Microplastics in LA County Stormwater

Scientific Studies Program
Fiscal Year 2022-2023

Watershed Areas:
Central Santa Monica Bay
Lower Los Angeles River
Lower San Gabriel River
South Santa Monica Bay

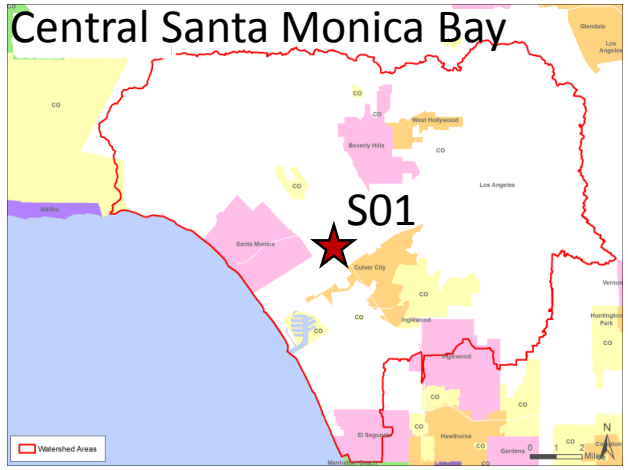
Project Lead & Presenter: Dr. Andrew Gray, UC Riverside

Study Overview

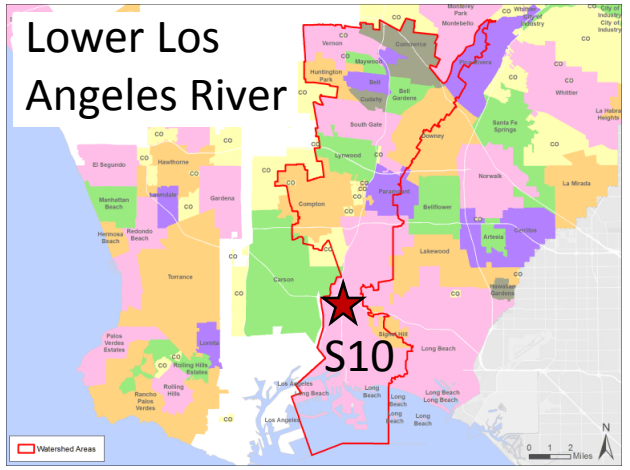
- Monitor stormflow for microplastics in 4 stream channels in partnership with LA County Public Works
- Model microplastic pollution fluxes
- Optimize monitoring techniques for LA County watersheds
- 3 year project

Nexus: Contributions to microplastics monitoring, analysis, and modeling will be used to evaluate the processes controlling microplastics ambient concentrations and loading in stormwater and urban runoff, and advance effective techniques for microplastics monitoring in rivers and streams.

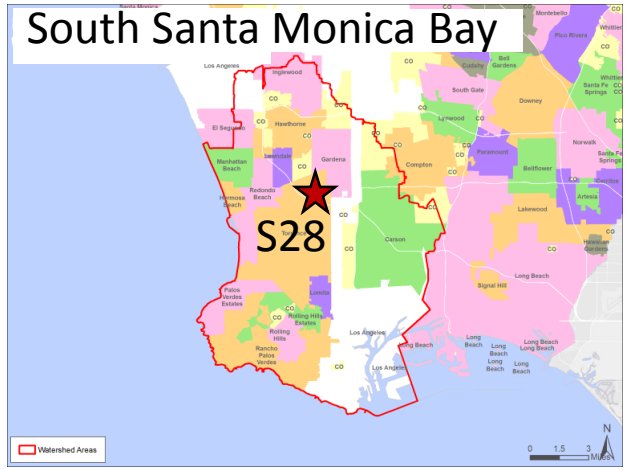
Study Locations



S01: Ballona Creek

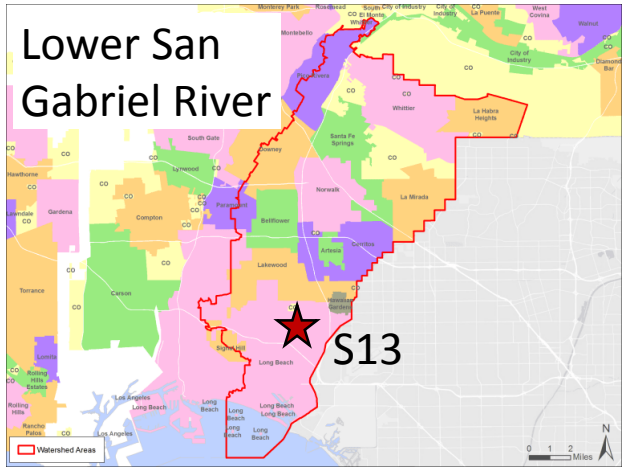


S10: Los Angeles River



S28: Dominguez Channel

★ LA County Mass Emission Stations



S13: Coyote Creek

Study Details

Problem Statement

- Microplastics are pollutants of increasing concern.
- Urban rivers are likely to be heavily contaminated with microplastics.
- Little is known about the drivers of microplastics concentration and flux in stormflow.

Study Objectives

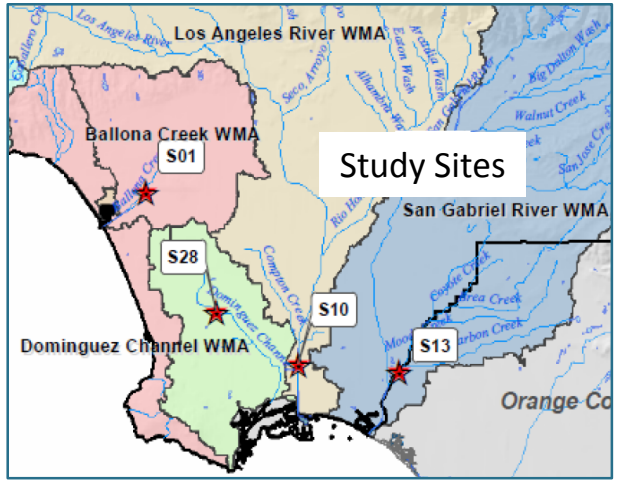
1. Monitor microplastics pollution at LA County mass emission stations.
2. Model microplastics fluxes from LA County rivers and streams.
3. Refine microplastics monitoring techniques for broader application.

Study Details

Study Methods

4 LAC Mass Emission Stations (MES)

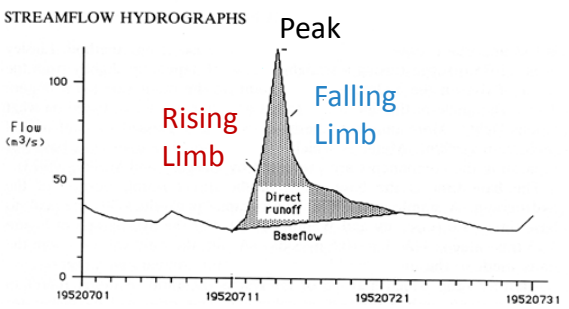
- **Ballona Creek** (S01; Watershed Area: Central Santa Monica Bay Region)
- **Los Angeles River** (S10; Watershed Area: Lower Los Angeles River Region)
- **Coyote Creek** (S13; Watershed Area: Lower San Gabriel River)
- **Dominguez Channel** (S28; Watershed Area: South Santa Monica Bay)

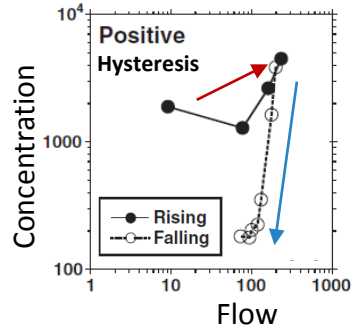


Wet season monitoring during each of years 1, 2, and 3

- 3 stormflow sampling events per year per MES
- Each sampling event = 2 samples:
  - **LAC**: bulk water (10-40 L); fixed intake point; autosampler
  - **UCR**: net (1-20 m^3) and bulk water (3-10L); flow integrated, crane deployed sampling devices
- **First flush** events prioritized when possible
- Additional storm event **hysteresis** monitoring once per MES

	Microplastics Samples (n) from Stormwater															
MES	S01			S10			S13			S28			Total			
Institution/Year	y1	y2	y3	y1	y2	y3	y1	y2	y3	y1	y2	y3	y1	y2	y3	Total
LACPW	3	3	3	3	3	3	3	3	3	3	3	3	12	12	12	36
UCR	3	6	3	3	6	3	3	3	6	3	3	6	12	22	22	48



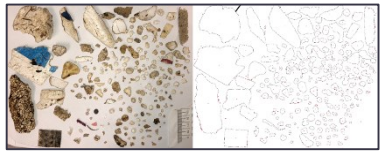


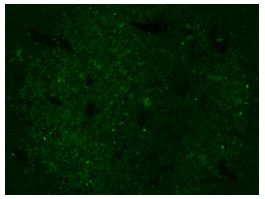
Study Details

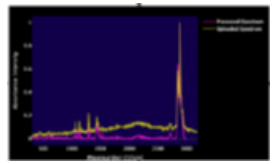
Laboratory Analysis

- Organic digestion
- Density separation
- Size fractionation

- Brightfield & Fluorescent microscopy with automated image analysis
- Fluorescent microscopy
- µ-FTIR spectroscopy; SEM EDS (tire wear)
- Blanks, QA/QC

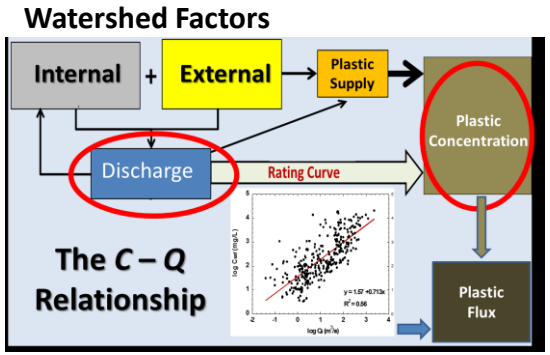






Flux Modeling

- Microplastics concentration results
- LAC MES discharge data
- Concentration-discharge rating curves
- Watershed composition evaluation
- Integration with regional microplastics modeling



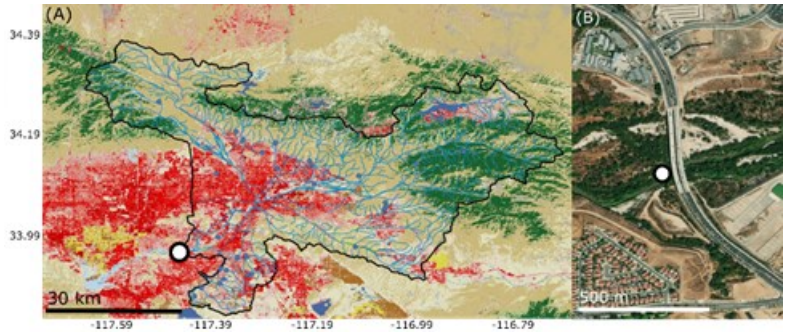
Monitoring Optimization

- Comparison of LAC autosampler and UCR flow integrated results in terms of concentration, particle size distribution, and polymer compositions
- Evaluation of representative sampling
- Sample effort and cost assessment

Study Details

Previous and Ongoing Microplastics Studies

Santa Ana River



Study Type

Preliminary investigations/
Method Development

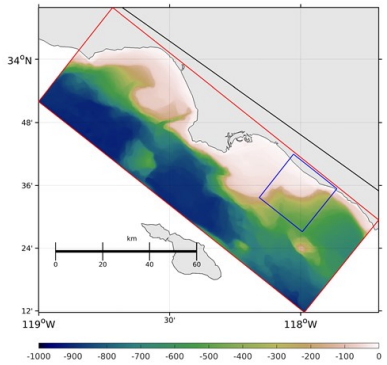
Target

Macro/Microplastic

Study Systems

- Santa Ana River above Prado
- Arlington Channel

San Pedro Bay

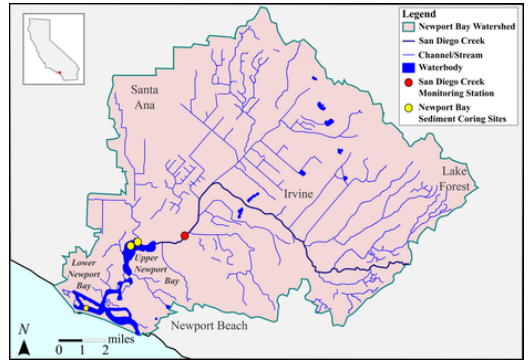


Integrated river/coastal ocean monitoring/modeling

Microplastic

- Los Angeles River
- San Gabriel River
- Coyote Creek
- Santa Ana River below Prado
- San Pedro Bay

Newport Bay



Fluvial flux and sedimentation monitoring

Macro/Microplastic

- San Diego Creek
- Santa Ana Delhi Channel
- Marsh and subtidal sediment

Cost & Schedule

Study Component	Year 1				Year 2				Year 3			
	2022				2023				2024			
	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F
Study design *(completed by initiation of project)*												
Microplastics monitoring of LAC stormflow												
Microplastics flux modeling												
Monitoring optimization analysis												
Stakeholder and technical advisory committee meetings												
Final reporting												

Funding Request

WASC	Year 1	Year 2	Year 3	Total
CSMB	$85,158.75	$86,442.50	$76,150.25	$247,751.50
LLAR	$85,158.75	$86,442.50	$76,150.25	$247,751.50
LSGR	$85,158.75	$86,442.50	$76,150.25	$247,751.50
SSMB	$85,158.75	$86,442.50	$76,150.25	$247,751.50
TOTAL	**$340,635.00**	**$345,770.00**	**$304,601.00**	**$991,006.00**

Cost per WASC: **$247,751**

Total Cost: $991,006

Cost Description: Primarily to support personnel effort, as well as analytical and field operations.

Summary of Benefits

This study will provide LAC and partner watersheds with answers to the following key questions on microplastics pollution:

1. How much microplastics are in LAC stormwaters? Characterizing microplastics in stormwater will allow managers to build a baseline understanding of how much and what kind of microplastics get into California surface waters from stormwater.

2. Can we predict the levels of microplastics for the future? Understanding the role of stormwater in watershed to regional microplastics budgets will further our understanding of microplastics pollution in the region, allowing us to predict microplastics fluxes in unstudied watersheds and with changes to watershed composition over time.

3. What are the optimal methods for monitoring microplastics in stormflow? Developing robust, reproducible, and cost-effective methods for sampling microplastics in stormflow is essential for supporting the benefits above, and will inform local to statewide microplastics monitoring in the future.

The findings of this study will also be used to educate the community on the topic of microplastics pollution through open stakeholder meetings, presentations, and community outreach. Through increased community engagement, the results of this study will increase public awareness of the current state of knowledge on microplastics.


Questions?

Regional Pathogen Reduction Study

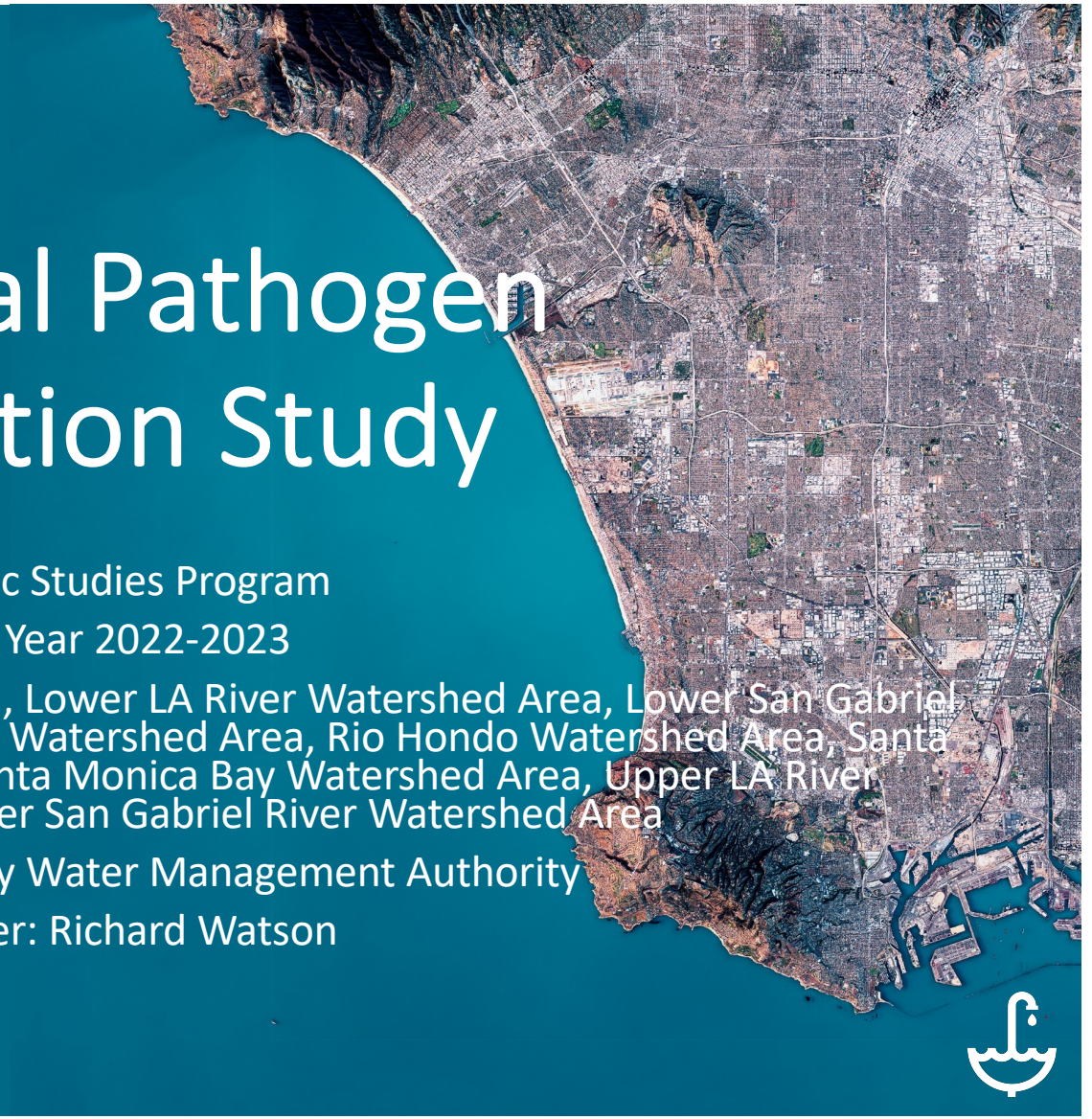
Scientific Studies Program

Fiscal Year 2022-2023

Central Santa Monica Bay Watershed Area, Lower LA River Watershed Area, Lower San Gabriel Watershed Area, North Santa Monica Bay Watershed Area, Rio Hondo Watershed Area, Santa Clara River Watershed Area, South Santa Monica Bay Watershed Area, Upper LA River Watershed Area, and Upper San Gabriel River Watershed Area

Project Lead: Gateway Water Management Authority

Presenter: Richard Watson

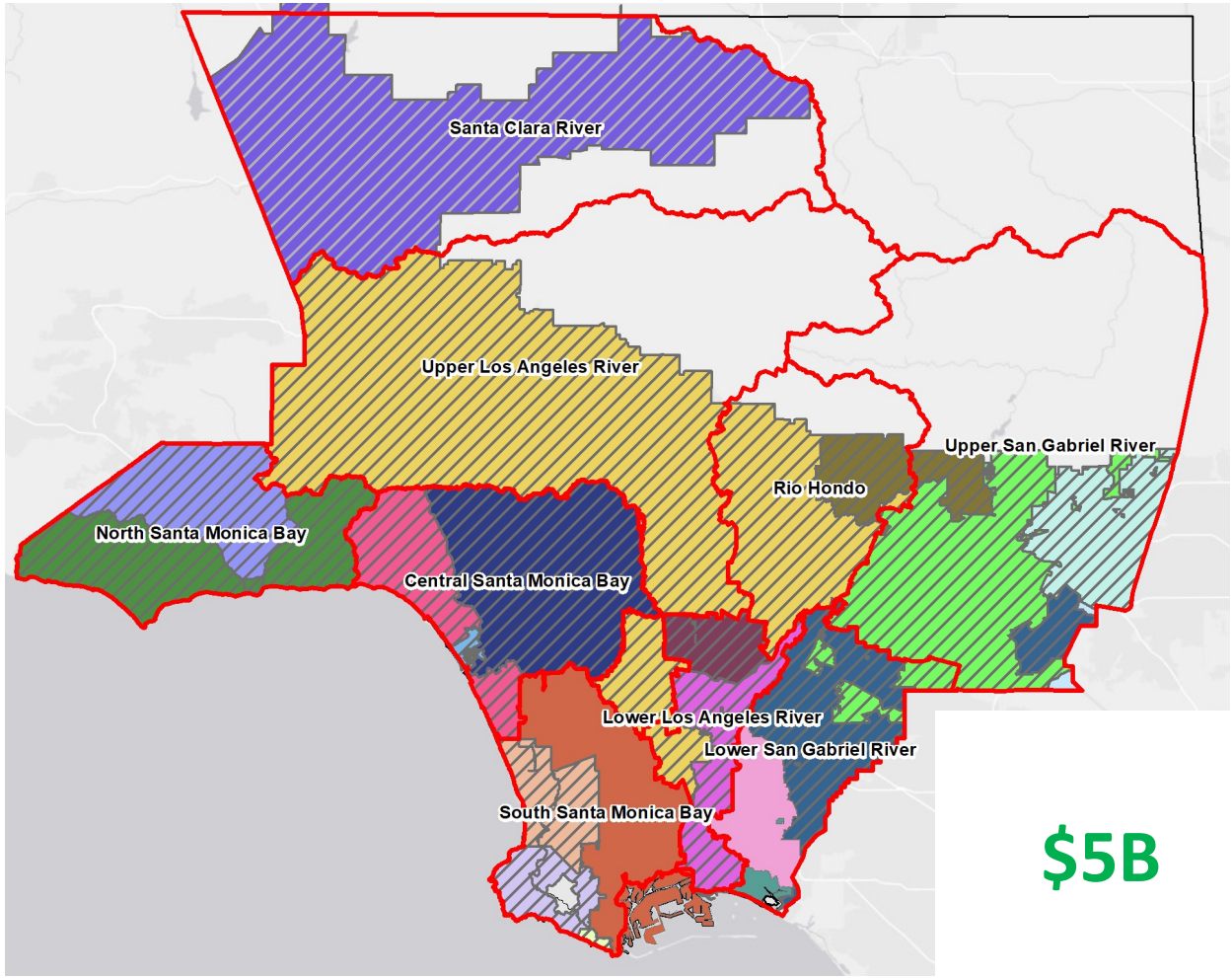


Study Overview

- This Study aims to use the latest available science to measure water-borne pathogens across watersheds. It will help identify key sources of human health risk, and develop cost-effective protective strategies

- Nexus to Stormwater and Urban Runoff Capture and Pollution Reduction
  - Study will facilitate improved targeting of pathogen sources and water to capture and/or treat
  - Study may reduce the level of stormwater capture for bacteria compliance purposes through the identification of non-MS4 sources of risk thereby improving the protection of human health
  - Study will likely lead to partnering with various parties, such as wastewater agencies and homeless services agencies, to address human sources of pathogens.

Study Location



$5B

Study Details

Problem Statement:

- Waterborne pathogens represent the most significant potential threat to the health of people recreating in and around the ocean and inland waters of Los Angeles County.

- Current standards are based on FIB (fecal indicator bacteria), which are used as proxies for pathogens.
  - FIB are ubiquitous; a vast network of structural control measures would need to be implemented to provide adequate control – projected cost over $5 billion.
  - USEPA and academia agree that human sources of pathogens pose the greatest risk
  - Unless high-risk sources are targeted, water capture projects may receive large FIB loads, but miss the highest risk human sources.

(Continued)

Scientific Study Details (Continued)

Methodology:

- Study work plan will be developed through a stakeholder-led process with the input of technical experts, including academics.
  - Stakeholder engagement is at the forefront of the study to ensure that diverse viewpoints are incorporated.

- Study will collect samples from beaches and waterbodies. Samples will be analyzed for traditional bacterial indicators, viruses, and human markers during wet and dry weather.
  - Identify areas with highest risk to support a focus on those areas
  - Identify the sources causing the highest risk to focus on those sources

- Study will assess control measure effectiveness and efficiency
  - Identify the best BMPs to address the sources
  - Support planning, applying municipal funds, requests for SCWP funding, and actions by other parties

(Continued)

Scientific Study Details (Continued)

- *Regional collaboration efforts:*
  - Small Group Initiated Discussions and built a scope for a Safe, Clean Water Regional Program project
  - Presented Approach to E/WMP Groups
  - Discussed with proponents of watershed-specific studies
  - Discussed with Regional Board staff

- Revised study twice to address concerns
  - Clearly focused on human pathogens
  - Clarified that study is a component of overall strategy to protect human health
  - Clarified that implementation continues during the study
  - Recognized that we do not need to wait until the end of the study to take action
  - Reduced first year cost of study

Recent Revisions to Regional Pathogen Summary

- Added North Santa Monica Bay back into study
- Added an illustrative overview in Attachments (for Section 2.3)
- Added a Details Attachment (for Section 2.4)
- Attachments include a fact sheet, a table of potential constituents, and a map of potential monitoring sites
- Clarified that focus is on urbanized areas
- Clarified that monitoring sites would be chosen from MS4 monitoring sites.

Cost & Schedule

Phase	Description	Cost	Schedule
Task 1	Stakeholder Process	$490,000	7/22 – 6/27
Task 2	Health Risk Assessment	$5,880,000	7/22 – 9/26
Task 3	Risk Management	$1,734,600	4/23 – 3/27
Task 4	Application of Study Findings	$490,000	1/26 – 6/27
TOTAL		**$8,594,600**	

Funding Request

WASC	Year 1	Year 2	Year 3	Year 4	Year 5
CSMB	$47,109.15	$329,764.06	$282,654.91	$307,364.38	$107,432.50
LLAR	$33,843.21	$236,902.50	$203,059.29	$220,810.57	$77,179.51
LSGR	$44,169,54	$309,186.78	$265,017.24	$288,184.85	$100,728.71
NSMB	$4,748.60	$33,240.22	$28,491.61	$30,982.33	10,829.20
RH	$30,413.67	$212,895.68	$182,482.01	$198,434.45	$69,358.42
SCR	$15,866.36	$111,064.53	$95,198.17	$103,520.32	$36,183.27
SSMB	$48,654.33	$340,580.32	$291,925.99	$317,445.93	$110,956.29
ULAR	$102,094.95	$714,664.67	$612,569.72	$666,120.09	$232,827.71
USGR	$49,973.39	$349,813.71	$299,840.33	$326,052.14	$113,964.40
TOTAL	**$376,873.21**	**$2,638,112.47**	**$2,261,239.26**	**$2,458,915.06**	**$859,460.00**

Summary of Benefits

- By developing a better understanding of pathogens present in the region's watersheds, the relative risk to human health they pose, and the effectiveness of various control measures, new or adapted BMPs can be established that improve water quality and reduce human health risks at our beaches and inland waterbodies.
- Short-term: results could be used to protect people from health risks that aren't currently known.
- Long-term: results will enable the targeted placement of BMPs in locations where they can maximize the prevention or treatment of key sources of human pathogens.


Questions?

Community Garden Stormwater Capture Investigation

Scientific Studies Program

Fiscal Year 2022-2023

Lower San Gabriel River

Los Angeles Community Garden Council

Diana Campos Jimenez, Juan Diaz-Carreras

About Us!

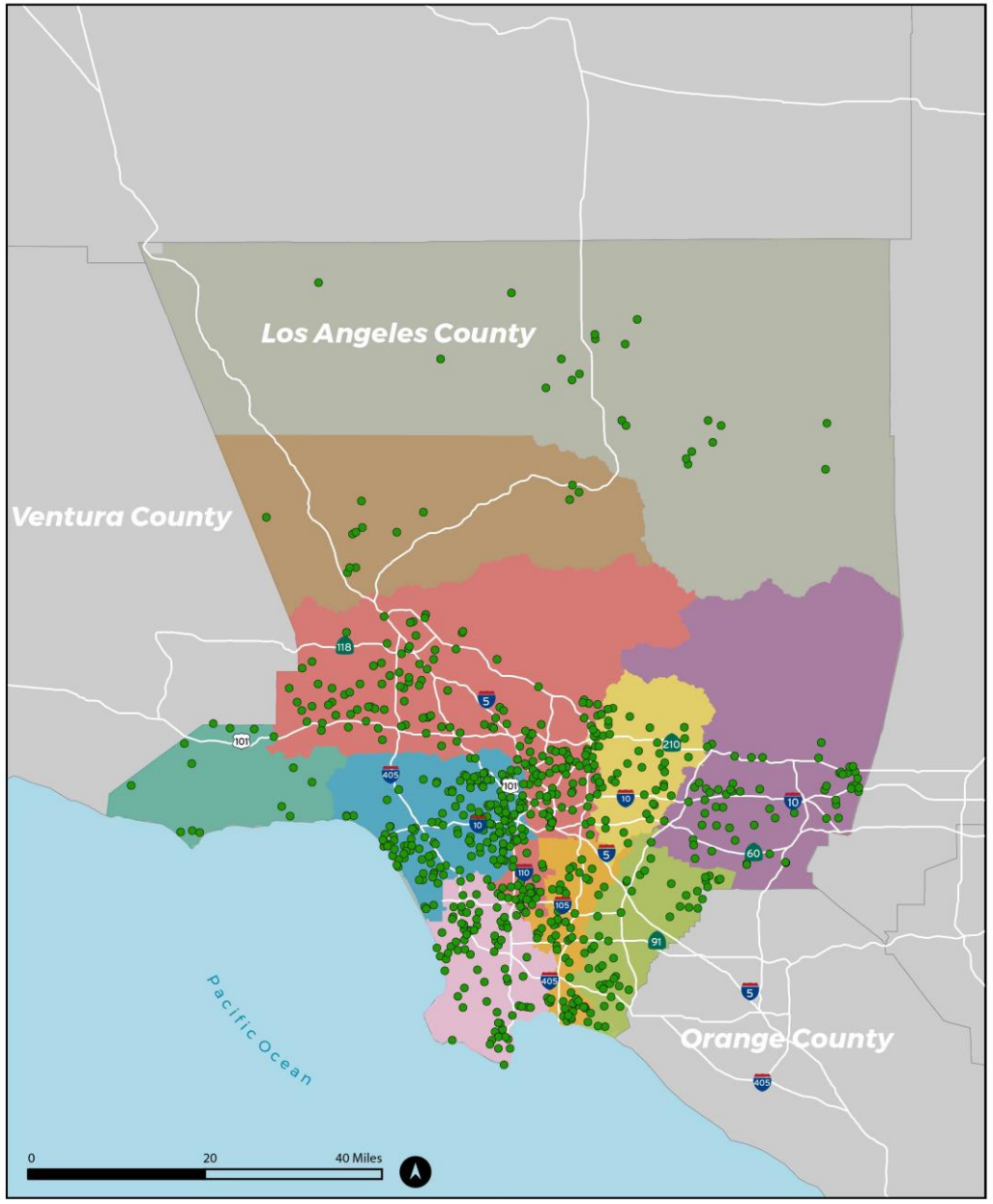
- A 501(c)3 non-profit organization founded in 1998
- Our mission is to strengthen communities by building and supporting community gardens where every person in Los Angeles County can grow fresh food in their neighborhood
- Manage 40+ community gardens
- Offer workshops, gardening advice, and community organizing
- Advocate for accessibility to affordable, healthy food

Project Overview

Community gardens can function as stormwater capture facilities. This study will investigate opportunities including conducting outreach.

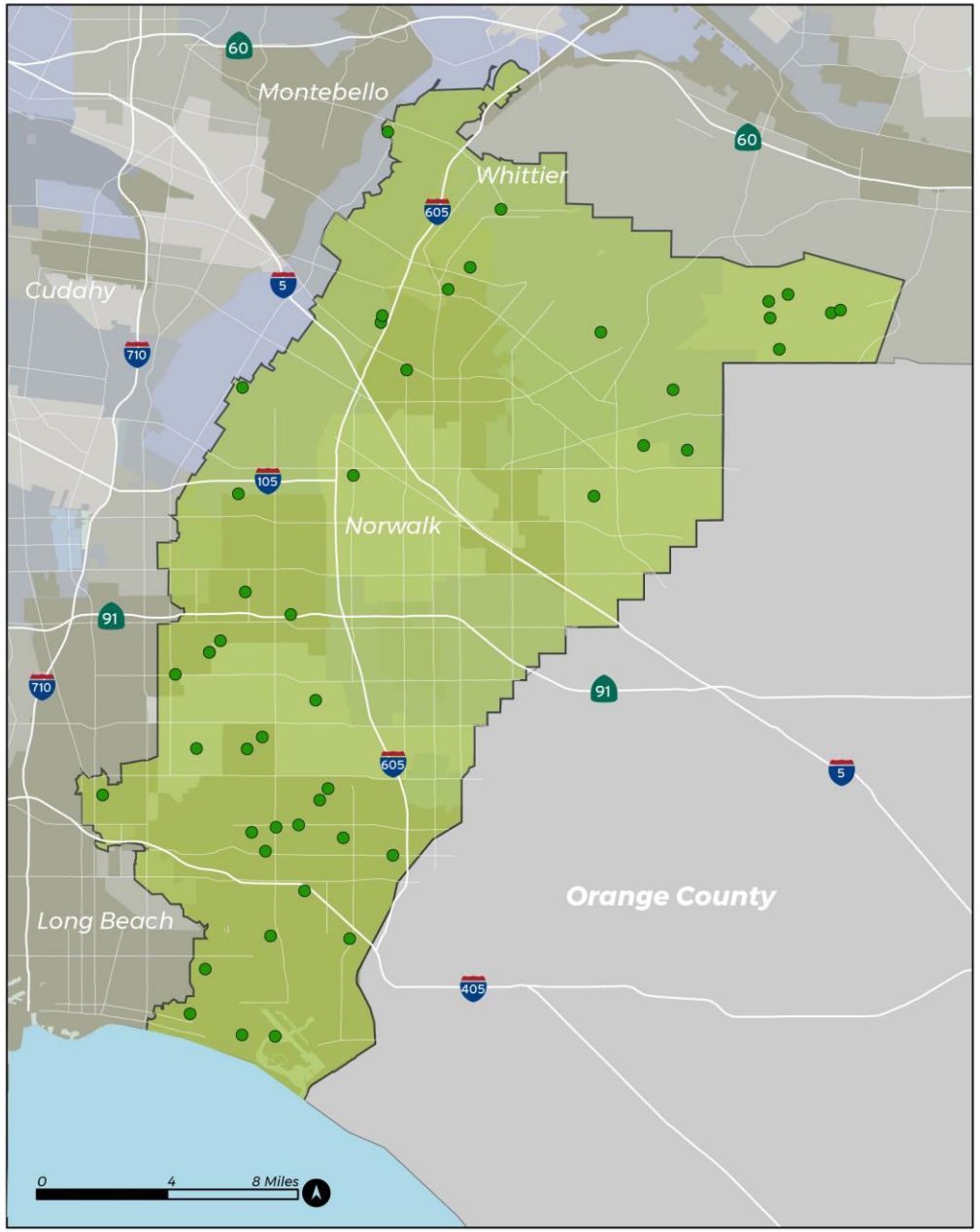
- Primary Objective: Identify Community Garden locations that have potential for stormwater capture.
- Secondary Objectives: Engage through direct dialog with gardeners on potential garden sites to ensure any recommendations are supported by the community the garden serves. Identify 3 high potential sites and produce a concept report for each.
- Project Status: Planning
- Total Funding Requested: $2,647,990 total/ $378,285 per watershed.

Project Location



- Almost 800 Community Gardens across LA County
- Many are managed by community groups
- Community gardens serve diverse communities in the County

Project Location

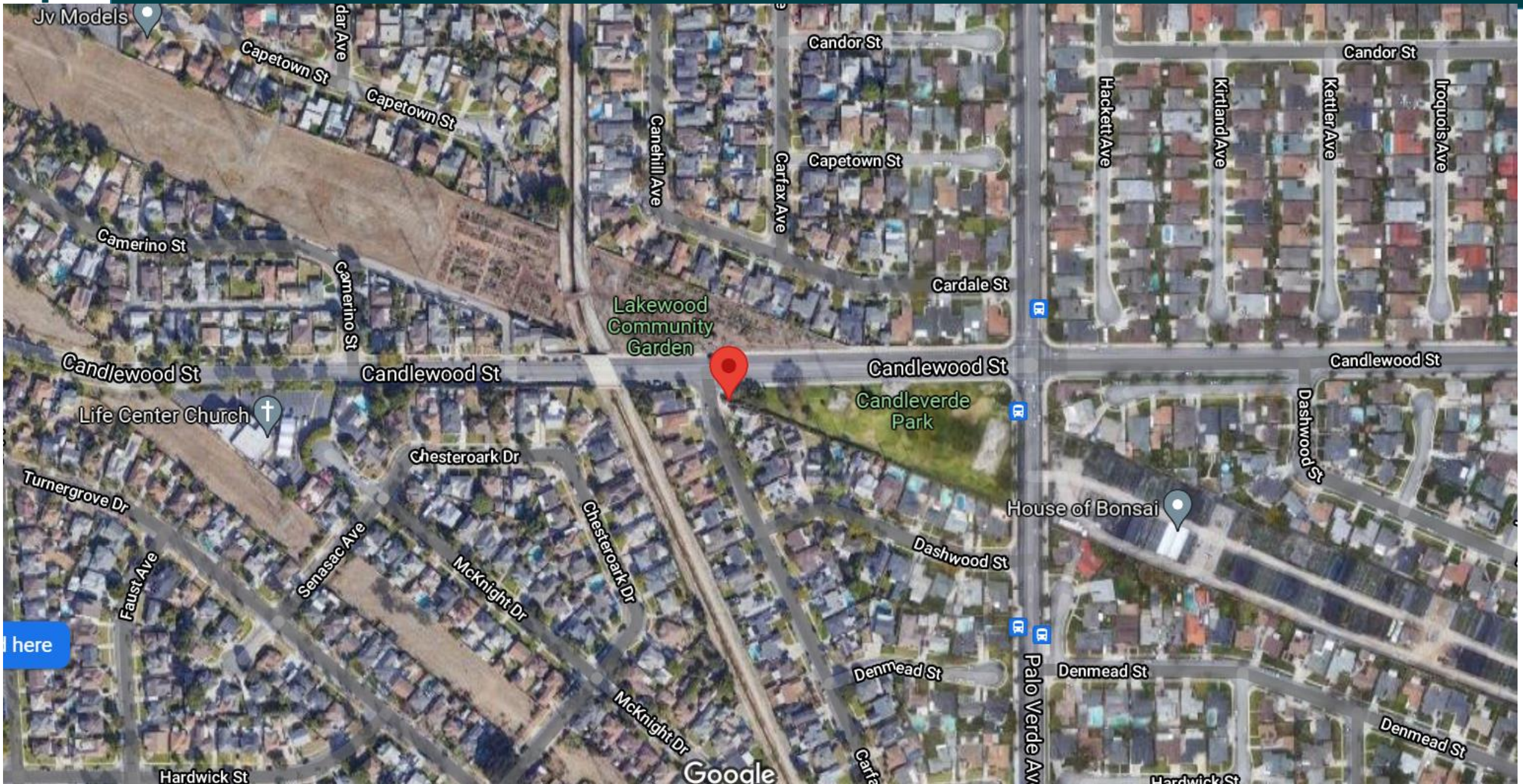


Lower San Gabriel Valley Watershed

- 47 community gardens in the watershed

- Lakewood Community Garden
  - Established in 1978
  - Approximately 2.6 acres
  - Gardens downstream of urban areas can be redesigned to collect offsite “run-on” from these areas to provide pollutant reduction benefits to municipalities.

Project Location



Project Background

- The primary objective of the Community Garden Stormwater Capture Scientific Study is to identify and evaluate potential sites for stormwater capture at community gardens within the Watershed.
- The Community Garden Stormwater Capture Scientific Study will propose and implement a methodology to compile, evaluate and prioritize potential opportunities to install best management practices (BMPs) at existing community garden sites to capture, infiltrate and/or treat urban stormwater runoff.
- The study will also include preliminary concept plans for three priority sites.

Cost & Schedule

Schedule Milestone Table	
Milestone Name	Completion Date
Database of Existing Community Gardens	01/03/2022
Develop Screening Criteria	03/01/2022
Preliminary Investigation	05/02/2022
Site Reconnaissance and Outreach	08/01/2022
Concept Reports and Fact Sheet	10/14/2022
SCW Program Technical Resources Funding Application	11/30/2022

Funding Request

Funding Requested Per Year Per Watershed		
Funding Request Year	Watershed Area	Amount for Year
Year 1	Central Santa Monica Bay	$ 189,142.00
Year 1	Lower Los Angeles River	$ 189,142.00
Year 1	Lower San Gabriel River	$ 189,142.00
Year 1	Rio Hondo	$ 189,142.00
Year 1	South Santa Monica Bay	$ 189,142.00
Year 1	Upper Los Angeles River	$ 189,144.00
Year 1	Upper San Gabriel River	$ 189,142.00
Total Year 1		$ 1,323,996.00
Year 2	Central Santa Monica Bay	$ 189,142.00
Year 2	Lower Los Angeles River	$ 189,142.00
Year 2	Lower San Gabriel River	$ 189,142.00
Year 2	Rio Hondo	$ 189,142.00
Year 2	South Santa Monica Bay	$ 189,142.00
Year 2	Upper Los Angeles River	$ 189,142.00
Year 2	Upper San Gabriel River	$ 189,142.00
Total Year 2		$ 1,323,994.00
Total Funding		$ 2,647,990.00


Questions?