Tracking of Fecal Contamination and Enterococcus in Playa Santa, Guánica

Geraldine Gómez Matias[a], geraldine.gomez@upr.edu, Prof. Julio Morell[ab], Sylvia Rodríguez-Abudo[ac], Ernesto Otero[a]

[a]Department of Marine Sciences, University of Puerto Rico at Mayagüez, Mayagüez, Puerto Rico 00680
[b]IOOS-Caribbean Coastal Ocean Observing System, Lajas, Puerto Rico 00677
[c]Center for Applied Ocean Science and Engineering, Department of Engineering Science and Materials, University of Puerto Rico-Mayaguez

Introduction

Fecal contamination in aquatic systems is a recurrent problem due to the discharge of untreated or poorly treated wastewaters to the ocean. It poses a major threat to human health, tourism and marine ecosystems. Playa Santa (Guánica, PR) is located near the south-western corner of the island. In recent years *Enterococcus* density has frequently exceeding the threshold recommended by Environmental Quality Board of Puerto Rico. These event have been more frequent during April, May, June, July and November. The objectives of this study are to monitor the areas affected by fecal contamination throughout Playa Santa, identify fecal contamination sources and provide data for the implementation a statistical model (Virtual Beach) developed by EPA with could provide forecasts and nowcasts of fecal contamination in this frequently visited beach area.

Methodology

Enterolert

Is a media for bacterial growth that uses a specific substrate as indicator (MUG) and 6.5% NaCl to detect *Enterococcus.*

Procedure:
1. Collect the sample.
2. Prepare sample dilutions (10mL of seawater sample with 90 mL autoclaved distilled water).
3. Dissolve Enterolert media in 100ml of water.
4. Pour sample into Quanti-Trays and seal.
5. Incubate samples at 41℃ for 24 hours.
6. Count positive wells (fluorescent under UV light) for *Enterococcus.*

Most Probable Number (MPN)
The Enterolert counts are used for estimation of MPN, a statistical method yielding *Enterococcus* density in the seawater sample.
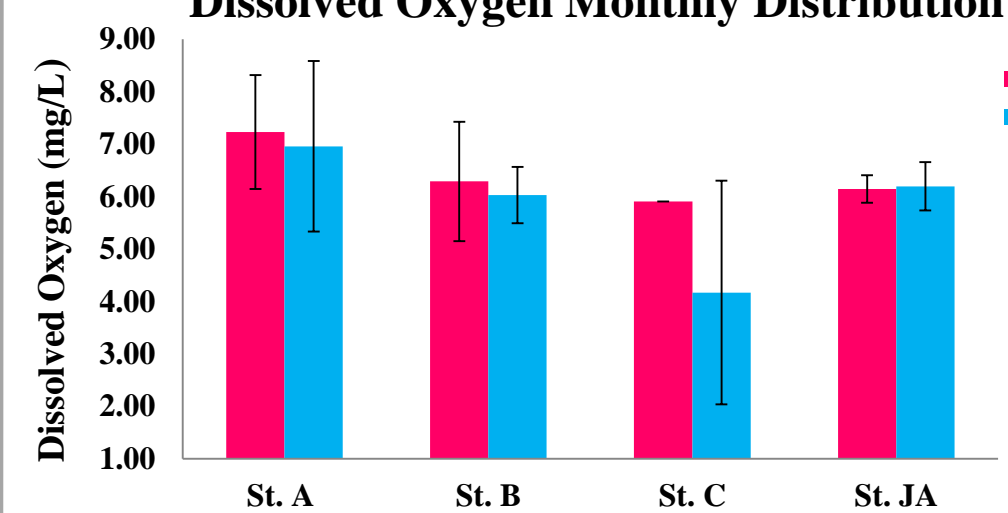

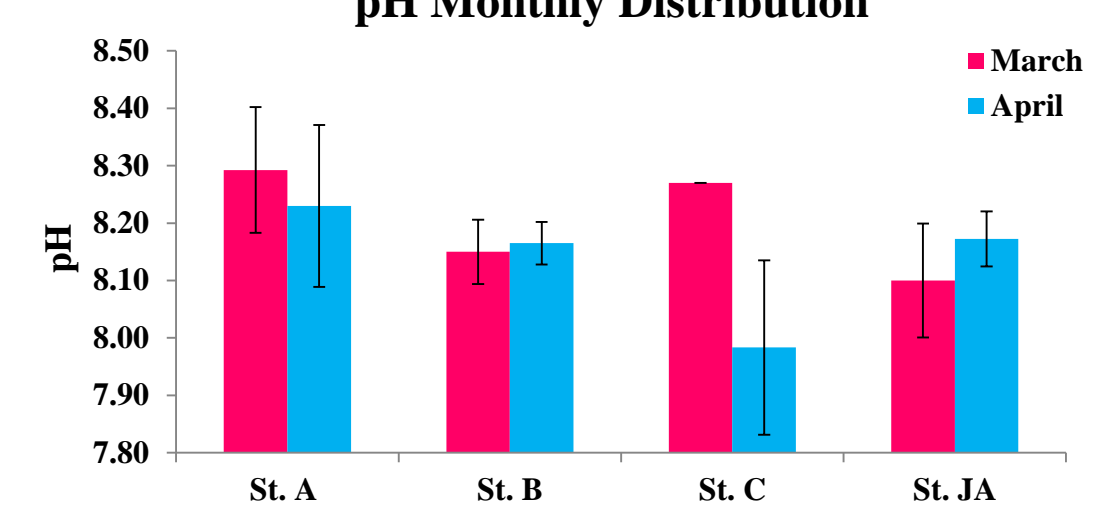*Fig. 1. Sample collection at Playa Santa*
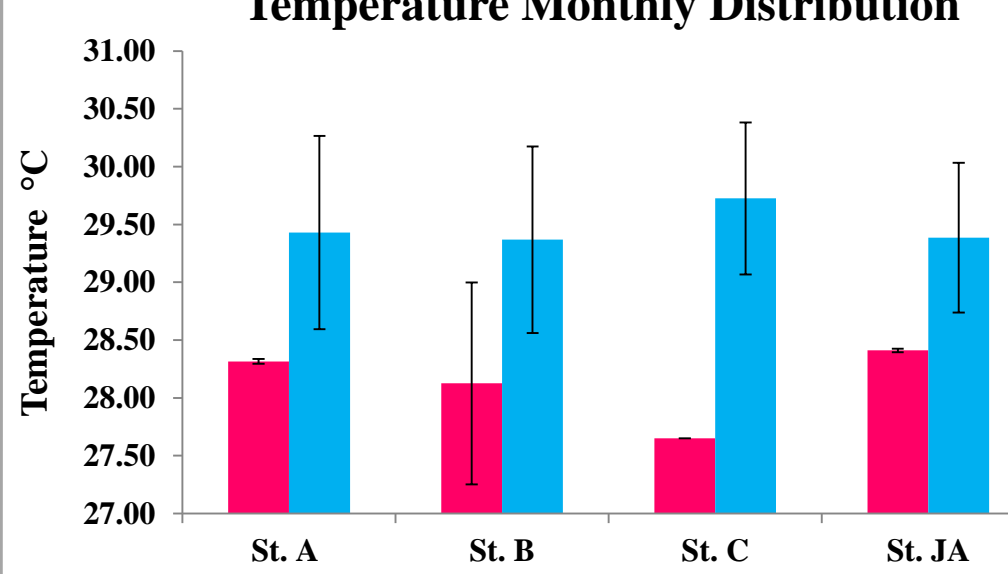

Fig. 2. Equipment used for sample analysis.
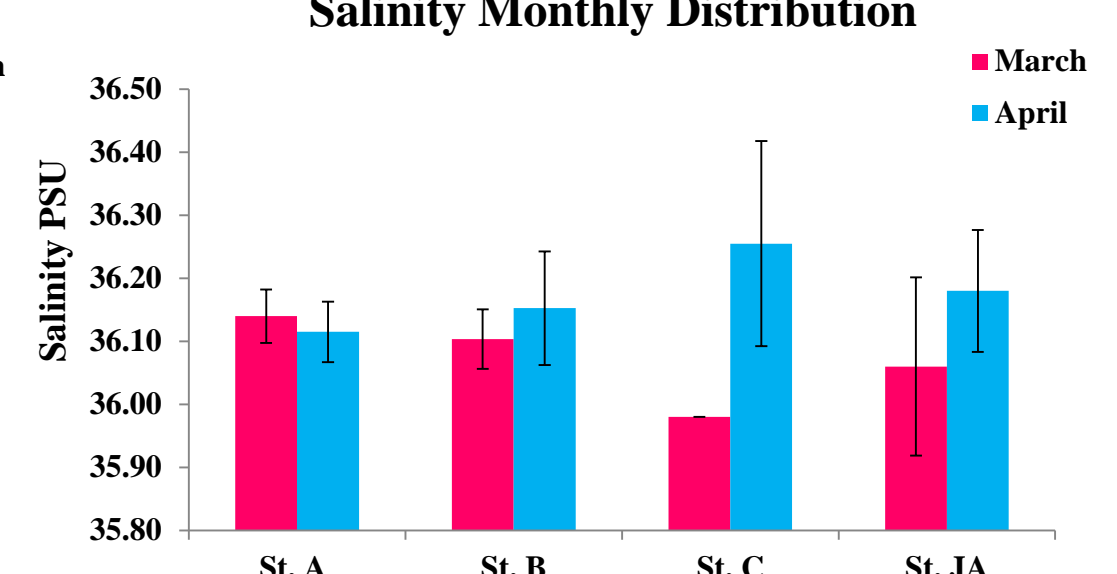
There was no significant correlation between *Enterococcus* density and the marine parameters observed (salinity, temperature, dissolved oxygen or pH).

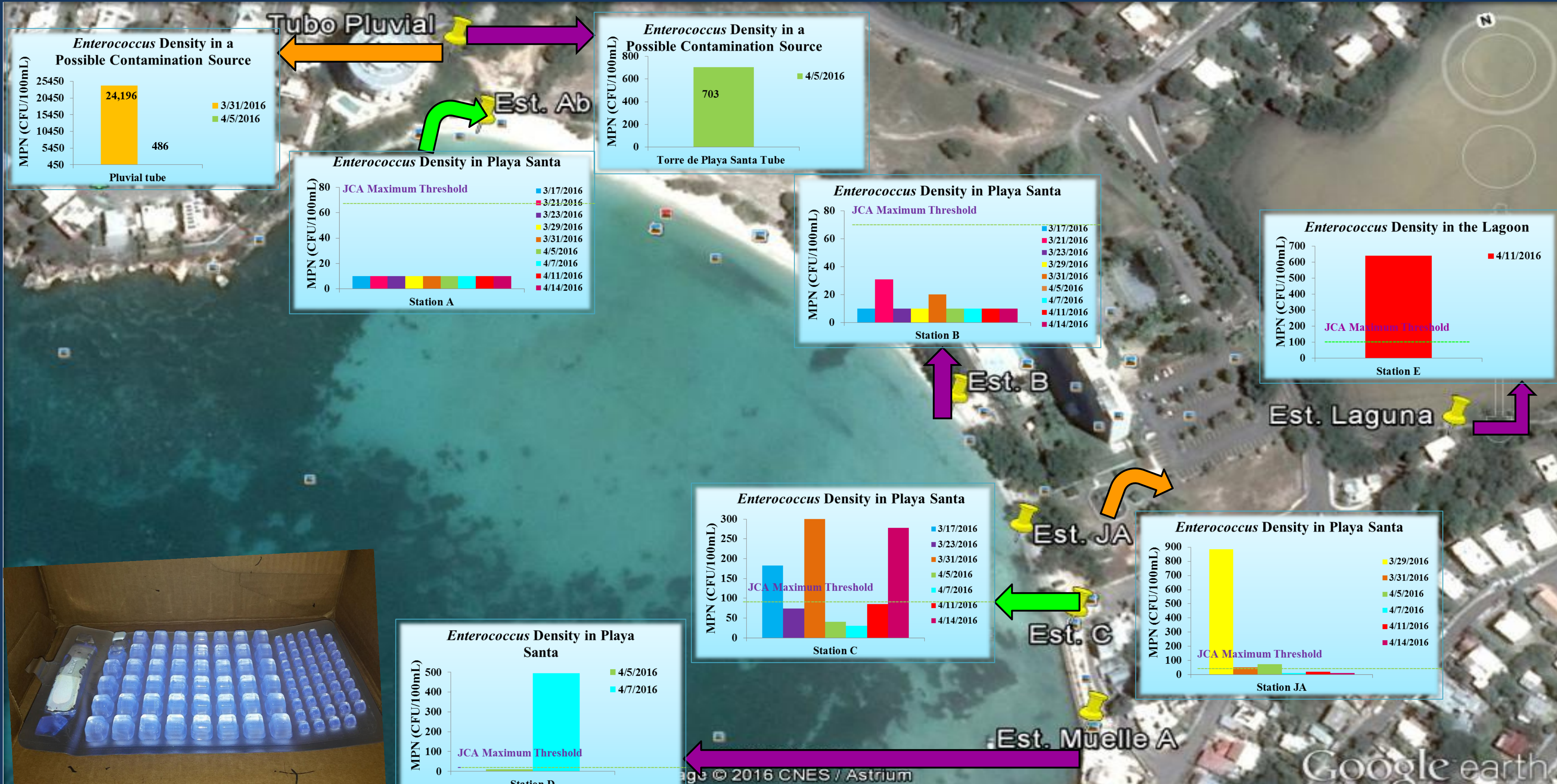*Station C was contaminated for approximately three weeks .*

Results

Fig. 4. Positive results to Enterococcus. Sample was collected in the pluvial tube.

The map shows the sampled stations located in the study area in Playa Santa. Each chart indicates *Enterococcus* density in each station.

Preliminary Results

- During the last years Playa Santa has presented an increment in Enterococcus density in the months April, May, June, July and November.
- At the moment, Station A has not presented an increment in enterococcus density, has always been <10CFU. Here, there is a pluvial tube and a discharge tube from "La Torre de Playa Santa". These tubes have presented positive results to enterococcus.
- Station C has always presented an increment in the enterococcus density located at the entrance of Playa Santa. At the moment, possible contamination sources have not been found close to the site.
- The Station JA has sometimes exceeded the threshold of enterococcus density permitted for Environmental Quality Board of Puerto Rico. In one occasion, an increment of enterococcus density was detected from Station C all the way down to Station JA.

References and Acknowledgements

[1] IDEXX Laboratories 2015. Enterolert. Available on http://www.idexx.es/water/products/enterolert-e.html
[2] Historic Dates 2003-2016 and SOP 2015 of Environmental Quality Board of Puerto Rico.