

## **Title**

Steve Tamar  
Surfrider Foundation Rincón, #19 Calle Nueva, Rincón PR 00677  
email: stevetamar@gmail.com

**Performance Period: December 1 2016 – May 30 2017**

## **LONG-TERM GOALS**

To continue weekly water sampling at the current sites, and biweekly sampling in the special research area (Reserva Marina Tres Palmas - Rincón public beach area) while incorporating new sampling sites to extend spatial coverage of the Blue Water Task Force water quality program as funds/trained volunteers allow, and share this data with CariCOOS Ecosystem and Water Quality module. To continue and refine post-rain sampling protocols to more exactly define the affects of runoff under varying environmental conditions on marine water quality, and its' diffusion and transport, to help refine existing CariCOOS nowcast modeling (specifically for Rincón public beach). To help develop the protocols, methodology and data requirements necessary to create nowcast modeling for other areas in coastal Puerto Rico. To continue investigating the affects of fresh water sources (both outflow and/or filtration through sandbars) on local marine water quality under varying environmental conditions. To investigate other methods of bacterial detection and quantification, and assess their accuracy and ease of use, and attempt to develop EPA-approvable techniques of water quality assessment that will be faster, less expensive and/or more suitable for community based programs than current techniques – thus permitting cost-effective expansion of the CariCOOS Water Quality module by developing BWTF-type programs elsewhere in PR.

## **MILESTONES / OBJECTIVES**

The primary milestone for the reporting period was the public release of the water quality nowcasts for the Rincón public beach (primarily based on Surfrider Rincón BWTF data) and Playa Santa (a project mentored/data managed by the Rincón BWTF program).

Another milestone contained within the April 24 2017 release of the 2016 Clean Water Report by the national Surfrider Foundation, showing that of the 35 chapter BWTF labs the Rincón program was credited with reporting 1372 water test results, accounting for 26% of the entire national water testing effort for calendar 2016. Of the credited samples, approximately 64% were collected, processed and tested by Rincón BWTF personnel, 23% were provided by the Playa Santa project, sampled, processed and tested by Geraldine Gómez, and 13% provided by the Rincón BWTF satellite program in Isabela, samples collected by volunteers of Rescate Playas Isabela, processed and tested by Environmental Sciences students at Ramey School, Aguadilla, under the supervision of their teacher Herald Roettger in close collaboration with the Rincón program.

Thus the Rincón BWTF maintains its' status as the 'flagship' lab within the national Surfrider Foundation BWTF program, accomplishing the most testing, the most outreach and education activity, and the most research effort, for the fourth year in a row. The Rincón chapter is currently leveraging this accomplishment for additional funding from the national Foundation to



expand and enhance our efforts, improve the design of the national BWTF database, and use this improved platform to promote CariCOOS data to a wider audience in the US.

Another significant milestone for calendar 2016: in addition to the credited 1372 water test results recorded on the national BWTF database, the Rincón lab also conducted 187 research water tests (primarily of fresh water outflows in the vicinity of the Rincón public beach) which were reported on social media releases as 'research sites not included on BWTF map' bringing the total number of water tests conducted to 1569. This exceeded the total number of water test results reported by the PR EQB (Junta de Calidad Ambiental) beach monitoring program – indicating that community-based water testing programs are potentially capable of replacing the PR JCA program should that need arise.

## **WORK COMPLETED**

During this reporting period, there were 41 BWTF testing dates (not including research transects conducted that were unrelated to CariCOOS requirements, nor entered on the National BWTF database). Test results entered on the national BWTF database (credited) include 369 samples collected, processed and tested by the Rincón lab, and 73 test results generated by the RPI/Ramey School program.

Exclusive of fresh water samples and post-rain sampling, these testing dates showed a total of 23 times beach sites exceeded the Beach Action Value of unacceptable bacterial water quality, including 12 times at sites also monitored by the PR JCA (8 times at the Rincón public beach). In addition, 99 water samples were tested for research purposes, primarily of fresh water sources suspected of influencing water quality at the Rincón public beach. These results were not entered into the national BWTF database, and thus not credited to the chapter program. Pre and post-rain sampling was conducted at the Rincón public beach on three dates (4/9, 5/18, 5/31) all post-rain samples exceeded the BAV, although only one averaged post-rain value was entered on the BWTF database per date. A total of 16 samples were processed and tested for this effort.

In addition, 115 test results from the Playa Santa project were provided by Geraldine Gómez for registered marine water sites, and entered into the Rincón BWTF database. Thus a total of 567 credited water test results were registered during this reporting period, and are publicly available either via CariCOOS or the national BWTF database under the Rincón program.

In comparison, the PR JCA also monitors four sites as does the Rincón BWTF (the public beaches of Añasco, Rincón, Aguada and Aguadilla). During this reporting period the JCA conducted 13 testing dates (52 samples), reporting 10 incidents of these beaches exceeding the BAV, only twice for Rincón.

## **MAJOR OUTCOMES**

Except on one occasion (5/31) we were unable to directly link any freshwater outflow to bacterial counts at the Rincón public beach. On this date the contamination/sediment plume from the caño Pepito was visually tracked to the public beach.

Beginning in April the Rincón BWTF began collecting additional water quality parameter data for these freshwater sources, including temperature (°C) turbidity (JTU) pH, and DO(ppm). The chapter seeks to

acquire more precise digital meters for these (and other) data to verify if these parameters might allow for more accurate source tracking.

It is apparent that more dense temporal sampling gives a more accurate assessment of water quality at several sites, in particular the Rincón public beach. It is most probable the source(s) of bacterial contamination at this site are very localized and intermittent, thus extremely difficult to locate. At this time, it appears that an accurate nowcast is the most feasible method of providing public health advisories for this site until the BWTF develops further investigative capacity.

## **RELATED PROJECTS**

In addition to a data management/advisory role in the Playa Santa project conducted by Geraldine Gómez, and our participation in the nowcast modeling (PI Sylvia Rodríguez Abudo)

The Rincón BWTF maintains an advisory role as research partner in the Quasi-realtime Biosensor project, and Steve Tamar is listed as a co-PI. (PI Pedro Resto Irizarry, UPRM Bioengineering Program)

Both these projects have a significant potential for leveraging funding for or by CariCOOS, contingent on their successful development.

## **WORK PLAN FOR UPCOMING PERFORMANCE PERIOD (June 1 2017 – Nov 30 2017)**

During the summer months the Rincón BWTF will be conducting a rigorous assessment and comparison testing of a newly developed bacterial detection method (Hy-Serve) during rain and non-rain events, in fresh and marine waters, and comparing our data with several other BWTF labs in various US states also engaged in field-trials of this much cheaper detection method. Should this method provide comparable accuracy to our currently used IDEXX/Enterolert method for detecting enterococcus bacteria, we will publish our results and seek EPA approval for this method.

Additional associated research will be conducted into comparing various types of positive control vehicles, and inquiries are currently being pursued regarding the use of the Hy-Serve method to detect other bacterial pathogens.

Training and loan/purchase of digital instrument platforms for a wide range of other water quality parameters will continue, with additional training of Rincón BWTF volunteers and supplemental lab facilities for maintaining/calibrating such instruments.

Coincident with this will be the attempt to coordinate with the national BWTF database to improve its' design, particularly in its' ability to display these additional data on a publicly accessible and downloadable format. Alternatively, the chapter will attempt to develop our own website to accomplish this.

Additional funding will be sought to spatially extend the BWTF program on the west coast of PR, currently in the process of training additional BWTF personnel for the Guanajibo/Hormigueros area and Boqueron, and possibly into Cabo Rojo.

## **REFERENCES**



<http://publicfiles.surfrider.org/SF-Clean-Water-Annual-Report-2016.pdf>

Surfrider Rincón BWTF database: <http://www.surfrider.org/blue-water-task-force/chapter/4>

<http://www.caricoos.org/ecosystem-and-water-quality>

## **PUBLICATIONS & PRODUCTS**

At the CariCOOS General Assembly on April 28 2017, the Rincón BWTF presented a poster entitled “Water Quality Information Flows and Engagement Routes: The Reciprocal Roles of a Community-based Science Program and CariCOOS with Stakeholder Groups” by Steve Tamar and Yamilette Colón.

Poster presented at 2017 CariCOOS General Assembly “Automated, Portable Fecal Bacteria Biosensor for Recreational Water” by Pedro Resto Irizarry, Dong Wang, Ubec Carambot, Osvaldo Duran, Luis Rosa, Gabriel Cordero, Azaria Feliciano, Jesus Aponte and Steve Tamar.

At the 2017 General Assembly Steve Tamar also participated in the panel discussion “Beach Hazards: Drowning Prevention and Water Quality” moderated by Sylvia Rodríguez Abudo.