

Monitoring and Improving Intertidal Oyster Resources in South Carolina Through the Use of Helicopter-Based Aerial Surveying

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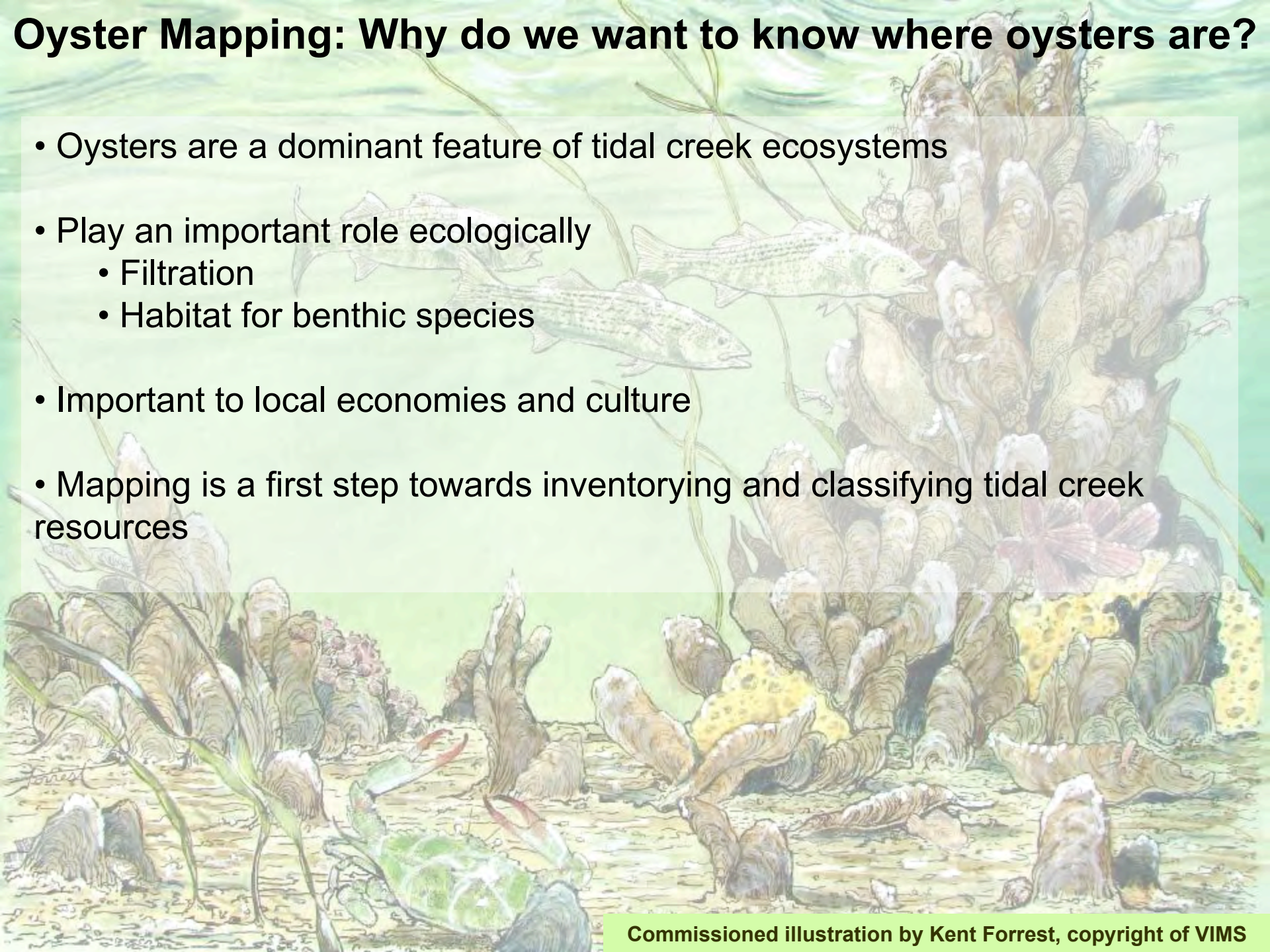
Shellfish Research Section
Marine Resources Division
South Carolina Department of Natural Resources

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Oyster Mapping: Why do we want to know where oysters are?

- Oysters are a dominant feature of tidal creek ecosystems
- Play an important role ecologically
 - Filtration
 - Habitat for benthic species
- Important to local economies and culture
- Mapping is a first step towards inventorying and classifying tidal creek resources



Overview

Mapping Eastern Oyster in South Carolina: Background

- John Battle 1890 - 1891 oyster survey
- 1980's ground-based boat survey
- Recent remote sensing efforts

Current helicopter surveying techniques

- High-resolution imagery acquisition
- Field and lab techniques

Application of data and future efforts

- Implications for shellfish restoration management
- Future focus areas

Mapping *C. virginica* in South Carolina



- Oyster resources in South Carolina are 95% intertidal (Bahr & Lanier, 1981): 2100+ acres (SCDNR) located in fringing reefs and on mud flats
- On-the-ground and aerial surveys are effective for delineating and monitoring most shellfish beds
- Aerial helicopter surveys are especially useful for surveying, as they can be used to capture both fringing and patch reefs located on mud flats

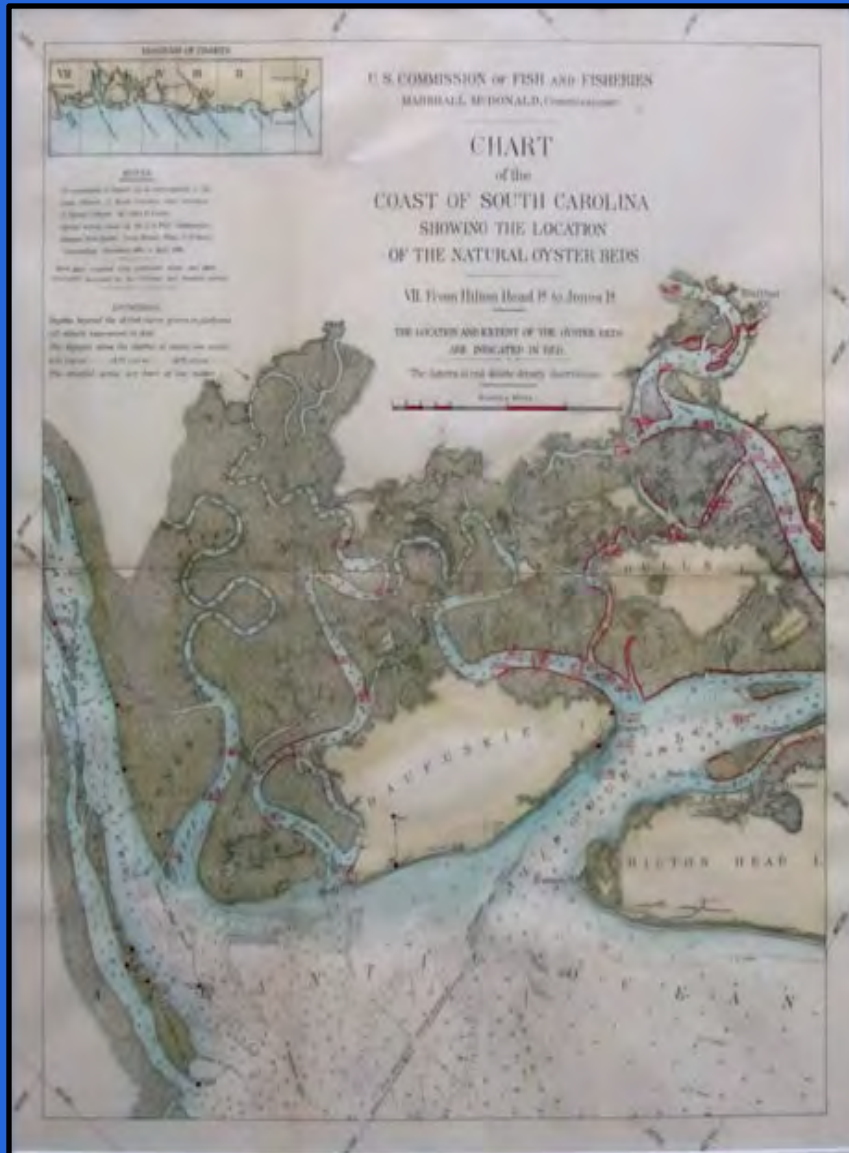
John D. Battle Intertidal Oyster Survey I (1890-1891)

- Fish Hawk – U.S. Navy steamer used by U.S. Fisheries Commission
- Collected hydrographic data and delineated oyster beds
- Locations and lengths of accessible fringing reefs recorded; reefs on mud flats or in smaller tidal creeks not measured
- Acreages totaled over large, pre-determined areas



<http://www.nefsc.noaa.gov/history/ships/fishhawk/fishhawk.html>

John D. Battle Intertidal Oyster Survey I (1890-1891)



SCDNR Intertidal Oyster Survey II (1980's)

- USGS 1:24,000 topographic maps enlarged to 1:12,000 for use in field
- Reefs were hand drawn onto USGS maps using known points as reference for placement of reefs
- Reefs on large mud flats were not individually measured; however, locations and extents of flats were drawn on maps
- Field maps were transferred by hand to Mylar maps, and then to a digital format for use in GIS software

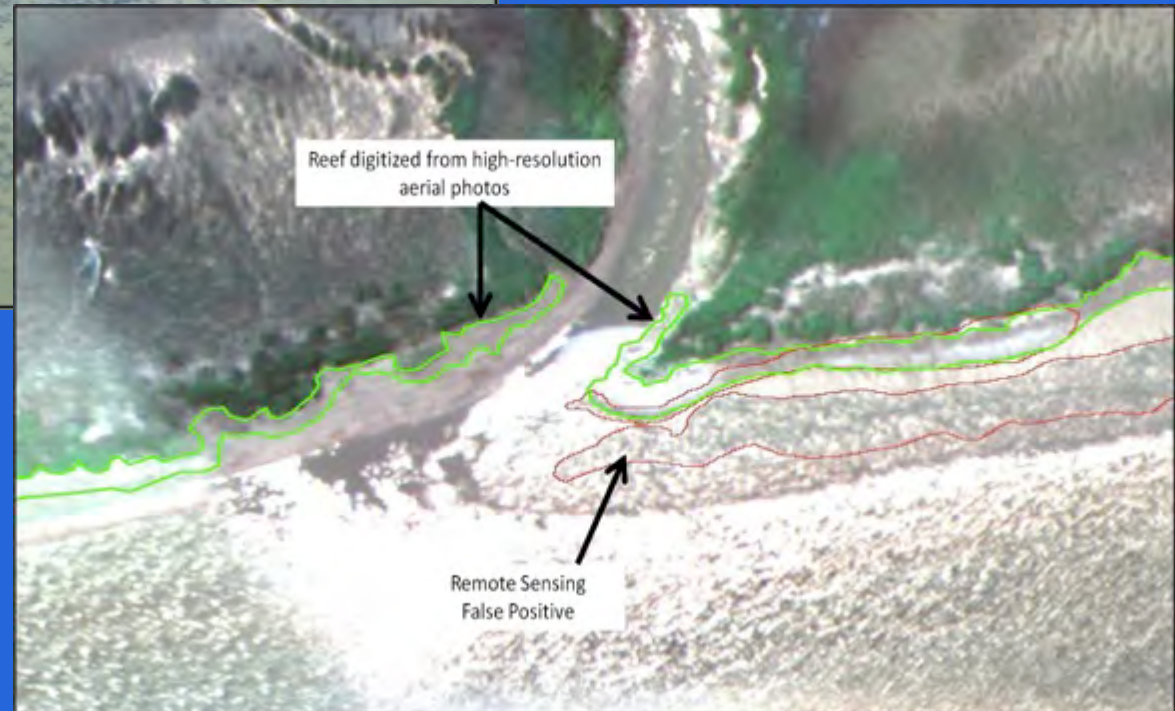


Imagery-Based Surveys – SCDNR (2003 – Present)

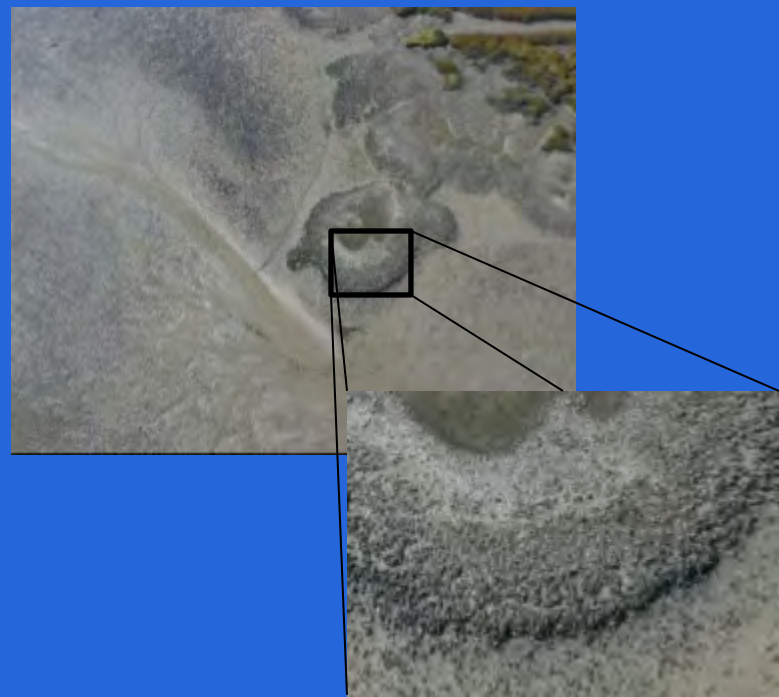
- Geo-rectified, multi-spectral (4-band), $\frac{1}{4}$ m theoretical ground resolution, digital orthophotography was captured for South Carolina's coastal zone (in collaboration with USGS, NOAA Coastal Services Center & Photo Science, Inc.)
- Oyster reefs were delineated using a combination of automated classification techniques (Feature Analyst®) and manual editing
- For areas accessible by boat, the correct designation of the presence or absence of an oyster reef based on the imagery was **> 80% overall**



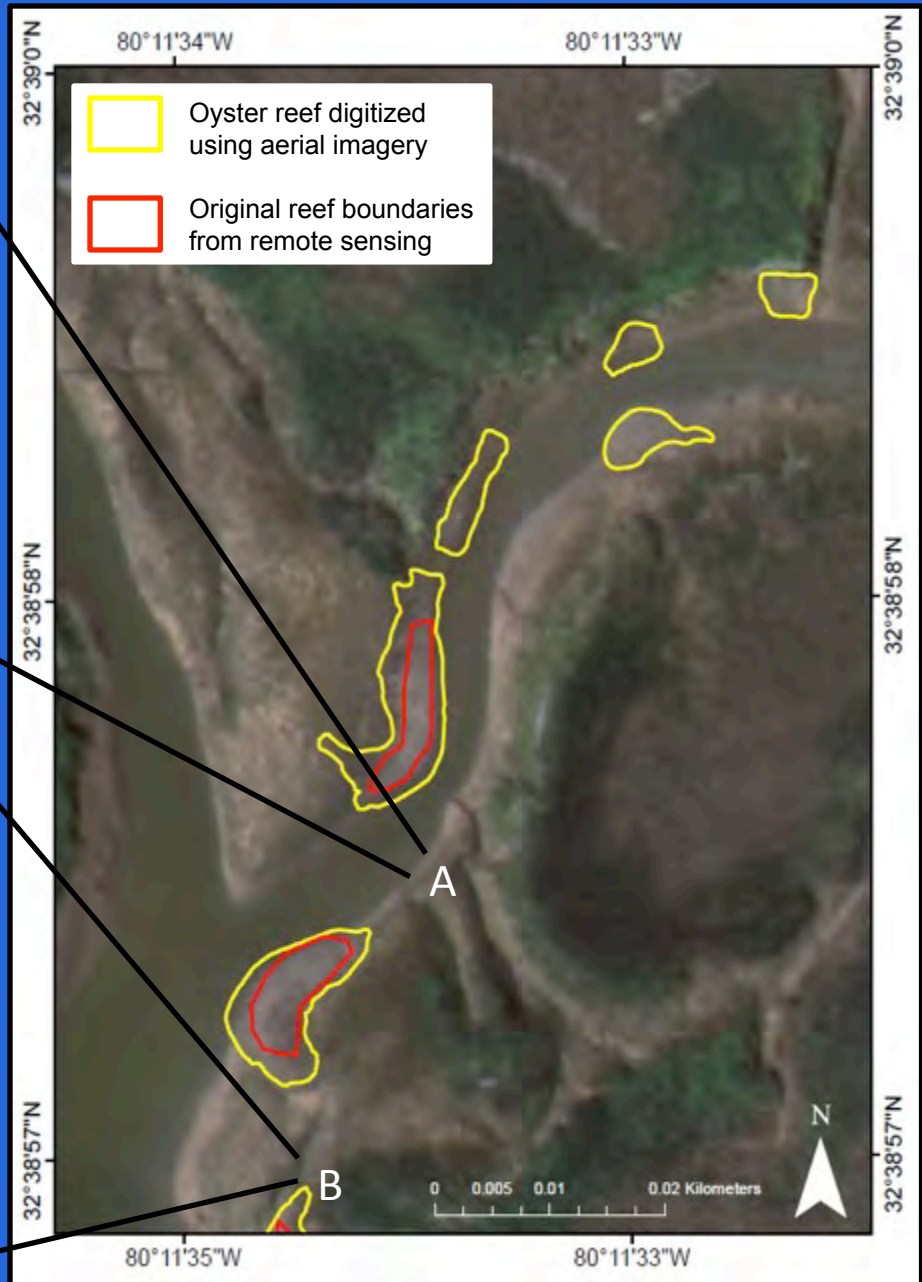
Issues with Remote Sensing Data: False Positives



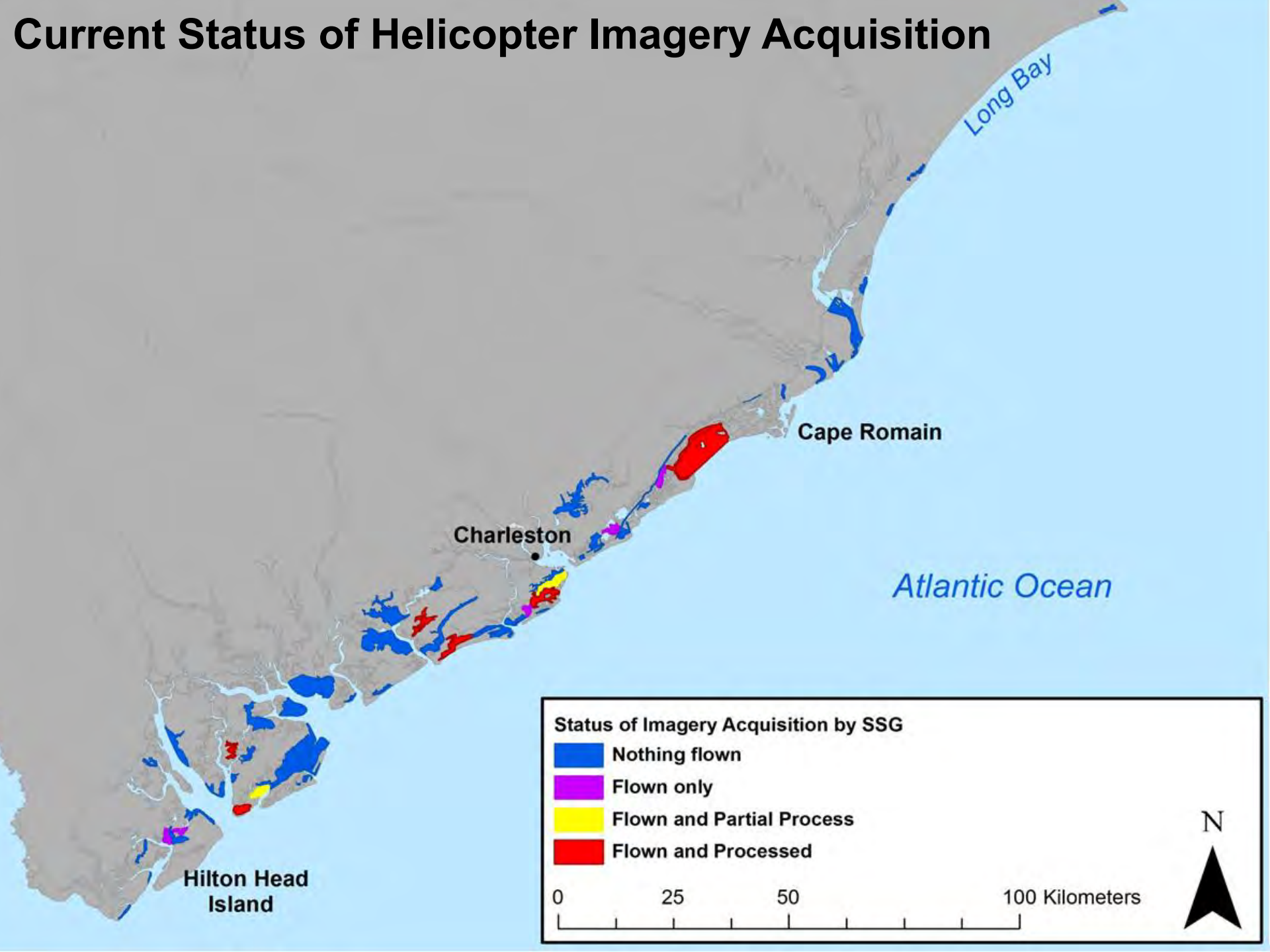
Editing and Expanding on the Digital Oyster Layer



Editing and Expanding on the Digital Oyster Layer



Current Status of Helicopter Imagery Acquisition



Implications for Shellfish Management

- Aerial imagery can be used as a baseline to assess the health of commercially and recreationally – harvested shellfish beds



Implications for Monitoring and Restoration

- Aerial assessments can be used to monitor areas undergoing change, or tidal creeks being impacted by nearby construction or commercial activity
- May also provide insight into restoration activities by illustrating change in distribution of oyster resource over time



Folly River, South Carolina: November 2012

Future Directions

- Continue investing in new remote sensing technologies to better serve mapping needs
- Use aerial imagery to improve oyster database
- Investigate other possibilities for aerial surveying needs



<http://robertreport.files.wordpress.com/2013/05/video-drones-articlelarge.jpg>

Acknowledgements

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Thank you! Questions?

