The Use of UAS's in Natural Resources: It's All About the Question

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Brief Overview of UFUASRP

-In our 15th year of existence

-Natural resource-based applications from the very beginning

-Approach from the natural resource scientist point of view; simplicity of use and budget

-Over last seven years, interest in sUAS for natural resources has grown exponentially

-Truly interdisciplinary research program

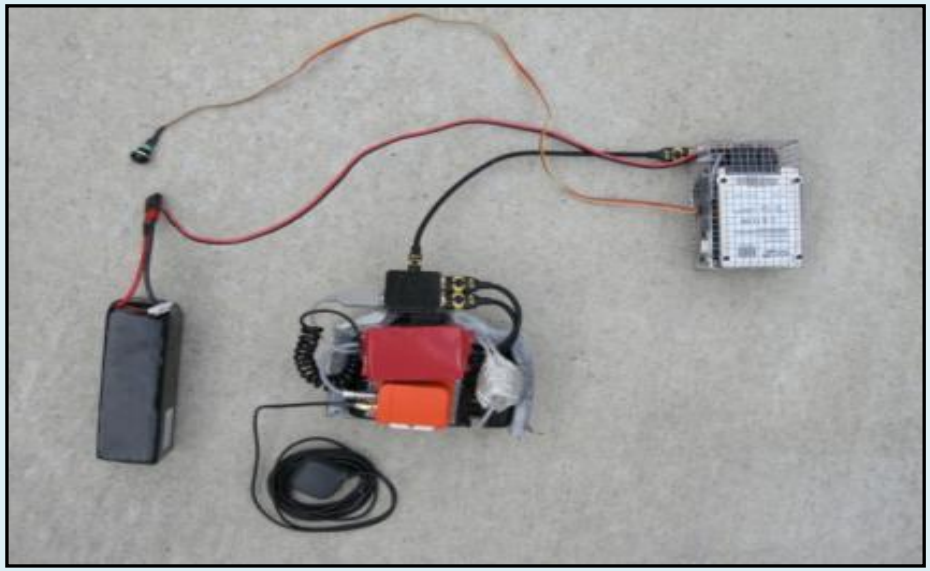
-As of July 1, 2014, we have 14 active FAA Certificates of Authorization; four additional pending

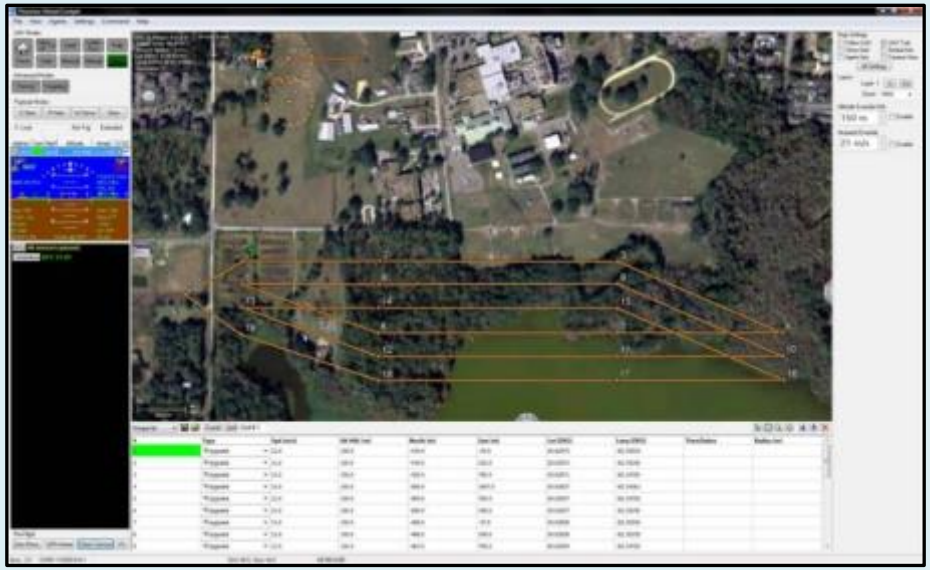
-Always learning and remain on the cutting edge

UFUASRP Airframe Evolution

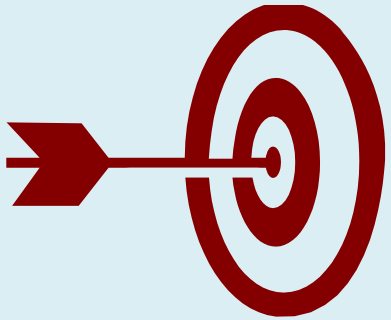
UF Nova 2.1 sUAS

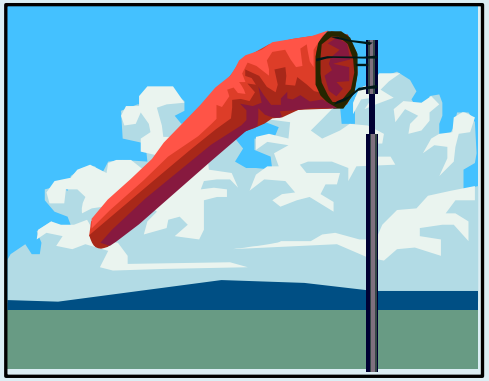
Nova 2.1 – Optical Payload and GCS





It All Starts With the Question





Authorizations/Regulations/Approvals

-Certificate of Authorization

-Aircraft Airworthiness

-Crew Certification

-Local Permission

-Notice to Airmen

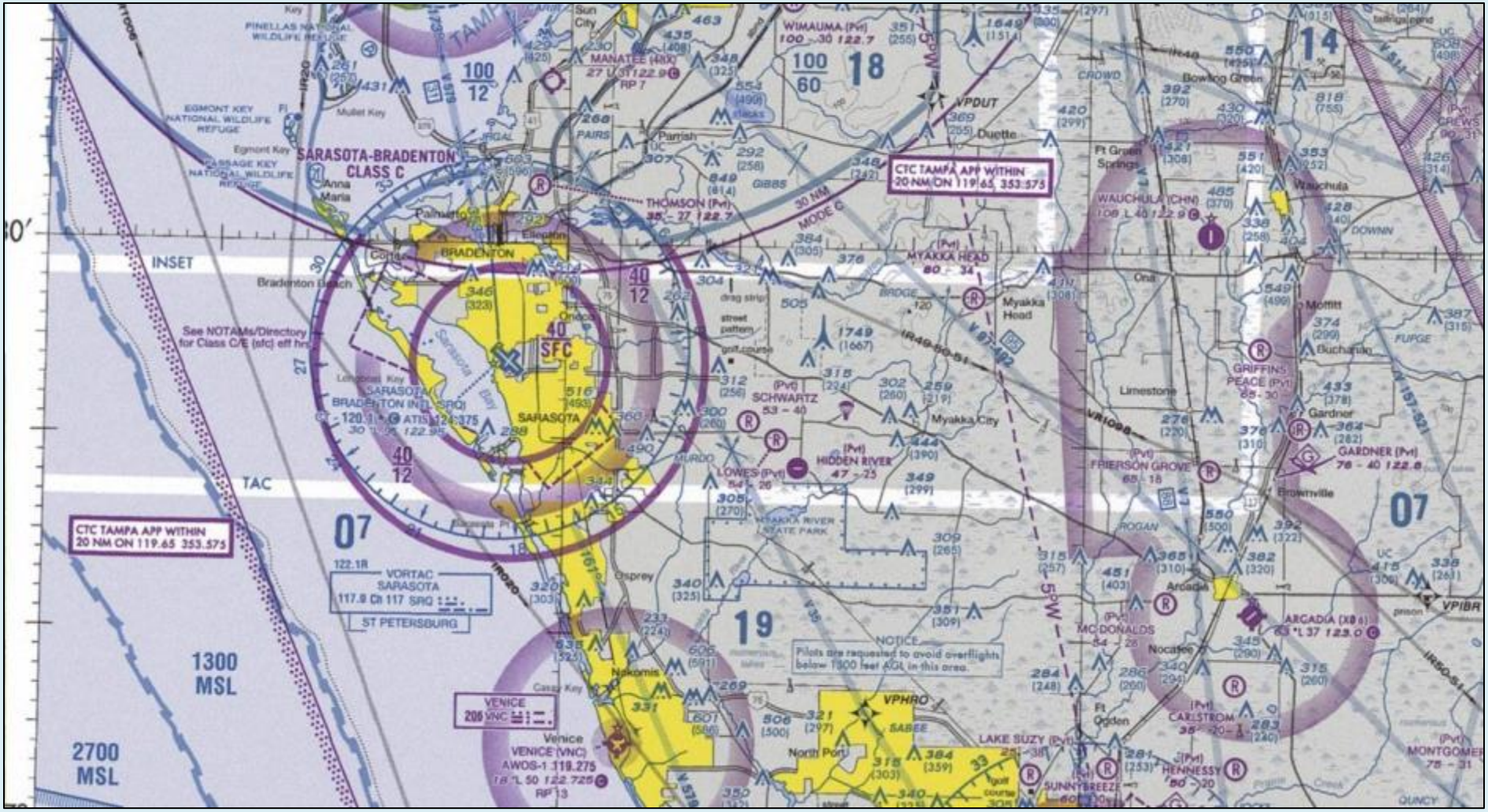
-Flight Restrictions

-Failsafe Approvals

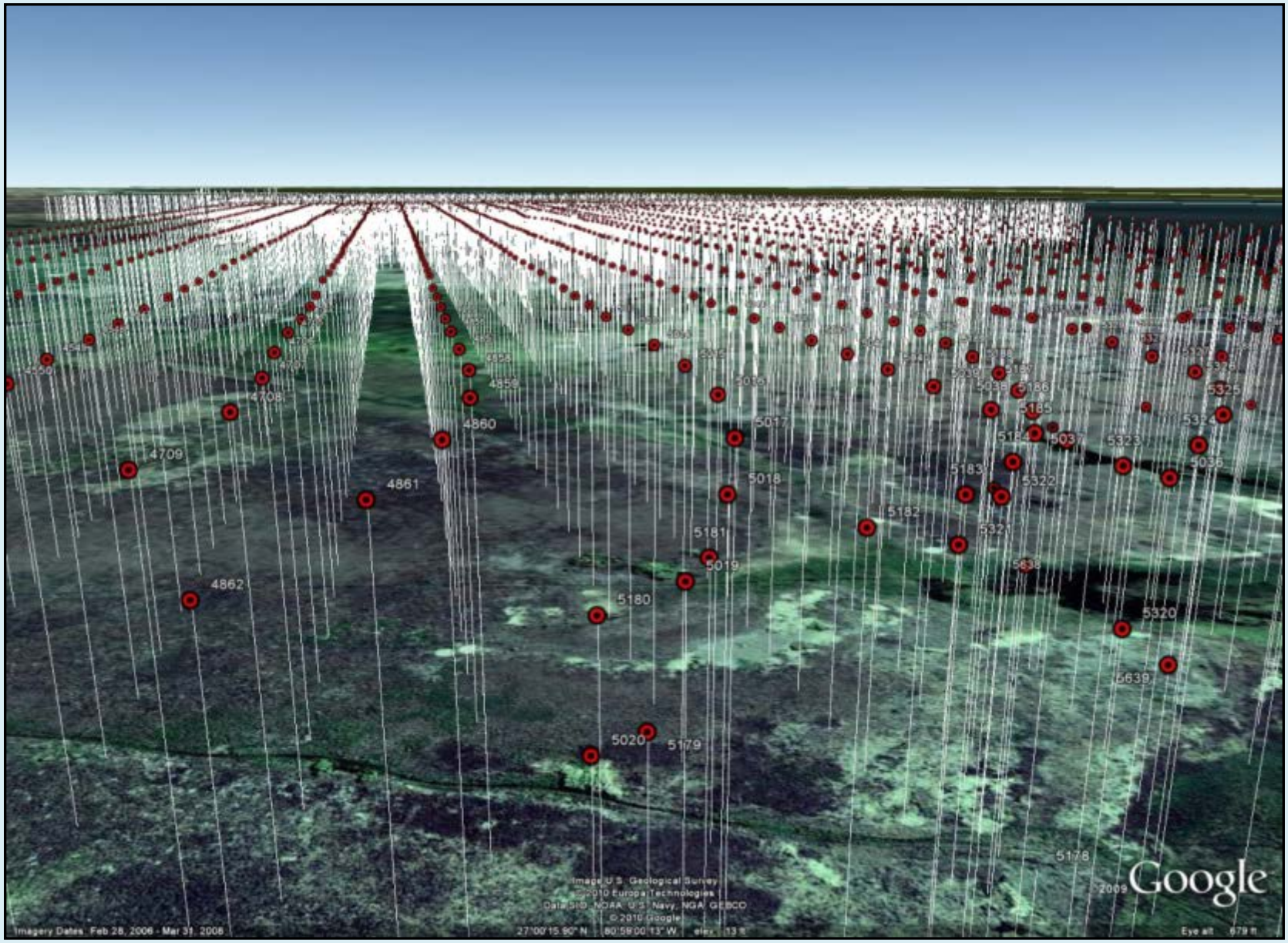
-International Traffic in Arms Regulations

» United States Munitions List

Nova 2.1 – Flight Planning

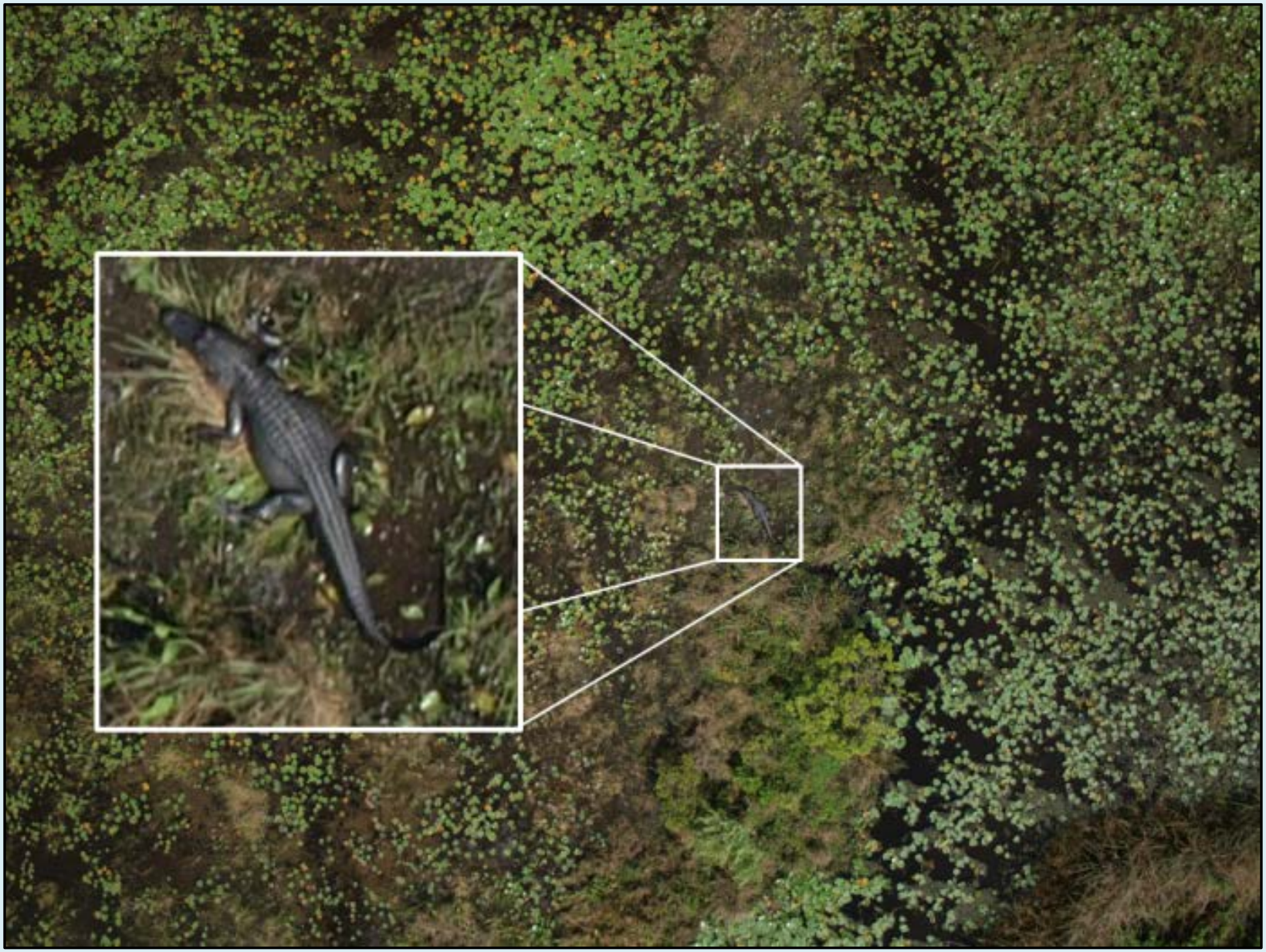


Nova 2.1 – Autopilot Precision



Nova 2.1 – Raw Image

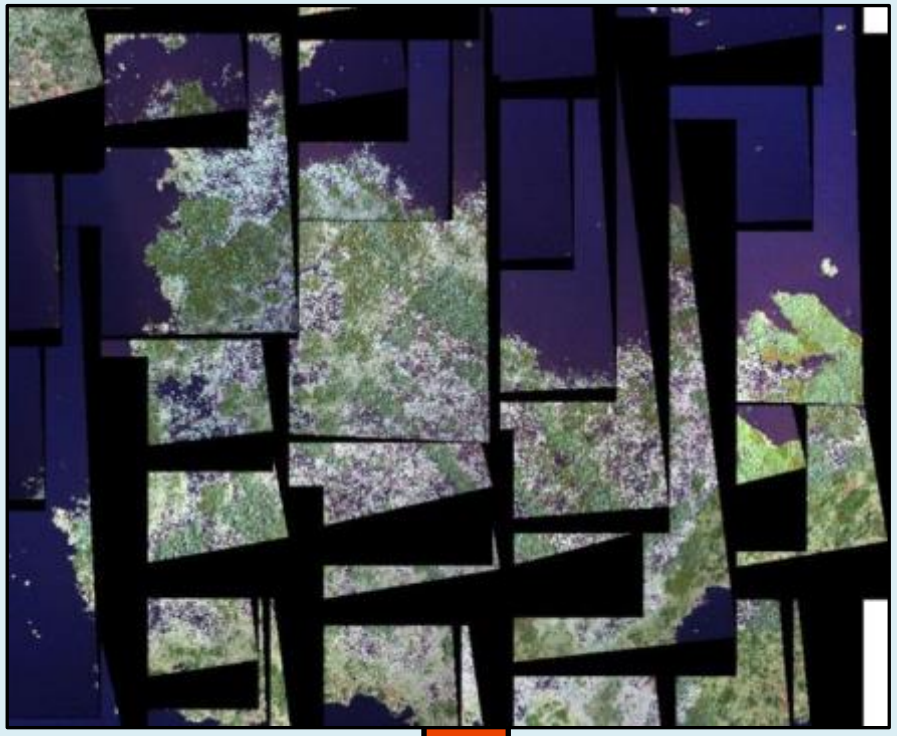
Nova 2.1 – Raw Image



Nova 2.1 – Raw Image

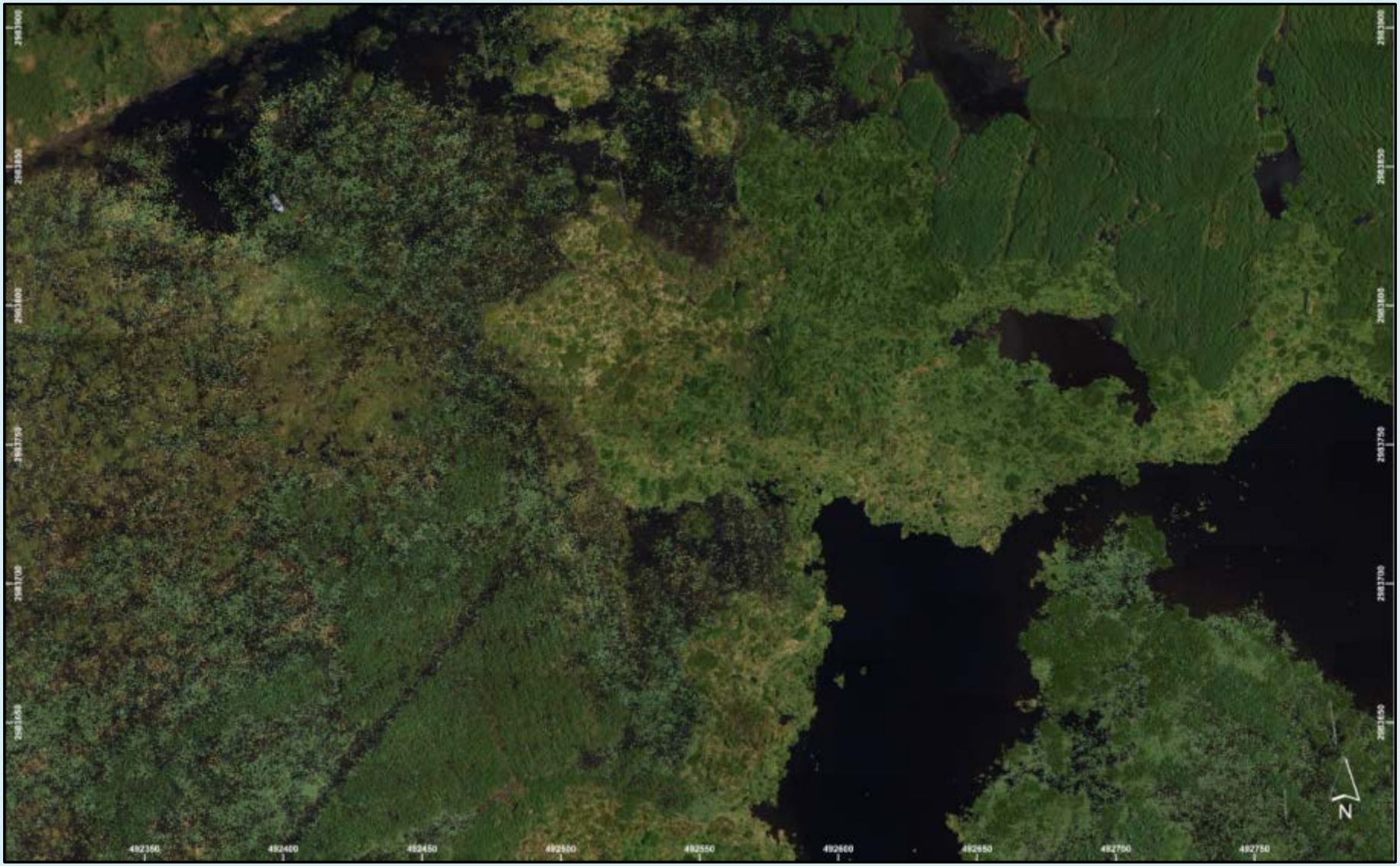
Nova 2.1 – Target Specific Imagery

Nova 2.1 – Image Processing

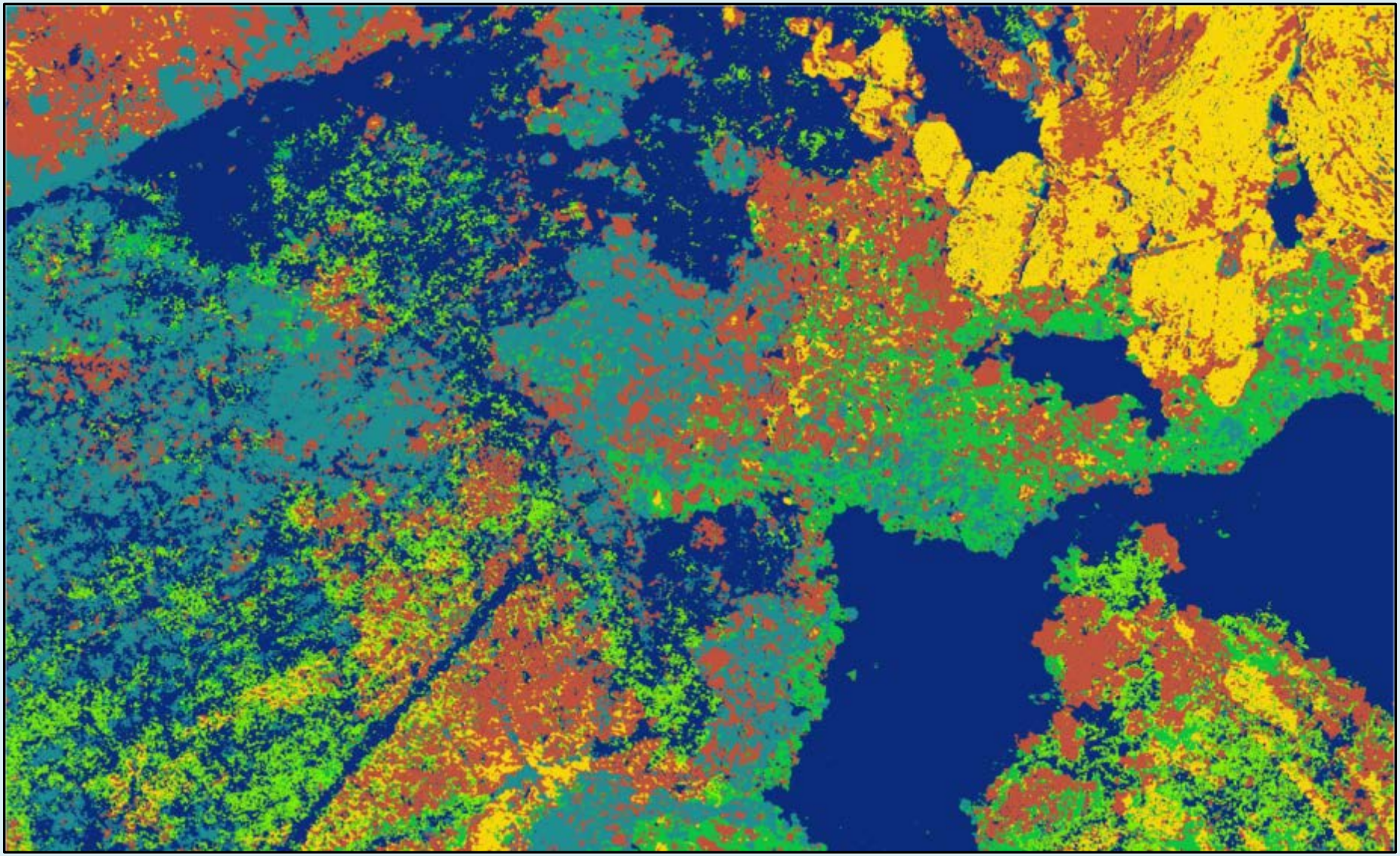


Nova 2.1 – Mosaic

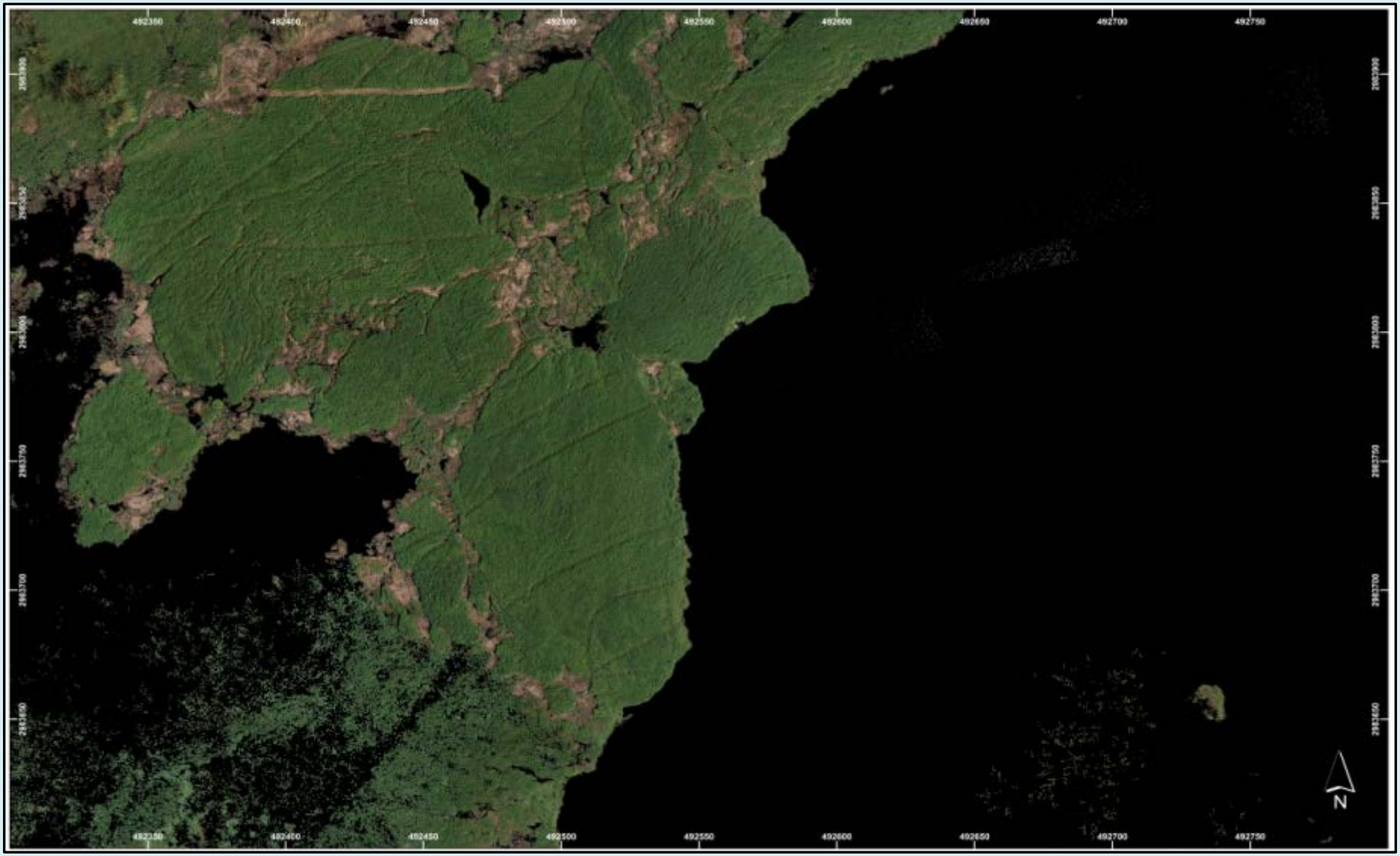
Nova 2.1 – Veg. Pre-treatment Mosaic



Nova 2.1 – Veg. Classified Mosaic



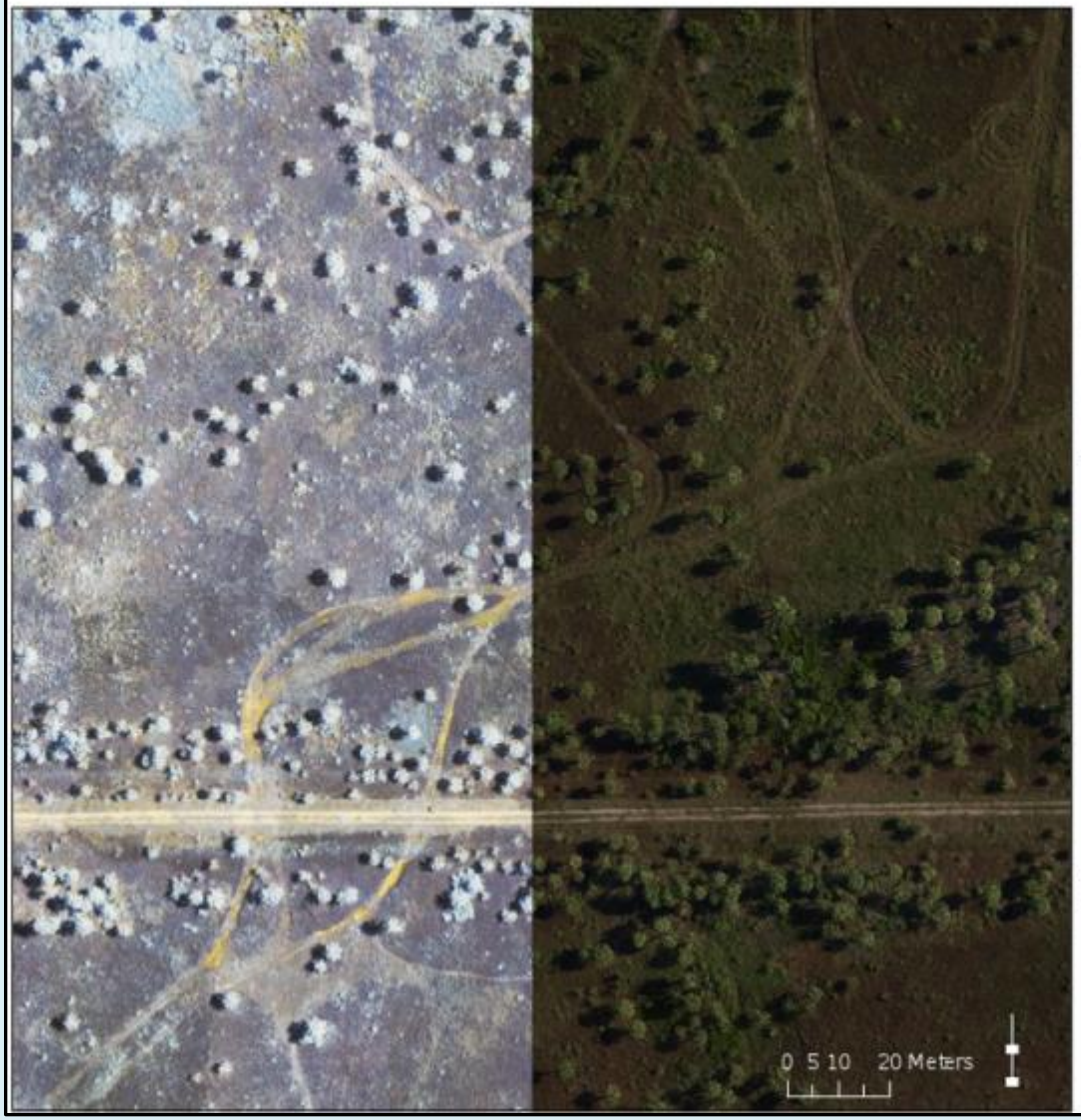
Nova 2.1 - Veg. Post-treatment Mosaic



Nova 2.1 – Multispectral Mosaics

Picayune Strand State Forest

Invasive Vegetation Site



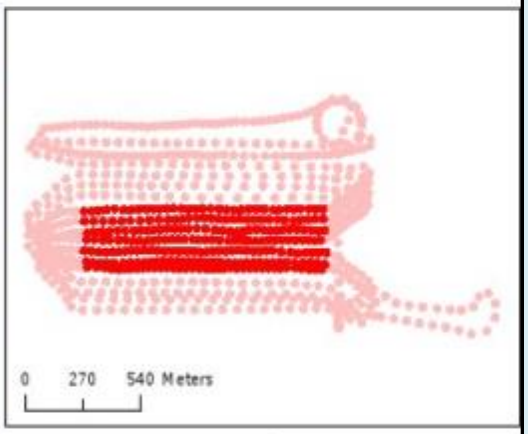
Acquired: July 7th, 2010 at 9:47 AM

Submitted: July 17th, 2010

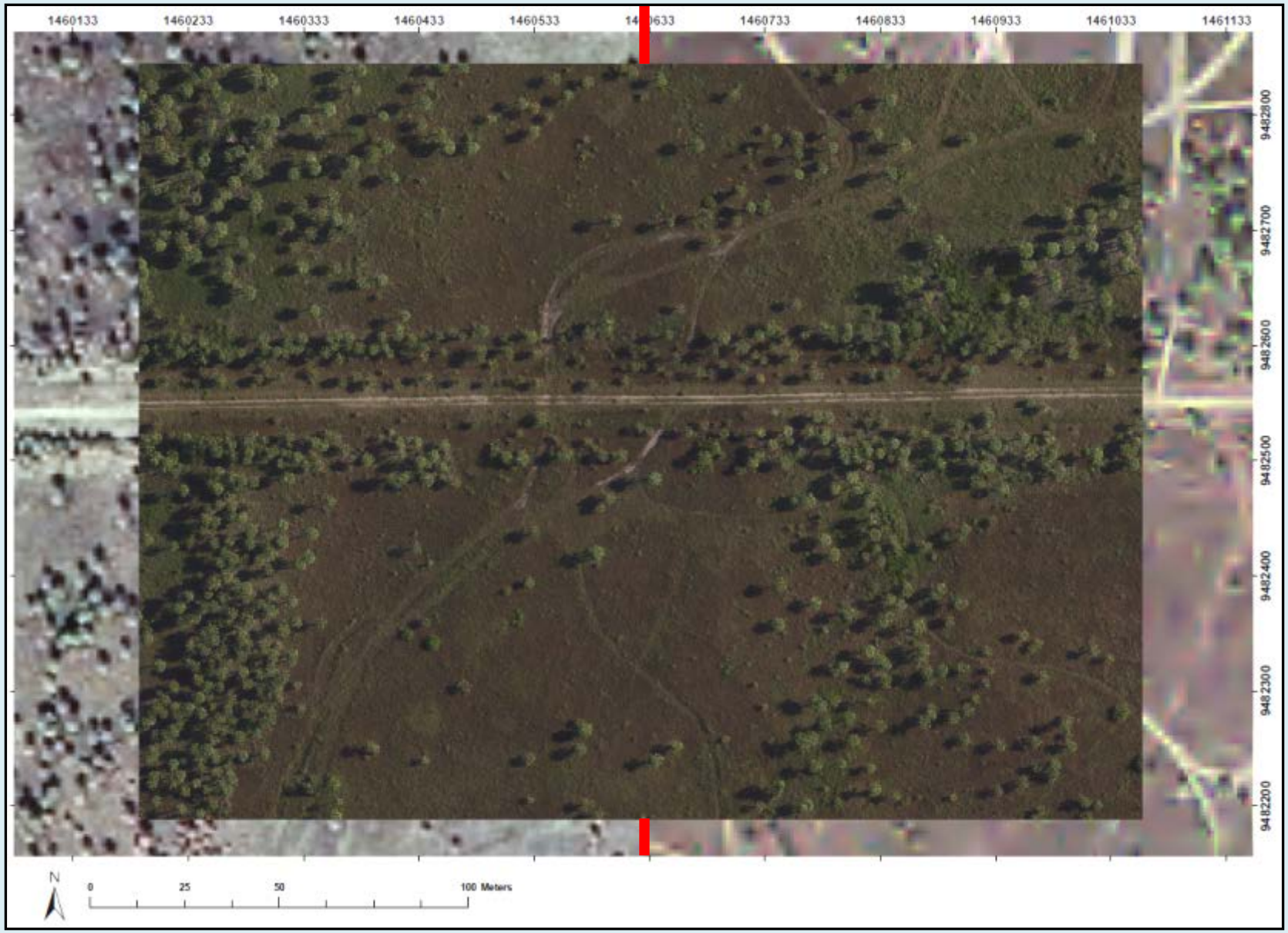
Description:

The 5 cm resolution color infrared (left) and 5 cm visible spectrum (right) orthomosaics are composed from two sets of directly georeferenced high resolution images. The U.S. Army Corp of Engineers, Jacksonville District, and the University of Florida Interdisciplinary UAV Research Group acquired this imagery using a hand-launchable autonomous aerial fixed-wing aircraft. The target area is being managed for invasive species.

The maps below show the location of each camera exposure from the visible imagery flight (top), highlighting the imagery that was included in the mosaic. Each flight was approximately 40 minutes in duration. The overview maps show the location of the target area relative to Picayune Strand State Forest (bottom-left) and Florida (bottom-right).

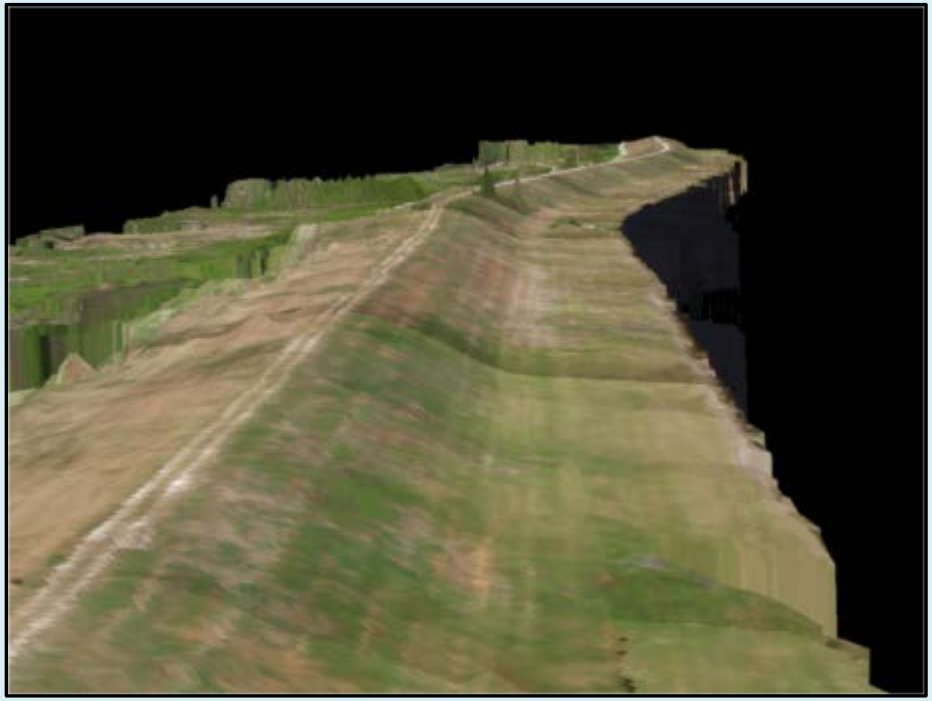


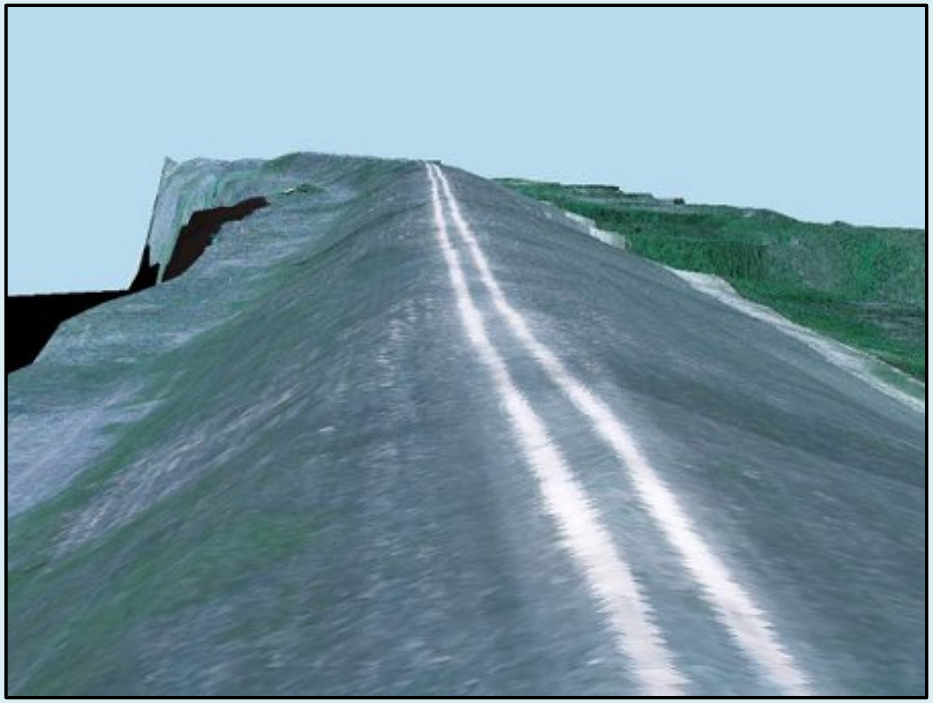
Nova 2.1 vs. Google Earth™/D.O.Q.Q.s



Nova 2.1 vs. Google Earth™

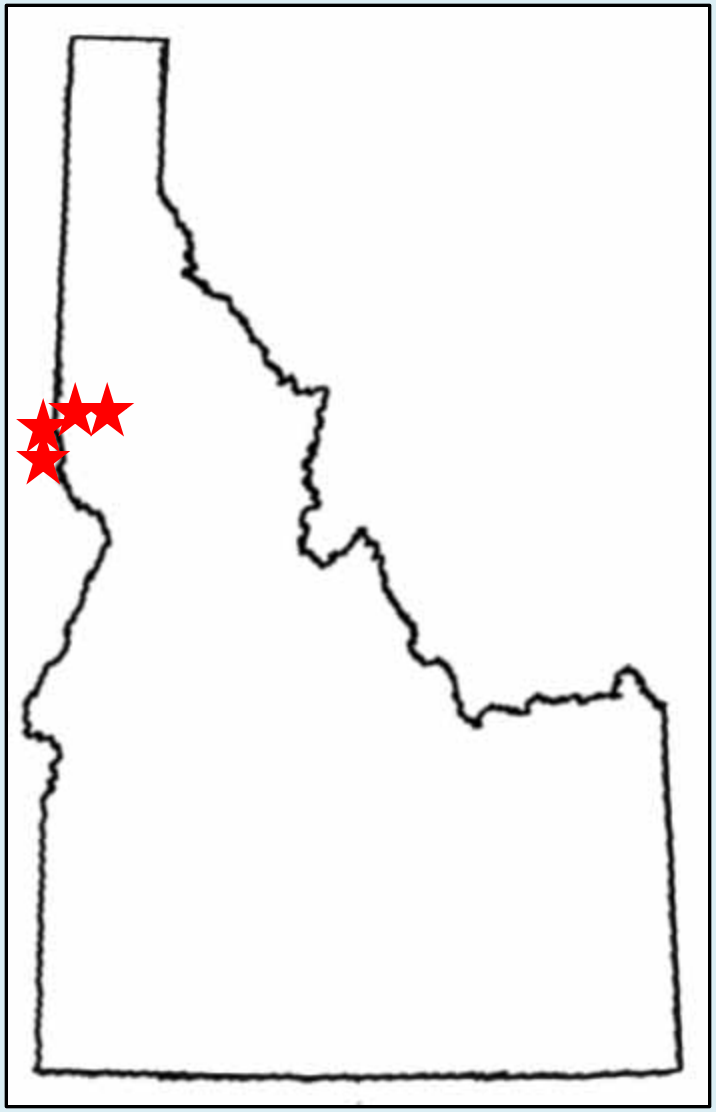
Nova 2.1 – 3-Dimensional Mosaics





Idaho Chinook Salmon Redd Study Sites

Snake River



Clearwater River

Chinook Salmon Redds

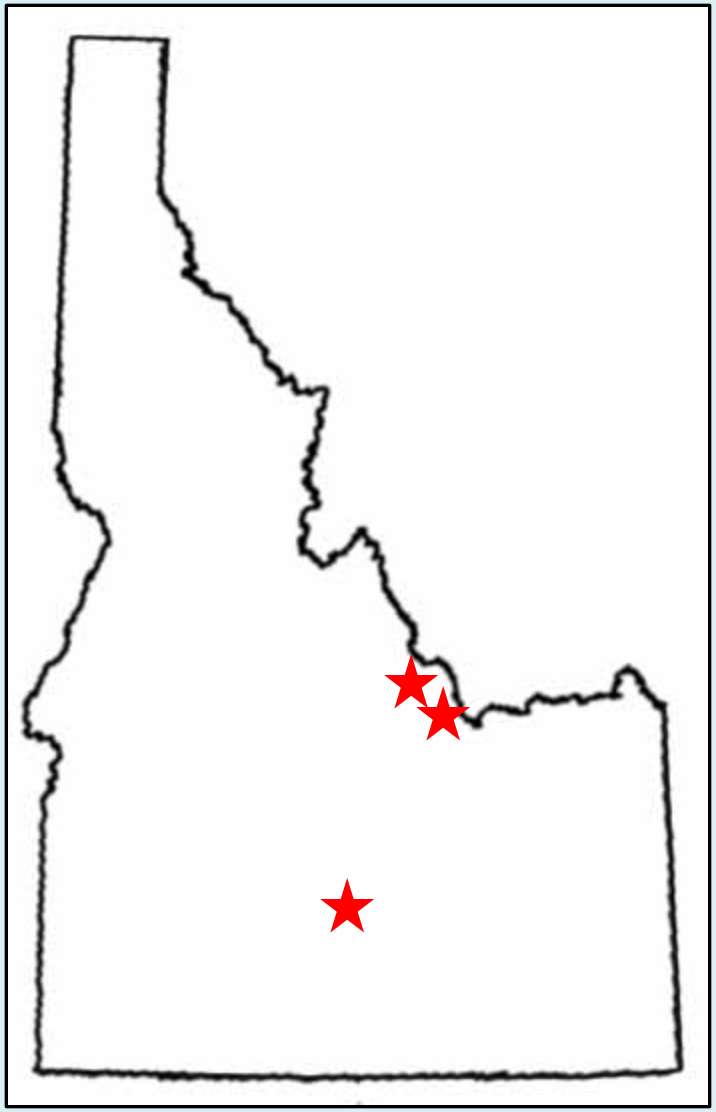
Chinook Salmon Redds

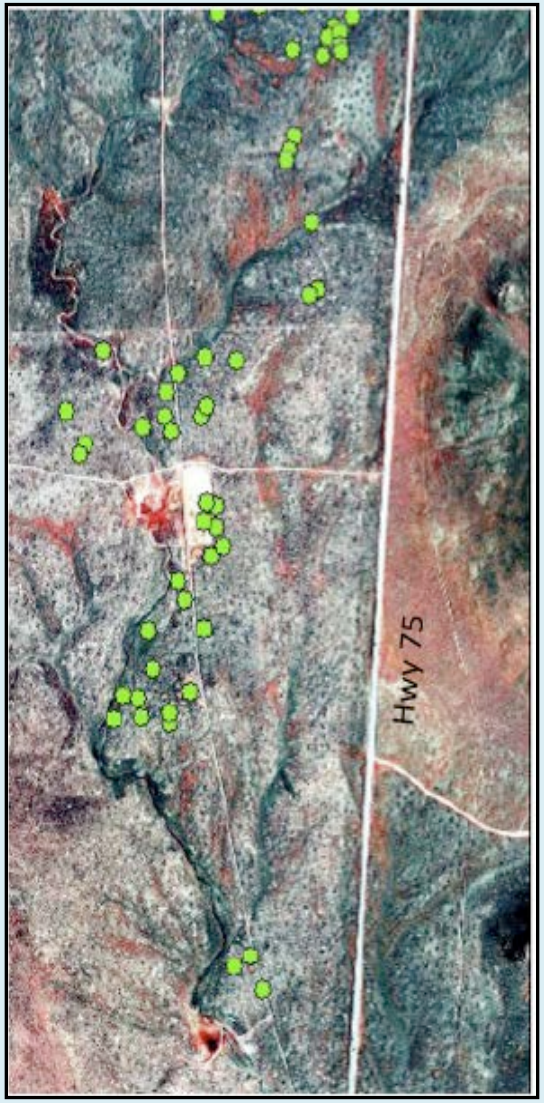
Chinook Salmon Redds

Idaho Pygmy Rabbit Study Sites

Cedar Gulch
Rocky Canyon

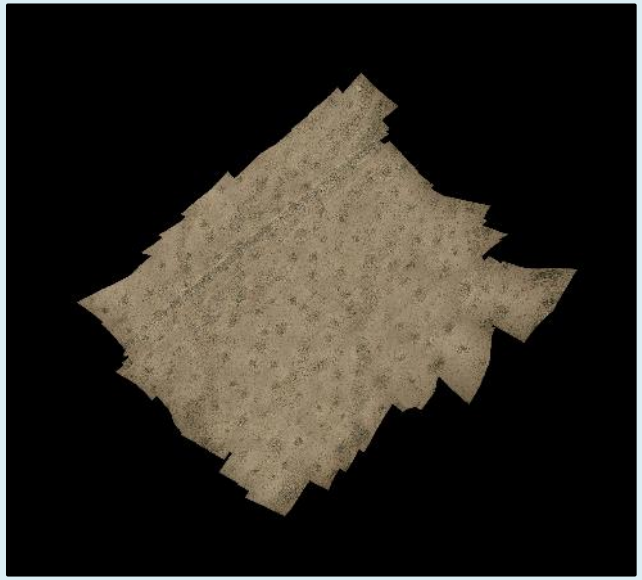
Magic Reservoir

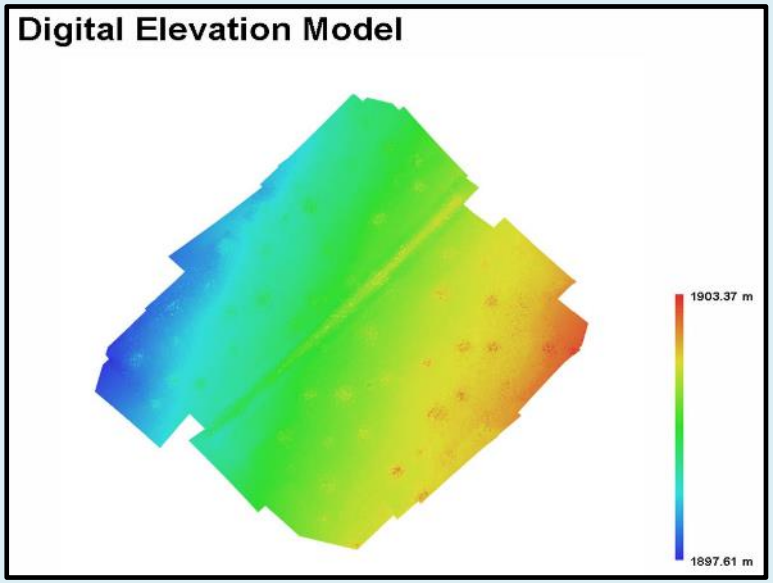




Pygmy Rabbits

Pygmy Rabbit Preferred Habitat





Limited Landing Opportunities

Pygmy Rabbit Tracks

Summer Flight Crew

Winter Flight Crew

Idaho – American White Pelicans

Idaho – American White Pelicans

Naval Air Station Patuxent River – Migratory Waterfowl/B.A.S.H. Threats

Lower Suwannee River and Cedar Keys National Wildlife Refuges

- Brown Pelican Reproduction and Nest Turnover
- Feral Hog Damage Locations and Assessments
- Florida Saltmarsh Vole
- Climate Change Projects

Additional Applications

Sarasota Bay:

-Dolphins, Spotted Eagle Rays, Seagrass

Cape Sable:

-Mangroves, Diamondback Terrapins, Saltwater Crocs

Florida Bay:

-Sawfish, Sea Turtles

Tampa Bay:

-TECO Canal Manatees

North Florida Lakes:

-Round-tailed Muskrats, Vegetation

Central Florida:

- Precision Agriculture

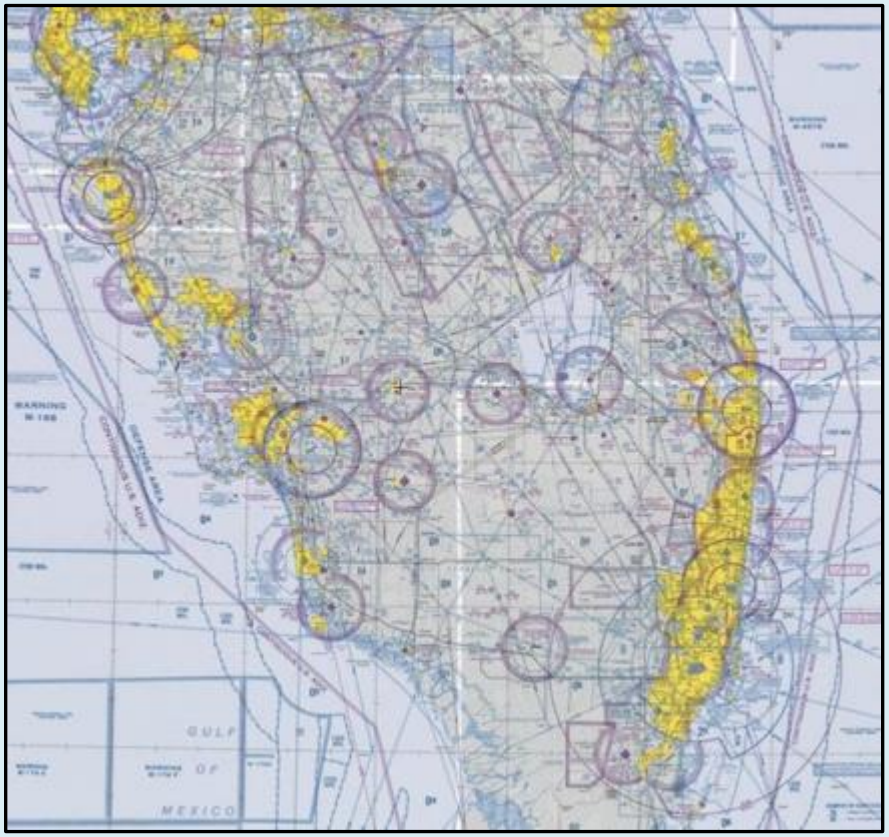
Apalachicola Bay:

-Oysters

Atlantic Coast:

-Anchovies

Payload Options – Manned Aircraft



Archie Carr National Wildlife Refuge – Nesting Sea Turtle Tracks

Archie Carr National Wildlife Refuge – Nesting Sea Turtle Tracks

Payload Options – Manned Aircraft

Brief Summary

-Start with the scientific QUESTION

-Have a plan for collecting statistically-significant DATA

-Have a plan for POST-PROCESSING the data

-Have a plan for ARCHIVING data

-Understand the complexities of working with sUAS

-Conduct operations with ’Due Diligence’

-Be patient and adaptive

UF UAS Research Program

UF UNIVERSITY of FLORIDA

Unmanned Aircraft Systems Research Program

Mr. Matthew A. Burgess, UF WEC/Program Coordinator
Dr. Raymond R. Carthy, UF WEC/Wildlife Lead
Mr. Joseph G. DiRodio, UF WEC/Aircraft Operator
Dr. Peter C. Frederick, UF WEC/Avian Lead
Dr. H. Franklin Percival, UF WEC/Program Director
Mr. Abraham Balmori, UF Aerospace/Airframe Specialist
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USGS science for a changing world

Questions?

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