Nutrients/Dissolved Oxygen Breakout Group
1/26/10

Outcome/Issue: impact of nutrient loadings on the loss of diversity and sustainability of living marine and coastal resources (i.e. fin fish, shell fish, shad, and native species such as eel grass and other sea grasses), and on the potential economic losses (i.e. property value, tourism, shrimp, crabs, and recreation) of the estuaries and oceans.

Tools (observations [in-situ and remote], models, assessment, and communication): Need a "complete enough" process that incorporates observations and models that address natural effects (climate) and anthropogenic sources (lawns, agriculture, discharge).

Successes – existing capabilities for transfer value and scaling up to national scale:

- Watershed model (SPARROW) that provides info on loadings to estuaries and point and non-point sources, and transport from upland to estuary.
- Available estuary circulation models which are open source, large network of community users (ROMS, FVCOM, ECOM). These circulation models need to recognize ocean inputs, inland inputs, physical processes (flushing by wind, currents, tides) and biological interpretation.
- Common set of observations that feed into models with data quality requirements in common formats.
- Capabilities: Technology (sensor): U of RI lab experts partner with users for improved adequate monitoring of and measurements of nutrients, sensor development. Support for nutrient monitoring and testing of nutrient analyzers.
- DE Bay testing of automated nitrate sensors.

Gaps and needs:

- Data starved for the right data and quality data at:
    - boundary of coastal to estuary flux
    - in shallow part of estuary, not just channel
    - freshwater inputs, particularly from ground water – direct and indirect (directly into estuary still not available from SPARROW)
    - atmospheric contribution
- Models all require parameterizations that may be locally specific. This demands sufficient data for calibration and for quantitative hypothesis testing.
- Adequate monitoring of and measurements of nutrients, sensor development. Support for nutrient monitoring and testing of nutrient analyzers. Concept/Capability: U of RI lab expert partner with users.
- Standard and good quality data set for spatial and temporal observations.
- True effects on biota via quantitative tests of hypotheses based on adequate data.

- Clear communication of findings to managers. However, communications must be two-way (i.e. the scientific community must be responsive to management needs and managers must be responsive to the needs of the scientific method).
- Data Management – how can this be most effectively achieved?

Action Items:

- Standard set of basic variables consistently monitored over time (e.g. DO, temp, pH, salinity, turbidity, total N and P and species, chlorophyll, light, wind, velocity, sea level, biological components such as sea grass beds and diversity).
- Measure metabolic rates (primary production, respiration, nitrification…) to improve models.
- Consider natural variability and major climatic events (NAO) and natural effects of.
- Regional measurements of nutrients and DO (RA scale).
- Communication of results and capabilities are more effective when common formats are used.
- Share observations (and data streams) with other RAs and watersheds (e.g. nutrient data, wind, remote sensing) for scientific interpretation and geophysical modeling purposes (before sharing with management – for cost effectiveness). Generate findings which are relative to managers, even if don't have a complete set of data.
- Compare to literature, as one first step. New hypotheses with fresh look at data.
- Good experimental design with similar good quality for data and models - collect data in support of models, run models in support of data.
- Establish background state and sustain observations to distinguish between nature vs anthropogenic for interpretative and stats power