Workshop Summary

Status, Trends, and Conservation of Eelgrass in Atlantic Canada and the Northeastern United States

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Status & Trends Around the Region

- Many areas experiencing eelgrass loss
- In general, highest rates of decline in southern part of region
- Exceptions
  - northern areas of loss, e.g. Pen. Bay, James Bay
  - southern areas of stability, e.g. eastern Long Island Sound

Drivers:

- **Water quality**
- Green crabs
- Aquaculture
- Thermal effluent

Questions:

- How does changing technology influence trend estimates?
- Complex interactions of multiple controlling factors
- Threshold density for maintenance
- How to protect remaining habitat

Protecting Habitat From Direct Impacts

- Vegetated areas have higher habitat value than unvegetated
- Activities with direct impacts persist – e.g. moorings, aquaculture, dragging
- Monitoring distribution, condition, and stressor/response relationships can help identify threats, diagnose causes, and suggest management solutions.

Questions:

- What is sustainable
- What is “high value”
- How much eelgrass must be protected to safeguard ecosystem services
- How to define areas for protection (eelgrass structural characteristics vs physical site attributes)
- What are best ways to ensure protection
  - legislative
  - community awareness
  - multi-sectoral partnerships

Restoration

- Location, location, location!!
- There are different definitions of success:
  - Target acreage (mitigation)
  - Persistence of bed
  - Education
- Partnerships for restoration in concert with shared information on potential habitat and restoration opportunities can enhance habitat gain

Questions:

- Standard monitoring frequency and duration, should incorporate abiotic and biotic factors
- Better temporal and spatial data sets for site selection
- Effects of regional factors on site selection – shoreline configuration, landscape position, conflicting site uses
- What is the minimum patch size to provide functions and ensure sustainability?

Water Quality

- Estuary-specific TMDL
  - N load based on sources, attenuation, hydrology calibrated with field data
  - Thresholds based on desired endpoints, including eelgrass
  - Conc. thresholds range .3 - .6 mg TN/L
  - Cost associated with N reduction drives individual assessments (i.e. per embayment)
- TN based on Kd requirement - .32 mg/L
  - Weight of evidence suggests this is good starting point
- Percent seagrass loss related to TN load
  - <50 kg TN ha^{-1} yr^{-1} : mean 50% loss
  - 51-99 : mean 75% loss
  - >100 : high loss
- Multi-metric approach
  - Criteria for summertime DIN, %SI, TN load, chl, macroalgae, …
  - Higher N loads may be allowable if ameliorating factors present

Questions:

- 22% surface irradiance is guiding targets, but this minimum light intensity was determined for survival of existing beds – is this too liberal a light threshold?
- What light intensity does eelgrass need for maximum production, growth, reproduction?
- How is this influenced by duration above certain light intensities?
- What are effects of multiple, interacting controlling factors? (e.g. sandy vs silty sediments)
- No one size fits all! So where do we start in setting N criteria? Do we have enough data to suggest criteria for *classes* of estuaries?
- Use of N reduction as mitigation for permitted losses?

Emerging Threats

- Global climate change: variation in shoot density and growth with temperature and mean sea level
- New species invasions can have dramatic effects before equilibrium is reached
- We are seeing some invasive species in association with eelgrass for the first time

Questions:

- Predicted range expansions of eelgrass and invasive species
- Interactions among multiple controlling factors, including emerging threats themselves (e.g. thermal tolerance of invasive species)
- Need to incorporate climate change in restoration planning
- Relative importance of nutrient enrichment vs invasive species in controlling eelgrass?
- Fate of seagrass NPP?
- Need to incorporate seagrass in global carbon budget
- Managing for resilience requires nurturing sources of renewal (rhizomes & seeds) – what does this mean in terms of establishing N criteria ? (i.e., derived N thresholds are related to maintaining existing eelgrass beds; more conservative criteria may be required for bed expansion via vegetative and seedling growth)


What are the pressing needs in research and conservation to inform policy and direct action?