# FL Peninsular Glades County - FL Southwest Edge Tie Analysis

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# FL Peninsular Glades County - FL Brighton Reservation Tie Analysis

Report Produced for the United States Geological Survey

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SUBMITTED TO:

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# Introduction

Dewberry was tasked to evaluate how well the newly produced FL Peninsular Glades County (acquired in late 2018 to early 2019) ties spatially to preexisting lidar data produced for the FL Brighton Reservation project and the FL Southwest lidar project. The lidar data acquired for the Brighton Reservation project was originally acquired for USGS in April 2015. The lidar data acquired for the FL Southwest project was originally acquired for USGS in 2018. Dewberry has compared the new Glades County lidar data to the existing Brighton data & the existing FL Southwest data where the two datasets overlap.

# Edge-Tie Analysis

There are 66 Glades tiles which overlap with the FL Brighton Reservation lidar data, there are 2 partial Glades tiles which overlap with the FL Southwest lidar data, shown in Figure 1 below. A difference raster was produced to analyze elevation differences between the two datasets in areas of overlap. Profiles and visual reviews were used to compare the two datasets where the datasets are adjacent, but do not overlap. This review of the adjacent, non-overlapping areas was to ensure no obvious feature discontinuities exist between the datasets. Dewberry has determined that no gross feature discontinuities were identified.

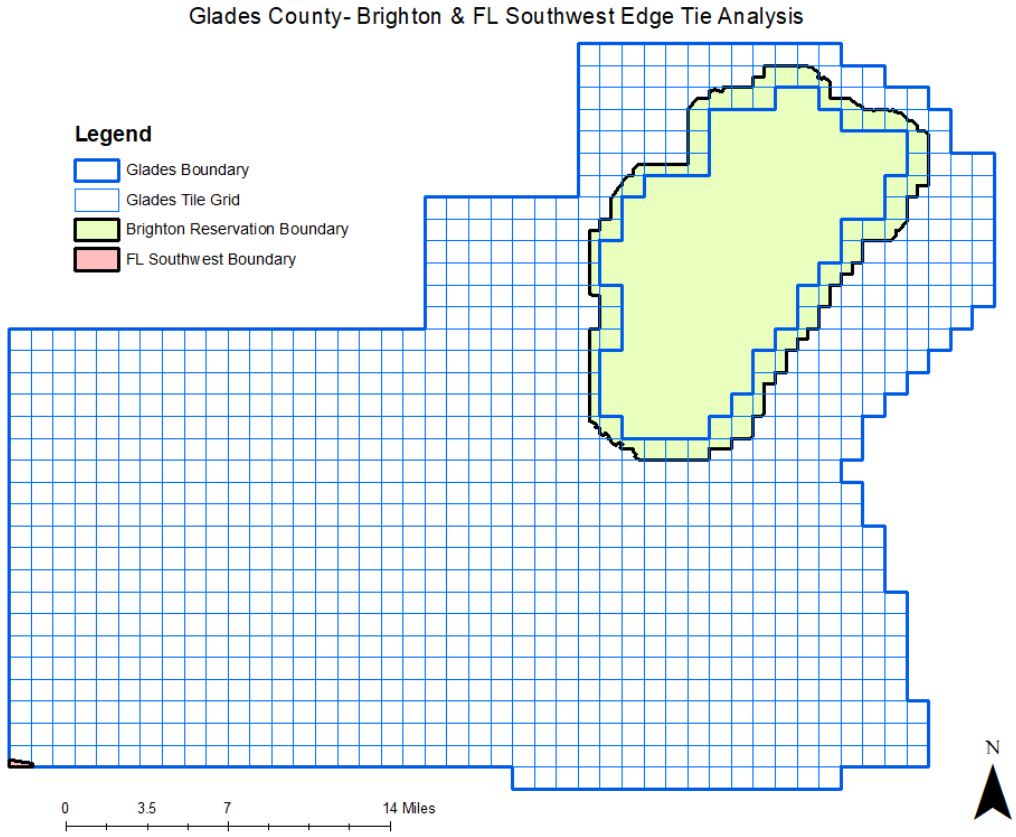


**Figure 1- Sixty-six tiles overlap between the Glades AOI and previously collected FL Brighton Reservation AOI, there are only two partial tiles that overlap the Glades AOI and the FL Southwest AOI.**

## DIFFERENCE RASTER

The USGS FL Brighton Reservation DEMs match the 2.5 ft DEM size specified for Glades county, the data was consistent. Using the 2.5 ft bare-earth DEMs for each dataset, Dewberry created a difference raster by subtracting SJRWMD FL Brighton Reservation data from Glades county data (Glades-FL Brighton Reservation). This difference raster is shown in Figure 2 below.

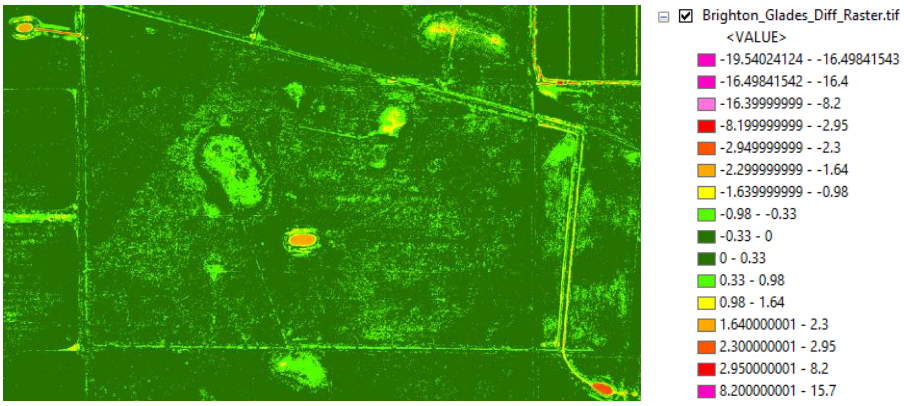


**Figure 2-Difference raster and symbology key created for the Glades- FL Brighton Reservation overlap.**

The USGS FL Southwest DEMs were re-sampled (from 0.5m) to match the 2.5 ft DEM size specificed for Glades County so that the data were consistent. Using the 2.5 ft bare-earth DEMs for each dataset, Dewberry created a difference raster by subtracting FL Southwest data from Glades county data (Glades-FL Southwest). This difference raster is shown in Figure 3 below.

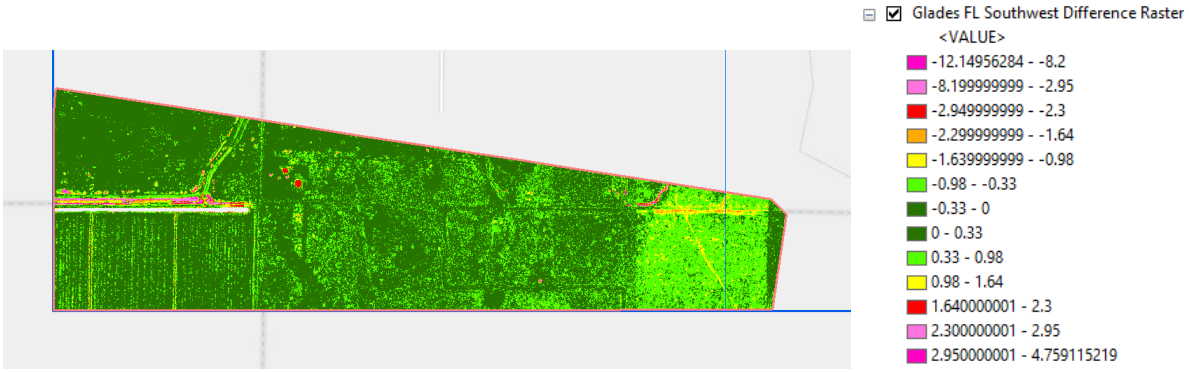


**Figure 3-Difference raster and symbology key created for the Glades- FL Southwest overlap.**

All hydrographic features breaklined in Glades, FL Brighton Reservation, and FL Southwest including streams, rivers, ponds, and lakes were excluded from analysis as water levels varied between the two lidar acquisitions. Hydrographic features, overlaid on the difference raster, are shown in blue in Figure 4 below.

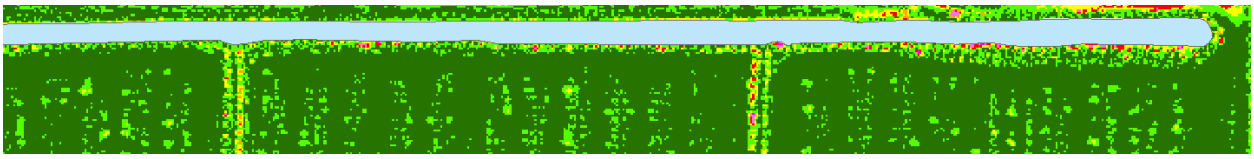

**Figure 4-Breaklined hydrographic, shown in blue fill , were removed from statistical analysis generated from the difference raster as water levels may vary between the different lidar acquisition years. This example is from the FL Southwest data.**

## ELEVATION DIFFERENCE THRESHOLDS

Per client discussions and requests, all overlapping data should be analyzed to show which areas have elevations within 10 cm (RMSEz requirements for USGS QL1 and QL2 data) of each other. As such, pixels

in the difference raster representing 0 to+10 cm and 0 to -10 cm of elevation change between the two datasets are binned. From these initial bins, Dewberry then used thresholds of 20 cm up until +/-90 cm as this allows detailed analysis of changes occuring which are less than +/-1 m in difference. The 20 cm bins, starting from the required +/-10 cm bin also allows for analysis of change at +/-30 cm, which is the required VVA for USGS QL1 and QL2 data. Larger elevations differences tend to result from similar or consistent sources, so after the +/-90 cm bins, data are binned to +/-2.5 m, +/-5 m, and everything greater than +5 m or less than – 5 m. If the units of data are in feet, the metric values listed above are converted to feet for analysis.
Dewberry symbolized the difference rasters for this analysis using the binned values and color schema shown below. Values are in feet.

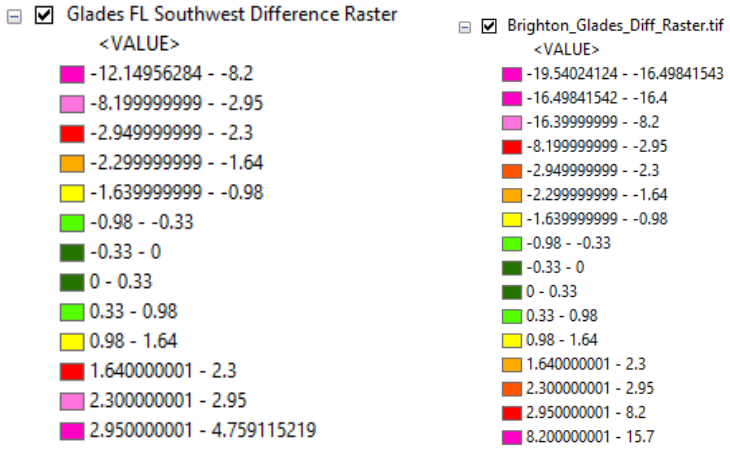


**Figure 5- Pixels within the 0 to +/-30 cm (0.98 ft) threshold are colored as green. Dark green is used for pixels in the 0 to +/- 10 cm (0.33 ft) bin and light green is used for the +/-10 cm (0.33 ft) to +/- 30 cm (0.98 ft) bin. The Glades FL Southwest symbology is on the left and on the right is the Glades Brighton Reservation difference raster.**

Figure 6 below shows the full difference raster symbolized with the key outlined above for FL Southwest.
Figure 7 below shows the full difference raster symbolized with the key outlined abover for Brighton Reservation

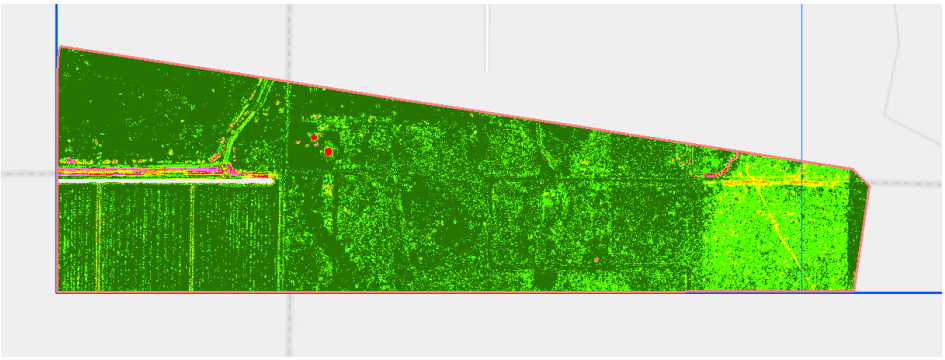

Figure 6- Full difference raster for Glades-FL Southwest overlap.

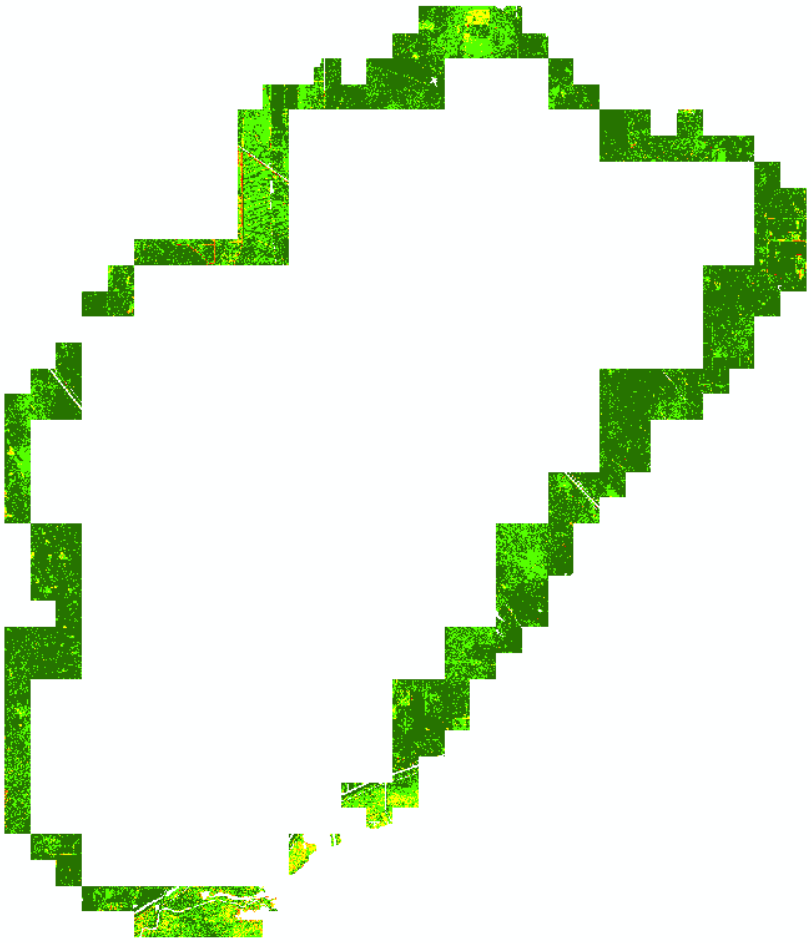

Figure 7- Full difference raster for the Glades- Brighton Reservation overlap.

## EDGE-TIE RESULTS

### Brighton Reservation

When looking at all overlap areas consisting of all slopes and all land cover types, 70.86% of the overlapping points are within the 0 to +/10 cm (0.33 ft) threshold with the majority of these points being located in flat, open terrain. Additional analysis shows 95.75% of the overlapping points are within the 0 to +/-30 cm (0.98 ft) threshold with the majority of these points being located in vegetated areas. These variations are allowable elevation differences between the two datasets.

The remaining points that exceed +/-30 cm (0.98 ft) are located in areas with temporal offsets. The temporal offsets may occur in dynamic, non-static environments, such as wetlands, marsh, or floodplains, or may occur in less dynamic, upland areas due to man-made or cultural changes.. The temporal offset cause in this overlap area are located in wetland/marsh areas. The differences greater than +/- 30 cm (0.98 ft) are described in the sections below.

## VEGETATION & WATER LEVELS

The majority of areas with larger vertical differences between these two datasets occur within vegetated areas and areas with changing water levels. These types of changes are due to the ~3

year temproal difference between the two lidar acquisitions as there are clearly changes in the man-made berms and some fields for agricultural use and water levels.

The figures below show examples of these temporal changes.

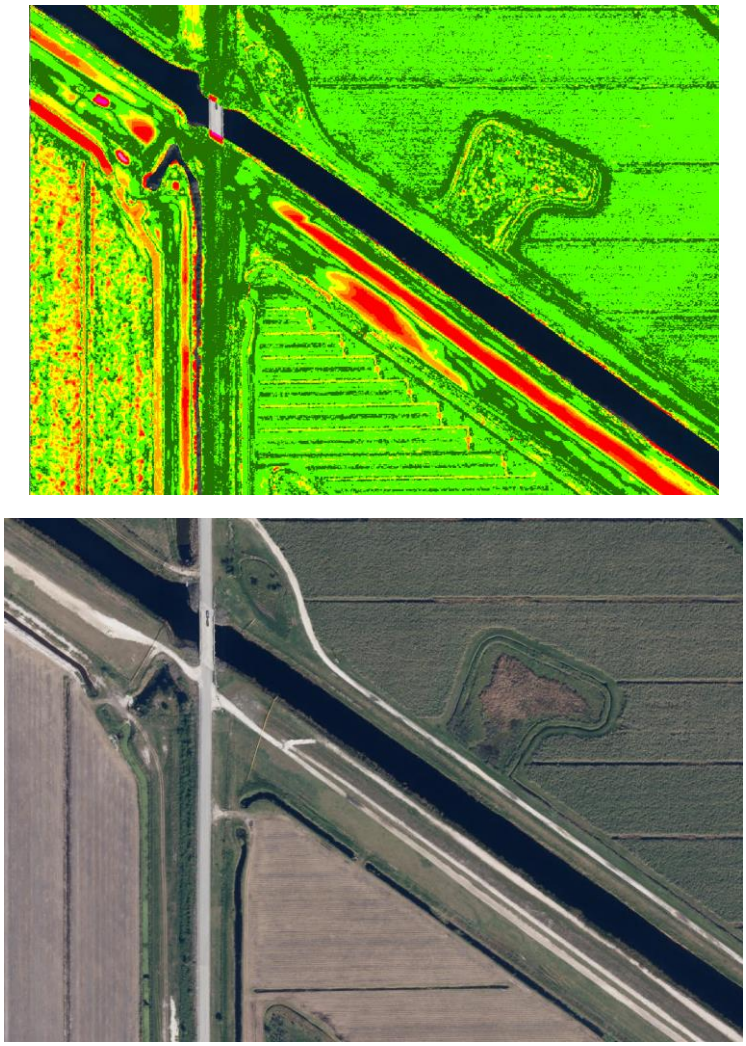

**Figure 8- Top image shows difference raster of area with temporal difference on the berms as well as water levels where the areas were not breaklined due to the specification requirements. The bottom image shows this area in the Base Map Imagery.**

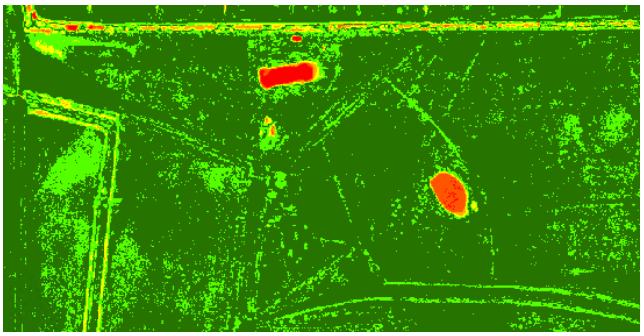

**Figure 9- Top image shows difference raster of area with temporal difference within the waterbodies that were not large enough to be collected. Bottom image shows this area in the Base Map Imagery.**

### FL Southwest AOI

When looking at all overlap areas consisting of all slopes and all land cover types, 71.99% of the overlapping points are within the 0 to +/10 cm (0.33 ft) threshold with the majority of these points being located in flat, open terrain. Additional analysis shows 96.51% of the overlapping points are within the 0 to +/-30 cm (0.98 ft) threshold with the majority of these points being located in vegetated areas. These variations are allowable elevation differences between the two datasets.

The remaining points that exceed +/-30 cm (0.98 ft) are located in areas with temporal offsets. The temporal offsets may occur in dynamic, non-static environments, such as wetlands, marsh, or floodplains, or may occur in less dynamic, upland areas due to man-made or cultural changes.. The temporal offset cause in this overlap area are located in wetland/marsh areas. The differences greater than +/- 30 cm (0.98 ft) are described in the sections below.

## WATER LEVELS

The majority of areas with larger vertical differences between these two datasets occur within vegetated areas and areas with changing water levels. These types of changes are due to the ~1.5 year temproal difference between the two lidar acquisitions as there are clearly changes in the bare earth/mounds and water levels

The figures below show examples of these temporal changes.

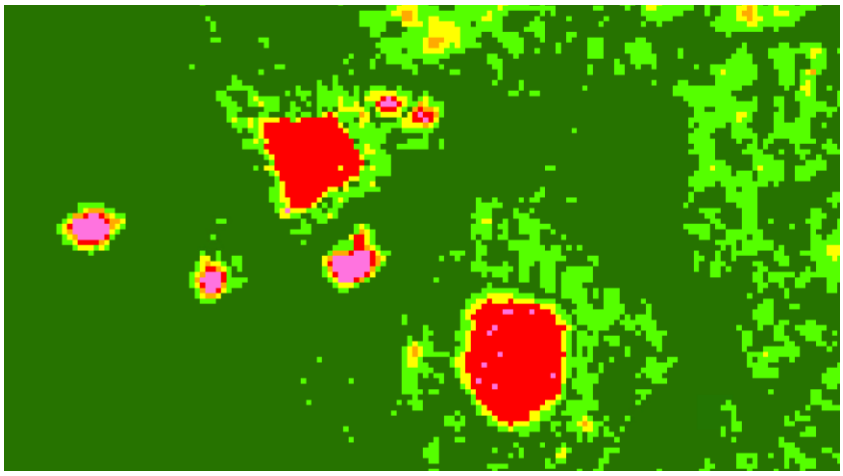

**Figure 10- Top image shows difference raster of area with temporal difference. Bottom image shows this area in the Base Map Imagery at two different times, the area on the left 2019, the area on the right if from 2017.**

## Summary

Overall the Glades and FL Brighton Reservation lidar data match well with 70.86% of the overlap data matching within 0 to +/10 cm (0.33 ft) and 95.75% of the overlap data matching within +/-30 cm (0.98 ft) . The areas of largest vertical elevation change occur due to temporal differences and include varying levels of water in hydrographic features and changes in wetlands/marsh areas. Cultural or man-made changes also contribute to larger elevation differences, including new hydrographic control structures, new reservoirs or impoundments, and likely construction/roadway improvements.

The Glades and FL Southwest lidar data match well with 71.99% of the overlap data matching within 0 to +/10 cm (0.33 ft) and 96.51% of the overlap data matching within +/-30 cm (0.98 ft) . The areas of largest vertical elevation change occur due to temporal differences and include varying levels of water in hydrographic features and changes in wetlands/marsh areas. Cultural or man-made changes also contribute to larger elevation differences, including new hydrographic control structures, new reservoirs or impoundments, and likely construction/roadway improvements.