



**21st
GLOBE
ANNUAL
MEETING**

**COASTAL RESILIENCE
IN URBAN ENVIRONMENTS**

July 30 - August 3, 2017
New Haven, Connecticut
#GLOBE21

THE GLOBE PROGRAM

SPONSORED BY
NASA NSF

SUPPORTED BY
NOAA U.S. DEPT. OF AGRICULTURE

IMPLEMENTED BY
UCAR

HOSTED BY
Southern Connecticut State University

Coastal Resilience

Moderator: Scott Graves

Presenters: David Kozak, Mark Paine, Jim Tait, Rebecca French



Coastal Resilience

Thursday 3 August, 2017 @ 12:45 – 1:45pm

Panel Discussion: Coastal Resilience

Moderator: Scott Graves

*Presenters: David Kozak, Mark Paine,
Rebecca French, Jim Tait*

*– panel questions/discussion points to
include ...*

*The importance of ongoing environmental
monitoring; expanding collaborations on
citizen science, academia and local state
agency stakeholders; and future planning
for coastal resilience – SLAMM modeling
and more. Examples of West Haven City, WH
High School, SCSU ENV classes, SCSU MAR
classes, East Haven City.*





Coastal Resilience

Thursday 3 August, 2017 @ 12:45 – 1:45pm

Panel Discussion: Coastal Resilience

Presenter: David Kozak

Mr. Kozak is a senior coastal planner in CT DEEP's Coastal Management Program. He has counseled coastal municipalities for over 20 years on coastal land conservation and development. Other recent responsibilities include identifying the State's most significant remaining coastal land conservation targets, overseeing Connecticut's coastal public access program and examining the potential response of Connecticut's coastal marshes and shoreline infrastructure to sea level rise. Dave received his Masters in Environmental Studies from the University of Oregon.





Coastal Resilience

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Panel Discussion: Coastal Resilience

Presenter: Mark Paine

Mr. Paine is the Department of Public Works liaison to the Harbor Management Commission, the Inland Wetlands Watercourse Agency and the West Haven Watershed Association. He has also managed the Menunkatuck Audubon Society's osprey platform project. He recently received the Outstanding Municipal Official of the Year award for New Haven County from the Southwest Connecticut Conservation District. Mr. Paine, an alumnus of SCSU, has worked with SCSU faculty including James Tait and Scott Graves on coastal resilience monitoring projects involving SCSU students. He has also worked with local West Haven High School teachers (Kevin Dickson) and students to further study the Cove River estuary.



Presenter: Mark Paine



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Presenter: Mark Paine



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COVE RIVER MARSHES “TREATED” IN 2011

Forty Nine acres are tidal wetlands in the Cove River system and are dominated by phragmites



INVASIVE SPECIES

- Non-native species – those species that are alien to the ecosystem that they have been introduced into, and whose introduction causes or is likely to cause harm to the environment or human health.
- Invasive species - some non-native species exhibit an aggressive growth habit and can out-compete and displace native species, and they are a serious problem in Connecticut and elsewhere.
- CT DEP – works to protect native species and the habitats in which they occur.
 - control & removal
 - assist landowners



ACTIONS / REMEDIATION

- Herbicide treatment:
 - Imazapyr & Glyphosate spraying
- Mulch Mowing:
 - “Marshmaster”
- Spot application of herbicide and weed pulling
- Native marsh grass planing & tending
- Continuous monitoring



EDUCATION / COLLABORATION

- SCSU Undergraduates
 - ENV350 class field studies
- SCSU Graduates
 - SCE575 class field studies
- WHHS Biology / Environmental Science
 - class field studies



Presenter: Jim Tait



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Presenter: Jim Tait

Dr. Tait received a Ph.D. in Earth Sciences, with a specialty in coastal oceanography, from the University of California at Santa Cruz. His current research focuses on the coastal impacts of large storms such as Irene and Sandy. He is co-founder and co-coordinator of the Werth Center for Coastal and Marine Studies at SCSU. He has worked with coastal communities to develop resilience in the face of rising sea level and storm intensification. One of his most cherished accomplishments is being included in the surfing movie *Beyond Monster Mavericks*.

Werth Center for Coastal and Marine Studies



Kaelyn Phillips



Lara Croft

Hurricane Impacts on the Connecticut Coast



Presenter: Jim Tait



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Coastal Resilience

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Working with fellow faculty and students on detailed beach and inland transects - surveying with Total Station.



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Presenter: Jim Tait



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Coastal Resilience

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CT Shore Profile Locations

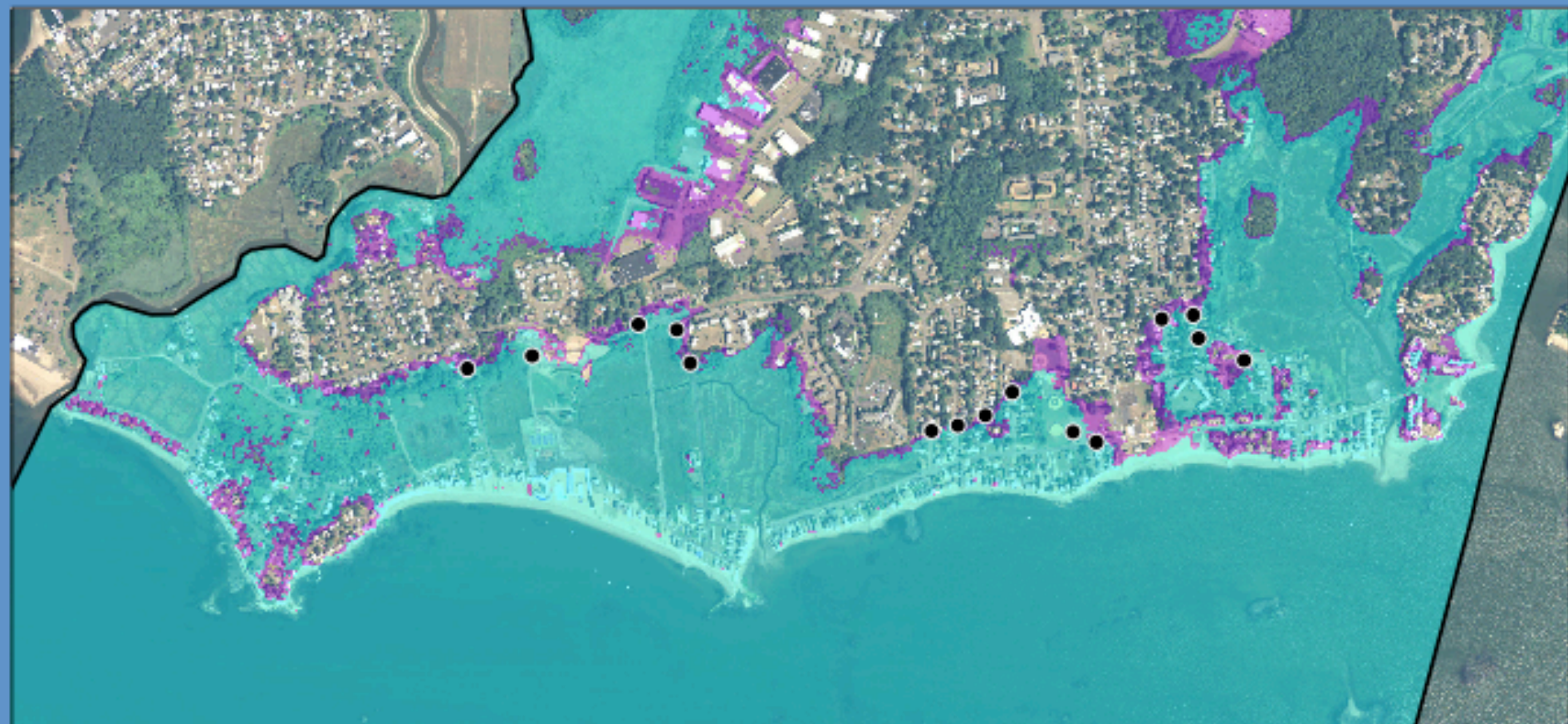
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Coastal Resilience

Thursday 3 August, 2017 @ 12:45 – 1:45pm

Superstorm Sandy's Peak Storm Surge in East Haven, Connecticut:
What if it occurred after high tide instead of low tide?



0 0.1 0.2 0.4 0.6 0.8 Miles

Sandy's peak storm surge arrived in East Haven, Connecticut at 9:36 p.m., October 29, 2012 at 8.93 feet. Due to the storm turning west, sending the eye into New Jersey, as well as an accelerated forward speed to approximately 45 km/h, peak storm surge arrived two hours after a spring low tide. Had it not been for this acceleration, peak storm surge would have occurred nearer to a spring high tide. This map is a depiction such a storm surge (12 feet) versus the actual storm surge that occurred (8.93 feet) relative to MSL.

This map was created by Michelle Ritchie, March 2nd, 2015.
Data were collected by James Tait, Michelle Ritchie, Alyssa Krinsky, and Ezgi Ferrand in November 2012.
Imagery: 2010 Multispectral Orthophotography, U.S. Geological Survey, (Uconn and CT DEEP)

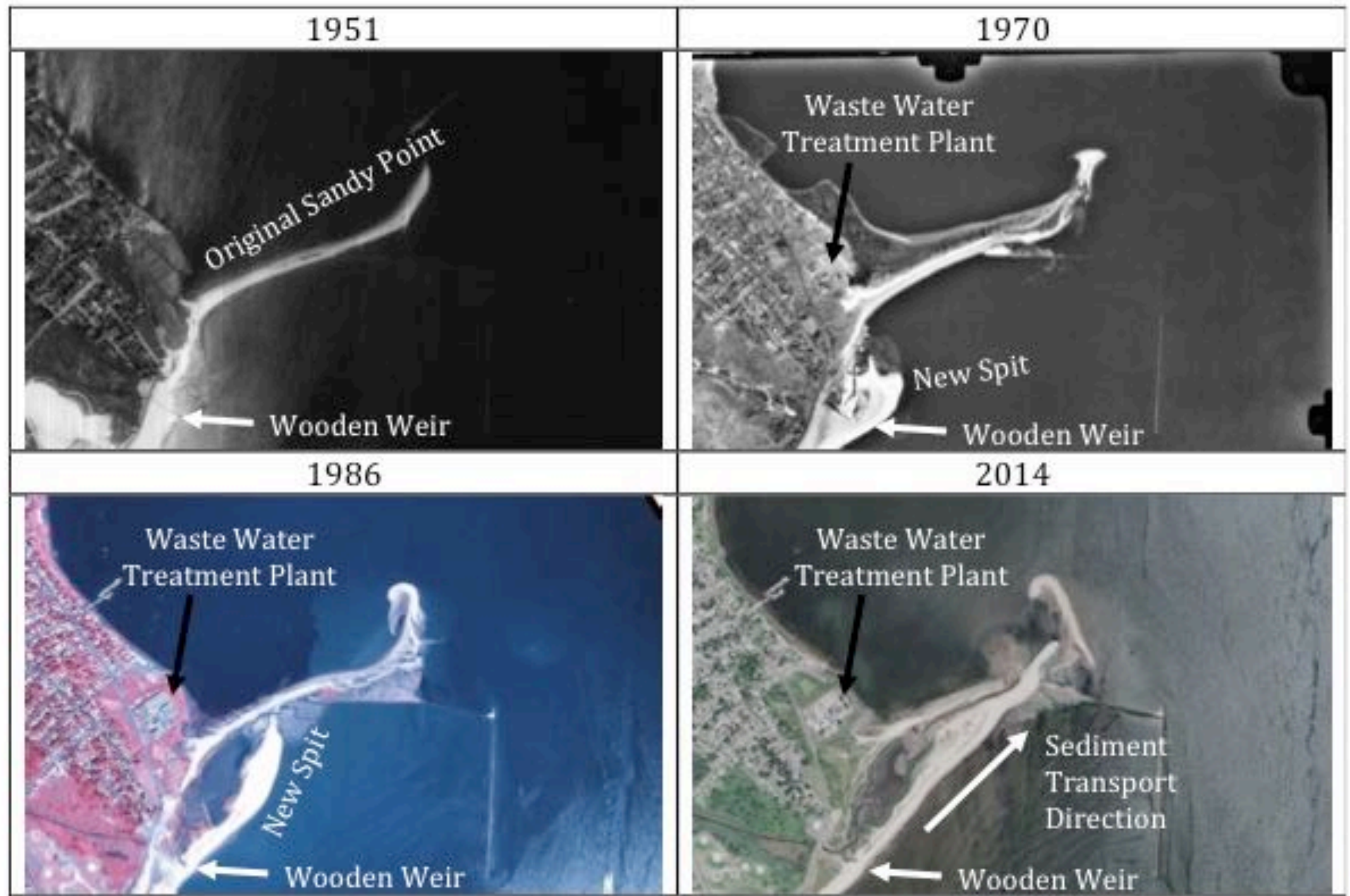
East Haven Town Boundary
● Points of Known Flood Reach
Sandy's Peak Storm Surge
Actual (8.93 feet)
Predicted (12 feet)



Coastal Resilience

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West Haven Along-shore sediment transport.





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Presenter: Jim Tait



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Panel Discussion: Coastal Resilience

Presenter: Rebecca French

Dr. French is the Director of Community Engagement for the Connecticut Institute for Resilience and Climate Adaptation (CIRCA). In this role, she develops relationships with community leaders in at risk communities, state policy makers and relevant state, local and regional organizations to translate the research products of CIRCA faculty and staff into usable information for these stakeholders and to solicit their input into the work of the Institute.

Previously Dr. French was a AAAS Science & Technology Policy Fellow with the U.S. Environmental Protection Agency in the Office of Research and Development on the staff of the Chief Innovation Officer. She led initiatives on using innovative tools from crowdsourcing and citizen science to ideation to prizes to address the impacts of climate change and to improve air quality in communities. Dr. French also spent a year in Congress as a Congressional Science Fellow, sponsored by the American Geophysical Union, in the Office of US Senator Bernie Sanders (I-VT). She served as a policy advisor to the Senator in the areas of energy, environment, and agriculture.



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What can citizen science do for coastal resilience?

- Can it deliver more of the science needed for sustainable natural resource management and environmental protection?
- Can it foster more public input and engagement in natural resource management and environmental protection and decision-making?

ISSUES IN ECOLOGY

Published by the Ecological Society of America

Investing in Citizen Science Can Improve Natural Resource Management and Environmental Protection

Duncan C. McKinley, Abraham J. Miller-Rushing, Heidi L. Ballard, Rick Bonney, Hutch Brown,
Daniel M. Evans, Rebecca A. French, Julia K. Parrish, Tina B. Phillips, Sean F. Ryan, Lea A. Shanley,
Jennifer L. Shirk, Kristine F. Stepenuck, Jake F. Weltzin, Andrea Wiggins, Owen D. Boyle,
Russell D. Briggs, Stuart F. Chapin III, David A. Hewitt, Peter W. Preuss, and Michael A. Soukup



Fall 2015

esa

Report Number 19

UConn

IRCA
and Climate Adaptation



Citizen science for science: climate and climate impacts

- Citizen science can often operate at greater geographic scales and over longer periods of time than conventional science—and sometimes at greater resolutions



UConn



Citizen science for science: monitoring coastal resilience

- Citizen science can speed up and improve field detection

2017 Volunteer Shorebird Monitoring Orientation

Saturday, March 04, 2017
9:00am - 12:00pm
Stratford, Connecticut



Photo: Ned Gerard/ Hearst Connecticut Media

Citizen science for public input and engagement in decision-making **for coastal resilience**

- Citizen science can answer local community questions of concern
- Citizen science can incorporate local and traditional knowledge





Coastal Resilience

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Moderator: Scott Graves

The importance of ongoing environmental monitoring; the value of Citizen Science and GLOBE; How local GLOBE students can connect their data collection to the needs of a local stakeholder/municipality. Examples of Cove River, West Haven City, WH High School, SCSU ENV classes.



Presenter: Scott Graves

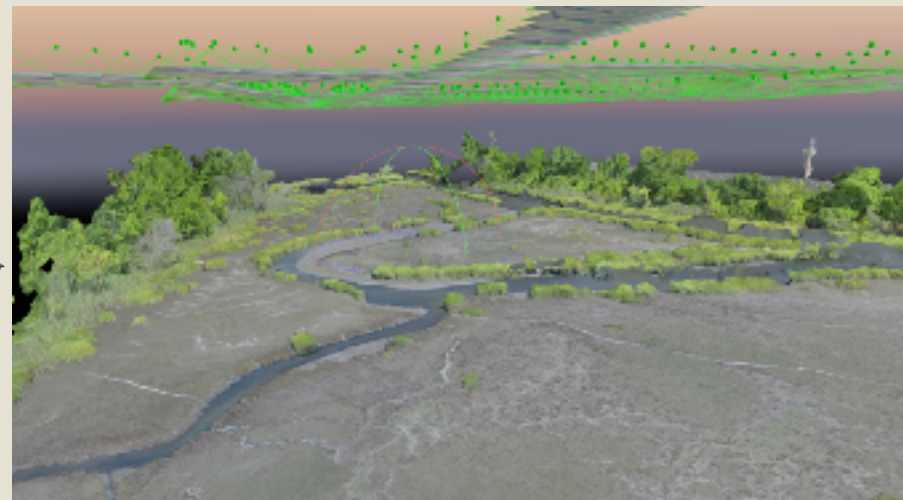


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Coastal Resilience

Osprey's View of Coastal Resilience in Urban Environments μ UAS: New Tools for Monitoring Coastal Resilience

Structure from Motion (SfM): software applications for Ecological Mapping with μ UAS/drones



Pix4D
mapper
processed with
Pix4D Mapper Pro

Pix4D map/model rendering with μ UAS flight path and camera locations above terrain



*μ UAS Piloting
Peter Broadbridge**



Ground Station App for Mission Planning

*Dr. Scott M. Graves, Associate Professor
Department of the Environment, Geography and Marine Sciences
Southern Connecticut State University*

Presenter: Scott Graves



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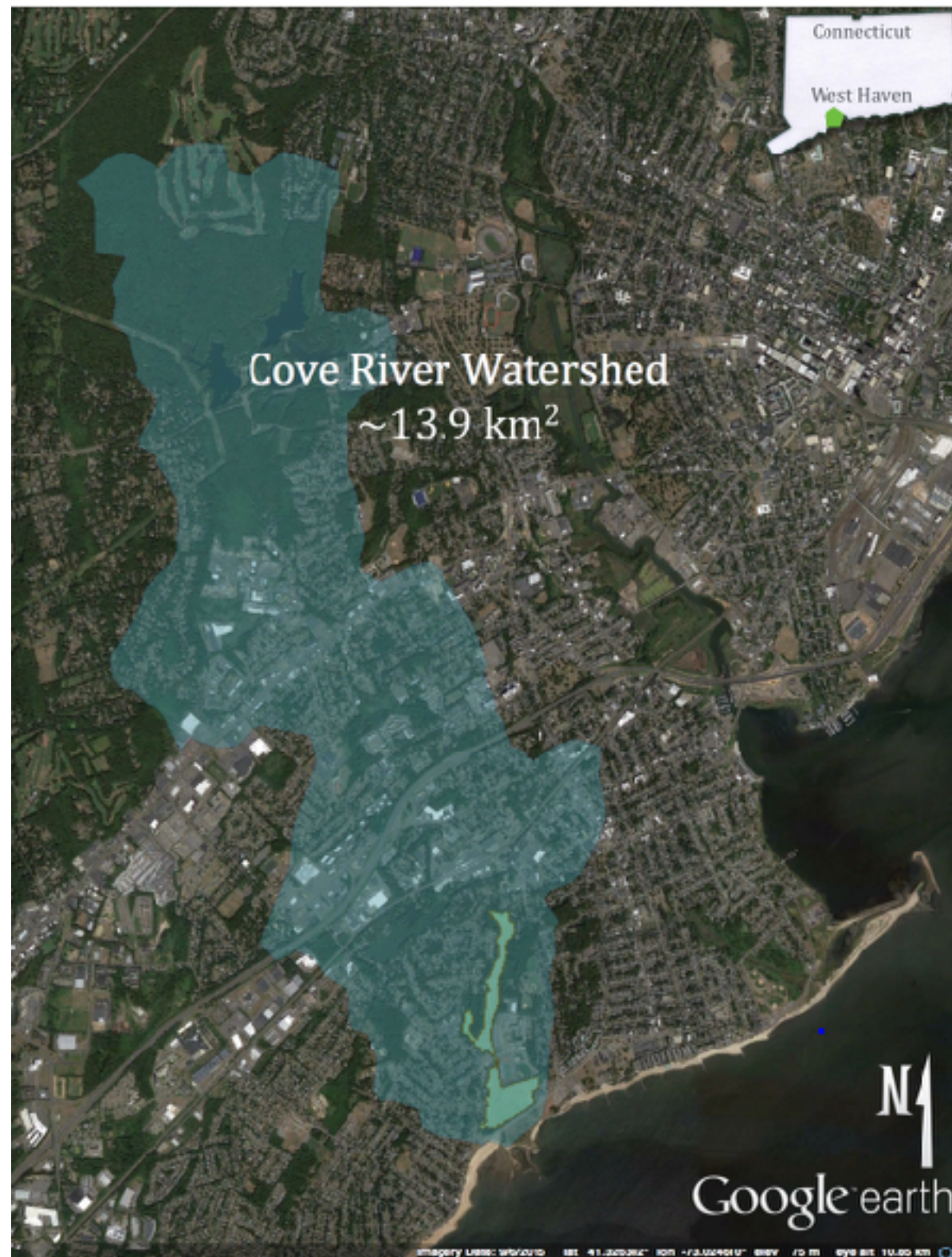


Presenter: Scott Graves



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Watershed and location map of Cove River Historical Site and field study site



Presenter: Scott Graves



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<http://www.snappergraphics.co.nz/project.php?pid=24>



*Ground-based photography -
ground-truthing*



fall 2012



spring 2013



*Ground-based photography -
ground-truthing*



Panorama Views of Lower-Mid Cover River Estuary/Marsh, April 30th 2016



Presenter: Scott Graves



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Project: 081116_erhs_midmarsh

Project Process View rayCloud Help

Project Process View Navigation Clipping Point Cloud Editing

Properties

3DR SOLO

PIX40 mapper pro

Survey Location
Sediment Sampling Location

Processing

Processing

1. Initial Processing 2. Point Cloud and Mesh 3. DSM, Orthomosaic and Index

Current: Done. 100%

Total: 1. 2. 3. 23/23

Output Status... Start Cancel Help

Arbitrary (m) - (7.62, 47.54, -30.59) [m]

10:18 AM 8/16/2016



Structure from Motion (SfM): software applications for Ecological Mapping with μ UAS/drones



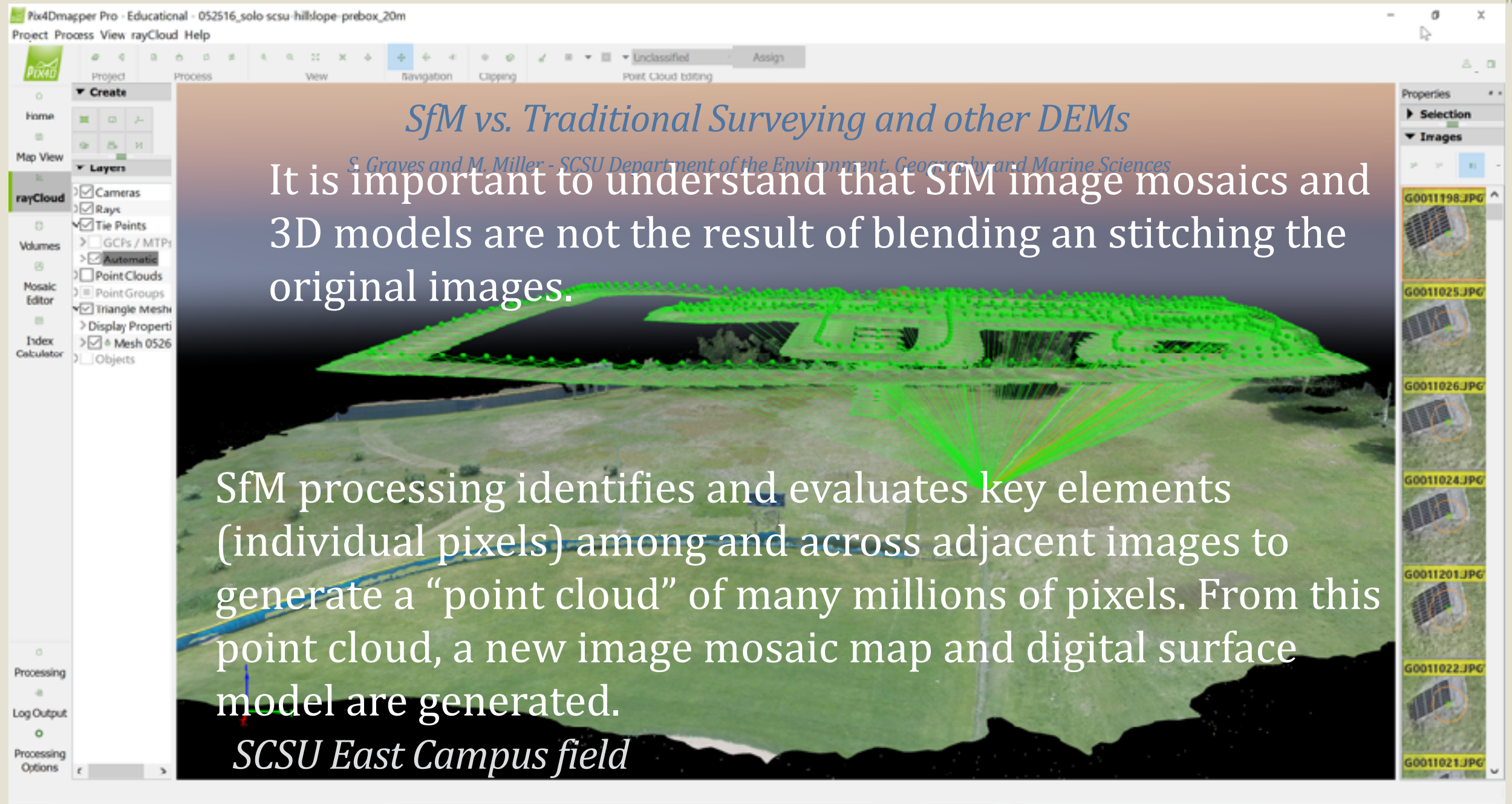
SfM vs. Traditional Surveying and other DEMs

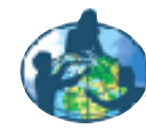
S. Graves and M. Miller - SCSU Department of the Environment, Geography and Marine Sciences

It is important to understand that SfM image mosaics and 3D models are not the result of blending or stitching the original images.

SfM processing identifies and evaluates key elements (individual pixels) among and across adjacent images to generate a “point cloud” of many millions of pixels. From this point cloud, a new image mosaic map and digital surface model are generated.

SCSU East Campus field





Google Earth Image of Cove River Historical Site wetland and forest habitats.

CRHS Estuarine salt marsh and mudflat

CRHS newly regrown closed canopy forest. 50-60 yrs of forest regrowth have converted what was an open meadow with just a few fringing trees, to a fully closed canopy forest.

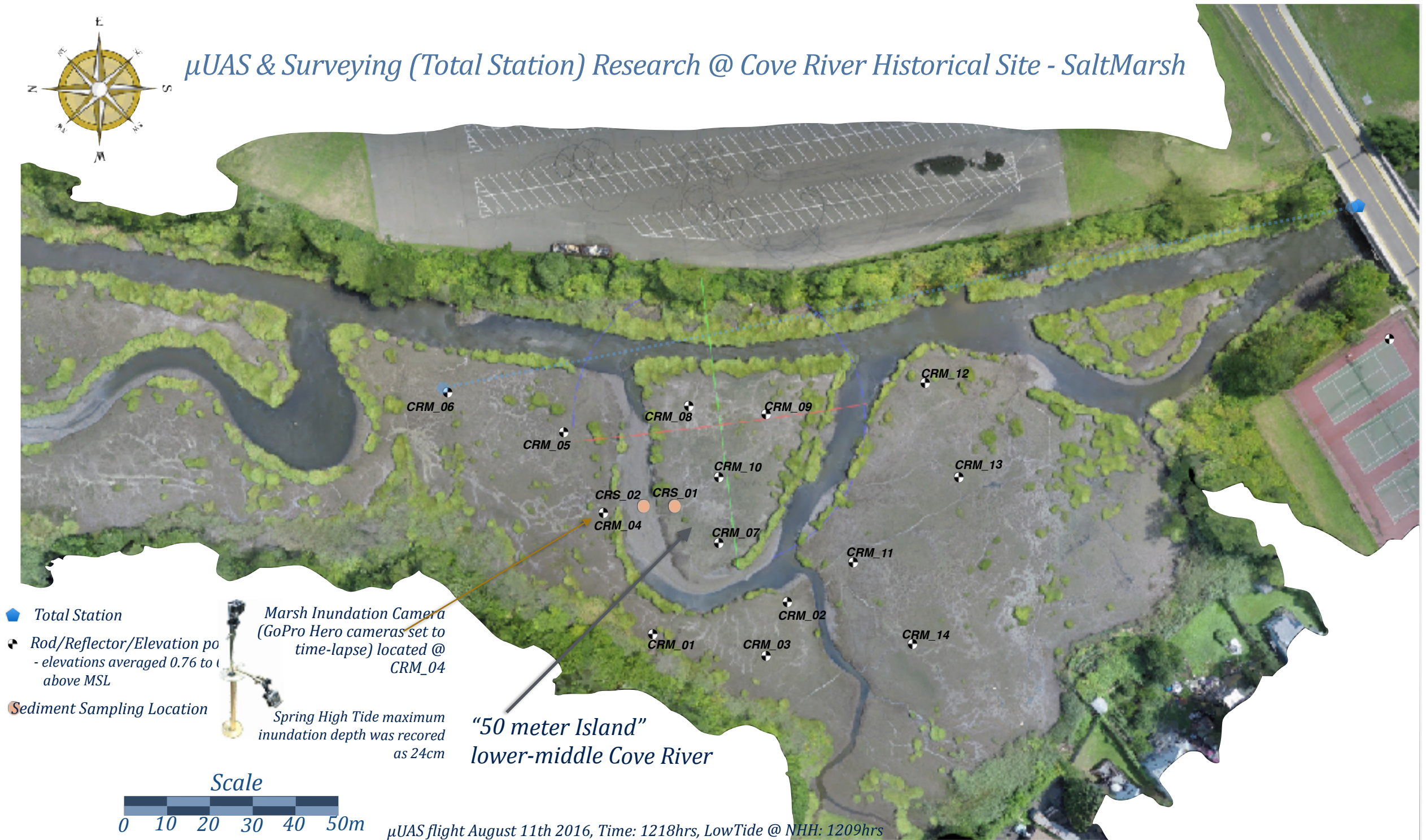
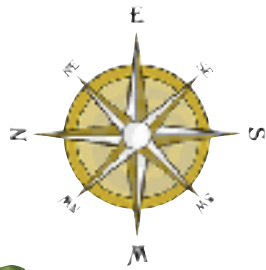
CRHS Fresh water marsh

Scale





μUAS & Surveying (Total Station) Research @ Cove River Historical Site - SaltMarsh





Cove River Historical Site Mid Marsh Complex

CRHS Marsh Complex Components

A. MidMarsh Area = 17,537m²

B. Marsh Channel Area = 3,617m²

C. UpperMidMarsh Mudflats Area = 3,412m²

D. 50m Island Mudflats Area = 1,449m²

E. LowerMidMarsh Mudflats Area = 5,663m²

F. TearDrop Island Mudflats Area = 261m²

Total Exposed Mudflats Area = 14,402m²

C+D+E+F

MarshVegetation Area = 3,135m²

A-B-C-D-E-F

Marsh Channel/Marsh Ratio = 20.6%

B/A

MarshVegetation/Mudflats Ratio = 21.7%

(A-B-C-D-E-F)/(A-B)

Google earth

Imagery Date: 4/20/2016 lat 41.289523° lon -72.961412° elev 0 m eye alt 261 m

Presenter: Scott Graves



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October 31st 2015 @ CRHS, mid tide stage



Acknowledgements: many thanks to the following persons for their invaluable help and assistance in conducting field surveys and in the μ UAS aerial mapping endeavors:

• μ UAS field team – graduate students Peter Broadbridge, Scott Thibault, Darryl Nicholson; • Marsh top surveying team – undergraduates Shannon Bronson, Matthew Connors, and Dr. J. Tait

***– all from Southern Connecticut State University
Department of the Environment, Geography and Marine Sciences***

