Sewer Sociology

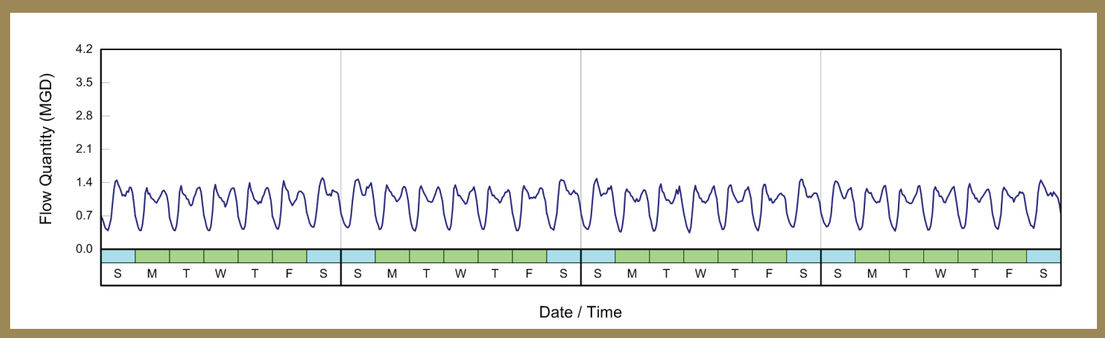
SAN DIEGO

sew´•ĕr sō•ci•ol´•ō•gy, the science of society, social institutions, and social relationships viewed through the eyes of a sewer; specifically: the systematic study of the development, structure, and interaction of organized groups of human beings through sewer use data. *Adapted from Merriam-Webster's Collegiate Dictionary, 11th Edition, 2004*

Most people rarely think about the sewers beneath their feet. However, the flow of wastewater in the sewers below provides a unique perspective into the life of the community above. This poster provides a tour of the City of San Diego and its surrounding metropolitan area through the eyes of a sewer, as revealed in hydrographs of sewer flow data. Differences in land use are apparent, as well as differences between weekdays, weekends, and holidays. Activities and events that distract and disrupt daily life can also be seen as departures from these patterns.

Kevin L. Enfinger, P.E. and Paul S. Mitchell, P.E.

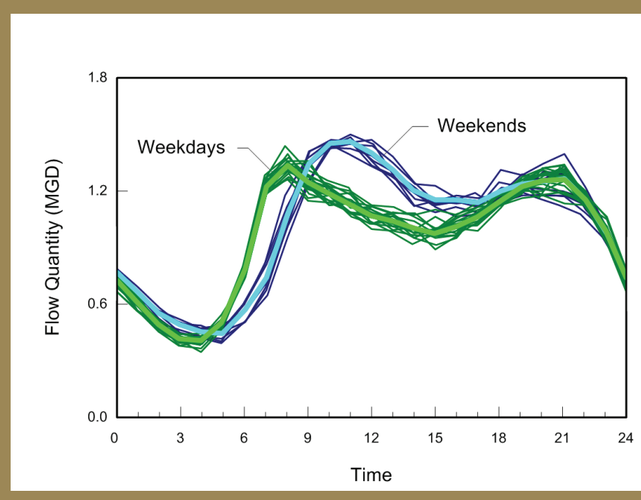
THE DAYS OF OUR (SEWER) LIVES



WEEKDAYS & WEEKENDS

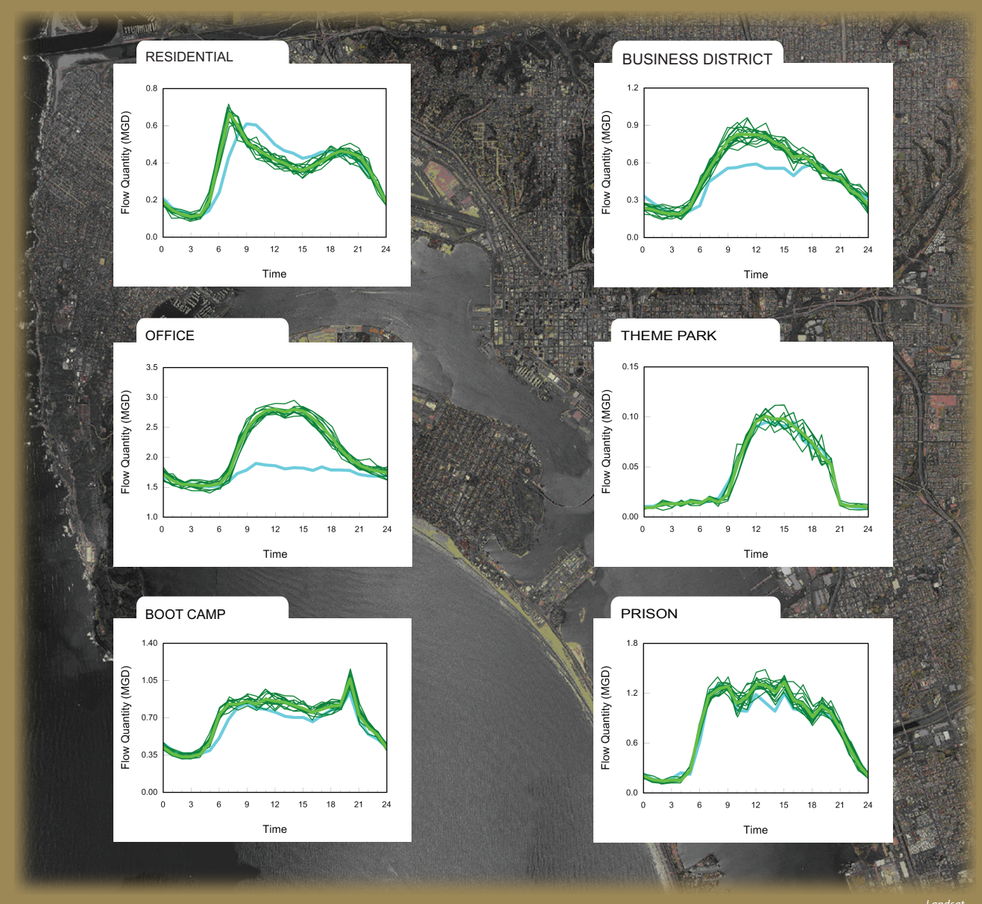
The hydrograph above displays flow monitor data from a residential area in San Diego recorded over a four week period during normal dry weather conditions. Note that a repeatable daily or *diurnal* pattern is observed. A more detailed view is obtained by plotting each day on top of the other in a composite 24-hour hydrograph as shown to the right. The distinctive diurnal patterns of weekday and weekend residential flow are apparent.

The light green curve and the light blue curve on the composite hydrograph are the average daily flow patterns observed on weekdays and weekends, respectively. The dark green curves and the dark blue curves are the individual weekday and weekend traces used to determine each average. These curves provide an indication of the normal variation in flow that can be expected during normal dry weather conditions. Composite hydrographs are used throughout this poster and serve as an important reference in the study of sewer sociology.



LAND USE

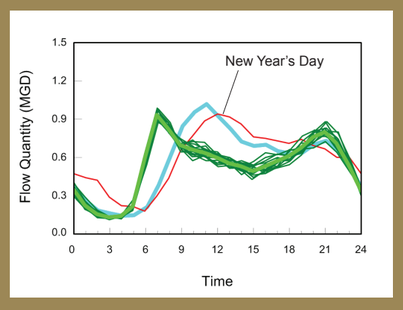
Land use within a particular area can impact the shape of the diurnal pattern. The examples below represent diurnal patterns from six different land use areas within the community. The residential pattern is the most common. Combinations and variations of these patterns are often observed in mixed land use areas. The boot camp example provides a glimpse into the life of a Marine Corps recruit – *Reveille* at 5:00 AM and *lights out* at 9:00 PM.

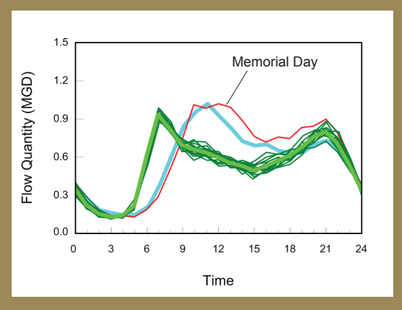


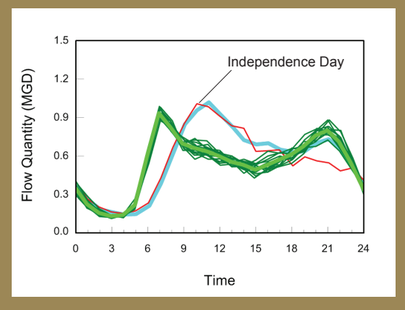
Landsat

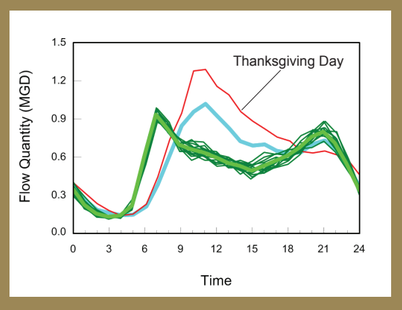
HOLIDAYS

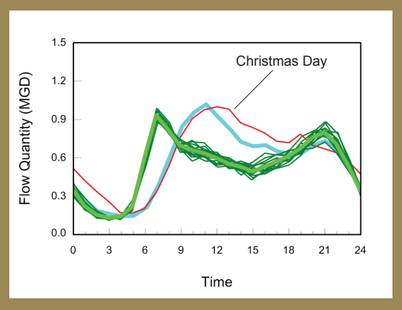
Holidays are welcome diversions from everyday life and provide time to celebrate, relax, or share with family and friends. These diversions are reflected in sewer use patterns, as shown below. Flow monitor data obtained from Chula Vista during several familiar holidays are displayed in comparison with normal weekday and weekend sewer use patterns. To a sewer sociologist, a holiday looks much like a weekend. However, characteristic differences are observed that make each holiday unique. See what differences you can find and how they compare with your holiday traditions.





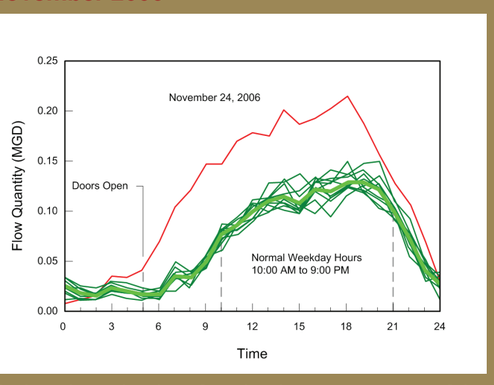






BLACK FRIDAY

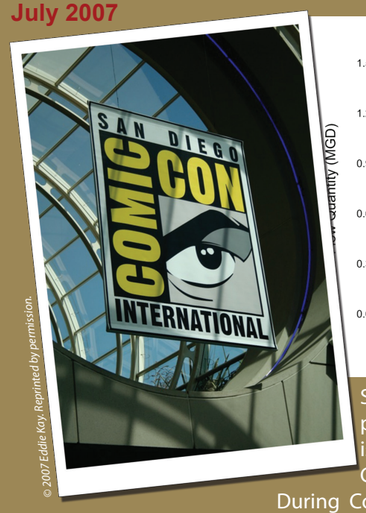
November 2006



Black Friday – the day after Thanksgiving – is one of the busiest shopping days of the Christmas holiday season, and many retailers offer special sales and incentives to attract consumers. Flow monitor data obtained downstream from a shopping mall in National City are shown here and depict the increase in sewer flows on Black Friday. Sewer flows began to increase a few hours earlier than normal as stores opened to waiting crowds of eager shoppers.

COMIC CON

July 2007



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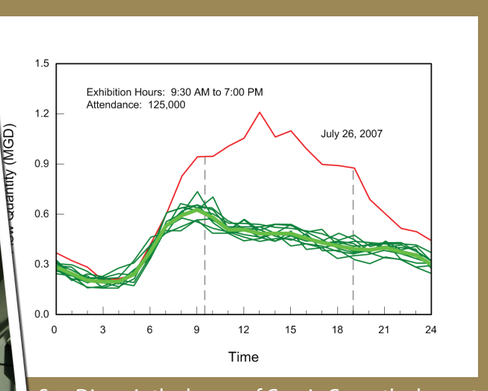


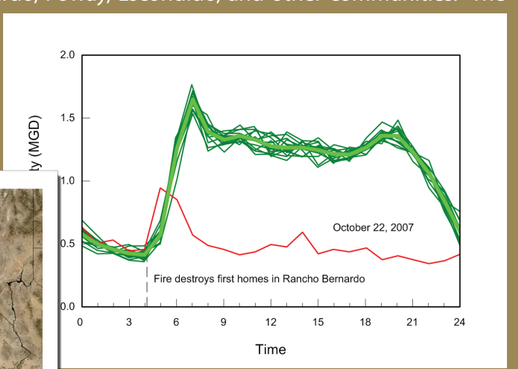
San Diego is the home of Comic Con – the largest pop-culture convention in the world. This event is held each year at the San Diego Convention Center and attracts well over 100,000 people. During Comic Con 2007, a sewer flow monitor quietly observed the event from a location downstream of the convention center. The results are dramatic. The sewer flow monitor reported an additional 285,000 gallons of wastewater on the opening day of the convention.

WILDFIRE EVACUATIONS

October 2007

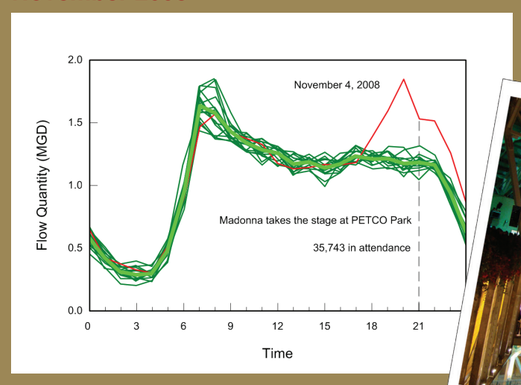
Several devastating wildfires raged through the San Diego County area in October 2007, prompting the evacuation of over 500,000 residents as fire fighters fought to save lives and protect property. The Witch Creek Fire alone burned nearly 200,000 acres and threatened residents in Ramona, Rancho Bernardo, Poway, Escondido, and other communities. The data shown here were obtained from a flow monitor located in Rancho Bernardo, where flames reached the first homes at about 4:07 AM on October 22, 2007. Note the drastic reduction in flow as residents awoke and fled the approaching wildfire – a complete evacuation of this area. A total of 365 homes were destroyed within the City of San Diego, and an additional 79 were damaged as a result of the wildfires. However, it is estimated that fire fighters saved approximately 6,000 homes within the path of the fires.

National Aeronautics and Space Administration

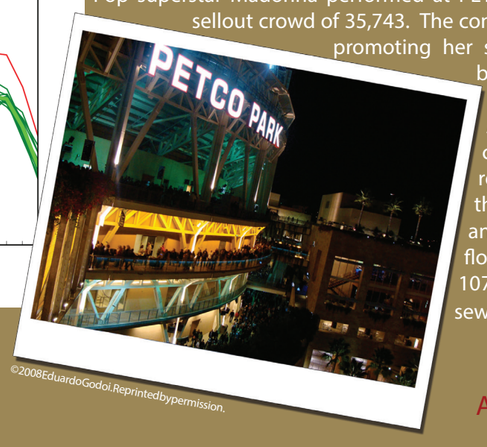


MADONNA IN CONCERT

November 2008



Pop superstar Madonna performed at PETCO Park on November 4, 2008 before a sellout crowd of 35,743. The concert was part of her *Sticky and Sweet* tour promoting her studio album *Hard Candy.* The concert began at 7:00 PM, and sewer flows peaked before Madonna took the stage. According to published accounts, the concert generated $5,097,515 in gross receipts and contributed over $200,000 to the City's general fund from stadium rent and concession sales. According to the flow monitor, the concert also contributed 107,000 gallons of wastewater, a per capita sewer use of 3.0 gallons/concert/ticket.



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