Projects designed to provide ecosystem and community resilience to flooding, storm surge, SLR and increased storm events

- Marsh Restoration
- Beach Restoration
- Aquatic Connectivity
- Science Support Tools

http://www.fws.gov/hurricane/sandy/
DOI Metrics Expert Group Report provides Ecological Performance Metrics

Organized by Coastal Feature

- Beach, Barrier Island, and Dunes
- Nearshore Shallow and Nearshore Deep
- Riverine and Riparian Zone
- Marshes and Wetlands
- Uplands and Watersheds
- Maritime Forests and Shrublands
- Estuaries and Ponds
- Grey infrastructure
- Green Infrastructure

Identifies Abiotic, Biotic, and Structural Metrics

Core Performance Metrics:
A set of performance metrics that are applied to multiple projects and at the full range of temporal and spatial scales to represent a change in resilience in one or more coastal features.
# Implementing Performance Metrics

## Comparison of Permit Required and Performance Metrics

Living Shoreline Project, Martin NWR, Smith Island, MD

<table>
<thead>
<tr>
<th>Permit Required</th>
<th>Performance (7 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric</td>
<td>Method</td>
</tr>
<tr>
<td>&gt;85% coverage of native plants</td>
<td>Pre and Post construction photos; Species ID, density and location</td>
</tr>
<tr>
<td>Monitor SAV - 5 years (2 years if robust)</td>
<td>Visual</td>
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*This image is a table showing the comparison of permit required metrics and performance metrics, including methods used for monitoring.*
Why Use Standardized Metrics

✓ To assess project performance and detect changes in resilience over time.
✓ Allows for comparison of similar project results at various temporal and spatial scales.
✓ Facilitates the development of best management practices for future use.
✓ Implementing best management practices result in savings by not incurring damage costs.

Key message: Using standard metrics, project results can be coalesced to provide best practices that will save money, lives, and natural resources.
Implementing Performance Metrics Monitoring Costs

Common mantras:
- Monitoring is expensive
  - As a result, monitoring is underfunded or not funded
- Managers would rather spend funds for more on the ground work then for monitoring

In reality:
- Monitoring costs are a fraction of overall project costs
  - Marsh restoration, Aquatic Connectivity and Living Shoreline Projects
    - Project Cost - $109,360,648
    - Performance Monitoring Cost - $6,517,753 (6.0%)
- Pay dividends into the future
  - Best management practices,
  - Comparable metrics across project types,
  - More informed management decisions
  - Saves money, lives, and natural resources

Key Message: Change the paradigm that monitoring is expensive to monitoring project performance is an integral component of an overall project design/cost.
Implementing Performance Metrics
State and federal permit required monitoring

Permit Required Monitoring Versus Performance Metrics

<table>
<thead>
<tr>
<th>Permits</th>
<th>Performance</th>
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<tbody>
<tr>
<td>Qualitative</td>
<td>Quantitative</td>
</tr>
<tr>
<td>Project design</td>
<td>Project performance and benefits</td>
</tr>
</tbody>
</table>

Incorporating performance metrics into permit required monitoring

- Best Management Practices - Saves money, reduces redundancy, and avoids failures by establishing science-based BMPs.
- Provides *in situ* monitoring network, comparison of similar project results at various spatial scales.
- May be best suited for new, developing, or un-tested restoration techniques.

Are there other approaches to incorporate performance metrics?
Next Steps

- Implement metrics to demonstrate Natural infrastructure projects perform and provide multiple benefits, i.e., demonstrate that projects work

- Refine/develop/identify metrics that demonstrate project performance (build on existing efforts)

- Develop design criteria for natural infrastructure projects
“If resilience is built through a project, and no perfect resilience metric is around to measure it, does it have an impact?”

Anonymous, National Adaptation Forum, St. Louis, MO 2015
Post Project Monitoring & Program Evaluation

Goal: Compatible ecological and socio-economic information across similar projects

Developed Core Ecological and Socio-economic Metrics


Long-Term Monitoring


Project Implementation

Ecological & Community Benefits Realized

Subbottom profiles in nearshore (Photo: USGS)
Saltmarsh Bird Survey (Photo: FWS)
SET Installation (Photo: FWS)
Elevation Surveys (Photo: FWS)