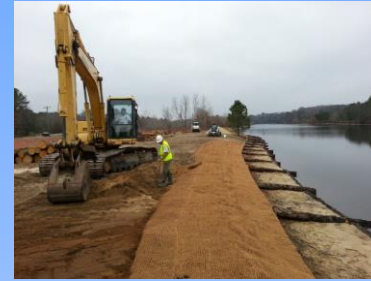




SOVEREIGN CONSULTING INC.  
AN ENVIRONMENTAL SERVICES FIRM

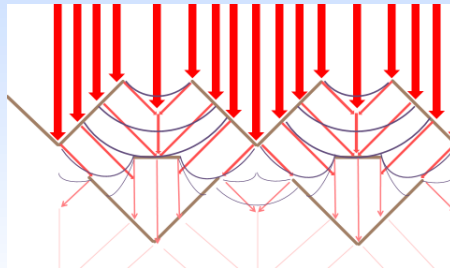
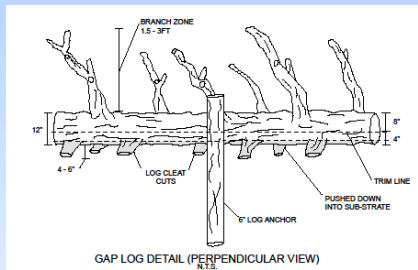
# ***Living Shoreline Treatments, Tactics, & Techniques in the Delaware Region***

## ***Restoration Session***



Delaware Estuary Science & Environmental Summit  
***"Balancing Progress & Protection – 10 Years of Science in Action"***

January 25-28, 2015  
Cape May, New Jersey



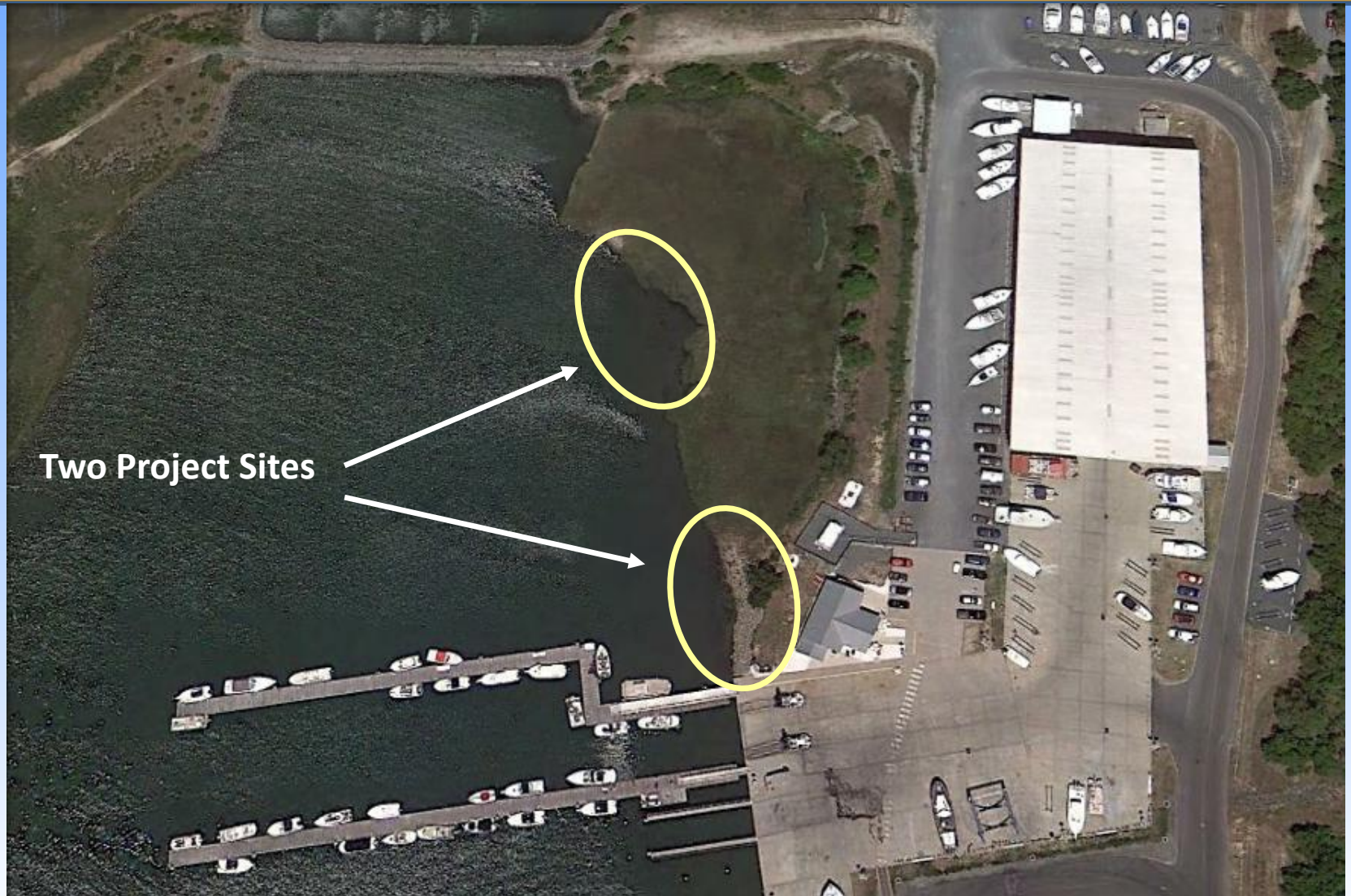
***Douglas Janiec  
Natural Resources Program Manager  
& Senior Restoration Ecologist  
Sovereign Consulting, Inc.***

# Treatments, Tactics, and Techniques Being Used

- **Delaware Estuary Living Shoreline Initiative (DELSI) Tactic** (100% green - low energy)
- **DELSI Hybrid** (DELSI in conjunction with shell bags and oyster castles)
- **Cupped Wave Spreader Treatment** (100% green, all log treatment – moderate energy)
- **Tidal River Vegetated Mud Sill Treatment** (nearly 100% green, log cells with plantings – low to moderate energy)
- **Wave Attenuation Device (WAD™)** (specially designed structural units to provide for ecological up lift – moderate to very high energy).



# DELSI Tactic – Indian River Inlet (back marsh), Sussex Co., DE





# DELSI Tactic – Indian River Inlet (back marsh), Sussex Co., DE

Tactic originally installed at low energy, mud/mucky environments.



This installation was a low energy, sandy environment.





# DELSI Hybrid– Mispillion Lighthouse, DE (Cedar Creek-Mispillion River Confluence, Kent/Sussex County Line, DE)





# DELSI Hybrid– Mispillion Lighthouse, DE (Cedar Creek- Mispillion River Confluence, Kent/Sussex County Line, DE)

*A pretty neat project,  
with a complicated energy  
paradigm*



- DELSI Tactic
- DELSI Tactic Hybrid
- Oyster Castles
- Shell Bags





# DELSI Hybrid– Mispillion Lighthouse, DE (Cedar Creek- Mispillion River Confluence, Kent/Sussex County Line, DE)





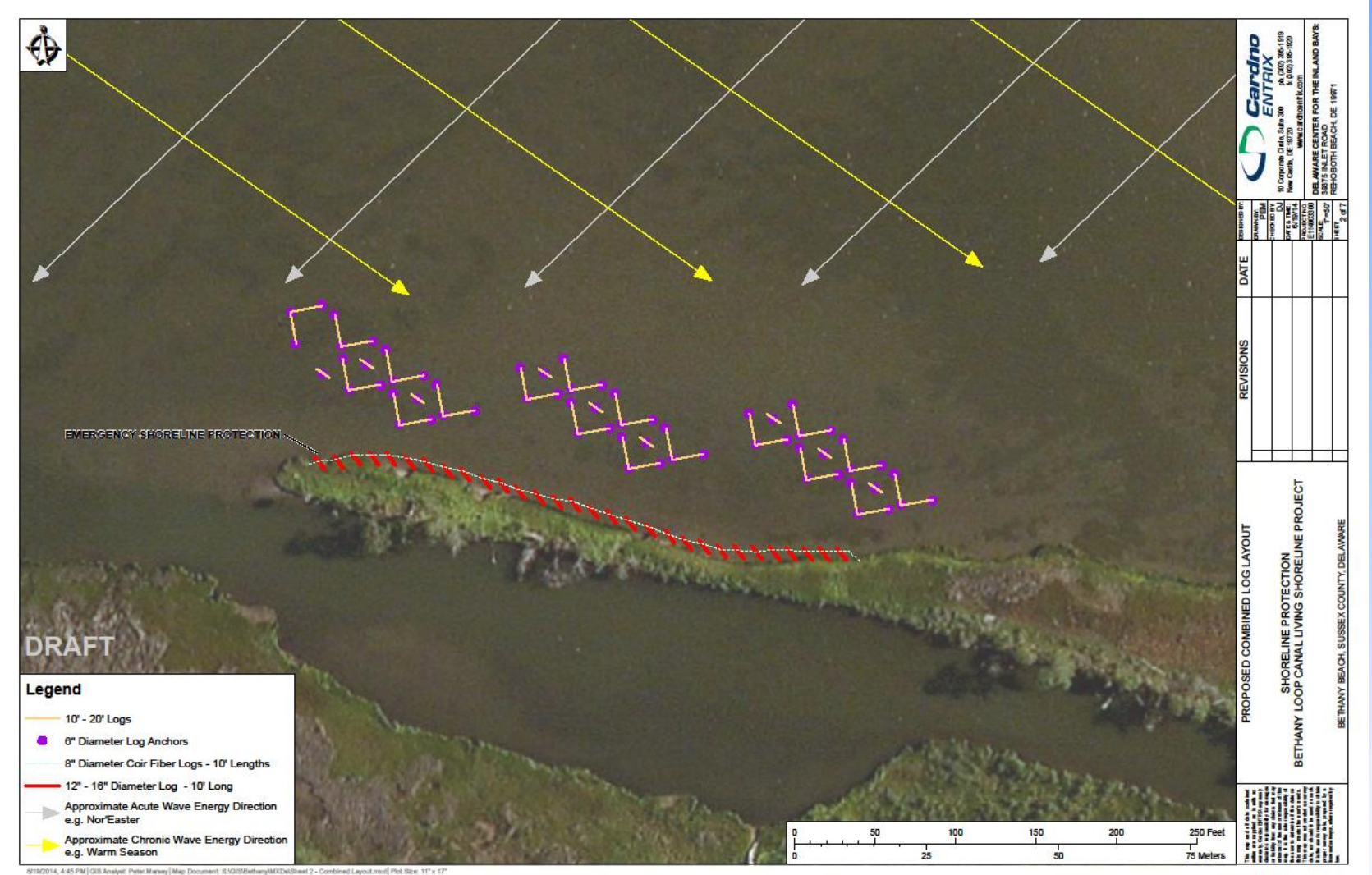
# Cupped Wave Spreader – Loop Canal, Bethany Beach, DE



Thank you, Delaware Center for the Inland Bays for sharing



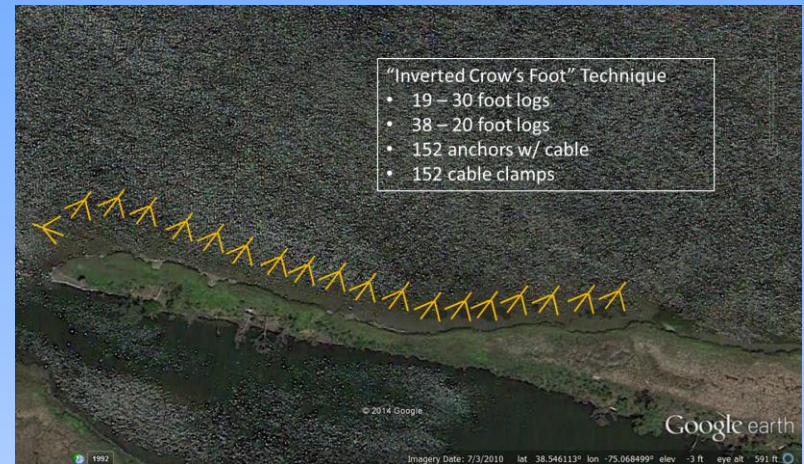
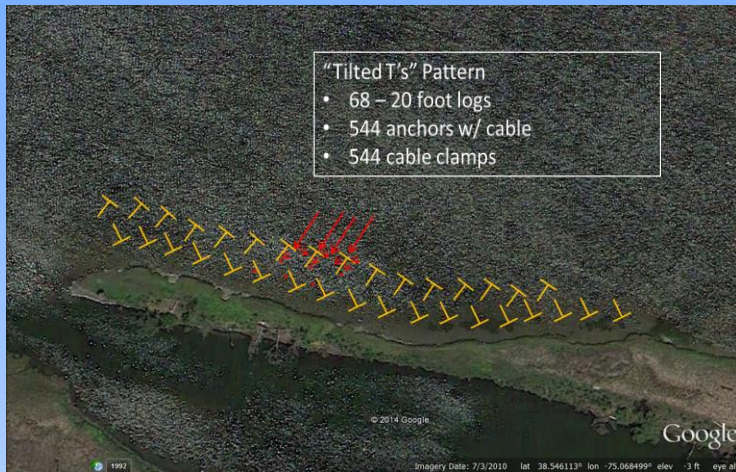
# Cupped Wave Spreader – Loop Canal, Bethany Beach, DE



Thank you, Delaware Center for the Inland Bays for sharing



# Cupped Wave Spreader – Loop Canal, Bethany Beach, DE



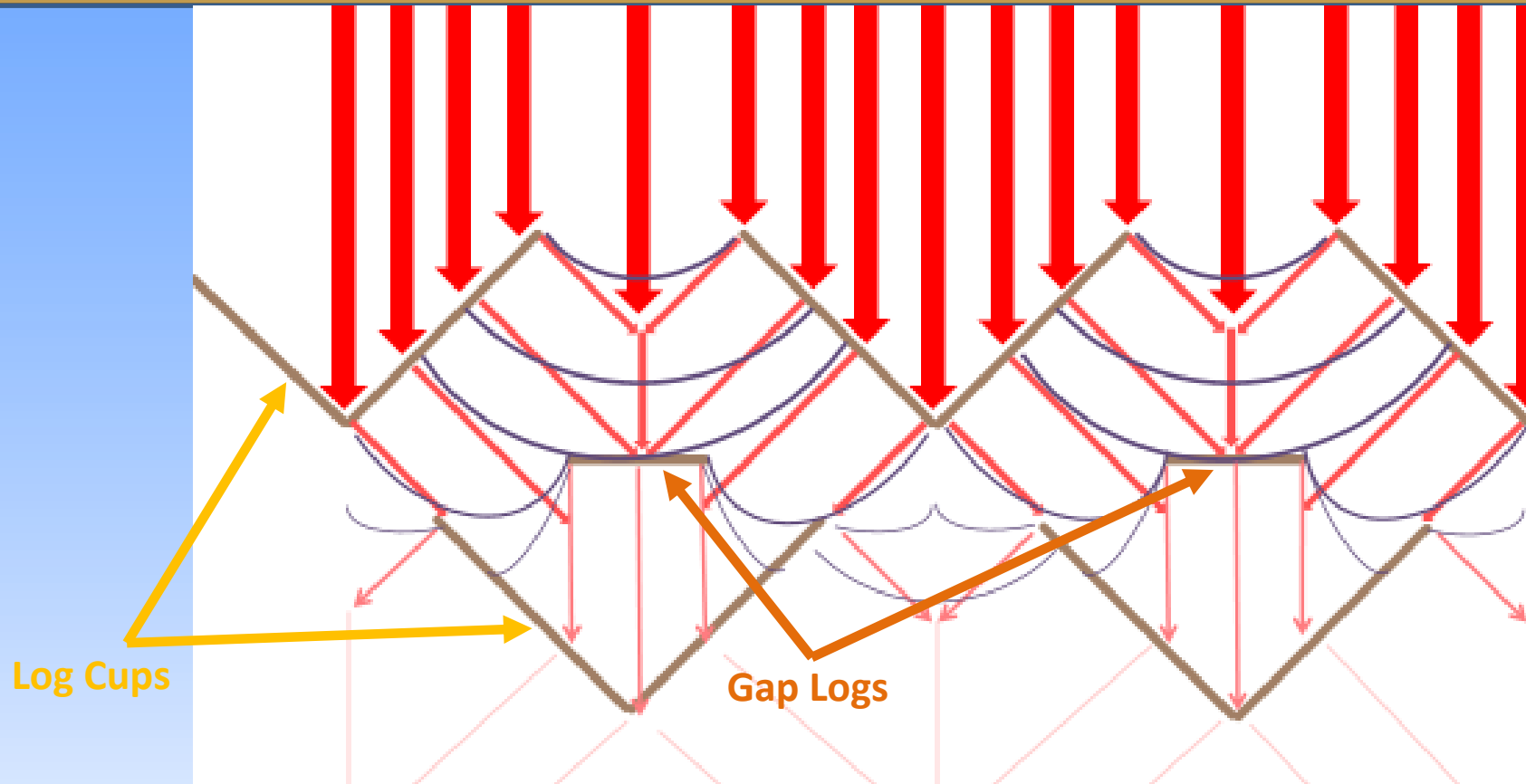
## Alternative Configurations



Thank you, Delaware Center for the Inland Bays for sharing



# Cupped Wave Spreader – Loop Canal, Bethany Beach, DE

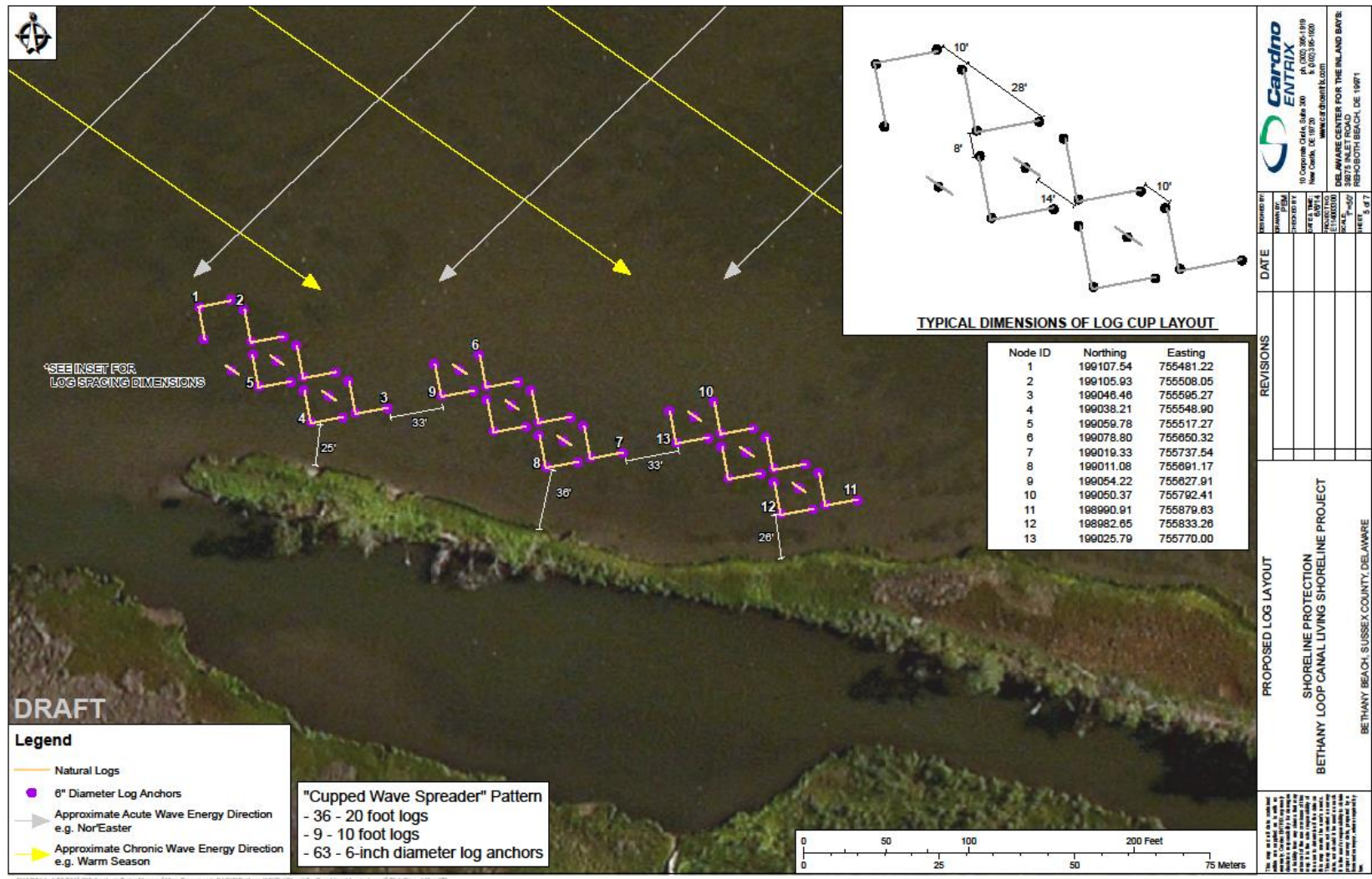


Thank you, Delaware Center for the Inland Bays for sharing





# Cupped Wave Spreader – Loop Canal, Bethany Beach, DE



Thank you, Delaware Center for the Inland Bays for sharing




The diagram illustrates the construction of a gap log detail. A horizontal log is shown with several vertical branches extending upwards. A central vertical post, labeled "6\" LOG ANCHOR", passes through the log. The log has a diameter of 8 inches at the top and tapers to 4 inches at the bottom. The branches are labeled "BRANCH ZONE 1.5-3FT". The log is secured by "LOG CLEAT CUTS" which are 4-6 inches wide. A "TRIM LINE" is indicated on the right side of the log. The log is pushed down into the substrate, as noted by the label "PUSHED DOWN INTO SUBSTRATE".

- Vertical Structure & Perches:** Indicated by a red arrow pointing to the branches.
- Trim & Substrate Lines:** Indicated by a red arrow pointing to the trim line on the log.
- Cleats:** Indicated by a red arrow pointing to the log cleat cuts.

**Gap Log Detail  
(cross section, n.t.s.)**

- Thank you, Delaware Center for the Inland Bays for sharing

 SOVEREIGN CONSULTING INC.  
AN ENVIRONMENTAL SERVICES FIRM

Thank you, Delaware Center for the Inland Bays for sharing



# Tidal Mud Sill – Marshyhope Creek Federalsburg, MD (Eastern Shore)



- Tributary to the Nanticoke R., tidal, maintained navigable channel
  - Chronic Wake Action + Highly Erodible Soils
  - 1'-3.5' vertical bank near high tide line
- BUT...
- Creek edges had gentle, consistent slopes, conducive for living shoreline design





# Tidal Mud Sill – Marshyhope Creek, Federalsburg, MD (Eastern Shore)



← Low Tide

High Tide →



Photographs provided by Duffield Associates, Inc.



SOVEREIGN CONSULTING INC.  
AN ENVIRONMENTAL SERVICES FIRM



# Tidal Mud Sill – Marshyhope Creek, Federalsburg, MD (Eastern Shore)



*Early 2014*

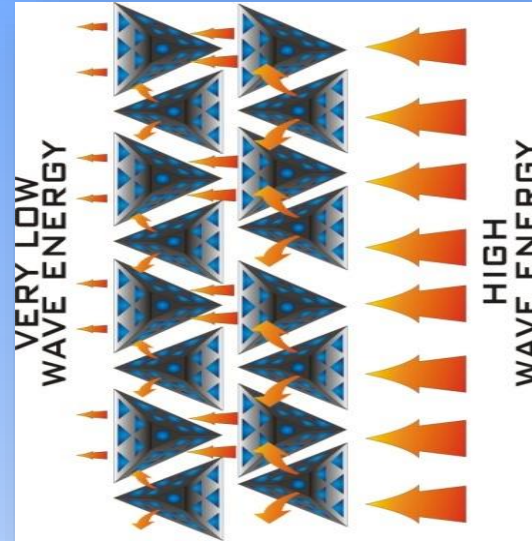
Photographs provided by Duffield Associates, Inc.



SOVEREIGN CONSULTING INC.  
AN ENVIRONMENTAL SERVICES FIRM



# Undisclosed Site in N. Delaware: 1<sup>st</sup> WAD Application in the Delaware Estuary



- Delaware hopes to see the first deployment of this technology in 2015.
- Provides for passive accretion of sediments.
- Resilient against minor and major storm events.



Photographs provided by Living Shoreline Solutions, Inc., and Mid Atlantic Environmental, LLC





# WAD Technology at Work



Video provided by Living Shoreline Solutions, Inc.



SOVEREIGN CONSULTING INC.  
AN ENVIRONMENTAL SERVICES FIRM



# *Thank You*

**Douglas Janiec**  
**Natural Resource Program Manager**  
**& Senior Restoration Ecologist**  
**Sovereign Consulting, Inc.**  
**973-433-6480**  
**[djaniec@sovcon.com](mailto:djaniec@sovcon.com)**

*A typical summer evening at The Point*