Mapping Mangroves by Geomorphic Type and Species In the Charlotte Harbor Region

Lisa B. Beever, James W. Beever III, Roy R. "Robin" Lewis III, Terry Tattar, Laura Flynn, Chandra Giri, Jordan Long, Liz Donley

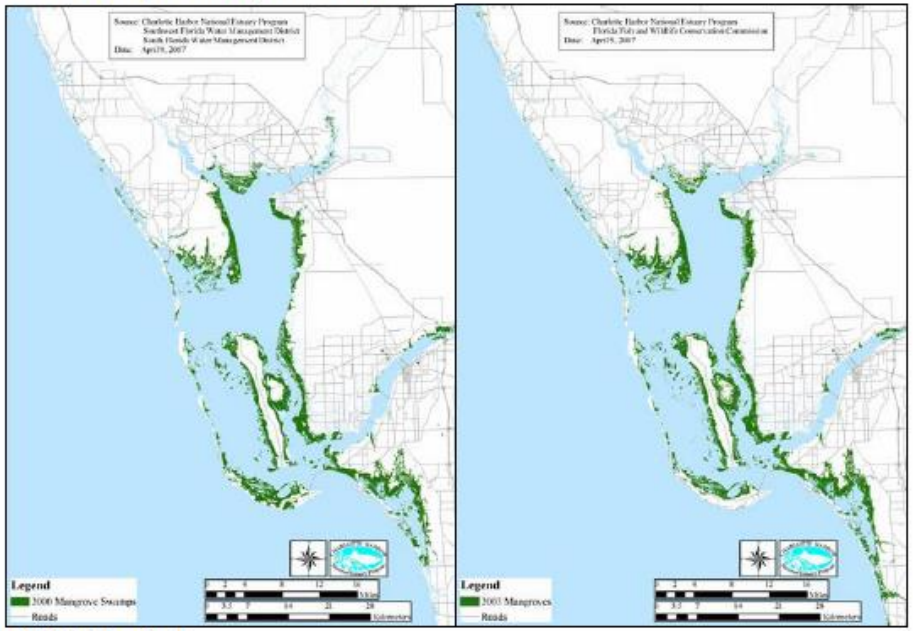
Coastal Habitat Integrated Mapping and Monitoring Program Workshop

Saint Petersburg, Florida

September 14, 2015

FW-g: Mangrove acreage and location by basin.

Summary: Landuse maps are created from aerial photography every 5 years by the water management districts and landcover maps are created by the FFWCC every 5-6 years. In addition the SWFWMD is contracting annual landuse land cover maps. The CHNEP staff can use FLUCCS codes and land cover maps to classify mangrove spatial extent and compare acreage over time.



Available Products:

- 2000 WMD Mangrove Land Use Shape File, including mangrove swamps.
- 2003 FFWCC Vegetative Communities Shape File, including mangroves.

Gaps:

1) Map mangrove systems by predominate species within existing programs.

Target:

- No long-term net declines in mangrove coverage by basin from 1980 coverage except as a result of natural variation, restoration to natural hydrology (e.g. filling of mosquito ditches), or where construction impedes restoration of mangroves.

FW-h: Mangrove species composition for sample sites.

Summary: Some localized mangrove surveys are conducted on an annual basis. The Sanibel-Captiva Conservation Foundation (SCCF) marine laboratory conducts surveys on Sanibel and Captiva at 12 plots. Annual analyses and reporting occurs in the SCCF document State of our Coastal Environment. Sites throughout Charlotte County were surveyed in response to Hurricane Charley by Terry Tattar and David Scott, in cooperation with Seagrant and West Coast Inland Navigation District (WCIND). In addition other sites throughout the CHNEP study area have been surveyed in the past, and data is available for future comparison. These include sites in the mangrove forests of Cayo Costa , Gasparilla Island, and Estero Bay.

Available Products:

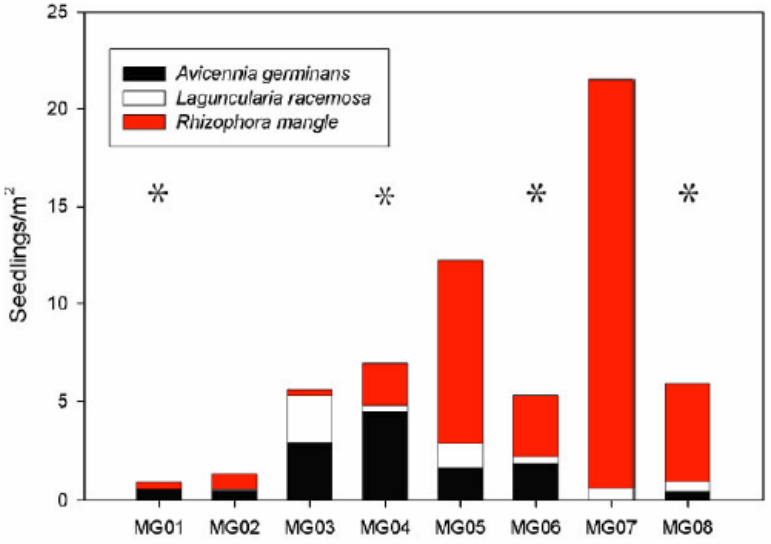
- SCCF State of our Coastal Environment annual report
- Cayo Costa Reports, 1977
- Milbrandt et al. 2006. Estuaries. 29(6A).

Gaps:

1) Expand mangrove species composition monitoring throughout entire CHNEP area, monitor transects every 5-10 years to evaluate mangrove species changes.

Targets:

- No long-term change in mangrove species composition, except as a result of natural forest succession.



FW-j: Intertidal and high saltwater marsh acreage and location by basin

Summary: Land use maps are created from aerial photography every 5 years by the water management districts and land cover maps are created by the FFWCC every 5-6 years. In addition the SWFWMD is contracting annual land use and land cover maps. The CHNEP staff can use FLUCCS codes and land cover maps to classify acreage over time in a general "salt marsh" category. The FFWCC map appears more reliable for salt marsh acreage. For example, note the presence of tidal salt marsh on Shell Creek on the FFWCC map. The differentiation between high marsh and tidal marsh may be estimated based on its presence behind mangrove (high marsh) versus its presence on a tidal creek or river (tidal marsh).

Available Products:

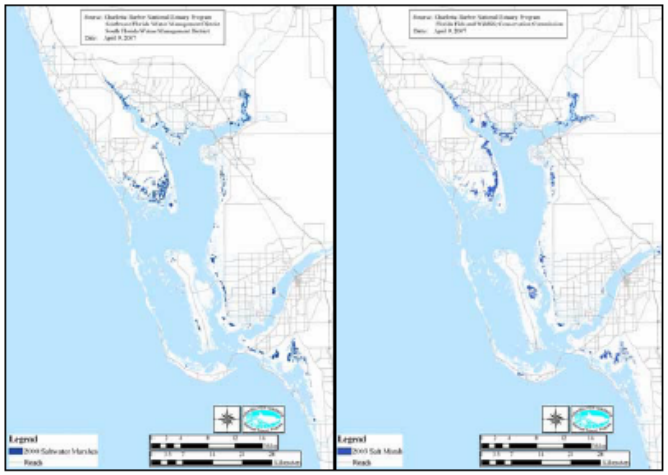
- 2000 Land Use map from Water Management Districts with Saltwater Marshes distinguished.
- 1986, 1997, 2003 Land Cover map from the Fish and Wildlife Conservation Commission with Salt Marsh distinguished.
- SFWMD Pre-Development Map south of Peace River, the SWFWMD Pre-Development Map of the Peace River basin, and the CHNEP Pre-Development Map of Sarasota County.

Gaps:

1) Differentiate between tidal and high marsh within existing land cover mapping programs.
2) Determine natural variation in salt water marsh habitat extent.
3) Predevelopment vegetation map for entire area to determine acreage changes.

Targets:

- No long-term net declines in intertidal saltwater marsh coverage by basin except as a result of natural variation or restoration.
- No long-term net declines in high saltwater marsh coverage by basin except as a result of natural variation or restoration.



FW-k: Percent exotics within saltwater marshes by basin.

Summary: Most salt marsh acreage, especially high marsh, is within Preserve State Parks. Managers are responsible for removal of exotics and probably could give information regarding exotic invasion status and other conditions related to salt marshes in their care. Charlotte County conducted melaleuca mapping on Cape Haze, which includes salt marsh.

Available Products:

- CHNEP staff requested melaleuca map for Cape Haze.
- CHNEP staff requested information related to the salt marshes within the Buffer Preserve State Parks.

Gaps:

1) Create a monitoring program to determine the percent of exotic plants in saltwater marshes throughout the CHNEP area.

Targets:

- Achievement of controllable levels of Florida Exotic Pest Plant Council-defined nuisance, invasive exotic plant species on saltwater marsh habitat on public lands by 2020.

Water Home
Drinking Water
Education & Training
Grants & Funding
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Our Waters
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Wetlands Program Development Grants

The Wetland Program Development Grants (WPDGs), initiated in fiscal year (FY) 1990, provide eligible applicants an opportunity to conduct projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. While WPDGs can continue to be used by recipients to build and refine any element of a comprehensive wetland program, priority will be given to funding projects that address the three priority areas identified by the EPA: Developing a comprehensive monitoring and assessment program; improving the effectiveness of compensatory mitigation; and refining the protection of vulnerable wetlands and aquatic resources. States, tribes, local governments (S/T/LGs), interstate associations, intertribal consortia, and national non-profit, non-governmental organizations are eligible to apply.

You will need Adobe Acrobat Reader to view the Adobe PDF files on this page. See EPA's PDF page for more information about getting and using the free Acrobat Reader.

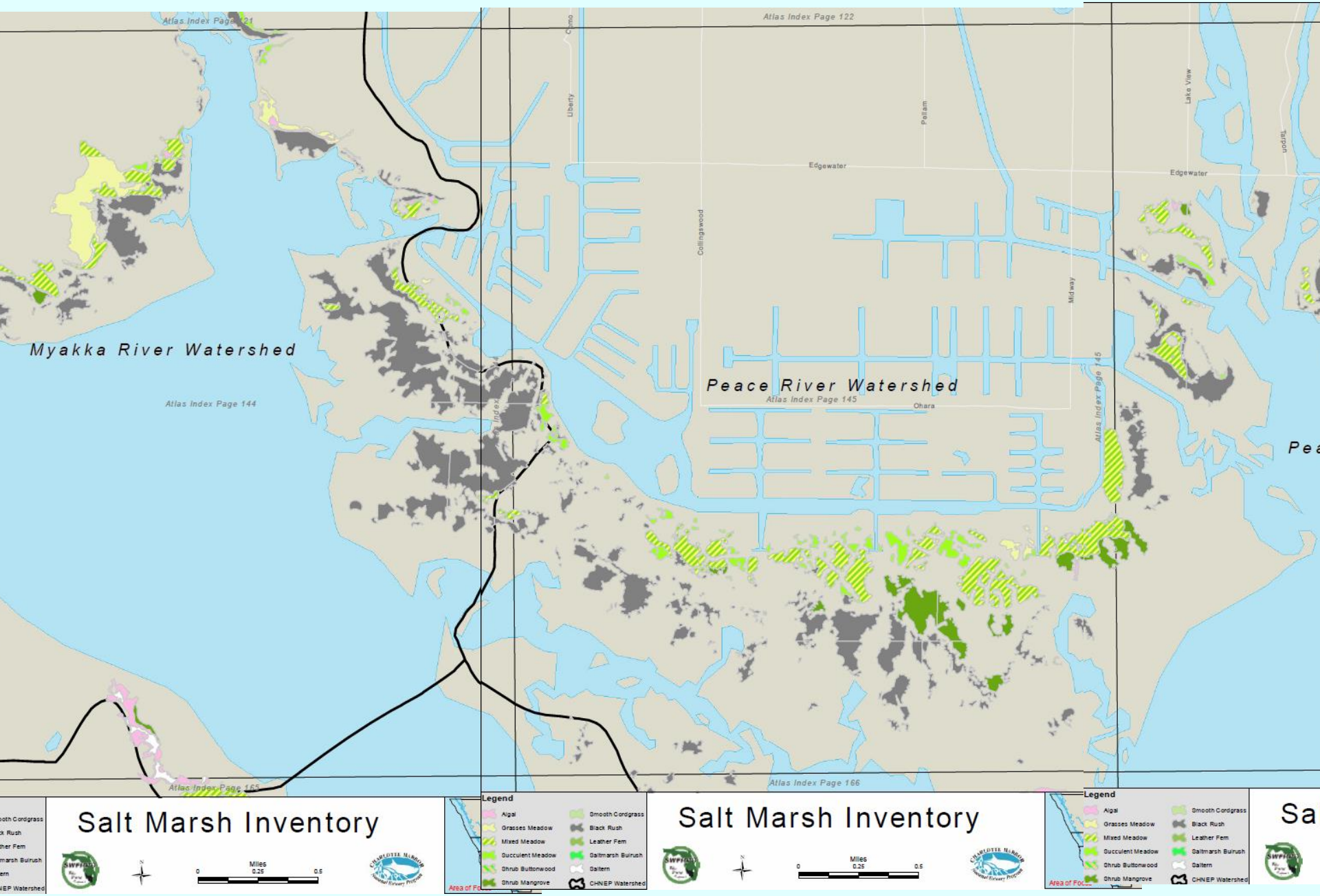
The Wetland Grants Database contains further information on Wetland Program Development Grants that were awarded in past years.

Wetland Program Development Grants Summaries, 2006–2011

Grant summaries for past grants from 2006–2011 (PDF) (226 pp, 1.1MB) contains summaries of Wetland Program Development Grants awarded from 2006 through 2011; includes project titles, descriptions, contact information, and links to the complete grant record in the Wetland Grants Database.

Applicants for Wetland Program Development Grants should examine the grant summaries in this PDF and consider whether there is any information from any grants similar to their current proposals that the applicant can benefit from (such as project design, deliverables, etc.). To that end, EPA has categorized the grants by topic area. Within each topic area, the grants are arranged first chronologically by year and then alphabetically by the state the grants work took place in. Along with project titles and descriptions, we have provided contact information if applicants want to talk to project implementers.

We have also provided a link for each grant to the complete grant record in the Wetland Grants Database. There, users can find additional information for these grants, including dollar figures, and project deliverables and final reports (the latter two are only available for closed-out grants).


Atlas Index Page 121
Atlas Index Page 122
Myakka River Watershed
Peace River Watershed
Atlas Index Page 144
Atlas Index Page 145
Atlas Index Page 165
Atlas Index Page 166
Edgewater
Ohara
Liberty
Collingswood
Pelham
Midway
Lake View
Tarpon
Salt Marsh Inventory
Miles
0
0.25
0.5
Legend
Algal
Grasses Meadow
Mixed Meadow
Succulent Meadow
Shrub Buttonwood
Shrub Mangrove
Smooth Cordgrass
Black Rush
Leather Fern
Saltmarsh Bulrush
Saltern
CHNEP Watershed
Salt Marsh Inventory
Miles
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0.25
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Grasses Meadow
Mixed Meadow
Succulent Meadow
Shrub Buttonwood
Shrub Mangrove
Smooth Cordgrass
Black Rush
Leather Fern
Saltmarsh Bulrush
Saltern
CHNEP Watershed


2010

FINAL REPORT- University of Massachusetts Grant # S2300000100000

Date: January 20, 2004

Sponsor: Charlotte Harbor National Estuary Program

Grant Title: Dynamics of Tree Mortality and Mangrove Recruitment within Black Mangrove Dieoffs in Southwest Florida

Investigators:

Principal Investigator: Terry A. Tattar, Ph.D., Professor of Microbiology, Department of Microbiology, University of Massachusetts, Amherst, MA 01003

Professional Geologist: David C. Scott, 1220 NW43 Ave., Cape Coral, FL33993

Introduction and Background:

A. Mangrove Biology and Health

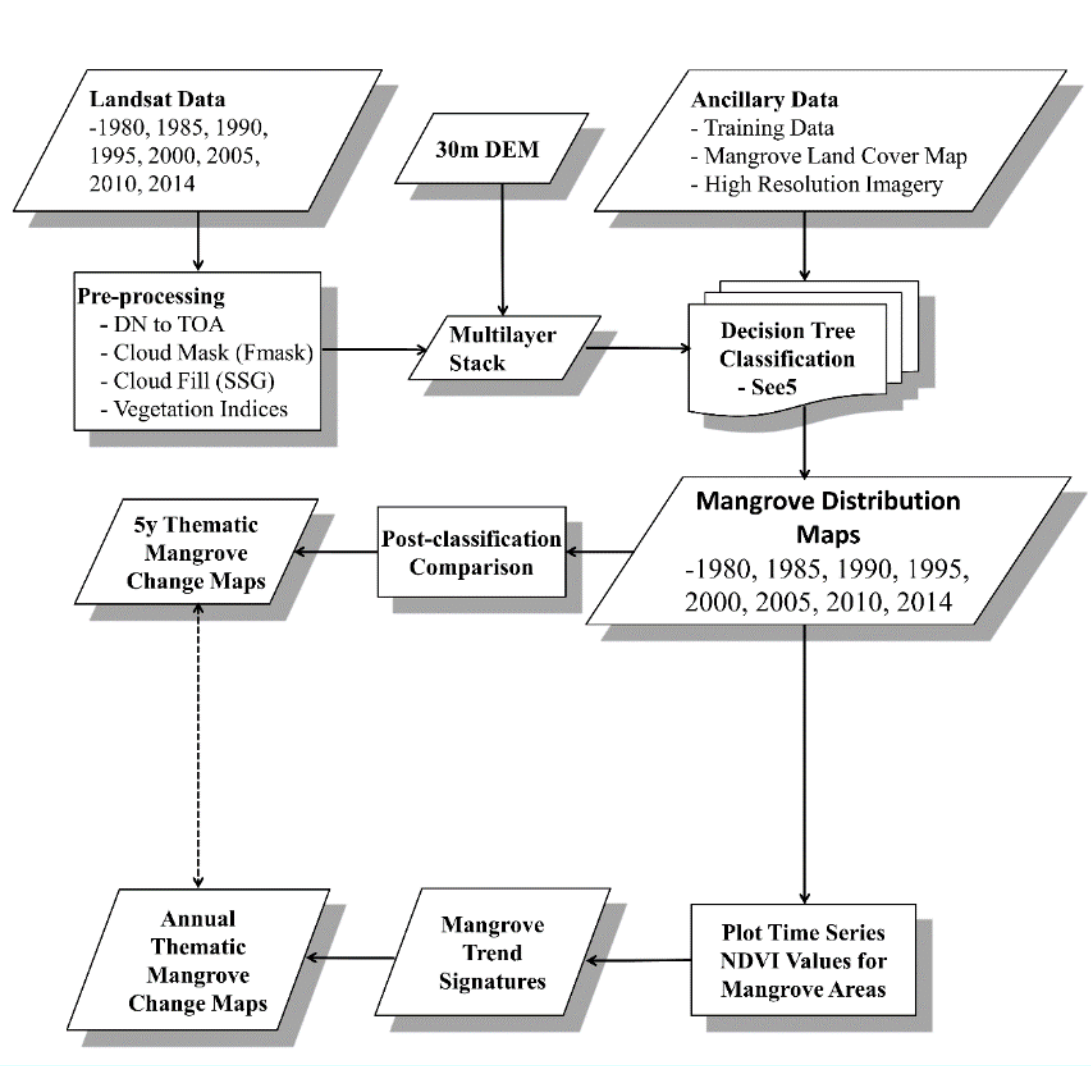
Mangrove forests are the dominant plant community in both the New and Old World tropical coastlines. Mangrove forests in the United States are found in Florida, Puerto Rico, south Texas and the Virgin Islands. Although mangrove forests are critical to stabilization of coastlines along the Atlantic coast and in the Gulf of Mexico (Odum, et al, 1982), their role in tropical fisheries has also been recognized (Hatcher, Joannes and Robertson, 1989). Numerous studies have shown that mangrove-fringed waters have much greater fish densities than communities where mangrove forests are absent (Yanez-

Identifying and Diagnosing Locations of Ongoing and Future Saltwater Wetland Loss: Mangrove Heart Attack

1. Annotated Bibliography
2. Mangroves and die-off identified with spectral data (USGS)
3. Site Visits
4. GIS mapping by Geomorphologic Type and Species
5. Catalogue of Restoration Opportunities
6. Report

Mapping and Monitoring of Mangrove Forests in the United States Using Satellite Imagery

- Mapping mangrove distribution and change using 30m Landsat data



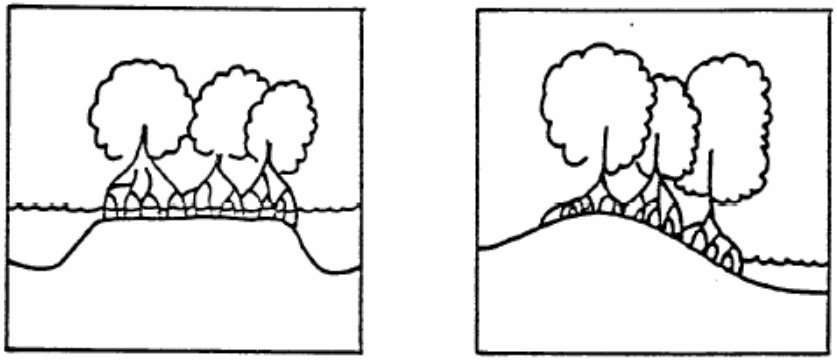
USGS science for a changing world

Jordan Long & Chandra Giri, December 2014

- **Florida mangrove distribution (2010)**
  - **241,029 ha**
  - **98% of US total mangrove**

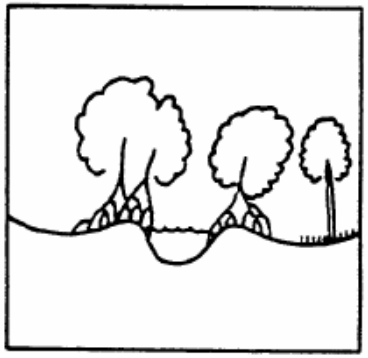
USGS
science for a changing world

Jordan Long & Chandra Giri, December 2014

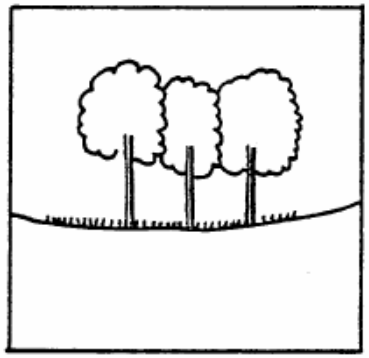


(1) OVERWASH FOREST

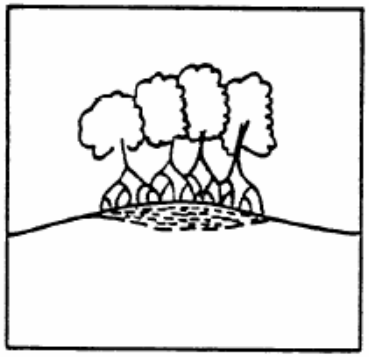
(2) FRINGE FOREST



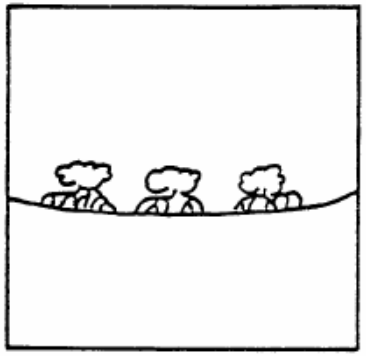
(3) RIVERINE FOREST



(4) BASIN FOREST



(5) HAMMOCK FOREST



(6) SCRUB FOREST

Figure 4. The six mangrove community types (Lugo and Snedaker 1974).

86 References to date

FWS/OBS-81/24
January 1982
Reprinted September 1985

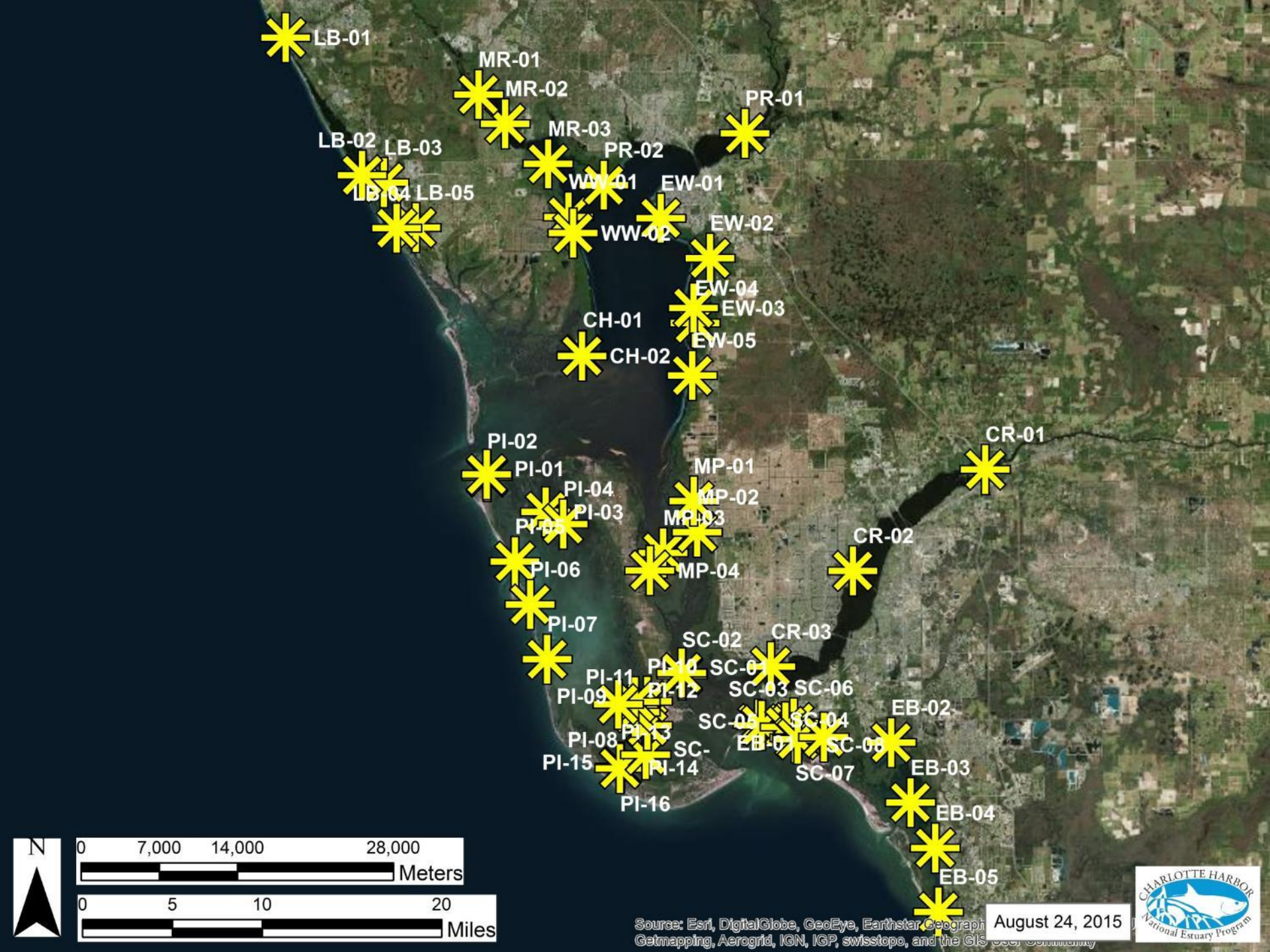
THE ECOLOGY OF THE MANGROVES OF SOUTH FLORIDA:
A COMMUNITY PROFILE

by

William E. Odum
Carole C. McIvor
Thomas J. Smith, III

Department of Environmental Sciences
University of Virginia
Charlottesville, Virginia 22901

FLUCSDESC	LEV4	LEV5	LEV4DESC	LEV5DESC
SALTWATER MARSHES	6421	64211	SUBTIDAL SALTWATER MARSH	SMOOTH CORDGRASS
SALTWATER MARSHES	6422	64221	TIDAL SALTWATER MARSH	BLACK NEEDLE RUSH
SALTWATER MARSHES	6422	64222	TIDAL SALTWATER MARSH	LEATHER FERN
SALTWATER MARSHES	6422	64223	TIDAL SALTWATER MARSH	BULRUSH
SALTWATER MARSHES	6423	64231	SUPERTIDAL SALTWATER MARSH	ALGAL SALTWATER MARSH
SALTWATER MARSHES	6423	64232	SUPERTIDAL SALTWATER MARSH	SALTERN
SALTWATER MARSHES	6423	64233	SUPERTIDAL SALTWATER MARSH	SUCCULENT MEADOW SALTWATER MARSH
SALTWATER MARSHES	6423	61234	SUPERTIDAL SALTWATER MARSH	MIXED MEADOW SALTWATER MARSH
SALTWATER MARSHES	6123	64235	SUPERTIDAL SALTWATER MARSH	GRASS MEADOW SALTWATER MARSH
SALTWATER MARSHES	6423	64236	SUPERTIDAL SALTWATER MARSH	SHRUB BUTTONWOOD MARSH
SALTWATER MARSHES	6423	64237	SUPERTIDAL SALTWATER MARSH	SHRUB BLACK MANGROVE MARSH
MANGROVE SWAMPS	6121	61211	OVERWASH MANGROVE FOREST	OVERWASH RED MANGROVE FOREST
MANGROVE SWAMPS	6121	61219	OVERWASH MANGROVE FOREST	OVERWASH DEAD MANGROVE FOREST
MANGROVE SWAMPS	6122	61221	FRINGE MANGROVE FOREST	FRINGE RED MANGROVE FOREST
MANGROVE SWAMPS	6122	61225	FRINGE MANGROVE FOREST	FRINGE MIXED MANGROVE FOREST
MANGROVE SWAMPS	6123	61231	RIVERINE MANGROVE FOREST	RIVERINE RED MANGROVE FOREST
MANGROVE SWAMPS	6123	61233	RIVERINE MANGROVE FOREST	RIVERINE WHITE MANGROVE FOREST
MANGROVE SWAMPS	6123	61235	RIVERINE MANGROVE FOREST	RIVERINE MIXED MANGROVE FOREST
MANGROVE SWAMPS	6124	61245	BASIN MANGROVE FOREST	BASIN MIXED MANGROVE FOREST
MANGROVE SWAMPS	6124	61242	BASIN MANGROVE FOREST	BASIN BLACK MANGROVE FOREST
MANGROVE SWAMPS	6125	61251	HAMMOCK MANGROVE FOREST	HAMMOCK RED MANGROVE FOREST
MANGROVE SWAMPS	6126	61262	SCRUB MANGROVE FOREST	SCRUB BLACK MANGROVE FOREST
MANGROVE SWAMPS	6126	61264	SCRUB MANGROVE FOREST	SCRUB BUTTONWOOD FOREST
MANGROVE SWAMPS	6126	61265	SCRUB MANGROVE FOREST	SCRUB MIXED MANGROVE FOREST
MANGROVE SWAMPS	6127	61271	ALTERED MANGROVE HEDGE	ALTERED RED MANGROVE HEDGE
MANGROVE SWAMPS-DIEOFF	6351	63511	OVERWASH MANGROVE FOREST	OVERWASH RED MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6351	63519	OVERWASH MANGROVE FOREST	OVERWASH DEAD MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6352	63521	FRINGE MANGROVE FOREST	FRINGE RED MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6352	63525	FRINGE MANGROVE FOREST	FRINGE MIXED MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6353	63531	RIVERINE MANGROVE FOREST	RIVERINE RED MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6353	63535	RIVERINE MANGROVE FOREST	RIVERINE MIXED MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6354	63545	BASIN MANGROVE FOREST	BASIN MIXED MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6354	63542	BASIN MANGROVE FOREST	BASIN BLACK MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6355	63551	HAMMOCK MANGROVE FOREST	HAMMOCK RED MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6356	63562	SCRUB MANGROVE FOREST	SCRUB BLACK MANGROVE FOREST
MANGROVE SWAMPS-DIEOFF	6356	63564	SCRUB MANGROVE FOREST	SCRUB BUTTONWOOD FOREST
MANGROVE SWAMPS-DIEOFF	6357	63571	ALTERED MANGROVE HEDGE	ALTERED RED MANGROVE HEDGE


LB-01
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August 24, 2015
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community
CHARLOTTE HARBOR
National Estuary Program

Site ID: CH-02	Date of Inspection: June 12, 2015					Ownership	TIITF/STATE LANDS
Location	**Township**	**Range**	**Section**	**Lat.**	**Long.**	**PA Number**	422125100001
Cape Haze Point	42	21	25	26.786274	-82.160541	**County**	Charlotte

From Pre-Visit Aerials:	
CHNEP Estuary Segment	Cape Haze
Water body	Charlotte Harbor
Mangrove Forest Type (from photographic aerial)	Black Mangrove Basin
Elevation (from LIDAR)	0.721574
Elevation (from other sources)	
Tidal Position	Low
Adjacent upland habitat type (if any)	None
FWC mapped as	Mangrove Swamp
WMD mapped as	Mangrove Swamps
USGS mapped as	Mangrove
% tree cover	85
Human impacts in site (ditching, fill, vehicles, bait digging, etc.)	None
Adjacent human impacts (dikes, roads, canals, bulkheads, etc.)	None

Note: spiders and egg cases. Canopy style ____(red) |(white) ∩ (black)

Mangrove Species & Conditions (in a 1,000 m^2 area)	Red Mangrove (*Rhizophora mangle*)	Black Mangrove (*Avicennia germinans*)	White Mangrove (*Laguncularia racemosa*)	Buttonwood (*Conocarpus erectus*)

Mangrove Species & Conditions (in a 1,000 m^2 area)	Red Mangrove (*Rhizophora mangle*)	Black Mangrove (*Avicennia germinans*)	White Mangrove (*Laguncularia racemosa*)	Buttonwood (*Conocarpus erectus*)
Present (Y/N)	Y	Y	Y	0
% Cover	60%	1%	40%	0
Tallest Tree Height (m)	12'	12'	15'	0
Shortest Tree Height (m)	12"	12'	4"	0
Seedlings Present (Y/N)	Y	0	Y	0
Propagules on Trees (Y/N)	N	N	N	0
General Crown Form	Oval	Round	Oval	0
Leaf Color (Munsell or Leaf Color Chart)	5GY 3/4	7.5GY 4/2	5GY 4/4	0
Estimated % Folivory	25%	20%	10%	0
Estimated % Dead Branches	10%	5%	30%	0
Estimated % Crown Density	85%	10%	20%	0
Tree Health (1 healthy, 2 early decline, 3 moderate decline, 4 severe decline, 5 dead)	1	1	2	0

Submerged Aquatic Vegetation (Associated with Mangrove Community)

SAV Species	Present (Y/N)	% Cover
Manatee grass (*Syringodium filiforme*)		
Shoal grass (*Halodule wrightii*)		
Tape grass (*Vallisneria americana*)		
Turtle grass (*Thalassia testudinum*)		
Widgeon grass (*Ruppia maritima*)		

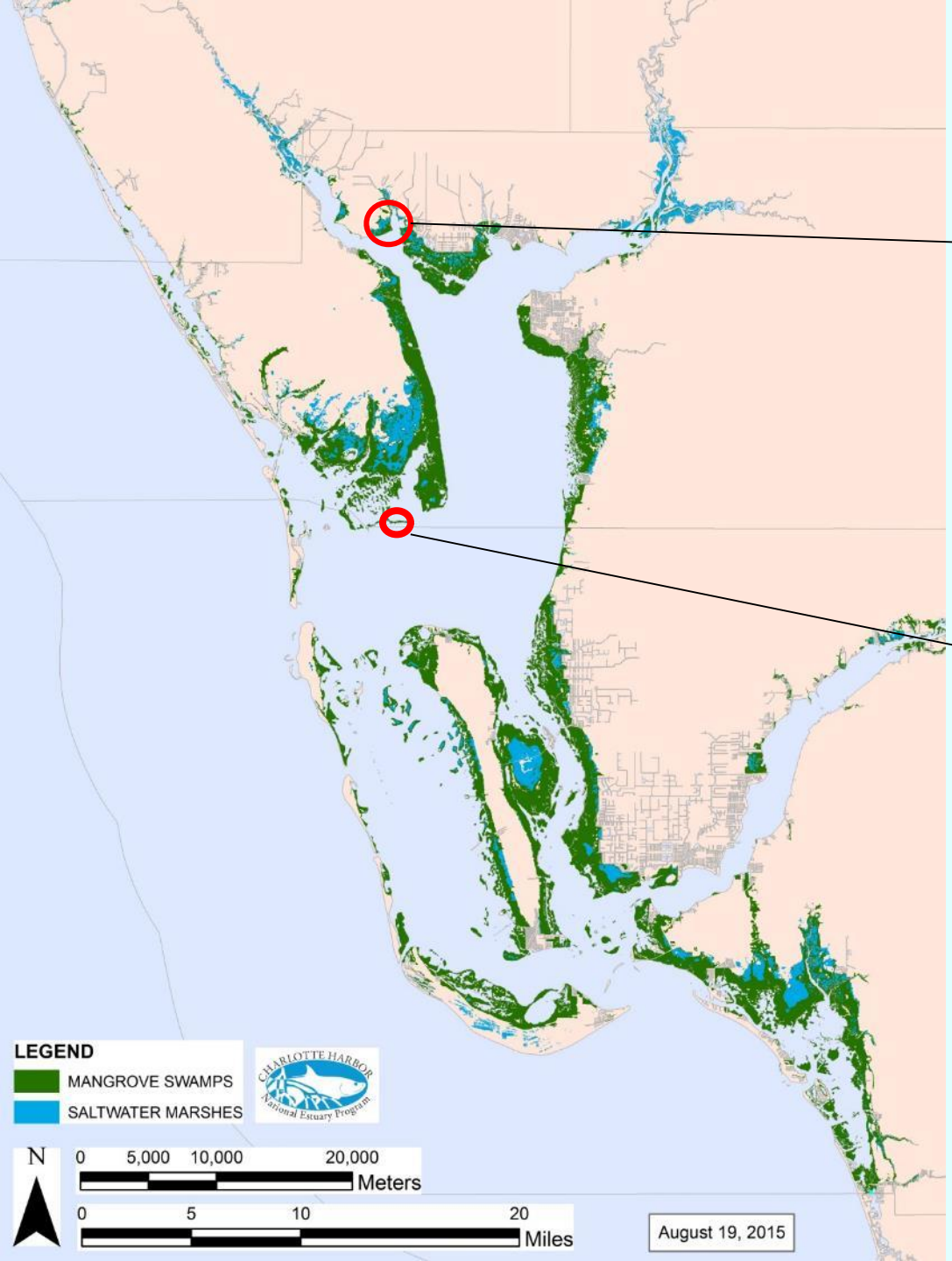
Invasive Exotic Vegetation (Assoicated with Mangrove Communit)

Exotic Species	% Cover	Tallest Tree Ht (m)	Shortest Tree Ht (m)
Brazilian pepper (*Schinus terebinthifolius*)	0		
Australian pine (*Casuarina agustifolia*)	0		
	0		

Upland/Wetland Plant Species	Present (Y/N)	% Cover	Upland/Wetland Species	Present (Y/N)	% Cover
Annual glasswort (*Salacornia bigelovii*)			saltmarsh morning-glory (*Ipomea sagittata*)		
Baker's cordgrass (*Spartina bakerii*)			Saltwater falsewillow (*Baccharis angustifolia*)		
Big leaf marshelder (*Iva frutescens*)			samphire (*Philoxerus vermicularis*)		
Black rush (*Juncus roemerianus*)			scorpionstail (*Heliotrope angiospermum*)		
Bushy sea ox-eye daisey (*Borrchia frutescens*)			sea blite (*Suada linearis*)		
Carolina sealavender (*Limonium carolianum*)			sea purselane (*Sesuvium portulacastrum*)		
Chaff flower (*Alternanthera ramossima*)			seacoast marshelder (Iva imbricata)		
Coastal searocket (*Cakile lanceolata*)			seashore dropseed (*Sporobolus virginicus*)		
Giant wild pine airplant (*Tillandsia utriculata*)			seashore paspalum (*Paspalum vaginatum*)		
Groundsel (saltbush) tree (*Baccharis halimifolia*)			seaside goldenrod (*Solidago sempervirens*)		
gulf cordgrass (*Spartina spartinae*)			seaside jackbean (*Canavalia rosea*)		
heavenlyblue morning-glory (*Ipomea violacea*)			seaside primrosewillow (*Ludwigia maritima*)		
Juba's bush blood-leaf (*Iresine diffusa*)			smooth cordgrass (*Spartina alternifolia*)		
leather fern (*Acrostichum aureum*)			southern needleleaf airplant (*Tillandsia setacea*)		
leather fern (*Acrostichum danaeifolium*)			spider lily (*Hymenocallis aloifolia*)		
Medicine vine (*Hippocratea volubilis*)			tree sea ox-eye daisey (*Borrchia arborescens*)		
moonflowers (*Ipomea alba*)			twisted airplant (*Tillandsia* flexuosa)		
perrenial glasswort (*Sarcocornia ambigua*)			wand goldenrod (*Solidago stricta*)		
rubber vine (*Rhabdadenia biflora*)			water pimpernel (*Samolus ebracteatus*)		
salt grass (*Distichlis spicata*)			Other		
salt wort (*Batis maritima*)	Y	50%	Other		

GIS Tools

- 2014 County Aerial Imagery
- 2015 USGS mangrove distribution
- 2009 SWFWMD FLUCCS
- 2008 SFWMD FLUCCS
- 1999 Infra-Red Imagery
- 2010 LiDAR/DEM
- 2003 FWC Vegetative Communities



Tippecanoe Creek

Gallagher Keys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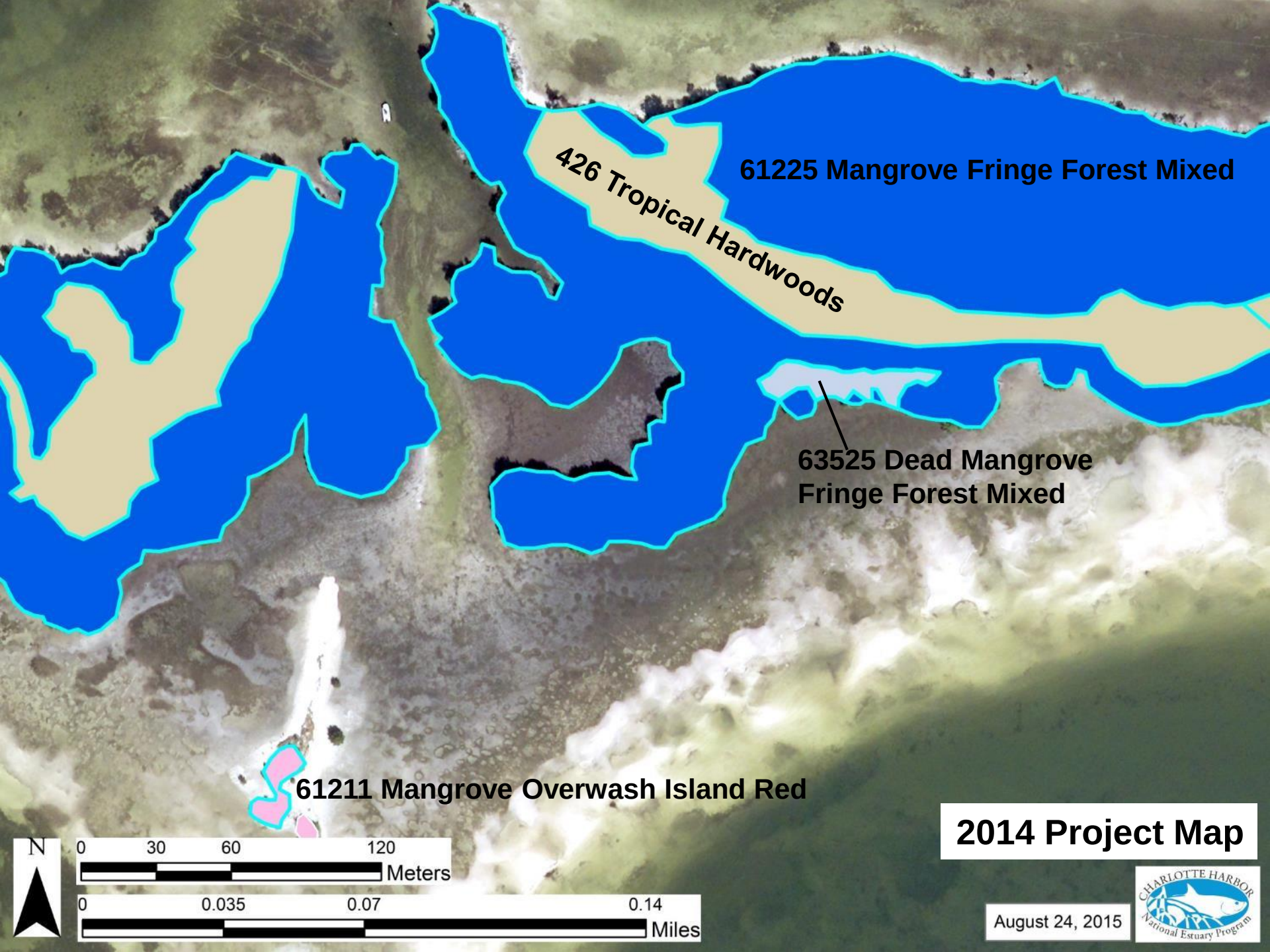
2014 Aerials
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program



2014 Project Map

August 24, 2015

CHARLOTTE HARBOR National Estuary Program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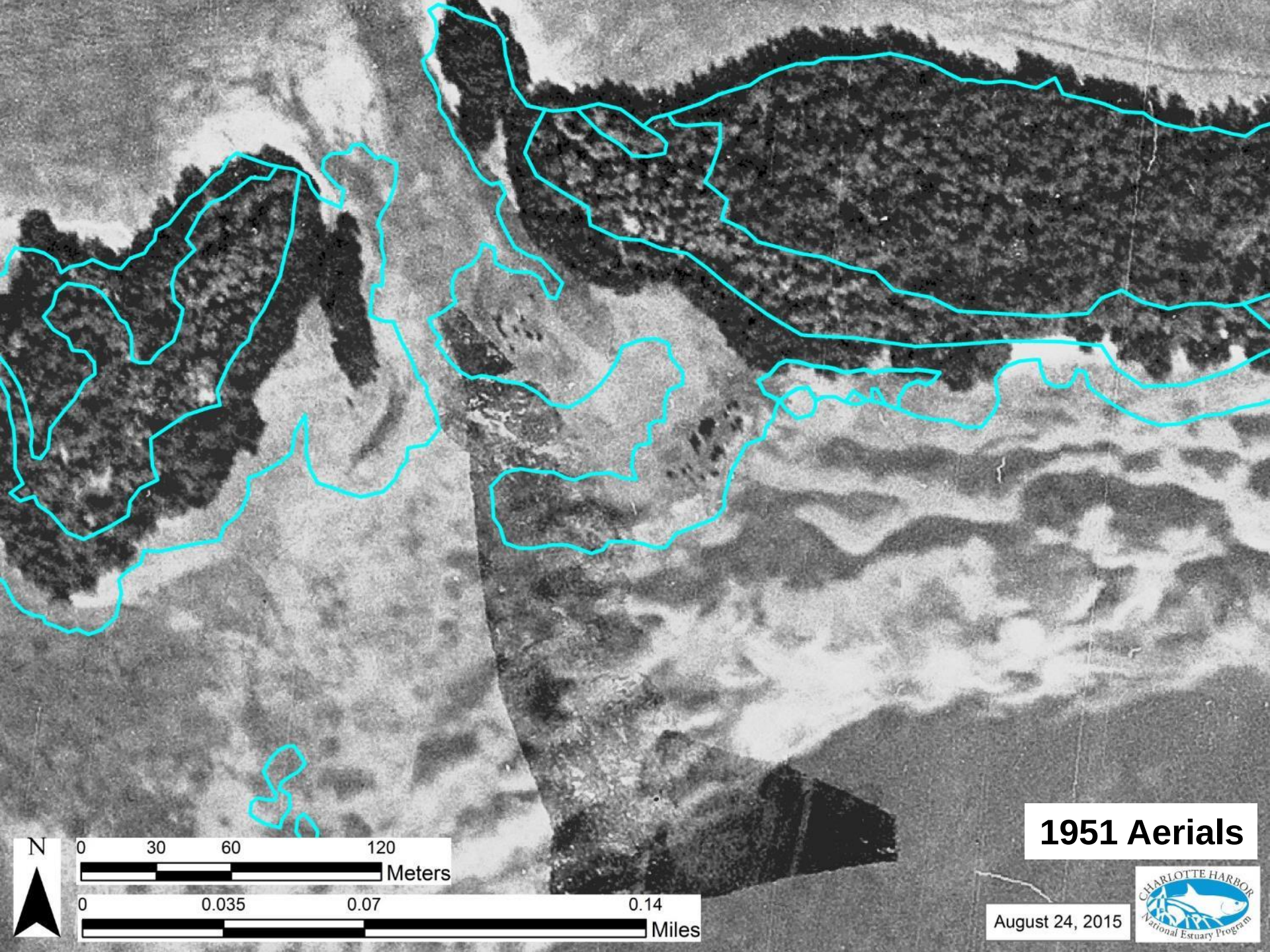
2014 Aerials
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program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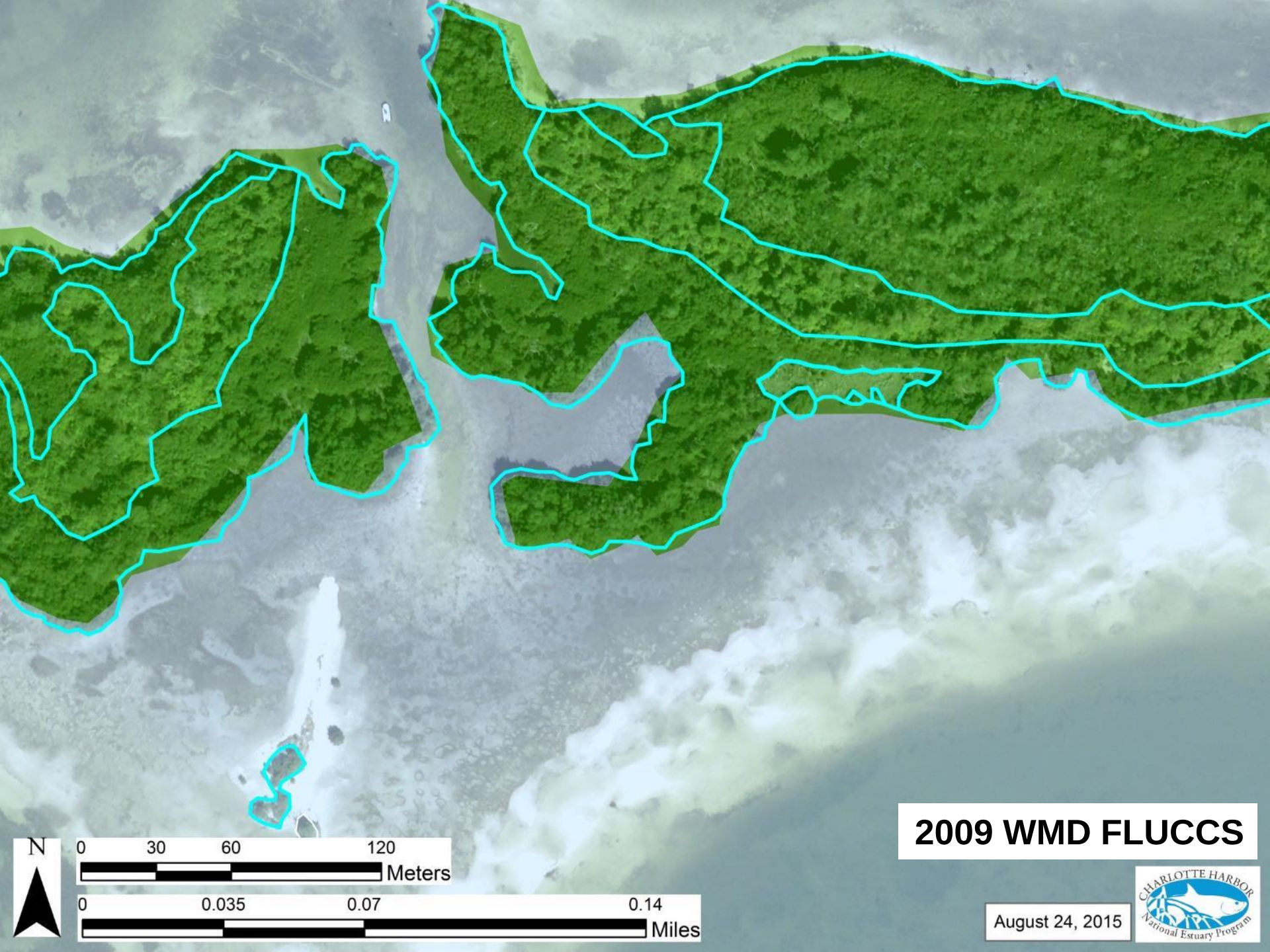
CHARLOTTE HARBOR
National Estuary Program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Meters
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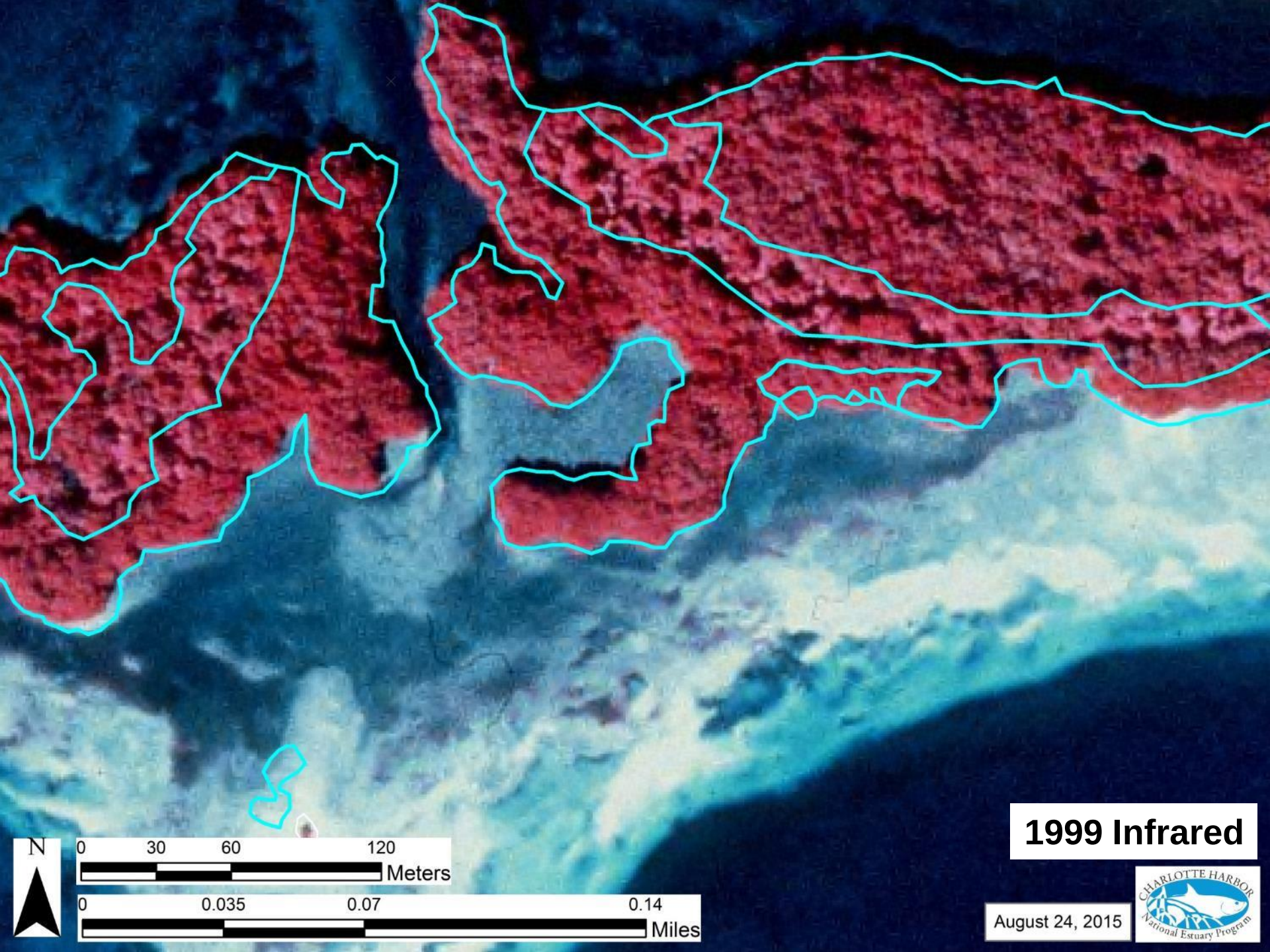
Miles
2009 WMD FLUCCS
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program


N
0
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120
Meters
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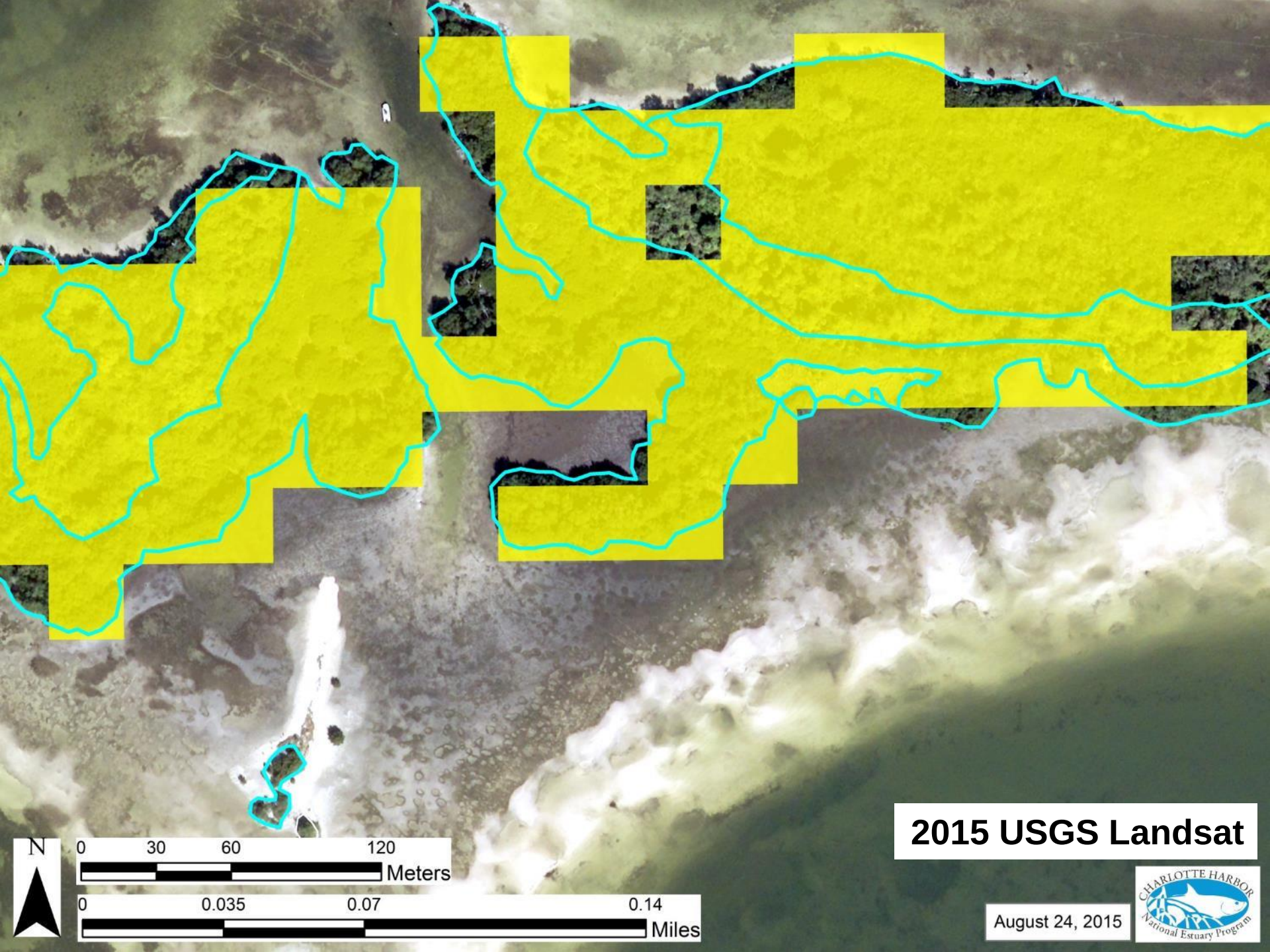
Miles
1999 Infrared
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program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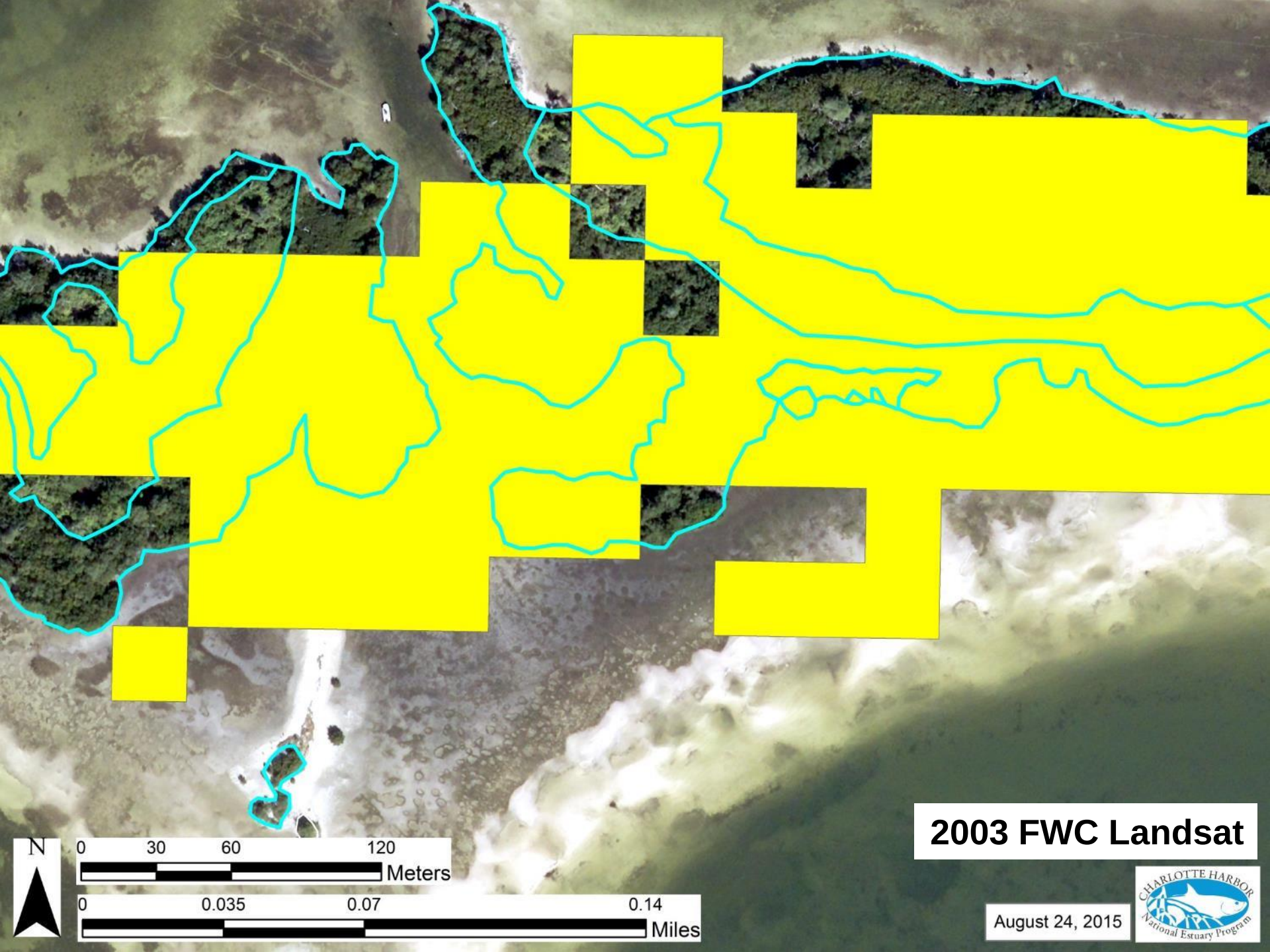
Miles
2015 USGS Landsat
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program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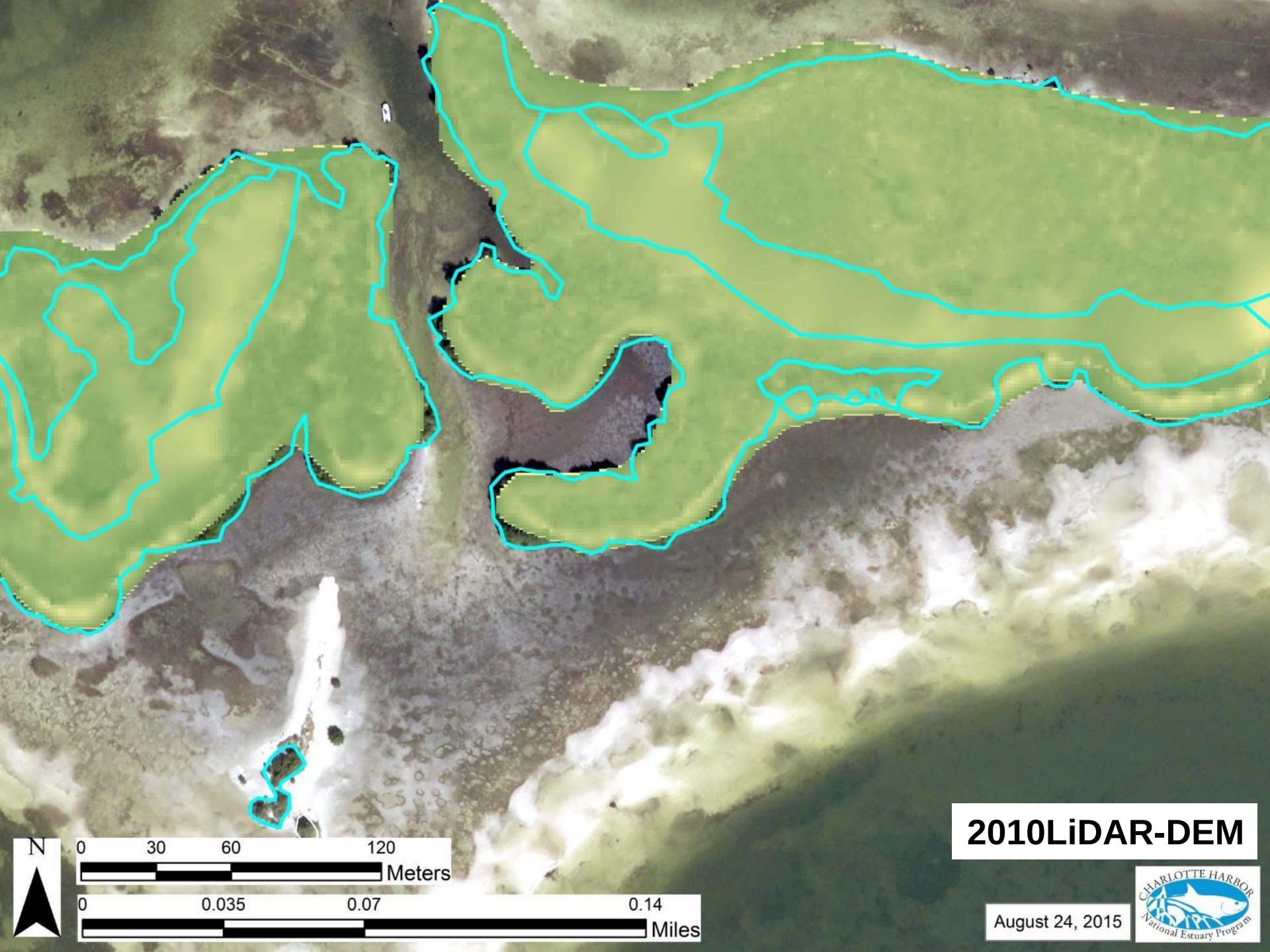
Miles
2003 FWC Landsat
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program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Miles
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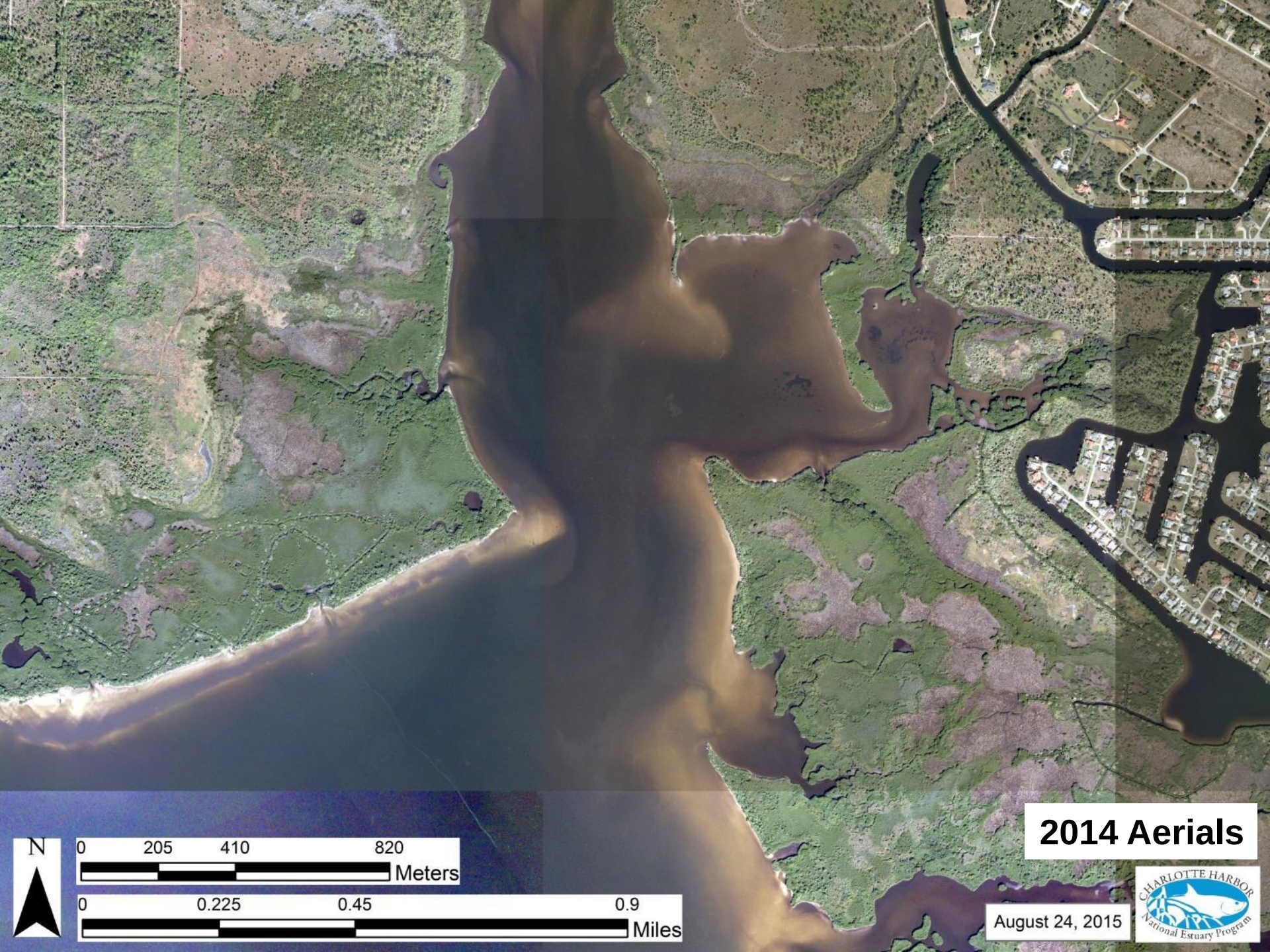
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program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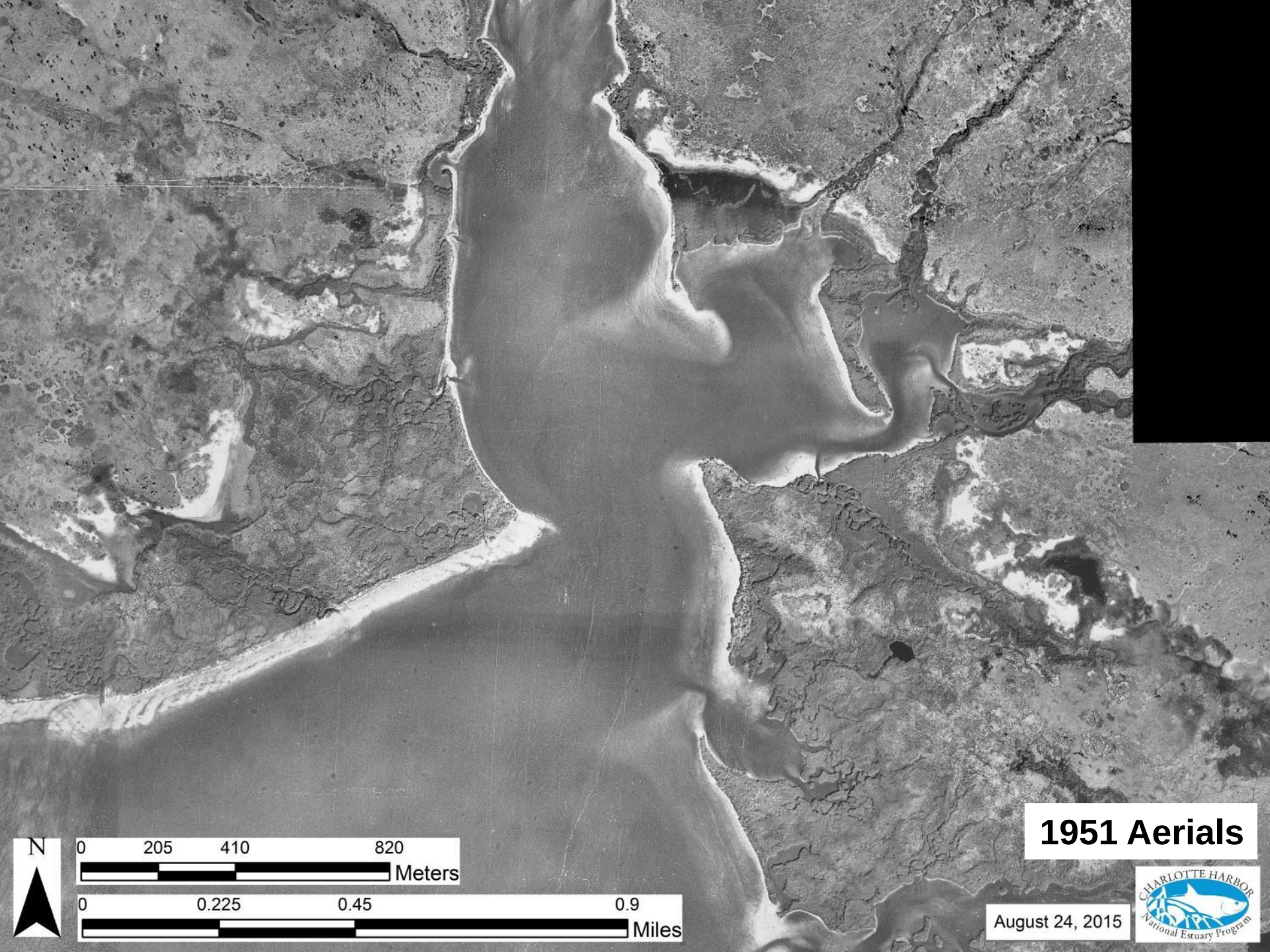
Miles
2014 Aerials
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program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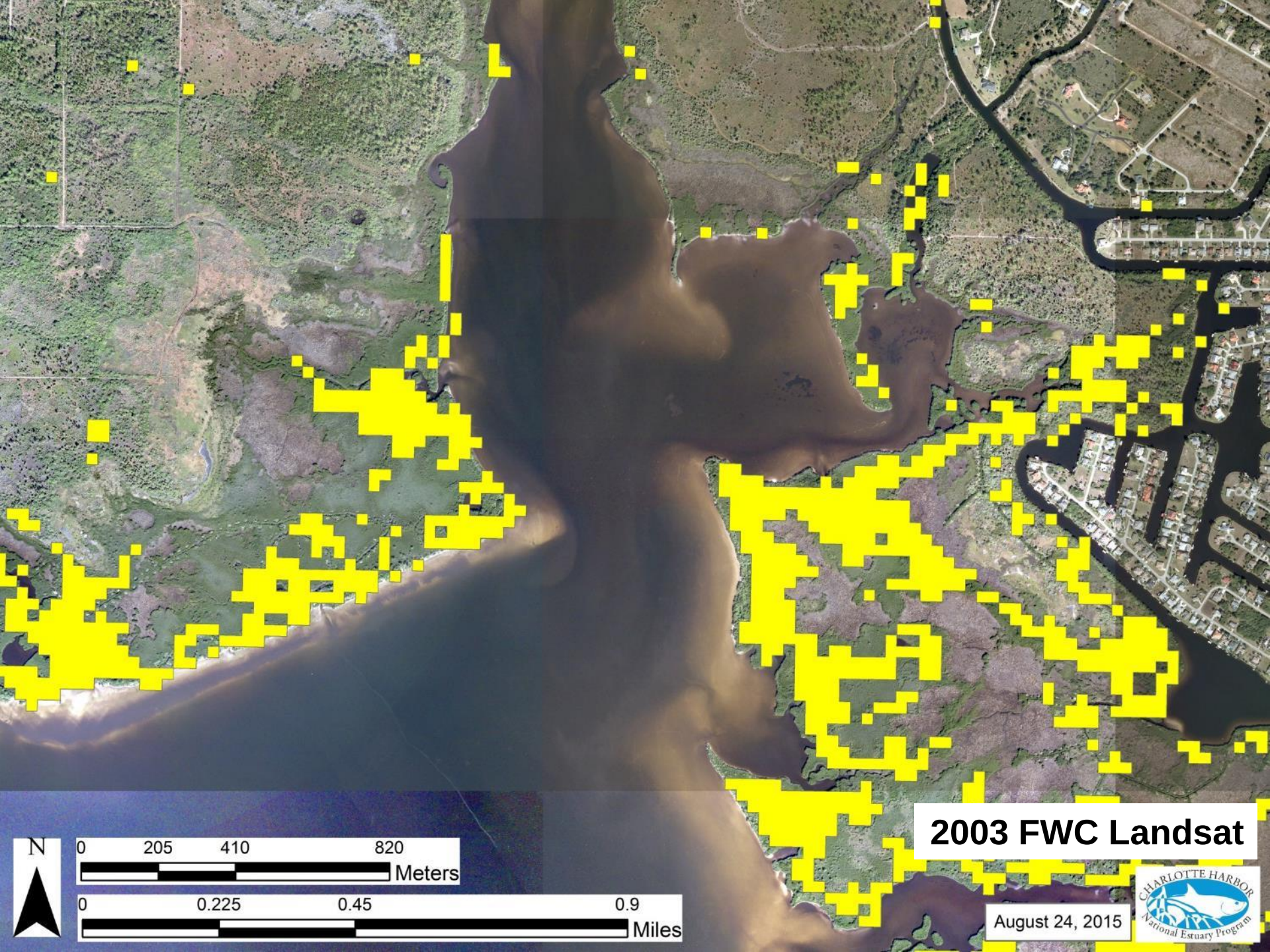
Miles
1951 Aerials
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program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Meters
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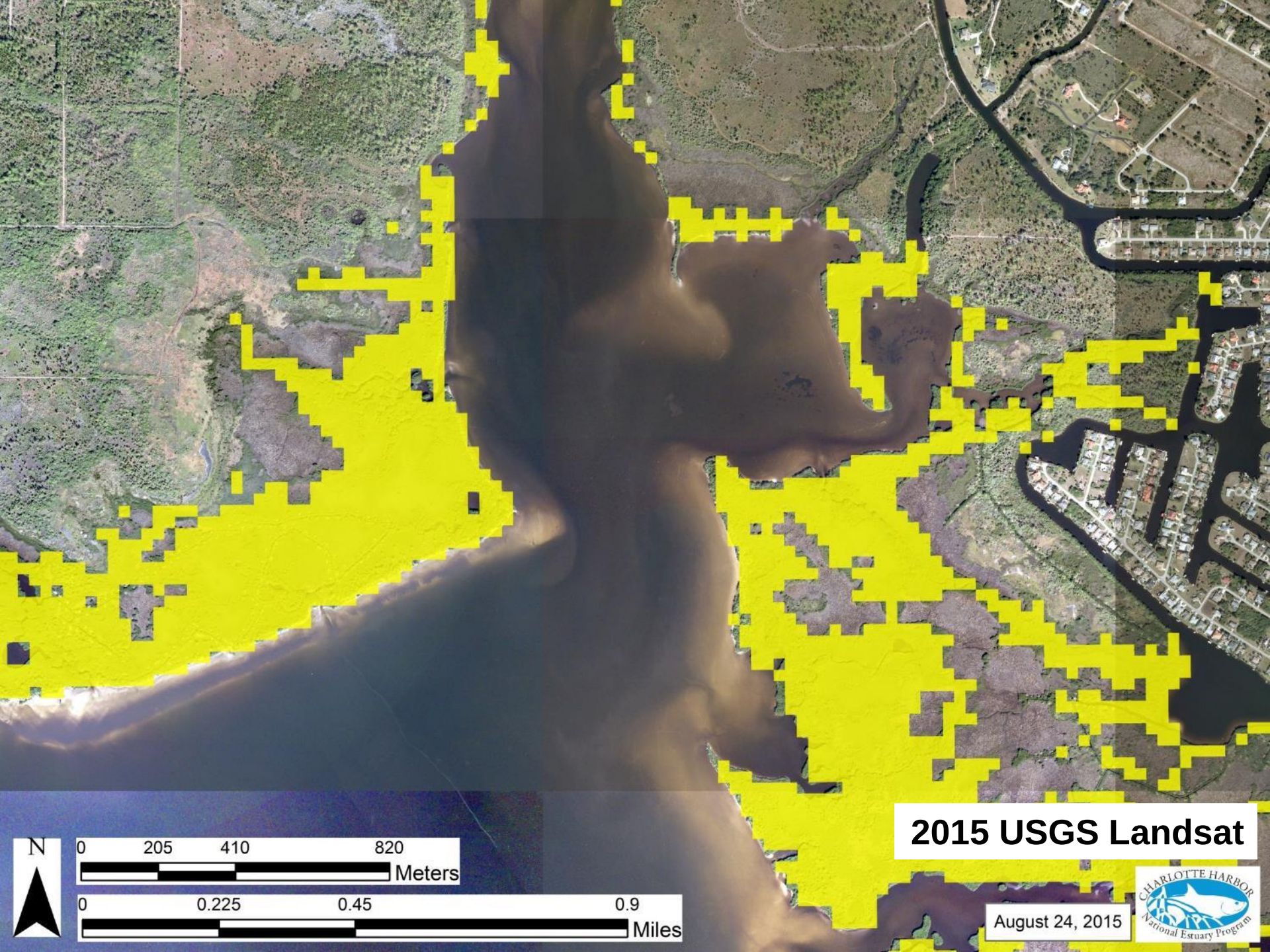
Miles
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program


2015 USGS Landsat
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Meters
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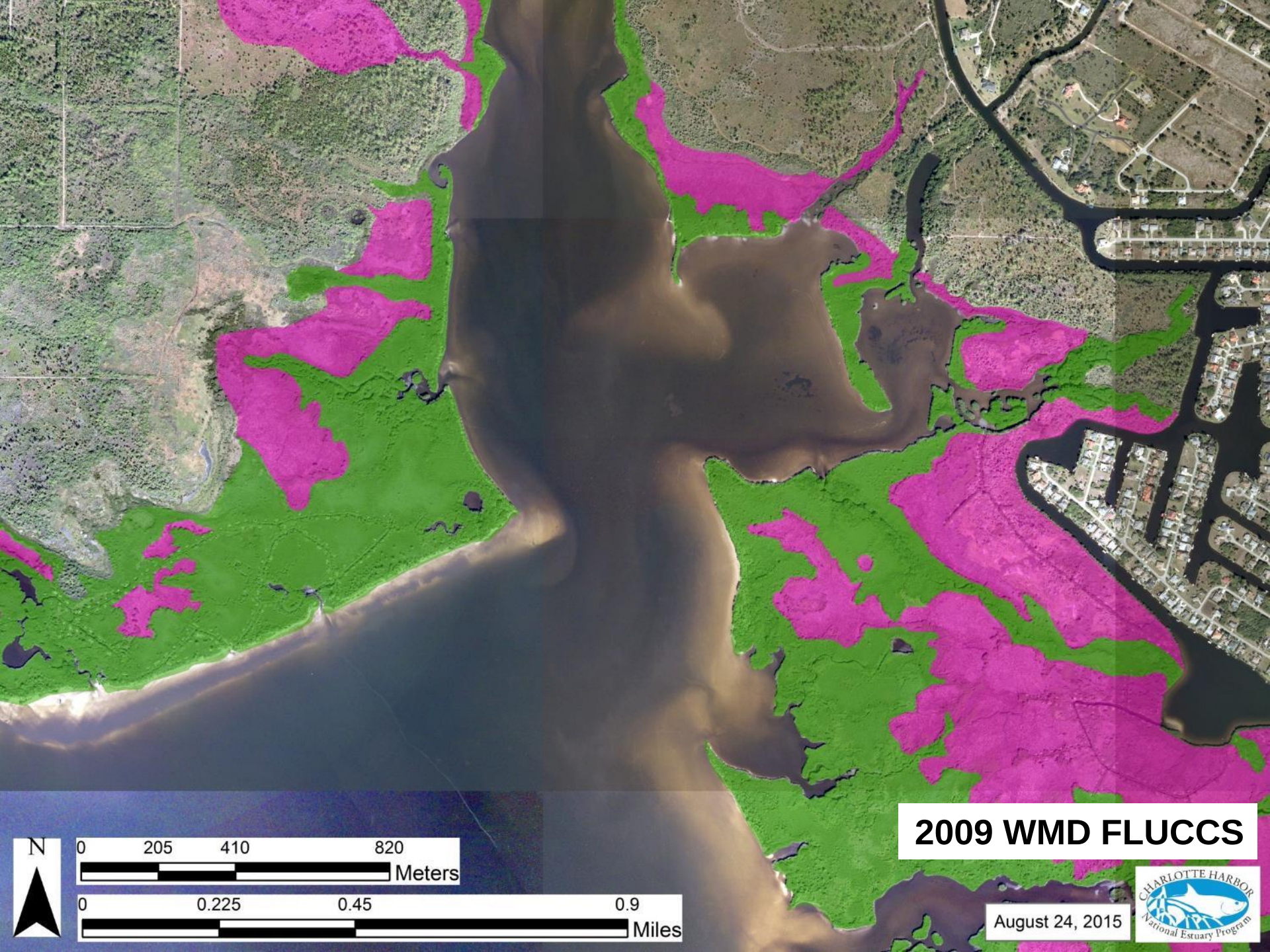
Miles
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program


2009 WMD FLUCCS
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Meters
0 0.225 0.45 0.9
Miles
August 24, 2015
CHARLOTTE HARBOR
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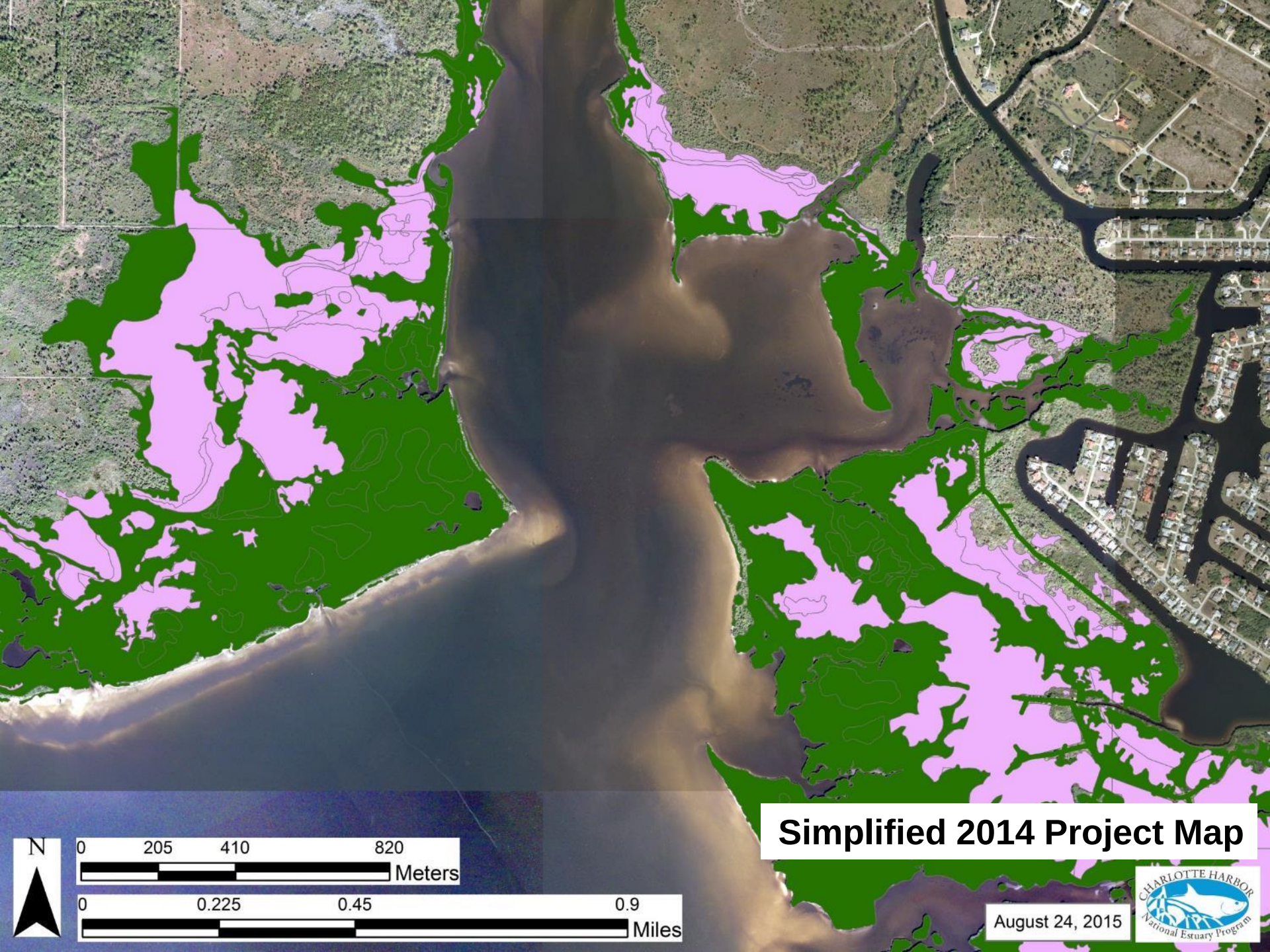
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Meters
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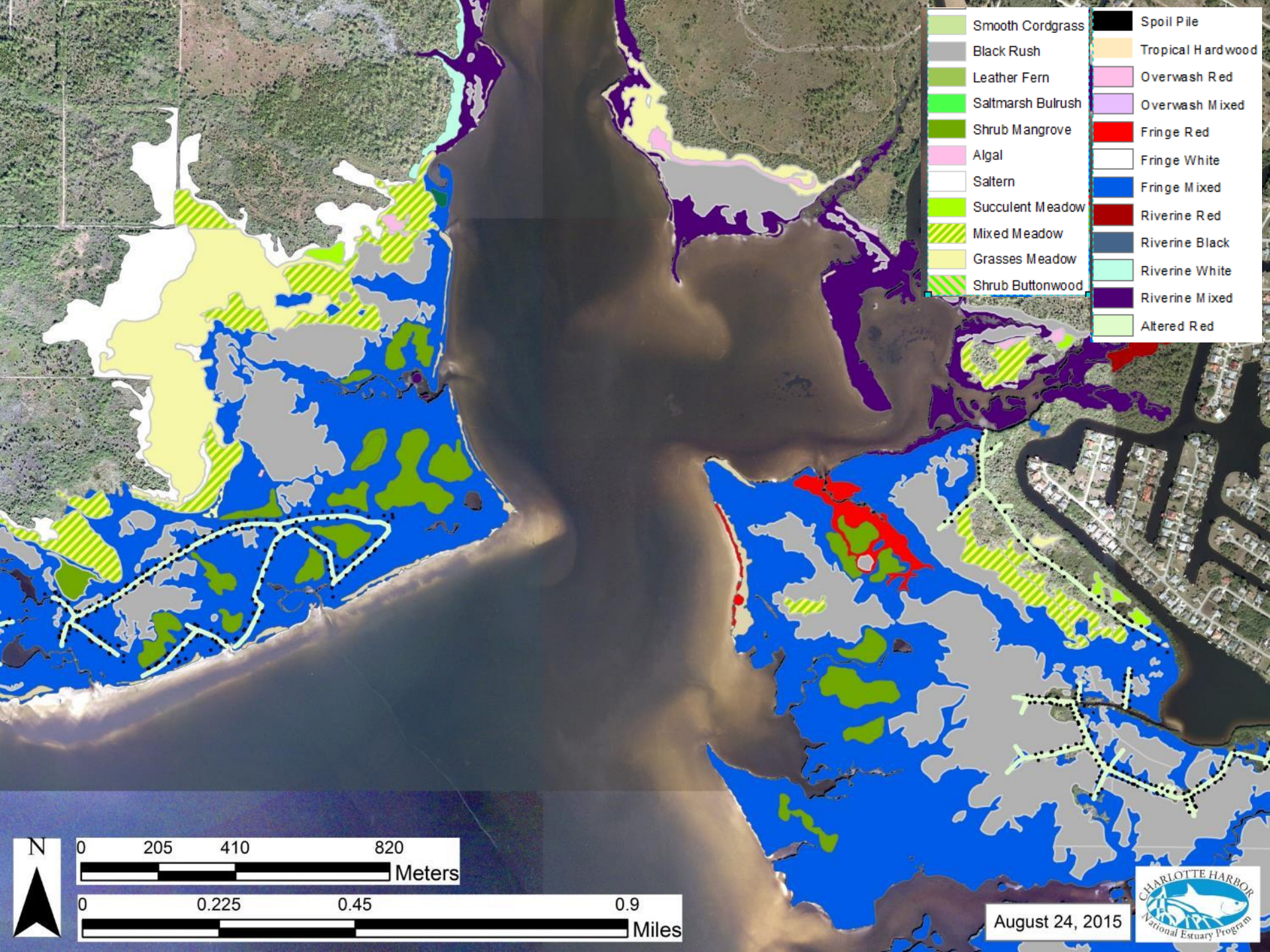
Miles
Simplified 2014 Project Map
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program


Smooth Cordgrass
Black Rush
Leather Fern
Saltmarsh Bulrush
Shrub Mangrove
Algal
Saltern
Succulent Meadow
Mixed Meadow
Grasses Meadow
Shrub Buttonwood
Spoil Pile
Tropical Hardwood
Overwash Red
Overwash Mixed
Fringe Red
Fringe White
Fringe Mixed
Riverine Red
Riverine Black
Riverine White
Riverine Mixed
Altered Red
N
0 205 410 820
Meters
0 0.225 0.45 0.9
Miles
August 24, 2015
CHARLOTTE HARBOR
National Estuary Program

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Terry Tattar