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# Microbiological quality of bathing waters versus sanitary regulation and beach users practices.

## A case study in Marseilles

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### INTRODUCTION

- Urban beaches are social and ecological coastal interfaces facing up human and environmental challenges, such as **allowing bathing activities free from sanitary issues**.
- In France, according to the EC Bathing Water Directive (2006/7/EC), the quality of bathing waters is monitored by the Regional Health Agencies (ARS). Water is sampled once a week during the bathing season, the result is available 24 hours later. In case of insufficient quality, local authorities are in charge of deciding to prohibit bathing.
- In Marseilles, a municipal monitoring of the bathing waters is organized on a daily base, with a sample made at 5 AM. Though a non-standardized method is used to assess the microbiological quality, the result is available in 2 hours, making thus possible to take a faster decision.

### SCIENTIFIC QUESTIONS

- does the sampling strategy lead to a sound assessment of the quality of bathing water on a day-to-day basis ?
- is the microbiological quality of bathing waters linked to the number and the behavior of beach users ?
- what are the users' expectations and their practices regarding the quality of bathing waters ?

### METHODOLOGY

#### Three urban beaches in Marseilles

##### Prophète beach

3 days (2016) + 7 days (2017) + 1 day (2018)  
143 samples - 143 pictures  
362 questionnaires



##### Pointe Rouge beach

3 days (2017)  
39 samples - 39 pictures  
76 questionnaires



##### Lave beach

3 days (2017)  
39 samples - 39 pictures  
86 questionnaires



#### In-situ co-observations + three co-designed field protocols

From 8:00 am to 8:00 pm

##### Bathing water quality

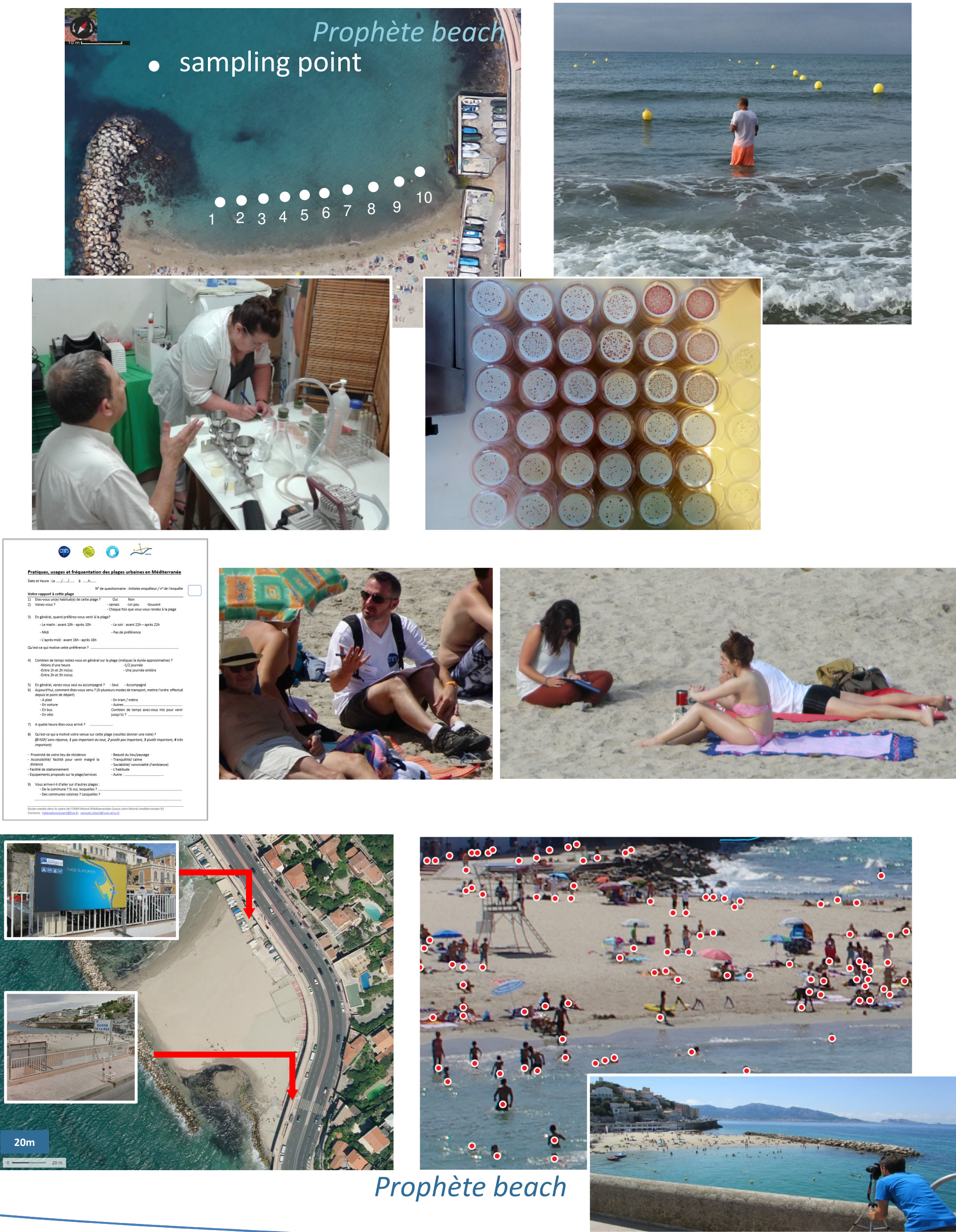
hourly water sampling  
+ fecal indicators quantification

##### Users' practices

questionnaires  
+ statistical analysis

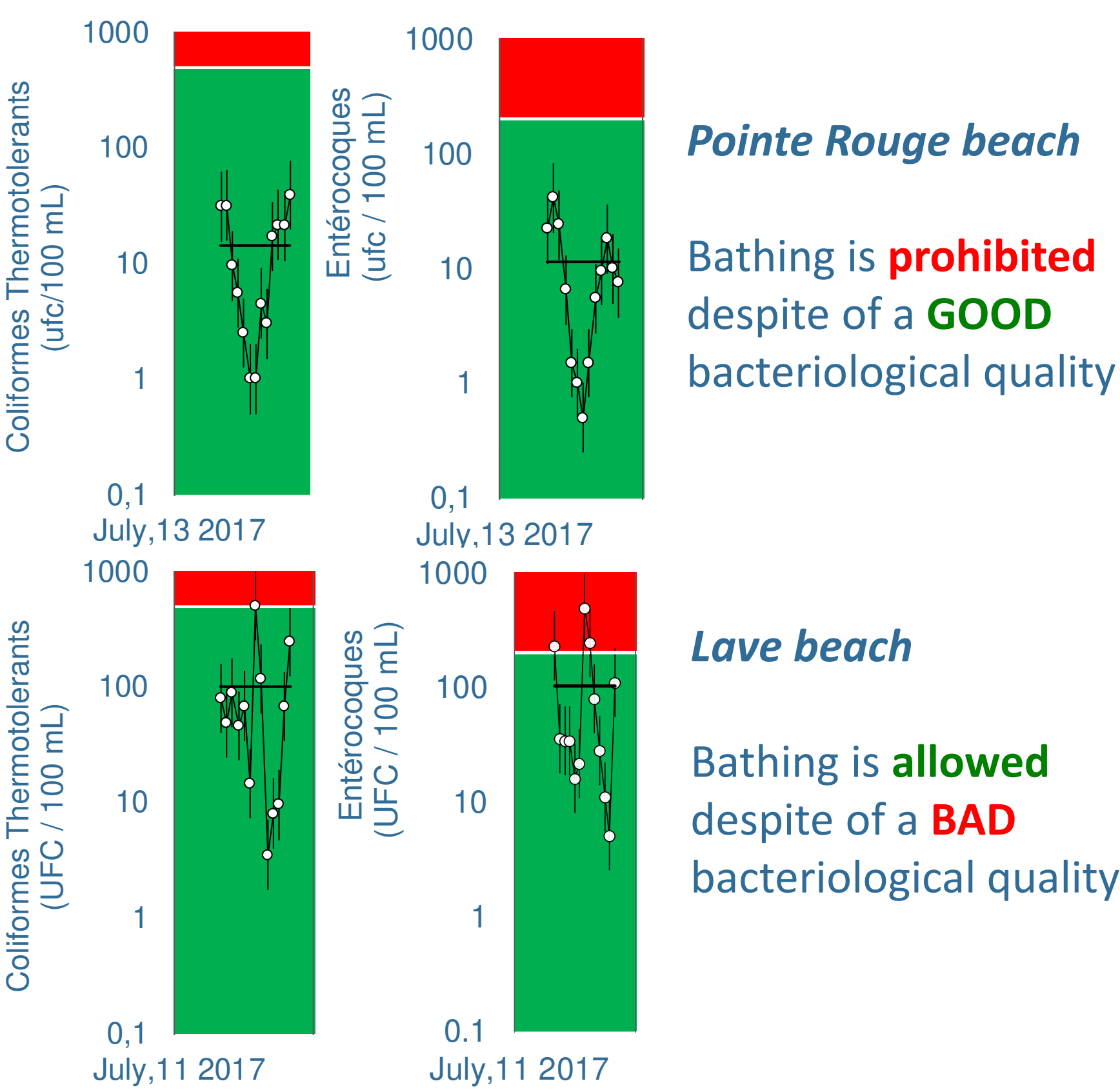
##### Beach attendance

counting beach users  
+ incoming-outgoing users



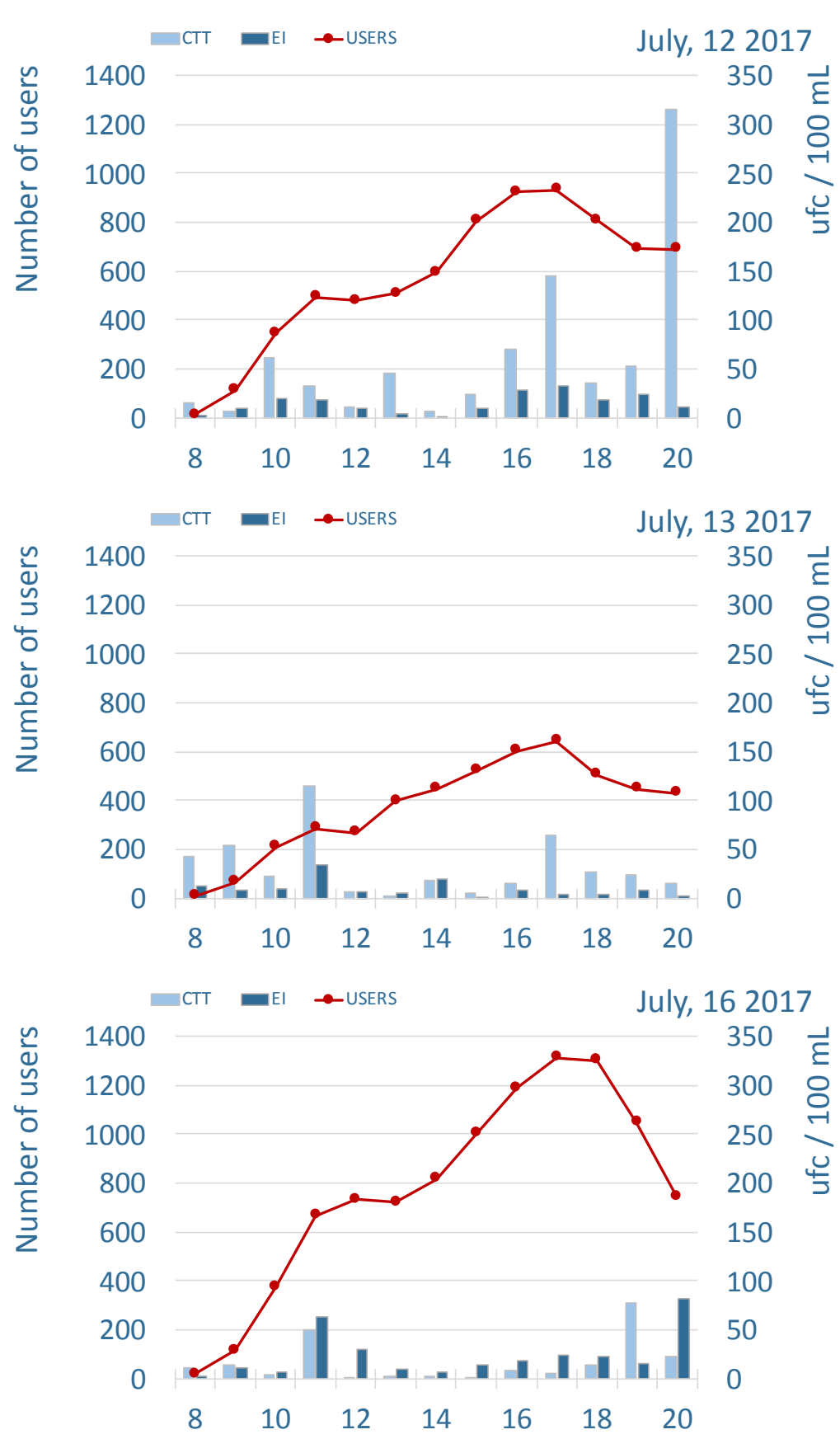
### RESULTS

#### Dynamics of fecal contamination indicators in bathing waters versus bathing authorization



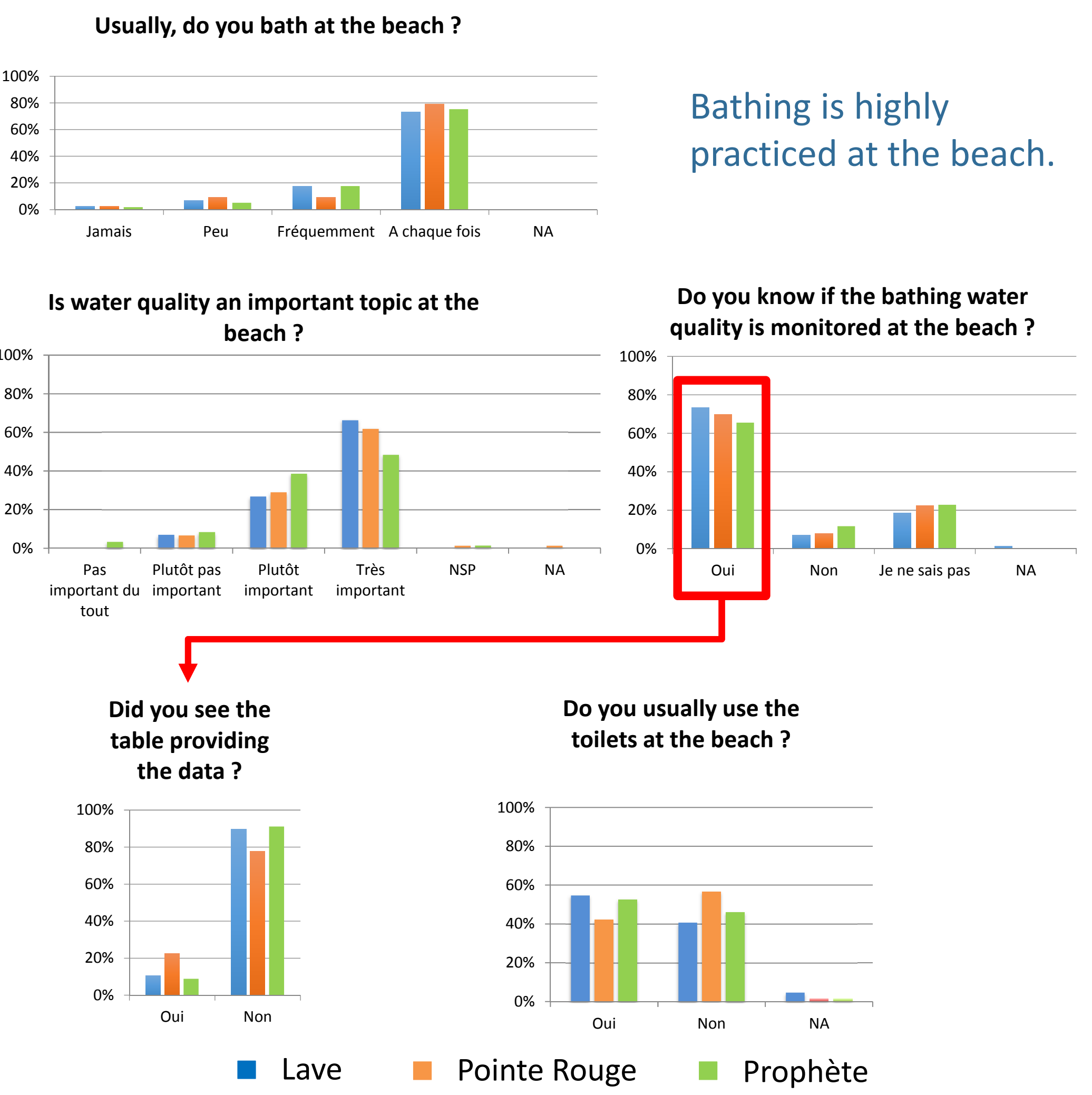
The hourly fluctuations of fecal contamination of bathing waters makes ineffective the unique dawn control made by Marseilles. It is necessary to adapt the strategy according to the variability or to the not-yet identified causes of variability.

#### Quality of bathing waters versus number of users

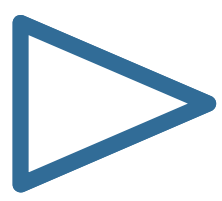


Despite of significant efforts to manage wastewater and treated effluents, the urban beaches of a large city such as Marseilles are subject to diffuse contaminations requiring a more suitable sanitary control of bathing waters. The results of the survey of bathers on the use of toilets allow us to say that users themselves could contribute to these contaminations.

#### Beach water quality versus users expectations and practices



Beach users are very much concerned about water quality. But the majority of them do not pay attention to the official measurements of the bathing water quality. **Nearly half of them do not use the toilets.**



Monitoring bathing water quality requires a fine understanding of the temporal variability of contaminants. Moreover it needs to be related to the users practices and better explained.