Delaware Living Shoreline Training Workshop

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Living Shoreline Monitoring

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Why Monitoring is Important

- What are your project's goal(s)?
  - Erosion control
  - Water quality improvement
  - Habitat improvement
  - Hydrological enhancement
- Is your project meeting it's goal(s)?
  - What monitoring will answer this.

Monitoring– Things to consider

- Time
  - How long are you willing to return to the site?
  - How often can you visit the site?
- Budget
  - How much money do you have allocated for the project?
- Expertise
  - Do you have staff that can perform the monitoring?
  - Do you have the necessary equipment?

Monitoring

- Doesn't have to be complicated or difficult
- Essentially taking repeated measurements in the same spots on anniversary dates.
- Monitoring Framework recommends methods to take measurements that are appropriate for a variety of users.

Delaware Living Shoreline (LS) Committee

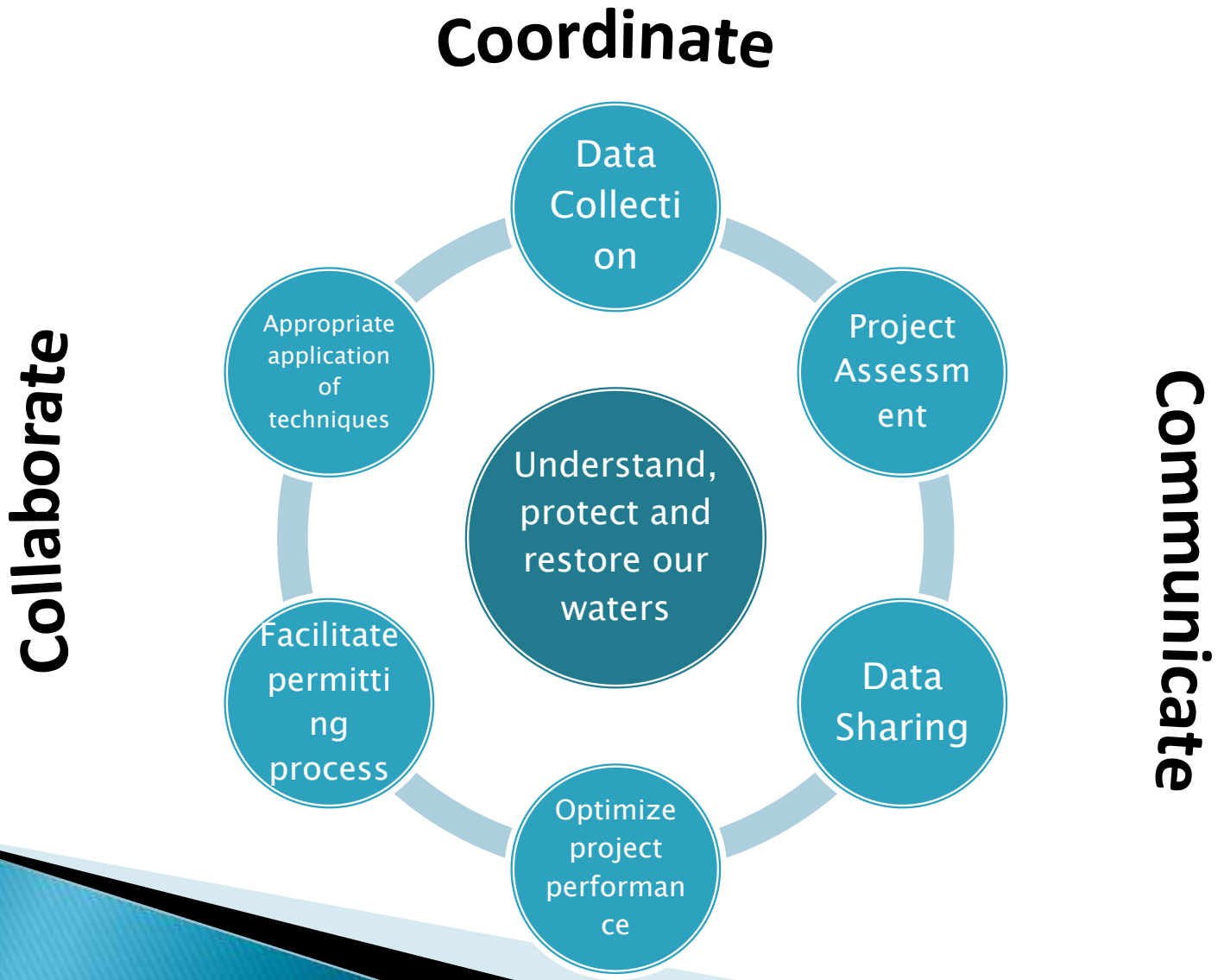
- Formed in October 2013, 40 members, 16 Organizations statewide, 9 meetings
- Policy, Outreach, Standards of Practice, and Implementation Subcommittees
- Definitions, signs, trainings, project sharing, troubleshooting, promoting LS practices
- Standardizing how LS projects are monitored

DELAWARE LIVING SHORELINE COMMITTEE

Monitoring Framework Objectives:

- To provide the user with a tool:
  - a table of monitoring metrics and methodological options
- To allow the user to develop an appropriate monitoring plan
- To generate an assessment of:
  - general effectiveness of a living shoreline project under specific conditions
  - The ability of a project to meet it's specific goals

Monitoring Framework Objectives:



Monitoring Framework Assumptions

1. A living shoreline project is envisioned or designed for a specific site

2. The project's goals and desired outcomes have been clarified (e.g. water quality, erosion, wildlife habitat)

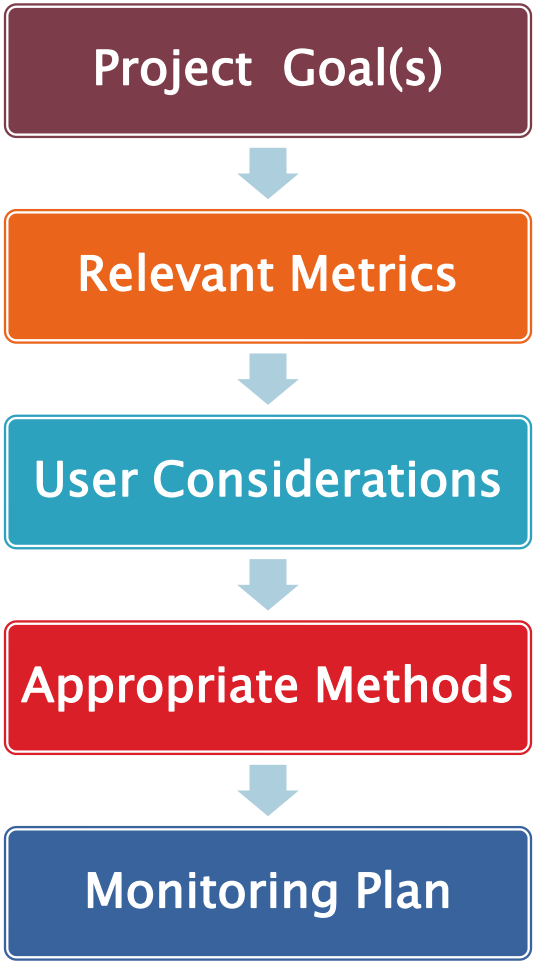
3. Monitoring is required or sought voluntarily

Outside Monitoring Framework Scope

- Guide practitioner in designing a living shoreline
- May guide practitioner in refining a project goal
- **BUT…….document may be useful for:**
- Guiding site assessment for project development
- Developing a monitoring budget and schedule

Monitoring Plan Conceptualization

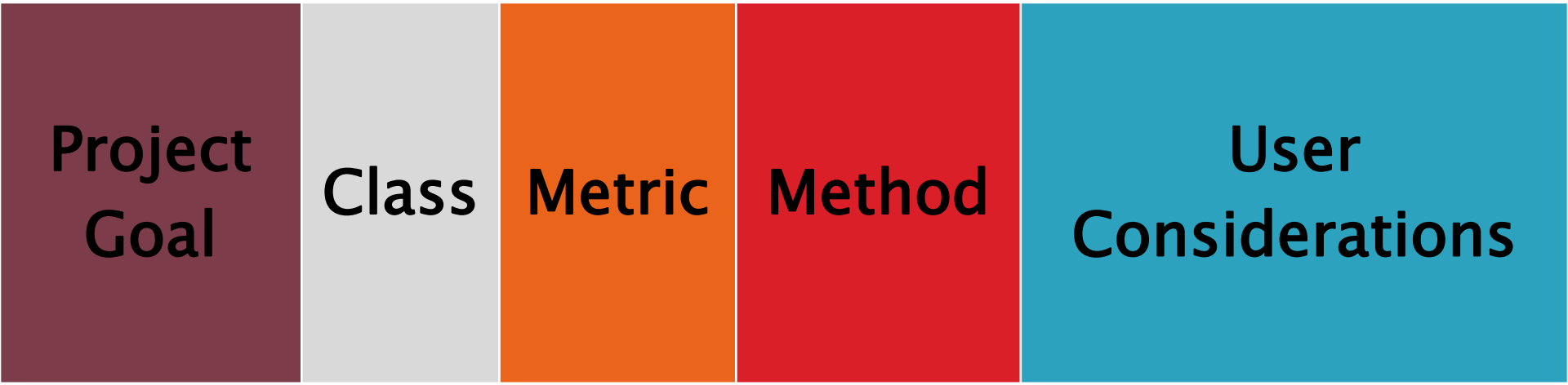
- How project performance will be gauged
- Step-wise progression
- General and user-friendly
- Provides a starting point; additional steps may be necessary in special cases



Framework User Output

- A table containing metrics (core and supplemental), methods (minimum 2), and user considerations for choosing appropriate methods
- **Goal Based**: metrics are recommended to determine if the specific goals of a project are being met and the relative effectiveness of the technique under specific conditions.

Monitoring Table Orientation



Project Goal(s)

1. Erosion Control
2. Water Quality
3. Habitat
    1. Fish and Wildlife Enhancement
    2. Vegetation Enhancement
4. Shoreline and Marsh Resilience
    - Flood protection and wave attenuation

Project Type Or Goal	Class	Metric	Method	User Considerations

Classes of Metrics

- Physical (position of shoreline)
- Chemical (water quality)
- Biological (bivalves, biomass)
- Structural (integrity of coir logs or oyster castles)
- Disturbance (tampering or trash capture)
- Socioeconomic
  - May be of magnitude or interest that warrants collection for short or long-term use
  - Inform users of ability to collect these data that may be related to each goal

Project Type Or Goal	Class	Metric	Method	User Considerations

Metrics

- to assess project success and gauge attainment of project goals
- **Core metrics** include a small number of common parameters that should be collected on all projects of a specific type or stated goal **(BOLD)**
- **Supplemental metrics** apply only to certain project designs and in situ physical, biological and chemical conditions as well as local economic/social concerns

Project Type Or Goal	Class	Metric	Method	User Considerations

Methods

- Techniques used to measure the value of a metric

- Minimum of 2 per metric
  1. High resolution = technical, suited for research groups
  2. Lower resolution = more user friendly, ideal for homeowner/citizen science level

User Considerations

Factors that guide selection of suitable methods

1. Technical Expertise
2. Budget and Resources
3. Temporal
4. Permitting
5. Scalability/Transferability of Data
6. Availability of Existing Data

Monitoring Plan Development

1. Define endpoints (if appropriate). Endpoints may not be needed (e.g. Change over Time Analysis)
2. Visualize the **spatial and temporal data collection design** based on metrics/methods. Show plot layouts, describe replication.
3. Discuss any considerations. (e.g. should plants only be assessed during peak growing season? Do SET data need to be collected at least 4 years before the products have meaning?)
4. What are long-term considerations for monitoring? When will funding run out? Can citizen science or some other approach be used to extend the monitoring, or is that unnecessary if the endpoints are achieved earlier?

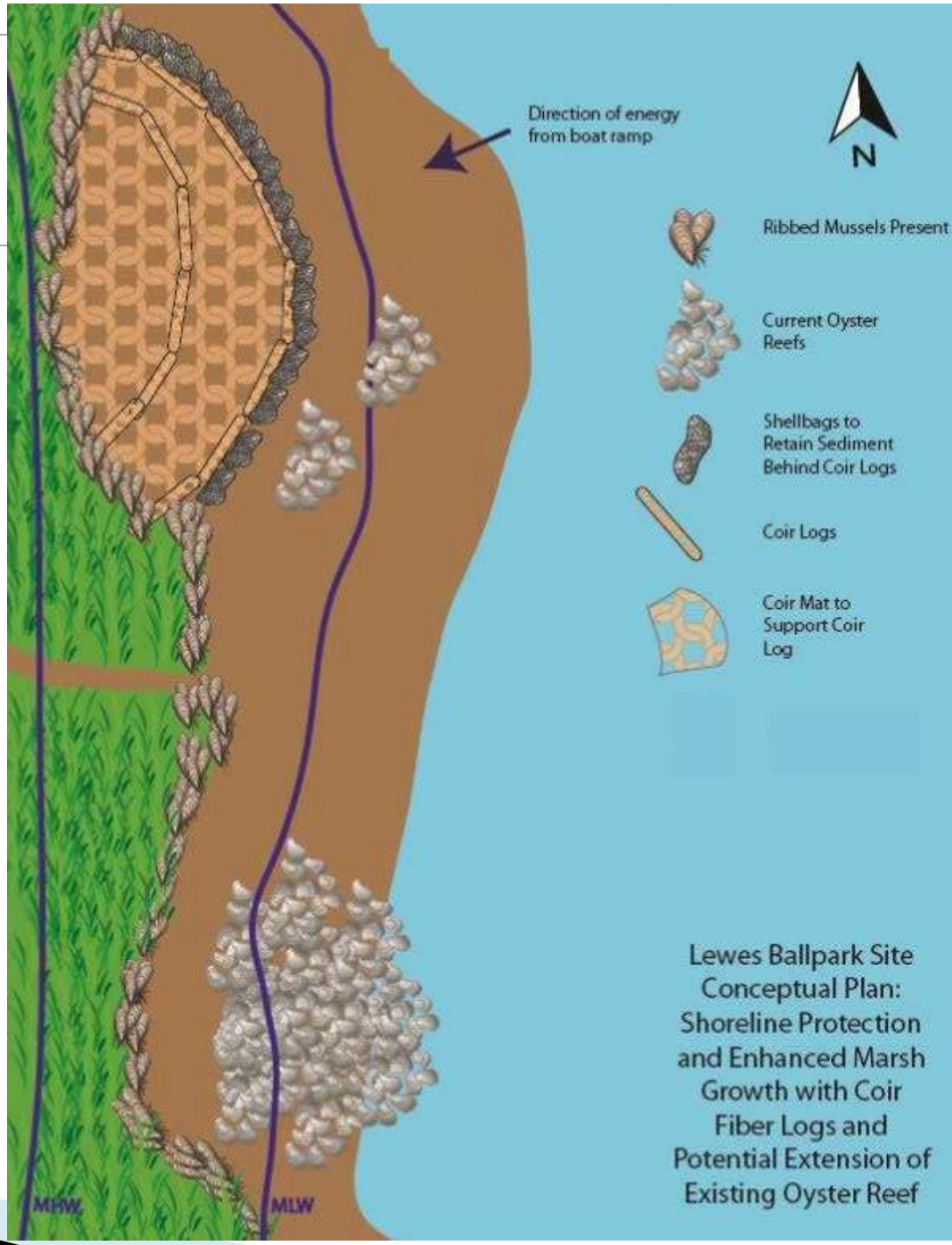
Example: Lewes Ball Field Project, Delaware

- **Partners:** Delaware DNREC and the Partnership for the Delaware Estuary (PDE)
- **Project Type:** Bio-Based Living Shoreline
- **Project Goal:** Erosion Control, Education, Demonstration
- **Tasks:** To track changes in vegetation extent and topography as a result of the installation at the treatment location and a paired control
- **Location:** Lewes Canal behind Little League Ball Fields

Example: Lewes Ball Field Project, Delaware

Project Design

- Paired treatment and control cells
- Works around existing mussel and oyster beds
- Coir logs will trap sediments, allow plants to establish and prevent erosion

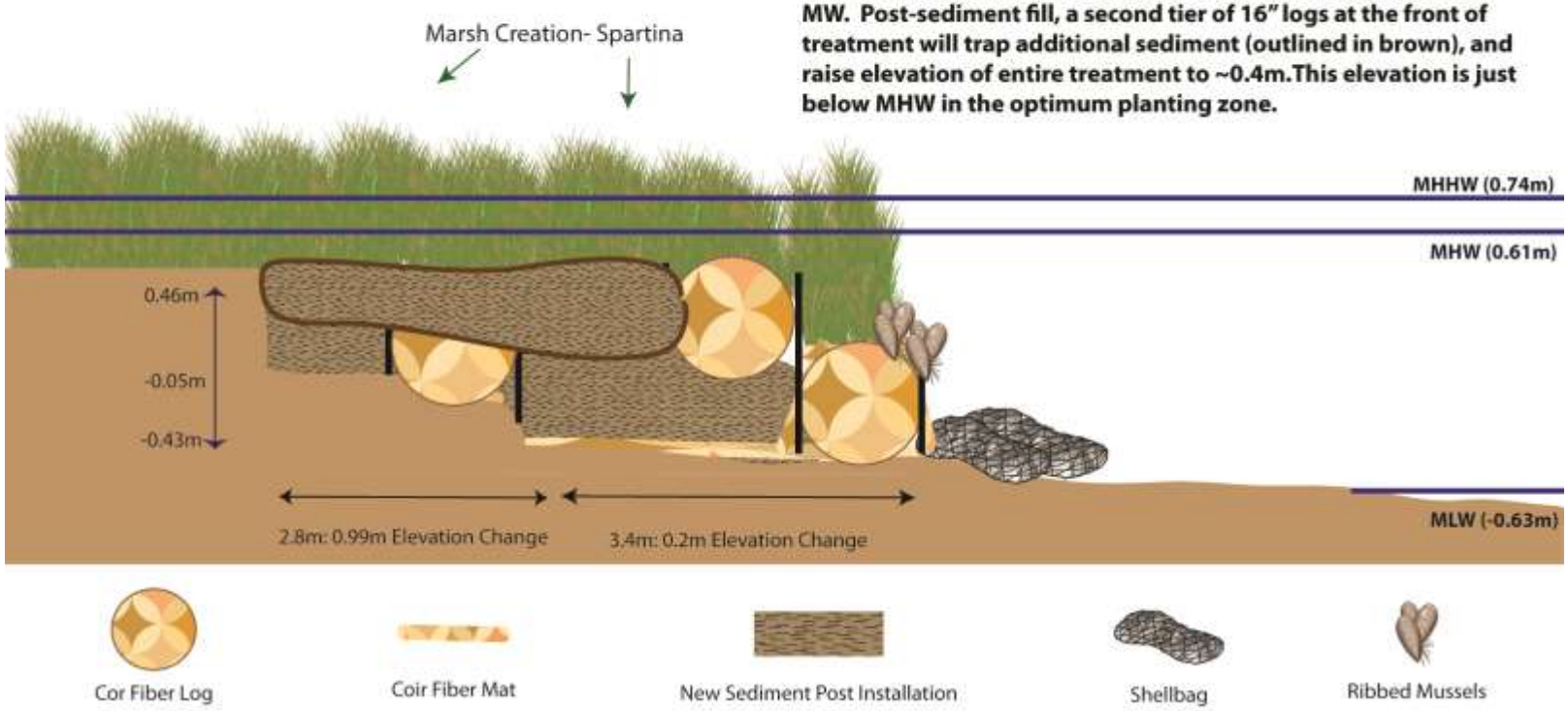


Lewes Ball Field Project Design

Lewes Ballfield Conceptual Plan Profile -

Salt Marsh Habitat Enhancement using Coir Fiber Logs and Natural Existing Ribbed Mussel Populations and Oyster Reefs

An initial installation of 16" coir logs in a terraced formation will trap sediment increasing the elevation at the front of the treatment to MW. Post-sediment fill, a second tier of 16" logs at the front of treatment will trap additional sediment (outlined in brown), and raise elevation of entire treatment to ~0.4m.This elevation is just below MHW in the optimum planting zone.



	Collection Times	Metric	Reasoning
Spring	Early March–End April	**Accretion Above Feldspar Marker Horizon (mm)**	Readings are easier to take without vegetation present
		Position of Shoreline	This metric is collected twice a year to account for inter annual variability
		Plot Elevations	This metric is collected every time a another metric is collected in a plot to provide paired elevation and other metric data
		Transect Elevations	Collected when vegetation is short to allow surveyor to capture any topographic features (e.g. terracing) present that may be hidden in high vegetation
		Infrastructure Position	
		Shellfish Density (/m^2)	Collected when community not obstructed by vegetation
Fall	Mid-September to Mid-October	**Horizontal Vegetation Obstruction**	Taken at end of peak growing season
		Vertical Light Penetration	Taken at end of peak growing season
		Species Composition Percent	Taken at end of peak growing season
		Bearing Capacity	Taken in fall so as not confounded in spring by frozen sub-surface
		Blade Height	Taken at end of peak growing season
		Plot Elevations	This metric is collected every time a another metric is collected in a plot

Lewes Ball Field Living Shoreline Project

Lewes, DE Living Shoreline Project Monitoring Protocol

Monitoring Type	Temporal Factor Level	Data	Collected On
Pre Survey	Before Installation	Topography	11/27/13
Baseline Survey	Before Installation	Topography	3/11/14
Baseline Physical and Shellfish Metrics (T_0)	Before Installation	All Spring Metrics	3/25/14
As Built Survey Tier 1	At Installation of Tier 1	Topography and Infrastructure Position	4/17/14
Sediment Monitoring	After Installation Tier 1	Depth of Captured Sediment	Monthly: 4/14 – 10/14
Baseline Vegetation Metrics* (T_0)	At Installation of Tier 2	All Fall Metrics	10/20/14
As Built Survey Tier 2	At Installation of Tier 2	Topography	10/20/14
Sediment Monitoring	After Installation of Tier 2	Depth of Captured Sediment	Monthly: 11/14 – 3/15
Physical and Shellfish Metrics (T_1)	After Installation	All Spring Metrics	3/18/15
Vegetation Salvage and Planting	After Installation	N/A	4/2/15 and 6/29/15
Vegetation Metrics (T_1)	After Installation	All Fall Metrics	9/24/15
Physical and Shellfish Metrics (T_2)	After Installation	All Spring Metrics	**Spring 2016****
Vegetation Metrics (T_2)	After Installation	All Fall Metrics	**Fall 2016****
Physical and Shellfish Metrics (T_3)	After Installation	All Spring Metrics	**Spring 2017****
Vegetation Metrics (T_3)	After Installation	All Fall Metrics	**Fall 2017****

*Baseline vegetation metrics taken post Tier 1 installation, due to circumstance that vegetation metrics need to be collected during peak growing season. Installation too young to have altered already growing grasses.

**Projected monitoring seasons in order to gauge effect of treatment over time

Monitoring Plots and Transects

Laying plot markers out in transects Pre-installation

Monitoring in Progress

Mussel lip counts

Clay marker plots

Measuring sediment accretion

Real-time kinetic (RTK) elevation surveying

Monitoring Framework

- Currently determining relevant metrics for Delaware
- Expected completion Fall 2016
- Method SOPs will be collected into the future