**Integrated Analysis Tools for the NERRS System-Wide Monitoring Program Data**

Marcus W. Beck – *ORISE Research Participation Program, USEPA*

1 Sabine Island Drive, Gulf Breeze, Florida 32561

850-934-2480, [beck.marcus@epa.gov](mailto:beck.marcus@epa.gov)

Todd D. O’Brien – *NMFS/NOAA COPEPOD Project*

Silver Spring, Maryland 20910

301-427-8160, [Todd.Obrien@noaa.gov](mailto:Todd.Obrien@noaa.gov)

Marie H. Bundy – *Ecologist and National Research Coordinator, NOAA*

Silver Spring, Maryland 20910

301-713-3155, [marie.bundy@noaa.gov](mailto:marie.bundy@noaa.gov)

Standardized monitoring programs have vastly improved the quantity and quality of data that form the basis of environmental decision-making. One example is the NOAA-funded National Estuarine Research Reserve System (NERRS) System-wide Monitoring Program (SWMP) that was implemented in 1995. NERRS is a unique state-federal partnership where federally funded research is founded on rigorous QA/QC and standardized approaches to data collection, and has provided two decades of continuous water quality and weather data from over 140 fixed stations in 28 reserves. SWMP data have been used in a variety of ecological studies with the objective of describing dynamics of estuarine ecosystems to better inform coastal management. The challenges of analyzing this massive dataset have been significant, and the lack of simple tools for processing and evaluating the increasing quantity of data have complicated comparisons between systems, as well as simple trend analysis at individual sites. Providing an understanding of regional and national trends while retaining the ability to understand local trends required an innovative and dynamic approach to training users and maintaining an evolving data analysis approach. Here we describe a suite of open-source analysis tools developed for the evaluation of SWMP data and the process that was used to create a “community of practice” among users. Tools include the R package SWMPr developed to retrieve, organize, and analyze data, Shiny web applications for interactively plotting and comparing trends in SWMP parameters, and an online forum where researchers can share ideas related to data analysis. Applications are maintained on the website [SWMPrats.net](http://SWMPrats.net) and are actively promoted within the NERRS community to augment existing data retrieval services. Overall, these tools provide an effective approach to link quantitative information with analytical needs to inform management programs aimed at coastal protection and restoration.