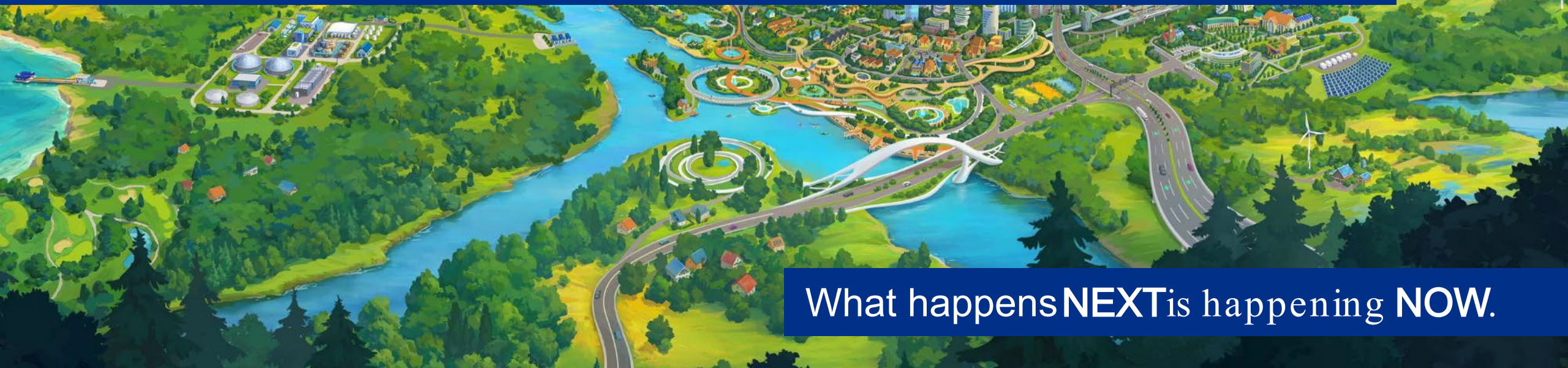


Transforming Environmental and Resilience Projects with AI and Geospatial Technologies



What happens **NEXT** is happening **NOW**.

Brendan Brown, PWS

September 2026

 sky wave[®] at 



CDM Smith is leveraging AI to drive data to decisions.



CDM Smith is leveraging AI to drive data to decisions.



Technical AI will transform the industry; there is room for unprecedented growth.

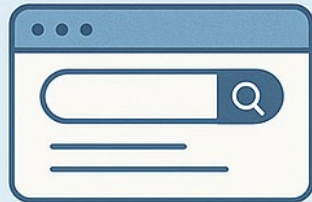
Administrative AI



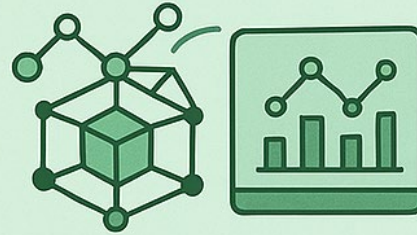
Writing Reports



Conducting Research



Technical AI



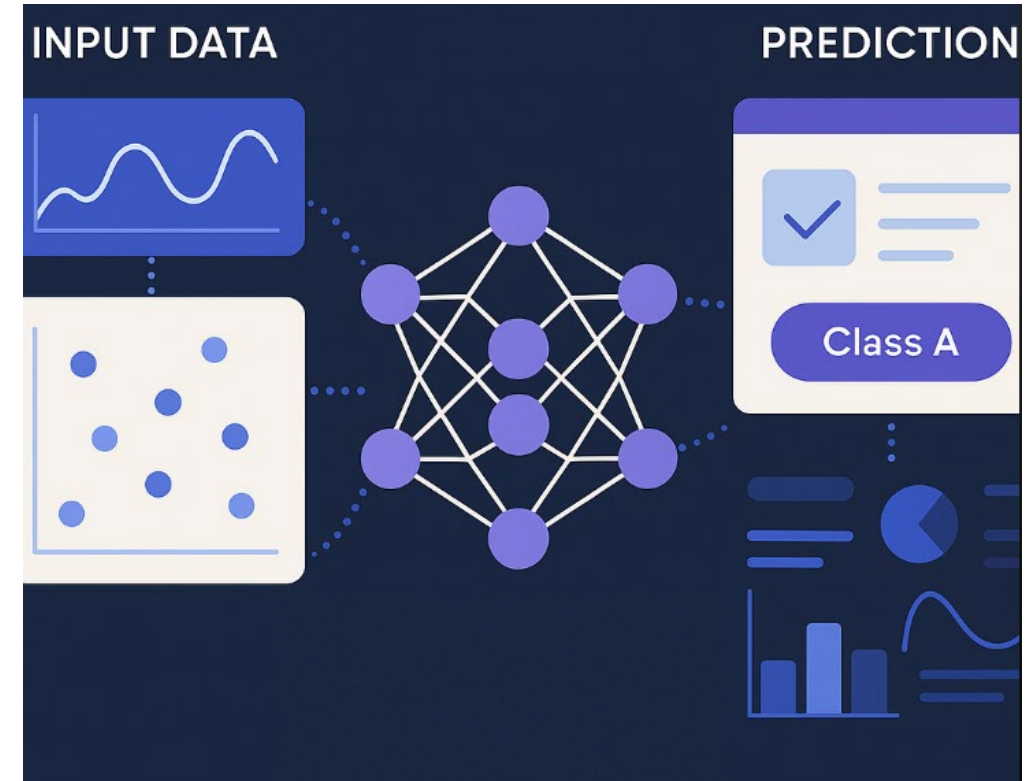
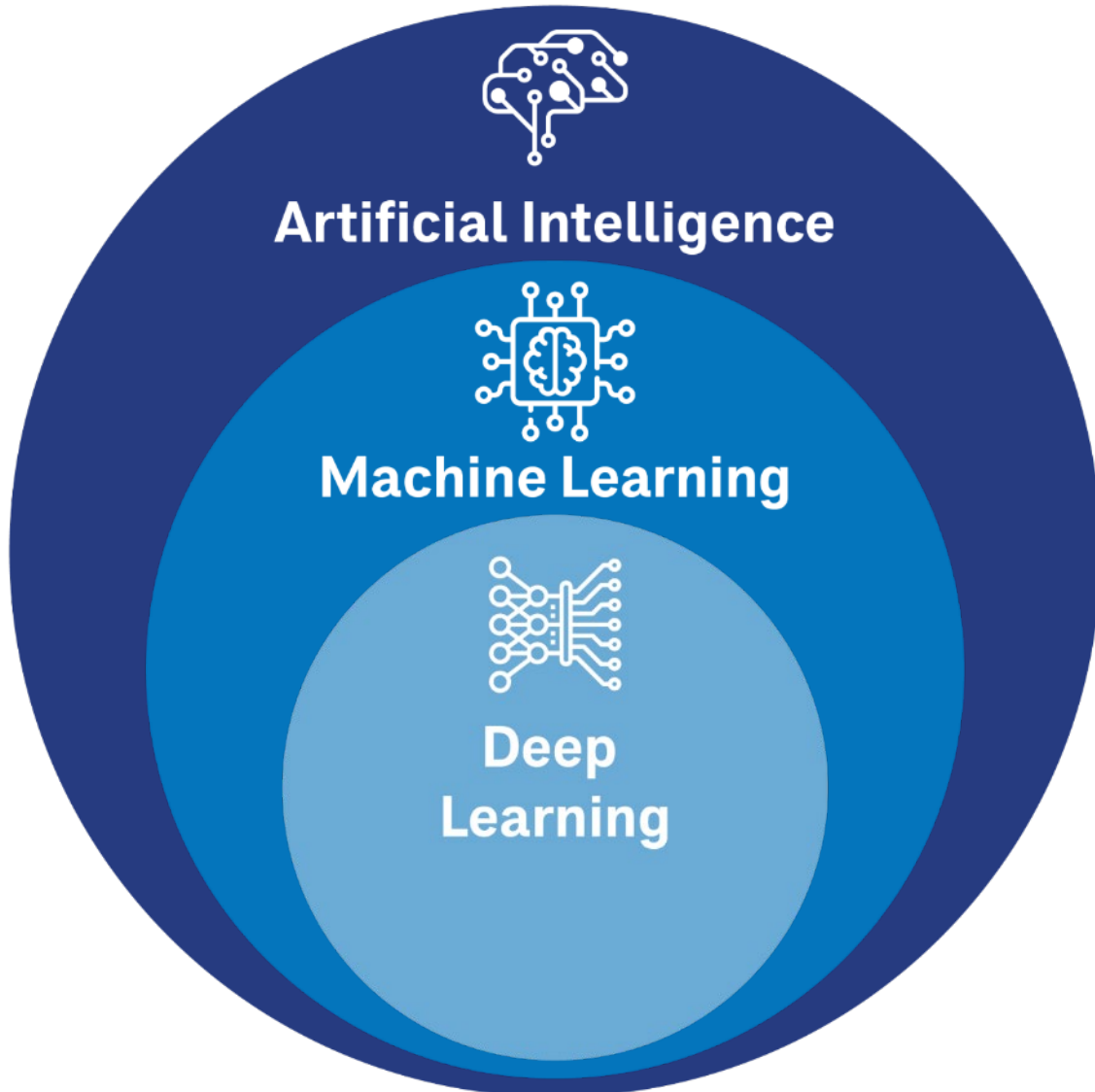
Predictive Modeling



Data Analysis

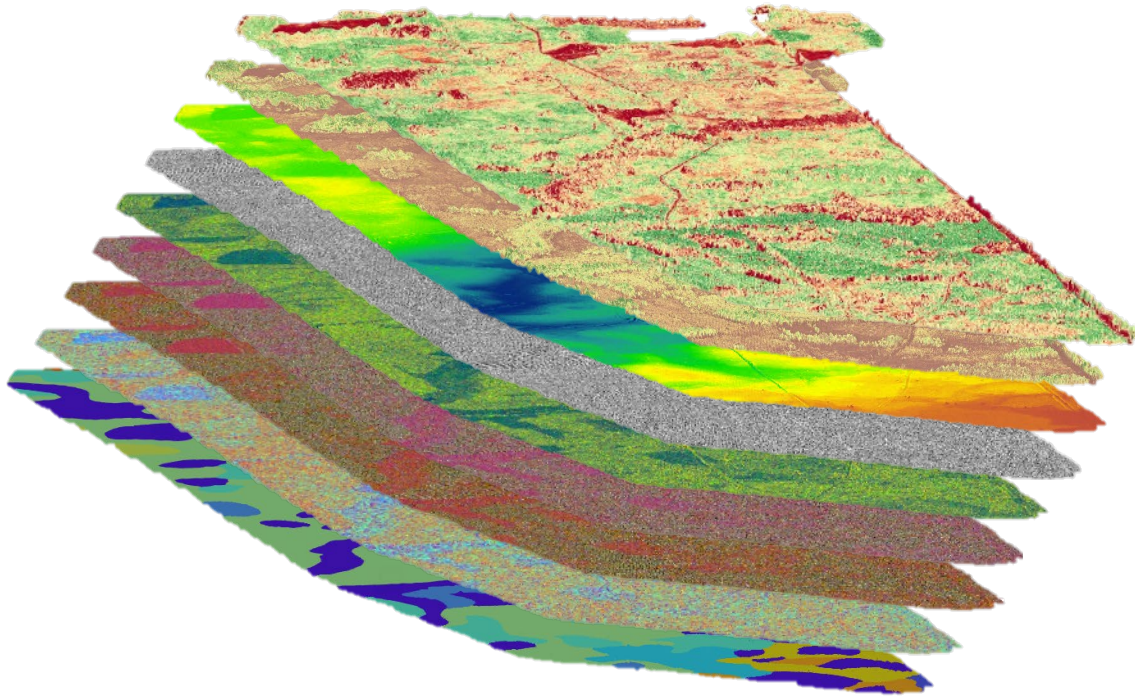


AI models are used to make predictions based on input data.



Machine learning models are used to predict values or variables of interest based on input data.

Model Variables

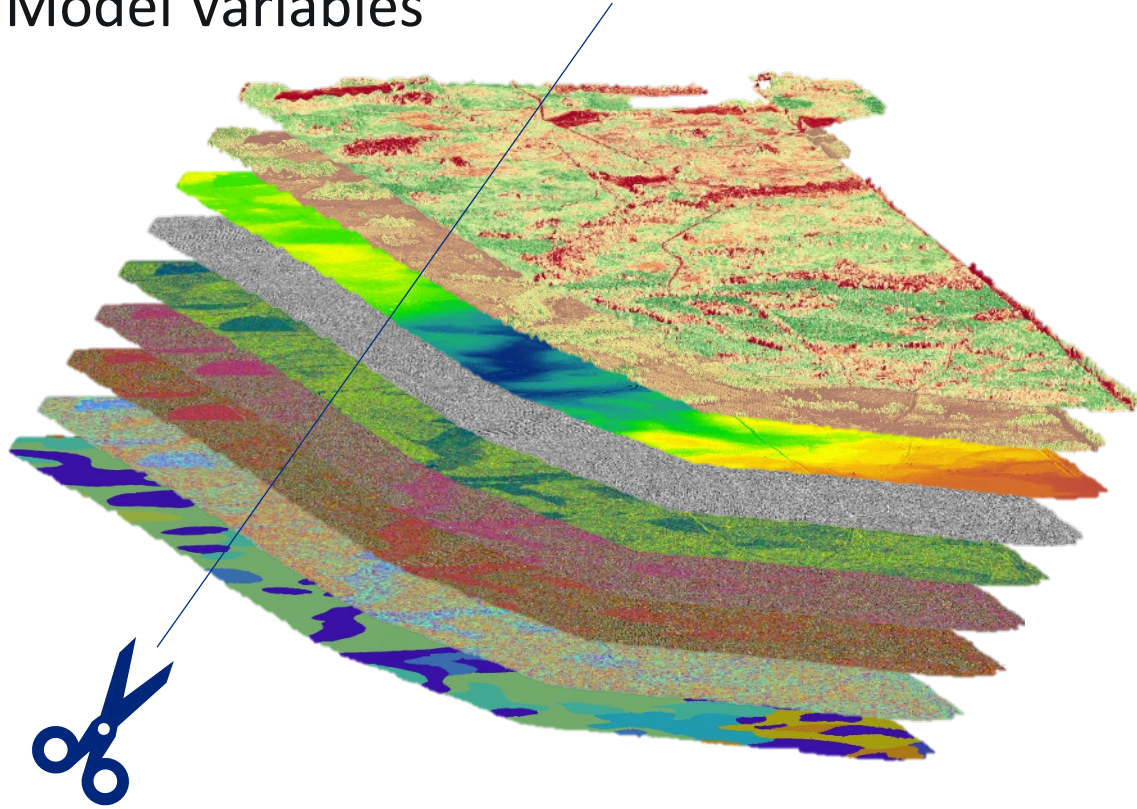


Target Variable

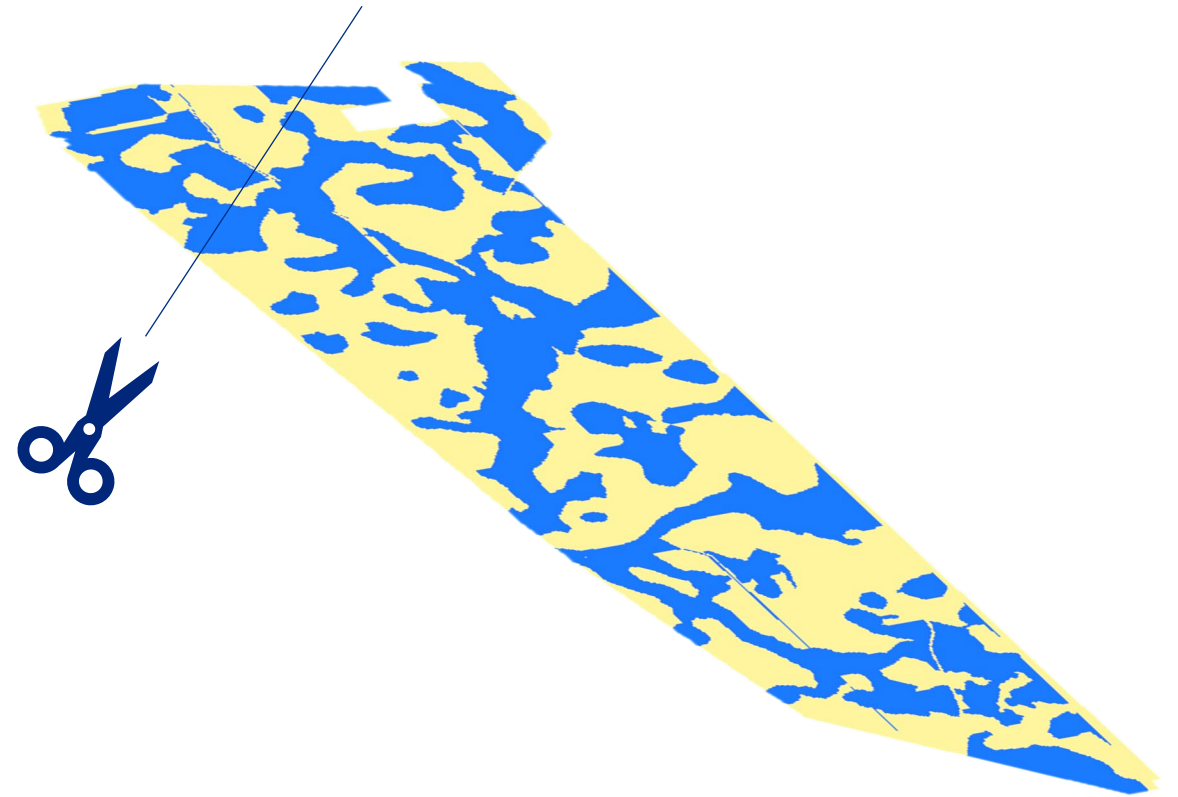


Machine learning models are used to predict values or variables of interest based on input data.

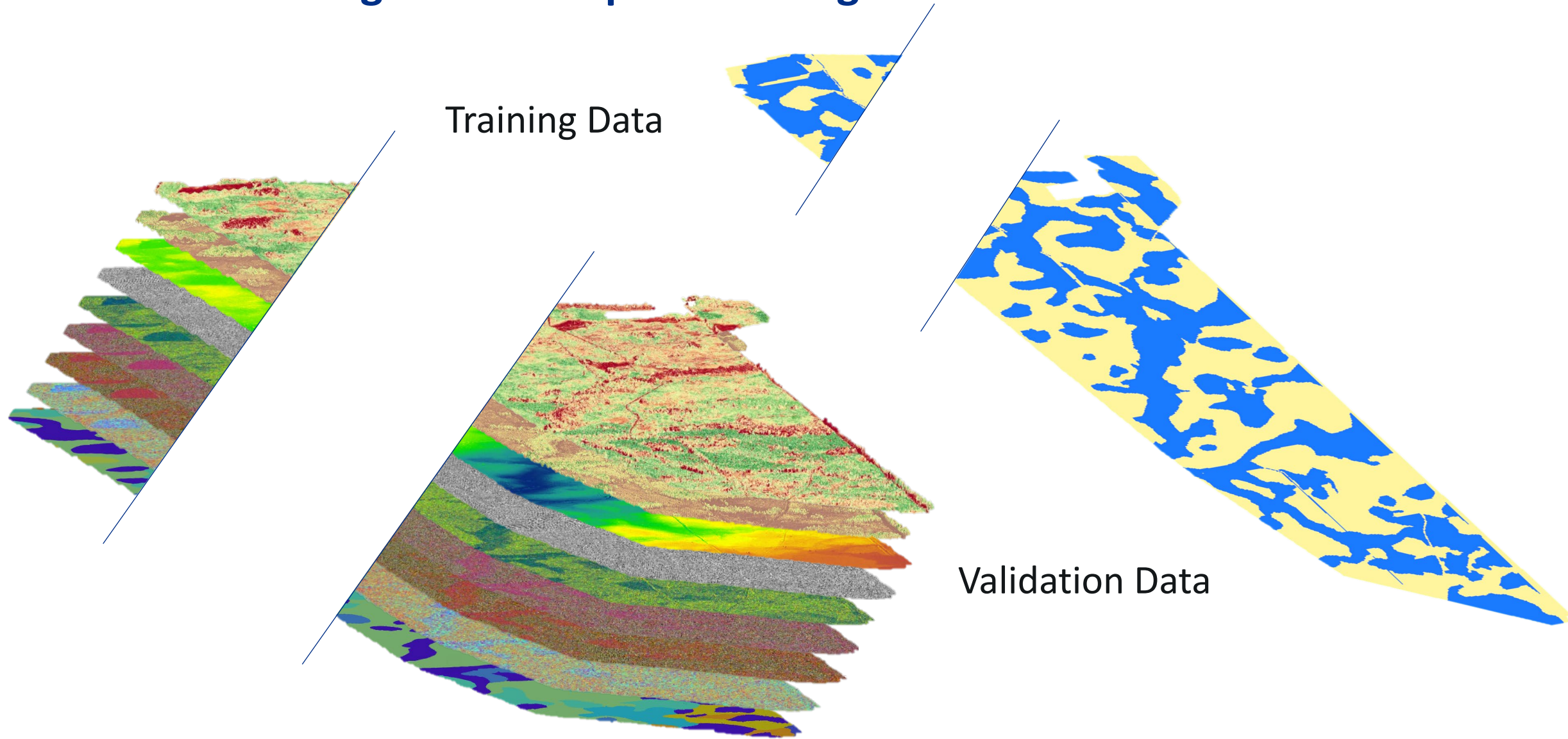
Model Variables



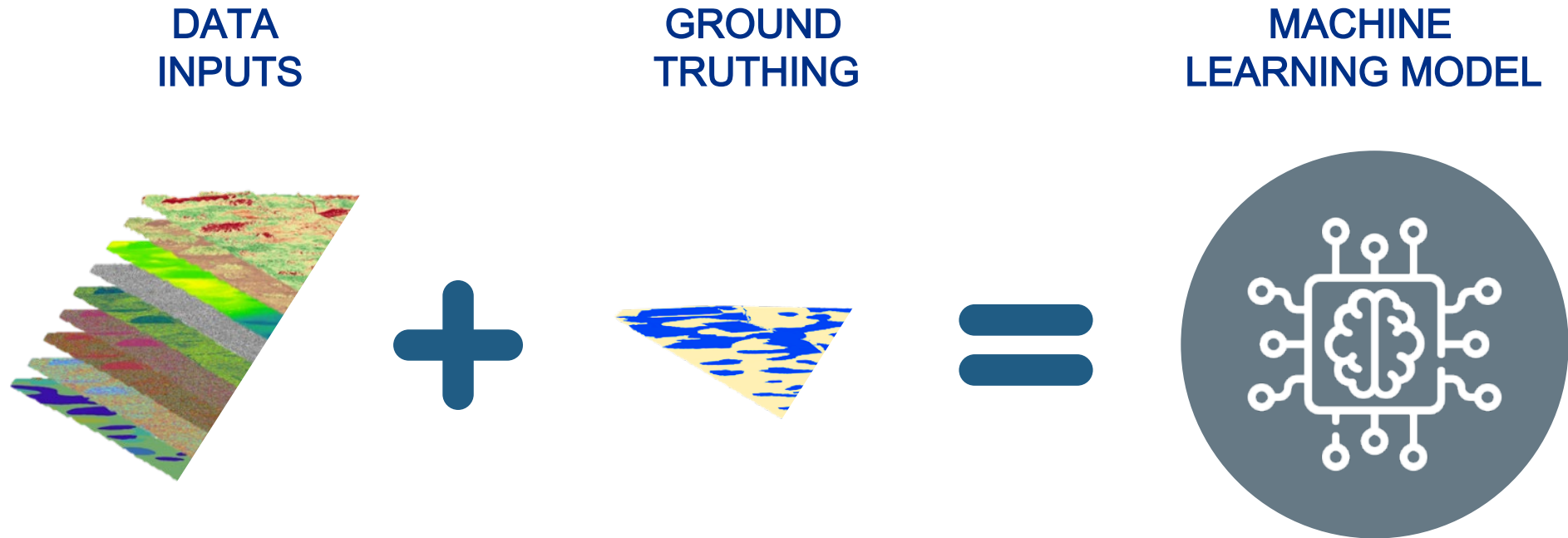
Target Variable



Machine learning models require training data and validation data.

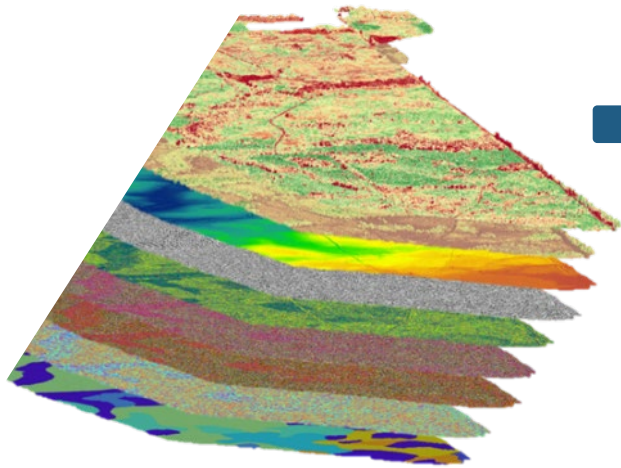


Training data is then used to train the machine learning model.

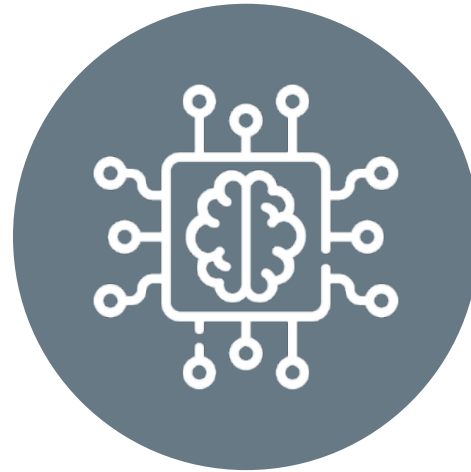


Model predictions are then compared to data of known values to determine model accuracy.

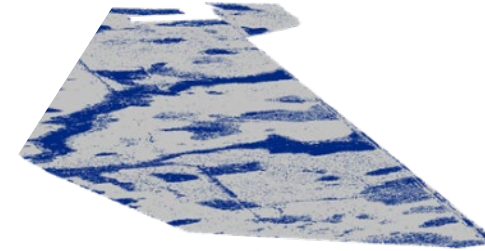
**DATA
INPUTS**



**MACHINE
LEARNING MODEL**

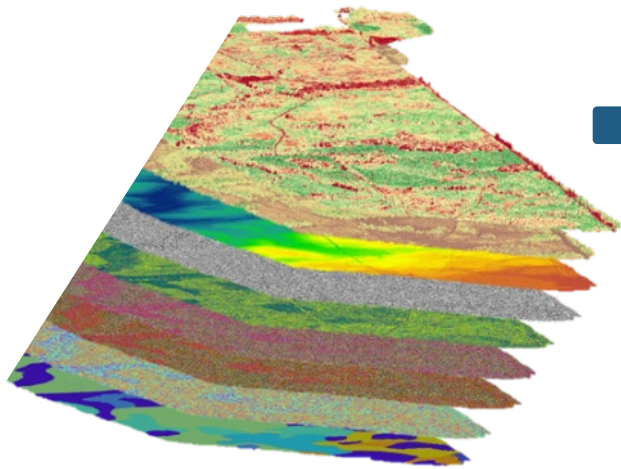


**MODEL
PREDICTIONS**

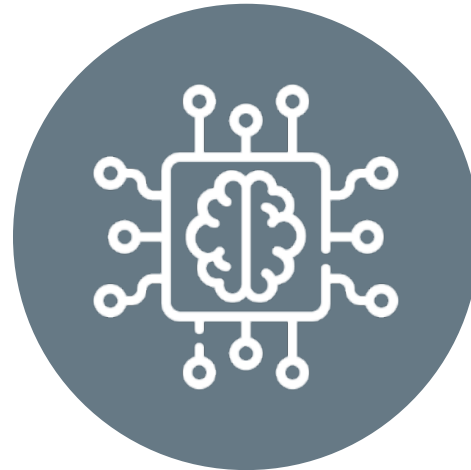


Model predictions are then compared to data of known values to determine model accuracy.

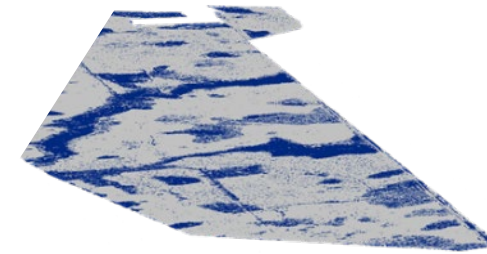
DATA
INPUTS



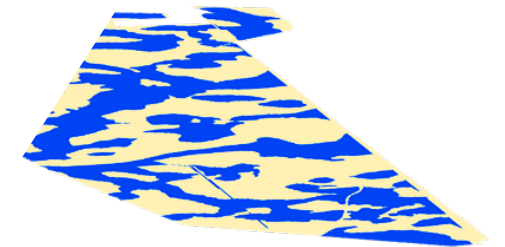
MACHINE
LEARNING MODEL



MODEL
PREDICTIONS



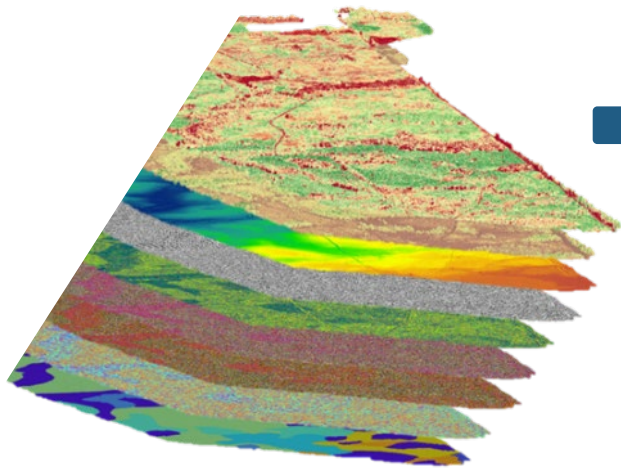
MEASURED
AGAINST



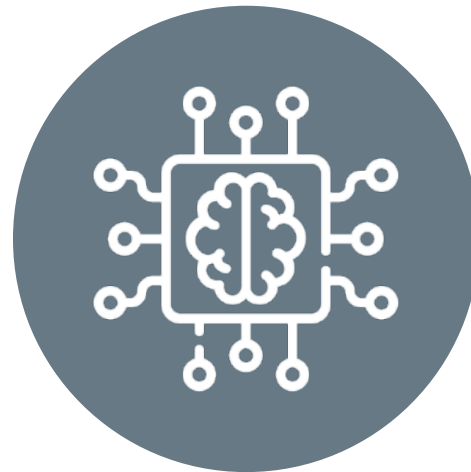
GROUND TRUTHING

Model predictions are then compared to data of known values to determine model accuracy.

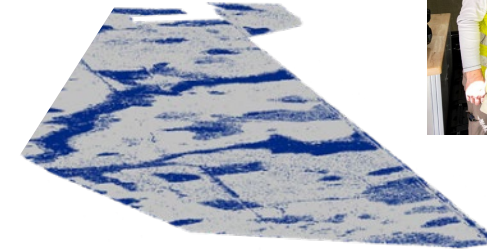
DATA
INPUTS



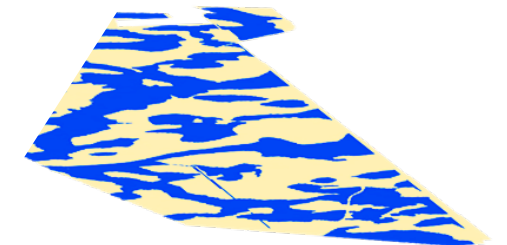
MACHINE
LEARNING MODEL



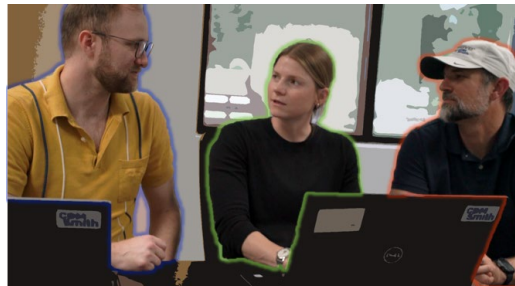
MODEL
PREDICTIONS



MEASURED
AGAINST



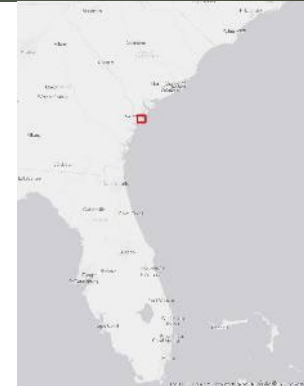
GROUND TRUTHING



Monitoring
Marsh Restoration

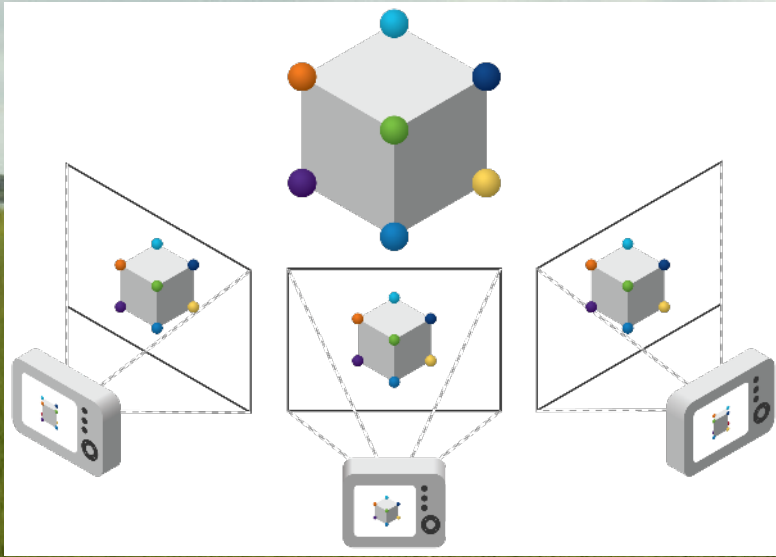


CDM Smith monitored a nature-based solution project at the mouth of the Savannah River.



CDM Smith monitored a nature-based solution project at the mouth of the Savannah River.





Structure from Motion (SfM) can be used to generate 3D models from 2D images.

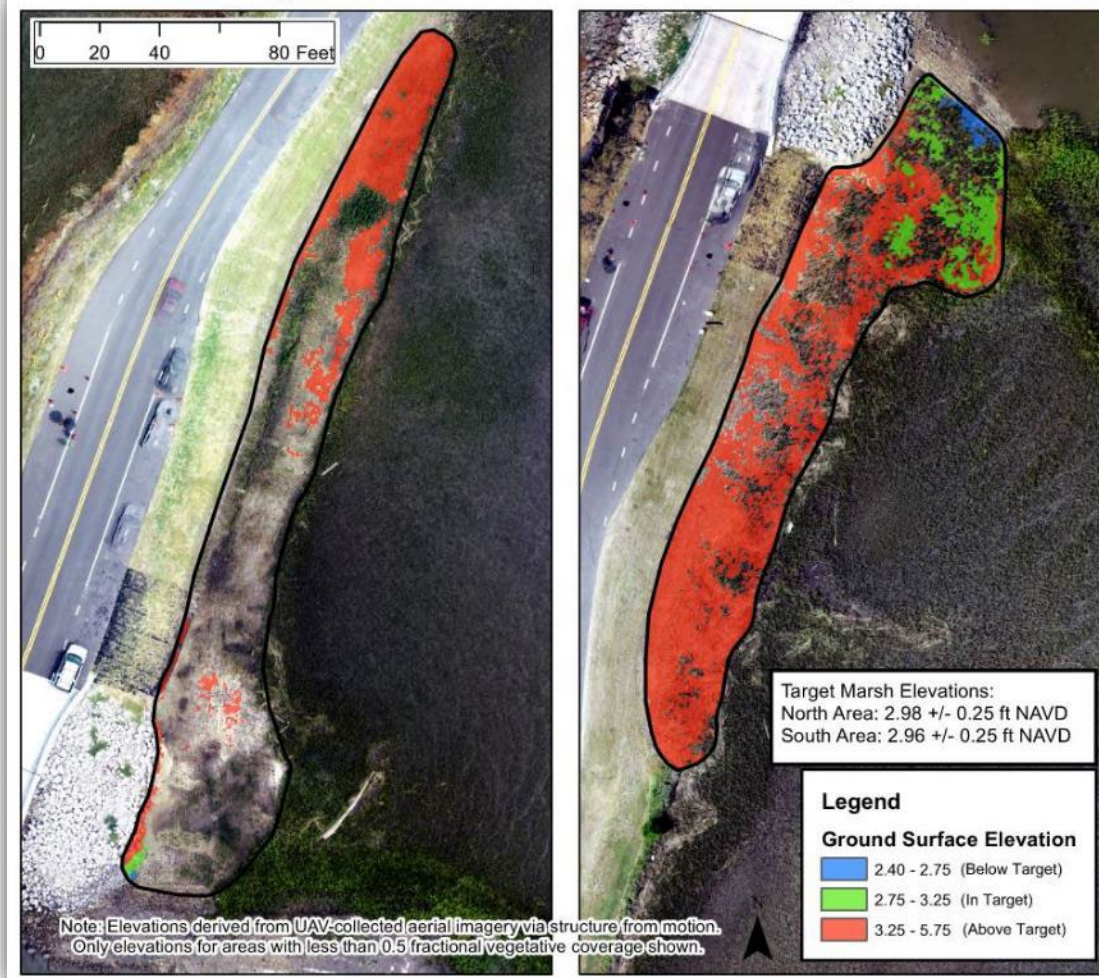


Sunlight

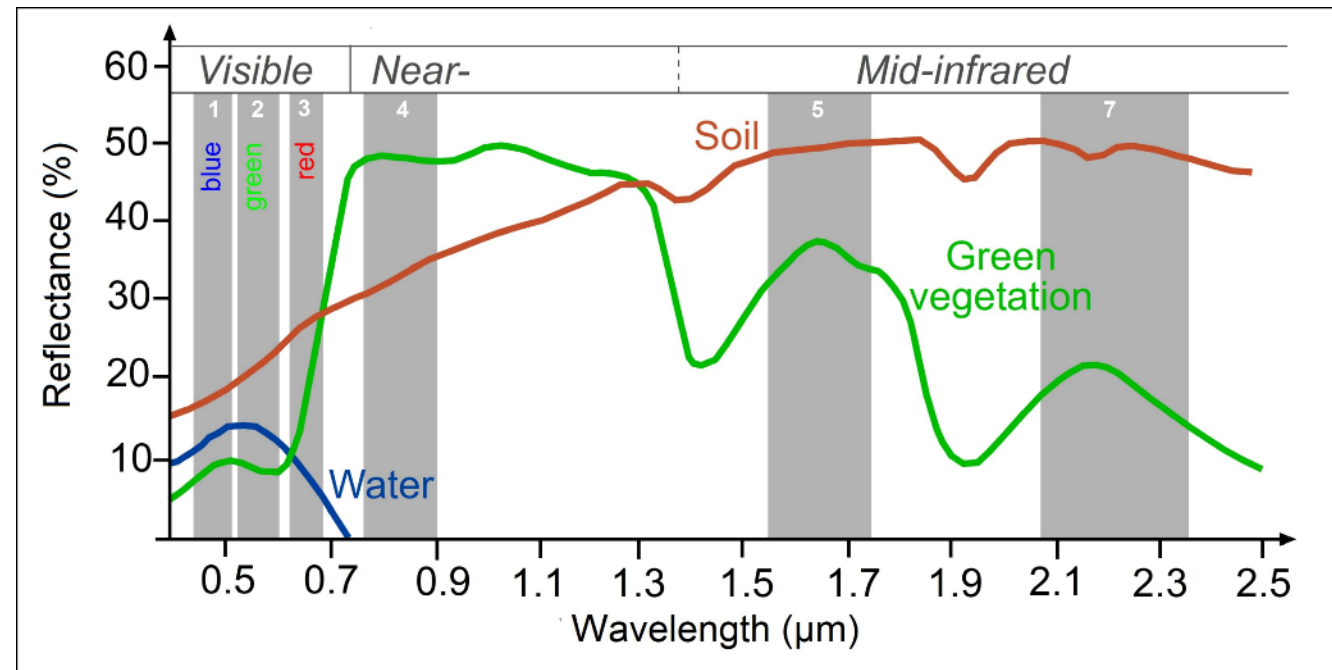
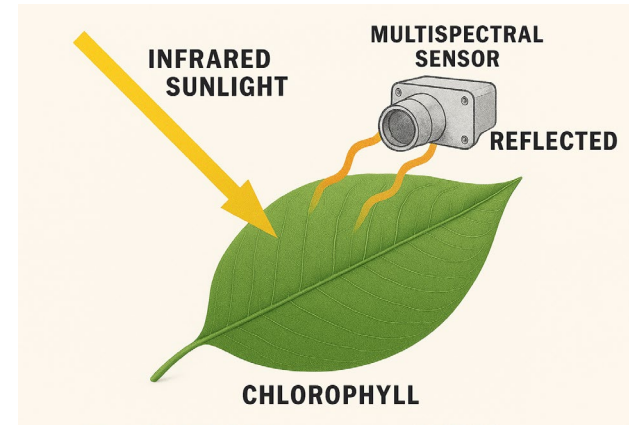
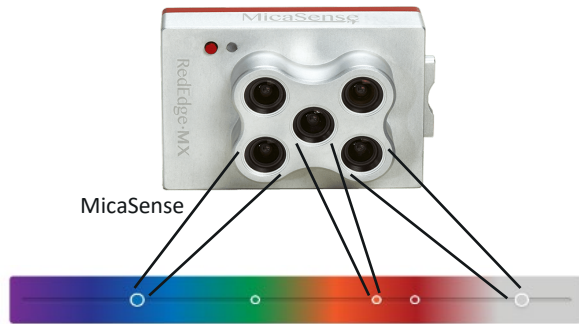
Drone data revealed that the contractor graded too high.



Areas out of spec for target grading



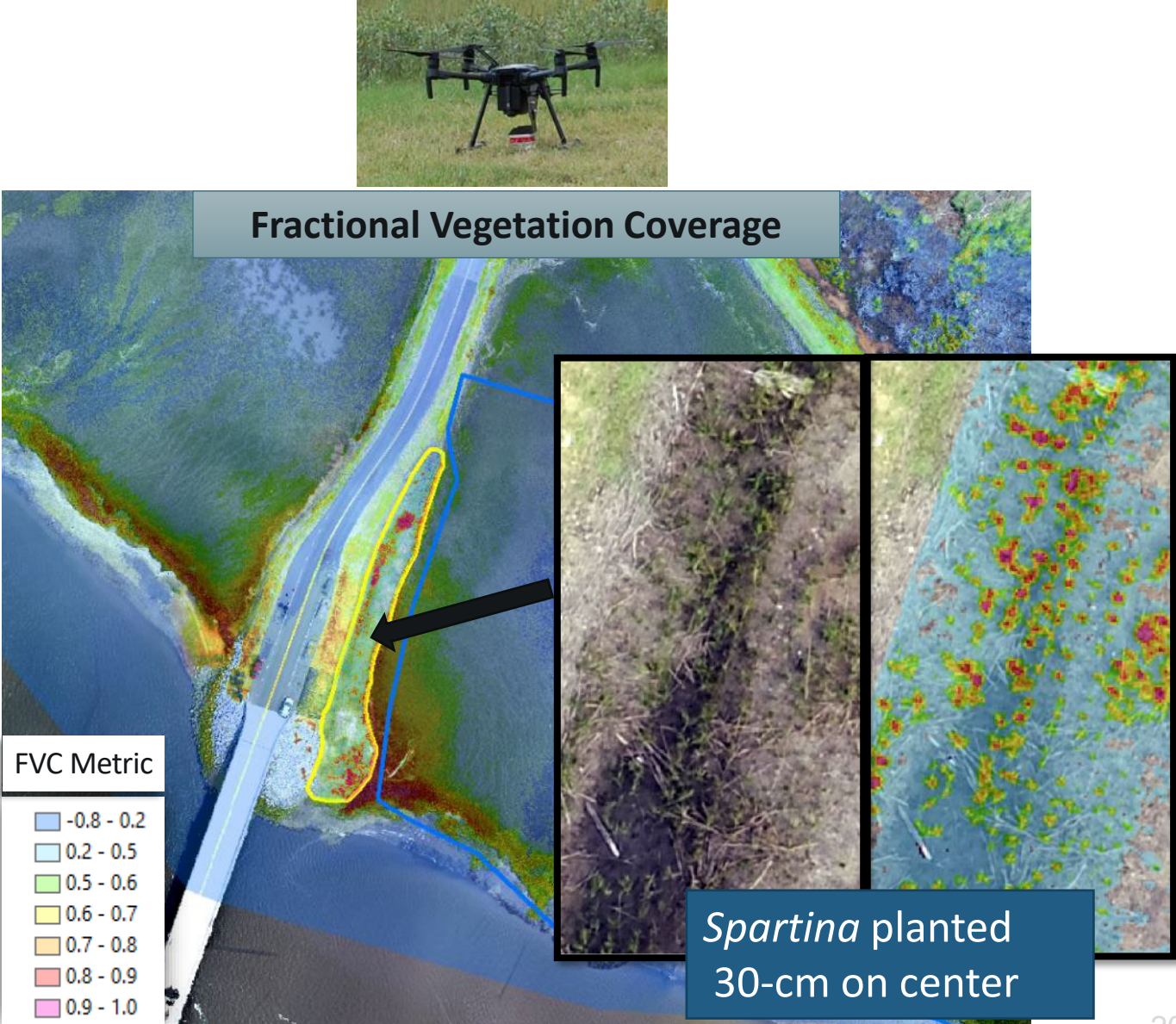
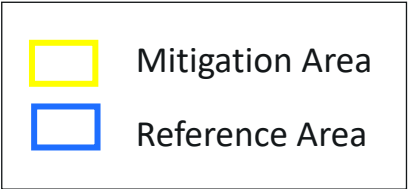
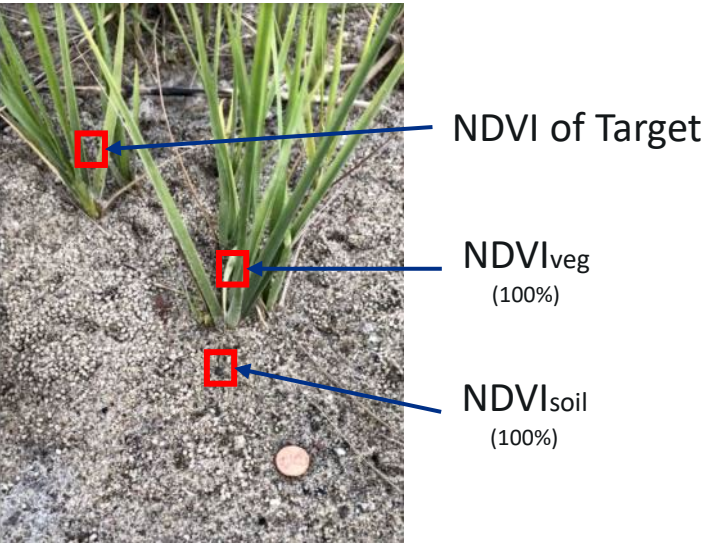
Multispectral data provides information vegetative cover and health.



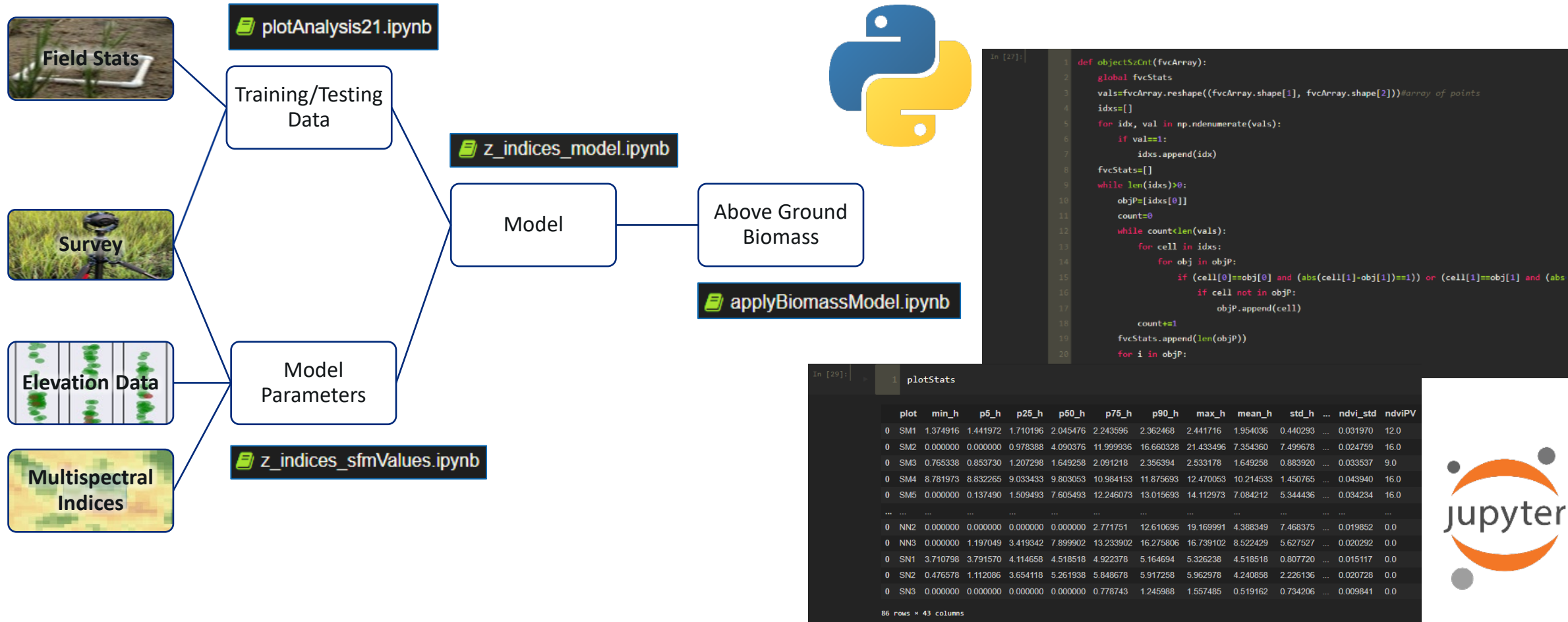
High resolution pixels identify individual *Spartina* plugs.

Fractional Vegetation Coverage (FVC)

$$\frac{\text{NDVI} - \text{NDVI}_{\text{soil}}}{\text{NDVI}_{\text{veg}} - \text{NDVI}_{\text{soil}}}$$

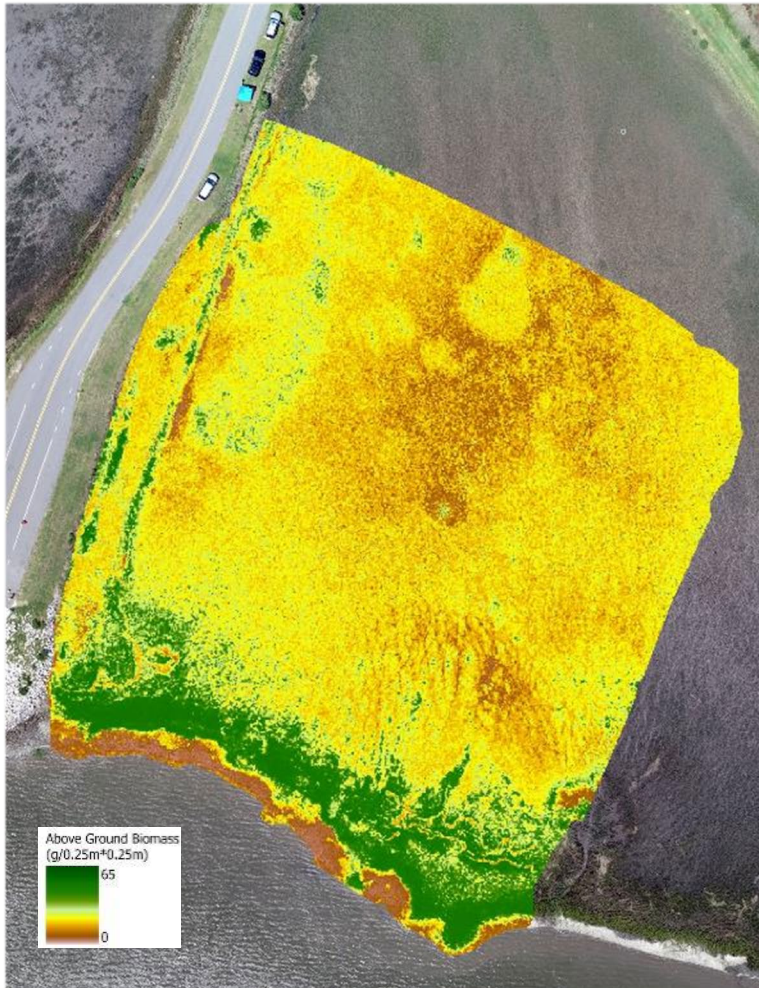


CDM Smith combined field data, 3D drone data, and multispectral data in a machine learning model to quantify biomass.

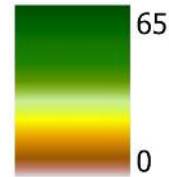


The machine learning model can output site wide biomass.

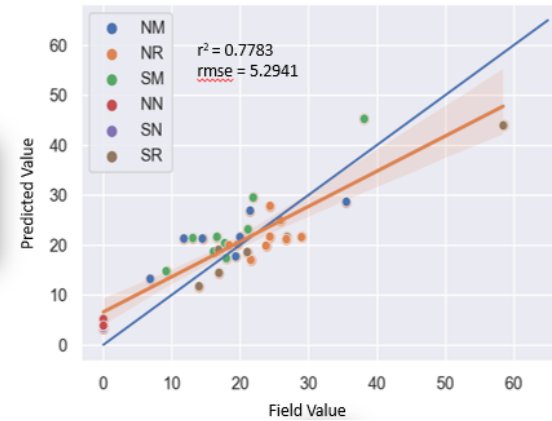
2021



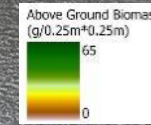
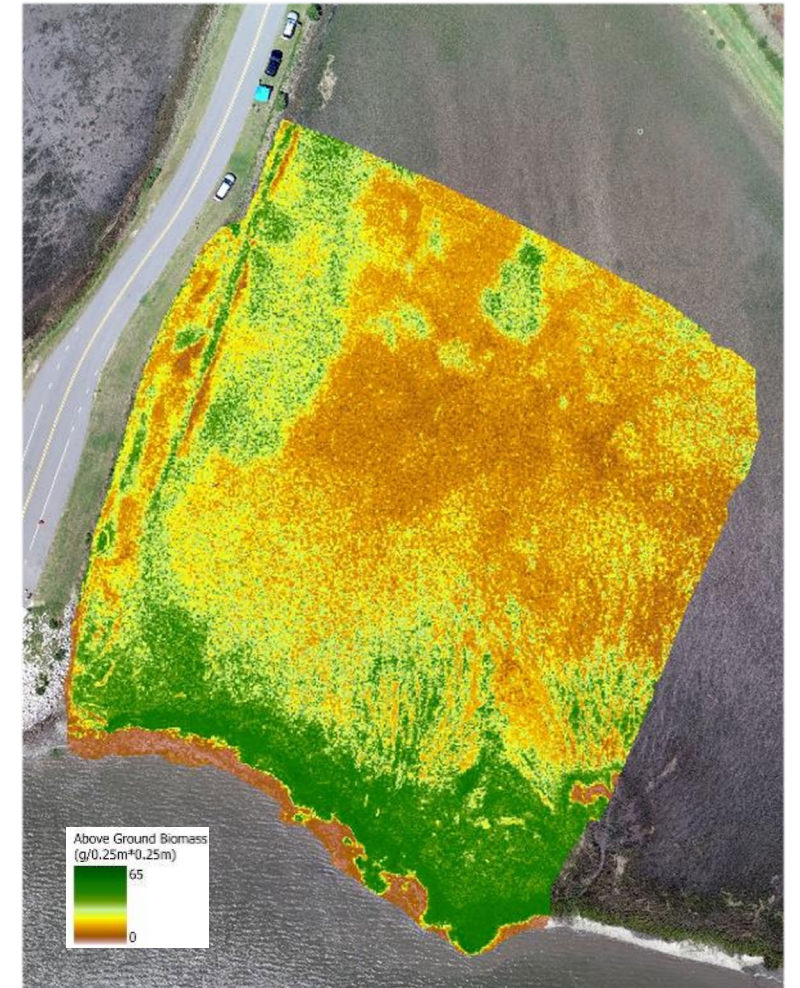
Above Ground Biomass
(g/0.25m*0.25m)



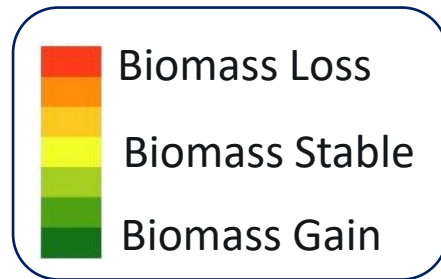
Random Forest AGB (g/0.25m*0.25m)



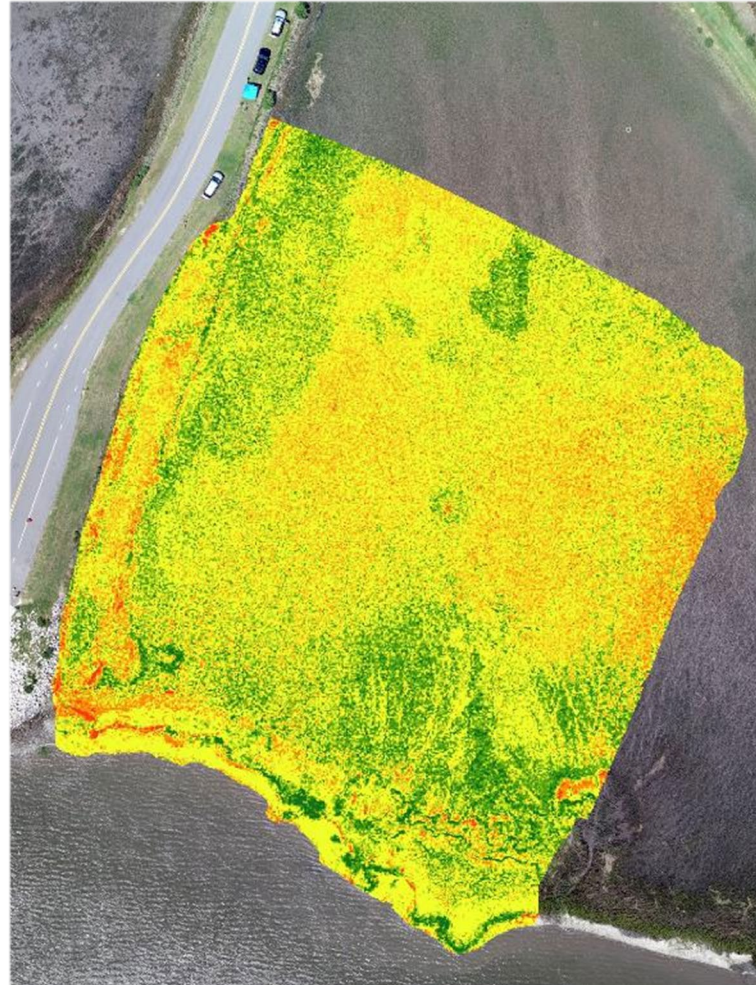
2022



Machine learning model results allow for easy identification of biomass loss and gain over time.



Change from 2021 to 2022





Reclaimed Water
Treatment Wetlands

CDM Smith used multispectral sensors and machine learning to monitor wetland treatment system pilot project.



There are multiple drawbacks to traditional monitoring.

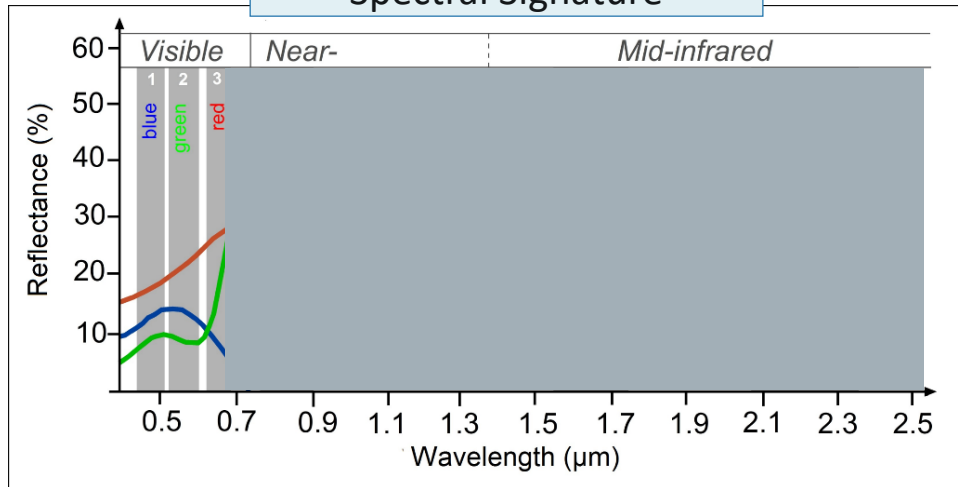
- Access issues/ safety
- Consistency between staff/ over time
- Inability to look back or change sampling methods
- Disturbing the sampling site



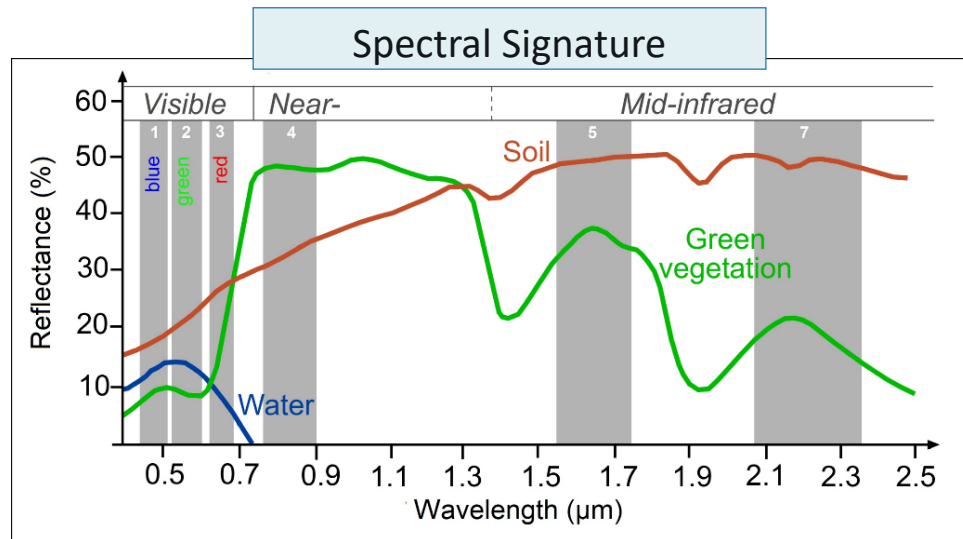
High resolution imagery is helpful but lacks the full picture.



Spectral Signature



High resolution imagery is helpful but lacks the full picture.

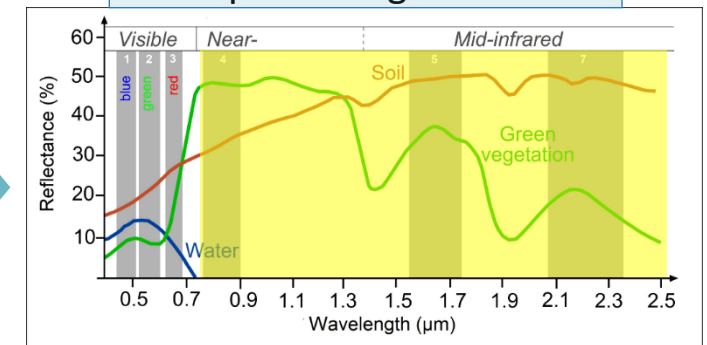


Multispectral sensors provide important vegetation data that our human eye cannot detect.

10-band Multispectral Sensor

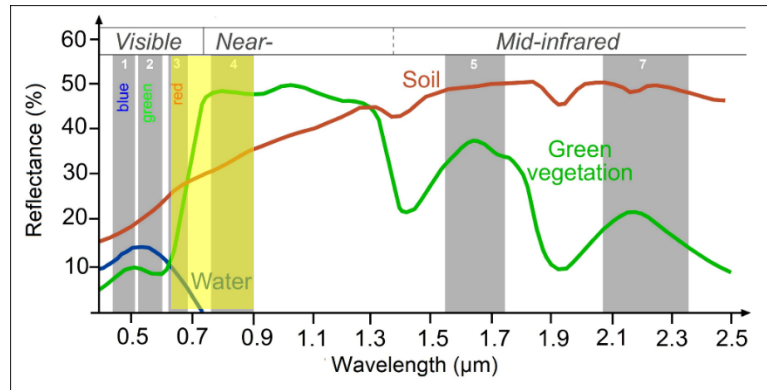


Spectral Signature

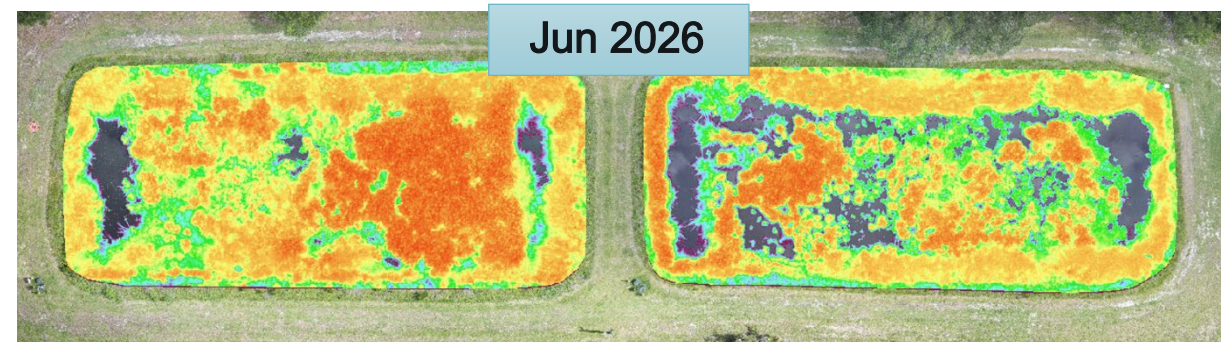
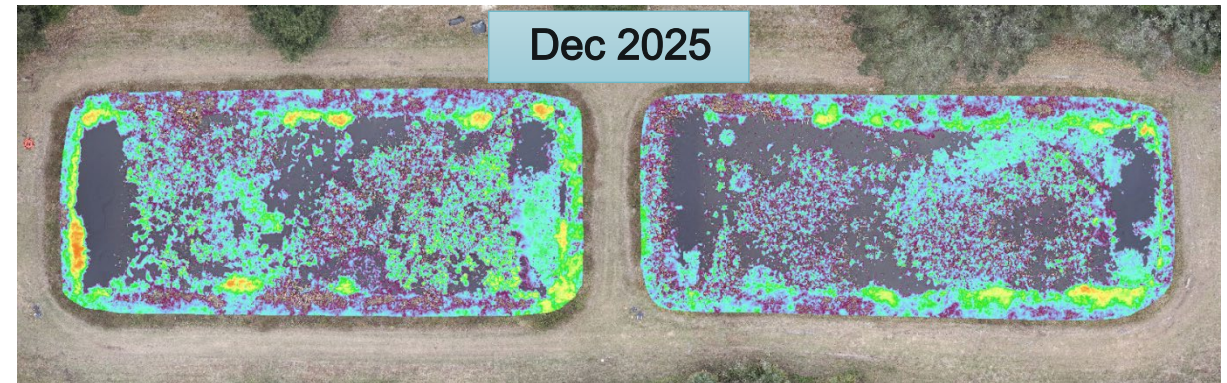
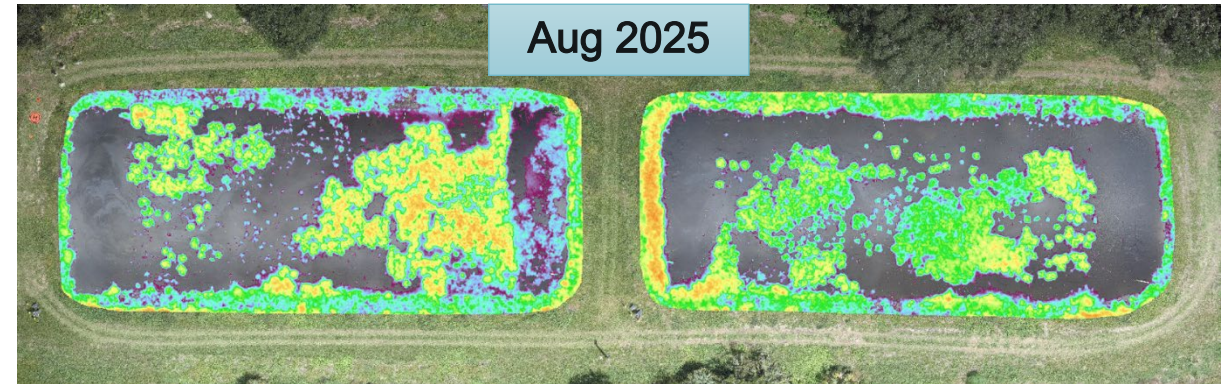
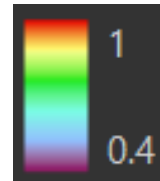


Multispectral based metrics can provide data on vegetative health.

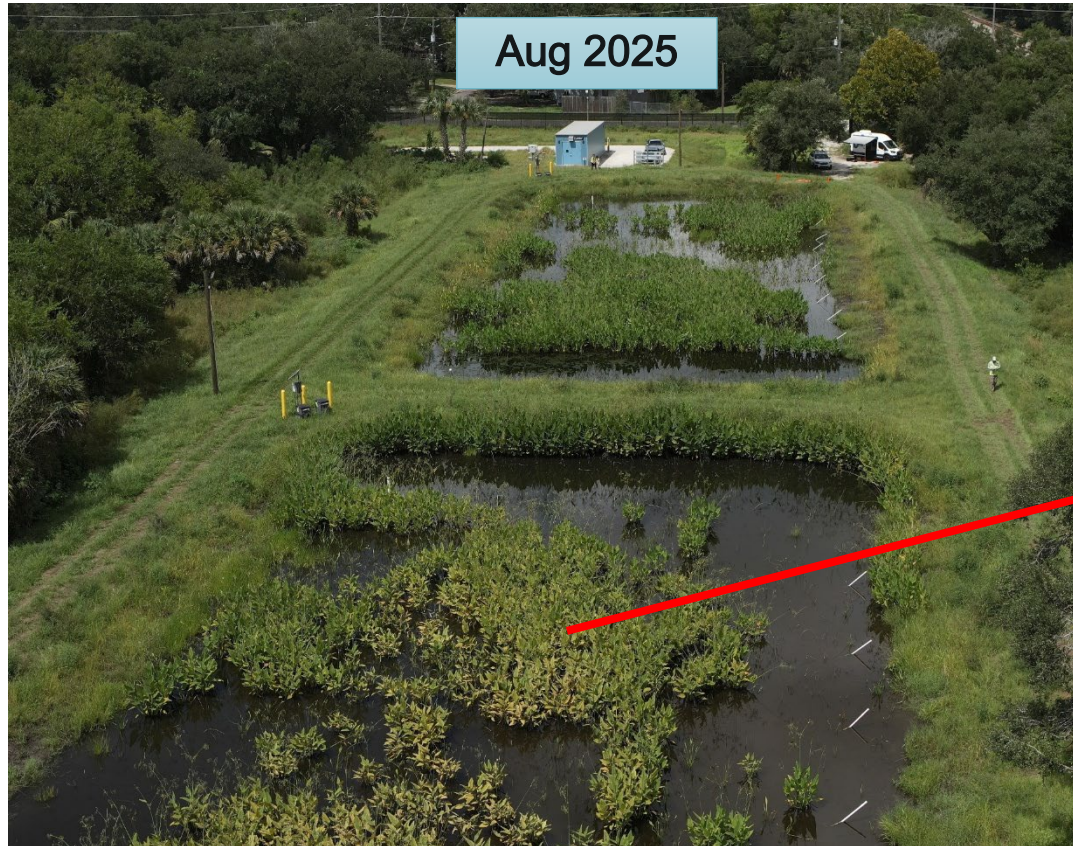
Normalized Difference
Vegetation Index (NDVI)



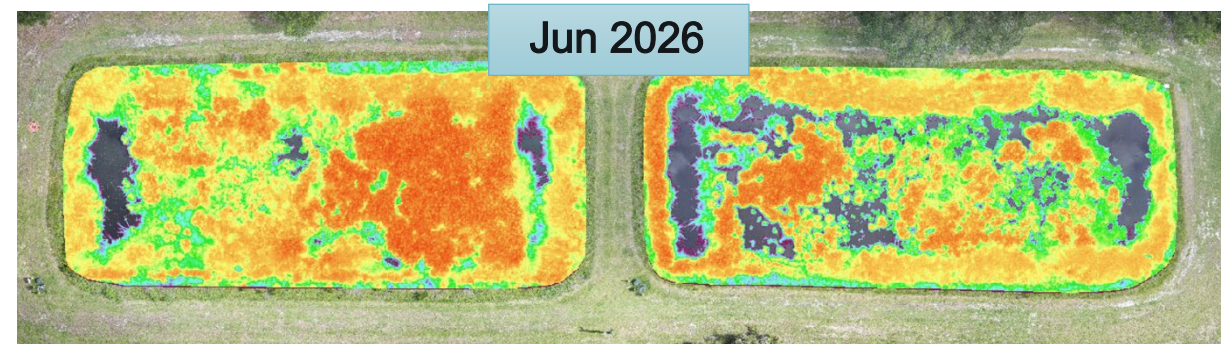
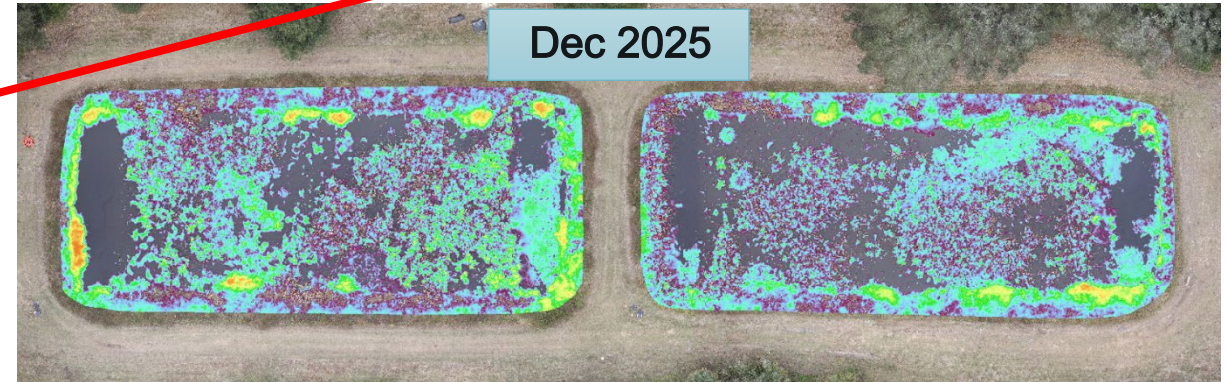
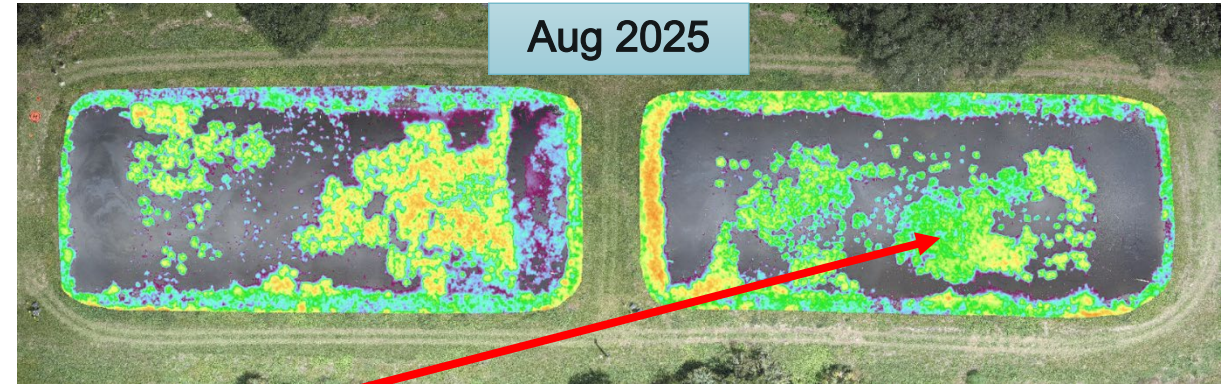
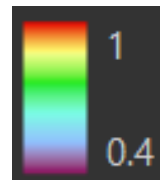
NDVI



Multispectral based metrics can provide data on vegetative health.



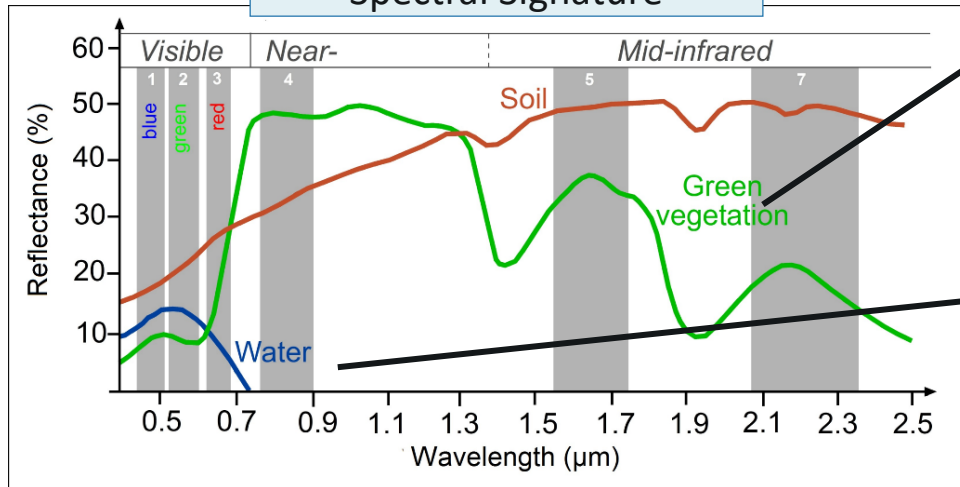
NDVI



CDM Smith used multispectral data and machine learning to map the extents of water vs vegetation.



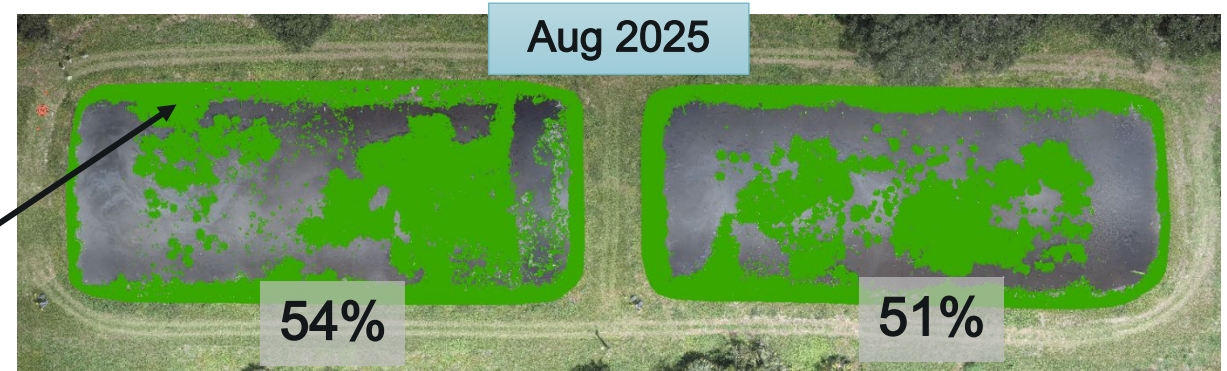
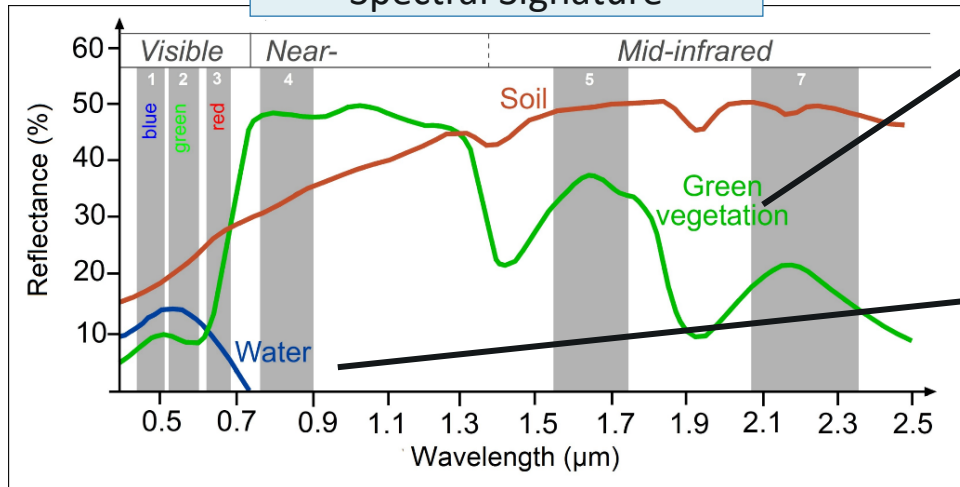
Spectral Signature



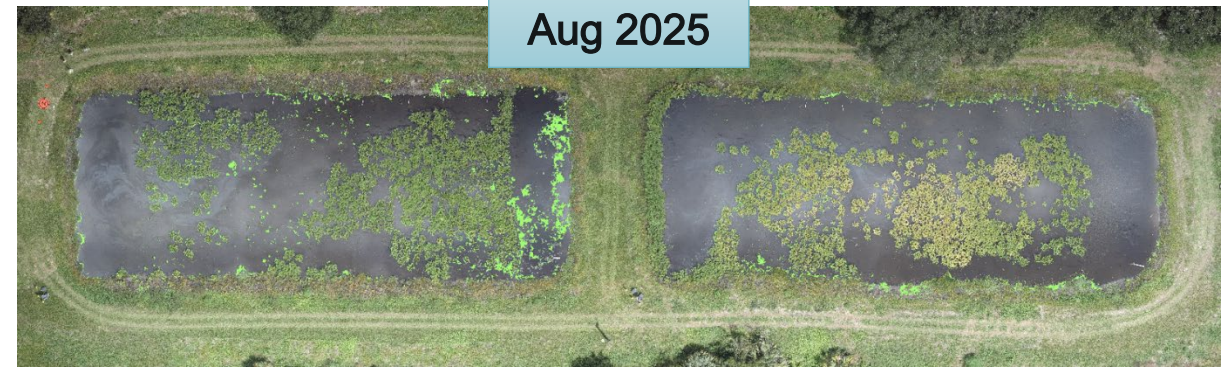
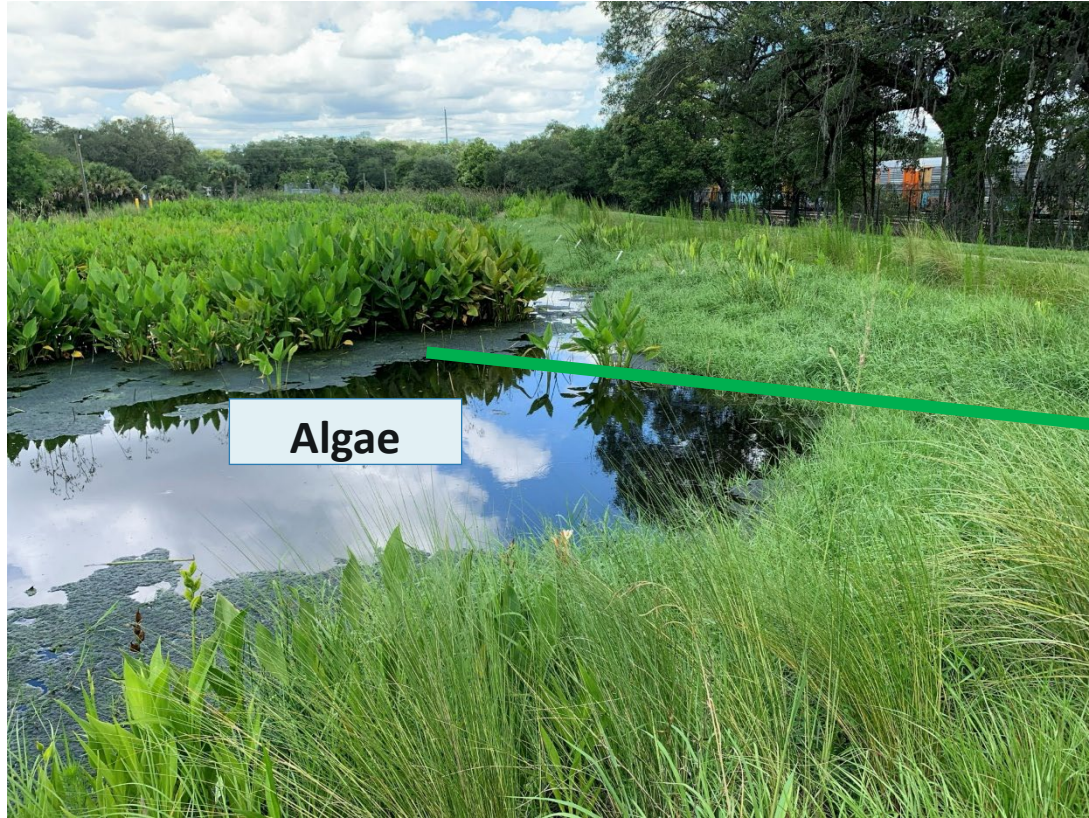
CDM Smith used multispectral data and machine learning to map the extents of water vs vegetation.



Spectral Signature



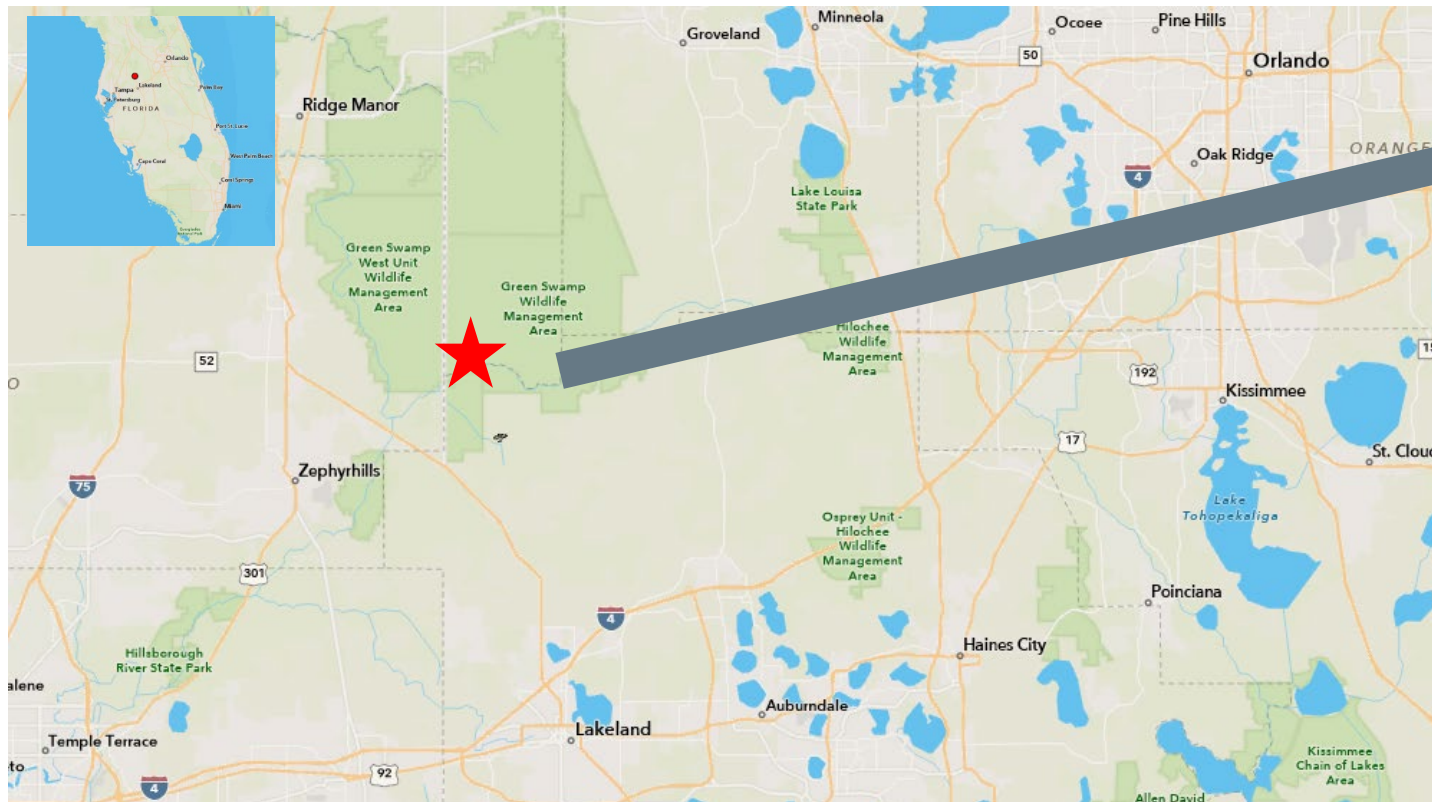
The digital archive allows us to reassess new developments:
CDM Smith used machine learning to quantify algae.





SWFWMD contracted with CDM Smith to efficiently map old world climbing fern in Green Swamp.

Southwest Florida
Water Management District



CDM Smith mapped the site with a vtol drone and 10-band multispectral sensor.



CDM Smith produced a high resolution aerial (1 in/pixel) and multispectral aerial (3 in/pixel).

High resolution digital camera

130 acre site



CDM Smith produced a high resolution aerial (1 in/pixel) and multispectral aerial (3 in/pixel).

10-band multispectral sensor

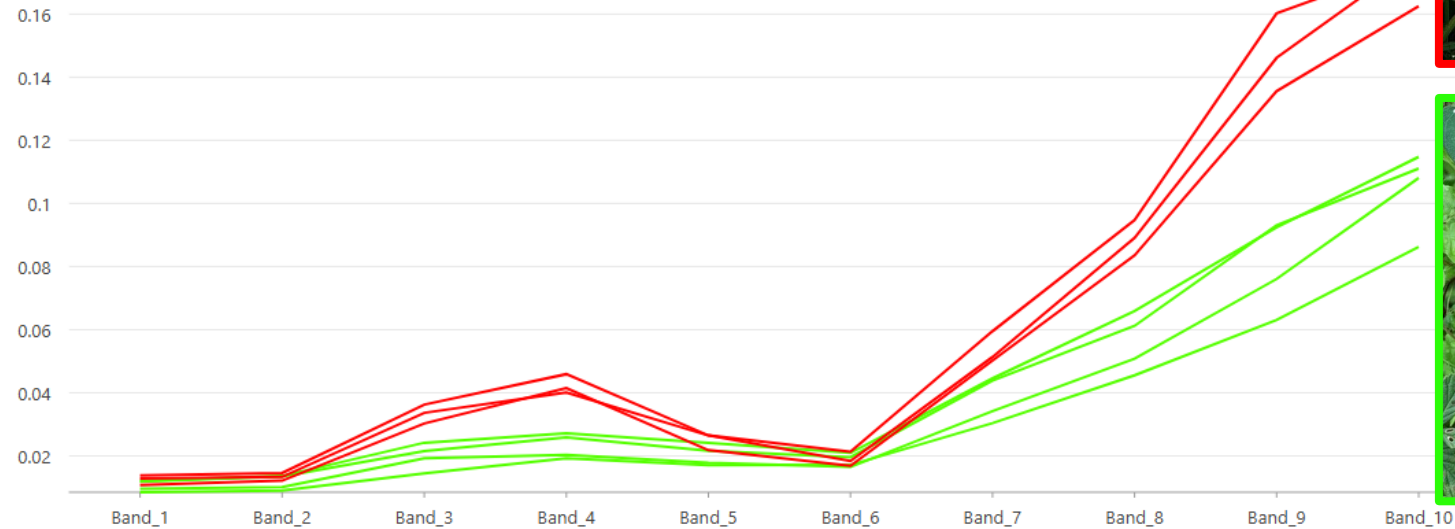
130 acre site



Field crews geolocated a few patches of OWCF to serve as ground truthing for machine learning.



Spectral Profile



Mapping expedites field location and treatment.



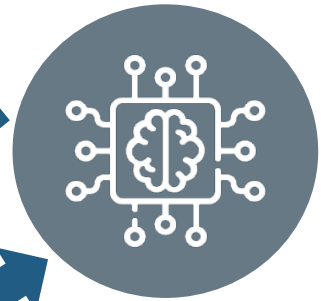
Modeling



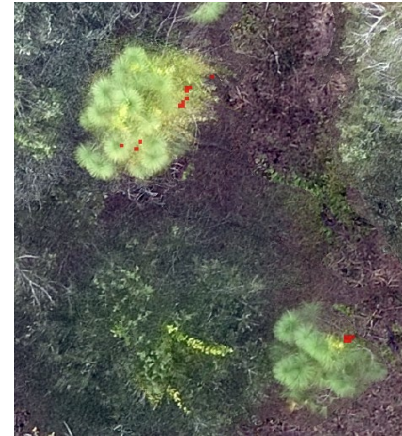
Mapping expedites field location and treatment.



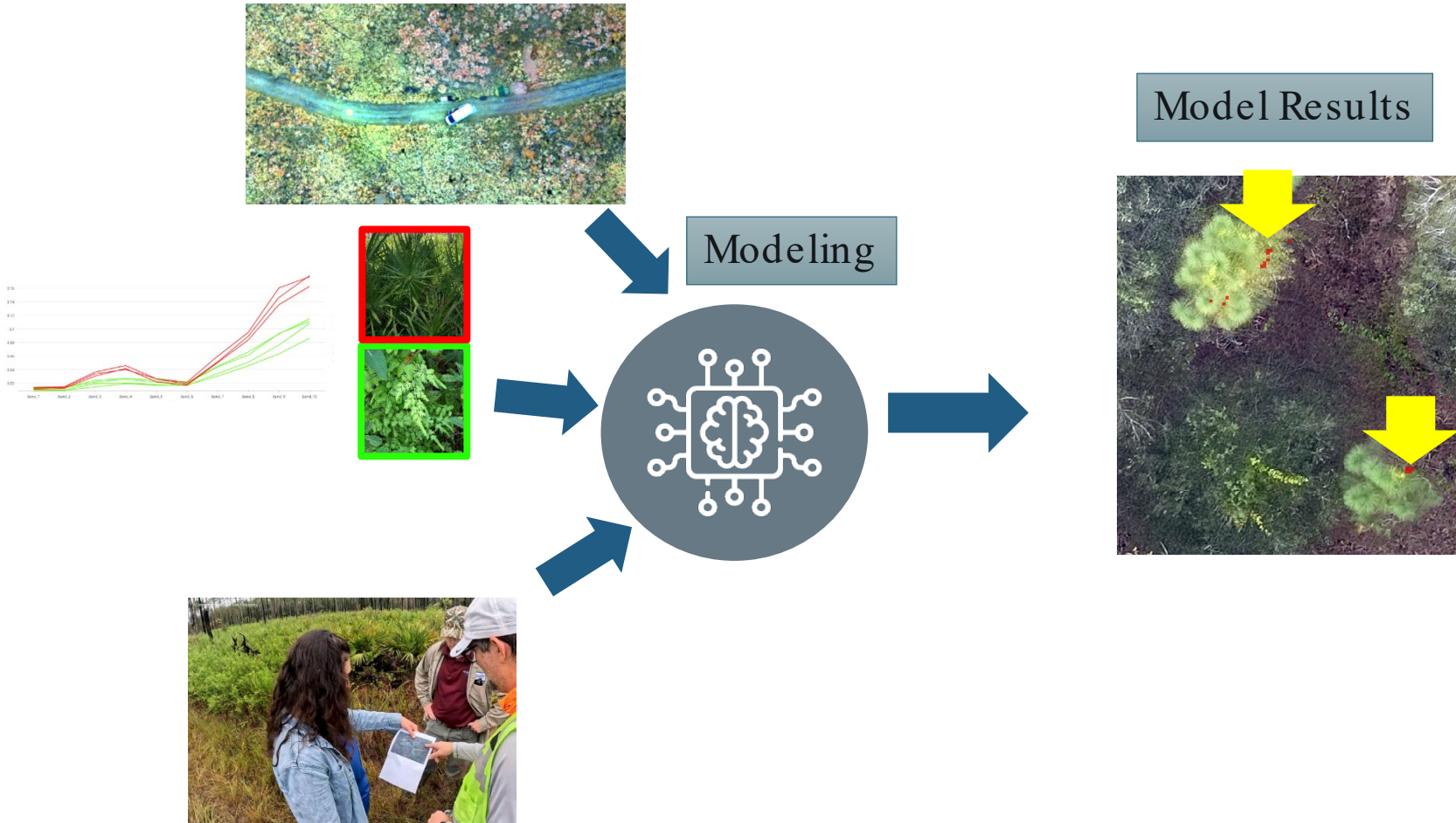
Modeling



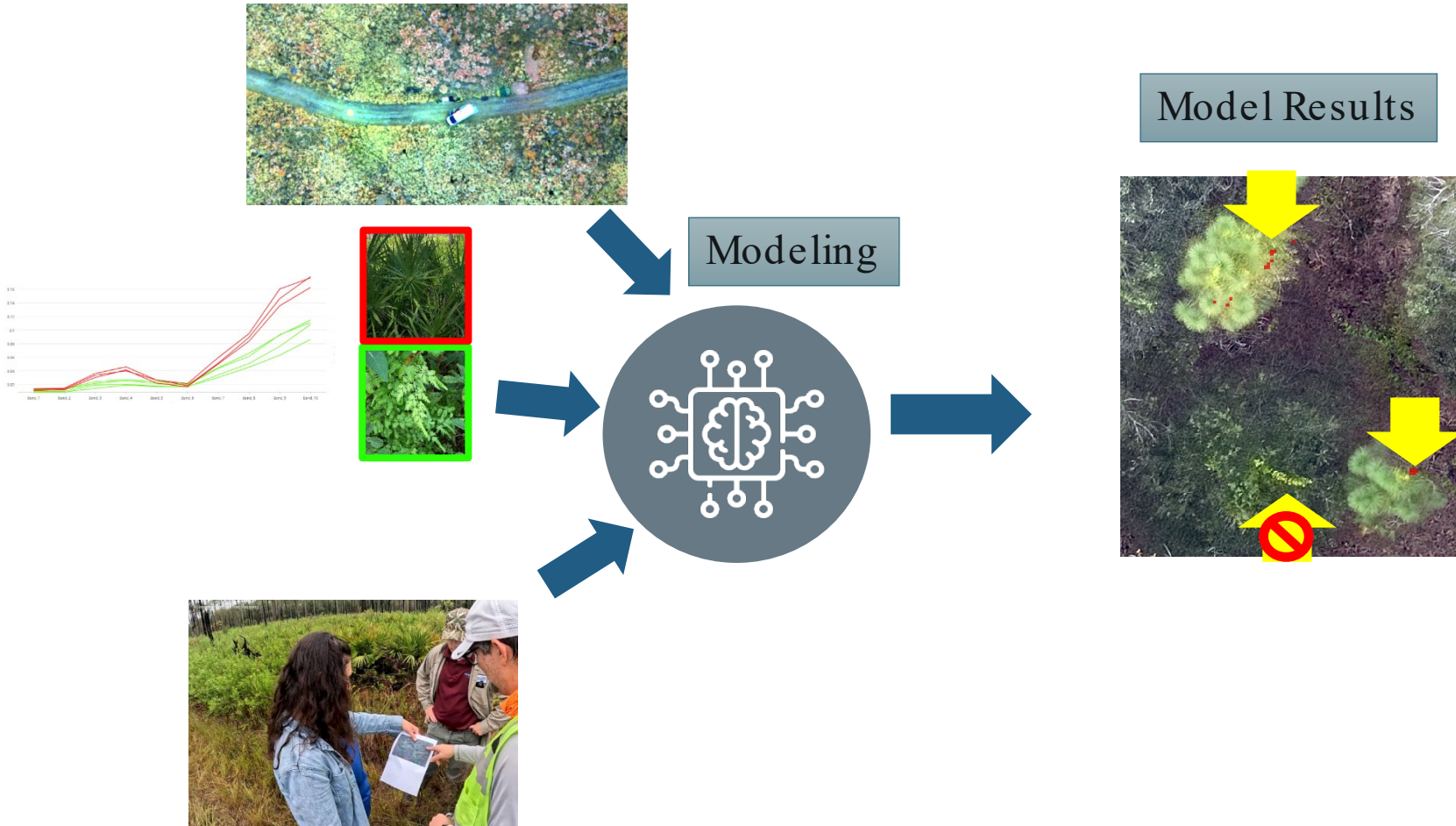
Model Results



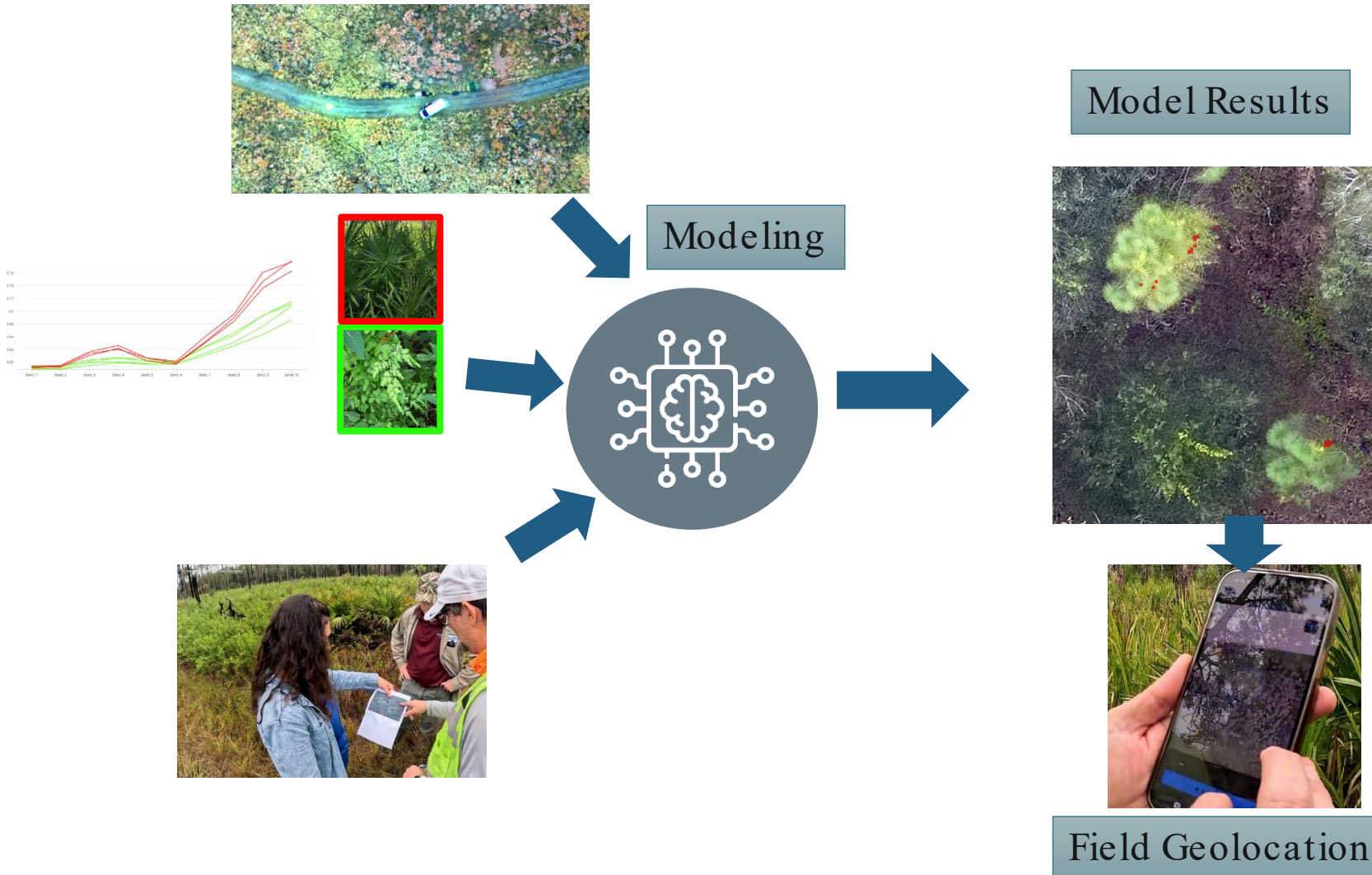
Mapping expedites field location and treatment.



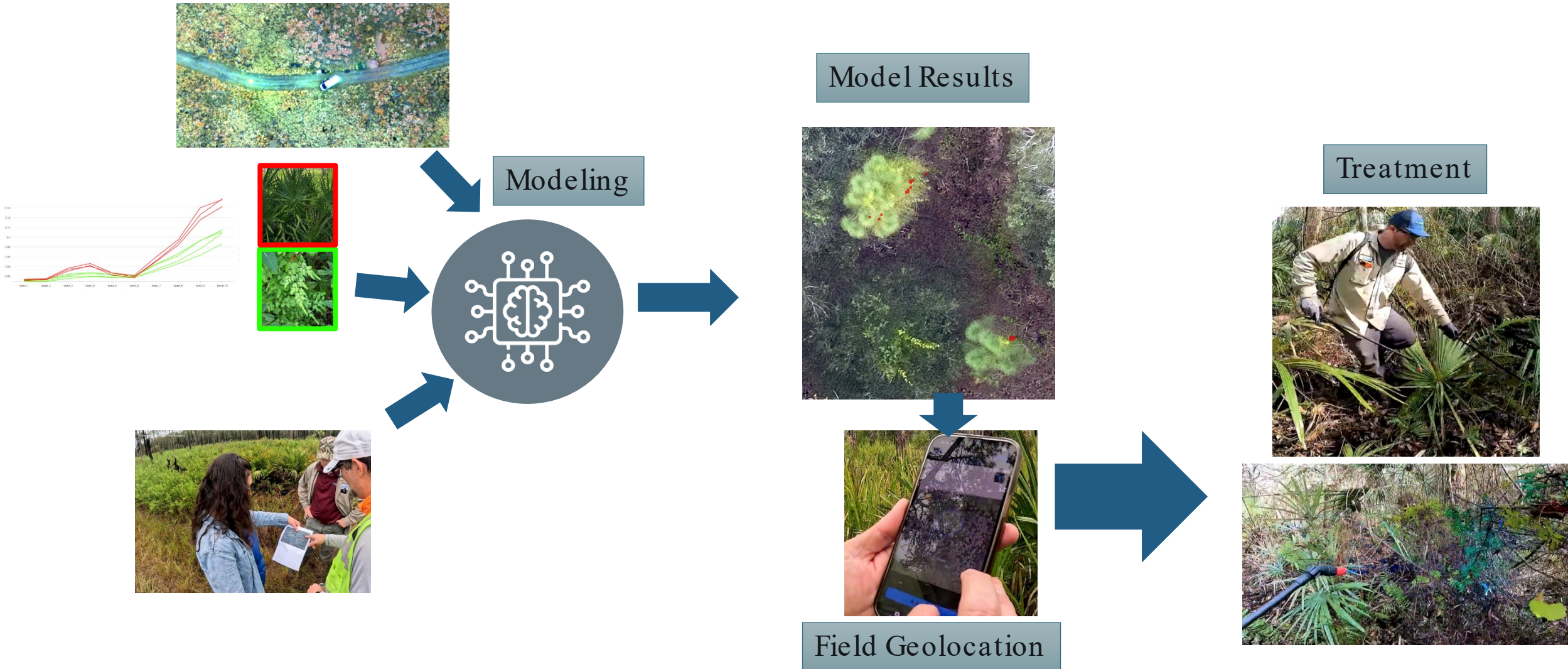
Mapping expedites field location and treatment.



Mapping expedites field location and treatment.

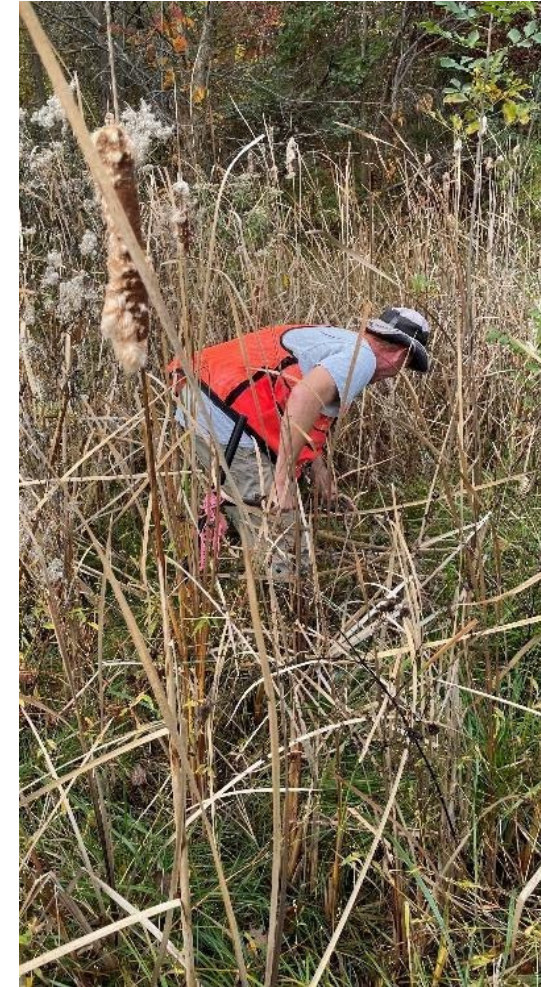
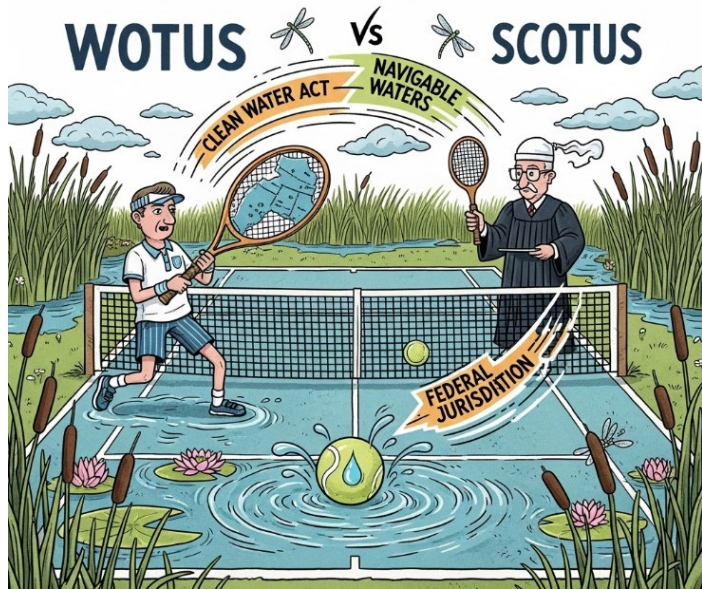


Mapping expedites field location and treatment.





Wetlands and other Waters of the US regulations are in constant flux and are time consuming to delineate.



Remote sensing data provides information that can be used to predict wetland presence with AI models.



Courtesy of SurvTech



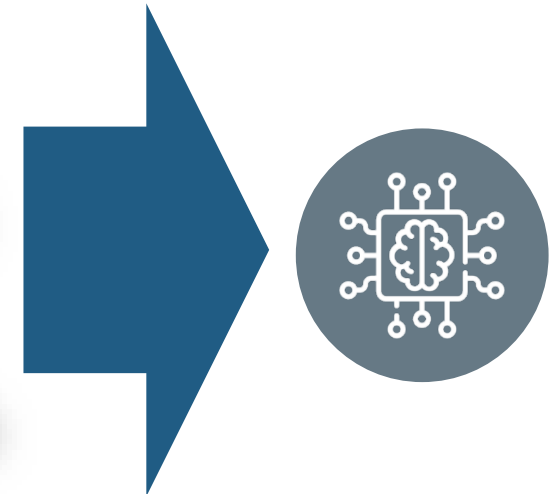
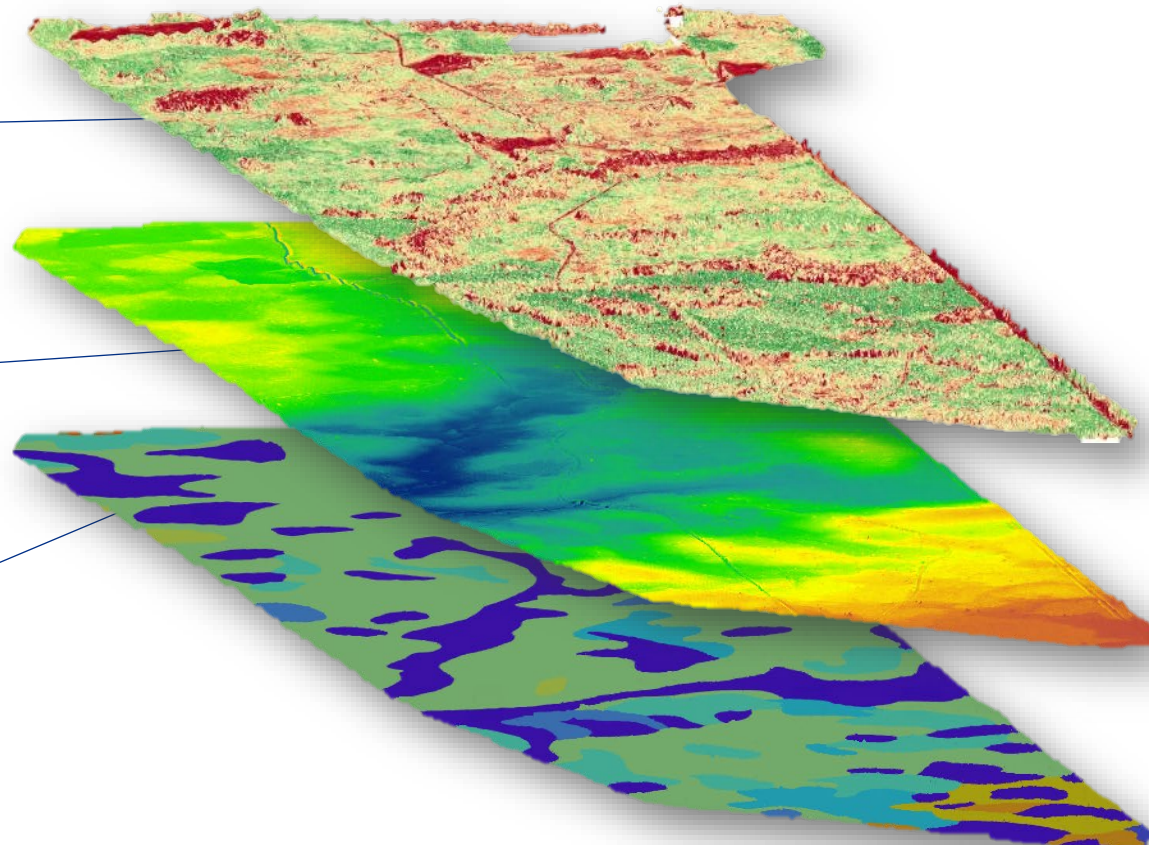
Vegetation



Hydrology



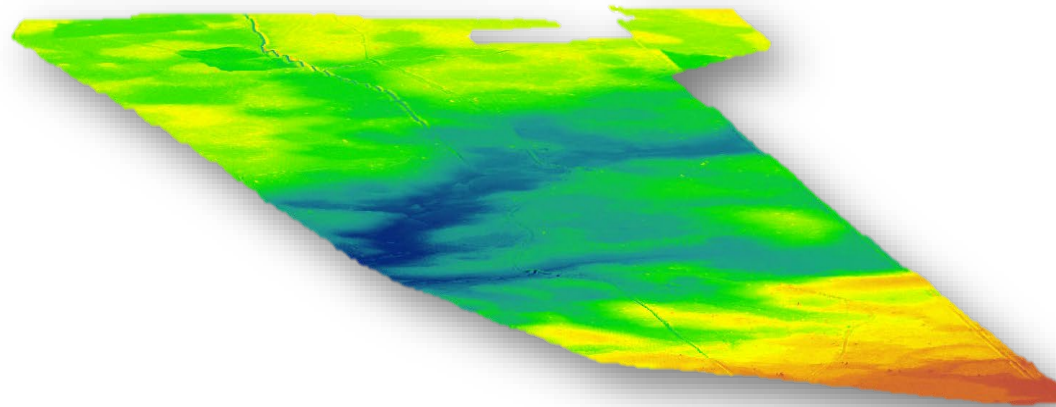
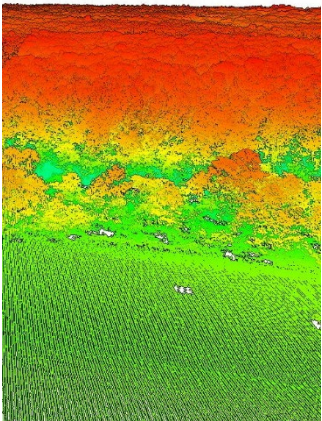
Soils



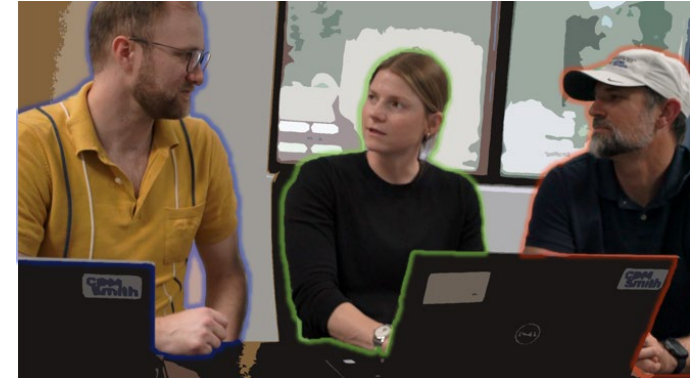
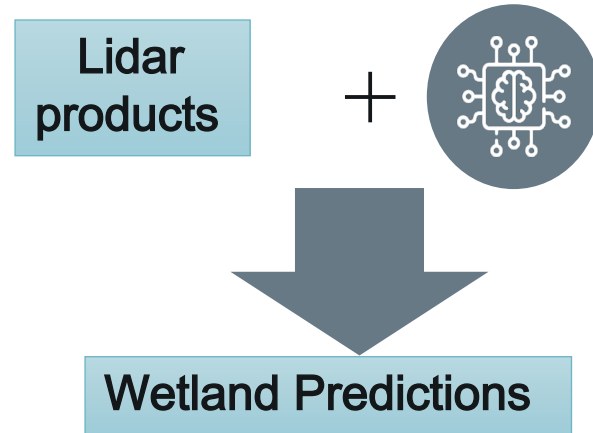
The team developed hydrology products from lidar data that increase model accuracy.



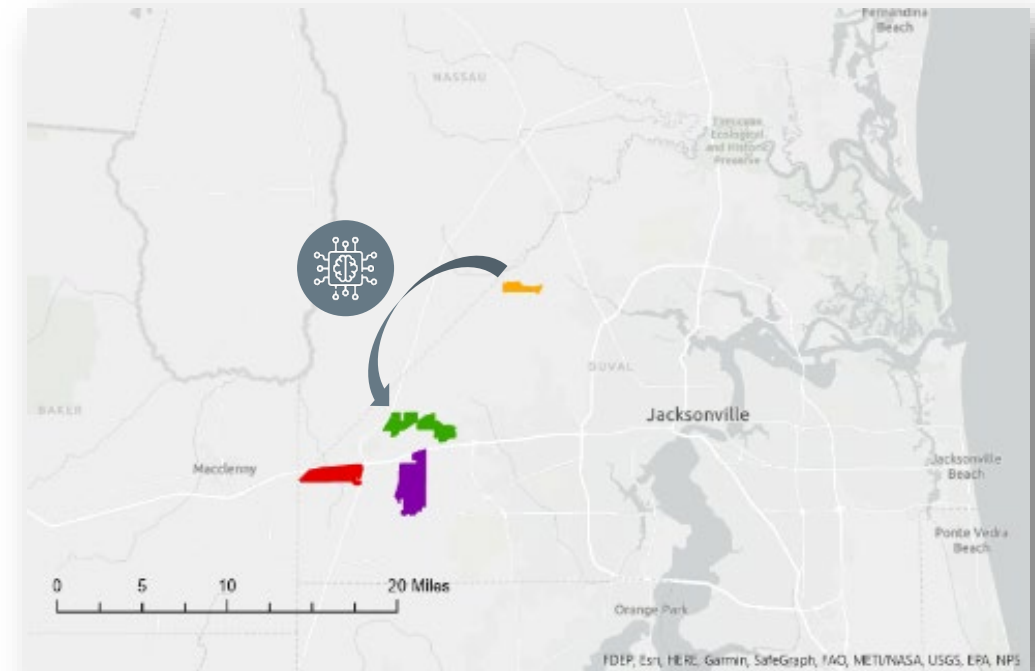
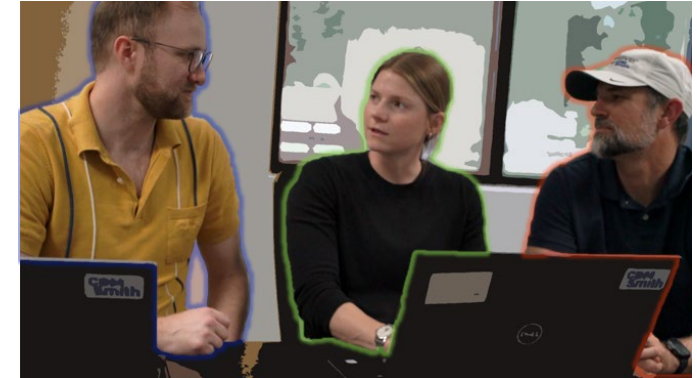
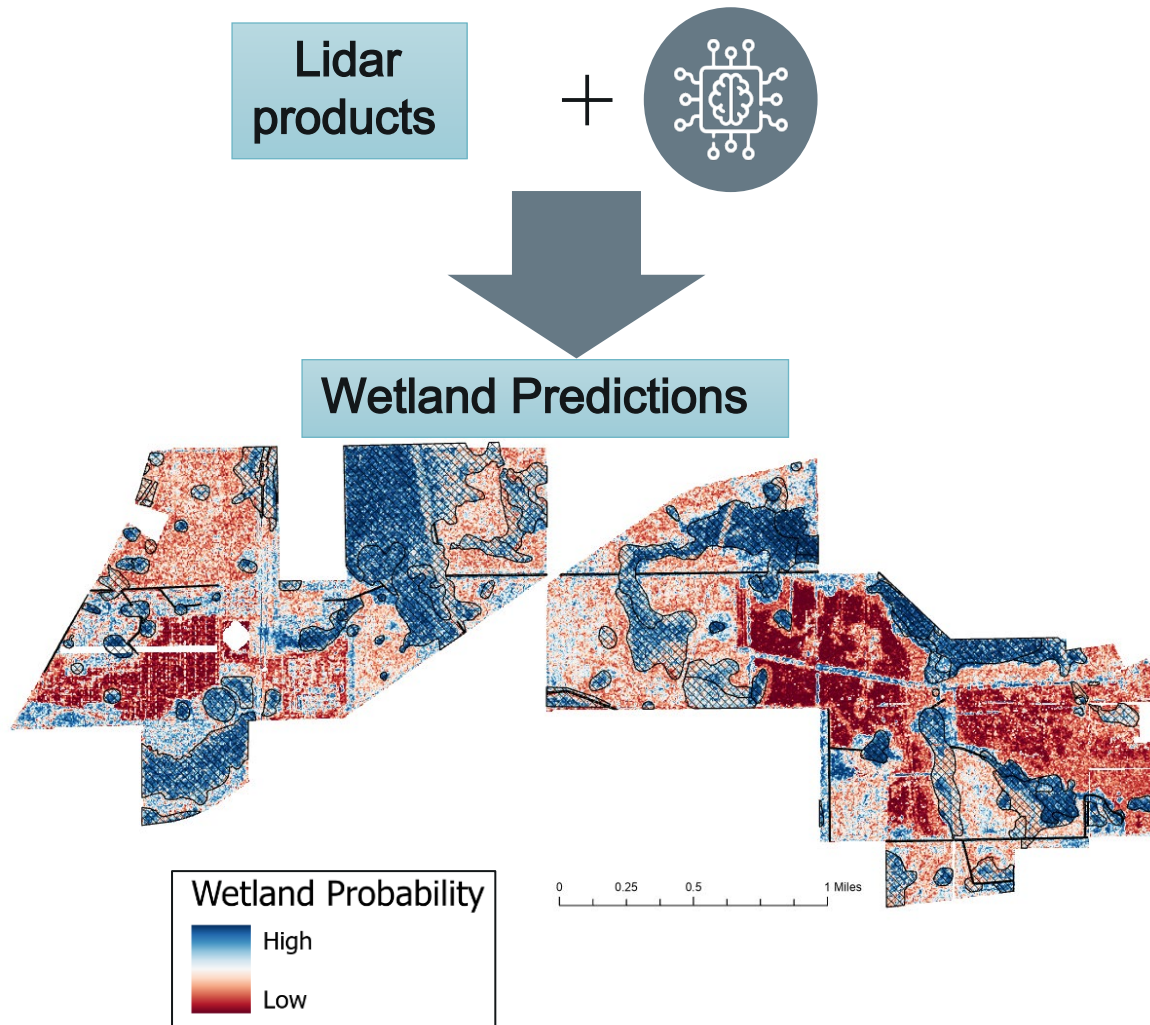
Lidar-derived
products



CDM Smith developed a machine learning model to map wetlands.

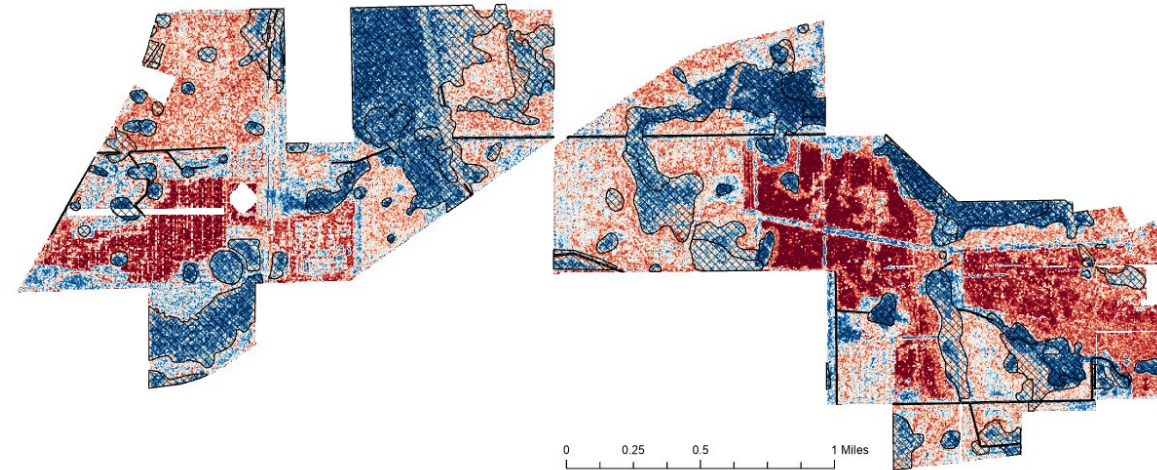


CDM Smith developed a machine learning model to map wetlands.

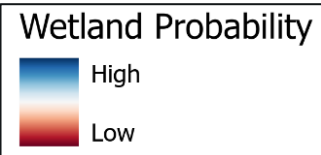
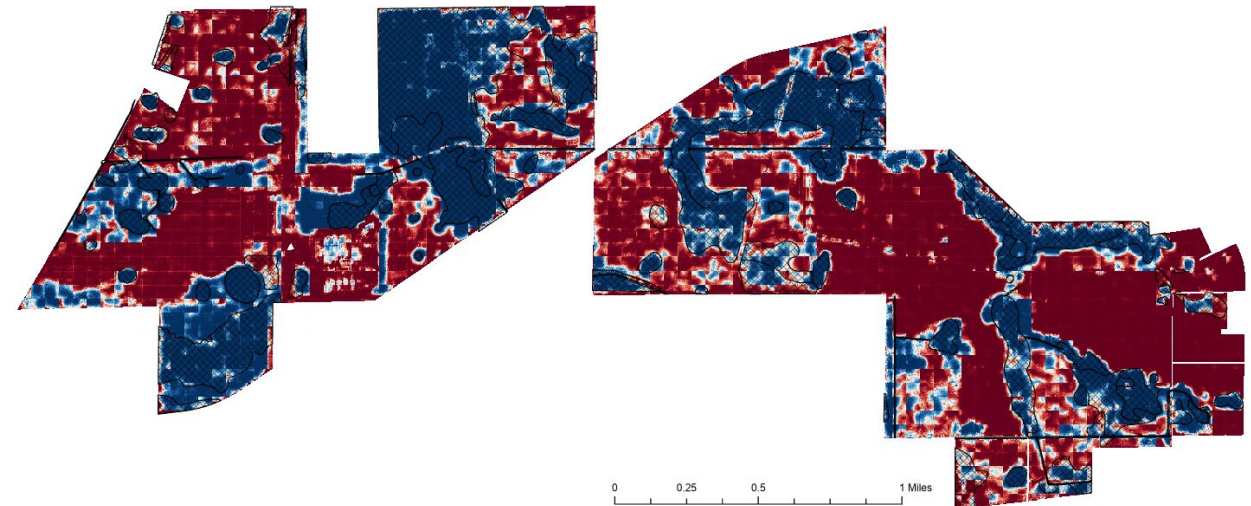


CDM Smith's deep learning model increased accuracy and ability to transfer the model to new sites.

Machine Learning Model

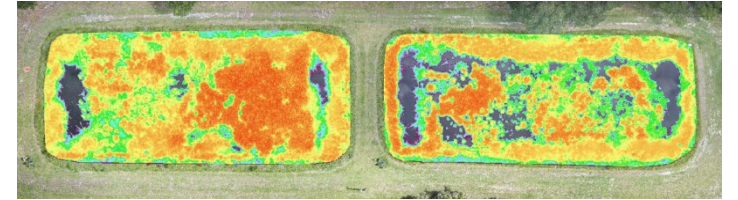
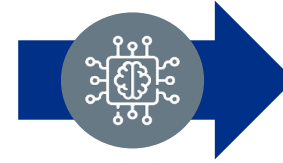


Deep Learning Model



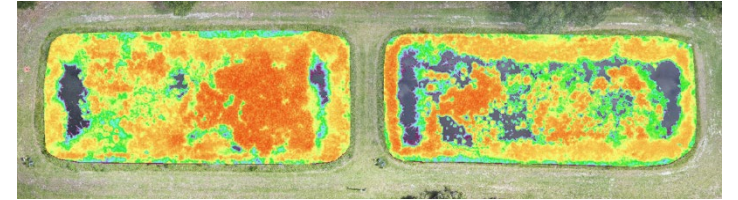
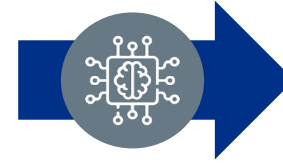
Subject matter experts play a vital role in AI model development and accurate interpretation of predictions.

Vegetation Monitoring

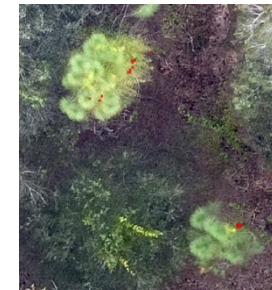
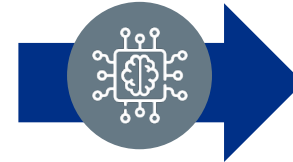


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Vegetation Monitoring

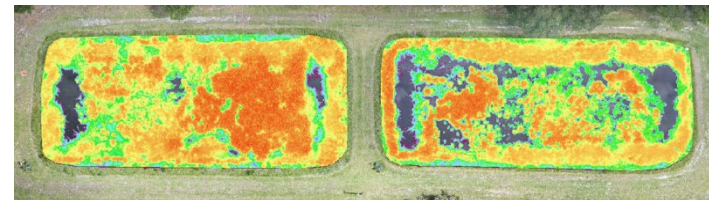
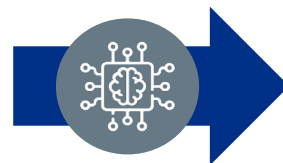


Exotic Species

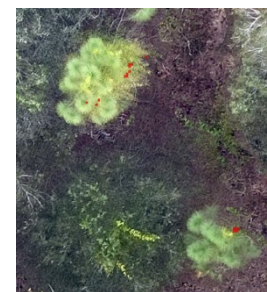
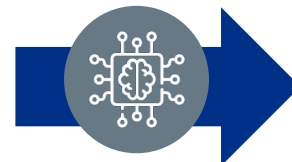


Subject matter experts play a vital role in AI model development and accurate interpretation of predictions.

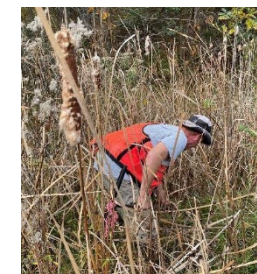
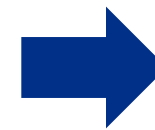
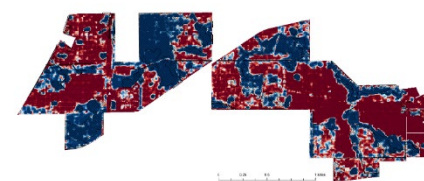
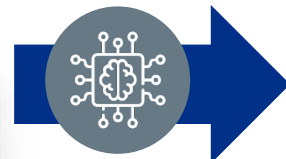
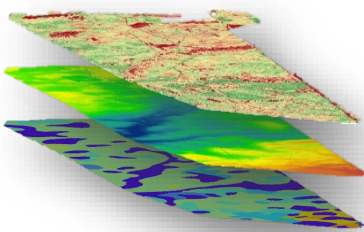
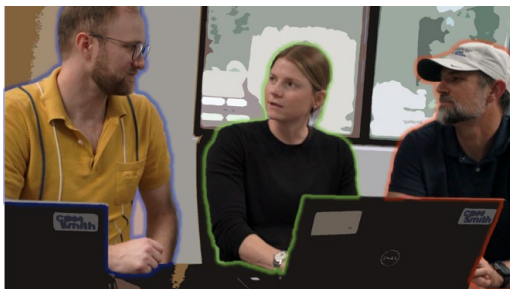
Vegetation Monitoring



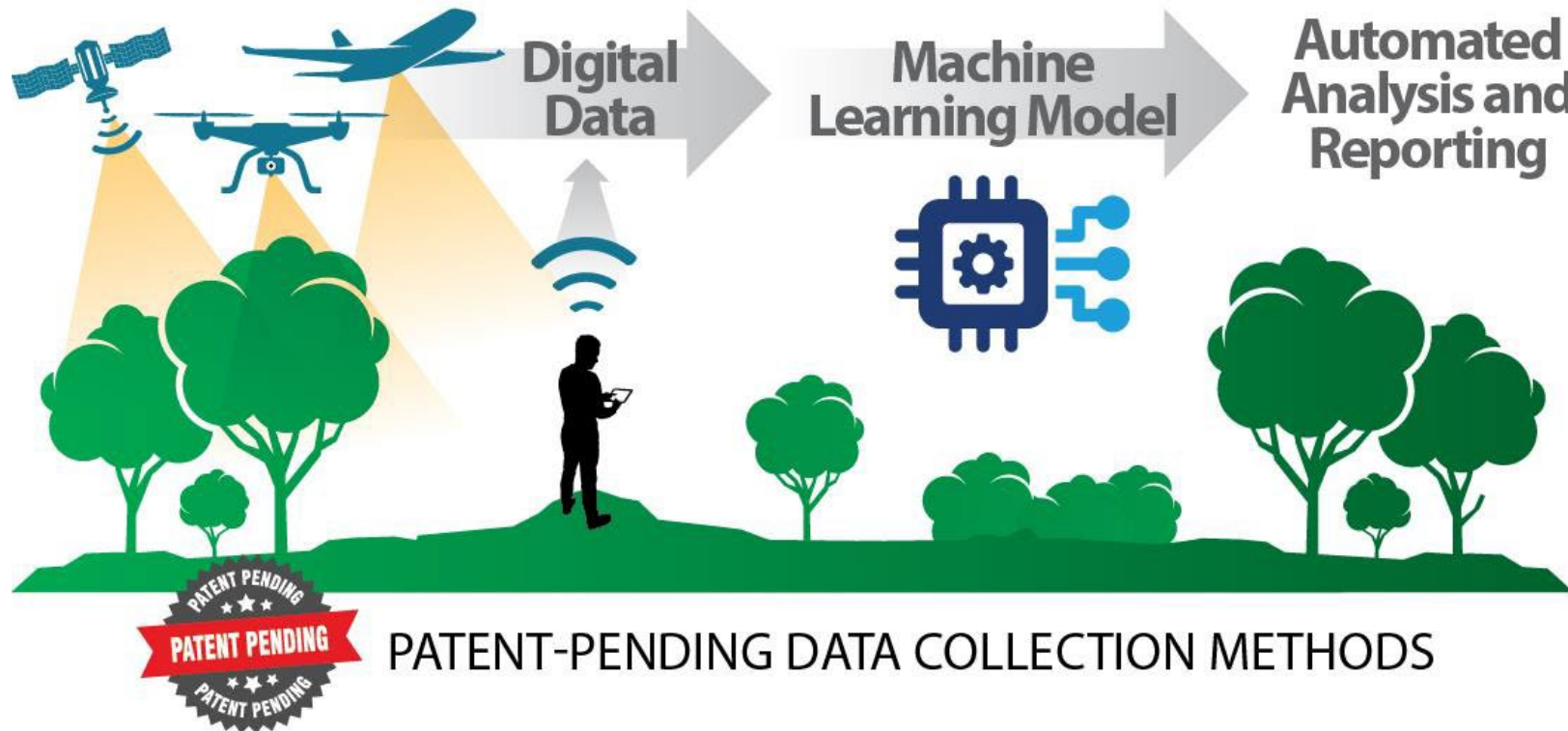
Exotic Species



Wetlands



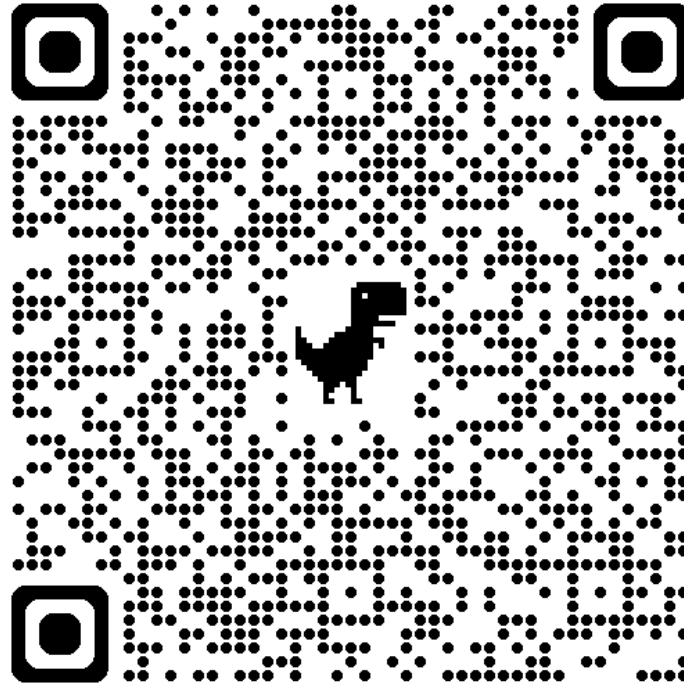
Sky Wave at CDM Smith leverages advanced remote sensing, automation, and AI to develop environmental solutions.



Contact:
skywave@cdmsmith.com

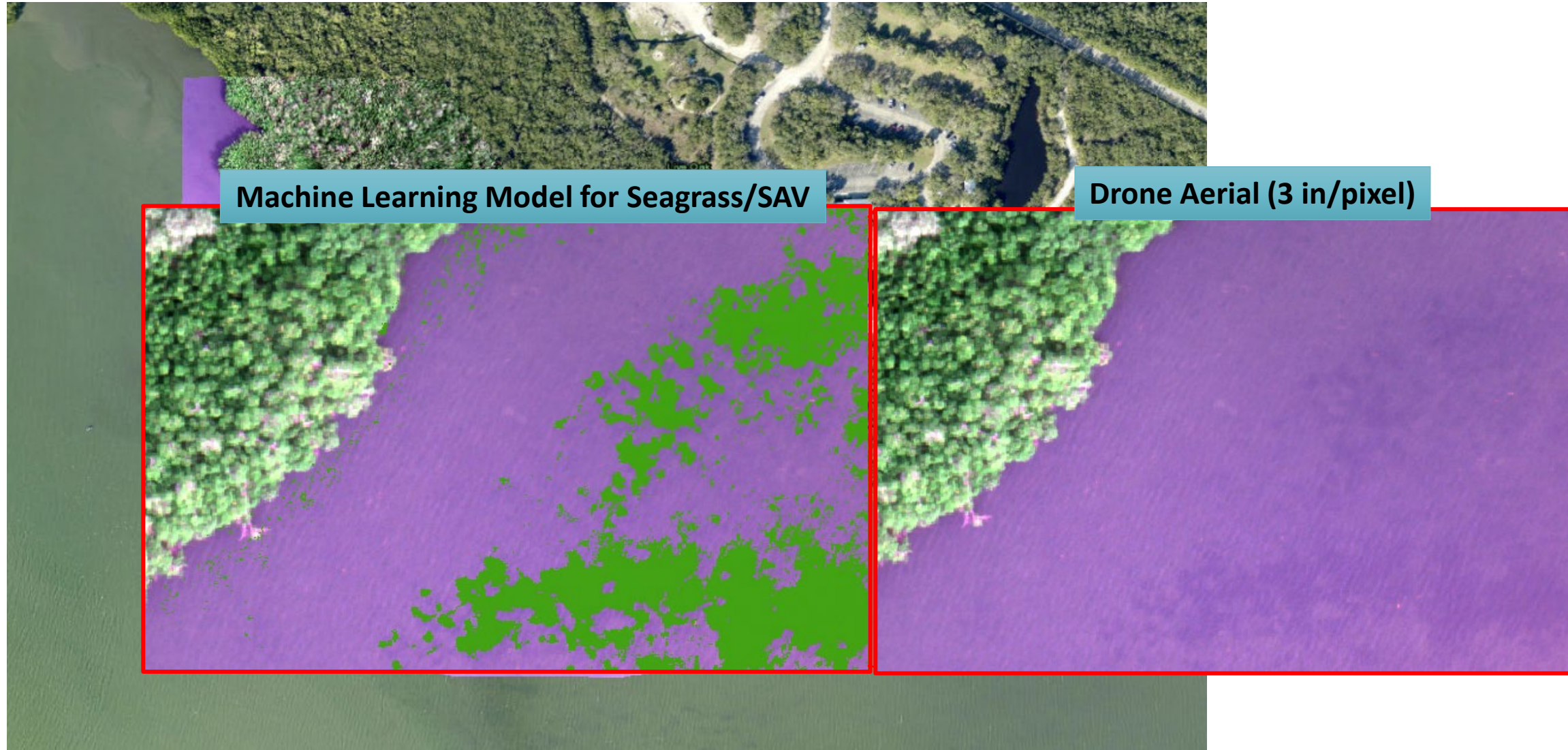
 sky wave[®] at **CDM Smith**

Scan for more information



 sky wave[®] at **CDM
Smith**

CDM Smith developed learning models to map seagrass/SAV versus sandy substrate.



CDM Smith developed a machine learning model with over 95% accuracy to identify the invasive species Australian pine.

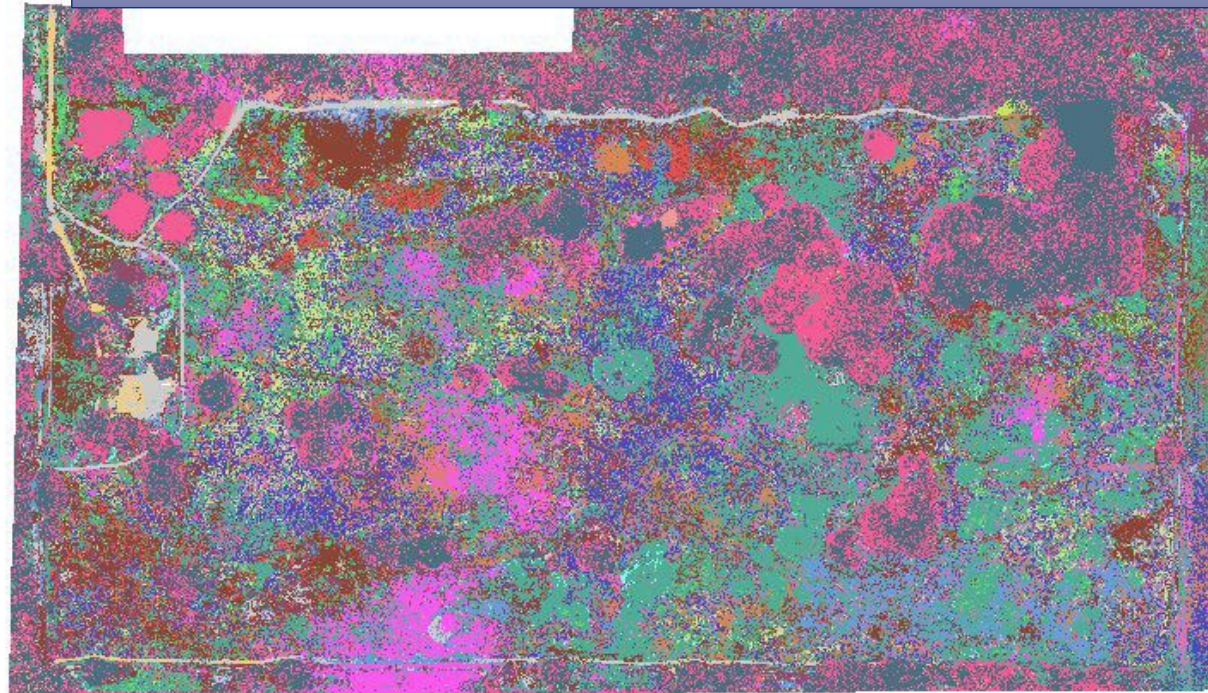


Australian Pine

CDM Smith developed a high accuracy map of native and exotic species using machine learning.

Overall machine learning model accuracy: > 80%

Pixel size = 3 inches

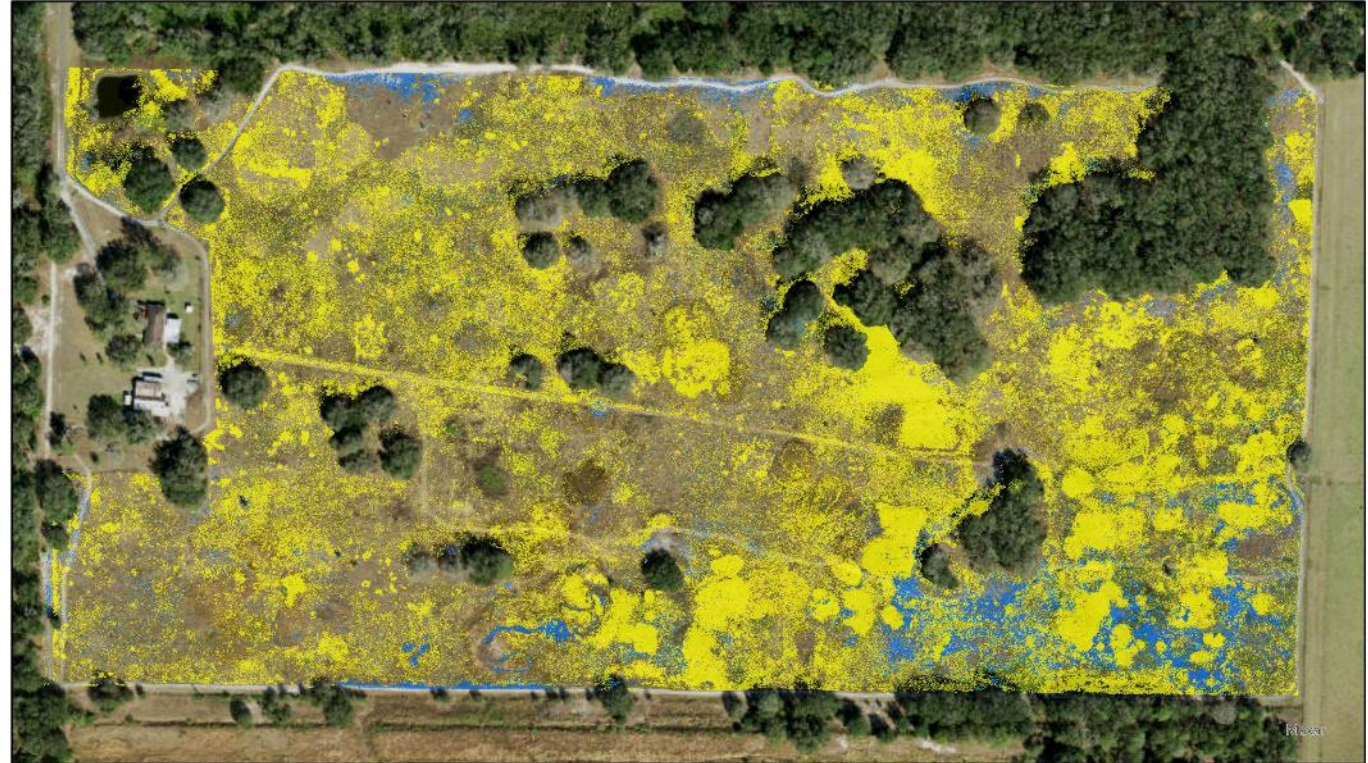


Class	★ cogon	laurel	prax	skunk
★ andro	dog	live	rag	★ smut
★ bahia	★ euka	musc creep	rubus	★ wire
berm	★ guinea	natal	salt	bare1
caesar	hetero	oak	★ sandlive	★ bare2
	jcw	per	★ sawpalm	

★ Exotic/Fire Species

★ Native/Fire Species

Machine learning model results can be used to pinpoint locations of exotic and native fire species.



Exotic/Fire Species

Native/Fire Species

