**NERRS/SWMP Data Analysis Workshop: *Time Series***

**2014 NERRS Annual Meeting - November 17**

**Workshop Website:** [**http://copepod.org/nerrs-swmp-workshop/**](http://copepod.org/nerrs-swmp-workshop/)

**Instructors:**

Todd D. O’Brien - NOAA/NMFS, COPEPOD, todd.obrien@noaa.gov

Dr. Marcus W. Beck - ORISE, USEPA, beck.marcus@epa.gov

**8:30am Software Set-Up / Help**

Instructors will assist workshop attendees with **last-minute** software and connectivity issues. Attendees are expected to have reviewed pre-workshop materials and have installed necessary software on their personal laptops. A step-by-step R installation guide and introductory lesson plan will be made available on the web for participants to apply before the workshop. This will provide the basic familiarity with R that is expected for participation in this workshop.

**9:00am Introduction/Overview (1 hr) - Todd O’Brien**

Objective: Participants have an understanding of the following related to time series analyses:

* What is time series analysis and what are the assumptions and caveats involved?
* From a single variable analaysis to an across-coasts, multi-site intercomparison, what questions could we answer using these approaches with SWMP data?

Agenda:

* Instructor and participant introduction, overview of the workshop format
* Brief overview of single variable explorations
  + sub-topics: gaps, tides, and seasonal cycles
* Brief overview of multi-variable comparisons
  + sub-topics: different sampling frequencies
* Multiple-site examples (looking within a single estuary)
  + sub-topics: different sampling methodologies

( Agenda continues on next page. )

**10:00am SWMP Data Retrieval and Preparation (½ hr) - Marcus Beck**

Objective: Participants have an understanding of the following:

* What are the various ways data are obtained from SWMP?
* What needs to be done to SWMP data to get it into a format to enter into a statistical program to conduct a time series analysis?

Materials: Dataset 1, Script 1

Agenda:

* Brief overview of SWMP network and available data
* Format and potential issues with output data
* Cleanup and pre-processing

**10:30am BREAK (15min)**

**10:45am Data Processing (1h 15min) - Marcus Beck**

Objective: Participants have an understanding of the following:

* How can SWMP data quality be evaluated and handled?
* How can data be selected and removed to facilitate analysis?
* What are some ways data can be combined?

Materials: Dataset2, Script2

Agenda:

* Review of import and handling QAQC flags
* Appropriate use of data subsets
* Combining data for comparisons

**12:00pm LUNCH**

( Agenda continues on next page. )

**01:00pm Exploratory Data Analysis (1 hr) - Marcus Beck**

Objective: Participants will consider a subset of fairly basic time series analytical techniques and will have an understanding of the following for each method:

* What are some basic time series analysis techniques and when would you use them?
* How are the data set up, what functions are used, and how are the results interpreted?

Materials: Dataset3, Script3

Agenda:

* Analysis 1 - missing data and interpolation
* Analysis 2 - smoothing and aggregation
* Analysis 3 - basic trend analysis

**02:00pm Example Dataset Group Activity (1 hr) - Interactive**

Objective: Participants will gain some experience with a simple problem related to SWMP data.

* The trainer will demonstrate the method for a specific question and dataset.
* Each participant will analyze a problem dataset on their laptop.

Materials: Dataset4, Script4

Agenda:

* Explanation of dataset and analysis objective
* Interactive breakout activity

**03:00pm BREAK (15 min)**

( Agenda continues on next page. )

**03:15pm Next Steps (advanced analysis, addl. resources, etc.) (1hr 45min)**

Objective: The outcomes of the day’s training are summarized and participants have information about additional resources.

* What are commonalities among methods and strengths and weaknesses of each?
* What are some resources that provide more instruction and information about time series analysis?
* What could be the focus of future trainings, especially with regard to multivariate statistics?

Materials: SWMP cookbook, help resources

Agenda:

* Summary of methods and their execution
* SWMP cookbook
* Where to go for help and additional resources
* Answer questions and facilitate a discussion about next step (e.g., multivariate analyses, inter-site comparisons, etc.)