State of Science Needs for the Oyster Action Team

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Current Needs That Are Being Addressed:

- Pre-restoration data collection and analysis
  - *Benthic habitat surveys complete in all 10 tributaries*
  - *GIS analysis of biological conditions and human use complete (ex: water quality; benthic habitat; SAV; oyster management regime; aids to navigation; pipeline crossings; etc)*
  - *These served as the basis for all 10 Oyster Restoration Blueprints, which are now complete*

- Restoration Progress Tracking
  - *Partners have established a GIS-based process for tracking collective progress*
  - *Key elements tracked are tributaries completed, acres restored, in-water restoration costs spent; summary report published annually.*

Current Needs That Are Being Addressed *(continued):*

- Monitoring of Restored Reefs
  - *Reefs are monitored 3 and 6 years post restoration*
  - *96% of monitored reefs are meeting pre-established 'Oyster Metrics' success criteria*

- Developing Streamlined Monitoring Protocol
  - *Current monitoring is effective but cumbersome and arguably over sampled.*
  - *A 'Rapid Assessment Protocol' (RAP) using video monitoring and image scoring has been developed and is being tested.*
  - *Early results are encouraging, but additional resources may be needed to refine or redevelop the RAP.*

Current Needs That Are Being Addressed *(continued):*

- Quantifying ecosystem services and economic impact
  - *The large-scale restoration can continue to serve as living labs to understand ecosystem services*
  - *7- year 'Oyster Reef Ecosystem Services' project complete*
  - *The Economic Impacts of Oyster Restoration and Seagrass Habitats of the Middle Peninsula, Virginia (Ihde, Knoche)*
- Monitoring performance of restored reefs
  - Developing Rapid Assessment Protocol (RAP)
- Oyster restoration BMP
  - In situ methods and quantification of denitrification rates by restored reefs over a range of Bay conditions

Emerging Science Needs

- Climate Change
  - Evaluating how and where oyster restoration can contribute to shoreline resilience
  - Understanding impacts of climate and weather change on oyster restoration and productivity (ex: OA, salinity and temp changes, etc)
- Refining restoration approaches
  - Modeling and mapping larval source/sink dynamics
  - Analyzing reef performance to inform future restoration
  - Evaluating if tributary-based, large scale restoration is the appropriate scale to develop self sustaining reefs resilient to seasonal and interannual stressors
  - Spatial analysis informing ways to best link restoration, wild harvest, and aquaculture at a tributary scale