Exploratory JBNERR System Wide Monitoring Program (SWMP) Time Series Data Analysis: Update

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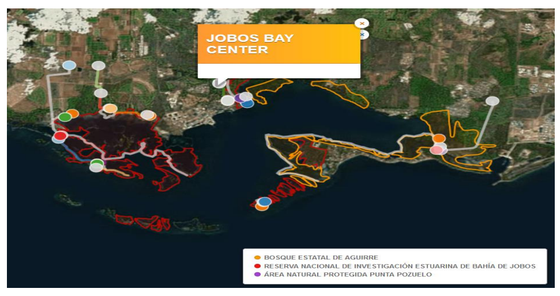
Introduction

The Jobos Bay National Estuarine Research Reserve (JBNERR) is located on the southeast Puerto Rico (PR) coastline and forms part of NOAA's National Estuarine Research Reserve System (NERRS, nerrs.noaa.gov). CARICOOS scientific personnel performed extended data QC and the preliminary statistical analysis of water quality and nutrient time series collected by the Exploratory JBNERR System Monitoring Program since 1995 and 2002, respectively. This work follows the Terms and Conditions stated in contract # 2015-000095 between the UPRM and the DRNA, dated March 16, 2015 and which are based on the proposal CARICOOS submitted to JBNERR on September 24, 2014. This poster includes a very brief excerpt from the Draft Final Report which contains a comprehensive suite of graphical products and statistical results resulting from the analysis.

The principal tasks that were addressed in our study are

- Characterization of the temporal variability of the water quality parameters sampled at each of the four monitoring station within Jobos Bay, namely stations 9, 10, 19 and 20. These water quality parameters being: temperature, dissolved oxygen concentration and saturation, salinity, pH, turbidity, chlorophyll and nutrients (nitrite, nitrate, ammonia, orthophosphates and dissolved inorganic nitrogen (DIN);



- Analysis of the temporal variability of the parameters sampled at JBNERR's meteorological station. These meteorological parameters being: air temperature, precipitation, wind speed and direction and atmospheric pressure;
- Correlation analysis among the various parameter time series.

Whereas the extended data QC was the main subject of last year's presentation here we focus on select results and graphical products that tease out the richness of the JBNERR-SWMP long-term data time series ensemble.

Trends (linear regressions)

JBNERR09	WQ parameters						
Summarize by:	Temperature	Salinity	DO concentration	pH	Turbidity	DO Percent Saturation	Chlorophyll
Annual averages (1996 - 2014)	POS NONSIG	NEG NONSIG	POS SIG	POS NONSIG	NEG SIG	POS NONSIG	- -
Monthly averages (1995 – 2015)	POS NONSIG	NEG NONSIG	POS SIG	POS NONSIG	NEG SIG	POS NONSIG	- -

JBNERR10	WQ parameters						
Summarize by:	Temperature	Salinity	DO concentration	pH	Turbidity	DO Percent Saturation	Chlorophyll
Annual averages (1996 – 2014)	POS NONSIG	POS NONSIG	POS NONSIG	NEG NONSIG	NEG NONSIG	NEG NONSIG	- -
Monthly averages (1996 – 2015)	POS NONSIG	POS NONSIG	POS NONSIG	NEG NONSIG	NEG SIG	NEG NONSIG	- -

JBNERR19	WQ parameters						
Summarize by:	Temperature	Salinity	DO concentration	pH	Turbidity	DO Percent Saturation	Chlorophyll
Annual averages (2002 – 2014)	NEG NONSIG	POS NONSIG	NEG NONSIG	POS NONSIG	NEG NONSIG	NEG NONSIG	- -
Monthly averages (2002 – 2015)	NEG NONSIG	POS SIG	NEG SIG	POS NONSIG	NEG NONSIG	NEG SIG	POS NONSIG

JBNERR20	WQ parameters						
Summarize by:	Temperature	Salinity	DO concentration	pH	Turbidity	DO Percent Saturation	Chlorophyll
Annual averages (2002 – 2014)	NEG NONSIG	POS NONSIG	NEG NONSIG	POS NONSIG	NEG NONSIG	NEG NONSIG	- -
Monthly averages (2002 – 2015)	NEG NONSIG	POS SIG	NEG SIG	NEG NONSIG	NEG NONSIG	NEG SIG	- -

December 2006 – December 2014	Parameters at Meteorological Station			
Monthly Average Data	Air Temperature	Wind Speed	PAR	Total Precipitation
Linear Trend Model (T= Time)	21.82 + 3.547e-09 T	-1.122 + 2.051e-09 T	-112.7 + 3.778e-07 T	0.03447 – 4.977e-12 T
P-value	0.0349	0.0000266	0.0002272	0.9171
Direction and Statistical Significance	POS SIG	POS SIG	POS SIG	NEG NONSIG

JBNERR09	Nutrient parameters				
Summarize by:	Orthophosphate	Ammonium	Nitrite	Nitrate	DIN
All best available data	NEG SIG	NEG SIG	POS SIG	POS SIG	NEG SIG
Before 2007	NEG SIG	NEG SIG	NEG SIG	NEG SIG	NEG SIG
After 2007	NEG SIG	POS SIG	POS SIG	POS SIG	POS SIG
After 2007 without 2012	- -	- -	POS SIG	- -	- -
JBNERR10	Nutrient parameters				
Summarize by:	Orthophosphate	Ammonium	Nitrite	Nitrate	DIN
All best available data	NEG SIG	NEG SIG	POS SIG	POS SIG	NEG SIG
Before 2007	NEG SIG	NEG NONSIG	NEG SIG	NEG NONSIG	NEG NONSIG
After 2007	NEG SIG	POS NONSIG	POS SIG	POS SIG	POS SIG
After 2007 without 2012	- -	- -	NEG NONSIG	- -	- -
JBNERR19	Nutrient parameters				
Summarize by:	Orthophosphate	Ammonium	Nitrite	Nitrate	DIN
All best available data	NEG SIG	NEG SIG	POS SIG	POS NONSIG	NEG NONSIG
Before 2007	NEG SIG	NEG NONSIG	NEG SIG	NEG NONSIG	NEG NONSIG
After 2007	NEG SIG	POS NONSIG	POS SIG	NEG NONSIG	NEG NONSIG
After 2007 without 2012	- -	- -	POS NONSIG	- -	- -
JBNERR20	Nutrient parameters				
Summarize by:	Orthophosphate	Ammonium	Nitrite	Nitrate	DIN
All best available data	NEG SIG	NEG SIG	POS SIG	POS SIG	NEG SIG
Before 2007	NEG SIG	NEG NONSIG	NEG SIG	NEG NONSIG	POS NONSIG
After 2007	NEG NONSIG	POS NONSIG	POS SIG	POS SIG	POS SIG
After 2007 without 2012	- -	- -	POS NONSIG	- -	- -

Summary of directions and statistical significance in the linear trend models of the WQ, meteorological and nutrient parameters

Select Climatologies, Contours, Spectra and Correlations – Spatial Gradient in Seasonal Signal