A Trash Biography

Friends of the Los Angeles River
Trash Report
2004-2011

Discarded debris collected during the 2011 CleanUp at Willow Street.

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ABSTRACT

The Los Angeles River runs 51 miles through the second largest urban area in the United States, draining a watershed that is home to 14 million people. As with many urban rivers, trash and litter are a common occurrence in the LA River. Realizing that the best strategy to reduce trash depends on where that trash originates, Friends of the Los Angeles River (FoLAR) began conducting trash sorts in 2004 to determine the types of trash found in the River. Trash sorts have taken place at five sites: Lake Balboa in the San Fernando Valley, Fletcher Drive and Steelhead Park in the Glendale Narrows, Compton Creek, and the Los Angeles River Estuary at Willow Street four miles from the Riverôs mouth. A randomly selected subset of trash (approximately every 5th bag) collected at each of these sites was sorted into categories and then weighed. Plastic film was generally found to be the largest trash category by volume, especially single-use plastic bags and snack and candy packaging. Metal, cloth and molded plastic were also found to be common. Polystyrene (more commonly referred to as Styrofoam) was abundant at two sites. Based on these findings, FoLAR recommends the increased use of closed-top trash cans, the creation of anti-litter educational programs at supermarkets, convenience stores and fast food restaurants (from which most of the LA River trash seems to originate); and that the recent ban of plastic bags in unincorporated Los Angeles be extended to the rest of the cities within Los Angeles County. FoLAR encourages corporations to take part financially and with their personnel at Los Angeles River cleanups, particularly those whose products consistently show up in the River. FoLAR also recognizes the importance of monitoring and working to reduce the smaller pieces of plastic found in the Riverôs flow that are still able to make it through the mesh of the trash-excluding screens that have been installed in the LA River stormwater system. The Los Angeles River Trash Total Maximum Daily Load (TMDL) and the associated governmental efforts to cut down on trash in the waterway has brought the goal of a trash-free LA River closer than ever before. With this achievement in sight, FoLAR emphasizes the continued importance of trash-reduction efforts.

INTRODUCTION

The Los Angeles River (ñLA Riverò) has seemed more like a repository for waste than a river ever since most of it was encased in concrete by the U.S. Army Corps of Engineers in the 1940ôs and 1950ôs. ñCradle to Riverò seems to be the life cycle of numerous disposable wrappers, containers, bags and cigarette butts, and the 21st-century midden heaps along the Riverôs banks have included relics of urban life as odd as saunas, phone booths, suitcases, couch cushions, hub caps and wet suits. Indeed, items as bizarre as human skulls, car-halves and even a bloody Santeria sword have been found in the River.

The Friends of the Los Angeles River (FoLAR) began the Great Los Angeles River CleanUp in 1990 with the goal of bringing people to the banks of the LA River and giving them the chance to see it in a new light: as a part of the local environment that must be maintained. A trash-free LA River has long been a goal of FoLAR. Since the first Great Los Angeles River CleanUp, the LA River has become significantly cleaner. FoLAR and others have succeeded in removing many larger items, and efforts to cleanup the River have increased. Thousands of people have participated in the past 22 cleanups helping to transform the Riverôs public perception. This is exemplified by Mayor Villaraigosaôs teaming up with FoLAR to declare the first ever LA River Day of Service, in conjunction with the CleanUp on April 30th, 2011. A recent convergence of governmental and non-governmental efforts to clean up the River has brought this goal closer to reality than ever before. In 2011, 4,000 people participated in the CleanUp.

In September 2001, the Environmental Protection Agency adopted the Los Angeles River Trash Total Maximum Daily Load (TMDL), a mandate requiring Southern California cities to reduce their trash contribution to the LA River by 10% each year for a period of 10 years with the goal of zero trash by 2015. The TMDL defines trash as debris of human origin that is trapped by a 5 mm mesh screen, encompassing all improperly discarded waste material including grass clippings and other yard wastes. These goals have thus far been achieved through public outreach, street sweeping, and most importantly the installation of catch basin inserts that catch trash within the stormwater system and prevent it from being carried into the River. Proposition O, approved by LA City residents in the November 2004 election authorized the City to issue $500 million in general bonds for cleaning up and preventing pollution of our waterways and beaches, has also provided funding for projects that cut down on trash carried by stormwater into the Los Angeles River. Most recently, Los Angeles County environmental supervisors voted in July 2011 to ban plastic bags in unincorporated parts of the county, an area encompassing 1.1 million people.

FoLAR began conducting trash sorts at its 2004 River School Day, an annual education fair and CleanUp for students throughout the Los Angeles Area, to investigate the composition of LA River trash. In addition to removing trash from the River, FoLAR was curious about what types of trash are in the River, where is it coming from, how it is getting there and how the amount of trash in the River can be reduced most effectively. During the 2010 and 2011 CleanUps trash sorts were conducted at Steelhead Park, Lake Balboa site in the Sepulveda Basin, the Willow Street Estuary, and at Fletcher Drive in the Glendale Narrows. FoLAR conducted a trash sort for the first time at Compton Creek in 2011.

This report examines the sources of the trash that finds its way into the River, the potential behaviors that led to it being there, and possible solutions to the problem, providing a road map towards a cleaner River and a cleaner Los Angeles. This document presents, for the first time, a comprehensive analysis of FoLARôs trash sort data to date.

METHODOLOGY

The volunteers who have sorted trash for FoLAR over the years have gradually refined the trash sort methodology, resulting in its present form. In the past, only weight or volume was recorded along with the brand names of different items. In its current form, however, both volume (in number of standardized trash bags) and weight (in pounds) of each trash category is recorded, along with the names and numbers of brand name items collected. In addition, FoLAR now uses 15 instead of the original 10 trash classes, giving a more detailed breakdown of the trash collected.

As it stands now, FoLARôs trash sort takes place according to the following system. First, between 10% and 20% of the total number of trash bags are randomly selected and brought to the trash sorting area for sampling (depending on how much total trash is collected and how many volunteers are available to help sort the trash). These selected bags are then emptied and sorted on a tarp into each of the following 15 categories:

- Food Service Packaging (clamshells, cups, etc.)
- Snack and Candy Packaging
- Bottles and Cans (California Redemption Value or ñCRVò beverage containers)
- Non-CRV Containers (other beverage containers)
- Molded Plastic (non-beverage containers)
- Metal (non-beverage containers)
- Glass (non-beverage containers)
- Cigarette Butts
- Polystyrene (Styrofoam, etc.)
- Paper bags, newspapers, etc.
- Plastic Film, non-grocery bags
- Plastic Film, single-use grocery bags
- Plastic Film, tarps
- Clothes and Fabric
- Other

Each class of trash are then sorted into other trash bags of uniform size, a rough measure of volume. Though other litter surveys have explicitly measured the dimensions of each trash item, this methodology is expensive and time-consuming. FoLAR has chosen to use the number of trash bags of each trash class to measure volume due to time and financial constraints. As items with legible brand names are put into these bags, the brand names are recorded. Once all of the trash has been sorted into the individual bags for each class, they are weighed. Once the data have been collected, the sorted trash is disposed of with the rest of the cleanup trash.

Though both weight and volume were measured, volume was taken to be a better measure of quantity since weight tends to overestimate quantity in certain cases - for example, even small amounts of metal appear heavy due to the materialôs high density ï and underestimates quantity in others, as in the case of plastic, a very light-weight material. Also, items of clothing had a tendency to be wet and thus weigh more, while plastic bags were often filled with wet sand, giving both the illusion of being heavier than they actually were.

Trash Sort Site Locations

Figure 1. A map of FoLARôs trash sort sites.

FoLAR has successfully sorted trash at five locations: Lake Balboa, Fletcher Drive, Steelhead Park, Compton Creek and Willow Street (see map above). All five sites are within natural-bottomed sections of the River where trash tends to collect in vegetation. Sites were chosen to provide data from a diverse group of locations from the San Fernando Valley (Lake Balboa), the Glendale Narrows (Fletcher Drive and Steelhead Park), and Compton Creek and Willow Street near the mouth of the River.

Trash flowing in the water of the Los Angeles River (i.e., in the laminar flow) was not collected, though FoLAR hopes to measure this in the future. Laminar flow, as opposed to turbulent flow, is characterized by fluid that flows in parallel layers without disruption or lateral mixing, allowing for estimation of densities of trash particles.

RESULTS

Fletcher Drive
2004, 2005, 2009, 2010

About Fletcher Drive

The Fletcher Drive trash sort site is located in the natural-bottomed Glendale Narrows and is the site of River School Day, a FoLAR educational event. The area is upstream of Steelhead Park and lies across the River from Marsh Park. It intercepts trash from Glendale, Burbank, and the San Fernando Valley.

Local students help collect trash at one of FoLAR's Fletcher Drive trash sorts.

Fletcher Trash Sort 2004 & 2005

In both 2004 and 2005, FoLAR sorted 60 cubic feet of litter with LA City Council District 1 and the Bureau of Sanitationôs Watershed Protection program. By volume, plastic film (composed of plastic bags, snack and candy wrappers, tarps and other thin sheets of plastic) was the most abundant in 2004 at about 34% of the total, followed by metal (19%) and cloth (18%). In 2005, trash was sorted and weighed, but volume was not estimated. Metal was the heaviest category, at 33% of the total mass, followed by cloth at 27 % and plastic film at 15%. **See pie charts on page 8.**

Although this trash was sorted at the same site both years, it is difficult to compare the two years because weight was not available for 2004 and volume was not available for 2005. However, if the composition of this trash was similar, then plastic film was by far the most abundant category of trash at Fletcher during these years; if moldable plastic and plastic film/bags are lumped together, then plastics made up approximately half of all the trash sorted at Fletcher in 2004.

Because metal and cloth are heavier than plastic, however, the metal and cloth collected in 2005ôs Fletcher Trash Sort outweighed the more voluminous plastic, together making up 60% of the mass of the 2005 Fletcher Trash Sort.

Fletcher Trash Sort 2009 & 2010

Plastic was the largest category at Fletcher Drive in 2009 by both weight and volume. In 2009, plastic film made up around 33% of the total weight of trash collected, followed by clothes and fabric at 25% and metal at 16%. Molded plastic made up 12% of the weight of the sample. Plastic shopping bags made up slightly less than half of the total volume of the trash collected, followed by clothes and the ñotherò category at around 17% of the total volume each. **See pie chart on page 9.**

In 2010, clothes/fabric was the heaviest category at around 61% of the total weight of the sample, though the trash sorters noted that the clothes were wet or filled with dirt and sand and thus were heavier than they should have been. Next was plastic shopping bags and metal, at 11% and 10% of the total sample respectively. The most voluminous categories in 2010 were plastic shopping bags (33%) and clothes/fabric (28%), followed by ñother,ò molded plastic and metal (9% each).

The most numerous brand name items found in 2009 were Frito Lay® chip bags (Doritos ®, Cheetos®, Lays®, etc.) (44), Rust-Oleum® spray cans (10), Coca-Cola® cans and bottles (eight), Snickers® wrappers (six), Kit Kat® wrappers (five), Capri Sun® juice containers (four), Blue Bunny® Ice Cream wrappers (three) and plastic 7-Eleven® bags (three). In 2010, the most common items were Frito Lay® chip bags (nine Cheetos®, eight Fritos® and five Doritos®) (22), Target® shopping bags (six), Ruffles® chip bags (three), McDonaldôs® cups (three), and plastic Coca-Cola® labels (two). Because these numbers represent only 20% of the total amount of trash collected, there were likely about five times more of each brand name item collected during the CleanUp. **See pie chart on page 9.**

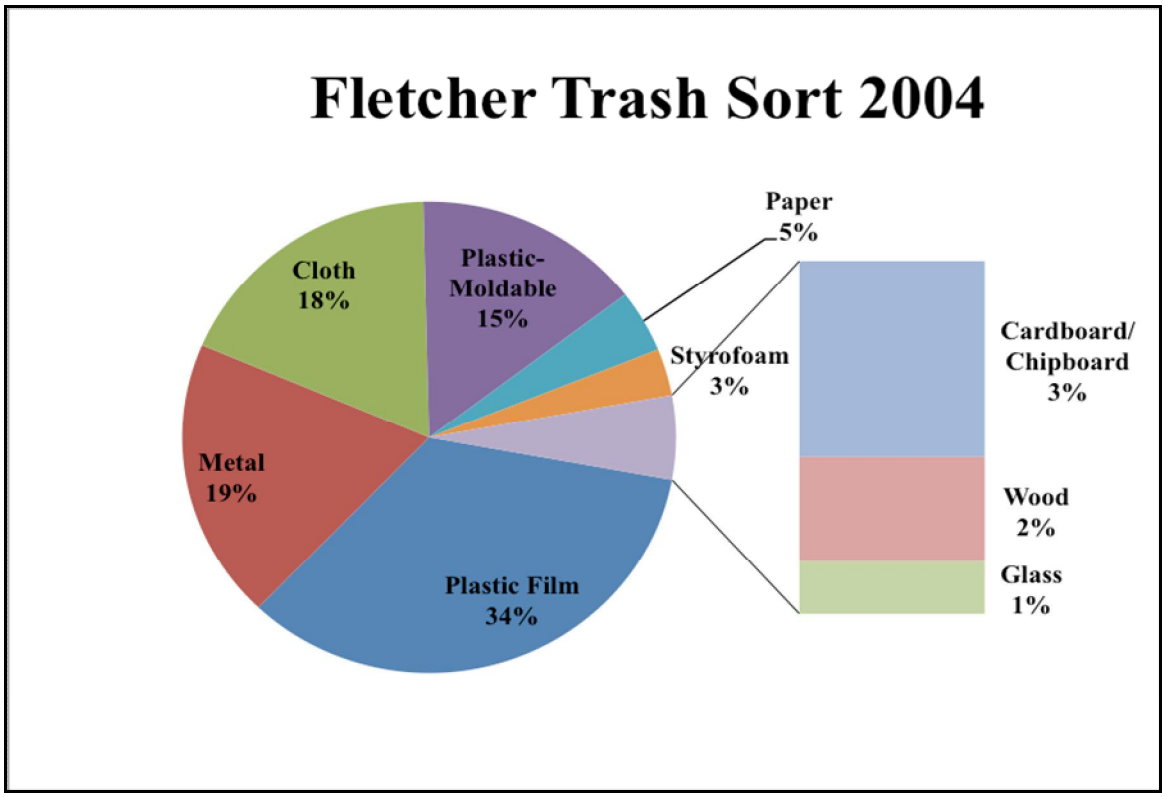


Figure 1. A break-down of the trash sorted at Fletcher Drive in 2004 by volume.

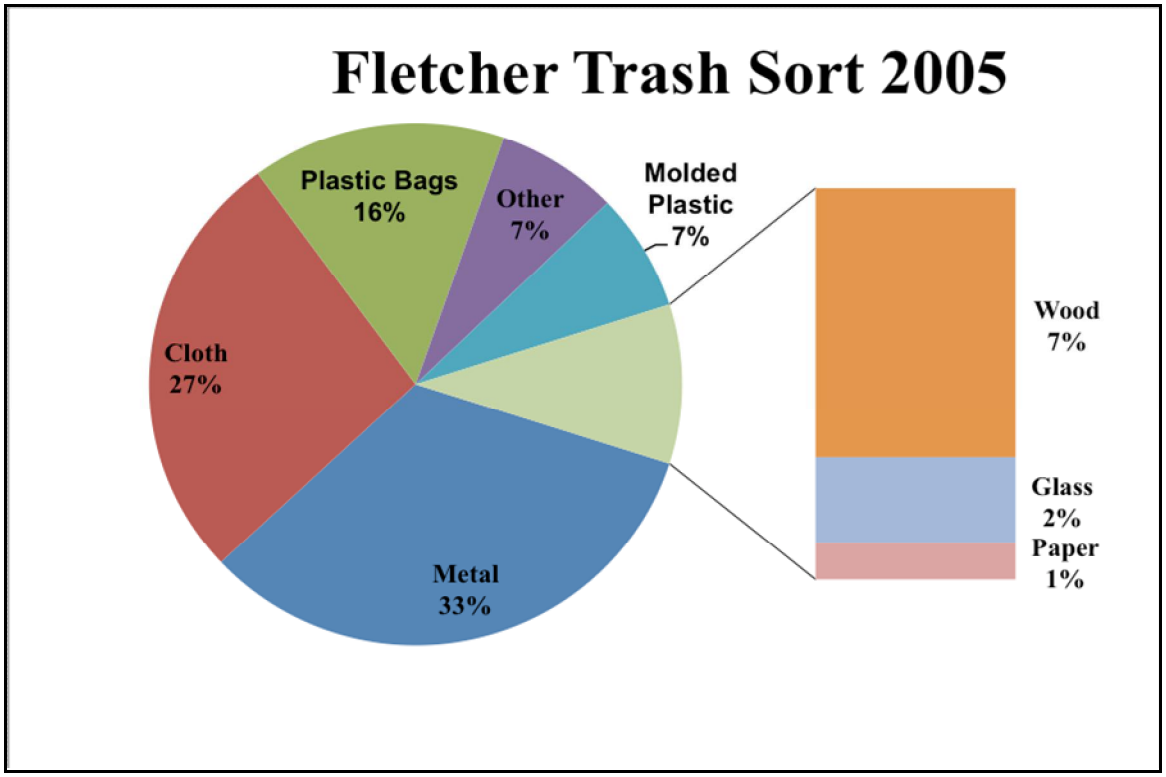


Figure 2. A break-down of the trash sorted at Fletcher Drive in 2005 Fletcher Drive by weight.

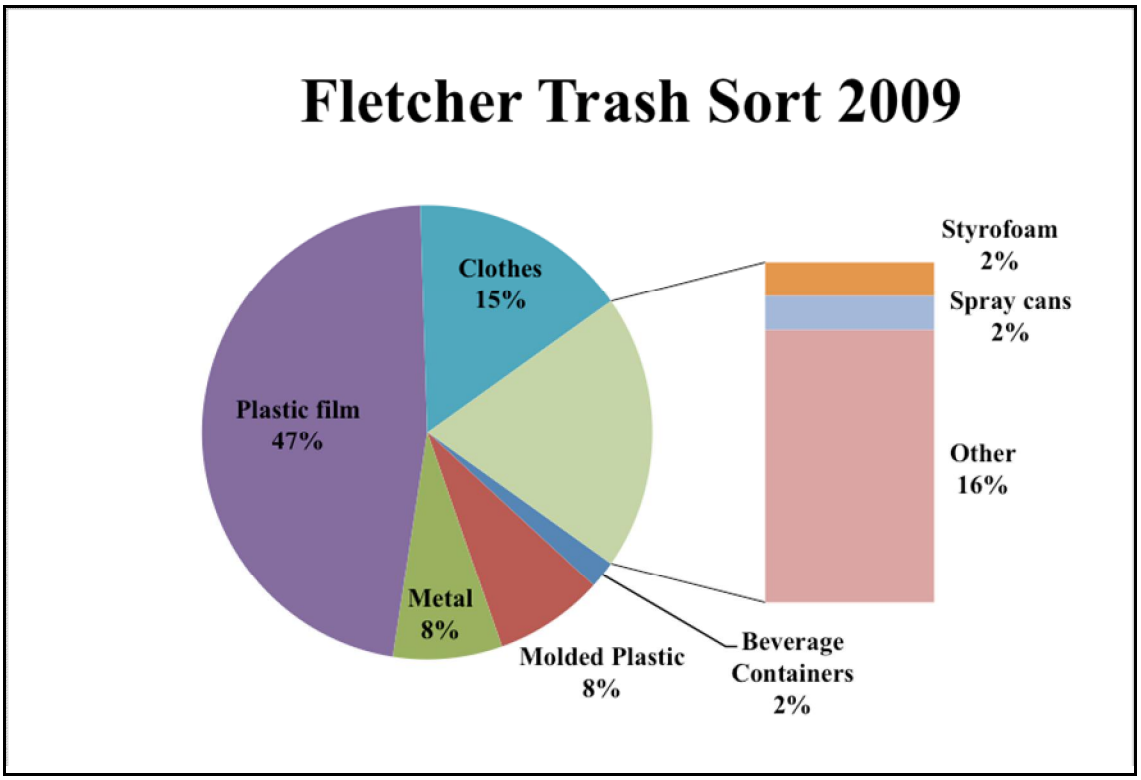


Figure 3. A break-down of the trash sorted at FoLARôs 2009 trash sort at Fletcher Drive by volume.

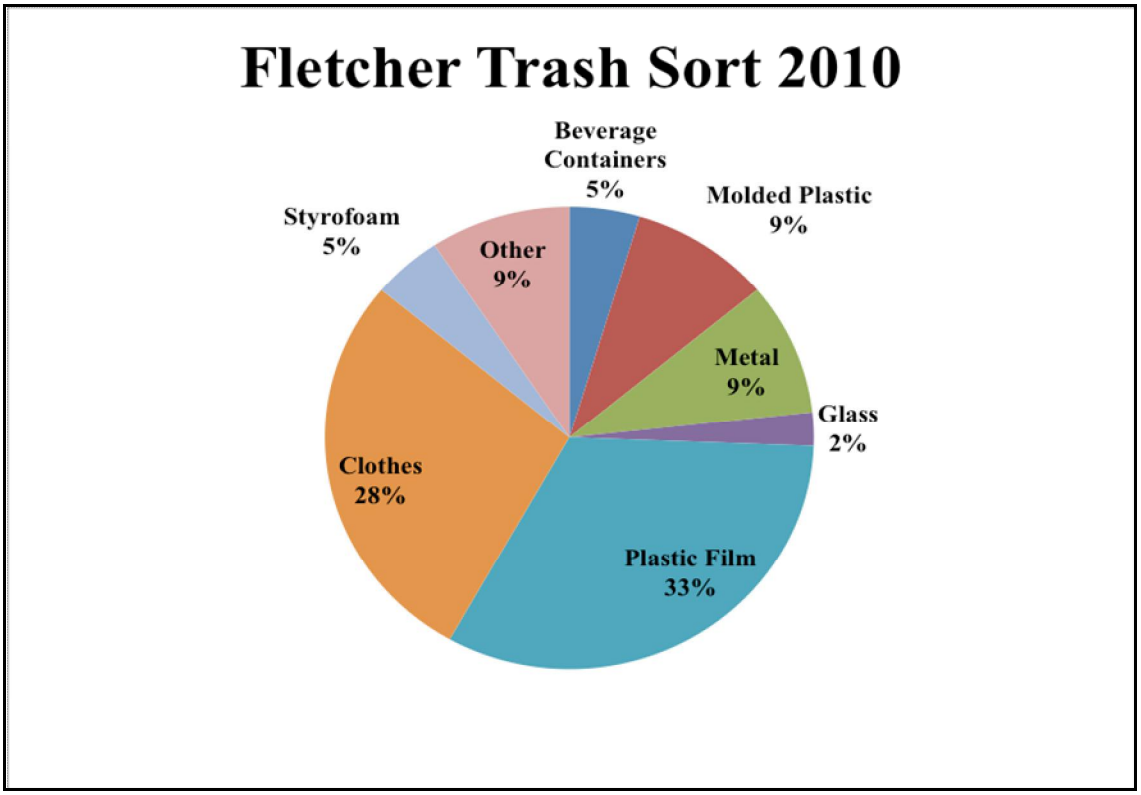
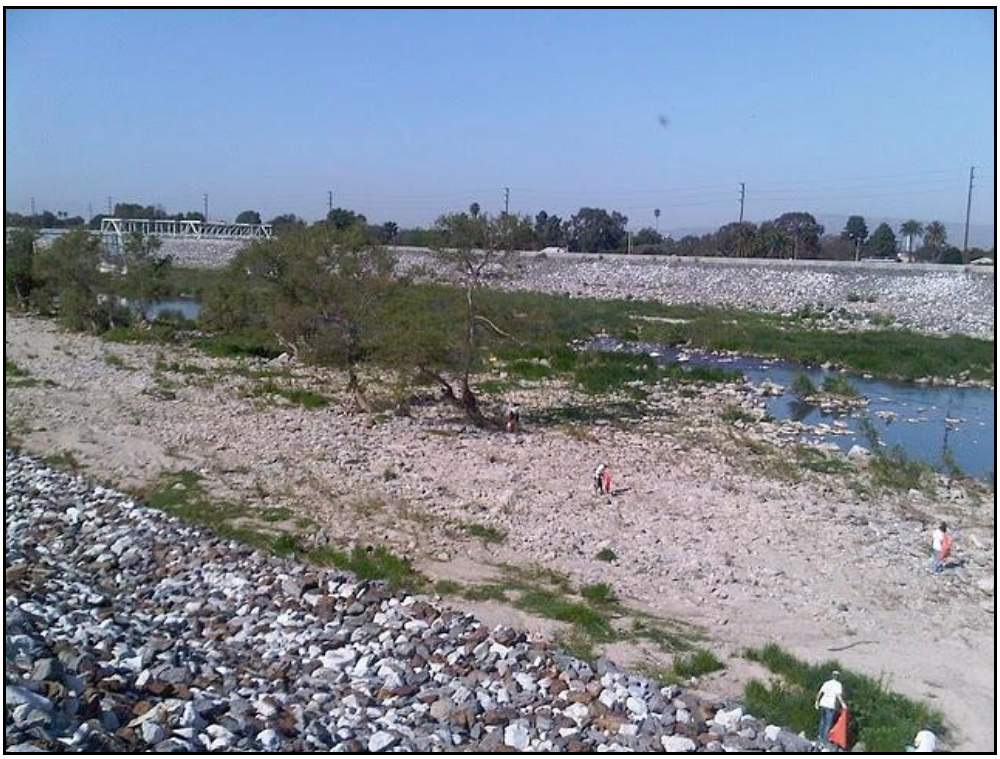


Figure 4. A break-down of the trash sorted at FoLARôs 2010 trash sort at Fletcher Drive by volume.

The Willow Street Estuary
2004, 2011

About the Willow Street Estuary

The Willow Street Estuary is located in Long Beach where the concrete bottom of the LA River ends and the freshwater of the River meets the saltwater of the ocean. The trees and brush that grow in the channel area intercept any trash that has made it past the other natural-bottomed areas, as well as that flowing from Compton Creek, a major tributary of the River. It is an ecologically vibrant area frequently visited by ducks, cormorants, egrets, herons, stilts, and other seabirds and waterfowl. Immediately upstream of the site are the Cities of Compton, Paramount, Lynwood and Downey.



A view of the Willow Street estuary during the 2011 clean-up.

Willow Street Estuary Trash Sort 2004

FoLAR conducted its first trash sort at the Willow Street Estuary site in 2004 in collaboration with the California Conservation Corps. The sorters followed the Bureau of Sanitationôs (described under ñMethodologyò on page 4) protocol, breaking down different trash classes into weight and volume, and also recording specific brand names.

Metal was the heaviest class of trash at 35% by weight, followed by plastic film (27%) and clothes (12%). Together, molded plastic and plastic film made up 33% of the weight of the trash sorted, almost more than the weight of the metal items sorted.

By volume, plastic was by far the greatest contributor, making up 55% of the total volume of the trash sorted (46% of which was plastic film and 9% of which was molded plastic) followed by metal (18%) and clothes (9%).

By far the most common brand of snack food waste was Frito Lay (Cheetos®, Doritos®, etc.) though the sorters also found Blue Bunny® Ice Cream wrappers and several brands of candy wrapper (Reeseôs Pieces®, Airheads®, Skittles®, and Snickers®). Several types of disposable polystyrene or paper cups and plates were also collected (AmPm® and McDonaldôs® coffee cups, Jack in the Box®, Quiznos® and Taco Bell® cups, 7-Eleven® nachos plates). Other items included a cardboard Budweiser® beer box, caution tape, a Right Guard® deodorant can, a spray paint can, a Tide® laundry detergent box, a Tidy Cat® litter bucket and a WD-40® spray can. **See pie chart on page 12.**

The 2011 Willow Street trash sort.

Willow Street Estuary Trash Sort 2011

Approximately 10% of the bags collected at the 2011 Willow Street Estuary clean-up were sorted. The volumes of the different trash categories were relatively evenly distributed though approximately 30% of the total volume was made up by the plastic film categories when taken together. The heaviest trash class by far was metal at around 44% of the total weight, followed by clothes and fabric at 17% and plastic grocery bags at 13%.

The most common brand items found were Fritos® chip bags and Capri Sun® juice containers (five each), Cheetos® bags, Cup of Noodles®, Layôs® potato chip bags, and Target® shopping bags (three each). **See pie chart on page 12.**

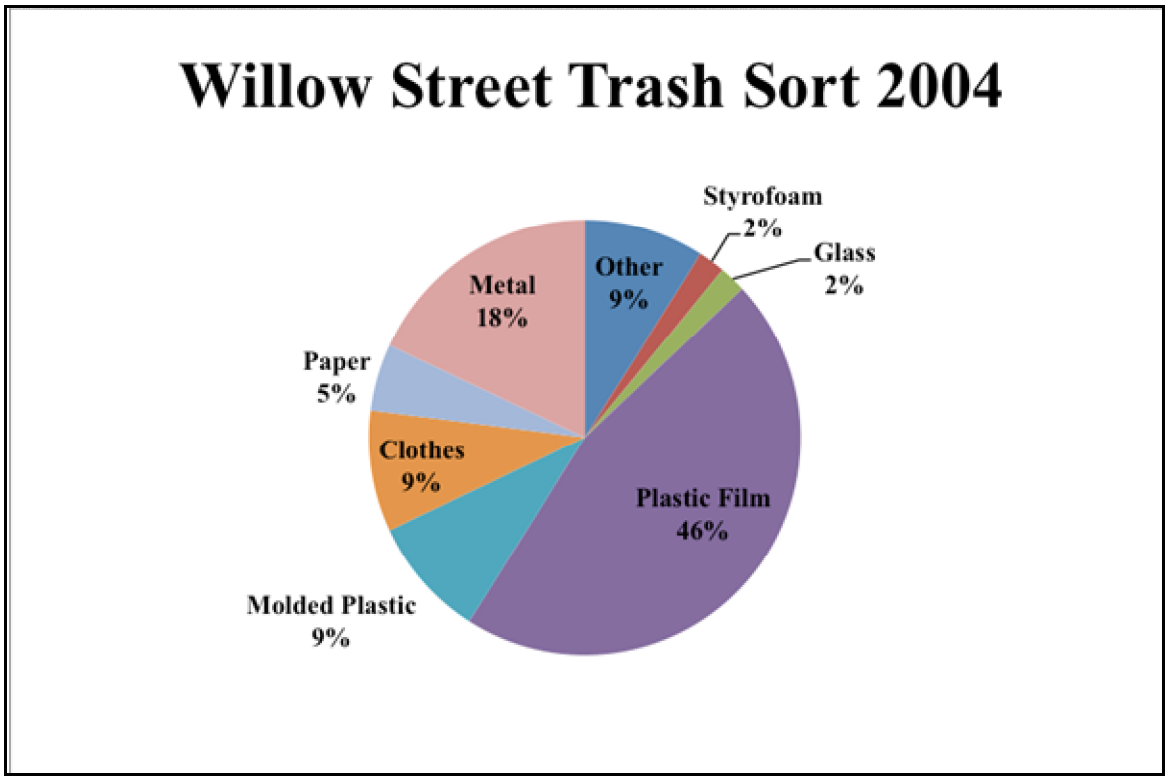


Figure 5. A break-down of the trash sorted at FoLARôs 2004 trash sort at the Willow St. estuary by volume.

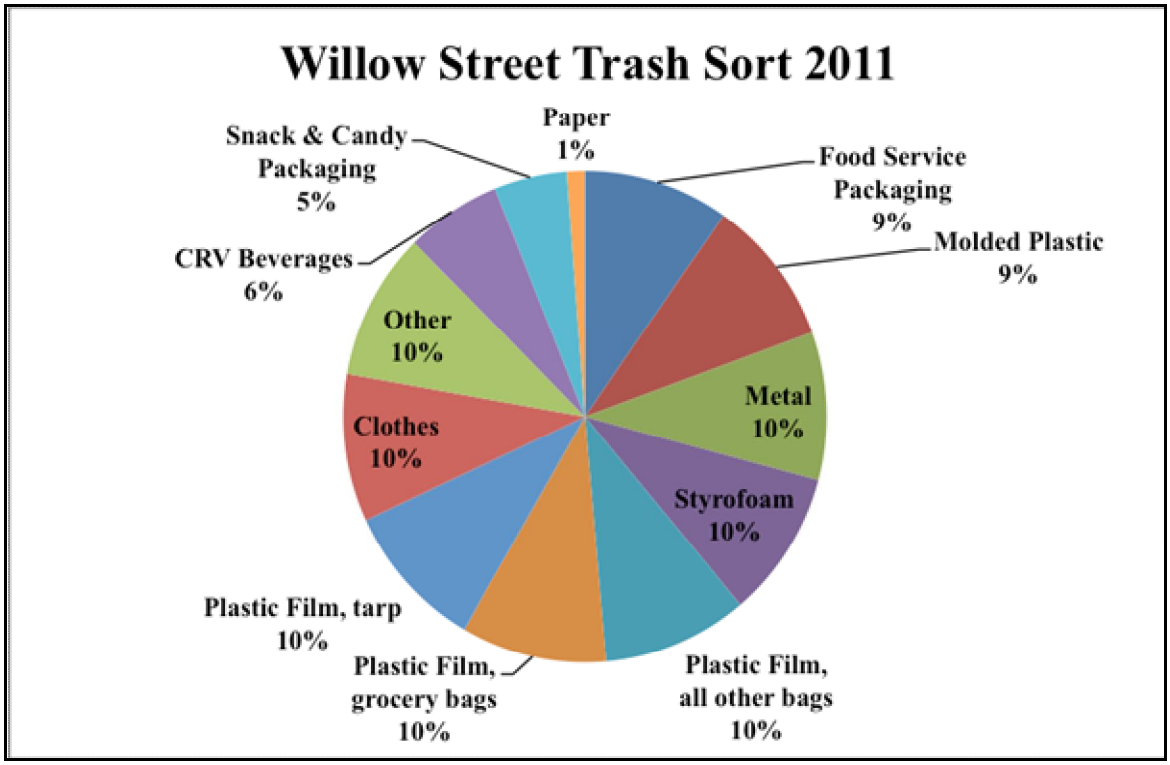


Figure 6. A break-down of the trash sorted at FoLARôs 2011 trash sort at the Willow St. Estuary by volume.

Lake Balboa, Sepulveda Basin
2010, 2011

About Lake Balboa

The Lake Balboa trash sort site is located at the Los Angeles River and Balboa Blvd., proximate to Anthony C. Bielensen Parkôs Lake Balboa. The site is within the Sepulveda Basin upstream of the Sepulveda Dam, one of the three natural-bottomed segments of the LA River. It intercepts trash from upstream areas of the San Fernando Valley, including the communities of Reseda, Winnetka, Woodland Hills and Canoga Park.

Lake Balboa Trash Sort 2010

The 2010 Lake Balboa trash sort focused on recording the number of items in each category and their brand names instead of weight or volume. The trash sorters collected 139 snack and candy wrappers, five bottles and cans, 36 non-CRV containers, five molded plastic containers, one glass bottle, 11 paper items, 23 plastic grocery bags, five other bag-types, 13 plastic film items, four items of clothing, two food service containers, and three other miscellaneous items.

The most common brand items were Frito Lay® brand chip wrappers ï Cheetos® and Doritos® wrappers (tied for most abundant with seven each), Blue Bunny® Ice Cream containers, McDonaldôs McCafe® cups and Capri Sun® juice containers (at five each), Nestle Drum Stick Sundae Cone® wrappers, Snickers® wrappers, Nature Valley® granola bar wrappers and 7-Eleven® drink cups (four), and Fritos® wrappers, Lays® potato chip bags plastic Arrowhead® water bottles, Heinz® ketchup packets, Good Humor Oreo Ice Cream® wrappers, Slim Jim Beef Jerky® wrappers, Starbucks® coffee cups, Gatorade® bottle wrappers and Subway® sandwich bags (three each). **See pie chart on page 14**.

Lake Balboa Trash Sort 2011

Sixteen out of the 300 bags collected at the 2011 Lake Balboa Trash Sort were sorted, approximately 5% of the total. By volume, the most numerous class of trash by far was plastic, with around 2/3rds of the trash being plastic film (including grocery bags and tarps).

By weight, the ñotherò category was the heaviest at 38 pounds (about 40% of the entire sample), followed by plastic grocery bags and metal, tied at about 15 pounds (about 16% of the sample), and clothes and fabric, at about 8 pounds (about 9% of the sample). The volume of the items in the ñotherò category, including suitcases and couch cushions, was not estimated due to their large size, hence the absence of an ñotherò category in the volume pi-chart on the next page (Figure 7).

While not all brand-name items were recorded due to time constraints, those that were included Natural Ice® cans (three), a McDonaldôs® cup, a Reeseôs® wrapper, and a full Coca-Cola® can. Frito Lay® product included Fritos® (two bags) Chesterôs Flaming Hot Cheetos®, Cheetos®, Sun Chips®, and Funyuns® wrappers. **See pie chart on page 14**.

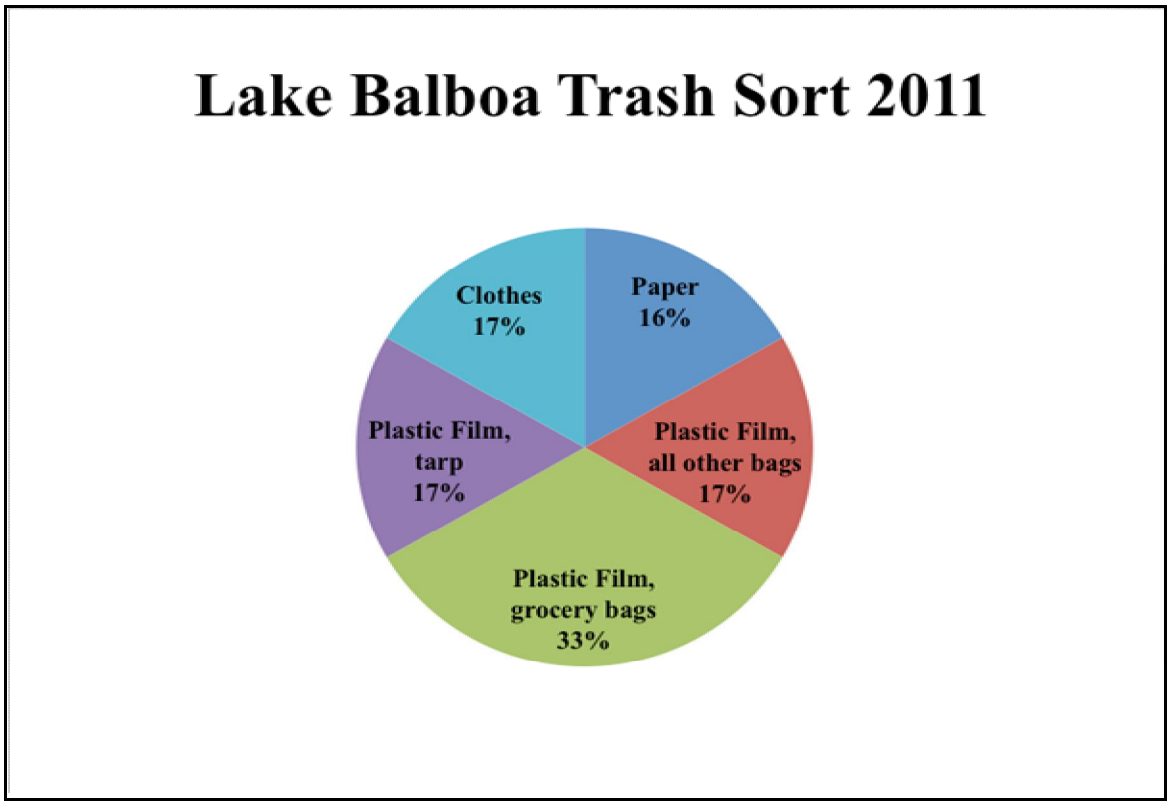


Figure 7. A break-down of the trash sorted at Lake Balboa in 2011 by volume.

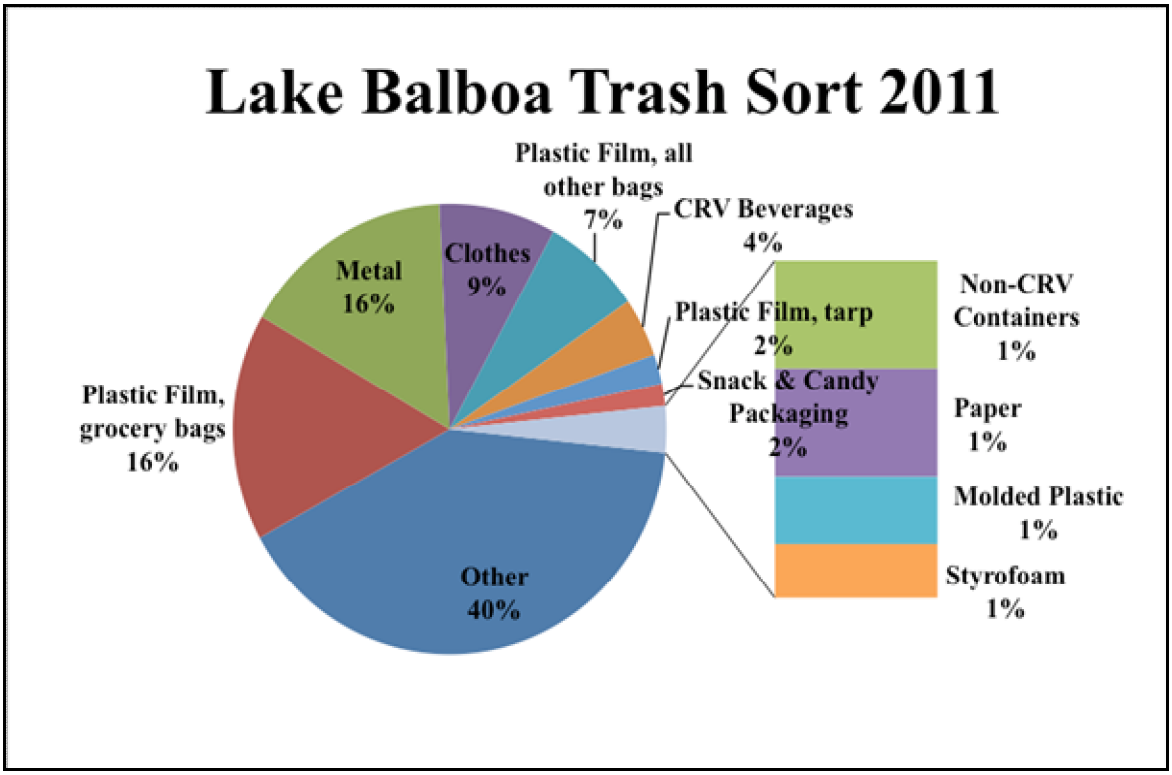


Figure 8. A break-down of the trash sorted at Lake Balboa in 2011 by weight.

Steelhead Park

2010, 2011

About Steelhead Park

Steelhead Park, a small, riverside pocket park designed by North East Trees, is located in the Glendale Narrows. It features native vegetation, a small outdoor classroom, and gates commemorating the steelhead trout. The park is located in one of three natural-bottomed sections of the river, and has trees and other vegetation that capture trash passing through from the San Fernando Valley and riverside neighborhoods in the Narrows. It is immediately downstream of the communities of Elysian Valley, Glassell Park, Atwater Village, Silver Lake, Los Feliz as well as the Fletcher Drive trash sort site, and upstream of the LA Riverôs confluence with the Arroyo Seco.

Steelhead Park Trash Sort 2010

Six out of the 30 trash bags collected in the 2010 Steelhead Park trash sort were sorted, about 20% of the total sample. By weight, the clothes and fabric category was heaviest (at 14 pounds), followed by ñotherò (eight pounds), plastic grocery bags (six pounds), plastic tarp (four and one half pounds), bottles and cans and molded plastic (four pounds each) and the other trash categories. Only two pounds of metal were sorted.

The ñother,ò clothes and fabric, plastic tarp and plastic grocery bag categories were the most voluminous trash classes at one full bag each, followed by plastic film and molded plastic, each approximately three-quarters full.

The brand names observed most were: Cheetos® chip bags (eight), Doritos® chip bags and Ralphôs® shopping bags (seven each), Breakfast Breaks® milk boxes (five), Blue Bunny® Ice Cream wrappers (four), and Frito®, Capri Sun®, Layôs® wrappers and Vons® shopping bags (three each). **See pie chart on page 16**.

Steelhead Trash Sort 2011

Seven out of the 56 trash bags collected in the 2011 Steelhead trash sort were sorted, about 13% of the total volume collected. By weight, plastic grocery bags were the heaviest category (at 22 pounds), followed by clothes and fabric (14 pounds), other plastic film bags and CRV beverage containers (10 pounds each), molded plastic (five pounds) and the other trash categories. By volume, single-use plastic grocery bags made up approximately 32% of the sample, followed by non-grocery plastic bags at 20%, clothes at 16%, and CRV beverage containers at 8% of the sample. Various sorts of plastic bags made up more than half of the sample by volume. **See pie chart on page 16.**

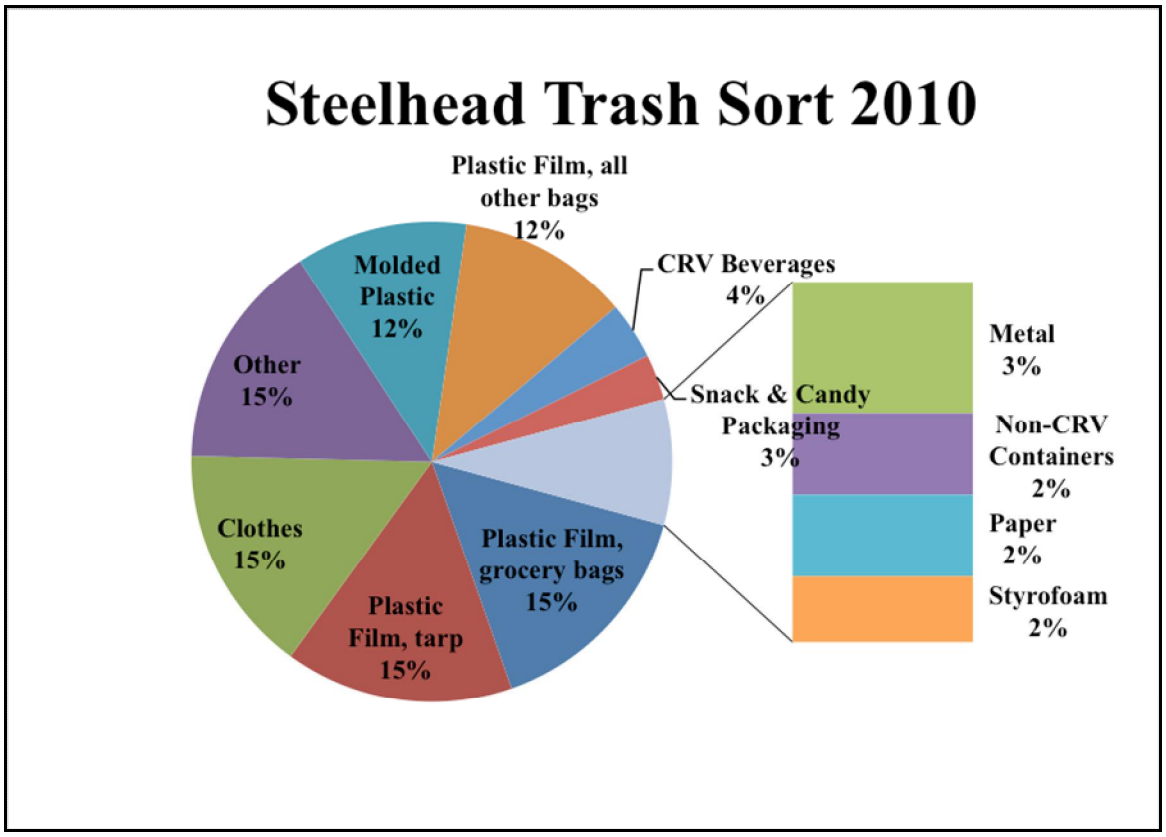


Figure 9. A break-down of the trash sorted at Steelhead Park in 2010 by volume.

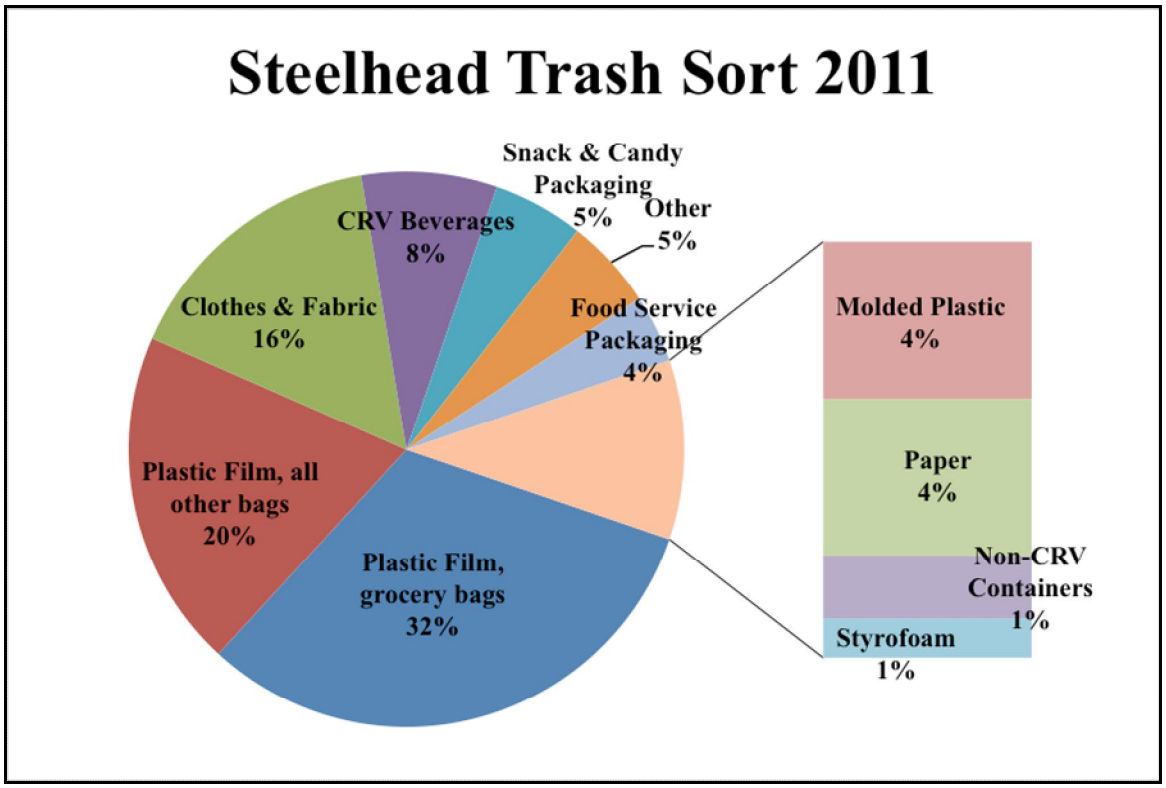


Figure 10. A break-down of the trash sorted at Steelhead Park in 2011 by volume.

Compton Creek
2011

About Compton Creek

Compton Creek is a major tributary of the LA River located in Compton, California that drains a 42 square mile area of South Central LA including parts of South Central Los Angeles as well as the community of Willowbrook. The Compton Creek CleanUp and trash sort site is located in lower Compton Creek near where it joins the LA River in a natural-bottom area next to the Metro Blue Line Station on Del Amo Boulevard.

Compton Creek Trash Sort 2011

Of the trash sorted at Compton Creek in 2011, the heaviest classes of trash were ñotherò (approximately 38% of the total), glass (22%), plastic grocery bags (13%), and metal (11%). The most voluminous trash categories were plastic grocery bags (20% of the total) and polystyrene (14%).

Not all brand name items were recorded. Among those collected were Doritos®, Cheetos®, Capri Suns®, Starbucks®, McDonaldôs® and Coca-Cola®.

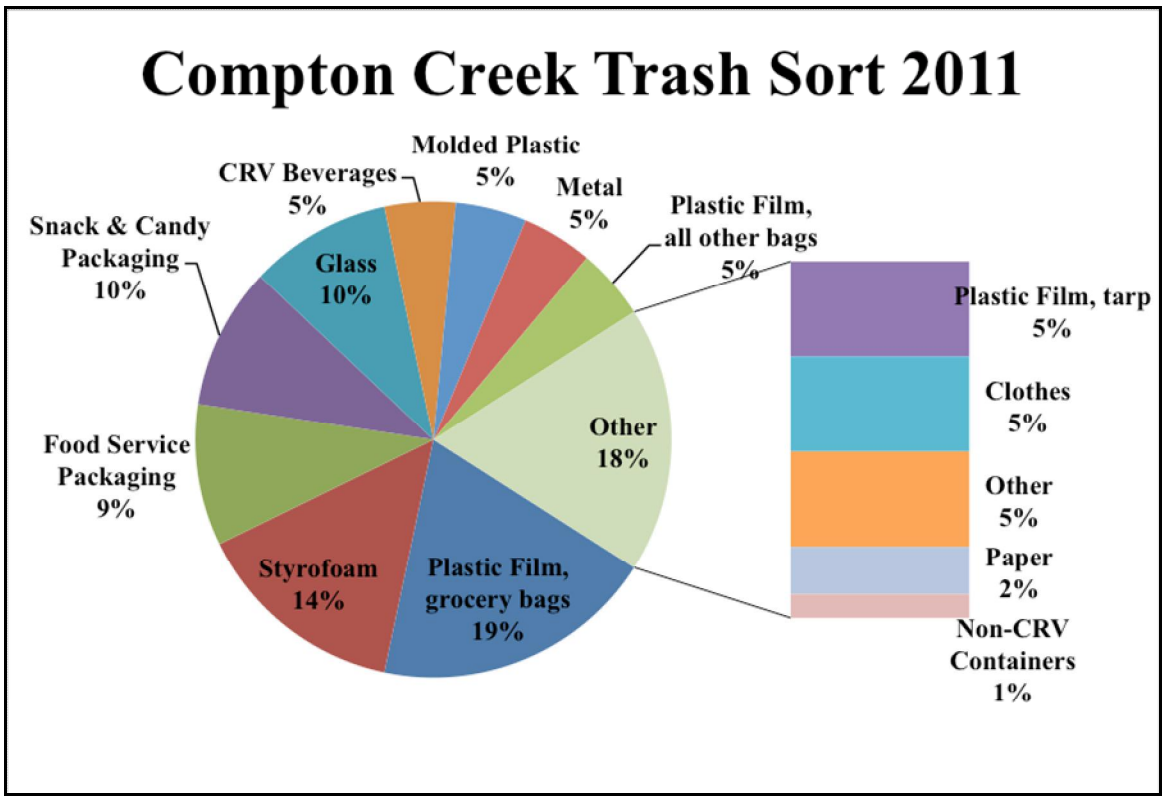


Figure 11. A break-down of the trash sorted at Compton Creek in 2011 by volume.

DISCUSSION

It is difficult to determine clearly from the trash sort data how the abundance of trash in the LA River has changed over time, given the uncontrolled nature of the cleanups and differences in the rain events responsible for washing trash into the River through the stormwater system. It is possible, however, to reach some conclusions based on the composition of trash found in the River, and the differences in composition between sites.

Plastic film was typically found to be the most abundant item by volume, and sometimes by weight, a testament to our dependence on convenience food and the carelessness in which we discard that waste, as well as its tendency to take to the air. Plastic bags were found to be quite abundant, particularly at the Fletcher trash sort site in 2009, where they were found to make up nearly half of the total volume of the trash sorted.

Metal, cloth and in some cases glass were found to be the heaviest trash categories. Even by volume, clothes and fabric still made up a significant portion of most of the trash sorts. Glass was not found to be present in significant volumes except at Compton Creek in 2011, where it made up 10% of the sample by volume. Miscellaneous items included in the ñotherò category such as shopping carts, suitcases, and couch cushions indicate that dumping is still an issue for the LA River since these items could not have been carried through the stormwater system nor blown into the waterway.

The volume of polystyrene (Styrofoam, etc.) found at the various trash sort sites was low, mostly below 5% of the sample, except for at Compton Creek in 2011, where polystyrene made up 14% of the total trash sorted, and at Willow Street in 2011, where polystyrene made up 10% of the total trash sorted.

Brand-name items were found to be widely prevalent at most sites, including fast food / food service packaging, snack and candy wrappers, cans, plastic bottles, and plastic bags. Certain items were more abundant than others, like Cheetos®, Fritos®, and Doritos® chip bags, Target® shopping bags, Capri-Sun® juice containers, McDonaldôs McCafe® cups, Coca-Cola® cans, Rust-Oleum® spray cans, Breakfast Breaks® and Blue Bunny® Ice Cream wrappers.

Between 4% and 8% of the trash sorted at Compton Creek in 2011, at Willow Street in 2011, and at Steelhead Park in 2010 and 2011 were CRV beverage containers. Their presence in the River at these sites potentially indicates either a lack of willingness of the consumer to return them or a lack of adequate recycling facilities in these areas.

Many of the items recorded were wrappers or containers for the types of packaged food and drink available in gas stations or convenience stores: candy, chips, wrapped ice cream, bottled water or soda, plastic bags, etc. Whereas the larger items --- weapons, phone booths, cars --- seem to have become less abundant, the fast-food packaging, wrappers, bottles and plastic bags of our throw-away culture have formed a consistently large portion of the trash collected during the past trash sorts. For example, metal went from about 20% of the composition of the trash sorted at Fletcher Drive in 2004 by volume to 8% and 9% in 2009 and 2010.

These results were similar to those of roadside litter surveys conducted around the United States in the amount of candy, snack and fast food packaging found; however, these litter surveys also found significantly fewer plastic bags. Whereas tobacco products such as cigarette packages, lighters and matchbooks made up a significant portion of roadside litter, typically between 1-8% of the sample by number, they were not found to have a significant presence in the LA River trash sorted (Stein 2010, Georgia 2007). Very few cigarette butts were collected and sorted compared with the aforementioned litter surveys, in which cigarette butts were more numerous by count than all other litter combined, perhaps because of their tendency to deteriorate in water.

Although adoption of the LA River TMDL should be commended for drastically reducing the amount of the trash entering the Los Angeles River, it fails to address three other ways trash enters the waterway. First, the trash exclusion grilles installed in the stormwater system do nothing to prevent trash from 1) blowing into or 2) being dumped directly into the River. A significant amount of the snack and candy wrappers, fast food containers, and plastic bags from the trash sorts may have blown into the River, meaning they will not be eliminated by the catch basin inserts. And the presence of significant amounts of clothing and fabric as well as larger items such as shopping carts indicate that homeless people are living on the River and that dumping is still most likely taking place.

Third, though this type of trash was not covered by this report, small particles of less than five millimeters in diameter such as preproduction plastic pellets (so-called ñnurdlesò) can still fit through the inserts and make their way into the river. Significant numbers of such small plastic particles were recovered from the flow of the LA River in a recent study and found to be more abundant than items larger than 5 millimeters in diameter (Moore et al 2011, Moore et al 2005 ñMaking Our Way Upstreamò). Though they are small and easy to overlook, these smaller pieces of plastic can have significant negative effects on wildlife in the river and ocean, and have also been shown to transport pollutants such as phthalates and polycyclic aromatic hydrocarbons (Moore et al 2005 ñOrganic Pollutantsò). Best Management Practices (BMPs) under the umbrella *Operation Clean Sweep* (OCS) have been shown to be moderately effective in reducing the number that are inadvertently released into the environment and offer a potential strategy for reducing the number that end up in the LA River. (Moore et al 2005 ñMeasuring the Effectiveness of Voluntary Plastic Industry Effortsò).

CONCLUSION

Over the years, a myriad of trash items have been taken out of the LA River, some more common than others, but for the most part waste that reveals our love of and dependence upon containers and wrappers from fast food and convenience stores. Trash in Los Angeles is a cultural and political problem, a problem of our own making, one that washes up on our beaches, blows through our streets and flows through our rivers.

Much progress has been made recently in cleaning up the LA River. However, Los Angeles should not rest on the laurels of its recent achievements but instead strive to ensure that the river is as free of trash as possible by the target date of 2015. The City and County of Los Angeles currently have the opportunity to innovate further with their current trash policies and push the region to the forefront of trash management systems across the United States, an admirable feat considering the size and urban nature of the Los Angeles area. Reducing the amount of trash in the LA River will further help the LA River Revitalization Master Plan and LAôs other beautification and solid waste management efforts. Another convincing reason to increase trash reduction efforts in the LA River is the role that plastic and other waste products play once they enter the environment.

Items designed to be used once and then discarded are unfortunately often made of materials that do not degrade easily, such as plastics. This results in the problem of overflowing landfills as well as litter that doesnôt even make it to the dump. An even more insidious problem was discovered by Captain Charles Moore of the Algalita Marine Research Foundation in 1997, when he came upon the so-called Great Pacific Garbage Patch while sailing to California from Hawaii.

The Great Pacific Garbage Patch is a constantly shifting area in the Northern Pacific with higher-than-normal quantities of marine debris, particularly small pieces of floating plastic. The plastic debris found in the patch can end up in the stomachs of seabirds, sea turtles, fish and other animals, damaging the marine ecosystem (Carr 1987, Frey et al 1987). Though a trash boom helps prevent LA River trash from making its way into the ocean, storms and floods often flush waste in the River out to sea. From there, it either winds up on beaches or eventually makes its way to the Garbage Patch.

This report has documented the most abundant categories of trash found in the River, namely plastic film (particularly single-use plastic grocery bags), clothing, snack and candy packaging, fast food and beverage containers, and to a lesser extent metal; and identified potential vectors by which trash is bypassing the trash excluding screens that have been installed because of the Trash TMDL (by wind, dumping or by being <5 mm in diameter). On the following page is a list of FoLARôs policy recommendations on how to continue to reduce trash in the LA River based on these findings.

As the 2015 goal of zero trash emission to the LA River comes nearer, FoLAR will continue to sort trash and monitor trash levels in the River, paying particular attention to small trash fragments in Riverôs laminar flow. Through advocacy and science, FoLAR hopes to continue making progress towards the goal of a trash-free LA River, and in so doing help Los Angeles County further improve its trash management systems.

RECOMMENDATIONS

TRASH REDUCTION:

1. **Expanded plastic bag ban -** A large number of plastic bags were found at trash sort sites along the LA River. In 2009, plastic bags made up nearly half of the trash items sorted by volume. Expanding the plastic bag ban from unincorporated Los Angeles to the rest of the county would help reduce the number of plastic bags in the river drastically, many of which most likely blow in from where they are left on the street.

2. **Covered trash cans –** Overflowing trash cans are a major source of trash items that potentially blow into the Los Angeles River. Investing in better trash infrastructure in all riverside parks and other areas within one or two miles of it could greatly reduce the amount of trash that blows into the River. One option is expanding the use of devices such as the Big Belly Solar Compactor, a closed-top trashcan that reduces how often trash must be collected by utilizing the power of the sun to compact its contents.

3. **Compostable fast food containers –** The use of compostable fast food containers coupled with well-marked repositories would cut down on the amount of polystyrene and other non-biodegradable food service packing material ending up in the LA River. LA should concurrently work to improve its composting infrastructure.

4. **Education –** Littering near the LA River could also be reduced by developing an anti-litter signage campaign in conjunction with river-adjacent communities - many of which already have educational campaigns - and by working with gas stations and convenience stores near the river to educate customers about recycling and littering.

5. **"Nurdles" reduction** ï If further work reveals significant numbers of small pre-production plastic pellets in the LA River, the City should pinpoint where they are coming from and work with the source facilities to develop better Best Management Practices to reduce the number that end up in the River.

6. **Corporate responsibility** ï FoLAR encourages corporations to take part financially and with their personnel at Los Angeles River cleanups, particularly those whose products consistently show up in the River.

MONITORING:

1. **Laminar flow –** In the past, FoLARôs trash sort has focused exclusively on trash big enough that volunteers are able to spot it and bring it to the trash sorters during cleanups. However, in the future it will become more and more important to measure the amount of small pieces of trash in the water column, particularly preproduction plastic pellets (ñnurdlesò) and post-production plastic fragments less than five millimeters in diameter, as these are able to bypass the trash excluders installed in the stormwater system.

2. **Overall abundance –** Quantitative measurements of how the overall abundance of trash is changing in the LA River should be developed in order to measure the success of efforts to comply with the LA River Trash TMDL.

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