# **Big Cypress Water Resources**



# Using Earth Observations to Assess Water Quality in Big Cypress Reservation, FL

## **Project Synopsis**

The Seminole Tribe of Florida Environmental Resource Management Department (ERD) investigates water quality in the Big Cypress Reservation. The Big Cypress Reservation's primary form of water management includes storm water retention ponds and a series of man-made canals. Concerns about water resource quality have generated interest in implementing remote sensing into the water monitoring methodology of the ERD, with a particular concern for determining sources of nutrient loading and highlighting water bodies that are at risk for algal blooms. This project utilized Landsat and Sentinel to create time series and maps for areas of interest around the Big Cypress Reservation to inform ERD water management decisions and investigations.

# **Study Area**





# Results



Fig. 1 & Fig. 2. The times series of Sentinel-2 NDCI and in situ Total Phosphate portray an inconsistent relationship with similar seasonal trends. Due to this inconsistency, it was not feasible to conclusively correlate between NDCI and Total Phosphate. However, the seasonal decomposition shows a potential association between NDCI and Total Phosphate.

# **Objectives**

- Develop temporal maps of indices using Earth observations
- Validate indices using in-situ water quality data
- Share a workflow and GIS tutorial with our partner for reproducibility
- **Evaluate** the feasibility of using Earth observations for monitoring water quality in the Big Cypress region

# **Earth Observations**





Landsat 8 OLI

Landsat 9 TIRS-2



Sentinel-2 MSI



Fig. 3 & Fig. 4. The times series of Sentinel-2 CDOM and in situ Total Nitrogen portray an inconsistent relationship with similar seasonal trends. Due to this inconsistency, it was not feasible to conclusively correlate between CDOM and Total Nitrogen. However, the seasonal decomposition shows a potential association between CDOM and Total Nitrogen.

Fig. 5: Comparison of Commercial NDCI with Sentinel-2 NDCI



Fig. 5. Comparison demonstrates the greater feasibility of using commercial data for monitoring algal blooms in the BCR canal system. The left image is not showing Maxar imagery or an index deriver from Maxar imagery. Instead, it is showing a photoshopped image to depict the capabilities of Maxar for this application. The image resembles the results we were able to achieve with Maxar WorldView-3.



#### Methodology



#### **Team Members**



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# **Conclusions**

- Major challenges in monitoring algal blooms in the Big Cypress Reservation canals include varied water flow rates, varied water levels, varied canal width, and lack of daily on-ground and imagery data.
- Improved Sentinel-2 or Maxar WorldView-3 indices that account for varied flow rates and water levels could be validated by correlation with on-ground data. Validated indices may identify algal blooms in the BCR canal system.

# **Project Partner**

Seminole Tribe of Florida, Environmental Resource Management Department

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