

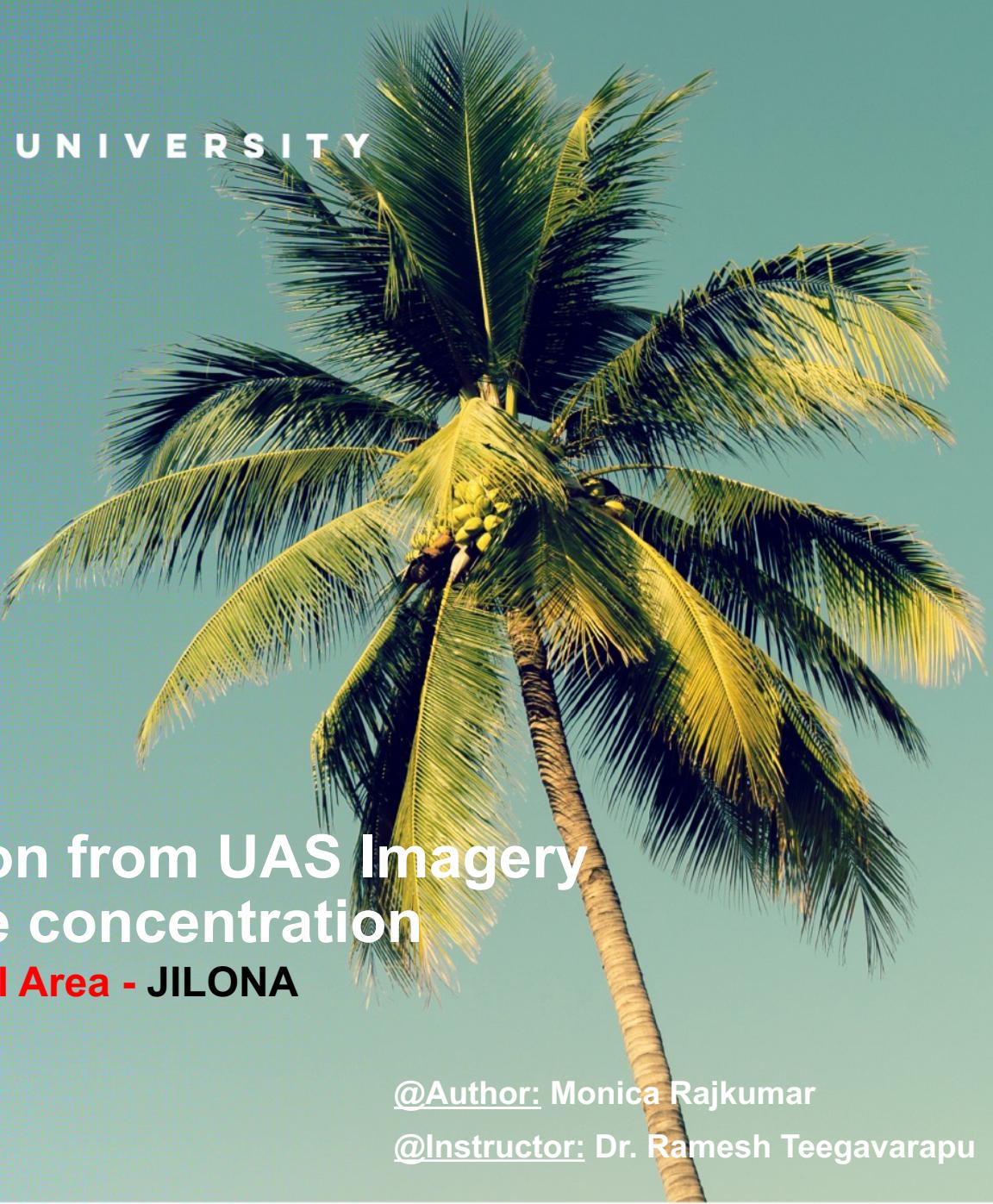


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YOUR
FUTURE
AWAITS

**Shoreline & Coastline extraction from UAS Imagery
and Determination of sea turtle concentration**

Jupiter Inlet Lighthouse Outstanding Natural Area - JILONA



@Author: Monica Rajkumar

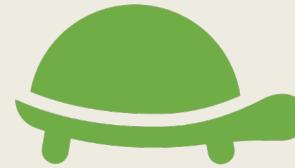
@Instructor: Dr. Ramesh Teegavarapu

Objective



Extract Shoreline & Coastline

Build a Geoprocessing tool to extract shoreline and coastline (waterline) using UAS Imagery



Map Sea Turtle Concentration

Kernel Density Analysis
Optimized Hotspot Analysis

Study Area

Jupiter Inlet Lighthouse Outstanding Natural Area



4.8  154 reviews

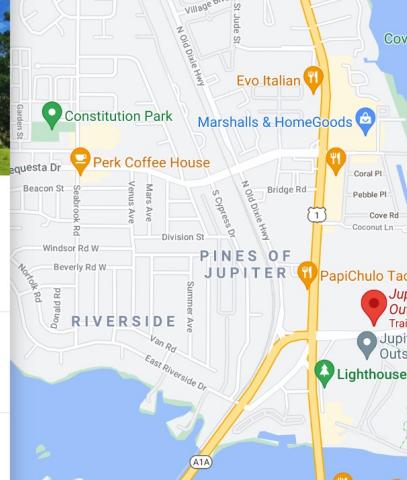
Nature preserve

[Directions](#) [Save](#) [Nearby](#) [Send to your phone](#) [Share](#)

Nature preserve with a park, boardwalk & trails, plus interpretive programs & lighthouse tours.

600 County Hwy 707, Tequesta, FL 33469

Rocky's Ace Hardware





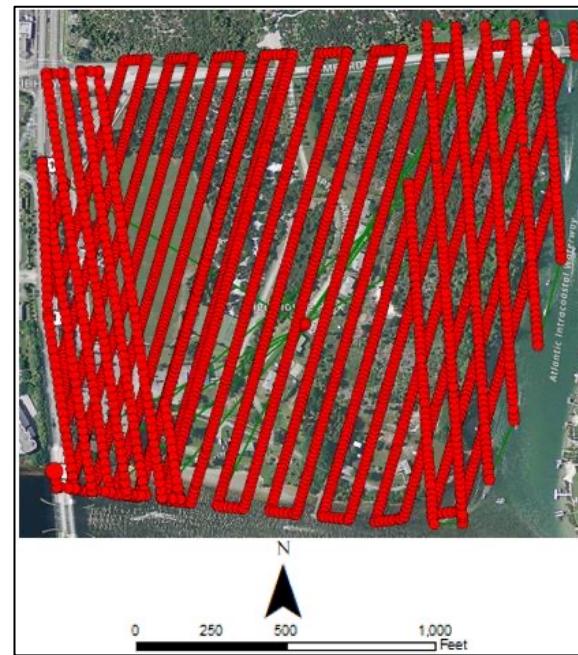
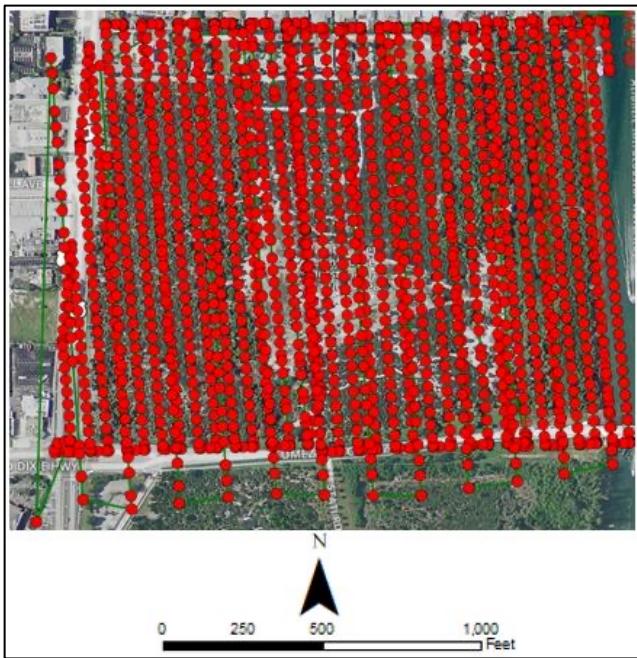
Data Collection – Red Edge Micasense



COMPONENT	DESCRIPTION
Weight	231.9 g (8.18 oz.) - (Includes DLS 2 and cables)
Dimensions	8.7 cm x 5.9 cm x 4.54 cm (3.4 in x 2.3 in x 1.8 in)
Spectral Bands	Blue, green, red, red edge, near-infrared (NIR) (global shutter, narrowband)
Wavelength (nm)	Blue (475 nm center, 32 nm bandwidth), green (560 nm center, 27 nm bandwidth), red (668 nm center, 16 nm bandwidth), red edge (717 nm center, 12 nm bandwidth), near-IR (842 nm center, 57 nm bandwidth)
RGB Color Output	Global shutter, aligned with all bands
Ground Sample Distance (GSD)	8 cm per pixel (per band) at 120 m (~400 ft) AGL
Capture Rate	One capture per second (all bands), 12-bit RAW
Interfaces	Serial, 10/100/1000 ethernet, removable Wi-Fi, external trigger, GPS, SDHC
Field of View	47.2° HFOV
Triggering Options	Timer mode, overlap mode, external trigger mode (PWM, GPIO, serial, and Ethernet options), manual capture mode



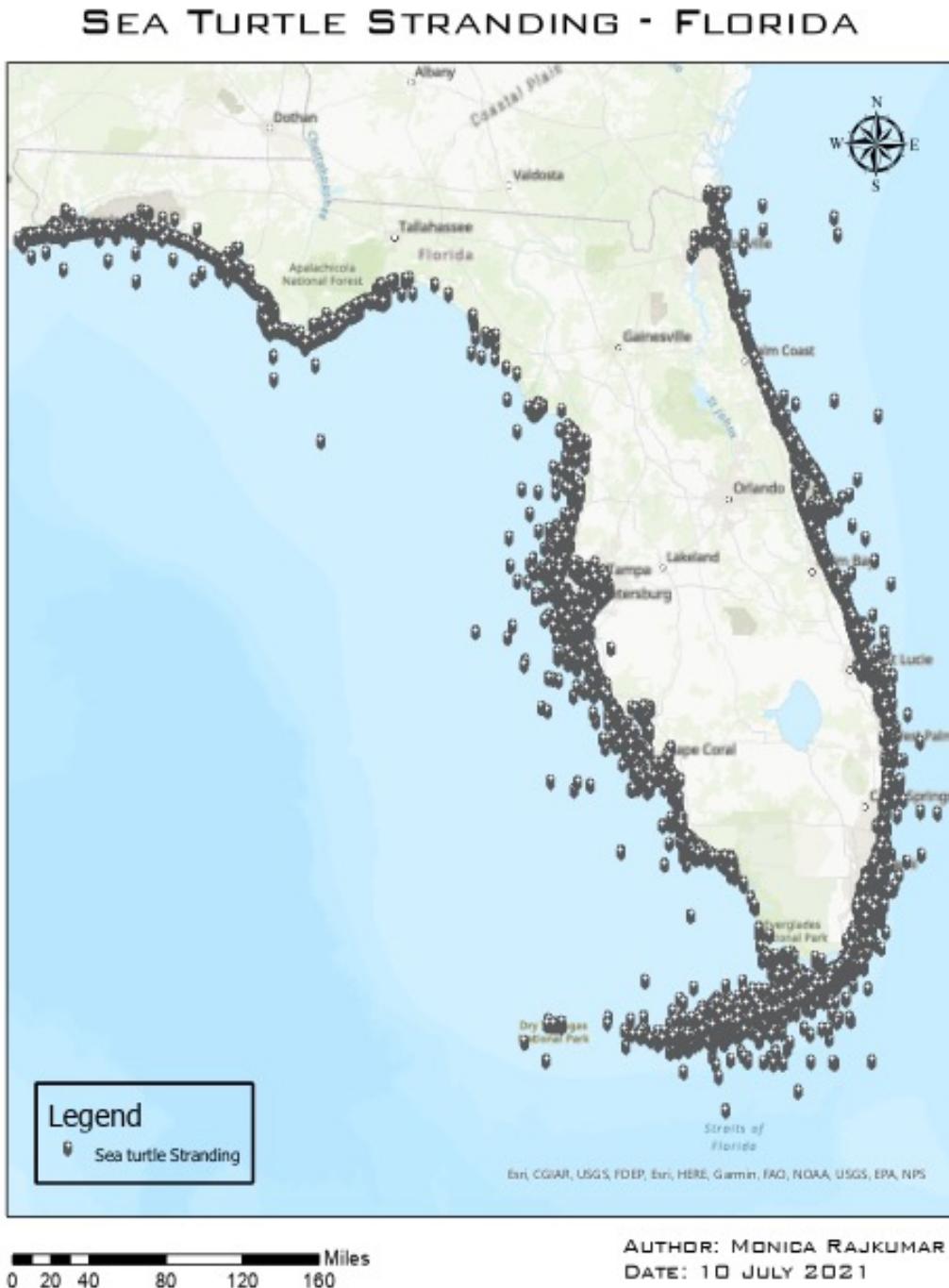
JILONA North and South Data



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Sea turtle stranding - FGDL



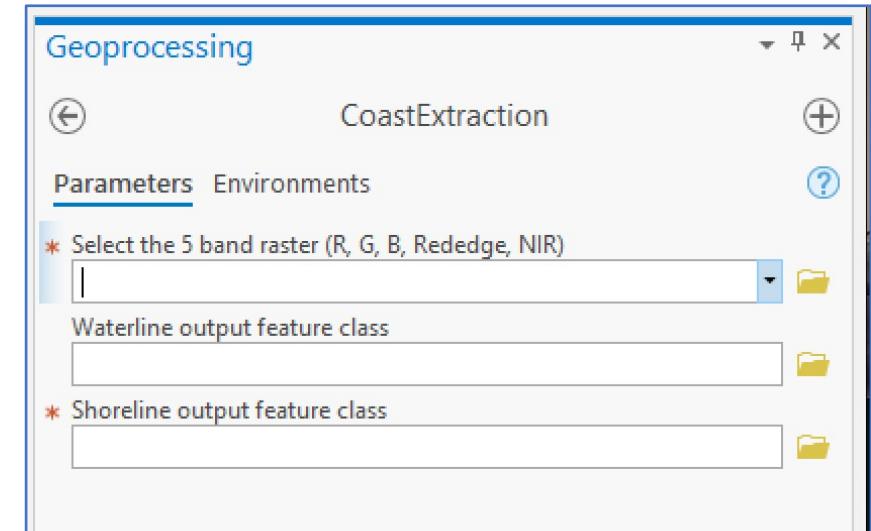


EXTRACTION USING GEOPROCESSING TOOL

- Built using Python - ArcPy
- Can be extended as ESRI Task Workflow

EXTRACTION TOOL

Using Python



Tool Properties: CoastExtraction

Label	Name	Data Type	Type	Direction	Category
Select the...	Select_the_5_band_raster	Raster Dataset,Raster Layer	Required	Input	
Waterline...	Waterline_output	Feature Class,Shapefile	Optional	Output	
Shoreline...	Shoreline_output	Feature Class,Shapefile	Required	Output	

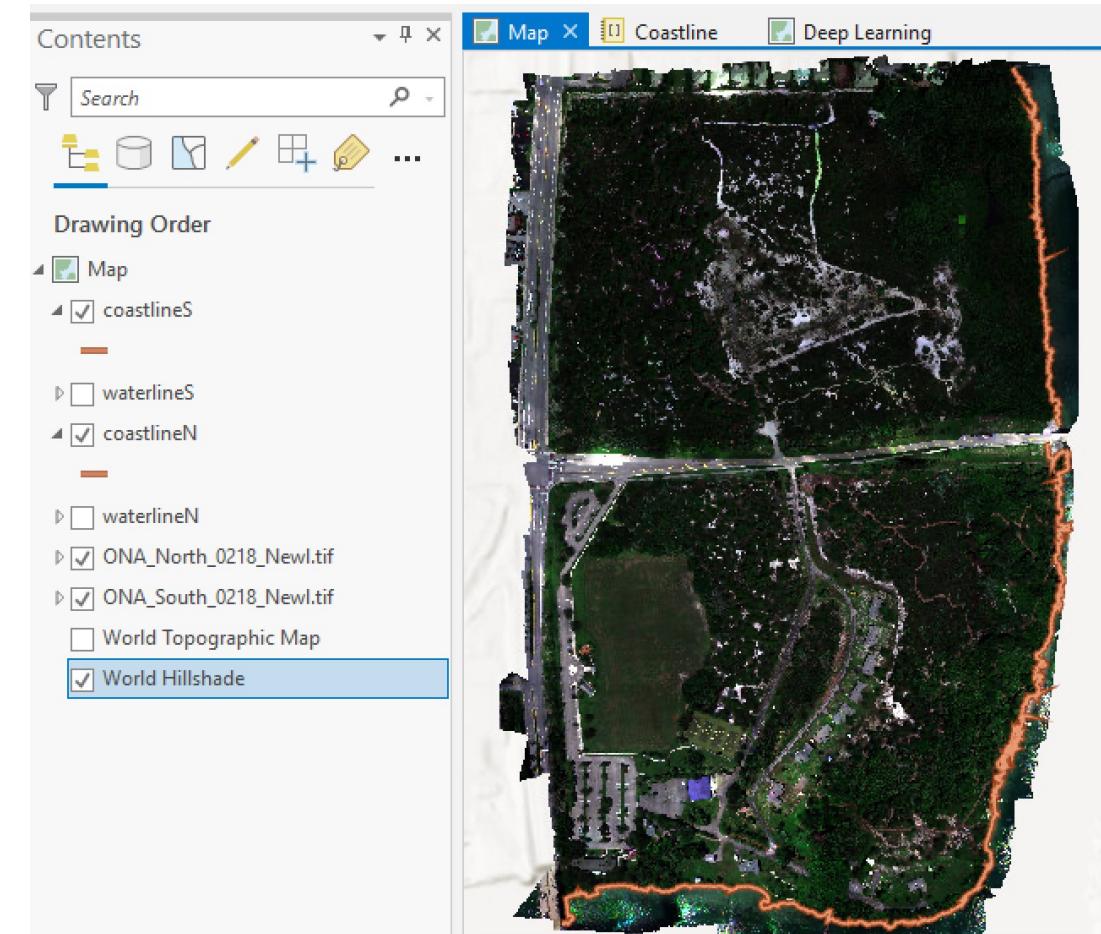
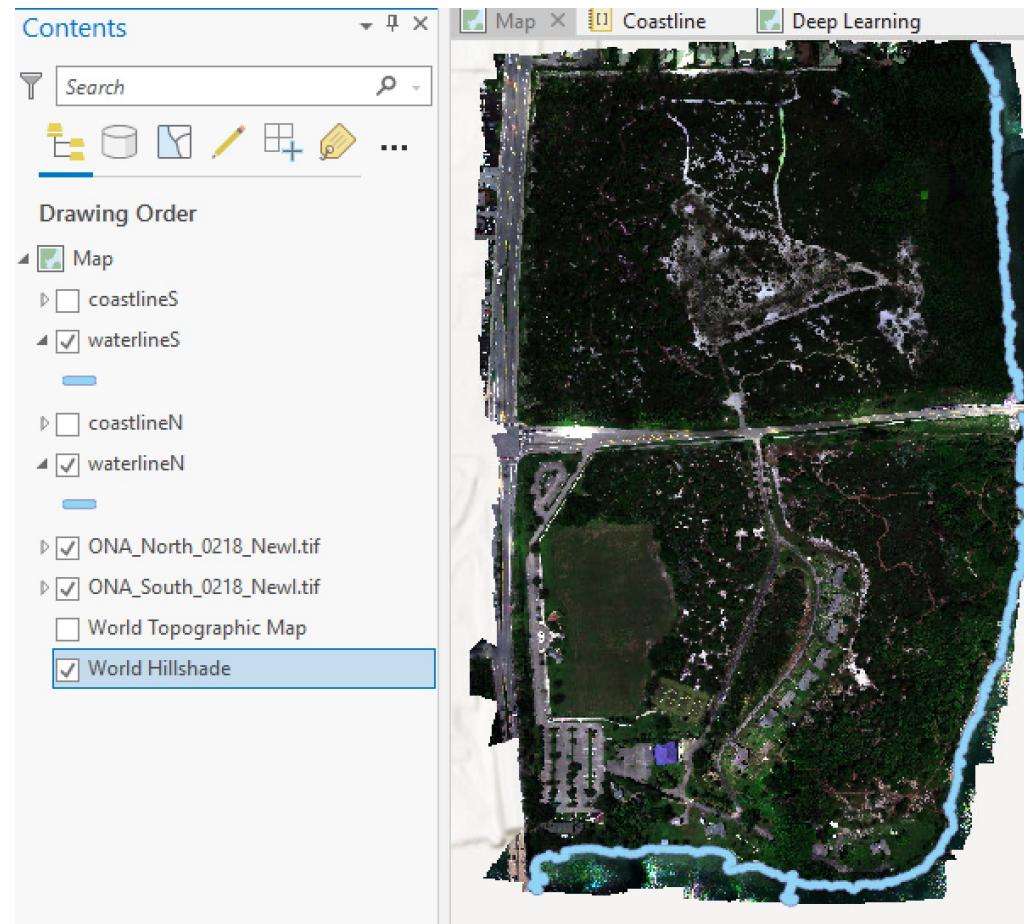
Run ▾

Catalog Geoprocessing History Symbology

METHODOLOGY

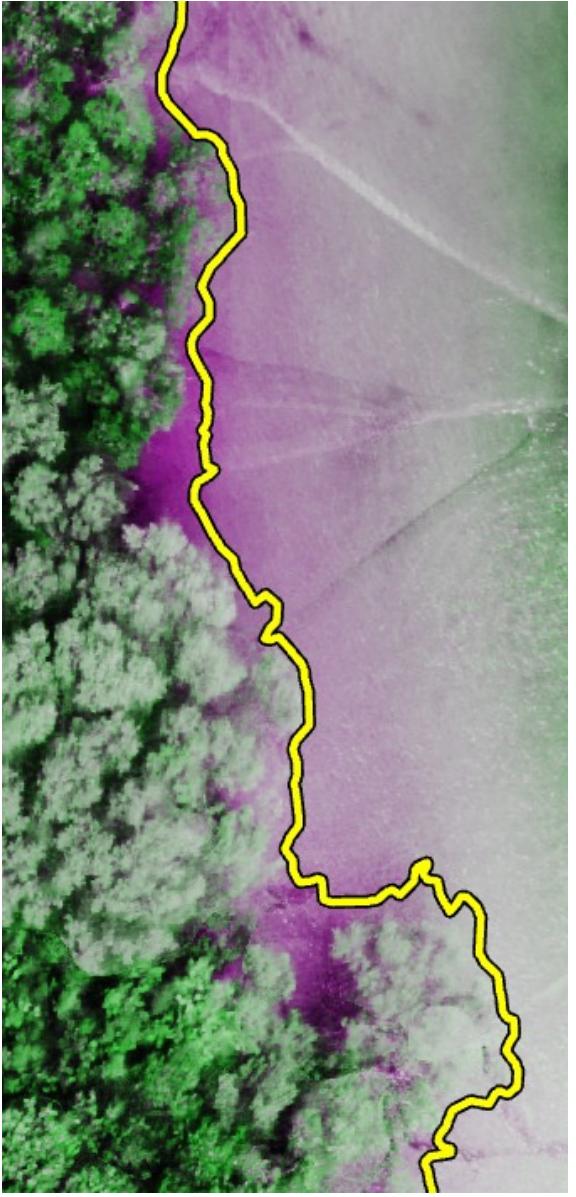
- Get the Raster input – 5 band imagery
- Modified NDWI generation using Green and Red Edge bands
- Thresholding NDWI raster as 0 and 1 to highlight features
- Smoothening process - Apply majority filter to each pixel to remove noise
- Raster to polygon - Create water and land polygons
- Select largest water polygon
- Polygon to line conversion
- Linear rings removal - unnecessary lines
- Unsplitting lines - Join all the lines
- Select largest line feature
- Clip extra lines using JILONA AOI
- Delete intermediate results

COASTLINE AND SHORELINE EXTRACTION

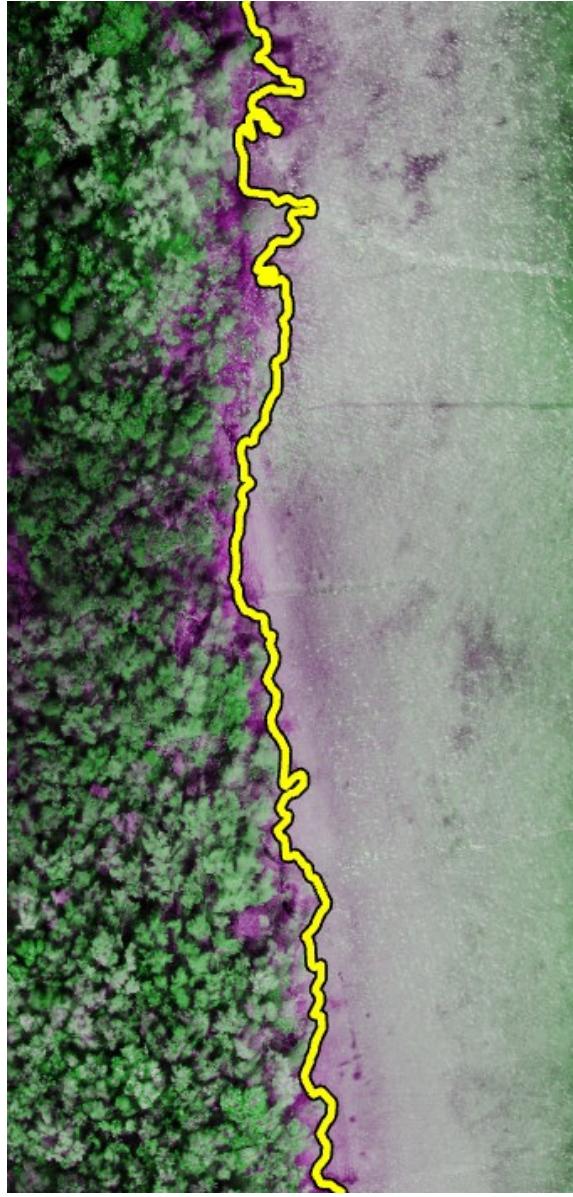


An aerial photograph of a coastal area, showing a mix of dark blue ocean water and lighter, textured land or shallow water along the shore. The text is centered over this image.

JILONA – COASTLINE EXTRACTION

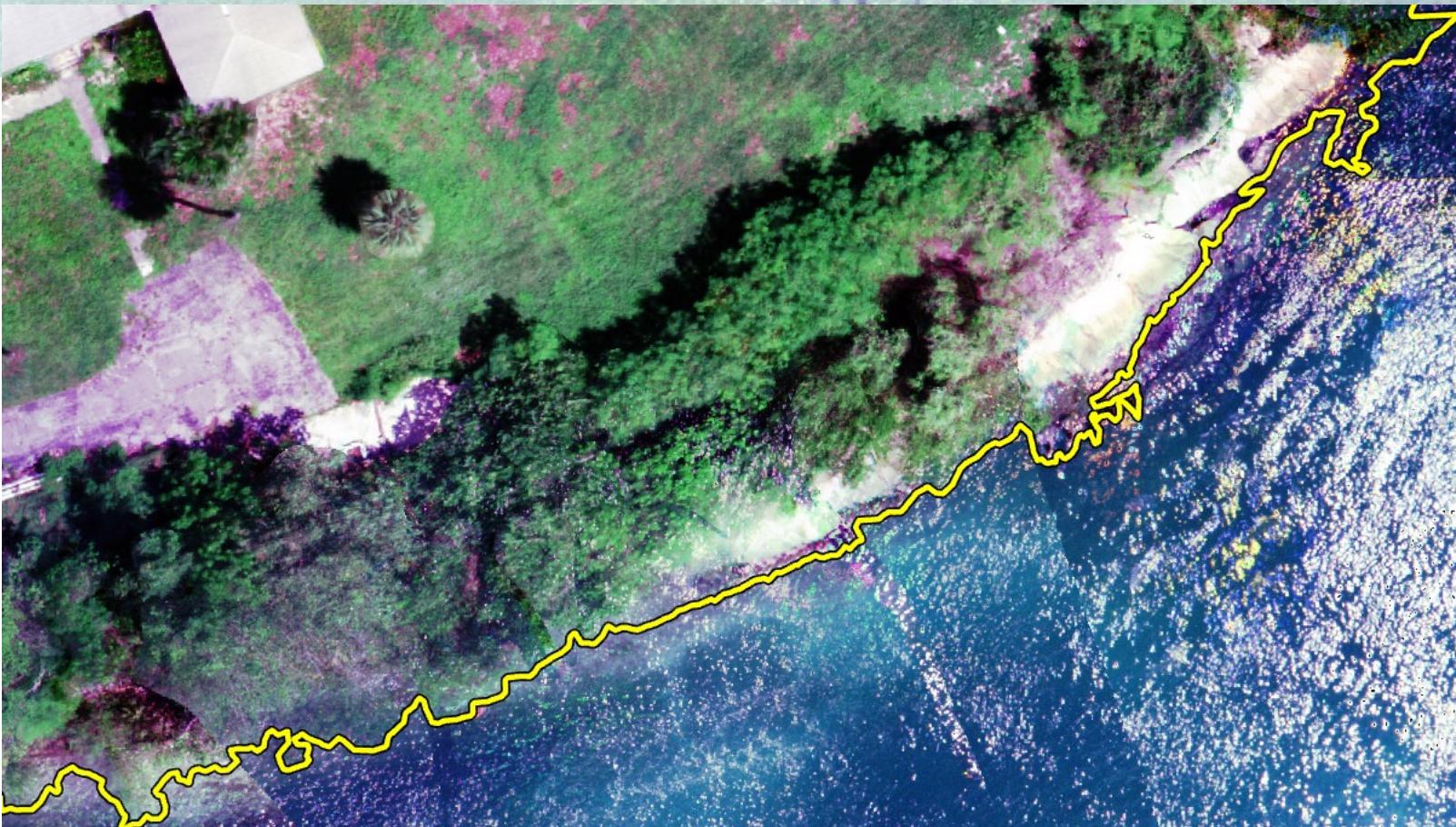


NORTH



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SOUTH - DOWN

UNIVERSITY



**SOUTH -
RIGHT**

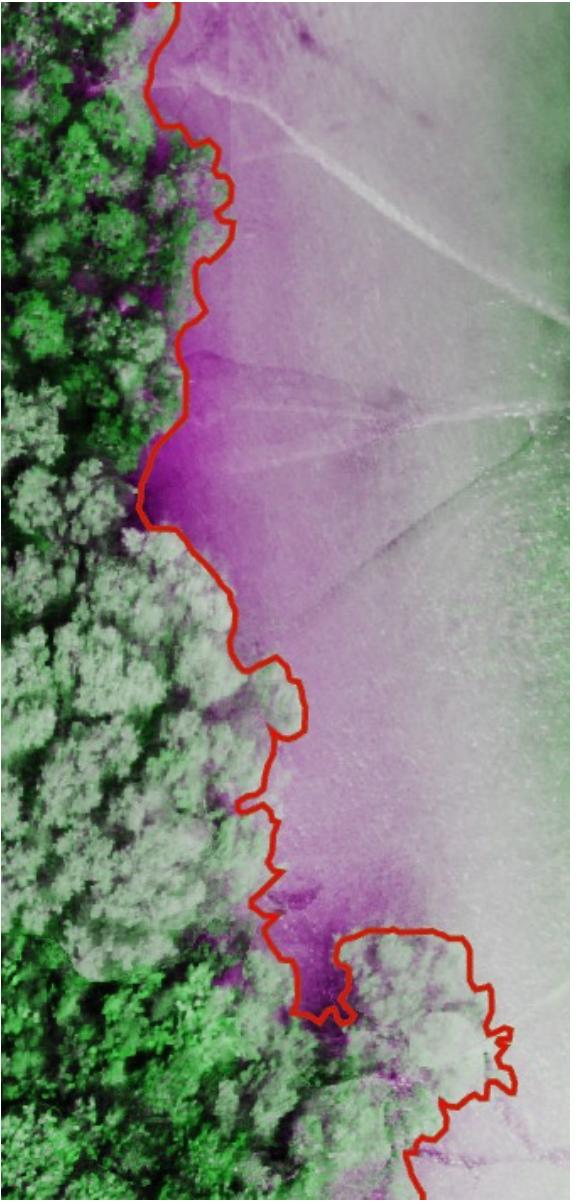


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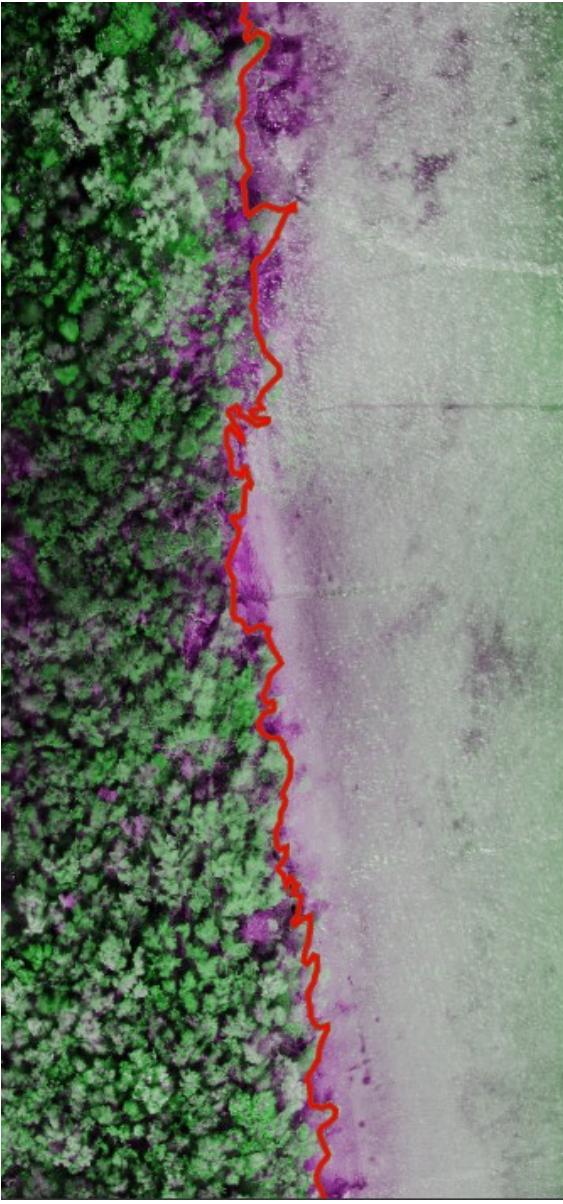


An aerial photograph showing a coastal scene. On the left, the ocean is a deep teal color with white-capped waves crashing onto a sandy beach. The sand is a light tan or beige color. A diagonal white line runs from the bottom center towards the top right, separating the image into two sections.

JILONA – SHORELINE EXTRACTION



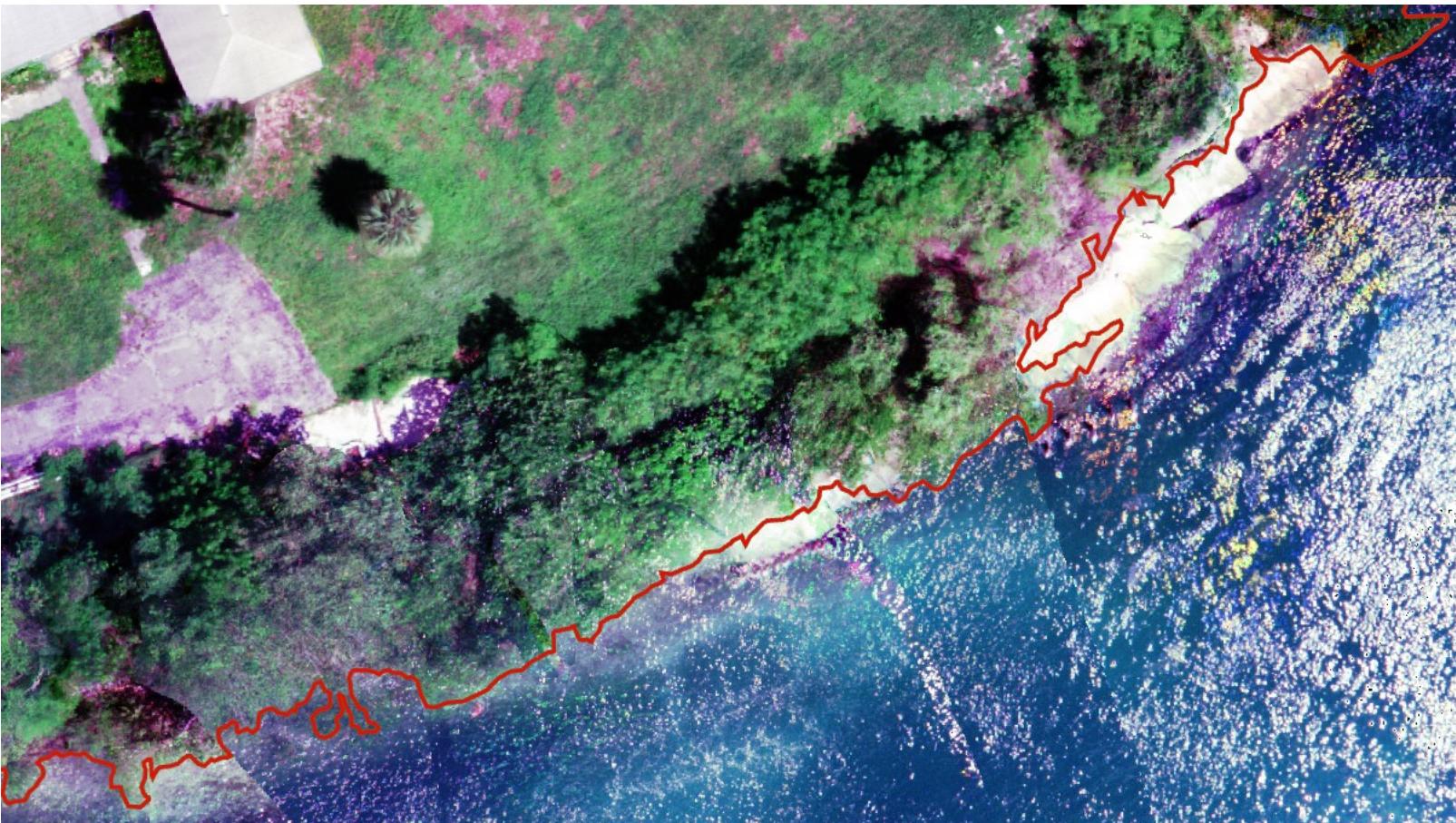
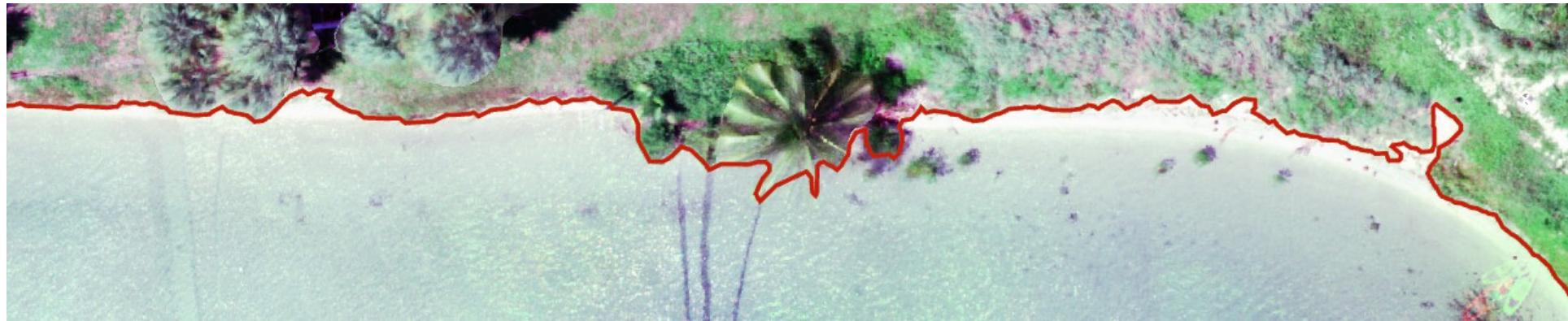
NORTH



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**SOUTH -
DOWN**





**SOUTH -
RIGHT**



An aerial photograph of a coastal landscape. The left side shows a green, hilly terrain with a winding pink path. The right side shows a blue body of water. A thick red line outlines the water's edge, while a yellow line follows the actual shoreline, which is often closer to the coast than the waterline.

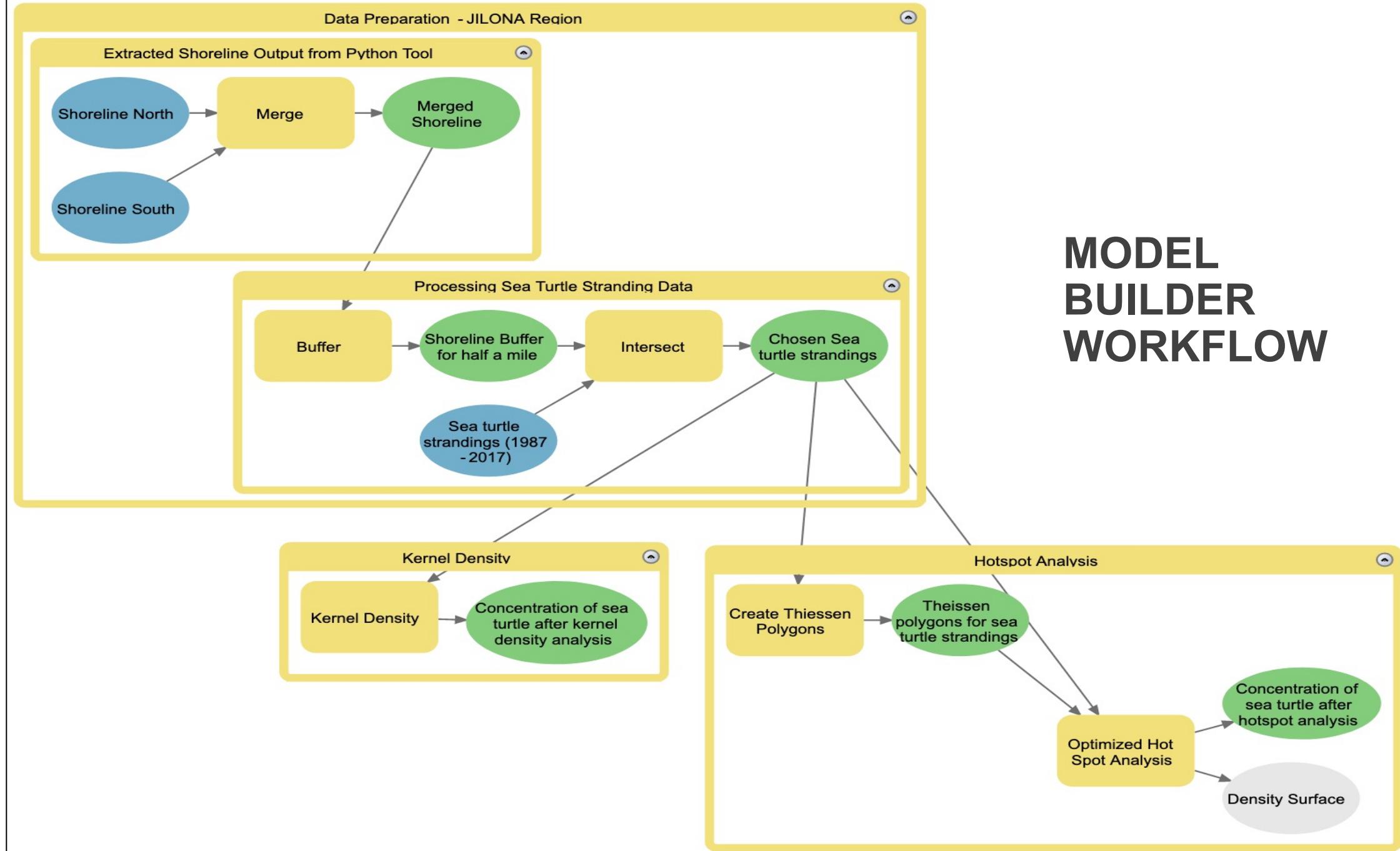
**Waterline &
Shoreline**

SEA TURTLE CONCENTRATION ALONG THE SHORELINE

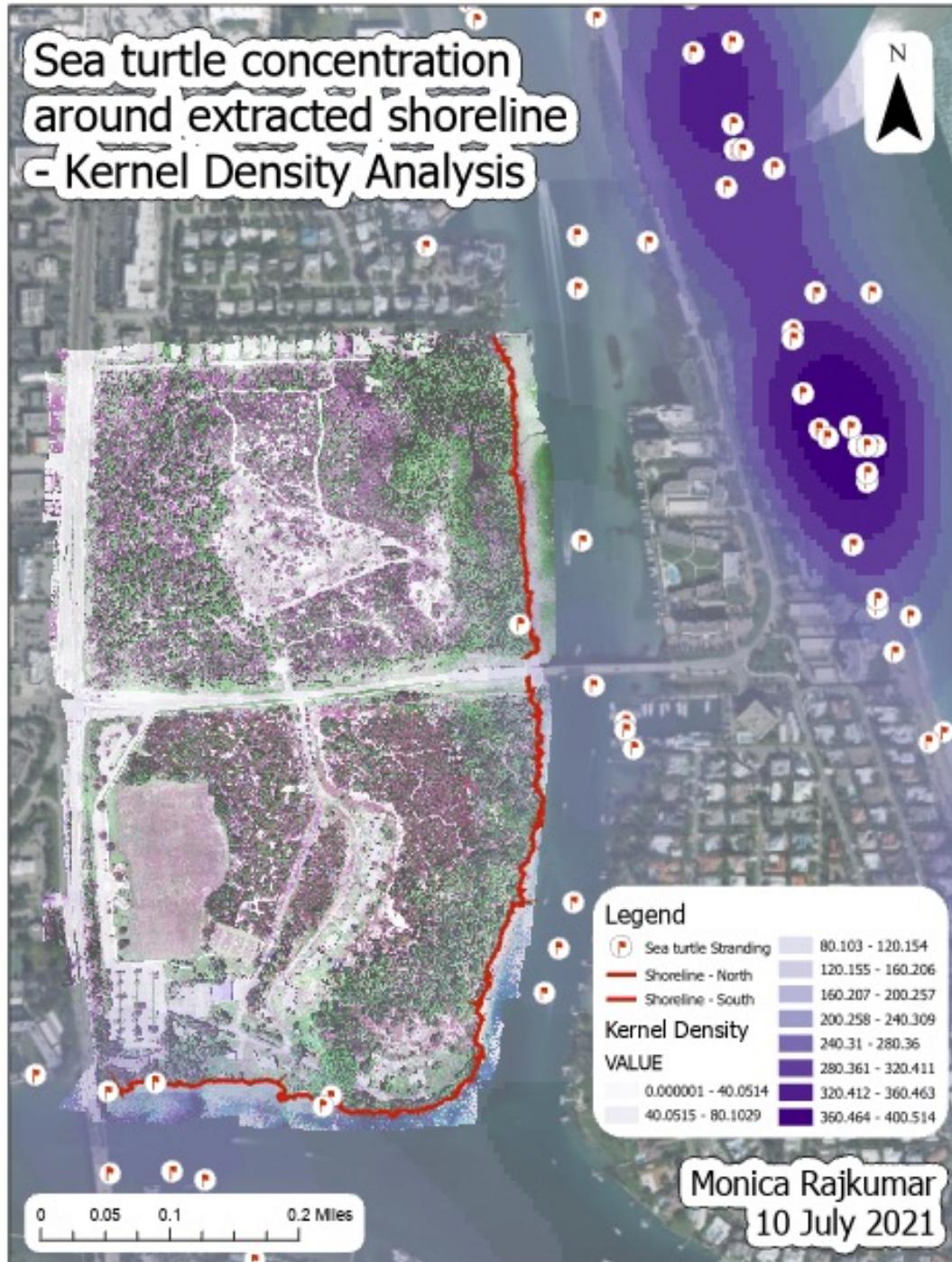
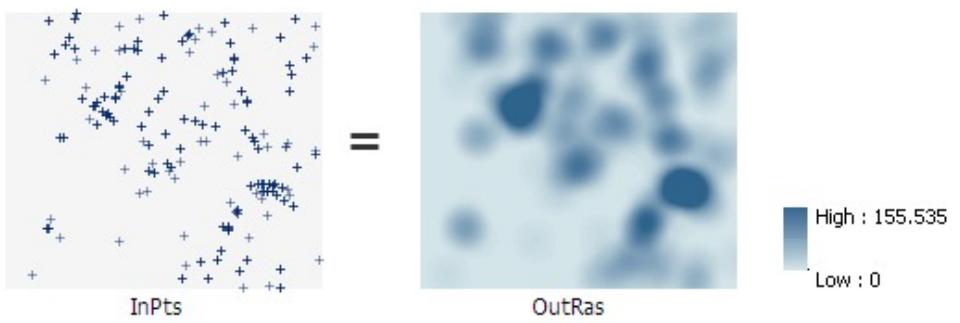


- Kernel Density Analysis
- Optimized Hotspot Analysis

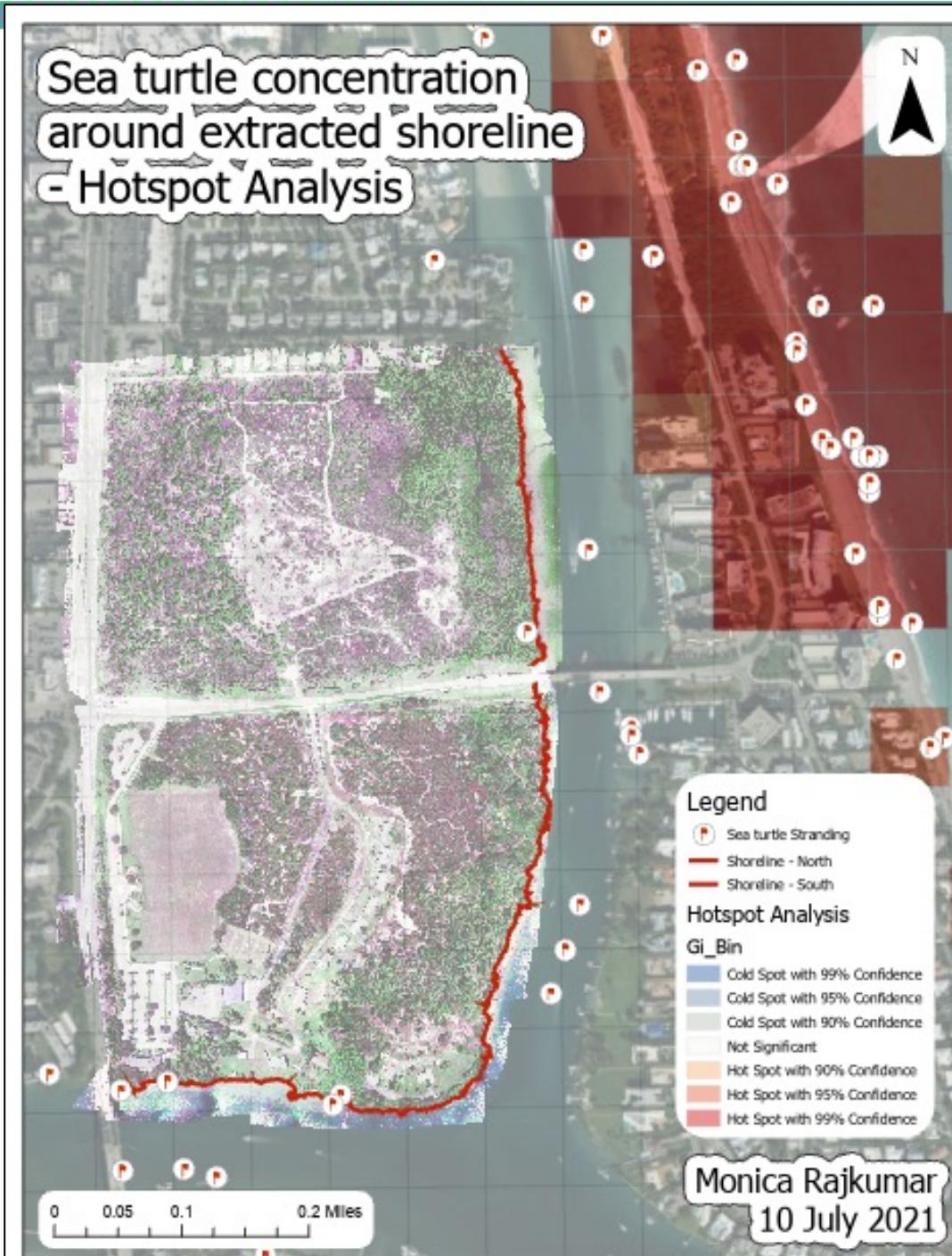
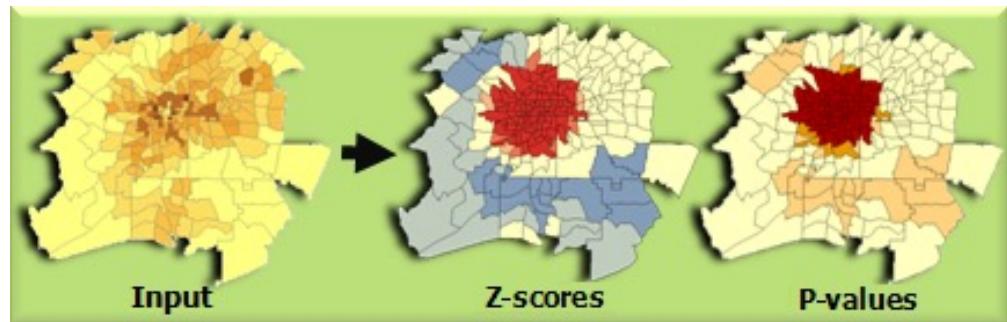
MODEL BUILDER WORKFLOW



Kernel Density Analysis



Optimized Hotspot Analysis



Future Scope

Perform shoreline change detection

Compute volume of soil erosion

Extraction using lesser band information

Deep learning model implementation for higher accuracy

Threats to sea turtle





REFERENCES

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THANK YOU!

