Trash Reduction in the Los Angeles River

EVALUATING CHANGES OVER TIME

Photo by Peg Grayson

MAY 2021

FRIENDS OF THE LA RIVER

DEDICATION

The Los Angeles River (L.A. River) is the birthplace of our region and was once the thriving, unifying water source for the people and wildlife of Los Angeles. But that common thread flowing through our collective history was severed in 1938 when the L.A. River was encased in concrete and enclosed by fences. In an act of civil disobedience, poet activist Lewis MacAdams took the first steps to mend this connection in 1986 when he cut open the chain link fence obstructing Angelenos from their rightful River. He declared the River open to all people and swore to serve as its voice. And thus was born the Friends of the Los Angeles River (FoLAR) and the River Movement.

The popular opinion of that time was, "Why not throw unwanted items into the concrete-lined ditch? No one seems to really care." In fact, few residents even realized there WAS a river in Los Angeles.

In 1989 the first La Gran Limpieza, or Great LA River CleanUp, took place at Los Feliz Boulevard. Inspired by the gospel hymn Shall We Gather at the River, Lewis called for 10,000 devotees. Thirty responded, and they communed by bagging trash and hauling out couches, computers, car parts, and the ever-present shopping cart.

What began with 30 people at one site has grown over 30 years into an effort mobilizing thousands of Angelenos of all ages and backgrounds to make a hands-on, immediate impact on our River's health at sites all along the River's 51 miles. Since 1989, an estimated 70,000 volunteers have removed nearly 800 tons of trash and debris that would have otherwise polluted the Pacific Ocean.

This report is an homage to Lewis' love for all aspects of the Los Angeles River, taking the form of detailed trash data collected over the past 16 years. In 2004, Lewis, who at age 60 was still passionately involved in every aspect of FoLAR, quickly saw the potential for using the data we collected on the trash pulled from the River during an annual event called River School Day. He asked us to collect additional data including the specific brands of snack packaging, convinced we would soon discover Frito Lay chip bags would account for the majority of the trash that we prevented from washing into the ocean. As you will soon discover, the story told by our trash findings is much more complex.

What started in 2004 as an activity to educate elementary school students has turned in to a long-running community science project where a group of dedicated volunteers sorts the trash collected at five La Gran Limpieza sites into specific categories so we can quantify the types of trash commonly found in the River and theorize on how that trash may have ended up in the channel.

Now, it is time to talk trash!

ACKNOWLEDGEMENTS

Zev Yaroslavsky

Ed Reyes

CONTRIBUTORS

Ashley Robinson, Heather Bowers, Nathan Pope, Travis Mortenson, FoLAR, City of Los Angeles, Environmental Resources Planning, LLC, Ruth Gallardo, Nicholas Tyack, Interns from Coca-Cola.

TABLE OF CONTENTS

TABLE OF FIGURES

ABBREVIATIONS

BMP	Best Management Practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CWA	Clean Water Act
EIR	Environmental Impact Report
US-EPA	U.S. Environmental Protection Agency
FoLAR	Friends of the Los Angeles River
LADPW	Los Angeles County Department of Public Works
LARWQCB	Los Angeles Regional Water Quality Control Board
LASAN	City of Los Angeles Bureau of Sanitation & Environment
MS4s	Municipal Separate Storm Sewer System
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
Trash TMDL	Trash Total Maximum Daily Load

FIGURE 1 – LOS ANGELES RIVER WATERSHED

Figure 1 shows the boundaries of the Los Angeles River Watershed.[1]

1 Council for Watershed Health. 2012

EXECUTIVE SUMMARY

The free-flowing and natural-bottomed Los Angeles River (L.A. River) was the sole water source for the city of Los Angeles before the Los Angeles Aqueduct was built in 1913. It was channelized after significant flooding in 1934 and 1938 negatively impacted the region's growing population. Once channelized, the river became a forgotten place, a no man's land that devolved into a convenient dumping ground.

Friends of the L.A. River (FoLAR) has endeavored for over 30 years to restore community connection and natural ecology as a unifying force for the river by educating, empowering, and mobilizing over 70,000 Angelenos to repair habitat and fight for policies to reclaim the collective right to a healthy, thriving, and equitably accessible river.

The L.A. River's historic relationship to Angelenos may be a little abstract for average residents to appreciate. To many, the mental image they associate with the channelized river is the trash that accumulates in the river and can then be carried downstream into the Pacific Ocean. Were the connection between Angelenos and the River stronger, the average citizen would be much more mindful of avoiding behavior that impacts the river.

Collaborative efforts among river stakeholders helped to set the stage for the successful adoption of a Total Daily Maximum Daily Load (TMDL) regulatory standard for trash entering the L.A. River. An initial version was approved in 2001, but controversy and legal challenges delayed implementation of a revised version until 2007. The Trash TMDL regulation established that the cities within the L.A. River watershed were each responsible to ensure zero trash entered the river due to stormwater originating in their jurisdictions.

In light of the Trash TMDL requirements, strategies were developed to remove trash from urban runoff using structural controls such as catch basins within storm drains. City and county engineers, as well as other qualified stakeholders, designed TMDL compliance strategies in order to produce quantifiable results demonstrating trash reductions.

An analysis of a combination of City of Los Angeles and Friends of the Los Angeles River data shows that implementing the Trash TMDL positively affected the L.A. River as the composition of trash in the river is now distinctly different from trash found on the streets.

The Los Angeles Trash TMDL is a working example of a cooperative and positive stakeholder process that successfully enacted real change to address a complex problem. Bringing together all interested stakeholders toward shared goals resulted in cooperative solutions that have largely mitigated the major sources of trash in the L.A. River.

However, trash still enters the river from many secondary sources. Using the collaborative pattern of the Trash TMDL formulation and implementation process to identify these secondary sources and design targeted solutions will be imperative to ensure continued success in cleaning up the L.A. River habitat.

TIMELINE

1815 Los Angeles River floods wash away the original Pueblo de Los Angeles.

1862 The Great Flood follows 45 days of "atmospheric river" storms that brought up to 10 feet of rain to California, Oregon, and Washington. Much of the Los Angeles Basin was flooded under four feet or more of water, and the Los Angeles, San Gabriel and Santa Ana Rivers all merged. Up to one-third of taxable property in California was destroyed, which forced the state into bankruptcy.

1938 Major flooding on the L.A. River and throughout Southern California kills at least 144 people and causes $78 million in damages ($1.42 billion in today's dollars). L.A. Mayor Frank Shaw is recalled by voters in the aftermath of the flood.

1941 The federal Flood Control Act enables the U.S. Army Corps of Engineers to start a 20-year project to channelize the L.A. River.

1969 A major storm hits Los Angeles[2], but the newly completed channelization project helps to prevent major flooding.[3]

1986 Friends of the L.A. River (FoLAR) is founded, helps start a long-term trend toward community demand for a cleaner river.

1989 FoLAR starts La Gran Limpeza, the Great L.A. River Cleanup.

1995 Clean Water Act regulatory process for the L.A. River begins, which provides river stakeholders a platform to advocate for a cleaner, healthier habitat.

1996 L.A. County adopts the Los Angeles River Master Plan which sought to balance flood control priorities with environmental enhancement, recreational opportunities, and economic development.

1997 Lewis MacAdams protests the County's intention to dredge the riverbed in the Glendale Narrows by standing in front of bulldozers.

1998 FoLAR, the Sierra Club and the Urban Resources Partnership host the River Through Downtown – an historic conference aimed at reimagining the L.A. River and the role it can play in the city.

2001 Regional Board adopts a TMDL for trash in the Los Angeles River Watershed, which sets in motion fifteen years of cooperative work by upstream and downstream cities, conservationists, environmentalists, and community activists.

2004 Thanks in part to broad engagement by river stakeholders, voters in the City of Los Angeles approve Prop O, which funds the structural controls needed to exclude trash from the municipal stormwater network.

2006 Proposition 84 authorizes the State of California to sell $5.4 billion in general obligation bonds for water and flood control projects.

Effects of these water quality investments start to become apparent as US EPA declares that the Los Angeles River is "a traditional navigable water."

2 https://framework.latimes.com/2016/12/15/1969-storm-fills-los-angeles-river/

3 U.S. Department of the Interior, Urban Sprawl and Flooding in Southern California, Geographical Circular 601-B

2012 FoLAR raises $1M and gifts it to the city of L.A. so that the U.S. Army Corps of Engineers can complete its ARBOR Ecosystem Restoration Feasibility Study.

2014 California voters approve Proposition 1, a statewide bond measure allocating $100M for L.A. River restoration.

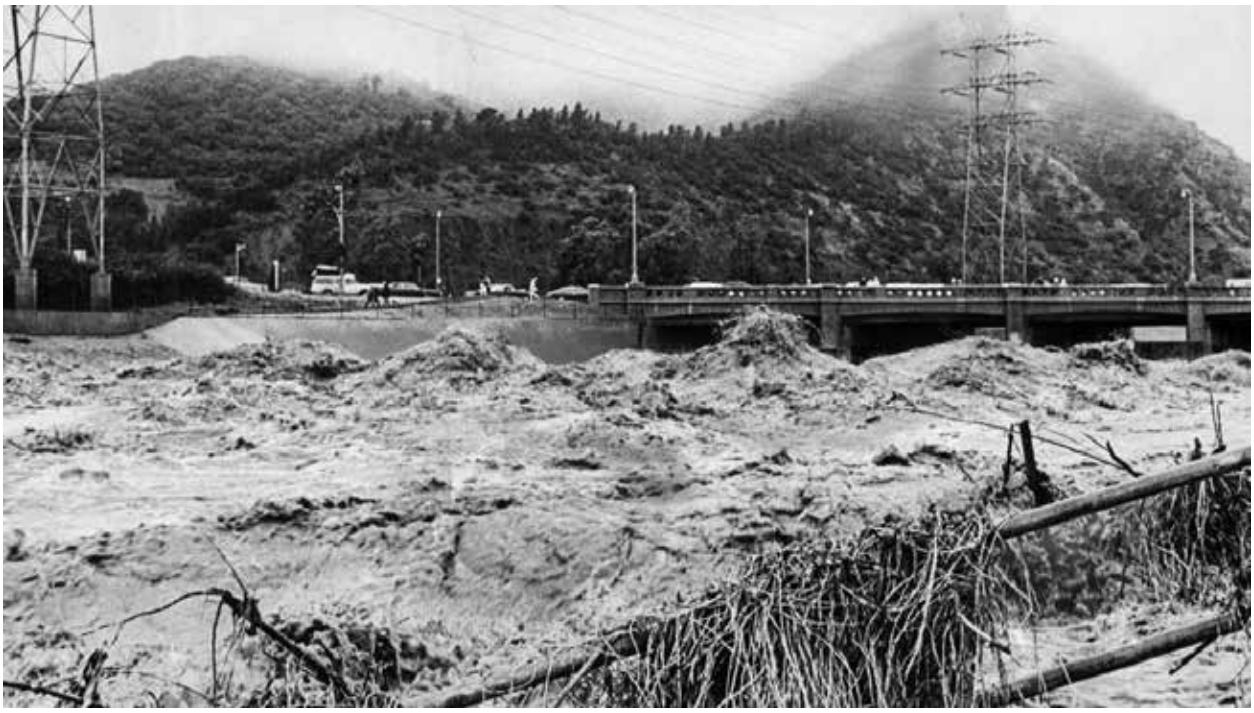
2016 The LA River Trash TMDL process is certified as complete.

2017 The Great L.A. River CleanUp engages 7,000 volunteers and is certified by American Rivers as the largest urban river cleanup in the country.

2018 Measure W, The Safe, Clean Water Program, was successfully passed by L.A. County on the November 2018 ballot, projected to raise $270 million per year to fund water quality improvement programs including the LA River.

2019 FoLAR celebrates the 30th anniversary of La Gran Limpeza.

FIGURE 2 – L.A RIVER, 1969 AT LOS FELIZ BLVD. – PHOTO CREDIT: LOS ANGELES TIMES



SECTION 1:
SETTING THE STAGE

From river to drainage ditch, to river again – the popular conception of the Los Angeles River (L.A. River) has evolved as momentum builds to restore it to the central position it once held as a geographic and cultural connector for the region.

A combination of ingenuity, political will and environmentalist enterprise have made possible a remarkable 50-year cooperative effort to revitalize the L.A. River. This has paralleled efforts throughout the Los Angeles region on environmental issues that once seemed endemic, such as the toxic levels of smog that once obscured the surrounding mountains and the sewage that would sicken surfers in Santa Monica Bay.

At the national level, a series of high-profile environmental disasters in the 1960s built the awareness and political will needed to change the way the federal government regulated the health of our oceans, rivers, and natural spaces. One key example is the heavily polluted Cuyahoga River in Northeast Ohio catching fire in 1969, which galvanized public opinion and led to the Clean Water Act in 1972.

Throughout the 1970s, governmental agencies, including the U.S. Environmental Protection Agency and the California Environmental Protection Agency, were formed and legislation such as the Clean Water Act and the Clean Air Act was signed into law in an effort to mitigate existing environmental damage. Working in parallel with the rapidly expanding environmental movement, new technologies and better practices were developed to safeguard ecosystems.

HISTORY OF THE LOS ANGELES RIVER

The L.A. River is a key feature of the alluvial plain that makes up Los Angeles County and Orange County.[4] The Mediterranean climate of the Los Angeles region generally results in dry summers alternating with wet winters when the surrounding mountains can receive upwards of 40 inches of rain within four months. During major storm events, large amounts of precipitation collect on the geologically young and steep mountainsides, which funnel and accelerate the water down to the L.A. Basin, into the L.A. River and out to the Pacific Ocean. Depending on varying annual levels of rainfall, the L.A. River would shift courses as heavier flows cut new channels into the floor of the floodplain.

Contrary to popular misconception, the L.A. Basin was not historically an arid desert but instead a relatively lush landscape of grasslands and forest, with year-round streams feeding into more than 15,000 acres of wetlands teeming with wildlife.

Prior to the arrival of European settlers, the Tongva people lived in villages along the river and hunted, fished, and gathered from the abundant river basin. One of the earliest Europeans to see the L.A. River was Father Juan Crespi, who documented the Portola Expedition that explored California on behalf of King Charles III of Spain in 1769. He called the river a "lush and pleasing spot in every respect" and named it "El Río de Nuestra Señora la Reina de los Ángeles de Porciúncula," meaning, The River of Our Lady Queen of the Angels of Porciúncula. Based in part on Father Crespi's impressions of this abundant river, Spanish viceroy Gaspar de Portolá established what would grow to be Spain's largest settlement in what is now southern California.

While earlier human habitation of Los Angeles was defined by cooperative coexistence with the dynamics of the L.A. River, the modern viewpoint has regarded the river as an opponent to subdue. The Tongva understood the need to relocate to higher ground during the rainy season, but the river's naturally varying course posed serious problems as population growth led to increased construction of permanent structures in the floodplain.

The L.A. River caused 17 recorded floods between 1815 and 1938. One particularly heavy flood in 1938 caused 114 deaths[5] and over $1.4 billion in damages (adjusted for inflation).

The decision to build in areas of known flood risk made necessary a 150-year campaign to control the remarkably high flows during winter storm events and confine the river to a consistent channel. This battle against nature influenced much of the built geography of the area between Downtown L.A., Santa Monica, and Long Beach and literally paved the way for modern Los Angeles.

In early attempts to control the river, engineers experimented with the materials that were available at the time, such as anchoring railroad boxcars along the river channel. Despite their best efforts, during years of very heavy rains the river continued to breach their levees and cause destructive flooding throughout Los Angeles and Long Beach. The levees were an object lesson in the challenges of taming natural processes, as they protected some areas while heightening flooding elsewhere.[6]

One result of the focus on flood control to the detriment of preserving existing ecosystems was the loss of the lush wetlands that once stretched from Downtown L.A. to the coast. All that survives now are remnants including MacArthur Park Lake, as well as the street names taken from the wetlands buried underneath them, such as Rodeo Drive and La Cienega Boulevard.

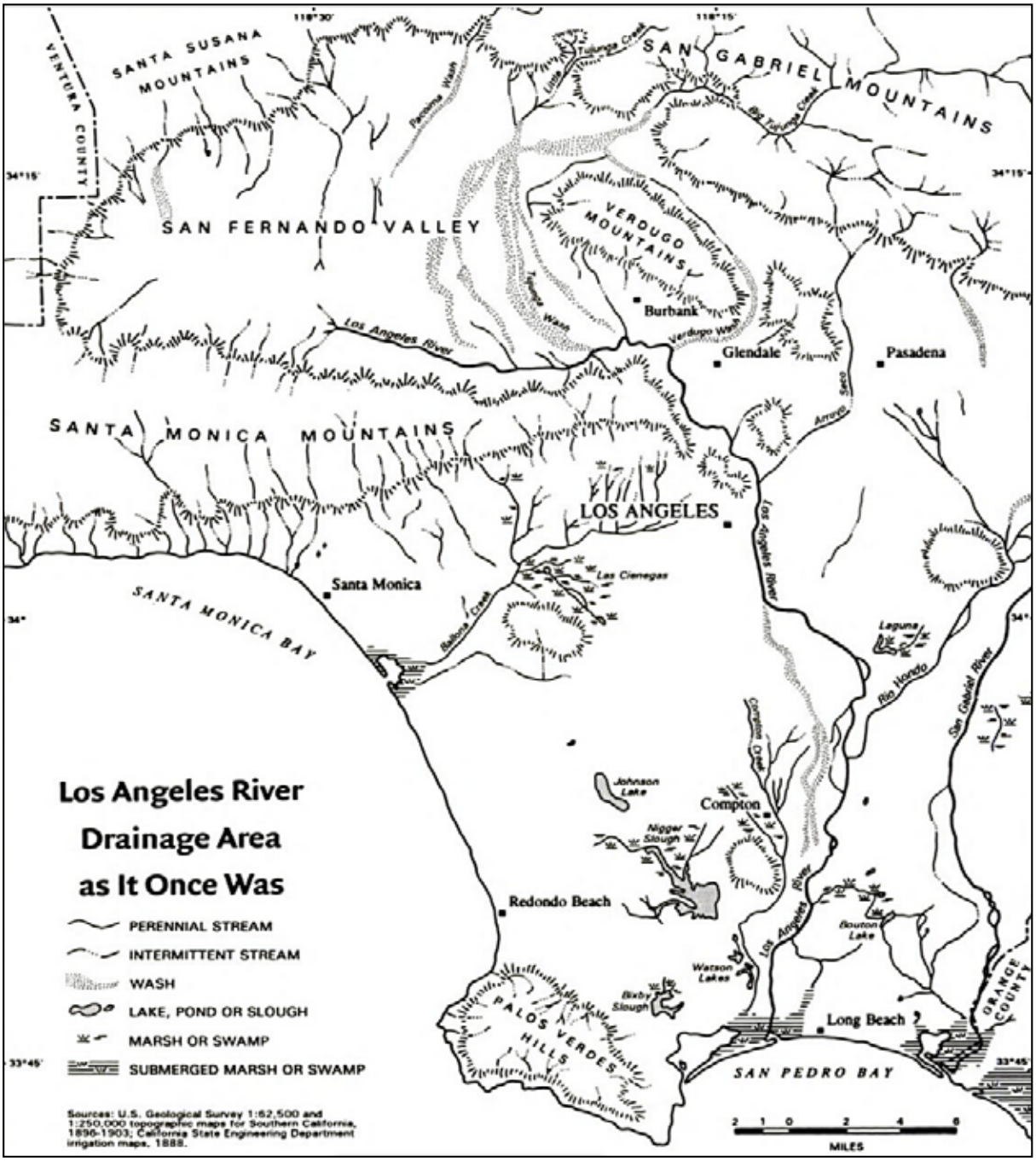
4 History of the Los Angeles River. Department of Public Works. (n.d.). Retrieved May 2016, from http://ladpw.org/wmd/watershed/LA/history.cfm

5 Simpson, Kelly. February 27, 2012. Los Angeles flood of 1938: The destruction begins. Retrieved May 2016, from https://www.kcet.org/departures-columns/los-angeles-flood-of-1938-the-destruction-begins

6 The Los Angeles River - Its Life, Death, and Possible Rebirth. Blake Gumprecht. Johns Hopkins University Press. Baltimore, MD. 2001.

FIGURE 3 – LOS ANGELES RIVER DRAINAGE AREA

Figure 3 shows the state of the L.A. River and associated wetlands around 1903, when flooding was still an ongoing concern.[7]



7 The map in Figure 1 was created by Blake Gumprecht and can be found in his book, The Los Angeles River – Its Life, Death and Possible Rebirth.

FROM RIVER TO FLOOD CONTROL CHANNEL

In response to the ongoing threat of floods, Los Angeles County in 1933 started requesting financial aid from the Works Progress Administration to construct flood control infrastructure. The political reaction to massive flooding in 1938 led to Congress approving the necessary funds for the U.S. Army Corps of Engineers to permanently channelize the river.

After the main channelization project established the concrete encasement we see today, the river was regarded primarily as a tool for flood control. With a vast majority of its natural habitat covered by millions of barrels of concrete, the river quickly became a convenient repository for unwanted runoff and trash from residential and industrial areas.

The channelized L.A. River largely faded from the public consciousness as L.A. residents gradually forgot the massive concrete channel was once a thriving ecosystem. In 1989 there was even a proposal to convert a portion of the river channel into a freeway[8].

This collective disregard for the river started to change in the late 1990s when the U.S. Army Corps of Engineers announced their intention to increase the level of flood protection from a 40-year storm to a 100-year storm. A significant shift in public opinion occurred when Angelenos learned the project involved bulldozing existing vegetation from the soft-bottom sections in the Glendale Narrows and removing other natural features the Corps regarded as an impediment to flood control. L.A. County Supervisor Zev Yaroslavsky emerged as a forceful advocate for preserving the habitat that had reemerged in the river channel, and the public rallied around him to demand changes to how the L.A. River was managed.

This episode marks the beginning of the current chapter of the L.A. River, as the previous bureaucratic mindset of taming the river started to give way to a more holistic view of the river as an urban habitat teeming with life, where the needs of the natural ecosystem and flood control can coexist with expanded parks and trails for residents. After years of neglect, the L.A. River found allies willing to fight for more respect.

Restoring an urban waterway is a different process than restoring less severely impacted ecosystems. The concrete channel will remain for the foreseeable future. Instead of trying to recreate the habitat as it was 300 years ago, the goal is to balance environmental improvements with accessibility and recreation. Environmental goals include restoring the steelhead trout run, which can co-exist with low-impact recreation opportunities such as kayaking. Communities along the river are developing riverfront parcels as urban open space, ranging from pocket parks to soccer fields.

This evolving view of multiplying the uses and the benefits of the river has led to innovative new concepts such as engineering natural wetlands that serve as green infrastructure to capture pollutants and slow down water flow. The prior dichotomy of viewing other river uses as interfering with flood control priorities has been exploded by the success of projects that combine habitat improvements with floodwater management. The L.A. County Measure W implementation process should lead to another round of innovative approaches to revitalizing the river and reengaging residents with this shared natural resource.

8 "Katz Tries Going With L.A. River's Flow: Freeway: He sees a stream of cars where no man has dared to drive before." Los Angeles Times, Oct. 15, 1989 https://www.latimes.com/archives/la-xpm-1989-10-15-mn-426-story.html

REGULATORY PROCESS

The shared recognition of the L.A. River as a major opportunity for habitat restoration and increased open space prompted local stakeholders focus on how to help this ignored but central geographic feature of L.A. This realization led to reshaping the future of the river with a combination of efforts from city governments, concerned citizens, and private enterprises working together to enact positive change.

Central to this shift was an emerging understanding of the repercussions of paving the river and how that affected its function as the main outlet for stormwater runoff for much of urban L.A. More attention focused on what was contained in the runoff, and how to reduce non-point-source pollution carried by the river out to the Pacific Ocean.

To better understand what was required to bring about this change, we must briefly review the regulatory process which was the basis of the past 30 years of work towards restoring health of the L.A. River.

Growing awareness of the importance of protecting our natural resources led to the enactment of the National Environmental Policy Act of 1969 (NEPA). NEPA then led to the Federal Water Pollution Control Act Amendments of 1972, better known as the Clean Water Act (CWA), which sought to "establish the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters."[9]

To maintain the chemical, physical and biological integrity of America's waters, a related permit program, National Pollutant Discharge Elimination System (NPDES), was created.

NPDES permits are required today by any facility that discharges substances into water protected under the CWA. The permit helps specify how to protect American waters by "translating general requirements of the CWA into specific provisions tailored to the operations of each person discharging pollutants."[10] Point sources, or sources in which substances are discharged into the water, have been broadly defined as any discernible, confined, and discrete conveyance (e.g., a pipe, ditch, or even floating crafts).

Other potential sources regulated by NPDES include municipal separate storm sewer systems (MS4), construction activities and industrial activities. Agricultural stormwater discharges and irrigation systems are not considered point sources.

In response to the new surge of federal regulations, states started redefining their own environmental standards. Following the adoption of NEPA, in 1970 California enacted the California Environmental Quality Act (CEQA), a "statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible."[11]

Under CEQA, any project with potential to affect the environment must assess any potential impacts before it starts by conducting and submitting an Environmental Impact Report (EIR). Developing these very lengthy and comprehensive documents became a central part of the regulatory process surrounding the L.A. River.

9 Summary of Clean Water Act. Environmental Protection Agency. (n.d.). Retrieved May 2016, from https://www.epa.gov/laws-regulations/summary-clean-water-act

10 NPDES frequent questions. EPA. Environmental Protection Agency. (n.d.). Retrieved May 2016, from https://www.epa.gov/npdes/npdes-frequent-questions

11 CEQA FAQs. (n.d.). Retrieved May 2016, from http://resources.ca.gov/ceqa/more/faq.html

REGULATORY TARGETS BROADEN TO TRASH

Over time, LA's growing population generated more trash and street litter, and a portion of that refuse entered the vast network of storm drain systems emptying into the L.A. River. The storm drain network encompasses hundreds of square miles of densely populated urban neighborhoods and heavily travelled freeways and rail corridors, which means the scale of the trash generation was significant.

The trash issue is magnified by the engineering strategy guiding the L.A. River channelization, which was designed to funnel the maximum amount of stormwater out of the watershed and into the Pacific Ocean as quickly as possible. Unfortunately, this also serves to multiply the downstream impacts as the trash load is collected and concentrated into the river channel. Since the design priority for flood protection was maximum flow with minimum obstructions, the river channel and connecting storm drain systems generally lack any controls to remove trash from the water.

The initial scope of Clean Water Act implementation in the 1970s and 1980s tended to focus on removing chemical contaminants. In the 1990s, the available science started to point to the need to also monitor and regulate for solid materials within the water.

TOTAL MAXIMUM DAILY LOAD

The Total Maximum Daily Load (TMDL) is the calculation of the maximum amount of a pollutant allowed to enter a water body so the water body will meet and continue to meet water quality standards for that specific pollutant. According to the Clean Water Act, each state must develop TMDLs for all the waters identified on their Section 303(d) list of impaired waters according to their priority ranking on that list and submit each to the US EPA for approval.[12]

By establishing TMDLs, the US EPA, in concert with state and local water control authorities, started to set limits for pollutants allowed to flow into the L.A. River. At first this was primarily applied to chemical contaminants such as mercury, but after assessing the potential functions of the L.A. River beyond flood control, those agencies applied an additional, unique TMDL to place limits on the rate of solids (trash) entering the river.

In 1996 and 1998, the Los Angeles Regional Water Quality Control Board (Water Quality Board) issued decisions that the L.A. River failed to meet TMDL standards for solids. The decision listed 83 percent of the river as impaired due to the presence of trash in the waterway.[13] This was the first time a federal agency regulated trash as a pollutant.

The efforts of the US-EPA, Heal the Bay, Santa Monica Baykeeper, and the State of California ultimately resulted in a TMDL that was approved on August 1, 2002. However, L.A. County and affected cities felt certain matters were overlooked, and fought for a more practical Trash TMDL, including a way to quantify results, compliance, and water quality.

The Trash TMDL regulates the outfall pipes of storm drains that empty into the L.A. River. The City of Los Angeles controls 33 percent of the regulated storm drains, while the other 42 cities control 29 percent and eight agencies (e.g., CalTrans) control 37 percent.[14]

In September 2003, the city and county of Los Angeles settled with the Water Quality Board and agreed to address several concerns, including improving the method of establishing water quality standards.[15]

In return, the City and the County agreed to spend nearly $170 million on compliance ($48 million for the county and $120 million for the city).[16] This settlement became effective on September 23,

12 https://www.epa.gov/tmdl/overview-total-maximum-daily-loads-tmdls

13 State of California. California Regional Water Quality Control Board, Los Angeles Region. Resolution NO. 07-012. August 9, 2007.

14 LA Sanitation. L.A. River. (n.d.). Retrieved May 2016, from https://www.lacitysan.org/san/faces/home/portal/s-lsh-wwd/s-lsh-wwd-wp/s-lsh-wwd-wp-ewmp/s-lsh-wwd-wp-ewmp-dc?_adf.ctrl-state=7f5jocmar_5&_afrLoop=5197511245283249#!

15 Santa Clara Valley Urban Runoff Pollution Prevention Program. Memorandum: Background information on trash management efforts- Los Angeles stormwater programs. September 13, 2004. Retrieved May 2016, from http://www.scvurppp-w2k.com/pdfs/0304/Memo_Los_Angeles_trash_mgmt_practices_final_091304.pdf

16 McGreevy, P., & Weiss, K. R. September 04, 2003. City, county agree on plan to cut trash in L.A. River. Los Angeles Times. Retrieved May 2016, from http://articles.latimes.com/2003/sep/04/local/me-river4

2003.[17] While LA City and County settled, 22 surrounding cities[18] challenged the regulation on 10 points, including issues of CEQA compliance.

Dubbed "The Coalition for Practical Cities," the 22 surrounding cities fought for a more active voice and greater collaboration in this monumental legislative project. As originally reported in the LA Times, Signal Hill Councilman Larry Forester said, "What I hope comes out of this is a collaborative effort. We need more collaboration. We need to work on achievable means to clean up this river."[19]

After several months, San Diego County Superior Court Judge Wayne L. Peterson ruled that the Water Quality Board failed to adequately complete a study for economic and environmental impacts, both required by state law.[20]

On January 26, 2006, the Court of Appeal ruled that until a revised environmental impact report (EIR) was conducted, the TMDL could not be implemented.[21] The original 10-year compliance mandate was then shortened to nine, thus maintaining the 2015 deadline for full compliance.

On August 9, 2007, the final EIR with several additional changes was adopted, and the Trash TMDL stood ready for implementation in 2008. The EIR concluded that while water quality would improve as a result of the TMDL, "significant adverse impacts to the environment" would occur primarily related to manufacturing and installing trash collection devices. These could be mitigated through "careful design and scheduling."[22]

The final TMDL also called for a nine-year compliance schedule, with a 40 percent baseline reduction compliance requirement in Year 1 followed by approximately 10 percent reductions each year thereafter.[23] The TMDL did not regulate direct dumping and wind-deposited trash but was limited to trash entering the river at point sources, defined as storm drains that empty into the river.

COMPLIANCE STANDARDS

Several concepts were defined to help cities and agencies regulate TMDL compliance. Litter was given a specific definition:

> "Any improperly discarded waste material including but not limited to convenience food, beverage, and other product packages of containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling or manufacturing."

Non-solids such as sediment, grease and oil were excluded from the definition, as was vegetation except for yard waste illegally disposed. For compliance purposes, the definition applies to anything fitting the above definition unable to pass through a 5-mm mesh screen. Simply put, anything made of metal, plastic, paper, glass, synthetic or natural materials larger than a pea is considered trash if improperly disposed.[24]

17 State of California regional water quality control board, Los Angeles region. (August 9, 2007). Retrieved May 2016, from https://www.waterboards.ca.gov/losangeles/board_info/eo_reports/past_eo_report/07_0809_eorpt.pdf

18 The 22 cities were Arcadia, Baldwin Park, Bellflower, Cerritos, Commerce, Diamond Bar, Downey, Irwindale, Lawndale, Monrovia, Montebello, Monterey Park, Pico Rivera, Rosemead, San Gabriel, Santa Fe Springs, Sierra Madre, Signal Hill, South Pasadena, Vernon, West Covina, and Whittier.

19 Bustillo, M., & McGreevy, P. January 07, 2004. State improperly approved new rules to clean trash from L.A. river, court says. Los Angeles Times. Retrieved May 2016, from http://articles.latimes.com/2004/jan/07/local/me-trash7

20 Ibid.

21 State of California Office of Administrative Law. July 1, 2008. Resolution No. 07-012. Retrieved May 2016, from https://ofmpub.epa.gov/waters10/attains_impaired_waters.show_tmdl_document?p_tmdl_doc_blobs_id=60600

22 California Regional Water Quality Control Board Los Angeles Region. August 9, 2007. Trash total maximum daily loads for the Los Angeles River watershed. Los Angeles, CA: Los Angeles.

23 State of California Office of Administrative Law. July 1, 2008. Resolution No. 07-012. Retrieved May 2016, from https://ofmpub.epa.gov/waters10/attains_impaired_waters.show_tmdl_document?p_tmdl_doc_blobs_id=60600

24 California Regional Water Quality Control Board Los Angeles Region. August 9, 2007. Trash total maximum daily loads for the Los Angeles River watershed. Los Angeles, CA: Los Angeles.

Compliance for the structural applications (full-capture devices installed in storm sewer inlets) requires they inhibit 100 percent of trash from entering the storm drain during the peak flow of a typical one-year, one-hour storm.

To achieve compliance mathematically, it was determined each of the storm drains in the L.A. River watershed had to be outfitted with either full-capture structural devices in high-trash areas, or by a combination of partial capture devices and institutional controls in low- and medium trash areas.

"There were some fundamental concepts in this process that helped set the stage for success, in particular the simple and inclusive definition of trash and the very clear goal of preventing that trash from entering the river from the storm drain system," said Enrique C. Zaldivar, Director and General Manager, L.A. Sanitation and Environment. "This made it possible to organize a very wide range of parties around one shared vision – keeping trash out of the L.A. River."

TARGETING TRASH HOT SPOTS

As the basic outline of the trash TMDL emerged, one major challenge remained – namely, how to focus available resources across a vast urban area to achieve compliance on a regulatory goal never tried before. The objective of reducing trash in a stormwater system, while seemingly straightforward, becomes incredibly challenging once it is overlaid onto a remarkably diverse urban geography.

The City of L.A. Bureau of Sanitation & Environment (LASAN) emerged as a key implementer for the Trash TMDL, as they are the managers of several elements of this puzzle: waste management, stormwater management, and wastewater management.

LASAN took the lead on analyzing available data from their operations and using geolocational tools to map the high, medium, and low trash generation areas to determine where to place full-capture and partial-capture structural controls [see Figure 2 for the resulting "hot spot" map]. This data model also linked the map of the underlying storm sewer network with aboveground locations where large amounts of trash have been observed, which helped to prioritize the placement of infrastructure and to ensure the highest-trash areas received sufficient attention.

The hot spot targeting effort is a good demonstration of the power of using "civic data" captured by municipal operations that can be analyzed and overlaid to reveal additional insights. In this case, combining data on stormwater runoff patterns and population density and comparing this with the amounts of waste that pumper trucks pulled out of storm drain inlets created a powerful tool to guide Trash TMDL-related decisions.

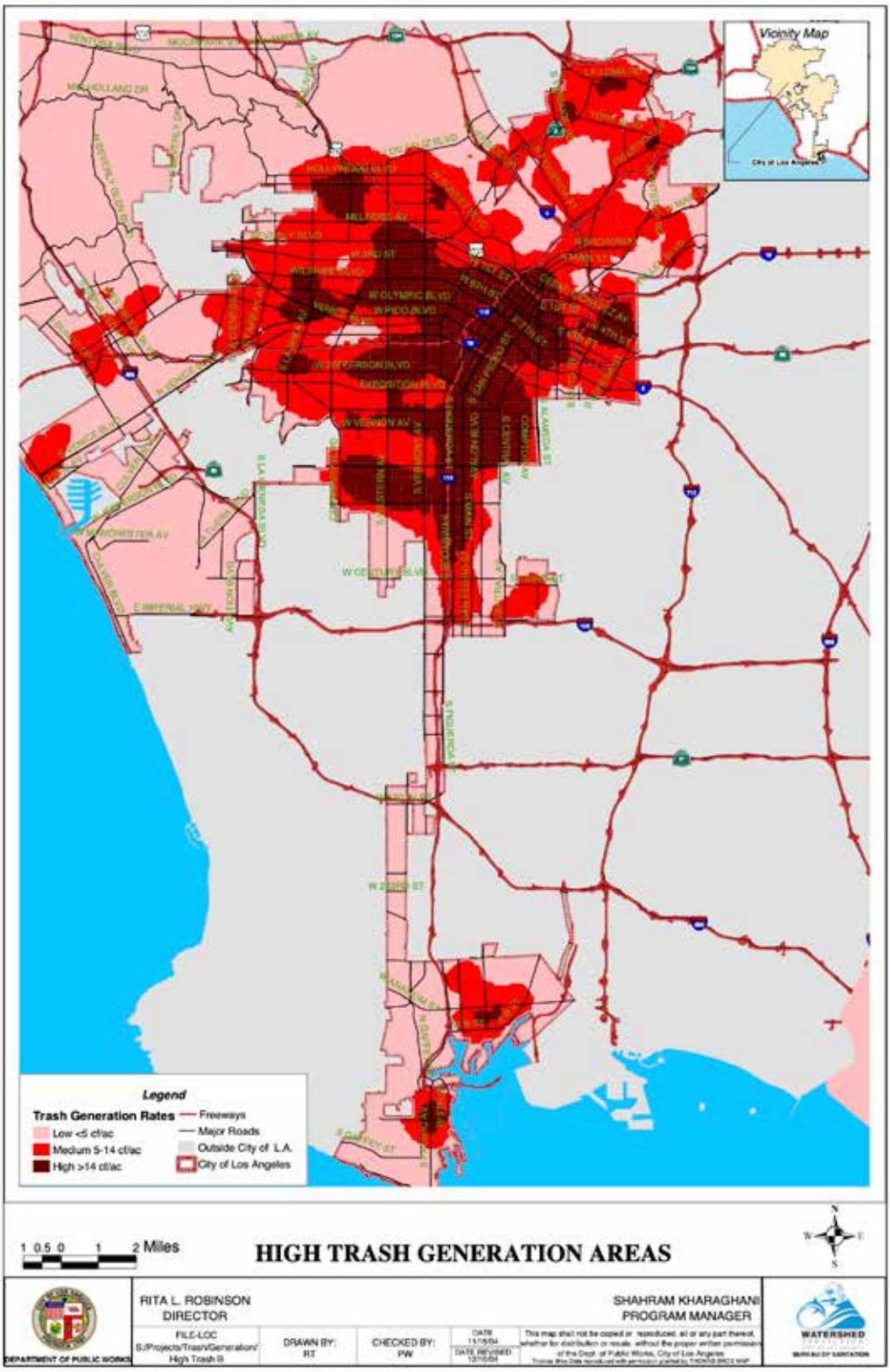
Taking this concept a step further, in 2016 LASAN launched a new program using GeoHub, the City of L.A.'s open data portal, to map the relative cleanliness of more than 9,000 miles of city streets in order to identify the areas in greatest need of cleaning[25]. The resulting CleanStat database compiles scores of 1 (Clean) to 3 (Needs Cleaning) for every street and alley in the City of L.A. in order to dispatch maintenance crews to the areas needing immediate cleanup, and to adjust street sweeping schedules to focus on the areas that most need the service.

The initial CleanStat survey showed 370 miles of roads and alleyways, or four percent of the total, needed immediate cleanup, with another 42% of road miles needing some level of cleanup. A significant percentage of these streets are within the storm sewer networks that drain into the L.A. River

This use of geotargeting data by LASAN could help enable major advances in removing litter from city streets before it can enter the river. Continued progress on street litter reduction should have significant benefits for further reducing trash in the river.

25 "New L.A. street database to guide cleanup efforts" Los Angeles Times April 6, 2016 https://www.latimes.com/local/california/la-me-clean-streets-20160409-story.html

FIGURE 4 – LASAN HOT SPOT MAP



BEST MANAGEMENT PRACTICES

Structural Controls

Structural controls include full-capture systems, required by the Trash TMDL for areas with high trash generation rates, as well as partial-capture systems, which were allowed in medium and low trash generation areas. In addition, measuring and certifying effects of institutional controls were required in areas that chose to use partial-capture systems.

Full-capture devices are those which will retain 100 percent of trash while allowing free flow of water during the peak flow rate of a typical one-year, one-hour storm. Regardless of the yearly baseline reduction requirements, full capture devices count as 100 percent compliance.[26]

Separating trash from stormwater may sound like a straightforward engineering challenge, but these capture devices must combine two diametrically opposed goals – retaining solids but allowing free flow of water – while being durable enough to withstand unpredictable conditions in an urban environment with minimal maintenance.

Engineers needed to solve a seemingly simple challenge, namely, how to create a barrier for trash that would still allow water to flow through unimpeded. However, if the trash barrier blocked the flow of water into the storm sewer system, the resulting flooding would create potentially significant financial liability. Since the devices must be certified to exclude trash for each specific installation, the equipment needs to be customized and field-tested. Once the devices are installed, a regular cleaning and maintenance schedule must be followed to ensure the devices remain effective.

The ingenuity and collaboration of a broad range of engineers made possible a host of highly effective solutions suited for different applications. As structural measures were gradually implemented to hit the Trash TMDL's escalating compliance goals, the average cost of each capture basin dropped from $2000 to $800, allowing the project to come in significantly under budget.

The continual engineering improvements from the operation and refinement of structural controls means that as these devices continue to become more effective and less expensive, they can become standard equipment for a wide range of future water quality and stormwater projects. The emphasis on structural controls due to their quantifiable results should end up to one of the major long-term benefits created by the Prop. O process.

The City of Los Angeles, responsible for reducing approximately 2.5 million of the trash TMDL's annual 5.4 million-pound baseline load, reached compliance almost exclusively using trash capture devices, spending $75 million to retrofit over 38,000 catch basins and about 15 large in-line devices.

Institutional Controls

Institutional controls are non-engineered instruments, including administrative and legal controls, that help to minimize the potential for exposure to a pollutant[27]. Institutional controls can include tactics such as increased street sweeping, public education programs, local ordinances, and tightened restrictions on littering.[28] Institutional controls can be less expensive than physical infrastructure upon implementation, but usually require sustained labor over time which can result in significant cumulative costs.

26 State of California Regional Water Quality Control Board, Los Angeles region. August 9, 2007. Retrieved May 2016, from http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/AdminRecordOrderNoR4_2012_0175/2009%20LA%20MS4%20LA%20River%20Trash%20Reopener%20AR/Section%201.pdf

27 US EPA OSWER 9355.0-89 EPA-540-R-09-001 December 2012: Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites https://www.epa.gov/sites/production/files/documents/final_pime_guidance_december_2012.pdf

28 California Regional Water Quality Control Board Los Angeles Region. August 9, 2007. Trash total maximum daily loads for the Los Angeles River Watershed. Los Angeles, CA: Los Angeles.

FUNDING

Proposition O

City of L.A. voters passed Proposition O, the Clean Water Bond in November 2004, authorizing $500 million in general obligation bonds to fund projects to improve water quality in local rivers, lakes, and beaches as well as to reduce storm drain pollution.

Prop. O was a critical element in the successful implementation of the Trash TMDL, providing $75 million to retrofit over 38,000 catch basins and about 15 large in-line trash capture devices.

Prop. O is also notable for launching a host of "green infrastructure" projects which sought to slow down water flow to balance the flood control priority with habitat restoration and beneficial reuse of stormwater.

Federal stimulus funds

Federal stimulus funding provided the means to install covers on Lower River catch basins in Southeast L.A. County jurisdictions[29].

Measure W

County of L.A. voters approved Measure W in November 2018 to implement a parcel tax to fund the Safe, Clean Water Program.

The Measure W process offers the opportunity to continue progress on trash reductions as a co-benefit to water quality improvements and increased stormwater capture.

COMPLETION

The installation of structural controls throughout the storm drain systems that empty into the L.A. River was finished a year ahead of schedule, and this work was deemed complete in 2013 when the City of Los Angeles published the *Final Quantification Study of Institutional Measures for the Trash TMDL.*

"One of the key reasons that the L.A. River stakeholders were able to make such rapid and cost-effective progress on trash reduction was the decision to approach compliance as an engineering problem," said Enrique C. Zaldivar of L.A. Sanitation and Environment. "Experts were able to use existing data, as well as the known physics of how solids behave in moving water, to design solutions for a wide variety of situations."

In 2015, all measures for the Trash TMDL were reached ahead of schedule and under budget.

29 https://www.latimes.com/archives/la-xpm-2010-sep-19-la-me-river-trash-20100919-story.html

KEY STAKEHOLDERS

River revitalization efforts require coordination between at least 27 federal, state, and local agencies[30] with jurisdiction over, or interest in, the L.A. River. Los Angeles County Department of Public Works (LADPW) and U.S. Army Corps of Engineers share primary responsibility for operations and maintenance, while another two dozen government entities have varying degrees of authority or regulatory requirements related to the river.

The complexity of this overlapping bureaucratic puzzle could typically be expected to create significant challenges for a project of this scale. In this case, it may have nudged all parties into recognizing that cooperation was an attractive alternative to regulatory gridlock.

As the scale of effort needed to meet Trash TMDL requirements and deadlines became more apparent, leadership and creativity from parties throughout the region helped to deescalate the contentious atmosphere that defined the early days of the regulatory process. Resolving the litigation over the Draft EIR then set the tone for a notably collaborative Trash TMDL implementation process which was completed ahead of schedule and under budget. A truly broad array of stakeholders and jurisdictions, each with divergent interests but all sharing a common goal, formed an effective coalition to clean up and start revitalizing the river.

The relationships formed during the Trash TMDL process, and the tangible results they produced, suggests it should be possible to continue this regional momentum toward reducing and removing trash from the L.A. River.

COUNTY OF LOS ANGELES

In 1991, the Board of Supervisors directed the LA County Department of Public Works (LADPW) to develop the Los Angeles River Master Plan. LADPW then worked closely with the County Regional Planning and Parks and Recreation Departments as well as the National Park Service.[31] The Master Plan was adopted by the County in 1996, and funding started flowing to revitalization projects. This L.A. River Master Plan has been a key policy framework that has guided the revitalization process for more than 20 years.

The County started a Master Plan update process in 2016 with regional agencies, city leaders, nonprofits, community groups, and other stakeholders that should continue to inspire and guide progress as the original vision starts to become reality.

Former L.A. County Supervisor Zev Yaroslavsky was an early champion for the L.A. River and was instrumental in efforts to help restore the L.A River.

CITY OF LOS ANGELES

The City of Los Angeles has played a central role in river issues, including contributing considerable resources to develop a master plan for river restoration efforts within its jurisdiction.[32]

In 1990, Mayor Tom Bradley established a task force to develop ways for Angelenos to interact with the L.A. River and improve its appearance.[33] In an effort to "reverse the neglect and disregard" of the L.A. River, the panel recommended that three areas along the river be returned to a more "natural" state, and that a bike path be constructed near Griffith Park.[34] Finally, they recommended that a master plan be developed for the entire river, which was facilitated by the County of Los Angeles in 1991.

30 The River Project. (n.d.). Retrieved May 2016, from http://www.theriverproject.org/learn/resources/agencies

31 Mountains Recreation & Conservation Authority. August 2003. Los Angeles River master plan: Sign guidelines. Retrieved May 2016, from http://ladpw.org/wmd/watershed/LA/FINALsignGUIDELINES.pdf

32 Jurisdiction and public involvement. (n.d.). Retrieved May 2016 from http://ladpw.org/wmd/watershed/la/larmp/LARMP-08%20Jurisdiction%20and%20Public%20Involvement.pdf

33 Appendix A: History of the Los Angeles River. (n.d.). Retrieved May 2016, from http://ladpw.org/wmd/watershed/la/larmp/LARMP-33%20Appendix%20A%20-%20History%20of%20the%20Los%20Angeles%20River.pdf

34 Lieberman, P. February 21, 1992. Panel tells plan to transform L.A. River: Development: A task force's proposal include a bike path and green area. The long-term goal is to reverse the waterway's neglect. Los Angeles Times. Retrieved May 2016, from http://articles.latimes.com/1992-02-21/local/me-2681_1_task-force

In 2002, another influential figure in the revitalization process emerged when Councilman Ed Reyes became chair of the Ad Hoc Committee on the L.A. River, which held the following guiding principles:

"The Los Angeles River flows through diverse communities throughout Los Angeles. Our river presents opportunities to revitalize our neighborhoods, to invest in our communities, to bring nature to people, and to enhance our quality of life. We envision a renewed Los Angeles River with a continuous greenway of interconnected parks and amenities connecting our communities along the River. We commit to bringing this vision to life through partnering with communities, businesses, organizations, and other jurisdictions, coordinating, and securing funding, and strongly advocating for a renewed and healthy river." [35]

As a community leader, Councilman Reyes renewed the public focus on the Los Angeles River. Where many saw only a drainage ditch, the councilman saw an opportunity to turn the river back into a healthy habitat to bring Angelenos together. This was precisely the perceptual shift FoLAR's Lewis MacAdams had been working for years to spur.

With a background in urban planning and several years of river projects completed, Reyes had momentum at the city, county and state levels, as well as added momentum from environmental groups such as FoLAR to seriously approach new river projects. He said the following in an exit interview:

"It was very difficult, because you are dealing with a mindset, a perception, that was aggrandized by Hollywood: It's the place people crash cars, chase the bad guys. As a kid, I understood what relief meant when I got to the river. To go down there, the acoustics are such that you don't hear the freeway, you don't hear the noise of the city. The only noise that is coming at you is the water running as it flows through the rocks. That is such a calming sound. For a kid who could not play in the local park — my brother had so many fights it wasn't funny. But when we found that river, boy, me and my friends, that was our Shangri-La. If I could feel that — when I realized what the planning powers of the city could be, I just went for it." [36]

In 2005, Councilmembers Ed Reyes and Eric Garcetti[37] helped to convene the Los Angeles River Plastics Industry Task Force as a broad-based forum for river stakeholders to work with representatives from the plastics industry to discuss potential solutions for reducing the amount of plastics that end up in the river. One of the outcomes of the Task Force was a joint effort by FoLAR and the Progressive Bag Alliance to recycle plastic bags found in the river, which eventually led to the City of L.A. changing its recycling policy to include plastic bags in their blue curbside recycling bins.

"One of the highlights of this process for me was the very open dialogues that happened at the task force meeting," said Shelly Backlar, policy director of FoLAR. "For example, one comment made at a meeting led to a conversation that resulted in a new recycling program being launched."

His experience as a councilmember with the river process led to now-Mayor Garcetti continuing to be a champion of both trash reduction as well as river revitalization.

At the City Council, the Art, Parks, Health, Aging and River Committee is the policy committee that handles L.A. River-related policy proposals.

35 LA City Council Ad Hoc Committee. October 8, 2002. Revitalizing the L.A. River. Retrieved May 2016, from http://www.lacp.org/River/LA_River_Guidelines.html

36 Regardie, J. July 2, 2013. The Ed Reyes exit interview. Retrieved May 2016, from http://www.ladowntownnews.com/news/the-ed-reyes-exit-interview/article_45a32eaa-e03d-11e2-84de-001a4bcf887a.html

37 City of Los Angeles Inter-Departmental Correspondence. August 3, 2005. Retrieved May 2016, from http://clkrep.lacity.org/onlinedocs/2004/04-1311_rpt_bos_8-3-05.pdf

FRIENDS OF THE LOS ANGELES RIVER

After the L.A. River was channelized, the river's pioneering advocate was Lewis MacAdams, a poet and political activist who dreamed of a river that was part of his great city. In 1985, he had been asked to write an article about the problems of Los Angeles and separately to participate in shows highlighting local performance artists. He decided the make the river the focus of both.

The initial reactions to MacAdams conceptual art were not favorable. In a review of an early performance of his piece "Friends of the Los Angeles River" at a downtown LA gallery, the Los Angeles Times noted that "With friends like MacAdams, the river needs no enemies.[38]" Still, he persisted, undaunted.

Later that year, MacAdams and three friends cut a hole in the fence along the river near the First Street Bridge and entered the L.A. River Channel, viewing what he described as "a latter-day urban hell."[39] Yet, through all the rubbish they observed, he saw hope:

> "We asked the river if we could speak for it in the human realm. We didn't hear it say no, and that was how Friends of the Los Angeles River began."[40]

Led by MacAdams, the group declared the river to be open and thus began a "40-year artwork"[41] to revitalize the river. The following year, with sculptor Pat Patterson and gallery owner Roger Wong, MacAdams co-founded Friends of the Los Angeles River (FoLAR) with the goal of creating a swimmable, fishable, bikeable, boatable waterway.

In 1988 FoLAR hosted the first "La Gran Limpiza," or Great Los Angeles River Cleanup, which has now become the nation's largest urban river cleanup. The formerly one-day event has expanded to three consecutive weekends to cover the upper, middle, and lower sections of the river. Since the cleanup's beginning, FoLAR estimates that more than 70,000 volunteers have removed 800 tons of trash that otherwise would have flowed out to the Pacific Ocean.

In 2004 as talk of the Trash TMDL was circulating, MacAdams thought the trash being removed from the river should be analyzed, making it easier to identify major pollutants. FoLAR has since contributed 15 years of "citizen science data" to help analyze the results of the trash TMDL implementation. More about data collection methods will be outlined in the Data section of this report.

To encourage more hands-on learning about the L.A. River and community engagement with the ongoing L.A. River restoration process, FoLAR created the "River Rover" (Figure 4) as a Mobile Visitor and Education Center. The Rover travels to schools and community events around Los Angeles, connecting Angelenos to their river with education programs for all ages.

FIGURE 5 – FOLAR RIVER ROVER

38 The Los Angeles River – Its Life, Death and Possible Rebirth. Blake Gumprecht. Johns Hopkins University Press. 1999., p. 253.
39 Ibid. p. 252.
40 Ibid.
41 A Brief History of Public Art and the L.A. River. Allison Carruth, March 19, 2014. Retrieved April 2020 from: https://www.kcet.org/shows/artbound/a-brief-history-of-public-art-and-the-la-river

THE NEXT CHALLENGE: UNHOUSED RESIDENTS OF THE RIVER

As trash has been successfully excluded from the storm drain system, there is now evidence of a major increase in trash discarded directly into the L.A. River.

This development marks a new chapter in the restoration of the river that will require a more nuanced and multifaceted approach than the relatively straightforward engineering solutions discussed previously in this report.

Increasing economic inequity, compounded by the impacts of COVID-19, has led to a dramatic surge in Los Angeles residents that lack stable housing. It is regrettable but understandable that unhoused residents have sought shelter in and around urban bridges and waterways.

The reality that we now face is that the L.A. River channel is being used as temporary housing for residents who lack other options. Without other viable options for housing, this situation is not likely to change soon.

Beyond the primary issues of how to best provide safe and secure housing for all Angelenos, the problem we now face is that the L.A. River lacks the infrastructure needed to support a human population. This lack of services inevitably leads to environmental impacts, such as waste being left in the river channel due to a lack of options to dispose of it properly.

The amounts of directly deposited trash varies based on the relative density of encampments, but the impacts are visible throughout the river channel. This category of directly deposited trash requires a completely different strategy for achieving reductions.

Available data clearly illustrates the scope of this issue. Los Angeles hosts one of the largest homeless populations in the U.S. The Los Angeles Homeless Services Authority (LAHSA) estimates 50,000 to 60,000 people are homeless on any given night in Los Angeles County.[42]

According to the U.S Department of Housing and Urban Development, "While homelessness in most states declined between 2018 and 2019, homelessness in California increased by 16 percent."[43] In addition, the poverty rate for the City of Los Angeles was 19.1 percent in 2018, higher than both Los Angeles County (14.2 percent) and the State of California (12.8 percent).[44]

Following COVID-19 shutdowns, unemployment rates initially soared to 20.9 percent in May 2020, the second highest rate among counties statewide. L.A. County has been disproportionately affected by the continuing economic fallout of COVID-19, and it seems safe to assume that the homeless population will continue to increase into the foreseeable future.

When analyzing the County's homeless population distribution by Service Planning Area (SPA), there is a strong geographic correlation between proximity to the L.A. River channel and the density of homeless residents.[45] 70% of homeless residents in Los Angeles County live within the four SPAs that include the L.A. River. SPA 6 also has the highest population density by far of all the SPAs (15,191 people per square mile), which is more than five times the average population density of L.A. County.

FIGURE 6 – HOMELESS CAMP AT THE WILLOW SITE

42 Homelessness in Los Angeles County 2019. Retrieved March 2020 from http://www.laalmanac.com/social/so14.htm

43 The 2015 annual homeless assessment report (AHAR) to congress. The U.S. Department of Housing and Urban Development. January 2020.

44 Retrieved March 2020 from https://www.census.gov/quickfacts/fact/table/losangelescountycalifornia,CA,losangelescitycalifornia/IPE120218

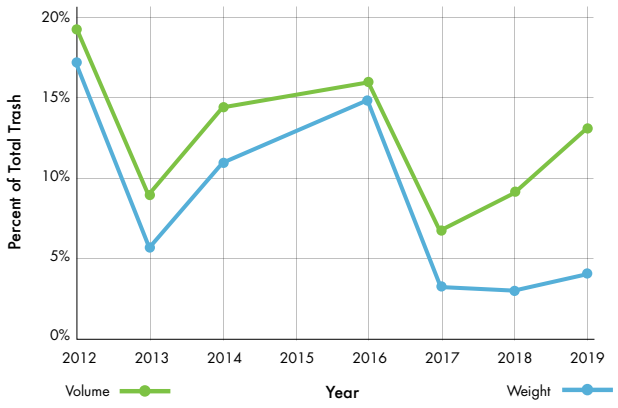
45 Retrieved March 2020 from http://www.laalmanac.com/social/so14.php

A primary environmental effect of this rising homeless population is a major increase in trash around the outdoor spaces being used as camp sites. According to a study of environmental impacts of the homeless in riparian zones:

> "Materials associated with homeless usage of riparian zones include those used for shelter building and maintenance (tarps, blankets, cardboard, wood pallets and other construction materials), as well as day-to-day living (clothing, bicycles and shopping carts, food packaging and organic waste, pharmaceuticals and personal care products, cigarette and drug paraphernalia)."[46]

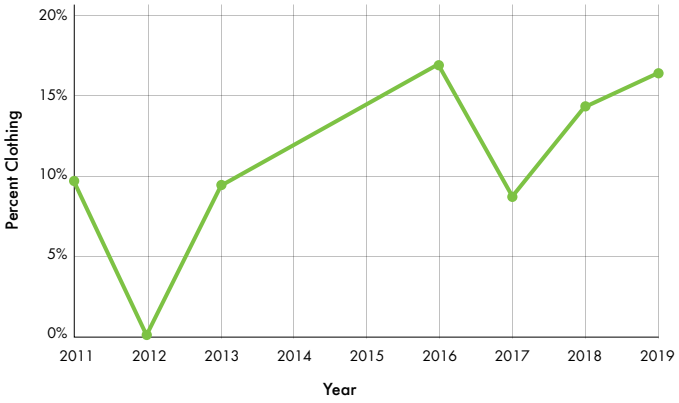
FoLAR cleanup data shows trash commonly associated with homeless residents, such as tarps and plastic film, increased between 2013 and 2016, decreased in 2017 (an extremely high rainfall year) and climbed again as shown in Figure 8.[47] Strains on the environment will continue to escalate in proportion to homeless population counts.

FIGURE 7 – PERCENTAGE OF PLASTIC FILM AT SEPULVEDA: 2012-2019



Clothing has also increased as a component of trash in the L.A. River over time. Willow's total percentage of clothing collected over the years suggests that, with the rise of the homeless population in this area, the amount of clothing left behind has also increased.

FIGURE 8 – PERCENTAGE OF CLOTHING COLLECTED AT WILLOW: 2011-2019



Encampment sweeps intended to keep city streets and waterways clean are both labor-intensive and costly, and require significant resources from multiple agencies such as LASAN, LAHSA, and the City of L.A. Police Department. According to an April 2019 story by LAist,[48]

> In the city's most recent approved budget, joint departmental programs conducting encampment sweeps/cleanups received at least $30 million in funding. The year before that, according to the L.A. Times, funding was $13 million.

The Services Not Sweeps Coalition of neighborhood homeless relief groups make the case that funding for sweeps are a misallocation of limited public resources. The LAist article continues:

> Instead of spending those millions on throwing away possessions stored in the public right-of-way and ticketing the people who live there, they ask why the city doesn't provide regular sanitation services. In other words, why not operate more like the predictable and scheduled rubbish pickup that serve Los Angeles residents with permanent roofs over their heads?
>
> "If you're going to be clean1ing the streets, do it in an organized manner," said Stephany Campos of Homeless Health Care Los Angeles. "Don't have these random sweeps where notices with a

46 White, C. Environmental impacts of homeless encampments in the Guadalupe river riparian zone. November 19, 2013. Retrieved June 2016, from https://dspace.royalroads.ca/docs/bitstream/handle/10170/665/white_courtenay.pdf?sequence=1https://dspace.royalroads.ca/docs/bitstream/handle/10170/665/white_courtenay.pdf?sequence=1

47 There is no data point for 2015 because in that year all plastic items were recorded together and not broken down any further.

48 https://laist.com/2019/04/10/homeless_sweeps_los_angeles_public_health.php

specific time and date are put up, but they're not followed through, or other times where there is no notice, and people's medications, belongings, documentation are thrown out."

There are no easy answers for homelessness in the L.A. region, but the future of trash reduction in the L.A. River depends on a pragmatic recognition that homeless encampments are the new reality.

New strategies and partnerships are needed in the near term to prevent or remove directly deposited trash from the river channel while longer-term solutions are found to provide housing and services for the residents of the river.

SECTION 2:
QUANTITATIVE ANALYSIS OF L.A. RIVER TRASH

The following section consists of an overview of data collected during and after Trash TMDL implementation meant to further the understanding of the amount and characteristics of trash found both within the river channel and in public spaces in the surrounding watershed.

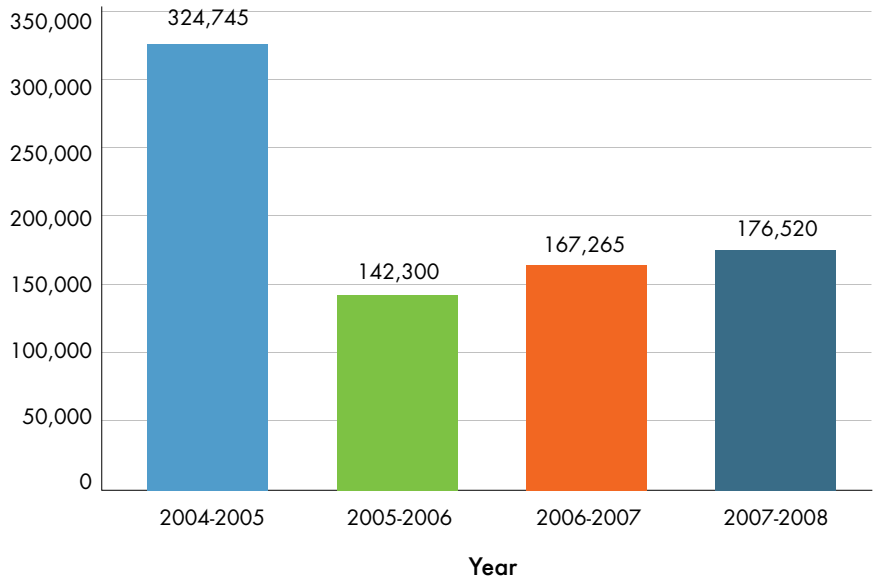
The overall amount and the relative individual size of trash items in the river has reduced considerably since the shift in community consciousness in the 1970s that led Angelenos to view the river as something more than a convenient dumping ground. Where in the early days of river cleanups there was a need for heavy-duty trucks, winches, and cranes to remove cars and major appliances, what is found today can be characterized mainly as urban street litter.

As trash loads are reduced to manageable levels through a combination of structural controls and cleanups, this presents an opportunity to identify the secondary sources that produce the remaining trash finding its way into the river.

This section examines the results of two trash analysis efforts by the City of L.A and FoLAR, discusses how these results validate the Trash TMDL process, and looks forward to how results to date could guide targeted efforts to address the remaining sources of trash.

QUANTIFYING TRASH REMOVAL

FIGURE 9 – POUNDS OF TRASH REMOVED FROM THE L.A. RIVER BY THE CITY OF LA



LASAN TRASH QUANTIFICATION STUDY

LASAN in 2013 performed a study[49] to measure litter rates on city streets to assess progress with institutional measures meant to reduce the waste load available to enter the L.A. River.

The study was conducted over eight weeks and examined ten sites selected from the medium- and low-trash-generating areas identified in the LABOS Hot Spot survey (see page 15) which represent the five most prevalent land-use categories: parks/open space, low-density residential, high-density residential, commercial, and industrial. The study period between July and August 2012 was chosen as a dry weather period with high outdoor activity when littering was most likely.

The litter generation rates for each land use category were then compared with the 2007 Baseline Report to measure the City's progress with trash reduction.

STUDY METHODOLOGY

Crew members visited each site once per week for eight weeks and collected all trash along pre-determined routes. The following day they sorted the trash collected at each site into the same 15 categories used at that time by FoLAR (see next section), and then recorded the volume, weight, and number of pieces for each category by site.

After sorting trash into categories, crew members measured and recorded the volume, weight, and number of pieces of trash in each category per site. This exercise was completed weekly throughout the duration of the study, on the day following the collection efforts.

RESULTS

The report used the results for week two through week five as a representative sample to calculate litter generation rates for the five land use categories. The report concluded that the total waste load allocation for the City of L.A. had reduced by 12.5 percent compared to the 2007 TMDL Baseline Report, presumably due to the institutional litter reduction measures.

The litter generation rates for each land use are as follows:

TABLE 10 – LITTER GENERATION RATE BY LAND USE TYPE

LAND USE TYPE	LITTER GENERATION RATE (GALLON/ACRE)
Commercial	18.52
Industrial	7.65
High Density Residential	2.86
Open Space/Parks	1.90
Low Density Residential	.98

49 City of Los Angeles, Quantification Study of Institutional Measures for Trash TMDL Compliance

CONCLUSIONS

The results of this litter quantification study by LASAN are another valuable set of data collected during the Trash TMDL process that helps to focus attention on the land use types most likely to be generating litter that ends up in the L.A. River. In addition, the report gives an initial look at the effectiveness of institutional controls, which appear to be effective in reducing overall trash loads on city streets and thus limiting the amount of trash available to enter the river channel.

The study results show that commercial and industrial areas, with a combined Litter Generation Rate of 26.17, are nearly five times as littered as High- and Low-Density Residential and Open Space/Parks, which have a combined rate of 5.74. These findings correspond with litter survey results nationally, which generally show that areas for which residents feel more ownership are less likely for litter to occur and more likely for the trash to be cleaned up.

Commercial and industrial areas, particularly in the lower-traffic fringes, tend to have a much weaker sense of individual responsibility for preventing and removing trash. As trash visibly accumulates, it gets more challenging to maintain social norms against littering. Different strategies are required to shift perception of these areas as shared spaces to be kept clean.

Now that structural controls for the storm sewer system have been fully implemented, the next major opportunity for reducing trash in the river is likely the street litter blown or otherwise carried directly into the river channel. Based on the above results, this litter is 4.5 times more likely to be coming from commercial and industrial areas, and there are likely to be specific sites that are disproportionate contributors.

A fresh look at existing trash data will likely reveal that a relatively limited number of river-adjacent commercial areas compromise the largest potential input of trash into the river channel. Combining the results of LASAN's litter quantification study with the Hot Spot mapping and GeoHub street trash data could create a powerful tool to estimate the locations where a majority of remaining trash in the river is likely originating. We recommend a relatively simple project for LASAN to revise the Hot Spot mapping with newly available data to refine the targeting for trash reduction.

FOLAR TRASH ASSESSMENTS AT LA GRAN LIMPIEZA 2004 - 2019

Trash cleanups have been a central focus for FoLAR since 1989 when Lewis MacAdams persuaded 30 of his artist friends to trespass into the river channel and spend the day collecting trash. He ended the day by calling for 10,000 volunteers to join them at the next cleanup. It took a few years longer than his original vision, but FoLAR's Great Los Angeles River Cleanup, or La Gran Limpieza, is now the largest urban river cleanup in the United States.

In 2017, the formerly one-day event expanded to three consecutive weekends to cover the upper, middle, and lower sections of the river. In 2019, several thousand volunteers removed an estimated 100 tons of trash from the river.[50]

Trash removal programs represent a win-win for the river, as tens of thousands of Angelenos have had an up-close experience inside the channel where they see both the trash and graffiti as well as glimpses of birds and butterflies as the river habitat reemerges. Trash removal is a highly visible means of reducing manmade impacts and lead more people to view the river as a natural feature flowing through their community.

In 2004, FoLAR partnered with LABOS and began to examine the types of trash collected during the cleanup to determine where the trash was coming from and how it was getting into the river. The goal for collecting this data was to identify likely sources of trash entering the river, which reduce the amount of trash in the river channel more effectively.

FoLAR now sorts trash at La Gran Limpieza cleanup sites as shown in Figure 4:

- Sepulveda Basin Recreation Area
- Bette Davis Park
- Fletcher Drive
- Steelhead Park
- Compton Creek
- Willow Street Overcrossing

These sites were chosen to provide data from a diverse group of locations along the length of the river from the San Fernando Valley (Lake Balboa Park), through the soft-bottom Glendale Narrows (Bette Davis Picnic Area, Fletcher Drive/Bowtie Parcel and Steelhead Park) to Compton Creek and Willow Street near the mouth of the river.

50 The Great L.A. River Cleanup (n.d.) Retrieved June 2016 from https://folar.org/cleanup/

FIGURE 11 – MAP OF FOLAR TRASH SORT SITES: 2011-2019

FOLAR TRASH SORT METHODOLOGY

The trash characterizations organized by FoLAR differ from the LASAN trash characterization report discussed above in that these results are limnological characterization assessments of trash from within the river channel, in contrast to the City's land-based characterization of litter in streets and public areas that could migrate into the river.

A crew of trained volunteers with multiple years of experience have gradually refined the trash assessment protocol. Initially, only weight or volume was recorded along with the brand names of different items. In its current form, volume (fullness of standard trash bags), weight (pounds) and item counts for each trash category are recorded along with the brand names or other notable details of items collected. In addition, FoLAR expanded from five categories to 15 categories of trash, giving a more detailed breakdown of the trash types.

During each La Gran Limpieza event, the FoLAR trash sort crew randomly selects approximately 5 percent of the trash bags filled by cleanup volunteers and moves those bags to a predetermined area for sorting. The amount of trash sorted depends on the total amount of trash collected at the cleanup site and the size of the trash sort crew.

Each of the selected bags is broken open and sorted on a tarp into each of the following fifteen categories:

1. Food Service Packaging (clamshells, cups, etc.)
2. Snack and Candy Packaging
3. Bottles and Cans (California Redemption Value "CRV" beverage containers)
4. Non-CRV Containers (other beverage containers)
5. Molded Plastic (non-beverage containers)
6. Metal (non-beverage containers)
7. Glass (non-beverage containers)
8. Cigarette Butts
9. Polystyrene (Styrofoam, etc.)
10. Paper Bags, Newspapers, etc.
11. Plastic Film, Non-Grocery Bags
12. Plastic Film, Single-Use Grocery Bags
13. Plastic Film, Tarps
14. Clothes and Fabric
15. Other

Each category is measured by three metrics (weight, count, and volume) to provide a more detailed representation of the trash collected since each metric offers a different perspective to assess the relative impact of each category of trash.

For example, metal items tend to be heavy and bulky due to their high density, while paper and plastic items tend to be more lightweight and compact. Fabric and clothing is often saturated with water, while plastic bags are intertangled with branches or filled with wet sand, making these items seem much heavier. Comparing all three metrics, along with examining the photos taken of each category, gives a more complete view of the characteristics of the trash sampled at each site.

Since the weight and size of each item of trash affects its mobility, patterns should emerge of the types of trash found at various points on the river throughout the year, with the heaviest metal items taking the longest time to accumulate downriver.

The piles for each category, shown in Figure 12, are placed into separate trash bags of uniform size so that a consistent measure of volume can be obtained for each category. FoLAR has found that using trash bags rather than buckets provides a better ability to visually gauge relative volume (e.g. 10%, 25%, etc.).

Once each category has been weighed, tallied and volumized, the sorted samples are put back with the rest of the cleanup trash for collection by LASAN.

FIGURE 12 – TRASH SORTING IN PROGRESS

RESULTS

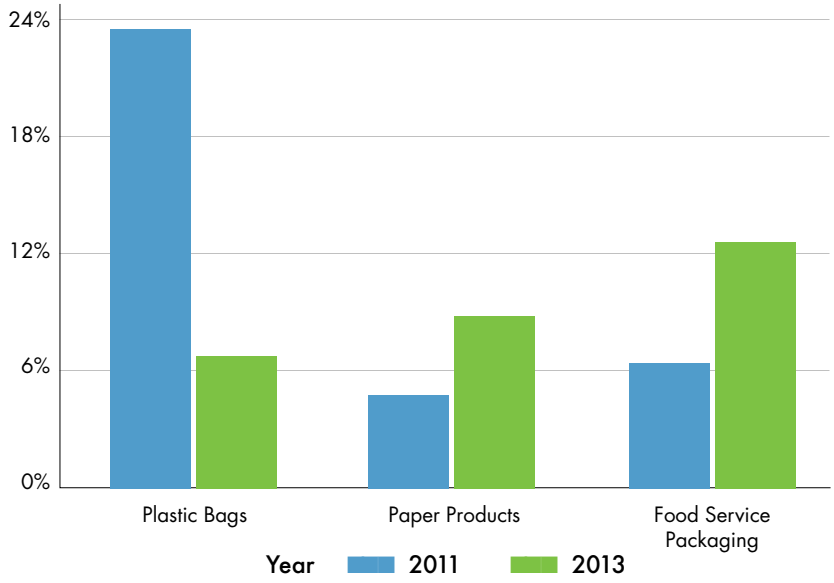
Sixteen years of trash sort results show the L.A. River channel contains a diverse range of trash that can be seen as a snapshot of all human activity in the surrounding densely populated urban watershed.

Variability of weather and economic conditions as well as changes in volunteers and methodology makes it difficult to draw definitive conclusions. However, some trends are apparent:

- The relative weight and density of categories appears to have a significant effect on the quantities of each category found on the upper river sites and the lower river sites. Heavy, dense items such as Metal, Non-Beverage and Clothing & Fabric are more likely to be found in the upper river sites from Sepulveda to Fletcher, at least in April when the cleanups occur.
- Large objects, typically recorded in the "other" category and likely the result of dumping adjacent to or into the river channel, have declined over time. There has been a noticeable reduction in the "charismatic megafauna" of the river such as sofas, major appliances, and car chassis. The continued presence of these large items serves as a reminder that a significant percentage of trash in the river seems likely to have been thrown or carried into the channel.
- Changes in trash volume or type can reveal likely litter sources. For example, the Compton Creek trash sort site is adjacent to a busy Metro Blue Line train station, where each year large amounts of food service-related trash are removed from along the fence line and within the river channel. After the station closed for several months, there was minimal trash found in the adjacent parking lot or in the river channel. This was clear evidence that localized point sources, in this case a high-traffic transitional public area bordering the river, continue to be a significant source of trash flowing into the river.
- Another major source of trash seems to be attributable to direct deposit into the river channel from neighboring homeless encampments. Encampments are clearly visible in the Sepulveda Basin, at Steelhead Park, and at the Bowtie Parcel, as well as in the estuary at Willow Street in Long Beach. We have observed a significant increase in clothing, food service and grocery store packaging as well as personal or household items that tend to fall under the miscellaneous category – such as disposable razors, barbecue grills, stereo speakers, and fishing line.
- Based on the observations by long-time cleanup volunteers, the visual appearance of trash has changed over the past decade. Many of the street litter items such as foodservice packaging and snack wrappers now look much less degraded, implying that these items have not travelled through storm drains but have blown into or were dropped directly into the river channel.

There are indicators of the relative effects of institutional controls. Plastic grocery bags were consistently one of the largest percentages of the trash found at each site between 2004 and 2010. of In August 2011, Los Angeles County issued a ban on single-use plastic bags, effective for County unincorporated areas. In the subsequent years, many cities in the county have followed suit, including the City of Los Angeles in 2015. The impacts of this legislation are clearly reflected in the data, but 60% of the effect appears to be substitution of materials rather than actual reduction of trash. Based on these results, it appears that bans may not change underlying human behavior but instead merely produce a change in litter type. As shown in Figure 11, FoLAR saw a 16 percent decrease in plastic bags found in the River from 2011-2013, while at the same time the share of food service packaging and paper increased by six and four percent.

FIGURE 13 – PLASTIC SHOPPING BAGS, PAPER PRODUCTS AND FOOD SERVICE PACKAGING



Providing alternative habits for consumers will be necessary to mitigate the environmental damage of single-use items. Banning a version of single-use products simply forces manufacturers or consumers to use a different material, and waste patterns are not interrupted. Encouraging realistic changes in routine rather than punishing consumers for use is necessary to enact meaningful changes in their trash generation.

Another consumer behavior modification that seems to have limits in its effectiveness is imposing redemption values on recyclable items. Beverage containers with California Redemption Value (CRV) are consistently found every year at nearly every site. The amounts vary, but their constant presence is a reminder that even putting a monetary value on trash has its limits in preventing those items from being littered. What is more surprising is these items are still easily found despite the amount of scavenging that occurs for CRV containers.

WHAT DO THESE STUDIES TELL US ABOUT THE TRASH TMDL?

Comparing and contrasting the LASAN and FoLAR results can help to establish relative effects of the Trash TMDL in reducing trash in the L.A. River, and provide answers to some key questions:

1. Have there been changes in the types of trash commonly found in the river?
2. Is there a difference between trash found on the streets and in the river?
3. What actions can be taken to continue to reduce trash in the river?

There are significant differences between the two studies, namely that LASAN examined the distribution of trash found on streets and public areas, while FoLAR quantifies the types of trash collected from the river channel. LASAN chose sites with low or medium trash generation rates, while FoLAR sites are areas of the river with a natural bottom where trash tends to collect.

Despite these differences, the essence of both studies is similar and the results offer valuable insights into the composition of trash both on land and in the river channel that should be useful in planning future revitalization and litter abatement efforts.

1. CHANGES IN COMPOSITION OF TRASH WITHIN THE RIVER

The proportions of trash types from pre- and post-TMDL trash sorts can be compared using volumetric data from Willow Street in 2004, collected prior to structural controls being installed, and 2011, the midpoint of the TMDL implementation period. (Note: the categories have become more detailed over time, starting with eight categories in 2004, increasing to 12 in 2011, and arriving at the current 15 categories in 2017.)

FIGURE 14 – TRASH SORTED IN 2004 AT WILLOW ST. BY VOLUME

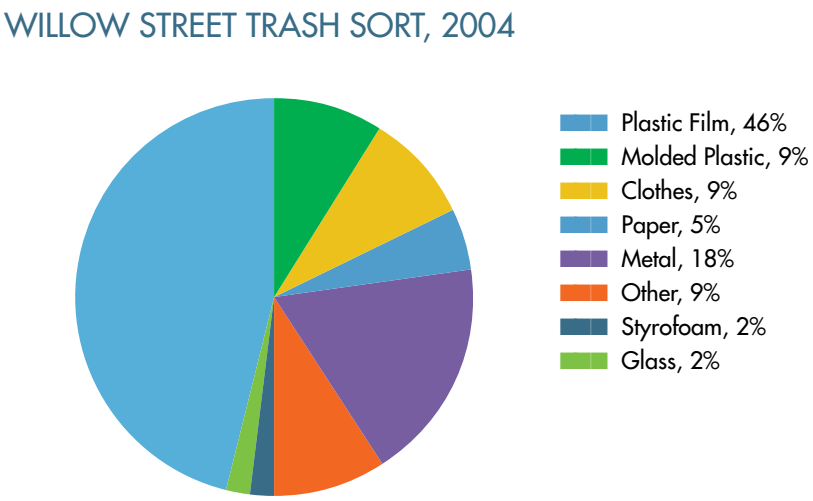
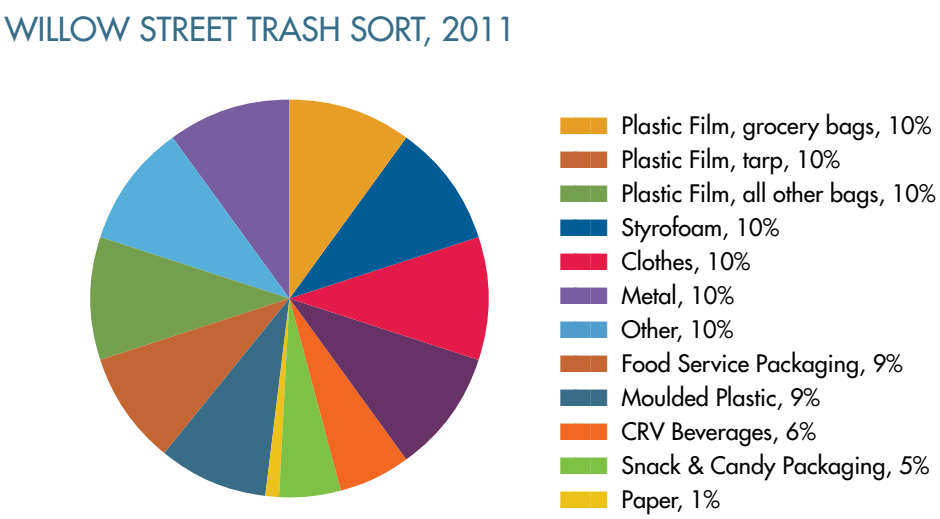


FIGURE 15 – TRASH SORTED IN 2011 AT WILLOW ST. BY VOLUME



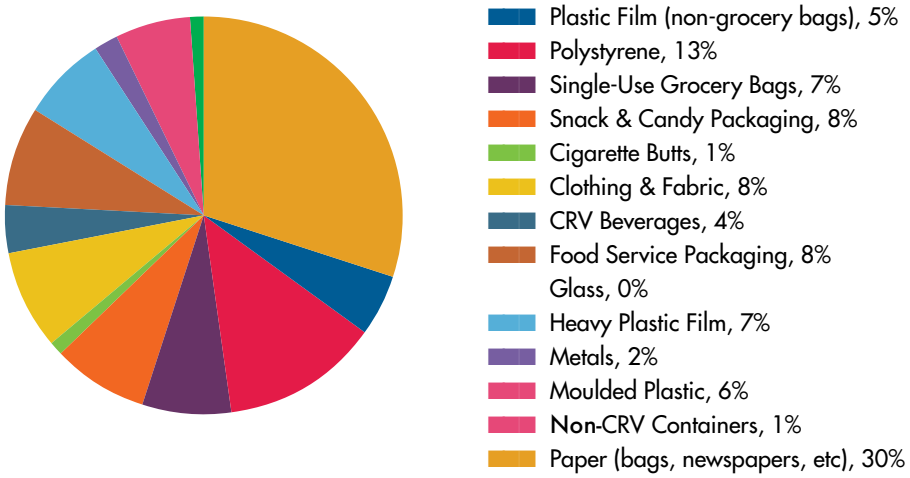
Data visualization reveals a dramatic difference in trash composition between these two years. The 2004 results show four dominant trash types which constitute 82 percent of the total. The 2011 graph reveals a strikingly even distribution between categories, with nine of the twelve categories each representing nine or ten percent of the total.

Comparing the two graphs suggests that a significant change occurred to trash pathways between 2004 and 2011, which corresponds to the period when a majority of structural controls were installed. The visual difference between the two graphs, from a relatively disordered distribution in 2004 to an equal and orderly distribution in 2011, creates the impression of a filter having been placed on major trash sources which blocked most of the dominant items, while a randomized assortment of trash still entered the river by secondary pathways. More recent volumetric results from Willow Street trash sorts continue to support this observation.

2. ARE THERE DIFFERENCES BETWEEN LITTER IN THE STREETS AND TRASH IN THE RIVER?

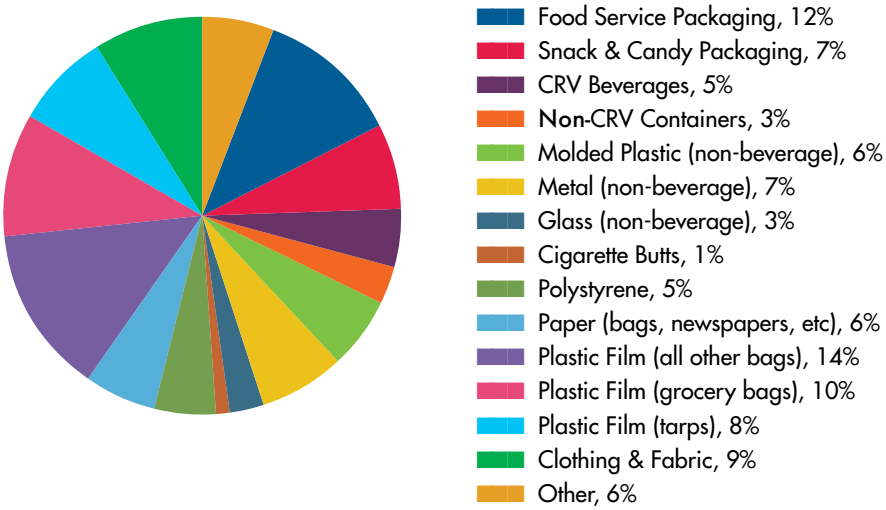
The following graphs compare the results of the LASAN 2012-13 trash characterization study, which examined litter found in public spaces and streets, with the combined results from the 2012 and 2013 FoLAR trash sorts, which examined trash found in the river channel.

FIGURE 16 – TRASH COLLECTED IN THE 2012-2013 LASAN QUANTIFICATION STUDY



The City of L.A.'s trash characterization shows trash within their study areas of streets, public spaces and parks consisted primarily of paper items (30 percent) followed by various polystyrene items (13 percent), snack and candy packaging (8 percent) and food service packaging (8 percent) as seen in Figure 16.

FIGURE 17 – TRASH COLLECTED IN THE 2012-2013 FOLAR CLEAN UP BY TYPE



Comparing Figure 16 to Figure 17 indicates a clear difference between the litter and trash accumulating on the streets, where the top two categories represent 43% of the total, versus what is actually found in the L.A. River, which has a relatively even distribution between one percent and 14 percent.

In the 2012-2013 Final Quantification Study of Institutional Measures for Trash TMDL Compliance, the City concluded,

> "It is clear that paper and Styrofoam products are major contributors to the trash that threaten to enter the L.A. River, making up 43 percent of the total trash collected during the entire Study duration. These materials are very light and prone to being picked up and carried by wind, which make them more threatening to pollute nearby waterbodies. While full capture systems are installed in high trash generating areas, it is still possible for the wind to carry paper and Styrofoam products to other areas of the City with partial capture systems or directly to receiving waterbodies. Thus, it is important for the City to take steps to control paper and Styrofoam litter."

However, the FoLAR data for the same years did not reflect these patterns, with paper and polystyrene found in the river at 5.9 percent and 4.7 percent, respectively. Historically, polystyrene has totaled approximately 5% of the trash collected from the L.A. River by volume.

Comparing the results of these two studies shows that a limited number of categories compromise most street litter types, while the trash found in the river channel has a much more even distribution. This again suggests the primary pathways for street litter to enter the river have been blocked, while a random assortment of trash still winds up in the river via numerous secondary sources.

Conclusion: Best management practices implemented as part of the Trash TMDL have reduced the flow of street litter into the L.A. River

Analyzing and comparing the two sets of survey results suggests there has been significant progress in reducing the flow of trash into the L.A. River, with the co-benefit of reducing the volume of trash escaping into the Pacific Ocean.

The LASAN survey shows that institutional controls such as increased street sweeping quantifiably reduced the amount of litter on city streets.

Lighter trash items compromise a much higher percentage of street litter than river trash, suggesting that institutional and structural controls on city streets are preventing lighter trash from entering the river.

There also appears to be a much more even distribution between the types of trash found in the river in comparison to the trash found on the street. The most common types of street litter are prevented from entering the storm sewer network, so the trash that enters the river by secondary pathways is more of a random sample of all commonly observed litter.

However, the more the river is cleaned up, the more the remaining trash stands out. The great strides taken over the last fifteen years toward a cleaner river should be viewed as the first steps toward a long-term goal of preventing trash throughout the entire L.A River watershed.

The Measure W implementation process represents a promising opportunity to pursue this goal. Tactics such as reducing the velocity of stormwater runoff and capturing it for groundwater recharge should have the co-benefit of reducing the amount of trash that can flow directly into the river channel.

3. WHAT CAN BE DONE TO FURTHER REDUCE TRASH IN THE RIVER?

Leverage City of L.A. leadership on civic data

Los Angeles Mayor Eric Garcetti's administration has demonstrated a commitment to using available data in innovative ways[51] to make better decisions on how to target civic resources and align ongoing activity. The Geohub[52] data portal enables multiple city and county departments to share and combine their operational data into sophisticated visualizations that spur insights into how to improve or streamline municipal services.

LASAN has already done excellent work in creating the trash hot spot maps used in the Trash TMDL process, but this project could be taken to a new level by using Geohub to combine data from other agencies that may reveal useful patterns. LASAN can overlay geolocated data related to urban activities known to have correlations with litter behavior, such as:

- Map the locations of convenience stores, a primary source for snack items consumed outdoors and presumably at highest risk of becoming litter, that are adjacent to transit stops, which are commonly very littered sites. Select the areas with the highest concentrations of both convenience stores and transit stops and do outreach to assess whether targeted education or prevention campaigns could potentially reduce litter behavior at these sites
- Overlay the contours of the L.A. River watershed onto the LASAN CleanStat street trash mapping tool to identify the Somewhat Clean and Not Clean blocks that drain into the river. Coordinate with City of L.A. Bureau of Street Services to survey these areas and brainstorm potential solutions to reduce the risk of street litter entering the river channel.

Perform a Secondary Trash Source Assessment

The Trash TMDL was successful in mitigating the primary source of trash in the L.A. River, namely the storm sewer network that empties into the river. To continue progress on reducing the remaining trash sources and pathways, we recommend compiling a list of the secondary trash sources that are now the primary targets for trash reduction. Examples of these potential sources include:

- Tributaries of the L.A. River that lack structural trash controls
- Bridges and overcrossings where traffic and pedestrians come into close contact with the river
- Transition points such as bus and train stops and transit hubs
- Public spaces and schools alongside or near the river with large numbers of visitors
- Corridors with high vehicle traffic adjacent to the river channel

Pilot project for self-organized homeless trash collection

Over the past decade, FoLAR staff have engaged in conversations with residents of the encampments within and adjacent to the river channel. Based on their feedback, there is a strong desire for a trash collection system within these homeless communities, and there are motivated residents who are willing to organize their neighbors to clean up trash on a regular basis.

We believe the desire for and need to remove trash before it piles up and makes its way into the river presents an excellent opportunity for a pilot program to establish trash collection systems in river-adjacent homeless encampments.

The California Coastkeeper Alliance has documented[53] several successful programs to organize homeless residents to clean up their encampments, resulting in dramatic reductions in downstream trash. The report cites several programs

51 https://datasmart.ash.harvard.edu/news/article/the-power-of-data-visualization-in-cities-los-angeles-geohub-1111
52 https://geohub.lacity.org
53 https://cacoastkeeper.org/lessons-learned-from-empowering-the-homeless-for-cleaner-rivers-streams/

located along the Russian River, Santa Ana River, and Coyote Creek that have organized homeless residents to remove trash from their encampments and then place bagged trash in a central area for collection on a weekly basis. Tens of thousands of pounds of trash have been removed from river-adjacent encampments by these programs.

We recommend a pilot program based on these successful models which would offer small weekly stipends for purchase of groceries to "captains" in exchange for them organizing their neighbors to collect and bag trash and neatly pile it at a predetermined location for a regularly scheduled pickup. We believe many residents of encampments will recognize reducing visual blight will reduce negative attention on their community.

Another key participant would be a liaison who is involved in community issues and understands the dynamics within specific local homeless encampments. This liaison function could also be performed via a partnership with a non-profit organization that provides supportive services to homeless residents such as SELAH Neighborhood Homeless Coalition[54]. This liaison would provide the captains with garbage bags and other needed supplies, doublecheck the trash is being put out for collection neatly and safely, and coordinate with the agency hauling the trash.

Local agencies with jurisdiction for river-adjacent areas can send a truck once per week to a collection point to pick up and dispose of the trash bags. A proactive system to remove trash from river-adjacent homeless communities will likely save labor by local agencies over time, while encouraging increased cleanliness could help to mitigate fire risk in the encampments.

Proposed pilot program locations:

- **Sepulveda Dam Recreation Area** – near long-term homeless encampments
- **Arroyo Seco** – final ¼ mile of the Arroyo Seco as it meets the L.A. River
- **Glendale Narrows** – a site TBD between Los Feliz Blvd and Fletcher Drive

To generate additional trash composition data, we recommend a crew from L.A. Conservation Corps does an initial cleanup and trash sort prior to local captains taking over, followed by quarterly trash sorts of samples of trash removed for pickup

Strategic placement and servicing of trash receptacles

The use of secure trash receptacles near high-trash sites, accompanied by a service schedule matched to usage patterns, is a direct and efficient means to collect and remove trash from the river channel.

While this is seemingly a simple concept, there is a wide range of variables that need to be aligned for a receptacle to truly reduce trash in the surrounding area:

- A wide variety of receptacle types have been developed for specific use cases, with design parameters such as how easy it is to deposit trash into the can, how well the can prevents trash from escaping, the relative labor involved in emptying the can, weather resistance, and durability.
- The specific positioning of receptacles is a key factor in how much potential litter they will collect. Sites in high-traffic areas, especially where people are transitioning from one activity to another (for example, at the entrance between a parking lot and a recreation area) are most effective at capturing trash that otherwise could become litter.

54 https://www.selahnhc.org/

- Receptacles should be emptied before they are most likely to become full, to avoid trash spilling out and people piling trash next to overflowing cans. Matching the service schedule to correspond with peak usage times, even if they occur on weekends, ensures that the maximum amount of trash ends up being removed from the site.

Due to the need to match each of these factors to each site, we strongly recommend a community process to incorporate feedback from local residents with direct experience of usage patterns and how trash tends to accumulate.

Continuing the discussion earlier in this report of how to best address trash generated by the unhoused population living near the river channel, we believe that it makes sense to add trash receptacles in high-use areas that would make it easier to dispose of trash that is an inevitable byproduct of encampments. If appropriate receptacles are not available where trash is being generated, it should be no surprise when that trash ends up in the river or on surrounding streets. Adding basic services such as trash collection to sites that are known to host unhoused communities is not encouraging camping, it is simply a pragmatic response to our current reality.

Targeted cleanups in strategic locations

There are locations along the river where trash continues to accumulate where cleanups timed around the rainy season would help to remove tons of trash that would otherwise be likely to be washed out to the ocean. Contracting with a nonprofit such as the Los Angeles Conservation Corps to perform regular cleanups at these locations would be a cost-effective means to remove a quantifiable amount of trash from the river channel.

If the trash removed from a certain location shows a reduction of 75% over a period of twelve months, that location can be considered for removal from the program.

Targeted locations include:

Willow Street Estuary – Near the end of the river in Long Beach, where the downstream current meets the ocean tidal influence and allows trash to settle out into the tall grass growing in the soft bottom. Since this is the last point before the trash boom and the ocean beyond it, this is the final chance to remove trash before it becomes marine debris. Biweekly cleanups for the four months prior to "first flush" storm events in November should capture the maximum amount of trash that has worked its way down the length of the river.

Sepulveda Dam – The Sepulveda Dam recreation area is a very large and high-traffic multi-use park located in the middle of the densely populated San Fernando Valley. Its position at the top of the river provides an opportunity to remove a potentially significant amount of trash that would otherwise travel downstream.

Arroyo Seco – The confluence of the Arroyo Seco and L.A. River, located just upstream from downtown L.A., is a point where trash has been observed to accumulate. These piles of trash could be due to the cross-current from the Arroyo Seco entering the main channel, causing trash from both directions to settle out. This location is easily accessible with a truck due to the entry ramp off of San Fernando Road.

REDUCE STREET DUMPING

The City of L.A., through the Clean Streets L.A. initiative, has proactively addressed an explosion of illegal dumping on streets and alleys. LASAN performs quarterly surveys of every street and alley in the City of L.A. and assigns each a relative rating.

The results show continued reductions in street trash, but hundreds of blocks within the L.A. River watershed remain classified as "Somewhat Clean" or "Not Clean."

The Final Quantification Study of Institutional Measures for Trash TMDL Compliance identified the following next steps:

"The City provides pick-up services for oversized items; however, based on the frequency of dumping, it seems that residents may not be aware that these services exist or know how to contact them. The City should consider further outreach to raise awareness about the large item pick-up services through the Street Services Department. If dumping of oversized items continues, the City should consider enforcing stricter rules or fines on residents and business owners. Large trash items on City streets are not only an eyesore but may pose health and safety risks as well."

According to LASAN data[55], 80 percent of the land surrounding the L.A. River was littered with large items (abandoned couches, mattresses, shopping carts, etc.) as seen in Figure 18. It is a reasonable assumption that the longer these large items are left on the street for collection, the likelier that these items will end up in the river.

Recommendations:

- Promote existing channels, such as City of L.A.'s 311 non-emergency service call center for residents to schedule large item pickups and the MyLA311 app to report illegal dumping.
- Consider public-private partnerships to expand the reach of large item pickups. For example, contract with nonprofits with fleets of trucks to do large item pickup and disposal in the areas with the highest concentrations of "Somewhat Clean" and "Not Clean" blocks.

FIGURE 18 – LARGE ITEMS ON THE STREETS ADJACENT TO THE L.A. RIVER

55 City of Los Angeles, Quantification Study of Institutional Measures for Trash TMDL Compliance

SECTION 3:
RECOMMENDATIONS FOR REDUCING TRASH IN THE L.A. RIVER

1. Ensure that trash control continues to be a priority in future stormwater projects, including the Measure W process
   - Continue to expand a system of uniform structural controls that are properly maintained throughout the entire watershed, particularly high-generation areas upstream
     - Find ways to link structural controls with green infrastructure
     - Shared goal: slow down water, remove pollutants, improve habitats
   - Continued institutional controls such as street sweeping and increased recycling and garbage bins in river-adjacent areas

2. Use data and geospatial analysis to identify and address trash hot spots
   - Combine available data to augment trash hot spot mapping
     - Find sources, pathways to river
     - Target public education and direct interventions
   - Conduct a "Trash Risk Assessment" to identify the likely secondary pathways of trash that are still contributing trash into the river, now that the primary pathway of storm sewers has been controlled

3. Self-organized homeless communities can be encouraged to clean up the trash around their encampments
   - Coordinate with local agencies to schedule weekly trash pickups
   - Potential pilot sites at Sepulveda Basin, Glendale Narrows and Arroyo Seco

4. Targeted cleanups in key trash collection areas can capture 15 to 30 percent of potential marine debris before first flush takes it out to sea
   - Schedule biweekly cleanup blitzes 3 months prior to the likely start of winter rainy season
   - Identify potential sources of litter to implement targeted enforcement of existing litter ordinances upstream

5. Explore options to prevent direct dumping and wind-deposited trash that is not addressed by structural controls
   - Conduct additional trash characterization studies to collect more detailed data to determine potential pathways for the specific types of trash being found at different points on the river

6. Encourage coordination to enable additional cleanups and trash prevention projects among the dozens of cities and agencies responsible for the river
   - Use River Rangers and other local job corps programs

7. Fund education programs focused on identified high-generation and hot spot areas
   - School programs
   - Outdoor education – River Rover
   - Train local restaurants in best management practices for trash control

continued

8. In addition to addressing sources of trash, we encourage a new look at strategies that could lead to overall reductions in trash. Reexamining assumptions about how commonly used items are produced and disposed of could lead to breakthroughs in sustainability and a reduction in environmental impacts.

   FoLAR strongly encourages all stakeholders to take tangible steps to increase the reuse and recyclability of everyday items.

   - For example, innovations in material engineering could increase the use of alternative materials and recycled content, while more efficient design could reduce the amount of materials required in products and packaging.
   - We encourage the creation of post-consumer recycled content requirements for packaging, as well as increased responsibility by industry to financially support packaging recycling and reuse programs.
   - The more that consumer products and packaging are reused or recycled, the less trash there is that can get into the river channel.

FRIENDS OF THE
LA RIVER

FOLAR | 570 WEST AVENUE 26, SUITE 250, LOS ANGELES, CA 90065 | 323.223.0585 | FOLAR.ORG