

Bight '13 Microbiology Drainage Water Study Plan

Assessing the Extent of Human Fecal Contamination in Southern California Drainages

Background

Natural and/or manmade drainages, including streams and storm drains, have been shown to have a significant influence on the microbiological quality of coastal waters. The presence of flowing drainages often greatly increases the frequency of violations of water quality standards for *Enterococcus* at beaches. However, because *Enterococcus* is a non-specific indicator of fecal material, the extent to which these flows contain human fecal contamination is unclear. Assessing how frequently human fecal contamination is present in flows from drainages throughout southern California is necessary to inform managers as to the extent of the problem and to assist in prioritizing individual sites for remediation efforts or adoption of alternative management strategies.

This study is part of the microbiology component of the 2013 Southern California Bight Regional Monitoring Program (Bight'13) and is a collaborative effort between multiple storm water agencies. The goal of the study is to assess the extent of human fecal contamination from coastal drainages to the ocean.

Approach

Each agency participating in the program will sample within its jurisdiction. Samples will be collected at selected sites and analyzed for a human-associated fecal marker (HF183). Marker results will be used to gauge the presence of human fecal material in each sample. The percentage of samples positive for human fecal material will then be used to assess the extent of human fecal contamination at each site and across the region. Some individual agencies have also elected to concurrently analyze samples for cultivable *Enterococcus*.

Study design

Twenty-three sites will be sampled under dry weather and eighteen under winter storm conditions across four counties (Table 1). In dry weather, a minimum of 50 samples will be collected at each site over two years. During winter storms, the number of samples collected (desired: 50 samples per site) will depend on the number of qualified storm events. A qualified storm event is defined as at least 0.10" rainfall at the closest rain gauge to the sampling site following an antecedent dry period of three or more days (Griffith et al. 2010). Winter storm sampling may be extended to include additional years by consensus of the Bight '13 Microbiology Committee.

All dry weather samples will be collected in the morning to mirror current monitoring procedures and limit degradation of the bacterial signal due to sunlight exposure following the routine sampling schedule for each site. Winter storm samples will be collected as soon as possible following the first 0.10" of rain, but no later than 72 hours later. Samples will be taken inside the drainage upstream of tidal influences and disinfection facilities (e.g., UV or Ozonation, if present) and transported on ice to the

laboratory for processing. Three replicate filters per sample will be created (100ml volume) within 6 hours of sample collection and stored at -80°C until analyzed for the HF183 human-associated fecal marker. Some agencies have also elected to analyze samples for cultivable *Enterococcus* by EPA Method 1600.

In addition to the task above, a special study will be conducted on a subset of sites to examine variability in bacterial measurement at different locations across channels over the course of a storm event. A subcommittee will develop a study plan and submit it for group approval prior to implementation.

Additional Measurements

Salinity will be determined for all samples. Field salinity measurements using a portable meter are preferred, but samples may be measured using a bench-top instrument if necessary. Water levels and flow rates will be recorded using existing gauges or estimated onsite during sampling using a calibrated measuring device affixed to the infrastructure.

Training

Training on sample handling and filtration will be provided by SCCWRP prior to the onset of sampling. SCCWRP will also provide training to participating agencies or their designee on measuring the HF183 human-associated marker.

Laboratory Intercalibration

All laboratories performing qPCR as part of this study will participate in a laboratory intercalibration exercise to ensure data comparability across laboratories. Laboratories that do not meet the quality assurance standards set by the Bight '13 Microbiology Committee will be provided technical assistance. These laboratories will not be allowed to process field samples until they have demonstrated proficiency in performing qPCR to the satisfaction of the Bight '13 Microbiology Quality Assurance Subcommittee.

Schedule

- Training on sample handling and filtration – July 11, 2013
- Sample collection will commence immediately upon the completion of training and continue for two years.
- Training on qPCR analysis for the HF183 human-associated fecal marker – August 27-29, 2013.
- Laboratory intercalibration exercise - October, 2013.
- qPCR analysis of samples will commence at each laboratory following demonstrated competence running qPCR

Data Reporting and Analysis

SCCWRP will compile and conduct initial analysis of study data. Both frequency and magnitude of human signal will be considered for assessing the extent of human fecal contamination. Pre-prepared field and data reporting sheets will be provided to each participating agency/laboratory as needed for

the field, laboratory intercalibration and sample analysis components of the study. Electronic field site occupation reporting devices will be provided if available.

Table 1. Site List

Drain name	Discharge Site	Dry Weather	Storm Weather	County
North Beach	Coronado North Beach	yes	yes	San Diego
Moonlight Beach	Moonlight Beach	yes	yes	San Diego
San Luis Rey River	Harbor Beach	yes	no	San Diego
San Diego River	Dog Beach, O.B.	yes	yes	San Diego
Tijuana River	Tijuana Slough National Wildlife Refuge	yes	yes	San Diego
Tecolote Creek	Tecolote, Mission Bay	yes	yes	San Diego
Sweetwater River	San Diego Bay	yes	yes	San Diego
Santa Ana River	Newport Beach	yes	yes	Orange
Talbert Channel	Huntington State Beach	yes	yes	Orange
AC-CCR	Aliso Creek	Yes	Yes	Orange
SJCL01	San Juan Creek	Yes	Yes	Orange
SADF01	Santa Ana Delhi Channel	Yes	Yes	Orange
CMCG02	Costa Mesa Channel at Highland	Yes	Yes	Orange
L01-SDu/s[#]	San Juan Creek	Yes	Yes	Orange
Ballona Creek	Dockweiler State Beach	yes	yes	Los Angeles
Malibu Creek	Surfrider Beach, Malibu	yes	yes	Los Angeles
Topanga Ck	Topanga State Beach	yes	yes	Los Angeles
Marie Canyon SD	Puerco Beach	yes	yes	Los Angeles
SMB-O-9	100 yd south of Malaga Cove	yes	no	Los Angeles
Malaga Creek	Malaga Cove	yes	no	Los Angeles
Montana Ave Drain	Santa Monica State Beach	no	yes	Los Angeles
Escondido Creek	Escondido State Beach	yes	yes	Los Angeles
Solstice Creek	Dan Blocker State Beach	yes	yes	Los Angeles
Ramirez Creek	Paradise Cove	yes	yes	Los Angeles
Sanjon Barranca	San Buenaventura State Beach	yes	no	Ventura
Santa Clara River	Surfers Knoll Beach or Oxnard Beach	yes	yes	Ventura
Industrial Drain	Ormond Beach	yes	no	Ventura
Calleguas Creek	Point Mugu Beach	yes	yes	Ventura
Ventura River	Surfers Point	no	yes	Ventura

Alternative site if SJCL01 is consistently dry.

References

Griffith, J.F., et al. Microbiological water quality at non-human influenced reference beaches in southern California during wet weather. Mar. Pollut. Bull. 2010 Apr 60(4):500-8

Figure 1. Site map.

