBC minus USACE



Transect View

Page: 42

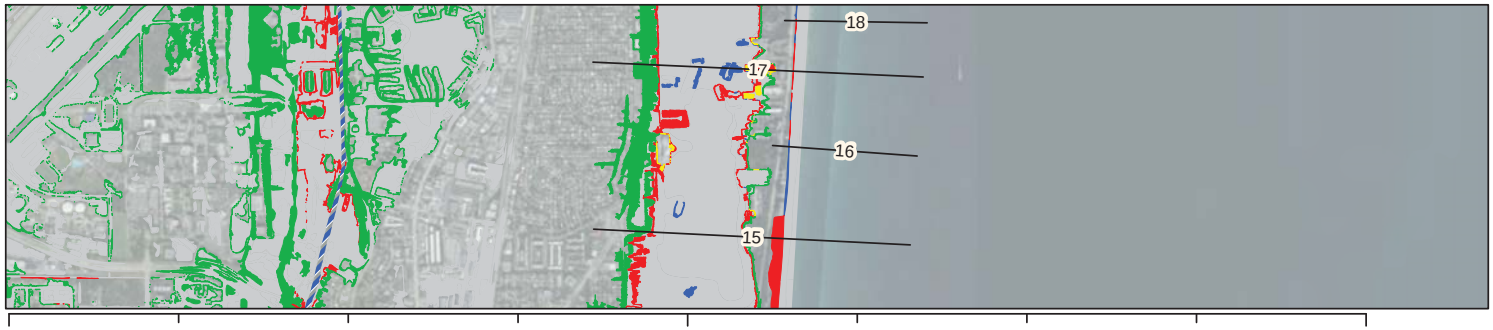


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

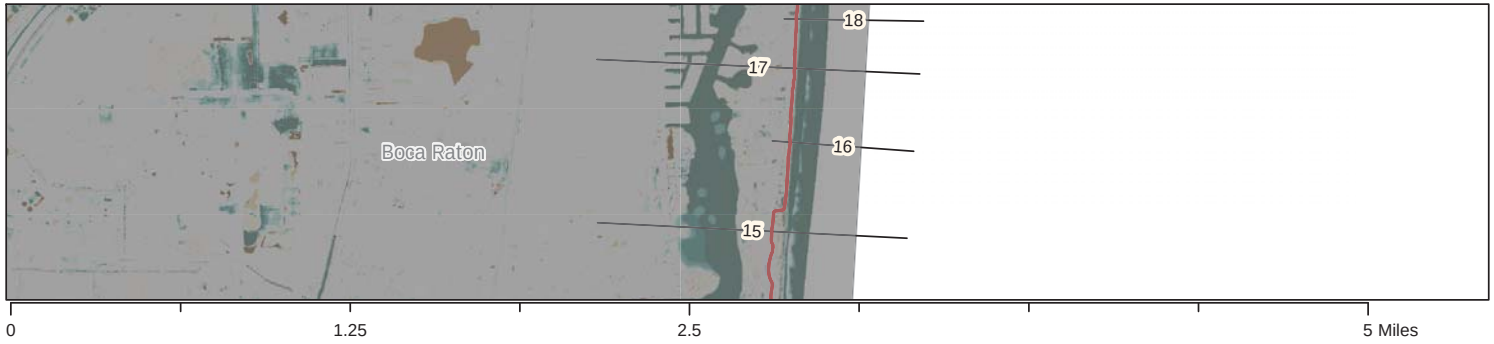
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

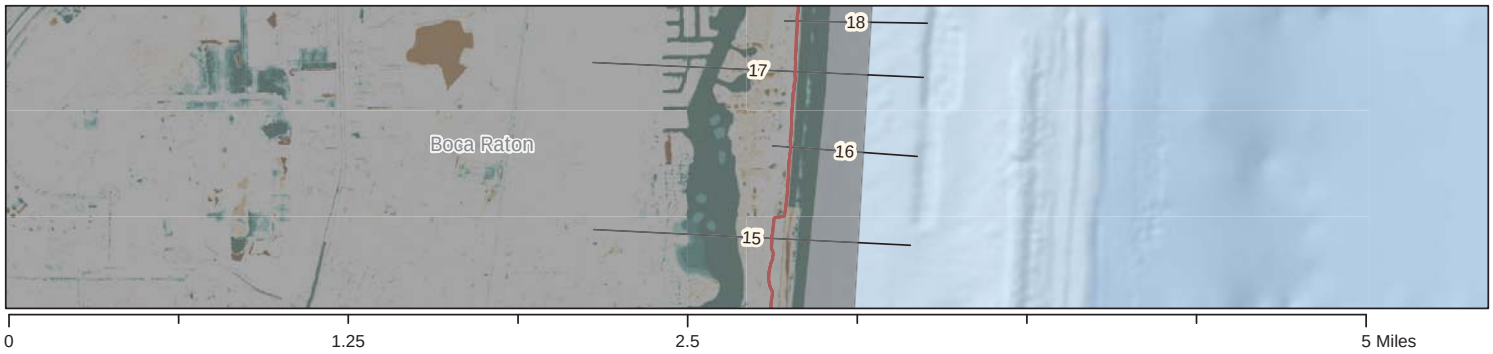
Change Since Last FIRM



PBC minus SWFLTB DEM

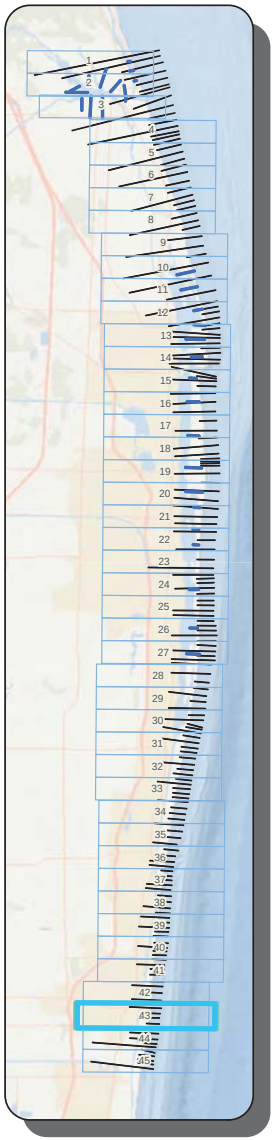


PBC minus USACE



Transect View

Page: 43

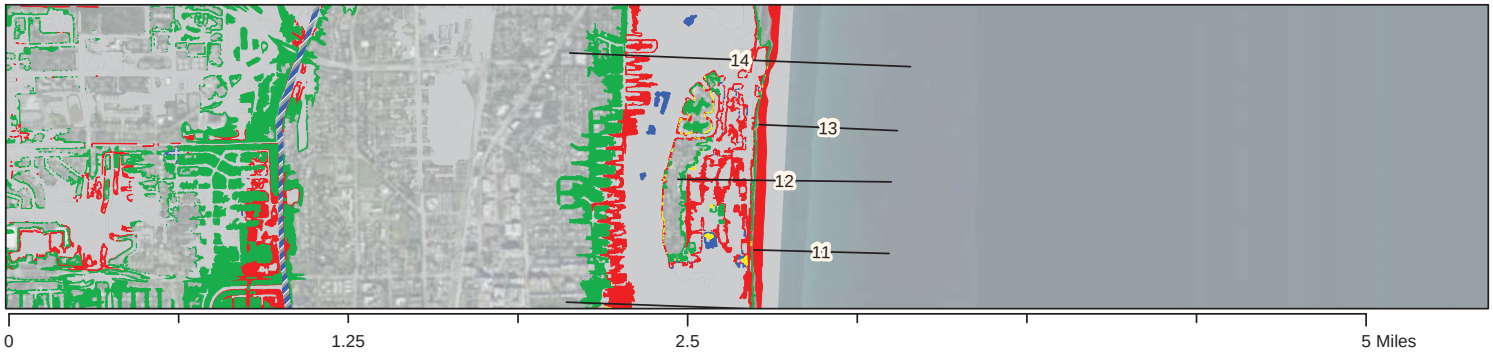


Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

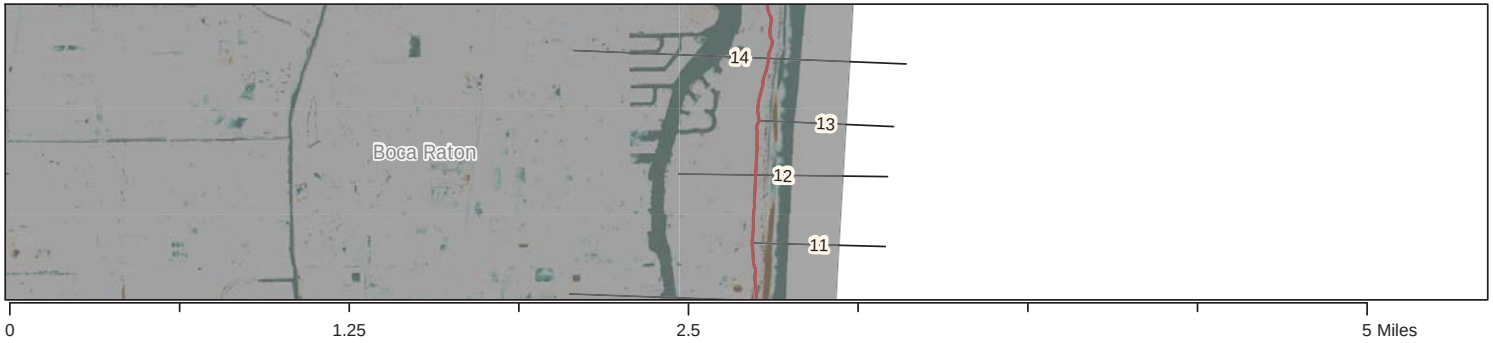
- Frontal Dune Line
- Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

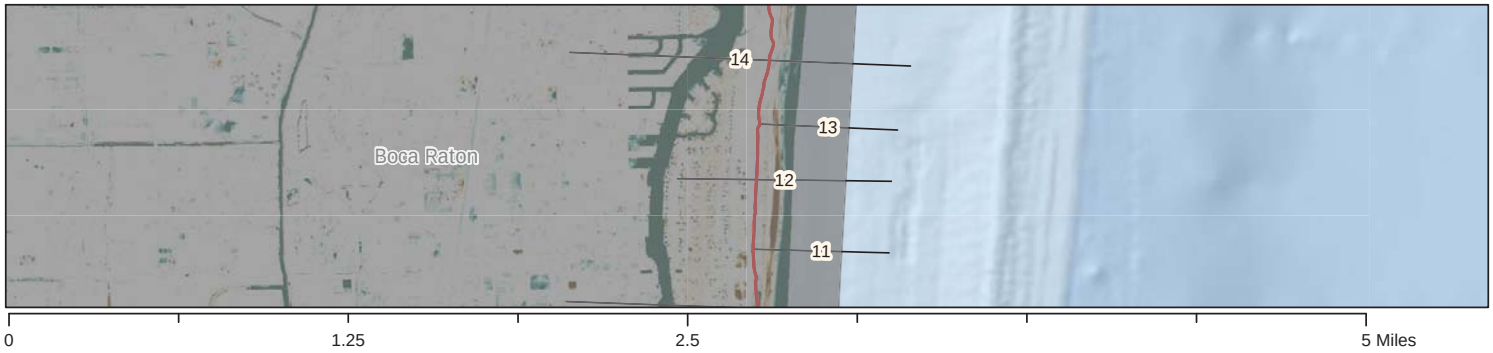
Change Since Last FIRM



PBC minus SWFLTB DEM

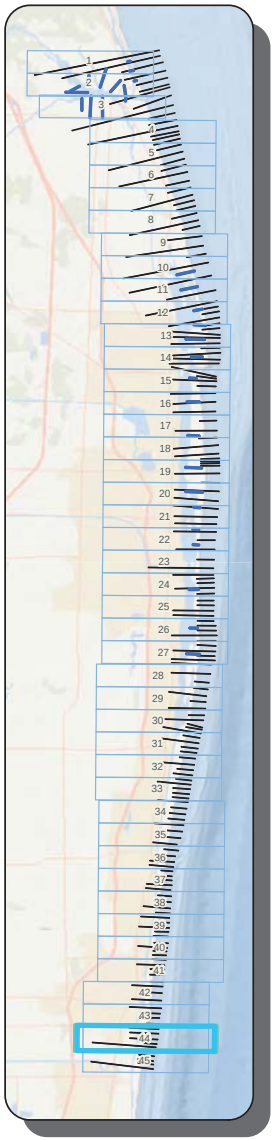


PBC minus USACE



Transect View

Page: 44



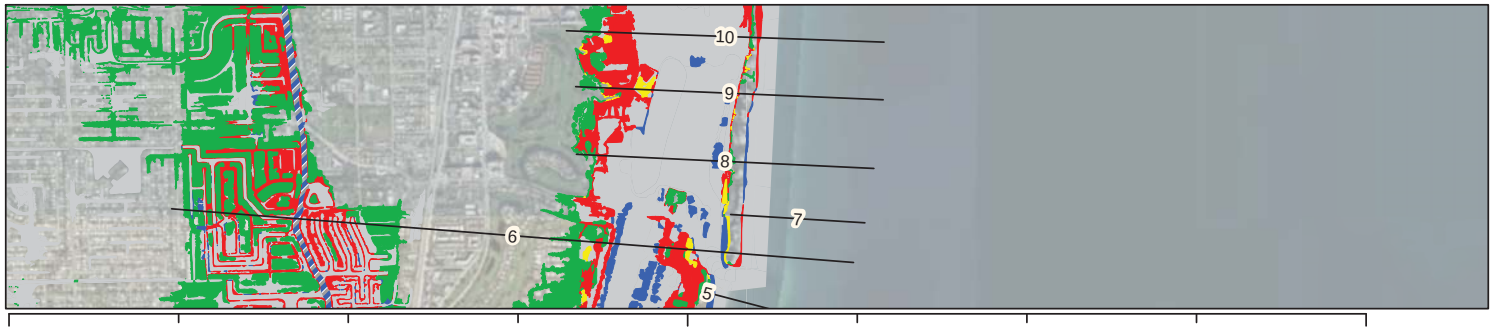
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

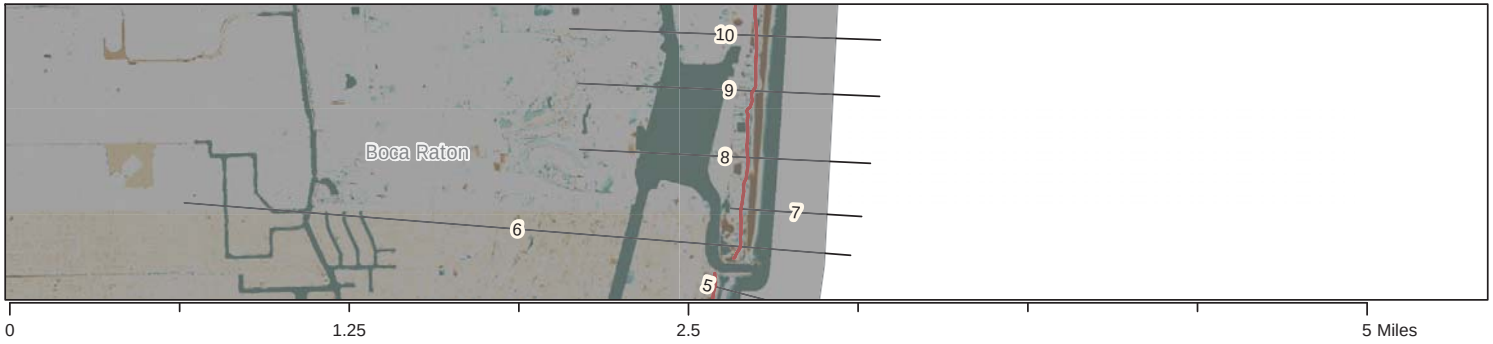
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

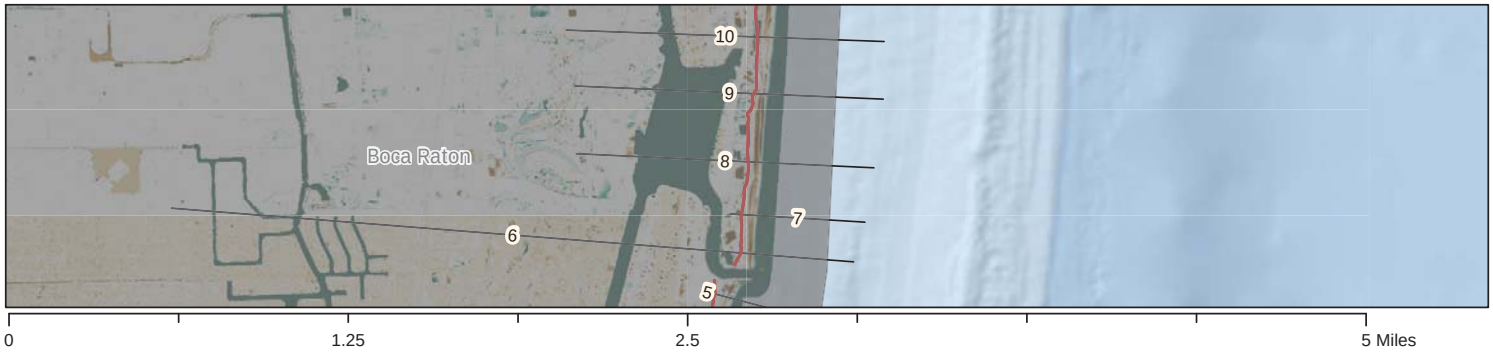
Change Since Last FIRM



PBC minus SWFLTB DEM

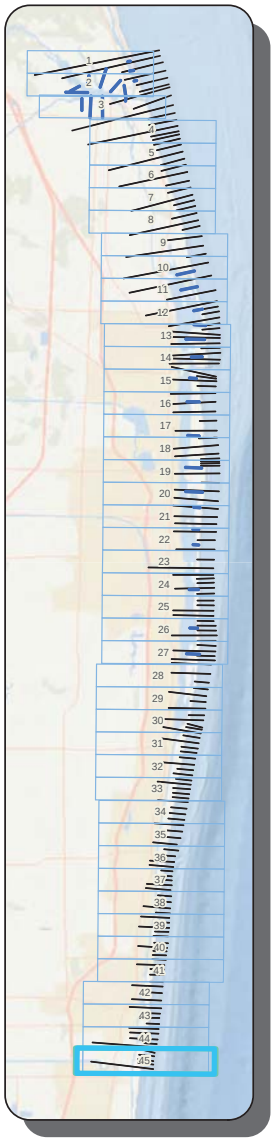


PBC minus USACE



Transect View

Page: 45



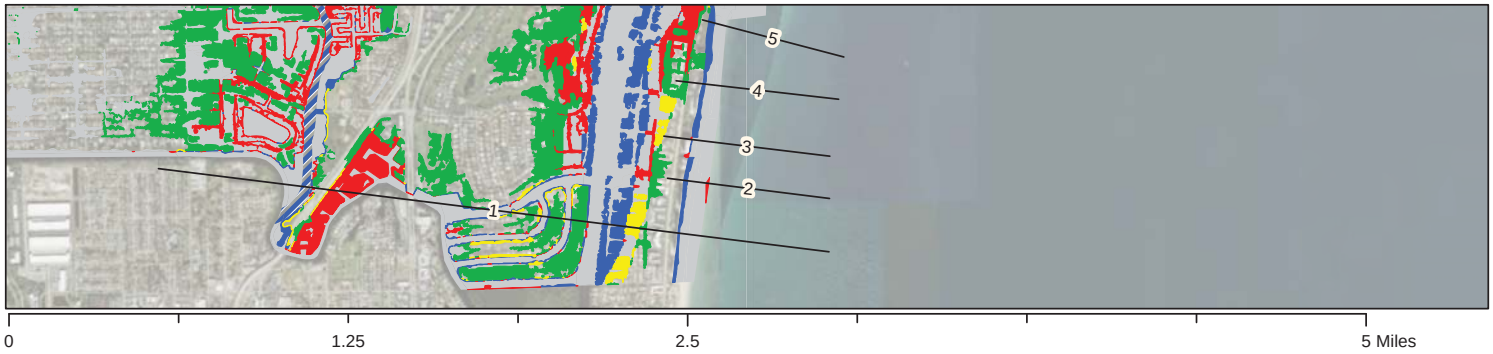
Change Since Last FIRM
- No Zone Change
- 1% Annual Decrease
- Floodway Decrease
- Floodway Increase
- 1% Annual Increase
- 0.2% Annual Decrease
- 0.2% Annual increase

Frontal Dune Line

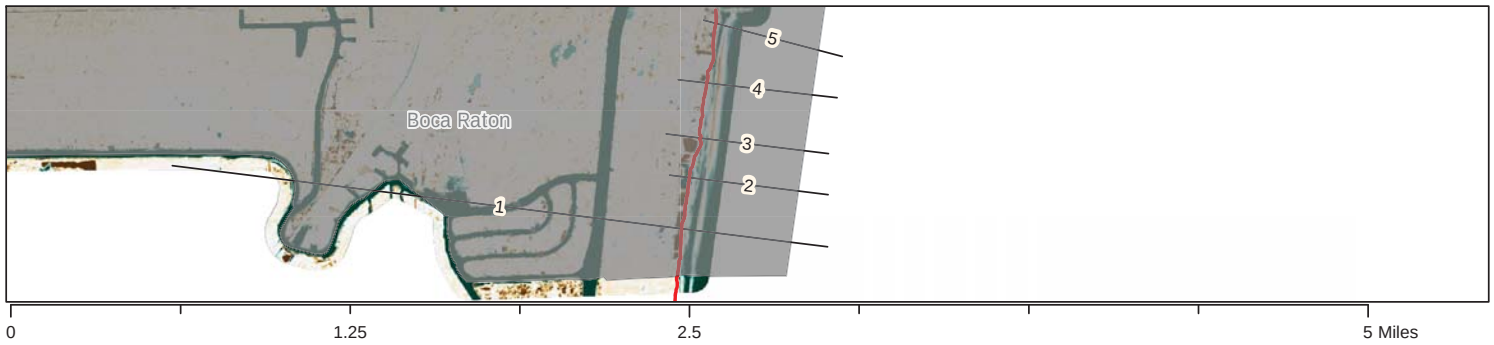
Municipalities

Calculated Difference (ft)
- ≤ -2.5
- ≤ -2
- ≤ -1.5
- ≤ -1
- ≤ -0.5
- ≤ 0.5
- ≤ 1
- ≤ 1.5
- ≤ 2
- ≤ 2.5
- ≤147.259583

Change Since Last FIRM



PBC minus SWFLTB DEM



PBC minus USACE