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# **Grand Bay NERR UAS Operational Assessment**

*Flown by Northern Gulf Institute (NGI)*

***Where? – Dangerous, Dull, Dirty and Denied (Arctic) Missions***

***Why? – Efficient, Effective, Economical, Environmentally Friendly***

***Who? – NGI, NWS (RFC), NOS (NERR), NMFS(USCG)***



# Mission Concept Review



## Executive Summary

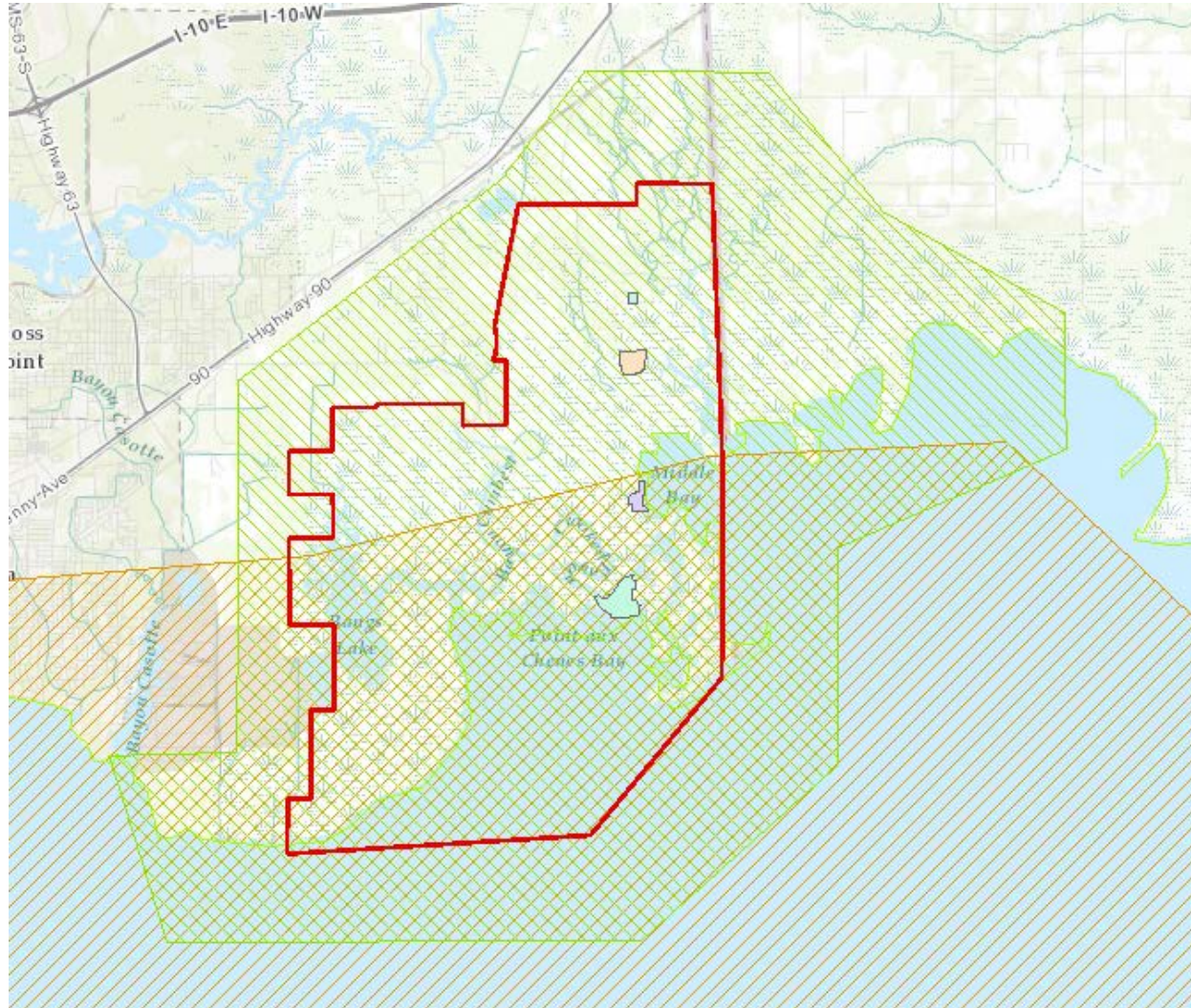
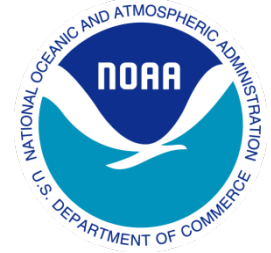
This mission will highlight a multi-agency, multi-mission UAS survey to fulfill observation requirements for the National Weather Services' (NWS) River Forecasting Center (RFC), National Ocean Service (NOS) Grand Bay National Estuaries Research Reserve (NERR) and National Marine Fisheries Service (NMFS) Endangered Species and Turtle Division coordinated through the NOAA UAS Program Office (OAR) and the Northern Gulf Institute (NGI).

## Agenda

- Welcome and Introductions (OAR) - JC Coffey
- Mission overview including Safety and COA brief (NGI) - Robert Moorhead
- River Forecasting Center Requirements (NWS) - Robert Moorhead
- Grand Bay National Estuarine Research Reserve Requirements (NOS) - Lindsay Spurrier
- Marine Mammal and Sea Turtle Conservation (NMFS) - Elizabeth Bevan for Barbara Schroeder
- Wrap-Up - JC Coffey



# Grand Bay NERR





# MISSION CONCEPT REVIEW GRAND BAY NERR SCIENCE GOALS & OBJECTIVES



- Reserve Habitat Map
  - NERRS Classification Scheme
  - Single species for emergent marsh (Sentinel Site)
- Digital Elevation Model
  - Comparison to LiDAR
  - Comparison to GBNERR DEMs
- “Road Map” for NERRS UAS projects



# MFS Sea Turtle Conservation



- The northern Gulf of Mexico (NGOM) is an important foraging habitat for the juvenile and adult sea turtles.
- Sea turtle conservation activities typically involve aerial surveys and in-water boat-based surveys.
- NMFS interested in determining the benefits that UAVs can provide for sea turtle conservation activities
  - Larger survey area
  - Minimal disturbance to wildlife
  - Detection of dead stranded turtles
  - Detection of live turtles

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
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Image Landsat

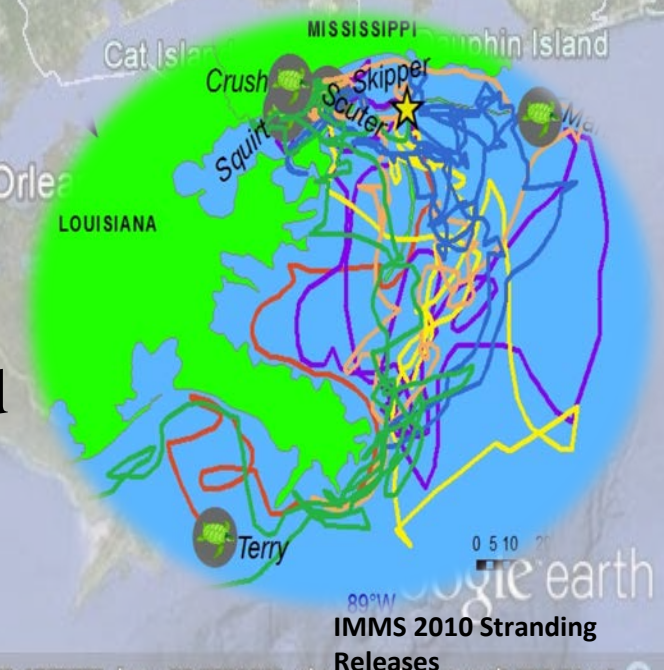




# Mission Goals



- Evaluate the effectiveness of using UAVs for in-water, sea turtle conservation activities in the NGOM region
  - Feasible for observing live and dead turtles?
- Potential to add behavioral component to traditional tracking data
- Develop a model for other ecological studies
- Define parameters for auto-recognition software
- Demonstrate the benefits of collaboration and partnerships for future sea turtle studies



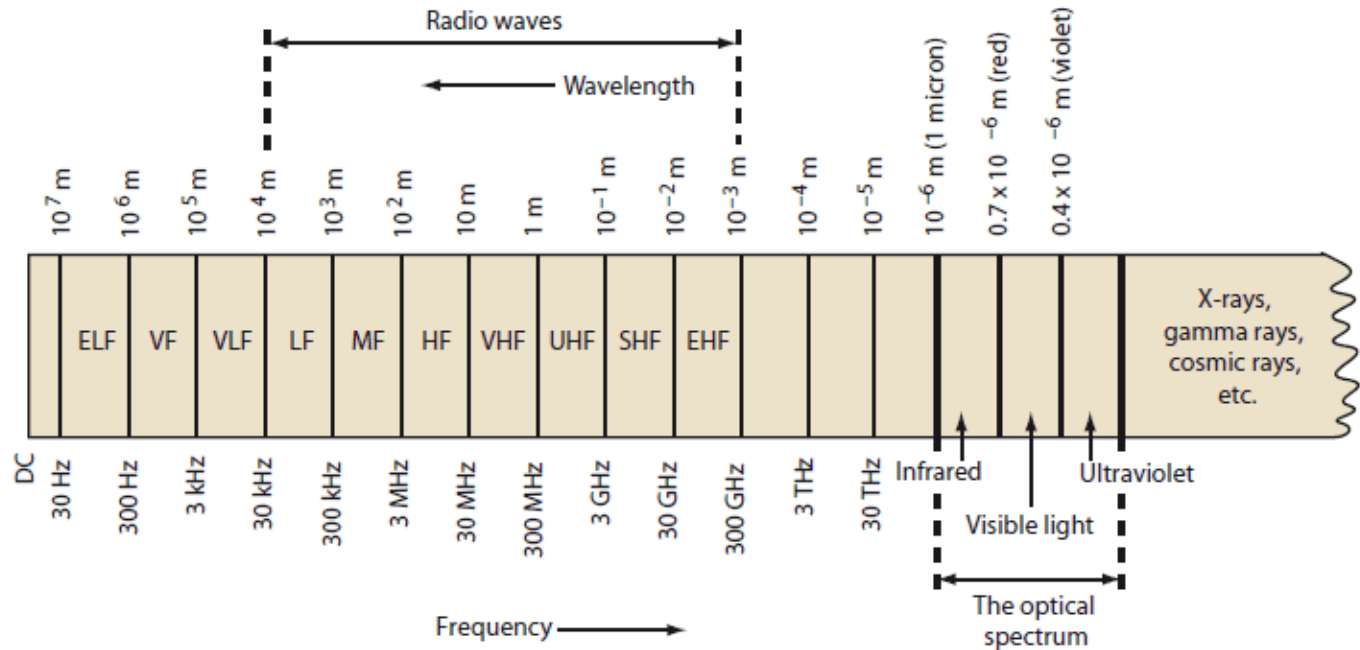
Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
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# River Forecasting Center: Science Goals & Objectives

- No fresh water (river) inflow to GBNERR
- All tidal driven

# Dimensions of interest

- Spatial (x,y,z) – resolution
- Intensity -- contrast
- Spectral



1. The electromagnetic frequency spectrum ranges from dc to light. The lower radio frequencies are designated mainly by frequency. The optical ranges are referred to by wavelength.



# Main CoA components

- Plane
- Place
- Procedures
  - Pilot
  - Operating ceiling
  - Lost comm link procedures
  - Lost GPS signal
  - Lost engine power
  - ...

# Robota Triton ([www.robota.us](http://www.robota.us))

- Flight time: 30 to 60 minutes
- Speed range: 20-35 mph
- Max wind speed: 25 mph
- Weight: 3.0 lbs w/o payload (0.5 lb payloads)
- Wing Span: ~5 ft
- Length: ~3 ft
- 2 cameras
  - visible (20 Mpixel camera, 5472x3648 pixels -> 0.5 inch pixels at 400' AGL in a 225'x150' image)
  - multispectral (2 inch pixels)
- Not waterproof
- ~\$5000 system

# PrecisionHawk Lancaster (precisionhawk.com)

- Weight: 3 lbs (2.2 lb payload capacity)
- Wing Span: 4 ft
- Lots of sensor options
  - Have G,R,NIR payload
- Highly automated system
- Data processing system
- ~\$24,000 system



# Altavian Nova Block 3 ([altavian.com](http://altavian.com))

- Linear Range: 50 miles
- Endurance: 60-90 minutes
- Cruise Speed: 35 mph
- Max Speed: 70 mph
- Altitude: 1200 ft ACL / 5000 ft MSL
- Wing Span: 108 in.
- Length: 67 in.
- Weight: 11 lbs. (15 lbs. MTOW)
- \$42,000 system

# Altavian Nova Block 3 (altavian.com)

- Example Visible Payload
  - 5184x3456 pixels
  - FOV is 21 degree cross-track and 31 degrees along-track
  - Footprint is 300 ft cross-track @ 800 ft AGL
  - GSD is approx. 1.0 in. per pixel cross-track @ 800ft
- Coverage versus Resolution
  - We can cover about a 1 mi<sup>2</sup>/hr with this payload at 800ft





# Proposed Schedule / Flights

- March 6
  - Site survey of Sentinel Sites
    - Determine which UAS based on accessibility to sites, spatial / spectral requirements, etc.
- Week of March 16-20
  - Test detectability and ability to characterize turtle effigies in Pearl River coastal watershed
- Week of March 23-27
  - 1-2 days seeking to meet at least NOS data collection requirements in GBNERR