

PUBLIC HEARING

Tentative Investigative Order No. R9-2019-0014

**Request for Technical and Monitoring Reports to
Identify and Quantify the Sources and Transport Pathways of
Human Fecal Material to the Lower San Diego River
Watershed**

June 12, 2019

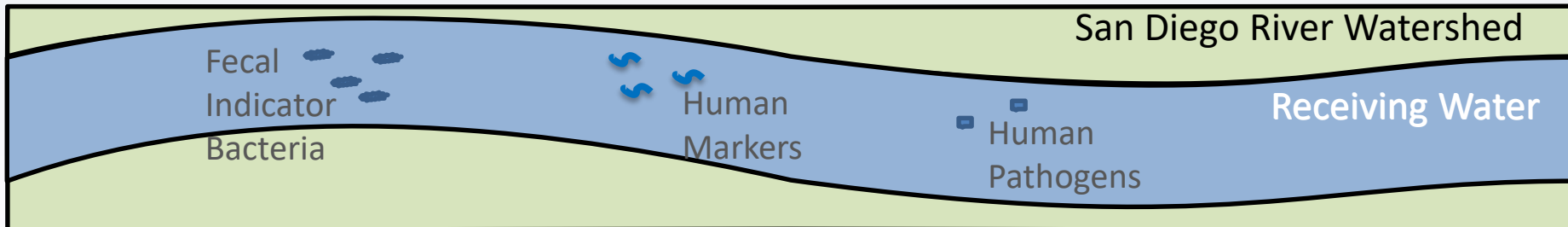
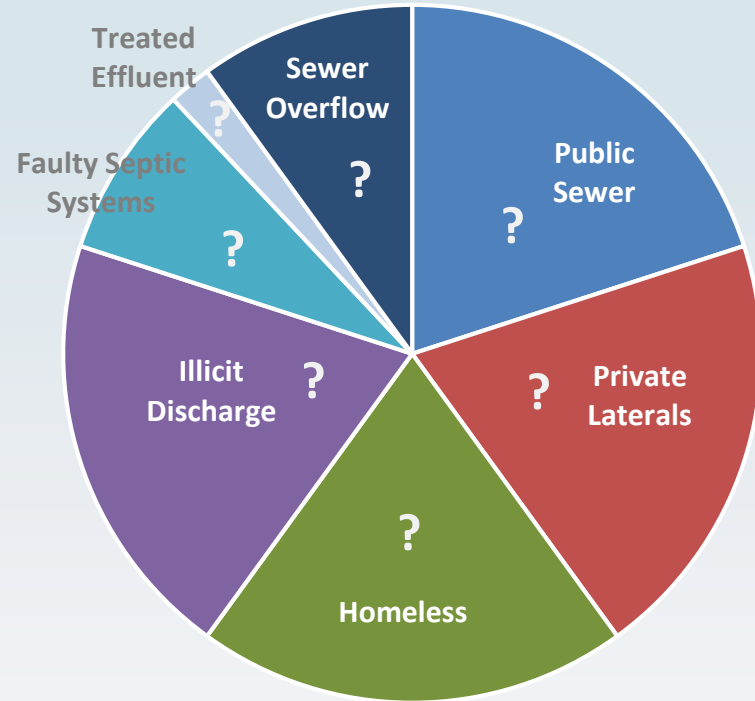


PURPOSE

Entities Named:

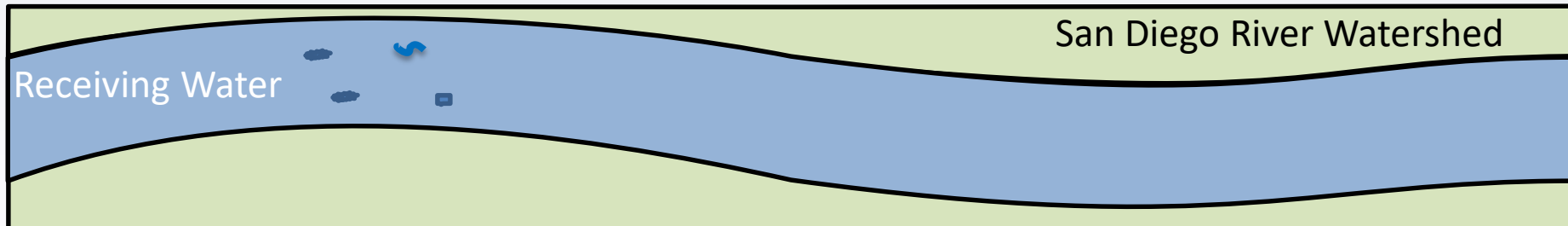
Sewer MS4 and	City of El Cajon
	City of La Mesa
	City of San Diego
	San Diego State University
Sewer MS4 only	Padre Dam MWD
	San Diego County Sanitation District
Septic MS4 only	County of San Diego Public Works
	City of Santee
	Metropolitan Transit System
	Caltrans
	County of San Diego DEH

Sources Of Human Fecal Wastes ?



OUTLINE

- **Geographic Information**
- **Background**
- **Potential Sources of Human Fecal Waste**
- **Tentative IO Requirements**
- **Significant Comments and Responses**
- **Staff Recommendation**



GEOGRAPHIC INFORMATION

Beneficial Uses for Mouth of San Diego River:

- REC-1
- REC-2
- SHELL
- COMM
- EST
- WILD
- RARE
- MAR
- MIGR
- SPWN

Beneficial Uses for inland water in 907.1:

- REC-1
- REC-2
- AGR
- IND
- PROC
- WARM
- BIOL
- WILD
- RARE

San Diego River Watershed

San Vincente Rsvr.

El Capitan Rsvr.

907.1

Google earth

Data LDEO-Columbia, NSF, NOAA
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus



30 mi

Beneficial Uses for Ocean Waters

“The beneficial uses of the ocean* waters of the State that shall be protected include **industrial water supply; water contact and non-contact recreation**, including aesthetic enjoyment; navigation; **commercial and sport fishing; mariculture***; preservation and enhancement of designated Areas* of **Special Biological Significance (ASBS); rare and endangered species; marine habitat; fish migration; fish spawning and shellfish* harvesting**” – **California Ocean Plan (2015)**



Photos taken at Dog Beach, near the mouth of the San Diego River on June 9, 2019

GEOGRAPHIC INFORMATION

**The Lower San Diego River Watershed:
REC-1 and REC-2
beneficial uses
across the
Watershed**

**Impaired water body list
for Indicator Bacteria:
Dog Beach,
Lower San Diego River,
Forrester Creek**

San Vincente Rsvr.
El Capitan Rsvr.
907.1

Google earth

Data LDEO-Columbia, NSF, NOAA
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

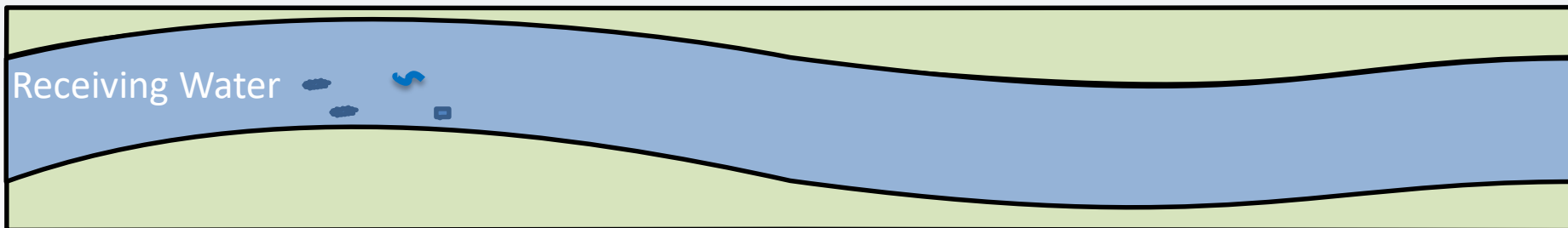


30 mi

BACKGROUND

- **2002, Dog Beach, Lower San Diego River, and Forrester Creek listed as impaired for REC-1**
- **2010, Bacteria TMDL for 20 Beaches/Creeks**
- **2014, Basin Plan Triennial Review Project**

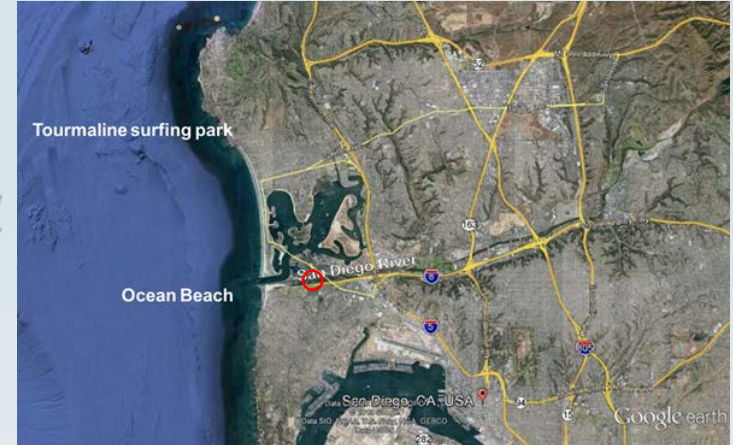
---→ 2014, Surfer Health Study



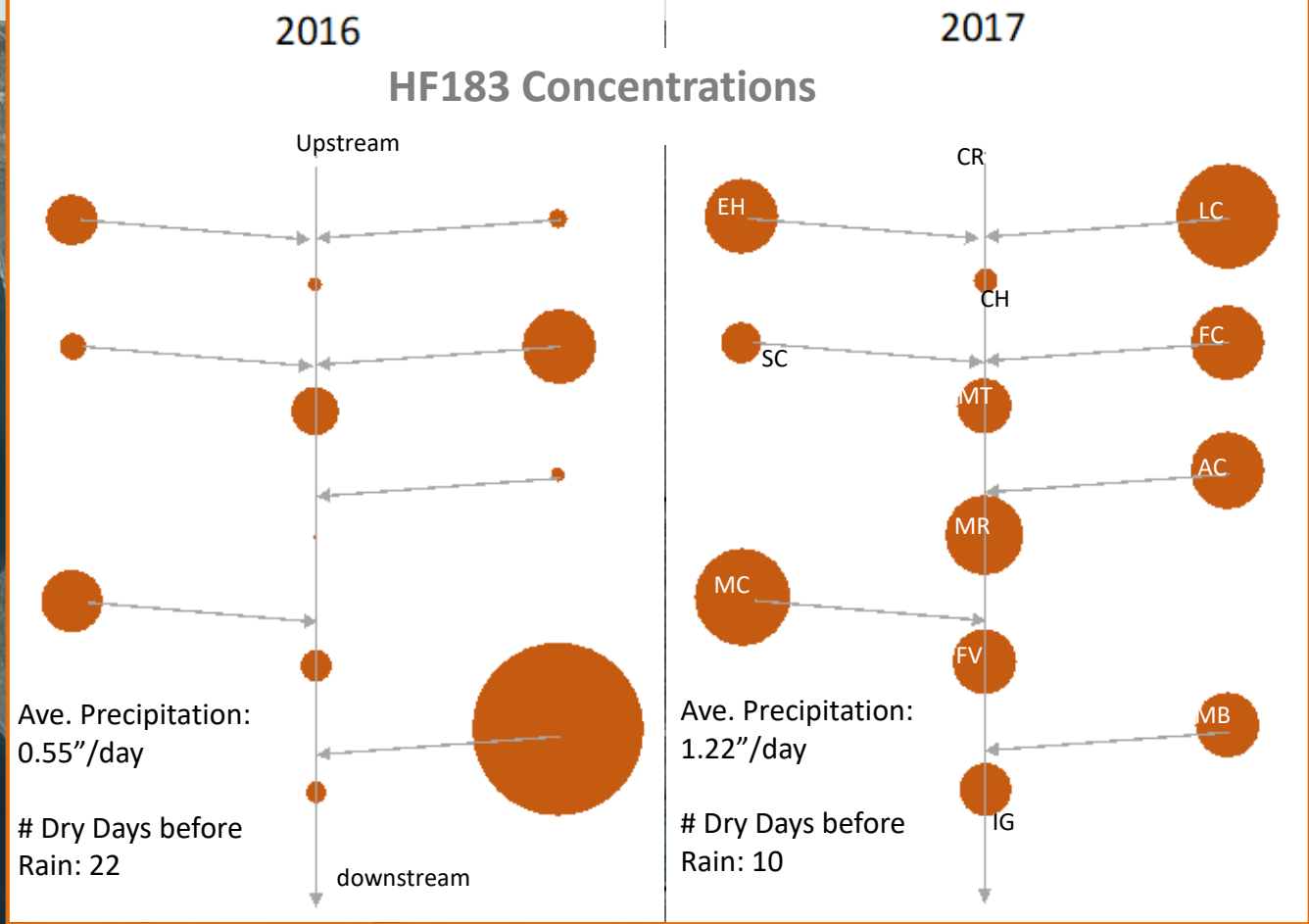
TRIGGERS

Widespread Signals of Human Fecal Waste

- Surfer Health Study (2014-2015)
- Upstream Microbial Source Tracking Study (2016-2017), next slide



Category		Surfer Health Study		Reference Range
		Detection Frequency (N= 23 samples)	Maximum Concentrations (copies/100 ml)	Point Loma WWTP Influent Sample Concentrations (N=5, copies/100 ml)
Pathogen	Norovirus	96%	495	180 to 4350
	Adenovirus	22%	42	Not Available
	Campylobacter	100%	1,136	Not Available
	Salmonella	25%	14	Not Available
	Enterovirus	0%	Not available	260 to 833
Human Marker	HF 183	100%	3,363	10 ⁶ to 10 ⁷
Fecal Indicator Bacteria	Enterococci	100%	26,000 (cfu/100 ml)	10 ⁵ to 10 ⁶ (cfu/100 ml)

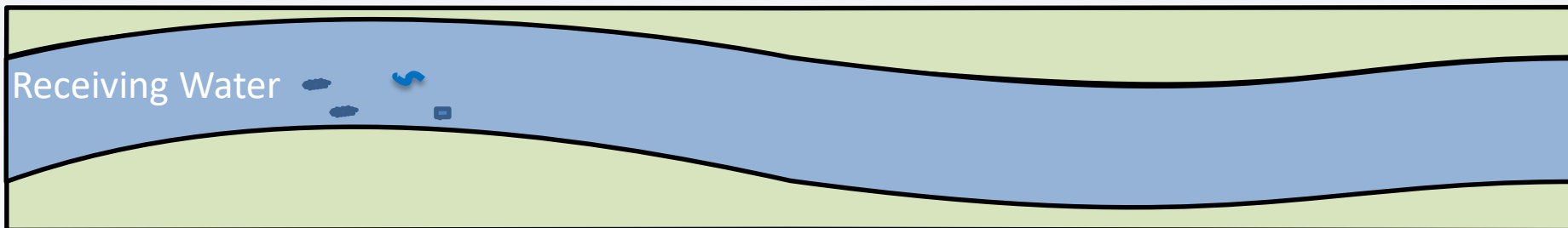


Widespread HF183 Suggests Broadly Present Human Fecal Material in the Receiving Water despite Multiple Permits that Control or Prohibit Such Discharge!

Human Marker	HF183	100	16,240	100	5,971
--------------	-------	-----	--------	-----	-------

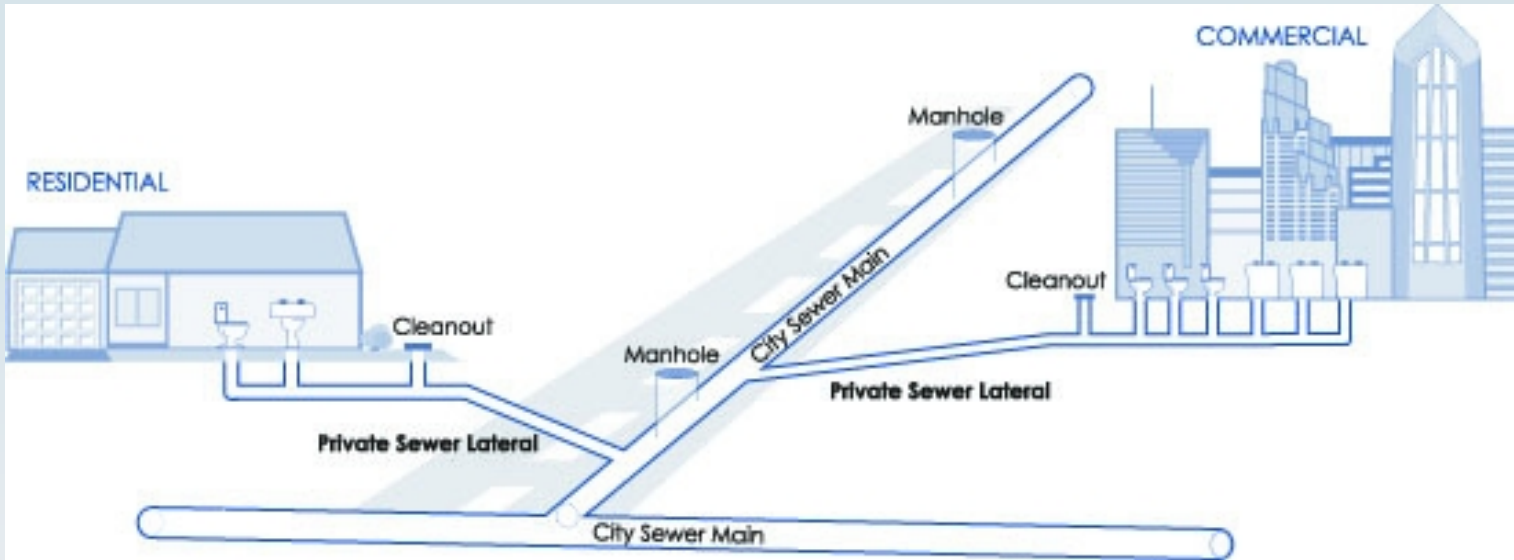
POTENTIAL SOURCES

- **Sewage Overflows and Discharges including Exfiltration**
 - **Public Sewer**
 - **Private Laterals**
- **Homeless Encampments**
- **Faulty Septic Systems**
- **Illicit Connections and Discharges to MS4**
- **Treated Wastewater (Background Signals)**
- **Recycled Water Land Discharge (Removed)**



POSSIBLE SOURCES AND PATHWAYS

SSOs and Private Lateral Discharges



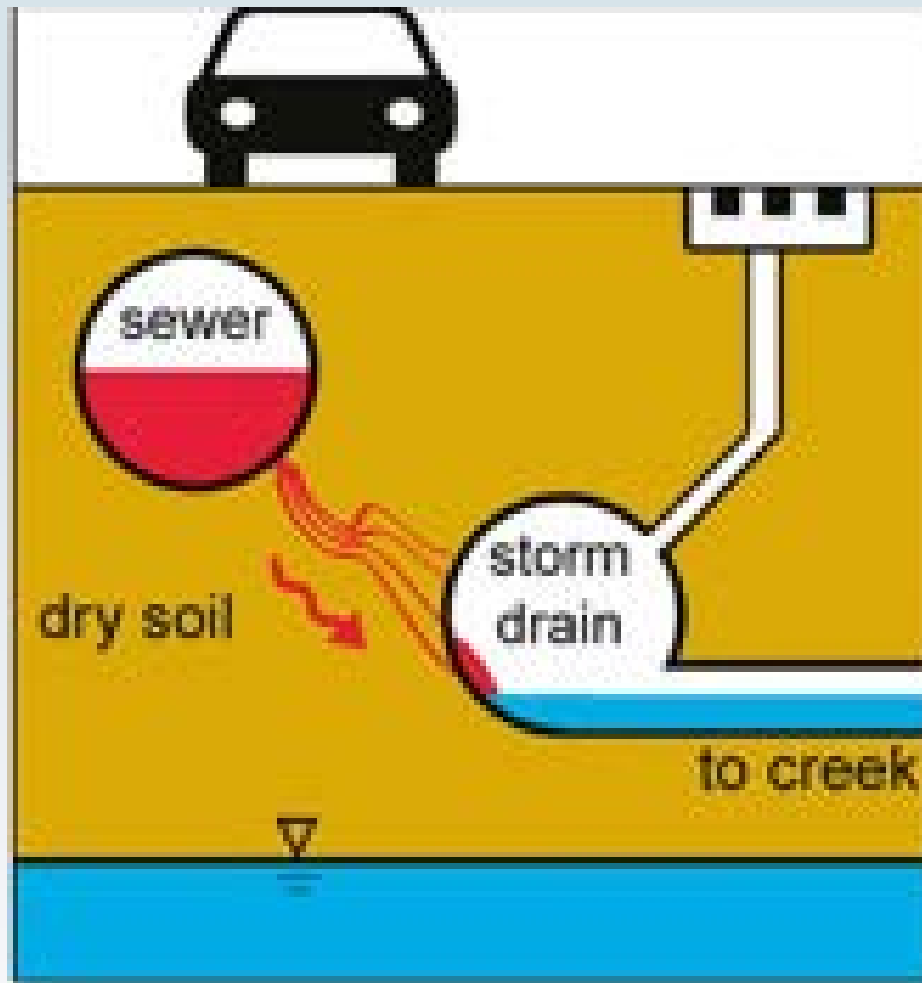
<https://www.sandiego.gov/public-utilities/customer-service/your-home-plumbing/sewer>



Harmony Grove Development Spill, Escondido, 02/17/17

POSSIBLE SOURCES AND PATHWAYS

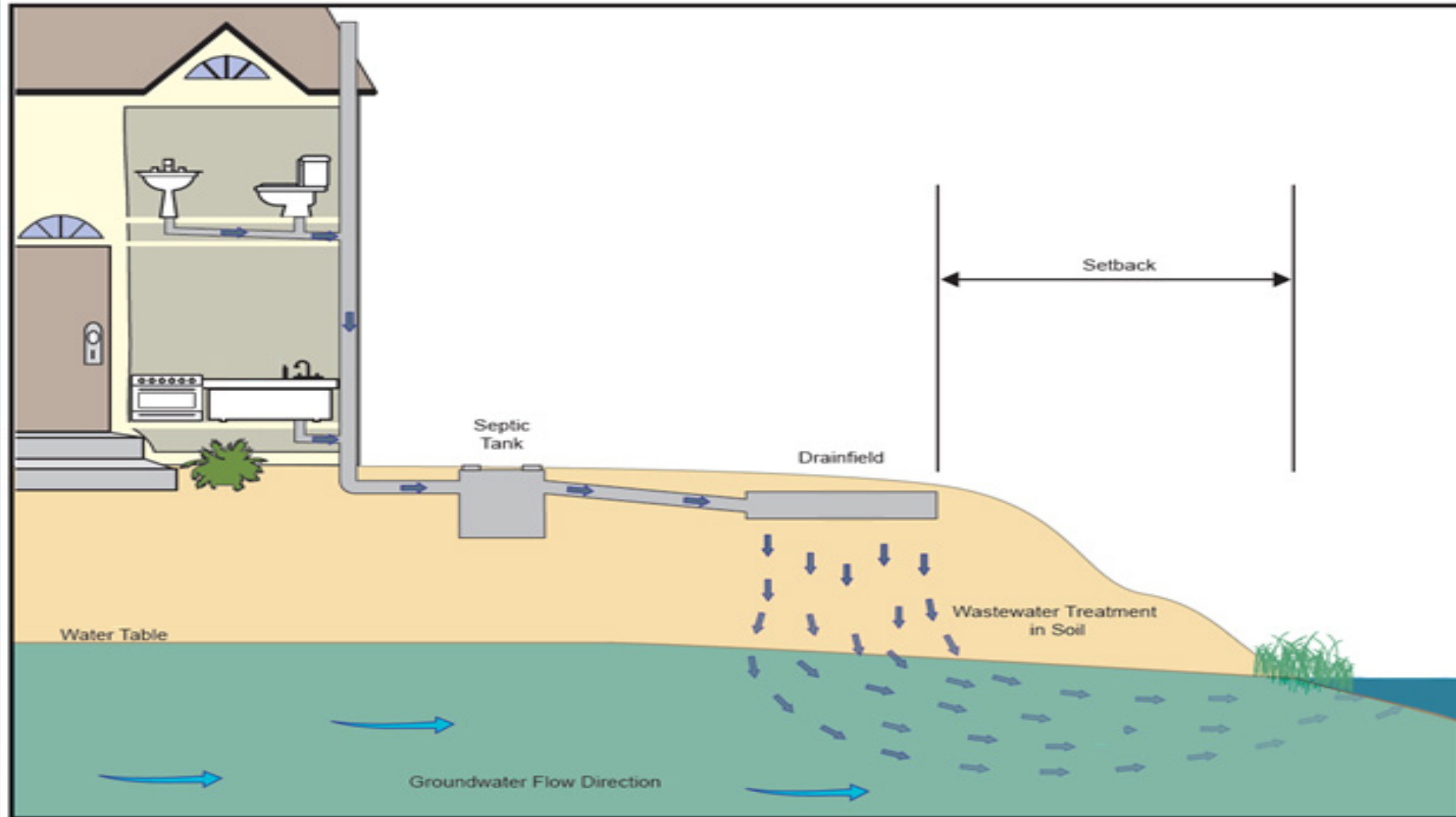
Exfiltration



Source: Sercu et al, 2011

POSSIBLE SOURCES AND PATHWAYS

Septic Systems



<https://www.epa.gov/septic/septic-systems-and-surface-water>

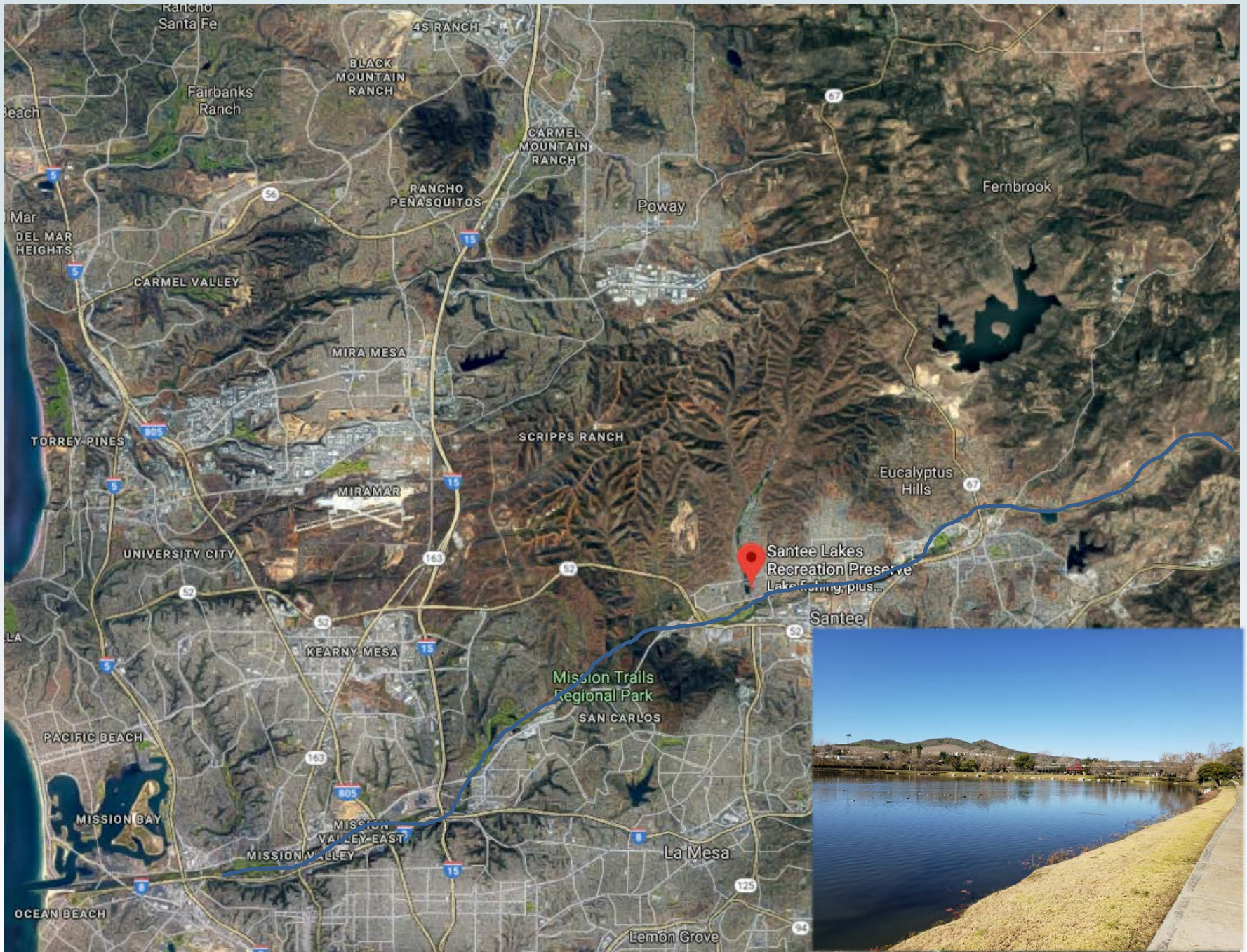
POSSIBLE SOURCES AND PATHWAYS

Recycled Water (Removed)



<https://www.nbsgov.com/blog/2016/09/29/recycled-water-pricing-alternatives/>





POSSIBLE SOURCES AND PATHWAYS

Treated Wastewater



Ray Stoyer WRF/Santee Lakes Map

POSSIBLE SOURCES AND PATHWAYS

Treated Wastewater

- Ramona MWD
- Julian Water Pollution Control Facility
- Both Removed from Tentative Order



POSSIBLE SOURCES AND PATHWAYS

Homeless Encampments

- 116 encampments (290 individuals) – Santee to Mission Valley (2016 survey)
- Present challenge to Cities, County, Caltrans, SDSU, and MTS
- Potential to defecate outdoors, introducing human fecal material to watershed



Source: KPBS – Katie Schoolov



Source: World Magazine – Tom Pfingsten



POSSIBLE SOURCES AND PATHWAYS

Illicit Discharges

- Illicit Connection (e.g., sewer to storm drain)
- Illegal Dumping (e.g. RV tanks to storm drain)

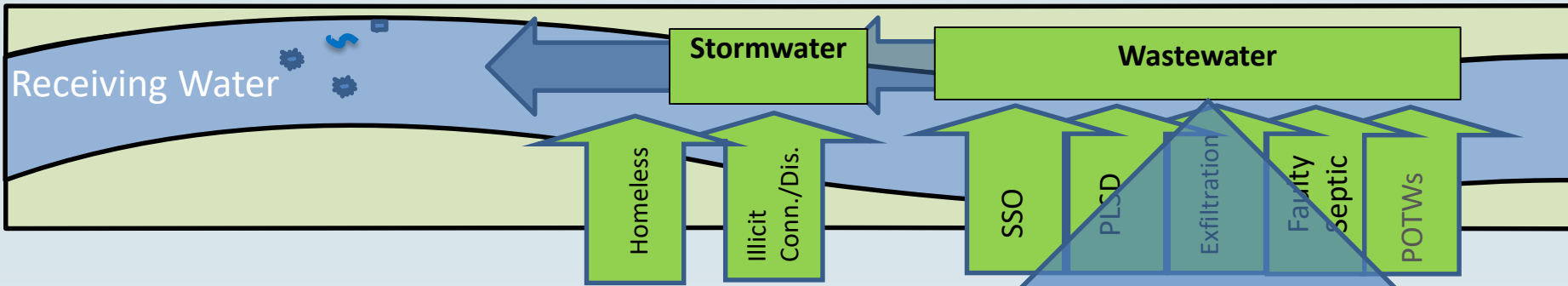


Source: beachapedia.org



Source: West Central Conservancy District

POTENTIAL CONTRIBUTING DISCHARGES & REGULATORY MEASURES



City of El Cajon
City of La Mesa
City of San Diego
City of Santee
Co. of San Diego
Padre Dam MWD
SD County Sanitary Dis.
Metro. Transit Sys.
San Diego State
Caltrans

Homeless	Illicit Conn./Dis.
X	X
X	X
X	X
X	X
X	X
X	X
X	X
X	X

SSO	PLSD	Exfiltration	Facility Septic	POTWs
X	X	X		
X	X	X		
X	X	X		
			X	
X	X	X		X
X	X	X		
X		X		

Responsible Parties

Regional and Statewide NPDES Permits and Land Use Authority

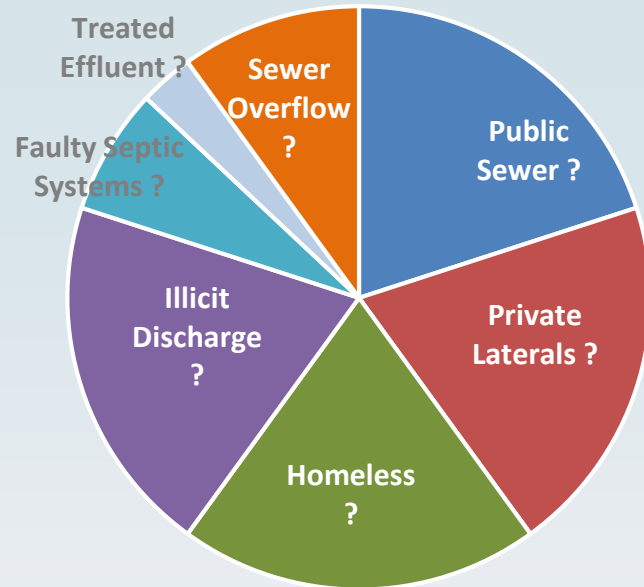
Regional and Statewide WDRs NPDES Permit (Padre Dam only)

TENTATIVE INVESTIGATIVE ORDER No. R9-2019-0014

– PURPOSE AND REQUIREMENTS

Purpose

- Identify and quantify relative contributions of suspected sources of human fecal materials
- Determine transport pathways of human fecal material
- Evaluate effectiveness of current management measures
- Consider development of remedial/abatement strategies



Requirements

- Establish Conceptual Site Model
- Submit Investigation Work Plan, including Quality Assurance Project Plan
- Submit Semiannual Reports and Final Reports

Schedule

- Submit Work Plan in 180 days
- Submit Final Investigation Reports in 48 months

HISTORY

- March 2018 – Hold public workshop
- May 21, 2018– Release Tentative Investigative Order for public comments
- June 20, 2018 – 30-day public comment period closes
- Late June 2018 – May 2019 – Prepare responses, revise the Tentative Order, prepare for issuance of final Investigative Order

SIGNIFICANT COMMENTS

- I. Question the Need for the Tentative IO and the San Diego Water Board Authority
- II. Question the Feasibility of the Investigation
- III. Question the Potential Sources Identified

SIGNIFICANT COMMENTS AND RESPONSES – I. NEEDS AND AUTHORITY

Comment

- Surfer Health Study (SHS) results showed gastrointestinal (GI) illness rates were lower than US EPA recommended allowable thresholds, therefore no need to investigate the human fecal sources.

Response

- Investigation is needed because human fecal wastes were observed in receiving waters despite multiple permits that control or prohibit discharges of human fecal waste.
- SHS study design is different from US EPA study designs and so the SHS results are not directly comparable to US EPA threshold.
- REC-1 beneficial use is (also) designated for inland waters across the watershed and needs to be protected.

SIGNIFICANT COMMENTS AND RESPONSES – I. NEEDS AND AUTHORITY

Comment

- Receiving water is not MS4 and discharge to receiving water from homeless encampments is not subject to MS4 permit regulation.

Response

- Most Municipalities possess land use authority over public lands, including river beds where homeless encampments are located.
- Direct or indirect human fecal material discharges to receiving waters may originate from homeless encampments on land within a public agency's jurisdiction.
- Relevant Findings were modified in the Tentative IO.

SIGNIFICANT COMMENTS AND RESPONSES – II. FEASIBILITY

Comment

- Homeless encampments are too complex to be solved by the named agencies alone.

Response

- The San Diego Water Board concur with the complexity about the homelessness issue.
- The Tentative IO (only) requires the identification of the contribution from the homeless, not the abatement of the problem.
- Such information is prerequisite to understand and address the human fecal wastes problem in the Watershed.

SIGNIFICANT COMMENTS AND RESPONSES – II. FEASIBILITY

Comment

- Suspected sources and pathways of human fecal material out of jurisdictional control.

Response

- Clarify in the Tentative Order Directives that Responsible Parties are not required to investigate suspected sources and pathways where they lack legal authority or cannot obtain such authority.
- Encourage the communication and coordination of investigation efforts for better data comparison and cost sharing.

SIGNIFICANT COMMENTS AND RESPONSES – II. FEASIBILITY

Comment

- Investigation methods for HF183 measurement and exfiltration studies are not mature or readily available.

Response

- USEPA recently published analysis method for HF183 (Method 1696).
- Live vs. Dead determination of HF183 is good information but not critical for the purpose of the investigation.
- Traditional and novel methods are available to quantify exfiltration.

SIGNIFICANT COMMENTS AND RESPONSES – II. FEASIBILITY

Comment

- An old assay (reagent), that reportedly may cause overestimation of results, was used in the HF183 analysis in the Surfer Health Study (SHS) and Microbial Source Tracking Study (MST). Are those HF183 analysis results reliable?

Response

- Recent study results of three-lab comparison showed lower HF183 analysis results for “old assay/ddPCR” (used in SHS and MST method) than “new assay/qPCR” (i.e., approximate to new EPA method 1696), i.e., no signs of overestimation with the SHS and MST method.
- Reduction of precision likely occurs when true HF183 concentrations in the samples are low (e.g., < 100 gene copies/100 ml). The environmental samples in SHS and MST have higher levels.

SIGNIFICANT COMMENTS AND RESPONSES – III. POTENTIAL SOURCES

Comment

- Exfiltration only occurs during dry weather and is unlikely to contribute to gastrointestinal illness.
- Exfiltration rate is difficult to quantify and methods are uncertain.

Response

- HF183 has been detected in tributaries and the main stem of watershed in both dry and wet weather.
- Studies outside the Region have documented exfiltration occurring.
- Agencies can reduce complexity by focusing investigation on portions of system most susceptible to exfiltration or with highest likelihood to affect surface waters.

SIGNIFICANT COMMENTS AND RESPONSES – III. POTENTIAL SOURCES

Comment

- Inappropriate to require investigation since Padre Dam's treated wastewater is regulated under an NPDES permit and generally complies with Title 22 requirements.

Response

- HF183 was observed at Sycamore Creek, downstream of overflow from Santee Lakes to Sycamore Creek.
- Treated wastewater will provide background signals of HF183.
- Quantification of background signals is necessary to assess and quantify contributions from other sources, i.e., raw sewage and human fecal deposit.

- Human fecal wastes were observed in receiving waters in the Lower San Diego River Watershed, posing threat to public health and REC-1 beneficial use, despite the existence of waste discharge prohibitions.
- Investigative Order is needed to
 - Identify and quantify relative contributions of suspected sources of human fecal materials
 - Determine transport pathways of human fecal material
 - Evaluate effectiveness of current management measures
 - Provide information for considering development of a strategic remedial/abatement strategy for human fecal sources in the Lower San Diego River Watershed.

Conclusion

A magnifying glass with a black handle and a silver frame is positioned over the word "Conclusion". The lens of the magnifying glass is centered over the letters "clu" in "Conclusion", making them appear larger and more prominent than the rest of the word. The background is a light, neutral color.

STAFF RECOMMENDATION:

Adopt Tentative Investigative Order No. R9-2019-0014

Request for Technical and Monitoring Reports to Identify and Quantify the Sources and Transport Pathways of Human Fecal Material to the San Diego River Watershed



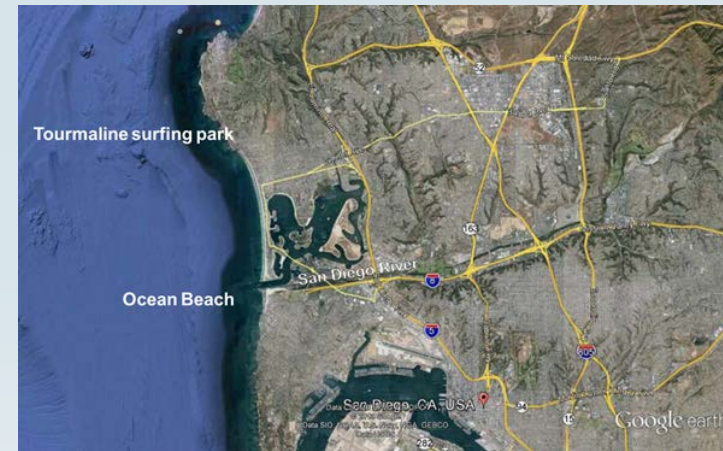
Supporting Information

TENTATIVE INVESTIGATIVE ORDER REVIEW

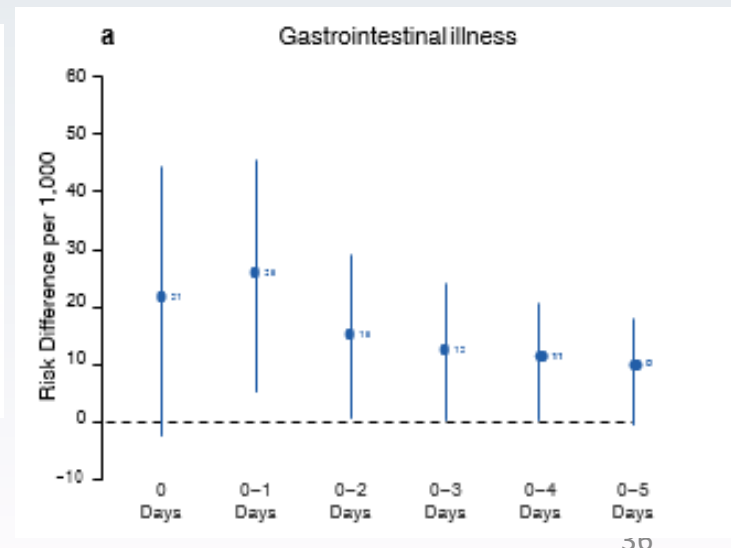
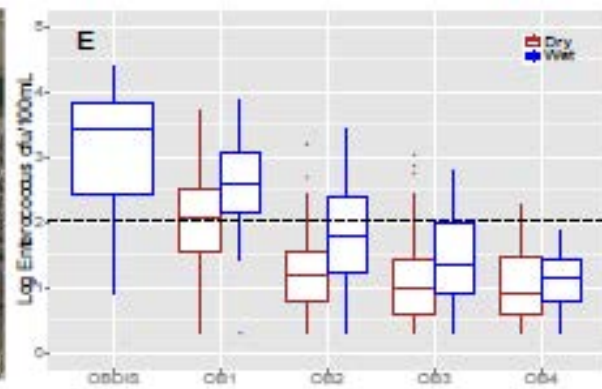
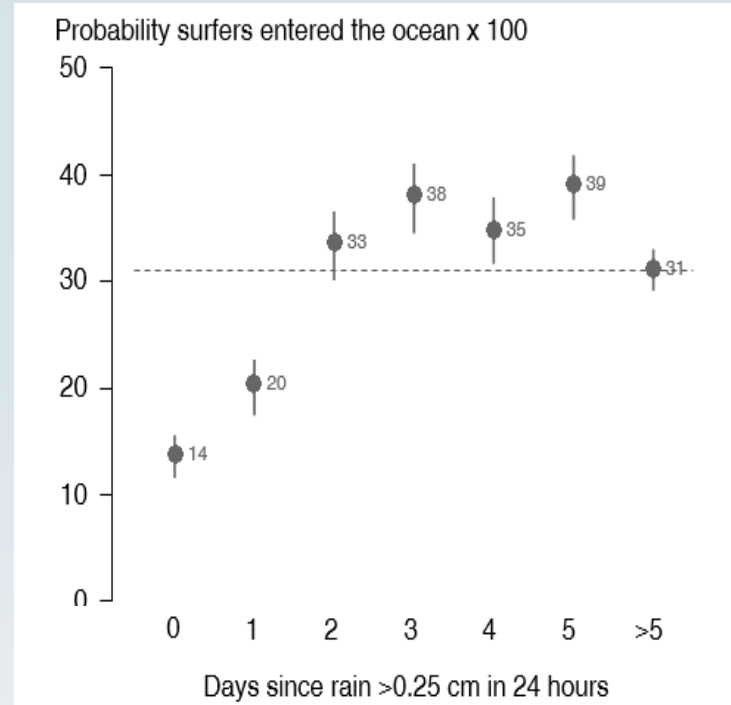
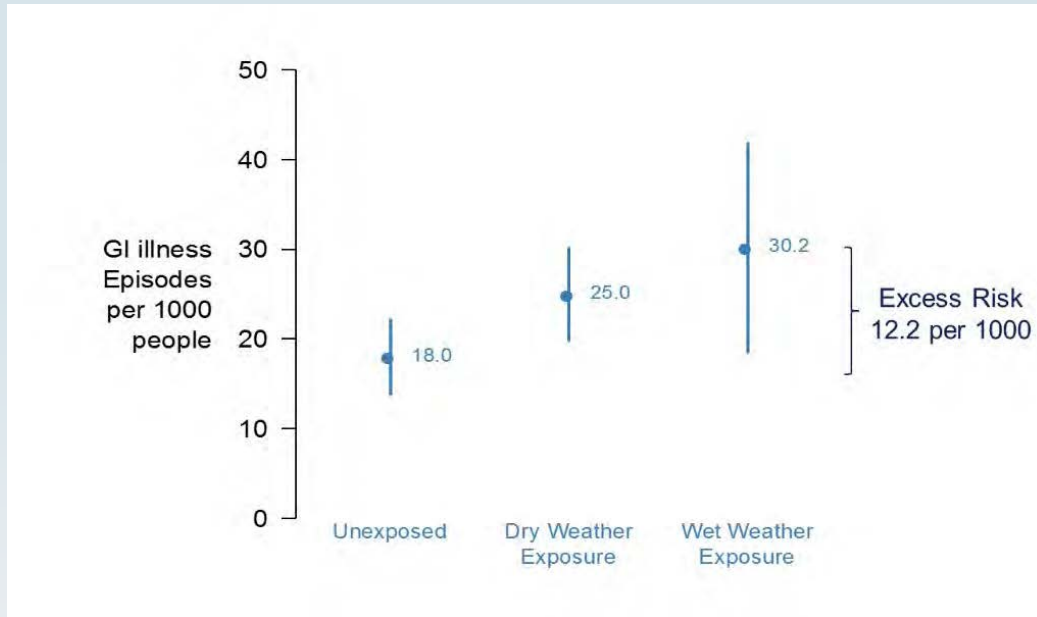
SCOPE OF IMPAIRMENT: SAN DIEGO RIVER WATERSHED

Surfer Health Study

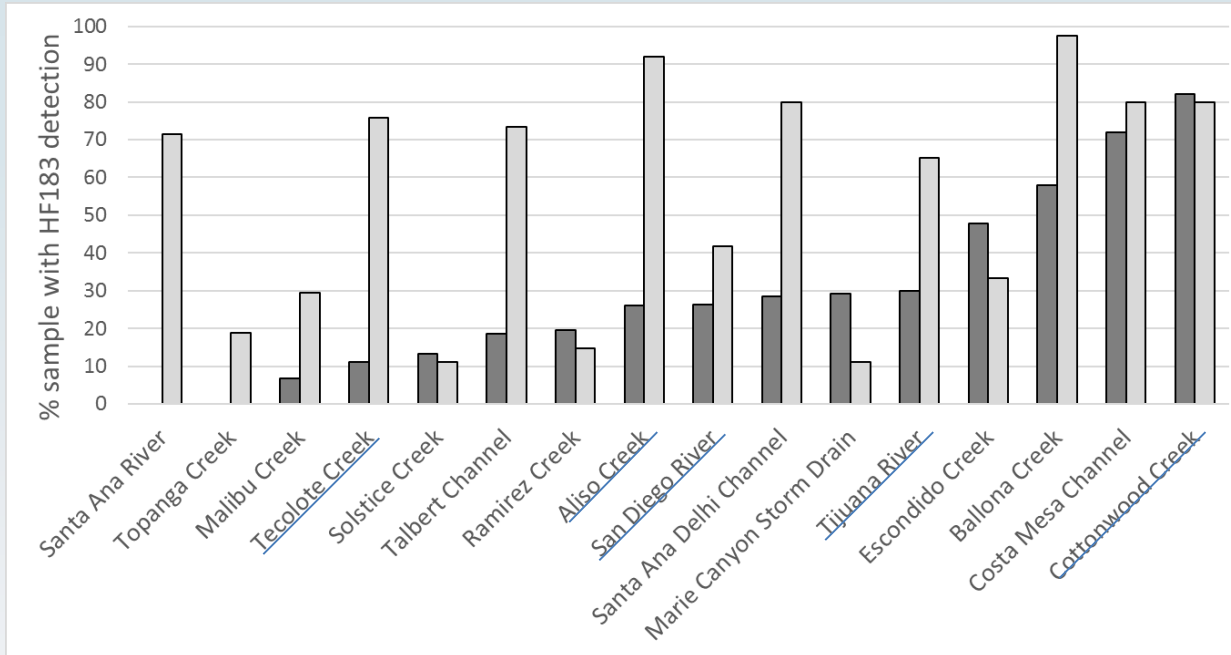
- 2014-2015
(Jan – April 2014; Dec 2014 – April 2015)
- 654 Surfers
- 10,081 Ocean Exposures Events
(*Dry and Wet Weather + Record Illness*)
- Predominately south of San Elijo State Beach
(*40% at Ocean and Tourmaline Beaches*)



Surfer Health Study Results



Bight 13 Study Results



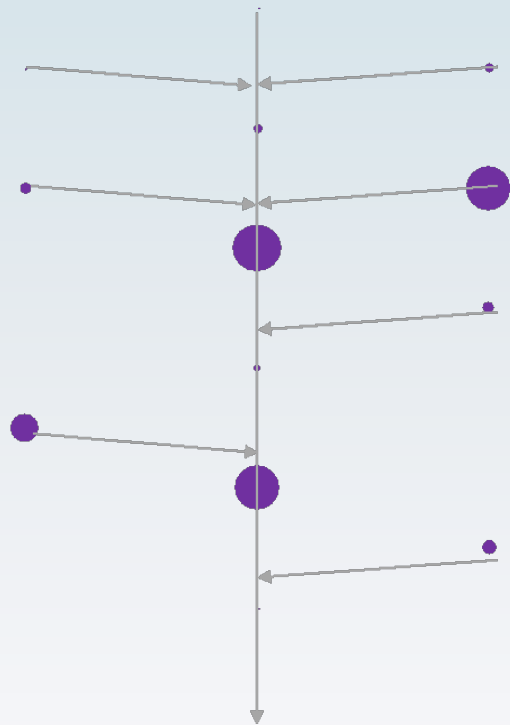
Frequency of HF183 detection by site in wet (light grey filled bars) versus dry (dark-filled) weather conditions. Sites are sorted from left to right by frequency of detection under dry weather conditions. Streams/creeks investigated in the San Diego Region are underlined. Sampling were conducted between 2013 and 2016.

*Note: The Escondido Creek depicted is within the Malibu Watershed

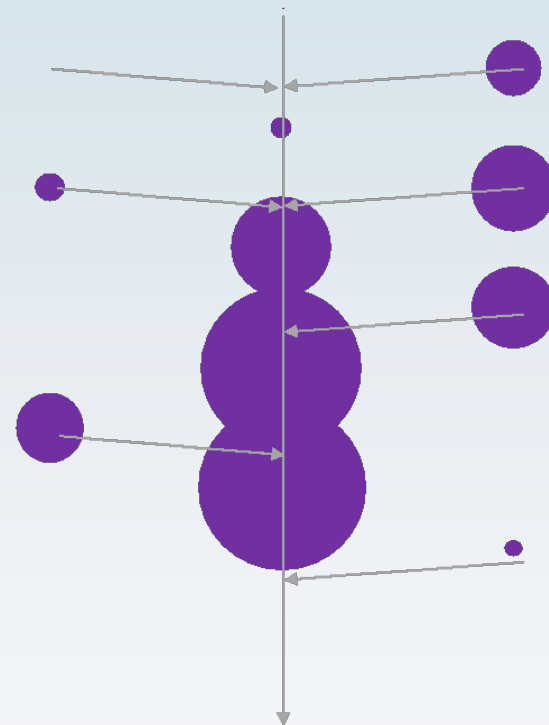
Source: SCCWRP Tech. Rept. 1000, 2017

Mass of Human Marker (HF183) in SD River

2016



2017



SIGNIFICANT COMMENTS AND RESPONSES – II. FEASIBILITY

Comment

- Investigation costs are high and schedules are too tight.

Response

- Joint investigation is encouraged to successfully achieve study objectives and share costs.
- Reporting schedule has been adjusted as appropriate.

Costs Proposed in SCCWRP Research Plan

The study objectives and proposed scope of work contained in the SCCWRP proposal are generally consistent with the requirements of this Investigative Order and include proposals for complex and resource-intensive studies with a projected cost **totaling \$4.14 million dollars**. The projected cost is broken up into seven tasks as set forth below:

- Task 1 establishing an Advisory Committee for decision making, independent technical review, and creating project documentation at an estimated cost of \$70,000;
- Task 2 microbial community profiling to confirm sanitary sewers are a contributor of human waste followed by discrete measurements of volumetric loss from sanitary sewers to quantify exfiltration rates at an estimated cost of **\$960,000**;
- Task 3 assessing the integrity of private sewer laterals and septic systems based on age, materials of construction, geology, proximity to receiving waters, and history of spills using visual inspections, closed circuit television, and pressure/die/smoke testing for laterals; and video camera septic systems at an estimated cost of **\$650,000**;
- Task 4 performing a census of people inhabiting in or near waterbodies in the Lower San Diego River Watershed using a variety of techniques including aerial surveys using manned or unmanned aircraft with high-resolution infrared sensors and on-the ground counts and quantifying the proportion of people defecating in or near the river at an estimated cost of **\$1,885,000**;
- Task 5 using real time sensors and automated equipment to detect and sample illicit discharge events from recreational vehicles at an estimated cost of **\$260,000**;
- Task 6 develop and implement a monitoring program that surveys the presence of HF183 during dry weather to supplement ongoing illegal connection and illicit discharge dry weather monitoring at an estimated cost of **\$185,500**; and
- Task 7 perform interim and final reporting and data management analysis required by the Investigative Order at an estimated cost of \$130,000.
- Three census are proposed during the wet season to assess variability over time.

Task	Outcome	Cost	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	Notes
Task 1: Project Governance and Planning							
Subtask 1A: Establish an Advisory Committee	Major project input and decision authority	40,000	10,000	10,000	10,000	10,000	
Subtask 1B: Create Sampling and Quality Assurance Plans	Project design documentation	30,000	10,000	10,000	10,000		
Task 2: Quantify Human Fecal Loading from Public Sewer Exfiltration							
Subtask 2A: Exploiting biofilms to verify the potential for sanitary sewer exfiltration	Estimate of sewage concentrations in stormwater samples from watersheds of concern throughout the San Diego region	630,000	240,000	390,000			Requires in-kind support from sewer agency
Subtask 2B: Empirical measurements of volumetric loss	Fecal loading estimate from publicly owned sewer lines, List of criteria for prioritizing aging sewer lines for inspection, rehabilitation, or replacement	280,000	90,000	100,000	90,000		Requires in-kind support from sewer agency
Subtask 2C: Verifying sewer exfiltration transport to receiving waters	Quantitative measurement of a unique tracer to definitively estimate transport from sections of test pipe to nearby receiving waters	50,000		25,000	25,000		Requires in-kind support from sewer agency
Task 3: Quantify Human Fecal Loading from Lateral Lines and Septic Systems							
Subtask 3A: Assessing the frequency of leaking laterals	Estimate of potential fecal loading from faulty private laterals in the San Diego River watershed	350,000		100,000	250,000		Includes homeowner incentives
Subtask 3B: Assessing the frequency of underperforming septic systems	Estimate of potential fecal loading from faulty septic systems in the San Diego River watershed	300,000			210,000	90,000	Includes homeowner incentives
Task 4: Quantifying Direct Inputs from Homeless Encampments							
Subtask 4A: Conducting a census and survey of homeless populations	Estimates of human fecal loading based on number of homeless and their sanitary habits	300,000	160,000	140,000			
Subtask 4B: Conducting fecal washoff experiments	Experimental evidence of fecal material washing off stream banks	100,000		75,000	25,000		
Subtask 4C: Confirming homeless fecal contributions	Empirical estimates of human fecal contributions from homeless populations	1,485,000	475,000	475,000	475,000	60,000	Includes all wet weather sampling requirements
Task 5: Quantifying Direct Inputs from Recreational Vehicles (RVs)							
Subtask 5A: Conducting a count of RV campers in urban areas	Estimate of the number of RVs living in and around the San Diego River watershed	150,000			75,000	75,000	
Subtask 5B: Quantifying illegal discharges from RV campers in urban areas	Estimate of human fecal loading from RVs in and around the San Diego River watershed; RV(s) to investigate for enforcement actions	110,000			55,000	55,000	
Task 6: Dry Weather Survey of Receiving Waters							
Subtask 6A: Developing a Study Design	Sampling and Analysis Plan for a dry weather survey of the San Diego River mainstem and major tributaries	25,500	17,500	8,000			
Subtask 6B: Monitoring and Analysis	Dry weather monitoring survey results of the San Diego River mainstem and major tributaries	160,000	40,000	80,000	40,000		
Subtask 6C: Working with IC/ID Programs to identify sources for remediation	Site-specific source tracking support	-					No cost estimate; site-specific, as-needed pricing
Task 7: Data Management, Analysis and Reporting							
Task 7A: Data Management and Analysis	Project database, including QA/QC data checkers, available for use by the participating agencies	50,000	15,000	10,000	10,000	15,000	
Task 7B: Quarterly, Draft and Final Reports	Oral Reports, Quarterly reports, Draft and Final Report reviewed and approved by the Advisory Committee	80,000	5,000	5,000	5,000	65,000	
TOTAL		4,140,500	1,062,500	1,428,000	1,280,000	370,000	

SEP Settlement for Sewage Spill at Los Coches Creek

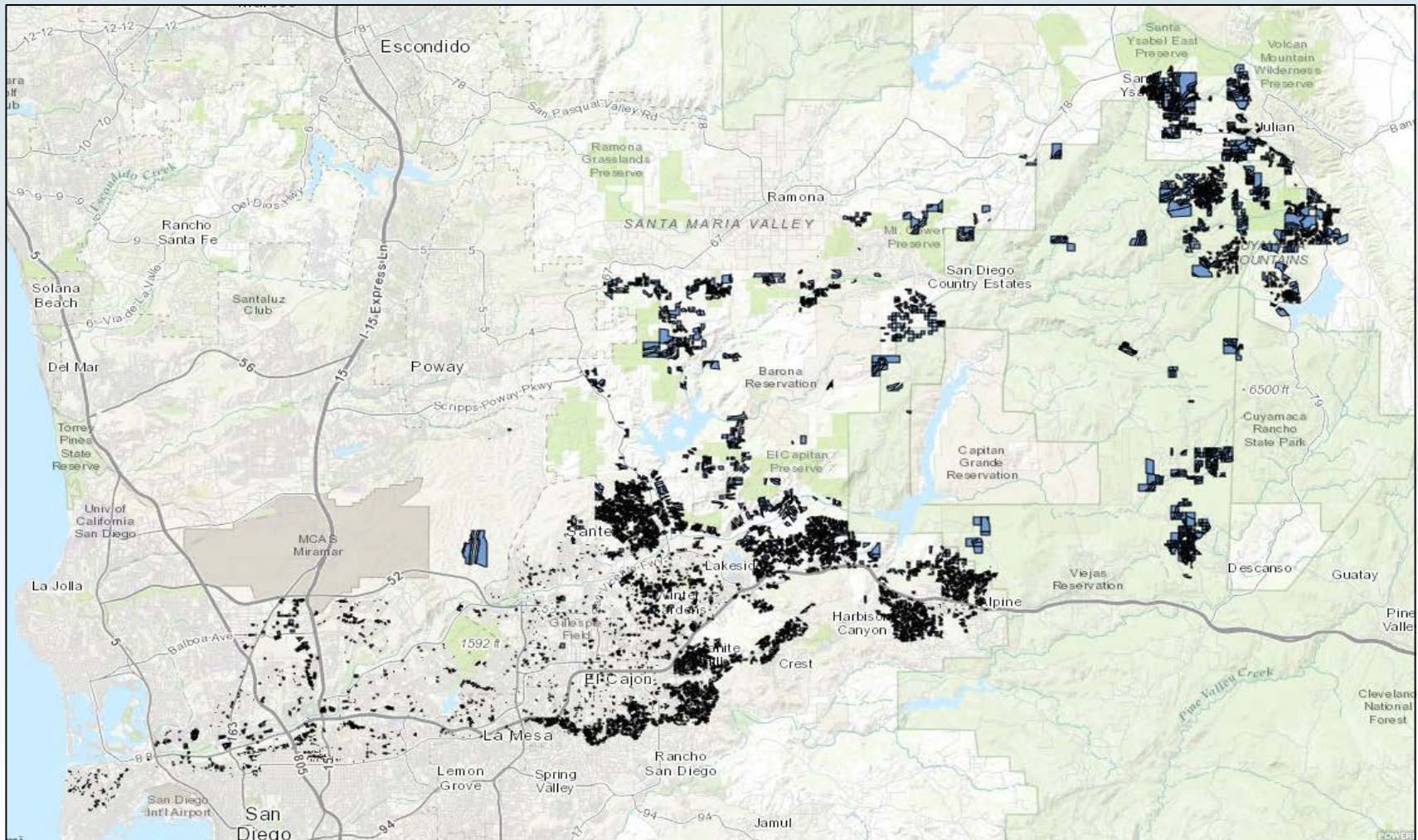
- The spill occurred From February 28, 2017 to March 17, 2017
- The volume of the spill was 762,739 gallons of raw sewage.
- The total amount for the SEP is \$2,798,000, of which the Regional Board will defer \$331,207 in suspended liability upon completion of the project.
- For an overview of the spill, and detailed SEP description, I would check out the Settlement Agreement R9-2019-0020 on our adopted order page:

https://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2019/R9-2019-0020.pdf

POSSIBLE SOURCES AND PATHWAYS

Septic Systems

Septic Systems in the San Diego River Watershed



Volume and Number of Spills (Jan 2013-Dec 2018)

Entity	# of SSOs	# of PLSDs
City of San Diego	231	276
SD County SD	56	5
Padre Dam	12	39
La Mesa	10	76
El Cajon	96	41
SDSU	5	0

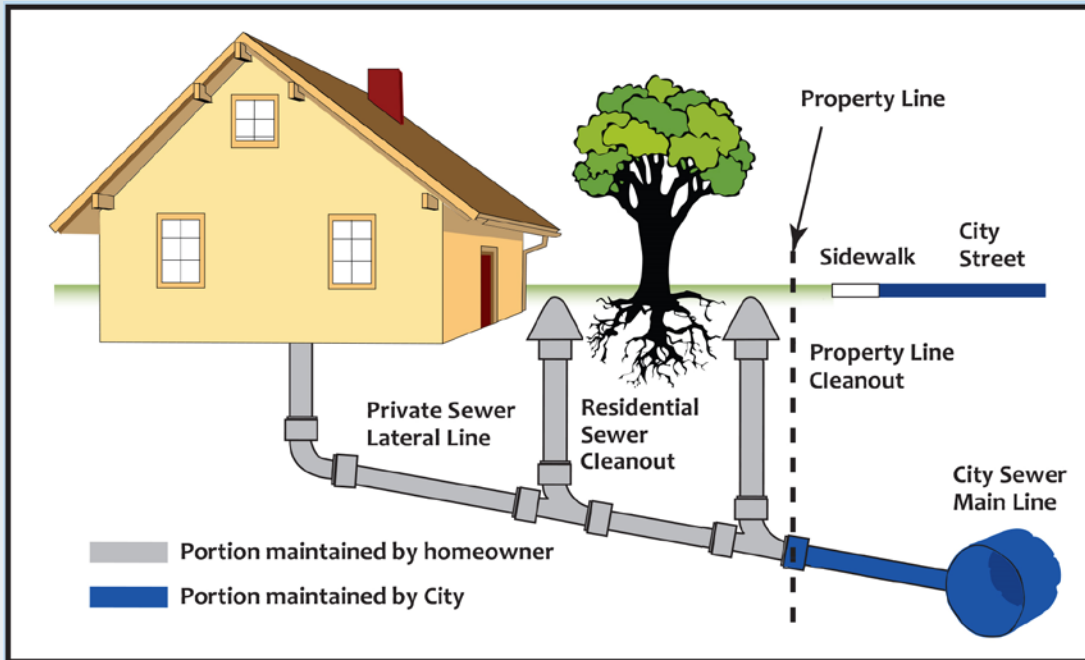
Entity	Volume of SSOs (gal)	Volume of PLSDs (gal)
City of San Diego	7,854,572	101,361
SD County SD	964,986	1,870
Padre Dam	6,523	12,381
La Mesa	2,055	37,778
El Cajon	15,570	3,956
SDSU	5,945	0

Miles of Sewer System

Entity	Miles of System
City of San Diego	3,000
SD County SD	400
Padre Dam	160
La Mesa	150
El Cajon	200
SDSU	6

POSSIBLE SOURCES AND PATHWAYS

SSOs and Private Lateral Discharges



<https://www.redwoodcity.org/departments/public-works/sewer>



<http://www.bwsc.org/COMMUNITY/sso/sso.asp>

Soil Type – USDA 1973

