

**Northeast Coastal and Barrier Network
Protocol Development Summary**
(Sept. 2005)

Protocol: Salt Marsh Nekton Monitoring

Parks Where Protocol will be Implemented: CACO, GATE, FIIS, ASIS, SAHI, GEWA,
COLO

Justification/Issues being addressed:

Threats to estuarine ecosystems include eutrophication, watershed development, wetland loss, overfishing, and other human-induced problems. Long-term monitoring of estuarine natural resources is needed to document the effects of anthropogenic impacts and to provide baseline data sets from unimpacted areas (Raposa and Roman, 2001).

Nekton, defined as an assemblage of fishes and decapod crustaceans, is an abundant Estuarine and salt marsh fauna with unique responses to environmental change that make them desirable for inclusion in a coastal monitoring program. Development of the Index of Biotic Integrity (Karr 1981) and the Estuarine Index of Biotic Integrity (Deegan et al. 1997) attests to the value of monitoring nekton to document ecosystem level responses to anthropogenic stress. The foundation of these indices lies in the notion that fishes and decapods incorporate and reflect multiple ecosystem processes, and therefore indicate overall ecosystem integrity.

The estuarine nekton assemblage is an integral link between primary producers, consumers, and top predators and is likely to respond to either top-down or bottom-up estuarine perturbations. For example, nutrient enrichment (a bottom-up perturbation) could affect nekton by altering submersed vegetative habitats (Valiela et al. 1992; Harlin 1995). Conversely, removal of predatory fishes through overfishing (top-down) could induce responses in the forage or prey nekton guild (Carpenter and Kitchell 1985). Nekton also represent a significant portion of the diets of many piscivorous birds, economically valuable fishes, and, when in estuaries, marine mammals (Friedland et al. 1988; Sekiguchi 1995; Smith 1997).

Developing and initiating long-term nekton monitoring in the Northeast Coastal and Barrier Network parks will help track natural and human-induced changes in estuarine nekton over time and advance our understanding of the interactions between nekton and the dynamic estuarine environment.

Monitoring Goals, Questions and Objectives to be addressed by the Protocol:

NCBN Goal:

To monitor salt marsh and estuarine ecosystem condition in NCBN parks in order to provide managers with information to make better informed management decisions and to work more effectively with other agencies and individuals for the benefit of these park resources.

Monitoring Question:

Is nekton community structure (species composition, abundance, and size structure) changing over time?

Monitoring Objective:

Determine long term trends in species composition, abundance and size structure in nekton communities in selected NCBN park salt marshes.

Vital Signs:

Salt Marsh Nekton Community Structure

Measures:

Species composition, size structure, abundance

Justification:

The abundance and composition of nekton species responds to environmental changes (e.g. sea level rise, nutrient loading, invasive species colonization). Monitoring nekton over time will help evaluate both natural and human-induced changes in estuarine nekton over the long-term and will advance our understanding of the interactions between nekton and the dynamic salt marsh and estuarine environment. Additionally, through long-term monitoring, the presence or emergence of invasive species of nekton will be detected and their subsequent impact on nekton community dynamics can be evaluated.

Basic Approach:

Nekton (Fish and Decapods) are defined as all free-swimming fish and decapod crustaceans that are common residents of salt marshes, utilizing the marsh surface, creeks and ditches, and marsh pools. At each study site 15 to 25 sampling locations will be established where nekton will be collected, depending on the available habitat. Sampling locations may include marsh pools, creeks, ditches and shoreline areas, depending on the topography of the site. Depending on the amount and type of open water habitat (pools or ditches) on the marsh, two different sampling techniques (throw trap and ditch net) will be employed. If pools and ditches are both present within the marsh, both habitats will be sampled. Pools and ditches will be sampled on ebbing tides, when the marsh surface has drained. Sampling will occur twice per year, once in early summer (June-July) and once in late summer-early fall (August – October).

Principal Investigators and NPS Lead:

Protocol development will be completed through cooperative agreement with the Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02882

Principal Investigator: Mary-Jane James-Piri, Ph.D.

NPS Leads: Bryan Milstead and Sara Stevens

Development Schedule, Budget, and Expected Interim Products:

In cooperation with the USGS, Cape Cod National Seashore has developed a protocol and implemented a nekton monitoring program. This protocol has also been implemented in seven USFWS sites along the Atlantic seaboard. Therefore, protocol development for NCBN parks has not required initial field research and has consisted primarily of converting the Cape Cod NS Nekton monitoring protocol to meet Network and NPS Inventory and Monitoring Program standards. The draft NCBN Salt Marsh Nekton Monitoring protocol has been completed for external peer review as part of the NCBN Phase 3 Report (draft December 2004). After peer review, revision and approval, implementation of this protocol in seven NCBN parks will occur

in 2005-2006.

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