A Report on Bacteria Sampling conducted in the Santa Monica Canyon Watershed

Background

Santa Monica Canyon Channel is a creek system that flows year-round, and empties into Santa Monica Bay (near Chautauqua Rd). Rustic Canyon Creek is a major tributary to the system, and accounts for a large portion of the total flow reaching the ocean. Other significant tributaries include drainages from Sullivan and Mandeville Canyons. Based on preliminary assessment, flow originates from a variety of sources related to "urban runoff" (via the storm drain system), as well as a significant contribution from groundwater upwelling.

On April 21, 2006 the City of Los Angeles (Watershed Protection Division) conducted sampling to characterize fecal indicator bacteria levels at selected locations in the watershed. Though not mandated, this study has relevance to the Santa Monica Bay Beaches Bacteria Total Maximum Daily Load (TMDL). The discharge point of Santa Monica Canyon Channel (at Will Rogers State Beach) is a TMDL monitoring site, and has historically shown elevated levels of fecal indicator bacteria.

Methods

Sample points (shown in Figure 1) were selected to characterize bacteria levels at the major tributaries in the watershed. Samples were analyzed for *E. coli*, *Enterococcus*, and Total Coliforms using the Chromogenic Substrate method. These parameters are used to detect the presence of fecal material in the water, and act as a surrogate to indicate the *potential* presence of waterborne pathogens. *E. coli* and *Enterococcus* are typically associated with the gut of warm-blooded animals; whereas, Total coliforms is inclusive of a much broader category of bacteria, some of which may be naturally occurring in uncontaminated waters. Analyses were performed by the City of Los Angeles Environmental Monitoring Division (Microbiology Unit).

In addition to bacteria analysis, flow measurements were taken at Rustic Canyon Creek (at SMC 008), Santa Monica Canyon Channel (at SMC 009) and immediately downstream from the confluence of these two streams. A "V-shaped" cross-section was assumed for the estimation of flow rates.

Results

The concentrations of each indicator are shown in Table 1. Station SMC 010 (located at the mouth of the watershed) showed significant concentrations for all three fecal indicators. This sample was taken downstream of the Low Flow Diversion system that was installed by the City of Los Angeles. On the day samples were collected (April 21, 2006), there was significant flow that bypassed the diversion system. Recently, however, the capacity of the diversion system was upgraded. As of June 2006, all flow from Santa Monica Canyon Channel is now being diverted into the sewer system before it reaches the ocean. Furthermore, shoreline-monitoring data for June 2006 indicate that Will

Rogers State Beach (at the discharge point for Santa Monica Canyon Channel) is meeting standards for water contact recreation.

Significant levels of bacteria were also encountered at the lower reach of Rustic Canyon Creek (SMC 008) and at Mandeville Canyon (SMC 001). The upper reaches of Rustic Canyon Creek (SMC 004 & SMC 006) showed very low levels of indicator bacteria, suggesting that contamination was isolated to the lower portion of the creek.

Flow rate data (shown in Table 2) indicate that Rustic Creek comprises roughly one-half of the total flow of Santa Monica Canyon Channel, suggesting that flow from this creek has potential to affect bacterial levels at the beach. However, it should be recognized that bacterial sampling and analyses are inherently variable, and more data should be considered before reaching conclusions about sources of contamination.

Conclusions

Data from this study are consistent with the notion that poor water quality at Will Rogers State Beach (at Chautauqua Rd) may be caused, in part, by bacterial inputs originating in the Santa Monica Canyon watershed. Commonly suspected sources of fecal bacteria include birds and other wildlife, horse manure, pet feces, septic tank systems, and other sources associated with “urban runoff”. In order to correlate indicator bacteria levels with one (or more) of these specific sources, a source-tracking study involving genetic markers would be necessary.

Preliminary findings indicate that full diversion of the Santa Monica Canyon Channel significantly improves water quality at the beach where the Channel would normally discharge to the ocean.

Table 1. Fecal Indicator Bacteria concentrations for Santa Monica Canyon Channel and Rustic Creek.

Santa Monica Canyon Channel	Sample ID#	Date Collected	*E. coli* MPN/100ml	*Enterococcus* MPN/100ml	Total coliform MPN/100ml	Ratio Fecal:Total coliform*
Mandeville Canyon	SMC 001	4/21/2006	630	230	3,300	0.19
Sullivan Canyon	SMC 002	4/21/2006	200	98	8,200	0.02
SMC @ Allenford Ave.	SMC 003	4/21/2006	100	74	2,600	0.04
SMC @ San Lorenzo St.	SMC 007	4/21/2006	200	85	4,200	0.05
SMC @ Channel Ln.	SMC 009	4/21/2006	<100	86	2,400	<0.04
Rustic Creek						
RC @ Evans Rd.	SMC 004	4/21/2006	<100	<10	1,300	< 0.08
RC @ Brooktree Rd.	SMC 006	4/21/2006	<100	31	2,200	<0.05
RC @ W. Channel Rd.	SMC 008	4/21/2006	1,100	130	9,100	0.12
Confluence						
Mouth of SMC	SMC 010	4/21/2006	520	120	15000	0.03

Extra Sample:

14200 Sunset Blvd.(storm drain)**	SMC 005	4/21/2006	100	<10	6400	0.02

* For the calculation of this ratio, E. coli values were substituted for Fecal coliforms.
**This sample was taken at a storm drain near the location of SMC 004.

Table 2. Flow rate data for Santa Monica Canyon Channel, Rustic Creek, and their combined flow. Estimates for daily volume (MGD) assume a v-shaped cross-section of the flood control channels.

Location	Flow rate (ft/sec)	Depth (inch)	Width (ft)	**Estimated daily volume (MGD[1])**
Santa Monica Channel @ Channel Ln.	5.5	2.75	7.6	**3.1**
Rustic Creek@ W. Channel Rd.	5.3	4	6	**3.4**
Short Street (combined flow)	6.3	4.25	8.8	**6.4**

[1] MGD= Millions of gallons per day
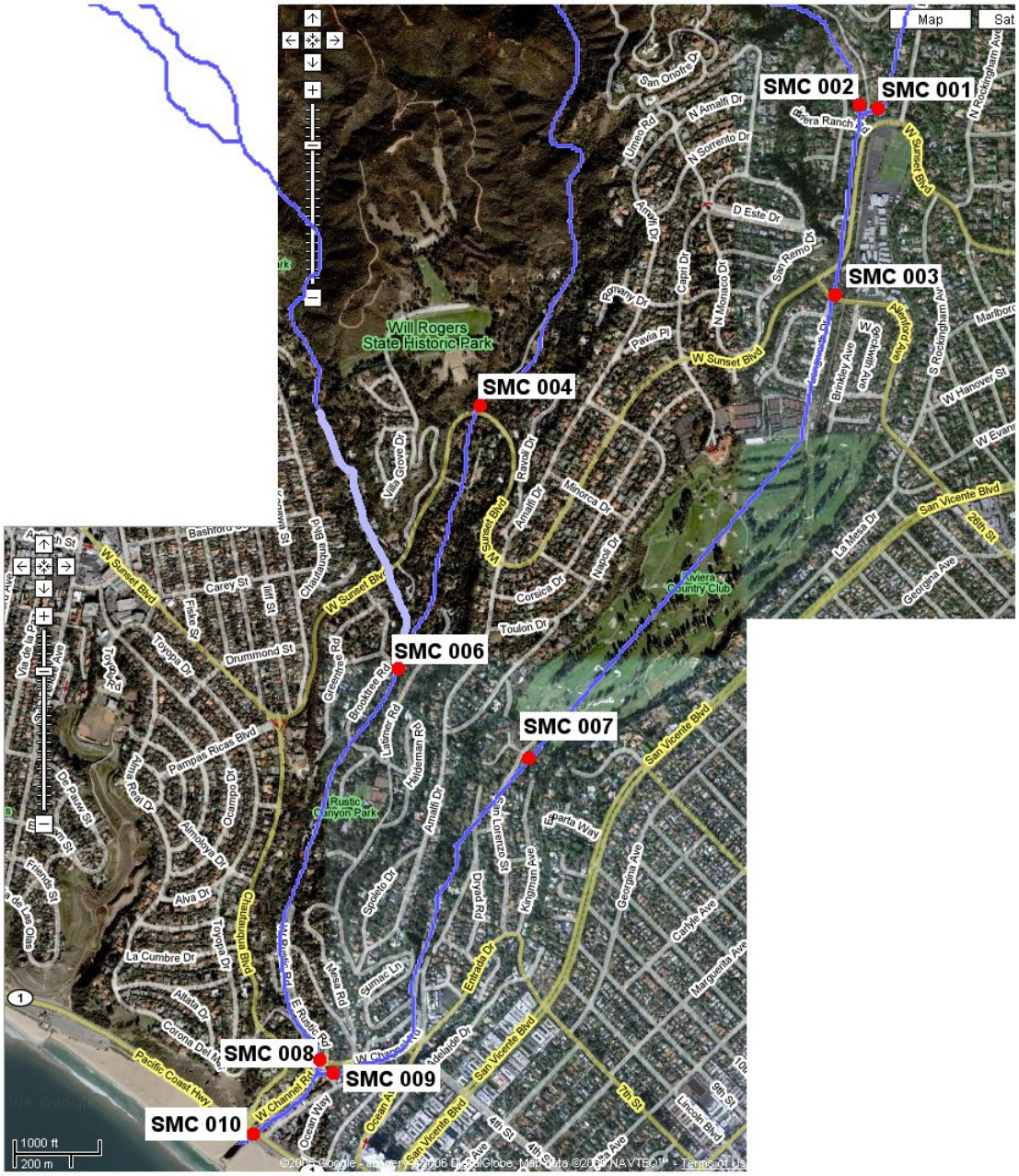
Figure 1. Map of sampling points in the Santa Monica Canyon Watershed.