

Ashley Robinson, Heather Bowers, Nathan Pope and Travis Mortenson

# Friends of the Los Angeles River

## Trash Clean Up: 10 Year Report

---



PHOTO: TOM UNDERHILL for Friends of the L.A. River 2012

---

---

2016

**CONTRIBUTORS:**

FoLAR, City of Los Angeles,

---

# Table of Contents

[Table of Contents](#)

[Abbreviations](#)

[Executive Summary](#)

[Setting the Stage](#)

[History](#)

[History of the Los Angeles River](#)

[Regulatory Background](#)

[Clean Water Act of 1972](#)

[Regulating the River](#)

[EIR](#)

[TMDL](#)

[Compliance Standards](#)

[Compliance Strategy](#)

[Key Stakeholders](#)

[Matters of Jurisdiction](#)

[Friends of Los Angeles River](#)

[City of Los Angeles](#)

[Plastics Industry Task Force](#)

[County of Los Angeles](#)

[US Army Corps of Engineers](#)

[Data Section](#)

[FoLAR Methodology](#)

[Los Angeles City Report on Trash TMDL Compliance 2013](#)

[Plastic Bag Legislation](#)

[Homeless Population](#)

[Lower Income Areas](#)

[Appendix](#)

---

<a href="#">Totals by Site</a>	
<a href="#">Change Over Years By Trash Category</a>	
<a href="#">Categories by Year and Site</a>	
<a href="#">Table of Contents</a>	
<a href="#">Abbreviations</a>	
<a href="#">Executive Summary</a>	
<a href="#">Setting the Stage</a>	
<a href="#">History</a>	
<a href="#">History of the Los Angeles River</a>	
<a href="#">Regulatory Background</a>	
<a href="#">Clean Water Act of 1972</a>	
<a href="#">Regulating the River</a>	
<a href="#">TMDL</a>	
<a href="#">Compliance Standards</a>	
<a href="#">Compliance Strategy</a>	
<a href="#">Key Stakeholders</a>	
<a href="#">Matters of Jurisdiction</a>	
<a href="#">Friends of Los Angeles River</a>	
<a href="#">City of Los Angeles</a>	
<a href="#">Plastics Industry Task Force</a>	
<a href="#">County of Los Angeles</a>	
<a href="#">US Army Corps of Engineers</a>	
<a href="#">Data Section</a>	
<a href="#">FoLAR Methodology</a>	
<a href="#">Los Angeles City Report on Trash TMDL Compliance 2013</a>	
<a href="#">Plastic Bag Legislation</a>	
<a href="#">Homeless Population</a>	
<a href="#">Lower Income Areas</a>	
<a href="#">Appendix</a>	

---

---

[Totals by Site](#)

[Change Over Years By Trash Category](#)

[Categories by Year and Site](#)

## 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
EPA	Environmental Protection Agency
FoLAR	Friends of the Los Angeles River
LADPW	Los Angeles Department of Public Works
LARWQCB	Los Angeles Regional Water Quality Control Board
MS4s	Municipal Separate Storm Sewer System
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
Trash TMDL	Trash Total Maximum Daily Load

---

## Executive Summary

The Los Angeles River, once called a lush and pleasing spot in every respect, was the reason Gaspar de Portolá led the Spanish to their largest settlement in southern California. The free-flowing and natural-bottomed LA River was channelized after a wave of destructive floods in the 1930s negatively impacted the region's growing population. This channelization masked the river, and it quickly degenerated into a convenient dumping ground until the 1960s and 1970s when a renewed focus on environmental stewardship blossomed.

By the 1990s, the river was recognized for what it could be again, a valuable habitat and key part of urban planning. However, many stakeholders had varying, sometimes conflicting, plans for revitalization. Businesses, environmentalists, and city residents, through years of work and collaboration, are integrating their plans in a way that will positively shape the LA River for years to come.

The collaboration efforts led to the creation of a Total Daily Maximum Load (TMDL) for trash in the LA River to attain water quality standards for the river. A controversial version was approved in 2001 and placed on hold until the end of negotiations and the start of implementation in 2007. This legislation established that the cities in the watershed were responsible to ensure that zero trash entered the river due to stormwater.

In light of the TMDL regulation, strategies were developed to remove trash from urban runoff. City and county engineers, as well as other qualified stakeholders designed the TMDL compliance strategies.

After analyzing a combination of City of Los Angeles and Friends of the Los Angeles River data, it became clear that implementing the TMDL positively affected the LA River as the composition of trash in the river is distinctly different from that on the streets. The Los Angeles Trash TMDL is a working example of enacting real change to address a complex problem. Bringing together all interested stakeholders resulted in realistic solutions that have kept urban trash out of the LA River.

---

However, trash from other sources remains. Using the collaborative pattern of the TMDL regulation to identify sources and future solutions will be imperative to continued success.

## **Section 1: Setting the Stage**

The Los Angeles River has required a collaborative effort to clean and heal. A series of environmental disasters in varying states gave the nation the push it needed to change the way it took care of its oceans, rivers, and natural spaces. Governmental agencies formed and create new legislation aimed at cleaning up the damage that had already been done. Working together, new technologies and better practices were created in order to ensure the lasting health of the environment.

The Los Angeles region has come together with regulatory agencies and stakeholders to protect and clean its river. From river to sewage drain, to river again—the concept of the Los Angeles River has been redefined, protected and monitored in an attempt to restore it to what it once was. The combination of industrial ingenuity, political power and environmentalist enterprise has made this historical cooperative effort to revitalize the LA River possible.

### **History of the Los Angeles River**

The LA River now looks like a man-made channel, but is an original part of the alluvial plain that makes up Los Angeles and Orange County.<sup>1</sup> The mountains surrounding Los Angeles County can receive upwards of 40 inches of rain per year, and depending on varying levels

---

<sup>1</sup> History of the Los Angeles River. Department of Public Works. (n.d.). Retrieved May 2016, from <http://ladpw.org/wmd/watershed/LA/history.cfm>

---

of moisture each year, the river would shift courses, following the heaviest flows. The river's varying course, though a natural occurrence, posed serious problems when the city started to depend on and grow around the river. This removed the buffer zone to accommodate any flooding, and the city repeatedly suffered major damage. The river caused 17 recorded floods between 1815 and 1938. One particularly heavy flood in 1938 caused 114 deaths<sup>2</sup> and (after adjusted for inflation) over \$1.4 billion in damages.

Even before this 1938 flood, the county had appealed to the Works Progress Administration for financial aid to construct infrastructure to minimize flooding. The reaction to the floods in 1938 led to the Army Corps of Engineers receiving the funds to channelize the river. After the main channelization project, the river remained largely unchanged until the late 1990s when additional work was done to increase the flood protection from a 40-year storm to a 100-year storm.

The LA River continued to serve as flood control for the Los Angeles Region, however it quickly became a convenient drainage area for any water or trash from residential and industrial areas. Over time as more and more trash and refuse ended up in the stormdrain system, the trash in the LA Region became magnified as it was funneled into a single channel. As the desire to maintain the quality of water flowing into the river came into focus, new methods of regulation were created and tested.

## **Regulatory Background**

Starting in the 1970's, the National Environmental Policy Act (NEPA) outlined the nation's goals for improving the environment. Through NEPA, the Clean Water Act was amended to "establish the basic structure for regulating discharges of pollutants into the waters of the

---

<sup>2</sup> 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>



---

United States and regulating quality standards for surface waters.”<sup>3</sup> 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.”<sup>4</sup>

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 (MS4s), 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. In conjunction with the passing of NEPA in 1970, California created the California Environmental Quality Act (CEQA). CEQA is 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.”<sup>5</sup> Under CEQA, any project that has potential to affect the environment must assess any potential impacts before it starts by conducting and submitting an Environmental Impact Report (EIR). These EIRs would become a central part of the regulatory process surrounding the LA River.

---

<sup>3</sup> Summary of the clean water act. EPA. Environmental Protection Agency. (n.d.). Retrieved May 2016, from <https://www.epa.gov/laws-regulations/summary-clean-water-act>

<sup>4</sup> NPDES frequent questions. EPA. Environmental Protection Agency. (n.d.). Retrieved May 2016, from <https://www.epa.gov/npdes/npdes-frequent-questions>

<sup>5</sup> Frequently asked questions about CEQA. (n.d.). Retrieved May 2016, from <http://resources.ca.gov/ceqa/more/faq.html>

---

With the new energy and innovations in place to help the environment, California's attention turned to helping the Los Angeles river, which until then was an ignored but major part of LA. The shift that would come to shape the future of the river was a combination of efforts from city governments, concerned citizens, and private enterprises working together to enact positive change.

### **Regulating the River**

In 1996 and 1998, the State of California dictated that the LA River didn't meet water quality standards due to trash. The Los Angeles Regional Water Quality Control Board (LARWQCB) listed 83 percent of the river as impaired because of trash.<sup>6</sup> Per section 303(d) of the Clean Water Act, if a water body doesn't meet the pre-established water quality standards, then it is listed as "impaired" and placed on the state's "Impaired Waterways List." The state must then establish a TMDL for each substance causing impairment and submit it to the EPA for approval.<sup>7</sup>

The efforts of the 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, LA County and affected cities felt matters were overlooked, and fought for a more practical Trash TMDL, including a way to quantify results, compliance and water quality.

This Trash TMDL would regulate the outfall pipes of storm drains that empty into the Los Angeles River. The City of Los Angeles controls 33 percent of storm drains emptying into the river, while the other 42 cities control 29 percent, and eight agencies (e.g., CalTrans)

---

<sup>6</sup> 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](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)

<sup>7</sup> City of Arcadia v. U.S. Environmental Protection Agency. (May 16, 2003). Retrieved May 2016, from [http://www.leagle.com/decision/20031407265FSupp2d1142\\_11295/CITY%20OF%20ARCADIA%20v.%20U.S.%20ENVIRON.%20PROTECTION%20AGENCY](http://www.leagle.com/decision/20031407265FSupp2d1142_11295/CITY%20OF%20ARCADIA%20v.%20U.S.%20ENVIRON.%20PROTECTION%20AGENCY)

---

control 37 percent.<sup>8</sup> To ensure compliance, the TMDL became part of storm drain permits such as the NPDES and MS4s.<sup>9</sup>

In September 2003, the city and county of Los Angeles settled matters with the LARWQCB, as the Board agreed to address several concerns, including improving the method of establishing water quality standards.<sup>10</sup> In return, the City and the County agreed to spend nearly \$170 million to comply (\$48 million for the county and \$120 million for the city).<sup>11</sup> This settlement became effective on September 23, 2003.<sup>12</sup> While LA City and County settled, 22 surrounding cities challenged the regulation on 10 points, including neglecting proper CEQA compliance.

Dubbed “The Coalition for Practical Cities,” the 22 surrounding cities<sup>13</sup> 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

---

<sup>8</sup> LA Sanitation. LA 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-lar.jsessionid=tMU7OkN-8nzGV8F-tabJloF7BKZRdL0xV5p7\\_IDoWK1DRzbp0RE4!-2053517842!-787228480?\\_adf.ctrl-state=1brfsz1lxm\\_4&\\_afLoop=27390757464805525&\\_afWindowMode=0&\\_afWindowId=null#!%40%40%3F\\_afWindowId%3Dnull%26\\_afLoop%3D27390757464805525%26\\_afWindowMode%3D0%26\\_adf.ctrl-state%3Df4tcy2o3l\\_4](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-lar.jsessionid=tMU7OkN-8nzGV8F-tabJloF7BKZRdL0xV5p7_IDoWK1DRzbp0RE4!-2053517842!-787228480?_adf.ctrl-state=1brfsz1lxm_4&_afLoop=27390757464805525&_afWindowMode=0&_afWindowId=null#!%40%40%3F_afWindowId%3Dnull%26_afLoop%3D27390757464805525%26_afWindowMode%3D0%26_adf.ctrl-state%3Df4tcy2o3l_4)

<sup>9</sup> Herzog, Megan. (January 26, 2015). Zero Trash. *Legal Planet*. Retrieved May 2016, from <http://legal-planet.org/2015/01/26/zero-trash/>

<sup>10</sup> 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](http://www.scvurppp-w2k.com/pdfs/0304/Memo_Los_Angeles_trash_mgmt_practices_final_091304.pdf)

<sup>11</sup> 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>

<sup>12</sup> 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](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)

<sup>13</sup> 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.

---

out of this is a collaborative effort. We need more collaboration. We need to work on achievable means to clean up this river."<sup>14</sup>

After several months, San Diego County Superior Court Judge Wayne L. Peterson ruled that the LARWQCB failed to adequately complete a study for economic and environmental impacts, both required by state law.<sup>15</sup> And 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.<sup>16</sup> The original 10-year compliance mandate was then shortened to nine, thus maintaining the 2015 deadline for full compliance.

In August 9, 2007, the final EIR and several additional changes were applied, and the Trash TMDL stood ready for implementation in 2008. The added EIR concluded that while water quality would improve as a result of the TMDL, another result would be "significant adverse impacts to the environment" primarily associated with manufacturing and installing trash collection devices. However, these could be mitigated through "careful design and scheduling."<sup>17</sup>

The final TMDL also called for a nine year compliance schedule. The first year featured a 40 percent baseline reduction compliance requirement followed mostly by 10 percent reductions each year thereafter.<sup>18</sup>

---

<sup>14</sup> 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>

<sup>15</sup> 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>

<sup>16</sup> 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](https://ofmpub.epa.gov/waters10/attains_impaired_waters.show_tmdl_document?p_tmdl_doc_blobs_id=60600)

<sup>17</sup> 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.

<sup>18</sup> 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](https://ofmpub.epa.gov/waters10/attains_impaired_waters.show_tmdl_document?p_tmdl_doc_blobs_id=60600)

---

## TMDL

By applying a TMDL, the EPA, in concert with state, county, and city-level water control boards, set acceptable limits for pollutants allowed to flow into the river. This was primarily applied to chemical contaminants such as mercury, but after assessing the potential functions of the LA River beyond flood control, those agencies applied an additional, unique TMDL: one that would limit trash into the river. Developing this legislation as a solution was a long process requiring cooperation and innovative ideas, but the results can serve as a model for other urban waterways.

## Compliance Standards

Several concepts were combined to help cities and governmental agencies regulate TMDL compliance. For this piece of legislation, trash is defined as any man-made litter that is improperly disposed of and that won't pass through a 5 mm mesh screen. Simply put, anything metal, plastic, paper, glass, synthetic, or natural that is larger than a pea can be considered trash if improperly disposed.<sup>19</sup>

Compliance for the structural applications (full-capture devices) signifies that 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 this mathematically, it was determined that each of the storm drains in the watershed had to be outfitted by either full-capture devices (full structural control) or by a combination of partial capture devices and institutional controls. Full-capture devices are those which will retain



---

<sup>19</sup> 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.

---

100 percent of trash and avoid flooding during the peak flow rate of a typical one-year, one-hour storm. Institutional controls include increased street sweepings, public education programs, and tightened restrictions on littering.<sup>20</sup> Regardless of the yearly baseline reduction requirements, full capture devices count as 100 percent compliance.<sup>21</sup>

The TMDL is also not concerned with direct dumping and wind-deposited trash. The legislation limits trash entering the river at point sources—storm drains that empty into the river.

### Compliance Strategy

Once the cities agreed on the structural changes to implement, engineers began to design better catch basin systems. Through their pioneering efforts and the help of engineers around the globe, new full-capture systems as well as partial-capture systems were developed, but the process was difficult. Engineers



needed to create a barrier for trash that would still allow water to flow through, or floods would threaten to damage the watershed. As their names suggest, full-capture systems prevent trash from entering drains at a higher rate than partial capture systems, though in some areas these partial-capture systems worked sufficiently. The full-capture systems

---

<sup>20</sup> 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.

<sup>21</sup> 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](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)

---

were put in high trash generation areas, while partial-capture systems were installed in medium and low trash generation areas. Measuring and certifying effects of institutional changes were also required in areas that installed partial-capture systems. This requirement was met when LA City published the Final Quantification Study of Institutional Measures for the Trash TMDL in 2013.

Structural measures were gradually implemented in order to hit the Trash TMDL's gradual compliance goals. Eventually the project was finished a year ahead of schedule. Engineers also were able to reduce the cost of each capture basin from \$2000 to \$800, allowing the project to come in massively under-budget.

Thus, in 2015 ahead of schedule and under budget, all measures for the Trash TMDL were reached. The EPA, Heal the Bay, Santa Monica Baykeeper, and many others were essential partners in achieving this monumental effort. Other organizations, highlighted in the following section, were key players in revolutionizing the perception and treatment of the LA River.

## **Key Stakeholders**

Without the leadership and cooperation of many parties, the regional benefits of the Trash TMDL would not have been possible. Due to a very unique combination of issues, interests, and jurisdictions, an unlikely coalition was formed to clean up and revitalize the river. The River Project identified 27 agencies with jurisdiction over or interest in the LA River at the federal, state, and local levels.<sup>22</sup> A Los Angeles Department of Public Works jurisdiction report states that operation and maintenance responsibilities fall on the LADPW and US Army Corps of Engineers, though the City of Los Angeles contributes considerable

---

<sup>22</sup> The river project. (n.d.). Retrieved May 2016, from <http://www.theriverproject.org/learn/resources/agencies>



---

resources and its own “master plan” to restoration efforts.<sup>23</sup>

While these matters of authority add complications to river revitalization, it assures that organizations with vested interests in a clean river contribute their own bright minds to finding a solution.

## City of Los Angeles

In 1990, Mayor Tom Bradley established a task force to develop ways for Angelenos to interact with the LA River and improve its appearance.<sup>24</sup> In an effort to “reverse the neglect and disregard” of the LA 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.<sup>25</sup> Finally, they recommended that a master plan be developed for the entire river, which was facilitated by the County of Los Angeles in 1991.

In 2002, another influential figure in the revitalization process displayed his leadership. Councilman Ed Reyes became chair of the Ad Hoc Committee on the LA 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

---

<sup>23</sup> Jurisdiction and public involvement. (n.d.). Retrieved May 2016 from <http://ladpw.org/wmd/watershed/la/larmp/LARMP-08%20Jurisdiction%20and%20Public%20Involvement.pdf>

<sup>24</sup> 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>

<sup>25</sup> 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](http://articles.latimes.com/1992-02-21/local/me-2681_1_task-force)



---

securing funding, and strongly advocating for a renewed and healthy river.<sup>26</sup>

As a community leader, Councilman Reyes renewed the public focus on the Los Angeles River. What many considered a drainage ditch, the councilman hoped to turn into a river. 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.<sup>27</sup>

Also in 2002 the City Bureau of Sanitation Watershed Protection Division conducted a survey for high trash generation areas, or “trash hot spots.” The study mapped out the city by land type and determined where trash was most likely to enter the water systems. These “hot spot” maps have been used in many subsequent studies as the baseline for efforts that aim to reduce the pollutants entering LA's urban runoff.<sup>28</sup>

---

<sup>26</sup> LA City Council Ad Hoc Committee. (October 8, 2002). Revitalizing the LA River. Retrieved May 2016, from [http://www.lacp.org/River/LA\\_River\\_Guidelines.html](http://www.lacp.org/River/LA_River_Guidelines.html)

<sup>27</sup> 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](http://www.ladowntownnews.com/news/the-ed-reyes-exit-interview/article_45a32eaa-e03d-11e2-84de-001a4bcf887a.html)

<sup>28</sup> City of Los Angeles Department of Public Works. (January, 2002). Retrieved May 2016, from [http://www.lastormwater.org/wp-content/files\\_mf/trash\\_gen\\_study.pdf](http://www.lastormwater.org/wp-content/files_mf/trash_gen_study.pdf)

---

Brought together in 2005, the an additional task force was organized was organized by then Councilmen Ed Reyes and Eric Garcetti.<sup>29</sup>

### **Friends of Los Angeles River**

After the LA River was channelized, the river's first advocate was Lewis MacAdams, a poet and political activist who dreamed of a river that was part of his great city. In 1986 he cofounded Friends of the Los Angeles River (FoLAR) with Pat Patterson and Roger Wong, with the goal of a bikeable, swimmable, and boatable river. Together they cut a hole in the fence, declared it open, and began a "40 year art work" to revitalize the river.

In 1986, FoLAR held the first "La Gran Limpieza," or the Great Los Angeles River Cleanup, and has since established itself as the premier advocacy group for the river. Each year the organization sponsors the Great Los Angeles River Cleanup, and in 2016 drew more than 9000 Angelenos to the river's banks, with trash bags in hand.

In 2004, as talk of the Trash TMDL was circulating, MacAdams thought that the trash being removed from the river should be analyzed, making it easier to identify major pollutants. Twelve years later, FoLAR has contributed 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 that follows.

---

<sup>29</sup> City of Los Angeles Inter-Departmental Correspondence. (August 3, 2005). Retrieved May 2016, from [http://clkrep.lacity.org/online/docs/2004/04-1311\\_rpt\\_bos\\_8-3-05.pdf](http://clkrep.lacity.org/online/docs/2004/04-1311_rpt_bos_8-3-05.pdf)

---

Additionally, FoLAR created the “River Rover” as a Mobile Visitor and Education Center. The Rover travels around Los Angeles, connecting Angelenos to their river with education programs for all ages.



## County of Los Angeles

In 1991, the Board of Supervisors directed the LA County Department of Public Works to develop the Los Angeles River Master Plan. The Master Plan was adopted by the County in 1996, and funding was provided for limited revitalization. Joining the LADPW were the County Regional Planning and Parks and Recreation Departments as well as the National Park Service.<sup>30</sup>

## Board of Supervisors

## LARWQCB

## US Army Corps of Engineers

In 1935, Congress authorized funds to channelize the river. In 1936, the Army Corps of Engineers was given an additional \$70 million to supervise and do all flood control plans in

---

<sup>30</sup> 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>

---

the watershed. In 1941, the Corps began channelizing the river, hiring 10,000 workers to pour 3 million barrels of concrete. Following construction, a flood in 1969 killed 73 people, prompting the Corps to reevaluate the “drainage system.” These first years of authority cemented the Corps as a key voice in the conversation about the river’s future.

Additional information about the corps is necessary. What have they helped with in this process?

## Section 2: Quantitative Analysis of LA River Trash

In recent years, many stakeholders have taken greater responsibility of the river, organizing cleanups and complying with regulations. Data has been collected as these activities have been carried out. These efforts have significantly impacted the Los Angeles River.

### FoLAR Report on Trash: La Gran Limpieza

FoLAR’s Great Los Angeles River Cleanup: La Gran Limpieza! Is the country's largest urban river cleanup. Starting in 1990 with 30 volunteers, it grew to include 9000 volunteers in 2016 who removed an 70 estimated tons of trash from the river.<sup>31</sup>

[add any more relevant information describing the history of the river clean up/ giving it credibility]

### FoLAR 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

---

<sup>31</sup> The great LA River cleanup (n.d.) Retrieved June 2016, from <https://folar.org/cleanup/>

---

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, FoLAR's trash sort takes place according to the following system. First, about 20 percent 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). Then, these selected bags are broken open and sorted on a tarp into each of the following fifteen categories:

- Food Service Packaging (clamshells, cups, etc.)
- Snack and Candy Packaging
- Bottles and Cans (California Redemption Value or "CRV" 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

These smaller piles of 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 those 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 a measure of quantity since weight tends to overestimate quantity in certain cases - for example, even small amounts of metal appear heavy due to the material's high density - 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 weigh more, while plastic bags were often filled with wet sand, giving both the illusion of being heavier than they actually were.

**Figure 1. A map of FoLAR's trash sort sites for 2011-2016.**



FoLAR has regularly 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. They 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 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 in addition to its current trash sort activities. 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.

---

Due to the nature of the data collected in this citizen effort, conclusive statements based off the data is advised. As the river cleanup was implemented over the years, the methodology and practices varied. From 2004-2005 clean up sites varied from those used from 2011 on. Furthermore trash categories, or how the trash was sorted and classified, changed over the years as well. For example, early in the cleanups, categories such as wood and construction material were used, but were not in later years. Educated assumptions were also necessary when interpreting various aspects of the data. These include:

- When a volunteer logged less than one bag for volume, it was interpreted as .5 of a bag.
- Three shards of glass was interpreted as .02 of a bag for volume
- One tarp was interpreted as one bag for volume
- In Fletcher, plastic bags was interpreted as plastic film

### **Los Angeles City Report on Trash TMDL Compliance 2013**

Many studies were conducted in the early years of the Trash TMDL to determine effectiveness of structural measures (full and partial capture devices). Based on the mathematics of their design and installation, areas in the watershed predicted that the output from storm drains would be effectively zero. Additionally, the City published a report about institutional measures (street sweeping, anti-litter campaigns, etc.) to quantify benefits.

### **Los Angeles City Report Methodology<sup>32</sup>**

---

<sup>32</sup> City of Los Angeles. (2013). Quantification study of institutional measures for trash tmdl compliance. Retrieved June 2016, from <https://dl.dropboxusercontent.com/u/58485867/FINAL%20Quantification%20Study%20of%20Institutional%20Measures%20for%20Trash%20TMDL%20Compliance.pdf>



---

CHARACTERIZATION STUDY: While not required to demonstrate compliance with the Trash TMDL, the City opted to perform an additional study component concurrently in order to qualitatively assess the collected trash data. This portion of the Study was based on previous anthropogenic trash studies completed by FoLAR. FoLAR has been conducting community clean-up events for over 20 years, beginning with the Great Los Angeles River Clean-Up in 1990. Since then, thousands of people have participated in its organized clean-ups, helping to transform the LA River's public perception. Mayor Villaraigosa teamed with FoLAR to declare the first ever LA River Day of Service in conjunction with the cleanup effort on April 30, 2011. The event was attended by 4,000 people.

In 2004, FoLAR began to examine what types of trash were being collected in the LA River, where the trash was coming from, and how it was getting there. By collecting this data, the group hoped to identify potential solutions to most effectively reduce the amount of trash in the LA River. A Trash Biography (FoLAR 2011) presents a comprehensive analysis of FoLAR's trash sort data from 2004 to 2011.

While this section compares results from this Study to data published by FoLAR, it is important to acknowledge the differences between the two efforts. Clean-up initiatives organized by FoLAR were "water" characterization assessments in that they characterized trash that had been collected from the banks of various waterbodies. In contrast, this Study focuses upstream of the receiving waters and performed a "land" characterization exercise. Since this Study is one of the first of its kind, it is difficult to compare against other similar studies. While it is not an exact comparison, relating results from the FoLAR studies to this Study may provide valuable information.

STUDY METHODOLOGY: For this portion of the Study, crew members were asked to sort the trash collected at each site into the following 15 categories, which are the same as those employed by FoLAR during their Clean-Up initiatives:

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

After sorting the trash into the specified 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.

### **Data Indications of Trash TMDL Success**

Below is a compilation of data that indicates that the Los Angeles Trash TMDL was successfully implemented, but that next steps are necessary. As stakeholders come together again to solve the problem of trash in the river we recommend the following questions be addressed:

- 
- Is there a difference between what is littered on the streets and what is littered into the river?
  - What trash is still commonly found in the river, and where does it come from?
  - What actions can be taken to continue to restore the river?

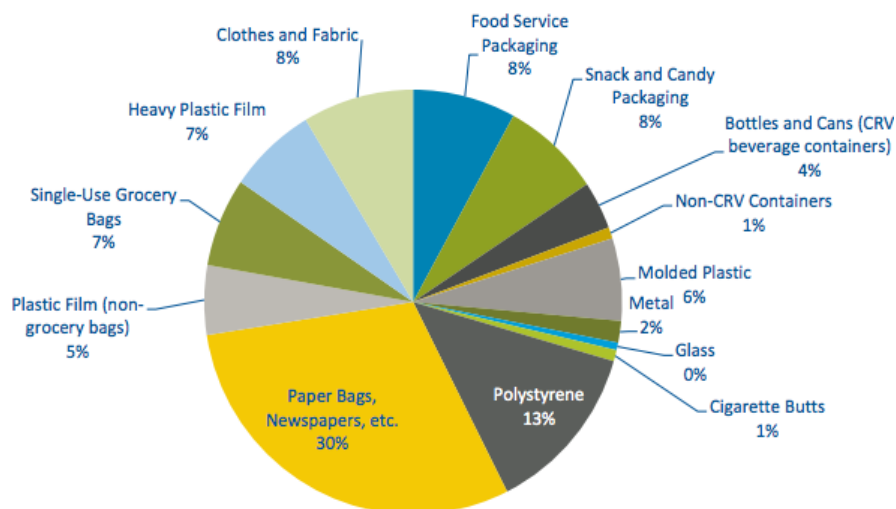
Compiling the data collected by the City and FoLAR tells an interesting story, as full compliance to the Trash TMDL changes the major aspects of trash discharged into the river.

The major difference between the two featured studies is the City's data monitors what is picked up from the streets while FoLAR's focuses specifically on trash picked up from riparian areas. The City chose its clean up sites based on trash generation rates, splitting it between low and medium areas. FoLAR sites were selected because they are natural bottom areas of the river where trash tends to collect.

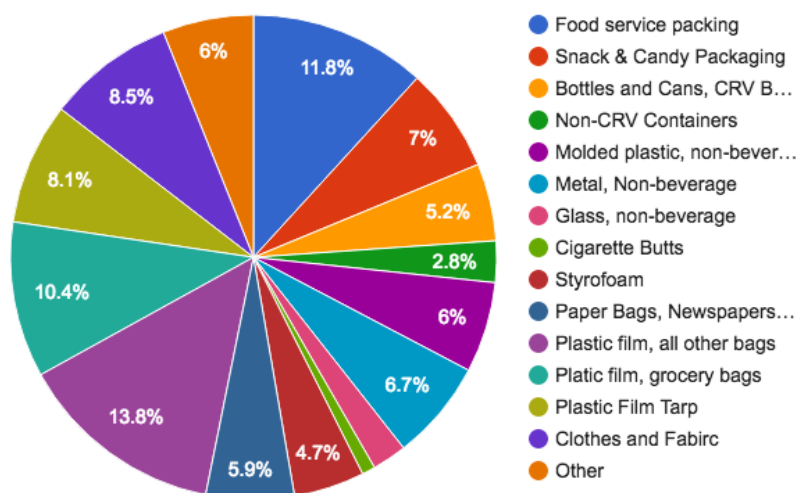
Despite these differences, the essence of the studies are similar and create valuable insights into the composition of trash both on land and in riparian areas. Trash is no longer entering the river through the storm drain system, but is potentially entering the river through means of littering, dumping and being blown by the wind. Analyzing and comparing FoLAR data with sources from city departments creates a clearer picture to, hopefully, influence future revitalization efforts.

By comparing the City's quantitative street trash data with FoLAR's river trash data, it becomes clear that the Trash TMDL has been an effective step in keeping urban trash out of the Los Angeles River.

## **Figure 2. Percentages of Total Trash Collected in the 2012-2013 City Clean Up**



**Figure 3. Percentages of Total Trash Collected in the 2012-2013 FoLAR Clean Up**



The above figures break down 15 trash types as percentages of the whole from 2012 to 2013. It is important to note that this is not aggregate data, but samplings from areas representative of the watershed and LA River.

Comparing the two sets of data indicates a discrepancy between the amount of trash found on the streets, and of that actually entering into the LA River. In the 2012-2013 Final Quantification Study of Institutional Measures for Trash TMDL Compliance, the City

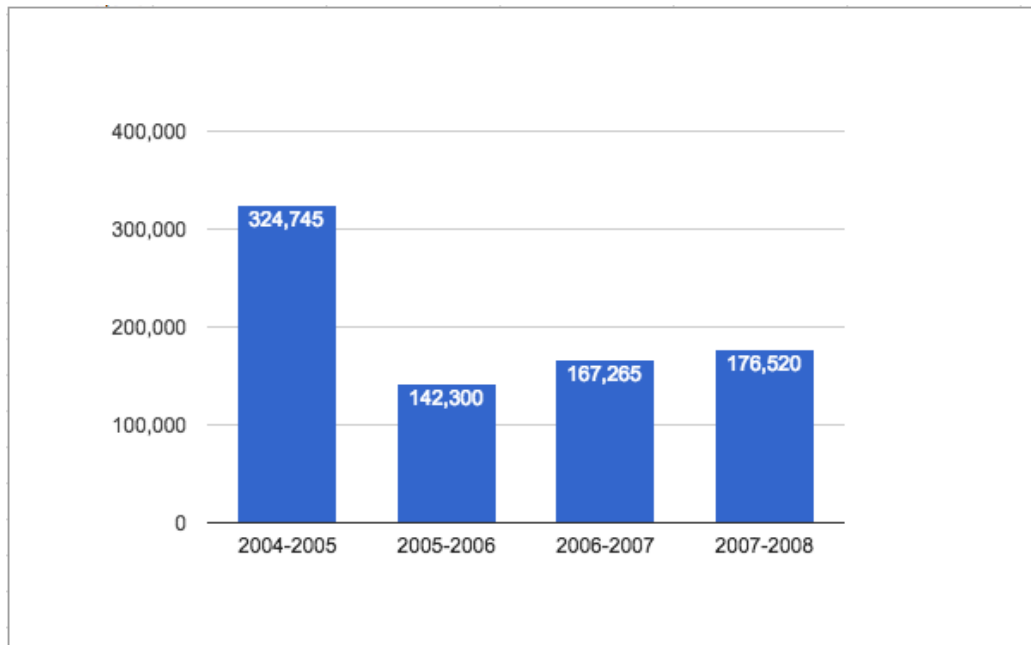
---

concluded,

“It is clear that paper and Styrofoam products are major contributors to the trash that threaten to enter the LA 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.”

Data collected by the trash sorts at the Gran Limpieza for the same years did not reflect these patterns. In the years 2012-2013, the paper and polystyrene percentages in the river were 5.9 percent and 4.7 percent, respectively.

Additionally, data collected in Long Beach indicates that efforts to clean stormwater runoff are working. The chart below is the amount of trash collected, in pounds, from the LA River before it runs into the ocean. There is a sharp cut in the amount collected from 2005-2006, after Proposition O,



In addition, [add qualitative quote about how the river is cleaner since the start of the clean ups- here. (a constant river cleanup volunteer states ....)]

Overall, while there is still trash entering into the river, the data indicates that it is not from what is recorded to be found on the streets. It can be concluded that the full and partial capture systems, results of the Trash TMDL, are successful and having their intended effect. For a more complete analysis, compiling and comparing data from street sweepers, amount of trash in catch basins, and even a more scientific collection of trash *in* the river is necessary. In order to advance efforts to prevent other trash from entering the LA River, various possibilities and trends represented in the FoLAR data are explored below.

---

# Appendix

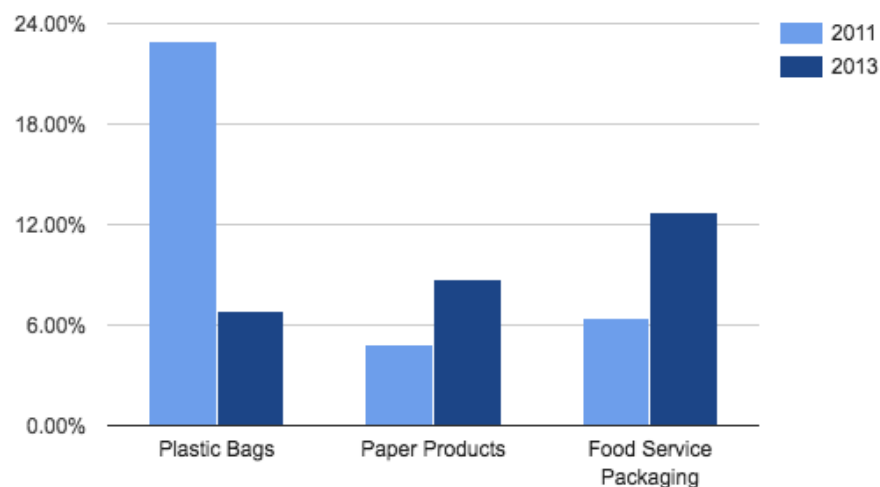
## Hypotheses

### Plastic Bag Legislation

In August 2011, Los Angeles County issued a ban on single-use plastic bags, effective for unincorporated areas within the County. 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 reflected clearly in the Los Angeles River. FoLAR saw a 16 percent decrease in the share of plastic bags found in the River from 2011-2013, while at the same time the share of food service packaging and paper increased by 6 and 4 percent.

**Figure.4 Two Year Comparison of Plastic Bags, Paper Products and Food Service Packaging**



*Figure 4.* While the total percentage of plastic bags has decreased, replacement products such as paper and food service packaging are on the rise.

---

As addressed by the County in the Environmental Impact Report, the 10 cent fee was not considered sufficient to mitigate the environmental damage of a switch from plastic to paper bags, the results of which are, though minimally, being felt in the Los Angeles River.

#### Next Steps:

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. Working with consumers to determine realistic changes in routine rather than punishing them for use is necessary to enact meaningful changes in their trash generation.

### Large Item Pickup

According to the City's data, 80% of land surveyed in the clean up was littered with large items (abandoned couches, mattresses, shopping carts, etc.). While FoLAR didn't include large items in its trash sort data, both organizations have photographic examples. The city hypothesized an "out of sight, out of mind" mentality that may be the case. Homeless settling in riparian areas is another potential source of large trash generation in the river, discussed in the section that follows.





---

## Next Steps:

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.”

## Homeless Population

It is no secret Los Angeles is home to one of the largest homeless populations. The Weingart Center in the Study of Homelessness and Poverty estimated that 82,000 people are homeless in Los Angeles City at any given night<sup>33</sup>. According to the U.S Department of Housing and Urban Development between 2014 and 2015 alone, the number of homeless individuals has increased by 20 percent.<sup>34</sup>

A Los Angeles homeless population map, created by the LA Times in 2015, reveals that the Sepulveda, Steelhead and Compton sites are located in areas moderately populated by LA's

---

<sup>33</sup> Homelessness in Los Angeles County. (n.d.). Retrieved June 2016, from <http://www.la Almanac.com/social/so14.htm>

<sup>34</sup> Cohen, R., Henry, M., Shivji, A., de Sousa, T., & Abt Associates Inc. (November, 2015). The 2015 annual homeless assessment report (AHAR) to congress. Retrieved June 2016, from <https://www.hudexchange.info/resources/documents/2015-AHAR-Part-1.pdf>

---

homeless.<sup>35</sup> The Bette Davis site is located in a sparsely populated area, and no data was available for the location of the Willow Creek clean up site.

With the homeless population on the rise, the environment is feeling its effects. 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).”<sup>36</sup>

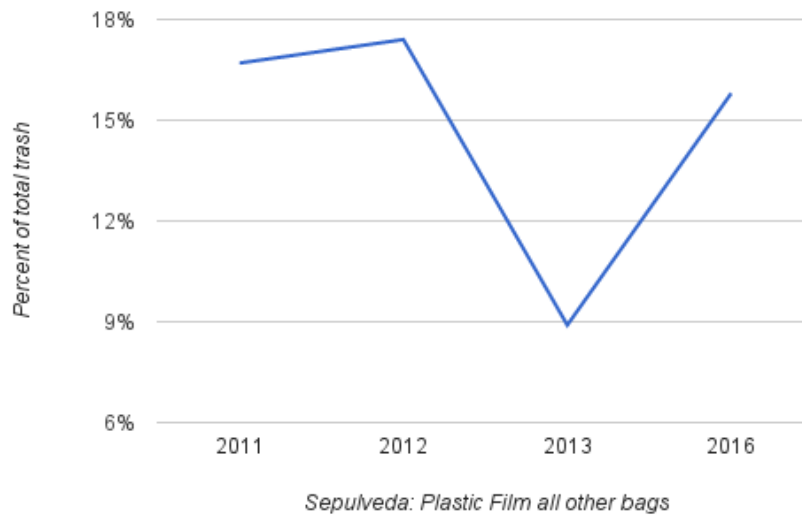
In general, food related trash was commonly picked up at sites located in moderately dense homeless population areas. At the Sepulveda site, from 2013 to 2016, plastic film consisting of items such as saran wrap and sandwich baggies increased from only being 8.9 percent of the total trash collected at the site to 15.8 percent.

**Figure 5. Total Percent of Plastic Film Collected at Sepulveda by Year**

---

<sup>35</sup> Los Angeles Times. (2015). Retrieved June 2016, from <http://graphics.latimes.com/homeless-los-angeles-2015/>

<sup>36</sup> White, C. (November 19, 2013). Environmental impacts of homeless encampments in the Guadalupe river riparian zone. Retrieved June 2016, from [https://dspace.royalroads.ca/docs/bitstream/handle/10170/665/white\\_courtenay.pdf?sequence=1](https://dspace.royalroads.ca/docs/bitstream/handle/10170/665/white_courtenay.pdf?sequence=1)[https://dspace.royalroads.ca/docs/bitstream/handle/10170/665/white\\_courtenay.pdf?sequence=1](https://dspace.royalroads.ca/docs/bitstream/handle/10170/665/white_courtenay.pdf?sequence=1)

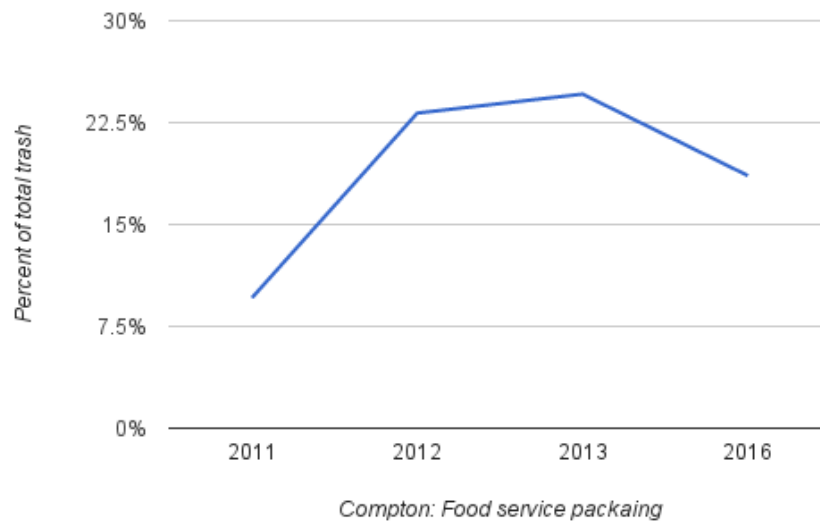


*Figure 5.* In concurrence with the rise in the Los Angeles homeless population in 2014, trash commonly littered by the homeless, such as plastic film, has increased.

At the Compton site, food service packaging made up almost a quarter of the trash collected for two consecutive years (2012-2013). While decreasing in 2016, food service packaging was still the largest category of trash collected, making up 18.6 percent of all the trash collected that year for that particular site. As the homeless population continues to rise, the strain on the environment increases as well.

---

**Figure 6.Total Percent of Food Service Packaging Collected at Compton by Year**



*Figure 6.* While food service packaging has decreased from 2013 to 2016, it still makes up almost a quarter of the total trash collected at the Compton clean up site.

#### Next Steps:

Cities may consider adding more trash cans in areas where the homeless populations is high. Because public trash cans are the only means as to which homeless people have readily access to dispose of their waste, these trash cans should be emptied more frequently. In addition, vendors of products that use food servicing packaging can have institutional measures, such as posters or ads on their trash cans, encouraging proper disposal of waste.

#### Lower Income Areas

---

As planning moves forward on increasing park space along the LA River, the Los Angeles Business Council released a report detailing the demographics currently around the river. The report states that 37 percent of the communities within a half-mile radius of the LA River are some of the most polluted and vulnerable areas in the state.<sup>37</sup> These areas have experienced widespread unplanned growth, and are largely lower-income areas.<sup>38</sup>

In a study regarding beach litter in southern Brazil, researchers found that, “Litter generation is about twice higher in the area occupied by people with lower average annual income and literacy degree.”<sup>39</sup> In addition, trash such as tires, rugs, used oil, furniture or construction materials are more likely to be dumped in such areas as people wish to avoid paying money to dispose of these items properly.

This trend is confirmed when compared with FoLAR’s trash sort data. Both the Compton Creek and Willow Creek sites are located near lower-income areas. Willow specifically often has the highest metal percentage of trash collected. In 2012 alone, the Willow site’s percentage of metal collected overshadowed the other sites by almost more than three percent.

---

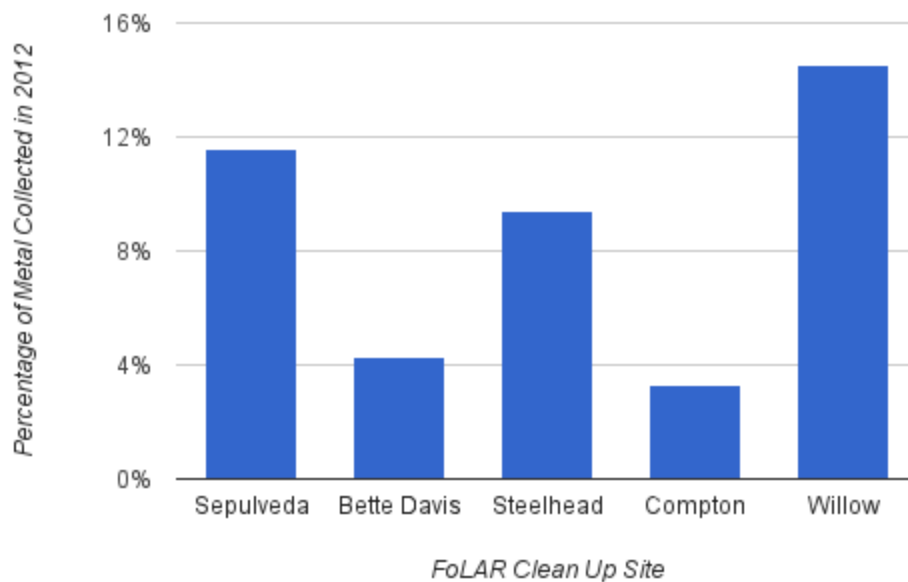
<sup>37</sup> LA Business Council LA River Report. (2015). Environment justice and community leaders on health, residential segregation, and displacement. Retrieved June 2016, from <http://www.cityprojectca.org/blog/wp-content/uploads/2015/06/LABC-LA-River-report-statement-20150604.pdf>

<sup>38</sup> Office of Environmental Health Hazard Assessment. (September 13, 2013). CalEnviroScreen 1.1. Retrieved June 2016, from <http://oehha.ca.gov/calenviroscreen/report-general-info/calenviroscreen-11>

<sup>39</sup> White, C. (November 19, 2013). Environmental impacts of homeless encampments in the Guadalupe river riparian zone. 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](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)

---

**Figure 7. 2012 Percent Totals of Metal Collected at FoLAR Clean Up Sites**

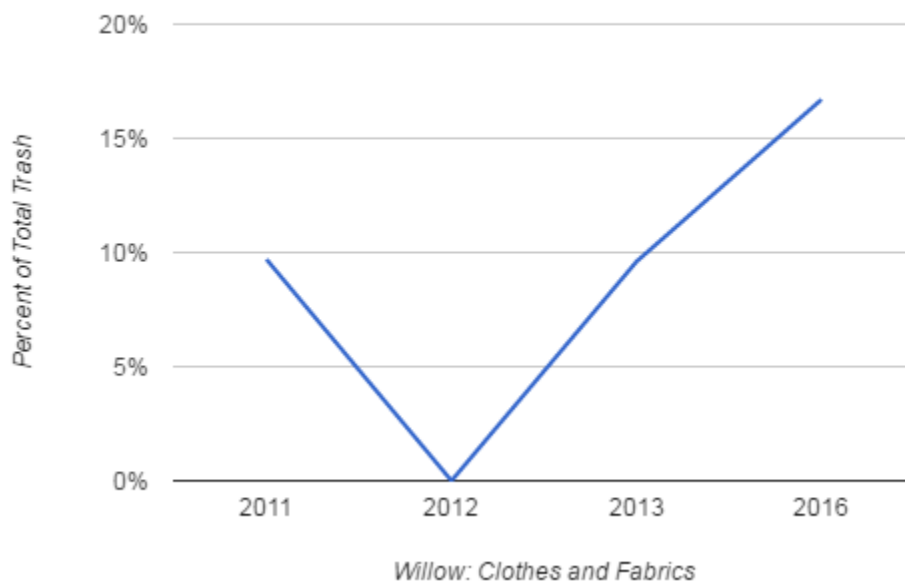


*Figure 7.* In 2012 the percentage of metal non-beverage trash collected is highest in Willow, a site in a low income area.

Clothing, another item subject to dumping in low income areas, has risen in the LA River as well. Willow's total percentage of clothing collected over the years illustrates that with the rise in the population in these lower income areas, dumping and littering practices also increase.

---

**Figure 8. Total Percent of Clothing Collected at Willow by Year**



*Figure 8.* The presence of clothing and fabrics at the Willow clean up site has increased with the rising low income population.

These sites have also shown an increase in food-service packaging, one of the most littered categories of trash. The unplanned growth in the lower-income areas means that the infrastructure for recycling is not as present here as it is elsewhere in the city.

---

### Next Steps:

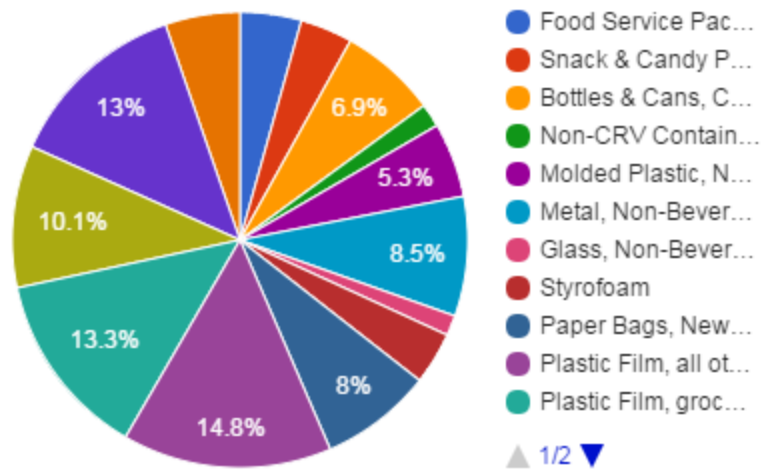
In order to address this littering issue, increased placement of recycling receptacles around these sections of the river would make it easier for people to get rid of their trash.

Continued street sweeping efforts as well will help, and increasing recycling and garbage bins in general across lower-income areas will help see a positive result.

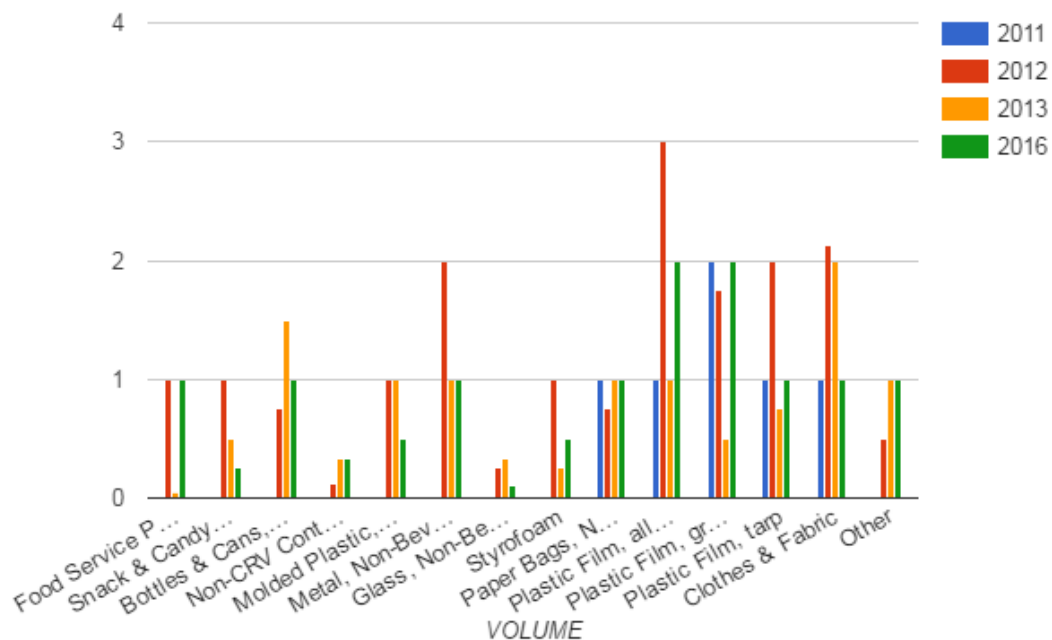
### **Totals by Site**

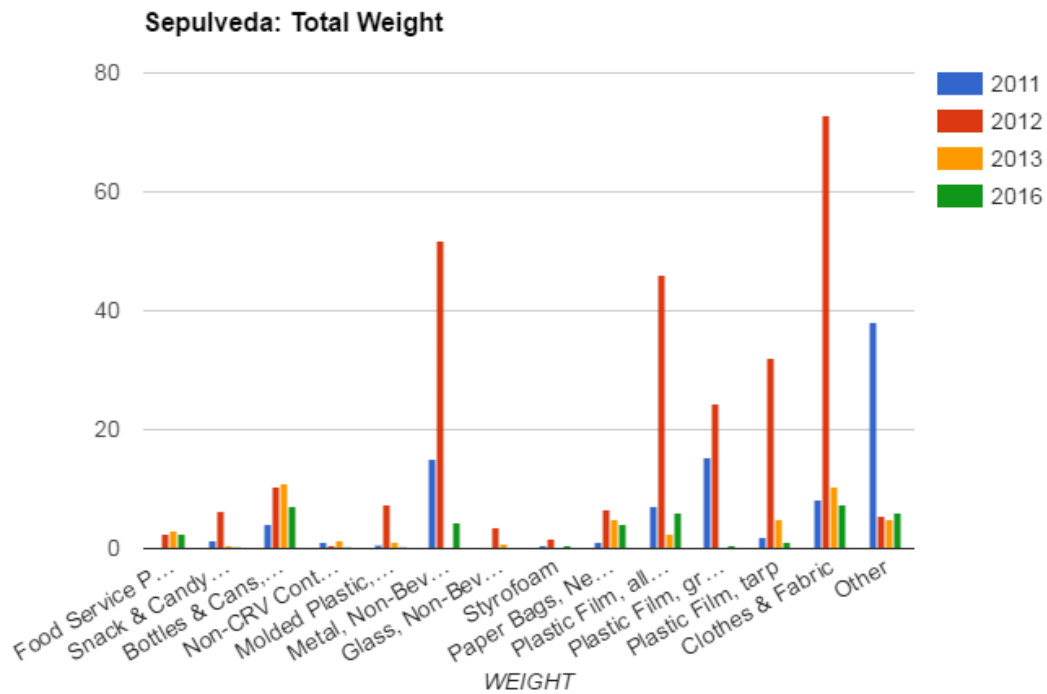


Sepulveda: Total Volume

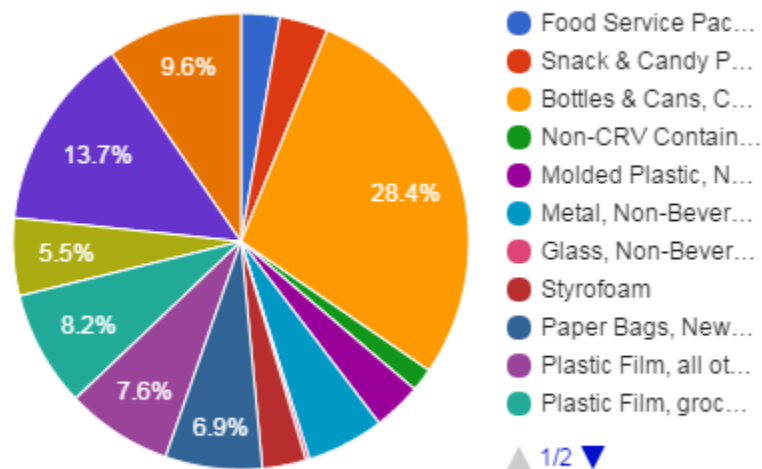


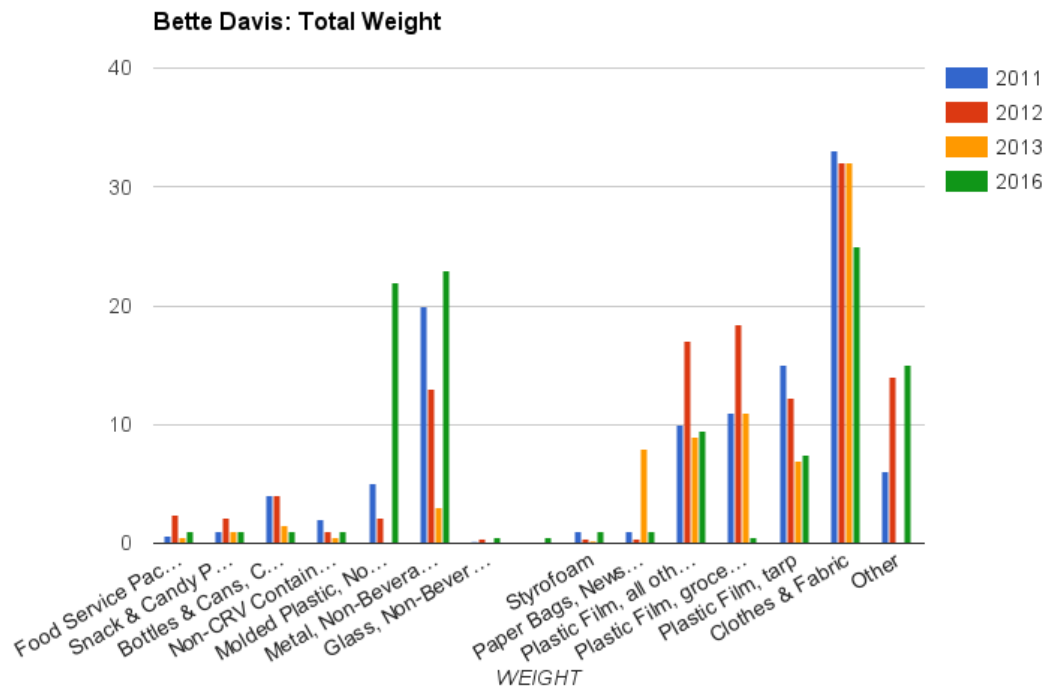
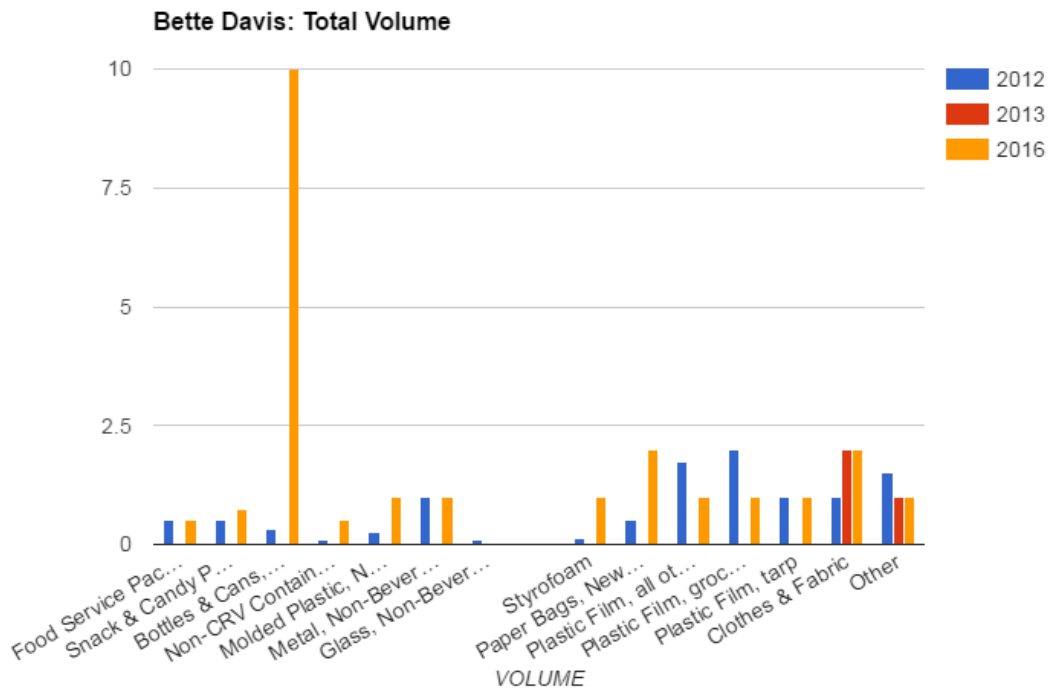
Sepulveda: Total Volume

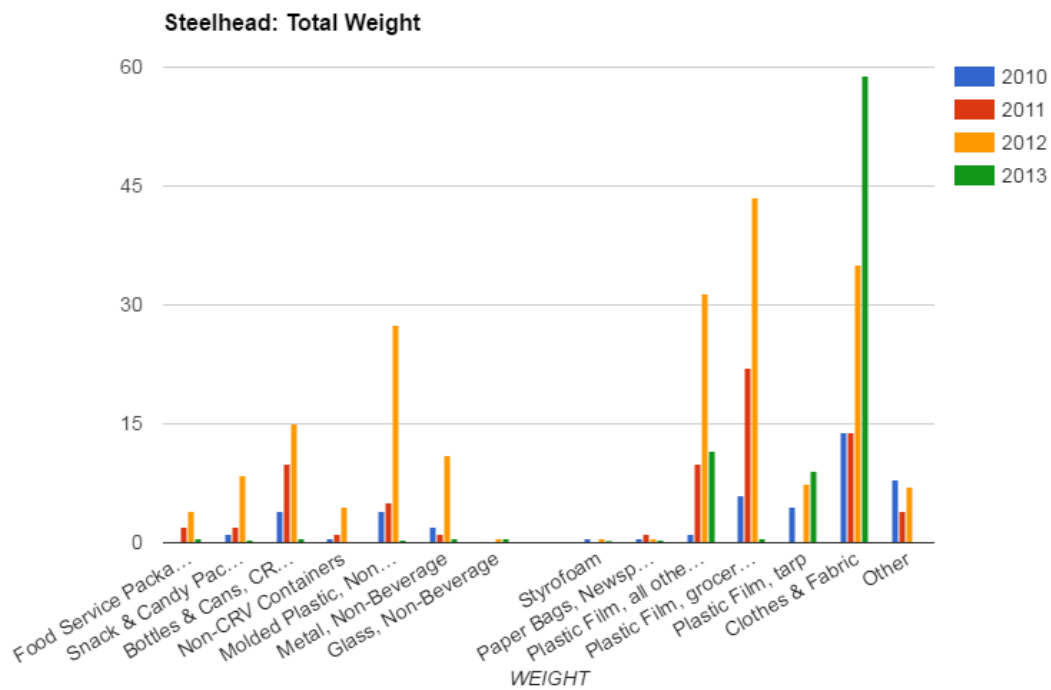
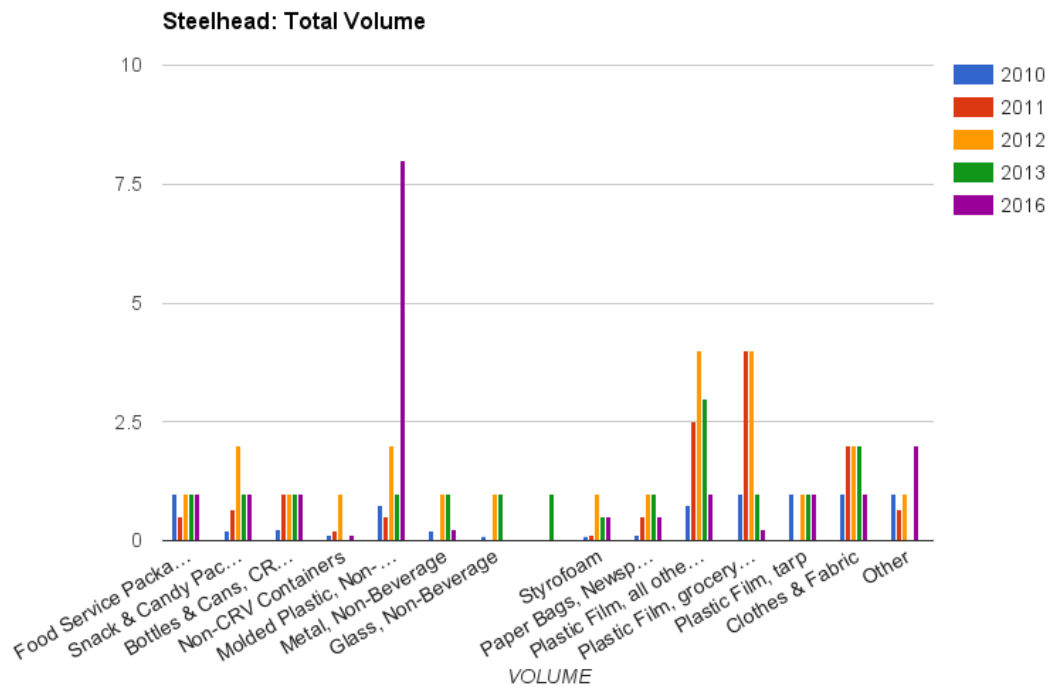




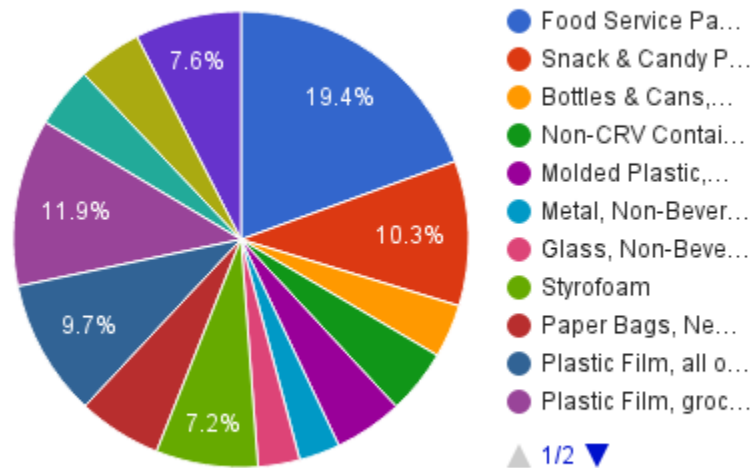
**Bette Davis: Total Volume**



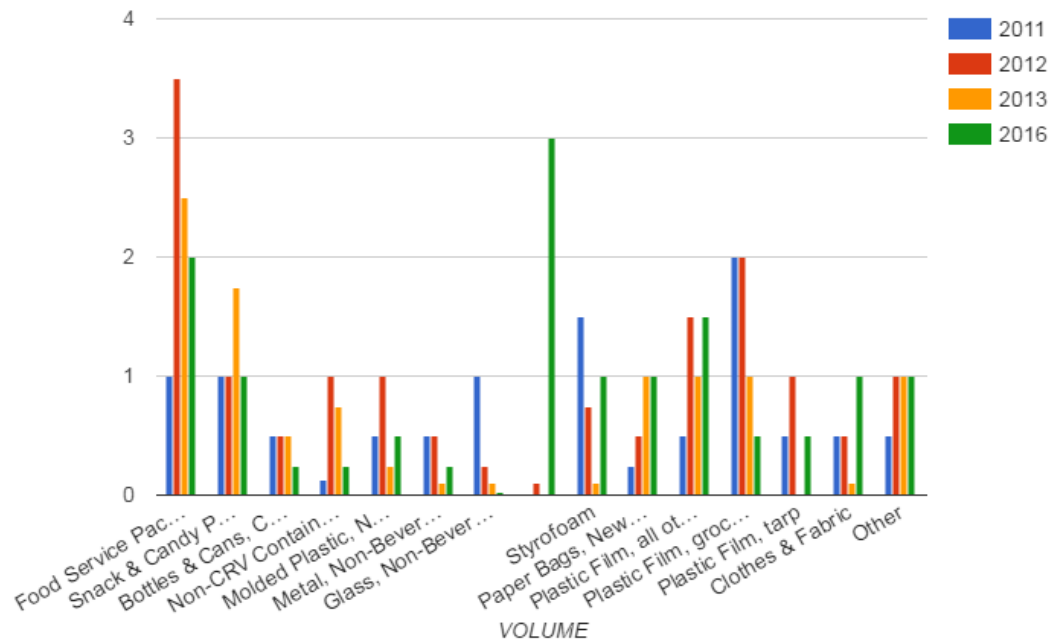


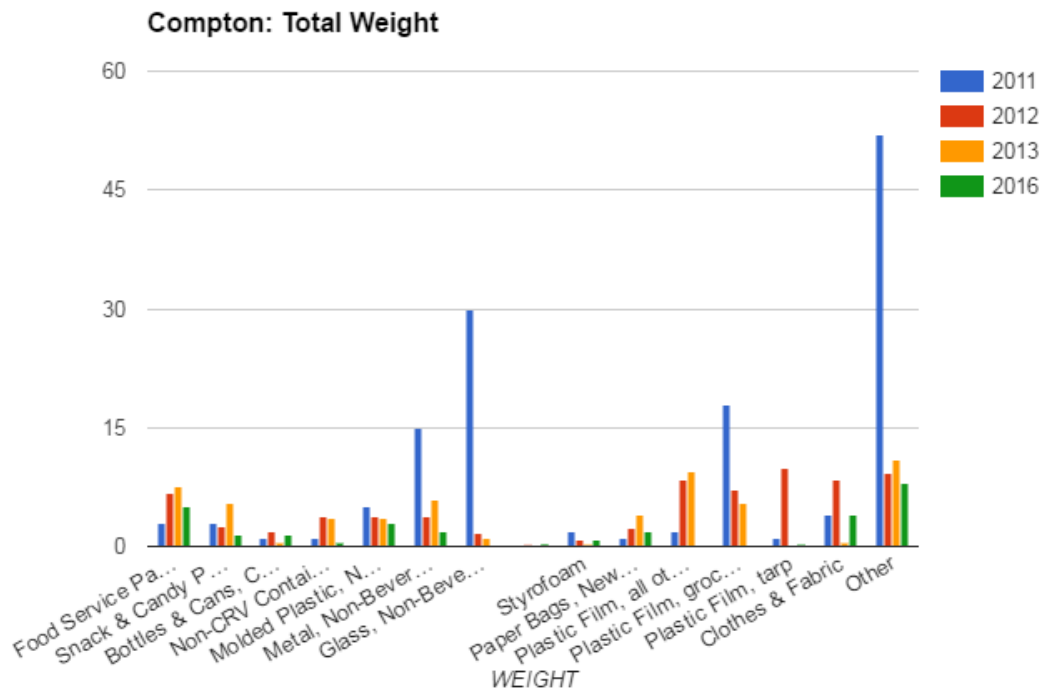


Compton: Total Volume

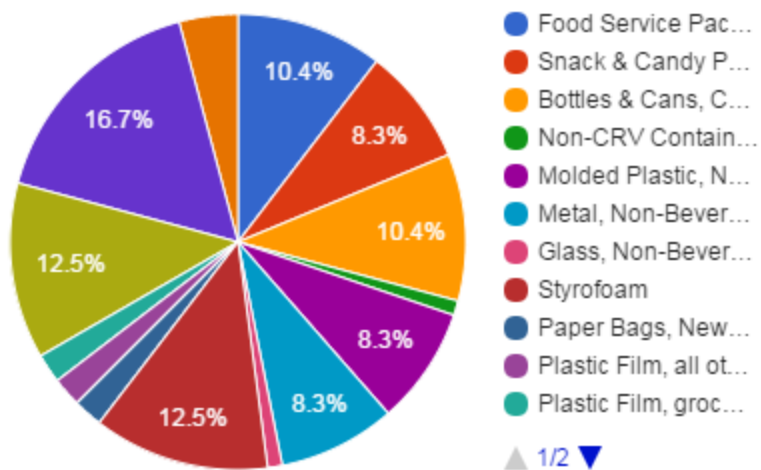


Compton: Total Volume

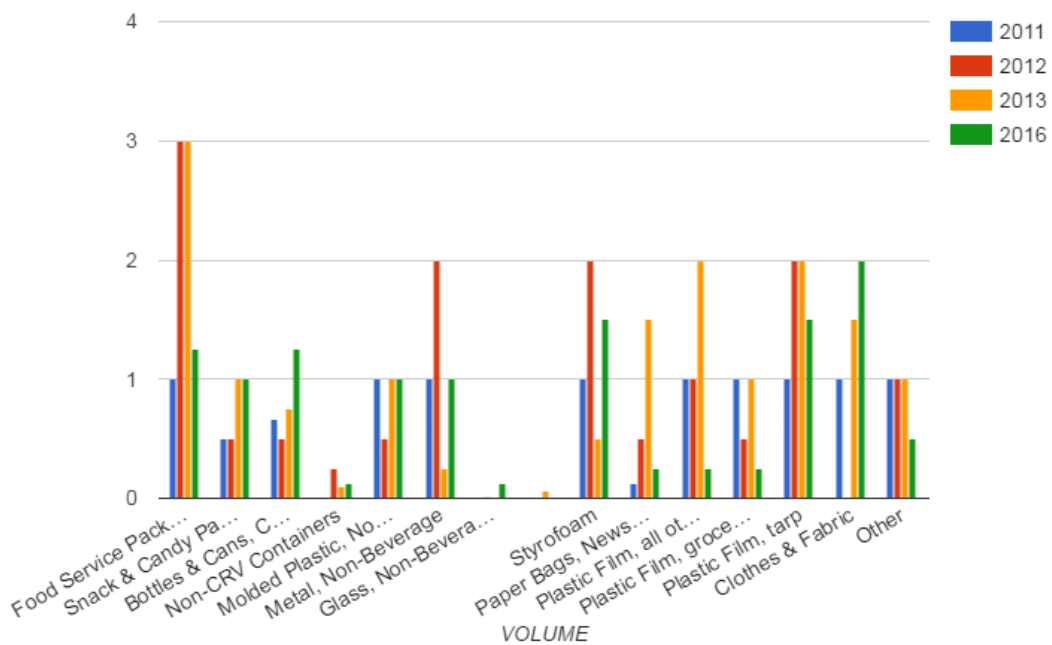


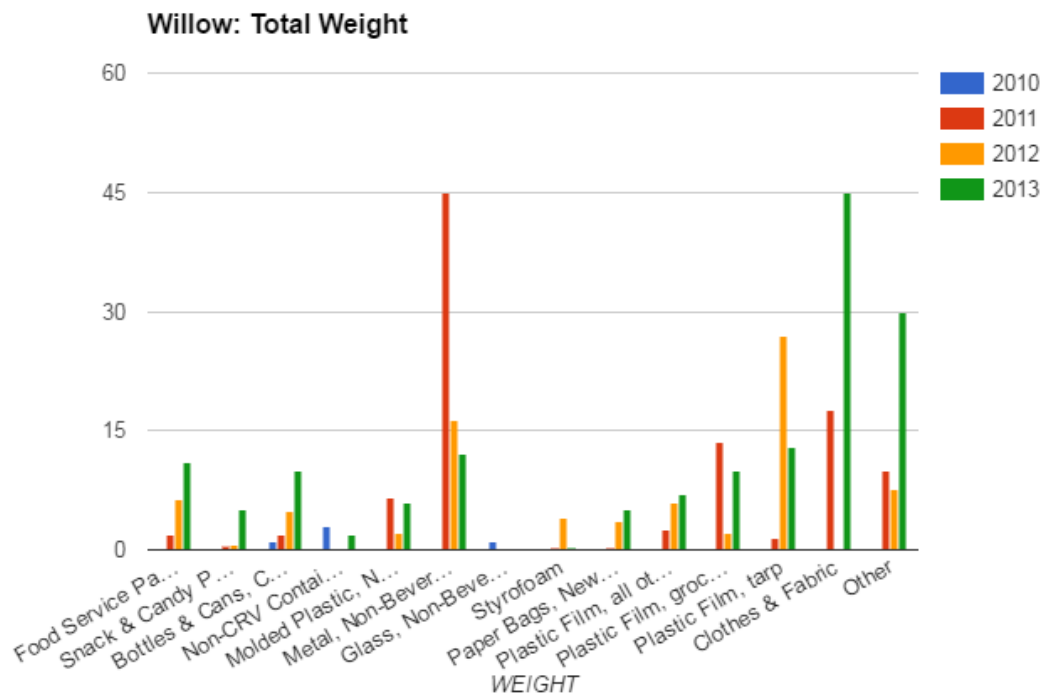


Willow: Total Volume



Willow: Total Volume

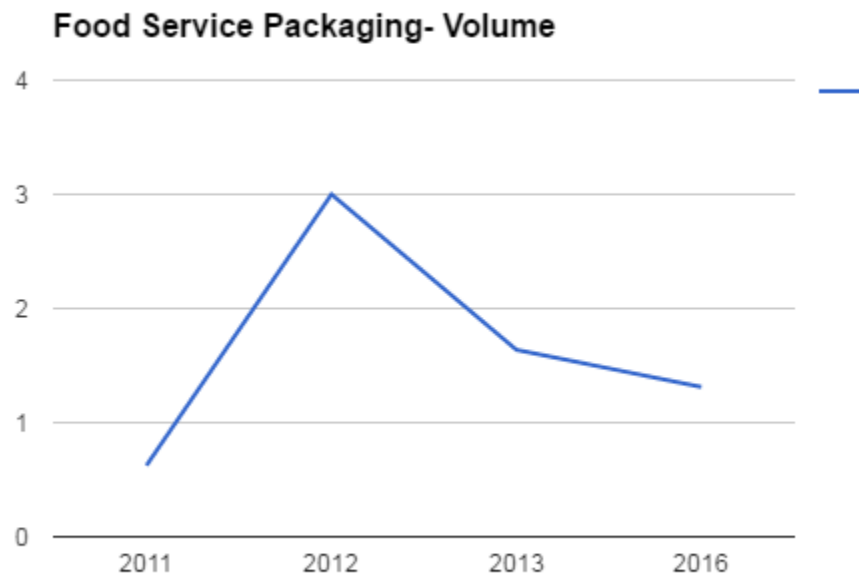






---

## Change Over Years By Trash Category

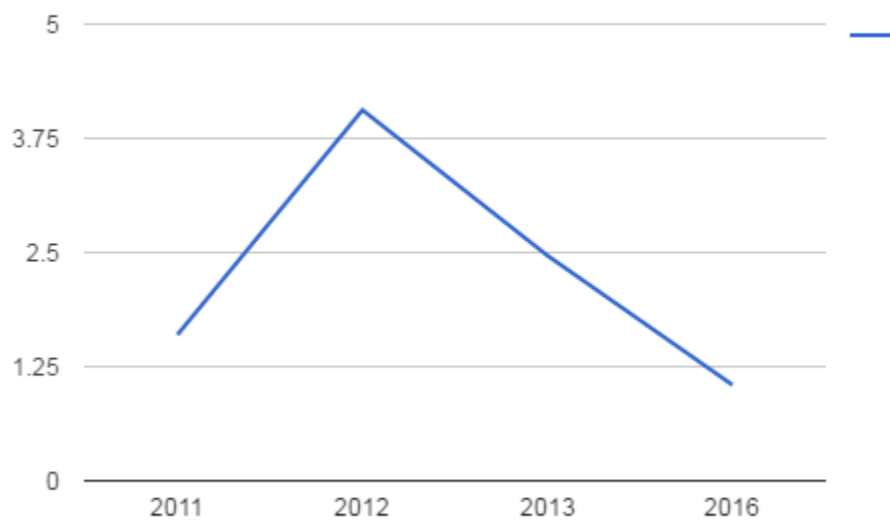


---

**Snack & Candy Packaging- Volume**

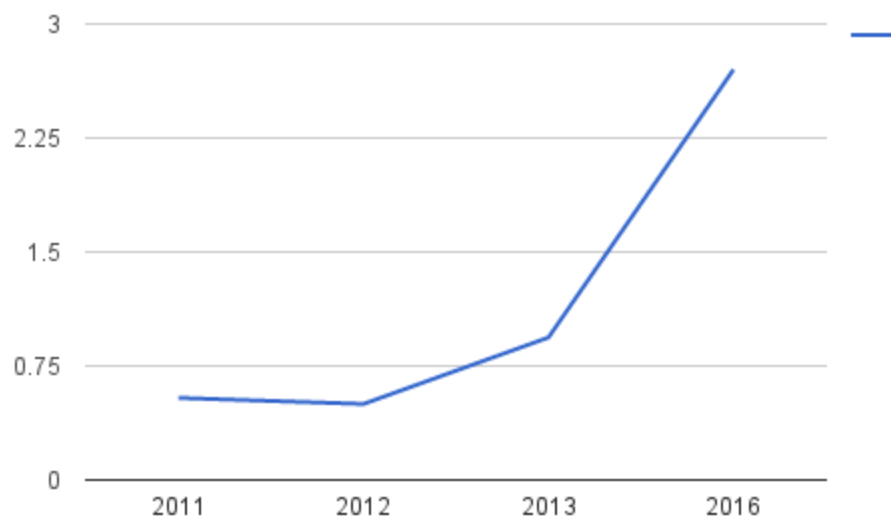


**Snack & Candy Packaging- Weight**

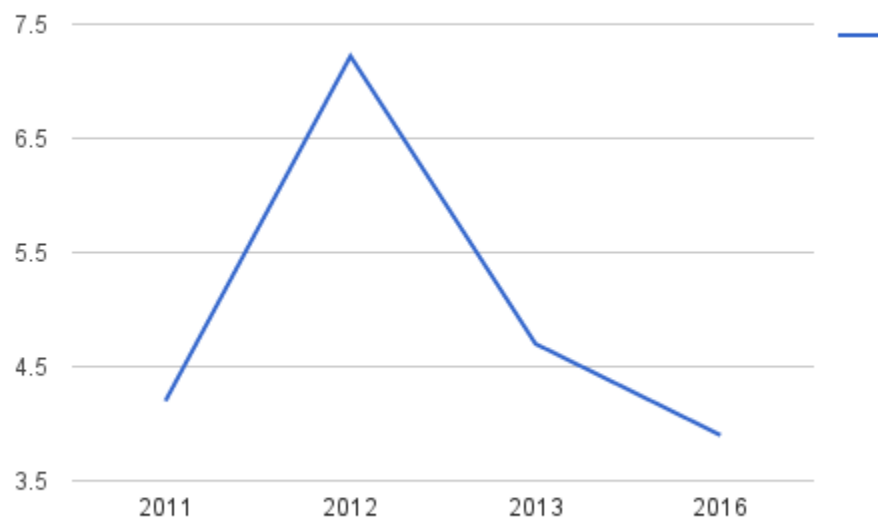


---

**Bottles Cans- Volume**

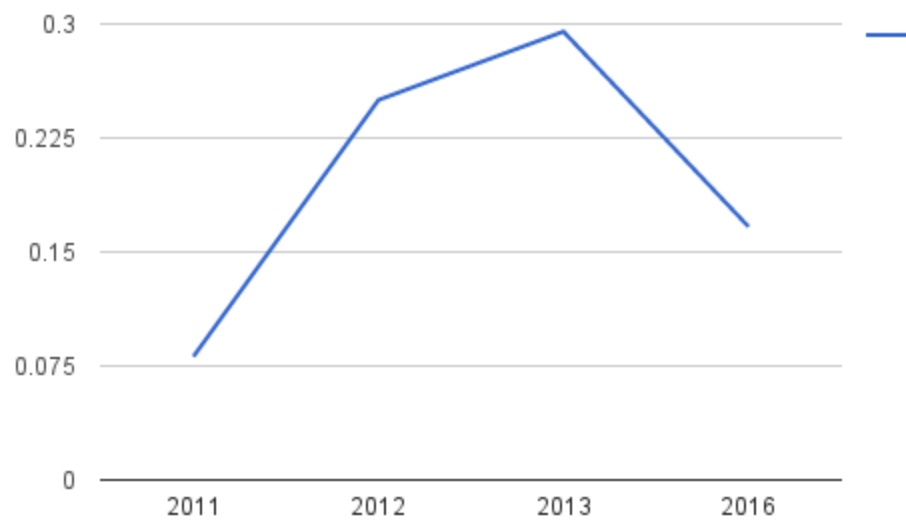


**Bottles Cans- Wieght**

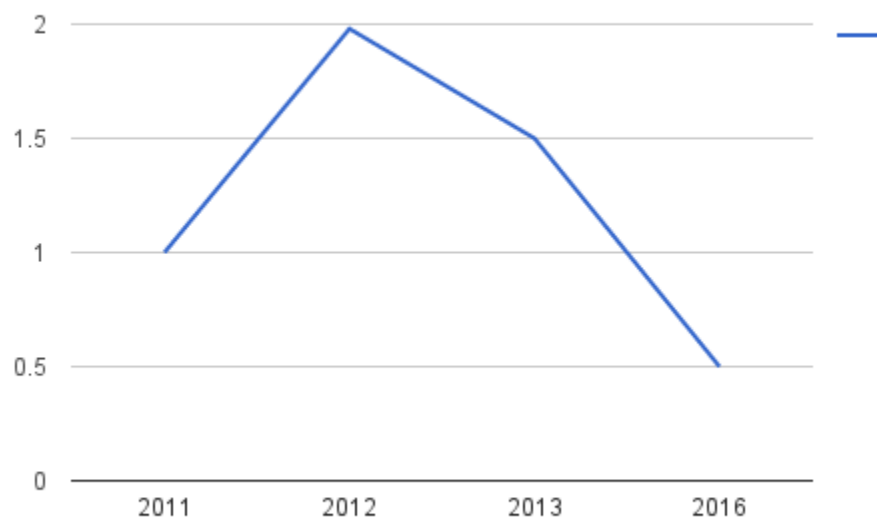


---

**Non CRV Containers- Volume**

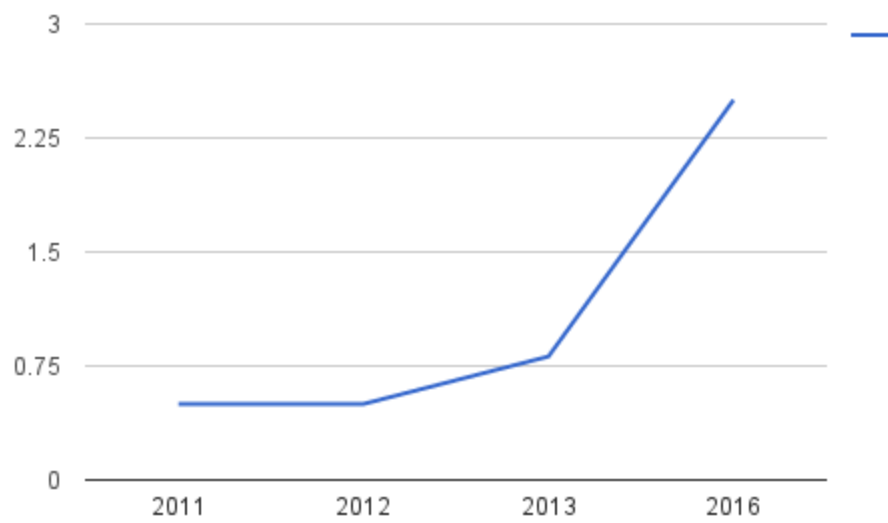


**Non CRV Containers- Weight**

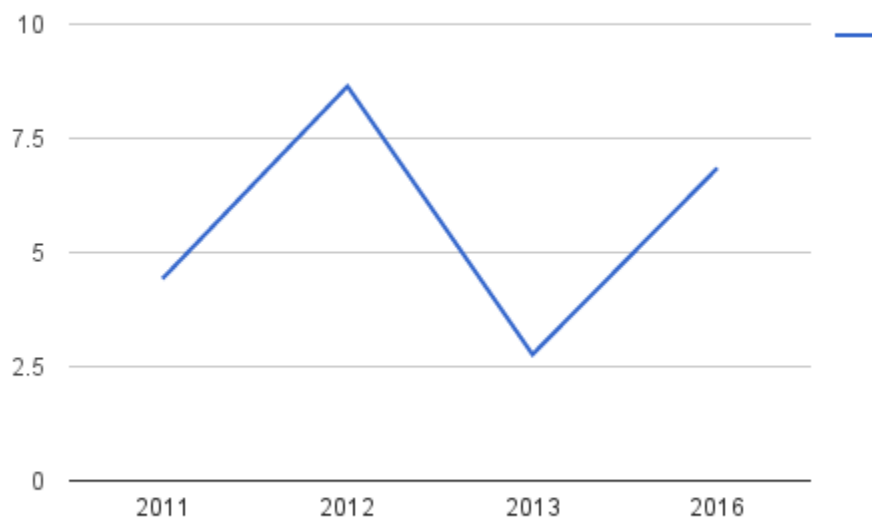


---

**Molded Plastic NB- Volume**

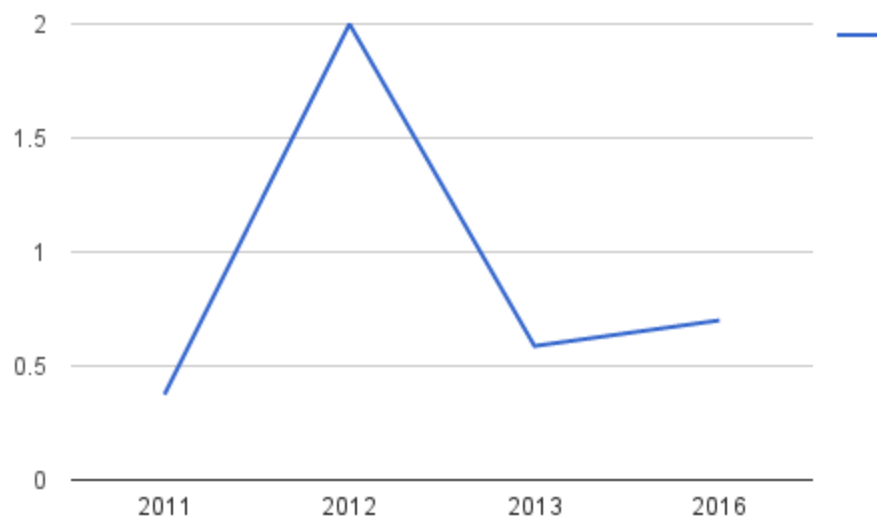


**Molded Plastic NB- Weight**

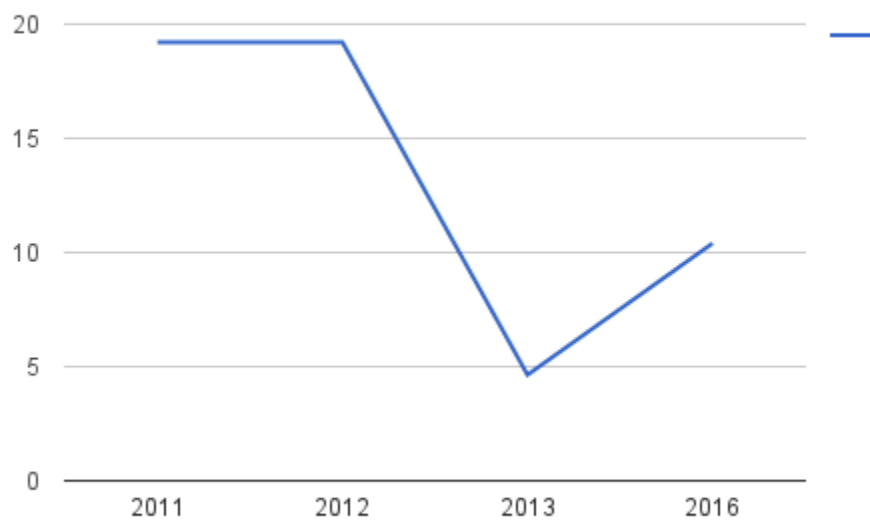


---

**Metal NB- Volume**

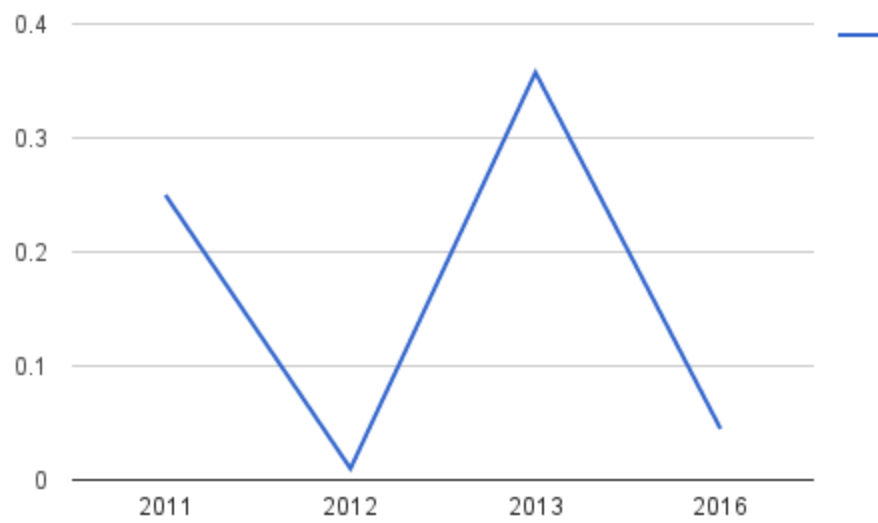


**Metal NB- Weight**

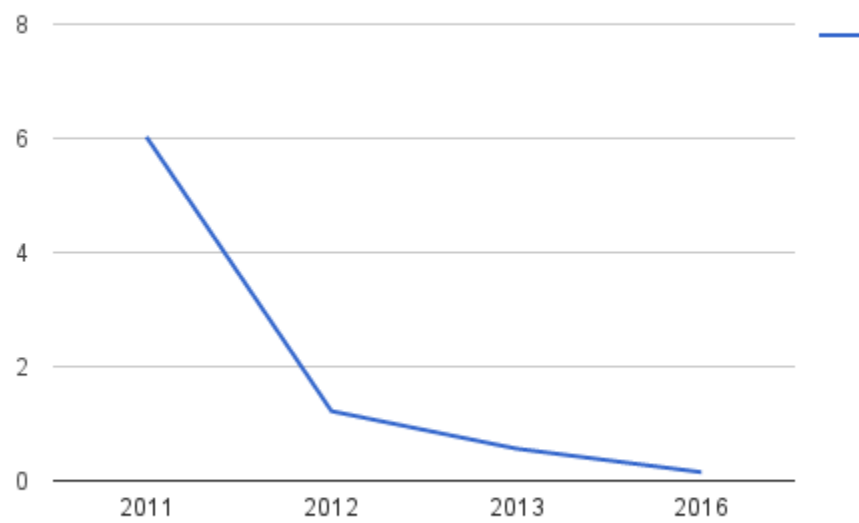


---

**Glass NB- Volume**

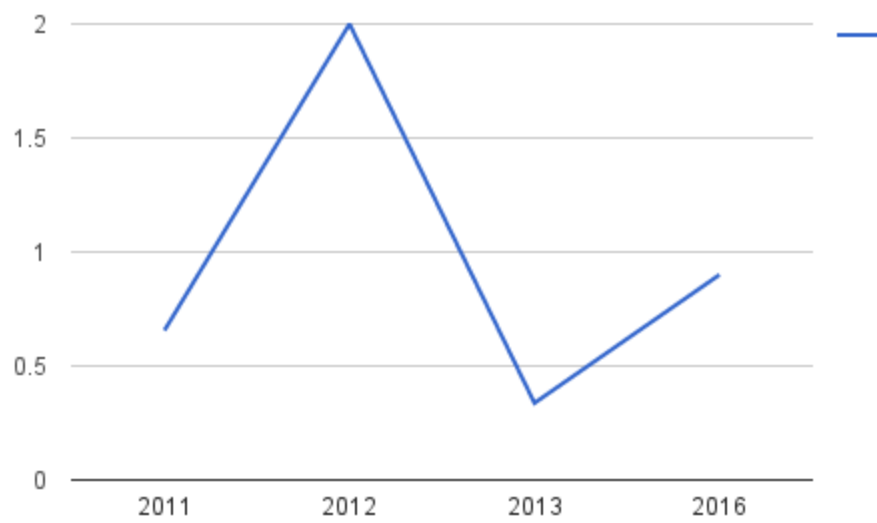


**Glass NB- Weight**

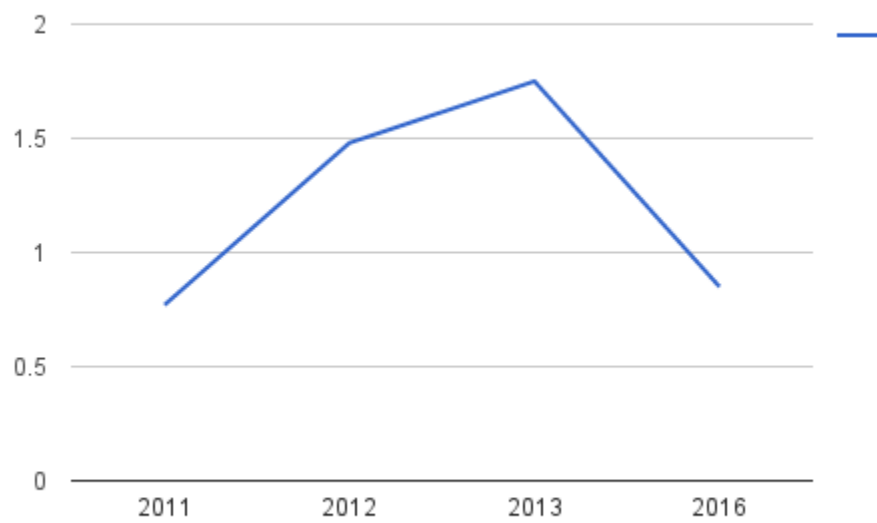


---

**Styrofoam- Volume**



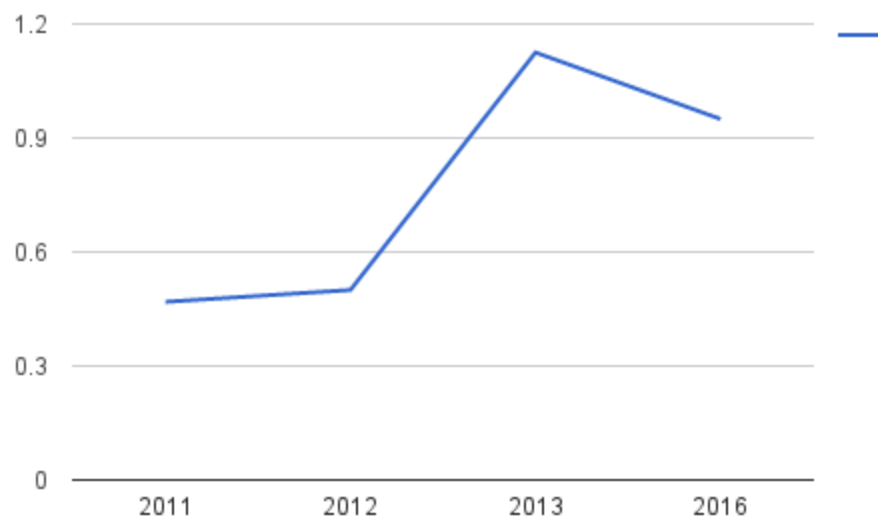
**Styrofoam- Weight**



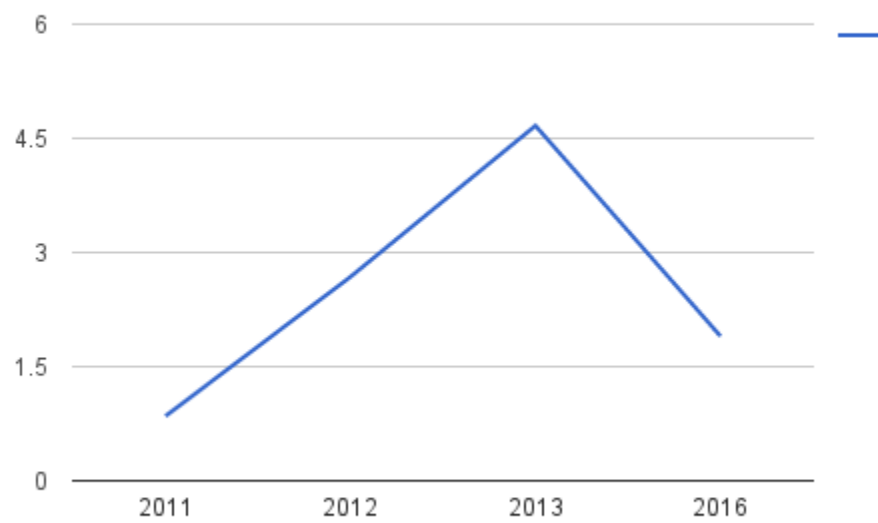


---

**Paper Bags/ Newspaper- Volume**

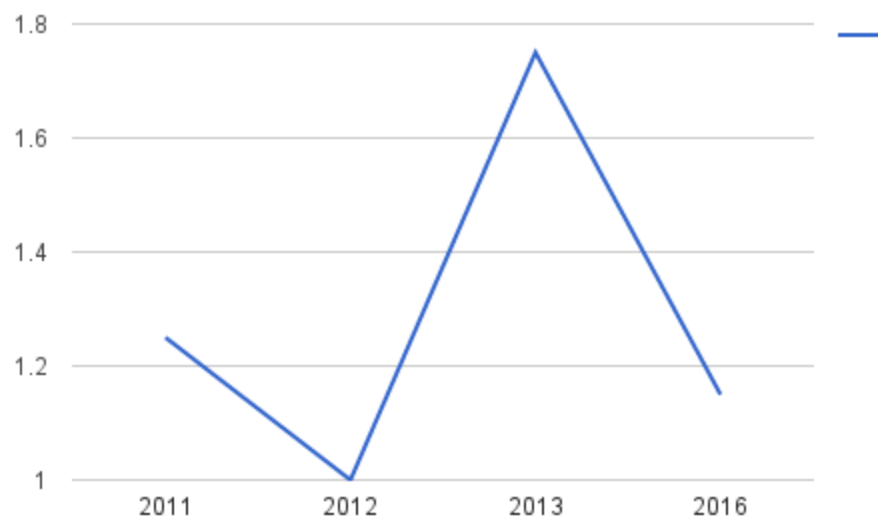


**Paper Bags/ Newspaper- Weight**

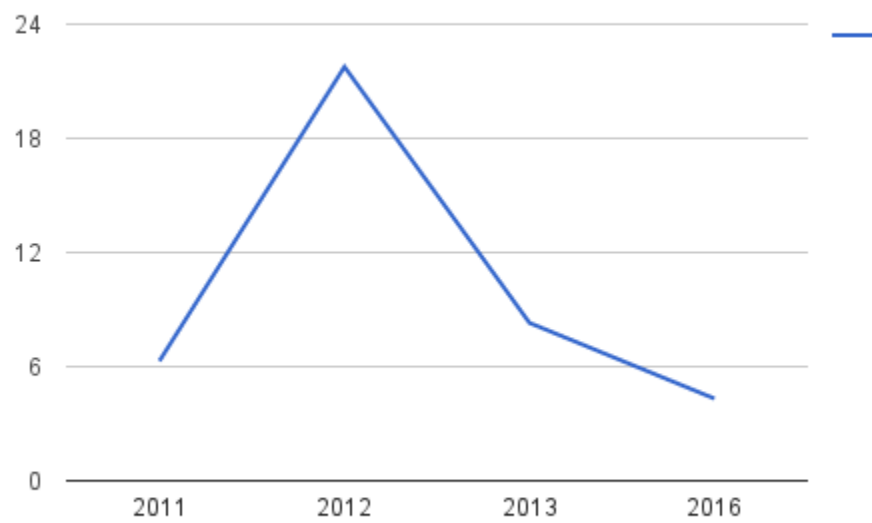


---

**Plastic All- Volume**

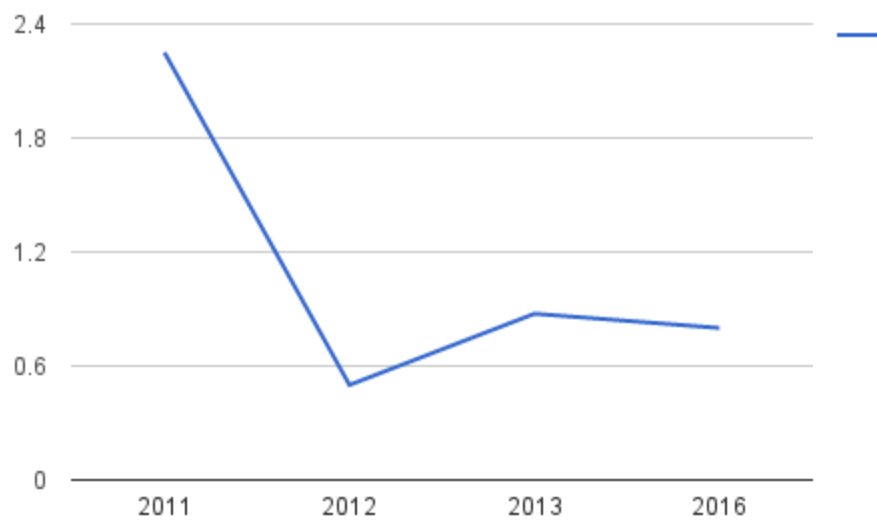


**Plastic All- Weight**

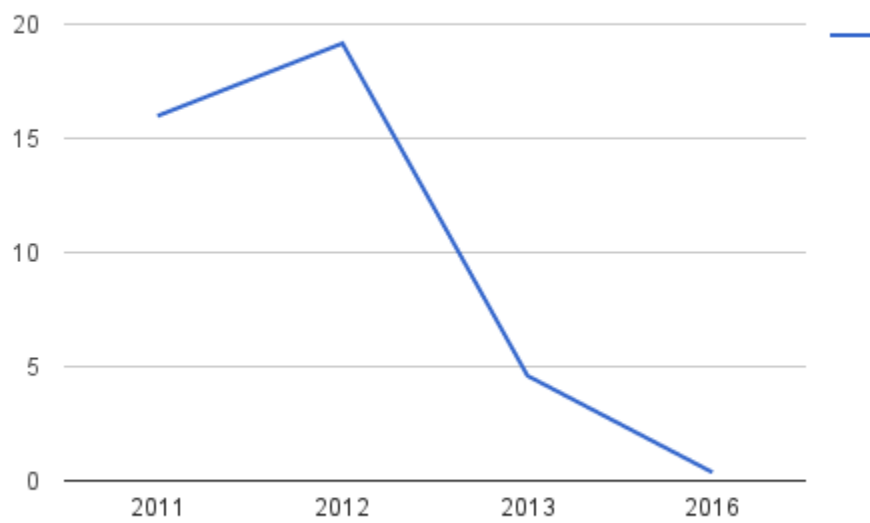


---

**Plastic Grocery Bags- Volume**

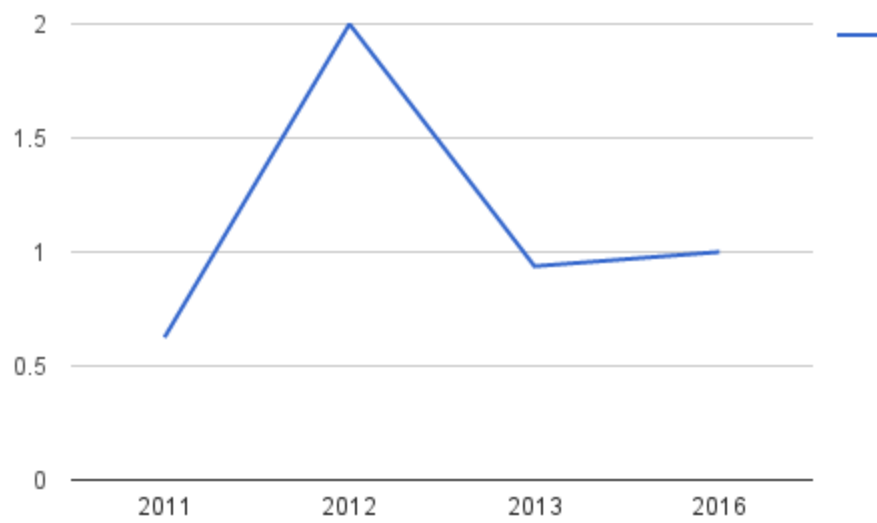


**Plastic Grocery Bags- Weight**

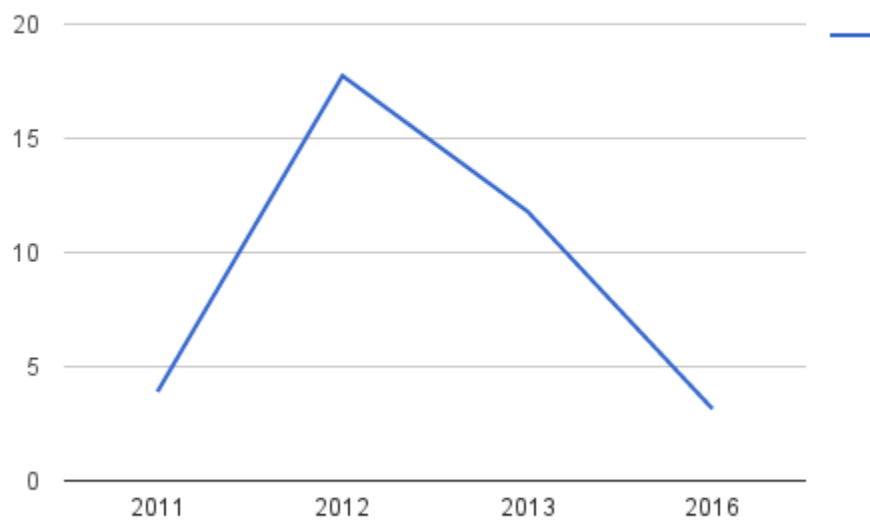


---

**Plastic Tarp- Volume**

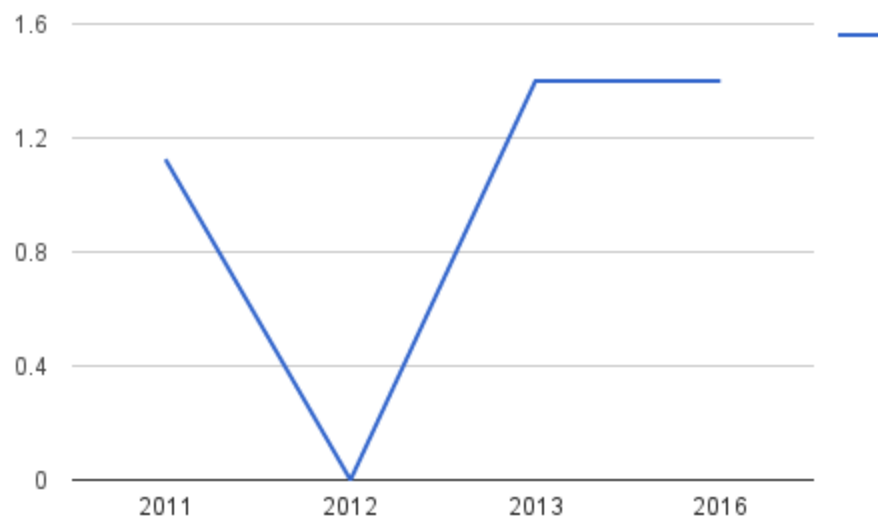


**Plastic Tarp- Weight**

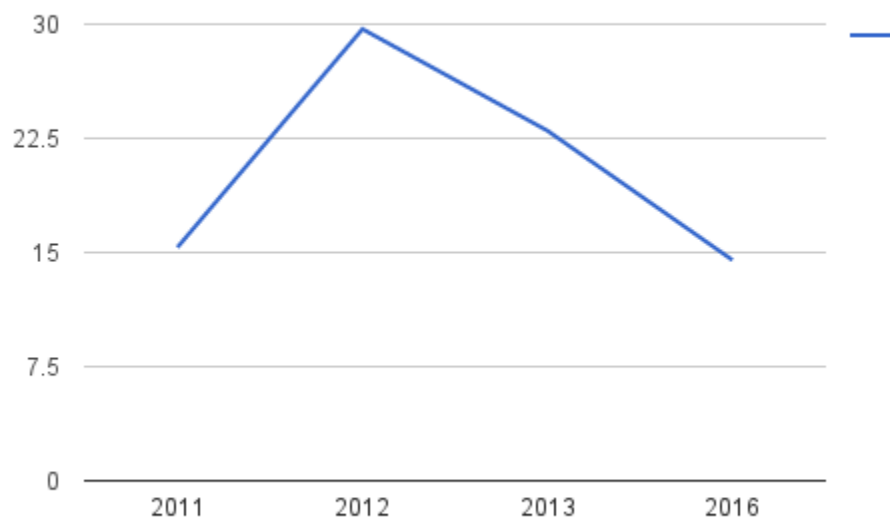


---

**Clothes Fabric- Volume**

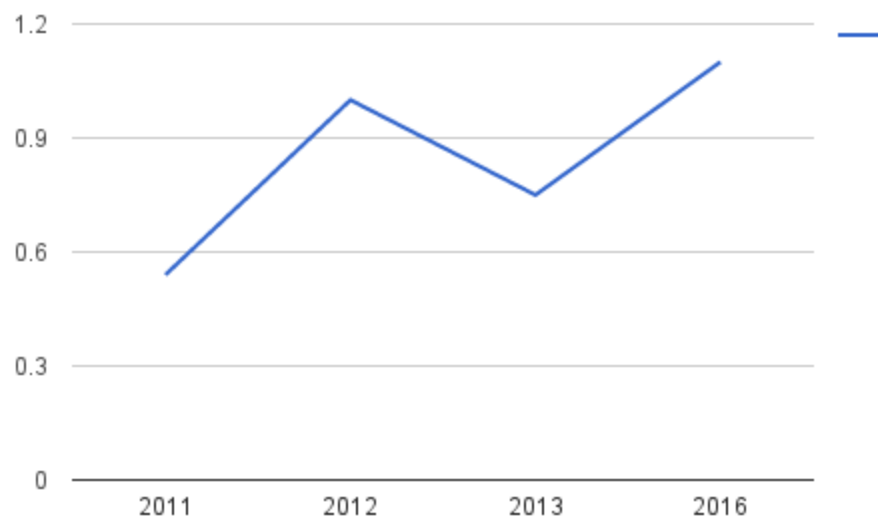


**Clothes Fabric- Weight**

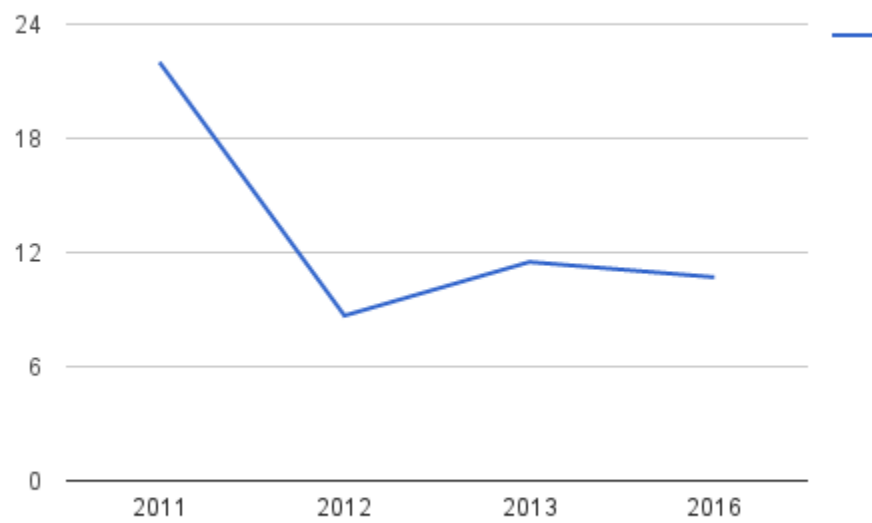


---

**Other- Volume**



**Other- Weight**

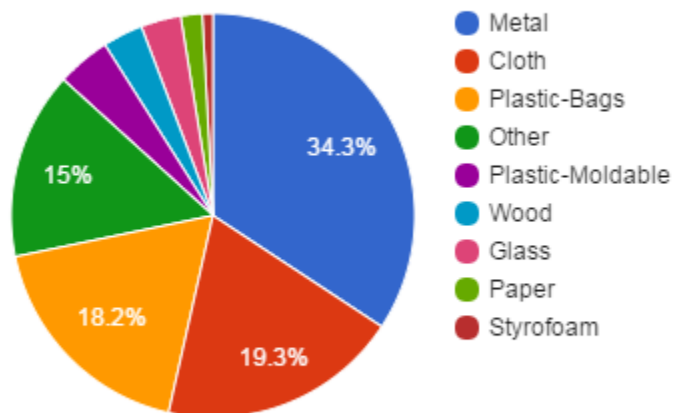


---

## Categories by Year and Site

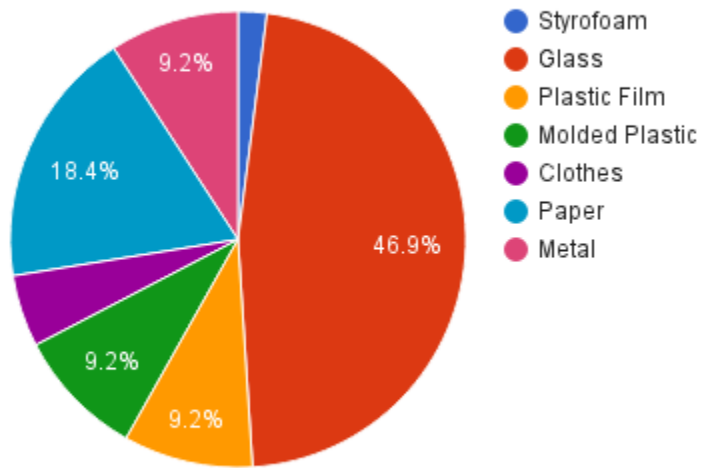
2004

**Fletcher: Volume 2004**

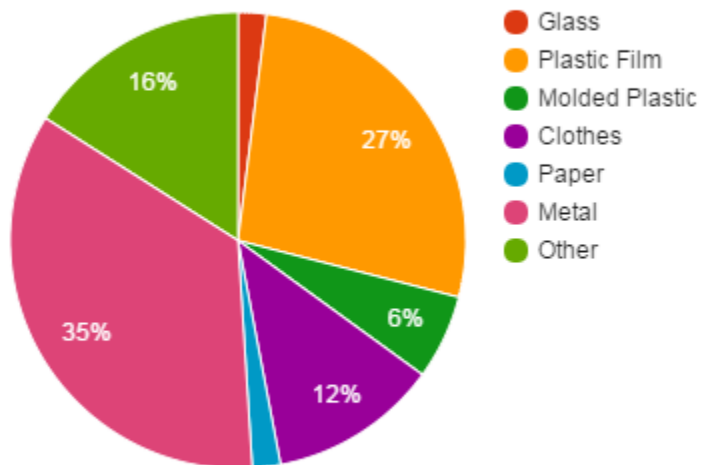


---

**Long Beach: Volume 2004**



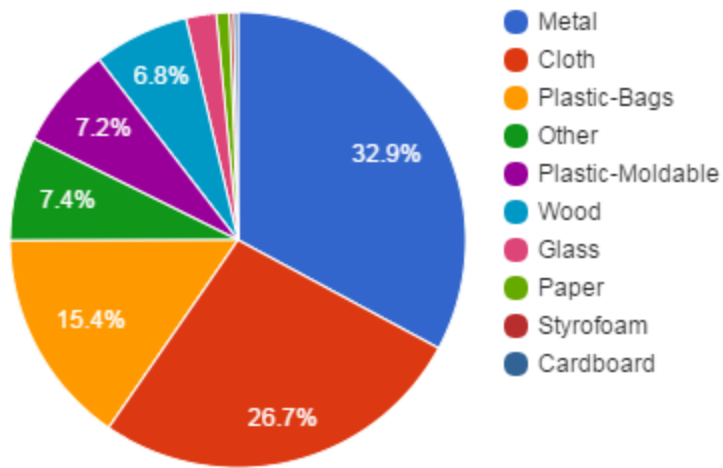
**Long Beach: Weight 2004**



2005

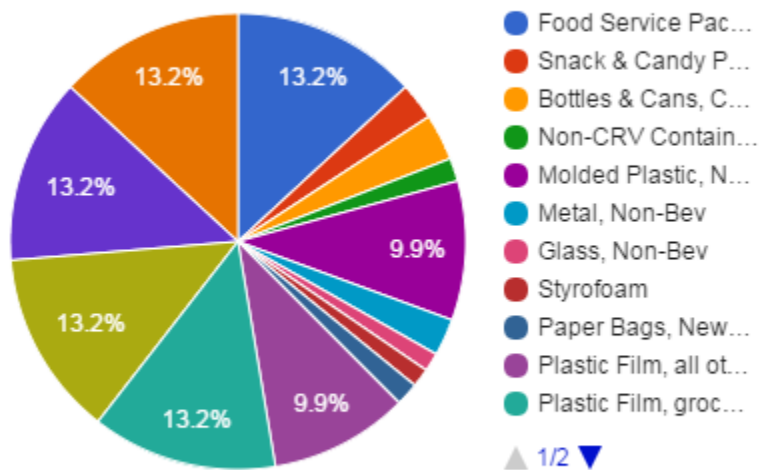


Fletcher: Weight 2005

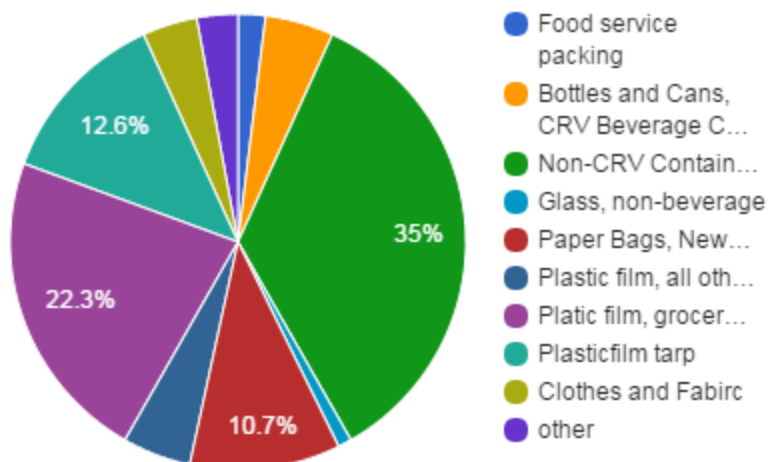


2010

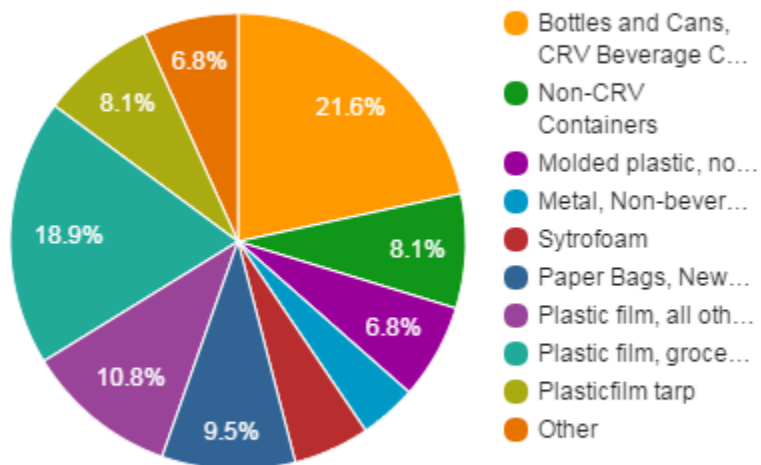
Steelhead: Volume 2010



**Lake Balboa: Weight 2010**

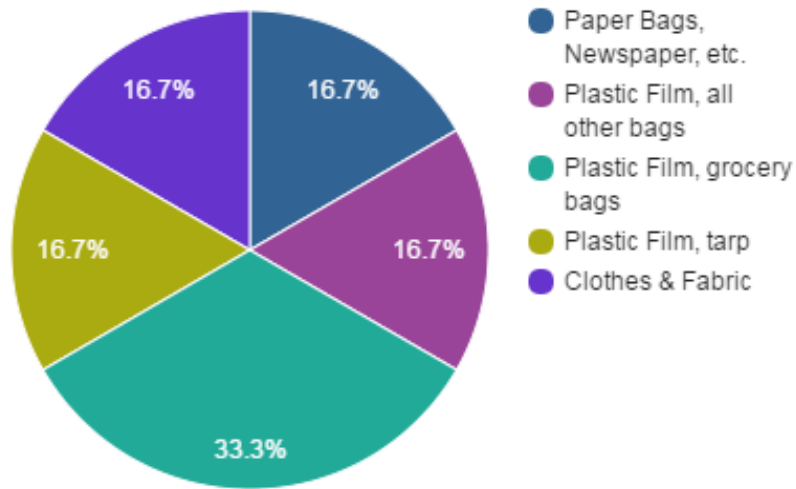


**River School: Weight 2010**

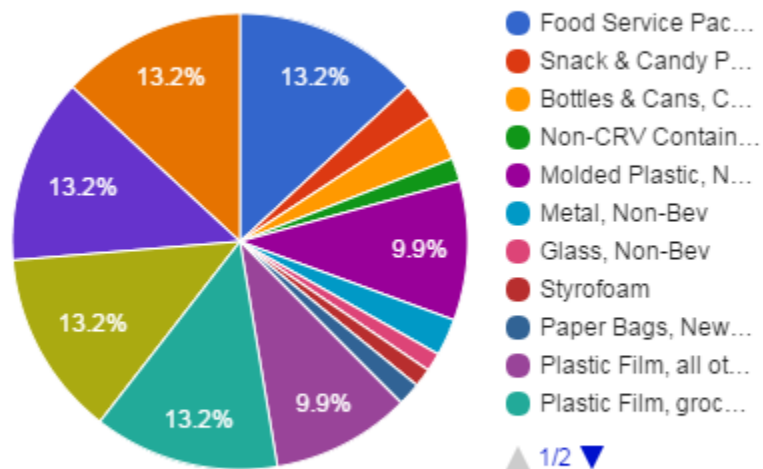


2011

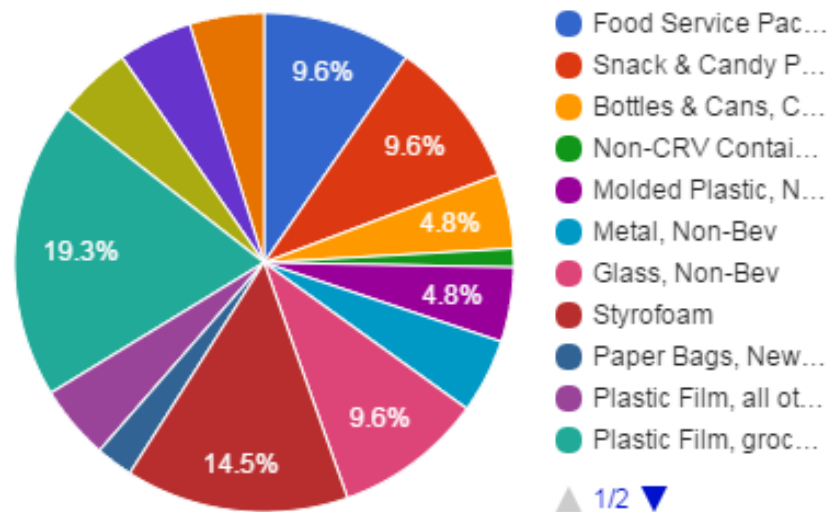
### Sepulveda: Volume 2011



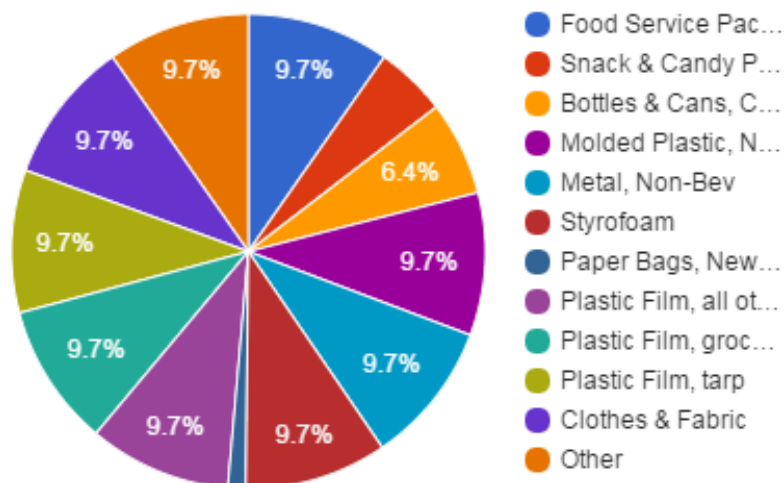
### Steelhead: Volume 2010



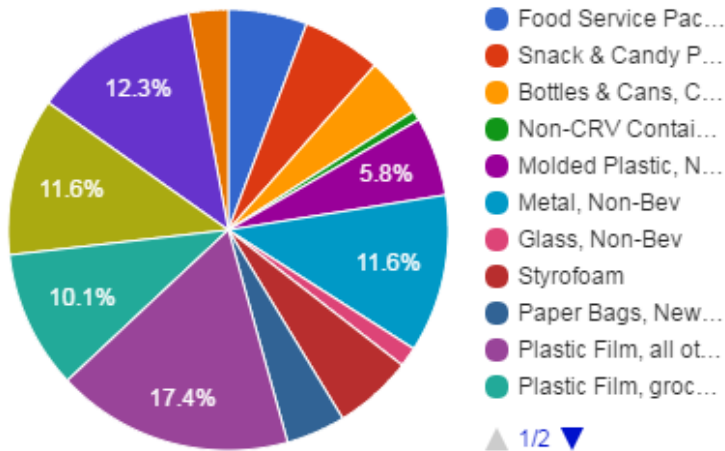
### Compton: Volume 2011



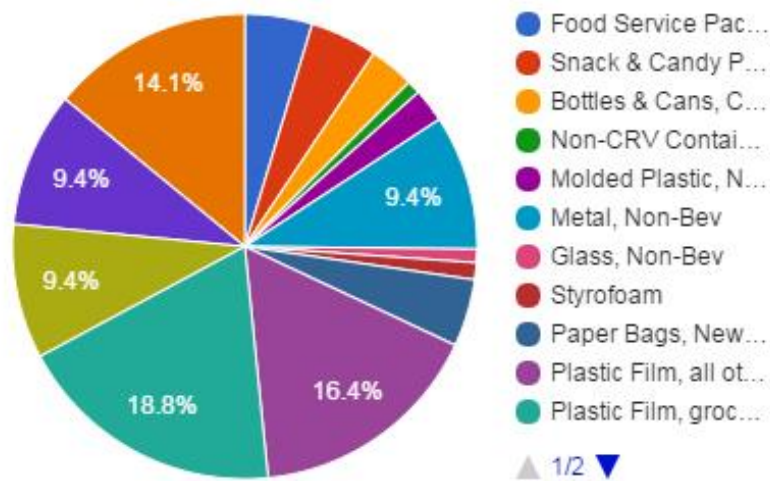
### Willow: Volume 2011



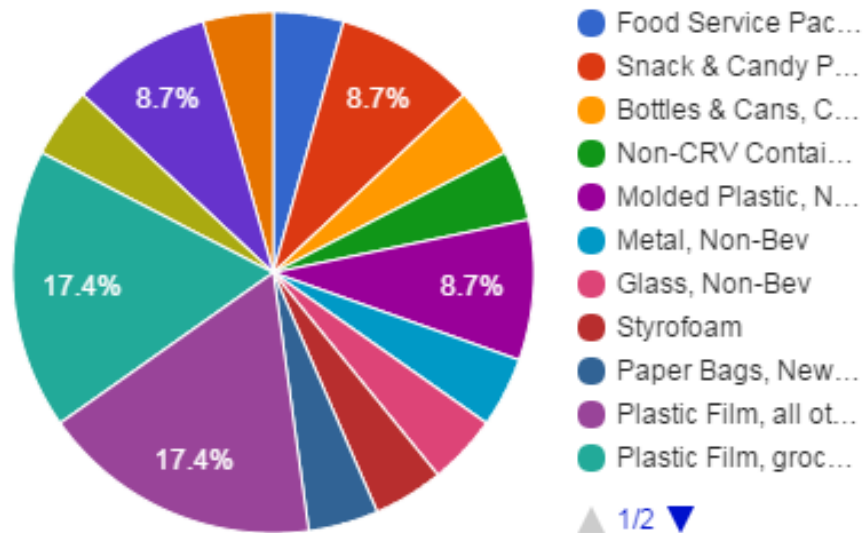
### Sepulveda: Volume 2012



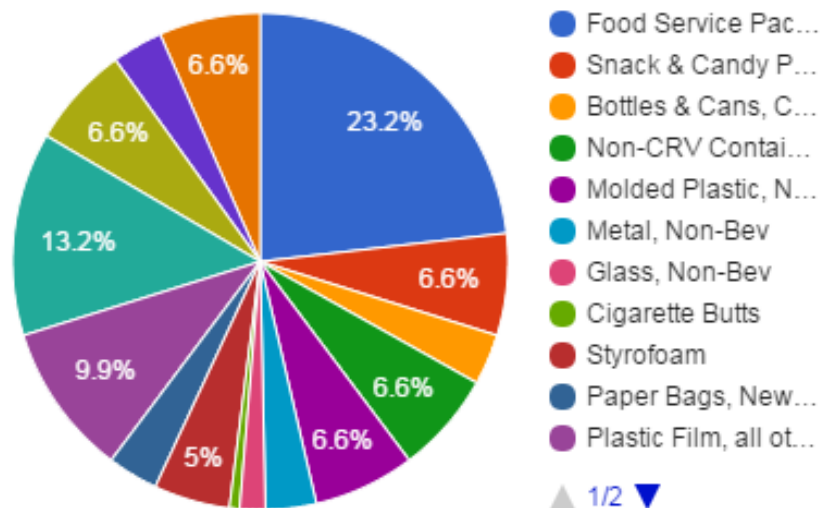
### Bette Davis: Volume 2012



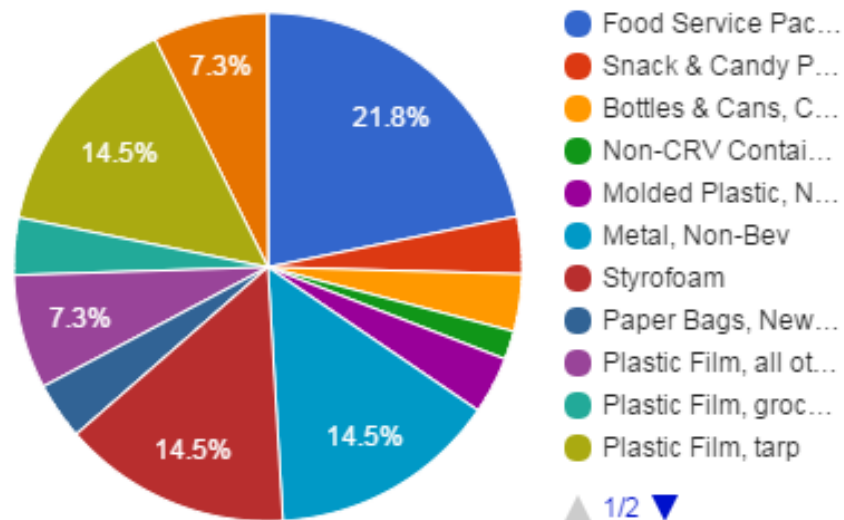
### Steelhead: Volume 2012



### Compton: Volume 2012

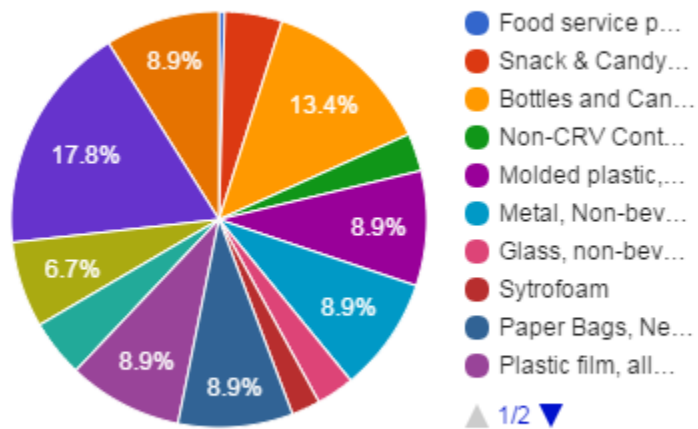


**Willow: Volume 2012**

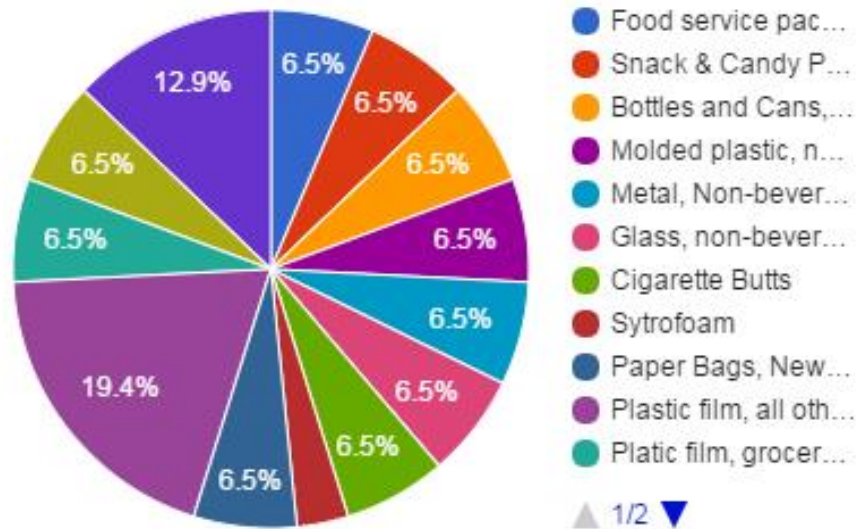


2013

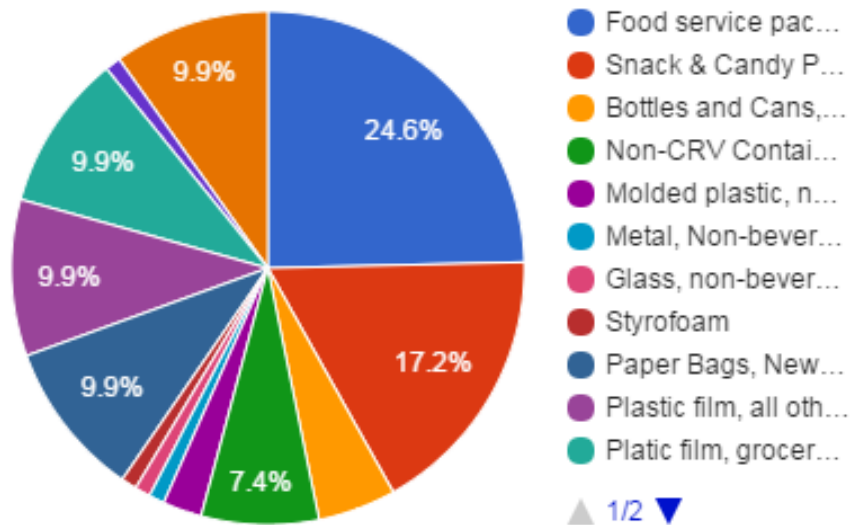
**Sepulveda: Volume 2013**



### Steelhead: Volume 2013

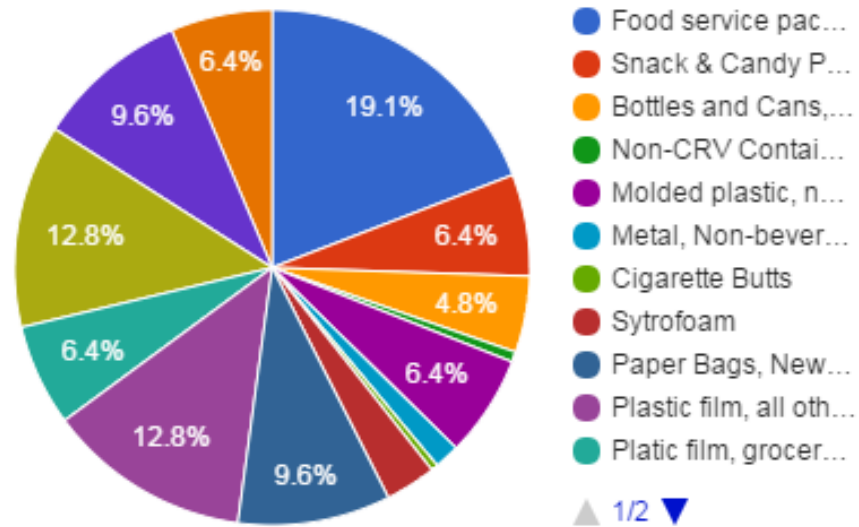


### Compton: Volume 2013



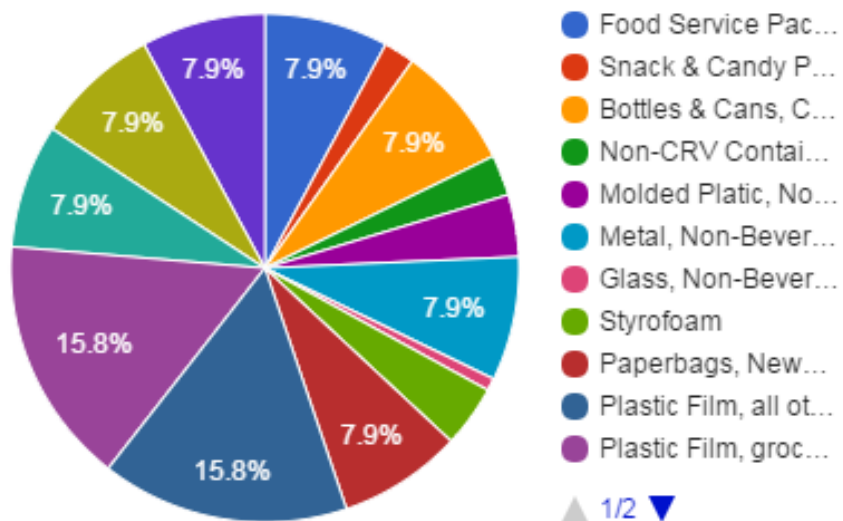


### Willow: Volume 2013

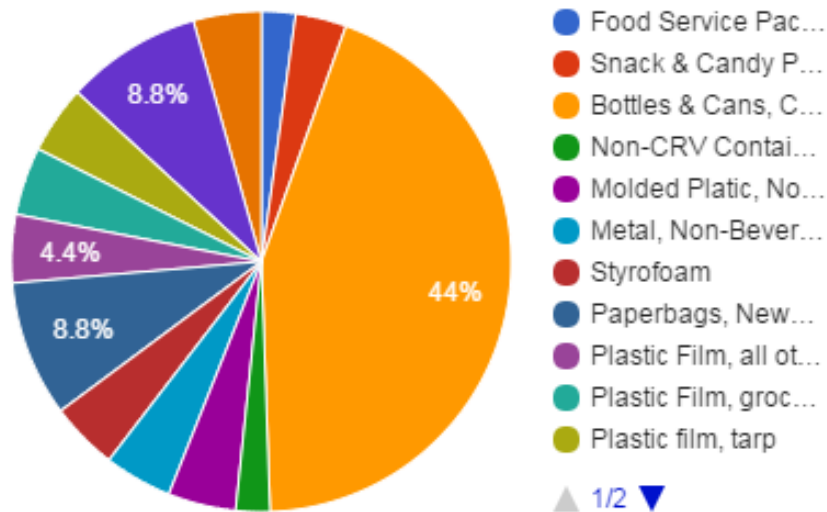


2016

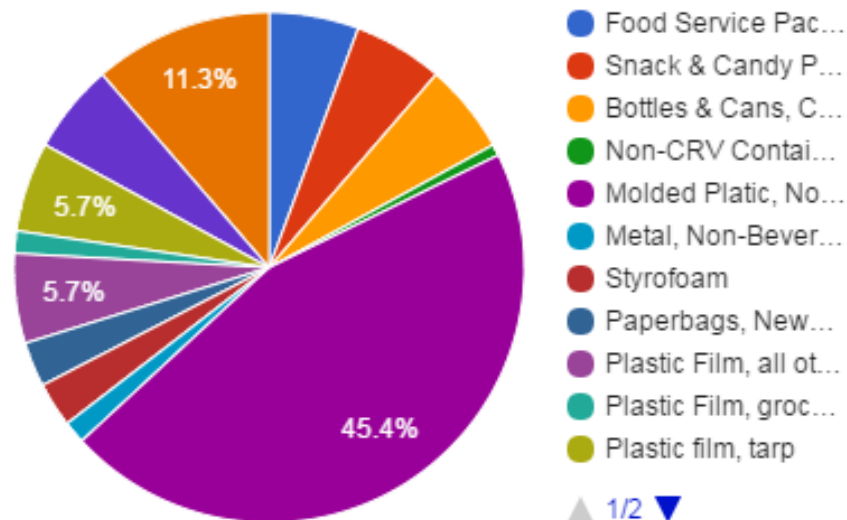
### Sepulveda: Volume 2016



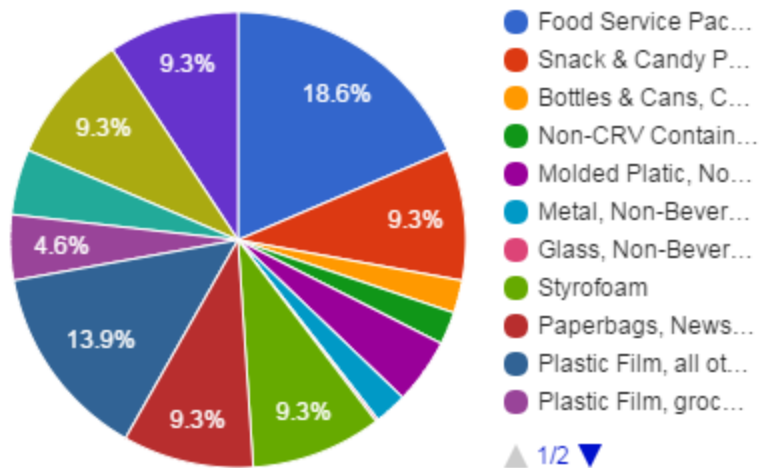
### Bette Davis: Volume 2016



### Steelhead: Volume 2016



### Compton: Volume 2016



### Willow: Volume 2016

