An Assessment of Enteric Bacteria Abundance in Playa Santa Beach, Southwest Puerto Rico

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Introduction

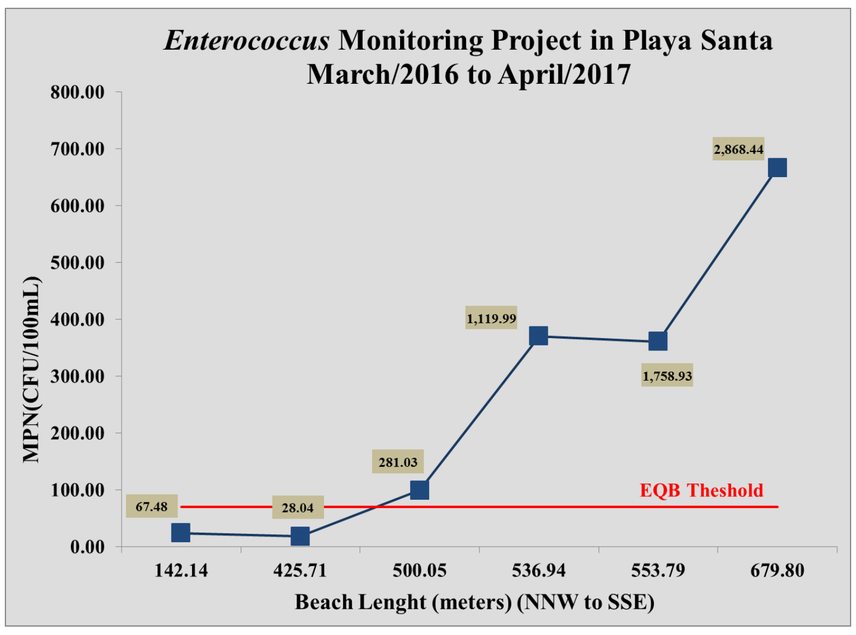
Fecal contamination is a current problem mainly occurring in beaches near urbanized coastal zones. Fecal contamination can result from poorly working sanitary systems discharging to the ocean or illegal direct sewage discharges also frequently found connected to a storm drainage system. In Playa Santa, fecal contamination has become a major issue because it can affect public health and also the local economy. The objectives of the research are to assess the spatial and temporal variability of Enterococcus levels throughout Playa Santa and to provide data for the validation of the statistical model (Virtual Beach) developed by the EPA. This statistical model can provide forecasts and current conditions of fecal contamination.

Methodology

Enterolert:

A media for bacterial growth that uses a specific substrate as indicator (MUG) and 6.5% NaCl to detect *Enterococcus*. Enterolert counts are used for estimation of MPN, a statistical method yielding *Enterococcus* density in the seawater sample.

Spatial Distribution of *Enterococcus* Density in Playa Santa

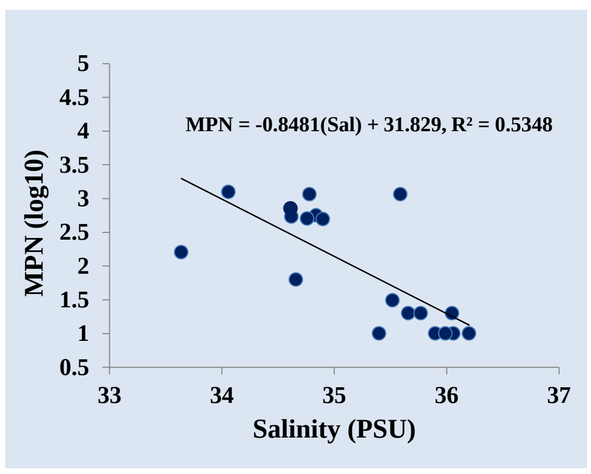


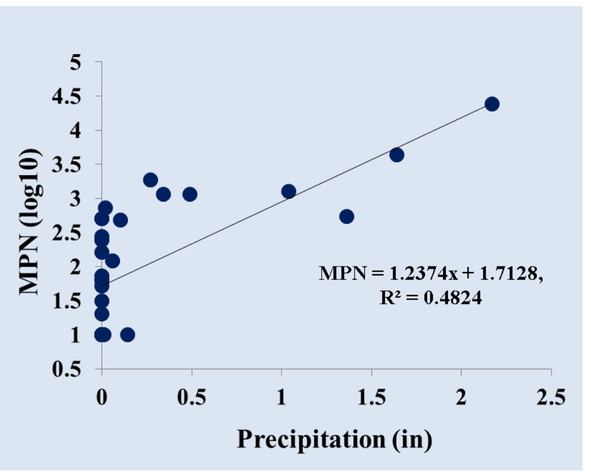
False sampling results (positive and negative) during 2016-2017

Validation of EQB status for days sampled in this project

False results	Amount of false Results	False results percentage
False positive results	11	22%
False negative results	2	<1%

Enterococcus Correlation in St. 6





Results

Fig. 5. Example of samples with positive results.

Conclusion

- ✓ More frequent sampling can help inform bathers with greater reliability about when the beach is suitable for swimming and recreational use. It can reduce the risk to public health and impact to the local economy because the number of false negative is slightly reduced (1%) while the number of false positives are reduced by 20%.
- ✓ There is a strong relationship between salinity and the density of Enterococcus in St.6. Salinity could serve as a proxy for detection of fecal contamination.
- ✓ The relationship between the amount of Enterococcus colonies and amount of rain within the past 24h is significant for station 6. On the other hand, there was no relationship found between rain and the amount of Enterococcus for stations 1 and 2. Rain data should help forecasting fecal contamination.
- ✓ The southeast sector of Playa Santa is more frequently affected by fecal contamination with stations 5 and 6 showing the highest levels of Enterococcus. This support the possible existence of a point source in this area.

References and Acknowledgements

[1] IDEXX Laboratories 2015. Enterolert. Available on http://www.idexx.es/water/products/enterolert-e.html
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[3] Historic Rain Data 2015-2017 of Western Regional Climate Center. Available on wrcc@dri.edu
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