Virginia Oyster Restoration

Susan Conner

Chief, Environmental Analysis Section

Norfolk District

3 December 2014

US Army Corps of Engineers

BUILDING STRONG®

Background

Overarching Goals

Overarching Goals

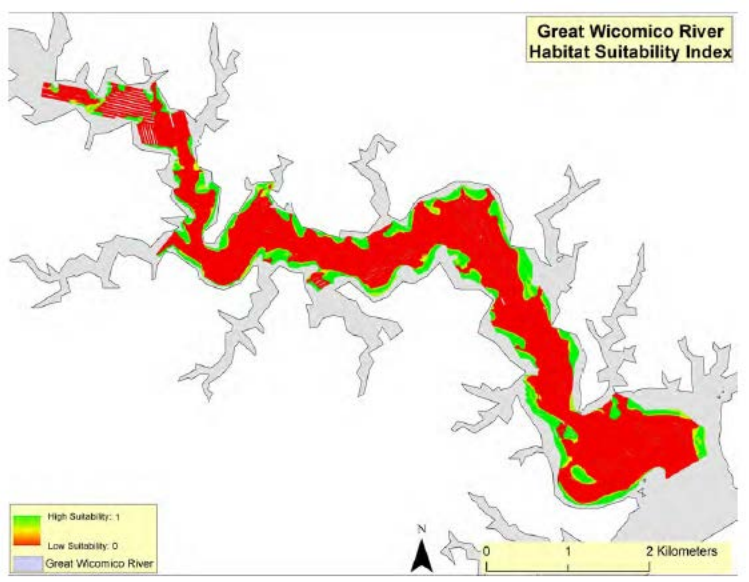
- The Chesapeake Bay oyster metrics report created a two-prong test for a restored tributary:
  - 50% to 100% of ‘currently restorable bottom’ is restored (to the reef-level success criteria). ‘Currently restorable bottom’ is, at a minimum, area with water quality suitable for oysters, and hard substrate.
  - The restored acreage should be 8% to 16% of historic oyster habitat in the trib.

Restoration Targets: USACE Master Plan

Tier 1 Tributaries/Areas	Restoration Target (Acres)	Approximate Achieved As Of 12/2014
Great Wicomico River	100 - 400	61
Lower Rappahannock River	1,300 - 2,600	
Piankatank River	700 - 1,300	20-30
Mobjack Bay	800 - 1,700	
Lower York River	1,100 - 2,100	
Pomocoke/Tangier Sound	3,000 - 5,900	
Lower James River	900 - 1,800	
Upper James River	2,000 - 3,900	
Elizabeth River	200 - 500	10 acres sanctuaries, 11 acres relic in Lafayette
Lynnhaven River	90 - 200	63 acres sanctuary plus natural areas and aquaculture

GIT Tributary-Level Success Metrics

- Minimum of 50% of the currently restorable bottom
  - That comprises at least 8% of the historic oyster bottom
    - And meets the reef-level goals



Virginia Oyster Restoration Projects

- Several projects in tributaries throughout the Chesapeake Bay
- Partners in Virginia Oyster Restoration: VMRC, City of Virginia Beach, CBF, TNC, City of Norfolk, ERP, Lynnhaven NOW, USACE, NOAA…
- Multiple stages:
  - Planning
  - Pre-construction / Permitting
  - Post Construction / Monitoring

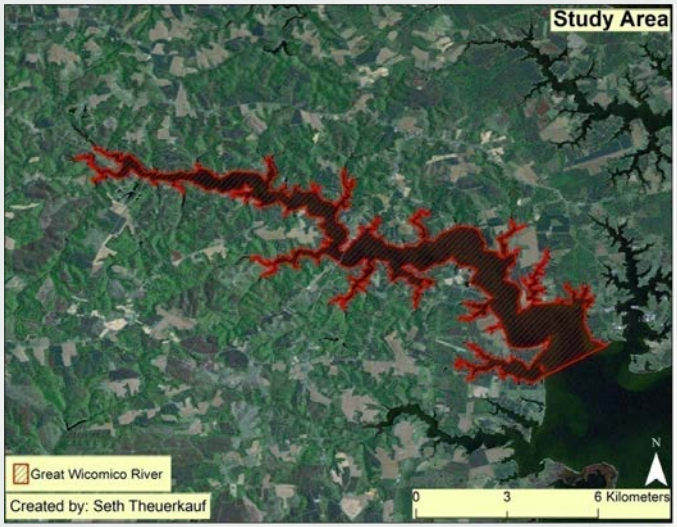
U.S.ARMY

BUILDING STRONG®

Great Wicomico River

Great Wicomico Project Details

- 85 acres of sanctuary reefs
  - 55 acres of low-relief reefs
  - 30 acres of high-relief reefs
- Construction completed 2004
- $4 million in federal funds



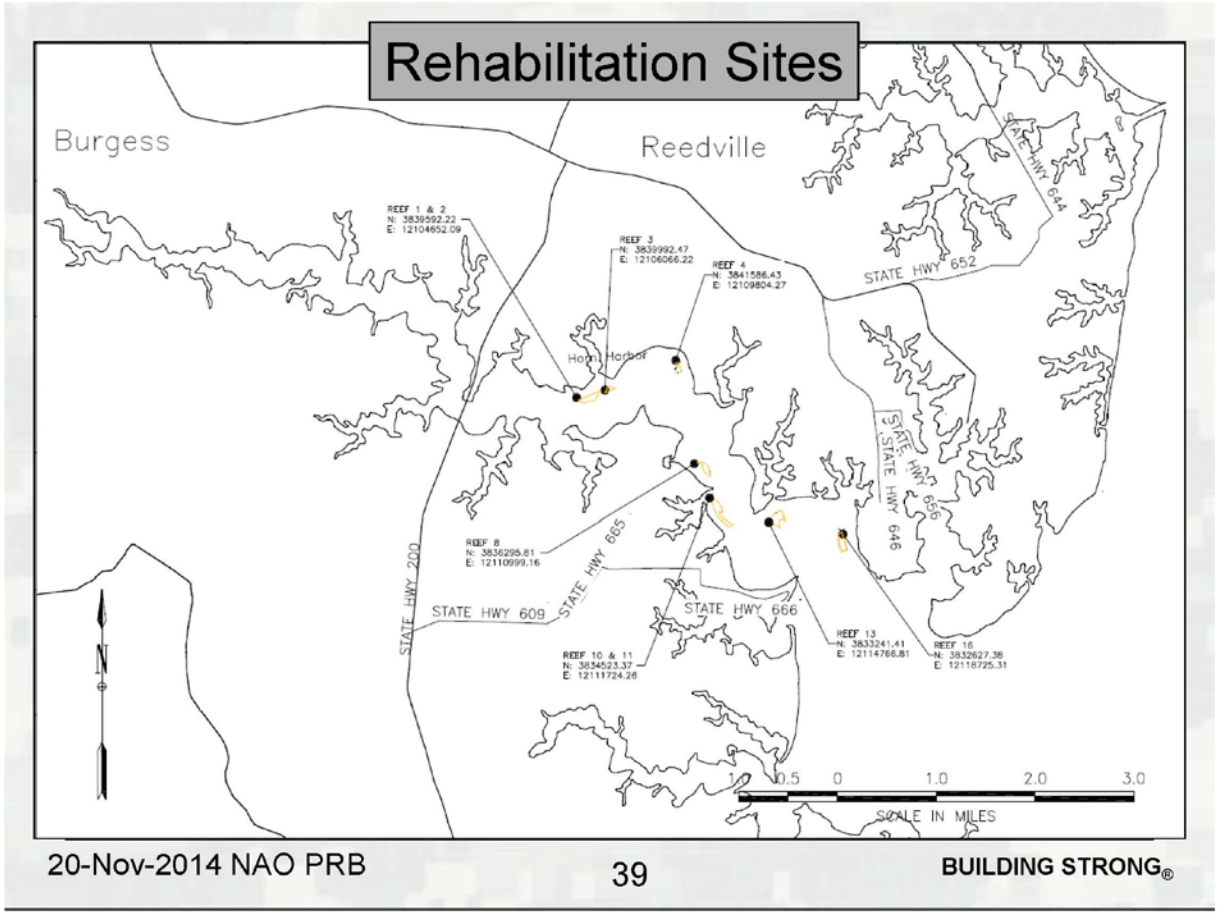
GWR Oysters

- The GIT target was exceeded in 49% (41.02 acres) of the reef acreage
- High-relief reef performed much better than low-relief reef, as did reefs constructed in shallower habitats

Restored Tributary

- 100-400 acres needed for restored tributary
- Currently ~61 acres are meeting GIT threshold

2015 Construction

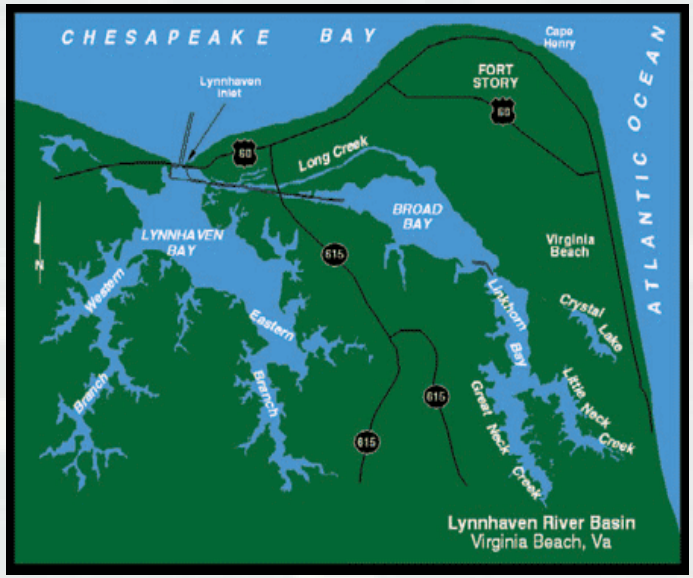


BUILDING STRONG®

LYNNHAVEN

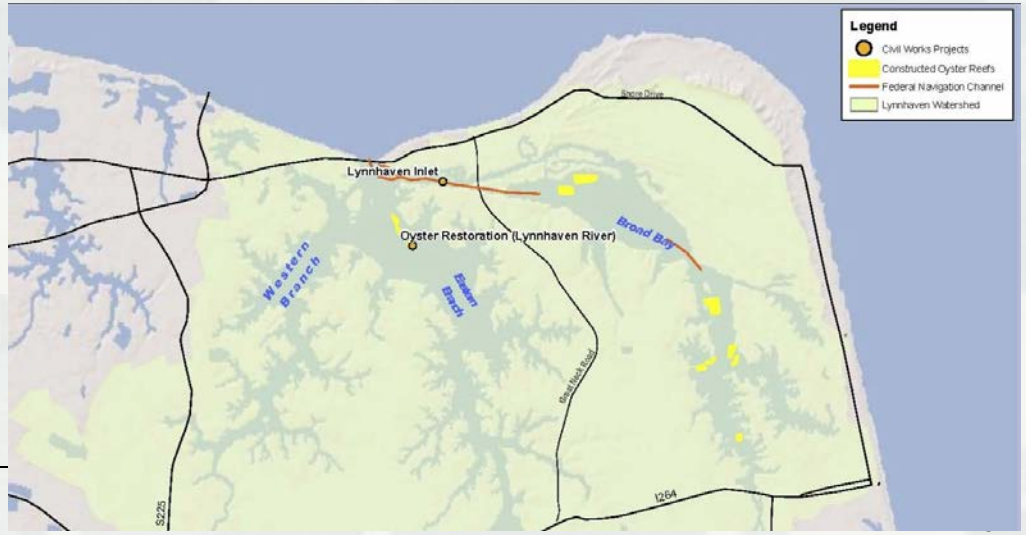
Lynnhaven River Basin

- Subestuary of lower Chesapeake Bay located in the City of Virginia Beach
- Less than 0.01 % of the Chesapeake Bay watershed
- Environmental decline traced to agricultural practices and continues because of dense development.



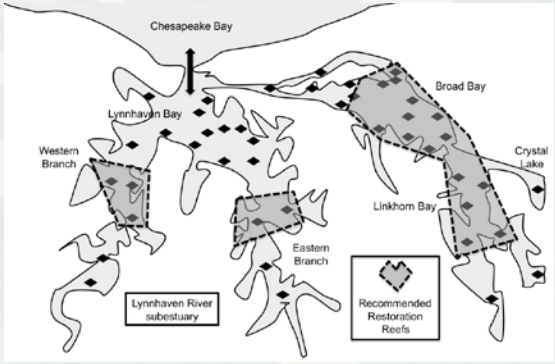
Present…

- High recruitment and large numbers
- Some oysters as large as 8-inches in length!



Lynnhaven Project Details

- 58 acres of sanctuary reefs constructed by USACE, 63 acres total (VMRC, VA Beach, Lynnhaven River NOW)
- Construction completed 2007-2008
- $5 million in federal funds



Lynnhaven River Oysters: Sanctuaries

- All reefs (50.83 acres) sampled exceeded the GIT thresholds for adult oyster density and biomass.
- The GIT targets, 50 oysters m^{-2} and 50 AFDM g m^{-2} of oysters, were exceeded in 51.2% (26.02 acres) of the reef acreage.

US Army Corps of Engineers
Norfolk District

Virginia Beach, Virginia

Native Oyster Restoration Project
Lynnhaven River
FY07 and FY08 Construction Areas

0 3,000 Feet

1" = 3,000'

Reef Constructed Areas

Construction Year

2007

2008

Projection:
Virginia State Plane
South Zone - NAD 83
U.S. Survey Feet

Aerial Photography Date:
VGIN south 2007

Project Manager: Brian Rheinhart
E-mail: brian.k.rheinhart@usace.army.mil
Phone: (757) 201-7768
Fax: (757) 201-7036

Prepared by: Geospatial Services Section

Map File: Construction_fy09.mxd
Map Date: 9 Feb 2009

Lynnhaven River Oysters

- To date 63 acres of sanctuary reef have been constructed by the USACE, City of Virginia Beach, CBF and Lynnhaven NOW
- Based on these numbers alone another 30 acres of sanctuary reefs would be required to reach the bottom of target range for declaring the Lynnhaven System a “restored” tributary.
- 31 acres to be constructed by USACE under Lynnhaven Ecosystem Restoration Project on 2018

Lynnhaven River Oysters: Other Oyster Populations

- Other oyster resources
- Within the past 5 years a number of leaseholders have become more active in planting their leases with shell and relying upon natural settlement to produce wild oysters for harvest. Hatchery-based oyster aquaculture has increased.
- A survey conducted in September of 2014 by Lynnhaven Now of the oyster growers in the tributary indicate that 9.5 million oysters are currently being raised in caged aquaculture within the system and another 2 million spat-on-shell have be place in on-bottom culture.

Lynnhaven River Oysters

- A 2004-2006 study of the oyster population in the Lynnhaven that included non-traditional habitats, like rip-rap, bulkheads and intertidal marsh areas, in addition to intertidal and subtidal reefs, estimated the oyster population in the Lynnhaven system to be 17.8 million oysters with 7.6 million (42%) of those oysters located in these non-traditional intertidal habitats.
- *Proposed: Broad Bay and Linkhorn Bay have been restored consistent with the explicit GIT metrics. The eastern and western branches of the Lynnhaven River are short of the target area for sanctuary reefs.*

WRRDA 2014:
Congress Authorized Construction of the Lynnhaven River Ecosystem Restoration Project

- 38 acres wetland restoration and diversification
- 94 acres restoration of SAV beds and 22 acres bay scallop restoration
- 31 acres hard reef habitat - not formulated for oysters but oysters are likely result

LAFAYETTE

Restored Tributary

- 200 - 500 acres needed to be restored (Elizabeth River)
- 10 acres restored so far and approximately eleven acres of relic reef meeting the GIT success metric identified

Lafayette River

- A 6.2-mile-long tributary of the Elizabeth River
- Restoration projects: ERP, CBF, NOAA, VMRC
- USACE Section 22: Assessment of Oyster Reefs in the Lafayette River as a Chesapeake Bay TMDL BMP
- USACE Section 22: Assessment of Oyster Reefs in the Lafayette River
  - Part 1 – oyster population survey
  - Part 2 – identify locations for future oyster projects

Lafayette River Seabed Habitats

Based on an acoustic (SONAR) mapping survey conducted by the NOAA Chesapeake Bay Office
January 2012

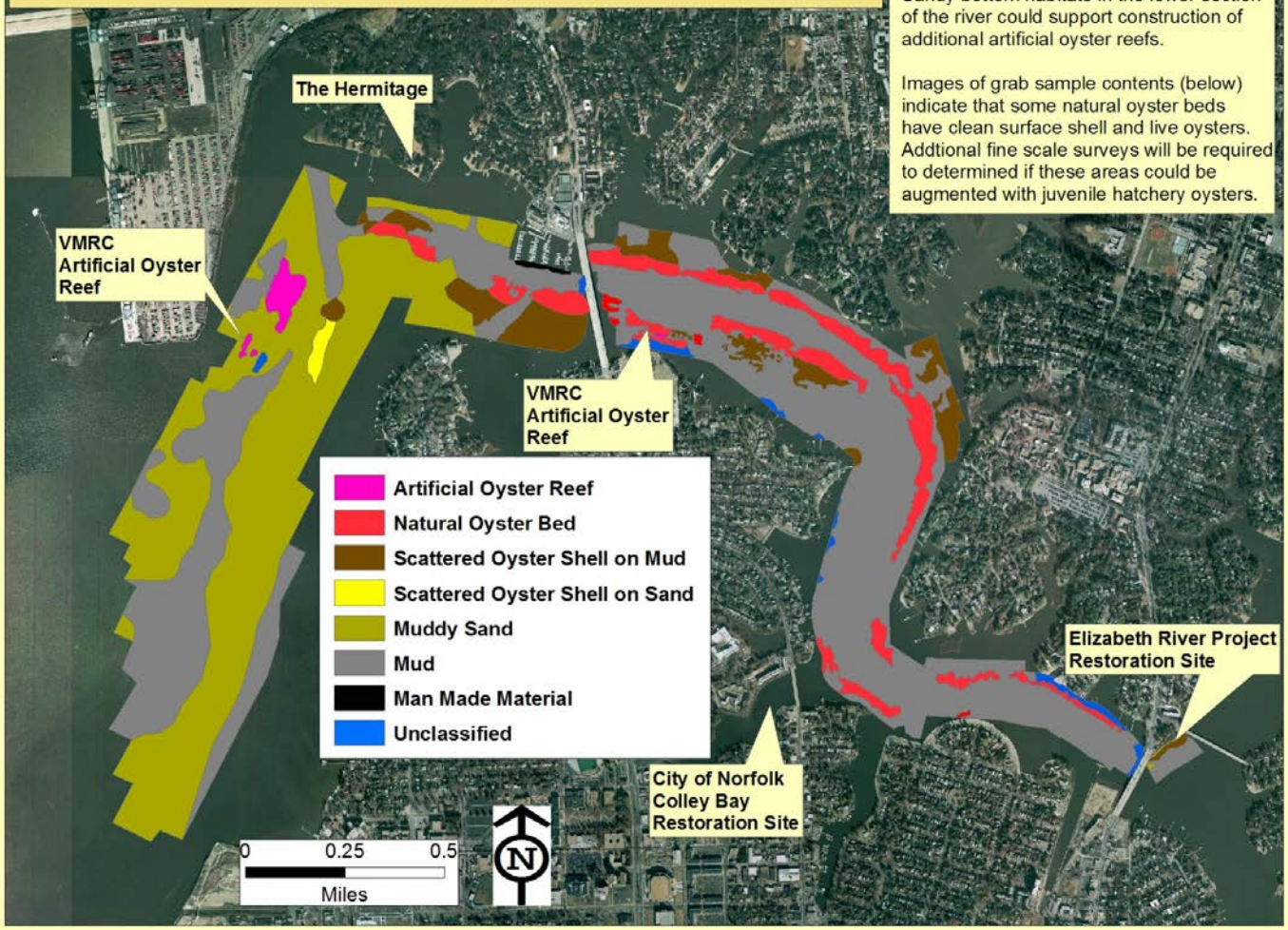
Chesapeakefieldops@noaa.gov

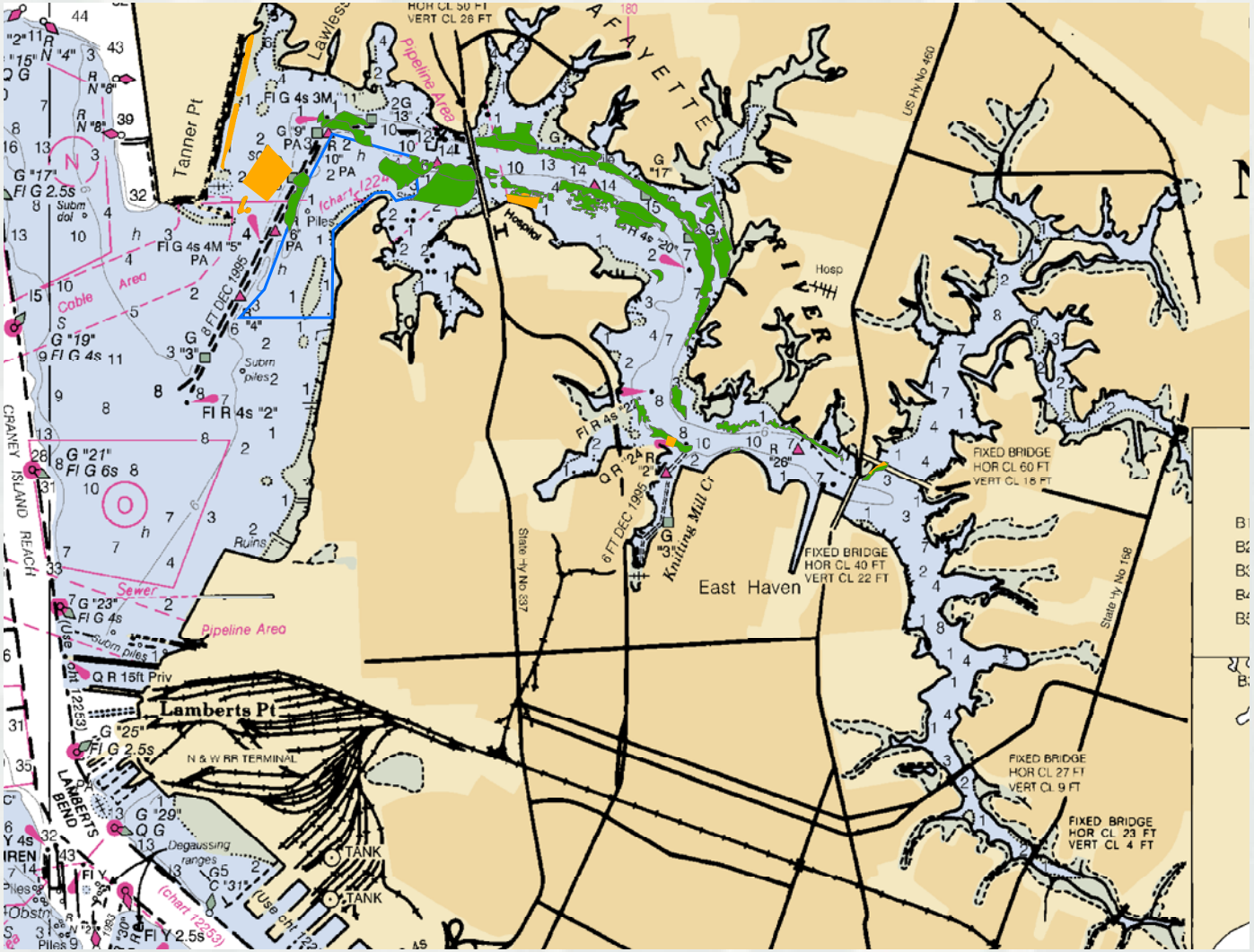
The river was surveyed to identifiy the distribution of existing oyster shell habitats and other hard bottom suitable for oyster restoration projects.

This habitat map, coupled with depth and water quality information, will guide future restoration activities.

Sandy bottom habitats in the lower section of the river could support construction of additional artificial oyster reefs.

Images of grab sample contents (below) indicate that some natural oyster beds have clean surface shell and live oysters. Addtional fine scale surveys will be required to determined if these areas could be augmented with juvenile hatchery oysters.





U.S.ARMY

BUILDING STRONG®

Lafayette Protection

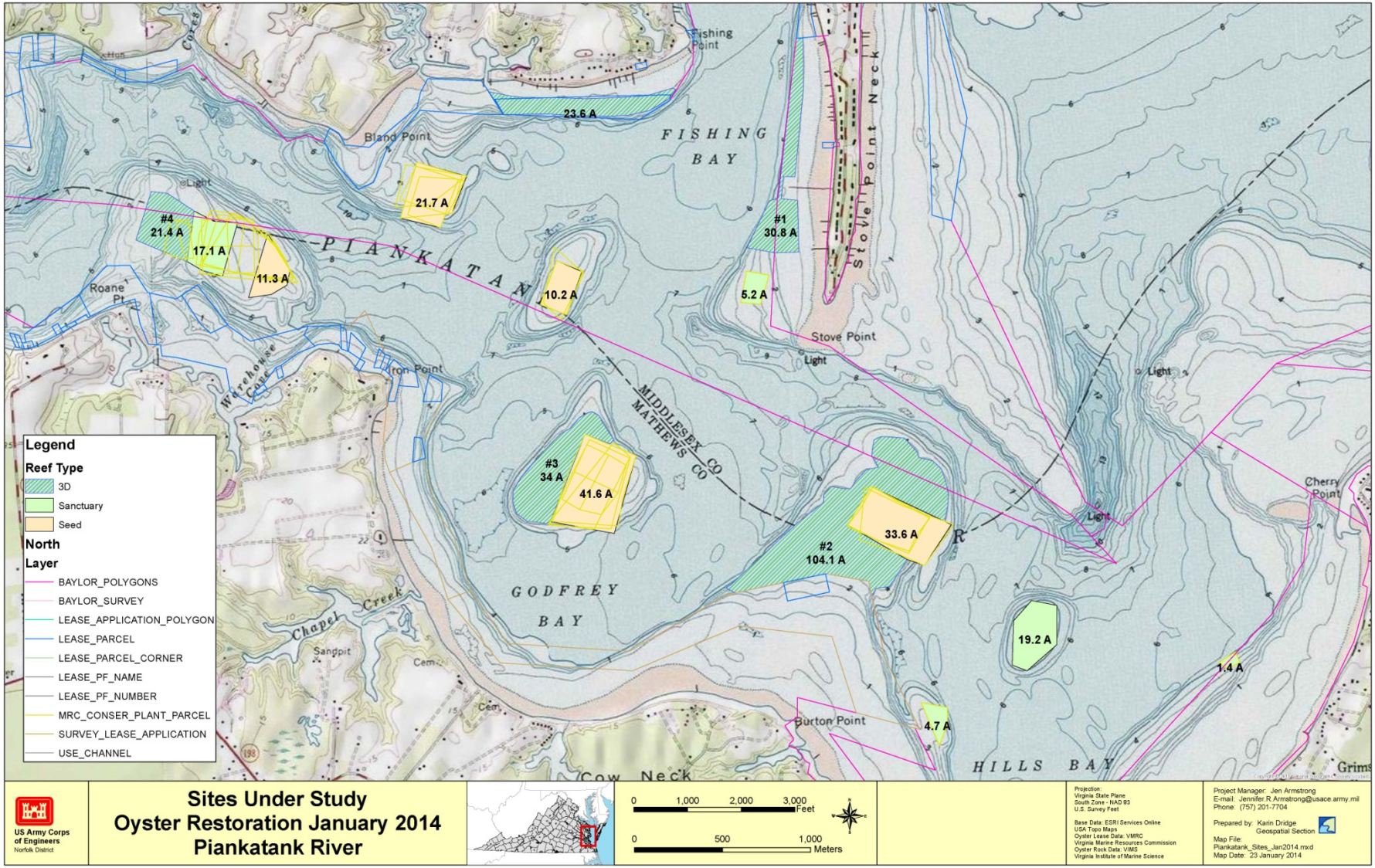
- For decades, the Lafayette River has been categorized as ‘condemned’ due to poor water quality, such that the Division of Shellfish Sanitation (DSS) of the Virginia Department of Health does not permit oyster harvesting, either from the public Baylor grounds or from private leases.
- Fortunately, the water quality has improved, and DSS is considering changing the oyster harvest designation from ‘condemned’ to ‘conditional.’ ‘Conditional’ harvest status would allow for harvest from private leases, under the stipulation that the oysters are relayed from the Lafayette into open harvest waters for depuration. This leaves a question as to the future of oyster restoration sites constructed under the ‘condemned’ status, which were meant to remain unharvested.
- Lafayette Tributary workgroup has scheduled a meeting with VMRC to discuss the path forward for protection of the relic reefs and constructed sanctuary reefs.


Lafayette River
Hoffler Creek
Baines Creek
Gilligan Creek
Blows Creek
Norfolk
N
US Army Corps of Engineers
Norfolk District
U.S. Army Corps of Engineers
Oyster Mitigation Projects
Craney Island Eastward Expansion
Hampton Roads, Virginia
August 2014
Projection:
Virginia State Plane
South Zone - NAD 83
U.S. Survey Foot

PIANKATANK

Restored Tributary

- 700 - 1300 acres identified in USACE Master Plan
- Tributary planning team has been refining this number, target will likely decrease
- Hope to build 50 – 100 acres over next few years



US Army Corps of Engineers
Norfolk District

Sites Under Study
Oyster Restoration January 2014
Piankatank River

Projection:
Virginia State Plane
South Zone - NAD 83
U.S. Survey Feet

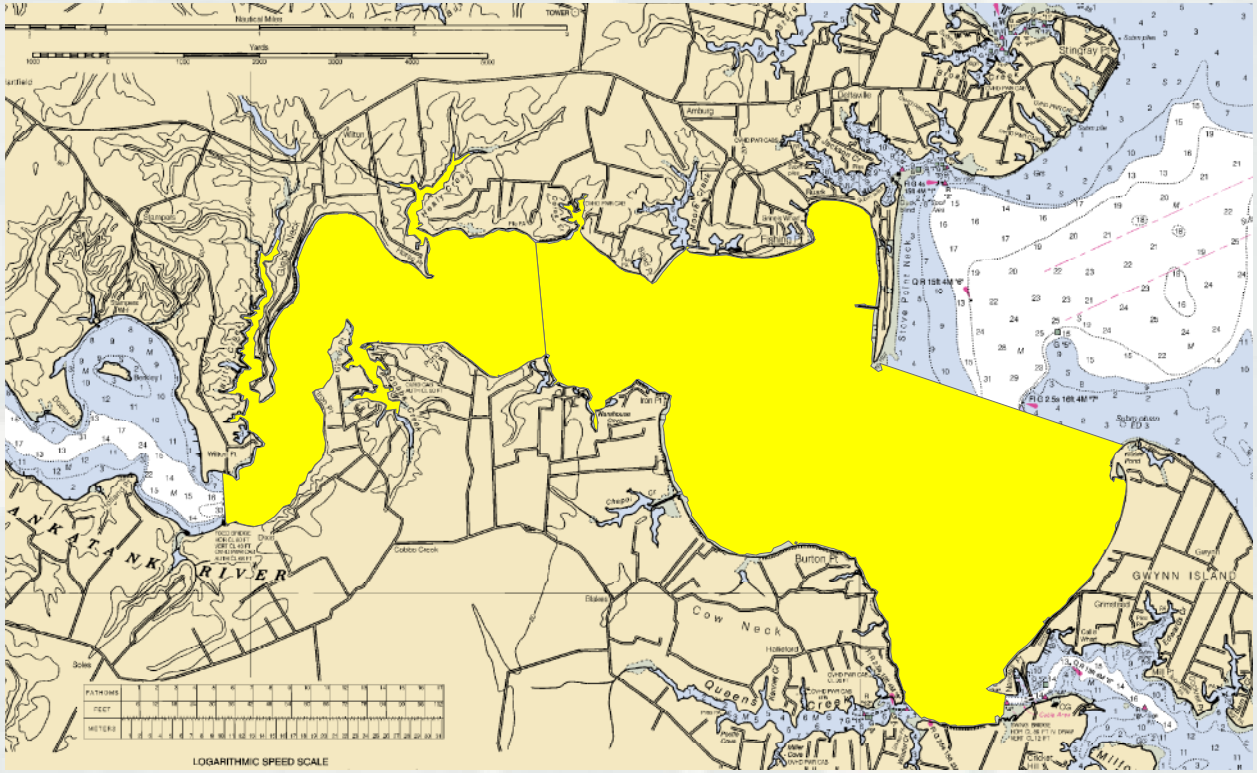
Base Data: ESRI Services Online
USA Topo Maps
Oyster Lease Data: VMRC
Virginia Marine Resources Commission
Oyster Rock Data: VIMS
Virginia Institute of Marine Science

Project Manager: Jen Armstrong
E-mail: Jennifer.R.Armstrong@usace.army.mil
Phone: (757) 201-7704

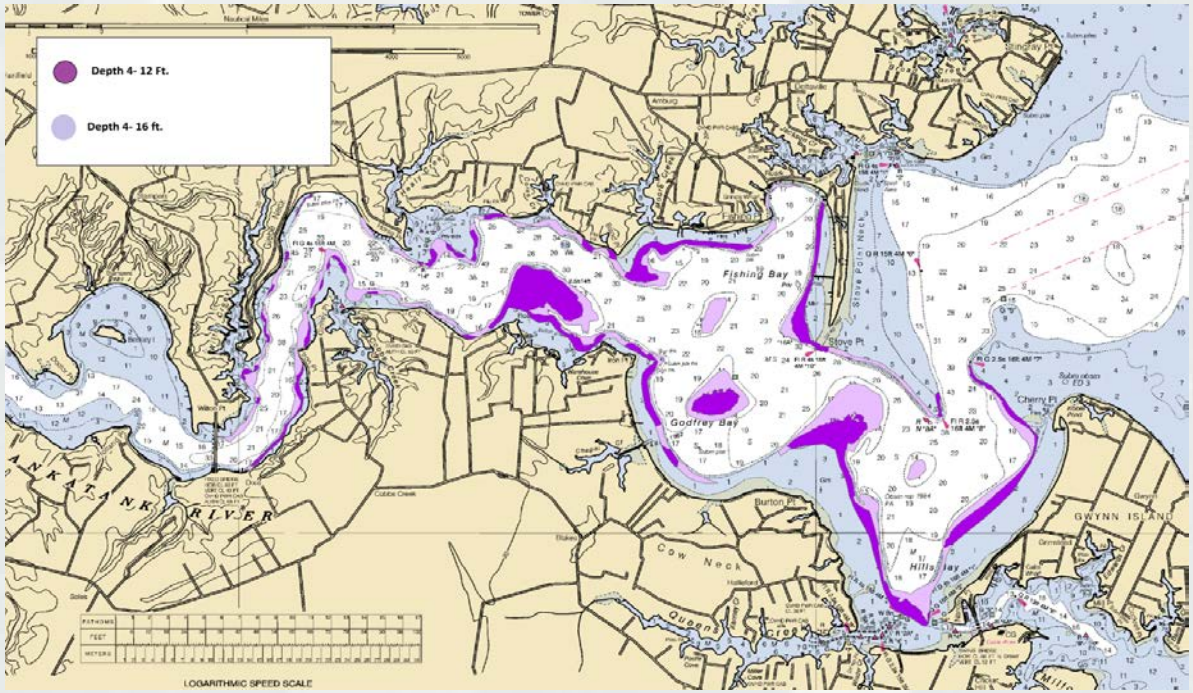
Prepared by: Karin Dridge
Geospatial Section

Map File:
Piankatank_Sites_Jan2014.mxd
Map Date: 23 January 2014

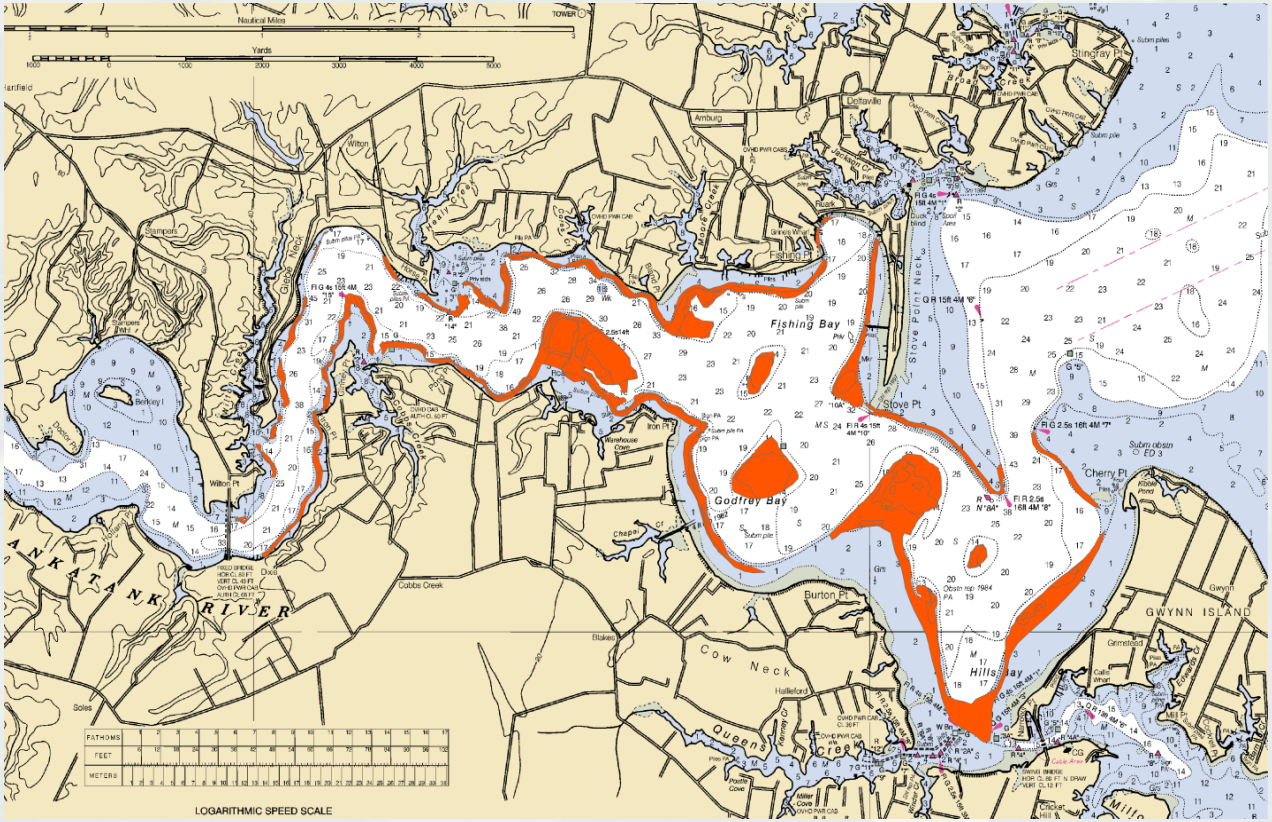
River segment: Define geographic boundaries of the river segment within which we will target oyster restoration. Basis: Input from Workgroup; extent of potential restoration areas in Lipcius report. Result: the 'lower Piankatank' tributary restoration project will extend from the Twigg Bridge (Route 3) to a line between Stove Point and Cherry Point



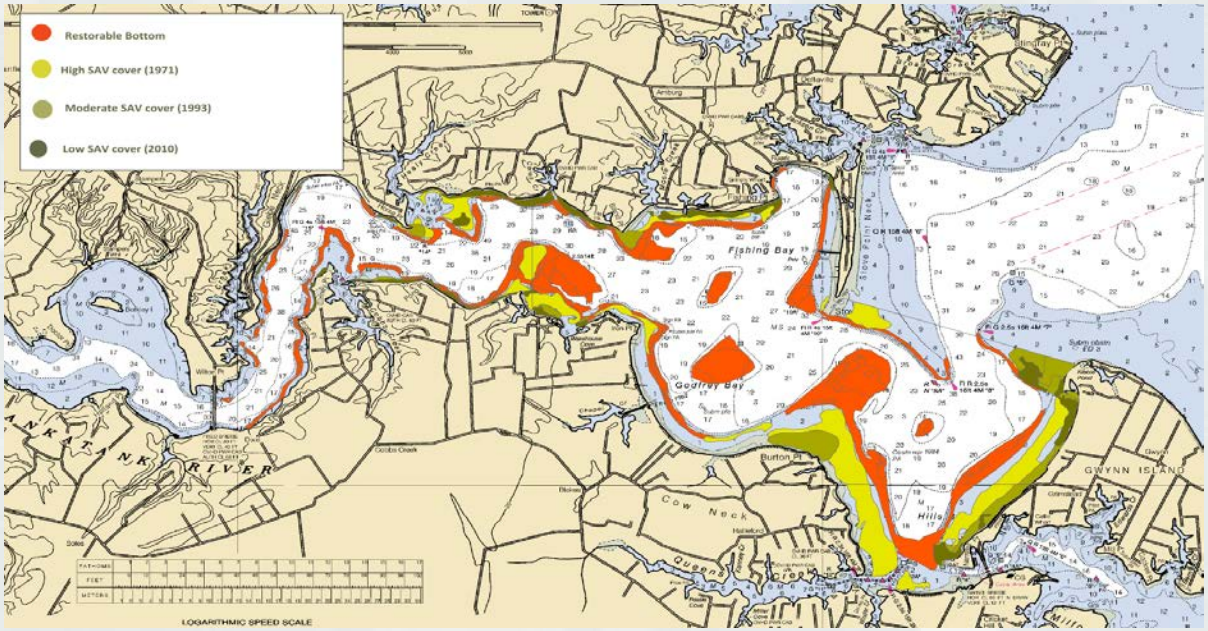
2) Depth: Define depth range suitable for oyster restoration work. Basis: Workgroup discussion; shallow extent of sonar survey. Concerns about low dissolved oxygen informed the 16 ft depth cutoff; concerns about survivability of reefs exposed at extreme low tides informed the 4 ft cutoff. Result: depth interval between 4 ft and 16 ft MLW is considered suitable for restoration, with a note that depth intervals of 4- 12 ft are optimal. Areas 12-16 ft should be considered on a case-by-case basis.



3) Hard river bottom: Define suitable (ie, hard) river bottom. Basis: NOAA sonar survey and ground truthing data, 2014. Result: Habitat types considered 'suitable' include any bottom consisting of either of the following: anthropogenic oyster rubble; biogenic oyster rubble; muddy sand; sand; unclassified; unclassified constructed reef.



4) SAV: Define potential SAV habitat, and remove from restorable bottom consideration. Basis: SAV beds are critical habitat, and oyster restoration should not interfere with (and ideally would enhance) SAV habitat recovery. Oyster reefs should therefore not be constructed on potential SAV habitat. VIMS SAV maps in a high coverage (1973), moderate coverage (1993), and low coverage years (2010) were considered. Results: Using the high SAV coverage (1971) data set, 66 acres of SAV beds overlap with potentially restorable bottom. These 66 acres were removed from restorable bottom consideration.



Rappahannock Modeling

- The Rappahannock model is an integrated hydrodynamic-larval tracking-population model and is structurally similar to the Great Wicomico model.
  - The model: hydro + larval tracking + population
- The hydrodynamic modeling is complete.
  - We used CH3D for the Rappahannock compared to ADH for the Great Wicomico. We chose CH3D to take advantage of the 3D capabilities of that code.
  - We have 6 years of hydro-data simulated.

Rappahannock Modeling

- Larval tracking model is 90% complete. This has been the trickiest part of modeling the Rappahannock.
- Given that the halocline wasn't well defined, we reparamterized the Great Wicomico Larval Tracking Model for the Rappahannock. Model runs are almost complete, and once we get the results we can plug them into the population model and run the scenarios.

Rappahannock Modeling

- Population model
  - The model is complete and is waiting for larval transport results.
  - The model is identical to the Great Wicomico, but the inputs (hydrodynamcis, larval transport, reef locations and numbers and environmental parameters) are parameterized for the Rappahannock.

- We are on schedule for completion by the end of the calendar year.
- We are simulating 20 reefs in the Rappahannock compared to 10 in the Great Wicomico.

Final Thoughts

- Water Resources Reform and Development Act of 2014: Increased USACE total budgetary authority in the 704b program (Chesapeake Bay Oyster Restoration) from $50 Million to $60 Million

- Tributary Planning
- Fossil shell is likely no longer a viable cost-share
- Virginia in need of sponsors with cash in order to continue to construct large scale oyster reefs
- How do we account for leased areas, aquaculture, natural areas, etc. when defining status of tributaries?

Conclusions