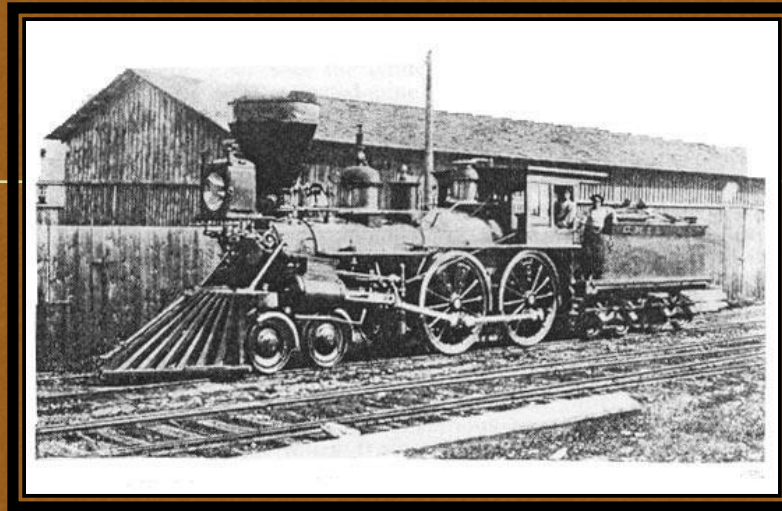


Updating the Remains of the Wilmington and Manchester Railroad near Wilmington NC using Historical Nautical Charts, High Resolution Aerial Photos, and GIS

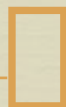


A presentation prepared for the Eagles Island Coalition
by

James McDaid Kapetsky, Ph.D.
November 8, 2015

Part 1

Introduction



Preface



- This is a report in PowerPoint format created for the Conservation Management Plan (CMP) of the Eagles Island Coalition (EIC). One of the target classes in the Cultural Resources category of the CMP is the Railway referring to the remains of the Wilmington and Manchester Railroad (W&M). Two goals for this target are expressed in the CMP. The first is the possible use of the roadway as a nature trail. This report covers how the remains of the roadway were verified using remote sensing, GIS and a ground survey, and indicates its unsuitability for a nature trail at present.
- The second goal of the CMP is to have the W&M bridge foundation on the Brunswick River incorporated into the EIC cultural resources program. At the time the CMP was formulated, the remains of two other structures had not been identified as trestles belonging to the W&M. This report covers the methods used to confirm the identification of the Brunswick River trestle and of the previously unidentified trestles on Redmond and Alligator Creeks, as well as the metrics of all three.
- Brief recommendations are provided on future activities related to the remains of the W&M within the context of the CMP.
- A companion report to this one created for the Conservation Management Plan is also on the EIC Web site. It is entitled *Status of the Remains of Tidewater Rice Culture on Eagles Island*.
- The author is a volunteer researcher for the Eagles Island Coalition.
- Comments and questions are invited: jameskapetsky@gmail.com

Objectives



- Update the knowledge on the location and condition of the roadbed of the W&M using nautical charts, aerial photos, satellite images and GIS, and verify the findings
- Bring to light the remains of two previously undescribed W&M trestles on Eagles Island
- Provide these results to the Eagles Island Coalition as a basis for further investigation of the historical significance of the remains of the W&M as cultural resources of the island, and as the basis for any future action on their preservation

A Brief History of the Wilmington & Manchester (W&M) Railroad



- ❑ In 1850 \$230,000 was subscribed to the capital stock of the W&M and work on the section out of Wilmington began at once¹
- ❑ By 1854 the W&M completed 163 miles of track from its terminal on Eagles Island just across the Cape Fear River from Wilmington to near Kingsville, SC²
- ❑ By 1892 an alternate route was developed to the north and its original route across Eagles Island was abandoned³
- ❑ The railroad was noted as abandoned on Chart 150 of 1888⁴ and on Chart 425 of 1893⁵

❑ 1 The Book of Wilmington, 1930, by Andrew J. Howell. p. 106

❑ 2 A Report of the Railroad Structures in the Environs of Wilmington North Carolina, 2001 by J.F. Newber. p. 22

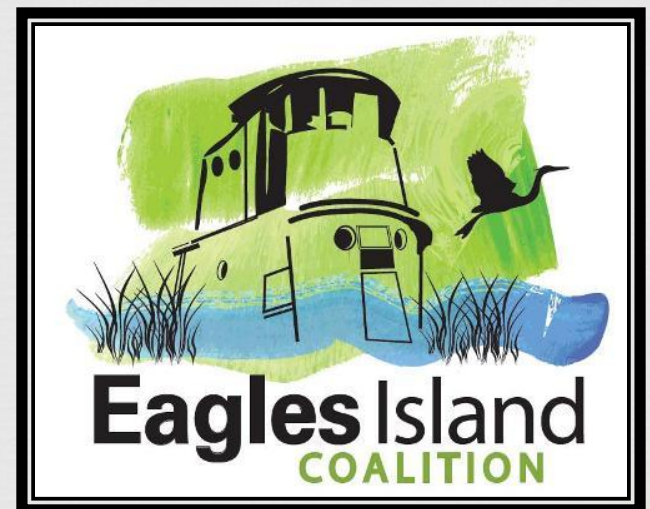
❑ 3 From Rails to Weeds. Searching Out the Ghost Railroads in Wilmington, Second Edition (1988, 1995) by Charles R. Kernan, pp. 5-7.

❑ 4 U.S. Coast Survey Chart 150 of 1898, 1:80,000 scale "MASONBORO INLET TO SHALLOTTE INLET INCLUDING CAPE FEAR, NORTH CAROLINA"; Image from NOAA's Office of Coast Survey Historical Map & Chart Collection
<http://historicalcharts.noaa.gov>

❑ 5 U.S. COAST SURVEY CHART 425 OF 1893, 1:40,000 scale "Cape Fear River from Reeves Point to Wilmington North Carolina"; Available at North Carolina Maps <http://dc.lib.unc.edu/cdm/singleitem/collection/ncmaps/id/1118/rec/10>

The remains of the W&M are among the cultural resources of interest to the Eagles Island Coalition

- Part of the EIC Mission relevant to the W&M remains
 - *Preserved historical sites and cultural artifacts*
- Relevant part of the EIC Goals
 - *Identify and map the highest priority habitats, species, and cultural resources in need of conservation attention on Eagles Island*



Part 2

The location of the W&M roadway in the
vicinity of Wilmington NC



Sources of Information and Stepwise Approach



- A digitized version of Chart 425 was imported into a GIS and georegistered
- The roadbed's location from Chart 425 was laid over high resolution aerial photos in the GIS
- Remaining segments of the roadbed were visually identified on the high resolution aerial photos from the USS North Carolina westward to US 74/76
- The charted location of the roadbed and the remains were compared
- Verification was carried out by field visits, through contacts with knowledgeable persons, and by comparison with the findings in *Rails to Weeds* (1985 and 1998) by C.R. Kernan

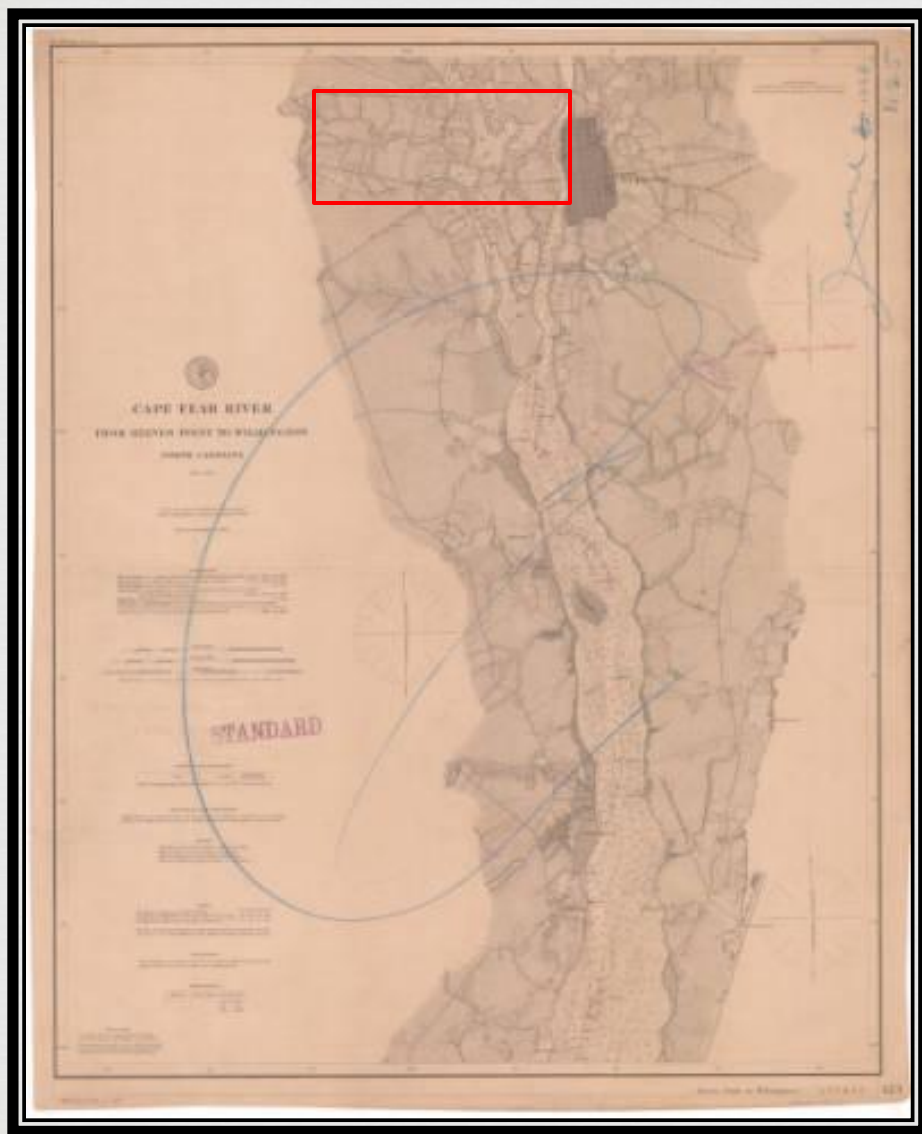
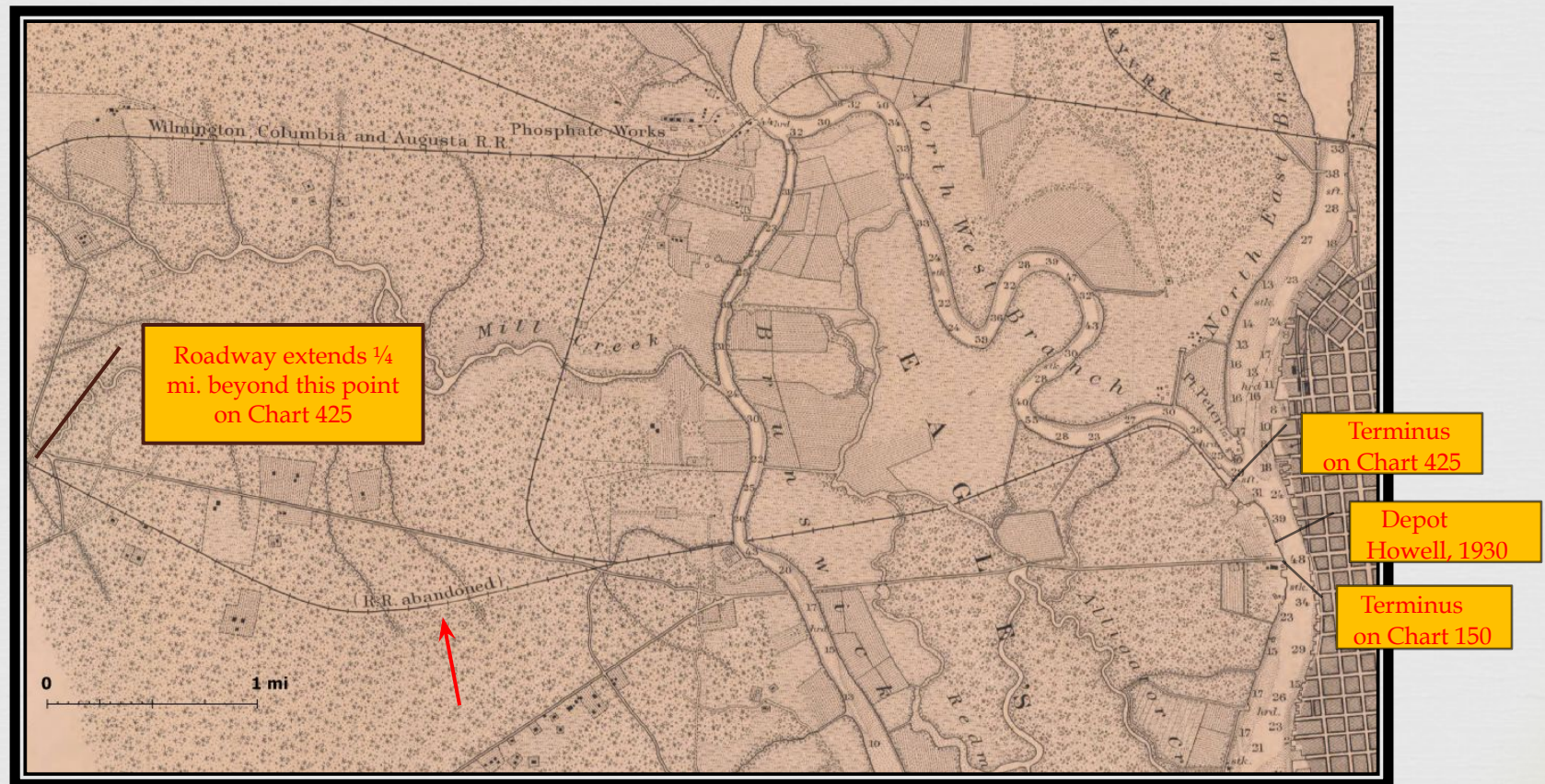


Chart 425 of 1893 “Cape Fear River from Reeves Point to Wilmington”

- Scale 1:40,000
- The chart was cropped for this study to include only the area shown in red

The Roadway of the W&M on Chart 425 of 1893 and terminal locations



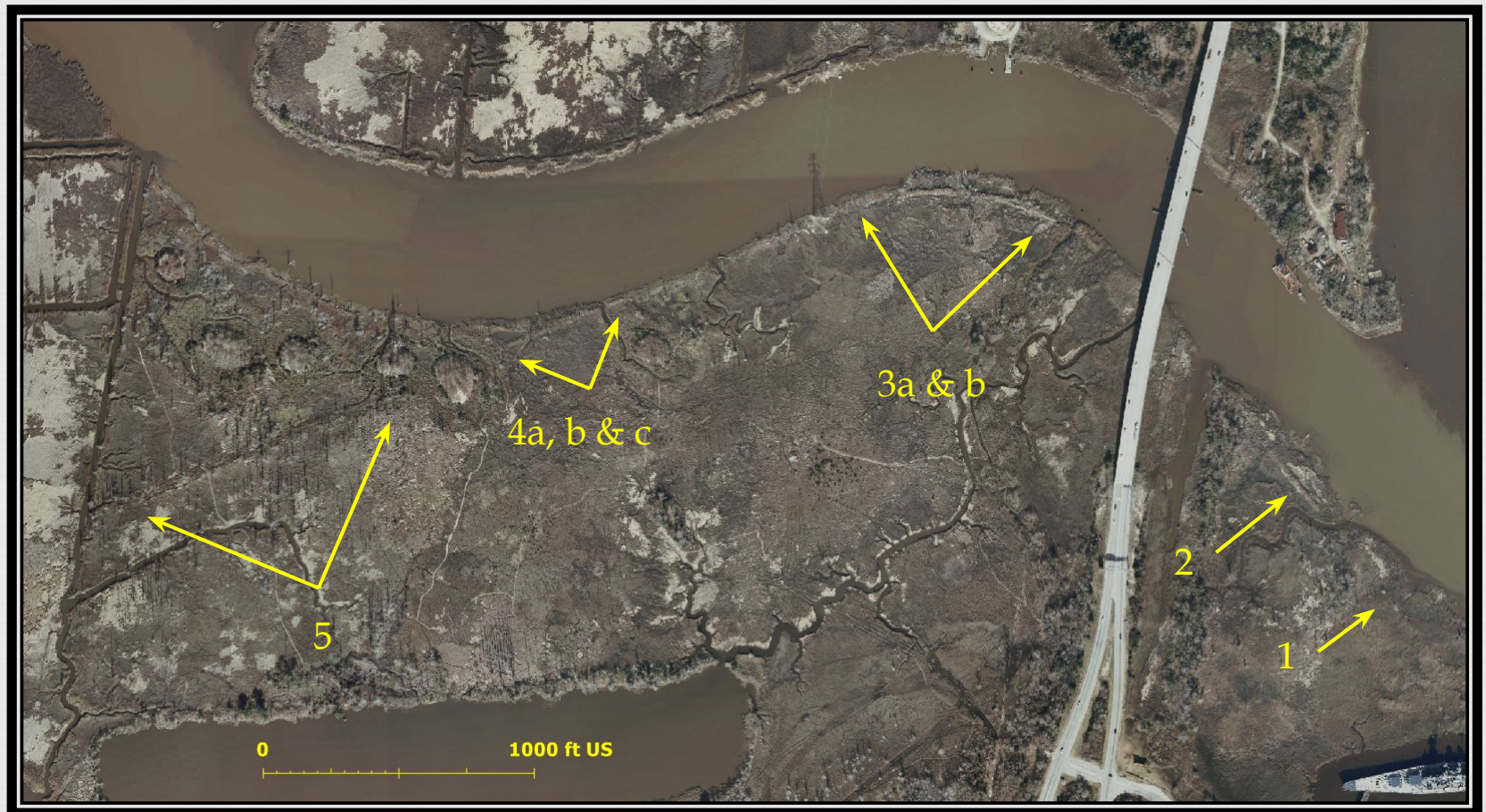
Regarding the location of the terminus, in readying the berth for the USS North Carolina workers scooped up thousands of old railroad spikes and boards from the site (<http://www.starnewsonline.com/article/2011001/ARTICLES/111009989?p=5&tc=pg>). The location of the USS North Carolina is close to the location of the depot indicated by Howell (p. 106, op. cit.) as opposite Chestnut St.

The W&M Roadway from Chart 425 of 1893 overlaid on High Resolution Orthophotos from 2010 ¹



¹ The roadway in the vicinity of the Battleship North Carolina is shown on Chart 150, but not on Chart 425

Visible remains of the W&M Roadway on Eagles Island on High Resolution Orthophotos from 2010



Highlighted Visible Remains of the W&M Roadway on High Resolution Orthophotos from 2010

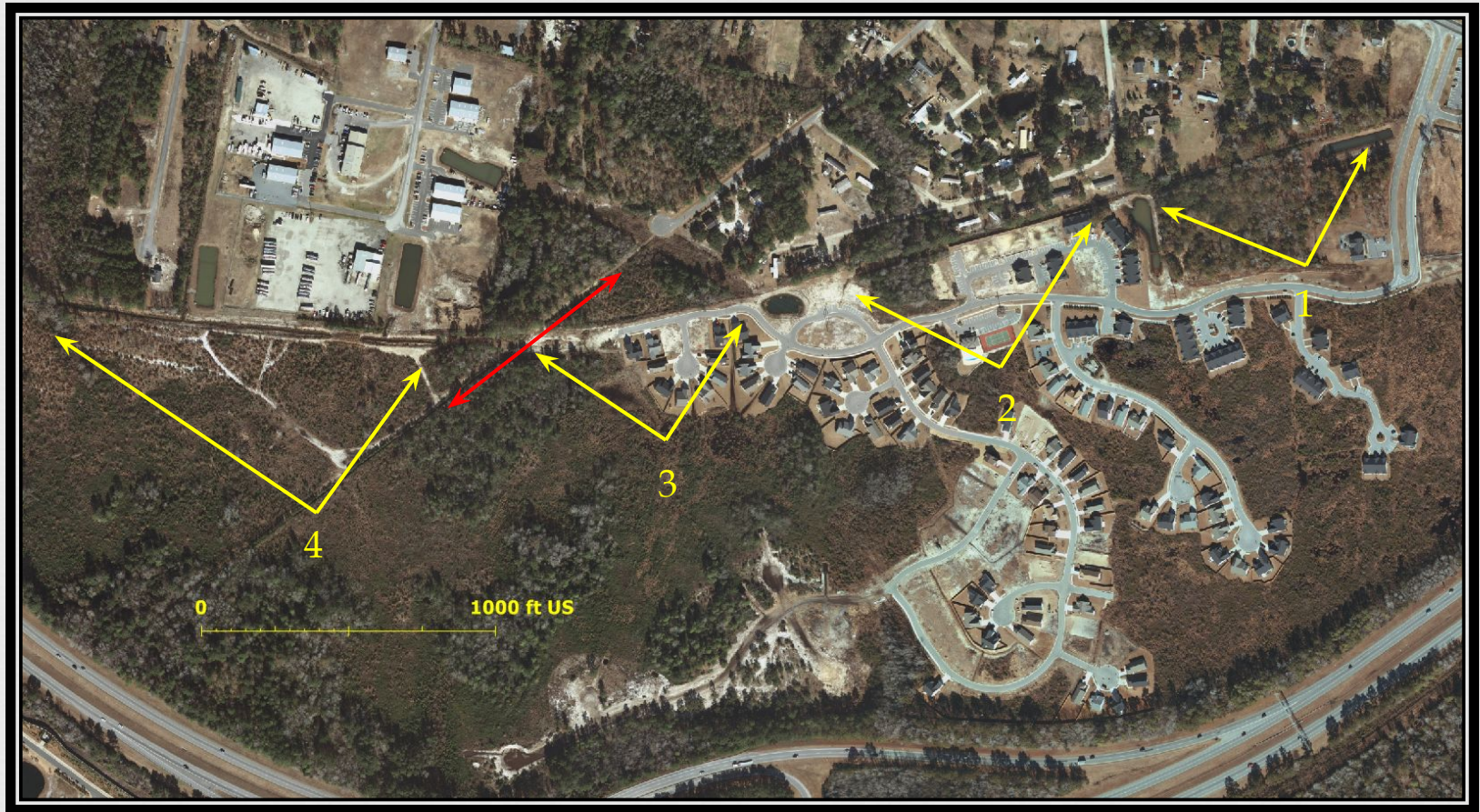


Metrics of W&M Roadway Visible Remains on Eagles Island



Segment	Length (ft)
1	26
2	96
3a	179
3b	14
4a	20
4b	80
4c	24
5	337
Total	776

Visible Remains of the W&M Roadway in Leland on High Resolution Orthophotos from 2010



Note from C. Kernan: The diagonal line (red) running NE to SW crossing the W&M roadway at the west end of Segment 3 is the roadway of the Wilmington, Brunswick and Southern RR.

Highlighted remains of the W&M Roadway on High Resolution Orthophotos from 2010



Metrics of W&M Roadway visible remains in Leland



Segment	Length (ft)
1	250
2	304
3	219
4	379
Total	1,152

Part 3

Verification of the remains of the W&M Roadway by Geo-Coincidence



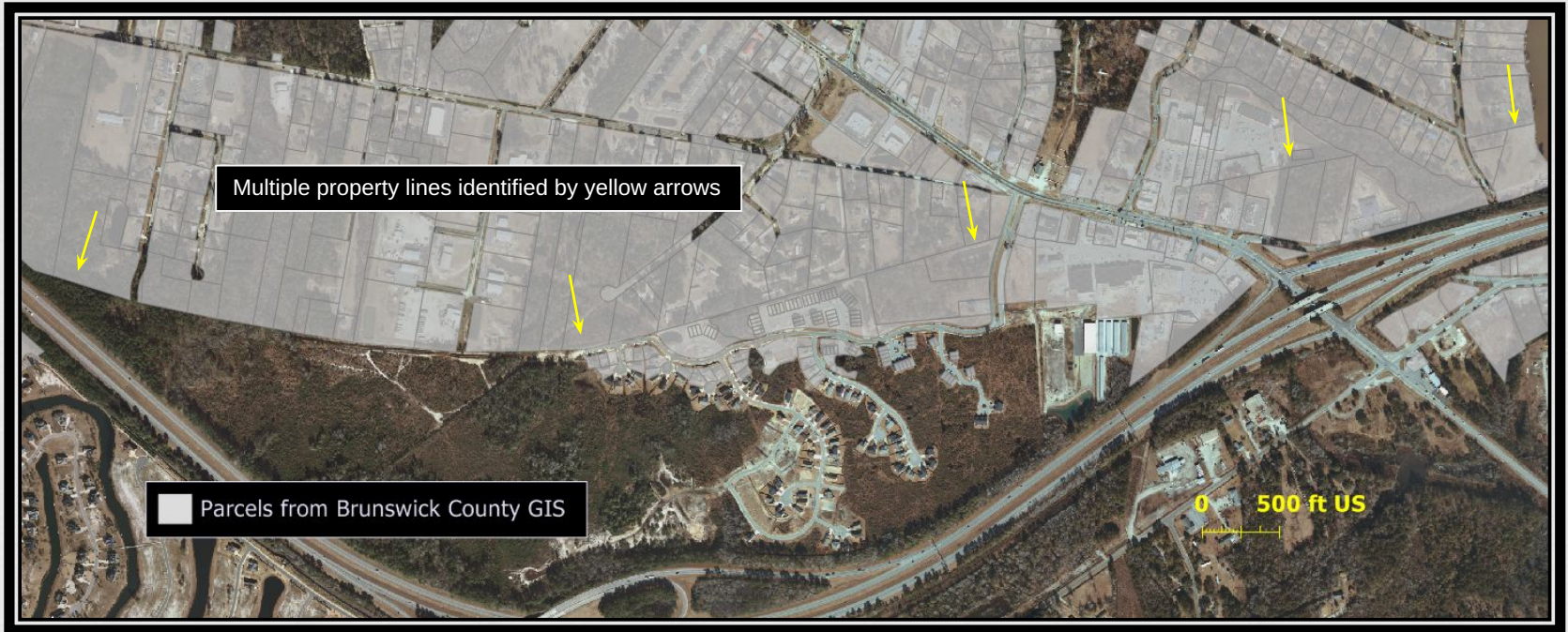
Verification by Geo-Coincidence on Eagles Island: Visible Remains on Aerial Photos and the W&M Roadway on the 1888 and 1893 Charts



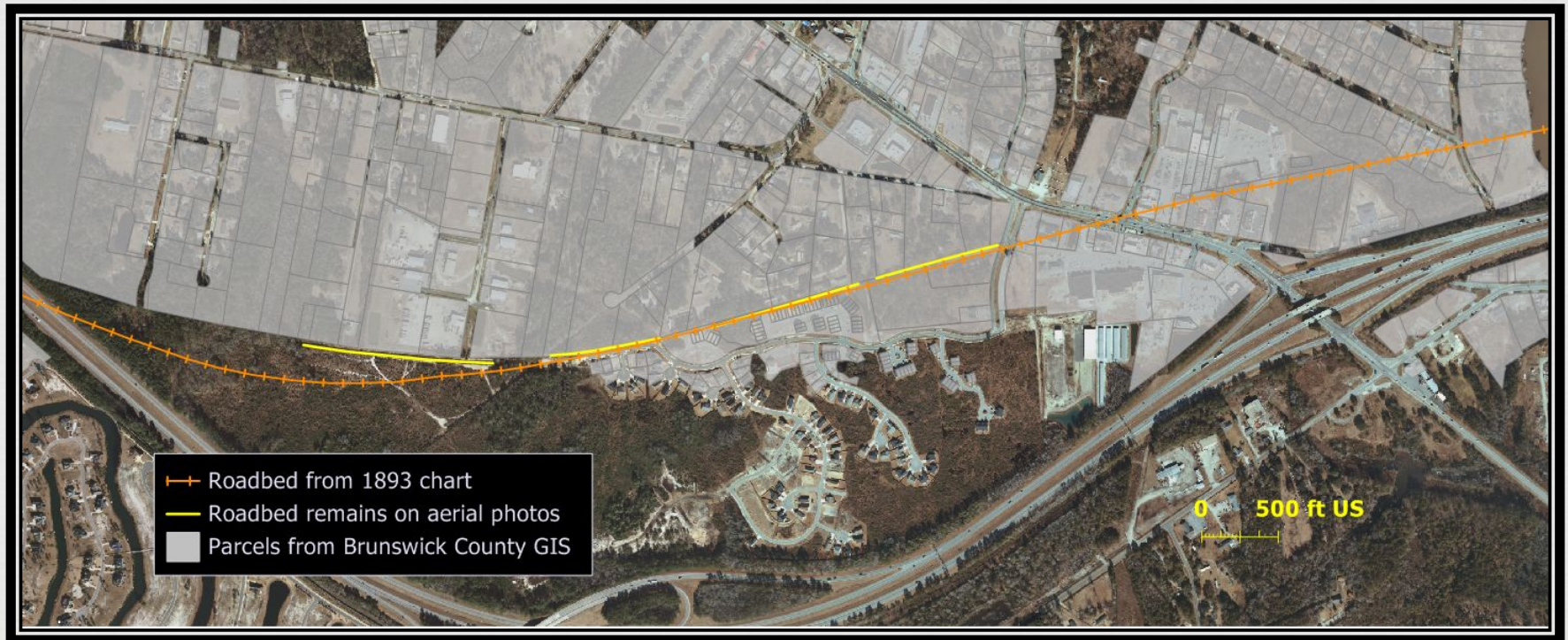
Verification by Geo-Coincidence in Leland: Visible Remains on Aerial Photos and the W&M Roadway on the 1893 Chart



Astute observation by C. Kernan: Odd property lines in Leland indicate the roadbed of the W&M¹



Verification by Property Lines: Visible remains coincide with property lines; charted roadbed is mostly coincident with the property lines



Part 4

Verification of the W&M Roadway by Expert Knowledge and On-Site Observations



Excerpts of Emails from Rob Moul on the W&M Roadbed in Relation to Mitigation Work



- 11/19/14 "I am quite familiar with this railroad bed that ran around the rim of the river across Eagle Island. We saw remnants of it when we worked on a spoil island mitigation project back in the late 1990s for DOT¹ and the bed was lower in elevation than the surrounding marsh. We could see some of the old rail road (RR) ties 18" to 24" below the marsh surface which probably indicates that Eagle Island is still slowly trapping detritus and sediment over the years and is actually gaining in elevation. We did find a stone bed underneath the RR ties and from what I recall it seemed to be a narrower gage than what we commonly see today."
- 12/3/14 "Back in 2001-2002 some of the old rail road bed was looked at to remove the old creosote ties and stone in order to enhance marsh flushing. Only a few portions of the old RR bed were considered high enough in elevation to be considered as "Uplands" by the Army Corps at that time. Those sections that were buried by dredge spoil were brought down to grade as part of the Eagles Island restoration plan to restore more tidal freshwater marsh. The resultant dredge spoil was gathered up into the 6 mounds we visited last year."
- "I remember looking at most of the RR bed segments back then and only the segment from "A" thru "B" on the attached 2002 Google map was raised (see following slides). Segment "B" to "C" was all covered with coastal wetlands vegetation (giant cordgrass, cattails, and *Phragmites*) and had no restoration potential. I believe a segment of the railroad bed ran from "C" near the shoreline to the vicinity of the Battleship."²
- "In summary these old rail road beds are either part of an old marsh restoration project or are regulated coastal and 404 wetlands due to their low elevations and saturation conditions. The coalition would need elevated walkways across these sites in order to gain access to the 6 elevated spoil mounds that were constructed during the 1998 DOT spoil island mitigation project."
- 1 A description of the mitigation project can be found on p. 8.1 of *Eagles Island: A History of a Landscape*. It can be downloaded via the Eagles Island Coalition Website eaglesisland.org
- 2 "The Segment shown as C to D was a barge unloading area and construction roadbed for the Rt 74/76/421 construction. NCDOT removed sections of it for wetland restoration."

Google Maps Image from Rob Moul Used to Describe the W&M Roadbed



Image annotated by Rob Moul and described on previous slide

W&M Roadbed in the Vicinity of the Cape Fear River and Meares Cut during Mitigation Work



Photo by Rob Moul; Red arrows define the Section A-B of Moul that corresponds to Segment 5 in this report

Comparison of Soil Auger Samples on the W&M Roadbed and Adjacent Marsh on the “Curve” Segment (3a)

W&M Roadbed

Adjacent Marsh



Photos 1/9/15. The W&M roadbed soil is sandy, probably indicating that sand was added to raise and stabilize the roadbed. In contrast, the soil from the adjacent marsh was high in organic material

Summary on the Remains of the W&M Roadway



- There is a good correspondence between the apparent remains on high resolution aerial photos and the location and alignment of the charted roadway
- Nine segments of remains are apparent on Google Maps and high resolution aerial photos
- Some of the remains have been verified on the ground and others have been verified by close coincidence with property lines and with the charted roadway
- The length of the roadway on Charts 425 and 150 is 8,644 ft
- Individual visible segment remains range in length from 14 ft to 776 ft
- The total length of the visible segment remains is 1,298 ft, about 15% of the original roadway on the charts
- Additional ground verification is required to be certain about the extents of some segments, particularly Segments 1 and 2 on Eagles Island
- Remains in Leland, not visible on aerial photos, may be verified by using GPS and property lines
- The field verification on Eagles Island indicated no practical use for the roadway as a nature trail at this time

Part 5

The W&M Trestles on Eagles Island



Sources of Information and Stepwise Approach



- Site visits were made for photography and to acquire the GPS coordinates of the trestles
- Confirmation of the trestle GPS locations and metrics of the remains were from a georegistered high resolution aerial orthophotograph
- Geo-verification of the trestles as those of the W&M was made through overlay of the charted roadbed on a high resolution aerial orthophotograph¹ clearly showing the remains in close proximity and in alignment with the charted roadbed

¹ High Resolution (0.5 ft) Orthophoto ID 2763919_OC6I037000203117022010 Acquired beginning 1/19/2010 and ending 2/1/2010 . Available from Earth Explorer :<http://earthexplorer.usgs.gov/>

Locations of the W&M Trestles on Eagles Island



The Remains of the Brunswick River Trestle Viewed from the Route 74/76/17 Bridge



6/28/2015

Tide at Wilmington =
-0.23 ft

The object in the foreground downstream from the trestle is the wreck of the barge Harry J. Sheridan, the history of which was described in a Wilmington Star News article in September, 1995

Close Up and Aerial View of the Remains of the Brunswick River Trestle

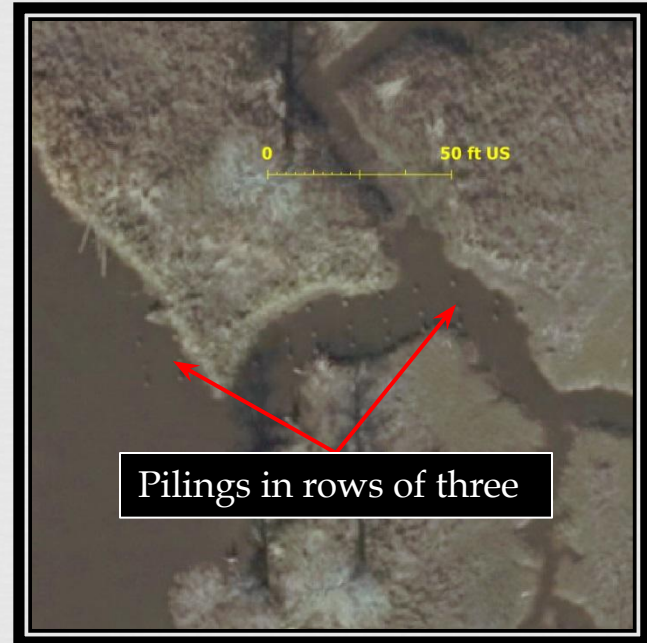


Trestle identified by Kernan, 1985 p.5 *op. cit.*; photographed by Newber, 2001 p.22 *op. cit.*

Close Up and Aerial View of the Remains of the Redmond Creek Trestle



3/14/2006; Tide at Wilmington -0.05 ft



Close Up and Aerial View of the Remains of the Alligator Creek Trestle



Verification of the Trestles by Expert Opinion



- E-mailed comments by Mark Koenig, Wilmington Railroad Museum, on viewing the close-up photographs of the trestles (5/29/15)
 - “In the case of Brunswick River and Alligator Creek, I think a solid case can be made for vintage-appropriate construction. I have some reservations about the Redmond Creek structures, though - superficially, they appear to be too new to match with the others”¹
 - “...my impression is that the structures were of a type commonly used across soft/tidal flatlands, driven in and assembled with some speed so as to get a line in operation as quickly as possible. Native timber was readily available, and techniques had already had a couple of decades to be established.”

¹ Comment on the Redmond Creek trestle was before the high resolution aerial orthophoto on Slide 38 was available to Mr Koenig

Verification by Geo-Comparison: The Brunswick River Trestle in Relation to the Charted W&M Roadbed



- Metrics
 - Charted roadbed is 12 ft south of center of trestle
 - Remains measure 37 ft north to south and 20 ft east to west
 - There are three horizontal members and more than 50 pilings
 - Two pilings are 35 ft from shore

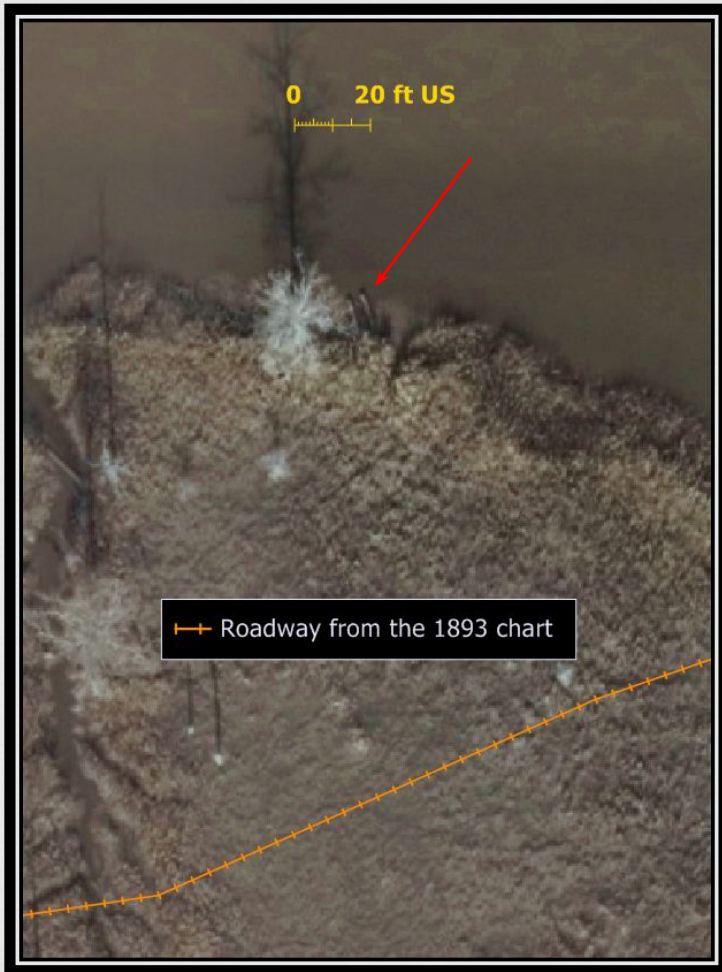
Verification by Geo-Comparison: The Redmond Creek Trestle in Relation to the Charted W&M Roadbed



Metrics

- Charted roadbed is 8 ft south of center of remains
- 6 pilings on Redmond Creek
- 23 Pilings on the branch creek
- Remains 91 ft long by 13 ft wide

Verification by Geo-Comparison: The Alligator Creek Trestle in Relation to the Charted W&M Roadbed



Metrics

- Charted roadbed is 120 ft south of trestle
- Part of the aerial view of the trestle is obscured by a tree; only two of the four horizontal members are visible

The W&M Alligator Creek and Redmond
Creek Trestles may have looked similar to
this



First trestle east of the Cape Fear Railroad Bridge on the CSX line. The trestle spans a large canal.

Summary of the W&M Trestles on Eagles Island



- Alligator Creek and Redmond Creek trestles were unidentified previous to this study
- There is no doubt that the trestles identified in this study are those of the W&M because:
 - No other known engineering works crossed the island in the vicinity of the trestle remains
 - The charted roadbed of the W&M corresponds very closely in distance and alignment to the actual locations of the trestle remains
- The metrics of the remains of the trestles were established
- The historical value of the trestle remains to the Eagles Island Coalition should be formally established by railroad historians. If of value, steps should be taken for digital and physical preservation

Acknowledgements



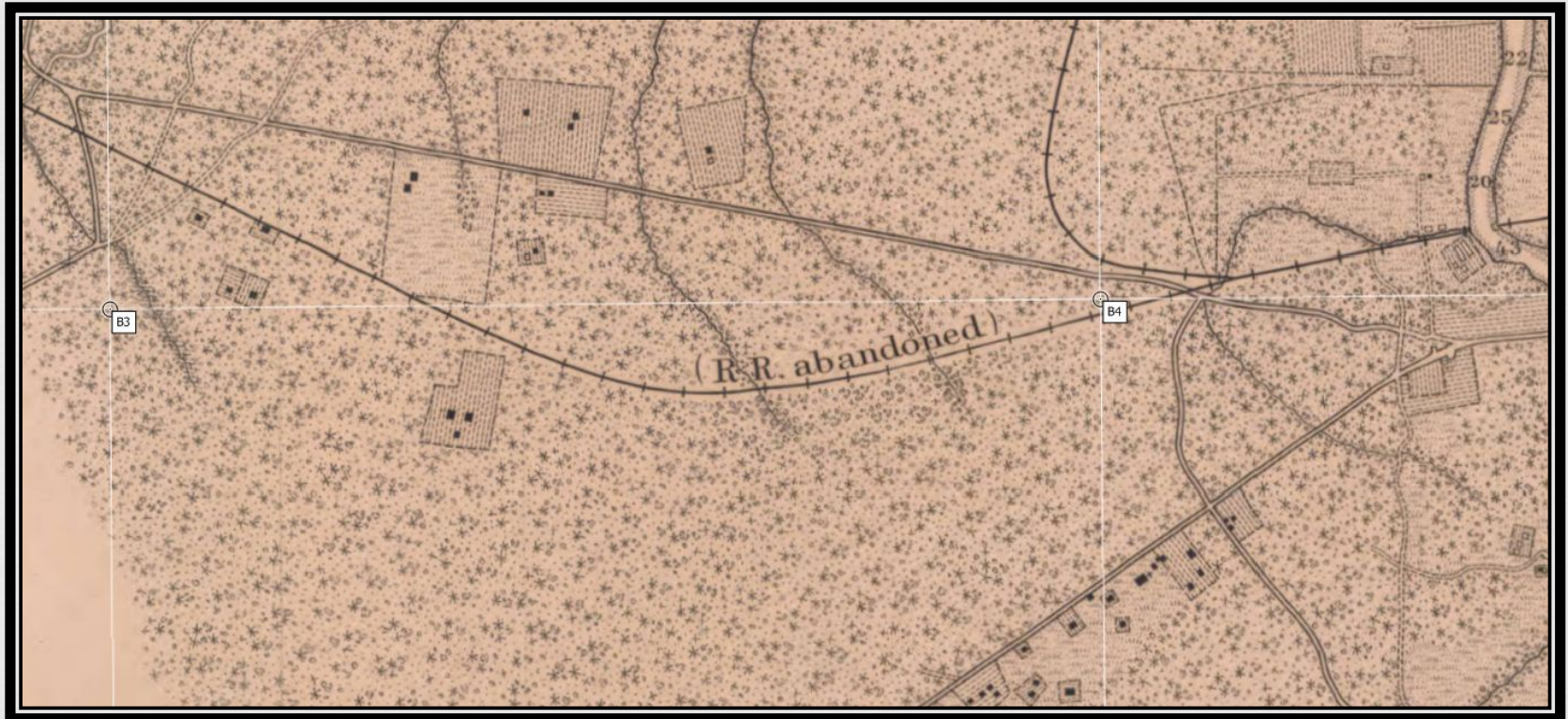
- Rob Moul, member Eagles Island Coalition, provided information on remains of the W&M related to mitigation work on Eagles Island, participated in the field verification on Eagles Island and reviewed the presentation
- Mark Koenig, Wilmington Railroad Museum, provided useful insights on the construction of the roadway and trestles, and reviewed earlier versions of the presentation
- Charles Kernan, author, *Rails to Weeds*, provided useful insights and information on the remains, especially with regard to property lines and kindly reviewed the presentation
- Niel Brooks, Eagles Island Coalition, and Chip Hemmingway, of Bowman Murray and Hemmingway, participated in the field verification on Eagles Island

FAQs



- Why are there so few remains of the roadbed on Eagles Island?
 - Remains still exist, but only on the higher northeastern side. There, the roadbed was made of solid material that was above the marsh level. Elsewhere, across the former rice fields which were flooded daily by tide waters, the roadbed probably was on pilings to allow a free flow of water under it. The pilings may still exist, but if so, are hidden by marsh vegetation, or have been covered by sediment.
- Why isn't there a closer coincidence between the charted remains of the roadbed and the actual remains?
 - Positional errors in the survey on which the chart was based
 - Positional errors in transferring the survey data to the chart
 - Spatial distortion of the paper chart before digitization and geo-registration
 - Errors in geo-registration
- Why didn't the roadbed follow a more direct route across Eagles Island?
 - "I suspect the rail line initially would have been a convenience for a cluster of commercial enterprises collected at the confluence of the Cape Fear River branches, along with handy lightering to Point Peter and directly across the river to the Wilmington & Weldon railhead and steamboats. There would be advantages in the ease of transferring freight from one railroad to another at this point, instead of across the river at the foot of Market Street, although the tracks were extended that far."
email from Mark Koenig 7/9/15

The End of the Line Thank you!



A section of the W&M on Chart 425 of 1893 in the area of present-day Leland near the junction of Rts 74/76 and 17