

Creating a Resilient Connecticut Municipal Resilience Planning Assistance Project

HUD Community Development Block Grant
Disaster Recovery Program

CT DOH/DEEP
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Connecticut Department of
Energy and Environmental Protection





Tracking Connecticut's Coast Using Aerial Photography with GIS

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Connecticut Department of Energy and Environmental Protection



Municipal Resilience Planning Assistance Project Task 1

Tidal Wetlands Feature Enhancement in GIS Mapping

- Conduct a coastal aerial photo flight to acquire infrared orthoimages for a means of inventorying and assessing current environmental and human-use conditions along Connecticut's coast and tidal rivers;
- Examine the coastal aerial photos to assess areas of tidal wetlands for internal water features; and,
- Digitize these features within a new GIS layer by comparing the photographs with U.S. Fish & Wildlife Service National Wetlands Inventory data.





Background of the Data



U.S. Fish and Wildlife Service
National Wetlands Inventory

US NWI Map



March 1, 2018

- | | | | | | |
|---|--------------------------------|---|-----------------------------------|---|----------|
|  | Estuarine and Marine Deepwater |  | Freshwater Forested/Shrub Wetland |  | Other |
|  | Estuarine and Marine Wetland |  | Freshwater Pond |  | Lake |
|  | Freshwater Emergent Wetland | | |  | Riverine |

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.



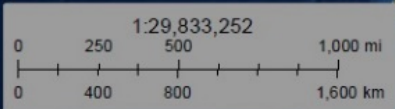
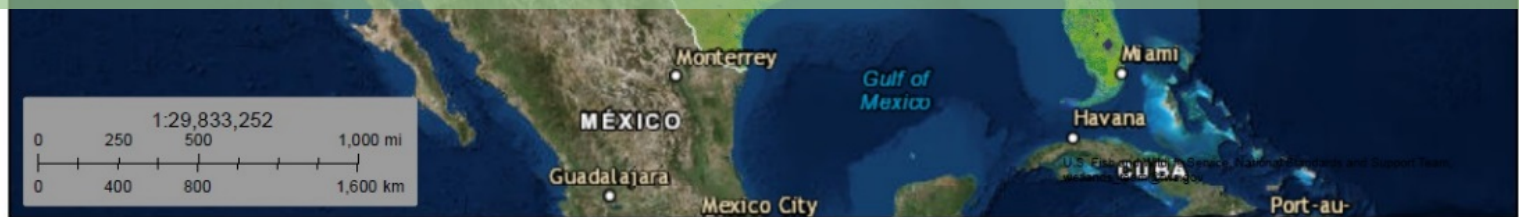
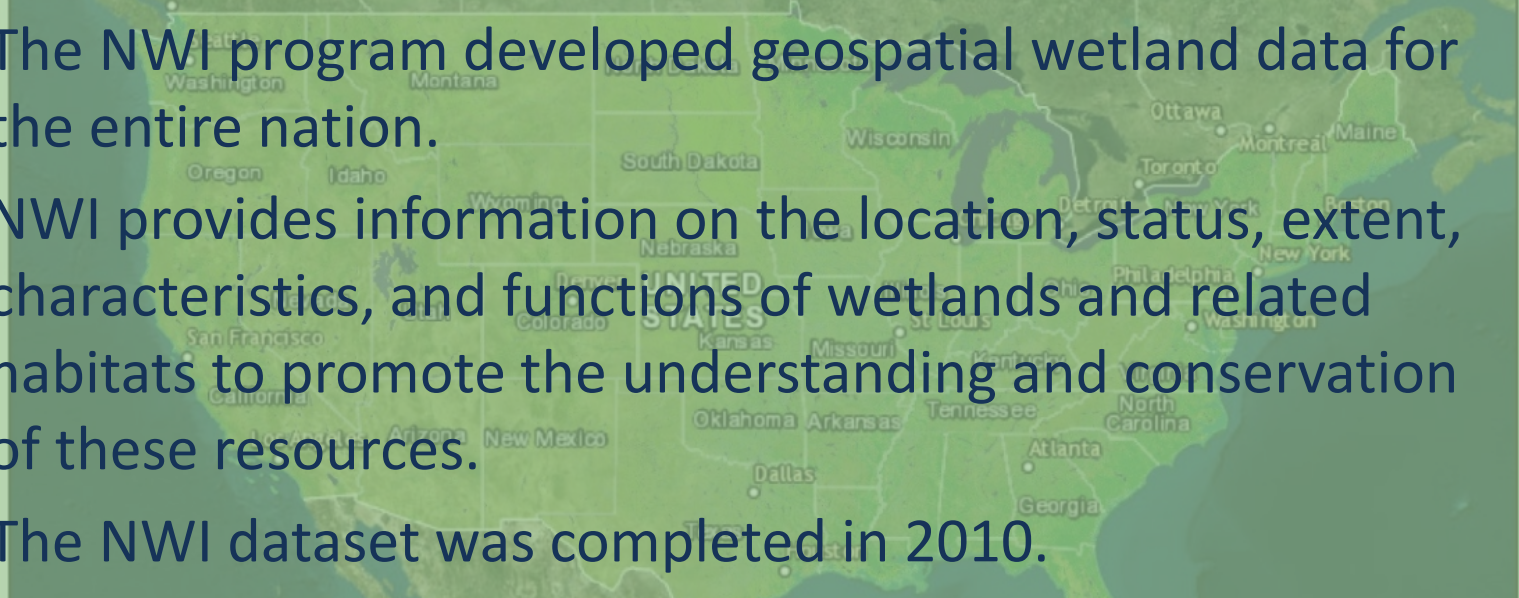
Background of the Data



US NWI Map



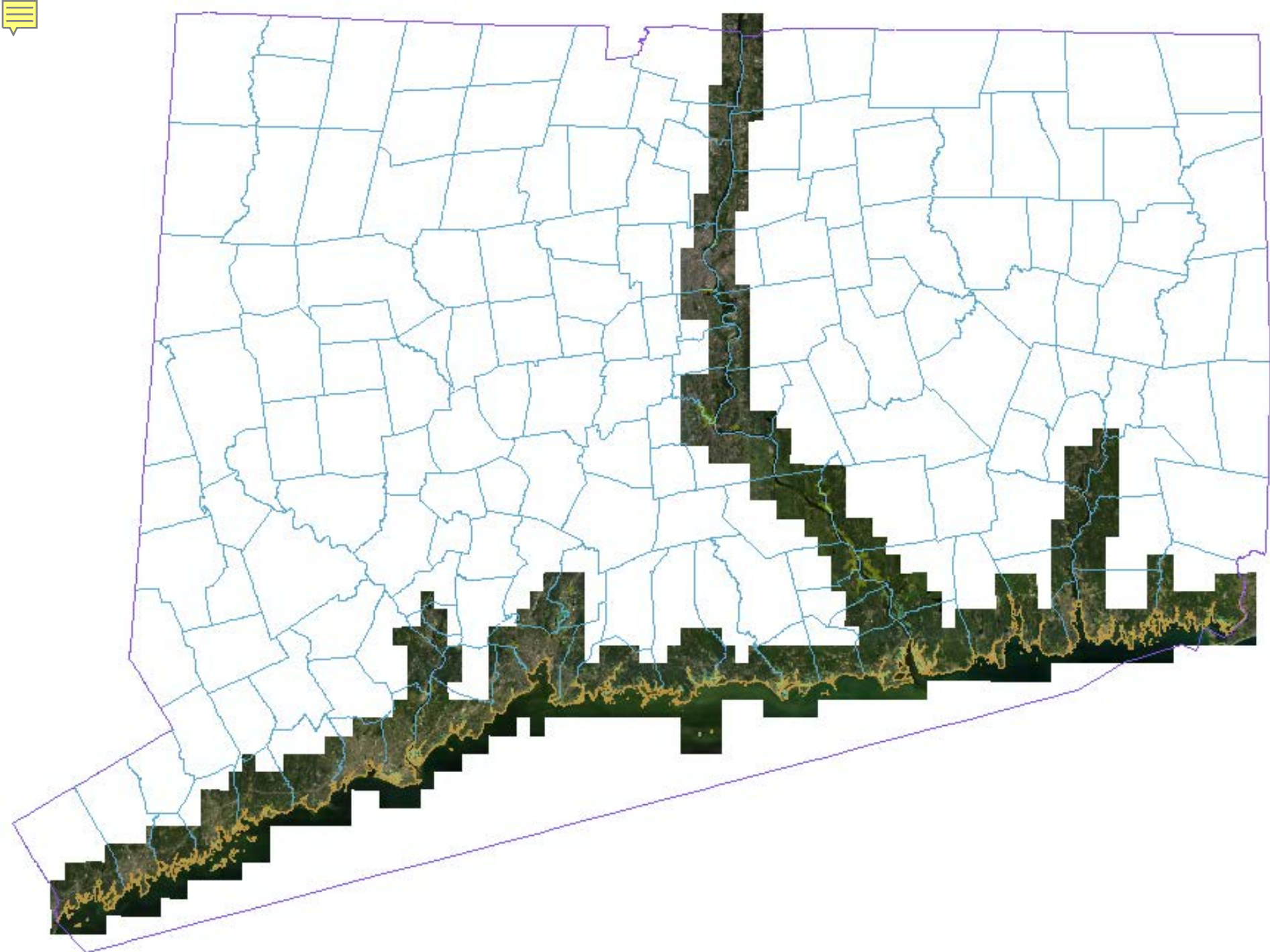
- The NWI program developed geospatial wetland data for the entire nation.
- NWI provides information on the location, status, extent, characteristics, and functions of wetlands and related habitats to promote the understanding and conservation of these resources.
- The NWI dataset was completed in 2010.



March 1, 2018

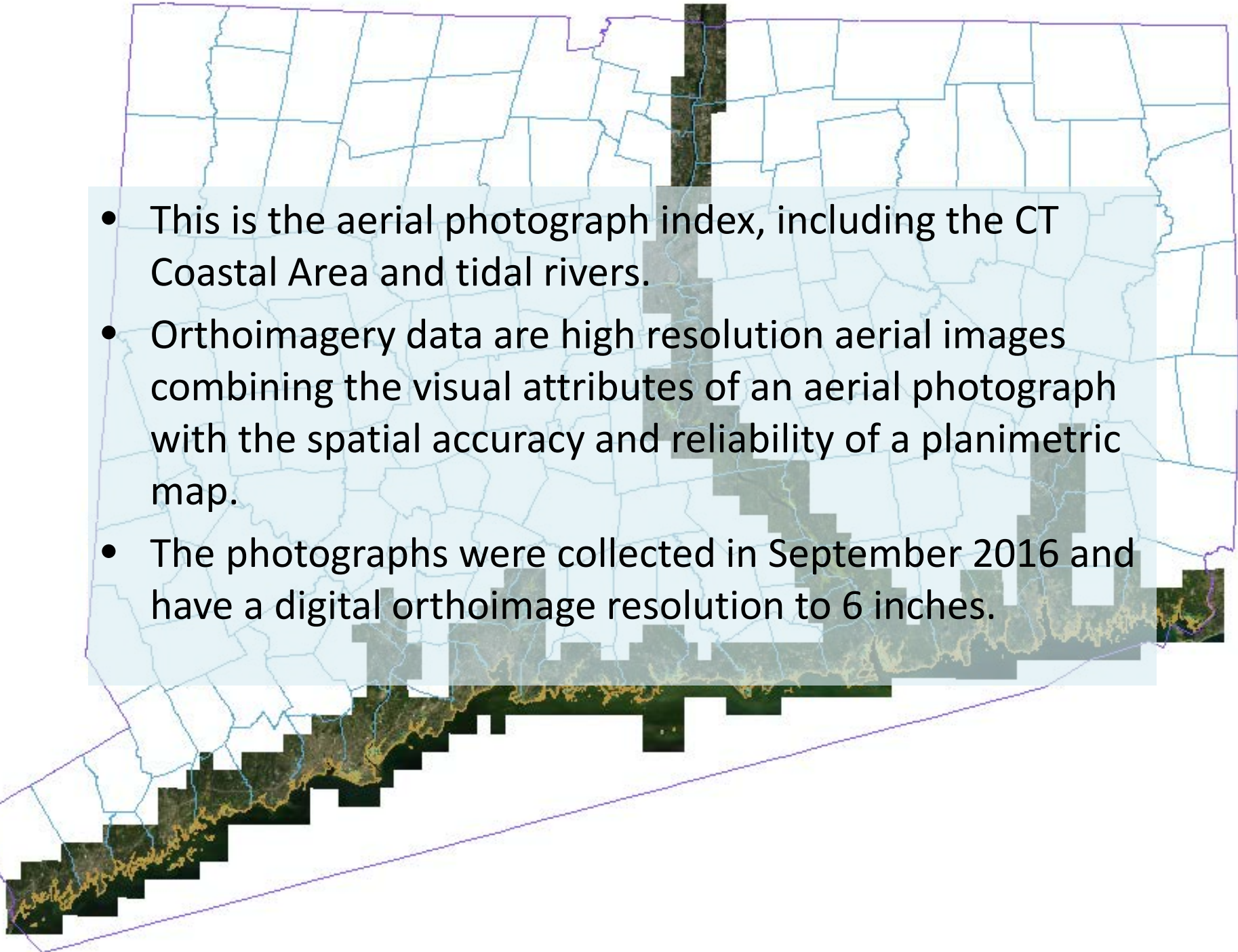
	Estuarine and Marine Deepwater		Freshwater Forested/Shrub Wetland		Other
	Estuarine and Marine Wetland		Freshwater Pond		Riverine
	Freshwater Emergent Wetland		Lake		

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

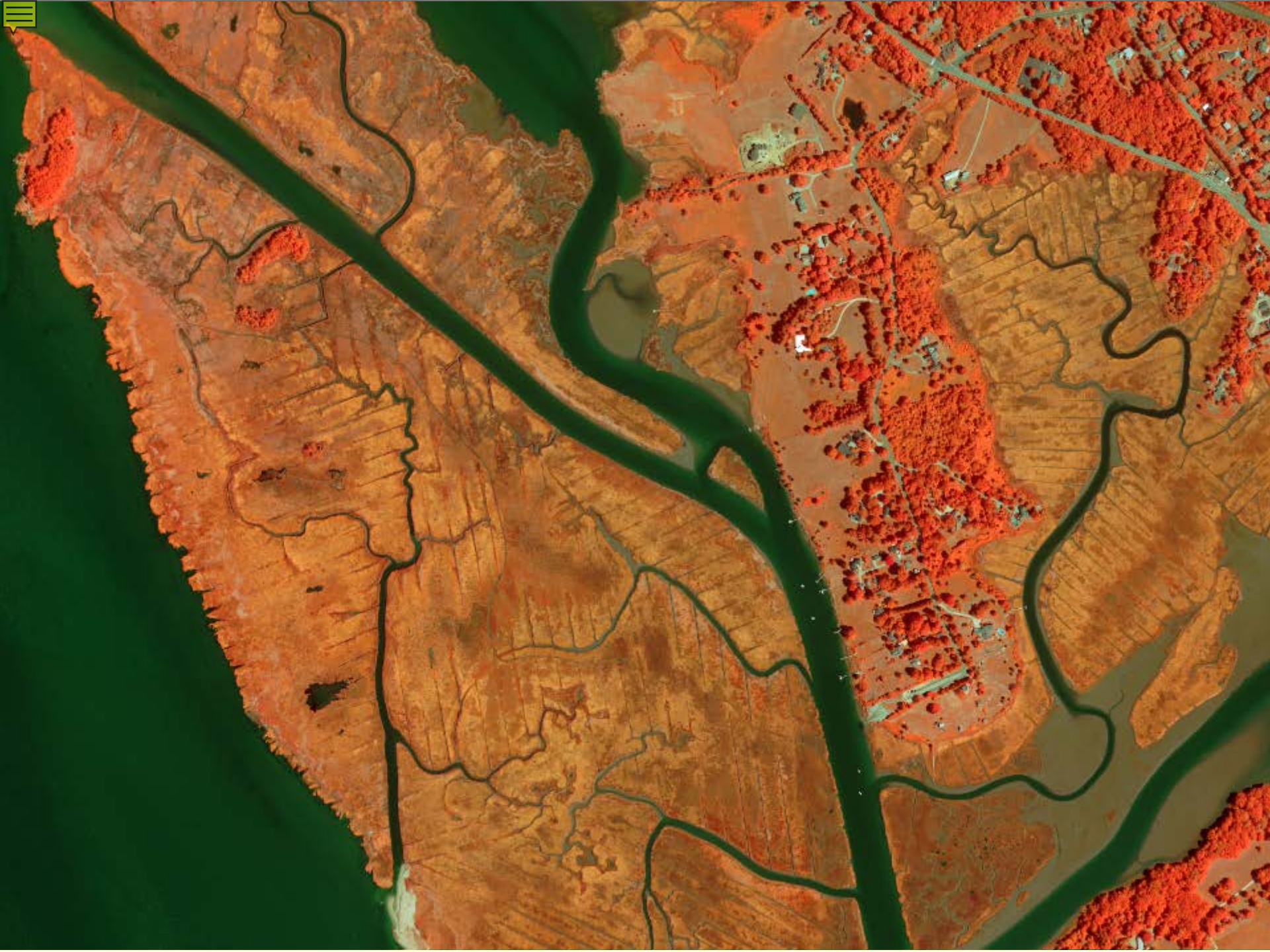


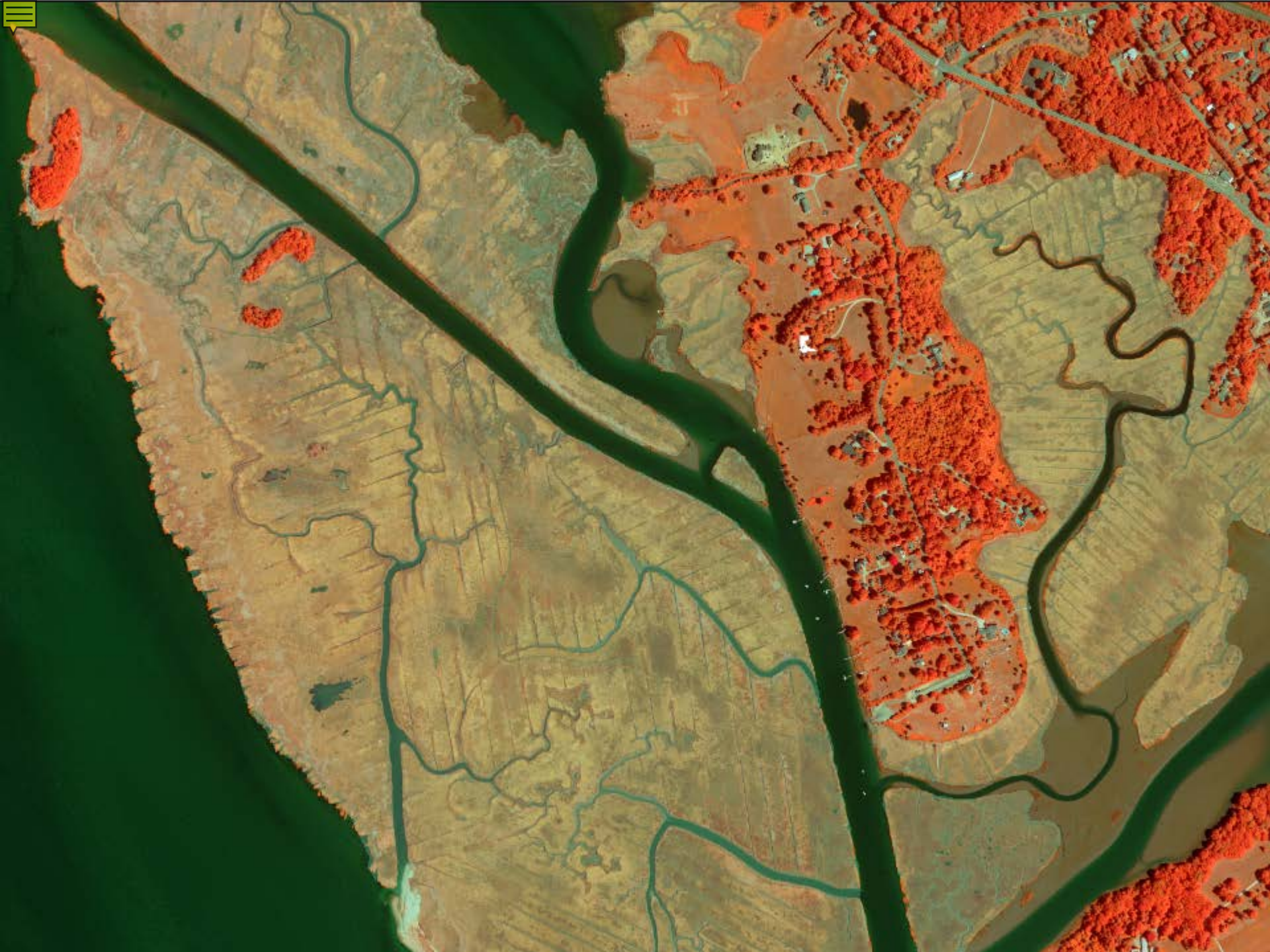


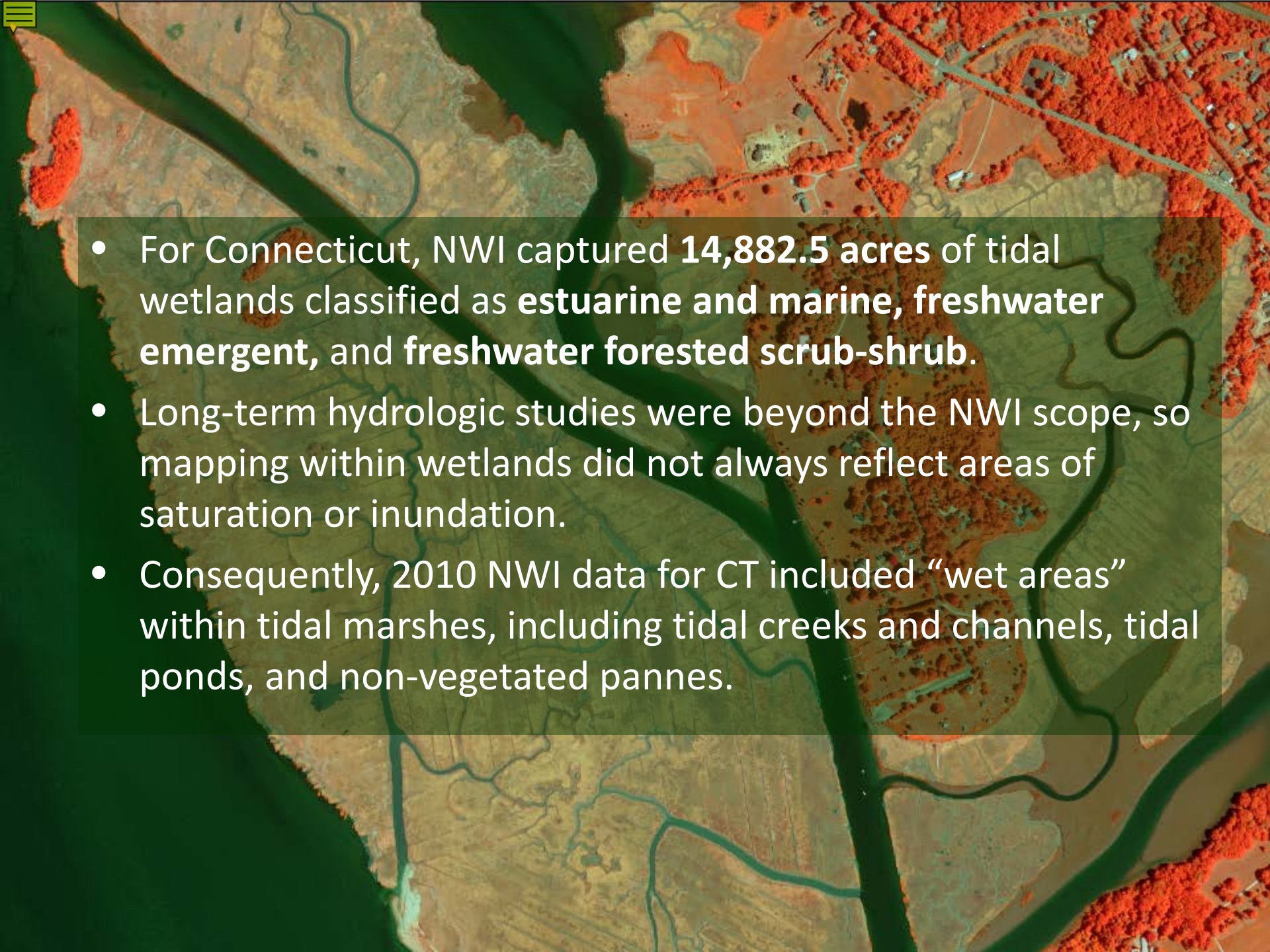
- This is the aerial photograph index, including the CT Coastal Area and tidal rivers.
- Orthoimagery data are high resolution aerial images combining the visual attributes of an aerial photograph with the spatial accuracy and reliability of a planimetric map.
- The photographs were collected in September 2016 and have a digital orthoimage resolution to 6 inches.









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- For Connecticut, NWI captured **14,882.5 acres** of tidal wetlands classified as **estuarine and marine, freshwater emergent, and freshwater forested scrub-shrub**.
 - Long-term hydrologic studies were beyond the NWI scope, so mapping within wetlands did not always reflect areas of saturation or inundation.
 - Consequently, 2010 NWI data for CT included “wet areas” within tidal marshes, including tidal creeks and channels, tidal ponds, and non-vegetated pannes.





25' wide

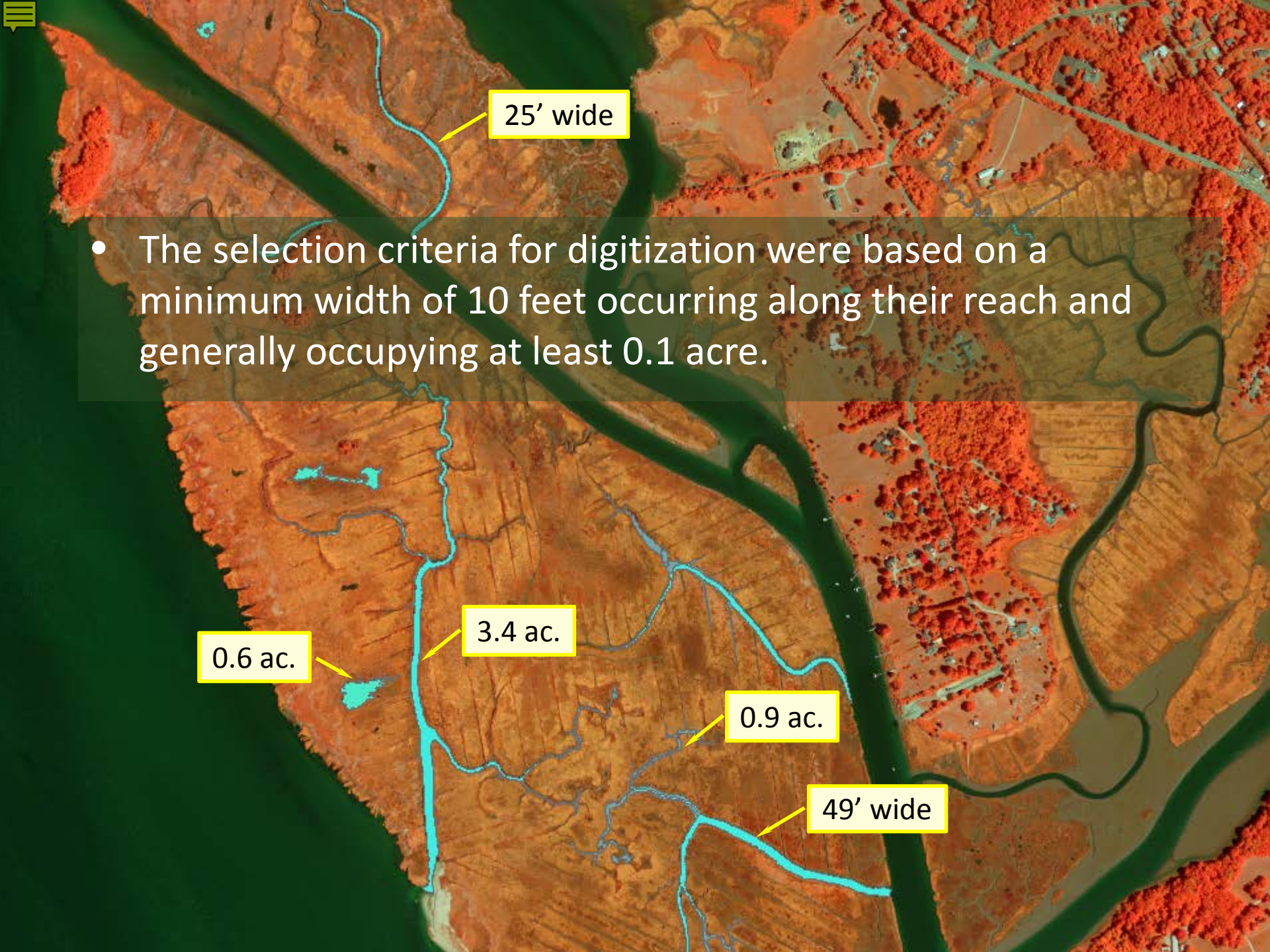
- The selection criteria for digitization were based on a minimum width of 10 feet occurring along their reach and generally occupying at least 0.1 acre.

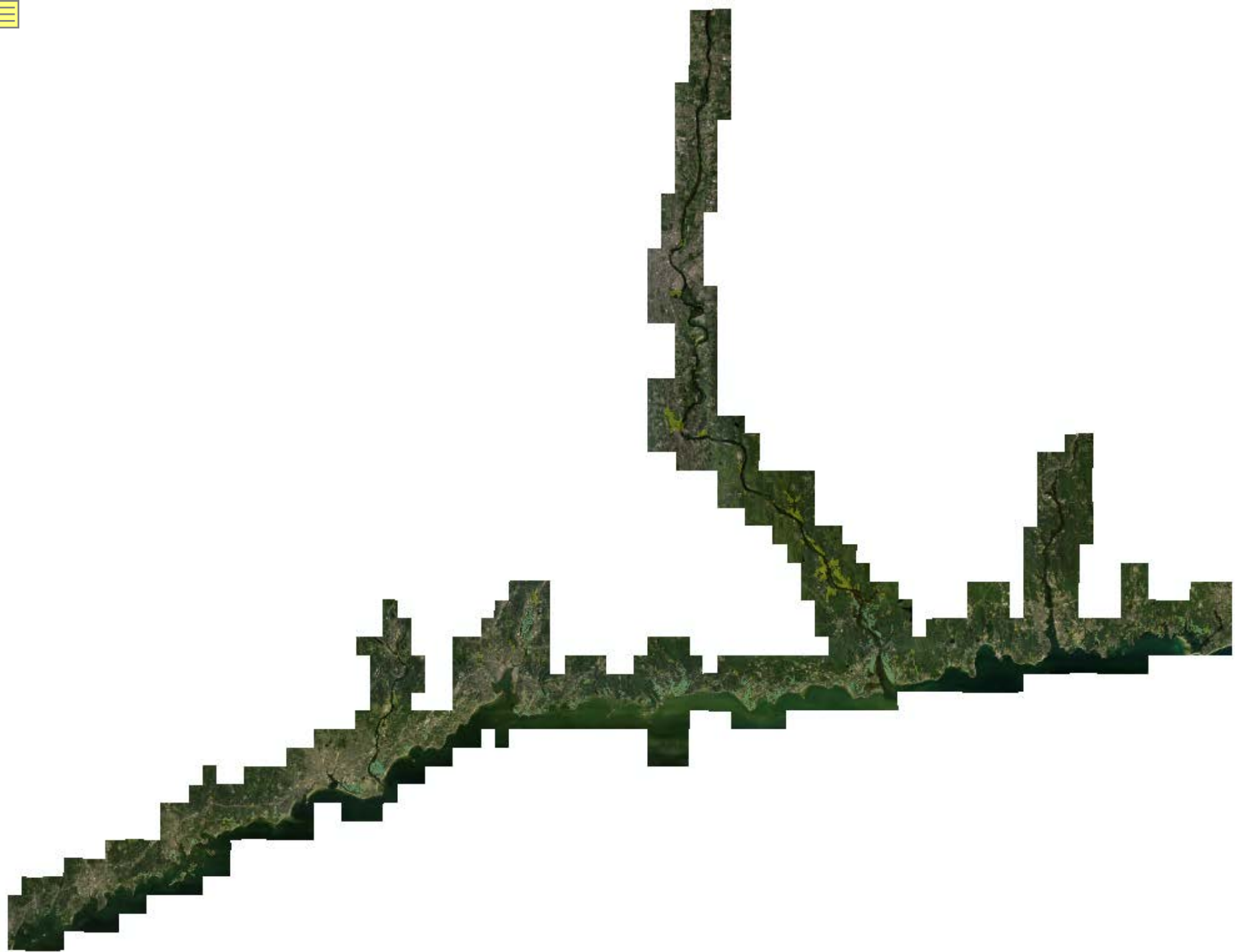
0.6 ac.

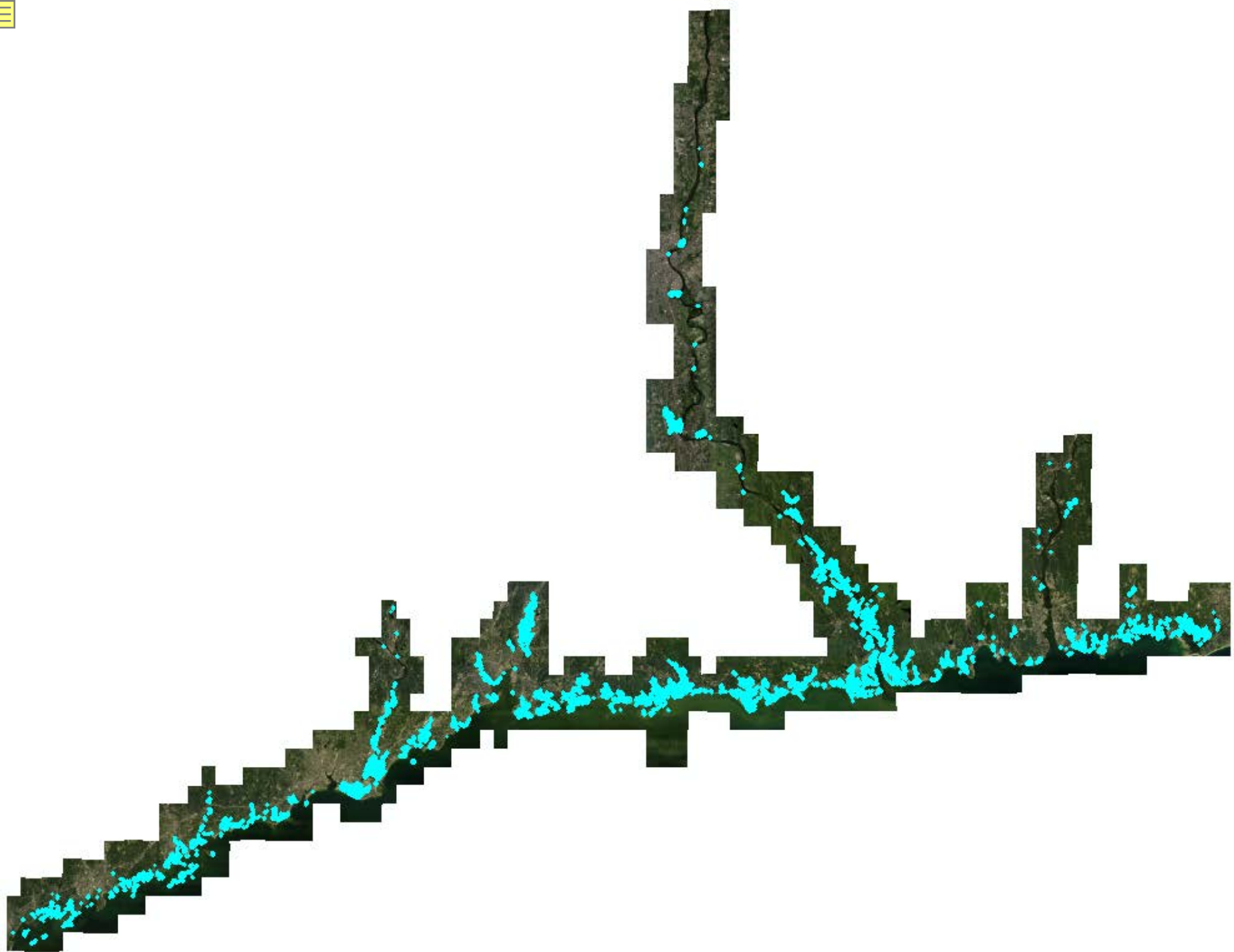
3.4 ac.

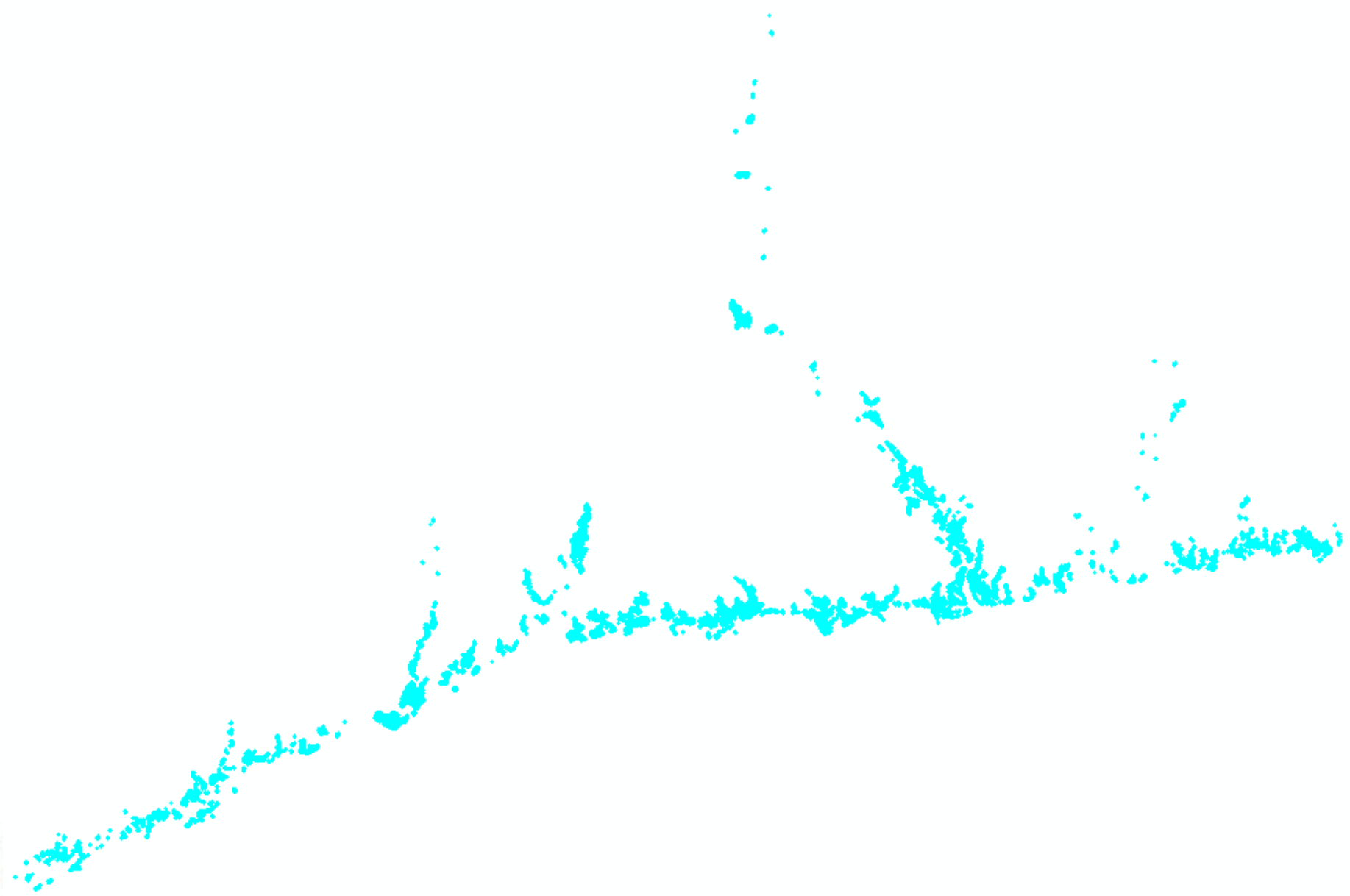
0.9 ac.

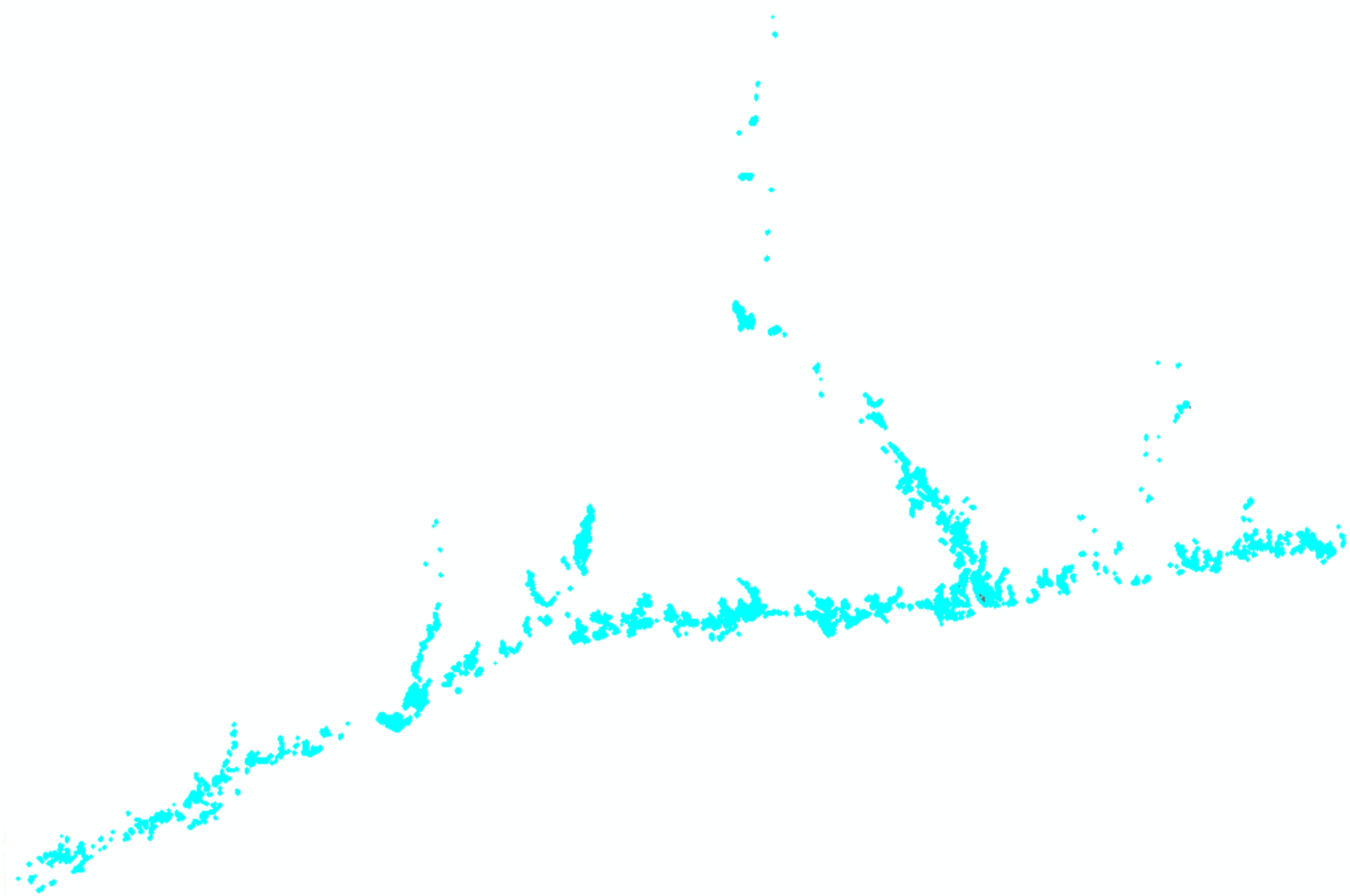
49' wide







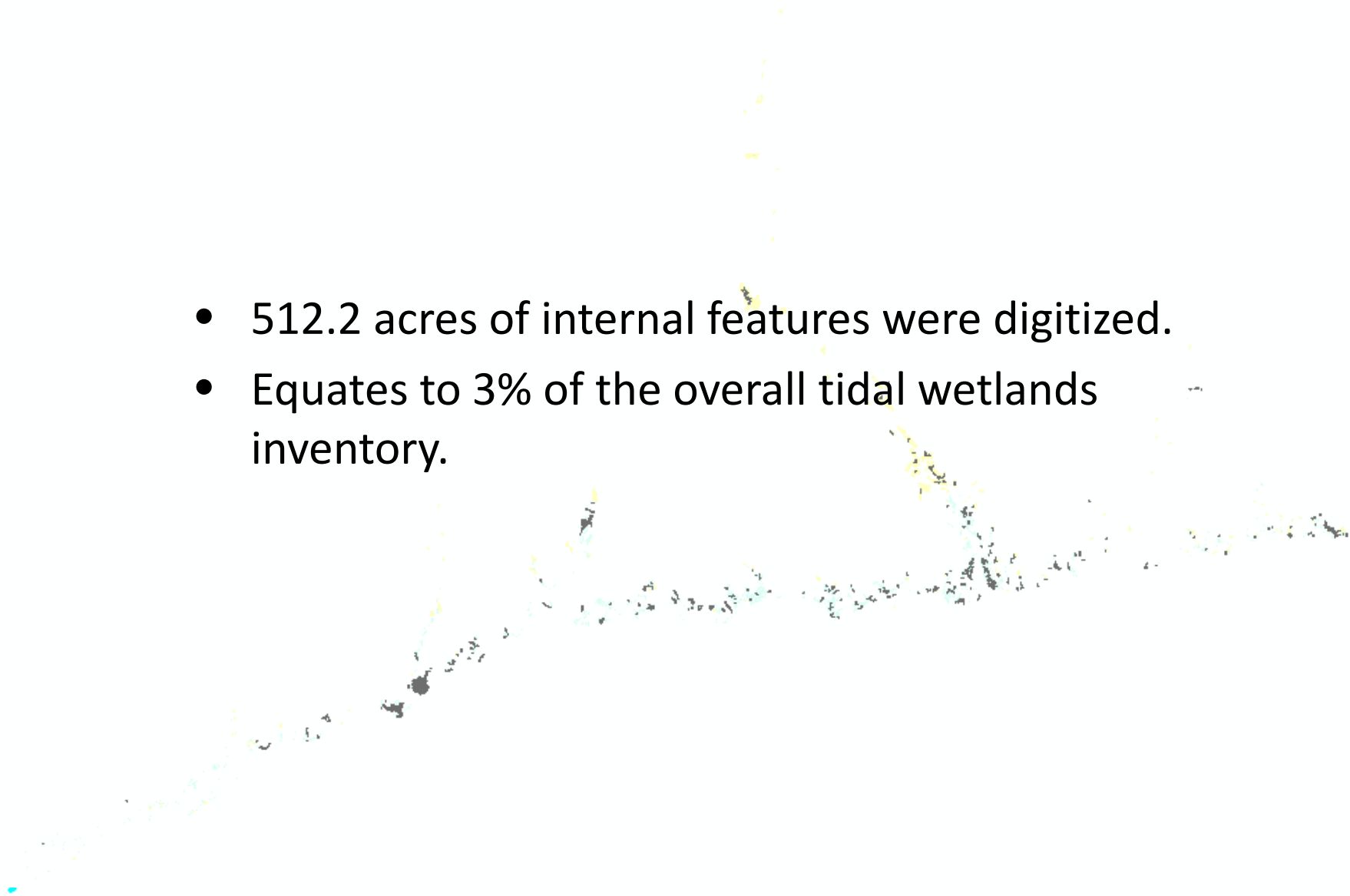






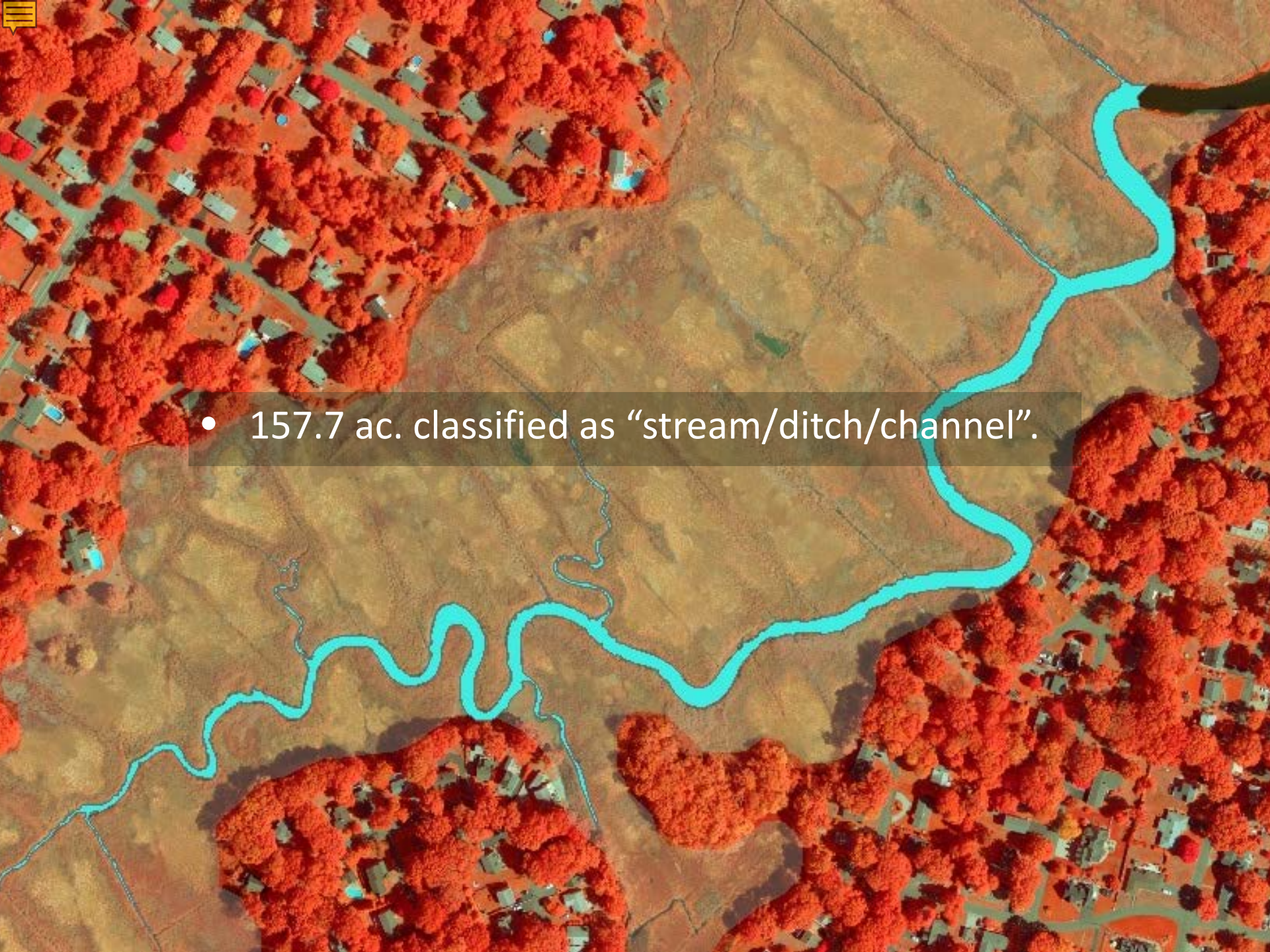


- 512.2 acres of internal features were digitized.
- Equates to 3% of the overall tidal wetlands inventory.





- 157.7 ac. classified as “stream/ditch/channel”.



- 
- An aerial photograph of a large, irregularly shaped pond. The pond is filled with water and is highlighted with a solid cyan color. The surrounding land is brown and textured, likely representing soil or vegetation. A dark line, possibly a road or boundary, runs diagonally across the upper left and lower right portions of the image. In the top left corner, there is a small yellow icon of a speech bubble with three horizontal lines inside.
- 20.5 ac. classified as “pond/pool”.



- 0.9 ac. classified as “upland island”.



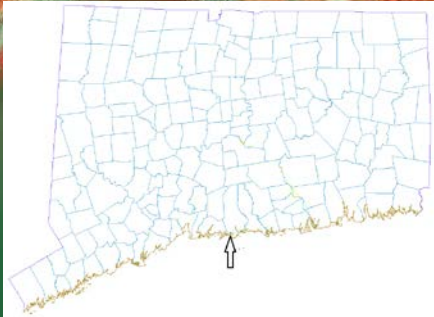
- 333.1 ac. classified as “saturated (non-vegetated) wetland”.



Applicability of the Data

- Purpose: to provide more accurate values for the overall area of vegetated tidal wetlands, using comparative quantitative analysis.
- These values are useful for examining periodic changes in tidal wetlands in order to develop strategies for their continued preservation and protection.
- Quantifying functioning tidal wetlands in combination with other GIS data can facilitate future policy development in part with other resilience measures.





Leetes Island Marsh
Guilford



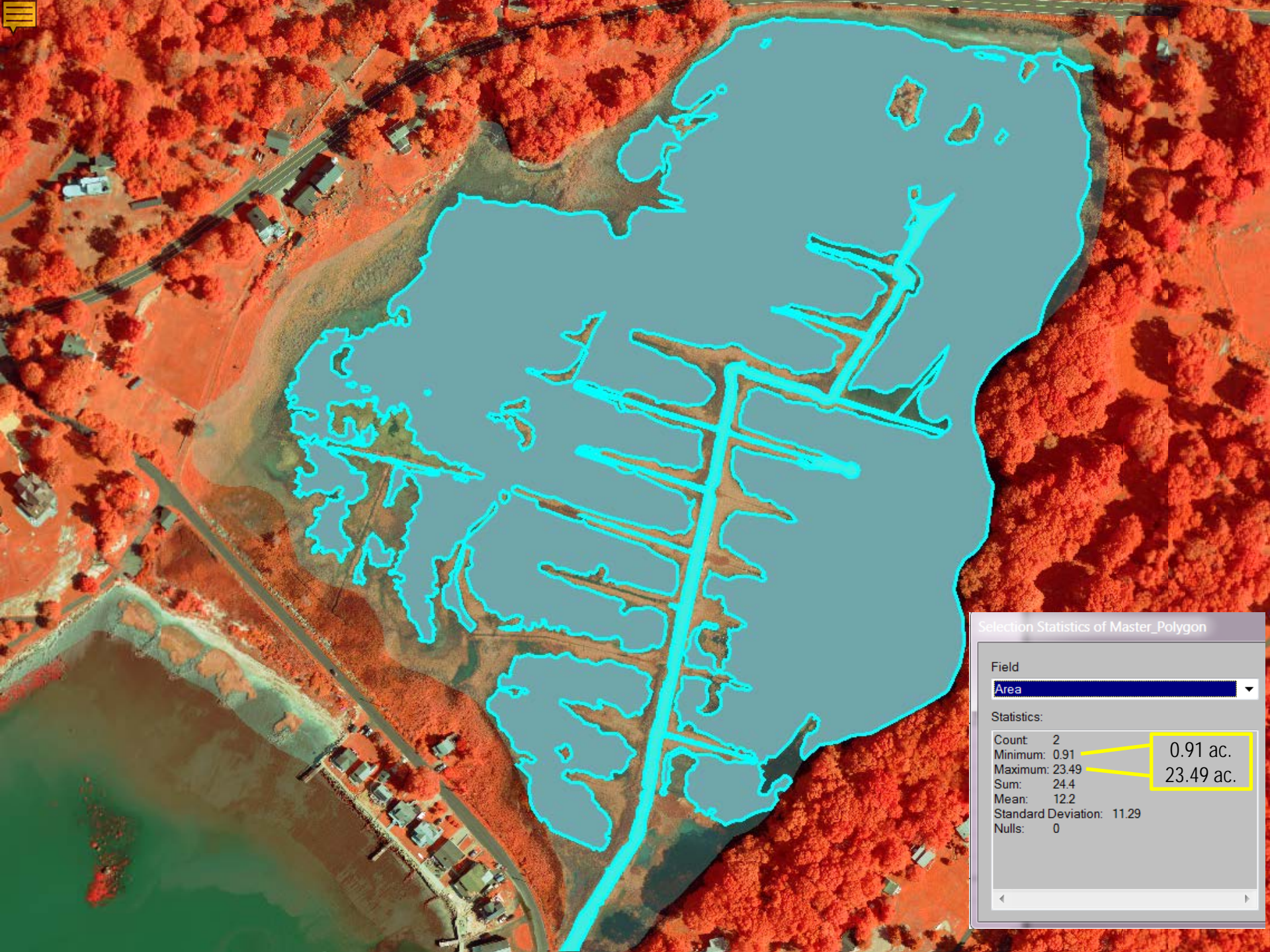
Selection Statistics of CT_2010_NWL_TidalWetlands

Field
Acres

Statistics:

Count:	2
Minimum:	2.822343
Maximum:	32.337683
Sum:	35.160026
Mean:	17.580013
Standard Deviation:	14.75767
Nulls:	0

35.16 ac.



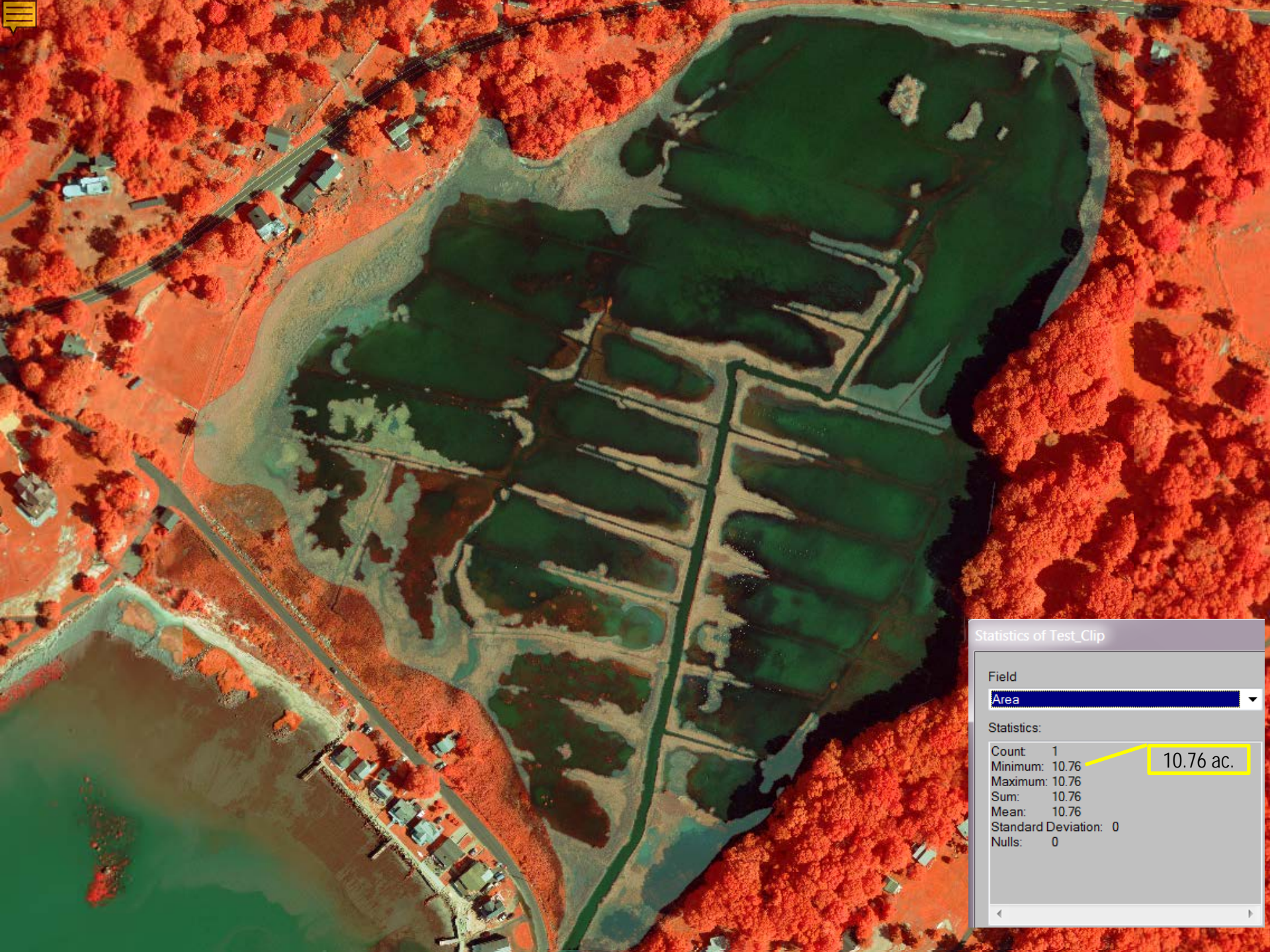
Selection Statistics of Master_Polygon

Field
Area

Statistics:

Count	2
Minimum:	0.91
Maximum:	23.49
Sum:	24.4
Mean:	12.2
Standard Deviation:	11.29
Nulls:	0

0.91 ac.
23.49 ac.



Statistics of Test_Clip

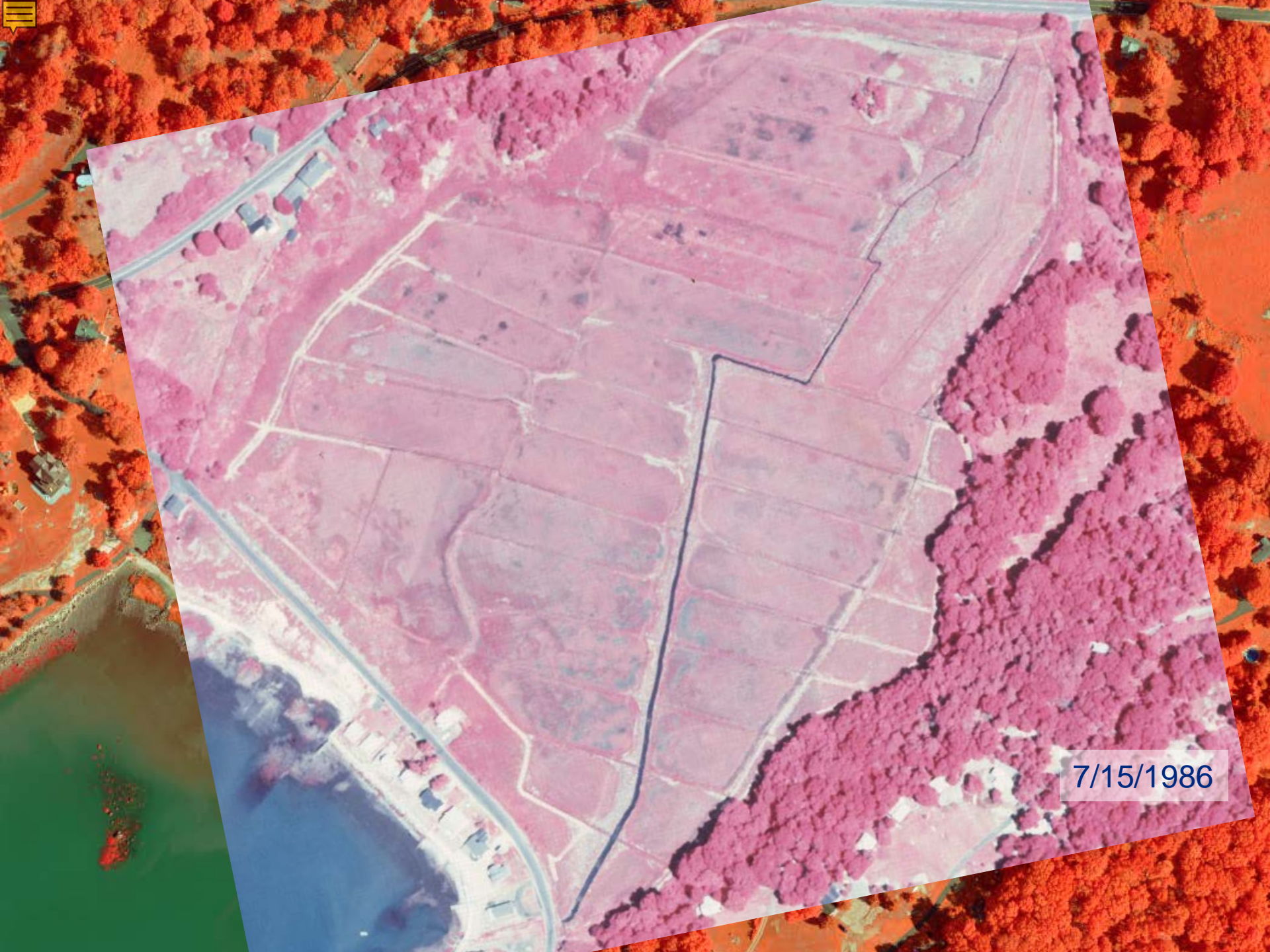
Field
Area

Statistics:

Count:	1	10.76 ac.
Minimum:	10.76	
Maximum:	10.76	
Sum:	10.76	
Mean:	10.76	
Standard Deviation:	0	
Nulls:	0	



9/6/2016



7/15/1986



7/3/1990



8/8/1995



9/6/2000



7/12/2005



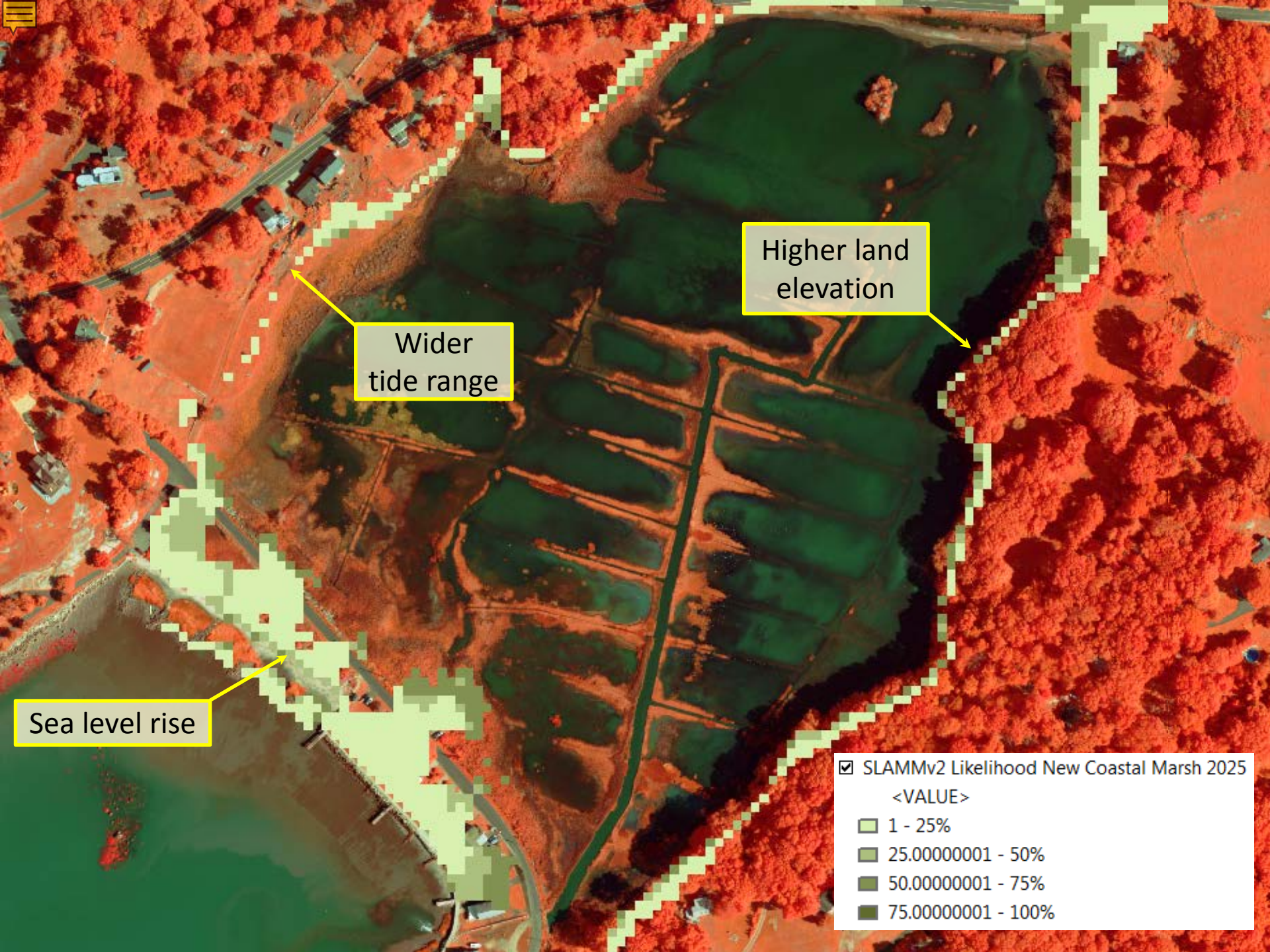
8/14/2010



9/6/2016



- SLAMMv2 Likelihood New Coastal Marsh 2025
<VALUE>
- 1 - 25%
 - 25.00000001 - 50%
 - 50.00000001 - 75%
 - 75.00000001 - 100%







Higher land elevation

Wider tide range

Sea level rise

SLAMMv2 Likelihood New Coastal Marsh 2025
<VALUE>

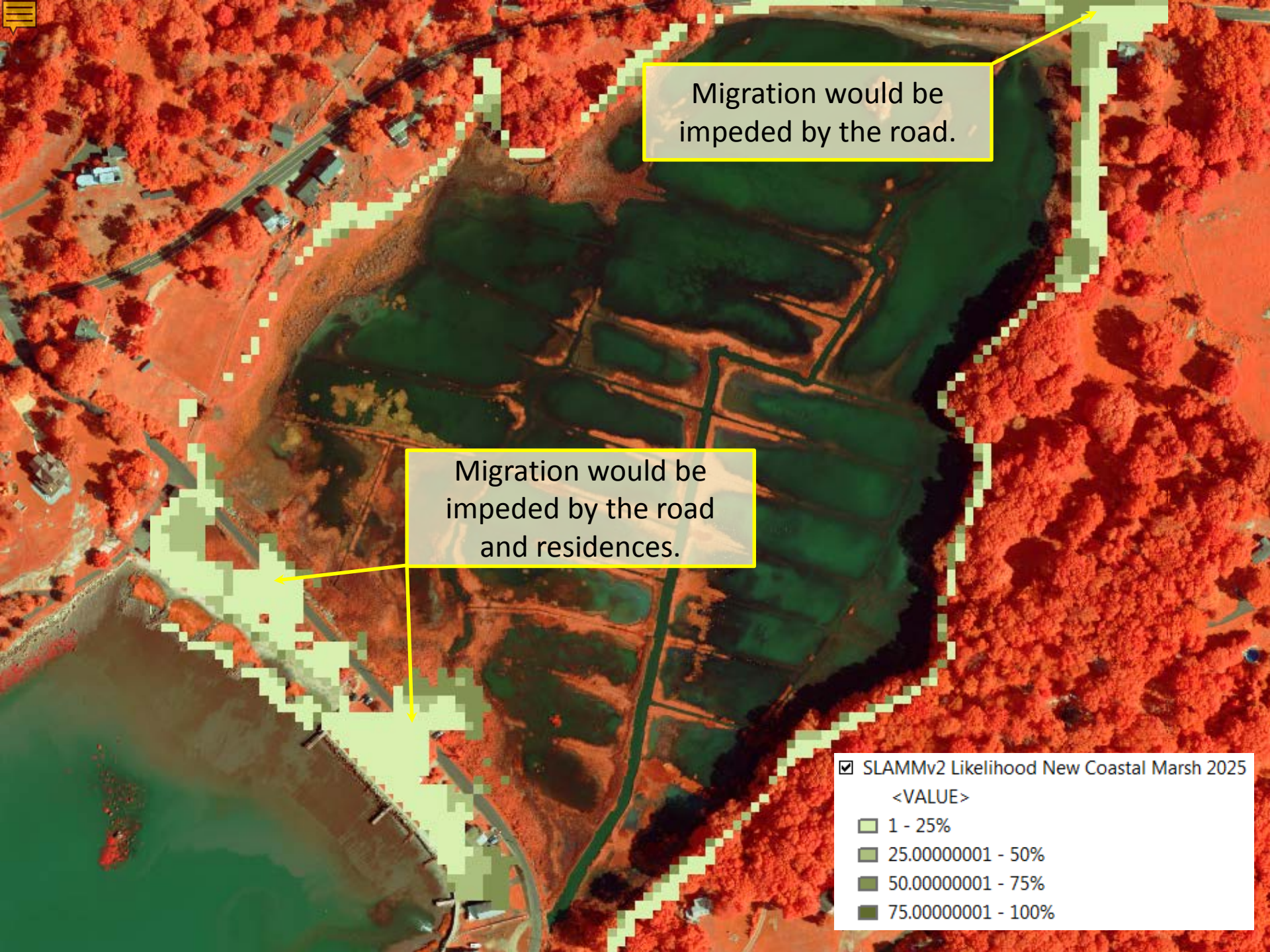
	1 - 25%
	25.00000001 - 50%
	50.00000001 - 75%
	75.00000001 - 100%



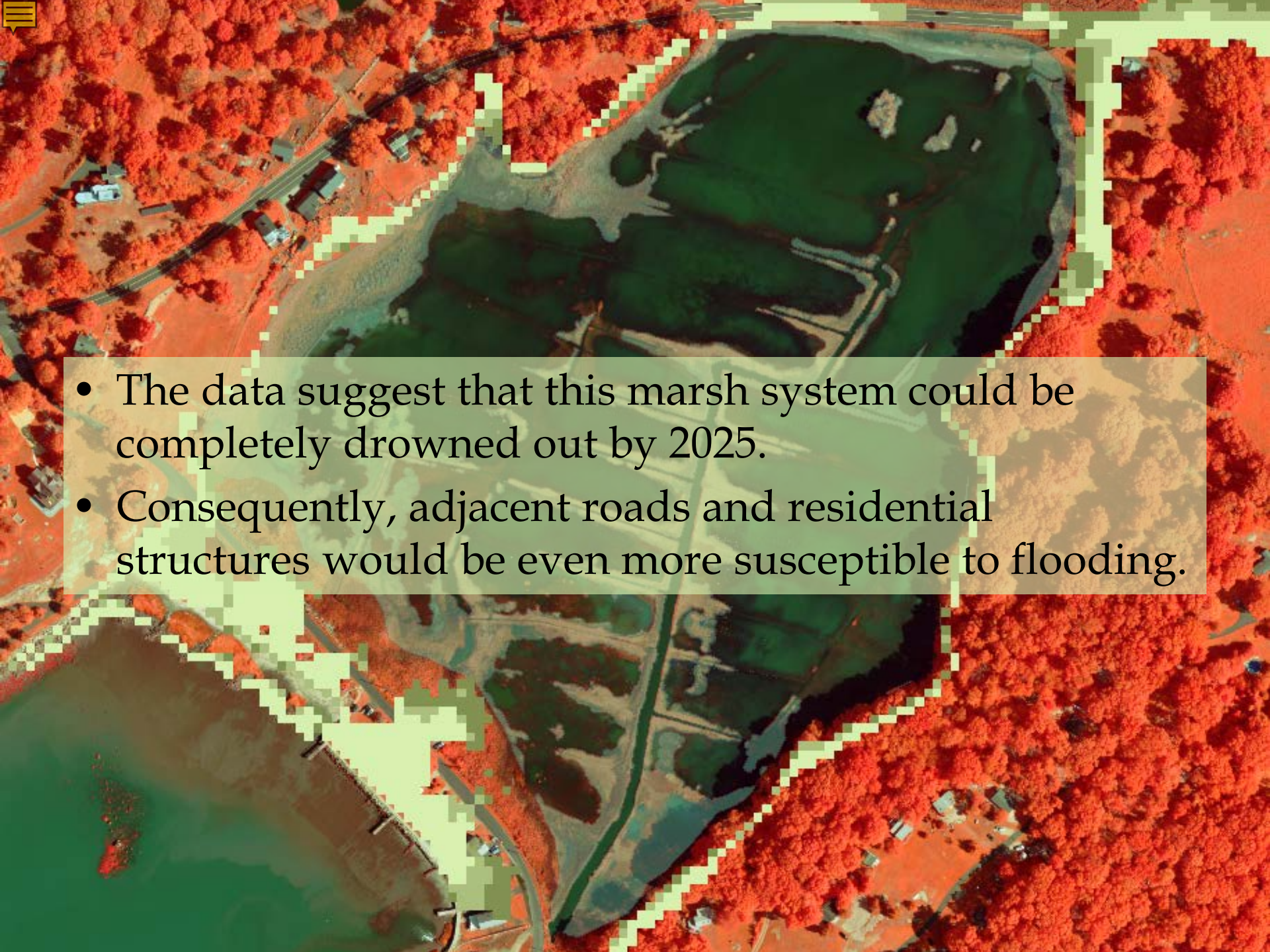
SLAMMv2 Likelihood New Coastal Marsh 2025

<VALUE>

- 1 - 25%
- 25.00000001 - 50%
- 50.00000001 - 75%
- 75.00000001 - 100%

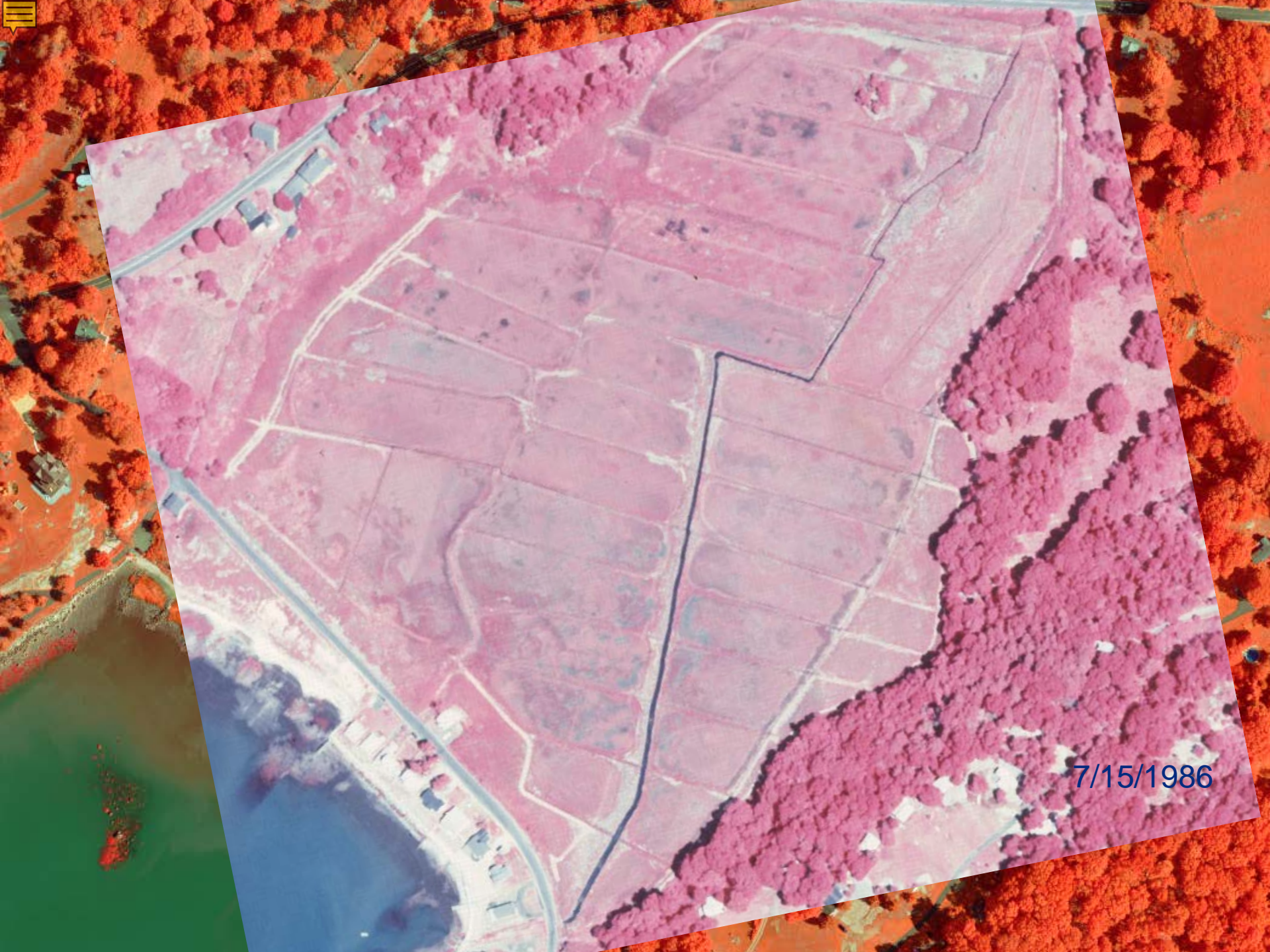




- 
- An aerial photograph of a marsh system, showing a large, irregularly shaped body of water with several smaller ponds and channels. The surrounding area is densely wooded with trees displaying vibrant autumn foliage in shades of orange, red, and yellow. A road and some residential structures are visible on the left side of the image. A semi-transparent text box is overlaid on the center of the image, containing two bullet points.
- The data suggest that this marsh system could be completely drowned out by 2025.
 - Consequently, adjacent roads and residential structures would be even more susceptible to flooding.



8/8/1995



7/15/1986

Section 22
Connecticut

Wetlands Restoration Investigation
Leetes Island Salt Marsh
Guilford, Connecticut

March 1994



US Army Corps
of Engineers
New England Division

Wetlands Restoration Investigation
Leetes Island Salt Marsh
Guilford, Connecticut

An emerging problem for tidal wetlands throughout the U.S. is the apparent increased rate at which sea level is rising. In marshes where there is an imbalance between rising sea level and vertical peat growth, subsidence and loss of vegetation occurs. Recent studies have shown significant changes in the vegetation of southeastern Connecticut salt marshes which are most likely due to accelerated sea level rise. In southwestern Connecticut, the loss of extensive areas of Salt Marsh Cordgrass is believed to be the result of sea level rise.

Sea level rise impacts are of particular concern in drained and subsided marshes such as Leetes Island where there has been a major imbalance between sea level rise and vertical accretion.

March 1994

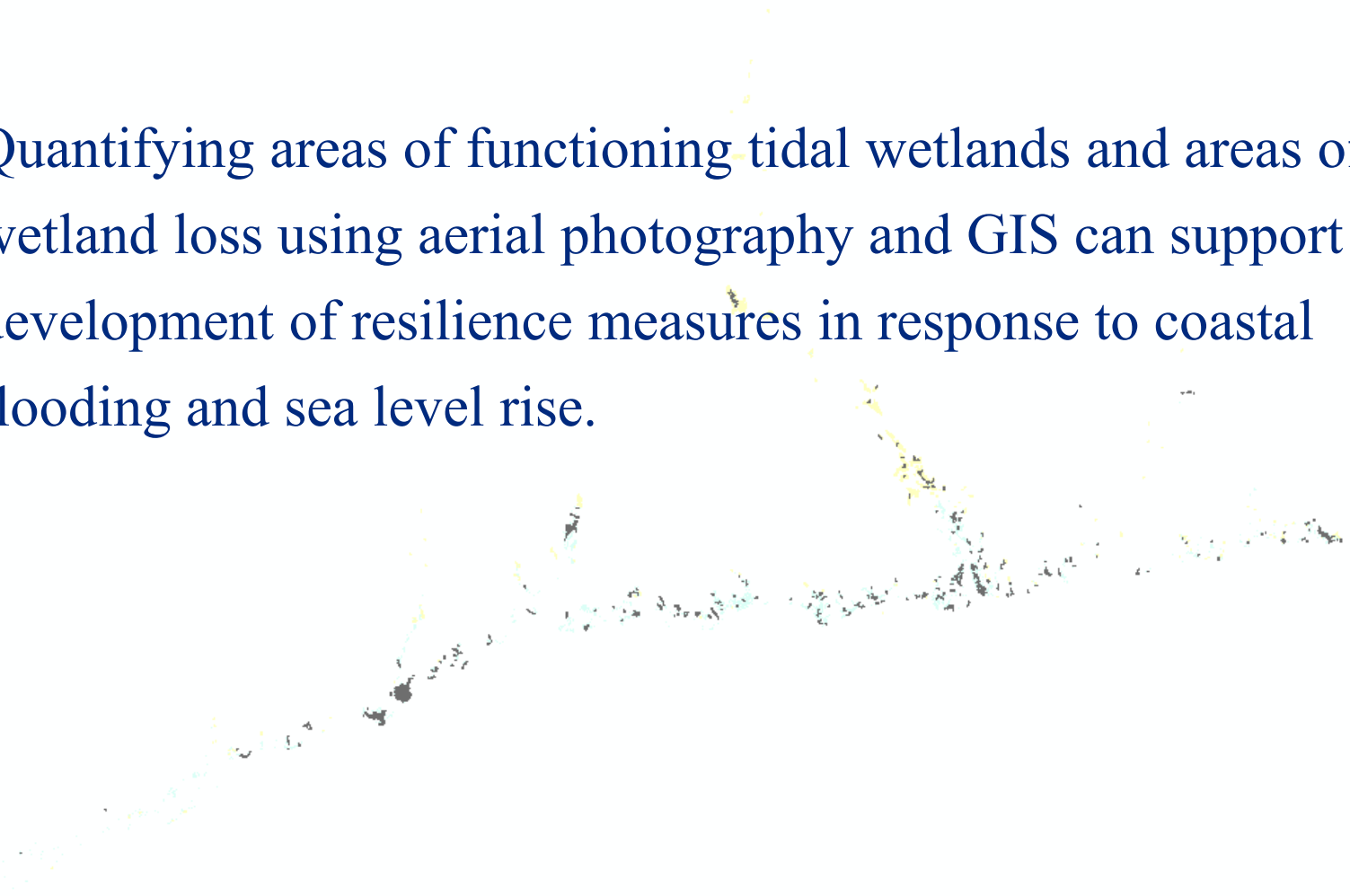


US Army Corps
of Engineers
New England Division



Conclusion

Quantifying areas of functioning tidal wetlands and areas of wetland loss using aerial photography and GIS can support development of resilience measures in response to coastal flooding and sea level rise.

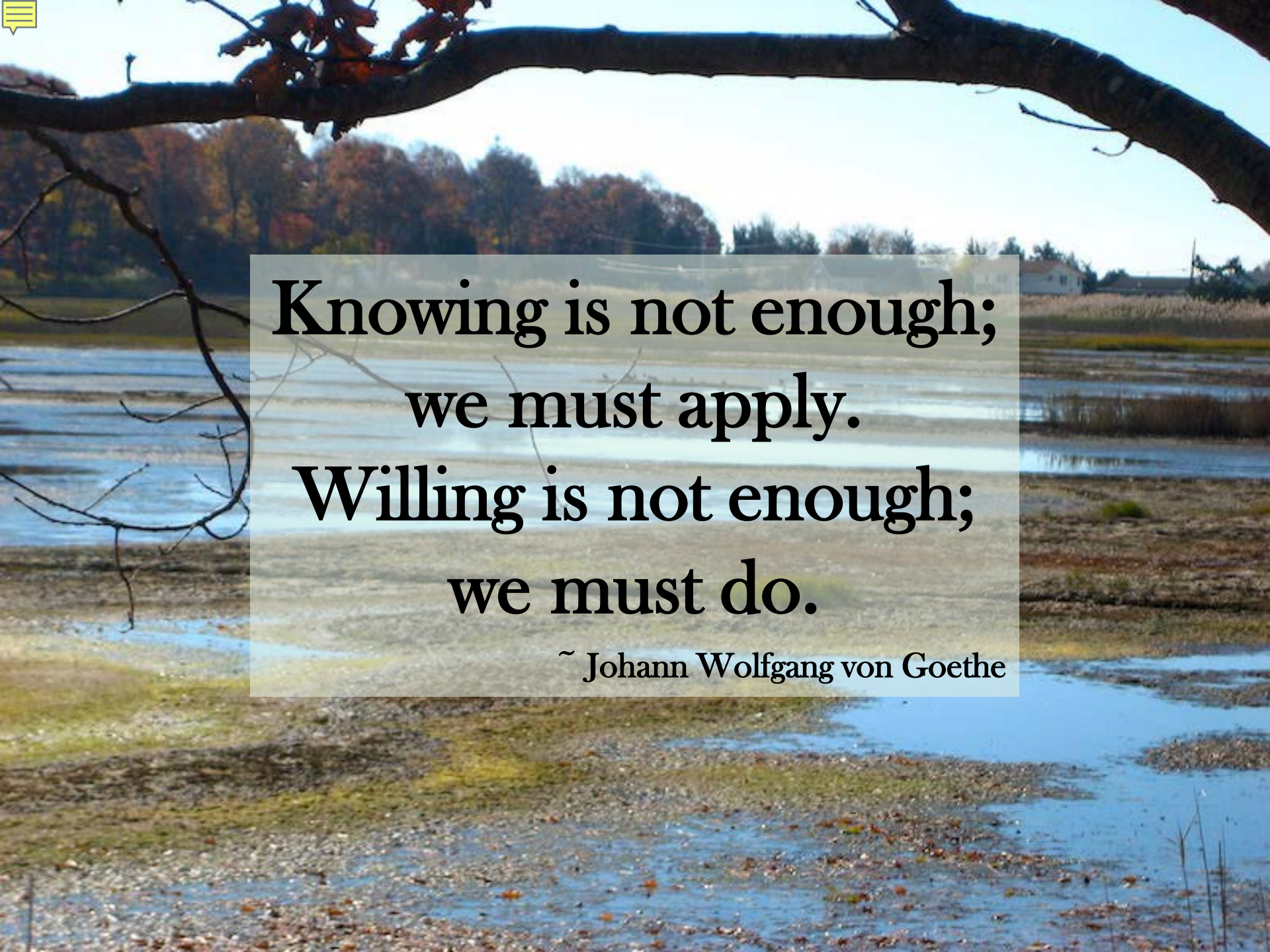




Accessing the Data

- The 2016 Coastal Orthophotography is accessible at:
http://www.cteco.uconn.edu/guides/Ortho_2016_Coast_4Band.htm
- The statewide 2016 aerial photographs are available at:
<http://cteco.uconn.edu/data/flight2016/index.htm>
- and aerials from previous years are available at:
<http://magic.lib.uconn.edu/>
- The tidal wetland enhancement data layer has not been included on CT ECO Map viewer, but it may become available at:
<https://ctdeep.maps.arcgis.com/home/index.html>



A scenic landscape photograph featuring a large, dark tree branch arching across the top of the frame. Below the branch, a body of water reflects the sky, with a shoreline of rocks and fallen leaves in the foreground. In the background, there are trees with autumn foliage and a few buildings under a clear blue sky.

**Knowing is not enough;
we must apply.
Willing is not enough;
we must do.**

~ Johann Wolfgang von Goethe



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