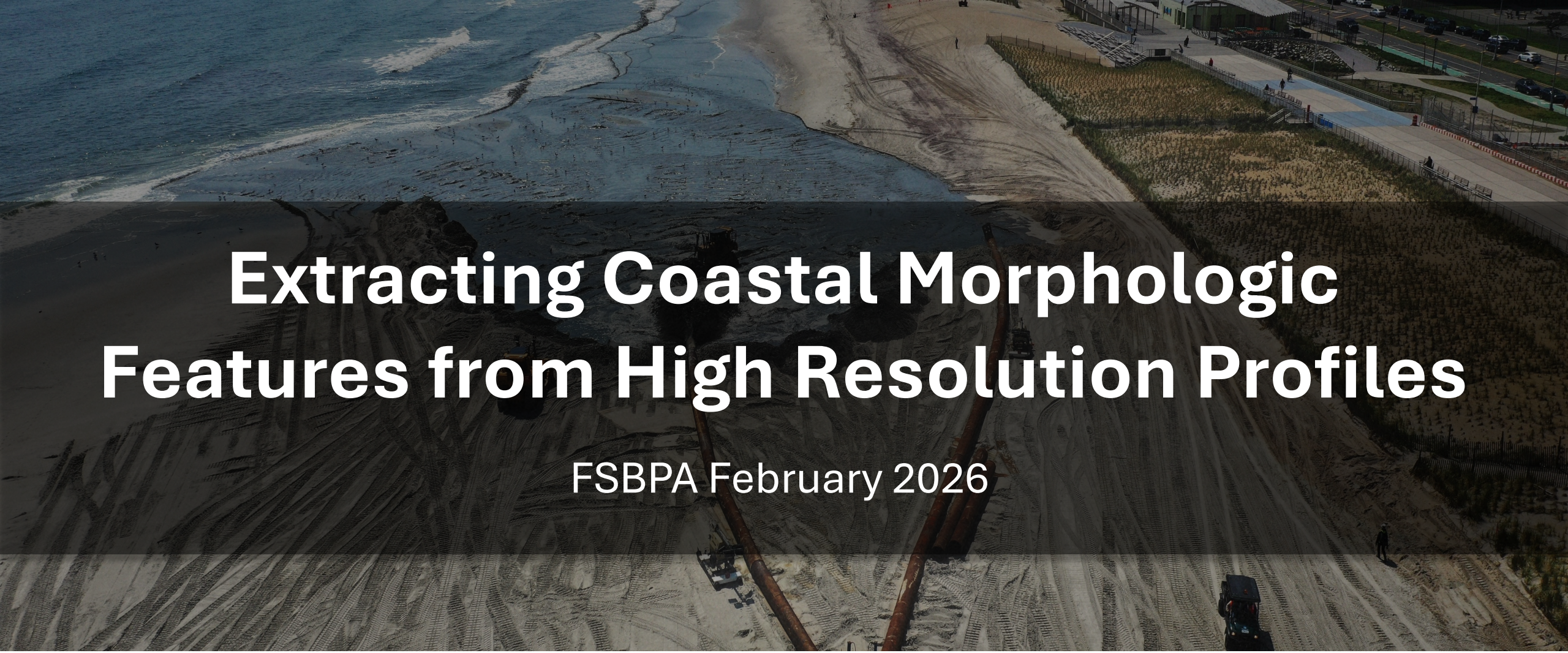


Extracting Coastal Morphologic Features from High Resolution Profiles

FSBPA February 2026

ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

NCMP

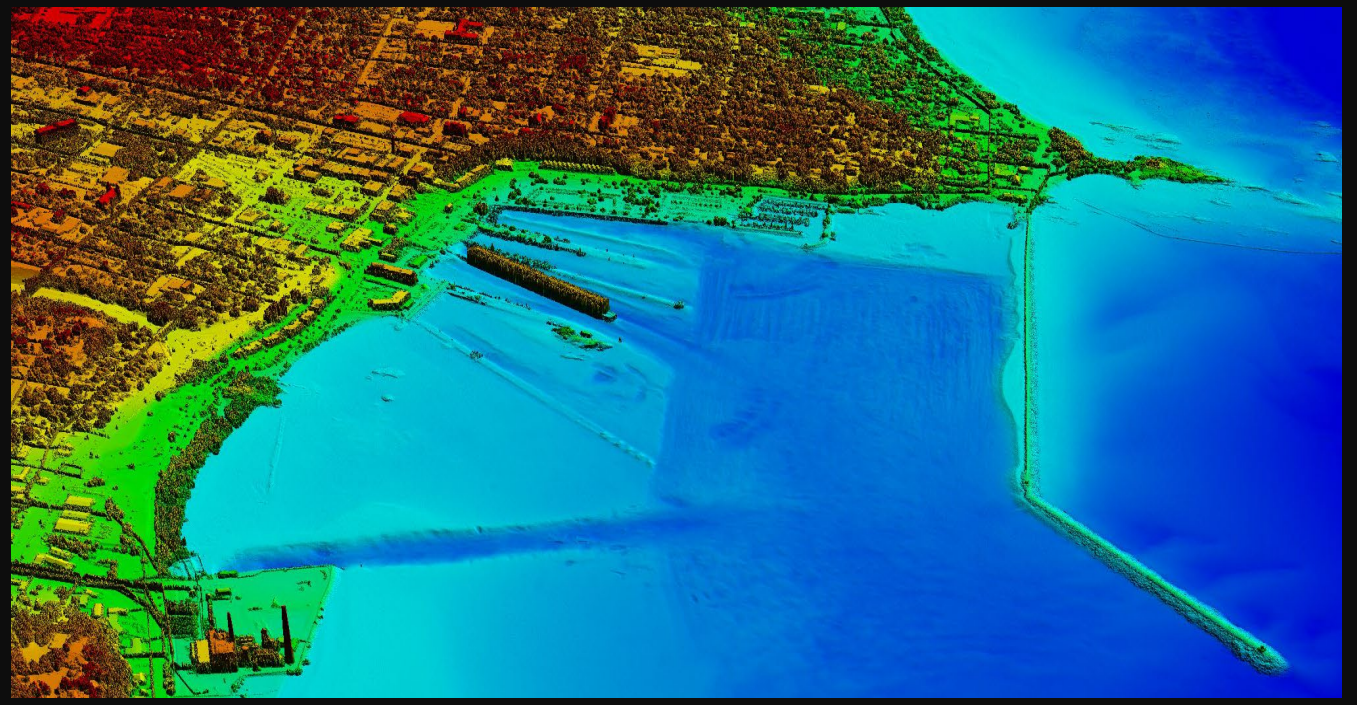
WOOLPERT

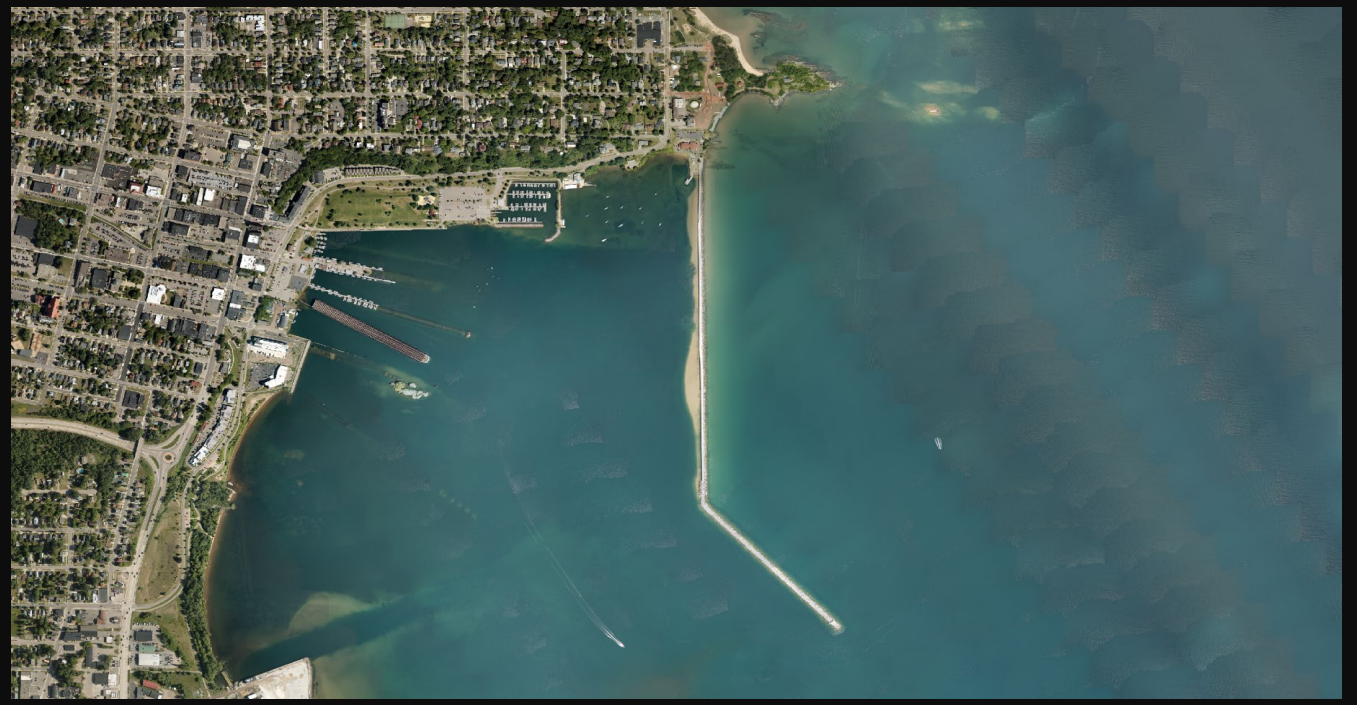
National Coastal Mapping Program (NCMP)

-Regional, repetitive, high-resolution, high-accuracy elevation and imagery data

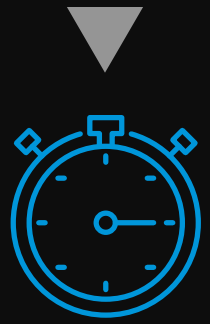
-How coastal zone is changing

-Sediment management quantification at regional, watershed scales





JALBTCX Toolbox

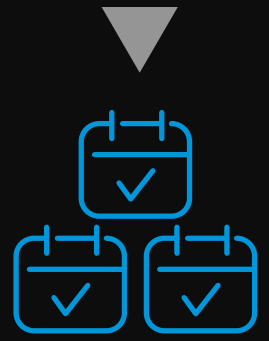


Quick Response

- Generate and edit baseline and transects
- Quantify shoreline and volume change
- Standardized mapping

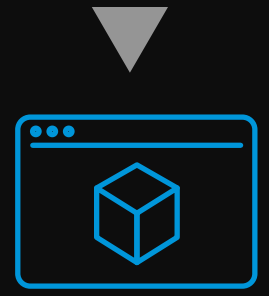
Coastal Engineering

- Profile metrics
- Coastal Engineering Resilience Index



Multiple Dataset

- Multiple years
- Quantify trends



Modeling

- CSHORE

https://www.cirpwiki.info/wiki/JALBTCX

US Army Corps of Engineers®

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JALBTCX
Joint Airborne Lidar Bathymetry Technical Center of Expertise

Generating Transects in Complex Coastal Environments

October 2025

ASBPA National Coastal Conference

OOLPERT

WO

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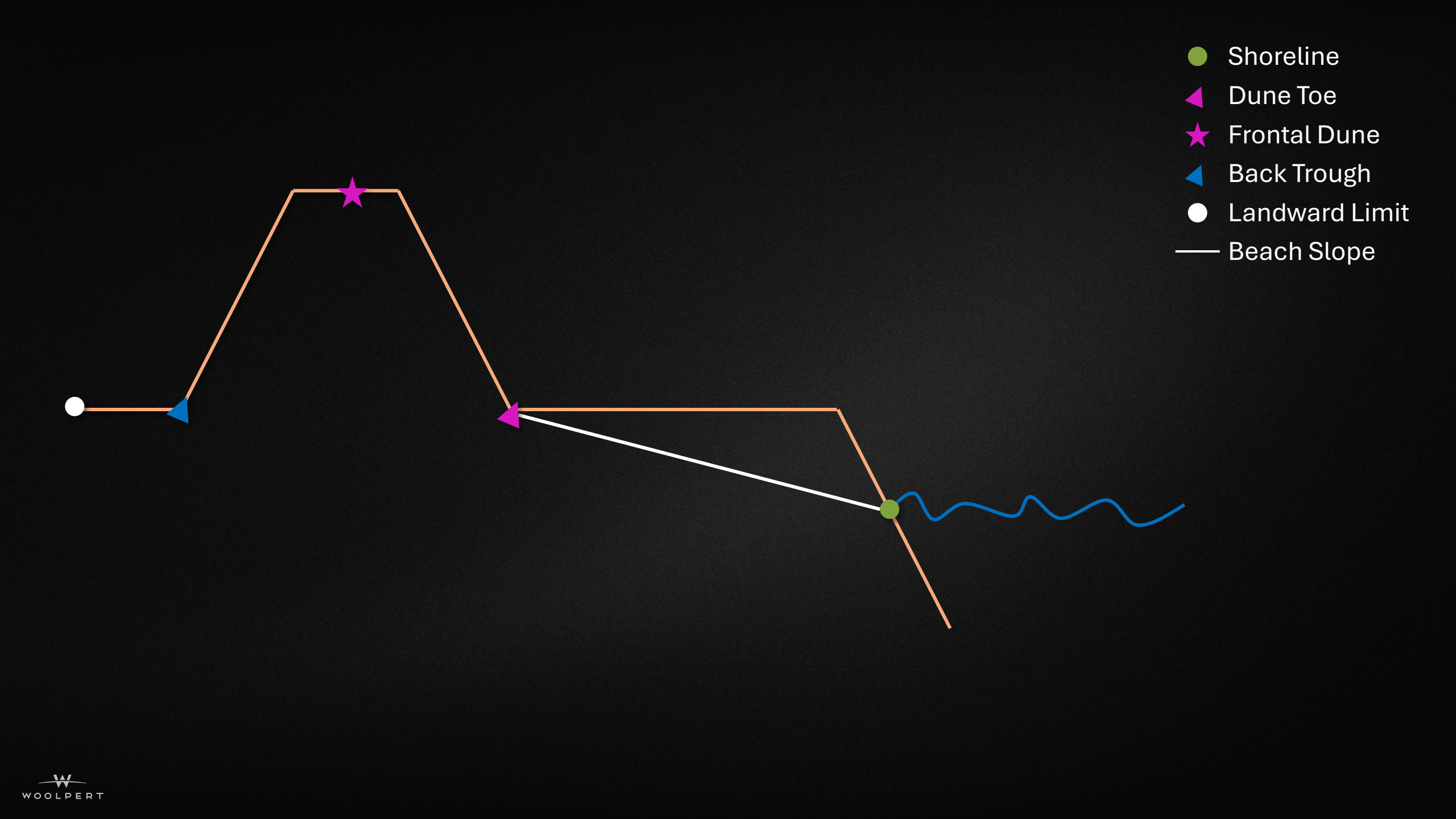
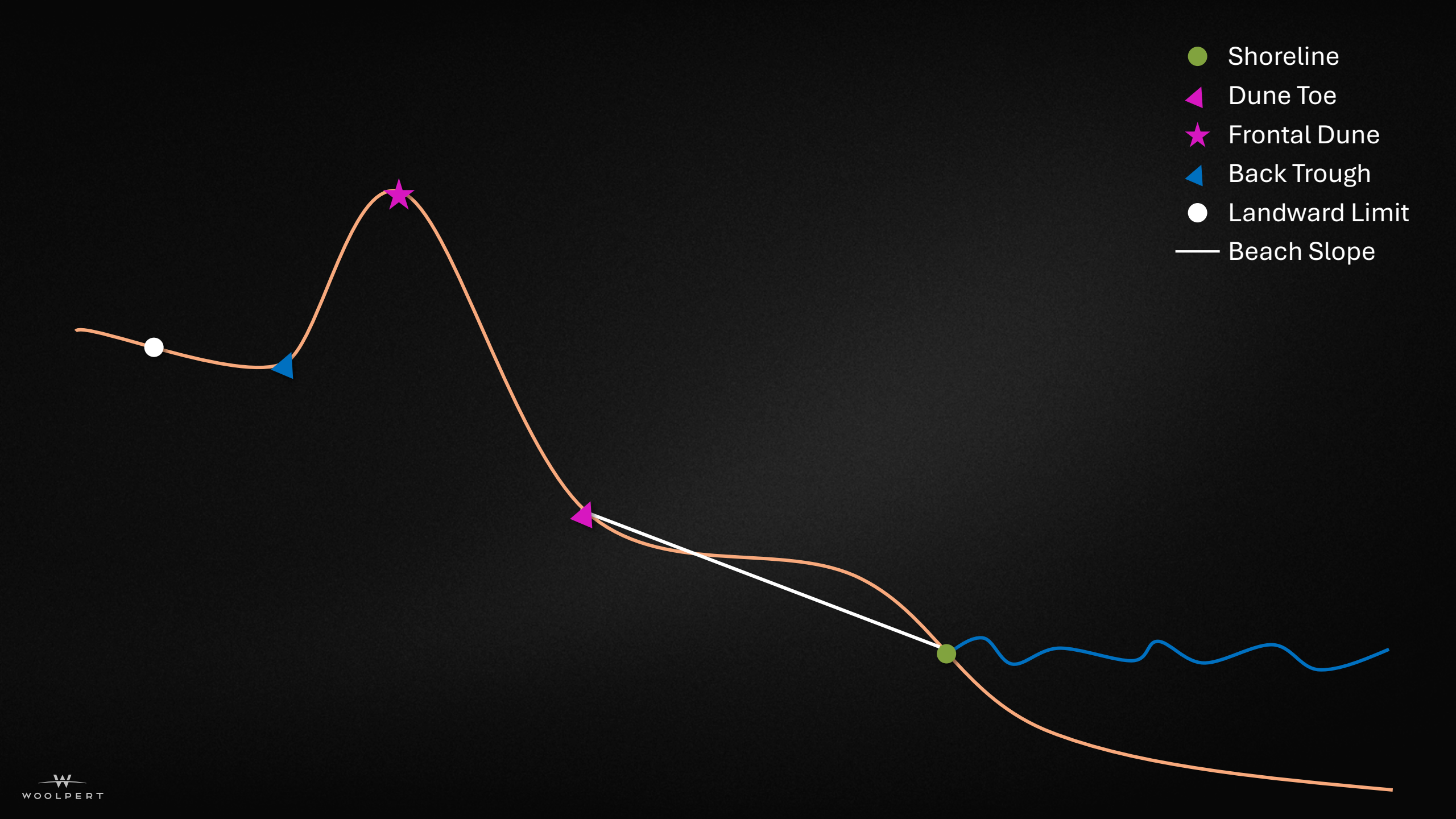
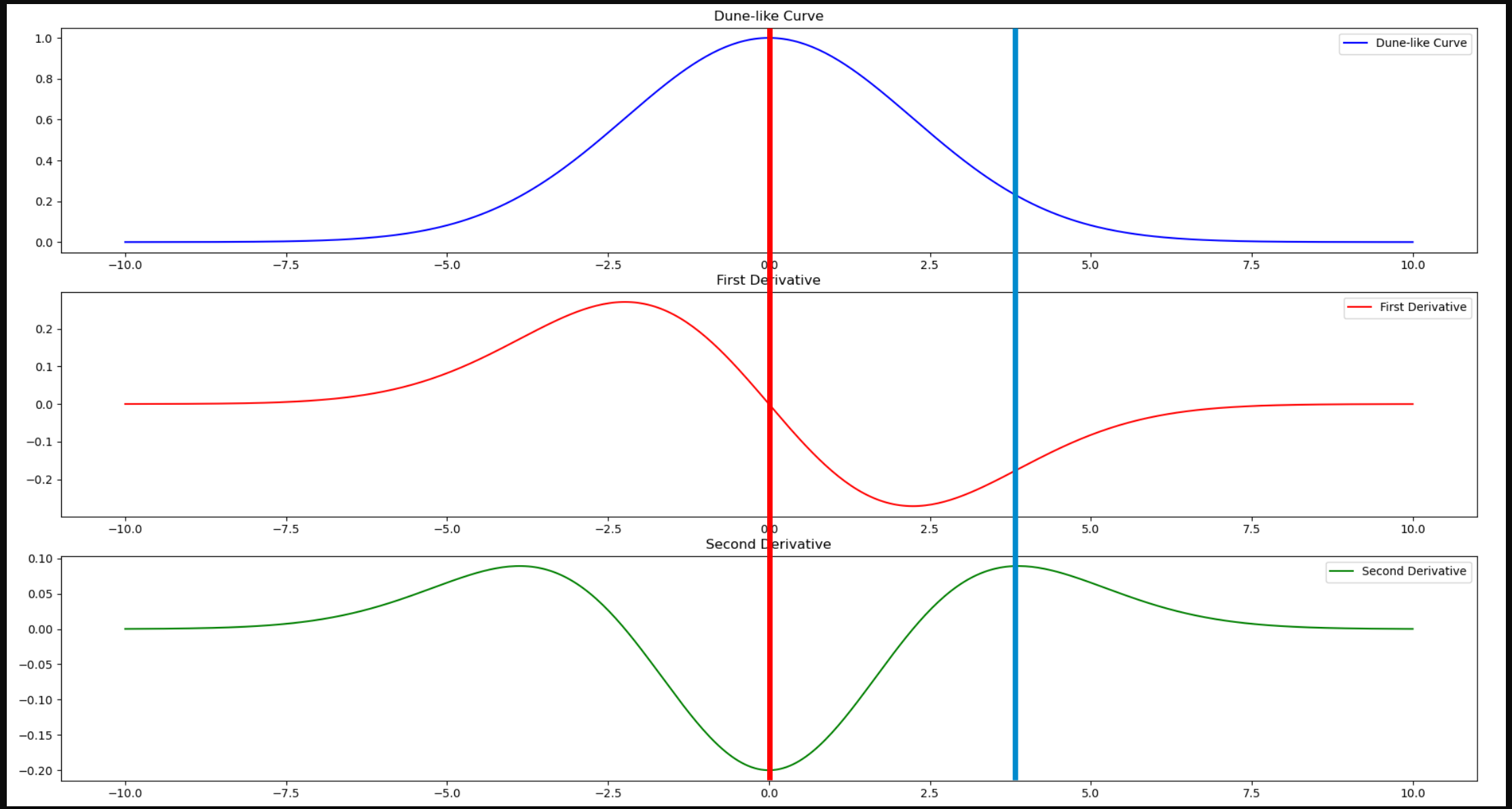
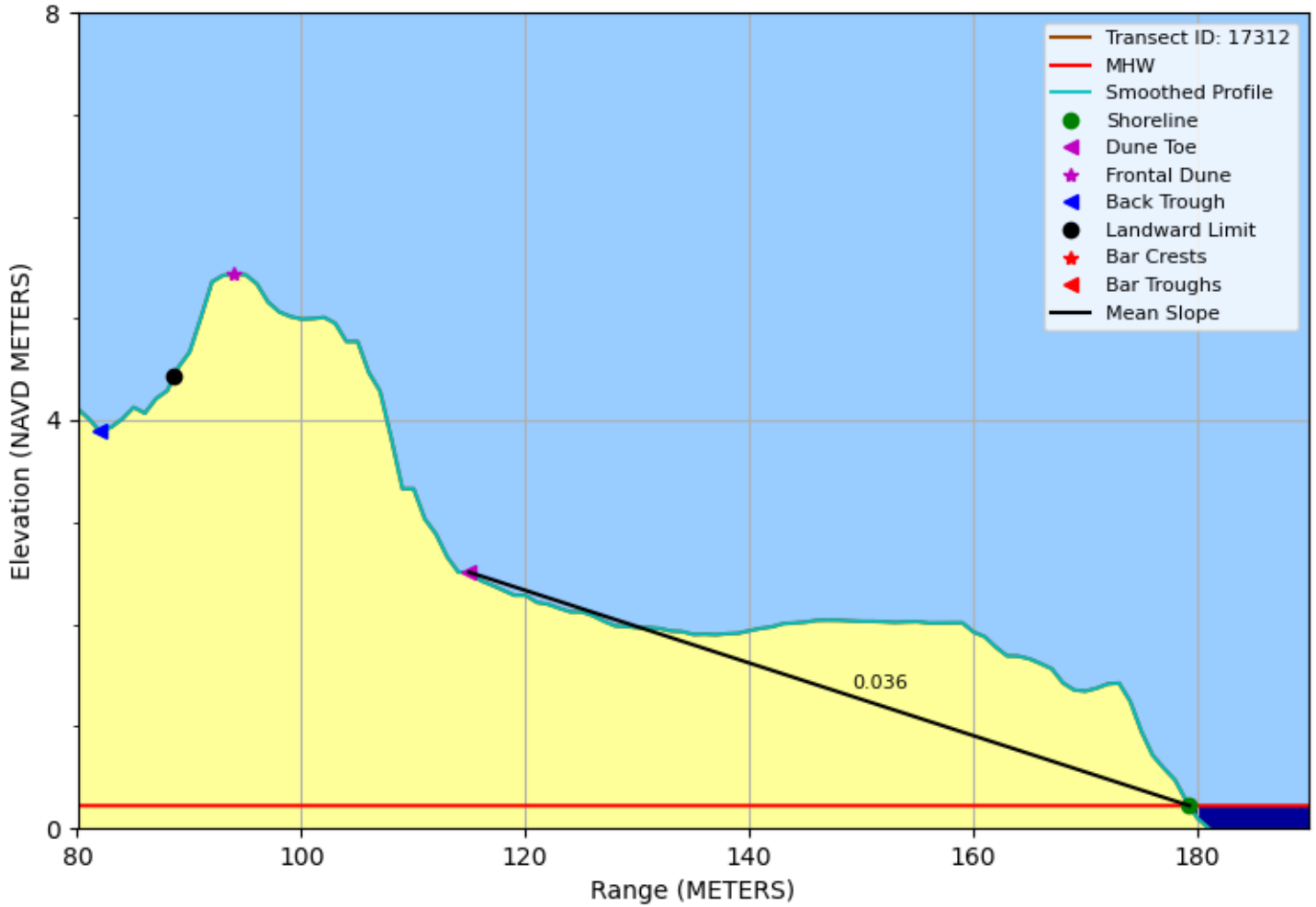
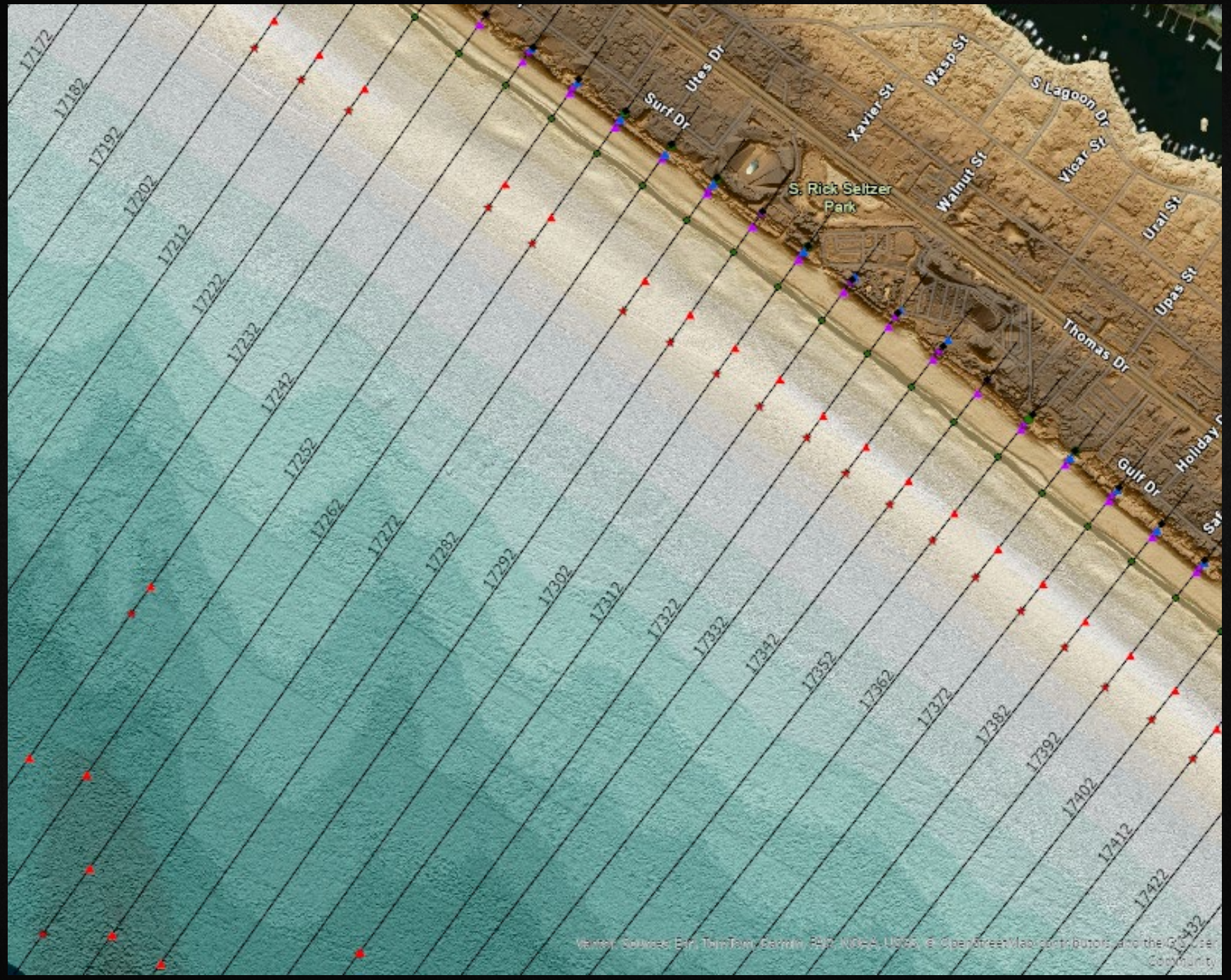

Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Beach Slope


Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Beach Slope

WOOLPERT


Dune-like Curve
Dune-like Curve
1.0
0.8
0.6
0.4
0.2
0.0
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5
10.0
First Derivative
First Derivative
0.2
0.1
0.0
−0.1
−0.2
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5
10.0
Second Derivative
Second Derivative
0.10
0.05
0.00
−0.05
−0.10
−0.15
−0.20
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5
10.0


Transect ID: 17312
MHW
Smoothed Profile
Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Bar Crests
Bar Troughs
Mean Slope
0.036
Elevation (NAVD METERS)
Range (METERS)
0
4
8
80
100
120
140
160
180


17172
17182
17192
17202
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17222
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17242
17252
17262
17272
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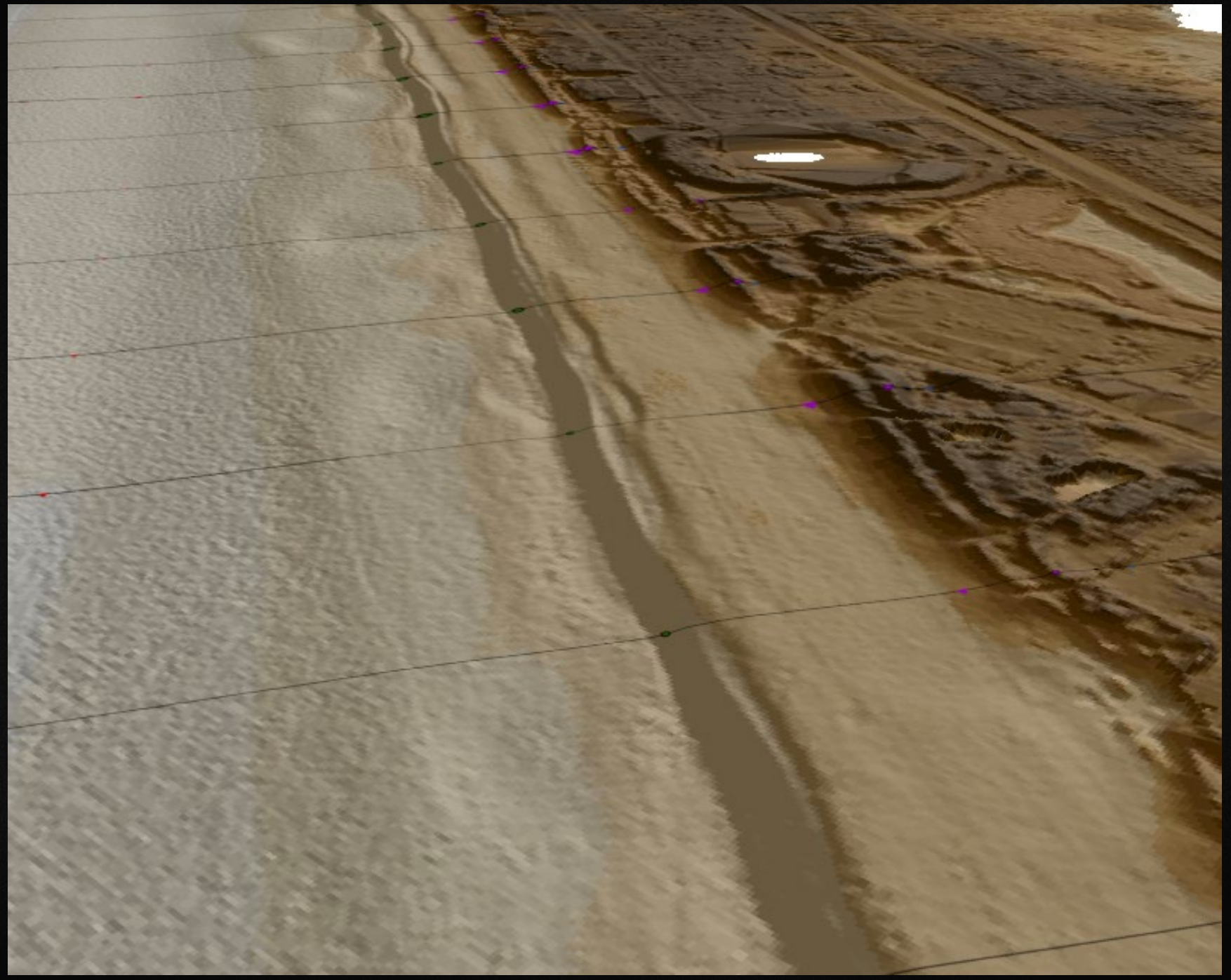
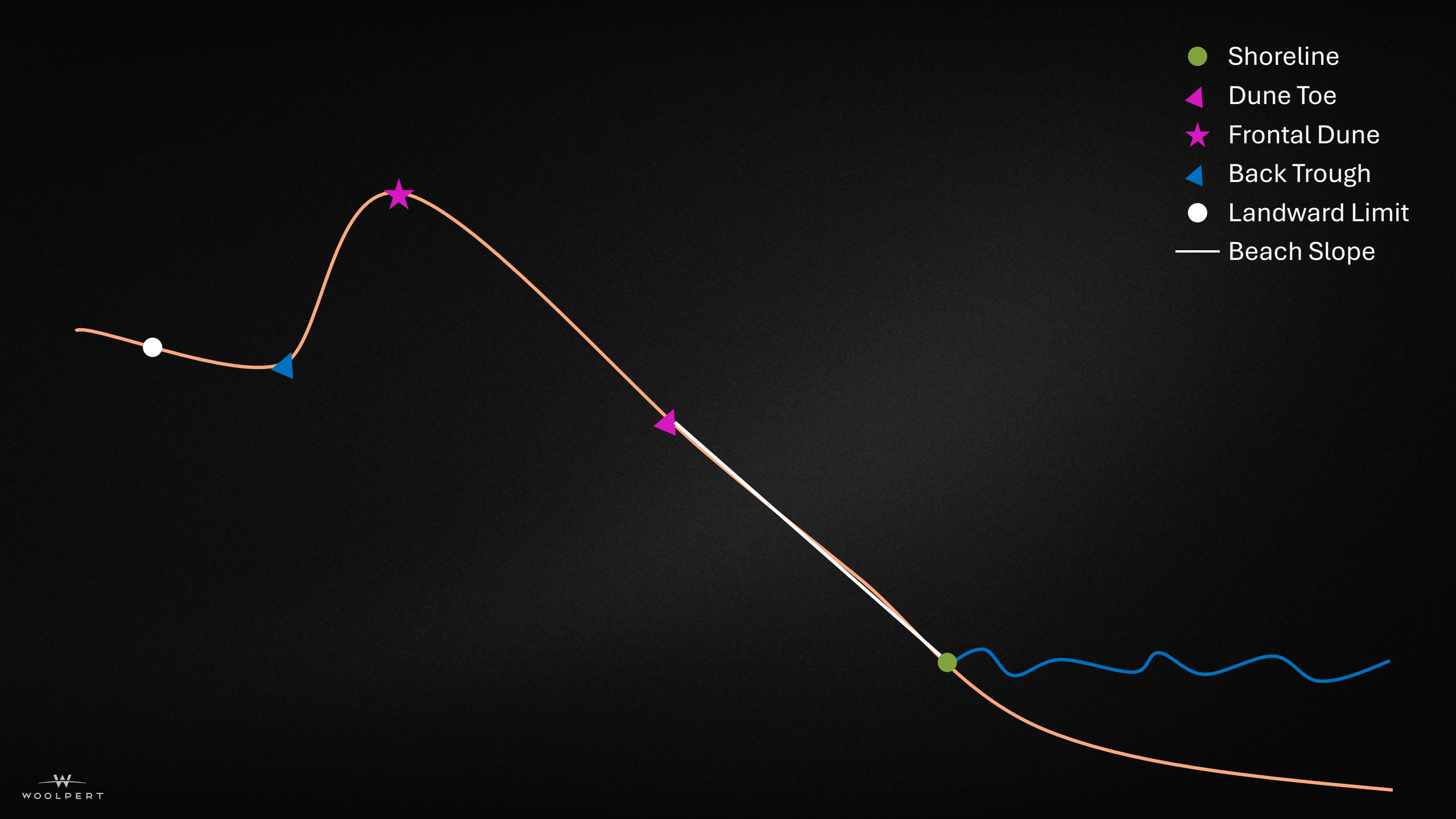
17292
17302
17312
17322
17332
17342
17352
17362
17372
17382
17392
17402
17412
17422
17432
Utes Dr
Surf Dr
Xavier St
Wasp St
S Lagoon Dr
Vicar St
Walnut St
S. Rick Seltzer Park
Ural St
Upas St
Thomas Dr
Gulf Dr
Holiday
Saf

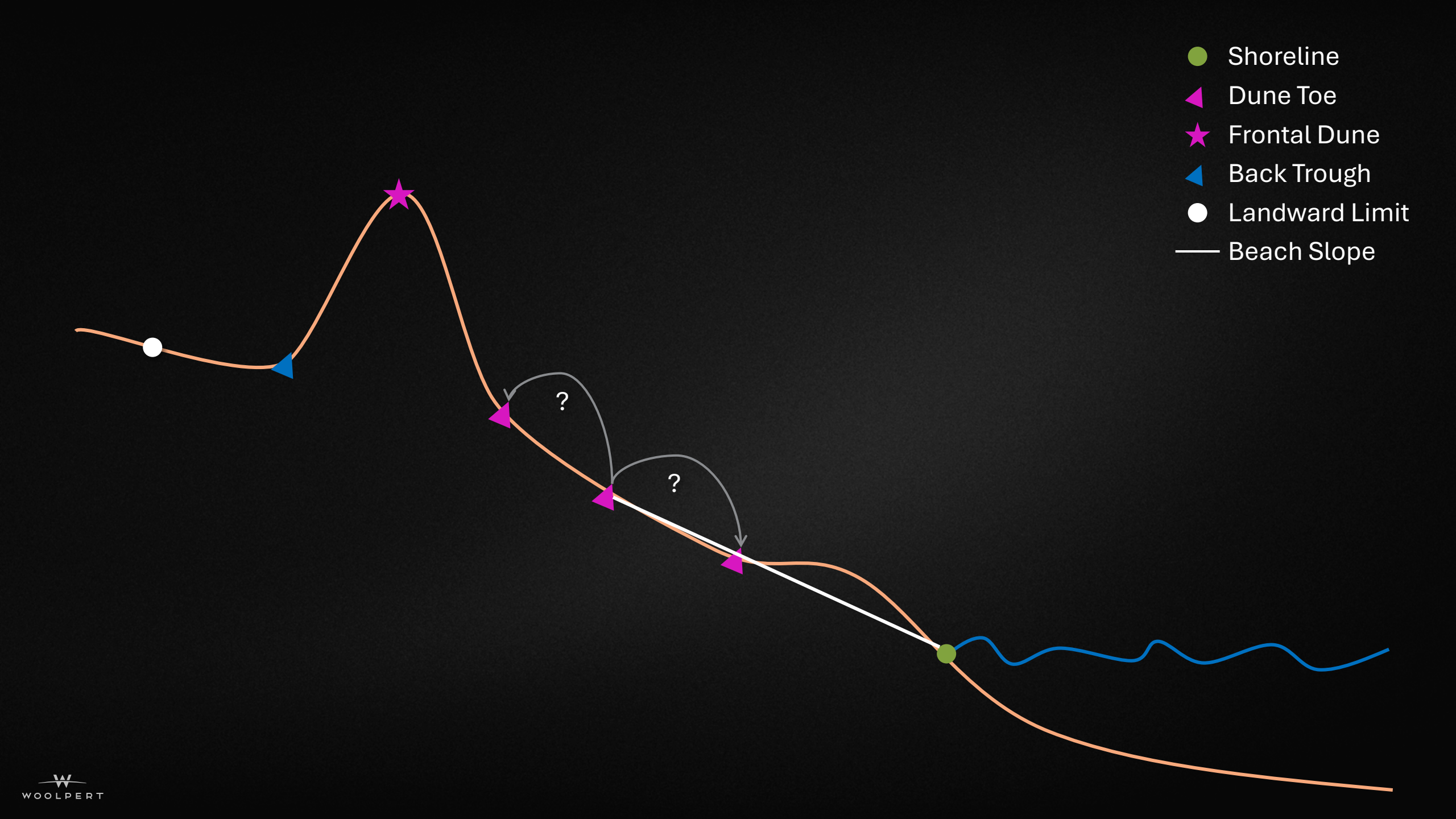
WOOLPERT



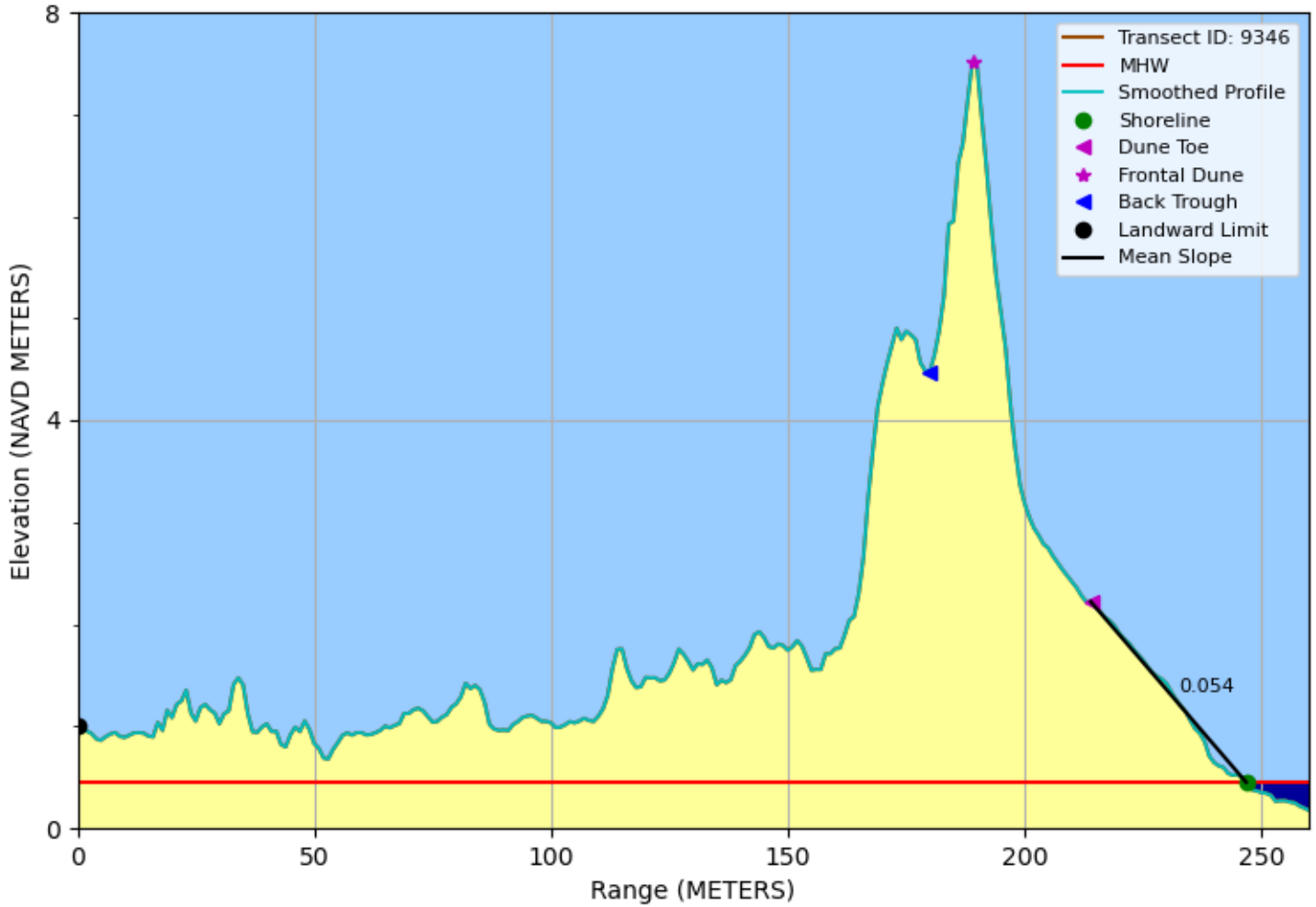
WOOLPERT

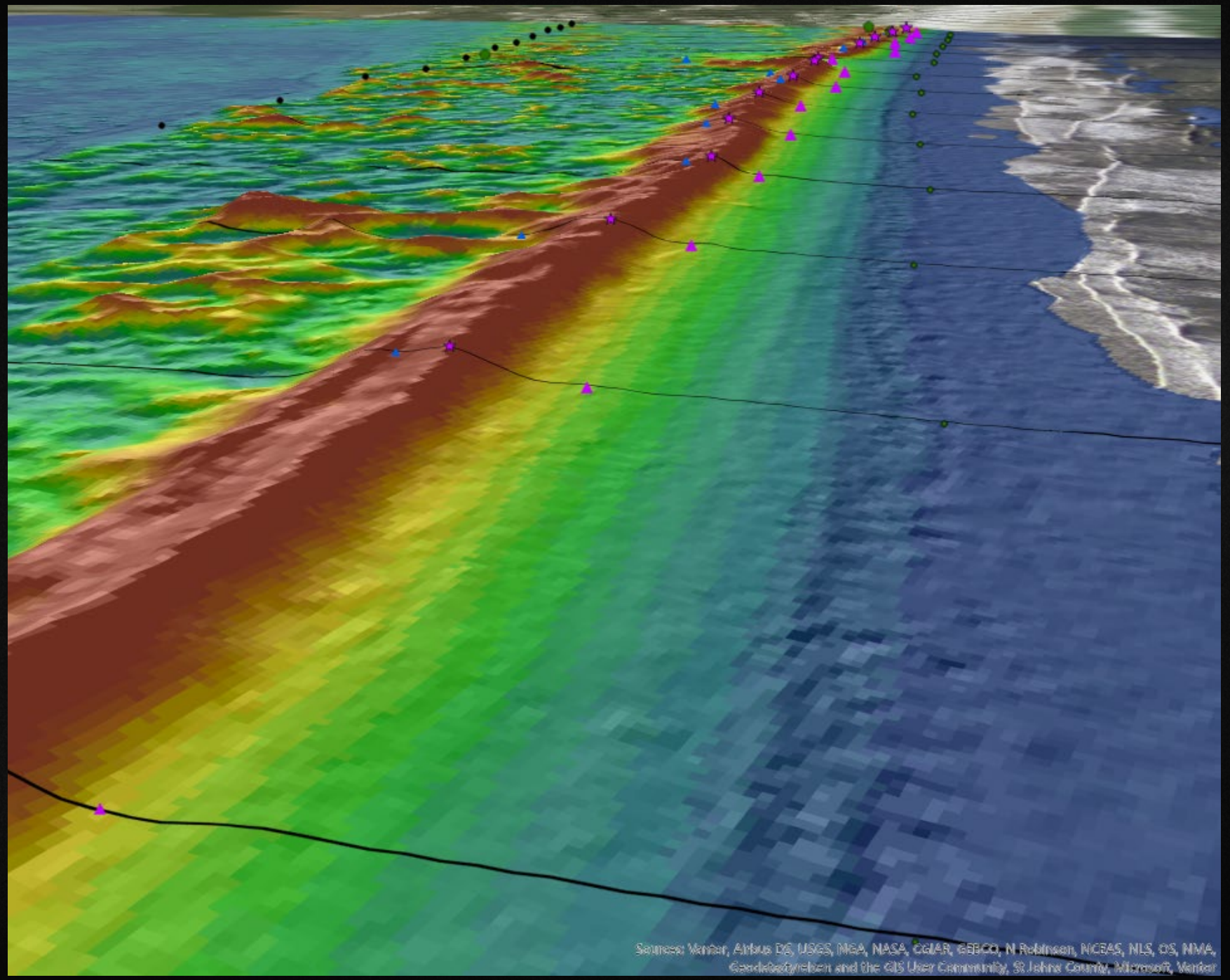

Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Beach Slope

WOOLPERT

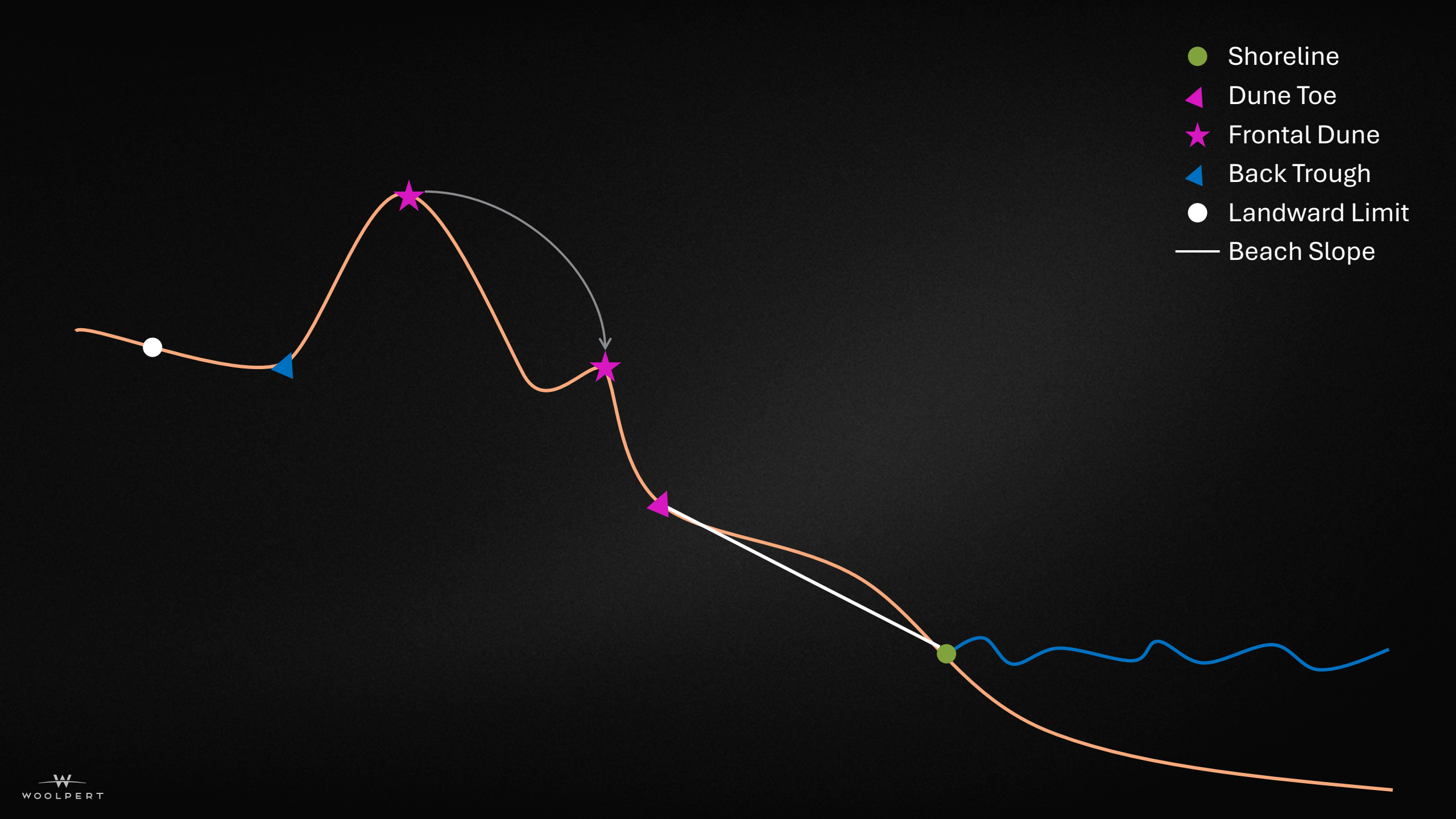

Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Beach Slope
?
?

WOOLPERT

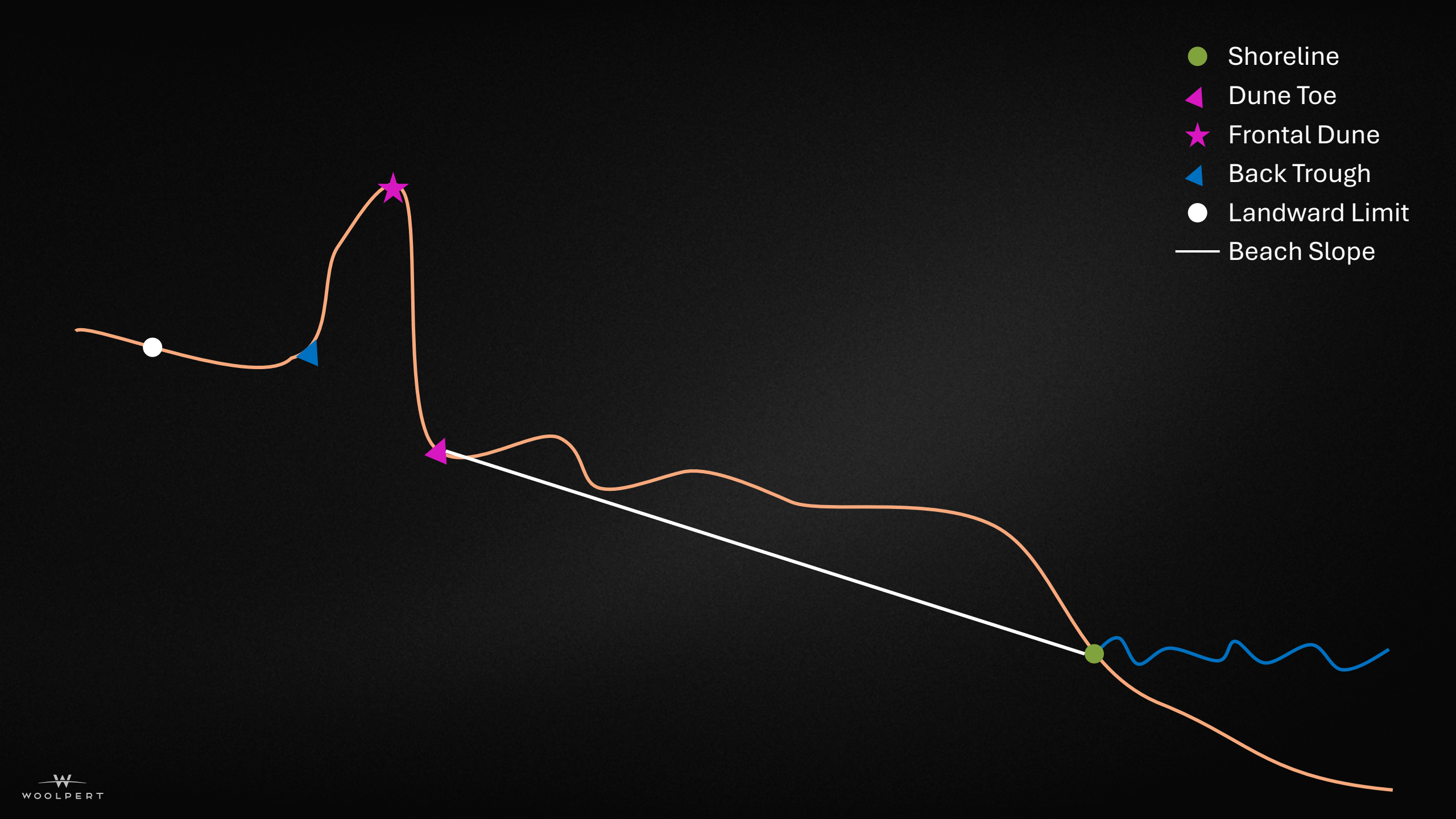

Transect ID: 9346
MHW
Smoothed Profile
Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Mean Slope
0.054
Elevation (NAVD METERS)
Range (METERS)
0
4
8
0
50
100
150
200
250

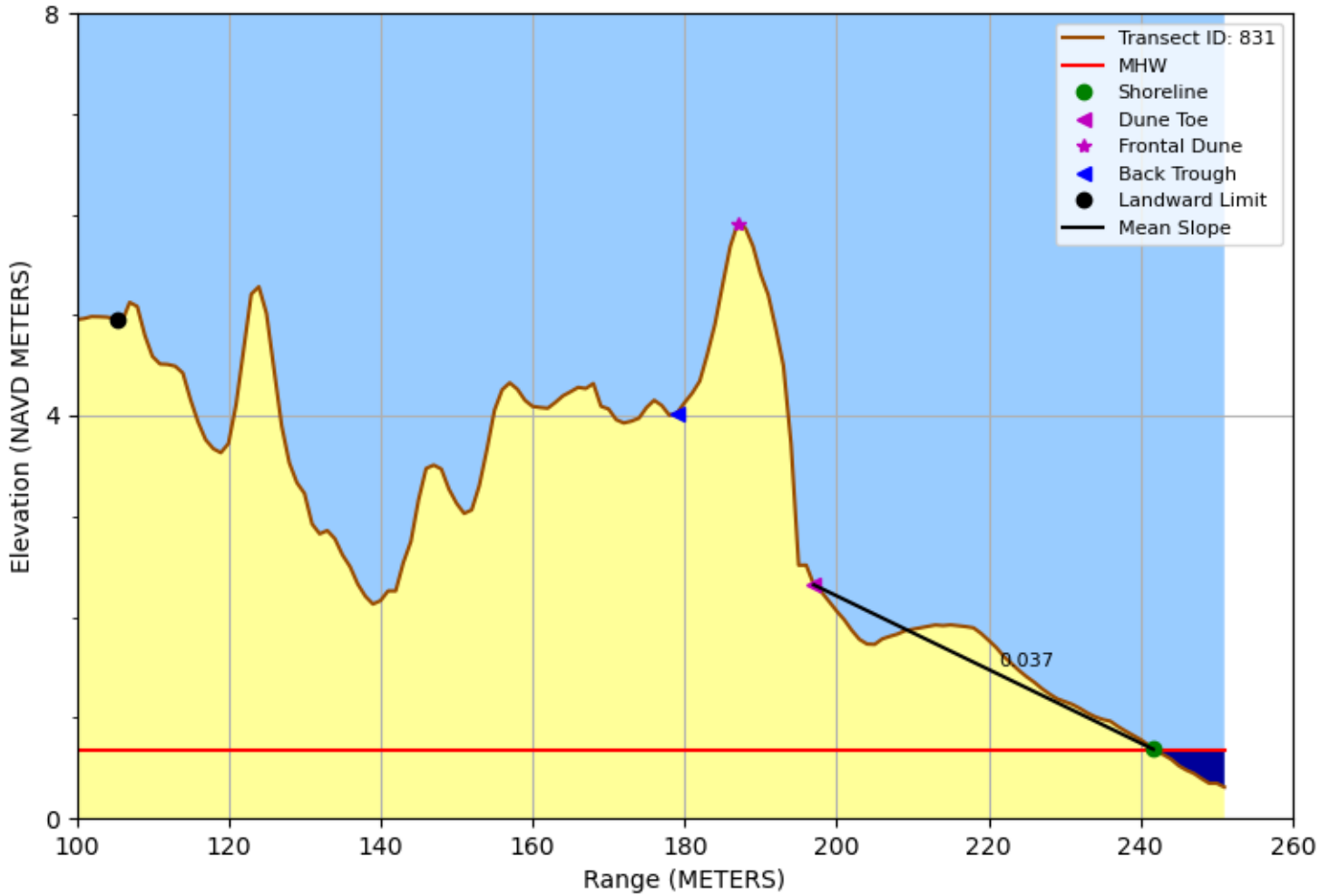

Sources: Vantor, Airbus DS, USGS, IMGA, NASA, CGIAR, GEBCO, N Robinson, NCEAS, NLS, OS, NVA,
GeoDatasystemen and the GIS User Community, St Johns County, Microsoft, Vantor

WOOLPERT

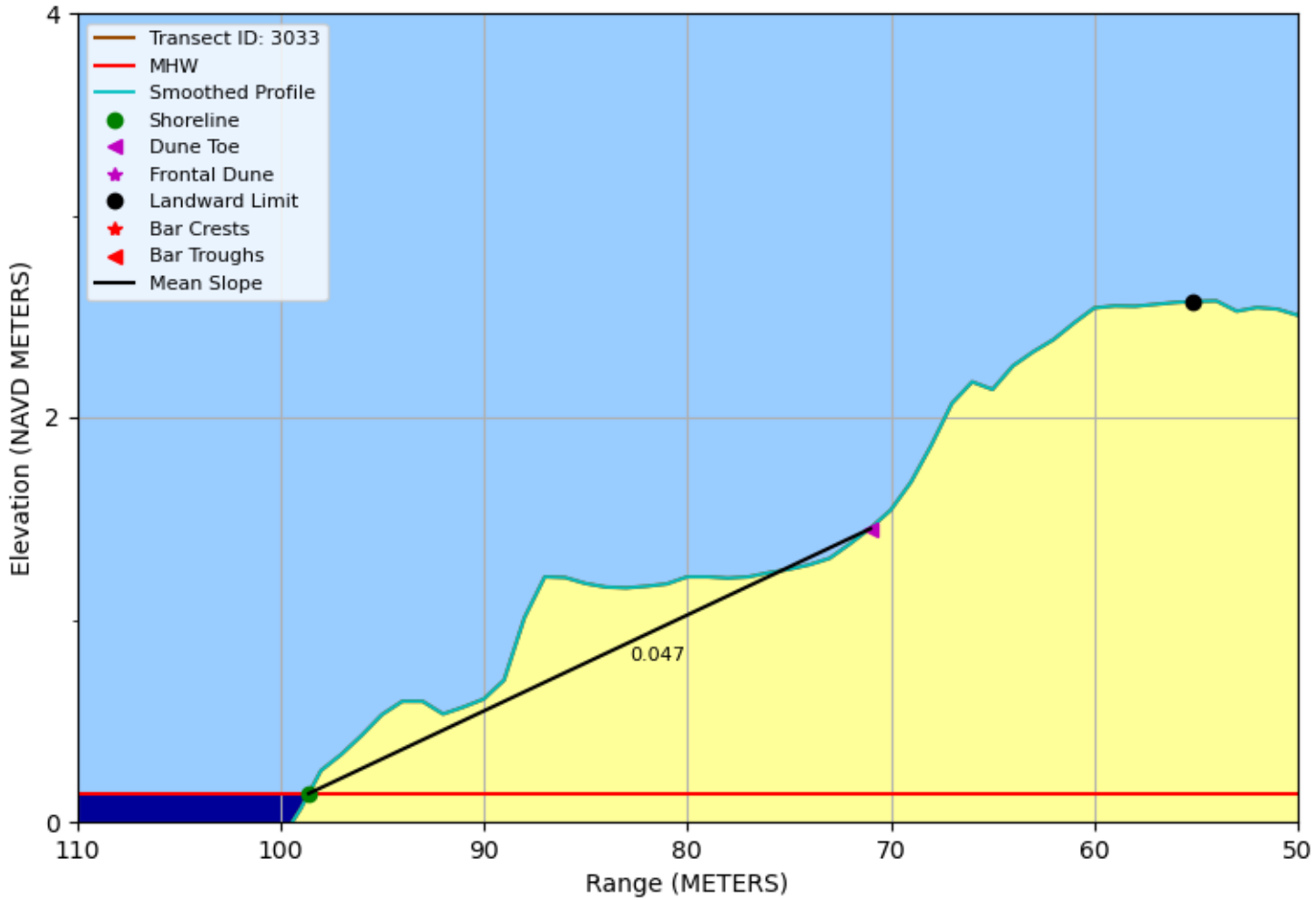

Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Beach Slope

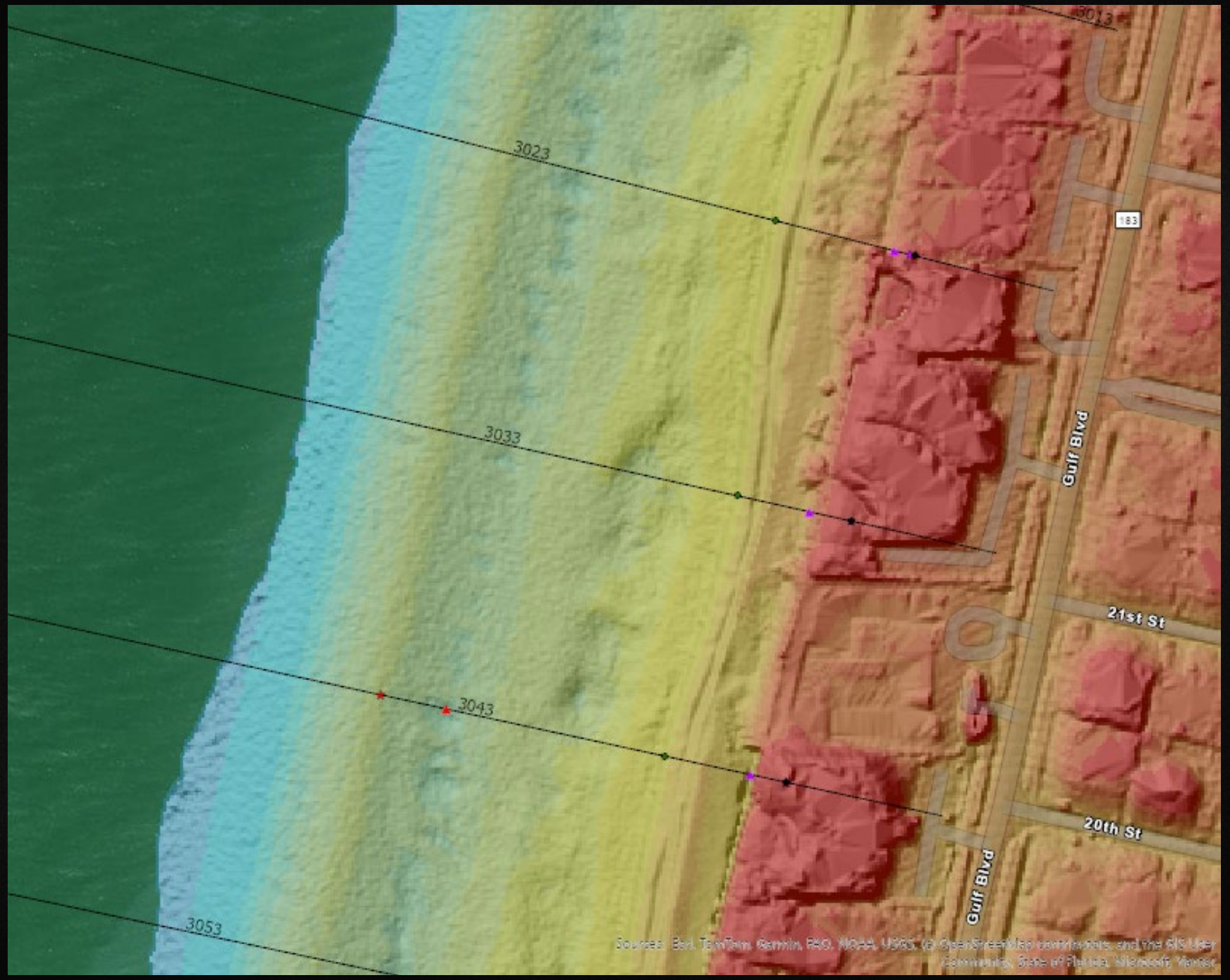
WOOLPERT

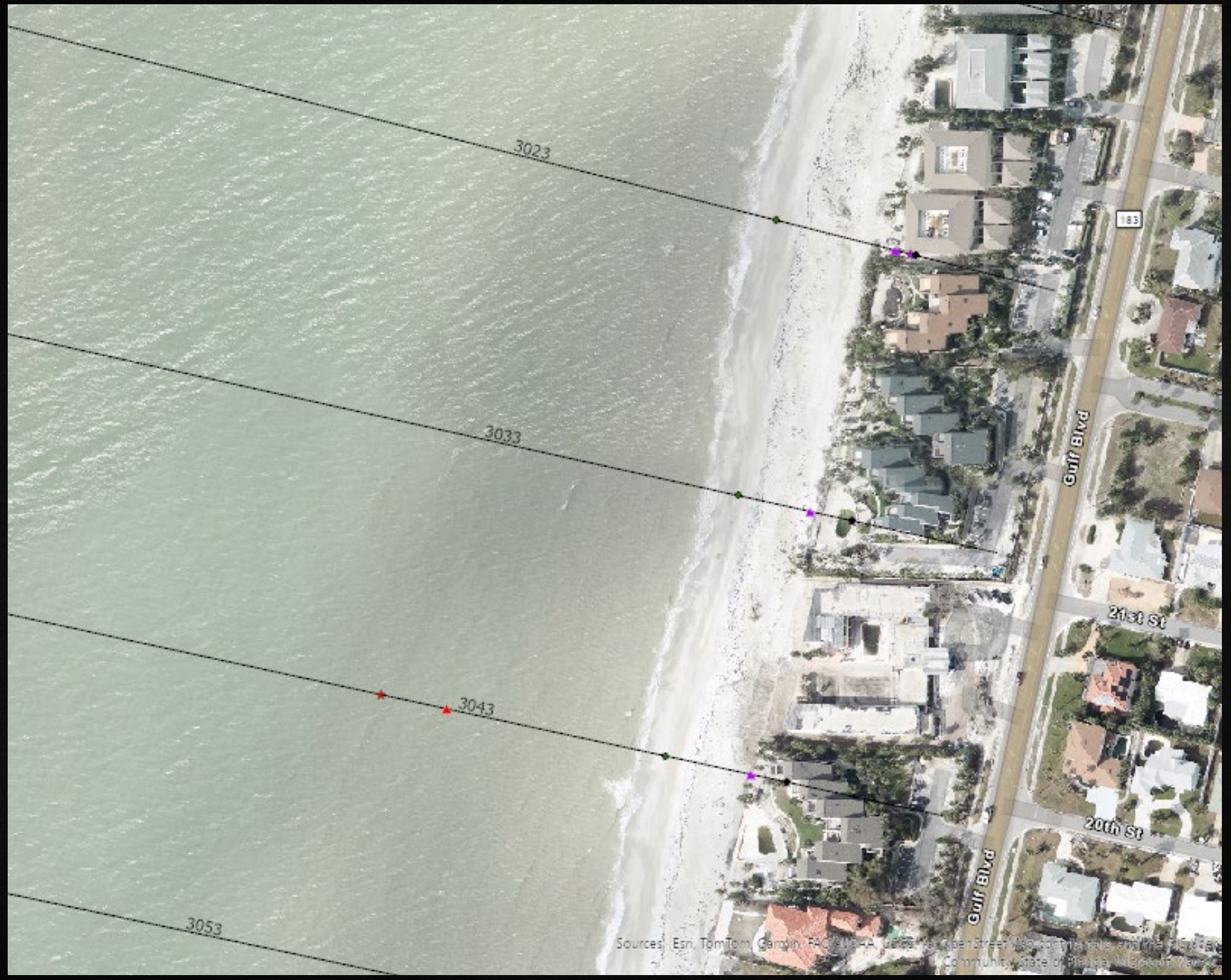

Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Beach Slope


Transect ID: 831
MHW
Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Mean Slope
0.037
Elevation (NAVD METERS)
Range (METERS)
0
4
8
100
120
140
160
180
200
220
240
260


State of Florida, Microsoft, Vantor


Transect ID: 3033
MHW
Smoothed Profile
Shoreline
Dune Toe
Frontal Dune
Landward Limit
Bar Crests
Bar Troughs
Mean Slope
0.047
Elevation (NAVD METERS)
Range (METERS)
4
2
0
110
100
90
80
70
60
50


3013
3023
3033
3043
3053
183
Gulf Blvd
21st St
20th St
Gulf Blvd



WOOLPERT

Cliff/Bluff Environments

CLIFF/BLUFF EROSION

FACTORS

- Cliff Hardness/ Geologic Conditions
- Cliff Face Armoring

Top

Cliff steepening

MARINE PROCESSES

- Beach erosion
- Beach lowering
- Tides
- Storm surge
- Wave runup

Base

Face

SUBAERIAL PROCESSES

- Groundwater
- Rilling
- Slope wash
- Rainfall/pore water pressure increase

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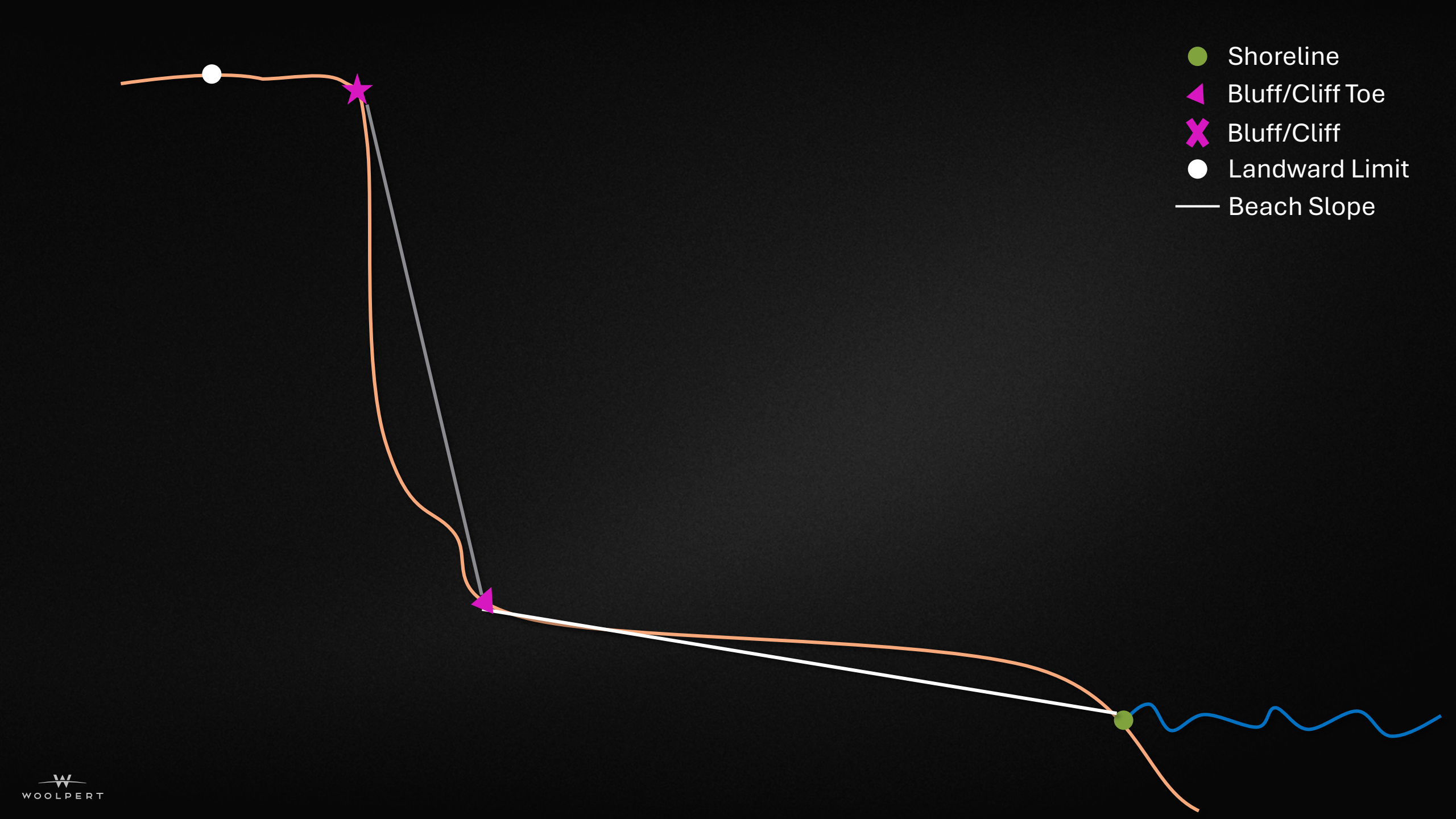
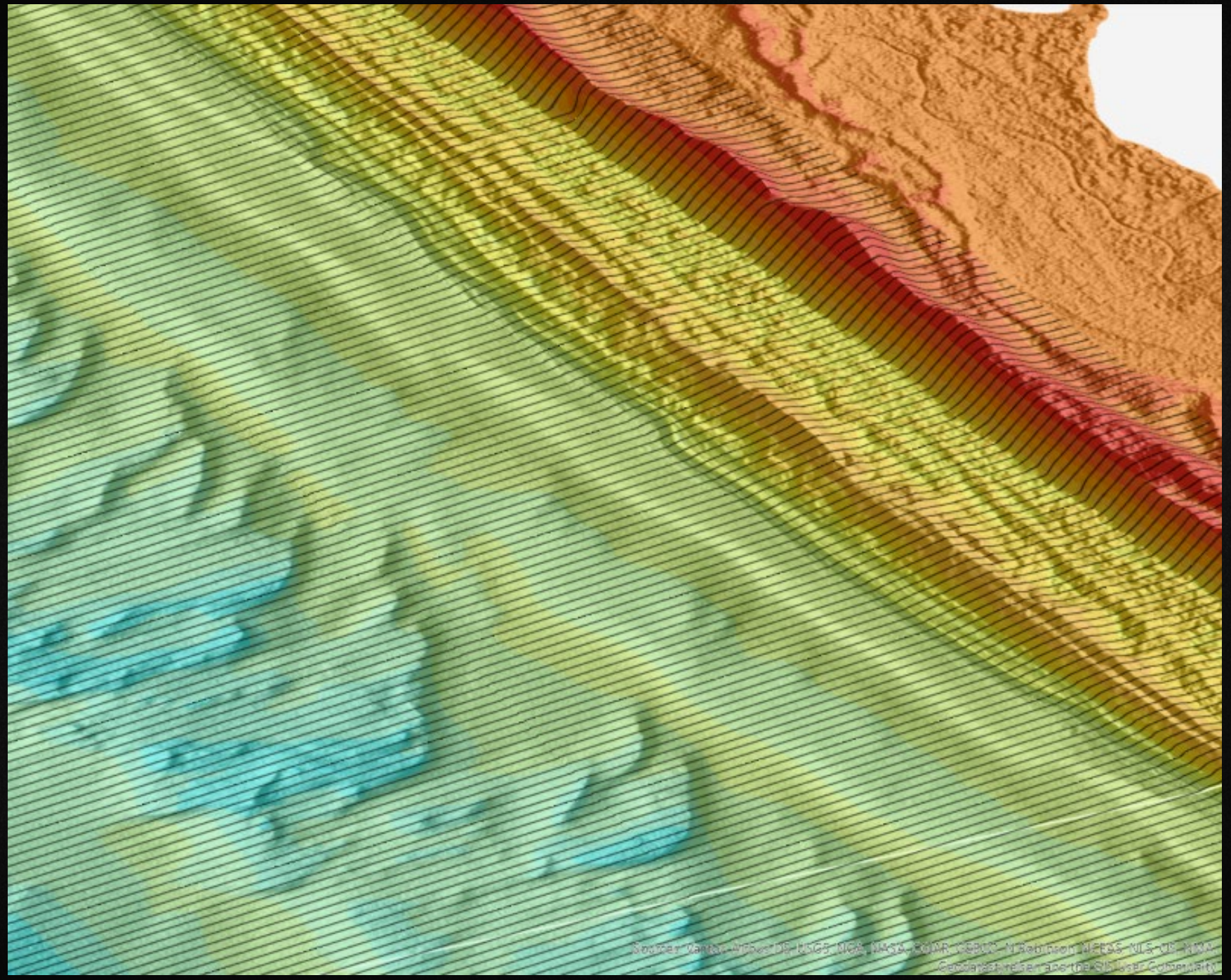

Shoreline
Bluff/Cliff Toe
Bluff/Cliff
Landward Limit
Beach Slope

WOOLPERT


Source: Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, GEBCO, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen and the GIS User Community

WOOLPERT


Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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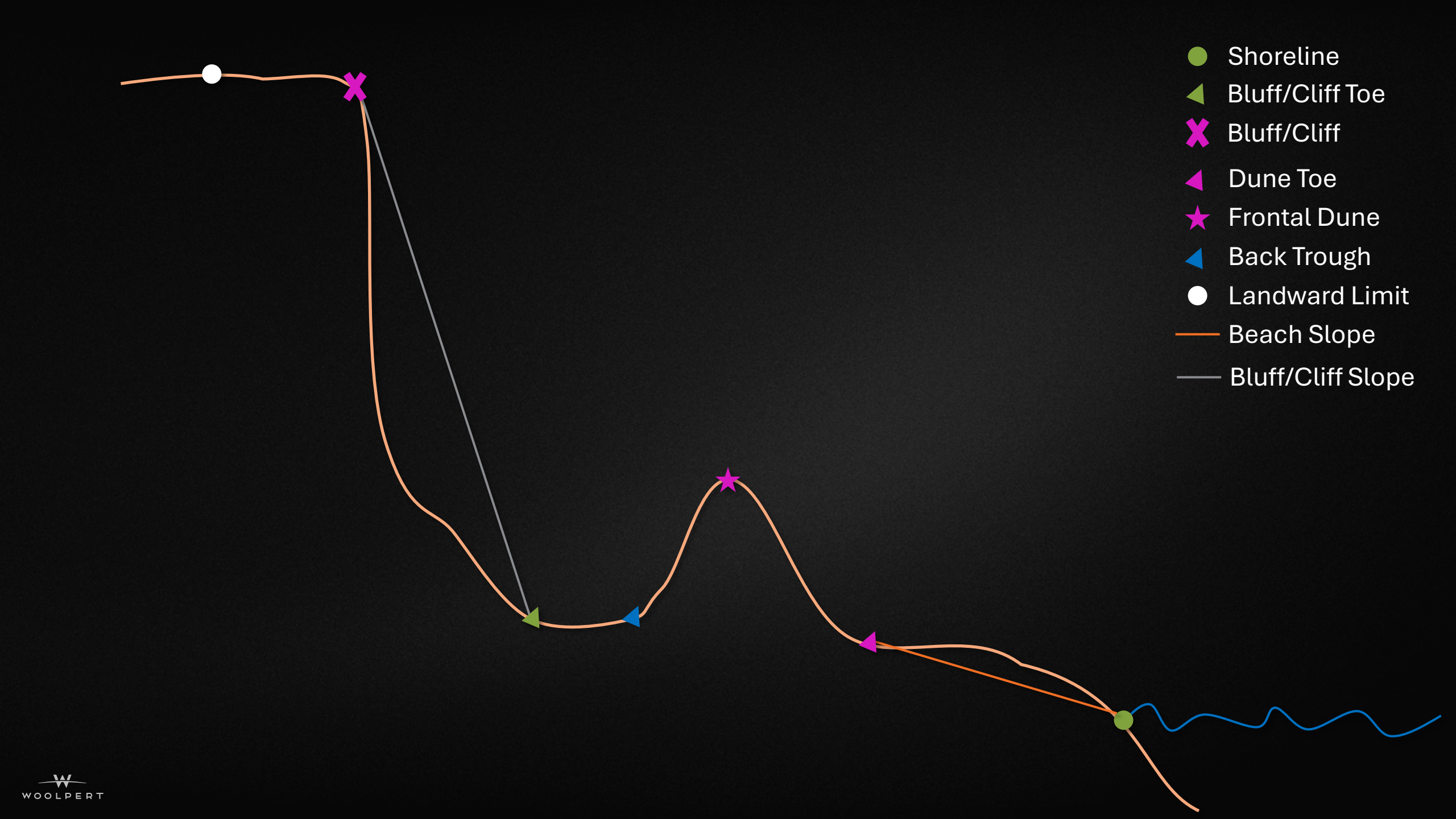
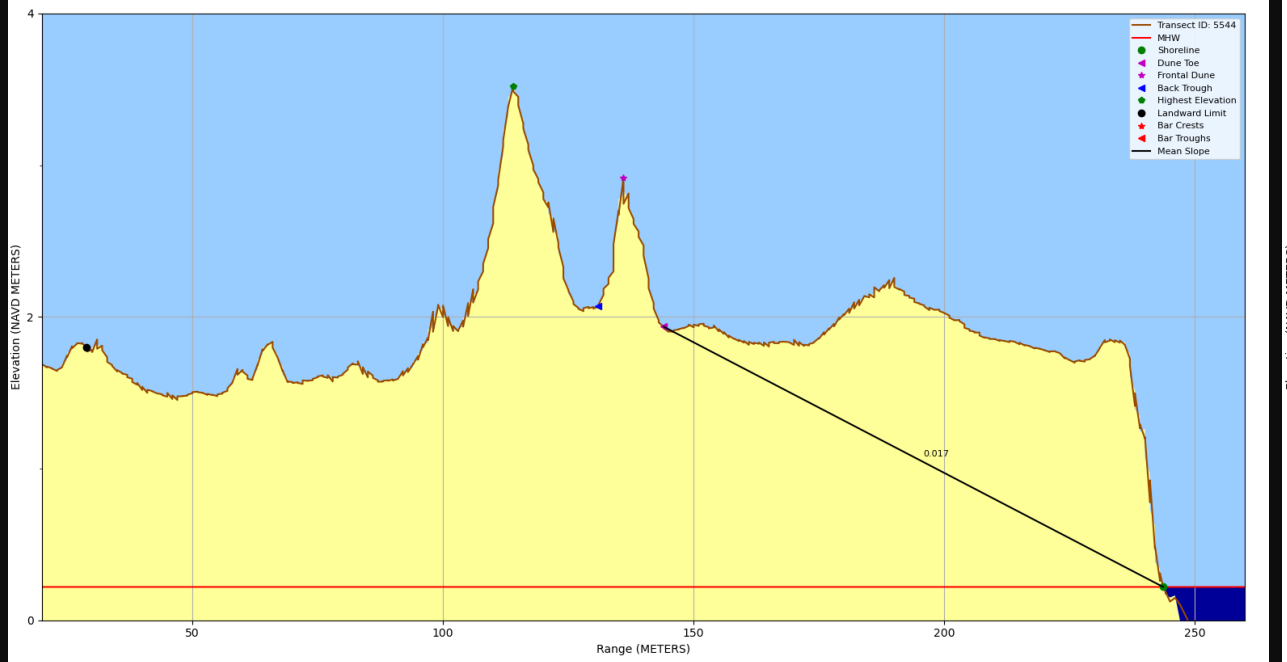
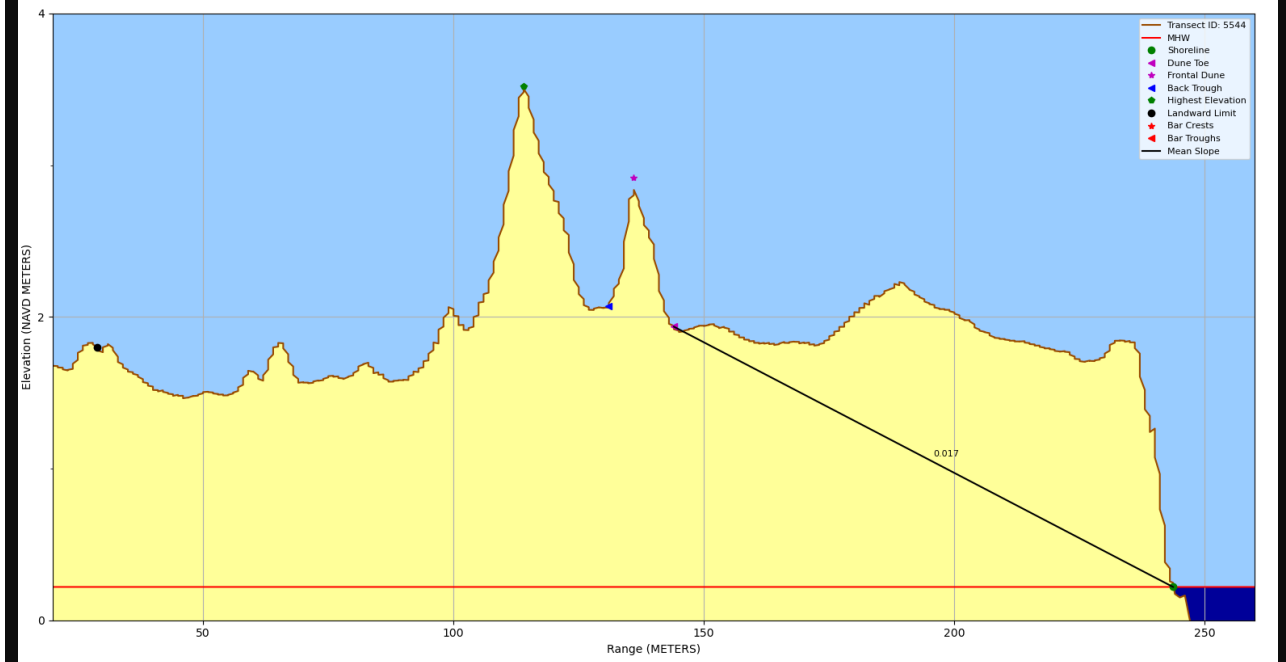

Shoreline
Bluff/Cliff Toe
Bluff/Cliff
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Beach Slope
Bluff/Cliff Slope

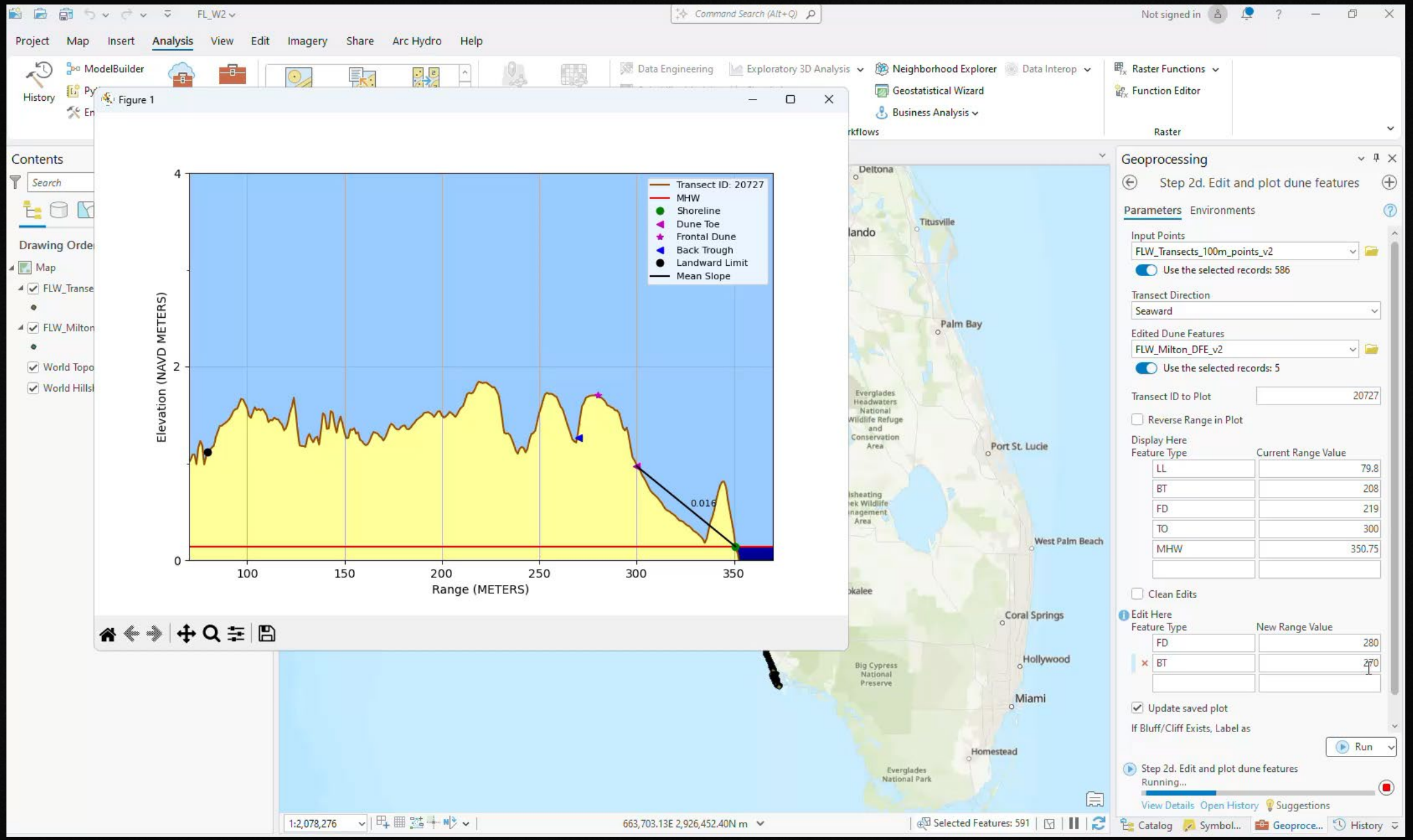
WOOLPERT

Raw



Filtered




Project
Map
Insert
Analysis
View
Edit
Imagery
Share
Arc Hydro
Help
Figure 1
Transect ID: 20727
MHW
Shoreline
Dune Toe
Frontal Dune
Back Trough
Landward Limit
Mean Slope
Elevation (NAVD METERS)
Range (METERS)
0.016
Geoprocessing
Step 2d. Edit and plot dune features
Parameters
Environments
Input Points
FLW_Transects_100m_points_v2
Use the selected records: 586
Transect Direction
Seaward
Edited Dune Features
FLW_Milton_DFE_v2
Use the selected records: 5
Transect ID to Plot
20727
Reverse Range in Plot
Display Here
Feature Type
Current Range Value
LL 79.8
BT 208
FD 219
TO 300
MHW 350.75
Clean Edits
Edit Here
Feature Type
New Range Value
FD 280
BT 270
Update saved plot
If Bluff/Cliff Exists, Label as
Run
Step 2d. Edit and plot dune features
Running...
View Details
Open History
Suggestions
Deltona
Titusville
Palm Bay
Port St. Lucie
West Palm Beach
Coral Springs
Hollywood
Miami
Homestead
Everglades National Park
Big Cypress National Preserve
1:2,078,276
663,703.13E 2,926,452.40N m
Selected Features: 591

Identifying the dune toe is not easy

Controlling where to look for metrics is key

- Minimum and maximum elevations
- East/NW coast FL: dune toe 1-3 m
- West coast FL: dune toe 1-2 m
- Prominence – vertical and horizontal difference between features

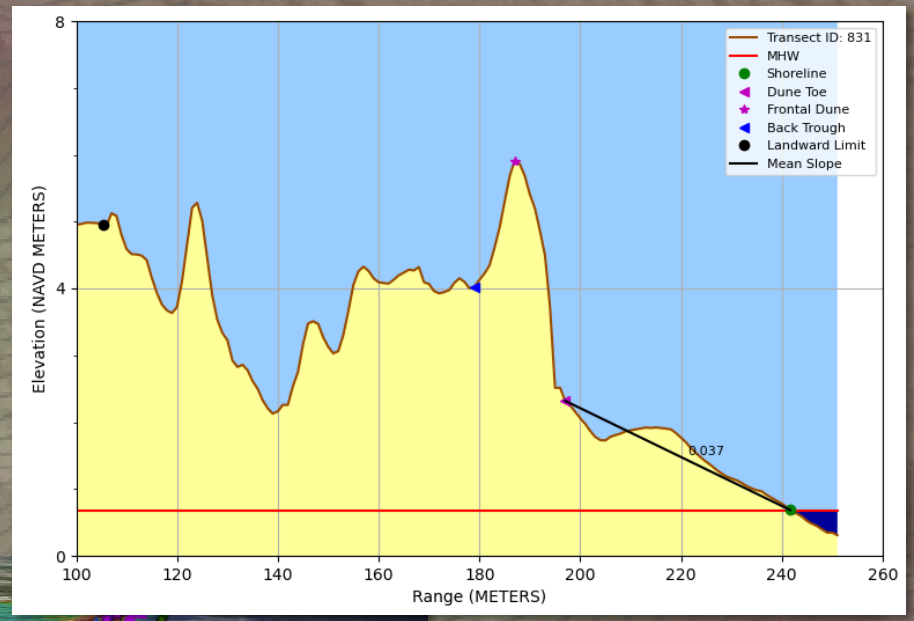
Search direction – to or from dune

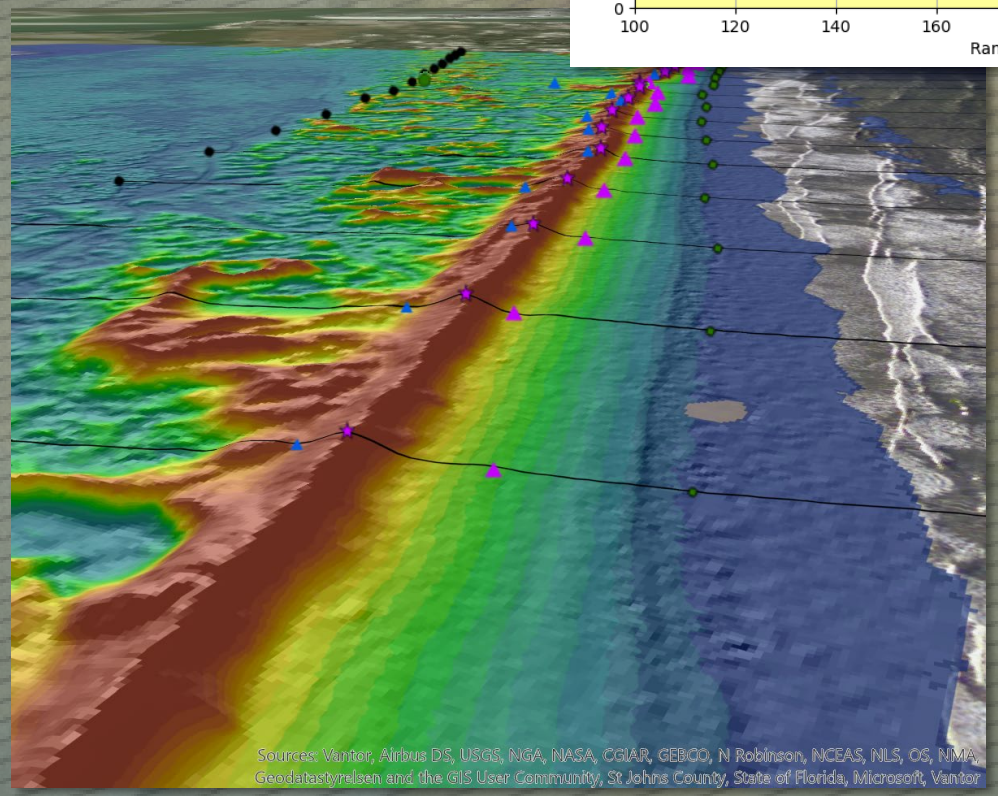
Workflow

- Calibrate input parameters
- Focus on 2D profiles first
- Record profiles to edit
- Run profile editor

QAQC once

Questions – call me





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Thank You!

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Quin.Robertson@Woolpert.com

Tellus Consulting
Zhifei Dong

USACE National Coastal Mapping Program
Jennifer Wozencraft
Charlene Sylvester

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