SAVE THE PLASTIC BAG COALITION

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July 30, 2014

Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814

VIA E-MAIL
commentletters@waterboards.ca.gov

RE: CEQA objections to and comments on proposed Trash Amendments regarding source control; notice of intent to litigate

Dear Board Members:

INTRODUCTION

I am counsel for the Save The Plastic Bag Coalition (the "Coalition"). The Coalition consists of companies that manufacture plastic and paper bags, including plastic reusable bags. In addition, I am also an anti-litter activist with significant knowledge about litter control, as discussed herein.

The comments and objections herein are made on environmental grounds and in the public interest in order to enforce a public duty. STPB's members are interested as citizens in having the public laws including CEQA executed and the public duties and environmental purposes in CEQA enforced. In *Save the Plastic Bag v. City of Manhattan Beach* (2011) 52 Cal.4th 155, the Supreme Court confirmed that STPB has standing to legally challenge plastic bag bans and litigate to enforce CEQA. The Supreme Court stated (at page 169):

> Corporate purposes are not necessarily antithetical to the public interest…. Corporations [may] have particular expertise and thus may have an enhanced understanding of the public interests at stake.

Supporting documents are submitted as part of the administrative record. All YouTube and other videos referenced herein with hyperlinks are also submitted as part of the administrative record as it is not practical to copy them on to a disk or flash drive or view them if they are able to be copied.

CEQA OBJECTIONS

The Draft Staff Report for Proposed Trash Amendments ("Staff Report"), which includes the draft Substitute Environmental Documentation ("SED"), states as follows at page 158:

> 6.15 Time Extension (Option for Board Consideration). The Trash Amendments propose for State Water Board consideration an approach to grant time extensions for final compliance to MS4 permittees who employ regulatory source controls (e.g., bans of single-use consumer products). While granting time extensions would delay full implementation of the proposed Trash Amendments, it would not have an adverse impact on the environment.

The Staff Report at page D-6 contains the following proposed Trash Amendment applicable to ocean waters:

> Time Extensions for Achieving Full Compliance (Option for Board Consideration). The permitting authority may give MS4 permittees that are complying under section Chapter III.L.2.a. up to a three (3) year time extension for achieving full compliance in areas where regulatory source controls are employed that take effect prior to or within three (3) years of the effective date of these Trash Provisions. Each regulatory source control employed by an MS4 will be eligible for up to a one (1) year time extension.

The Staff Report at page E-6 contains the following proposed Trash Amendment applicable to inland surface waters, enclosed bays, and estuaries:

> The permitting authority may give MS4 permittees that are complying under section Chapter IV.C.3.a. up to a three (3) year time extension for achieving full compliance in areas where regulatory source controls are employed that take effect prior to or within three (3) years of the effective date of these Trash Provisions. Each regulatory source control employed by an MS4 will be eligible for up to a one (1) year time extension.

At page 79-80 of the Staff Report, staff discusses whether times extensions should be granted in return for regulatory source controls. Staff states at page 80 that the only purpose of source controls is to "remove a specific type of item from the waste stream." Staff states that they are merely floating the proposal for public comment and make no recommendation.

We object to any such time extensions on the ground that regulatory sources controls are not effective to reduce litter in the ocean, inland surface waters, enclosed bays, or estuaries (collectively "water bodies"). Source controls such as plastic bag bans or fees are an ineffective method of litter control, and are merely symbolic. We agree with staff that product bans and

product fees do nothing more than "remove a specific type of item from the waste stream." We do not agree and we object to the assertion that granting time extensions "would not have an adverse effect on the environment."

Litter must be removed by street sweeping or other means. Storm water drain capture devices and other effective measures for keeping water bodies clear of litter are absolutely necessary and should never be delayed. Plastic bag bans are ineffective and symbolism to the extent that that they seek to reduce litter. You cannot ban your way to clean streets and water bodies.

Based on CEQA Guidelines § 15250, we object to the proposed Trash Amendment as deferral of MS4 compliance would have a significant negative impact on the environment. Further such adverse effects would not be offset by any significant environmental benefits from a plastic bag ban or fee. **CEQA Guidelines § 15250 states: "A certified program remains subject to other provisions in CEQA such as the policy of avoiding significant adverse effects on the environment where feasible."** (Note: The CEQA Guidelines are binding.) Clearly, avoiding the significant negative environmental impact of time extensions for MS4 compliance is feasible simply by not permitting such extensions.

We object on the ground that the Staff Report contains no analysis whatsoever of the negative environmental impacts of the proposed time extensions. The Board cannot make an informed decision without such an analysis. At the very least, an SED or EIR must show a significant benefit from source controls such as a plastic bag ban or fee that would offset the significant negative impact of time extensions. **Such a showing must be based on substantial evidence. (CEQA Guidelines § 15384.)**

The Water Board's statutory mandate and CEQA require that the Staff Report and the decision of the Water Board on the Trash Amendment must be based on facts, science, and effectiveness -- not symbolism. Banning plastic bags is not a legally acceptable reason to delay effective litter reduction measures.

If the proposed extensions are to be adopted, then a full environmental analysis must be prepared in accordance with CEQA. The Coalition will file a legal action to enforce this requirement if no such analysis is prepared.

DISCUSSION SUPPORTING OBJECTIONS

A. THE GREEN PATROL: A SUCCESSFUL MODEL SHOWING THAT LITTER CAN BE VIRTUALLY ELIMINATED BY GIVING AREA OWNERSHIP TO CLEANING CREWS; IN CONTRAST, BANNING OR IMPOSING A FEE ON A SINGLE PRODUCT SUCH AS PLASTIC BAGS HAS NO EFFECT AT ALL ON LITTER

From 1997 to 2013, I lived in San Francisco. In 2000, I formed San Francisco Graffiti Busters and sued the City and County of San Francisco to require the city to remove the graffiti on parking signs. The result was that the city cleaned over 20,000 parking signs.

I was appalled by the amount of litter in San Francisco. I was picking up and disposing of the litter from streets in North Beach myself, because the street sweeping was either non-existent or so infrequent that it was ineffective. Subsequently I along with my anti-litter activist colleague Gideon Kramer conceived and developed the idea of a "Green Patrol" to keep San Francisco clean of litter and graffiti. The idea was that a team of two street cleaners/graffiti removers would patrol a defined area of the city and take personal responsibility for keeping that area pristine. Those two people would get to know the business people and residents. They would not be sent to other areas of the city: they would "own" that particular area.

We approached District 3 (North Beach) Supervisor Aaron Peskin and the SFDPW Deputy Director for Operations Mohammed Nuru with the Green Patrol idea and they strongly supported it. We designed uniforms for a pilot crew and logo for a dedicated SFDPW-Green Patrol van. In 2001, the Green Patrol was launched in North Beach by Mayor Brown personally. Two DPW employees wore the T-shirts and caps that we had designed for them and used the Green Patrol van. From that moment on, North Beach had no litter at all. Nothing. The area was pristine.

The Green Patrol was a victim of its own success. My understanding was that the union representing SFDPW street cleaners was upset, because the Green Patrol's excellent results made union street cleaners in other parts of the city look bad in comparison. The Green Patrol was eventually terminated after a great deal of in fighting, but not before it showed how street cleaning should be done.

The Green Patrol was a successful model. In November 2001, the San Francisco Board of Supervisors passed a resolution commending me and Gideon Kramer for the Green Patrol. (See Doc. WB1.)

The lesson from the Green Patrol is that effective litter control is possible in high litter areas if cleaning crews are given "ownership" of particular areas rather than being shifted from one location to another. The same applies to beaches, rivers, and everywhere else. In contrast, banning or imposing a fee on a single product such as plastic bags achieves nothing.

THE SAN FRANCISCO GREEN PATROL

Mayor Brown launches the Green Patrol

The Green Patrol, extremely effective, not symbolic

B. PLASTIC BAGS ARE A TINY PERCENTAGE OF LITTER

From 2009 to 2013, I lived on Vandewater Street in San Francisco, which is between North Beach and Fisherman's Wharf. The litter problem on Vandewater Street was particularly acute when trash or recycling trucks came by. They left a mess in their wake.

I picked up litter from the entire length of Vandewater Street at least twice a week. Despite the fact that it is only a one-block residential street with no stores, I would completely fill at least a large kitchen plastic trash bag with litter just from that one block each time I went out to clean up. I was well aware of what was really in the litter stream, because I was picking it up. I rarely found plastic bags. Most of what I found was paper products.

I would walk along the edge bay at Fisherman's Wharf many days each week and along the beach in front to the Maritime Museum at the western end of Fisherman's Wharf. There were hundreds of stores in Fisherman's Wharf providing plastic bags at that time, because plastic bags had not yet been banned at smaller stores. Only supermarkets such as Safeway and large drug stores such was Walgreens were covered by a plastic bag ban at that time. I never saw any plastic bags or any other litter in the bay.

In all the time I lived in the San Francisco Bay Area from 1997 to 2013, I walked along the shoreline hundreds of times and regularly used ferries. I never once saw a plastic bag in the water.

San Francisco near Fisherman's Wharf in front of the Maritime Museum.
No plastic bag litter problem.

I certainly saw a lot of litter in San Francisco, but plastic bags were only a tiny percentage of litter. This is confirmed by the city's litter audits.

According to the May 2007 City of San Francisco Litter Survey Report (at page 29), which was completed before the 2007 plastic bag ban took effect, plastic grocery bags were 1.9% of total large litter and plastic retail bags were only 0.6% of total large litter. (Doc. WB6.) According to the City of San Francisco Streets Litter Re-Audit 2009 (at page 42): "Plastic bags including retail sacks and zipper bags represented 2.4% of total large litter (108 items out of 4,488)." (Doc. WB7.)

A YouTube video shows an audit team working for contractors working for SF Environment examining and counting litter at a specified location. In the entire 8 minute 25 second video, not one plastic bag is found. The video is hereby submitted into the administrative record. (Doc. WB2 is the placeholder for the video.) The URL for the video is:

http://www.youtube.com/watch?v=X3DRBzjwCQM

The following is a summary of the findings of other litter audits, showing the plastic grocery bags are in average about half of one percent of litter.

#	**Survey**	**Year**	**Percent**
1	Toronto	2012	0.8%
2	Edmonton	2011	1.1%
3	Alberta	2009	0.0%
4	San Francisco	2008	0.6%
5	San Jose	2008	0.4%
6	Keep America Beautiful	2008	0.6%
7	Alberta	2007	2.0%
8	San Francisco	2007	0.6%
9	Toronto	2006	0.1%
10	Toronto	2004	0.2%
11	Durham (Canada)	2003	0.3%
12	Peel (Canada)	2003	0.1%
13	York (Canada)	2003	0.4%
14	Toronto	2002	0.6%
15	Florida	2002	0.5%
16	Florida	2001	0.7%
17	Florida	1997	0.6%
18	Florida	1996	1.0%
19	Florida	1995	0.7%
20	Florida	1994	0.6%

C. A SAN FRANCISCO LITTER VIDEO SHOWS THAT BANNING PLASTIC BAGS HAS NO EFFECT ON REDUCING LITTER

In 2009, I took a two-minute video of litter on Mason Street, at the western end of Vandewater Street. ("San Francisco litter video.") (Doc. WB3 is the placeholder for the video.) The video is hereby submitted into the administrative record. There is a Trader Joe's on the same block at Mason and Bay and a Safeway and a Walgreens close by. Plastic bags had been banned at those stores since 2007, but they were still being dispensed for free at hundreds of other stores in the neighborhood and nearby Fisherman's Wharf. The video shows that there is a huge variety of products in the litter stream and proves that banning a product has no effect on reducing litter. The images below are from the video. The URL for the video is:

https://www.youtube.com/watch?v=pazWMPTCDmE

D. SAN FRANCISCO'S PLASTIC BAG BAN IS AN EXAMPLE OF IDEOLOGY AND SPIN PREVAILING OVER FACTS, WITH THE RESULT THAT NO LITTER REDUCTION WAS ACHIEVED; THE WATER BOARD SHOULD NOT MAKE THE SAME MISTAKE

Egged on by an army of ideologically-motivated plastic haters, the San Francisco Board of Supervisors and the SF Environment exaggerated plastic bag litter and launched a witch-hunt against plastic bags to buttress its green credentials and *appear* to attack the litter problem.

There were no plastic bags in the San Francisco litter video, even though hundreds of stores in the area where the video was taken dispensed plastic bags at that time. I confronted the city with this fact. The City Attorney responded that there were no plastic bags in the video "because the wind blows them into the water." (Doc. WB4: City's opposition brief at p. 15 filed in Superior Court in *Save The Plastic Bag Coalition v. City and County of San Francisco,* San Francisco Superior Court, Case No. CPF-12-511978.) This was blatant nonsense.

Save The Bay issued a media release claiming that a million plastic bags get into the San Francisco Bay each year. I sent Save The Bay a written request for evidence support the million figure. I received no reply.

In its CEQA Categorical Exemption Certificate in support of its 2012 ordinance expanding its plastic bag ban, the San Francisco Department of the Environment claimed: "One study in 2007, removed approximately 25,000 plastic bags in one day from San Francisco Bay." A review of the Save The Bay data showing how many bags were found in the bay around San Francisco during the 2009 annual cleanup shows that this is what they found around San Francisco (Doc. WB5):

- Warm Water Cove: "Plastic bags and other trash wash off city streets into this Bayside cove at the end of 24th Street near the Potrero Power Plant. The site is also piled with toxic tires illegally dumped over the years. Bags removed on Coastal Cleanup Day 2008: 542."

- Candlestick Park [which is not even in San Francisco]: "Rampant illegal dumping and a nearby freeway contribute to the massive trash problem this shoreline park in San Francisco. Bags removed on Coastal Cleanup Day 2008: 750."

The number of bags found at the two hotspots was 1,292. This was an *annual* cleanup. That is less than 4 bags per day. *Save The Bay does not state that any plastic bags were found in the water!*

Based on these fictions, San Francisco adopted an expanded plastic carryout bag ban in 2012. Now all virtually all stores and restaurants in the city are covered by the ban. San Francisco has virtually eliminated maybe 1-2% of all litter, but the other 98-99% remains. Street sweeping is just as essential now as it was before the expanded ban. The litter problem has not been solved.

In 2011, four years after plastic bags were banned, San Francisco was ranked as the 12th dirtiest city in the nation in Travel + Leisure's annual America's Favorite Cities survey. SF Gate reported:

> Of course, the Travel + Leisure rating shouldn't come as too big a surprise. Last fall, the lousy economy forced the city to lay off scores of manual street sweepers who spent their days cleaning up the fast-food wrappers, cigarette butts and wind-blown newspapers littering the city's neighborhood commercial corridors.
>
> More than a half year after the crew was all but depleted, "the change is noticeable," said San Francisco public works chief Ed Reiskin. And not for the better, noted city officials.
>
> "We're not able to keep up with the amount of litter and trash that's accumulating," said Supervisor John Avalos.
>
> Last week, Avalos asked Mayor Ed Lee what, if anything, he plans to do to address the gritty problem. The answer, included in the mayor's $6.8 billion budget plan for the fiscal year that starts July 1, is to ramp up the street-sweeping crew, starting this summer.
>
> The plan, which needs the supervisors' OK, would cobble together a combined $950,000 from the Department of Public Works, the Department on the Environment and the San Francisco Public Utilities Commission to pay for a new street-sweeping program, Reiskin said. As envisioned, the city would partner with a nonprofit to hire and pay 20 to 30 workers.
>
> They would be supervised by DPW and enrolled in an apprenticeship program with Laborers International Union, Local 261. Not only would the neighborhood commercial districts be cleaner, Lee said, but entry-level workers would be put on a career path that may start with pushing a broom but could turn into more lucrative construction gigs later.
>
> Still, the public shouldn't set their expectations too high. There once were about 100 street sweepers, each responsible for tidying up a five-block stretch; the new crew would be less than a third the size.

http://www.sfgate.com/bayarea/article/Travel-magazine-says-S-F-is-among-dirtiest-2367382.php

Did banning plastic bags result in clean streets in San Francisco? No. What was the real cause of San Francisco's litter problem? The lack of street sweeping.

E. THE MARINE IMPACTS OF PLASTIC BAGS ON MARINE LIFE HAVE BEEN MISREPRESENTED

The Staff Report states at page A-6:

> Sea turtles are especially prone to ingestion of marine trash, particularly plastics. Sea turtles, mistaking them for food, swallow plastic bags that block the turtle's digestive tract and lead to starvation (U.S. EPA 1992).

David Laist, a senior policy analyst with the U.S. Marine Mammal Commission, has publicly stated as follows (Doc. WB9):

> In their eagerness to make their case [against plastic bags], some of the environmental groups make up claims that are not really supportable.

Anti-plastic bag campaigners groups show the same picture of a turtle with a blue bag in its mouth, over and over again and try to provoke an emotional response from audiences. See:

http://www.savetheplasticbag.com/ReadContent612.aspx

We have no idea whether the blue bag photograph is real or PhotoShopped.

Anti-plastic bag campaigners have produced a mere handful of other photographs taken over the past 30 years. They shown the same photographs repeatedly. However, there is little if any evidence of turtles death caused by plastic bags. If there is any such evidence, the number of is very small. Doc. WB18 is an index of all the turtles admitted to the Sea Turtle Rescue and Rehabilitation Center from 1996 to 2012. There are 17 pages showing the types of turtles and the causes of injury or death. *Plastic bags are not even mentioned!*

There is an allegation circulating on the Internet that 100,000 marine mammals and a million seabirds are killed every year by plastic bags. It is a myth. The U.S. and Australian Governments say that the figures are false. (Docs. WB10, WB11, WB12, WB13.) In 2008, the *Times of London* published an article entitled "Series of blunders turned the plastic bag into global villain" which states in part as follows (Doc. WB10):

> The central claim of campaigners is that the bags kill more than 100,000 marine mammals and one million seabirds every year. However, this figure is based on a misinterpretation of a 1987 Canadian study in Newfoundland, which found that, between 1981 and 1984, more than 100,000 marine mammals, including birds, were killed by discarded nets. The Canadian study did not mention plastic bags.
>
> Fifteen years later in 2002, when the Australian Government commissioned a report into the effects of plastic bags, its authors misquoted the Newfoundland study, mistakenly attributing the deaths to "plastic bags".

> The figure was latched on to by conservationists as proof that the bags were killers. For four years the "typo" remained uncorrected. It was only in 2006 that the authors altered the report, replacing "plastic bags" with "plastic debris". But they admitted: "The actual numbers of animals killed annually by plastic bag litter is nearly impossible to determine."
>
> In a postscript to the correction they admitted that the original Canadian study had referred to fishing tackle, not plastic debris, as the threat to the marine environment.
>
> Regardless, the erroneous claim has become the keystone of a widening campaign to demonise plastic bags.
>
> David Santillo, a marine biologist at Greenpeace, told The Times that bad science was undermining the Government's case for banning the bags. "It's very unlikely that many animals are killed by plastic bags," he said. "The evidence shows just the opposite."

The U.S. National Oceanic and Atmospheric Administration ("NOAA") states as follows: (Docs. WB12, WB13.)

> *Question*: Is it true that 100,000 marine mammals and/or sea turtles die each year due to marine debris/plastics/plastic bags?
>
> *Answer*: We were able to find no information to support this statement. An erroneous statement attributing these figures to plastic bags was published in a 2002 report published by the Australian Government; it was corrected in 2006.
>
> *Question*: Is it true that marine debris kills a million seabirds each year?
>
> *Answer*: This statement is currently unknown. We are so far unable to find a scientific reference for this figure. The closest we have found is "214,500 to 763,000 seabirds are killed annually incidental to driftnet fishing by Japanese fishermen in the North Pacific Ocean (US Department of Commerce, 1981)" from Laist, 1987. This refers to active fishing gear bycatch and not marine debris; it also predates the high seas driftnet ban adopted by the United Nations General Assembly in 1992.

The BBC made a video that shows that shows what albatrosses swallow. As we can see, there are no plastic bags in the video. STPB requests that the video be made part of the administrative record. (Doc. WB14 is the placeholder for the video.) The URL for the video is:

http://www.youtube.com/watch?v=yom6zlm5VqE&feature=player_embedded

Image from the BBC video showing a variety of “plastic” items swallowed by the albatrosses. There are no plastic bags.

Table 1. Entangled birds (n=152) recorded from 2001-2005.

Common name	n	Entanglement material (where identified)
Black-footed Albatross	1	Rope
Brandt’s Cormorant	11	Fishing line, fishing hook, rope and metal
Brown Pelican	5	Fishing hook, hook and sinker
California Gull	4	Fishing line
Common Merganser	1	Fishing line
Common Murre	42	Balloon, fishing line, fishing hook, fishing net, hook, line and sinker, plastic, salmon gear
Double-crested Cormorant	3	Fishing line
Glaucous-winged Gull	5	Fishing line, fishing hook, fishing net
Heermann’s Gull	1	Fishing line
Northern Fulmar	3	Balloon & string, fishing line and sinker
Pelagic Cormorant	6	Fishing line, fishing hook, line and sinker
Short-tailed Shearwater	1	Fishing line
Sooty Shearwater	11	Fishing line, fishing hook
Surf Scoter	1	Fishing line
Western Grebe	8	Fishing line, string
Western Gull	25	Fishing line, fishing hook, line and sinker
Unidentified spp.	24	Fishing line, fishing hook, plastic, rope and string

Table showing the causes of bird entanglements based on three beach monitoring programs. There are no plastic bags. (Doc. WB15)

http://www.farallones.org/volunteer/documents/PSGPoster.pdf

CONCLUSION

The *Times of London* stated in an editorial (Doc. WB16):

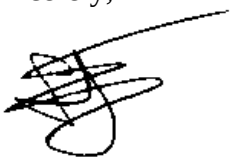
> There is a danger that the green herd, in pursuit of a good cause, stumbles into misguided campaigns. Analysis without facts is guesswork. Sloppy analysis of bad science is worse. Poor interpretation of good science wastes time and impedes the fight against obnoxious behavior. There is no place for bad science, or weak analysis, in the search for credible answers to difficult questions….
>
> Many of those who have demonized plastic bags have enlisted scientific study to their cause. By exaggerating a grain of truth into a larger falsehood they spread misinformation, and abuse the trust of their unwitting audiences.

We have produced a six-minute video entitled: "Are You Being Told The Truth About Plastic Bags?" We are hereby submitting the video into the administrative record. We strongly urge the Board to view the video. (Doc. WB17 is the placeholder for the video.) The URL for the video is:

www.plasticbagmovie.com

The Water Board's statutory mandate and CEQA require that the Staff Report and the decision of the Water Board on the Trash Amendment must be based on facts, science, and effectiveness -- not symbolism. Banning plastic bags is not a legally acceptable reason to delay effective litter reduction measures.

Sincerely,



Stephen L. Joseph
Counsel

FILE NO. 012017 RESOLUTION NO. 906-01

Green Patrol.

Resolution commending the Green Patrol for launching its innovative pilot cleaning program in North Beach.

WHEREAS, The City and County of San Francisco has been criticized for the lack of cleanliness of its streets, parks, and other public spaces, including the failure to eradicate the problems of widespread graffiti and litter; and

WHEREAS, The Mayor and Department of Public Works have given priority to addressing the cleanliness of the City and have been working hard to develop solutions; and,

WHEREAS, Two community activists, Gideon Kramer and Stephen Joseph have proposed a program to the City called "Green Patrols" based on Gideon Kramer's "Green Patrol" pilot program in his North Mission neighborhood; and

WHEREAS, The Mayor, Supervisor Peskin and the Department of Public Works, working with Gideon Kramer and Stephen Joseph, are launching a pilot "Green Patrol" program using Department of Public Works employees in North Beach commencing in November 2001, as a potential model for thoroughly cleaning and maintaining a minimum acceptable standard of cleanliness in the City; now, therefore, be it

RESOLVED, That the Board of Supervisors commends the Mayor; the Director of the Mayor's office of Neighborhood Services, Alex Tourk; the Department of Public Works including its Deputy Director for Operations, Mohammed Nuru; Gideon Kramer; and Stephen Joseph for developing the "Green Patrols" initiative and launching the pilot program; and, be it

FURTHER RESOLVED, That the Board of Supervisors will closely monitor the progress of the pilot "Green Patrol" program in North Beach and stands ready to lend its full support if the pilot program establishes its effectiveness and viability.

Supervisor Peskin, Newsom, Leno
BOARD OF SUPERVISORS

City Hall
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102-4689

City and County of San Francisco

Tails

Resolution

File Number: 012017 **Date Passed:**

Resolution commending the Green Patrol for launching its innovative pilot cleaning program in North Beach.

November 13, 2001 Board of Supervisors — ADOPTED

Ayes: 11 - Ammiano, Daly, Gonzalez, Hall, Leno, Maxwell, McGoldrick, Newsom, Peskin, Sandoval, Yee

File No. 012017

I hereby certify that the foregoing Resolution was ADOPTED on November 13, 2001 by the Board of Supervisors of the City and County of San Francisco.

Gloria L. Young
Clerk of the Board

NOV 21 2001

Date Approved

Mayor Willie L. Brown Jr.

SF Litter Audit

Paul Ledesma

Subscribe 7

116 views

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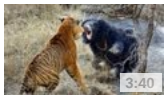
Uploaded on Apr 28, 2009

This video shows an audit team working for HDR/BVA, under contract to SF Environment, counting litter at a specified location. The litter team of Douglas Anthony & Thorne Bertrand are shown counting individual pieces of litter. Thanks to Pam Ledesma for shooting and putting this video together.

Show more



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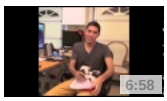

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This is How Russians Deal With Littering
by **Distractify247**
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Don't Drop Litter Or Else
by **Thomas Black**
2,315 views

Leopard Kills Two Warthog (INTERESTING VIDEO)
by **TheAnimalsWild**
631,287 views

NO COMMENTS YET

Share your thoughts

Animals Can Be Stupid Compilation 2014!
by **FunVideos247**
2,950,720 views

Lioness vs Leopard - 9 July 2013 - Latest Sightings
by **Kruger Sightings**
895,284 views

9:08

Funny Skit - Security Audit (Office Space Humour)
by **Peter Lawrence**
99 views

7:50

Karaokê
by **Rec Filmes**
1,335 views

1:48

I will not litter,keep environment clean
by **IWILLsg**
41,892 views

3:55

STOP LITTERING! REVERSE! PICK IT UP! This film should be seen by the
by **dhtcuae**
1,976 views

5:13

UTM Green Team Anti Litter 2008
by **Trinidad Skateboarding**
451 views

3:33

Littering in Front of People
by **LAHWF**
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Unlikely Friendship : Documentary on a Lion and Leopard Together in the
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San Francisco litter

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38,030 views **1** of 34

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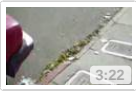

Litter on San Francisco Street
364 views
cmski11

Deshelving Israeli Goods at Trader Joe's
122,239 views
katrap40

San Francisco Municipal Railroad - Cable Car
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Bag Monster Attacks San Francisco
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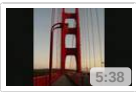
GreenIdeasVideos

Trader Joe's Waterfall San Francisco
426 views
kevinsyoza



If you're going to San Francisco
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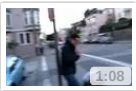

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Me on a Japanese train
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Garbage Ramps London Trip
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Towbe

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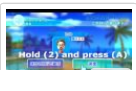
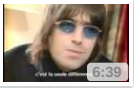
ApFaqTech


Wii Sports Resort Codes - Tips - Secrets! (huge...
201,957 views
CheatBob

Drunk man bothering Trader Joe's employees
4,512 views
atothev917

Schwarze A7000 street sweeper sweeping up leaves.
1,295 views
schwarzevideo



Oasis - Interview
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Removing trash from Kyoto railway station
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c4epr

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Marina neighborhood of San Francisco. (Declaration of Stephen Joseph, filed July 2, 2012, ¶ 34.) At that time, Trader Joe's dispensed no plastic bags. The video shows leaves in the gutter, a Starbucks cup and one single-use paper checkout bag. Of course plastic bags were not prominent in the gutter litter. Trader Joe's was not at the time dispensing them, and the wind blows them into the water. Plastic bags don't typically rest in the gutter. The 2012 Ordinance, with its 10-cent charge for paper single-use checkout bags, can only be expected to further reduce consumption of paper checkout bags at supermarkets like the Marina Trader Joe's.

Manufacturers complain that litter bins in high traffic areas overflow. According to Manufacturers, this is an existing problem, long before the 2012 Ordinance has taken effect. (AR 003945.) There is no connection between this small litter problem and the 2012 Ordinance. A CEQA challenger must establish a causal connection between the challenged action and the potential adverse environmental impact. (*Surfrider Found. v. California Coastal Comm'n* (1994) 26 Cal.App.4th 151, 156.) Likewise, Manufacturers complain that dog waste in the street is an existing problem. (AR 003949.) Their assertion that the unavailability of free single-use plastic check out bags will exacerbate the existing excrement problem on City streets lacks any factual basis. Manufacturers provide no evidence whatsoever. (See AR 003948.) It is more likely that resourceful and responsible dog owners will obtain "suitable container[s] or other suitable instrument[s]" from numerous available alternative sources to comply with the Health Code.

e. Manufacturers speculate that the 10-cent fee may be ineffective to encourage use of reusable checkout bags.

There is no factual basis for Manufacturers' conjecture that the 2012 Ordinance's 10 cent single-use bag charge is too low to encourage use of reusable checkout bags. Refuting Manufacturers' conjecture, a 5 cent fee in Washington D.C. resulted in an 81% reduction in single-use bags. (AR 000006-000007.) The experience of Washington D.C., which like San Francisco attracts many tourists, belies Manufacturers' speculation that a single-use bag fee will be ineffective in San Francisco. Studies from other jurisdictions show that fees on single-use bags of 5-25 cents per bag have reduced all single-use bag consumption by 50-95%. (AR 000005-000007.)

FACT SHEET
Bay Trash Hot Spots 2009: Spotlight on Plastic Bag Pollution

Plastic bags are among the most harmful, ubiquitous and preventable types of Bay pollution. They smother wetland habitat and degrade water quality. Animals are often killed when they mistake bags for food or become entangled in them. Plastic breaks up into pieces that remain in our waterways forever.

The **2009 Bay Trash Hot Spots** are San Francisco Bay shorelines and creeks where volunteers reported removing the most plastic bags on Coastal Cleanup Day 2008. On this one day alone, volunteers reported to the Ocean Conservancy that nearly 15,000 plastic bags were removed from these ten hot spots – a shocking number considering that these areas represent a very small portion of the Bay shoreline and its tributaries. In fact, **Save The Bay estimates that more than one million plastic bags wind up in San Francisco Bay each year.**

Not every Bay shoreline and tributary is cleaned up on Coastal Cleanup Day, and data isn't available for every 2008 Coastal Cleanup Day site. However, the 2009 Bay Trash Hot Spots are clearly blighted by large amounts of plastic trash, are representative of problem areas all around the Bay, and underscore the need to tackle the pervasive plastic bag pollution problem in our environment.

Save The Bay is asking the mayors of **Bay Trash Hot Spots** cities to prioritize legislation that ends the distribution of free single-use bags, both plastic and paper, to reduce Bay pollution and protect wildlife. This legislation will require the Bay Area community to switch to reusable bags.

Save The Bay's 2009 Bay Trash Hot Spots: Spotlight on Plastic Bags
(Visit Save The Bay's interactive website: www.saveSFbay.org/baytrash to see a map of this year's Bay Trash Hot Spots, photos, videos and how to help)

- **Albany-Berkeley-Emeryville shoreline (Alameda County):** The large urban population and the proximity of heavily-used Interstate 80 contribute to the huge quantity of trash along this 14-mile stretch of Bay shoreline.
  Bags removed on Coastal Cleanup Day 2008 (CCD 08): 7,497
- **Antioch Shoreline (Contra Costa County):** A park, marina, businesses, a nearby Amtrak Station, and plenty of trash are found along this stretch of the Delta leading into the Bay.
  Bags removed on CCD 08: 478
- **Belden's Landing (Solano County):** A common fishing and recreation area near Suisun City, a close look at this area nestled in the San Pablo Bay wetlands reveals hundreds of plastic bags hidden in the reeds.
  Bags removed on CCD 08: 591
- **Burlingame Bayfront to Mills Creek, Millbrae (San Mateo County):** Plastic bags wash up onto the shoreline and blow into the Bay from nearby streets at this shoreline park within view of San Francisco Airport.
  Bags removed on CCD 08: 784
- **Candlestick Park (San Francisco):** Despite daily cleanups by local groups, rampant illegal dumping and a nearby freeway contribute to the massive trash problem at this shoreline park in San Francisco.
  Bags removed on CCD 08: 750
- **Coyote Creek (Santa Clara County):** Trash from dumping, littering, and encampments gets caught on low-hanging branches along this creek that runs through San Jose and Milpitas, forming huge rafts of trash.
  Bags removed on CCD 08: 1,100
- **Mare Island Strait (Solano County):** Past the intersection of Lemon and Derr Streets in Vallejo, railroad tracks and industry are adjacent to Mare Island Strait.
  Bags removed on CCD 08: 400
- **Richmond shoreline from Shimada Friendship Park to Point Isabel (Contra Costa County)**: Urban creeks transport trash downstream to wetland marshes along the Richmond shoreline that are frequented by shorebirds. *Bags removed on CCD 08: 2,252*
- **Ryder Park (San Mateo County):** Ryder Park, situated between the Bay and a part of San Mateo that used to be thriving wetlands, is popular for its trails and shoreline playground.
  Bags removed on CCD 08: 384
- **Warm Water Cove (San Francisco):** Plastic bags and other trash wash off city streets into this Bayside cove at the end of 24th Street near the Potrero Power Plant. The site is also piled with illegally dumped toxic tires.
  Bags removed on CCD 08: 542

(Not every section of the Bay watershed had Coastal Cleanup Day events and some sites did not report trash data)

The City of San Francisco

STREETS LITTER AUDIT

2007

PREPARED FOR

The City and County of San Francisco
Department of Environment

SF Environment

PREPARED BY

HDR | Brown, Vence & Associates, Inc.

&

MGM Management
A Division Of 1184614 Ontario Inc.
Environmental & Management Service

June 2007

Executive Summary

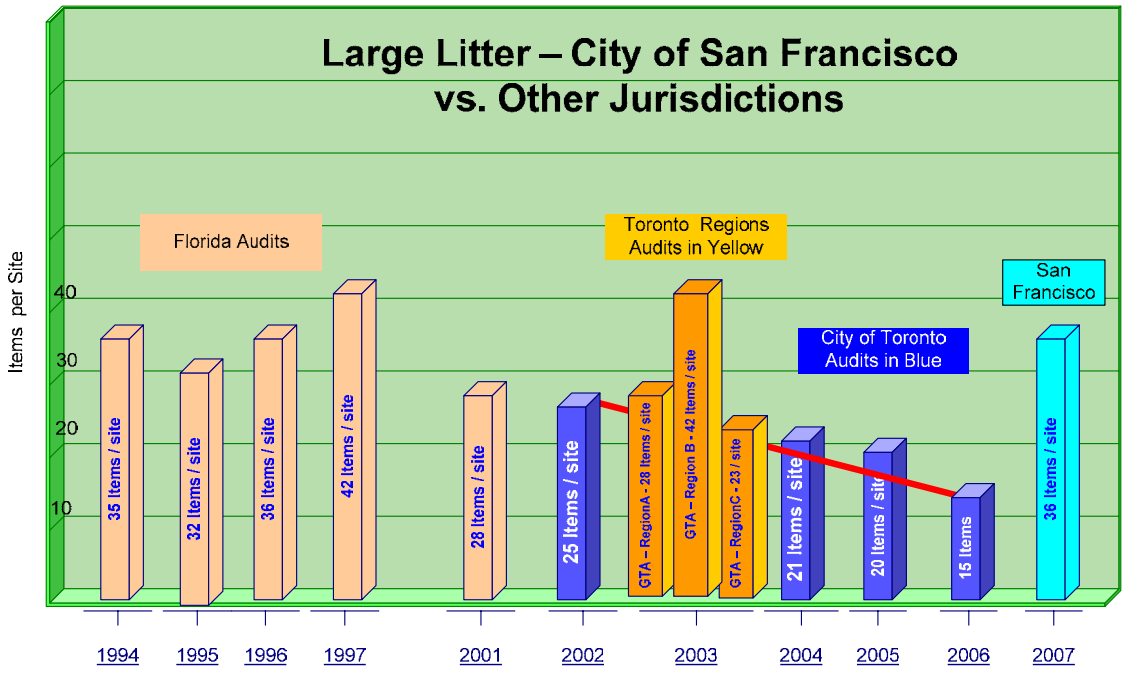
The City of San Francisco is known throughout North America for its forward thinking and initiatives to protect the environment. The City has a multitude of waste reduction and waste management programs in place to improve the environment for residents.

In early 2007, the City made inquiries into the feasibility for conducting a litter audit in 2007. Working with HDR / BVA Engineering, a local San Francisco full service firm, the City inquired into methods used by other municipalities to impartially and accurately audit litter on city streets. HDR / BVA in turn contacted MGM Management, a Canadian environmental consulting firm that has expertise in the area of litter audit work. MGM Management has conducted over a dozen major litter audits to major North American municipalities since 2002, and has an accumulated litter data base of over 46,000 observations.

A project plan was developed and approved by San Francisco Department of Environment to conduct a litter audit in April 2007. HDR / BVA Engineering managed and provided trained auditors for the work, while MGM Management provided the methodology protocols, site selection, data management and data analysis services

Within this study litter is classified as “large” for those items over 4 square inches in size or as “small” litter for items less than 4 sq. in. Eighty-four sub-categories of large and sixteen sub-categories for small litter were examined.

A total of 3,812 pieces of large litter were observed by auditors, on San Francisco streets during the April 2007 litter audit. One hundred and five sites were audited between April 9 – 20, 2007. This was an average of 36 items of large litter per site. As this audit is the benchmark or first litter audit done by San Francisco, it is not possible to comment upon whether the City is getting more or less littered with time. However, because the San Francisco audit was conducted using the same methodology as other jurisdictions some anecdotal comparison is possible. The chart below illustrates how the results in the San Francisco litter audit compare with other jurisdictions.



The largest category of large litter observed, at 570 litter pieces was miscellaneous paper. This represented 15% of the total littered items observed. Non-branded paper napkins and paper towels was the second most significant category of litter with 494 items observed, or 13% of total litter. All fiber based products and items that were observed contributed 2,051 items or 54% of the total large litter observed. Fiber based litter included paper, paperboard, cardboard, towels, napkins, newspapers, books, flyers, printed materials, and business forms, stationary.

An interesting observation was made in terms of what brands of printed materials are on the ground in San Francisco. MUNI tickets and transfers are a significant contributor to paper litter on city streets. This observation of transit ticket, receipts and transfers as being a significant contribution to paper litter is consistent with observations made by the consultant in our (other) urban audits. This is an area where action can reduce litter significantly.

The second most significant material type observed was plastic materials. These included miscellaneous plastic, plastic packaging, wrap, plastic bags-retail and non-retail, hot and cold plastic drink cups, plastic jars, bottles, composites, utensils, zip bags, beverage containers, trays, polystyrene cups, confectionary, sweet and snack food packaging, pouches, plates, retail bags, and carrying rings. The most significant single category of plastic litter was unidentified miscellaneous plastic litter; which is litter that is so broken or weathered that auditors cannot identify it with certainly; and is assumed to be plastic.. Miscellaneous plastic litter accounted for 342 littered items or 9% of total litter. All large plastic litter in aggregate accounted for 746 items observed, or 20% of total large litter observed.

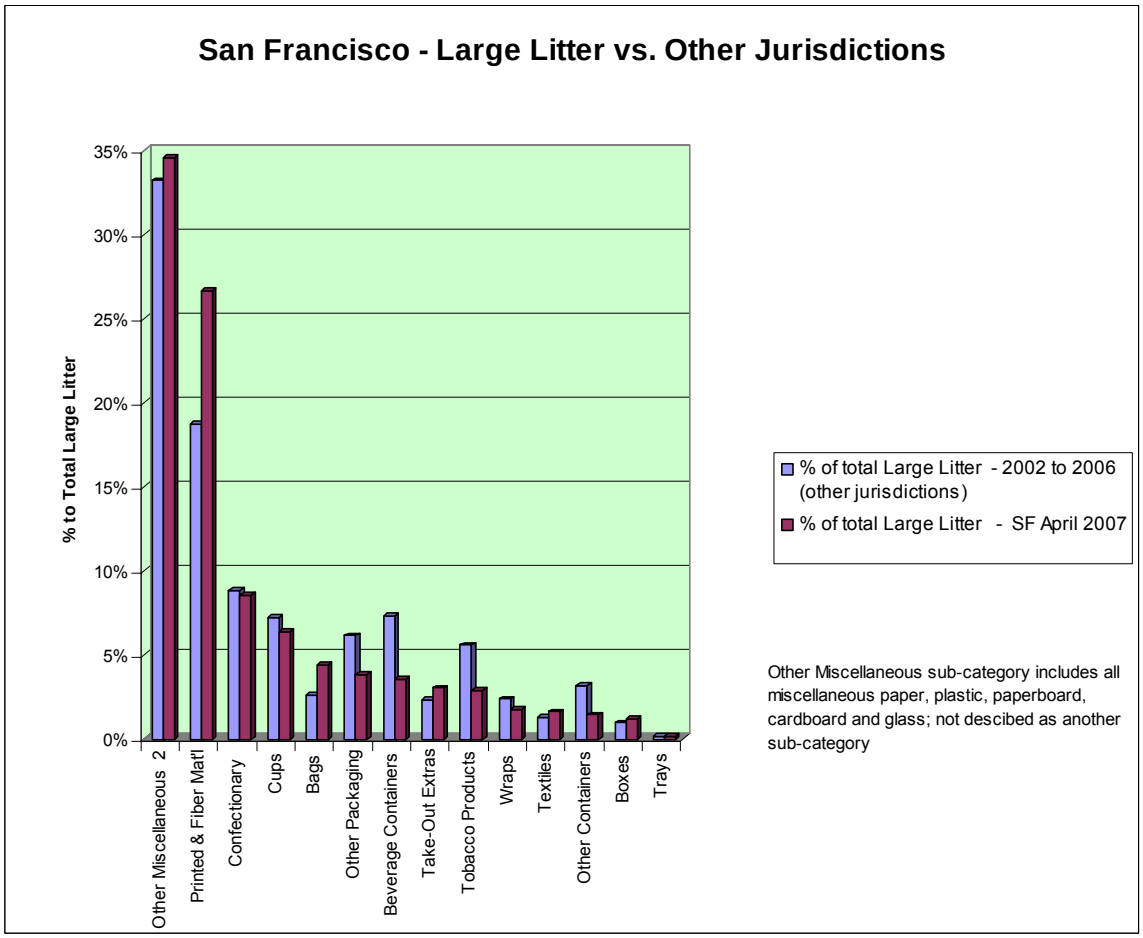
Of interest to the City of San Francisco is how litter occurrence in that municipality compared to other jurisdictions where litter audits have been done using the same methodology. A comparison of San Francisco, versus other audits performed by the consultant between 2002 – 2006, appears below.

San Francisco vs. Other Jurisdictions (2002 - 2006)[1]

	Observations - 2002 to 2006 (other jurisdictions)	**% of total Large Litter** - 2002 to 2006 (other jurisdictions)	**San Francisco Litter Audit (April 2007)**	**% of total Large Litter** - SFO April 2007
Other Miscellaneous [2]	15,428	33%	1,316	35%
Printed & Fiber Mat'l	8,693	19%	1,016	27%
Confectionary	4,094	9%	326	9%
Cups	3,366	7%	243	6%
Bags	1,232	3%	169	4%
Other Packaging	2,862	6%	145	4%
Beverage Containers	3,420	7%	135	4%
Take-Out Extras	1,076	2%	116	3%
Tobacco Products	2,594	6%	110	3%
Wraps	1,109	2%	68	2%
Textiles	608	1%	62	2%
Other Containers	1,472	3%	55	1%
Boxes	448	1%	45	1%
Trays	88	0%	6	0%
	46,490	100%	3,812	100%

1. Aggregated litter data, Litter audits by MGM Management including:
City of Toronto, Canada (2002, 2003, 2004 (2 audits), 2005, 2006
Regional Municipality of Peel, Canada (2003)
Regional Municipality of York, Canada (2003)
Regional Municipality of Durham, Canada (2003)

2. Other Miscellaneous sub-category includes all miscellaneous paper, plastic, paperboard, cardboard and glass; not descibed as another sub-category



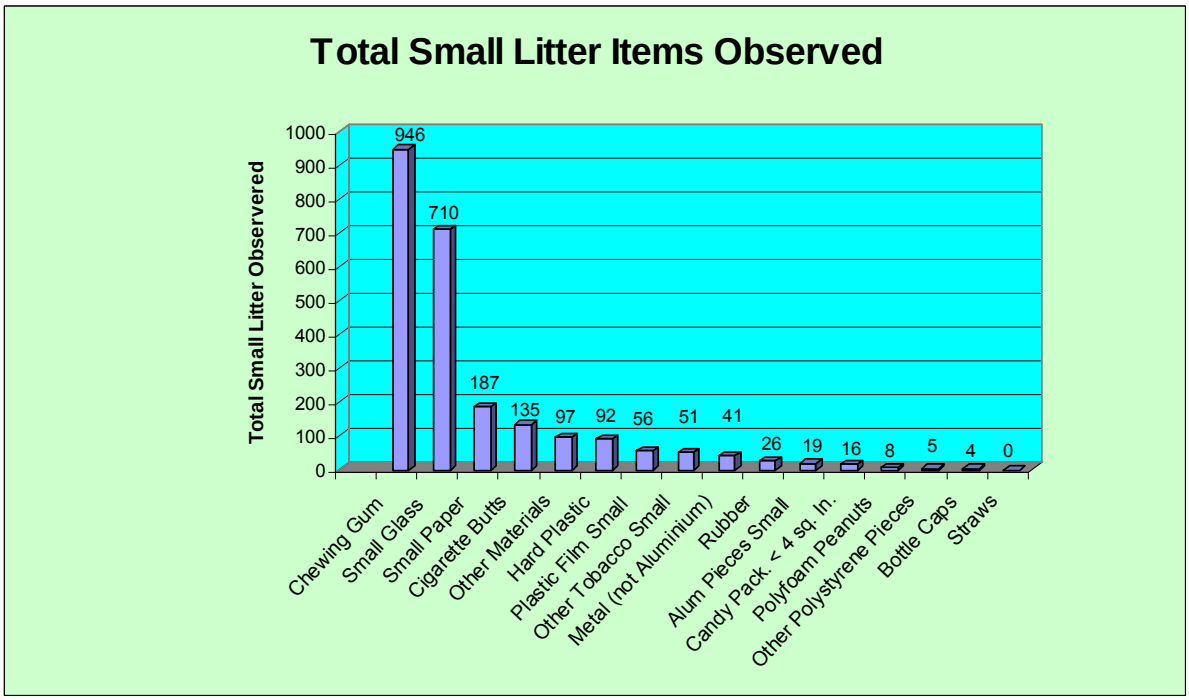
Observations of the small litter classification during the San Francisco audit showed a relatively low occurrence of small litter on city streets, as compared to audits performed by the consultant in other cities. In San Francisco, 2,393 small litter items were observed in 104 sites audited. This averages 23 items per site and is comparable with 21 items / site for the City of Toronto, Ontario, Canada; where considerable clean-up activities and litter abatement efforts have been underway for several years. Averages twice as high as the small litter rate observe in San Francisco in 2007 have been recorded by the consultant in other audits.

Gum deposits on San Francisco streets are a significant issue. Gum deposits on sidewalks and roadways cause a sticky and annoying problem for pedestrians. Gum deposits accounted for 39.5% of all the small litter observed during the audit. Glass and paper small litter were also significant contributors to this class of litter.

Small litter is difficult to control, in that it is “manufactured” by a combination of degradation (weather) and man-made activities (vehicle traffic, mowing, etc.).

The small litter results for the 2007 San Francisco audit sites are illustrated below.

Due to the nature of randomly selecting sites and the methodology used for litter auditing of those locations, the consultant is of the opinion that this litter audit is representative of the overall litter occurrence in the City of San Francisco streets, as of April 2007.



2007 San Francisco - Small Litter – by Category

Small Litter Summary

Category	Description	Total Small Litter Items Observed	SF 2007 % of Total Small Litter	Toronto 2006 % of Total Small Litter
16	Chewing Gum	946	**39.5%**	30.9%
8	Small Glass	710	**29.7%**	15.4%
9	Small Paper	187	7.8%	17.3%
1	Cigarette Butts	135	5.6%	14.8%
15	Other Materials	97	**4.1%**	2.5%
11	Hard Plastic	92	**3.8%**	3.6%
10	Plastic Film Small	56	2.3%	2.8%
2	Other Tobacco Small	51	2.1%	2.4%
14	Metal (not Aluminium)	41	**1.7%**	1.1%
13	Rubber	26	**1.1%**	0.7%
12	Alum Pieces Small	19	0.8%	2.4%
5	Candy Pack. < 4 sq. In.	16	0.7%	1.6%
6	Polyfoam Peanuts	8	0.3%	2.3%
7	Other Polystyrene Pieces	5	0.2%	1.7%
3	Bottle Caps	4	0.2%	0.1%
4	Straws	0	0.0%	0.4%
		2393	100.0%	100.0%
	Average SF Small Litter Items / site [1.]	23		

Note: Current Toronto small litter average 21 Items / site

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Acknowledgements

This report was made possible through the efforts of a team of energetic and dedicated people. We wish to acknowledge the following persons:

- Julia Chang, City Government Recycling Coordinator; SF Environment
- Sunshine Swinford-DeVries, SF Environment
- Ruth C. Abbe, National Practice Leader, Zero Waste Planning, HDR/ BVA Engineering
- James Madden , Project Leader, HDR/ BVA Engineering
- Chris Hammer, Team Leader , San Francisco Litter Audit 2007
- Mark McKenney, Partner, MGM Management
- Patricia McKenney, Partner, MGM Management
- Auditors: Missy Peebles, Eric Bonilla, Peter Kinne, Dan Krantz. Glen Miller Jr.

1.0 Introduction

1.1 Overview

Litter is a problem virtually everywhere where disposable / recyclable packaging is used. People have personal opinions about what litter is – the reality is much different. Whereas there is a general perception that select groups of products make up the majority of litter, field research shows that litter is made up of a broad range of products and materials.

Various researchers describe a clear picture of what litter is comprised of. For example, data show that beverage containers are usually less than 10% (by count) (Daniel Syrek of the Institute for Applied Research), Florida State University at Gainesville, Center for Marine Conservation, and Keep America Beautiful, Keep Florida Beautiful etc. – as well as Beverage Recovery in Canada research in Newfoundland and Ontario, Canada). Beverage container litter includes milk cartons and bottles, pop, beer, liquor, wine, coolers, sips, cups etc.

The purpose of this report is to outline the methodology and results of a litter audit conducted on behalf of the City of San Francisco during April 2007.

This work was conducted by HDR / BVA Engineering Inc.; a San Francisco based full service engineering and environmental management firm. MGM Management, a Division of 6528058 Canada Inc. was sub-retained by HDR / BVA Engineering Inc. to assist them in the design, site selection, data management and data analysis for this litter audit.

MGM Management has conducted a number of litter audits including this audit:

- Ontario – conducted under supervision of Dan Syrek, 1990
- Ontario – Toronto area 1994, done by McKenney with Syrek assistance
- City of Toronto, Streets Litter Audit 2002
- Regional Municipality of Peel, Streets Litter Audit 2003
- Regional Municipality of York, Streets Litter Audit 2003
- Regional Municipality of Durham, Streets Litter Audit 2003
- City of Toronto – Streets Litter Audit 2004
- City of Toronto – Parks Litter Audit 2004
- City of Toronto - Streets Litter Audit 2005
- City of Toronto - Streets Litter Audit 2006
- City of San Francisco (USA) - Streets Litter Audit 2007 (April 2007)
- City of Edmonton - Streets Litter Audit 2007 (May –June 2007)
- City of Toronto - Streets Litter Audit 2007 (pending July – Aug 2007)
- City of Hamilton (Canada) – Streets Litter Audit (pending Aug 2007)

In the USA – over 30 litter count surveys have been done by Syrek, (and reviewed by MGM Management). More recently five excellent surveys have been completed across all of the 29 counties of Florida by the University of Florida. Criticism developed that the Syrek methodology was too complicated and difficult to replicate the results, thus a simpler method was sought. In 1993 the Florida Legislature directed the Florida Center for Solid and Hazardous Waste Management to conduct a state-wide litter count. The Center developed a method for surveying litter that was understandable, simple and statistically valid. MGM Management has been trained in the methods of both the Syrek and by staff of the University of Florida to extract the best of both methodologies and adapt them to our methods.

In the past some local environmental groups have done litter audits of their own design. These methodologies may not be scientific in their development and they often tended to not be reproducible. Measurement techniques need to be unbiased, scientifically rigorous, and reproducible to be defensible. Comparison to other jurisdictions has not usually been possible with local litter audit methods. The methodology used and the data developed from this audit can be reproduced should the City of San Francisco wish to do so, and the results can be compared to other jurisdictions that have used the same approach.

This survey uses a proven and recognized method of identifying litter survey sites and for counting litter.

2.0 City of San Francisco Litter Audit - Methodology

The City of San Francisco litter audit counted “accumulated litter”. This is as compared to “fresh litter” counts, where a sight is cleaned, then researchers return after a set time to count the number of pieces of litter that have been deposited. Accumulated litter allows for an examination of the occurrence of litter as it is has developed over time. Fresh litter count surveys are much more labour intensive, and costly to conduct, than accumulated litter counts.

2.1 Site Selection Process

2.1.1 Random Site Selection

In selecting where to conduct a site audit it is important to have an unbiased method of selection. The current methodology does not allow discretion in the field in selecting sites to be audited. Sites are pre-selected using computer techniques. In this way, neither the “dirtiest” nor the “cleanest” locations are picked. The survey teams count litter at sites that are selected in advance of field crews traveling to the location.

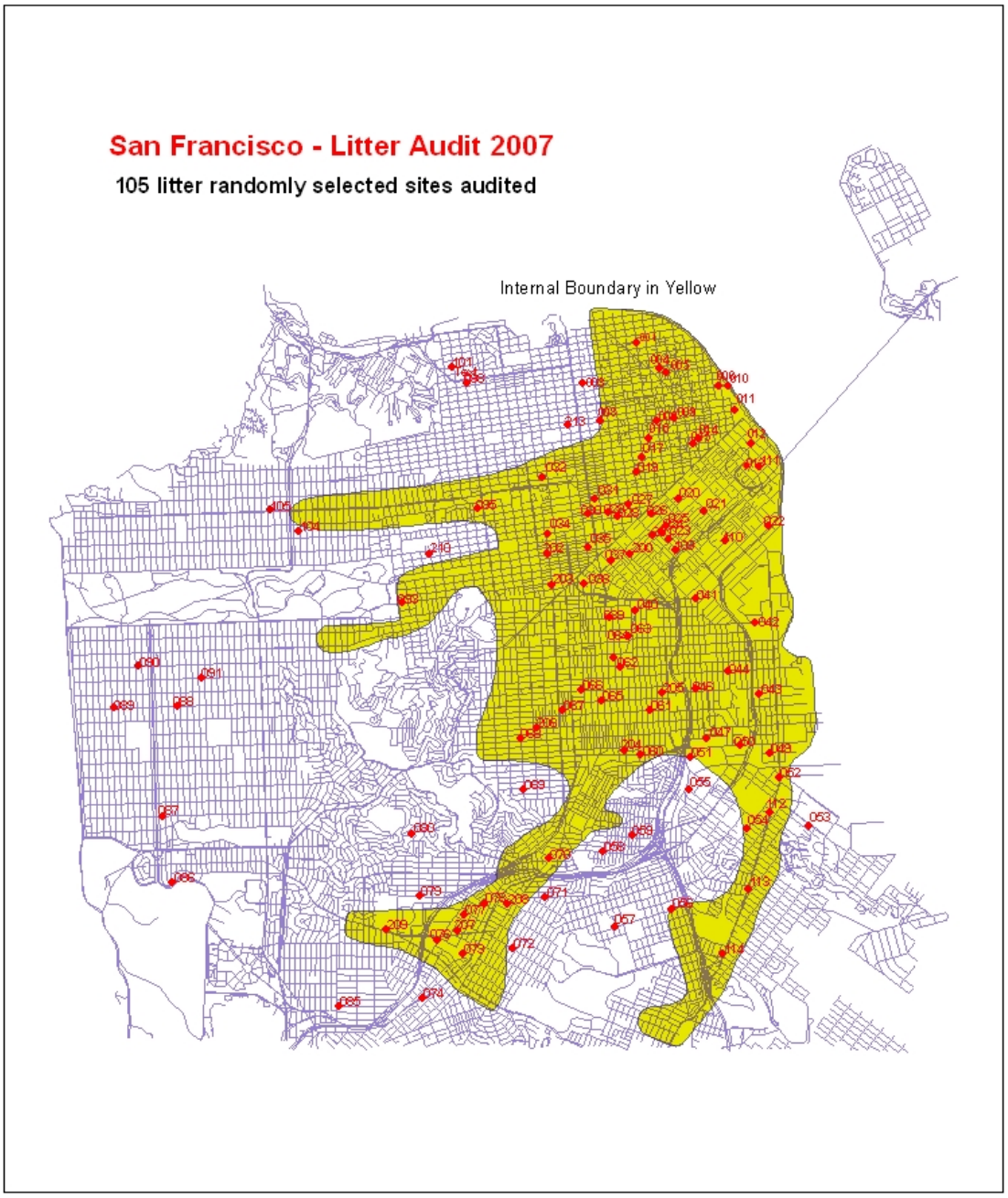
To select sites for the City of San Francisco Litter Audit, a geographical information system (GIS) database for the City of San Francisco was acquired (software used was ArcGIS 9.2 by Environmental Systems Research Institute Inc.). Working with San Francisco Environment, GIS data files were provided. Using ArcGIS 9.2, the consultant had access to 16,256 center-line coordinates for all potential public street locations within the service area of the City of San Francisco. With these data coordinates, the consultant used a computer sample generation program to randomly select potential litter audit sites. These data were then plotted on computer generated maps using ArcGIS 9.2, and detailed locations identified.

The consultant was requested to force the site selection program to provide 75% of the locations within the internal boundary service areas of the City, while the remaining 25% of sites represented the rest of the City’s geographical area.

The final outcome was 120 randomly selected potential sites. Some of these sites were rejected because they were within ¼ mile of each other, or because they occurred on freeways, railway lines, or ponds. A total of 105 randomly selected sites were audited by field surveyors, from the period April 9, 2007 to April 20, 2007.

Figure 1 - 105 Random Sites Were Audited in 2007

Sites were chosen by computer using ArcGIS 9.2 software.



The potential sample sites were then plotted for the entire City of San Francisco on a GIS generated map. Detailed street maps are then used to more accurately locate the sites, using two local map sources, San Francisco; ISBN 1-55368-168-1,MapArt www.mapart.com and also San Francisco & San Mateo Counties; Street Guide, The Thomas Guide, ISBN 01-528-85961-7.

Sites were rejected if they were located:

- on major highways / freeways
- location was on a bridge
- location clearly within a construction area
- on railway / subway rights-of-way
- on hydroelectric power line rights-of-way
- on / within water (ponds, rivers, streams/ lakes)
- access was difficult or impossible
- if located on industrial or private lands

Detailed directions were written by the consultant to direct audit teams to each of the selected sites. Directions were written in a manner that would allow any field team to find each site easily. Field teams were asked to travel to the sites using these directions so that no bias towards whether the site was dirty or clean would be introduced.

For each site further details of the audit site were added to the archival file by the audit team while at location, to allow future audit teams to find the same sites should the City wish to re-audit them in the future.

2.2 Detailed Site Files

The consultant created an individual hard copy site file for each location. These files contain the following:

- discrete site location ID number
- travel directions sheet
- photographic label card (for taking photos on-site)
- Large Litter Site Surveyor Form - (for recording large litter observed)
- Small Litter Item Count form (for recording small litter)

2.3 Conducting a Site Audit

Teams were paired in groups of two. Site auditors were hired by HDR / BVA Engineering Inc. Each team worked independently, reporting their activities to the HDR / BVA Engineering Inc., Project Manager. The City was divided into two work sectors, with teams assigned site files accordingly.

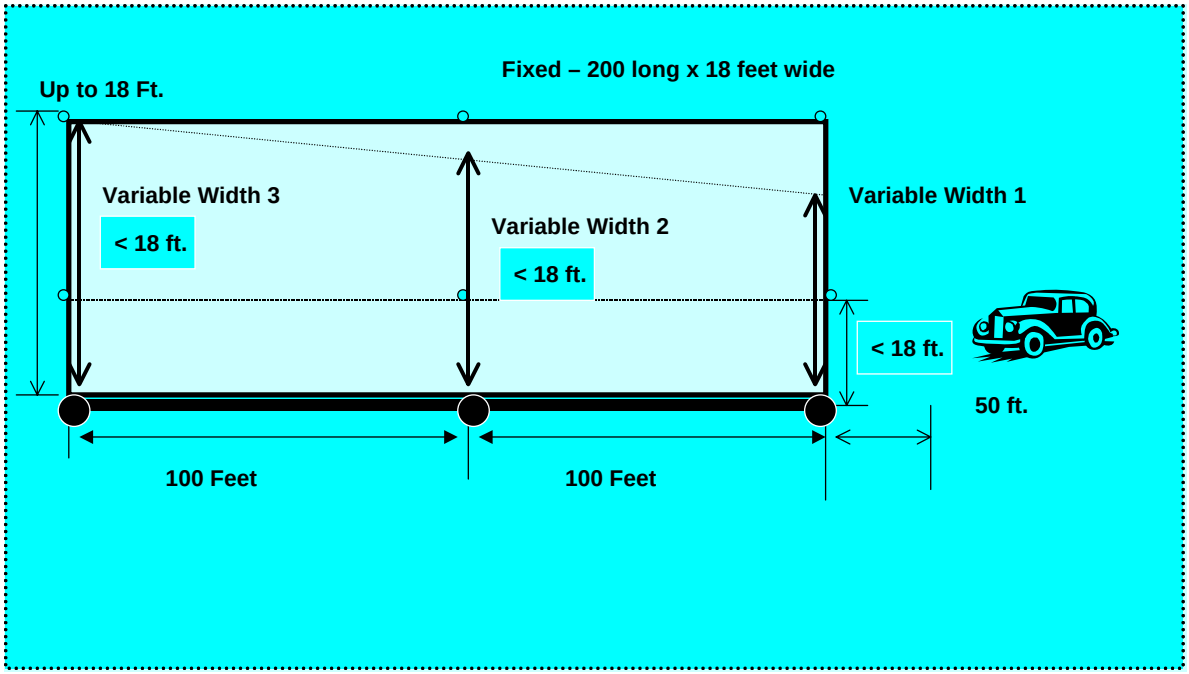
Upon being assigned site files each audit team traveled to their sites. It is of note that the team that audited the downtown areas volunteered to use bicycles as their transportation method. This proved to be a very effective means of doing sites in a congested metropolitan area. By using bicycles, time was saved, and parking costs avoided.

Teams approached their assigned sites from the directions requested and located the site. Upon arriving at a site, the teams safely parked their vehicles. Traffic cones were place on the roadway for traffic control, and team members dressed in fluorescent orange/ yellow traffic vests to increase their visibility. The teams reported their activities throughout the sampling day to the Project Manager by cellular telephone.

Beginning at the front of the parked car (or the start of the site), the team used a measuring device to measure 50 feet ahead of the start of the site. Using street marking paint, a mark was drawn on the pavement ahead to denote the staring point of the audit site. From this point the team measured an additional 100 feet, marking the roadway with another identifier to show the mid-point of the site. A final measurement of an additional 100 feet denoted the end of the audit site. Each site was 200 feet in length.

The width of the site was measured from 1.5 feet inside the curb (from the center of the roadway) towards the outer edge of the site, up to a maximum width of 18 feet. The rule was set to include 1.5 feet into the street since the curb is a normal catchments structure, for which the municipality is responsible for litter clean up. Sites with a width of 18 feet and 200 feet long were designated as a "fixed" site. In many instances a site was less than 18 feet wide. This occurred in commercial areas where storefronts provide less than 18 feet from the roadways (plus 1.5 feet into the road). Sites less than 18 feet in width are designated as "variable" sites.

Figure 2 - Schematic of Litter Audit Site



2.4 Classification of Large Litter

For purposes of classifying litter, and in accordance with the methods used in previous litter surveys conducted by us, large litter was defined to be that which is greater than 4 square inches in size.

2.5 Classification of Small Litter

Small litter were those pieces of debris that were less than 4 square inches in size, within a defined area with an audit site. The small litter audit methodology examines three transacts, or slices, of the site. A frame made of 1/2 inch P.V.C. plastic tubing was constructed to act as a frame. This frame was 1 foot wide and 6 feet long. A surveyor would look for and count small litter in three samples, one at the start of the site, one at the mid-point and one at the end of the site. At each transact section; three flips of the frame are done, thus surveying 18 square feet of the site – repeated three times.

Figure 3 – Small Litter Templates

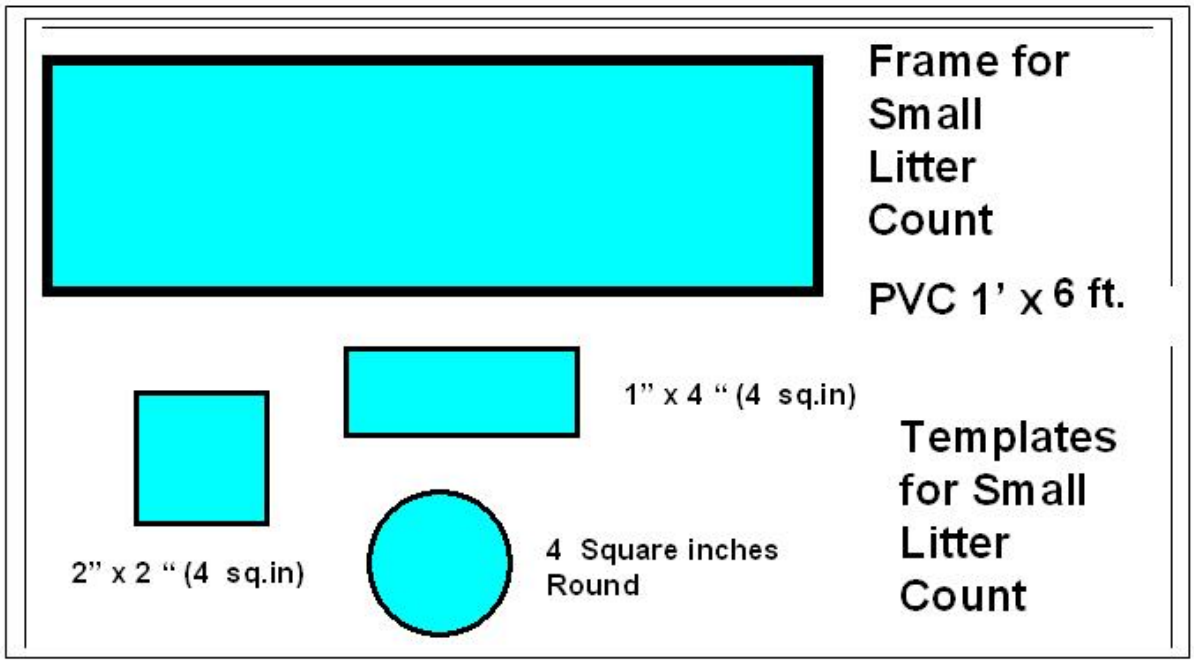


Figure 4 – Site Set-up – Small Litter

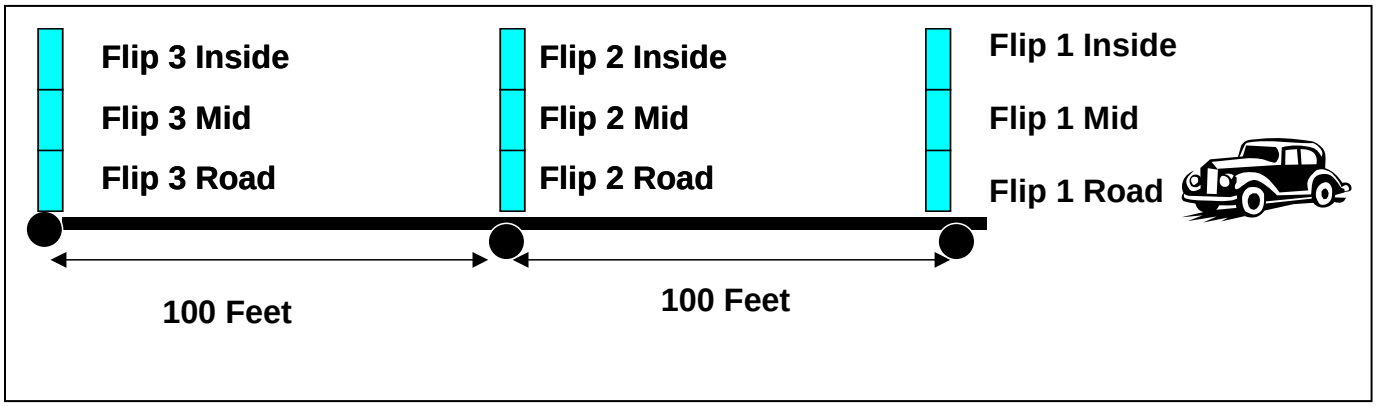


Table 1 - Categories of Small Litter

The categories in the litter counts less than 4 square inches that were examined are:

- cigarette butts/ debris
- other tobacco
- bottle caps
- straws
- candy packaging & wrappers
- polyfoam packing materials
- other polystyrene debris
- glass
- paper
- plastic film
- hard plastic
- aluminium / foil debris
- rubber
- metal (not aluminium)
- other materials
- gum deposits on roadways & sidewalks

Table 2 - Categories of Large Litter

Eighty-four sub-categories of large litter were counted, including:

Major Category	Sub-Category Number	Large Litter	Sub-Category Name	Material
1	1	Beer Cans	Beverage	metal
	2	Beer Bottles (glass)	Beverage	glass
	3	Soft Drink (glass)	Beverage	glass
	4	Soft Drink (cans)	Beverage	metal
	5	Soft Drink (plastic)	Beverage	plastic
	6	Sport Drink (glass)	Beverage	glass
	7	Sport Drink (plastic)	Beverage	plastic
	8	Water (glass)	Beverage	glass
	9	Water (plastic)	Beverage	plastic
	10	Wine/ Liquor (glass)	Beverage	glass
	11	Wine/ Liquor (plastic/other)	Beverage	plastic
	12	Milk/Juice (Plastic)	Beverage	plastic
	13	Milk/Juice (glass)	Beverage	glass
	14	Milk/Juice (Gable Top)	Beverage	paper
2	15	Foil Pouches	Other Packaging	composite
	16	Aseptic (Box)	Other Packaging	composite
	17	Broken Glass Container	Other Packaging	glass
	18	Six pack plastic rings	Other Packaging	plastic
	75	Foil containers	Other Packaging	metal
3	19	Plastic drink cups	Cups	plastic
	20	Paper Cups (cold)	Cups	paper
	21	Paper Cups (Hot)	Cups	paper
	22	Polystyrene cups (foam)	Cups	plastic
	23	Other paper cups	Cups	paper
	24	Cup Lids, Pieces lids	Cups	plastic
4	25	Plastic retail bags	Bags	plastic
	26	Paper retail bags	Bags	paper
	27	Paper bags - fast food	Bags	paper
	28	Plastic bags - not retail	Bags	plastic
	29	Paper bags - not retail	Bags	paper
	30	Zipper bags/ sandwich	Bags	plastic
5	31	Cardboard boxes/ box mat'l	Other Packaging	paper
	32	Paperboard (cereal type)	Other Packaging	paper
	33	Paper Beverage Cases	Other Packaging	paper
	34	Polystyrene clamshells	Other Packaging	plastic
	35	Paper clamshells	Other Packaging	paper
	36	Other Plastic Shells/Boxes	Other Packaging	plastic
6	37	Plastic Jars / Bottles/ Lids	OTHER CNTRS.	plastic
	38	Glass jars/ bottles misc.	OTHER CNTRS.	glass
	39	Cans - steel	OTHER CNTRS.	metal
	40	Cans - aluminum	OTHER CNTRS.	metal
	41	Container lids	OTHER CNTRS.	
	42	Aerosol cans (paint, oils, etc.)	OTHER CNTRS.	metal
7	43	Paper Food Wrap	Food Wraps/ Cntrs	paper
	44	Paper / foil composite wrap	Food Wraps/ Cntrs	composite
	45	Plastic wrap	Food Wraps/ Cntrs	plastic
	54	Condiment package (salt, ketchup, vinegar etc.)	Take-Out Extras	
	55	Utensils	Take-Out Extras	plastic

	56	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes	Take-Out Extras	paper
	57	Paper Fast Food Plates	Take-Out Extras	paper
	58	Poly Fast Food Plates	Take-Out Extras	plastic
	59	Other Plastic FF Plates	Take-Out Extras	plastic
	60	Plates - Other Mat's	Take-Out Extras	
8	46	Polystyrene Trays	Trays	plastic
	47	Paper Trays	Trays	paper
	48	Other Mat'l Trays (what?)	Trays	
9	49	Gum wrappers	Confectionary/Snack	
	50	Candy bar wraps	Confectionary/Snack	
	51	Candy pouches	Confectionary/Snack	
	52	Sweet packaging (describe)	Confectionary/Snack	
	53	Other confectionery (describe)	Confectionary/Snack	
	63	Snack food packaging	Confectionary/Snack	
10	61	Clothing or clothing pieces	Cloth	
	62	Other cloth	Cloth	
11	64	Plastic packaging other	Other Miscellaneous	plastic
	65	Paper packaging other	Paper/ Fibre Mat'l	paper
	66	Plastic / composite other	Other Miscellaneous	
	67	Foil materials / foil pieces	Other Miscellaneous	metal
12	68	No Brand Name Towels / Napkins / Serviettes	Paper/ Fibre Mat'l	paper
	69	Lottery ticket debris	Paper/ Fibre Mat'l	paper
	70	Printed material (newspapers, flyers, books etc.)	Paper/ Fibre Mat'l	paper
	71	Stationary (school, business etc.)	Paper/ Fibre Mat'l	paper
	72	Receipts (business forms, bus transfers, etc.)	Paper/ Fibre Mat'l	paper
13	73	Cigarette / cigar debris (>4")	Tobacco	
	74	Tobacco other (packs, matches, cellophane)	Tobacco	
14	76	Misc. Paper	Other Miscellaneous	paper
	77	Misc. Plastic	Other Miscellaneous	plastic
	78	Misc. Paperboard	Other Miscellaneous	paper
	79	Misc. Cardboard	Other Miscellaneous	paper
	80	Misc. Glass	Other Miscellaneous	glass
	81	Vehicle & Metal Road Debris	Other Miscellaneous	
	82	Construction debris	Other Miscellaneous	
	83	Tire & Rubber debris	Other Miscellaneous	rubber
	84	Home Articles	Other Miscellaneous	

Table 3 - Detailed Descriptions of Large Item Categories

1	Beer Cans		All brands of consumer beer can containers
2	Beer Bottles (glass)		Refillable and non-refillable beer bottles, all sizes
3	Soft Drink (glass)		Soft drinks, carbonated, non-carbonated, flavoured drinks in glass containers
4	Soft Drink (cans)		Soft drinks, carbonated, non-carbonated, flavoured drinks in metal can containers
5	Soft Drink (plastic)		Soft drinks, carbonated, non-carbonated, flavoured drinks in plastic containers, all sizes
6	Sport Drink (glass)		Sport drinks, carbonated or non-carbonated, flavoured drinks in glass containers, all sizes
7	Sport Drink (plastic)		Sport drinks, carbonated or non-carbonated, flavoured drinks in plastic containers, all sizes
8	Water (glass)		Packaged water, carbonated or non-carbonated, flavoured drinks in glass containers, all sizes
9	Water (plastic)		Packaged water, carbonated or non-carbonated, flavoured drinks in plastic containers, all sizes
10	Wine/ Liquor (glass)		Wine & liquor in glass, all sizes
11	Wine/ Liquor (plastic/other)		Wine & liquor in plastic or any other formats, all sizes
12	Milk/Juice (Plastic)		Milk or juice containers, packages in plastic
13	Milk/Juice (glass)		Milk or juice containers, packages in glass
14	Milk/Juice (Gable Top)		Milk or juice containers, packages in gable top paper cartons, all sizes
15	Foil Pouches		All packaged goods in foil packaging, pieces of foil materials
16	Aseptic (Box)		Drink-in-box, juice, fluids, other
17	Broken Glass Container		Glass fragments
18	Six pack plastic rings		Retainer plastic for carrying cans
19	Plastic drink cups		Cups, all sizes, all resin types
20	Paper Cups (cold)		Cups, all sizes, all paper types - cold drinks
21	Paper Cups (Hot)		Cups, all sizes, all paper types - hot drinks
22	Polystyrene cups (foam)		Cups, all sizes, all polystyrene types - hot drinks
23	Other paper cups		Cups, other materials
24	Cup Lids, Pieces lids		Fragments and pieces of cups
25	Plastic retail bags		Whole and pieces of retail plastic bags
26	Paper retail bags		Whole and pieces of retail paper bags

27	Paper bags – fast food		Whole and pieces of fast food outlet paper bags
28	Plastic bags – not retail		Whole and pieces of plastic bags, not retail i.e. dry cleaning
29	Paper bags - not retail		Paper bags & sacs, example leaf bag debris
30	Zipper bags/ sandwich		plastic lunch bags and sacs
31	Cardboard boxes/ box mat'l		All cardboard and box materials
32	Paperboard (cereal type)		Cereal, shoe boxes and pieces etc.
33	Paper Beverage Cases		Paper material outer packaging for beverage products
34	Polystyrene clamshells		Whole and pieces of take-away or other Styrofoam containers
35	Paper clamshells		Whole and pieces of take-away or other paper containers
36	Other Plastic Shells/Boxes		PET, PVC, HDPE , other material shells
37	Plastic Jars / Bottles/ Lids		All jars, bottles etc, plastic, non beverage, example dish detergent bottle
38	Glass jars/ bottles misc.		All jars, bottles not described above, in glass
39	Cans – steel		Food, non-food and other product steel can containers
40	Cans - aluminum		Food, non-food and other product aluminum can containers
41	Container lids		All lids, closures, and pieces > 4 sq. in.
42	Aerosol cans (paint, oils, etc.)		Aerosol cans, tops, lids - all products
43	Paper Food Wrap		Wrap for food, commercial & non-commercial; example meat wrap,
44	Paper / foil composite wrap		Wrap for food or non-food items, commercial & non-commercial; example hamburger paper/ foil composite wrap,
45	Plastic wrap		All plastic wrap types, food, non-food
46	Polystyrene Trays		Trays for take-out, non-take out, microwavable, display etc
47	Paper Trays		Trays for take-out, non-take out, microwavable, display etc
48	Other Mat'l Trays (what?)		Trays for take-out, non-take out, microwavable, display etc
49	Gum wrappers		Packaging used to seal, sell gum products
50	Candy bar wraps		Packaging used to seal, sell candy products
51	Candy pouches		Packaging used to seal, sell candy products - pouch format
52	Sweet packaging (describe)		Packaging used to seal, sell confections (cakes, pies, sweet snack products

53	Other confectionery (describe)		All other packaging for confectionaries
54	Condiment package (salt, ketchup, vinegar etc.)		Pouches, containers, creamers etc
55	Utensils		Forks, knives, chop sticks etc
56	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes		Towels & napkins etc with brand identification identifiable
57	Paper Fast Food Plates		Paper Plates, used to serve fast food
58	Poly Fast Food Plates		Polystyrene Plates, used to serve fast food
59	Other Plastic FF Plates		Other Material Plates, used to serve fast food
60	Plates - Other Materials		Plates for other than fast food applications, i.e. picnic plates used by families
61	Clothing or clothing pieces		All cloth, clothing pieces, and clothing discarded on the site
62	Other cloth		Tarps, industrial fabrics etc
63	Snack food packaging		All snack food (i.e.. Salty snacks, chips)
64	Plastic packaging other		Plastic packaging otherwise not described
65	Paper packaging other		Paper packaging otherwise not described
66	Plastic / composite other		All paper and composite debris not previously described
67	Foil materials / foil pieces		Foils and pieces, aluminum food foils, industrial foils
68	No Brand Name Towels / Napkins / Serviettes		Napkins and towels - no brand identification
69	Lottery ticket debris		Tickets, and gaming items
70	Printed material (newspapers, flyers, books etc.)		All printed material, commercially printed
71	Stationary (school, bus. etc.)		Includes school papers, written items, other printed materials such as business forms
72	Receipts (business forms, bus transfers etc.)		Receipts, business items, invoices, packing slips, bus transfers, commercial tickets (concerts, cinema)

73	Cigarette / cigar debris (>4")		Tobacco items
74	Tobacco other (packs, matches, cellophane)		Packages, wrappers, tobacco foil products, lighters, matchboxes
75	Foil containers		Foil containers (ice cream wraps)
76	Misc. Paper		All other non-described paper material, whole or shredded, unidentifiable as another category
77	Misc. Plastic		All other non-described plastic material, whole or shredded, unidentifiable as another category
78	Misc. Paperboard		All other non-described paperboard material, whole or shredded, unidentifiable as another category
79	Misc. Cardboard		All other non-described cardboard material, whole or shredded, unidentifiable as another category
80	Misc. Glass		All other non-described glass material, whole or broken, unidentifiable as another category
81	Vehicle & Metal Road Debris		Debris associated with transportation, private or commercial
82	Construction debris		Debris associated with construction, private or commercial
83	Tire & Rubber debris		Rubber materials, tire pieces, shock absorbers, sheet rubber or pieces
84	Home Articles		All non-described household items, (i.e.. Lamps, electrical, lawn chairs, etc)

2.6 Survey Counts

After setting up each site, one auditor commenced the large litter survey count, and recorded brands of items observed at the site. The other auditor commenced the small litter survey, using the methodology described above.

Before starting the large litter survey, the field technician first checked his/her tape recorder to ensure it was working properly.

The auditor then dictated the description sections of the Surveyor Site Form (Appendix 1) into the recorder. This information describes the site number, date, digital photos taken, camera used, start time, type of site (residential, industrial, commercial, downtown core), type of roadway, whether road is divided, grass height, evidence of a clean-up, stop sign/ traffic light visible, fast food near-by, convenience store nearby, described the litter catch points (grass mow line, hedge, fence, other), and provided a visual litter rating on a subjective basis. All photographs are part of the archival record for this survey – and are part of the electronic database supplied to the City

The visual litter rating is an "opinion" expressed by the surveyor as to whether the site is dirty (highest rating = 4) or clean (lowest rating = 1).

Once this information is recorded the auditor proceeds to walk the first pass through the site slowly, taping his/ her observations into the tape-recorder as they observe the site. Proceeding back and forth across the site until the surveyor has walked the site up to the mid-point. The surveyor noted that they had reached the mid-point, then continuing on observing litter up to the end of the site boundary, making verbal notations of the litter observed and describing them into the 84 sub-categories of litter. This completed "Pass One". The surveyor then repeated the observations (Pass Two) over the site, using the same procedure, but in the opposite direction. Results of the two passes are used in data analysis.

2.7 Documentation & File Management

At each site the teams were required to make a tape-recorded record of their observations of large litter. At the end of doing the verbal entries into the recorder, a team member then transcribed the verbal observations onto a Large Litter Site Form (Appendix 1). In this way the verbal record was transferred to a written record for the site.

These forms were later transcribed into a database for analysis. Each site's observation forms were transcribed at the site before leaving the location. If a recording problem occurred, the site was redone.

Each form was returned in its file folder to the Project Manager for archival purposes.

2.8 Photographic Record of the Site

At each site location, the litter audit team took digital photographs. One shot was taken at the start of the site, looking towards the end of the site – away from the vehicle. The second shot was taken in the mid-point of the site – looking across the width of the site toward the boundary. And the final photograph was taken at the end of the site – looking back towards the start of the site (towards the vehicle). The purpose of the photographs is to set the scene of the site – not to detail litter on the ground.

In each case the number of photographs at each site was recorded on the Surveyor Site Form. The site-specific digital photographs were downloaded to the database of the survey, as an archival record of the site during the audit period.

Figure 5 - Site Photographs (example photographs)

2.9 Branded Litter Observations

Using the Large Litter Site Form (with 84 sub-categories of large litter) as a guide, data was also gathered for observing Branded Litter. Branded litter is large litter (i.e. over 4 square inches) that has a recognizable brand name affixed. Team auditors verbally identified litter by brand name, which was later transcribed onto the Large Litter Site Form, for data entry and analysis. Where any doubt occurred in the identification of a brand of litter, no entry was made.

2.10 Survey Schedule and Progress

The field audit teams were assembled for training on April 9, 2007. Following an orientation and safety training session field observations began immediately. Fieldwork was conducted between April 9, 2007 – April 20, 2007.

Each two-person audit team were able to complete between 7 – 10 sites per day allowing for breaks, lunch and travel time.

3.0 Large Litter Survey Results

Field observations were dictated into tape recorders, then later transcribed onto Large Litter Site Form (Appendix 1) and Small Item Count Sheets.

Forms were then inputted into a Microsoft Access database for analysis.

3.1 Discussion of Large Litter Results

Litter counted for the City of San Francisco Litter audit, were grouped into 14 broad categories.

- Other (incl. misc. paper)
- Other Packaging (salty snacks etc)
- Cups (hot, cold drinks)
- Tobacco products
- Bags (paper, plastic)
- Food wraps
- Plates
- Paper (printed mat's, news)
- Confectionary (candy)
- Beverage containers
- Other Containers (not beverage)
- Take out extras (condiments etc)
- Cloth / Clothing
- Trays

In total, 3,812 pieces of large litter were counted. This is an average of 36 items per site based upon the 105 sites audited.

The largest category of litter observed, at 570 litter pieces, was miscellaneous paper. This represented 15% of the total littered items observed. Non-branded paper napkin and paper towels was the second most significant category of litter with 494 items observed, or 13% of total litter. All fiber based products and items observed contributed 2,051 items or 54% of the total litter observed. Fiber based litter included paper, paperboard, cardboard, towels, napkins, newspapers, books, flyers, printed materials, and business forms, stationary.

The second most significant material type observed was plastic materials.
These included miscellaneous plastic, plastic packaging, wrap, plastic bags-retail and non-retail, hot and cold plastic drink cups, plastic jars, bottles, composites, utensils, zip bags, beverage containers, trays, polystyrene cups, confectionary, sweet and snack food packaging, pouches, plates, retail bags, and carrying rings. The most significant single category of plastic litter was unidentified miscellaneous litter; which is litter that is so broken or weathered that auditors cannot identify it with certainly; and is assumed to be plastic. Miscellaneous plastic litter accounted for 342 littered items or 9% of total litter. All large plastic litter in aggregate accounted for 746 items observed, or 20% of total litter observed.

Observations of the small litter classification during the San Francisco audit showed a relatively low occurrence of small litter on city streets, as compared to audits performed by the consultant in other cities. In San Francisco, 2,393 small litter items were observed in 104 sites audited. This averages 23 items per site and is comparable with 21 items / site for the City of Toronto, Ontario, Canada; where considerable clean-up activities and litter abatement efforts have been underway for several years. Averages twice as high as the small litter rate observe in San Francisco in 2007 have been recorded by the consultant in other audits.

Figure 6 – Most Significant Sub-Categories of Litter

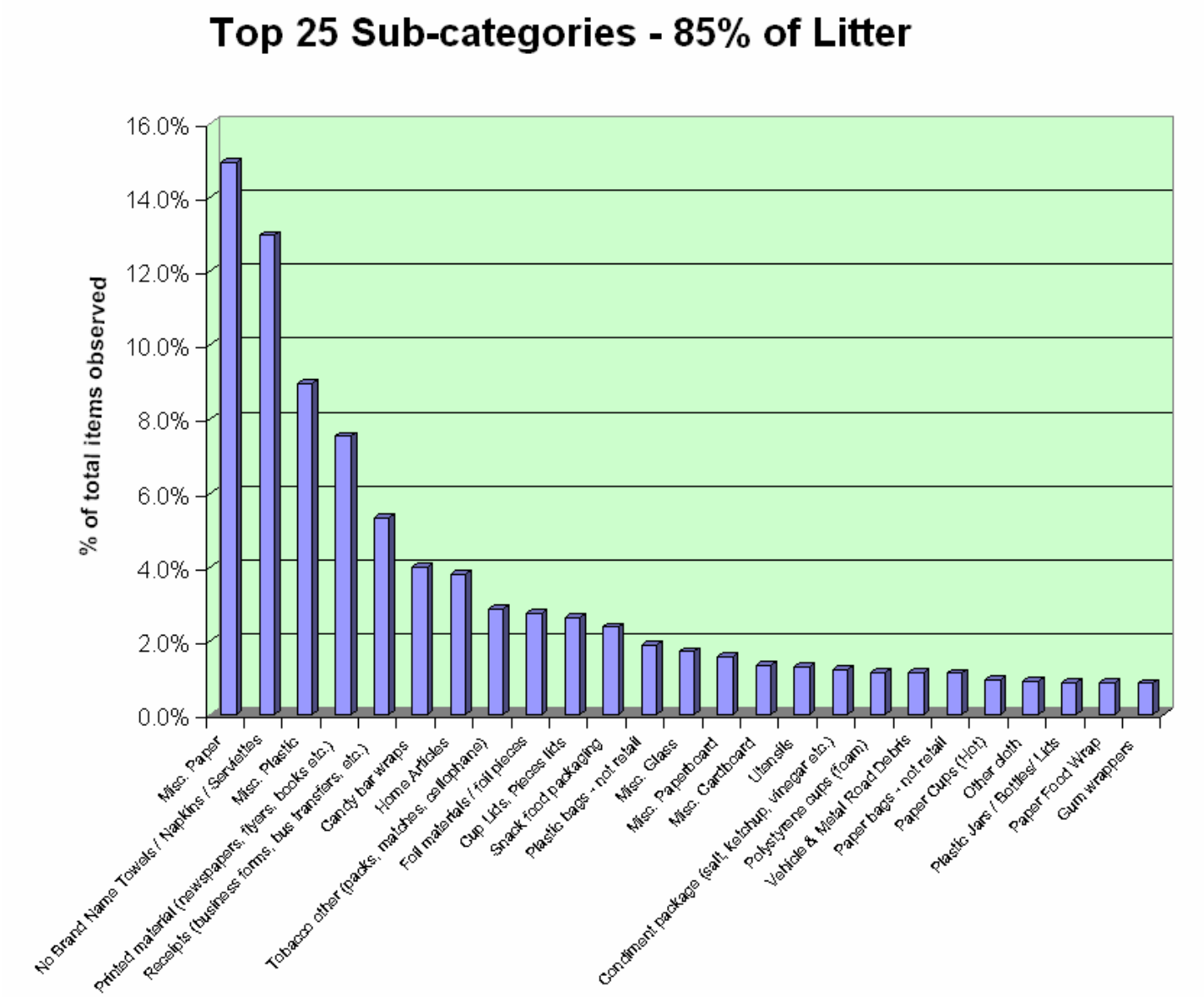


Table 4 - Top Litter Sub-Categories Equal 85% of Litter

San Francisco - Large Litter Observations - Top 25 Categories

Large Litter Category	Average	% of Total	
Misc. Paper	570	15.0%	
No Brand Name Towels / Napkins / Serviettes	494.5	13.0%	
Misc. Plastic	342	9.0%	
Printed material (newspapers, flyers, books etc.)	287	7.5%	
Receipts (business forms, bus transfers, etc.)	203	5.3%	
Candy bar wraps	152	4.0%	
Home Articles	145	3.8%	
Tobacco other (packs, matches, cellophane)	109	2.9%	
Foil materials / foil pieces	104.5	2.7%	
Cup Lids, Pieces lids	100.5	2.6%	
Snack food packaging	90.5	2.4%	
Plastic bags - not retail	71.5	1.9%	
Misc. Glass	65	1.7%	
Misc. Paperboard	59.5	1.6%	
Misc. Cardboard	50.5	1.3%	
Utensils	49	1.3%	
Condiment package (salt, ketchup, vinegar etc.)	46	1.2%	
Polystyrene cups (foam)	43	1.1%	
Vehicle & Metal Road Debris	43	1.1%	
Paper bags - not retail	42.5	1.1%	
Paper Cups (Hot)	36	0.9%	
Other cloth	34	0.9%	
Plastic Jars / Bottles/ Lids	33	0.9%	
Paper Food Wrap	32.5	0.9%	
Gum wrappers	32	0.8%	84.9%

Table 5 - Summary of All Large Litter Observed (2007)

San Francisco - Large Litter Observations - All Categories

Large Litter Category	Average	% of Total
Misc. Paper	570	15.0%
No Brand Name Towels / Napkins / Serviettes	494.5	13.0%
Misc. Plastic	342	9.0%
Printed material (newspapers, flyers, books etc.)	287	7.5%
Receipts (business forms, bus transfers, etc.)	203	5.3%
Candy bar wraps	152	4.0%
Home Articles	145	3.8%
Tobacco other (packs, matches, cellophane)	109	2.9%
Foil materials / foil pieces	104.5	2.7%
Cup Lids, Pieces lids	100.5	2.6%
Snack food packaging	90.5	2.4%
Plastic bags - not retail	71.5	1.9%
Misc. Glass	65	1.7%
Misc. Paperboard	59.5	1.6%
Misc. Cardboard	50.5	1.3%
Utensils	49	1.3%
Condiment package (salt, ketchup, vinegar etc.)	46	1.2%
Polystyrene cups (foam)	43	1.1%
Vehicle & Metal Road Debris	43	1.1%
Paper bags - not retail	42.5	1.1%
Paper Cups (Hot)	36	0.9%
Other cloth	34	0.9%
Plastic Jars / Bottles/ Lids	33	0.9%
Paper Food Wrap	32.5	0.9%
Gum wrappers	32	0.8%
Paper Cups (cold)	32	0.8%
Construction debris	31.5	0.8%
Lottery ticket debris	31	0.8%
Sweet packaging (describe)	30.5	0.8%
Beer Bottles (glass)	29.5	0.8%
Plastic drink cups	29.5	0.8%
Clothing or clothing pieces	28	0.7%
Plastic packaging other	27.5	0.7%
Plastic wrap	25.5	0.7%
Plastic retail bags	23	0.6%
Polystyrene clamshells	20.5	0.5%
Candy pouches	18.5	0.5%
Name Brand (Fast Food etc.) Towels / Napkins	14.5	0.4%
Paper retail bags	14	0.4%
Wine/ Liquor (plastic/other)	13	0.3%
Soft Drink (cans)	12.5	0.3%

Continued…..

San Francisco - Large Litter Observations - All Categories

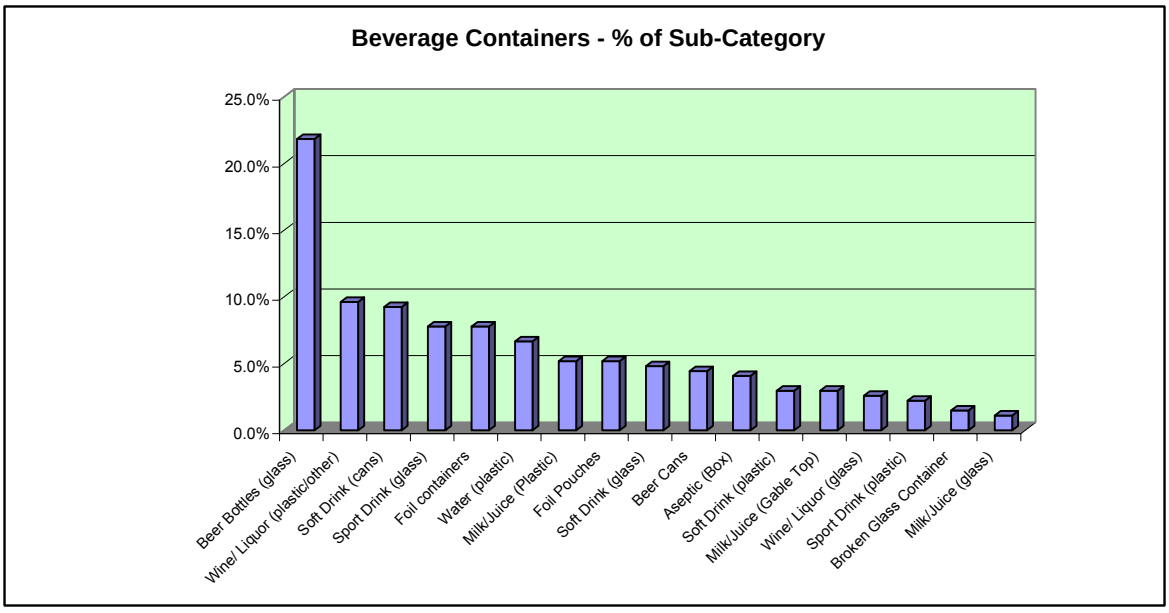
Large Litter Category	Average	% of Total
Zipper bags/ sandwich	11.5	0.3%
Foil containers	10.5	0.3%
Plastic / composite other	10.5	0.3%
Sport Drink (glass)	10.5	0.3%
Paper / foil composite wrap	10	0.3%
Paperboard (cereal type)	10	0.3%
Tire & Rubber debris	9.5	0.2%
Water (plastic)	9	0.2%
Other Plastic Shells/Boxes	7.5	0.2%
Cardboard boxes/ box mat'l	7	0.2%
Foil Pouches	7	0.2%
Milk/Juice (Plastic)	7	0.2%
Paper bags - fast food	7	0.2%
Soft Drink (glass)	6.5	0.2%
Beer Cans	6	0.2%
Cans - aluminium	6	0.2%
Aerosol cans (paint, oils, etc.)	5.5	0.1%
Aseptic (Box)	5.5	0.1%
Cans - steel	5	0.1%
Paper Trays	4.5	0.1%
Milk/Juice (Gable Top)	4	0.1%
Soft Drink (plastic)	4	0.1%
Poly Fast Food Plates	3.5	0.1%
Wine/ Liquor (glass)	3.5	0.1%
Container lids	3	0.1%
Other confectionery (describe)	3	0.1%
Paper Fast Food Plates	3	0.1%
Sport Drink (plastic)	3	0.1%
Paper packaging other	2.5	0.1%
Broken Glass Container	2	0.1%
Glass jars/ bottles misc.	2	0.1%
Milk/Juice (glass)	1.5	0.0%
Other paper cups	1.5	0.0%
Cigarette / cigar debris (>4")	1	0.0%
Paper clamshells	1	0.0%
Stationary (school, business etc.)	1	0.0%
Polystyrene Trays	0.5	0.0%
	3812.5	100.0%

3.2 Detailed Analysis by Major Category

3.2.1 Beverage Containers
(Soft drink, beer, wine/liquor, sports, water)

Beverage Container Summary

	Items	% of Sub-Category	% of Total Litter
Beer Bottles (glass)	29.5	21.9%	0.77%
Wine/ Liquor (plastic/other)	13	9.6%	0.34%
Soft Drink (cans)	12.5	9.3%	0.33%
Sport Drink (glass)	10.5	7.8%	0.28%
Foil containers	10.5	7.8%	0.28%
Water (plastic)	9	6.7%	0.24%
Milk/Juice (Plastic)	7	5.2%	0.18%
Foil Pouches	7	5.2%	0.18%
Soft Drink (glass)	6.5	4.8%	0.17%
Beer Cans	6	4.4%	0.16%
Aseptic (Box)	5.5	4.1%	0.14%
Soft Drink (plastic)	4	3.0%	0.10%
Milk/Juice (Gable Top)	4	3.0%	0.10%
Wine/ Liquor (glass)	3.5	2.6%	0.09%
Sport Drink (plastic)	3	2.2%	0.08%
Broken Glass Container	2	1.5%	0.05%
Milk/Juice (glass)	1.5	1.1%	0.04%
Total	135	100.0%	3.54%



Discussion:

The total beverage category yielded a count of 135 items, or 3.5 % of the total litter counted. This level of beverage container litter is lower that than the 7.3 % of total litter for beverage containers observed in audits conducted by the consultant in all jurisdictions between 2002-2006 from other jurisdictions (46,000 data points). This may partially be explained by the California Redemption Value, placed upon containers in California which provides an incentive for many of these containers to be salvaged for refunds. The data obtained where the contribution of containers was over 7% were in non-deposit – refund jurisdictions.

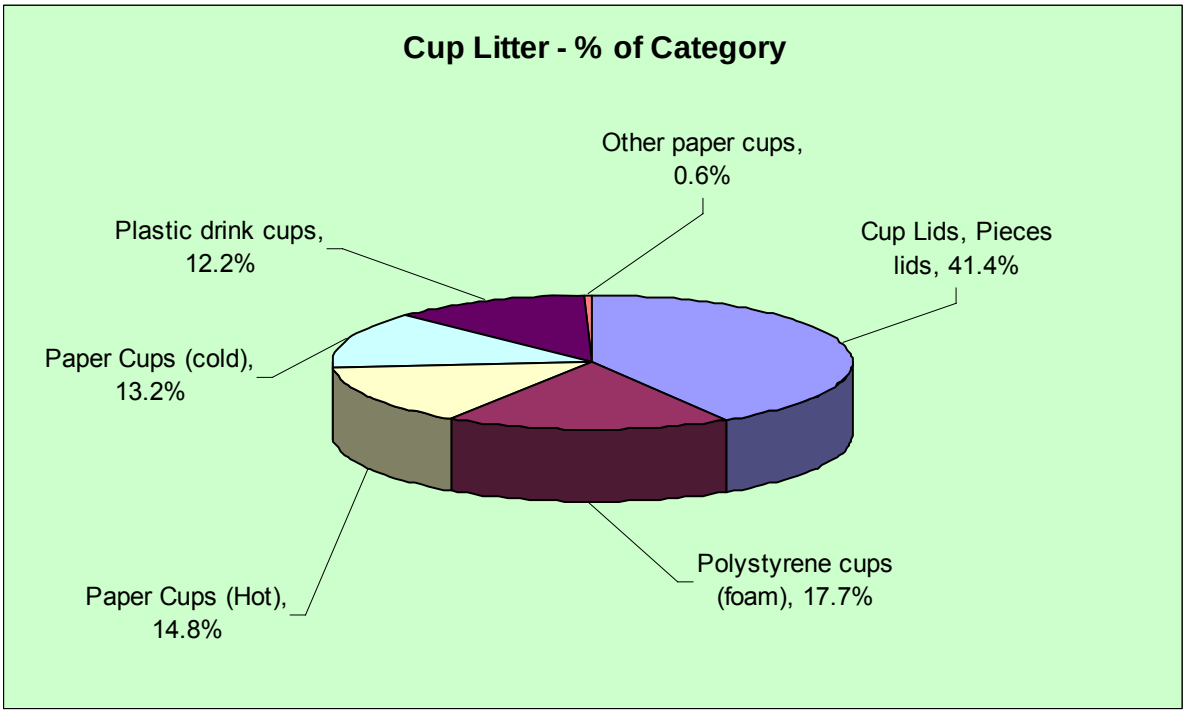
Soft drink containers in aggregate accounted for 1 % of total litter (0.96% for all types of soft drink and sport drink containers). Beer containers accounted for about the same amount at 0.92% of total litter; while wine / liquor containers were lower at 0.43% of total litter.

3.2.2 Cups

Cup Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Cup Lids, Pieces lids	100.5	41.4%	2.64%
Polystyrene cups (foam)	43	17.7%	1.13%
Paper Cups (hot)	36	14.8%	0.94%
Paper Cups (cold)	32	13.2%	0.84%
Plastic drink cups	29.5	12.2%	0.77%
Other paper cups	1.5	0.6%	0.04%
Total	242.5	100.0%	6.36%

1. Note: Observations may not be whole numbers due to averaging.
2. Category average - 2002 - 2006 7.2 % (46,000 observations)



Discussion:

Cup litter includes hot and cold drink cups. This is indicative of wastes from a variety of over-the-counter food providers, whereby litter is then deposited on public lands. The category includes, polystyrene cups as well as lids and pieces of lids from hot and cold drink containers.

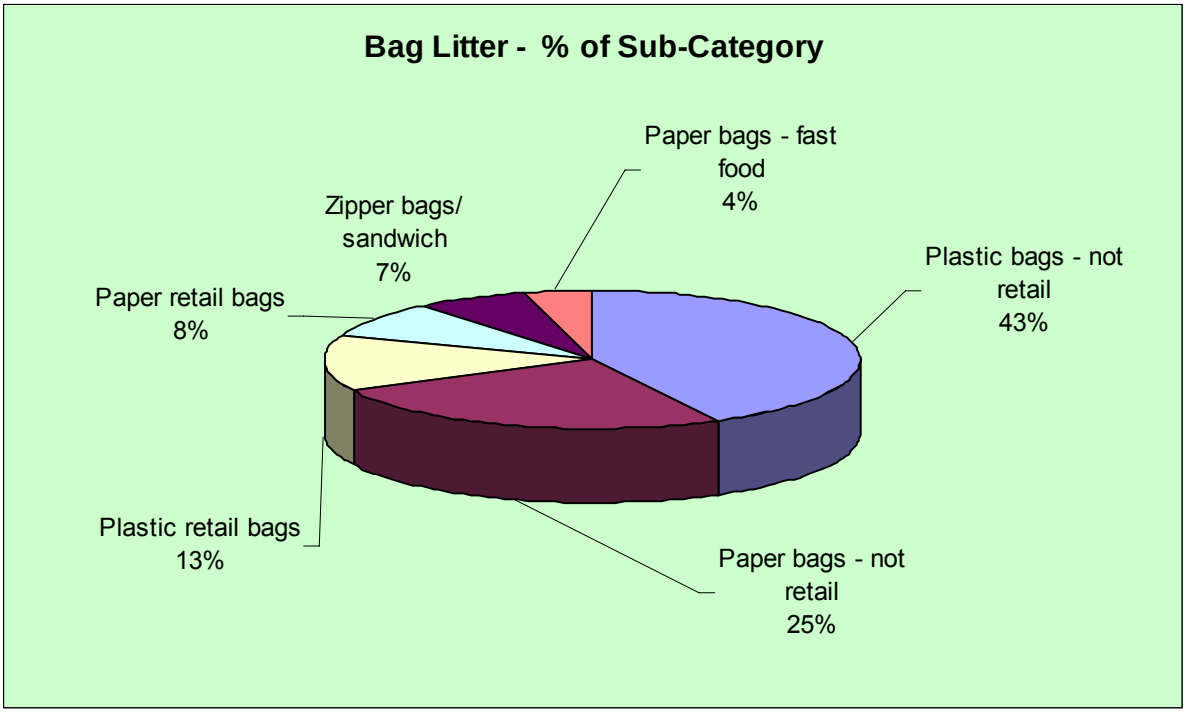
The sub-category yielded 6.4 % of the total litter counted in the San Francisco Litter audit, compared to a category average over the consultants 2002 – 2006 audits from other jurisdictions of 7.2% of total litter. San Francisco appears to have an average amount of cup litter. Cup lids and pieces and Styrofoam cups make up the majority of the litter in this category, reflecting those retailers that sell their product in this format.

3.2.3 Bags

Bag Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Plastic bags - not retail	71.5	42.2%	1.88%
Paper bags - not retail	42.5	25.1%	1.11%
Plastic retail bags	23	13.6%	0.60%
Paper retail bags	14	8.3%	0.37%
Zipper bags/ sandwich	11.5	6.8%	0.30%
Paper bags - fast food	7	4.1%	0.18%
Total	169.5	100.0%	4.45%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006 7.2 % (46,000 observations)



Discussion:

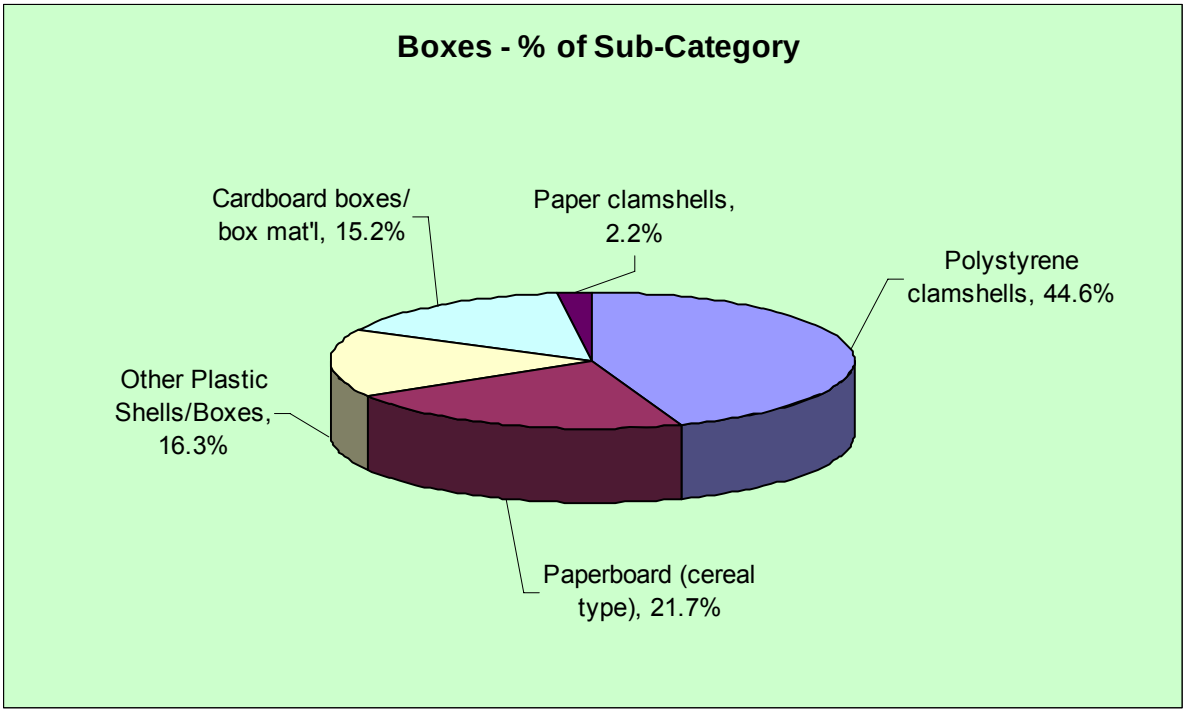
Bags that were not retail in nature, such as dry cleaning bags or other non-branded plastic bags represented 3 % of total litter (1.88% plastic bags – not retail) + 1.11% paper bags – not retail), representing the largest portion of litter in this sub-category or 68% of bag litter. Plastic bags with a retail marking on them (i.e. grocery bags) represented 13% of the litter in this category, 0.59% of total litter. Paper bags from fast food outlets accounted for 4 % of this sub-category, and paper bags other than from retail were 8% of the sub-category litter. Bag litter in San Francisco was observed to by higher (4.43% of total litter) than the consultant's category average for bags in all audits conducted between 2002 – 2006 (2.7%) from other jurisdictions.

3.2.4 Boxes

Box Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Polystyrene clamshells	20.5	44.6%	0.5%
Paperboard (cereal type)	10	21.7%	0.3%
Other Plastic Shells/Boxes	7.5	16.3%	0.2%
Cardboard boxes/ box mat'l	7	15.2%	0.2%
Paper clamshells	1	2.2%	0.0%
Totals	46	100.0%	1.2%

1. Note: Observations may not be whole numbers due to averaging
2. Sub-category average - 2002 - 2006 0.8% (46,000 observations)



Discussion:

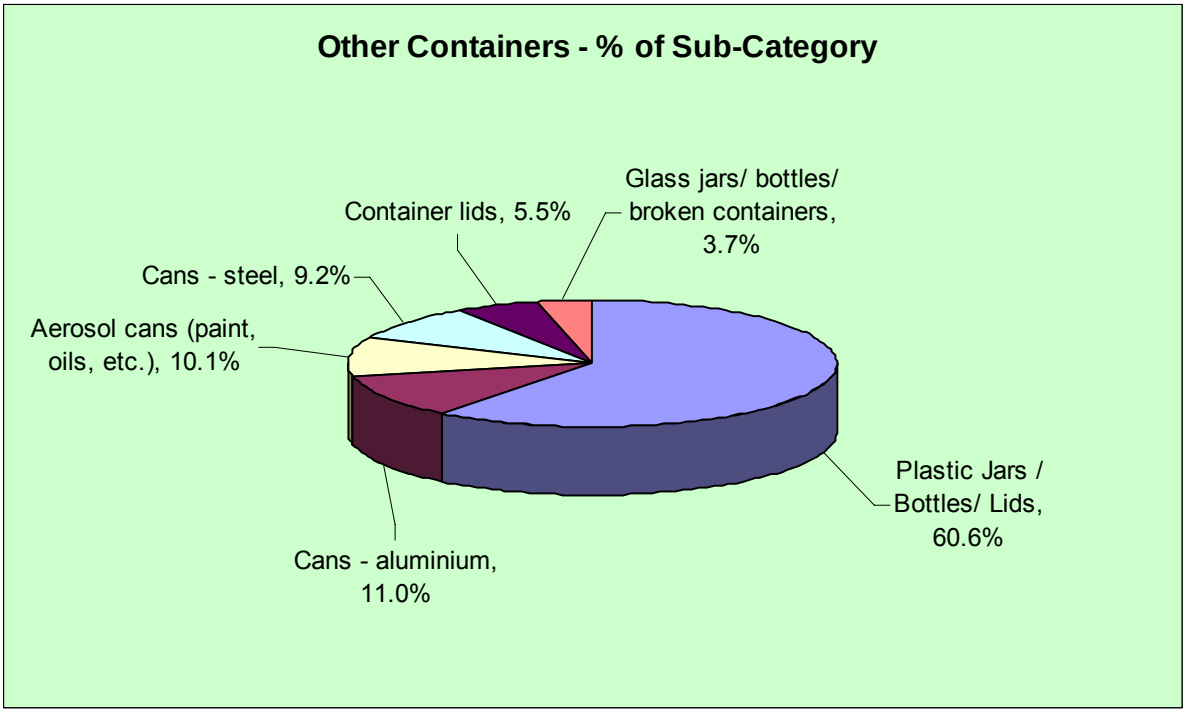
Polystyrene clamshell type boxes and paperboard type boxes represented 66 % of this sub-category. The amount of litter from the boxes sub-category was slightly greater as a percentage of total litter in the San Francisco audit as compared to the consultant's average for this category in audits between 2002 – 2006 from other jurisdictions; 1.2% of total litter in the San Francisco audit compared to an average of 0.8% in aggregate litter audits from other jurisdictions.

3.2.5 Other Containers (non-beverage)

Other Containers Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Plastic Jars / Bottles/ Lids	33	60.6%	0.87%
Cans - aluminium	6	11.0%	0.16%
Aerosol cans (paint, oils, etc.)	5.5	10.1%	0.14%
Cans - steel	5	9.2%	0.13%
Container lids	3	5.5%	0.08%
Glass jars/ bottles/ broken containers	2	3.7%	0.05%
	54.5	100.0%	1.43%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006 1.4 % (46,000 observations)



Discussion:

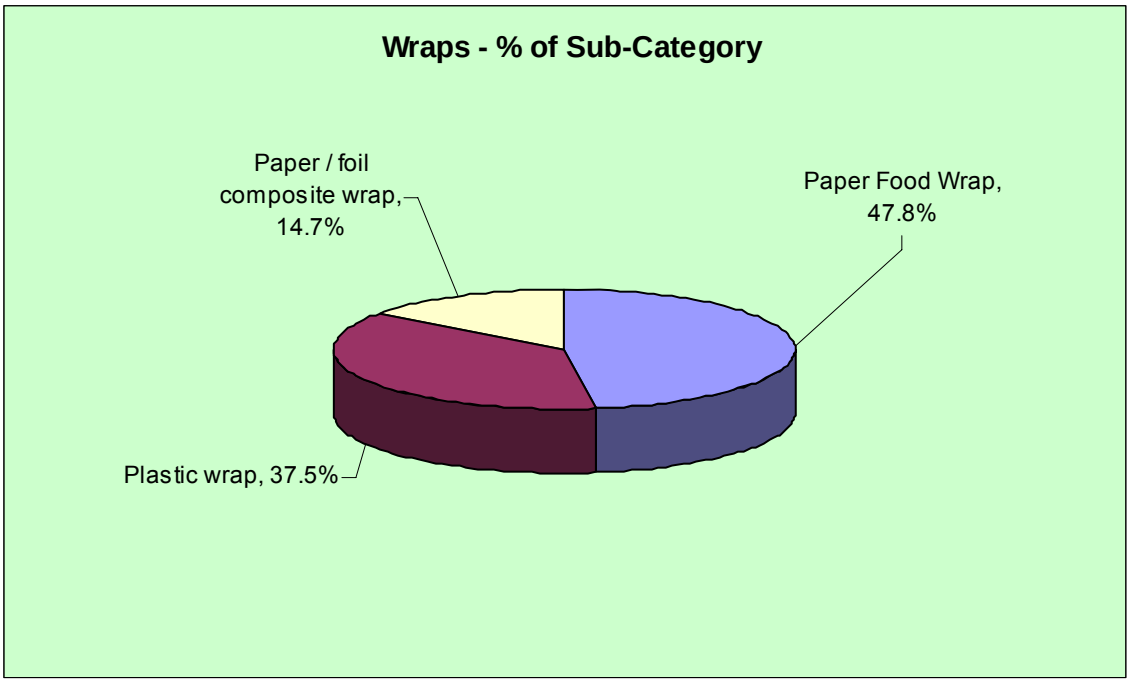
Containers other than beverage containers accounted for quite low proportion of total litter in the San Francisco litter audit. Only 54 large litter items (1.43 % of total litter) were observed in this sub-category. Plastic jars, bottles and lids which did not fit another specific sub-category were 61% of the litter in this sub-category. The proportion of other container litter observed during the San Francisco litter audit was consistent with the consultant's observations of this category being 1.4% of total litter, in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations).

3.2.6 Wraps

Wraps Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Paper Food Wrap	32.5	47.8%	0.85%
Plastic wrap	25.5	37.5%	0.67%
Paper / foil composite wrap	10	14.7%	0.26%
Total	68	100.0%	1.78%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006 2.4 % (46,000 observations)



Discussion:

Within this category are items which are used to wrap food for consumption off premises, mainly from fast food outlets. Paper food wraps accounted for the largest segment of the wrap litter observed, at 48 % of the sub-category. Plastic food wrap materials were 58% of the observed warp litter in this sub-category.

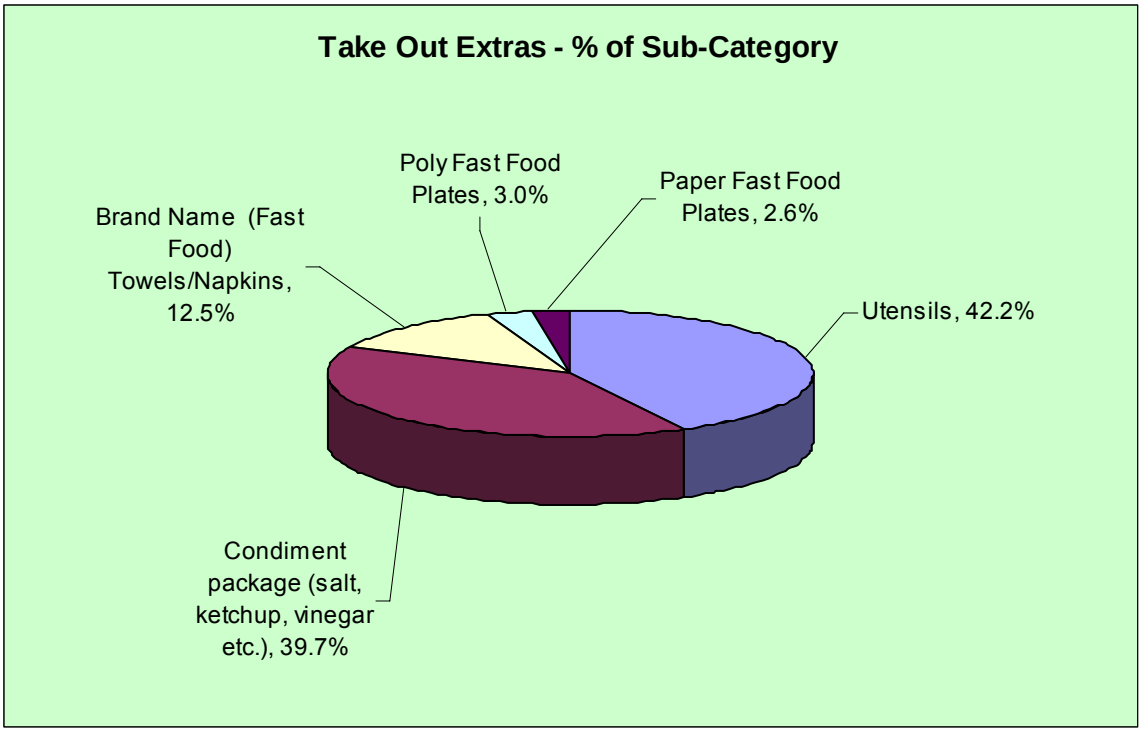
The proportion of wrap litter observed during the San Francisco litter audit was marginally less than the average found in aggregated litter observations in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations) (1.78% wraps in San Francisco vs. 2.4% wraps in 46,000 observations).

3.2.7 Take Out Extras

Take-Out Extras Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Utensils	49	42.2%	1.29%
Condiment package (salt, ketchup, vinegar etc.)	46	39.7%	1.21%
Brand Name (Fast Food) Towels/Napkins	14.5	12.5%	0.38%
Poly Fast Food Plates	3.5	3.0%	0.09%
Paper Fast Food Plates	3	2.6%	0.08%
Total	116	100%	3.04%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006, 2.38 % (46,000 observations)



Discussion:

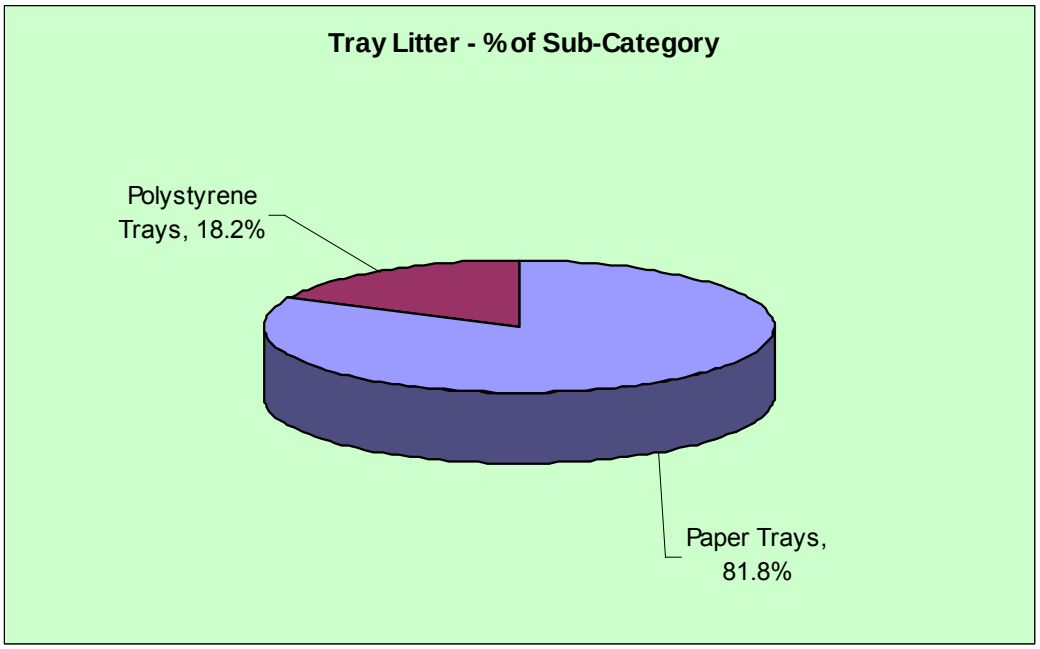
The sub-category of Take-out Food Extras includes condiment packages (ketchup, vinegar, salt, pepper, etc.) and utensils used by patrons of fast food establishments, as well as name brand napkins and fast food plates. Non-branded napkins are not included in this sub-category, since they may or may not be attributable to fast food outlet customers, and are therefore included in with paper litter. Utensils and condiment packaging from fast food stores made up 82% of the litter attributed to this sub-category. The proportion of take-out extras litter observed during the San Francisco litter audit was greater than the average found in aggregated litter observations performed between 2002 – 2006 in other jurisdictions (46,000 observations). (3.04% wraps in San Francisco vs. 2.38% take-out extra litter found in 46,000 observations).

3.2.8 Trays

Tray Litter Summary

	Items 1.	% of Sub-Category	% of Total Litter 2.
Paper Trays	4.5	81.8%	0.12%
Polystyrene Trays	1	18.2%	0.03%
Other Tray Materials	0	0.0%	0.00%
	5.5	100.0%	0.14%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006, 0.2 % (46,000 observations)



Discussion:

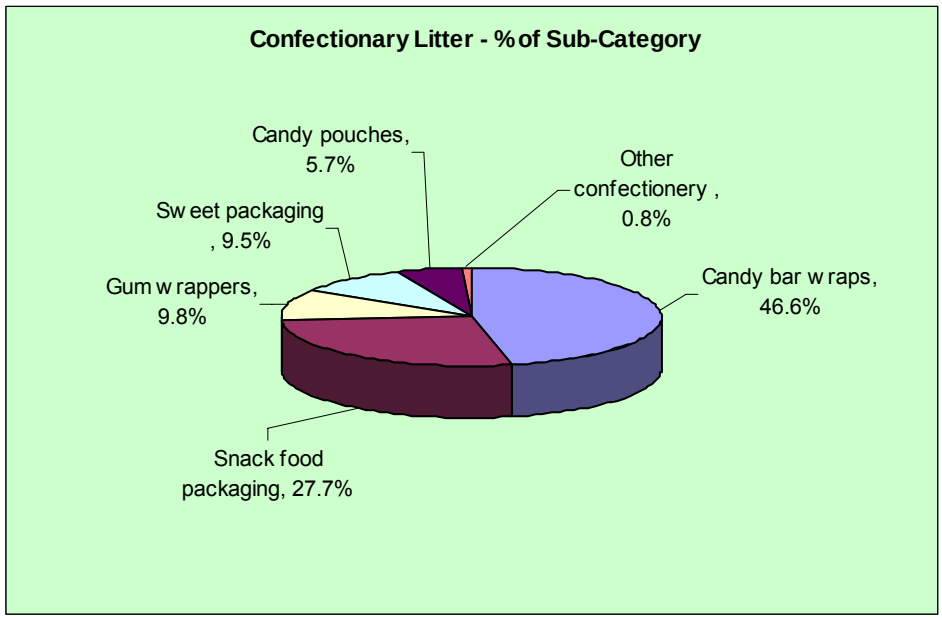
Trays represented a very small category of large litter well less than 1% (0.14%). Tray litter observed during the San Francisco litter audit was less than the average found in aggregated litter observations in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations). (0.14% wraps in San Francisco vs. 0.20 % take-out extra litter found in 46,000 observations).

3.2.9 Confectionary

Confectionary Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Candy bar wraps	152	46.6%	3.99%
Snack food packaging	90.5	27.7%	2.37%
Gum wrappers	32	9.8%	0.84%
Sweet packaging	31	9.5%	0.81%
Candy pouches	18.5	5.7%	0.49%
Other confectionery	2.5	0.8%	0.07%
Totals	326.5	100.0%	8.57%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006, 8.8 % (46,000 observations)



Discussion:

Confectionary products include candy bar wraps, candy pouches, and other snack food packaging and pouches. Confectionary packaging wastes are a significant component of the litter observed in this audit, at 8.6% of the total large litter observed.

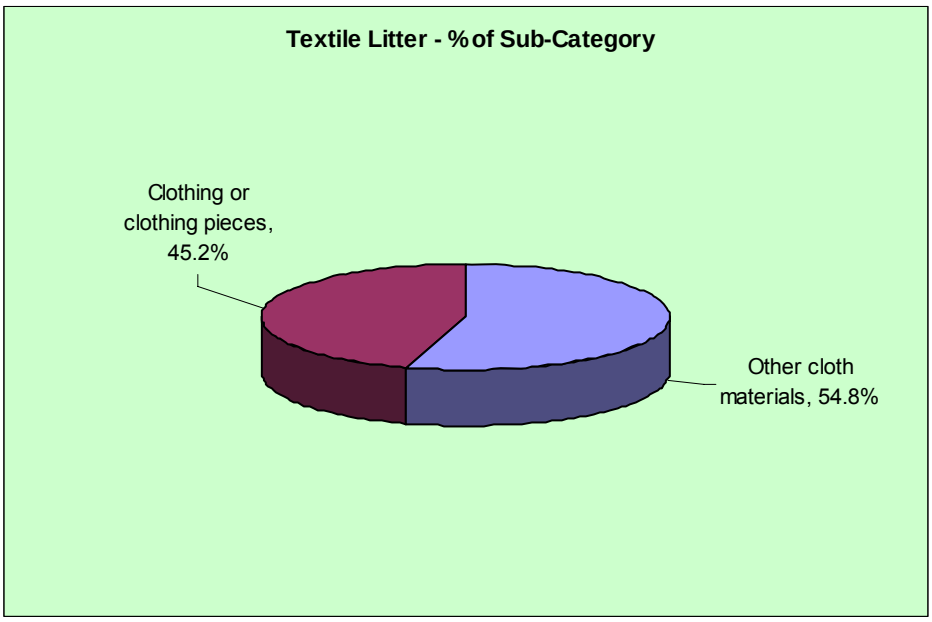
The most significant contributors were candy bar wrappers and snack food packaging (snack food packaging include savoury and salty snacks). Confectionary litter observed during the San Francisco litter audit was very close to the average found in aggregated litter observations in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations). (8.57 % of total litter in San Francisco vs. 8.8% observed in 46,000 observations).

3.2.10 Textiles

Textile Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Other cloth materials	34	54.8%	0.89%
Clothing or clothing pieces	28	45.2%	0.73%
Total	62	100.0%	1.63%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006, 1.3 % (46,000 observations)



Discussion

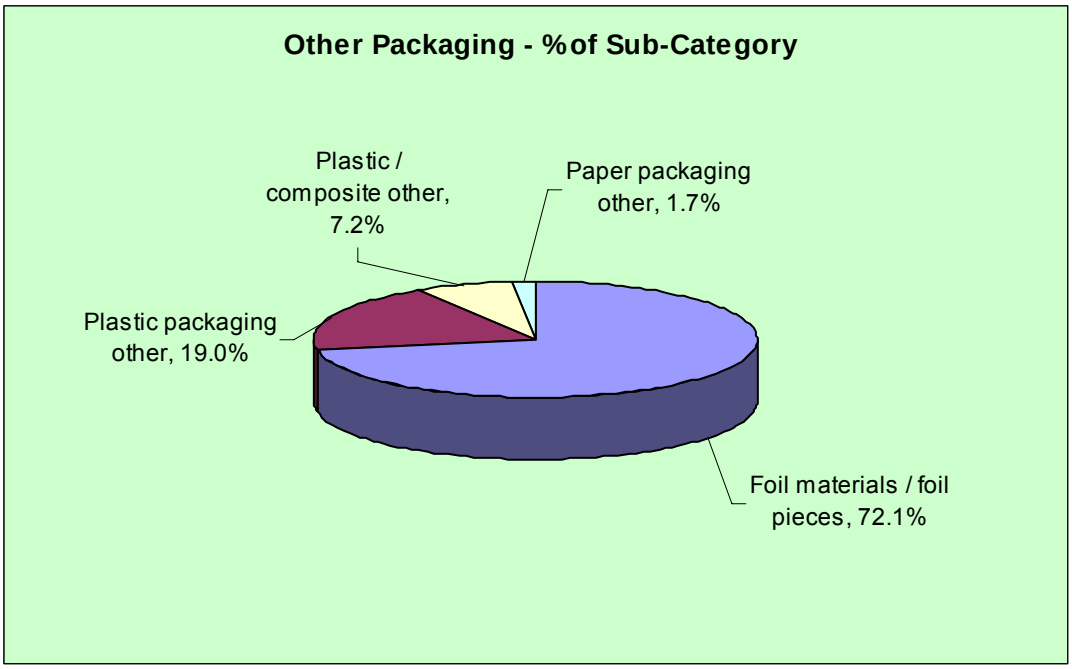
In total 62 items of textile nature were observed in the San Francisco litter audit – this is a relatively small contributor to total large litter in the City. The textile litter observed during the San Francisco litter audit was very close to the average found in aggregated litter observations in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations). (1.63 % of total litter in San Francisco vs. 1.3% observed in 46,000 observations).

3.2.11 Other Packaging

Other Packaging Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Foil materials / foil pieces	104.5	72.1%	2.74%
Plastic packaging other	27.5	19.0%	0.72%
Plastic / composite other	10.5	7.2%	0.28%
Paper packaging other	2.5	1.7%	0.07%
Total	145	100.0%	3.80%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006, 6.2 % (46,000 observations)



Discussion

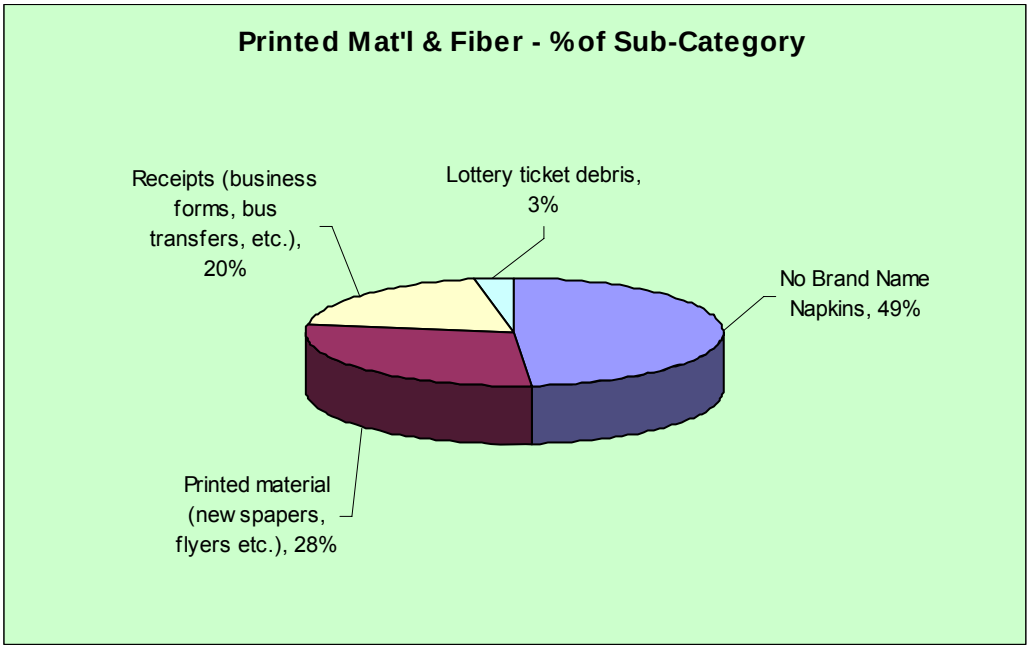
This sub-category includes packaging that did not fit into other packaging sub-categories, but which were still identifiable as large litter. In the San Francisco litter audit this is a significant contributor of total large litter in the City. The “other packaging” large litter observed during the San Francisco litter audit was less than the average found in aggregated litter observations in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations). (3.8 % of total litter in San Francisco vs. 6.2% observed in 46,000 observations). In this aggregated data, foil materials and foil pieces makes up the largest segment in the sub-category as observed in San Francisco.

3.2.12 Printed & Fibre Materials

Printed and Fiber Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
No Brand Name Napkins	494.5	49%	13.0%
Printed material (newspapers, flyers etc.)	287	28%	7.5%
Receipts (business forms, bus transfers, etc.)	203	20%	5.3%
Lottery ticket debris	31	3%	0.8%
Stationary (school, business etc.)	1	0%	0.0%
Totals	1016.5	100%	26.7%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006, 18.7 % (46,000 observations)



Discussion

This sub-category is a significant contributor to large litter in San Francisco. The largest proportion of this sub-category, (49%) was napkins or pieces of napkins which could not be directly attributed to the fast food sub-category, because no brand markings were visible. It is likely that a significant proportion of this napkin litter originates from fast food service outlets.

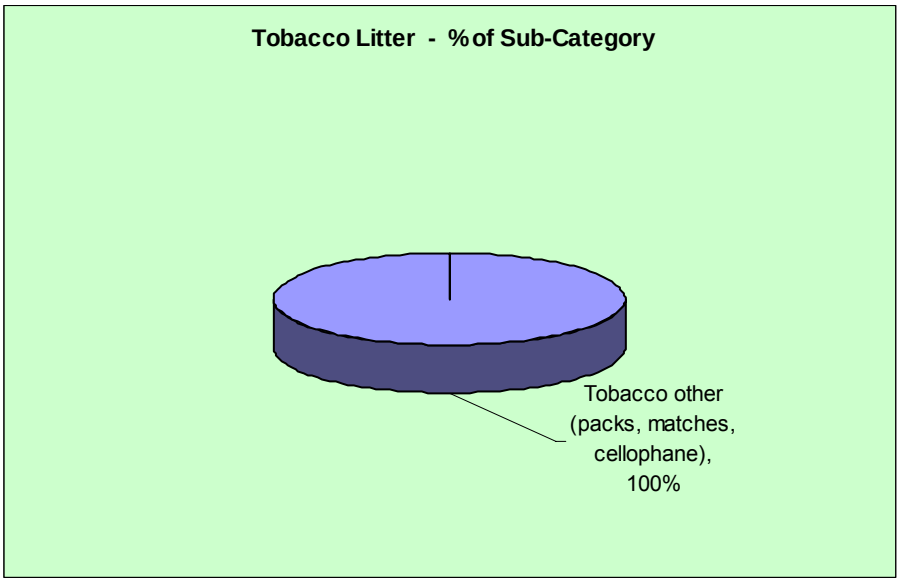
Printed materials including newspaper and flyer litter, printed MUNI tickets and other business receipts are also large contributors to overall large litter in the City. This sub-category is a higher level of proportional litter, compared to the average found in aggregated litter observations in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations). (27 % of total litter in San Francisco vs. 18.7% observed in 46,000 observations).

3.2.13 Tobacco

Tobacco [1.] Products Litter Summary

	Items [2.]	% of Sub-Category	% of Total Litter [3.]
Tobacco other (packs, matches, cellophane)	110	100%	2.89%

1. Tobacco litter does not include cigarette butts - < 4 sq. in in size (see small litter)
2. Note: Observations may not be whole numbers due to averaging.
3. Sub-category average - 2002 - 2006, 5.6 % (46,000 observations)



Discussion

The amount of tobacco large litter observed on San Francisco streets contributed 2.89% of total litter. This a significantly lower level of tobacco litter compared to the average found in aggregated litter observations in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations). (2.89 % of total litter in San Francisco vs. 5.6% observed in 46,000 observations).

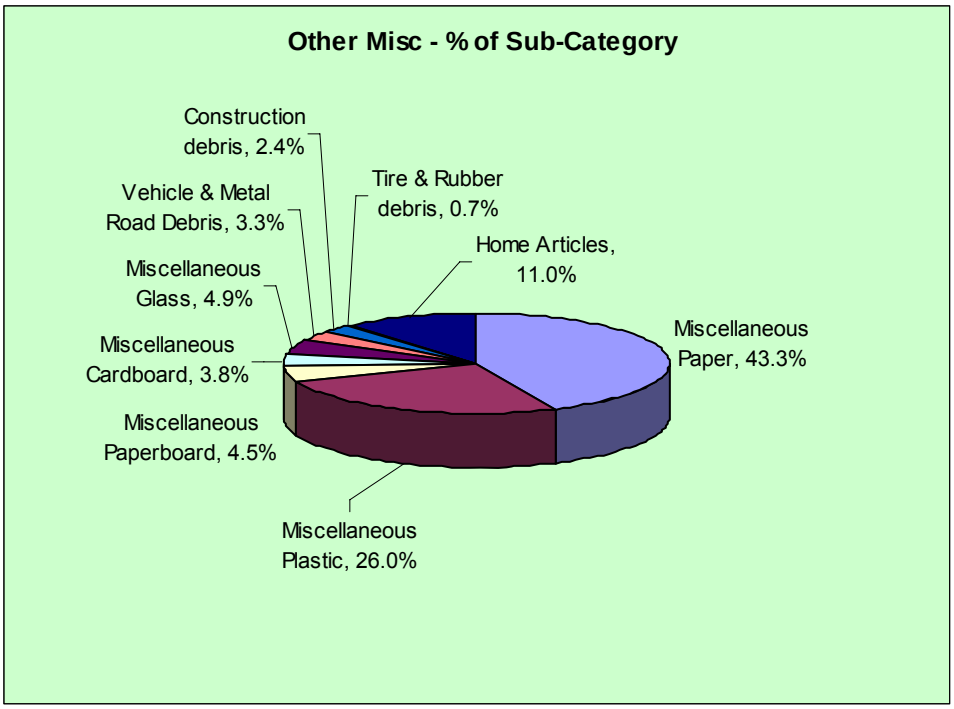
3.2.14 Other Miscellaneous

This sub-category is normally the largest sub-category grouping because it includes various miscellaneous material types which cannot be grouped in other categories. The sub-category includes miscellaneous paper, miscellaneous plastic, miscellaneous cardboard, miscellaneous paperboard, miscellaneous glass, vehicle & road debris, tire and rubber debris, construction debris, and home articles.

Other Miscellaneous Litter Summary

	Items [1.]	% of Sub-Category	% of Total Litter [2.]
Miscellaneous Paper	570	43.3%	15.0%
Miscellaneous Plastic	342	26.0%	9.0%
Miscellaneous Paperboard	59.5	4.5%	1.6%
Miscellaneous Cardboard	50.5	3.8%	1.3%
Miscellaneous Glass	65	4.9%	1.7%
Vehicle & Metal Road Debris	43	3.3%	1.1%
Construction debris	31.5	2.4%	0.8%
Tire & Rubber debris	9.5	0.7%	0.2%
Home Articles	145	11.0%	3.8%
Total	1316	100.0%	34.5%

1. Note: Observations may not be whole numbers due to averaging.
2. Sub-category average - 2002 - 2006, 33.2 % (46,000 observations)



Discussion:

This sub-category yields the largest segment of litter observed in the City of San Francisco Litter Audit since it is a general category that encompasses much of the unspecific litter observed. In total 1,316 pieces of large litter fell into this general category.

Miscellaneous materials are those that cannot be identified other than by the material type or likely origin of the litter (i.e. home articles, vehicle debris). Paper materials accounted for the largest proportion of this sub-category, at 570 large litter items in this sub-category (43%) or a significant 15% of total large litter counted. Miscellaneous plastic materials accounted for 342 of the sub-category and 9% of all the large litter counted.

These categories consisted of bits of stationary, newspapers, flyers, and often included shredded paper from lawn mowing. This material derives from a plethora of sources, that once weathered or when grass is mowed is shredded into indistinguishable large litter pieces.

Miscellaneous paper and miscellaneous plastic are two sub-categories that warrant discussion. Because of the nature of paper or plastic litter, it is often not possible for litter auditors to determine what the paper or plastic litter was as an original product or packaging component. This is because both types of these materials degrade due to weathering, and often lost their distinguishing features that would allow more positive identification to be included in another sub-category. If litter auditors could not positively categorize a piece of paper or plastics litter as belonging to a specific sub-category (i.e. confectionary), then they classified that item of litter as miscellaneous paper or plastic. These two sub-categories are significant for planners of litter abatement programs, since in aggregate they represent nearly one-quarter (24%) of total large litter on San Francisco streets. Effective efforts to reduce paper litter and plastic litter would reduce total litter substantially.

The miscellaneous litter observed is consistent with aggregated litter observations in audits performed between 2002 – 2006 in other jurisdictions (46,000 observations). (34.5 % of total litter in San Francisco vs. 33.2% observed in 46,000 observations).

4.0 Small Litter Survey Results

4.1 Discussion of Small Litter Results

The categories examined in the litter counts of items less than 4 square inches in size are:

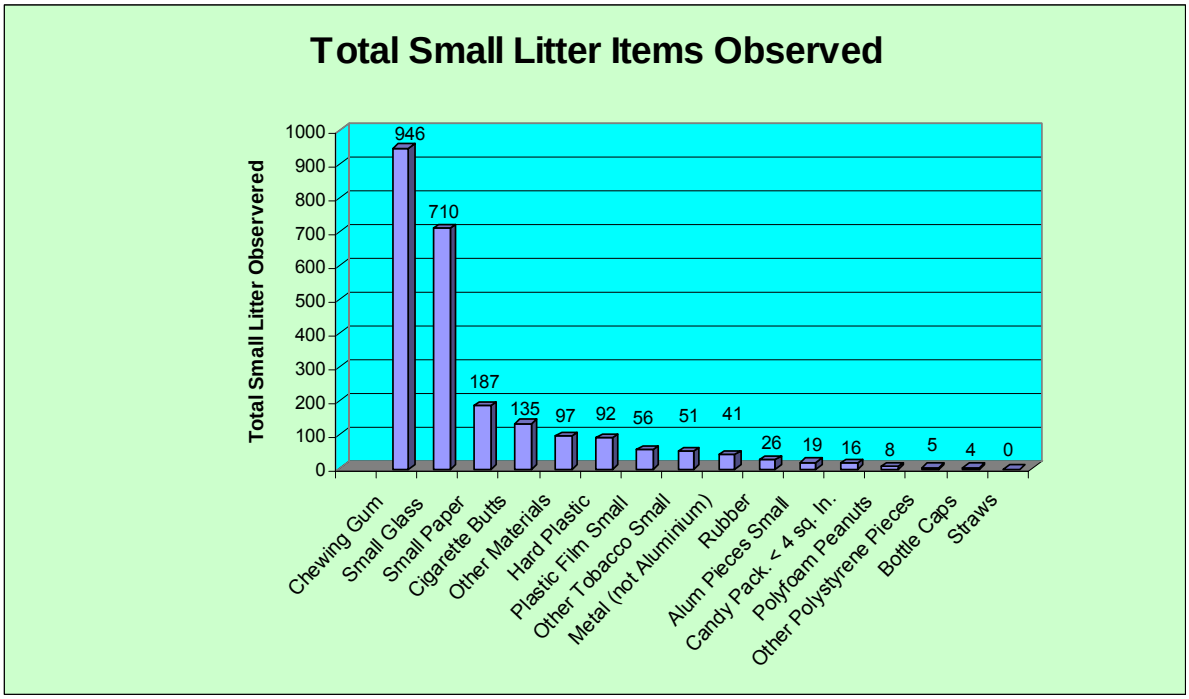
- cigarette butts/ debris
- other tobacco
- bottle caps
- straws
- candy packaging
- polyfoam packing materials
- other polystyrene debris
- glass
- paper
- plastic film
- hard plastic
- aluminum / foil debris
- rubber
- metal (not aluminum)
- other materials
- chewing gum

The small litter methodology allows researchers to count small litter that fell within the three slices within a given site (transacts) – three 6 square foot segments of a site (3 x 1 foot by 6 feet). Accordingly, the small litter counts may or may not have recorded some of the small litter existing on a site, depending on whether the placement of the transact frames encompass the small litter or not. However, the benefit of this method is its rigor. Every site was handled in the same way. Thus, this was a fair and objective examination of small litter as observed.

Small litter is difficult to control, because it is “manufactured” by a combination of degradation (weather) and man-made activities (vehicle traffic, mowing, etc.).

Observations of small litter during the San Francisco litter audit showed a relatively low occurrence of small litter on city streets, as compared other to audits performed by the consultant in other jurisdictions. In San Francisco, 2,393 small litter items were observed in 104 sites audited. This average of 23 items per site is comparable with 21 items / site for the City of Toronto, Ontario, Canada; where considerable clean-up activities and litter abatement efforts have been underway for several years. Averages twice as high as the small litter rate observed in San Francisco in 2007, have been recorded by the consultant in audits conducted in other jurisdictions. A note of caution however is required in considering small litter audit results. The methodology specifies that only a very small area within a site is actually measured for small litter items. For a fixed site (18 ft x 200 ft = 3,600 sq. ft.) less than 1% of the entire site is audited for small litter items. The small litter audit results should be considered as an indication of “relative” types of small litter on local streets.

It is interesting to note that gum deposits on San Francisco streets were the most significant small litter item observed, this is consistent with other audits performed by the consultant where gum deposits are usually the largest proportion of small litter observed. The other top small litter proportions (i.e. paper, glass, cigarette butts) observed in the San Francisco audit are also consistent with previous audit observations from other jurisdictions.



2007 San Francisco - Small Litter – by Category

Category	Description	Total Small Litter Items Observed	SFO 2007 % of Total Small Litter	Toronto 2006 % of Total Small Litter
16	Chewing Gum	946	**39.5%**	30.9%
8	Small Glass	710	**29.7%**	15.4%
9	Small Paper	187	7.8%	17.3%
1	Cigarette Butts	135	5.6%	14.8%
15	Other Materials	97	**4.1%**	2.5%
11	Hard Plastic	92	**3.8%**	3.6%
10	Plastic Film Small	56	2.3%	2.8%
2	Other Tobacco Small	51	2.1%	2.4%
14	Metal (not Aluminium)	41	**1.7%**	1.1%
13	Rubber	26	**1.1%**	0.7%
12	Alum Pieces Small	19	0.8%	2.4%
5	Candy Pack. < 4 sq. In.	16	0.7%	1.6%
6	Polyfoam Peanuts	8	0.3%	2.3%
7	Other Polystyrene Pieces	5	0.2%	1.7%
3	Bottle Caps	4	0.2%	0.1%
4	Straws	0	0.0%	0.4%
		2393	100.0%	100.0%
	Average SFO Small Litter Items / site [1]	23		

Note: Current Toronto small litter average 21 Items / site

On a concluding note, one way to derive more accurate small litter audit information is to do full site small litter audit observations. These have been done by the consultant in other audits, but in the case of the San Francisco litter audit for 2007 full site small litter audits were not done due to their labour cost. Each full site small litter audit takes 1 – 3 hours to complete compared to the method chosen for the San Francisco 2007 audit, where a large and small litter site could be completed in well under 1 hour.

The benefit of doing full site small litter observations is that a much larger small litter sample size is observed, and a "concentration" figure can be estimated. By knowing the total area of the sites where the full small observations are done, a concentration of types of litter per square foot can be calculated. Some municipalities have found this useful to estimate for example the total number of cigarette butts on city streets (within stated error factors).

Notes:

APPENDIX 1 – Large Litter Audit Form

Large Litter Site Form
CHECK TAPE RECORDER IS WORKING

Site ID Number: _____ Date:_____ Photos Taken: ___ Y/N

Start Time: _____ Finished Time: _____ Tape #: _____

Surveyor's Name: _____ FIXED or VARIABLE _____ F / V (circle one)

If variable:

Width 1 :Beginning: _____ ft. (up to 18ft.)
Width 2: Middle: _____ ft. (up to 18ft.)
Width 3: End _____ ft. (up to 18ft.) **Always 200 feet long**

Road type: Major highway ☐ Paved Rural Road ☐Unpaved Rural Road ☐ Major City Street ☐

Minor City Street ☐ Laneway Other ☐ _____ (describe)
Lanes: 2, 4, 6, other (explain)
_____

Is roadway / highway divided: _____ Y / N

Area Attribute:

Built up / urban area ☐ Is the area Residential ☐ Industrial ☐ Parkland ☐ Rural setting ☐

Grass Height: a. < 3 inches: ☐ b. 3" – 6": ☐ c. over 6 ": ☐ (Check one)

Catch point: fence ☐ hedge ☐ curb ☐ mower line ☐ tree line ☐ other ☐
_____ details

Visual rating of site: (1 = cleanest ; 4 = dirtiest) _____

Is there a Fast food store within 1 KM? _____ Y/N

Convenience store within 1 KM _____ Y/N

Traffic light / stop sign or major intersection within sight? _____ Y/N

Evidence of Litter Clean up? _____ Y/N
Cleanup details _____

_____ (text)

Additional comments : _____

CAT #	CATEGORY	Pass 1	Total	Pass 2	Total	BRAND NAMES OBSERVED
	MISCELLANEOUS LITTER					
76	Misc. Paper (unidentifiable paper)					
77	Misc. Plastic (unidentifiable plastic)					
78	Misc. Paperboard (unidentifiable paperboard)					
79	Misc. Cardboard (unidentifiable cardboard)					
80	Misc. Glass (unidentifiable glass)					
	CONTAINERS					
1	Beer Cans					
2	Beer Bottles (glass)					
3	Soft Drink (glass)					
4	Soft Drink (cans)					
5	Soft Drink (plastic)					
6	Sport Drink (glass)					
7	Sport Drink (plastic)					
8	Water (glass)					
9	Water (plastic)					
10	Wine/ Liquor (glass)					
11	Wine/ Liquor (plastic/other)					
12	Milk/Juice (Plastic)					
13	Milk/Juice (glass)					
14	Milk/Juice (Gable Top)					
15	Foil Pouches					
16	Aseptic (Box)					
17	Broken Glass Container					
18	Six pack plastic rings					
	CUPS					
19	Plastic drink cups					
20	Paper Cups (cold)					
21	Paper Cups (Hot)					
22	Polystyrene cups (foam)					
23	Other paper cups					
24	Cup Lids, Pieces lids					
	BAGS					
25	Plastic retail bags					
26	Paper retail bags					
27	Paper bags – fast food					
28	Plastic bags – not retail					
29	Paper bags - not retail					
30	Zipper bags/ sandwich					
	Boxes					
31	Cardboard boxes/ box mat'l					
32	Paperboard (cereal type)					
33	Paper Beverage Cases					
34	Polystyrene clamshells					
35	Paper clamshells					
36	Other Plastic Shells/Boxes					
	Other Containers & Packaging					
37	Plastic Jars / Bottles/ Lids					
38	Glass jars/ bottles misc.					
39	Cans – steel					
40	Cans – aluminium (not beverage)					
41	Container lids					
42	Aerosol cans (paint, oils, etc.)					
64	Plastic packaging other					
65	Paper packaging other					
66	Plastic / composite other					
67	Foil materials / foil pieces					
75	Foil containers					

	WRAPS & TRAYS					
43	Paper Food Wrap					
44	Paper / Foil composite wrap					
45	Plastic wrap					
46	Polystyrene Trays					
47	Paper Trays					
48	Other Mat'l Trays					
	CANDY & GUM & SNACKS					
49	Gum wrappers					
50	Candy bar wraps					
51	Candy pouches					
52	Sweet packaging (describe)					
53	Other confectionery (describe)					
63	Snack food packaging (chips / peanuts etc)					
	FAST FOOD ITEMS					
54	Condiment package (salt, ketchup, vinegar etc.)					
55	Utensils					
56	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes					
57	Paper Fast Food Plates					
58	Poly Fast Food Plates					
59	Other Plastic Fast Food Plates					
60	Plates - Other Materials					
68	No Brand Name Towels / Napkins / Serviettes					
	HOUSHOLD ARTICLES					
61	Clothing or clothing pieces					
62	Other cloth					

81	Vehicle & Metal Road Debris					
82	Construction debris					
83	Tire & Rubber debris					
84	Home Articles					
	PRINTED MATERIALS					
69	Lottery ticket debris					
70	Printed material (newspapers, flyers, books etc.)					
71	Stationary(school, bus. etc.)					
72	Receipts (business forms , bus transfers etc.)					
	TOBACCO PRODUCTS					
73	Cigarette / cigar debris (>4")					
74	Tobacco other (packs, matches, cellophane)					

APPENDIX 2 – Site Locations & Driving Directions

Site Id	Map Source	Map Insert Co-ord	Full Map Coord	Site_name	Site_type	Directions	Additional Comments
1	MapArt	B-82	A-10	FRANCISCO	STREET	Francisco St - just west of Mason St.	Street sweeping sign.
3	MapArt	C-81	B-9	UNION	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel N on Sansome to Broadway then turn left onto Broadway - proceed to Columbus turn right onto Columbus - continue to Union St turn Left onto Union - proceed past Larkin - site is on Union just west of Larkin St.	Very steep with construction in progress - did not include obvious construction materials.Gardner waters plants and sprays debris down hill.
4	MapArt	C-83	B-11	FILBERT	STREET	Filbert west of Stockton	Site in front of church and church buildings. Street sweeping signs.
5	MapArt	D-83	B-11	JASPER	PLACE	Jasper Place - is Proceed N on Sansome St - left on Broadway proceed to Grant - turn right on Grant to Filbert - turn Left on Filbert and proceed to Jasper Place - turn left onto Jasper Place - site is before Union St	Very narrow alley. Small stree in North Beach very very clean.
6	MapArt	C-85	B-11	DAVIS	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel North on Sansome St - to Vallejo St - turn right and proceed to Davis St - turn right onto Davis - site is immediately after turning onto Davis.	There is a parking lot past the fence.
7	MapArt	D-81	B-10	WASHINGTON	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel North on Sansome St to California - turn left (west) continue on California until Larkin - turn right (N) on Larkin - to Washington St - turn right on Washington - Site is on Washington east of Larkin	
8	MapArt	D-83	B-11	POWELL	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel N on Sansome St to California and turn left onto California - proceed to Powell St and turn right -(N) - proceed past Clay St - site is on Powell just N of Clay	
9	MapArt	D-83	B-11	GRANT (was PAGODA PI)	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel N on Sansome - turn left onto Sacramento St - proceed to Grant St. Site on Grant St. north of Clay St.	
10	MapArt	D-85	B-12	THE EMBARCADERO	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel North on Sansome St to Broadway - turn Right travel East to The Embarcadero -- - Site is south of Broadway	Anti-Litter sign on site.
11	MapArt	D-85	B-12	DRUM	STREET	Drum St - downtown - N side of street east do Davis St.	All small litter sites in front of a tennis club.
12	MapArt	E-86	C-12	HOWARD	STREET	Howard St. just west of Spear St on N side of street	Many strings around parking meters.
13	MapArt	F-86	C-12	FREMONT	STREET	Fremont St - N of Folsom St.	
14	MapArt	E-84	C-11	PETRARCH	PLACE	Commencing at HDR's Offices (Sansome/ Sutter) - travel N on Sansome - turn left Pine St - then immediately thereafter turn onto Petarch Place - it is VERY close to HRD offices.	
15	MapArt	E-84	C-11	MONTGOMERY	STREET	North on Sansome St from HDR offices, to Pine St turn left on Pine - proceed to Montgomery turn left onto Montgomery - site is on Montgomery at Bush St.	
16	MapArt	E-83	C-10	NOB HILL	PLACE	From HRD office - N on Pine St. Turn left onto Pine St. proceed west on Pine to Mason St. - turn Right on Mason to Nob Hill - site is on Nob Hill Place. (This site may be hard to find)	Cars parked parallel on street.

Site Id	Map Source	Map Insert Co-ord	Full Map Coord	Site_name	Site_type	Directions	Additional Comments
17	MapArt	E-82	C-10	TAYLOR	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Geary St - turn right onto Geary and proceed west to Taylor - turn right onto Taylor and proceed north of Sutter - Site is on Taylor just N of Sutter.	
19	MapArt	F-83	C-11	GEARY	BOULEVARD	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Geary St. - turn Right onto Geary St …. Site is on Geary in front of Union Square. Measure where people can walk.	Litter was measured where people can walk. Grate by curb collected litter.
20	MapArt	G-84	D-11	MISSION	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to proceed to 4th -site is on Mission between 4th & 5th St.	Site in front of Westin Denys, etc.
21	MapArt	G-85	D-11	04 TH	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St - turn left onto th St….. Site is at 4th St / Folsom…….Site is at Just S of Folsom St.	
22	MapArt	H-86	D-12	KING	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St. - turn left onto 4th St ; Turn Left onto King St. …. Site is on King just SW of 2 St.	Near Bauparie
23	MapArt	H-83	D-11	RUSS	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St - turn left (S) onto 6th St. proceed to Minna St. turn Right onto Minna St and then turn left onto Russ St - Site on Russ St just before Folsom St	Section 3 of small litter in front of Extreme Pizza.
24	MapArt	H-83	D-11	RUSS	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 6th St turn left onto 6th St.- proceed to Minna St - turn right on Minna and proceed to Russ St - Turn left onto Russ St - Site is immediate at Russ and Minna on Russ St.	
25	MapArt	H-83	D-10	HOWARD	STREET	Howard St. just west of 6th St on N side of street	
26	MapArt	G-83	D-10	STEVENSON	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 6th St - turn left onto 6th St - then first left onto Stevenson - site is on Stevenson just after turning from 6th St.	Street cleaning signs.
27	MapArt	G-82	D-10	LEAVENWORTH	STREET	Leavenworth - Just N of Golden Gate Ave - on E side of street	
28	MapArt	G-82	D-10	MCALLISTER	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Ellis St. - to Hyde St turn left onto Hyde going South - then turn left onto McAllister - site is just east of Hyde on south side of McAllister.	
29	MapArt	G-82	D-10	LARKIN	STREET	Larkin just N of McAllister St - by the Hastings College of Law on E side of street	
30	MapArt	G-81	D-10	GOLDEN GATE	AVENUE	Golden Gate - East of Van Ness	Cleanup sign. Item 79 in large litter were full boxes.
31	MapArt	F-81	D-10	ELLIS	STREET	Ellis just w of Polk	Small Litter - section 1 is in front of Comfort Inn and Section 2 in front of Auto Repair "TRI" . Sign on site.

Site Id	Map Source	Map Insert Co-ordinates	Full Map Coord	Site_name	Site_type	Directions	Additional Comments
32	MapArt	F-80	C-9	POST	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Geary St - turn right onto Geary and proceed westbound - turn onto Laguna St - then immediately onto Post St - site is on Post just west of Laguna St.	Sign on site.
34	MapArt	H-81	D-9	FULTON	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Van Ness - turn right go N to Fulton St. Turn left and proceed on Fulton - site is on Fulton just west of Laguna St - by U of San Fran	Space under fence that catches debris. Sign.
35	MapArt	H-81	D-10	FELL	STREET	Site is on north side of Fell St. just east of Pierce by Ida B Wells School.	Litter gathered around trees & parked cars.
37	MapArt		D-10	MISSION	STREET	Mission St SW of 10 th St - before 11th St	Street signs
38	MapArt	J-81	E-9	MCCOPPIN	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Valencia St - turn left onto Valencia - proceed to McCoppin turn left again onto McCoppin - Site is on McCoppin just west of Jessie St.	Section 1 of small litter was square at grass that collected litter.
39	MapArt		E-10	15TH	STREET	Site is on 15 ST - w of Shotwell St, below Hwy 101 Expressway	
40	MapArt		E-10	TREAT	AVENUE	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 10th St - turn left (SE) into 10 th St. - Turn right onto Harrison St. (S) - continue to Treat St.… Turn left onto Treat Street - two sites are on Treat St this one is on Treat at Alabama & Alameda	Small Litter Audit - Section 1 in front of SPCA and Section 2 has "no dumping" sign of fence.
41	MapArt		E-11	DE HARO	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St. - proceed to Third St ; Turn right (West) onto 16 th St. - continue to De Haro St. turn left onto De Haro St …. Site is On De Haro just at start of King St.	
42	MapArt		E-12	16TH	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St - turn left (SE) on to 4th St. then turn Right (SW) onto Third St - continue towards Missions Rock Terminal to 16th St - turn Right onto 16 St.	All sections in front of new UCSF building; very very tidy. Site clean as a whistle. Opposiote side of street was much dirtier.
43	MapArt		F-12	INDIANA	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St. - proceed to Third St ; Turn right (West) onto Third St. - continue to Mariposa St. turn right (W) then on third street turn Left (S) onto Indiana St. …. Site is on Indiana just N of Tubb St in small green space area	Broken window found on large litter site as well as a television. Cars parked perpendicular to curb.
44	MapArt		F-12	19TH	STREET	19th - East of Connecticut , not far from John F Foran Expressway Sit eon 19th St/	Home article - ant trap. Steep Street
46	MapArt		F-11	22ND	STREET	22nd at Rhode Island St.	Extremely steep street.

Site Id	Map Source	Map	Full Map	Site_name	Site_type	Directions	Additional Comments
47	MapArt		G-11	26TH	STREET	From HDR's Offices - travel SW on Market St to 4th St. - proceed to Third St ; Turn right (West) onto Third St. - continue to Mariposa St. turn right (W) then on third street turn Left (S) onto Indiana St. ; Continue S on Indiana to Cesar Chavez - (Cesar Chavez may turn in to Army St. W of Guerro St) proceed to Cesar Chavez / Army and Castro - From Cesar Chavez/ Castro proceed N on Castro to 26th St. - turn right onto 26th St. - site is on north side of 26 st., east of Da Haro, between Da Haro and Wisconsin	
49	MapArt		G-12	MARIN	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St. - proceed to Third St ; Turn right (West) onto Third St. - continue to Mariposa St. turn right (W) then on third street turn Left (S) onto Indiana St. - Continue S on Indiana until Cesar Chavez - turn Right (W) proceed to Evans Ave , turn right onto Evans (SE) proceed to Marin St. …. Site is on Marin just before Tennessee - east of Hwy 280	Dumoed bag of trash on site. Sampled 18 feet out from warehouse wall, plus 5ft out from fence. Wide Unmarked Lane - No curb.
50	MapArt		G-12	CESAR CHAVEZ	STREET	Cesar Chavez at Just west Mississippi St	
51	MapArt		G-12	MARIN	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St. - proceed to Third St ; Turn right (West) onto Third St. - continue to Mariposa St. turn right (W) then on third street turn Left (S) onto Indiana St. - Continue S on Indiana until Cesar Chavez - turn Right (W) proceed to Evans Ave , turn right onto Evans (SE) proceed to Marin St. …. Site on north side of Marin just between Kahas and Potrero.	Marin St and Potrero there were high weeds where a lot of tras was.
52	MapArt		H-13	03 ST	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St. - proceed to Third St ; Turn right (West) onto Third St. - Site is on 3 St at 000 Arthur towards Burka.	
53	MapArt		J-12	EVANS	AVENUE	Commencing from HDR's offices, proceed SW on Market St. to 3rd St - proceed on 3rd past Hwy 101 - continue on towards Bay where 3rd turn South - continue south past Marin St (& over Islais Creek Channel) then turn left onto Evans - site is on Evans just before Keith St. (near Postal Facility)	Very windy so trash was blowing garbage between passes 1 and 2.
54	MapArt		H-12	PHELPS	STREET	Commencing from HDR's offices, proceed SW on Market St. to 3rd St - proceed on 3rd past Hwy 101 - continue on towards Bay where 3rd turn South - continue south past Marin St (& over Islais Creek Channel) then turn right onto Phelps - site is on Phelps just past La Salle Blvd. (near SFO Community College)	In small litter unable to make 3rd flip on section 3 due to schrubbery. Several photos taken of trash dump area.Really trashy and next to industrial business looks like dumping zone. Schrubbery crowded with litter and a car seat on curb.

Site Id	Map Source	Map Insert Co-ord	Full Map Coord	Site_name	Site_type	Directions	Additional Comments
55	MapArt		H-11	MCKINNON	AVENUE	Commencing from HDR's offices, proceed SW on Market St. to 3rd St - proceed on 3rd past Hwy 101 - continue on towards Bay where 3rd turn South - turn right on Cesar Chavez St proceed to Evans Ave - turn left onto Evans - go S on Evans to McKinnon Ave turn right - site is on McKinnon from Upton St. towards Barnavald on side of metal fence	Major #3 (16.5"X 12") illegal dumping site plus two #2 (3'X5") sites nearby on this stretch of McKinnon. These were in front of the mesh wire fence of "Golden Brand Receiving" (Barneveld Ave.) Several documentary photos taken (survey sheet has more detail
56	MapArt		K-11	BACON	STREET	Commencing from HDR's offices, proceed SW on Market St. to Van Ness proceed to Mission St. - turn right and proceed on Mission to Silver Ave. proceed on Silver to University St - turn right (S) proceed to Bacon St. - site is on Bacon just past Goettingen St - between Goettingen St & Brussels St. on same side as school playground.	
57	MapArt		K-10	BACON	STREET	Commencing from HDR's offices, proceed SW on Market St. to Van Ness proceed to Mission St. - turn right and proceed on Mission to Silver Ave. proceed on Silver to University St - turn right (S) proceed to Bacon St. - turn right - site is on Bacon between Princton St. & Amherst.	
58	MapArt		J-10	CRESCENT	AVENUE	commencing from HDR's offices, proceed SW on Market St. to Van Ness proceed to Mission St. - turn right and proceed on Mission to Crescent St - turn left (east) and proceed to near end of Crescent St. just west of Andover St.	
59	MapArt		J-10	PRENTISS	STREET	From HRD's offices travel SW on Market St. - turn left onto 10 St and then right onto Mission St going South - proceed on Mission until turning left onto Cortland Ave - proceed along Cortland to Banks - turn right - go S on Banks to Tomkins turn left then turn left again onto Prentiss - site is on Prentiss N of Tomkins	
60	MapArt		G-10	CESAR CHAVEZ	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 4th St. - proceed to Third St ; Turn right (West) onto Third St. - continue to Mariposa St. turn right (W) then on third street turn Left (S) onto Indiana St. - Continue S on Indiana until Cesar Chevez - …. Site is on south side of Cesar Chavez between Harrison and Alabama.	
61	MapArt		G-10	23RD	STREET	Site on south side of 23rd St west of Bryant St. between Bryant and Florida.	
62	MapArt		F-10	FOLSOM	STREET	Sie is on east side of Folsom St - Just S of 19th. Next to fire station.	
63	MapArt		F-10	TREAT	AVENUE	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 10th St - turn left (SE) into 10 th St. - Turn right onto Harrison St. (S) - continue to Treat St.… Turn left onto Treat Street - two sites are on Treat St one at each end - this one is at Treat and Alameda Street -- Site is on west side of Treat St between 17th St and 16th St.	Unable to do flip 3 in section 1 or section 3 of small litter. Trash collects in the pockets around the trees in the sidewalk. This iste appears to be a dumping site i.e. broken glass, condoms, clothing.

Site Id	Map Source	Map Insert Co-ord	Full Map Coord	Site_name	Site_type	Directions	Additional Comments
64	MapArt		F-10	SHOTWELL	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 10 th St - turn left and proceed South to 18th St - turn left and proceed to Shotwell St. Turn left onto Shotwell - site is on east side of Shotwell between 19th St and 18th St.	Sidewalk is very clean but drug/dump litter on inner and outer part of curb. Appears as though site is home to vagrants.
65	MapArt		G-10	22ND	STREET	Site is on the norths side of 22nd St. between Capp and mission.	Site is located in front of a business. Lots of chewing gum on the sidewalk.
66	MapArt		F-9	21ST	STREET	Site is on south side of 21St just west of Valencia St	
67	MapArt		G-9	QUANE	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Delores St - turn Left and proceed South to 22nd St - turn left onto 22nd St - proceed to Quane St - Site is on Quane St just S of 22nd St.	Site consisted of property & driveways - 18 foot width across alleyway.
68	MapArt		E-8	NOE	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St. - turn right on 15th St. proceed 100 yard to Noe St. and turn left (S) onto Noe St - site is on West side of Noe between Jersey St. & & 25th St.	
69	MapArt		H-8	NOE	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Delores - turn left and travel South on Delores to 29th St. turn right (West) and proceed to Noe turn left (South) on Noe - site is on Noe between Day and 29th St across from school	
70	MapArt		J-9	MISSION	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Guererro St. - turn left onto 4th St ; Turn Right onto Cesar Chavez - to Mission St - turn Right - proceed SW to St (Saint) Mary's St. - Site on Mission w of St Mary's.	Tons of gum splotches on this sidwalk stretch between Murray and Delaware Terrace.
71	MapArt		K-9	SILVER (Was CAYUGA (m	STREET	Three sites on / near original site - Moved to Silver Ave. - Silver at Cogdon St. - Commencing from HDR's offices, proceed SW on Market St. to Van Ness proceed to Mission St. - turn right and proceed on Mission to Silver Ave. proceed on Silver to Edinburgh St - Site is on Silver just east of Edinburgh S	Tall grass 12" plus around 2 trees planted in side walk.
72	MapArt		K-8	PERSIA (CAYUGA - duplica	AVENUE	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Guererro St. - turn left onto Guererro St - proceed south to Cesar Chavez turn left proceed to Mission St - - turn proceed to Persia - turn left onto Persia - site is on Persia just after Madrid St	
73	MapArt		K-8	CAYUGA	AVENUE	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Guererro St. - turn left onto Guererro St - proceed south to Cesar Chavez turn left proceed to Mission St - - turn Right onto Mission proceed to Ocean Ave. turn right proceed to Alemany Ave turn left onto Alemany. From site on Alemany Ave just past Ottawa Ave - go N on Ottawa - left onto Cayuga; site on Cayuga across from Balboa High School and starts 4 car lengths below Junior Terrace along the school wire fence side of Cayuga.	
74	MapArt		K-8	ALEMANY	BOULEVARD	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Guererro St. - turn left onto Guererro St - proceed south to Cesar Chavez turn left proceed to Mission St - - turn Right onto Mission proceed to Ocean Ave. turn right proceed to Alemany Ave turn left onto Alemany. Site is on Alemany Ave just past Foote St	
75	MapArt		B-9	OCTAVIA	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel N on Sansome - turn left (west) onto California - proceed to Franklin St.- proceed N on Franklin to Union St then right onto Octavia St. . Site is on Octavia North of Union St	Cleaning sign.
76	MapArt		K7	SAN JOSE AVE.	AVENUE	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 10 th St - turn left (S) and proceed to Mission St turn right onto Mission- proceed on Mission to Ocean Ave - turn right onto Ocean Ave then right onto San Jose - site is in front of Balboa Park (actually in front of park on San Jose)	

Site Id	Map Source	Map Insert Co-ord	Full Map Coord	Site_name	Site_type	Directions	Additional Comments
77	MapArt		K7	DELANO AVE.	AVENUE	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Guererro St. - turn left onto 4th St ; Turn Right onto Cesar Chavez - to Mission St - turn Right - proceed SW to Tingly St - turn Right proceed along Mission to Santa Rosa Ave.....From Santa Rosa site - Delano Ave is west on San Rosa to San Jose Ave - turn left (SW) to San Juan turn left again and proceed to Delano Ave .... Site is on Delano just past Santa Ynez Ave starting at 35 Delano.	
78	MapArt		K8	SANTA ROSA AVE.	AVENUE	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Guererro St. - turn left onto 4th St ; Turn Right onto Cesar Chavez - to Mission St - turn Right - proceed along Mission to Santa Rosa Ave. Site is on Santa Rosa starting at 239 Santa Rosa.	
79	MapArt		K7	JUDSON AVE.	DRIVE	This site is quite close to Molimo Dr - follow Forester St S to Judson - site is on Judson E of Forester	Returned to site to obtain data on trash in the grass field as had not realized it was to be included when they were there previously. Site was even cleaner then on first visit.
80	MapArt		J7	MOLIMO DR.	DRIVE	Starting at California St/ Market Street - travel SW on Market St. - street becomes Portola Drive - continue on along Portola past the intersection of Woodside (going west) / O'Shaughnessy going SE) - turn left after O'Shaughnessy onto Teresita o Stay on Teresita until you hit Bella Vista Way - turn left - the first street on your right is Molimo Dr. - Site starts at #63 Molima Dr and proceeds towards Teresita.	
85	MapArt		L6	BROAD ST.	DRIVE	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Guererro St. - turn left onto Guererro St - proceed south to Cesar Chavez turn left proceed to Mission St - - turn Right onto Mission proceed to Ocean Ave. turn right proceed to Alemany Ave turn left onto Alemany - continue on Alemany go under Hwy 280 turn on Orizaba Ave to Broad St - turn right - site is on Broad at corner of Orizaba Ave.	
86	MapArt		K3	GELLERT DR.	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to South Van Ness - turn left proceed S on South Van Ness to Ocean Ave. - turn right on Ocean and proceed to Clearfield Dr left and proceed to end of St to Gellert - turn right - site is between Clearfield & Morningside Dr.	
87	MapArt		H3	VICENTE ST.	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to South Van Ness - turn left proceed S on South Van Ness to Ocean Ave. - turn right on Ocean and proceed to 19Ave - turn right (N) proceed to Vicente St. - turn left onto Vincente and proceed to 35 Ave - site is on Vicente just west of 35 Ave.	Sidewalk is clean but tall grass in front of a few residences has collected litter.
88	MapArt		G3	NORIEGA ST.	STREET	From HRD's offices travel N on Sansome St to Geary St - turn left onto Geary and proceed (quite a long way) past Mason St and towards the Univ. of San Francisco - Continue to Stanyan turn right (S) on Stanyan and proceed past Golden Gate park then turn right (W) onto Lincoln Way(West)- proceed on Lincoln Way to 32 Ave - turn left onto 32 Ave and proceed to Noriega St - turn right on Noriega - Site is immediately after turn on Noriega.	
89	MapArt		G2	NORIEGA ST.	STREET	From HRD's offices travel N on Sansome St to Geary St - turn left onto Geary and proceed (quite a long way) past Mason St and towards the Univ. of San Francisco - Continue to Stanyan turn right (S) on Stanyan and proceed past Golden Gate park then turn right (W) onto Lincoln Way(West)- proceed on Lincoln Way to 32 Ave - turn left onto 32 Ave and proceed to Noriega St - turn right on Noriega - Site is near the end of Noriega. just west of 42nd Ave across from 76 Gas Station.	

Site Id	Map Source	Map Insert Co-ord	Full Map Coord	Site_name	Site_type	Directions	Additional Comments
90	MapArt		F3	KIRKHAM ST.	STREET	From HRD's offices travel N on Sansome St to Geary St - turn left onto Geary and proceed (quite a long way) past Mason St and towards the Univ. of San Francisco - Continue to Stanyan turn right (S) on Stanyan and proceed past Golden Gate park then turn right (W) onto Lincoln Way(West)- proceed on Lincoln Way to Sunset Blvd - turn left (S) onto Sunset Blvd. to Kirkham turn right onto Kirkham - Site on Kirkham St. between 38th and 39th Ave.starting next to house #1501 38th Ave.	Photos taken of large clear plastic bag that appeared to be dumped which contained plastic dishware and a toaster rack.
91	MapArt		F3	LAWTON ST.	STREET	From HRD's offices travel N on Sansome St to Geary St - turn left onto Geary and proceed (quite a long way) past Mason St and towards the Univ. of San Francisco - Continue to Stanyan turn right (S) on Stanyan and proceed past Golden Gate park then turn right (W) onto Lincoln Way(West)- proceed on Lincoln Way to 19th Ave - turn left onto 19th Ave then proceed S to Lawton St - turn right (W) and proceed to site which is bewtween 28th Ave and 29th Ave. on the north side of the street.	
93	MapArt		E7	WALLER ST.	STREET	Waller St - just east of Stnayan St.	
95	MapArt		D8	ELLIS ST.	STREET	Ellis just w of Divisadero St on N side of street	There are driveways and high grass/bush area just west of the gas station. Most of the trash collected in schrubbery right behind 76 gas station. Took extra photo of this site.
98	MapArt		B8	DIVISADERO ST.	STREET	Commencing from HDR's offices, proceed N on Sansome St to California - turn left onto California - proceed to Divisadero - turn right (N) proceed to Greenwich St. - site is on Divisadero just N of Greenwich St	Looks like gum was removed on parts of sidewalk.
101	MapArt		D6	STANYAN ST.	AVENUE	From HRD's offices travel N on Sansome St to Geary St - turn left onto Geary and proceed (quite a long way) past Mason St and towards the Univ. of San Francisco - to turn Right onto Stanyan St - Site is on East side of Stanyan St between Anza St. and Turk Blvd.	Site is a residential area that is well maintained.
104	MapArt		D5	12TH AVE.	STREET	From HRD's offices travel N on Sansome St to Geary St - turn left onto Geary and proceed (quite a long way) past Mason St and towards the Univ. of San Francisco - Continue past Stnayan Blvd.to 12th Ave. Site is on west side of 12 th Ave just south of of Anza St. Between Anza St. and Balboa St.	
105	MapArt		E5	GEARY (was 10th Ave.)	BOULEVARD	From HRD's offices travel N on Sansome St to Geary St - turn left onto Geary and proceed (quite a long way) past Mason St and towards the Univ. of San Francisco - Continue past Park Presidio Blvd. Site on north side of Geary between 16th Ave. and 17th Ave.	Lots of wind and pedestrians
109	MapArt	H-84	D11	SHERMAN	STREET	SW on Market St to 6th St.; S on 6th St. to Harrison St.; W on Harrison St to Sherman St.; site on Sherman St just North of Harrison St.	Illegal Dumping of Old Toilet, Box et Al. Small Litter Section 2 in front of school.
110	MapArt	H-85	D12	BRANNAN	STREET	SW on Market Street, S on 4th Street, go under the I80. Brannan is the 3rd street past I80. Site on Brannan between 4th and 5th.	
111	MapArt	F-86	C12	BEALE	STREET	From Market Street turn south on Beale. Site is between Beale and Folsom.	

Site Id	Map Source	Map Insert Co	Full Map Coord	Site_name	Site_type	Directions	Additional Comments
112	MapArt		H12	3RD	STREET	SW on Market; turn S onto 4th Street and proceed to 3rd St; turn right onto 3rd St. proceed past Evans St.; site on West side of 3rd St. just south of Galvez Ave.	
113	MapArt		K12	3RD	STREET	From Market Street turn S onto 4th St; proceed to 3rd St. and turn right onto 3rd St. and proceed south past Cesar Chavex St and Evans Ave. Site is on 3rd St. just North of Underwood. Site should be done on east side of 3rd if possible.	Train line (T- Line) divides the street.
114	MapArt		L12	3RD	STREET	Site is on 3rd Street from Ingerson towards Hollister.	There were several trash collection points on this iste. Tall grass in front of residential garage, grass & chain link fence and dirt pockets in front of business. Three photos were taken of these areas.
200	MapArt	H-83	D10	9TH	STREET	9 st at between Atoma and Minna St SE of Market St.	
201	MapArt	H-83	D10	7TH	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to 7th St - turn left onto 7th St..... Site is on east side of 7th St.just before Howard St.	
202	MapArt		D9	BUCHANAN ST.	STREET	Buchanan St - just North of Fell St	Fence by playground. Wiind blows most of the litter to the other side of the street.
203	MapArt		E9	BUCHANAN ST.	STREET	Buchanan St - just South of Waller St	
204	MapArt		G10	FOLSOM ST.	STREET	Site on west side of Folsom St. - just N of Cesar Chavez St. between Cesar Chavez and 26th St.	
205	MapArt		G11	HAMPSHIRE ST.	STREET	Site on west side of Hampshire St - between 22nd St. and 21st St.	Very wind trash was blowing in and out of site.
206	MapArt		G9	24TH ST.	AVENUE	Site is on south side of 24th St. east of Sanchez St.	Small Litter - none found. Large leafed plants are lovely to look at but most of the litter collected underneath them.
207	MapArt		K8	MEDA AVE. (as site #76A)	STREET	From HRD office - travel SW on Market St to Van Ness - turn left onto Van Ness to Mission - turn right onto Missions and proceed past Hwy 280 to Onondaga Ave turn right on Onondaga Ave proceed to Oteso Ave turn right and proceed to Meda - turn left onto Meda - site starts at 2 Meda and goes across Ostago along Meda.	
208	MapArt		K8	COTTER ST.	AVENUE	Commencing at HDR's Offices (Sansome/ Sutter) - travel North on Sansome to Vallejo St - turn right and proceed to Davis St - turn Right - site is immediately after turn onto Davis. St. - turn left onto 4th St ; Turn Right onto Cesar Chavez - to Mission St - turn Right - proceed SW to Cotter St - turn Right onto Theresa St. .... At end of the street turn left onto San Jose Ave proceed 100 yds to Cotter turn left onto Cotter. Site on Cotter 50 feet from Misson on public library side.	
209	MapArt		L7	OCEAN AVE. (was site #79A	STREET	Commencing at HDR's Offices (Sansome/ Sutter) - travel SW on Market St to Guererro St. - turn left onto Cesar Chavez - to Mission St - turn Right onto Mission St and proceed all the way S to Ocean Ave. turn right onto Ocean Ave - site is on Ocean just past Capistrano Ave.	
210	MapArt		D7	ASHBURY ST.	STREET	West side of Ashbury St - just south of Fulton St	A lot of litter was collected in the grass & dirt around the trees planted in the sidewwalk.
213	MapArt		B9	FRANKLIN ST.	STREET	Franklin - N of Washington St.	Street cleaning signs.

APPENDIX 3 – Site Rankings

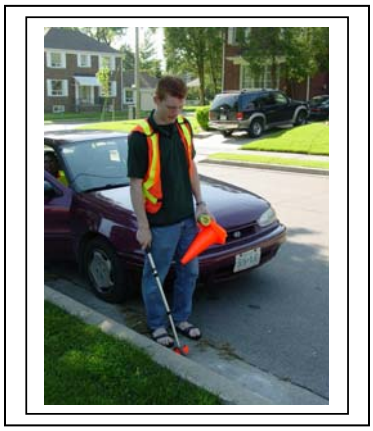
Site Id	Site Name	Items / Site	
109	SHERMAN	93	Above average
25	HOWARD	87	Above average
61	23RD	87	Above average
38	MCCOPPIN	76	Above average
201	7TH	73	Above average
14	PETRARCH	71	Above average
37	MISSION	67	Above average
39	15TH	63	Above average
9	GRANT (was PAGODA Pl)	60	Above average
98	DIVISADERO ST.	56	Above average
105	GEARY	54	Above average
114	3RD	53	Above average
65	22ND	49	Above average
4	FILBERT	48	Above average
40	TREAT	48	Above average
88	NORIEGA ST.	47	Above average
13	FREMONT	44	Above average
56	BACON	44	Above average
62	FOLSOM	44	Above average
110	BRANNAN	44	Above average
70	MISSION	38	Above average
71	SILVER	38	Above average
17	TAYLOR	36	Above average
204	FOLSOM ST.	34	Above average
205	HAMPSHIRE ST.	33	Above average
67	QUANE	32	Above average
8	POWELL	31	Above average
21	04 TH	28	Above average
24	RUSS	28	Above average
26	STEVENSON	28	Above average
1	FRANCISCO	26	Above average
27	LEAVENWORTH	25	Above average
63	TREAT	25	Above average
31	ELLIS	24	Above average
200	**9TH**	**23**	**AVERAGE**

Site Id	Site Name	Items / Site	
23	RUSS	22	Below average
73	CAYUGA	22	Below average
111	BEALE	22	Below average
30	GOLDEN GATE	20	Below average
51	MARIN	20	Below average
52	03 ST	20	Below average
58	CRESCENT	20	Below average
72	PERSIA	20	Below average
208	COTTER ST.	20	Below average
5	JASPER	19	Below average
6	DAVIS	19	Below average
112	3RD	19	Below average
20	MISSION	18	Below average
113	3RD	18	Below average
213	FRANKLIN ST.	17	Below average
22	KING	16	Below average
55	MCKINNON	16	Below average
85	BROAD ST.	16	Below average
202	BUCHANAN ST.	16	Below average
54	PHELPS	15	Below average
209	OCEAN AVE. (was site #79A)	15	Below average
7	WASHINGTON	14	Below average
16	NOB HILL	14	Below average
28	MCALLISTER	14	Below average
75	OCTAVIA	14	Below average
10	THE EMBARCADERO	13	Below average
49	MARIN	13	Below average
87	VICENTE ST.	13	Below average
89	NORIEGA ST.	13	Below average
95	ELLIS ST.	13	Below average
3	UNION	12	Below average
35	FELL	12	Below average
69	NOE	12	Below average
91	LAWTON ST.	12	Below average
93	WALLER ST.	12	Below average
15	MONTGOMERY	11	Below average
210	ASHBURY ST.	10	Below average
11	DRUM	9	Below average
68	NOE	9	Below average
104	12TH AVE.	9	Below average
207	MEDA AVE. (as site #76A)	9	Below average
34	FULTON	8	Below average
78	SANTA ROSA AVE.	8	Below average
43	INDIANA	7	Below average
53	EVANS	7	Below average
79	JUDSON AVE.	7	Below average
29	LARKIN	6	Below average
41	DE HARO	6	Below average
66	21ST	6	Below average
74	ALEMANY	6	Below average
76	SAN JOSE AVE.	6	Below average
203	BUCHANAN ST.	6	Below average
47	26TH	5	Below average
46	22ND	4	Below average
57	BACON	4	Below average
77	DELANO AVE.	4	Below average
44	19TH	3	Below average
59	PRENTISS	3	Below average
90	KIRKHAM ST.	3	Below average
19	GEARY	2	Below average
50	CESAR CHAVEZ	2	Below average
80	MOLIMO DR.	2	Below average
101	STANYAN ST.	2	Below average
86	GELLERT DR.	1	Below average
# sites		2393	
99	Average number of litter items per site	24	Below average

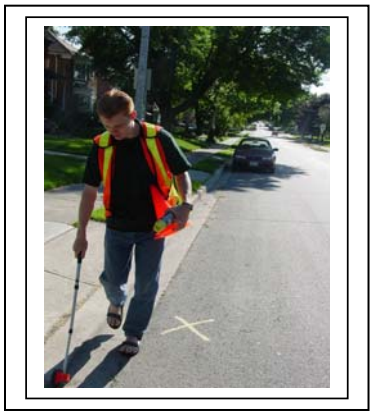
APPENDIX 4 - Photos - Setting up a Site

Large Litter Audits

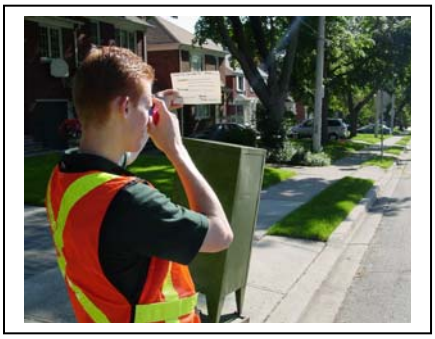
- Team Arrives at the site, Measures 50ft. ahead of car, sets up site



- Marks starting point – mid-point and end of site



- Takes photos of site



- Then walks site – describing the large litter – and dictating into a tape recorder

Photos - Small Litter – Set up and Counting

- While team member is completing large litter count – small litter frame is used to examine small litter

- Small litter is examined at close range In order to see, count and describe

- Three “flips” counted at each site

APPENDIX 5 - Branded Litter Survey
(2007)

PREPARED FOR

San Francisco Environmental Services

PREPARED BY MGM Management
www.mgm-management.com
May 2007

Appendix 5 - Branded Litter Survey

1.0 Methodology – Branded Litter

Using the Surveyor Site Form (with 84 categories of large litter) as a guide, data observing the names of manufacturers and brand owners of littered materials were recorded. Branded litter is described as any large litter (i.e. over 4 square inches) that has a recognizable brand name affixed. Where doubt occurred in the brand of the item – no entry was made.

Auditors identified litter by brand name, which was later transcribed onto Site Survey Forms, for data entry and analysis.

2.0 Branded Litter Results

2.1 Beverage Branded Litter

Beer cans represent an insignificant contribution to large litter in the City of San Francisco. Only a few beer containers (6 cans in total) of any brand were observed during the audit. We deem this sample to be too small to be statistically valid for commenting on the distribution of beer container litter on San Francisco streets.

The 3 brands of beer cans and 4 brands of beer bottles were observed:

Cans

- Budweiser
- Coors
- Miller

Beer Bottles

- Widemer
- Corona (33% - 3 of 9)
- Richards Beer
- Carvichi

2.2 Soft Drink Cans - Branded Litter

Soft drink containers were also a relatively small contributor to large litter on San Francisco streets. Only a few soft drink beverage containers were brand identified by auditors (20 containers in total). We deem this sample to be too small to be statistically valid for commenting on the distribution of soft container brands on San Francisco streets; however we report the observations below.

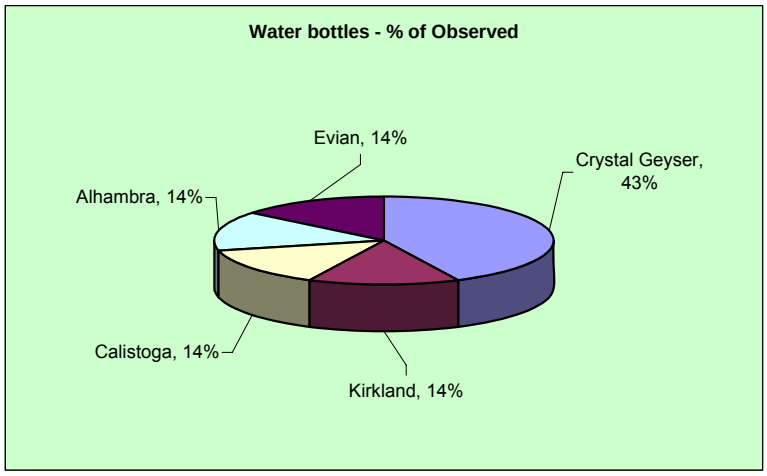
Brands of soft drinks observed:

- Sobe
- Snapple
- Nantucket Nectar
- Red Bull
- Coca-Cola
- Rockstar
- Shasta

2.3 Bottled Water - Branded Litter

Water Bottle Brands

	Units	% of Observed
Crystal Geyser	3	43%
Kirkland	1	14%
Calistoga	1	14%
Alhambra	1	14%
Evian	1	14%
	7	100%



Discussion: Bottled water has continued to be a growth packaged beverage for people on the go. Sales of bottled water have been reported growing at over 10% per year in various trade magazines.

Five brands of water bottles observed as litter on San Francisco streets in the 2007 litter audit; these were:

- Crystal Geyser (most significant)
- Kirkland (COSTCO)
- Calistoga
- Alhambra
- Evian

2.4 Sport Drinks - Branded Litter

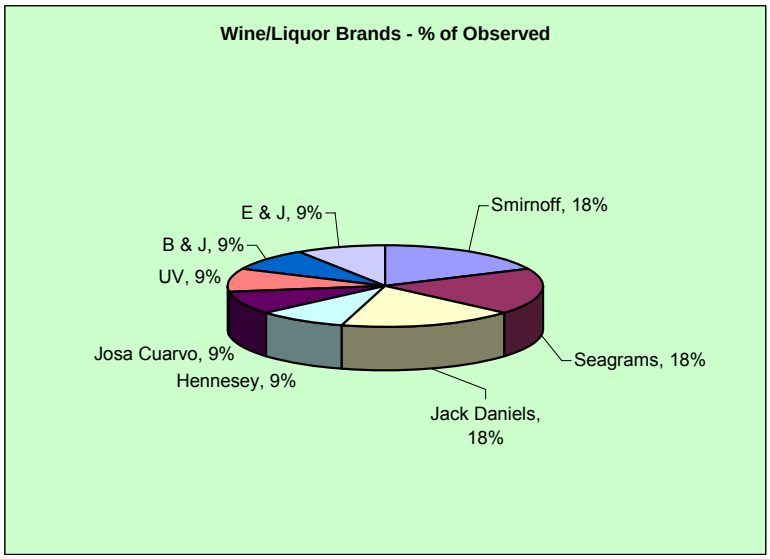
Discussion: Sport drinks were not a significant component of total large litter on San Francisco streets. Only 3 sports drink containers were observed in the 2007 audit. The only brand name observed was Gatorade.

2.5 Wine & Liquor - Branded Litter

Wine & liquor large litter was also not a significant component of total large litter on San Francisco streets. Eleven branded containers in the wine & liquor category were observed in the 2007 San Francisco litter audit.

Wine/ Liquor Bottle Brands

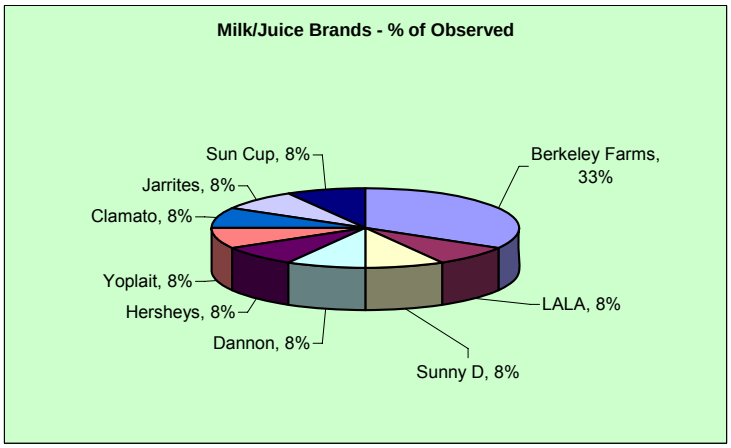
	Units	% of Observed
Smirnoff	2	18%
Seagrams	2	18%
Jack Daniels	2	18%
Hennesey	1	9%
Josa Cuarvo	1	9%
UV	1	9%
B & J	1	9%
E & J	1	9%
	11	100%



2.6 Milk & Juice - Branded Litter

Milk & Juice Container Brands

	Units	% of Observed
Berkeley Farms	4	33%
LALA	1	8%
Sunny D	1	8%
Dannon	1	8%
Hersheys	1	8%
Yoplait	1	8%
Clamato	1	8%
Jarrites	1	8%
Sun Cup	1	8%
	12	100%

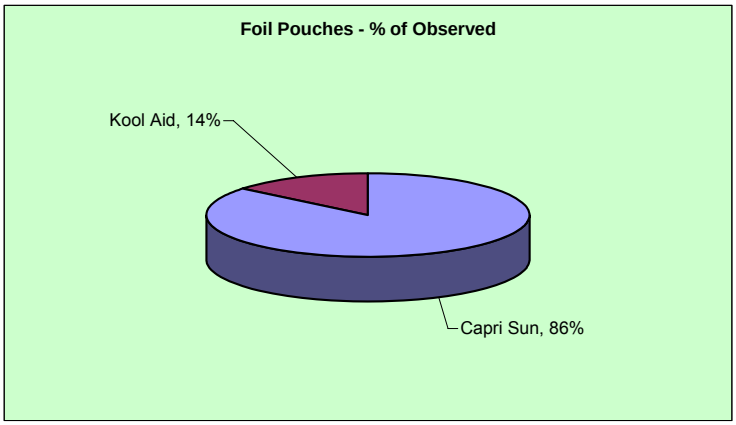


Discussion: Various brands of milk and juice products in glass and plastic containers were observed during the 2007 litter audit. The most prominent brand observed was Berkeley Farms product containers.

2.7 Foil Pouch Drinks - Branded Litter

Foil Pouch Container Brands

	Units	% of Observed
Capri Sun	6	86%
Kool Aid	1	14%
	7	100%



Discussion: Only 7 containers were observed for this sub-category of large litter, of which 6 were Capri Sun.

3.0 Cups, Lids and Cup Debris Branded Litter

This category encompasses all cold and hot drink cup litter, including lids.

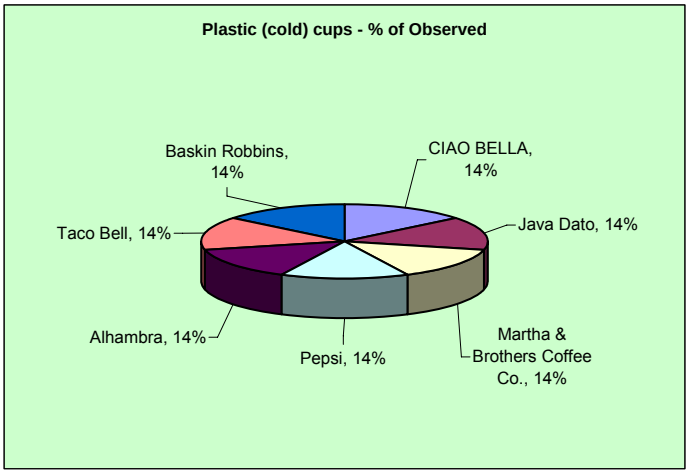
In general sites near a coffee shop, fast-food outlet or other over-the-counter drink outlet were highest in their occurrence of cup debris.

Presentation of the brand observations for this subcategory appears below.

Plastic drink (cold) cup Brands

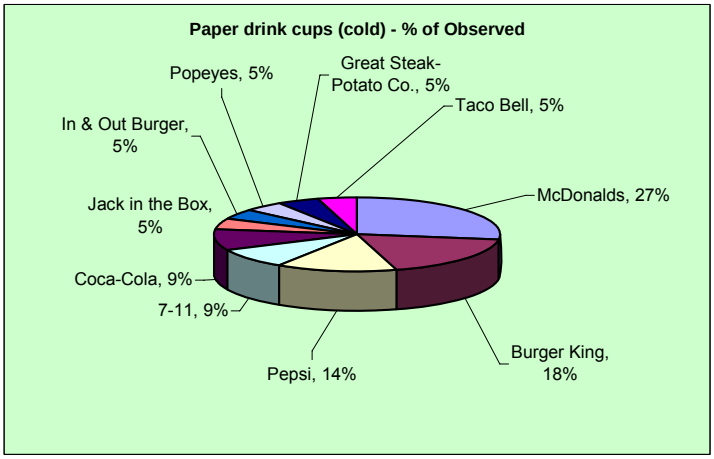
	Units	% of Observed
CIAO BELLA	1	14%
Java Dato	1	14%
Martha & Brothers Coffee	1	14%
Pepsi	1	14%
Alhambra	1	14%
Taco Bell	1	14%
Baskin Robbins	1	14%
	7	100%

Total observed 29 items - 7 brands



Paper drink (cold) cup Brands

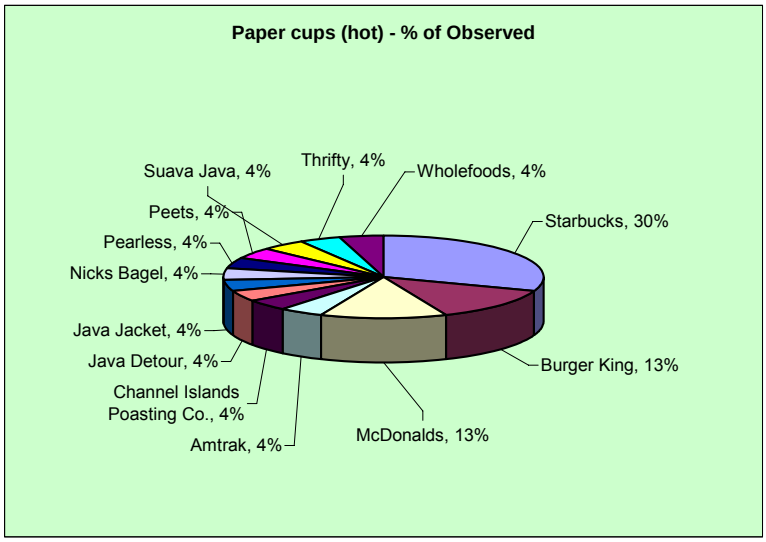
	Units	% of Observed
McDonalds	6	27%
Burger King	4	18%
Pepsi	3	14%
7-11	2	9%
Coca-Cola	2	9%
Jack in the Box	1	5%
In & Out Burger	1	5%
Popeyes	1	5%
Great Steak-Potato Co.	1	5%
Taco Bell	1	5%
	22	100%



The 2007 San Francisco Litter audit also examined the brands of hot drink paper cups, normally associated with coffee shops. These brand results appear below.

Paper drink (hot) cup Brands

	Units	% of Observed
Starbucks	7	30%
Burger King	3	13%
McDonalds	3	13%
Amtrak	1	4%
hannel Islands Poasting Co.	1	4%
Java Detour	1	4%
Java Jacket	1	4%
Nicks Bagel	1	4%
Pearless	1	4%
Peets	1	4%
Suava Java	1	4%
Thrifty	1	4%
Wholefoods	1	4%
	23	100%



Starbucks, Burger King and McDonalds accounted for 56% of the branded hot cup litter observed.

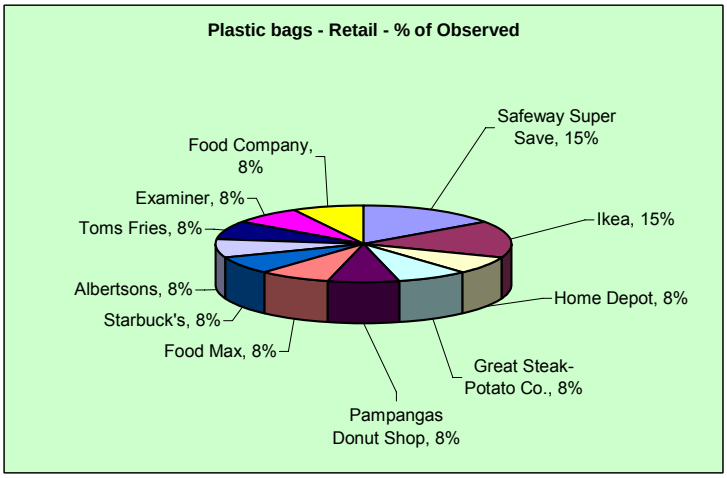
4.0 Bag Branded Litter

4.1 Plastic & Paper Retail and Paper Bags from Fast Food

In the 2007 San Francisco Litter Audit, field teams observed 13 items in the plastic retail bag sub-category. There were ten brands of plastic retail bags observed, with Ikea and Safeway brands occurring more than the others.

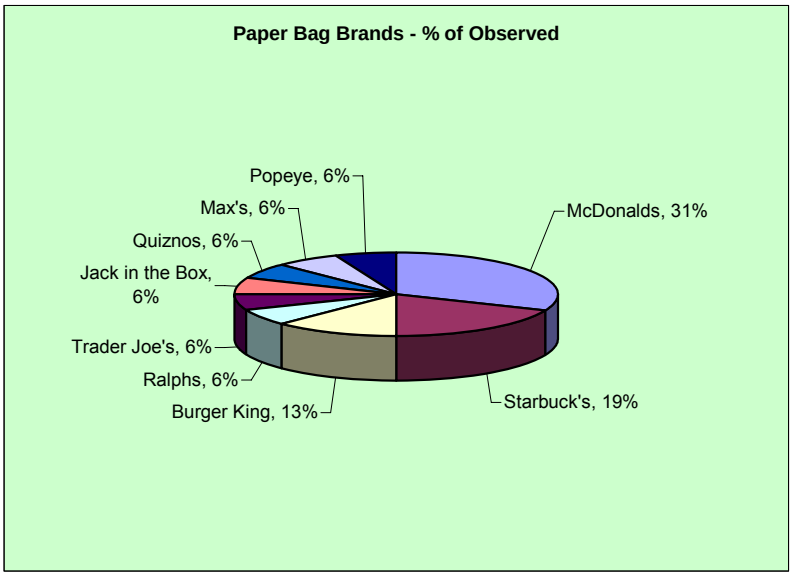
Plastic Bags - Brands

	Units	% of Observed
Safeway Super Save	2	15%
Ikea	2	15%
Home Depot	1	8%
Great Steak-Potato Co.	1	8%
Pampangas Donut Shop	1	8%
Food Max	1	8%
Starbuck's	1	8%
Albertsons	1	8%
Toms Fries	1	8%
Examiner	1	8%
Food Company	1	8%
	13	100%



Paper Bags - Brands

	Units	% of Observed
McDonalds	5	31%
Starbuck's	3	19%
Burger King	2	13%
Ralphs	1	6%
Trader Joe's	1	6%
Jack in the Box	1	6%
Quiznos	1	6%
Max's	1	6%
Popeye	1	6%
Total	16	100%



In the paper bags sub-category, McDonalds, Starbuck's and Burger King represented 63% of the brands observed.

5.0 Boxes, Cardboard Boxes, Other Containers, Food Wrap

The boxes sub-category of litter, contributed 1.2% of total large litter observed. The brands that were observed were: North Beach, Tylenol, TDK, Benadryl, Corona, SOS, Jiffy Muffin, and Tampax.

In the Other Containers sub-category (1.4% of total large litter), Walgreens, Rite Aid, Planters, Similac, Dinty Moore, Neon and Dole containers were observed.

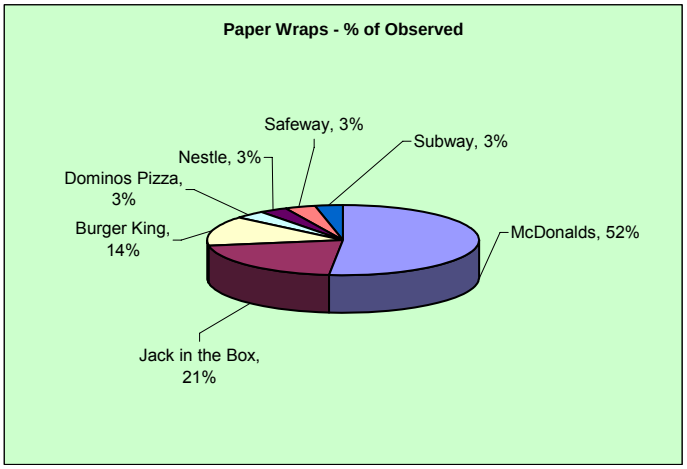
6.0 Fast Food Litter Brands Identified

6.1 Food Wraps - Brands

Brands observed in the wraps sub-category were 1.78% of total large litter and are illustrated below in terms of the brands observed.

Paper Wraps - Brands

	Units	% of Observed
McDonalds	15	52%
Jack in the Box	6	21%
Burger King	4	14%
Dominos Pizza	1	3%
Nestle	1	3%
Safeway	1	3%
Subway	1	3%
Total	29	100%



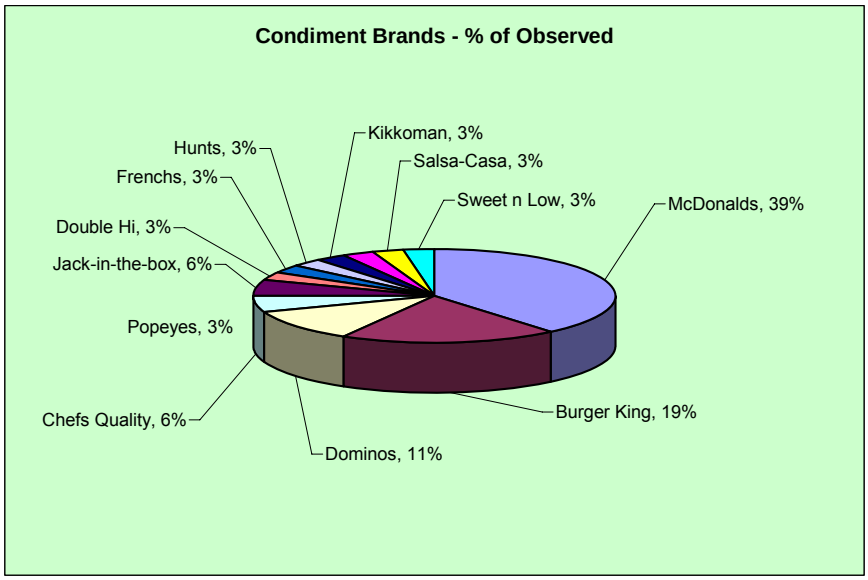
The litter audit teams observed other food wrap materials, such as plastic wraps, and plastic/composite foil wraps; however positive brand identifications could not be made.

6.2 Take-Out Extra Branded Litter

Take-out extras constitute a relatively significant contribution of large litter observed on San Francisco streets, with 116 items (3.04% of total large litter observed) . Eighty-two per cent of the take out litter observed were utensils from fast food or condiment packages. The brand observations for these items are illustrated below. Note that utensils do not normally carry any brand information therefore the data presented below represents condiment packaging.

Condiment Packaging - Brands

	Units	% of Observed
McDonalds	14	39%
Burger King	7	19%
Dominos	4	11%
Chefs Quality	2	6%
Jack-in-the-box	2	6%
Double Hi	1	3%
Frenchs	1	3%
Hunts	1	3%
Kikkoman	1	3%
Popeyes	1	3%
Salsa-Casa	1	3%
Sweet n Low	1	3%
Total	36	100%



7.0 Confectionary Branded Litter

Confectionary products comprised 8.57 % of total large litter in the San Francisco audit which is a significant amount of litter. Below we illustrate the brands of products observed in this sub-category.

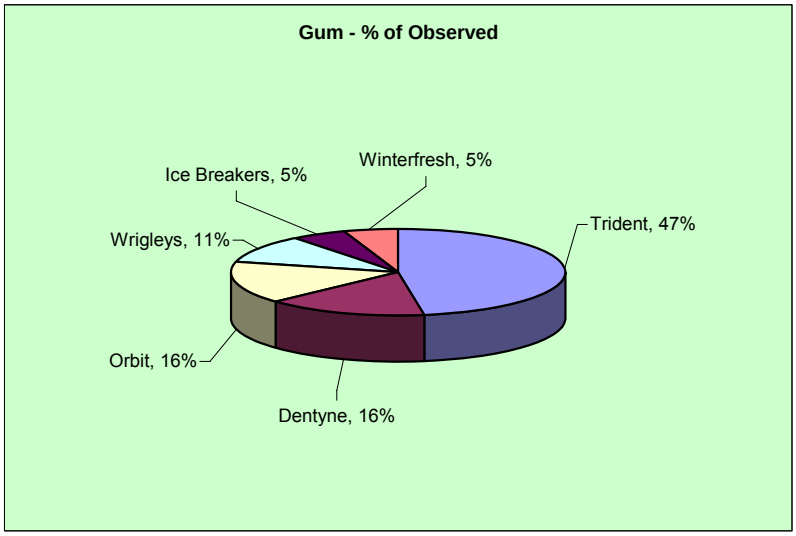
7.1 Brands of Gum Wrap Litter

Gum litter appears to be a significant issue in San Francisco. Gum packaging litters the streets, and there are high occurrences of gum deposits on sidewalks and streets throughout the city.

Three brands make up over 80% of branded gum litter observed (Trident, Dentyne, Orbit).

Confectionary - Gum - Brands

	Units	% of Observed
Trident	9	47%
Dentyne	3	16%
Orbit	3	16%
Wrigleys	2	11%
Ice Breakers	1	5%
Winterfresh	1	5%
	19	100%



7.2 Brands of Candy Wrap Litter

In the San Francisco litter audit 152 candy wraps were observed, which represent a significant contribution to total large litter at 3.99%. Of these 152 candy wraps observed, 100 were identifiable by brand. The brand identity of these candy wraps is illustrated below.

Confectionary - Candy Wrappers - Brands

	Units	% of Observed		Units	% of Observed
Tootsie Roll	8	8.0%	Butter Finger	1	1.0%
Hersheys	7	7.0%	Glorias	1	1.0%
Snickers	7	7.0%	Goodyear	1	1.0%
M & M's	4	4.0%	Gummy Worms	1	1.0%
Werthers	4	4.0%	Jeffifay	1	1.0%
Mamba	3	3.0%	Joseph Schmidt	1	1.0%
Nestle	3	3.0%	Kellogs	1	1.0%
Reese	3	3.0%	Kiss	1	1.0%
Twix	3	3.0%	Laffy Taffy	1	1.0%
Airheads	2	2.0%	Lifesaver	1	1.0%
Brachs Cinnamon	2	2.0%	Lollipop	1	1.0%
Charms	2	2.0%	Max	1	1.0%
Ghiradelli	2	2.0%	Menthe Mint	1	1.0%
Jelly Belly	2	2.0%	Musketeers	1	1.0%
Jolly Ranches	2	2.0%	New York	1	1.0%
Kit-Kat	2	2.0%	Night Crawler	1	1.0%
Milky Way	2	2.0%	Orbit	1	1.0%
Nature Valley	2	2.0%	Rice Krispy Treats	1	1.0%
Nibs	2	2.0%	Skittles	1	1.0%
Now-Later	2	2.0%	Sour Neon	1	1.0%
Sour Power	2	2.0%	Sour Patch	1	1.0%
Starburst	2	2.0%	Twinkie	1	1.0%
Abba Zabba Taffy	1	1.0%	Walgreen	1	1.0%
Balis Best	1	1.0%	Welchers	1	1.0%
Boyba Wang	1	1.0%	Wenka Laffy Taffy	1	1.0%
Bubbaloo	1	1.0%	White Rabbit	1	1.0%
			Whoppers	1	1.0%
			Wonka	1	1.0%
				100	100%

7.3 Brands of Candy Pouch Litter

During the San Francisco litter audit only eight brand observations for candy punch litter were made, these included: Mike-N-Ike, Air Head, Granola, Nature Valley Lite Sours, Nestle, Delmonte and M & M's.

7.4 Brands of Sweet Snack Litter

Confectionary - Sweet snack packaging - Brands

	Units	% of Observed		Units	% of Observed
Altoids	1	4%	Klondike	1	4%
Betty Crocker	1	4%	Little Debbie	1	4%
Dots	1	4%	Malstar	1	4%
Drumstick	1	4%	Nannis	1	4%
Famous Amos Cookies	1	4%	Nature Valley	1	4%
Gogurt	1	4%	Orbit	1	4%
Good Cooky	1	4%	Organic Krispy Rice	1	4%
Gummy Worm	1	4%	Propez	1	4%
Hagen Dass	1	4%	Ricola	1	4%
Halls	1	4%	Safeway	1	4%
Ice Breakers	1	4%	Starbuck's	2	7%
Icepep	1	4%	Starbuck's	1	4%
Junior Caramel	1	4%	X-H	1	4%
			Total	27	100%

7.5 Brands of Snack Food (savoury & salted snacks) Litter

Confectionary - Snack packaging (savory/salted) - Brands

	Units	% of Observed		Units	% of Observed
Cheetos	6	8.6%	Cop Agra	1	1.4%
Doritos	6	8.6%	Christie	1	1.4%
Frito	6	8.6%	Davids	1	1.4%
Planters Peanuts	3	4.3%	Dearfield Farms	1	1.4%
Sour Power	3	4.3%	El Sabrosa	1	1.4%
Austin	2	2.9%	Flavorade	1	1.4%
Cottage Cheese III	2	2.9%	Garden	1	1.4%
Keebler	2	2.9%	Granola	1	1.4%
Kettles	2	2.9%	Hostess	1	1.4%
Little Debbies	2	2.9%	Nissin	1	1.4%
Lunchables	2	2.9%	Organic Valley	1	1.4%
Nature Valley	2	2.9%	Precious	1	1.4%
Slim Jim	2	2.9%	Pringles	1	1.4%
Styrofoam Cups Noodles	2	2.9%	Protein Bar	1	1.4%
Sunmaid	2	2.9%	Pudding Cup	1	1.4%
Toms	2	2.9%	Quaker	1	1.4%
Amos	1	1.4%	Ramon	1	1.4%
Baby star Noodles	1	1.4%	Roland	1	1.4%
Brown Cow	1	1.4%	Ruffles	1	1.4%
Cheese Maker	1	1.4%	Seawood	1	1.4%
			Total	70	100.0%

8.0 Branded Printed Materials

In the sub-category of branded litter, printed material represents about 13.6% of the total litter observed, and as such is a significant sub-category.

Printed materials of various types of newspapers and advertisements were a significant contributor to large litter, contributing 7.5 % of total large litter observed. Many of the pieces of large litter counted could not be positively identified as to the brand name of the producer of the printed material, due mostly to weathering of the litter, or shredding where lawn mowing activities may take place.
The printed materials that could be identified by brands are illustrated below.

8.1 Newspapers, Advertisements

Printed Litter - (papers/flyers) - Brands

	Units	% of Observed		Units	% of Observed
Pizza Lova	4	12.1%	Mr. pizza Man	1	3.0%
Trader Joe's	3	9.1%	Mythic Pizza & La Carreta	1	3.0%
Shiso flyer	2	6.1%	Nob Hill Gazette	1	3.0%
Best Buy	1	3.0%	Rite Aid	1	3.0%
Circuit City	1	3.0%	SF Guardian	1	3.0%
Digna Cleaning	1	3.0%	Spanish Cultural Center	1	3.0%
E Bay Express	1	3.0%	Starbuck's	1	3.0%
Faqueria	1	3.0%	Subway	1	3.0%
GMC	1	3.0%	Tritech	1	3.0%
Irish Harold	1	3.0%	Venica Pizza Man	1	3.0%
JC Pennys	1	3.0%	Volara Pizza	1	3.0%
Lowes	1	3.0%	Yellow Pages	1	3.0%
Magazina	1	3.0%	Zcavacha	1	3.0%
Mervins	1	3.0%			
				33	100.0%

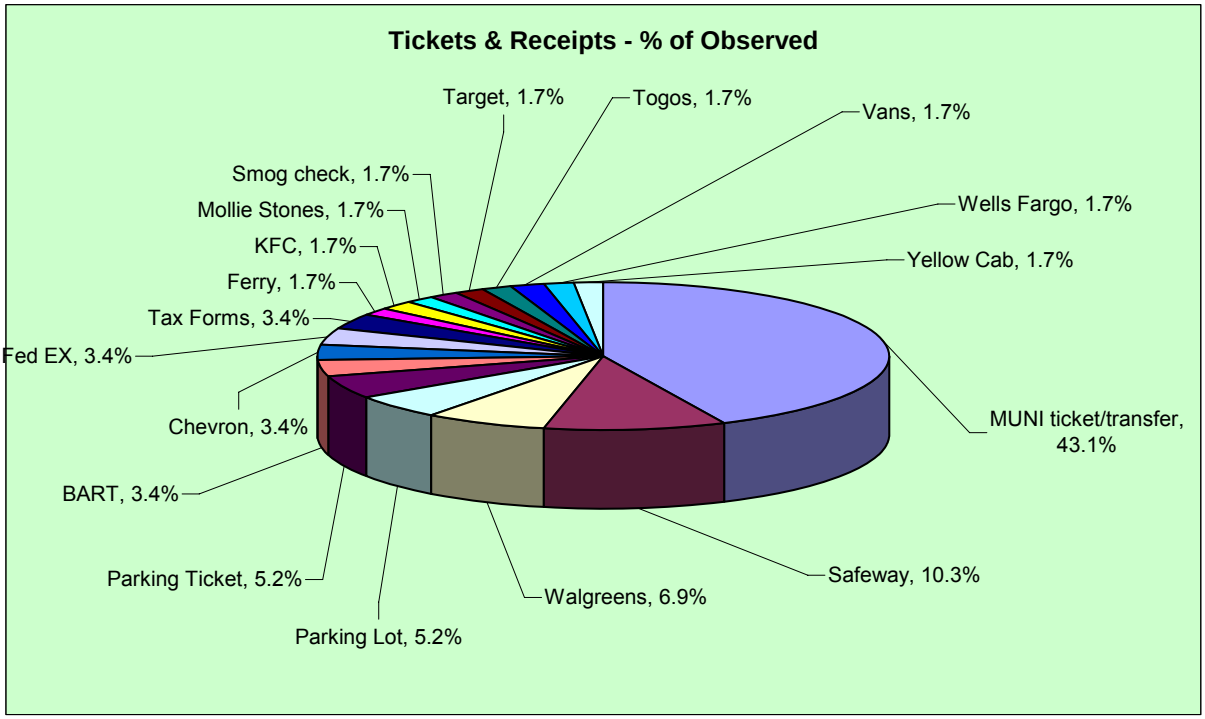
8.2 Business Forms (MUNI Tickets, business receipts etc)

Business forms, tickets, transfers and receipt litter continue to be of significance as a sub-category of large litter on San Francisco streets. Business forms as a sub-category represent 5.3% of total large litter. MUNI tickets and transfers are a significant branded business form of litter. This observation, with bus and transit litter being significant, has been observed by the consultant at similar levels of total litter in other municipalities. This is an on-going issue for large municipalities.

See data details on the next page.

Printed Litter - (Tickets/transfers / receipts) - Brands

	Units	% of Observed
MUNI ticket/transfer	25	43.1%
Safeway	6	10.3%
Walgreens	4	6.9%
Parking Lot	3	5.2%
Parking Ticket	3	5.2%
BART	2	3.4%
Chevron	2	3.4%
Fed EX	2	3.4%
Tax Forms	2	3.4%
Ferry	1	1.7%
KFC	1	1.7%
Mollie Stones	1	1.7%
Smog check	1	1.7%
Target	1	1.7%
Togos	1	1.7%
Vans	1	1.7%
Wells Fargo	1	1.7%
Yellow Cab	1	1.7%
	58	100.0%

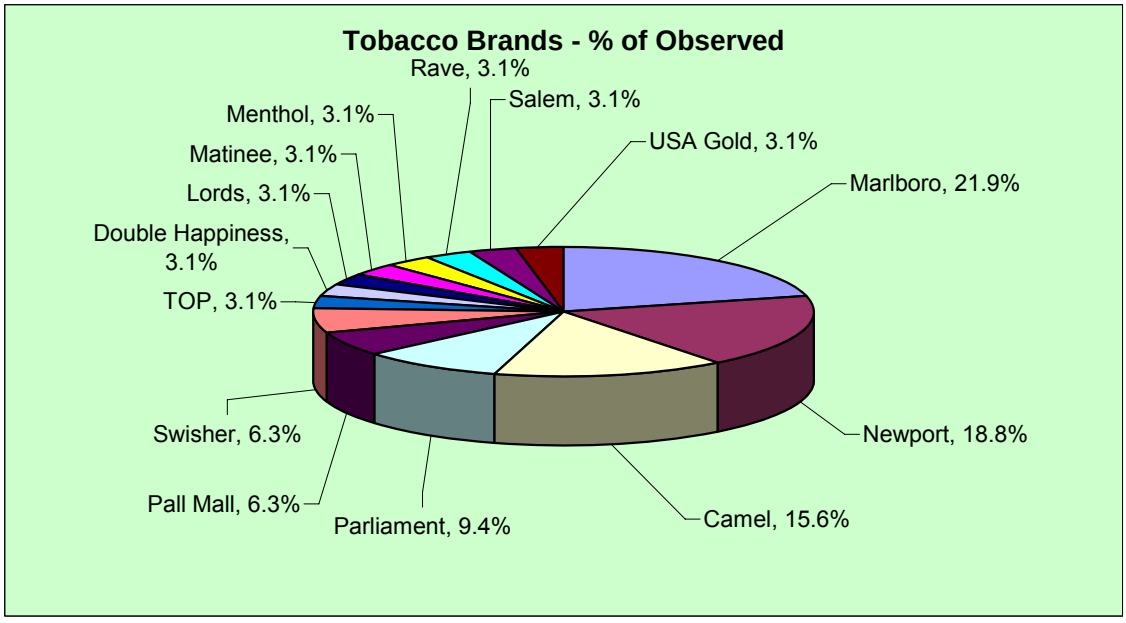


9.0 Tobacco Litter

Marlboro, Newport, Camel and Parliament brands make up 66% of tobacco litter observed on San Francisco streets.

Tobacco Litter - Brands

	Units	% of Observed
Marlboro	21	21.9%
Newport	7	18.8%
Camel	6	15.6%
Parliament	5	9.4%
Pall Mall	3	6.3%
Swisher	2	6.3%
TOP	2	3.1%
Double Happiness	1	3.1%
Lords	1	3.1%
Matinee	1	3.1%
Menthol	1	3.1%
Rave	1	3.1%
Salem	1	3.1%
USA Gold	1	3.1%
	32	100.0%



BRAND Identification - Brand Names Identified by Category

Beverage	Items Identified	% of Total Litter
Crystal Geyser	3	0.08%
Jack Daniels	2	0.05%
Seagrams	2	0.05%
Smirnoff	2	0.05%
Alhambra	1	0.03%
B & J	1	0.03%
Calistoga	1	0.03%
Coca-Cola	1	0.03%
E & J	1	0.03%
Ensure	1	0.03%
Evian	1	0.03%
Hennesey	1	0.03%
Josa Cuarvo	1	0.03%
Kirkland	1	0.03%
Lucea Thai Tea	1	0.03%
Red Bull	1	0.03%
Rockstar	1	0.03%
Shasta	1	0.03%
Sunny D	1	0.03%
UV	1	0.03%

Plastic & Paper Bags	Items Identified	% of Total Litter
McDonalds	5	0.13%
Starbuck's	3	0.08%
Burger King	2	0.05%
Ikea	2	0.05%
Safeway Super Save	2	0.05%
Albertsons	1	0.03%
Examiner	1	0.03%
Food Company	1	0.03%
Food Max	1	0.03%
Great Steak-Potato Co.	1	0.03%
Home Depot	1	0.03%
Jack in the Box	1	0.03%
Max's	1	0.03%
Pampangas Donut Shop	1	0.03%
Popeye	1	0.03%
Quiznos	1	0.03%
Ralphs	1	0.03%
Starbuck's	1	0.03%
Toms Fries	1	0.03%
Trader Joe's	1	0.03%

Cup Litter	Items Identified	% of Total Litter
McDonalds	9	0.24%
Starbucks	7	0.18%
Burger King	4	0.10%
Pepsi	4	0.10%
Burger King	3	0.08%
7-11	2	0.05%
Coca-Cola	2	0.05%
Alhambra	1	0.03%
Amtrak	1	0.03%
Bar Mo	1	0.03%
Baskin Robbins	1	0.03%
Channel Islands Poasting Co.	1	0.03%
CIAO BELLA	1	0.03%
Great Steak-Potato Co.	1	0.03%
In & Out Burger	1	0.03%
Jack in the Box	1	0.03%
Java Dato	1	0.03%
Java Detour	1	0.03%
Java Jacket	1	0.03%
Martha & Brothers Coffee Co.	1	0.03%
Nicks Bagel	1	0.03%
Pearless	1	0.03%
Peets	1	0.03%
Pepsi	1	0.03%
Popeyes	1	0.03%
Suava Java	1	0.03%
Taco Bell	1	0.03%
Taco Bell	1	0.03%
Thrifty	1	0.03%
Wholefoods	1	0.03%

Boxes & Clamshells	Items Identified	% of Total Litter
McDonalds	9	0.24%
Benadryl	1	0.03%
Corona	1	0.03%
KFC	1	0.03%
Listerine	1	0.03%
North Beach	1	0.03%
Sos	1	0.03%
Tampax	1	0.03%
TDK	1	0.03%
Tylenol	1	0.03%
Yves	1	0.03%
Alkaseltzer	0	0.00%

Other Containers	Items Identified	% of Total Litter
Walgreens	1	0.03%
Rite Aid	1	0.03%
Planters	1	0.03%
Dole	1	0.03%
Similac	1	0.03%
Neon	1	0.03%
Dinty Moore	1	0.03%

Paper & Plastic Wraps

	Items Identified	% of Total Litter
McDonalds	15	0.39%
Jack in the Box	6	0.16%
Burger King	4	0.10%
Angel 500	2	0.05%
Dominos Pizza	1	0.03%
Me Jii	1	0.03%
Nestle	1	0.03%
Padia Sura Orange Crama	1	0.03%
Safeway	1	0.03%
Subway	1	0.03%
Togos	1	0.03%
Triaminic	1	0.03%

Take-Out Extras

	Items Identified	% of Total Litter
McDonalds	14	0.37%
Burger King	7	0.18%
Dominos	4	0.10%
Chefs Quality	2	0.05%
Jack-in-the-box	2	0.05%
Quiznos	2	0.05%
7 Eleven	1	0.03%
Cup Noodles	1	0.03%
Double Hi	1	0.03%
Frenchs	1	0.03%
Hunts	1	0.03%
Kikkoman	1	0.03%
Popeyes	1	0.03%
Salsa-Casa	1	0.03%
Starbucks	1	0.03%
Sweet n Low	1	0.03%
Tullys	1	0.03%

Trays

	Items Identified	% of Total Litter
Yves	1	0.03%

Confectionary

	Items Identified	% of Total Litter
Trident	9	0.24%
Tootsie Roll	8	0.21%
Hersheys	7	0.18%
Snickers	7	0.18%
M & M's	4	0.10%
Werthers	4	0.10%
Dentyne	3	0.08%
Mamba	3	0.08%
Nestle	3	0.08%
Orbit	3	0.08%
Reese	3	0.08%
Twix	3	0.08%
Airheads	2	0.05%
Brachs Cinnamon	2	0.05%
Charms	2	0.05%
Ghiradelli	2	0.05%
Jelly Belly	2	0.05%
Jolly Ranches	2	0.05%
Kit-Kat	2	0.05%
Milky Way	2	0.05%
Nature Valley	2	0.05%
Nibs	2	0.05%
Now-Later	2	0.05%
Sour Power	2	0.05%
Starbuck's	2	0.05%
Starburst	2	0.05%
Wrigleys	2	0.05%
Abba Zabba Taffy	1	0.03%
Altoids	1	0.03%
Balis Best	1	0.03%
Betty Crocker	1	0.03%
Boyba Wang	1	0.03%
Bubbaloo	1	0.03%
Butter Finger	1	0.03%
Dots	1	0.03%
Drumstick	1	0.03%
Famous Amos Cookies	1	0.03%
Glorias	1	0.03%
Gogurt	1	0.03%
Good Cooky	1	0.03%
Goodyear	1	0.03%
Gummy Worms	2	0.03%
Hagen Dass	1	0.03%
Halls	1	0.03%

Confectionary (con't)

	Items Identified	% of Total Litter
Ice Breakers	2	0.03%
Icepep	1	0.03%
Jeffifay	1	0.03%
Joseph Schmidt	1	0.03%
Junior Caramel	1	0.03%
Kellogs	1	0.03%
Kiss	1	0.03%
Klondike	1	0.03%
Laffy Taffy	1	0.03%
Lifesaver	1	0.03%
Little Debbie	1	0.03%
Lollipop	1	0.03%
Malstar	1	0.03%
Max	1	0.03%
Menthe Mint	1	0.03%
Musketeers	1	0.03%
Nannis	1	0.03%
Nature Valley	1	0.03%
New York	1	0.03%
Night Crawler	1	0.03%
Orbit	2	0.03%
Organic Krispy Rice	1	0.03%
Propez	1	0.03%
Rice Krispy Treats	1	0.03%
Ricola	1	0.03%
Safeway	1	0.03%
Skittles	1	0.03%
Sour Neon	1	0.03%
Sour Patch	1	0.03%
Starbuck's	1	0.03%
Twinkie	1	0.03%
Walgreen	1	0.03%
Welchers	1	0.03%
Wenka Laffy Taffy	1	0.03%
White Rabbit	1	0.03%
Whoppers	1	0.03%
Winterfresh	1	0.03%
Wonka	1	0.03%
X-H	1	0.03%

Other Packaging	Items Identified	% of Total Litter
Reeses	1	0.03%
Nona Shim	1	0.03%
McDonalds	1	0.03%

Printed Materials	Items Identified	% of Total Litter
MUNI ticket/transfer	25	0.66%
Safeway	6	0.16%
Pizza Lova	4	0.10%
Walgreens	4	0.10%
Parking Lot	3	0.08%
Parking Ticket	3	0.08%
Trader Joe's	3	0.08%
BART	2	0.05%
Chevron	2	0.05%
Fed EX	2	0.05%
Shiso flyer	2	0.05%
Tax Forms	2	0.05%
Best Buy	1	0.03%
Circuit City	1	0.03%
Digna Cleaning	1	0.03%
E Bay Express	1	0.03%
Faqueria	1	0.03%
Ferry	1	0.03%
GMC	1	0.03%
Irish Harold	1	0.03%
JC Pennys	1	0.03%

Printed Materials (con't)	% of Total Litter	
Items Identified		
KFC	1	0.03%
Lowes	1	0.03%
Magazina	1	0.03%
Mervins	1	0.03%
Mollie Stones	1	0.03%
Mr. pizza Man	1	0.03%
Mythic Pizza & La Carreta	1	0.03%
Nob Hill Gazette	1	0.03%
Rite Aid	1	0.03%
SF Guardian	1	0.03%
Smog check	1	0.03%
Spanish Cultural Center	1	0.03%
Starbuck's	1	0.03%
Subway	1	0.03%
Target	1	0.03%
Togos	1	0.03%
Tritech	1	0.03%
Vans	1	0.03%
Venica Pizza Man	1	0.03%
Volara Pizza	1	0.03%
Wells Fargo	1	0.03%
Yellow Cab	1	0.03%
Yellow Pages	1	0.03%
Zcavacha	1	0.03%

Tobacco Materials	Items Identified	% of Total Litter
Marlboro	22	0.58%
Newport	7	0.18%
Camel	6	0.16%
Parliament	5	0.13%
Pall Mall	3	0.08%
Swisher	2	0.05%
TOP	2	0.05%
Double Happiness	1	0.03%
Lords	1	0.03%
Marlboro	1	0.03%
Matinee	1	0.03%
Menthol	1	0.03%
Rave	1	0.03%
Salem	1	0.03%
Sonoma	1	0.03%
USA Gold	1	0.03%
Walgreens	1	0.03%

Other Miscellaneous	Items Identified	% of Total Litter
Fed Ex	8	0.21%
Cal Tax info	1	0.03%
Bed Bath & Beyond	1	0.03%
Refresha	1	0.03%
Stabucks	1	0.03%
Kleenex	1	0.03%
Eco Lab	1	0.03%
Lynx	1	0.03%
Martha Brothers	1	0.03%
Mike Ikes	1	0.03%
Bussman Fuses	1	0.03%
Duracell	1	0.03%
Arris	1	0.03%
Kichls	1	0.03%
Scottys	1	0.03%
Energizer	1	0.03%

All Branded Large Litter - Alphabetical

	Items Identified	% of Total Litter		Items Identified	% of Total Litter
7 Eleven	3	0.08%	E & J	1	0.03%
Abba Zabba Taffy	1	0.03%	E Bay Express	1	0.03%
Airheads	2	0.05%	Eco Lab	1	0.03%
Albertsons	1	0.03%	Energizer	1	0.03%
Alhambra	2	0.05%	Ensure	1	0.03%
Alkaseltzer	0	0.00%	Evian	1	0.03%
Altoids	1	0.03%	Examiner	1	0.03%
Amtrak	1	0.03%	Famous Amos Cookies	1	0.03%
Angel 500	2	0.05%	Faqueria	1	0.03%
Arris	1	0.03%	Fed Ex	10	0.26%
B & J	1	0.03%	Ferry ticket	1	0.03%
Balis Best	1	0.03%	Food Company	1	0.03%
Bar Mo	1	0.03%	Food Max	1	0.03%
BART	2	0.05%	Frenchs	1	0.03%
Baskin Robbins	1	0.03%	Ghiradelli	2	0.05%
Bed Bath & Beyond	1	0.03%	Glorias	1	0.03%
Benadryl	1	0.03%	GMC	1	0.03%
Best Buy	1	0.03%	Gogurt	1	0.03%
Betty Crocker	1	0.03%	Good Cooky	1	0.03%
Boyba Wang	1	0.03%	Goodyear	1	0.03%
Brachs Cinnamon	2	0.05%	Great Steak-Potato Co.	2	0.05%
Bubbaloo	1	0.03%	Gummy Worms	2	0.05%
Burger King	20	0.52%	Hagen Dass	1	0.03%
Bussman Fuses	1	0.03%	Halls	1	0.03%
Butter Finger	1	0.03%	Hennesey	1	0.03%
Cal Tax info	1	0.03%	Hersheys	7	0.18%
Calistoga	1	0.03%	Home Depot	1	0.03%
Camel	6	0.16%	Hunts	1	0.03%
Channel Islands Poasting Co.	1	0.03%	Ice Breakers	2	0.05%
Charms	2	0.05%	Icepep	1	0.03%
Chefs Quality	2	0.05%	Ikea	2	0.05%
Chevron	2	0.05%	In & Out Burger	1	0.03%
CIAO BELLA	1	0.03%	Irish Harold	1	0.03%
Circuit City	1	0.03%	Jack Daniels	2	0.05%
Coca-Cola	3	0.08%	Jack in the Box	10	0.26%
Corona	1	0.03%	Java Dato	1	0.03%
Crystal Geyser	3	0.08%	Java Detour	1	0.03%
Cup Noodles	1	0.03%	Java Jacket	1	0.03%
Dentyne	3	0.08%	JC Pennys	1	0.03%
Digna Cleaning	1	0.03%	Jeffifay	1	0.03%
Dinty Moore	1	0.03%	Jelly Belly	2	0.05%
Dole	1	0.03%	Jolly Ranches	2	0.05%
Dominos Pizza	5	0.13%	Josa Cuarvo	1	0.03%
Dots	1	0.03%	Joseph Schmidt	1	0.03%
Double Happiness	1	0.03%	Junior Caramel	1	0.03%
Double Hi	1	0.03%			
Drumstick	1	0.03%			
Duracell	1	0.03%			
		0.03%			

All Branded Large Litter - Alphabetical

	Items Identified	% of Total Litter		Items Identified	% of Total Litter
Kellogs	1	0.03%	North Beach	1	0.03%
KFC	2	0.05%	Now-Later	2	0.05%
Kichls	1	0.03%	Orbit	5	0.13%
Kikkoman	1	0.03%	Organic Krispy Rice	1	0.03%
Kirkland	1	0.03%	Padia Sura Orange Cran	1	0.03%
Kiss	1	0.03%	Pall Mall	3	0.08%
Kit-Kat	2	0.05%	Pampangas Donut Shop	1	0.03%
Kleenex	1	0.03%	SFO Parking Ticket	3	0.08%
Klondike	1	0.03%	Parliament	5	0.13%
Laffy Taffy	1	0.03%	Pearless	1	0.03%
Lifesaver	1	0.03%	Peets	1	0.03%
Listerine	1	0.03%	Pepsi	5	0.13%
Little Debbie	1	0.03%	Pizza Lova	4	0.10%
Lollipop	1	0.03%	Planters	1	0.03%
Lords	1	0.03%	Popeye	3	0.08%
Lowes	1	0.03%	Propez	1	0.03%
Lucea Thai Tea	1	0.03%	Quiznos	3	0.08%
Lynx	1	0.03%	Ralphs	1	0.03%
M & M's	4	0.10%	Rave	1	0.03%
Magazina	1	0.03%	Red Bull	1	0.03%
Malstar	1	0.03%	Reeses	4	0.10%
Mamba	3	0.08%	Refresha	1	0.03%
Marlboro	23	0.60%	Rice Krispy Treats	1	0.03%
Martha & Brothers Coffee Co.	1	0.03%	Ricola	1	0.03%
Martha Brothers	1	0.03%	Rite Aid	2	0.05%
Matinee	1	0.03%	Rockstar	1	0.03%
Max	1	0.03%	Safeway	10	0.26%
Max's	1	0.03%	Salem	1	0.03%
McDonalds	53	1.39%	Salsa-Casa	1	0.03%
Me Jii	1	0.03%	Scottys	1	0.03%
Menthe Mint	1	0.03%	Seagrams	2	0.05%
Menthol	1	0.03%	SF Guardian	1	0.03%
Mervins	1	0.03%	Shasta	1	0.03%
Mike Ikes	1	0.03%	Shiso flyer	2	0.05%
Milky Way	2	0.05%	Similac	1	0.03%
Mollie Stones	1	0.03%	Skittles	1	0.03%
Mr. Pizza Man	1	0.03%	Smirnoff	2	0.05%
MUNI ticket/transfer	25	0.66%	Smog check	1	0.03%
Musketeers	1	0.03%	Snickers	7	0.18%
Mythic Pizza & La Carreta	1	0.03%	Sonoma	1	0.03%
Nannis	1	0.03%	Sos	1	0.03%
Nature Valley	3	0.08%	Sour Neon	1	0.03%
Neon	1	0.03%	Sour Patch	1	0.03%
Nestle	4	0.10%	Sour Power	2	0.05%
New York	1	0.03%	Spanish Cultural Center	1	0.03%
Newport	7	0.18%	Starbucks	17	0.45%
Nibs	2	0.05%	Starburst	2	0.05%
Nicks Bagel	1	0.03%	Suava Java	1	0.03%
Night Crawler	1	0.03%			
Nob Hill Gazette	1	0.03%			
Nona Shim	1	0.03%			

All Branded Large Litter - Alphabetical

	Items Identified	% of Total Litter		Items Identified	% of Total Litter
Subway	2	0.05%	Vans	1	0.03%
Sunny D	1	0.03%	Venica Pizza Man	1	0.03%
Sweet n Low	1	0.03%	Volara Pizza	1	0.03%
Swisher	2	0.05%	Walgreens	7	0.18%
Taco Bell	2	0.05%	Welchers	1	0.03%
Tampax	1	0.03%	Wells Fargo	1	0.03%
Target	1	0.03%	Wenka Laffy Taffy	1	0.03%
Tax Forms	2	0.05%	Werthers	4	0.10%
TDK	1	0.03%	White Rabbit	1	0.03%
Thrifty	1	0.03%	Wholefoods	1	0.03%
Togos	2	0.05%	Whoppers	1	0.03%
Toms Fries	1	0.03%	Winterfresh	1	0.03%
Tootsie Roll	8	0.21%	Wonka	1	0.03%
TOP	2	0.05%	Wrigleys	2	0.05%
Trader Joe's	4	0.10%	X-H	1	0.03%
Triaminic	1	0.03%	Yellow Cab	1	0.03%
Trident	9	0.24%	Yellow Pages	1	0.03%
Tritech	1	0.03%	Yves	2	0.05%
Tullys	1	0.03%	Zcavacha	1	0.03%
Twinkie	1	0.03%			
Twix	3	0.08%			
Tylenol	1	0.03%			
USA Gold	1	0.03%			
UV	1	0.03%			

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The City of San Francisco
STREETS LITTER RE-AUDIT
2009

PREPARED FOR

The City of San Francisco
San Francisco Environment Department

PREPARED BY

HDR | Brown, Vence & Associates, Inc.

&

MGM Management
A DIVISION OF 6528058 CANADA INC.

September 2009

Executive Summary

The City of San Francisco conducted its third litter audit in April 2009, following up on similar studies conducted in the city in 2008 and 2007. The audit was conducted by HDR / BVA Engineering, a local San Francisco engineering and environmental consulting firm. HDR contracted MGM Management, a Canadian environmental consulting firm that has expertise in the area of litter audits to design the audit to conform to previous litter audits conducted for the city. MGM Management has conducted sixteen previous litter audits for major North American municipalities and provincial clients since 2002, accumulating a data base of over 67,000 litter observations. James Madden, Sustainability Practice Project Manager, SAIC Engineering and Chris Hammer of Sustainable Design Resources, supervised the field audit teams and field data collection activities.

Litter is classified as "large litter" for those items over 4 square inches in size or as "small" litter for items less than 4 sq. in. Eighty-four sub-categories of large and sixteen sub-categories of small litter were examined.

A total of 4,488 large litter items were observed by auditors, on San Francisco streets during the April 2009 litter audit.

One hundred and thirty eight sites were chosen (increased from 132 potential sites in 2008) of which 132 were audited between April 20 – May 5, 2009. Of the 138 potential sites, there were six sites not audited. They were rejected in the field for safety or logistical reasons by audit teams. This audit was conducted at the same time of the year as the 2007 - 2008 audits (mid-April – early May).

The table below illustrates the results of the 2009 large litter audit results compared to 2007 (baseline year) and 2008.

Table ES - 1: Comparison of Results 2009, 2008, 2007

2009	2008	2007
Sites	**Sites**	**Sites**
132	130	105
Items/ Site	**Items/ Site**	**Items/ Site**
34.0	30.6	36.3
11%	-16%	Baseline
-6.4%	2009 lower than 2007 baseline year	

The 2009 audit results show an 11% increased in large litter items / site compared to 2008, however the 2009 results for large litter were 6.4% lower than the baseline year of 2007.

The largest category of large litter observed was Miscellaneous Paper at 552 litter pieces. This is a higher result for this sub-category as compared to the 2008 (319 items) but similar to the result for this sub-category in the 2007 audit (570 items). Non-branded paper napkins were the next most significant sub-category noted in the 2009 audit (438 items). This is a lower result for this sub-category as compared to the 2008 (664 items) but similar to the result for this category in the 2007 audit (494 items).

Printed paper materials were the third most significant litter sub-category in the 2009 audit, at 373 items, which is similar to the result noted in 2008 (380 items) and higher than noted in 2007 (287 items)

In 2009 fiber materials contributed 46 % of the total large litter observed. In 2008 fiber contributed 51% of the total large litter observed, as compared to 54% in the 2007 audit. Fiber based litter included paper, paperboard, cardboard, towels, napkins, newspapers, books, flyers, printed materials, and business forms, stationary , paper packaging, and paper bags. The data suggests that fiber based litter continues to be a major contributor to litter on San Francisco streets.

Table ES - 2: All Paper & Fiber Litter – 2009 Audit

All Fiber Observed	Items Observed	% of Total Large Litter
Printed materials	557.5	12.4%
Misc. Paper	552.5	12.3%
Napkins (all types)	479	10.7%
Fiber Packaging (incl bags/wraps)	432.5	9.6%
Misc. Cardboard	34.5	0.8%
Misc. Paperboard	6	0.1%
	2,062	45.9%

Note: Whole numbers may not appear due to averaging.

The second most significant material type observed were plastic materials. These included miscellaneous plastic, plastic packaging, wrap, plastic bags-retail and non-retail, hot and cold plastic drink cups, plastic jars, bottles, composites, utensils, zip bags, beverage containers, trays, polystyrene cups, confectionary, sweet and snack food packaging, pouches, plates, retail bags, and carrying rings. The most significant single category of plastic litter was unidentified miscellaneous plastic litter; which is litter that is broken up or weathered such that auditors cannot identify it with certainty but can identify the litter as plastic. Miscellaneous plastic litter accounted for 219 littered items or 4.9 % (compared to 4.7% in 2008) of total litter. All large plastic litter in aggregate accounted for 887 items observed (compared to 953 in 2008 and 746 in 2007). Plastic litter accounted for 20% of total large litter observed in 2009 (compared to 24 % in 2008 and 20% in 2007). Details of the plastic litter observed appear below in Table ES 3 – All Plastic Litter 2009 Audit.

Table ES – 3: All Plastic Litter – 2009 Audit

All Plastics Observed	Items Observed	% of Total Large Litter
Misc. Plastic	219	4.9%
Cup Lids, Pieces lids	160.5	3.6%
Plastic packaging other	111.5	2.5%
Plastic retail bags	68	1.5%
Plastic drink cups	51	1.1%
Plastic Jars / Bottles/ Lids	32.5	0.7%
Utensils	29.5	0.7%
Polystyrene cups (foam)	27.5	0.6%
Plastic wrap	25	0.6%
Plastic bags - not retail	23.5	0.5%
Candy pouches	17.5	0.4%
Sweet packaging	17	0.4%
Water bottles (plastic)	15.5	0.3%
Zipper bags/ sandwich	15.5	0.3%
Plastic / composite other	13	0.3%
Other confectionery pckg	12.5	0.3%
Sport Drink (plastic)	11	0.2%
Other Plastic Shells/Boxes	10	0.2%
Polystyrene clamshells	7	0.2%
Polystyrene Trays	7	0.2%
Poly Fast Food Plates	5.5	0.1%
Other Plastic FF Plates	5	0.1%
Six pack plastic rings	2.5	0.1%
	887	19.8%

Note: Whole numbers may not appear due to averaging.

In Figure ES – 1 below, we compare litter occurrence in San Francisco versus previous audits completed using this methodology. This allows a comparison to other jurisdictions where litter audits have been done using this methodology.

The average of items of large per site observed in San Francisco in 2009, 2008 and 2007 can be compared to other jurisdictions that have conducted litter audits using this methodology.

Figure ES – 1: Comparison San Francisco vs. Other Jurisdictions

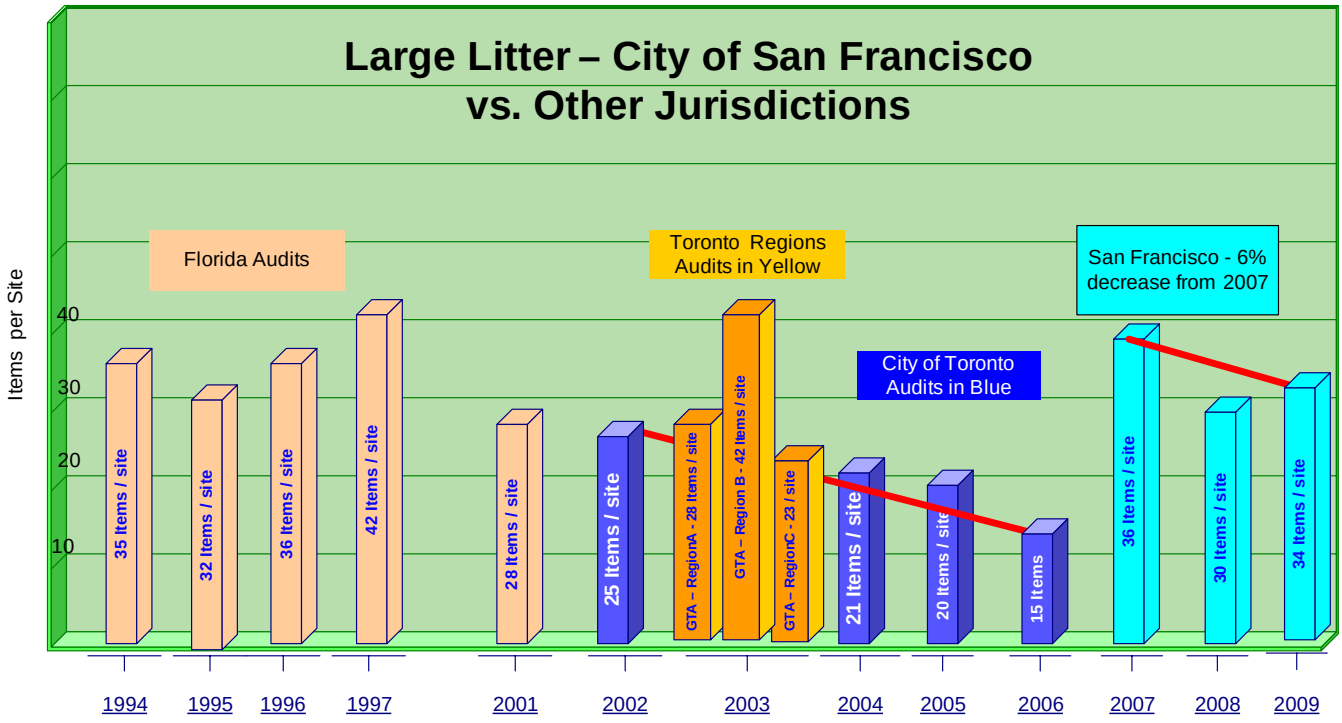


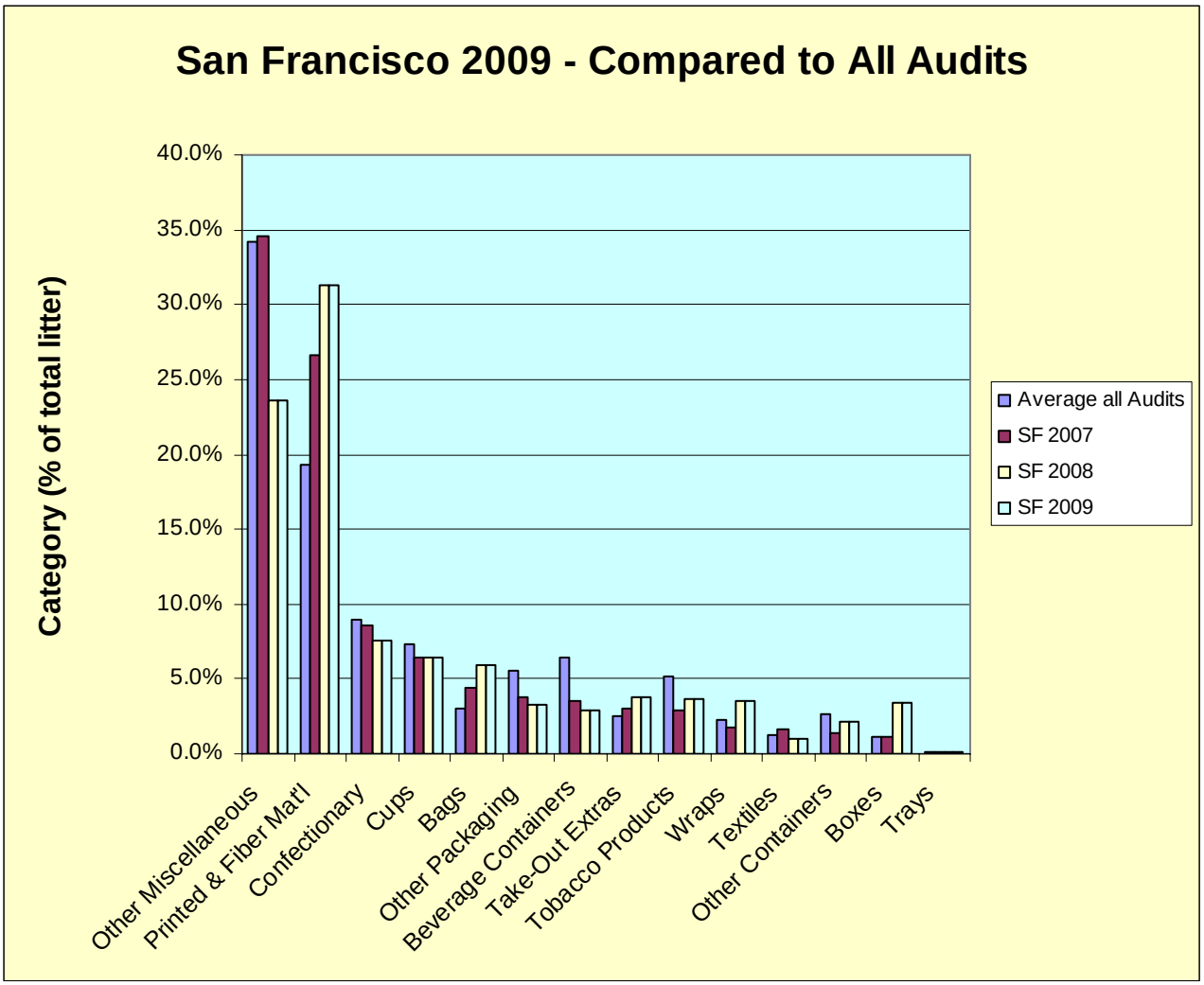
Table ES – 4: Comparison to Multiple Litter Audits

San Francisco 2009 vs. Other Jurisdictions (2002 - 2008) [1.]

	Observations - 2002 to 2008 (other jurisdictions)	Percentage 2002 to 2008 (other jurisdictions)	San Francisco April 2007	San Francisco April 2008	San Francisco April 2009
		% of total large litter	% of total large litter	% of total large litter	% of total large litter
Other Miscellaneous	21,270	34.2%	34.5%	23.6%	23.6%
Printed & Fiber Mat'l	11,985	19.3%	26.7%	31.3%	31.3%
Confectionary	5,568	8.9%	8.6%	7.6%	7.6%
Cups	4,580	7.4%	6.4%	6.4%	6.4%
Bags	1,865	3.0%	4.4%	5.9%	5.9%
Other Packaging	3,475	5.6%	3.8%	3.3%	3.3%
Beverage Containers	4,012	6.4%	3.5%	3.0%	3.0%
Take-Out Extras	1,553	2.5%	3.0%	3.8%	3.8%
Tobacco Products	3,217	5.2%	2.9%	3.7%	3.7%
Wraps	1,409	2.3%	1.8%	3.6%	3.6%
Textiles	811	1.3%	1.6%	1.0%	1.0%
Other Containers	1,678	2.7%	1.4%	2.2%	2.2%
Boxes	714	1.1%	1.2%	3.4%	3.4%
Trays	108	0.2%	0.2%	0.1%	0.1%
	62,245	100.0%	100%	100%	100%

1. Aggregated litter data, Litter audits by MGM Management including:
City of Toronto, Canada (2002, 2003, 2004 (2 audits), 2005, 2006
Regional Municipality of Peel, Canada (2003)
Regional Municipality of York, Canada (2003)
Regional Municipality of Durham, Canada (2003)
City of Edmonton, Canada (2007)
City of San Jose, CA (2008), City of San Francisco 2007 & 2008

Figure ES 2: Comparison to Multiple Litter Audits



Note: Chart compares San Francisco – Large litter results to all litter observations conducted by consultant , 2002 - 2009

Regulated Materials

At the time of the 2009 litter audit two types of potentially littered items were regulated under municipal ordinances: retail plastic bags and polystyrene packaging materials. The tables below compare large litter results for these items for the 2007, 2008 and 2009 litter audits. Further detail is presented in Appendix 5.

Table ES – 5 - Regulated Materials

Summary - Retail Plastic Bags Litter

	% of Total Large Litter				
2007	2.49%				
2008	4.08%	-64%	Decrease from 2007		
2009	2.05%	50%	Decrease from 2008		
		18%	Decrease from 2009 vs 2007		

Summary - Polystyrene Litter

	% of Total Large Litter				
2007	1.81%				
2008	1.16%	36%	Decrease from 2007		
2009	1.07%	8%	Decrease from 2008		
		41%	Decrease from 2009 vs 2007		

Small Litter in San Francisco

Observations of the small litter classification during the San Francisco audit resulted in a higher occurrence of small litter on city streets, as compared to 2008 and 2007 audits. During the 2009 audit 3,370 small litter items were observed at audited sites (25 items per site) , compared to 2,335 small litter items in the 2008 audit (18 items per site) and 2,393 in 2007 (23 items per site). Averages twice as high as these small litter rates observe in San Francisco in 2007 have been recorded by the consultant in other litter audits.

In 2009, the City of San Francisco litter audit examined small litter using the same methods used in 2008 and 2007. However, in 2009 another approach to observing small litter was added to the study. This expanded methodology examined all the small litter on a given site which were named “Super Sites”.

As identified in both of the 2007 and 2008 litter audits, gum deposits on San Francisco streets continue to be a significant issue. Gum deposits on sidewalks and roadways cause an annoying problem for pedestrians. Gum deposits accounted for 32% of all the small litter observed during the 2009 audit. In the 2008 litter audit gum deposits were even higher at 41% of all the small litter observations. Glass and paper small litter were also significant contributors to this class of litter, at 23% of total small litter for glass and 8% for paper.

Cigarette butts observed accounted for 8% of all the small litter observed on the regular litter audit site samples. It must be noted however, that the proportion of the site examined for small litter is quite small; hence it is not unexpected to see results that are skewed to the low side. To improve the data in examining small litter the consultant used a comprehensive site methodology called “Super Site” examination. More detailed discussion about the Super Site audit methodology where small litter was examined in much greater detail in presented in Section 5.0, of this report.

The small litter results, for the 2009 San Francisco audit sites, done using the routine methodology are illustrated below.

Due to the nature of randomly selecting sites and the methodology used for litter auditing of those locations, the consultant is of the opinion that this litter audit is representative of the overall small litter occurrence in the City of San Francisco streets, as of April 2009.

Figure ES - 3: 2009 San Francisco - Small Litter – by Category

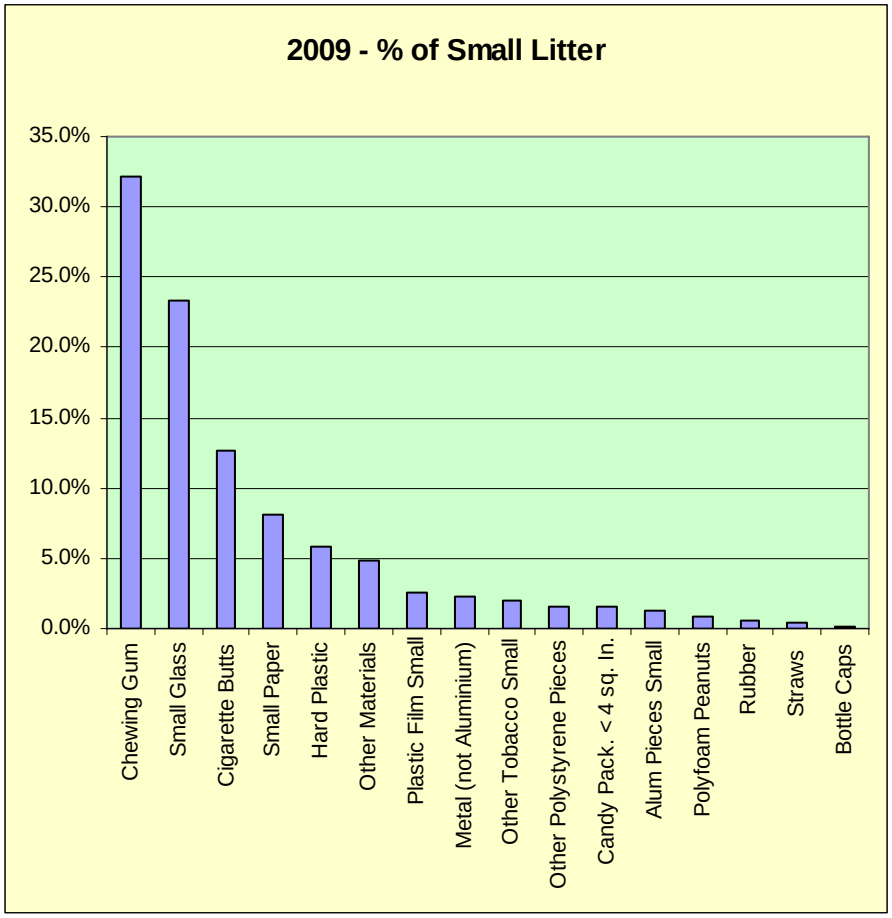


Table ES – 6: Small Litter Summary Table

Small Litter Summary - SF 2009

	Category Description	SF 2009 Total Small Litter Items Observed	SF 2009 % of Total Small Litter	SF 2008 Total Small Litter Items Observed	SF 2008 % of Total Small Litter	SF 2007 Total Small Litter Items Observed	SF 2007 % of Total Small Litter
16	Chewing Gum	1082	32.1%	960	41.1%	946	39.5%
8	Small Glass	787	23.4%	535	22.9%	710	29.7%
9	Small Paper	271	8.0%	153	6.6%	187	7.8%
1	Cigarette Butts	425	12.6%	234	10.0%	135	5.6%
15	Other Materials	162	4.8%	73	3.1%	97	4.1%
11	Hard Plastic	197	5.8%	85	3.6%	92	3.8%
10	Plastic Film Small	84	2.5%	33	1.4%	56	2.3%
2	Other Tobacco Small	67	2.0%	9	0.4%	51	2.1%
14	Metal (not Aluminium)	77	2.3%	52	2.2%	41	1.7%
13	Rubber	18	0.5%	10	0.4%	26	1.1%
12	Alum Pieces Small	44	1.3%	135	5.8%	19	0.8%
5	Candy Pack. < 4 sq. In.	52	1.5%	36	1.5%	16	0.7%
6	Polyfoam Peanuts	31	0.9%	2	0.1%	8	0.3%
7	Other Polystyrene Pieces	54	1.6%	6	0.3%	5	0.2%
3	Bottle Caps	6	0.2%	8	0.3%	4	0.2%
4	Straws	13	0.4%	4	0.2%	0	0.0%
		3370	100.0%	2,335	100%	2,393	100%
	Number of Sites Audited	132		130		105	
	Aver Small Litter per site	25.5		18.0		22.8	

Super Site - Small Litter

An additional data collection methodology was added as an addendum piece of research to the annual field work activities during the San Francisco litter audit conducted in 2009.

The San Francisco Department of Environment requested that we examine a sample of audit sites in detail for small litter. Thirty-two sites were examined, where all the small litter on the site was documented. This approach compares to auditing a smaller slice of a site as in the normal small litter methodology. This new labor intensive approach was added to San Francisco's annual litter audit in an effort to expand the City's knowledge of small litter on streets.

Table ES-6 summarizes the results of those observations. We have excluded chewing gum deposits from the data, as they are the result of historic accumulations on side walks and street curb side's, and skew the small litter portion of the results for the Super Site observations. In Figure ES – 6 below are the results of the Super Site audits:

Table ES – 7: Super Site Summary

Super Sites - San Francisco - Excluding Gum Deposits

Glass	4,100	37.5%	
Cigarette Butts & Tobacco Other	2,683	24.6%	Top 3 Items
Paper	1,819	16.6%	78.7%
Hard Plastics	720	6.6%	
Candy wrappers	390	3.6%	
Plastic film	328	3.0%	
Metal (not Alum)	263	2.4%	
Aluminum	197	1.8%	
Other Materials	127	1.2%	
Polyfoam pieces	107	1.0%	
Bottle caps	65	0.6%	
Rubber	57	0.5%	
Straws	55	0.5%	
Polyfoam peanuts	16	0.1%	
	10,927	100%	

Cigarette butts and other small tobacco litter (matches, filters, etc) accounted for 2,683 observations or 24.6% of all litter observed at the 32 Super Sites, and were the second most predominant sub-category recorded. Paper pieces were third, at 17% of all litter observed on the Super Sites. These three sub-categories of litter accounted to 78.7% of items observed at the Super Sites.

Further details related to the Super Site audit portion of this audit appear in Section 5.0.

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Acknowledgements

This report was made possible through the efforts of a team of energetic and dedicated people. We wish to acknowledge the following persons:

- Paul Ledesma, City of San Francisco, Zero Waste Coordinator; San Francisco Environment
- Ruth C. Abbe, National Practice Leader, Zero Waste Planning, HDR/ BVA Engineering
- James Madden , Sustainability Practice, Project Manager, SAIC Engineering
- Chris Hammer, Sustainable Design Resources; Team Leader , San Francisco Litter Audit 2007, 2008 and 2009
- Mark McKenney, Partner, MGM Management
- Patricia McKenney, Partner, MGM Management
- Auditors:
  - Melissa Barrow
  - Salem Kimble
  - Douglas Anthony
  - Thorne Bertram
  - Anthony Broese
  - Dan Krantz .

1.0 Introduction

1.1 Overview

Litter is a problem virtually everywhere where disposable / recyclable packaging is used. People have personal opinions about what litter is – the reality is much different. Whereas there is a general perception that select groups of products make up the majority of litter, field research shows that litter is made up of a broad range of products and materials.

The purpose of this report is to outline the methodology and results of the third litter audit conducted on behalf of the City of San Francisco during April 2009, and to compare these results with the litter audit conducted in San Francisco in April 2007 and April 2008.

This work was conducted by HDR / BVA Engineering Inc.; a San Francisco based full service engineering and environmental management firm. SAIC Engineering of Oakland, CA, assisted in the project management of the work, Chris Hammer of Sustainable Design Resources was the field supervisor for a portion of the audit work. MGM Management, a Division of 6528058 Canada Inc. was sub-retained by HDR / BVA Engineering Inc. to assist them in the design, site selection, data management and data analysis for this litter audit.

MGM Management has conducted a number of litter audits including this audit:

- Ontario – conducted under supervision of Dan Syrek, 1990
- Ontario – Toronto area 1994, done by McKenney with Syrek assistance
- City of Toronto, Streets Litter Audit 2002
- Regional Municipality of Peel, Streets Litter Audit 2003
- Regional Municipality of York, Streets Litter Audit 2003
- Regional Municipality of Durham, Streets Litter Audit 2003
- City of Toronto – Streets Litter Audit 2004
- City of Toronto – Parks Litter Audit 2004
- City of Toronto - Streets Litter Audit 2005
- City of Toronto - Streets Litter Audit 2006
- City of San Francisco (USA) - Streets Litter Audit 2007 (April 2007)
- City of Edmonton - Streets Litter Audit 2007 (May –June 2007)
- City of San Francisco (USA) - Streets Litter Audit 2008 (April 2008)
- City of San Jose (USA) - Streets Litter Audit 2008 (August 2008)
- City of San Francisco (USA) - Streets Litter Audit 2008 (April 2009)
- City of Edmonton (Canada) - Streets Litter Audit 2008 (June 2009)
- Alberta Transportation – Evaluation of the Effectiveness of Litter Clean-up Programs on Alberta Highways (July 2009)

In the USA – over 30 litter count surveys have been done by Syrek, (and reviewed by MGM Management). More recently five excellent surveys have been completed across all of the 29 counties of Florida by the University of Florida. Criticism developed that the Syrek methodology was too complicated and difficult to replicate the results, thus a simpler method was sought. In 1993 the Florida Legislature directed the Florida Center for Solid and Hazardous Waste Management to conduct a state-wide litter count. The Center developed a method for surveying litter that was understandable, simple and statistically valid. MGM Management has been trained in the methods of both the Syrek and by staff of the University of Florida to extract the best of both methodologies and adapt them to our methods.

In the past some local environmental groups have done litter audits of their own design. These methodologies may not be scientific in their development and they often tended to not be reproducible. Measurement techniques need to be unbiased, scientifically rigorous, and reproducible to be defensible. Comparison to other jurisdictions has not usually been possible with local litter audit methods. The methodology used and the data developed from this audit can be reproduced should the City of San Francisco wish to do so, and the results can be compared to other jurisdictions that have used the same approach.

This audit uses a proven and recognized method of identifying litter survey sites and for counting litter.

2.0 City of San Francisco Litter Audit - Methodology

The City of San Francisco litter audit counted “accumulated litter”. This is as compared to “fresh litter” counts, where a site is cleaned, then researchers return after a set time to count the number of pieces of litter that have been deposited. Accumulated litter allows for an examination of the occurrence of litter as it is has developed over time. Fresh litter count surveys are much more labour intensive, and costly to conduct, than accumulated litter counts.

2.1 Site Selection Process

2.1.1 Random Site Selection

In selecting where to conduct a site audit it is important to have an unbiased method of selection. The current methodology does not allow discretion in the field in selecting sites to be audited. Sites are pre-selected using computer techniques. In this way, neither the “dirtiest” nor the “cleanest” locations are picked. The survey teams count litter at sites that are selected in advance of field crews traveling to the location.

To select sites for the City of San Francisco Litter Audit, a geographical information system (GIS) database for the City of San Francisco was acquired (software used was ArcGIS 9.2 by Environmental Systems Research Institute Inc.). Working with San Francisco Environment, GIS data files were provided. Using ArcGIS 9.2, the consultant had access to 16,256 center-line coordinates for all potential public street locations within the service area of the City of San Francisco. With these data coordinates, the consultant used a computer sample generation program to randomly select potential litter audit sites. These data were then plotted on computer generated maps using ArcGIS 9.2, and detailed locations identified.

The consultant was requested to weight the site selection program to provide 75% of the locations within the internal boundary service areas of the City, while the remaining 25% of sites represented the rest of the City’s geographical area.

The final outcome was 175 randomly selected potential sites. Some of these sites were rejected because they were within ¼ mile of each other, or because they occurred on freeways, railway lines, or ponds. In 2007 a total of 105 randomly selected sites were audited by field surveyors, from the period April 9, 2007 to April 20, 2007.

These same 105 sites were re-audited in 2008, plus an additional 25 randomly selected sites were added to the list of sites, to increase the sample size to 130 sites that were audited. The 2008 field audit work was completed from April 7 – April 18, 2008.

All of the 2007 and 2008 sites were again audited in 2009. Two additional sites were added in 2009 to the list of sites, which increased the sample size to 132 sites. The 2009 field audit work was completed from April 20 – May 5, 2009.

Figure 1 - 132 Random Sites Were Audited in 2009

Sites were chosen by computer using ArcGIS 9.2 software.

The potential sample sites were then plotted for the entire City of San Francisco on a GIS generated map. Detailed street maps are then used to more accurately locate the sites, using two local map sources, San Francisco; ISBN 1-55368-168-1,MapArt www.mapart.com and also San Francisco & San Mateo Counties; Street Guide, The Thomas Guide, ISBN 01-528-85961-7.

Sites were rejected if they were located:

- on major highways / freeways
- location was on a bridge
- location clearly within a construction area
- on railway / subway rights-of-way
- on hydroelectric power line rights-of-way
- on / within water (ponds, rivers, streams/ lakes)
- access was difficult or impossible
- if located on industrial or private lands

Detailed directions were written by the consultant to direct audit teams to each of the selected sites. Directions were written in a manner that would allow any field team to find each site easily. Field teams were asked to travel to the sites using these directions so that no bias towards whether the site was dirty or clean would be introduced.

For each site further details of the audit site were added to the archival file by the audit team while at location, to allow future audit teams to find the same sites should the City wish to re-audit them in the future.

2.2 Detailed Site Files

The consultant created an individual hard copy site file for each location. These files contain the following:

- discrete site location ID number
- travel directions sheet
- photographic label card (for taking photos on-site)
- Large Litter Site Surveyor Form - (for recording large litter observed)
- Small Litter Item Count form (for recording small litter)

2.3 Conducting a Site Audit

Teams were paired in groups of two. Site auditors were hired by HDR / BVA Engineering Inc. Each team worked independently, reporting their activities to the SAIC Engineering, Project Manager and to the Sustainable Design Resources, field work supervisor. The City was divided into two work sectors, with teams assigned site files accordingly.

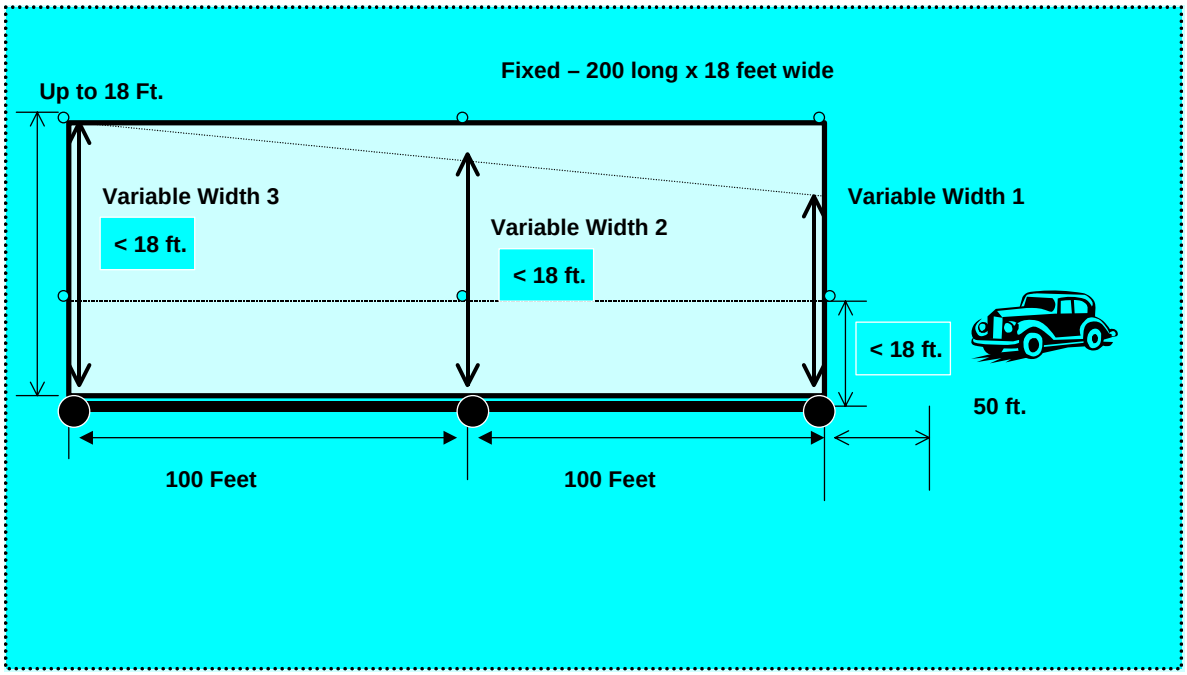
Upon being assigned site files each audit team traveled to their sites. It is of note that the team that audited the downtown areas volunteered to use bicycles as their transportation method. This proved to be a very effective means of doing sites in a congested metropolitan area. By using bicycles, time was saved, and parking costs avoided.

Teams approached their assigned sites from the directions requested and located the site. Upon arriving at a site, the teams safely parked their vehicles. Traffic cones were place on the roadway for traffic control, and team members dressed in fluorescent orange/ yellow traffic vests to increase their visibility. The teams reported their activities throughout the sampling day to the Project Manager by cellular telephone.

Beginning at the front of the parked car (or the start of the site), the team used a measuring device to measure 50 feet ahead of the start of the site. Using street marking paint, a mark was drawn on the pavement ahead to denote the staring point of the audit site. From this point the team measured an additional 100 feet, marking the roadway with another identifier to show the mid-point of the site. A final measurement of an additional 100 feet denoted the end of the audit site. Each site was 200 feet in length.

The width of the site was measured from 1.5 feet inside the curb (from the center of the roadway) towards the outer edge of the site, up to a maximum width of 18 feet. The rule was set to include 1.5 feet into the street since the curb is a normal catchments structure, for which the municipality is responsible for litter clean up. Sites with a width of 18 feet and 200 feet long were designated as a "fixed" site. In many instances a site was less than 18 feet wide. This occurred in commercial areas where storefronts provide less than 18 feet from the roadways (plus 1.5 feet into the road). Sites less than 18 feet in width are designated as "variable" sites.

Figure 2 - Schematic of Litter Audit Site



2.4 Classification of Large Litter

For purposes of classifying litter, and in accordance with the methods used in previous litter surveys conducted by us, large litter was defined to be that which is greater than 4 square inches in size.

2.5 Classification of Small Litter

Small litter were those pieces of debris that were less than 4 square inches in size, within a defined area within an audit site. The small litter audit methodology examines three transacts, or slices, of the site. A frame made of 1/2 inch P.V.C. plastic tubing was constructed to act as a frame. This frame was 1 foot wide and 6 feet long. A surveyor would look for and count small litter in three samples, one at the start of the site, one at the mid-point and one at the end of the site. At each transact section; three flips of the frame are done, thus surveying 18 square feet of the site – repeated three times.

Figure 3 – Small Litter Templates

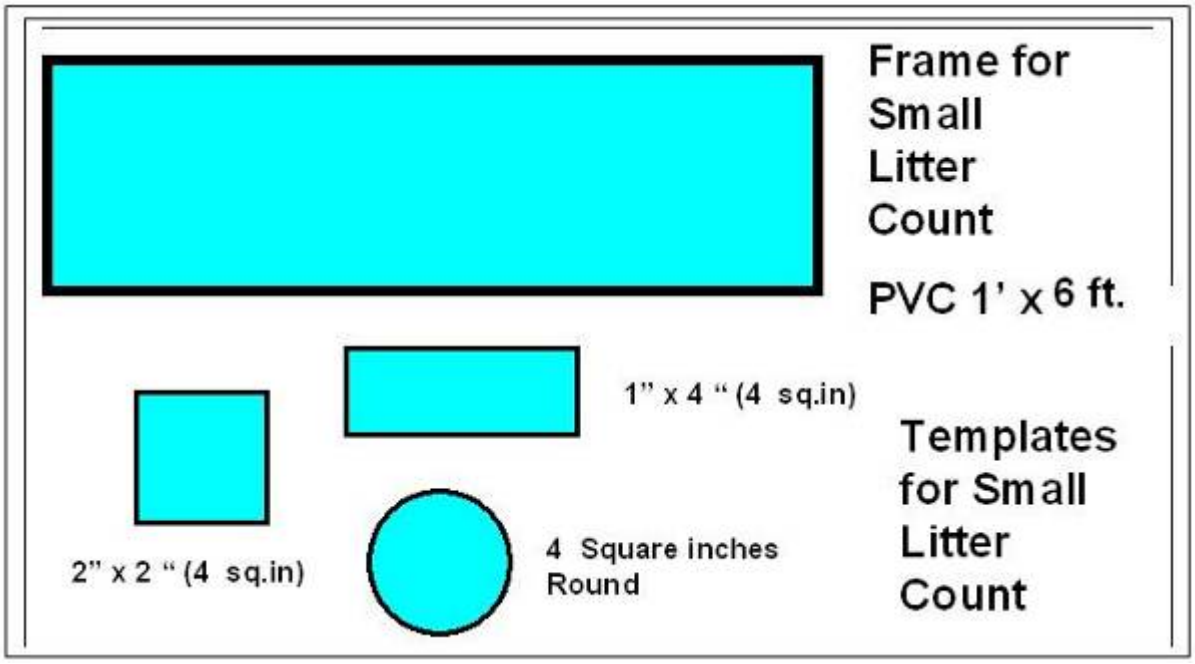


Figure 4 – Site Set-up – Small Litter

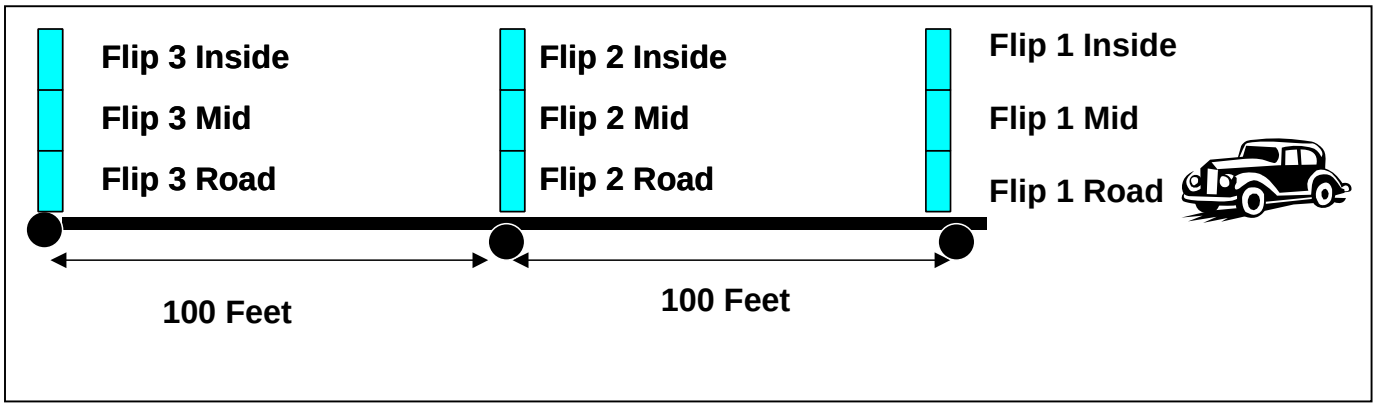


Table 1 - Categories of Small Litter

The categories in the litter counts less than 4 square inches that were examined are:

- cigarette butts/ debris
- other tobacco
- bottle caps
- straws
- candy packaging & wrappers
- polyfoam packing materials
- other polystyrene debris
- glass
- paper
- plastic film
- hard plastic
- aluminum / foil debris
- rubber
- metal (not aluminum)
- other materials
- gum deposits on roadways & sidewalks

Table 2 - Categories of Large Litter

Eighty-four sub-categories of large litter were counted, including:

Major Category	Sub-Category Number	Large Litter	Sub-Category Name	Material
1	1	Beer Cans	Beverage	metal
	2	Beer Bottles (glass)	Beverage	glass
	3	Soft Drink (glass)	Beverage	glass
	4	Soft Drink (cans)	Beverage	metal
	5	Soft Drink (plastic)	Beverage	plastic
	6	Sport Drink (glass)	Beverage	glass
	7	Sport Drink (plastic)	Beverage	plastic
	8	Water (glass)	Beverage	glass
	9	Water (plastic)	Beverage	plastic
	10	Wine/ Liquor (glass)	Beverage	glass
	11	Wine/ Liquor (plastic/other)	Beverage	plastic
	12	Milk/Juice (Plastic)	Beverage	plastic
	13	Milk/Juice (glass)	Beverage	glass
	14	Milk/Juice (Gable Top)	Beverage	paper
2	15	Foil Pouches	Other Packaging	composite
	16	Aseptic (Box)	Other Packaging	composite
	17	Broken Glass Container	Other Packaging	glass
	18	Six pack plastic rings	Other Packaging	plastic
	75	Foil containers	Other Packaging	metal
3	19	Plastic drink cups	Cups	plastic
	20	Paper Cups (cold)	Cups	paper
	21	Paper Cups (Hot)	Cups	paper
	22	Polystyrene cups (foam)	Cups	plastic
	23	Other paper cups	Cups	paper
	24	Cup Lids, Pieces lids	Cups	plastic
4	25	Plastic retail bags	Bags	plastic
	26	Paper retail bags	Bags	paper
	27	Paper bags - fast food	Bags	paper
	28	Plastic bags - not retail	Bags	plastic
	29	Paper bags - not retail	Bags	paper
	30	Zipper bags/ sandwich	Bags	plastic
5	31	Cardboard boxes/ box mat'l	Other Packaging	paper
	32	Paperboard (cereal type)	Other Packaging	paper
	33	Paper Beverage Cases	Other Packaging	paper
	34	Polystyrene clamshells	Other Packaging	plastic
	35	Paper clamshells	Other Packaging	paper
	36	Other Plastic Shells/Boxes	Other Packaging	plastic
6	37	Plastic Jars / Bottles/ Lids	OTHER CNTRS.	plastic
	38	Glass jars/ bottles misc.	OTHER CNTRS.	glass
	39	Cans - steel	OTHER CNTRS.	metal
	40	Cans - aluminum	OTHER CNTRS.	metal
	41	Container lids	OTHER CNTRS.	
	42	Aerosol cans (paint, oils, etc.)	OTHER CNTRS.	metal
7	43	Paper Food Wrap	Food Wraps/ Cntrs	paper
	44	Paper / foil composite wrap	Food Wraps/ Cntrs	composite
	45	Plastic wrap	Food Wraps/ Cntrs	plastic
	54	Condiment package (salt, ketchup, vinegar etc.)	Take-Out Extras	
	55	Utensils	Take-Out Extras	plastic

	56	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes	Take-Out Extras	paper
	57	Paper Fast Food Plates	Take-Out Extras	paper
	58	Poly Fast Food Plates	Take-Out Extras	plastic
	59	Other Plastic FF Plates	Take-Out Extras	plastic
	60	Plates - Other Mat's	Take-Out Extras	
8	46	Polystyrene Trays	Trays	plastic
	47	Paper Trays	Trays	paper
	48	Other Mat'l Trays (what?)	Trays	
9	49	Gum wrappers	Confectionary/Snack	
	50	Candy bar wraps	Confectionary/Snack	
	51	Candy pouches	Confectionary/Snack	
	52	Sweet packaging (describe)	Confectionary/Snack	
	53	Other confectionery (describe)	Confectionary/Snack	
	63	Snack food packaging	Confectionary/Snack	
10	61	Clothing or clothing pieces	Cloth	
	62	Other cloth	Cloth	
11	64	Plastic packaging other	Other Miscellaneous	plastic
	65	Paper packaging other	Paper/ Fibre Mat'l	paper
	66	Plastic / composite other	Other Miscellaneous	
	67	Foil materials / foil pieces	Other Miscellaneous	metal
12	68	No Brand Name Towels / Napkins / Serviettes	Paper/ Fibre Mat'l	paper
	69	Lottery ticket debris	Paper/ Fibre Mat'l	paper
	70	Printed material (newspapers, flyers, books etc.)	Paper/ Fibre Mat'l	paper
	71	Stationary (school, business etc.)	Paper/ Fibre Mat'l	paper
	72	Receipts (business forms, bus transfers, etc.)	Paper/ Fibre Mat'l	paper
13	73	Cigarette / cigar debris (>4")	Tobacco	
	74	Tobacco other (packs, matches, cellophane)	Tobacco	
14	76	Misc. Paper	Other Miscellaneous	paper
	77	Misc. Plastic	Other Miscellaneous	plastic
	78	Misc. Paperboard	Other Miscellaneous	paper
	79	Misc. Cardboard	Other Miscellaneous	paper
	80	Misc. Glass	Other Miscellaneous	glass
	81	Vehicle & Metal Road Debris	Other Miscellaneous	
	82	Construction debris	Other Miscellaneous	
	83	Tire & Rubber debris	Other Miscellaneous	rubber
	84	Home Articles	Other Miscellaneous	

Table 3 - Detailed Descriptions of Large Item Categories

1	Beer Cans		All brands of consumer beer can containers
2	Beer Bottles (glass)		Refillable and non-refillable beer bottles, all sizes
3	Soft Drink (glass)		Soft drinks, carbonated, non-carbonated, flavoured drinks in glass containers
4	Soft Drink (cans)		Soft drinks, carbonated, non-carbonated, flavoured drinks in metal can containers
5	Soft Drink (plastic)		Soft drinks, carbonated, non-carbonated, flavoured drinks in plastic containers, all sizes
6	Sport Drink (glass)		Sport drinks, carbonated or non-carbonated, flavoured drinks in glass containers, all sizes
7	Sport Drink (plastic)		Sport drinks, carbonated or non-carbonated, flavoured drinks in plastic containers, all sizes
8	Water (glass)		Packaged water, carbonated or non-carbonated, flavoured drinks in glass containers, all sizes
9	Water (plastic)		Packaged water, carbonated or non-carbonated, flavoured drinks in plastic containers, all sizes
10	Wine/ Liquor (glass)		Wine & liquor in glass, all sizes
11	Wine/ Liquor (plastic/other)		Wine & liquor in plastic or any other formats, all sizes
12	Milk/Juice (Plastic)		Milk or juice containers, packages in plastic
13	Milk/Juice (glass)		Milk or juice containers, packages in glass
14	Milk/Juice (Gable Top)		Milk or juice containers, packages in gable top paper cartons, all sizes
15	Foil Pouches		All packaged goods in foil packaging, pieces of foil materials
16	Aseptic (Box)		Drink-in-box, juice, fluids, other
17	Broken Glass Container		Glass fragments
18	Six pack plastic rings		Retainer plastic for carrying cans
19	Plastic drink cups		Cups, all sizes, all resin types
20	Paper Cups (cold)		Cups, all sizes, all paper types - cold drinks
21	Paper Cups (Hot)		Cups, all sizes, all paper types - hot drinks
22	Polystyrene cups (foam)		Cups, all sizes, all polystyrene types - hot drinks
23	Other paper cups		Cups, other materials
24	Cup Lids, Pieces lids		Fragments and pieces of cups
25	Plastic retail bags		Whole and pieces of retail plastic bags
26	Paper retail bags		Whole and pieces of retail paper bags

27	Paper bags – fast food		Whole and pieces of fast food outlet paper bags
28	Plastic bags – not retail		Whole and pieces of plastic bags, not retail i.e. dry cleaning
29	Paper bags - not retail		Paper bags & sacs, example leaf bag debris
30	Zipper bags/ sandwich		plastic lunch bags and sacs
31	Cardboard boxes/ box mat'l		All cardboard and box materials
32	Paperboard (cereal type)		Cereal, shoe boxes and pieces etc.
33	Paper Beverage Cases		Paper material outer packaging for beverage products
34	Polystyrene clamshells		Whole and pieces of take-away or other Styrofoam containers
35	Paper clamshells		Whole and pieces of take-away or other paper containers
36	Other Plastic Shells/Boxes		PET, PVC, HDPE , other material shells
37	Plastic Jars / Bottles/ Lids		All jars, bottles etc, plastic, non beverage, example dish detergent bottle
38	Glass jars/ bottles misc.		All jars, bottles not described above, in glass
39	Cans – steel		Food, non-food and other product steel can containers
40	Cans - aluminum		Food, non-food and other product aluminum can containers
41	Container lids		All lids, closures, and pieces > 4 sq. in.
42	Aerosol cans (paint, oils, etc.)		Aerosol cans, tops, lids - all products
43	Paper Food Wrap		Wrap for food, commercial & non-commercial; example meat wrap,
44	Paper / foil composite wrap		Wrap for food or non-food items, commercial & non-commercial; example hamburger paper/ foil composite wrap,
45	Plastic wrap		All plastic wrap types, food, non-food
46	Polystyrene Trays		Trays for take-out, non-take out, microwavable, display etc
47	Paper Trays		Trays for take-out, non-take out, microwavable, display etc
48	Other Mat'l Trays (what?)		Trays for take-out, non-take out, microwavable, display etc
49	Gum wrappers		Packaging used to seal, sell gum products
50	Candy bar wraps		Packaging used to seal, sell candy products
51	Candy pouches		Packaging used to seal, sell candy products - pouch format
52	Sweet packaging (describe)		Packaging used to seal, sell confections (cakes, pies, sweet snack products

53	Other confectionery (describe)		All other packaging for confectionaries
54	Condiment package (salt, ketchup, vinegar etc.)		Pouches, containers, creamers etc
55	Utensils		Forks, knives, chop sticks etc
56	Name Brand (Fast Food etc.) Towels / Napkins / Serviettes		Towels & napkins etc with brand identification identifiable
57	Paper Fast Food Plates		Paper Plates, used to serve fast food
58	Poly Fast Food Plates		Polystyrene Plates, used to serve fast food
59	Other Plastic FF Plates		Other Material Plates, used to serve fast food
60	Plates - Other Materials		Plates for other than fast food applications, i.e. picnic plates used by families
61	Clothing or clothing pieces		All cloth, clothing pieces, and clothing discarded on the site
62	Other cloth		Tarps, industrial fabrics etc
63	Snack food packaging		All snack food (i.e.. Salty snacks, chips)
64	Plastic packaging other		Plastic packaging otherwise not described
65	Paper packaging other		Paper packaging otherwise not described
66	Plastic / composite other		All paper and composite debris not previously described
67	Foil materials / foil pieces		Foils and pieces, aluminum food foils, industrial foils
68	No Brand Name Towels / Napkins / Serviettes		Napkins and towels - no brand identification
69	Lottery ticket debris		Tickets, and gaming items
70	Printed material (newspapers, flyers, books etc.)		All printed material, commercially printed
71	Stationary (school, bus. etc.)		Includes school papers, written items, other printed materials such as business forms
72	Receipts (business forms, bus transfers etc.)		Receipts, business items, invoices, packing slips, bus transfers, commercial tickets (concerts, cinema)

73	Cigarette / cigar debris (>4")		Tobacco items
74	Tobacco other (packs, matches, cellophane)		Packages, wrappers, tobacco foil products, lighters, matchboxes
75	Foil containers		Foil containers (ice cream wraps)
76	Misc. Paper		All other non-described paper material, whole or shredded, unidentifiable as another category
77	Misc. Plastic		All other non-described plastic material, whole or shredded, unidentifiable as another category
78	Misc. Paperboard		All other non-described paperboard material, whole or shredded, unidentifiable as another category
79	Misc. Cardboard		All other non-described cardboard material, whole or shredded, unidentifiable as another category
80	Misc. Glass		All other non-described glass material, whole or broken, unidentifiable as another category
81	Vehicle & Metal Road Debris		Debris associated with transportation, private or commercial
82	Construction debris		Debris associated with construction, private or commercial
83	Tire & Rubber debris		Rubber materials, tire pieces, shock absorbers, sheet rubber or pieces
84	Home Articles		All non-described household items, (i.e.. Lamps, electrical, lawn chairs, etc)

2.6 Survey Counts

After setting up each site, one auditor commenced the large litter survey count, and recorded brands of items observed at the site. The other auditor commenced the small litter survey, using the methodology described above.

Before starting the large litter survey, the field technician first checked his/her tape recorder to ensure it was working properly.

The auditor then dictated the description sections of the Surveyor Site Form (Appendix 1) into the recorder. This information describes the site number, date, digital photos taken, camera used, start time, type of site (residential, industrial, commercial, downtown core), type of roadway, whether road is divided, grass height, evidence of a clean-up, stop sign/ traffic light visible, fast food near-by, convenience store nearby, described the litter catch points (grass mow line, hedge, fence, other), and provided a visual litter rating on a subjective basis. All photographs are part of the archival record for this survey – and are part of the electronic database supplied to the City

The visual litter rating is an "opinion" expressed by the surveyor as to whether the site is dirty (highest rating = 4) or clean (lowest rating = 1).

Once this information is recorded the auditor proceeds to walk the first pass through the site slowly, taping his/ her observations into the tape-recorder as they observe the site. Proceeding back and forth across the site until the surveyor has walked the site up to the mid-point. The surveyor noted that they had reached the mid-point, then continuing on observing litter up to the end of the site boundary, making verbal notations of the litter observed and describing them into the 84 sub-categories of litter. This completed "Pass One". The surveyor then repeated the observations (Pass Two) over the site, using the same procedure, but in the opposite direction. Results of the two passes are used in data analysis.

2.7 Documentation & File Management

At each site the teams were required to make a tape-recorded record of their observations of large litter. At the end of doing the verbal entries into the recorder, a team member then transcribed the verbal observations onto a Large Litter Site Form (Appendix 1). In this way the verbal record was transferred to a written record for the site.

These forms were later entered into MGM Management's database for analysis. Each site's observation forms were transcribed at the site before leaving the location. If a recording problem occurred, the site was redone.

Each form was returned in its file folder to the Project Manager for archival purposes. All data forms were scanned to preserve them for archival purposes.

2.8 Photographic Record of the Site

At each site location, the litter audit team took digital photographs. One shot was taken at the start of the site, looking towards the end of the site – away from the vehicle. The second shot was taken in the mid-point of the site – looking across the width of the site toward the boundary. And the final photograph was taken at the end of the site – looking back towards the start of the site (towards the vehicle). The purpose of the photographs is to set the scene

of what an individual site looked like at the time of its audit – not to show details of the litter on the ground.

In each case the number of photographs at each site was recorded on the Surveyor Site Form. The site-specific digital photographs were downloaded to the database of the survey, as an archival record of the site during the audit period.

Figure 5 - Site Photographs (example photographs)

2.9 Branded Litter Observations

Using the Large Litter Site Form (with 84 sub-categories of large litter) as a guide, data was also gathered for observing Branded Litter. Branded litter is large litter (i.e. over 4 square inches) that has a recognizable brand name affixed. Team auditors verbally identified litter by brand name, which was later transcribed onto the Large Litter Site Form, for data entry and analysis. Where any doubt occurred in the identification of a brand of litter, no entry was made.

2.10 Survey Schedule and Progress

The field audit teams were assembled for training on April 20, 2009. Following an orientation and safety training session field observations began immediately. Fieldwork was conducted between April 20 – May 5, 2009.

Each two-person audit team were able to complete between 7 – 10 sites per day allowing for breaks, lunch and travel time.

3.0 Large Litter Survey Results

Field observations were dictated into tape recorders, and then later transcribed onto Large Litter Site Form (Appendix 1).

Forms were then inputted into a Microsoft Access database for analysis.

3.1 Discussion of Large Litter Results

Litter counted for the City of San Francisco Litter audit, were grouped into 14 broad categories.

- Other (incl. misc. paper)
- Other Packaging (salty snacks etc)
- Cups (hot, cold drinks)
- Tobacco products
- Bags (paper, plastic)
- Food wraps
- Plates

Paper (printed mat's, news)
Confectionary (candy)
Beverage containers
Other Containers (not beverage)
Take out extras (condiments etc)
Cloth / Clothing
Trays

In total, 4,488 pieces of large litter were counted. This is an average of 34 items per site based upon the 132 sites audited. This compares to 3,978 large litter items averaging 31 items of large litter per site in the 2008 audit and 3,812 large litter items, averaging 36 items of large litter per site in the 2007 audit.

The table below illustrates the results of the 2009 large litter audit results compared to 2007 (baseline year) and 2008.

Table 4 – Summary of Results 2009, 2008, 2007

2009	2008	2007
Sites	**Sites**	**Sites**
132	130	105
Items/ Site	**Items/ Site**	**Items/ Site**
34.0	30.6	36.3
11%	-16%	Baseline

-6.4% 2009 lower than 2007 baseline year

The 2009 audit results show an 11% increased in large litter items / site compared to 2008, however the 2009 results for large litter were 6.4% lower than the baseline year of 2007.

The largest category of large litter observed was Miscellaneous Paper at 552 litter pieces. This is a higher result for this sub-category as compared to the 2008 (319 items) but similar to the result for this sub-category in the 2007 audit (570 items). Non-branded paper napkins were the next most significant sub-category noted in the 2009 audit (438 items). This is a lower result for this sub-category as compared to the 2008 (664 items) but similar to the result for this category in the 2007 audit (494 items).

Printed paper materials were the third most significant litter sub-category in the 2009 audit, at 373 items, which is similar to the result noted in 2008 (380 items) and higher than noted in 2007 (287 items)

In 2009 fiber materials contributed 46% of the total large litter observed. In 2008 fiber contributed 51% of the total large litter observed, as compared to 54% in the 2007 audit. Fiber based litter included paper, paperboard, cardboard, towels, napkins, newspapers, books, flyers, printed materials, and business forms, stationary , paper packaging, and paper bags. The data suggests that fiber based litter continues to be a major contributor to litter on San Francisco streets

Table 5 - All Paper & Fiber Litter – 2009 Audit

All Fiber Observed	**Items Observed**	**% of Total Large Litter**
Printed materials	557.5	12.4%
Misc. Paper	552.5	12.3%
Napkins (all types)	479	10.7%
Fiber Packaging (incl bags/wraps)	432.5	9.6%
Misc. Cardboard	34.5	0.8%
Misc. Paperboard	6	0.1%
	2,062	45.9%

Note: Whole numbers may not appear due to averaging.

The second most significant material type observed were plastic materials. These included miscellaneous plastic, plastic packaging, wrap, plastic bags-retail and non-retail, hot and cold plastic drink cups, plastic jars, bottles, composites, utensils, zip bags, beverage containers, trays, polystyrene cups, confectionary, sweet and snack food packaging, pouches, plates, retail bags, and carrying rings. The most significant single category of plastic litter was unidentified miscellaneous plastic litter; which is litter that is broken up or weathered such that auditors cannot identify it with certainty but can identify the litter as plastic. Miscellaneous plastic litter accounted for 219 littered items or 4.9 % (compared to 4.7% in 2008) of total litter. All large plastic litter in aggregate accounted for 887 items observed (compared to 953 in 2008 and 746 in 2007). Plastic litter accounted for 20% of total large litter observed in 2009 (compared to 24 % in 2008 and 20% in 2007). Details of the plastic litter observed appear below in Table 6 – All Plastic Litter 2009 Audit.

Table 6 - All Plastic Litter – 2009 Audit

All Plastics Observed	Items Observed	% of Total Large Litter
Misc. Plastic	219	4.9%
Cup Lids, Pieces lids	160.5	3.6%
Plastic packaging other	111.5	2.5%
Plastic retail bags	68	1.5%
Plastic drink cups	51	1.1%
Plastic Jars / Bottles/ Lids	32.5	0.7%
Utensils	29.5	0.7%
Polystyrene cups (foam)	27.5	0.6%
Plastic wrap	25	0.6%
Plastic bags - not retail	23.5	0.5%
Candy pouches	17.5	0.4%
Sweet packaging	17	0.4%
Water bottles (plastic)	15.5	0.3%
Zipper bags/ sandwich	15.5	0.3%
Plastic / composite other	13	0.3%
Other confectionery pckg	12.5	0.3%
Sport Drink (plastic)	11	0.2%
Other Plastic Shells/Boxes	10	0.2%
Polystyrene clamshells	7	0.2%
Polystyrene Trays	7	0.2%
Poly Fast Food Plates	5.5	0.1%
Other Plastic FF Plates	5	0.1%
Six pack plastic rings	2.5	0.1%
	887	19.8%

Note: Whole numbers may not appear due to averaging.

In Figure 6, below we compare litter occurrence in San Francisco versus all previous audits completed by the consultant. This allows a comparison to other jurisdictions where litter audits have been done using the same methodology.

The average of items of large per site observed in San Francisco in 2009, 2008 and 2007 can be compared and contrasted versus other jurisdictions that have conducted litter audits using this methodology.

Figure 6 – Large Litter – San Francisco vs. Other Jurisdictions

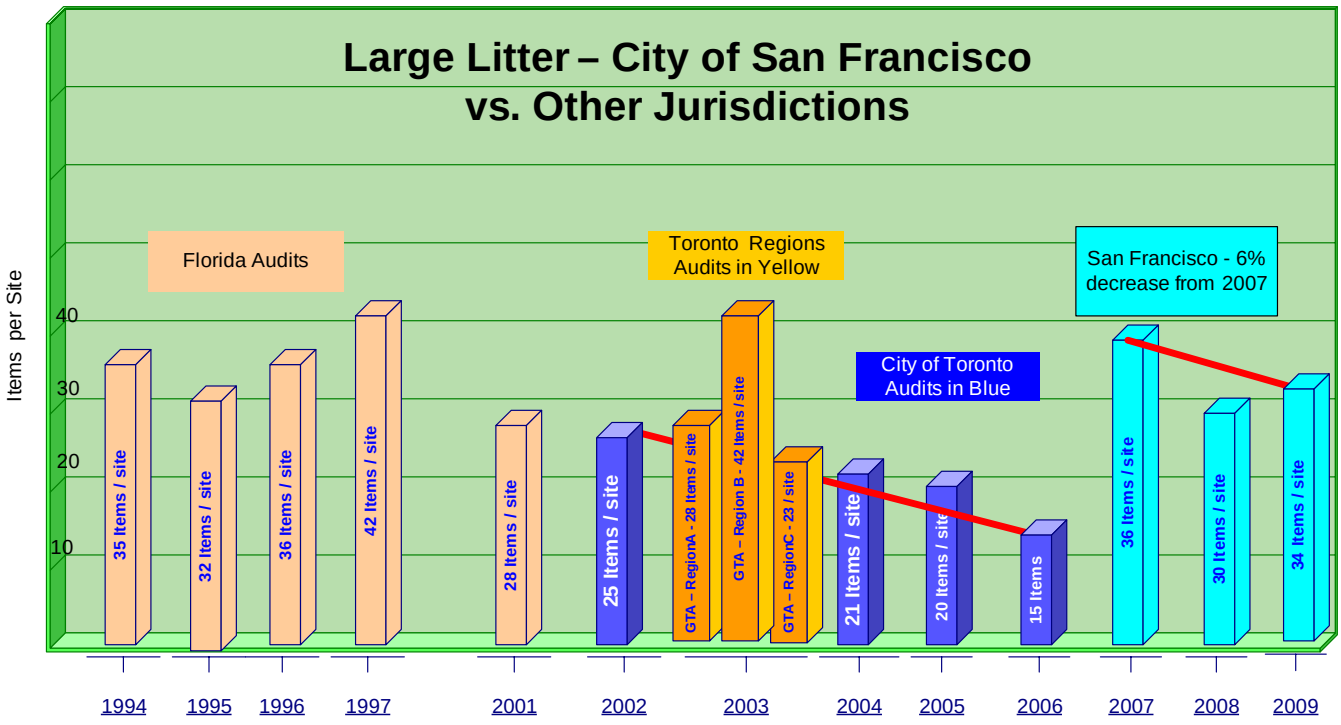


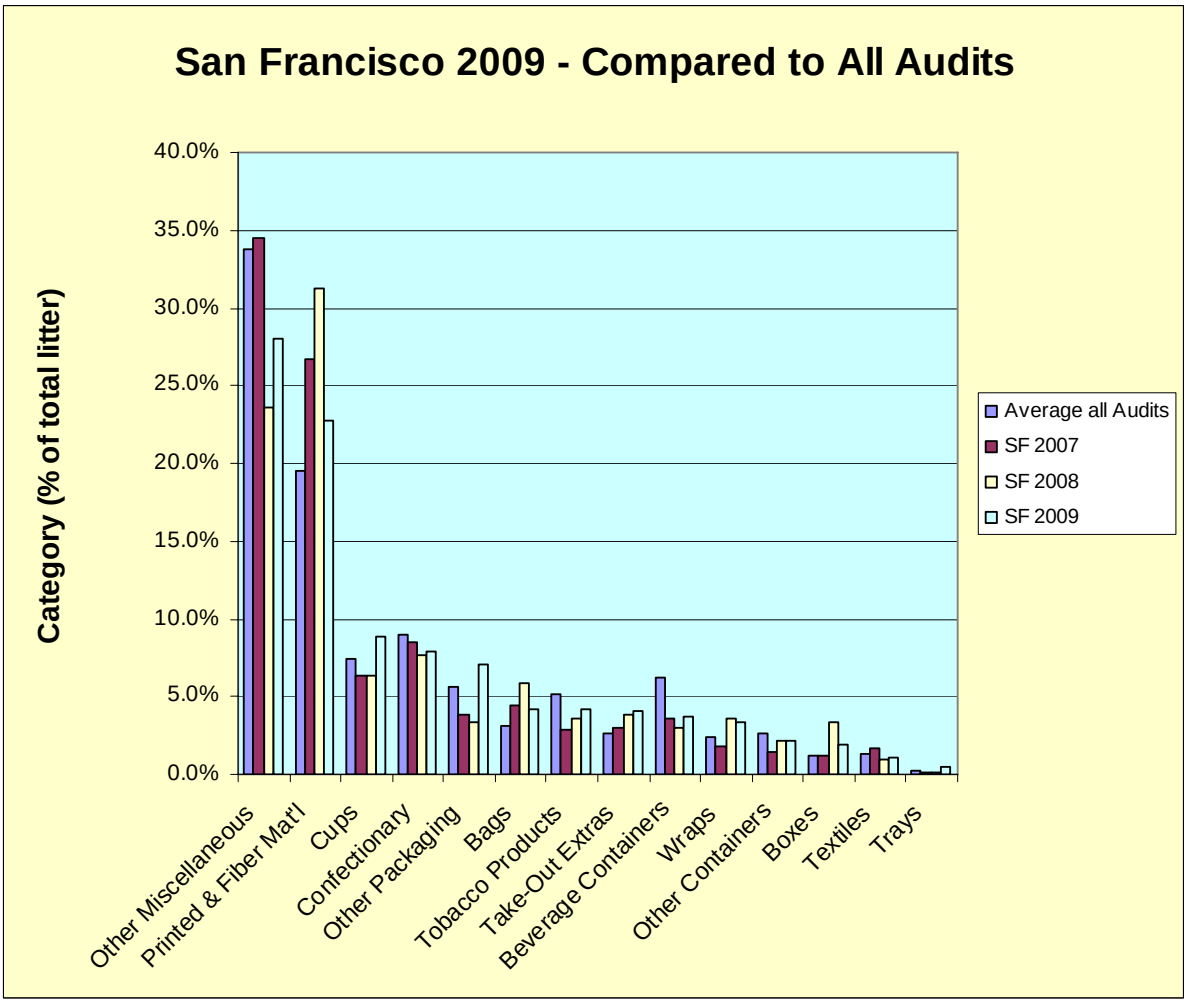
Table 7 – Comparison of San Francisco Litter Audits

San Francisco 2009 vs. Other Jurisdictions (2002 - 2008) [1.]

	Observations - 2002 to 2008 (other jurisdictions)	Percentage 2002 to 2008 (other jurisdictions)	San Francisco April 2007	San Francisco April 2008	San Francisco April 2009
		% of total large litter	% of total large litter	% of total large litter	% of total large litter
		Average all Audits	SF 2007	SF 2008	SF 2009
Other Miscellaneous	22,538	33.8%	34.5%	23.6%	28.0%
Printed & Fiber Mat'l	13,009	19.5%	26.7%	31.3%	22.8%
Cups	4,980	7.5%	6.4%	6.4%	8.9%
Confectionary	5,991	9.0%	8.6%	7.6%	7.9%
Other Packaging	3,727	5.6%	3.8%	3.3%	7.1%
Bags	2,057	3.1%	4.4%	5.9%	4.2%
Tobacco Products	3,406	5.1%	2.9%	3.7%	4.2%
Take-Out Extras	1,730	2.6%	3.0%	3.8%	4.1%
Beverage Containers	4,180	6.3%	3.5%	3.0%	3.7%
Wraps	1,563	2.3%	1.8%	3.6%	3.4%
Other Containers	1,763	2.6%	1.4%	2.2%	2.1%
Boxes	793	1.2%	1.2%	3.4%	1.9%
Textiles	863	1.3%	1.6%	1.0%	1.1%
Trays	133	0.2%	0.2%	0.1%	0.5%
	66,733	100.0%	100%	100%	100%

1. Aggregated litter data, Litter audits by MGM Management including:
City of Toronto, Canada (2002, 2003, 2004 (2 audits), 2005, 2006
Regional Municipality of Peel, Canada (2003)
Regional Municipality of York, Canada (2003)
Regional Municipality of Durham, Canada (2003)
City of Edmonton, Canada (2007)
City of San Jose, CA (2008), City of San Francisco 2007 & 2008

Figure 7 - Comparison San Francisco to All Litter Audits



Note: Chart compares San Francisco – Large litter results to all litter observations conducted by consultant , 2002 - 2009

Miscellaneous paper, non-branded napkins, printed materials, candy bar wrappers, miscellaneous plastics and tobacco products led the list of items found on 2009 audit sites.

The top 25 sub-categories, accounted to 81% of the total large litter observed in the 2009 audit.

Figure 8 and Table 8 below illustrate these findings.

Figure 8 – Top 25 Subcategories Significant

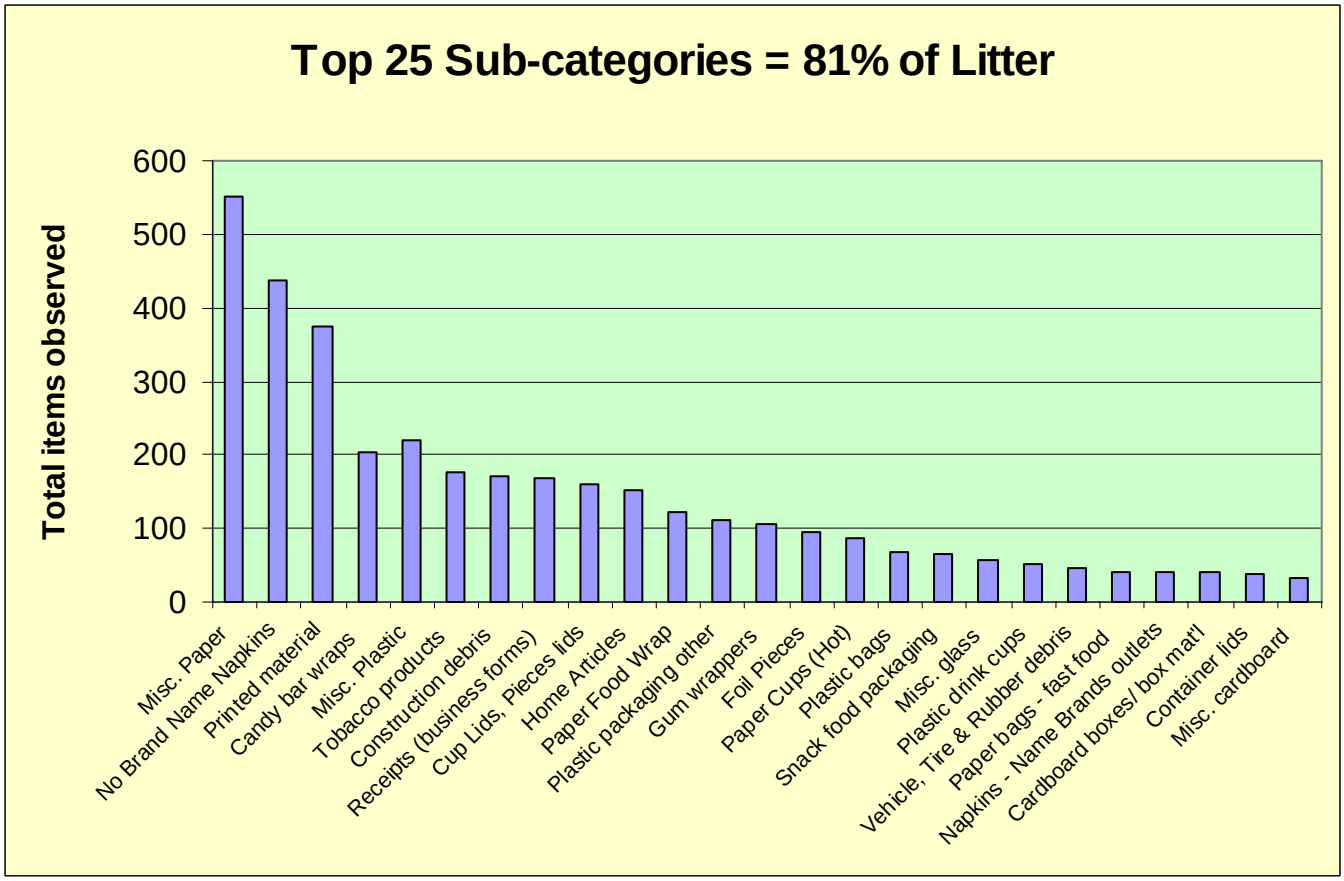


Table 8 - Details of the Top 25 Sub-categories

Top 25 Sub-categories 2009

		2009	2008	2007
1	Misc. Paper	552	317	570
2	No Brand Name Napkins	438	664	495
3	Printed material	374	380	287
4	Candy bar wraps	203	100	152
5	Misc. Plastic	219	186	342
6	Tobacco products	177	144	109
7	Construction debris	170	103	Not in Top 25
8	Receipts (business forms)	167	167	203
9	Cup Lids, Pieces lids	161	96	101
10	Home Articles	151	128	145
11	Paper Food Wrap	122	51	Not in Top 25
12	Plastic packaging other	112	56	Not in Top 26
13	Gum wrappers	106	131	32
14	Foil Pieces	96	Not in Top 25	Not in Top 25

		2009	2008	2007
15	Paper Cups (Hot)	87	57	36
16	Plastic bags	68	136	72
17	Snack food packaging	66	Not in Top 25	Not in Top 25
18	Misc. glass	57	Not in Top 25	Not in Top 25
19	Plastic drink cups	51	Not in Top 25	Not in Top 25
20	Vehicle, Tire & Rubber debris	47	62	43
21	Paper bags - fast food	41	Not in Top 25	Not in Top 25
22	Napkins - Name Brands outlets	40	Not in Top 25	Not in Top 25
23	Cardboard boxes/ box mat'l	40	49	51
24	Container lids	38	Not in Top 25	Not in Top 25
25	Misc. cardboard	32	Not in Top 25	Not in Top 25
	Sum - Top 25 Sub-categories	3,615		
	% of Total Large Litter	81%		

Table 9 - Summary of All Large Litter Observed (2009 – 2008 - 2007)

San Francisco - All Large Litter Data

Large Litter	**2009 Results**	2008 Results	2007 Baseline
Misc. Paper	552.5	317	570
No Brand Name Towels / Napkins / Serviettes	438.5	664	494.5
Printed material (newspapers, flyers, books etc.)	373.5	380	287
Misc. Plastic	219	185.5	342
Candy bar wraps	203	100	152
Tobacco other (packs, matches, cellophane)	177	144	109
Construction debris	169.5	102.5	31.5
Receipts (business forms, bus transfers, etc.)	167	166.5	203
Cup Lids, Pieces lids	160.5	96	100.5
Home Articles	151	127.5	145
Paper Food Wrap	122	51	32.5
Plastic packaging other	111.5	55.5	27.5
Gum wrappers	105.5	131	32
Foil materials / foil pieces	95.5	55.5	104.5
Paper Cups (Hot)	87	56.5	36
Condiment package (salt, ketchup, vinegar etc.)	77	87	46
Paper Cups (cold)	72	37	32
Plastic retail bags	68	25.5	23
Snack food packaging	66	30	90.5
Misc. Glass	57	18.5	65
Plastic drink cups	51	31	29.5
Vehicle & Metal Road Debris	46.5	33	43
Paper bags - fast food	41	6	7
Name Brand (Fast Food etc.) Towels / Napkins / Se	40.5	14.5	14.5
Cardboard boxes/ box mat'l	39.5	49	7
Container lids	39	6.5	3
Misc. Cardboard	34.5	35	50.5
Clothing or clothing pieces	33.5	26.5	28
Plastic Jars / Bottles/ Lids	32.5	74	33
Paper packaging other	31	10	2.5
Utensils	29.5	37	49
Foil Pouches	28	8.5	7
Polystyrene cups (foam)	27.5	31	43
Lottery ticket debris	26.5	6	31
Plastic wrap	25	85.5	25.5
Plastic bags - not retail	23.5	136	71.5
Paper retail bags	21	14	14
Paper bags - not retail	20.5	43	42.5
Other cloth	18	9	34
Paper Fast Food Plates	18	4	3
Candy pouches	17.5	71.5	18.5
Milk/Juice (Plastic)	17	5.5	7
Stationary (school, business etc.)	17	25.5	1
Sweet packaging	17	16	30.5
Paperboard (cereal type)	16	39.5	10
Water bottles (plastic)	15.5	11	9

Large Litter

	2009 Results	2008 Results	2007 Baseline
Zipper bags/ sandwich	15.5	10.5	11.5
Beer Bottles (glass)	14.5	2.5	29.5
Plastic / composite other	13	9	10.5
Tire & Rubber debris	13	62	9.5
Other confectionery pckg	12.5	7	3
Wine/ Liquor (glass)	12.5	7	3.5
Cigarette / cigar debris (>4")	11.5	1	1
Other Mat'l Trays (what?)	11.5	0	0
Soft Drink (plastic)	11	6	4
Aseptic (Box)	10.5	1	5.5
Other Plastic Shells/Boxes	10	16	7.5
Glass jars/ bottles misc.	9.5	3.5	2
Wine/ Liquor (plastic/other)	9.5	12	13
Soft Drink (cans)	9	17	12
Milk/Juice (Gable Top)	8.5	13.5	4
Paper Beverage Cases	8.5	8.5	0
Cans - steel	7	2	5
Foil containers	7	17	10
Polystyrene clamshells	7	7.5	20
Polystyrene Trays	7	2.5	1
Soft Drink (glass)	7	1	6
Sport Drink (plastic)	7	4.5	3
Paper / foil composite wrap	6.5	4.5	10
Beer Cans	6	4	6
Misc. Paperboard	6	55.5	59
Paper clamshells	6	12	1
Paper Trays	6	0	4
Sport Drink (glass)	6	0	10
Aerosol cans (paint, oils, etc.)	5.5	0	5
Plates - Other Mat's	5.5	0	0
Poly Fast Food Plates	5.5	4	3
Other Plastic FF Plates	5	4	0
Milk/Juice (glass)	2.5	3	1
Other paper cups	2.5	3	1
Six pack plastic rings	2.5	2.5	0
Broken Glass Container	1	10	2
Cans - steel	0	0	5
Cans - aluminium	0	0	6
	4488.5	3972.5	3812.5

2009	2008	2007
Sites	**Sites**	**Sites**
132	130	105
Items/ Site	**Items/ Site**	**Items/ Site**
34.0	30.6	36.3

Change from previous year audit	11%	-16%	Baseline
	-6.4%	2009 lower than 2007 baseline year	

3.2 Detailed Analysis by Major Category

3.2.1 Beverage Containers

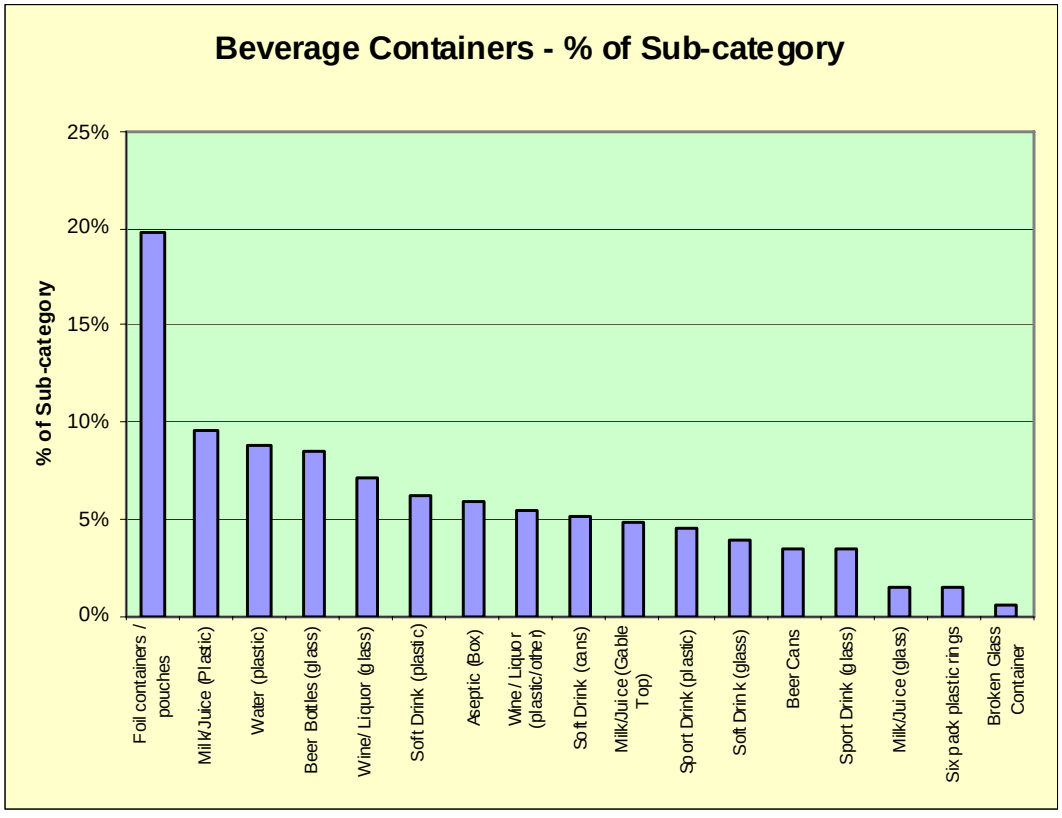
(Soft drink, beer, wine/liquor, milk & juice, sports drinks, water)

Beverage Containers

	2009	2009	2009	2008	2007
Soft drinks, bottled water, juices, milk, liquor, wine , beer , sport dinks , other	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Foil containers / pouches	35	20%	0.780%	0.642%	0.460%
Milk/Juice (Plastic)	17	10%	0.379%	0.151%	0.180%
Water (plastic)	15.5	9%	0.345%	0.277%	0.250%
Beer Bottles (glass)	15	8%	0.334%	0.063%	0.770%
Wine/ Liquor (glass)	12.5	7%	0.279%	0.176%	0.090%
Soft Drink (plastic)	11	6%	0.245%	0.151%	0.100%
Aseptic (Box)	10.5	6%	0.234%	0.025%	0.140%
Wine/ Liquor (plastic/other)	9.5	5%	0.212%	0.302%	0.340%
Soft Drink (cans)	9	5%	0.201%	0.428%	0.330%
Milk/Juice (Gable Top)	8.5	5%	0.189%	0.113%	0.100%
Sport Drink (plastic)	8	5%	0.178%	0.126%	0.080%
Soft Drink (glass)	7	4%	0.156%	0.025%	0.170%
Beer Cans	6	3%	0.134%	0.101%	0.160%
Sport Drink (glass)	6	3%	0.134%	0.000%	0.280%
Milk/Juice (glass)	2.5	1%	0.056%	0.076%	0.040%
Six pack plastic rings	2.5	1%	0.056%	0.050%	0.000%
Broken Glass Container	1	1%	0.022%	0.252%	0.050%
	176.5	100%	3.93%	2.96%	3.54%

Note: Whole numbers may not appear due to averaging.

Average 2002 - 2009, all audits 67,000 observations = 6.3%



Discussion:

More beverage container litter was observed in 2009, than in 2008 or in 2007. In 2009 the audit documented 176 beverage containers (3.9% of total large litter) compared to a count of 118, or 3.0 % in 2008, and 3.5% in 2007.

These levels of beverage container litter are lower that than the 6.3 % of total litter for beverage containers observed in audits conducted by the consultant in all jurisdictions from 2002-2009 by this consultant. This may be partially explained by the California Redemption Value, placed upon containers in California which provides an incentive for many of these containers to be salvaged for refunds. It is interesting to note that in San Francisco, non-California Redemption Value containers were the products observed most often, such as milk, juice and drink pouch containers

As in 2008, foil pouches and foil beverage containers were the largest subcategory observed as beverage container litter. These pouches continue to be extremely popular at and are used by brands such as Capri Sun and Minute Maid.

Soft drink containers in aggregate accounted for less than 1 % of total litter (0.91% for all types of soft drink and sport drink containers – compared to 0.73% in 2008). Beer containers accounted for more litter than in 2008, 0.47% of total litter compared to 0.16% in 2008, and 0.92% of total litter in 2007.

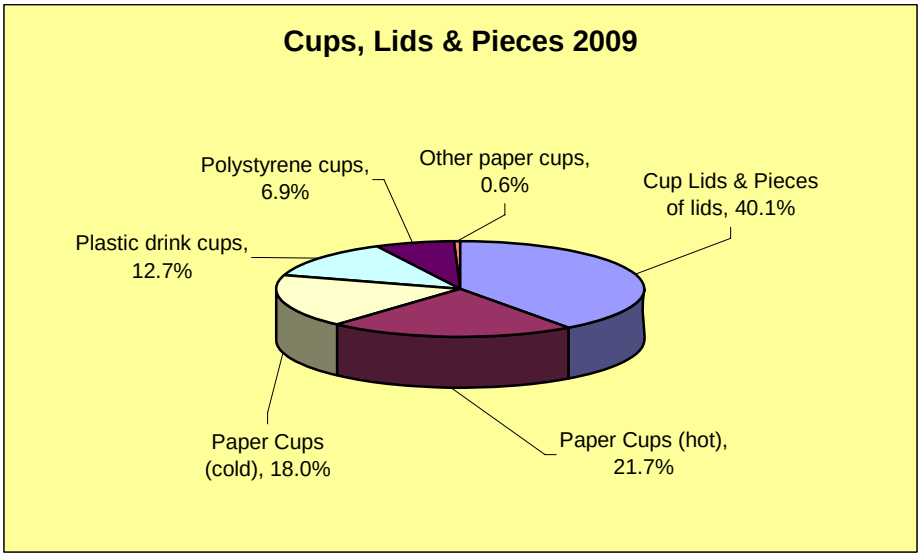
Water bottles continue to be a significant portion of beverage container litter being the third largest type of containers observed during the audit (9% of subcategory and 0.345 % of total litter.

3.2.2 Cups

Cups, lids, pieces of cup debris[1.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Cup Lids & Pieces of lids	160.5	40.1%	3.6%	2.42%	2.64%
Paper Cups (hot)	87	21.7%	1.9%	1.42%	0.94%
Paper Cups (cold)	72	18.0%	1.6%	0.93%	0.84%
Plastic drink cups	51	12.7%	1.1%	0.78%	0.77%
Polystyrene cups	27.5	6.9%	0.6%	0.78%	1.13%
Other paper cups	3	0.6%	0.1%	0.06%	0.04%
	400.5	100.0%	8.9%	6.39%	6.36%

1. Note: Whole numbers may not appear due to averaging.
Average 2002 - 2009, all audits 67,000 observations = 7.5%



Discussion:

Cup litter includes hot and cold drink cups and pieces of lids from cups. This is indicative of wastes from a variety of over-the-counter food providers, whereby litter is then deposited on streets and sidewalks. This sub-category includes paper and plastic cups as well as lids and pieces of lids from hot and cold cups.

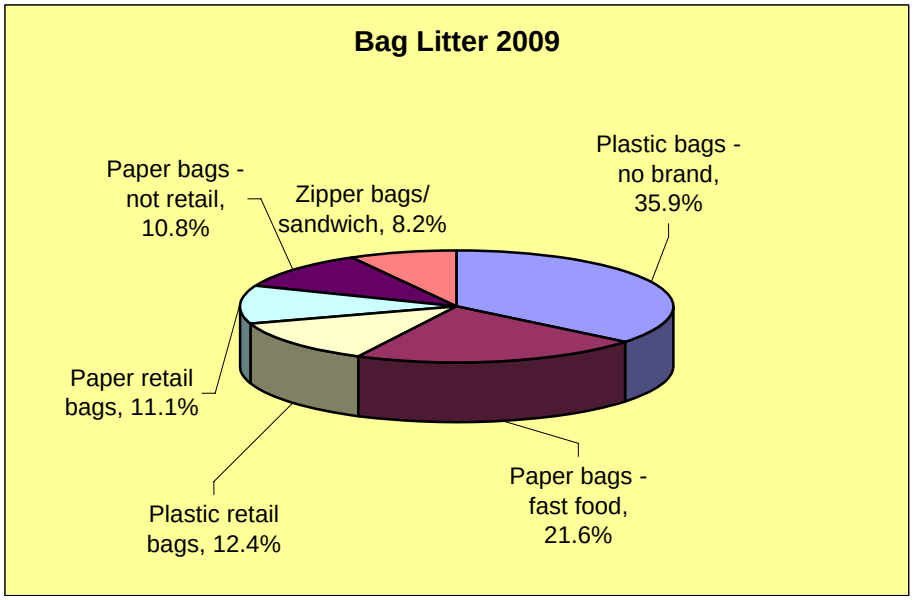
The sub-category contributed less litter in 2009, 8.9% compared to 2008 at 10.1%, but more than the 2007 baseline audit (6.4 % of the total litter). When compared to all litter audits between 2002 – 2009 audits from other jurisdictions which averaged 7.5% of total litter San Francisco appears to have an average or slightly above average amount of cup litter. Cup lids and pieces and paper cups make up the majority of the litter in this category, reflecting those food retailers that sell their products in cups.

3.2.3 Bags

Bags [1.]

	2009 Items	2009 % of Sub-category	2009 % of Total Large Litter	2008 % of Total Large Litter	2007 % of Total Large Litter
Plastic bags - no brand	68	35.9%	1.52%	3.42%	1.11%
Paper bags - fast food	41	21.6%	0.91%	1.08%	1.88%
Plastic retail bags	23.5	12.4%	0.52%	0.64%	0.60%
Paper retail bags	21	11.1%	0.47%	0.35%	0.37%
Paper bags - not retail	20.5	10.8%	0.46%	0.26%	0.31%
Zipper bags/ sandwich	15.5	8.2%	0.35%	0.15%	0.18%
	189.5	100.0%	4.22%	5.91%	4.45%

1. Note: Whole numbers may not appear due to averaging.
Average 2002 - 2009, all audits 67,000 observations = 3.1%



Discussion:

Plastic bags including retail sacks and zipper bags represented 2.4% of total large litter (108 items out of 4,488). Plastic bags accounted for 57% of bag litter, compared to 73% of bag litter observed in the 2008 litter audit. Paper fast food bags accounted for 22 % of this sub-category, with non-fast food and non-retail paper bags (like lunch bags) also representing 22% of the sub-category.

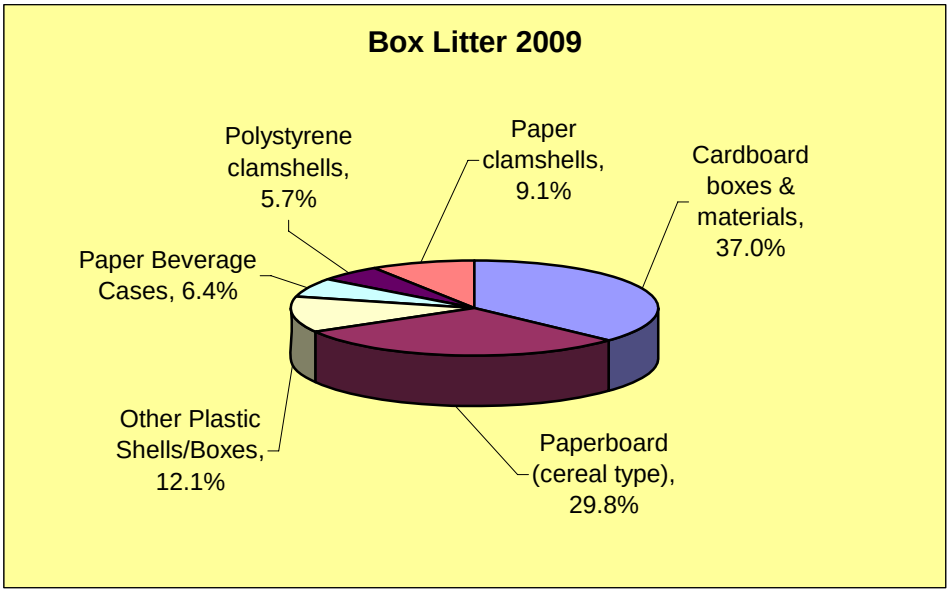
In each of the three litter audits (2007 – 2008 – 2009) bag litter in San Francisco has been observed as being higher (4.5% in San Francisco) than the sub-category average for bags in all audits conducted between 2002 – 2009 (3.1%) in all jurisdictions.

3.2.4 Boxes

Boxes [1.]

	2009 Items	2009 % of Sub-category	2009 % of Total Large Litter	2008 % of Total Large Litter	2007 % of Total Large Litter
Cardboard boxes & materials	39.5	37.0%	0.88%	1.23%	0.20%
Paperboard (cereal type)	16	29.8%	0.36%	0.99%	0.30%
Other Plastic Shells/Boxes	10	12.1%	0.22%	0.40%	0.20%
Paper Beverage Cases	8.5	6.4%	0.19%	0.30%	0.00%
Polystyrene clamshells	7	5.7%	0.16%	0.21%	0.00%
Paper clamshells	6	9.1%	0.13%	0.19%	0.50%
	87	100.0%	1.80%	3.34%	1.20%

1. Note: Whole numbers may not appear due to averaging.
Average 2002 - 2009, all audits 67,000 observations = 1.2%



Discussion:

The amount of large litter in the boxes sub-category which was observed in 2009 was similar to that documented in 2007 (1.8% in 2009, 1.2% in 2007). There was more box litter observed in 2008 than observed in the 2007 audit.

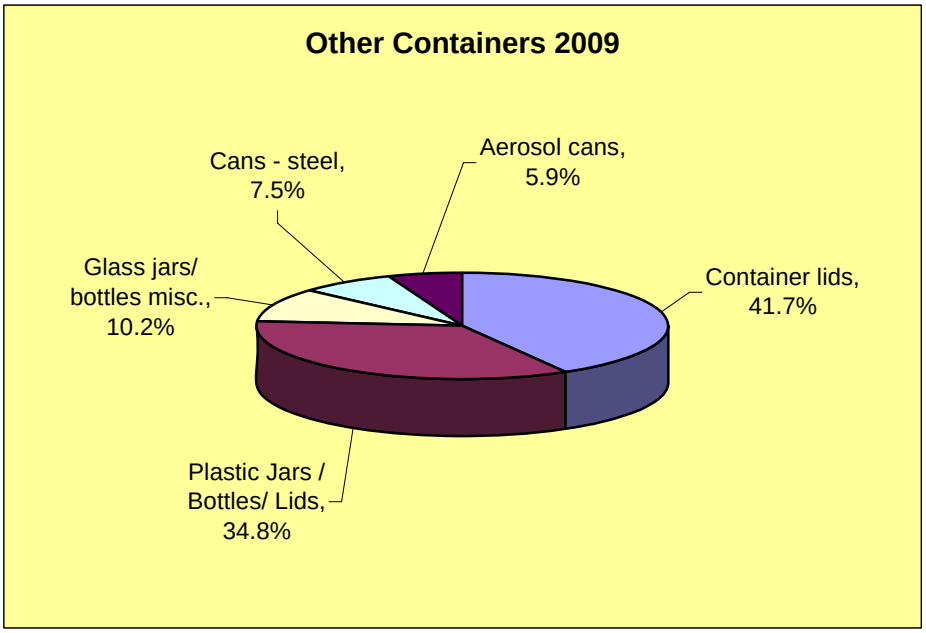
The amount of cardboard box litter was in San Francisco was similar to the average for this sub-category as observed in all jurisdictions audited by the consultant between 2002 – 2009 1.8% vs. 1.2% of all large litter documented in all previous audits).

3.2.5 Other Containers (non-beverage)

Other Containers [1.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Container lids	39	41.7%	0.87%	1.86%	0.87%
Plastic Jars / Bottles/ Lids	32.5	34.8%	0.72%	0.16%	0.08%
Glass jars/ bottles misc.	9.5	10.2%	0.21%	0.09%	0.05%
Cans - steel	7	7.5%	0.16%	0.05%	0.13%
Aerosol cans	5.5	5.9%	0.12%	0.00%	0.14%
Cans - Aluminum	0	0.0%	0.00%	0.00%	0.16%
	93.5	100.0%	2.08%	2.16%	1.43%

1. Note: Whole numbers may not appear due to averaging.
Average 2002 - 2009, all audits 67,000 observations = 2.6%



Discussion:

Containers other than beverage containers accounted for a relatively small proportion of total litter in the 2009 San Francisco litter audit. The amount of Other Containers has held fairly consistent in all three litter audits conducted since 2007, at or around 2% of total large litter.

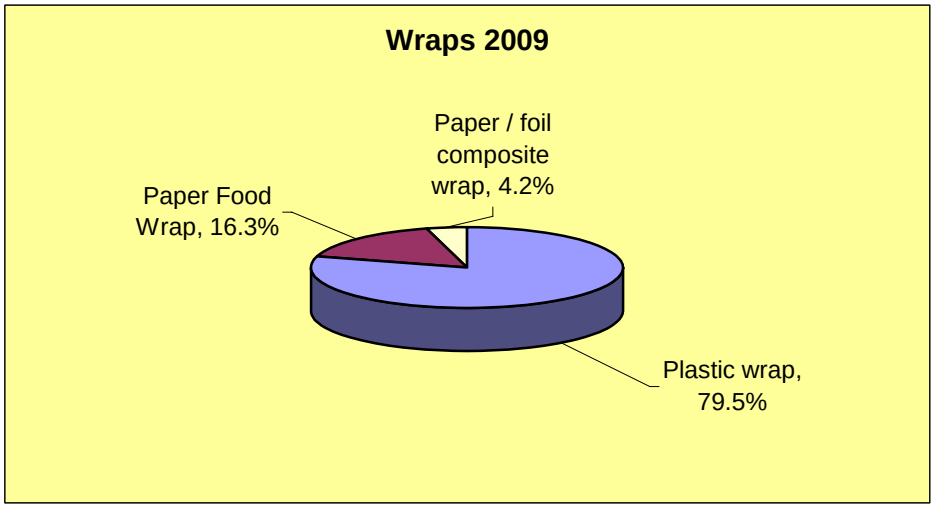
Container lids and plastic jars, bottles and lids which did not fit another specific sub-category were 77% of the litter in this sub-category, which is similar to the results of the 2008 audit for this sub-category. The proportion of Other Container litter observed during the 2009 San Francisco litter audit (2.1% of total large litter) was slightly lower than the consultant's observations of this sub-category (2.6% of total litter), in all previous audits performed between 2002 – 2009 in other jurisdictions (67,000 observations).

3.2.6 Wraps

Wraps [1.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Plastic wrap	122	79.5%	2.72%	2.15%	0.67%
Paper Food Wrap	25	16.3%	0.56%	1.28%	0.85%
Paper / foil composite wrap	6.5	4.2%	0.14%	0.11%	0.26%
	153.5	100%	3.42%	3.55%	1.78%

1. Note: Whole numbers may not appear due to averaging.
Average 2002 - 2009, all audits 67,000 observations = 2.6%



Discussion:

Within this sub-category are items which are used to wrap food for consumption off premises, mainly from fast food outlets. About 40% more food wrap materials were observed in the 2009 and 2008 litter audits as compared to the base year of 2007. This may be a sampling anomaly since the observed wrap litter in 2008 and 2009 are similar. The majority of food wrap materials in 2009 were plastic food wrap litter, accounting for 80% of this subcategory in 2009 of the food wrap materials (plastic food wrap represented 85% of this sub-category in 2008).

The proportion of wrap litter observed during the 2009 San Francisco litter audit was higher than the average found in aggregated litter observations in audits performed between 2002 – 2009 in audits in all other jurisdictions (3.4% wraps in San Francisco vs. 2.6% wraps in 67,000 observations).

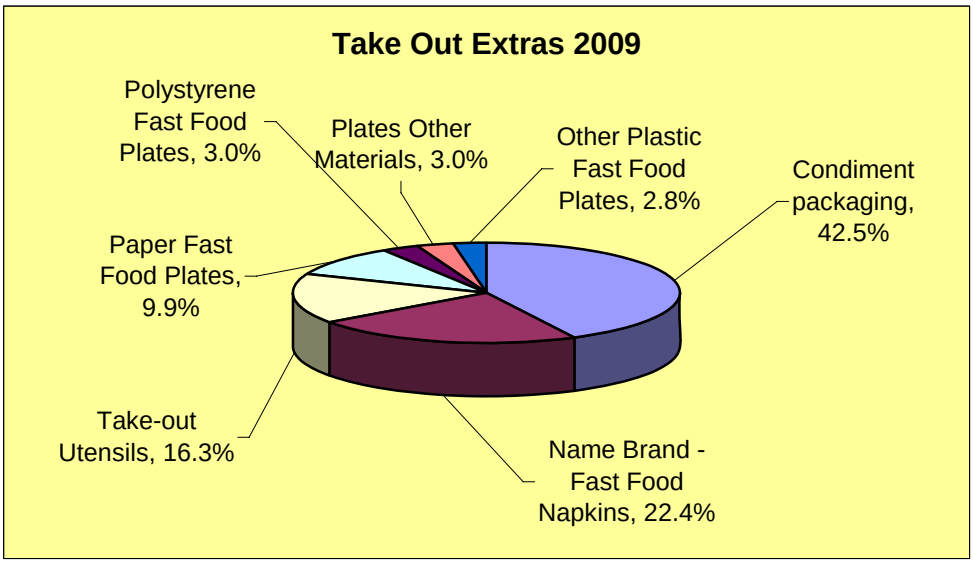
3.2.7 Take Out Extras

Take-Out Extras [1. & 2.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Condiment packaging	77	42.5%	1.72%	2.19%	1.21%
Name Brand - Fast Food Napkins	40.5	22.4%	0.90%	0.36%	0.38%
Take-out Utensils	30	16.3%	0.66%	0.93%	1.29%
Paper Fast Food Plates	18	9.9%	0.40%	0.10%	0.09%
Polystyrene Fast Food Plates	5.5	3.0%	0.12%	0.10%	0.08%
Plates Other Materials	5.5	3.0%	0.12%	0.10%	0.08%
Other Plastic Fast Food Plates	5	2.8%	0.11%	0.10%	0.08%
	181	100.0%	4.03%	3.79%	3.04%

Sub-category average (2002 - 2009 - 67,000 observations) = 2.6%

1. Item counts may not equal whole numbers due to averaging.
2. Take-out extras include: condiment packaging (eg. Salt, pepper, sugar, soya,mustard, relish, mayo, spoons, forks, plates, other fast food items



Discussion:

The sub-category of Take-out Food Extras includes condiment packages (ketchup, vinegar, salt, pepper, etc.) and utensils used by patrons of fast food establishments, as well as name brand napkins and fast food plates. Non-branded napkins are not included in this sub-category, since they may or may not be attributable to fast food outlet customers, and are therefore included with fiber based litter.

In the 2009 litter audit condiment packaging, napkins and utensils continued to be the main large litter components in this sub-category, together accounting for 81% of Take-out Extra litter (same result as in 2008). In all three litter audits since 2007, the proportion of take-out extras litter observed during the San Francisco litter audit has been greater than the average found in aggregated litter observations between 2002 – 2009 in all jurisdictions (4.03% in 2009, 3.79% in 2008, 3.04% 2007; vs. 2.6% in 67,000 observations). Take-out extras litter as a proportion of total large litter has remained at a fairly constant level since 2007.

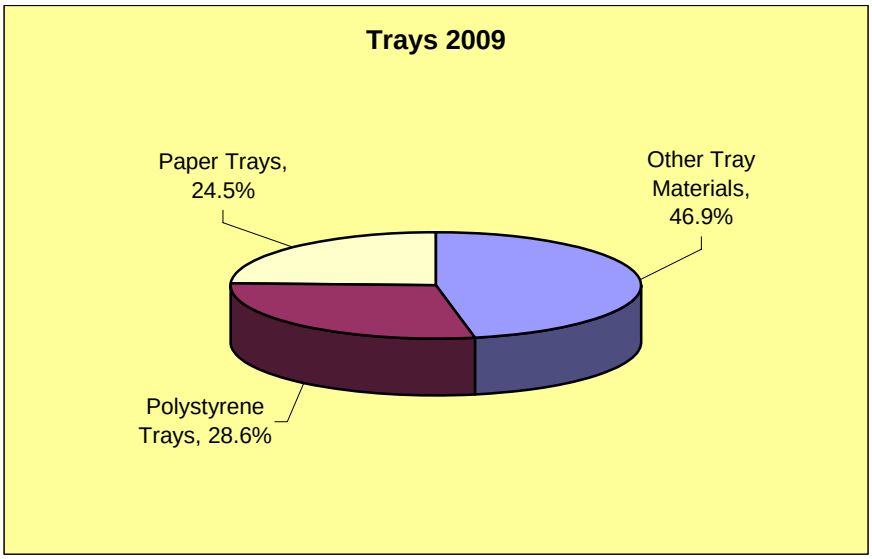
3.2.8 Trays

Trays [1.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Other Tray Materials	11.5	46.9%	0.26%	0.00%	0.00%
Polystyrene Trays	7	28.6%	0.16%	0.08%	0.03%
Paper Trays	6	24.5%	0.13%	0.03%	0.12%
	24.5	100.0%	0.55%	0.10%	0.15%

Sub-category average (2002 - 2009 - 67,000 observations) = 0.2%

1. Item counts may not equal whole numbers due to averaging.



Discussion:

Trays continue to represent a very small sub-category of large litter which is less than 1% of total litter (0.55% in 2009; 0.10% in 2008 and 0.15% of total litter in 2007). Tray litter observed during the San Francisco litter audit was higher than the average found in aggregated litter observations in audits performed from 2002 – 2009 in aggregated data for all jurisdictions. (0.55% wraps in San Francisco vs. 0.20 % take-out extra litter found in 67,000 observations).

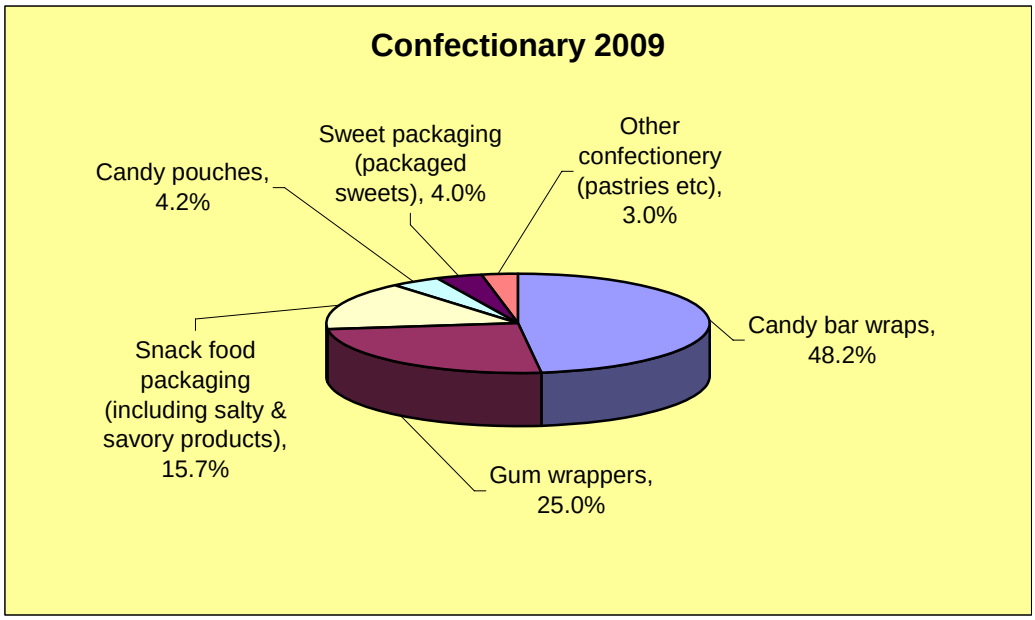
3.2.9 Confectionary

Confectionary [1.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Candy bar wraps	203	48.2%	4.52%	2.52%	3.99%
Gum wrappers	105.5	25.0%	2.35%	3.30%	0.84%
Snack food packaging (including salty & savory products)	66	15.7%	1.47%	0.76%	2.37%
Candy pouches	17.5	4.2%	0.39%	1.80%	0.49%
Sweet packaging (packaged sweets)	17	4.0%	0.38%	0.40%	0.81%
Other confectionery (pastries etc)	12.5	3.0%	0.28%	0.18%	0.07%
	421.5	100.0%	9.39%	7.61%	8.57%

Sub-category average (2002 - 2009 - 67,000 observations) 9.00%

1. Item counts may not equal whole numbers due to averaging.



Discussion:

Confectionary products include candy bar wraps, candy pouches, including other sweet and snack food packaging. Confectionary packaging litter continued to be a significant component of the litter observed in this audit, at 9.4% of total large litter compared to 7.6% observed in 2008 and 8.6% in 2007. The contribution of this sub-category of litter is at the average observed in all audits conducted by the consultant since 2002.

The most significant contributors were candy bar wrappers and gum wrappers which collectively accounted for 73% of the confectionary litter observed in 2009. Confectionary litter observed during the 2009 San Francisco litter audit was slightly higher than the average found in aggregated litter observations in audits performed between 2002 – 2000 in all jurisdictions (9.4 % of total litter in San Francisco vs. 9.0% observed in 67,000 observations).

3.2.10 Textiles

Textiles [1.]

	2009 Items	2009 % of Sub-category	2009 % of Total Large Litter	2008 % of Total Large Litter	2007 % of Total Large Litter
Clothing or clothing pieces	33.5	65.0%	0.75%	0.68%	0.74%
Other cloth	18	35.0%	0.40%	0.23%	0.89%
	51.5	100.0%	1.15%	0.91%	1.63%

Sub-category average (2002 - 2009 - 67,000 observations) =1.3%

1. Item counts may not equal whole numbers due to averaging.

Discussion

In the 2009 litter audit 52 textile items were observed, compared to a 35 items in 2008 and 62 textile items in 2007. The 2009 audit yielded a similar result for textile materials as in 2008 and 2007, confirming that this sub-category is a relatively small contributor to total large litter in the City. The textile litter observed during the 2009 San Francisco litter audit was near the average found in aggregated litter observations in audits performed from 2002 – 2009 in other jurisdictions (1.2% of total litter in San Francisco vs. 1.3% observed in 67,000 combined litter observations).

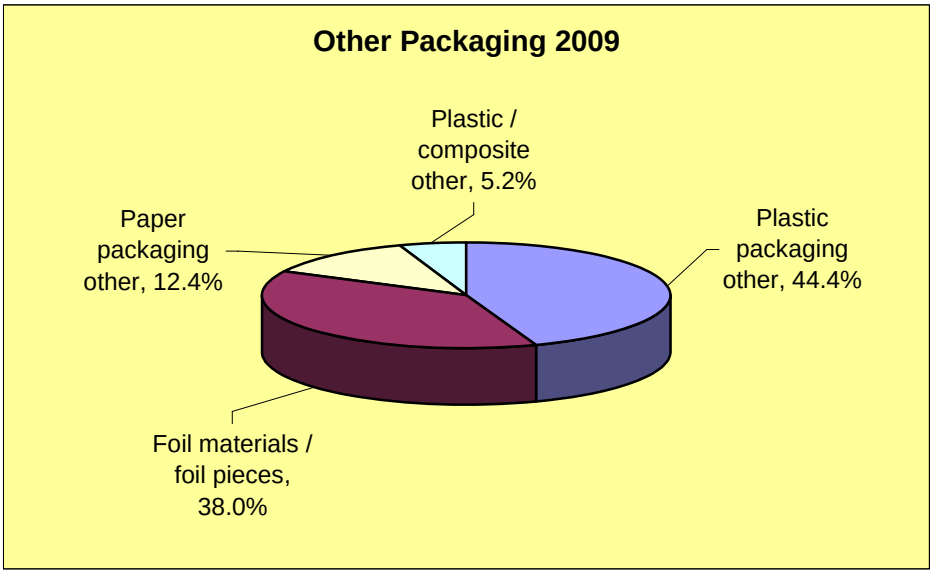
3.2.11 Other Packaging

Other Packaging [1.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Plastic packaging other	111.5	44.4%	2.48%	1.40%	0.72%
Foil materials / foil pieces	95.5	38.0%	2.13%	1.41%	2.74%
Paper packaging other	31	12.4%	0.69%	0.26%	0.27%
Plastic / composite other	13	5.2%	0.29%	0.23%	0.07%
	251	100%	5.59%	3.30%	3.80%

Sub-category average (2002 - 2009 - 67,000 observations) = 5.6%

1. Item counts may not equal whole numbers due to averaging.



Discussion

This sub-category includes packaging that did not fit into other packaging sub-categories, but were identifiable as packaging litter. This sub-category is a significant contributor of large litter in the City.

The data shows a higher contribution of Other Packaging litter in 2009 as compared to the 2008 and 2007 litter audits. In the 2008 litter audit and the 2007 study, “other packaging” large litter was less than the average found in aggregated litter observations in audits performed between 2002 – 2009 in other jurisdictions (2008 – 3.3% and 2007 - 3.8 % of total litter). In 2009, this sub-category increased to 5.6% of total large litter, equalling the average of observed in 67,000 observations, from all jurisdictions between 2002 and 2009.

A similar result was observed in 2009 compared to 2008, whereby other plastic packaging and foil packaging materials and pieces represent 82% of this sub-category (85% in 2008).

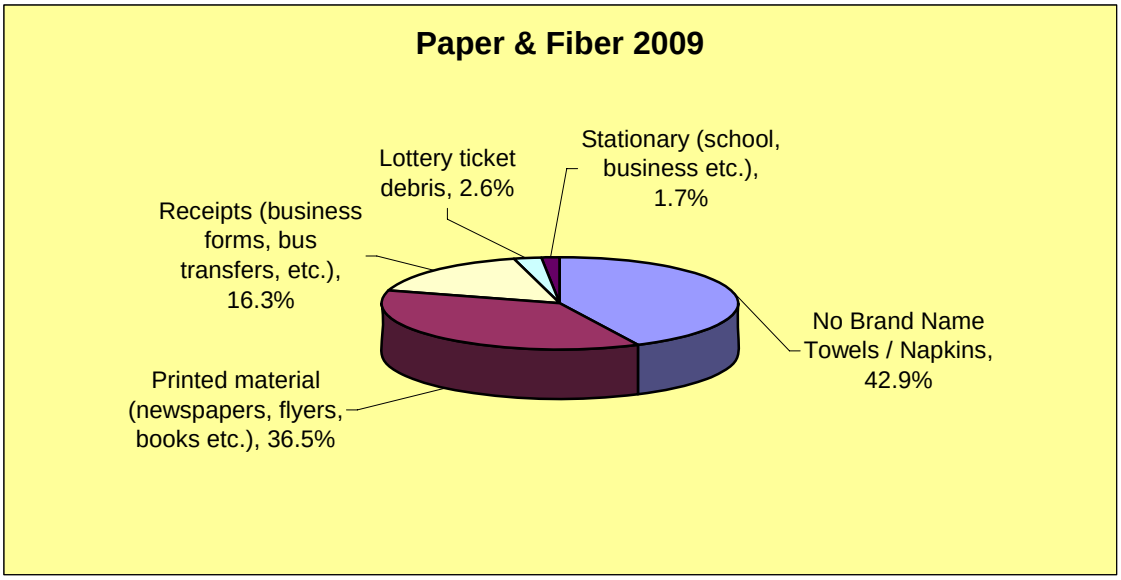
3.2.12 Printed & Fibre Materials

Printed and Fiber Materials [1.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
No Brand Name Towels / Napkins	438.5	42.9%	9.77%	16.71%	13.00%
Printed material (newspapers, flyers, books etc.)	373.5	36.5%	8.32%	9.56%	7.50%
Receipts (business forms, bus transfers, etc.)	167	16.3%	3.72%	4.19%	5.30%
Lottery ticket debris	26.5	2.6%	0.59%	0.15%	0.80%
Stationary (school, business etc.)	17	1.7%	0.38%	0.64%	0.10%
	1022.5	100.0%	22.78%	31.26%	26.70%

Sub-category average (2002 - 2009 - 67,000 observations) = 19.5%

1. Item counts may not equal whole numbers due to averaging.



Discussion

This sub-category continues to be a significant contributor to large litter in San Francisco. The 2009 audit shows similar results for this sub-category as observed in the 2008, and in 2007. The largest contributor to fiber litter in 2009 continues to be paper napkins or pieces of napkins which could not be directly attributed to the fast food sub-category, because no brand markings were visible. It is likely that a significant proportion of this napkin litter originates from fast food service outlets.

Printed materials including newspaper and flyer litter, printed MUNI tickets and other business receipts are significant contributors to large litter observed in the City. This sub-category exhibits a higher proportion of litter, compared to the average found in aggregated litter observations in audits performed from 2002 – 2009 in other (23 % in San Francisco vs. 19.5% from 67,000 previous observations).

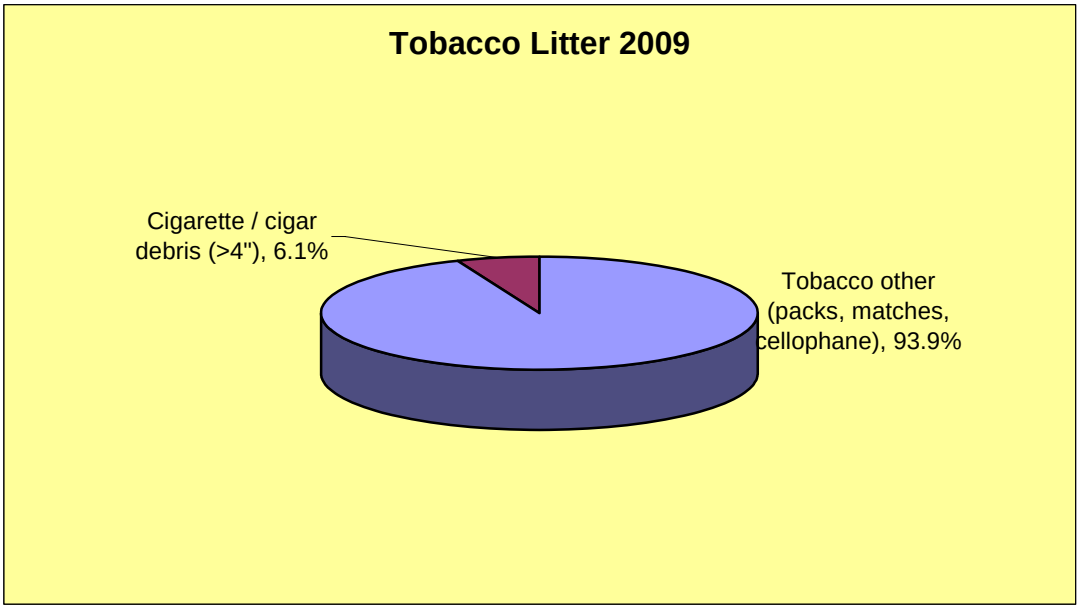
3.2.13 Tobacco

Tobacco Packaging & Materials [1. & 2.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Tobacco other (packs, matches, cellophane)	177	93.9%	3.94%	3.65%	2.89%
Cigarette / cigar debris (>4")	11.5	6.1%	0.26%	0.00%	0.00%
	188.5	100.0%	4.20%	3.65%	2.89%

Sub-category average (2002 - 2009 - 67,000 observations) = 5.1%

1. Item counts may not equal whole numbers due to averaging.
2. Large litter in the tobacco sub-category does not include cigarette butts - which are < 4 sq.in and are included in the analysis of small litter, and Super Site litter that follows in this report



Discussion

The amount of large tobacco litter observed on San Francisco streets was 4.2% of total litter in the 2009 audit, compared to 3.65% of total large litter in 2008. Tobacco packaging and product litter in San Francisco, was observed to be below the average amount of this sub-category found in aggregated litter observations in audits performed from 2002 – 2009 in all jurisdictions (4.2 % of total litter in San Francisco vs. 5.1% observed in 67,000 observations). The reader is directed to the Super Site observations in this report as they appear in Section 5, which comment upon the occurrence of all small litter including tobacco (cigarette butts etc) in an expanded audit procedure. Tobacco products and cigarette butts are a significant contributor to litter on City streets, as they proven to be in most other cities that have conducted litter audits.

3.2.14 Other Miscellaneous

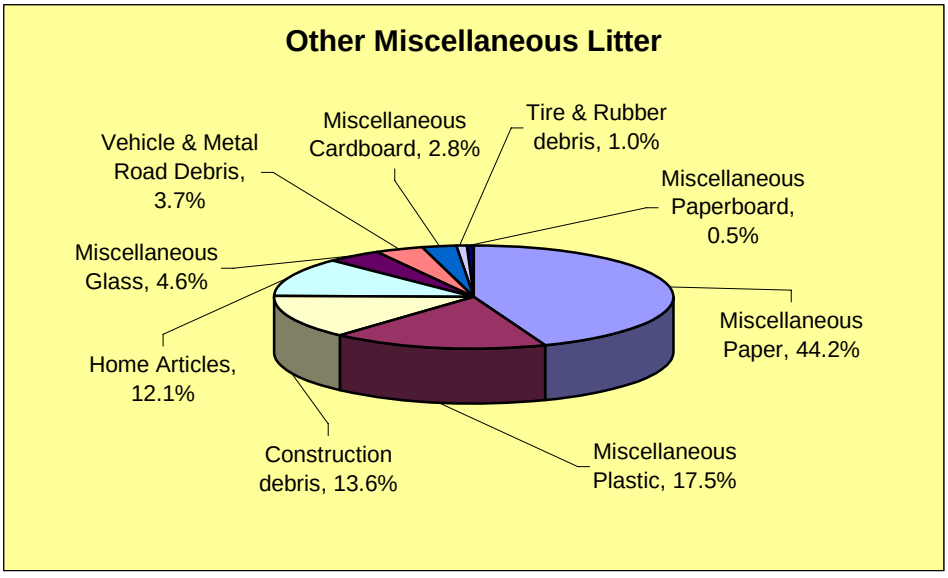
This sub-category is normally the largest sub-category grouping because it includes various miscellaneous material types which cannot be grouped in other categories. The sub-category includes miscellaneous paper, miscellaneous plastic, miscellaneous cardboard, miscellaneous paperboard, miscellaneous glass, vehicle & road debris, tire and rubber debris, construction debris, and home articles.

Other Miscellaneous Materials [1.]

	2009	2009	2009	2008	2007
	Items	% of Sub-category	% of Total Large Litter	% of Total Large Litter	% of Total Large Litter
Miscellaneous Paper	552.5	44.2%	12.31%	7.98%	15.00%
Miscellaneous Plastic	219	17.5%	4.88%	4.67%	9.00%
Construction debris	169.5	13.6%	3.78%	2.58%	0.80%
Home Articles	151	12.1%	3.36%	3.21%	3.80%
Miscellaneous Glass	57	4.6%	1.27%	0.47%	1.70%
Vehicle & Metal Road Debris	46.5	3.7%	1.04%	0.83%	1.10%
Miscellaneous Cardboard	34.5	2.8%	0.77%	0.88%	1.30%
Tire & Rubber debris	13	1.0%	0.29%	1.56%	0.20%
Miscellaneous Paperboard	6	0.5%	0.13%	1.40%	1.60%
	1249	100.0%	27.83%	23.57%	34.50%

Sub-category average (2002 - 2009 - 67,000 observations) = 33.8%

1. Item counts may not equal whole numbers due to averaging.



Discussion:

This sub-category yields the largest segment of large litter observed in the City of San Francisco Litter Audit since it is a sub-category that encompasses much of the unspecific litter observed. In total 1,249 items in this category were observed (28% of all large litter), compared to 937 items in 2008. These results compare to 1,316 Other Miscellaneous litter items which were observed on fewer sites (105) in 2007.

Other Miscellaneous Materials are those that cannot be identified other than by the material type or likely origin of the litter (i.e. home articles, vehicle debris). In the 2009 audit, miscellaneous paper materials accounted for the largest proportion of this sub-category, at 552 large litter items in this sub-category (42% of the sub-category) equalling a significant 12% of the total large litter counted. Miscellaneous plastic material was the next most significant material accounting for 219 items of the sub-category or 4.9% of all the large litter observed.

Miscellaneous paper consists of items of stationary, newspapers, flyers, and often included shredded paper from lawn mowing. This material derives from a plethora of sources, that once weathered or when grass is mowed can be shredded into indistinguishable large litter pieces.

Similar to the 2009 observations, in the 2007 and 2008 audits, miscellaneous paper and miscellaneous plastic represent the two most significant material categories of litter. Because of the nature degradation of paper or plastic litter, it is often not possible for litter auditors to determine what the paper or plastic litter was as an original product or packaging component. Weathering causes the loss of distinguishing features that would allow more positive identification to include the litter in another sub-category. If litter auditors could not positively categorize a piece of paper or plastics litter as belonging to a specific sub-category (i.e. confectionary), then that item was classified that as miscellaneous paper or plastic. These two sub-categories are significant for planners of litter abatement programs, since in aggregate they represent 17% of all large litter in 2009, 13% in 2008, and 24% of all large litter in the 2007 audit. Effective efforts to reduce paper litter and plastic litter would be effective in reducing total litter on City streets. The Other Miscellaneous Material large litter sub-category remains the most significant grouping of litter in 2009, as it was in 2007 and in 2008.

The Other Miscellaneous Materials litter observed in the 2009 litter audit was lower than aggregated litter observations from all audits performed from 2002 – 2009 (28 % of total litter in San Francisco 2009 vs. 34% from 67,000 observations).

4.0 Small Litter Survey Results

4.1 Discussion of Small Litter Results

The categories examined in the litter counts of items less than 4 square inches in size are:

- cigarette butts/ debris
- other tobacco
- bottle caps
- straws
- candy packaging
- polyfoam packing materials
- other polystyrene debris
- glass
- paper
- plastic film
- hard plastic
- aluminum / foil debris
- rubber
- metal (not aluminum)
- other materials
- chewing gum

The small litter methodology requires researchers to count small litter that appears within three slices at a site (transacts). These transacts are three 6 square foot segments of each site (3 x 1 foot by 6 feet). Accordingly, the small litter counts does not record all of the small litter existing on a site, but only a sample of the small litter present. However, the benefit of this method is its rigor. Every site was sampled in the same way. Thus, observations are fair and objective and give a snap shot of small litter at all sites during the litter audit.

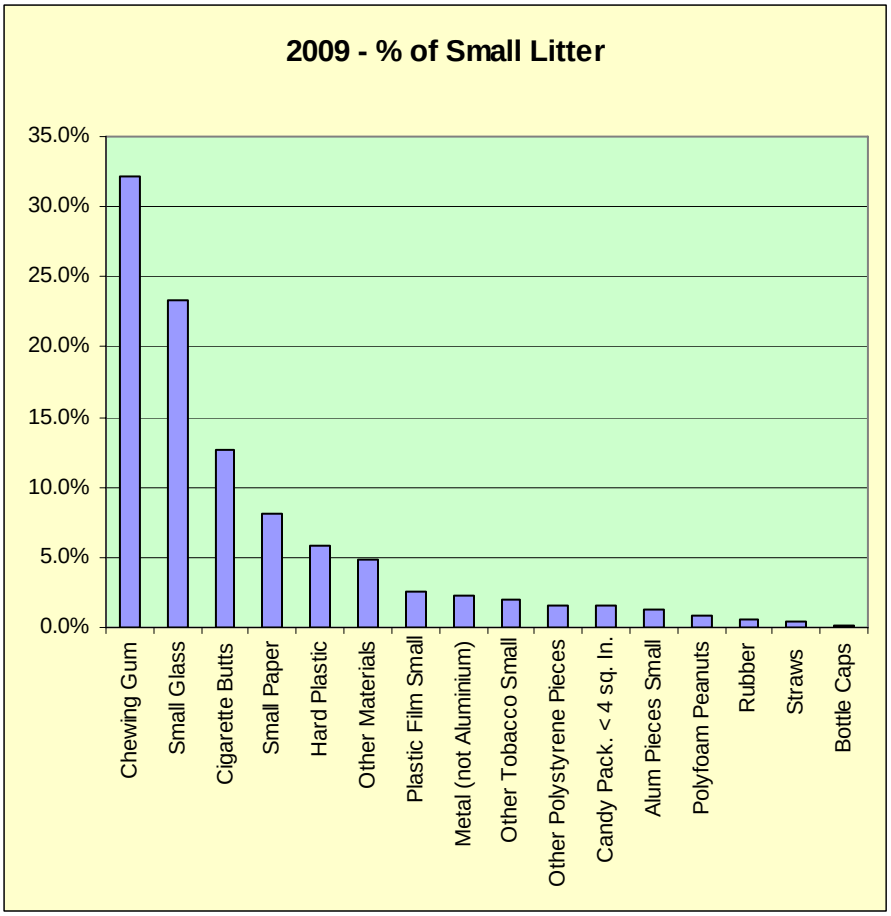
Observations of small litter during the San Francisco litter audit showed a relatively low occurrence of small litter on City streets, as compared other to audits performed by the consultant in other jurisdictions. The 2009 litter audit found more small litter on sites than in was observed in 2008 or 2007. In the 2009 audit the average number of small litter items per site was 26 items accounting for 3,370 items on the 130 sites examined. This compares with results from the 2008 audit in San Francisco where 2,335 items of small litter (18 items per site over 130 sites) and to 2,393 in 2007 (23 items / site observed in 2007 over 105 sites).

In 2009, as observed in 2007 and in 2008, gum deposits on San Francisco streets continue to be the most significant small litter item recorded. This is consistent with other audits performed by the consultant where gum deposits are usually the largest proportion of small litter observed. The other top small litter proportions (i.e. paper, glass, cigarette butts) observed in the San Francisco audit are also consistent with previous audit observations from other jurisdictions.

For a closer examination of small litter observed using an expanded methodology in 2009, see Section 5.0; Super Sites.

Small Litter Summary - SF 2009

Description	2009 Total Small Litter Items Observed	SF 2009 % of Total Small Litter	SF 2008 Total Small Litter Items Observed	SF 2008 % of Total Small Litter	SF 2007 Total Small Litter Items Observed	SF 2007 % of Total Small Litter
Chewing Gum	1082	32.1%	960	41.1%	946	39.5%
Small Glass	787	23.4%	535	22.9%	710	29.7%
Small Paper	271	8.0%	153	6.6%	187	7.8%
Cigarette Butts	425	12.6%	234	10.0%	135	5.6%
Other Materials	162	4.8%	73	3.1%	97	4.1%
Hard Plastic	197	5.8%	85	3.6%	92	3.8%
Plastic Film Small	84	2.5%	33	1.4%	56	2.3%
Other Tobacco Small	67	2.0%	9	0.4%	51	2.1%
Metal (not Aluminium)	77	2.3%	52	2.2%	41	1.7%
Rubber	18	0.5%	10	0.4%	26	1.1%
Alum Pieces Small	44	1.3%	135	5.8%	19	0.8%
Candy Pack. < 4 sq. In.	52	1.5%	36	1.5%	16	0.7%
Polyfoam Peanuts	31	0.9%	2	0.1%	8	0.3%
Other Polystyrene Pieces	54	1.6%	6	0.3%	5	0.2%
Bottle Caps	6	0.2%	8	0.3%	4	0.2%
Straws	13	0.4%	4	0.2%	0	0.0%
	3370	100.0%	2,335	100%	2,393	100%
Number of Sites Audited	132		130		105	
Aver Small Litter per site	26		18		23	



5.0 Super Site – Small Litter Results

5.1 Methodology for Super Site Audits

A new approach to examining small litter was added as an addendum piece of research to the field work activities during the San Francisco litter audit in 2009.

San Francisco Environment requested that the consultant examine 30 sites (32 sites were actually done) to observe ALL small litter and large litter of those sites. This labor intensive approach was added to San Francisco's annual litter audit in an effort to expand the City's knowledge of small litter occurrence on City streets.

The table following summarizes the results of those observations. The client asked that we comment upon the occurrence of small litter with the exclusion of chewing gum deposits from the data, as gum deposits are the result of historic accumulations on side walks and street curb side's, and skew the small litter portion of the results for the Super Site observations.

5.2 Results of Super Site Audits

When we look at the Super Site data with gum excluded we see:

Super Sites - San Francisco - Excluding Gum Deposits

Glass	4,100	37.5%	
Cigarette Butts & Tobacco Other	2,683	24.6%	Top 3 Items
Paper	1,819	16.6%	78.7%
Hard Plastics	720	6.6%	
Candy wrappers	390	3.6%	
Plastic film	328	3.0%	
Metal (not Alum)	263	2.4%	
Aluminum	197	1.8%	
Other Materials	127	1.2%	
Polyfoam pieces	107	1.0%	
Bottle caps	65	0.6%	
Rubber	57	0.5%	
Straws	55	0.5%	
Polyfoam peanuts	16	0.1%	
	10,927	100%	

Cigarette butts and other small tobacco litter (matches, filters, etc) accounted for 2,683 observations or 24.6% of all litter observed at the 32 Super Sites, and were the second most predominant sub-category recorded. Paper pieces were third, at 17% of all litter observed on the Super Sites. These three sub-categories of litter accounted to 78.7% of items observed at the Super Sites.

Along with 10,927 pieces of small litter on the 32 Super Sites, our audit teams recorded 43 large litter tobacco product items (tobacco packaging, wraps, cellophane etc).

This data is supported by observations made by the City of Toronto, in Super Site audits they conducted during three audits 2004 – 2006. Toronto observed 98,819 pieces of small litter on 68 sites. In their data Cigarette Butts & Tobacco, paper and glass represented 73% of small litter on the audit sites examined. This is a reasonable correlation to the San Francisco observations reported here.

SUPER SITE - San Francisco - Small Litter Data 2009 (excluding Gum Deposits)

	Site ID Number	Site Name	Map Coord.	Large Tobacco Packaging Litter Also Observed	1 Cigarette Butts	2 Other Tobacco Small	3 Bottle caps	4 Straws	5 Candy Wrappers	6 Polyfoam Peanuts	7 Polyfoam Pieces	8 Glass	9 Paper	10 Plastic Film	11 Hard Plastic	12 Aluminum	13 Rubber	14 Metal (not Alum.)	15 Other Material	Site Total
	001	Francisco Street	H-82 / A-10	5	328	3	1	4	11	0	0	87	97	12	26	11	2	4	2	588
	005	Jasper Place	D-83 / B-11	5	54	5	1	0	15	0	2	223	90	17	17	15	5	14	0	458
	008	Powell Street	D-83 / B-11		96	20	0	0	8	0	0	39	54	12	10	6	2	1	3	251
	010	The Embarcadero	C-85 / B-12		41	2	0	0	7	3	2	128	65	13	13	4	1	4	1	284
	011	Drum Street	D-85 / B-12	1	24	1	1	0	6	1	2	71	47	6	8	3	2	6	1	179
	013	Fremont Street	F-86 / C-12		126	5	3	4	1	0	0	142	43	4	27	0	2	34	5	396
	015	Montgomery St	E-84 / C-11		55	14	0	0	3	0	0	326	7	15	7	0	2	5	0	434
	017	Taylor Street	E-82 / C-10		187	11	0	0	19	0	23	51	28	9	14	8	2	6	1	359
	022	King Street	H-86 / D-12		59	18	0	0	4	0	5	94	75	11	10	8	2	1	0	287
	024	Russ Street	H-83 / D-11	6	183	13	15	1	15	0	0	204	89	16	55	8	1	5	60	665
	028	McAllister Street	G-82 / D-10		58	12	1	1	7	1	1	131	56	17	4	8	0	3	0	300
	030	Golden Gate Ave.	G-81 / D-10	1	131	2	3	2	6	0	2	54	42	11	7	5	1	5	0	271
	035	Fell Street	H-81/ D-10	1	34	0	2	0	17	0	3	423	40	10	31	5	1	18	2	586
	052	3rd St - S of Cargo Way	H-13		21	2	0	0	9	7	5	68	68	6	9	4	1	4	2	206
	054	Phelps Street	H-12		26	1	2	5	23	0	20	276	49	19	66	9	1	10	1	508
	062	Folsom Street	F-10	3	32	2	2	2	27	0	0	42	86	6	16	8	3	8	2	236
	063	Treat Street	F-10	6	29	4	6	1	20	2	12	98	79	6	18	10	2	17	3	307
	070	Mission Street at Bosworth	J-9		68	4	1	0	19	0	0	27	59	9	37	9	2	5	4	244
	073	Cayuga Avenue	K-8	2	54	1	3	3	36	0	19	413	49	15	43	12	3	4	2	657
	085	Broad Street	L-6	1	85	2	2	6	31	0	2	23	171	21	31	8	4	2	4	392
	087	Vincente Street	H-3		68	3	1	1	8	0	0	43	24	8	8	4	0	0	1	169
	091	Lawton Street	F-3	4	29	4	0	0	7	0	2	35	18	5	15	4	2	5	5	131
	093	Stanyan - N Waller	E-7		211	14	4	5	17	1	0	329	80	8	13	9	2	6	3	702
	095	Ellis Street	D-8	2	84	4	2	7	29	0	4	59	135	31	18	3	2	55	6	439
	104	12th Avenue	D-5		33	4	1	0	11	0	2	49	33	5	13	4	5	2	3	165
	112	3rd St - S of Galvez	H-12	1	87	12	1	4	7	0	0	223	67	4	91	7	0	11	1	515
	113	3rd St - N of Underwood	J-12	4	33	9	3	4	5	0	1	107	26	3	43	5	1	9	0	249
	200	9th Street	H-82 / D-10		112	33	1	0	4	1	0	163	55	12	14	8	1	13	9	426
	205	Hampshire Street	F-11		19	4	3	2	12	0	0	83	18	5	7	5	2	3	1	164
	007	Washington Street	D-81 / B-10	1	31	2	0	0	4	0	0	49	38	9	15	5	2	1	2	158
	Supp 1	Judah / Great Highway			45	3	6	3	2	0	0	37	26	1	28	1	1	2	3	158
	Supp 3	Sloat Rd / Crestlake Drive			25	1	0	0	0	0	0	3	5	2	6	1	0	0	0	43
																				0
																				0
		All Large + Small Tobacco Litter	2,511	43	2,468	215	65	55	390	16	107	4,100	1,819	328	720	197	57	263	127	10,927
					2683															10,927
	32	Total Super Sites			25%		0.6%	0.5%	3.6%	0.1%	1.0%	37.5%	16.6%	3.0%	6.6%	1.8%	0.5%	2.4%	1.2%	100.0%
			Items / site		77	7	2	2	12	1	3	128	57	10	23	6	2	8	4	341

Notes:

ER Planning Report Brief: Plastic Retail Bags in Litter

Environmental Resources Planning, LLC is the only U.S. firm focusing exclusively on litter-related field surveys and research studies. Our firm analyzes select components of the litter stream to better understand the dynamics underlying littering rates. Our staff led the design and project management of Keep America Beautiful's *2009 National Litter Survey*. That study found that plastic bags of all types comprise only 0.6 percent of litter. Percentages for categories such as plastic bags constituted such a minute portion of roadside litter that they were not specifically addressed in the *2009 National Litter Survey*.

National, state and city-wide litter surveys conducted with statistically-based scientific methodologies have established that plastic retail bags continue to comprise a small percentage of litter and the waste stream. Our staff have planned and conducted a number of recent litter surveys. These statistically-based studies were conducted with scientific rigor using trained professionals. Data and methodologies were explained in detail to allow review by interested parties and affected stakeholders.

Litter surveys showing unusually high rates of items such as plastic bags were typically conducted by volunteers rather than professional staff. These surveys tended to lack random sampling and statistical methodologies. At times, material categories were not consistent. While such studies have helped create the awareness of litter's impacts, their limitations have, in some cases, resulted in erroneous depictions of plastic retail bags as a component of the overall litter stream.

Retail Plastic Bags in Recent Litter Surveys

#	Survey	Year	Percent	#	Survey	Year	Percent
1	Toronto	2012	0.8%	11	Durham	2003	0.3%
2	Edmonton	2011	1.1%	12	Peel	2003	0.1%
3	Alberta	2009	0.0%	13	York	2003	0.4%
4	San Francisco	2008	0.6%	14	Toronto	2002	0.6%
5	San Jose	2008	0.4%	15	Florida	2002	0.5%
6	KAB	2008	0.6%	16	Florida	2001	0.7%
7	Alberta	2007	2.0%	17	Florida	1997	0.6%
8	San Francisco	2007	0.6%	18	Florida	1996	1.0%
9	Toronto	2006	0.1%	19	Florida	1995	0.7%
10	Toronto	2004	0.2%	20	Florida	1994	0.6%

As shown in the table above, recent science-based litter surveys using random sampling methodologies consistently found that retail plastic bags comprise a minor portion of litter, usually less than one percent.

Steven R. Stein, Principal
Environmental Resources Planning, LLC

ER PLANNING

Plastic's Future May Not Be In The Bag

by ALAN GREENBLATT

Enlarge Justin Sullivan/Getty Images

This could become a thing of the past in San Francisco.

June 10, 2010

Plastic bags may have become victims of their own success. Their very ubiquity — an estimated 90 billion plastic bags are used in the United States each year — has led to a small but growing number of jurisdictions discouraging their use through fees or outright bans.

Last week, the California Assembly voted to approve the first statewide ban on both plastic and paper "single-use" bags. Republican Gov. Arnold Schwarzenegger has said he'll sign the bill if it makes it to his desk. The state Senate is expected to act on it by August.

The California proposal follows about a dozen local bans within the state, as well as bans and bag taxes enacted in several other countries, including China, Ireland and Bangladesh.

This past January, Washington, D.C., imposed a 5-cent fee on bags given out by stores that sell food. And last year, the top environmental official with the United Nations called for a worldwide ban on "pointless" single-use plastic bags.

"Of course we have the environmentalists on board, but we also have the grocers, the retailers and the United Food and Commercial Workers union," says Kirsten James, water quality director for Heal the Bay, a Santa Monica-based environmental group that has been a leading proponent of the California ban.

Based On Myth And Misinformation?

Of course, not everyone agrees that dispensing with plastic bags would be wise — or even necessary. The chemical and plastic industries have long pushed back against bans and bag fees, arguing that plastic bags occupy a relatively small share of space in landfills and that they cost less money and require less energy to produce than paper bags.

Companies and trade groups associated with the manufacture of plastic bags have sponsored several webpages devoted to debunking supposed myths about plastic bags.

Stephen L. Joseph, who is counsel to Save the Plastic Bag Coalition, a San Francisco-based group that gets support from the plastic bag industry, says environmentalists are guilty of promoting their cause through "myth,

Enlarge David McNew/Getty Images

Blowing across the sand in Manhattan Beach, Calif.

misinformation and some outright lies."

He says they have willfully misled the public and legislators about the extent of pollution and harm to animals caused by plastic bags. He cites a 2008 article in the *Times* of London that reported that one widely cited figure -– that 100,000 marine animals are killed annually by plastic bags -– was based on the misinterpretation of a study that didn't even mention plastic bags.

"The *Times* has established that there is no scientific evidence to show that the bags pose any direct threat to marine mammals," the article concluded.

Are The Skeptics Right?

"In their eagerness to make their case, some of the environmental groups make up claims that are really not supportable," says David Laist, a senior policy and program analyst with the federal Marine Mammal Commission.

But that doesn't mean critics such as Joseph are right that plastic bags don't harm marine animals at all, he says. It's just that it's difficult to document the extent of the problem.

"There's basically no way to go out and do a sample of the number of animals that die as a result of this," he says. "For the most part, they occur scattered all over the ocean and quickly get eaten by predators or sink to the bottom and are never found."

Turtles, apparently, are the hogs of the sea. "They eat everything," he says. "They don't seem to discriminate between plastic bags and jellyfish or anything else."

The fact that animals eat plastic –- even if they don't die by the tens of thousands as a result -– troubles Alfred C. Carr Jr., a Democrat in the Maryland House who has sponsored a bill to impose a Washington, D.C.-style nickel fee on bags. "Plastic bags don't biodegrade," Carr says. "They break into smaller pieces, meaning they'll get into the food chain, which means they get into us."

Ill Effects On Land

Possible effects on marine life and the food chain are not the only motivation driving supporters of bag bans and fees. California state Rep. Julia Brownley, who sponsored the statewide ban legislation, calls the proliferation of bags that billow through neighborhoods "urban tumbleweed."

A plastic bag dancing in the wind may have furnished a poetic ending for the film *American Beauty*, but in most contexts it would be considered blight. "Especially in low-income areas, they may not have the public works funding to clean these up," says Kirsten James of Heal the Bay.

A 2008 trash survey by the District Department of the Environment found that plastic bags "dominate all other categories" within Washington's Anacostia River watershed.

That study helped prompt the local 5-cent bag fee. The department plans to do a follow-up survey within the next year, but in the meantime merchants are reporting decreases of 50 percent or more in bag usage since the fee took effect, says Charles Allen, chief of staff to Councilman Tommy Wells, sponsor of the fee.

"Anecdotally, we're hearing from many groups that do annual river cleanups that they are seeing a dramatic reduction in the number of plastic bags they are pulling from the river this year," he says.

A Mixed Bag

But for now, Washington stands alone. Last year, Seattle voters rejected a 20-cent fee on plastic bags. Carr's bill in Maryland has yet to gain traction. And recommendations from Florida's Department of Environmental Protection to ban or at least discourage the use of plastic bags have gone nowhere in the legislature.

So far, at least in this country, the campaign against plastic bags amounts to more of a groundswell than a real tide. About a dozen California cities and counties have followed San Francisco's lead since 2007 in passing local bans on bags, but three of the ordinances have been blocked by the Save the Plastic Bag Coalition through court action or legal settlements.

Still, continuing interest in this topic among coastal communities in particular led the California Grocers Association to endorse the proposed statewide ban. "This year, there was so much momentum at the local level that the grocers didn't want to have to face a patchwork policy," Kirsten James says.

James says her group, Heal the Bay, has gotten so many requests for information from other jurisdictions that it has put together a "toolkit" for crafting and promoting legislation elsewhere.

Plastic bag makers may have won some debates in the court of public opinion — as well as some victories in actual courts — but if the California Senate approves the ban, momentum may start shifting toward the banners.

"I think a lot of the members of the Senate are going to be taken in by what they're being told by the environmentalists, which is unfortunate," says Stephen Joseph of the Save the Plastic Bag Coalition.

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Recent First

Sharon Oshe (SharonO) wrote:
My cousin is a farmer, and she complains bitterly about all the plastic bags billowing through her acres. If she misses one and it gets shredded and packed in with the harvest, it can ruin the whole lot. Get rid of them! In the meantime, if you choose not to recycle and just throw them away, put a bit of heavier trash in them and tie it off - that will keep it from blowing around and ending up high in a tree or in some farmer's field.
June 10, 2010 11:38:13 AM PDT
Recommend (0) Report abuse

Rich Charts (libertyville) wrote:
I guess I should be environmentaly conscious and leave my dog poo on the neighbors lawn and sidewalks. Without the plastic bags, there are no other containers adequate to be courteous and community conscious. Oh what unintentional consequences we weave, or leave.
June 10, 2010 11:35:39 AM PDT
Recommend (1) Report abuse

Lyle Buettner (taoist) wrote:
Can we make plastic bags from anything other then petroleum? How about corn, soy, or hemp?
June 10, 2010 11:33:48 AM PDT
Recommend (0) Report abuse

R Carey (TaoJones) wrote:
How many plastic bags would it take to plug an oil well?
June 10, 2010 11:26:48 AM PDT

Recommend (3) Report abuse

Jo Gonz (JoGonz) wrote:
About time
June 10, 2010 11:22:53 AM PDT
Recommend (2) Report abuse

Jessica Smith (NevadaGeo) wrote:
I support this. I'm sick of seeing those things blowing around in the desert. But if they are banned I don't know what I'll use for kitty litter scoop bags.
June 10, 2010 11:20:54 AM PDT
Recommend (4) Report abuse

Heidi Woeller (Karen05) wrote:
I've long wanted to set up a baggie webcame, watching a bag supposedly disintegrate, or follow it as it blows across the earth. Tie a baggie to a fence, in full sun -- one of those supposedly biodegradable ones, and have a day counter of watching it degrade. (I tried this experiment years ago sans bagcam and the baggie never disintegrated in 2 yrs.)
June 10, 2010 11:20:25 AM PDT
Recommend (3) Report abuse

Brian Edmison (brian72975) wrote:
What about the fact that they're just plain wasteful? Set aside bans or taxes and just use common sense. Ten bucks will get you as many reusable bags as you're ever likely to need.
June 10, 2010 11:06:25 AM PDT
Recommend (7) Report abuse

From The Times

March 8, 2008

Series of blunders turned the plastic bag into global villain

Alexi Mostrous

Green Central: click here to read Times Online's environment blog

Scientists and environmentalists have attacked a global campaign to ban plastic bags which they say is based on flawed science and exaggerated claims.

The widely stated accusation that the bags kill 100,000 animals and a million seabirds every year are false, experts have told The Times. They pose only a minimal threat to most marine species, including seals, whales, dolphins and seabirds.

Gordon Brown announced last month that he would force supermarkets to charge for the bags, saying that they were "one of the most visible symbols of environmental waste". Retailers and some pressure groups, including the Campaign to Protect Rural England, threw their support behind him.

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But scientists, politicians and marine experts attacked the Government for joining a "bandwagon" based on poor science.

Lord Taverne, the chairman of Sense about Science, said: "The Government is irresponsible to jump on a bandwagon that has no base in scientific evidence. This is one of many examples where you get bad science leading to bad decisions which are counter-productive. Attacking plastic bags makes people feel good but it doesn't achieve anything."

Campaigners say that plastic bags pollute coastlines and waterways, killing or injuring birds and livestock on land and, in the oceans, destroying vast numbers of seabirds, seals, turtles and whales. However, The Times has established that there is no scientific evidence to show that the bags pose any direct threat to marine mammals.

They "don't figure" in the majority of cases where animals die from marine debris, said David Laist, the author of a seminal 1997 study on the subject. Most deaths were caused when creatures became caught up in waste produce. "Plastic bags don't figure in entanglement," he said. "The main culprits are fishing gear, ropes, lines and strapping bands. Most mammals are too big to get caught up in a plastic bag."

He added: "The impact of bags on whales, dolphins, porpoises and seals ranges from nil for most species to very minor for perhaps a few species.For birds, plastic bags are not a problem either."

The central claim of campaigners is that the bags kill more than

100,000 marine mammals and one million seabirds every year. However, this figure is based on a misinterpretation of a 1987 Canadian study in Newfoundland, which found that, between 1981 and 1984, more than 100,000 marine mammals, including birds, were killed by discarded nets. The Canadian study did not mention plastic bags.

Fifteen years later in 2002, when the Australian Government commissioned a report into the effects of plastic bags, its authors misquoted the Newfoundland study, mistakenly attributing the deaths to “plastic bags”.

The figure was latched on to by conservationists as proof that the bags were killers. For four years the “typo” remained uncorrected. It was only in 2006 that the authors altered the report, replacing “plastic bags” with “plastic debris”. But they admitted: “The actual numbers of animals killed annually by plastic bag litter is nearly impossible to determine.”

In a postscript to the correction they admitted that the original Canadian study had referred to fishing tackle, not plastic debris, as the threat to the marine environment.

Regardless, the erroneous claim has become the keystone of a widening campaign to demonise plastic bags.

David Santillo, a marine biologist at Greenpeace, told The Times that bad science was undermining the Government’s case for banning the bags. “It’s very unlikely that many animals are killed by plastic bags,” he said. “The evidence shows just the opposite. We are not going to solve the problem of waste by focusing on plastic bags.

“It doesn’t do the Government’s case any favours if you’ve got statements being made that aren’t supported by the scientific literature that’s out there. With larger mammals it’s fishing gear that’s the big problem. On a global basis plastic bags aren’t an issue. It would be great if statements like these weren’t made.”

Geoffrey Cox, a Tory member of the Commons Environment Select Committee, said: “I don’t like plastic bags and I certainly support restricting their use, but plainly it’s extremely important that before we take any steps we should rely on accurate information. It is bizarre that any campaign should be endorsed on the basis of a mistranslation. Gordon Brown should get his facts right.”

A 1968 study of albatross carcasses found that 90 per cent contained some form of plastic but only two birds had ingested part of a plastic bag.

Professor Geoff Boxshall, a marine biologist at the Natural History Museum, said: “I’ve never seen a bird killed by a plastic bag. Other forms of plastic in the ocean are much more damaging. Only a very small proportion is caused by bags.”

Plastic particles known as nurdles, dumped in the sea by industrial companies, form a much greater threat as they can be easily consumed by birds and animals. Many British groups are now questioning whether a ban on bags would cost consumers more than the environmental benefits.

Charlie Mayfield, chairman of retailer John Lewis, said that tackling packaging waste and reducing carbon emissions were far more important goals. “We don’t see reducing the use of plastic bags as our biggest priority,” he said. “Of all the waste that goes to landfill, 20 per cent is household waste and 0.3 per cent is plastic bags.” John Lewis added that a scheme in Ireland had reduced plastic bag usage, but sales of bin liners had increased 400 per cent.

Australian Government
Department of the Environment, Water, Heritage and the Arts

Publications

Plastic Shopping Bags – Analysis of Levies and Environmental Impacts

Final Report
Prepared by Nolan-ITU in association with RMIT Centre for Design and Eunomia Research and Consulting Ltd
December 2002

- Download the Report

Excerpt from the Executive Summary

The plastic bag is an established part of Australian shopping – with approximately 6.9 billion plastic bags used by Australian consumers every year. The current plastic shopping bag is well suited to its task – it is cheap, lightweight, resource efficient, functional, moisture resistant, allows for quick packing at the supermarket and is remarkably strong for its weight. However, the perceived environmental impacts of plastic shopping bags have raised community concern.

The Commonwealth Government resolved to evaluate the likely impacts of taxes and levies on plastic bags and the potential impacts of alternatives to provide a solid base for informed debate and national policy development regarding plastic shopping bags in Australia. Nolan-ITU, in association with the RMIT Centre for Design and Eunomia Research and Consulting, has been commissioned by Environment Australia to conduct the evaluation.

The purpose of this report is to explore the options and their associated potential environmental and economic impacts to inform policy and decision making. Therefore, no specific policy recommendations are made.

Note: In September 2006, the report was revised to correct an error on page 30. The sentence:

'A figure of 100,000 marine animals killed annually has been widely quoted by environmental groups; this figure was from a study in Newfoundland which estimated the number of animals entrapped by plastic bags in that area from a four-year period from 1981-84'

Has been replaced with:

'A figure of 100,000 marine animals killed annually has been widely quoted by environmental groups; this figure was from a study in Newfoundland which estimated the number of animals entrapped by plastic debris in that area from a four-year period from 1981-84'

Download the Report

This report is available as a PDF file. You will need Adobe Acrobat Reader installed on your computer to view the PDF file.

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Last updated: Tuesday, 19-Dec-2006 14:38:08 EST

Frequently Asked Questions
All About Marine Debris

How much debris enters the ocean?

There is truly no accurate answer to this question. A figure that has been cited came from a 1975 study by the National Academy of Sciences that estimated approximately 1.4 billion pounds of trash per year enters the ocean (NAS, 1975). Important items to note about this figure:

- This study was published in 1975, 13 years before the implementation of MARPOL Annex V prohibited the dumping of plastics and restricting the dumping of other wastes in the oceans, and thus is quite dated.
- This study only took into account debris from vessels. Data were collected from vessels' Garbage Record Books.

Debris laden shores along the southeasat coast of the Big Island of Hawaii.

NOAA is working with other agencies and groups to investigate the best available information to work towards a more current estimate. While the NAS (1975) study estimated then-legal dumping of waste from ocean vessels, an accurate, current estimate of debris entering the oceans would need to measure debris entering from rivers, storm sewers, beach litter, illegal dumping at sea, and many other avenues.

Are there really 46,000 pieces of plastic per square kilometer of the world's oceans?

We were unable to find a reference for this figure. The closest we could find was a UNEP report published in 2005 that mentions a figure of 13,000 pieces of litter per square kilometer; however there is no source or referenced study for that figure (UNEP, 2005).

Marine debris is
any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes.

To date, there has not been a comprehensive marine debris abundance assessment for the world's oceans, or even for a single ocean. This is partly due to the lack of a standardized at-sea plastic marine debris monitoring method. The NOAA Marine Debris Program is working together with the University of Washington, Tacoma to develop an agreed-upon standard methodology for pelagic marine debris monitoring to help us compare sampling sites and acquire reliable estimates of plastic debris in the oceans.

Derelict vessels and fishing gear are two types of marine debris from the ocean.

Is it true that 80% of marine debris comes from land and 20% comes from the ocean?

This statement is possible, but unknown. We have been looking into the origin of that figure. It's frequently quoted in the press, but doesn't appear often in scientific literature. A few times the results from the International Coastal Cleanup were cited as the source for these percentages; however if you take a look at the results from any given year, you will notice percentages differing from one place to another. Additionally, this event surveys primarily beach debris, and thus may overestimate land-based sources because of beachgoers' litter.

We also know relatively little about what is lying on the ocean floor or suspended in the water column. Because of this we truly can't say what the land- and ocean-based percentages are with any certainty or accuracy. Just begin to think of all the debris types that sink (e.g., metal, dense plastics) in addition to all the ships on our ocean floor and you get the picture.

How long do various marine debris items take to degrade in the marine environment?

Bottom line: Most debris items take a long time to degrade in the marine environment. However, the more natural/organic the material composition of the item is, the less time it generally takes to degrade.

Figures on the amount of time it takes for durable debris items to break down in the environment are many and varied (e.g., Aluminum can: 100 years (The Coral Reef Alliance and Worldwise) vs. 80-200 years (Mote Marine Laboratory)). It is unknown where the numbers listed in degradation timelines for these durable items originated or how they were estimated. Likely that the numbers listed on posters and pamphlets are estimates intended to raise awareness of the very long life of marine debris items rather than provide exact degradation rates.

Basically, degradation time depends upon numerous factors including material type, size, and thickness, temperature, wave action, exposure to sunlight, and location (e.g., on the beach, in the surf, floating at sea, etc).

For more information on the degradation of plastic debris, please visit http://marinedebris.noaa.gov/info/plastic.html.

Is it true that 100,000 marine mammals and/or sea turtles die each year due to marine debris/plastics?

This statement is possible, but difficult to say with certainty. To date there are no published studies specifically researching how many marine mammals die each year directly due to marine debris. Regardless of the exact number that die each year due to marine debris, each death is one too many. Marine debris doesn't belong in our oceans and waterways.

Below is the closest figure that we could find. These statements were made in a paper presented at the 1984 Workshop on the Fate and Impact of Marine Debris by Wallace (1985). The manuscript does not state that marine mammals are dying from plastic pieces, but rather that mortality is caused by entanglement from lost fishing gear and other unknown causes.

"Debris entanglement is estimated to cause 50,000 to 90,000 deaths per year in the northern fur seal. The population in 1983 was dropping on the main rookery in Alaska at about 8% per year. At least 50,000 deaths are thought to be due to entanglement; the other 40,000 deaths possible entanglement or possibly some unknown factor such as disease (Fowler, 1983)."

In the conclusions: "Up to one hundred thousand marine mammals and possibly more die each year. Half or more of the individuals of certain marine reptile species are affected by the plastic litter, and beachcombing land mammals become snarled in nets and die. ..."

Entangled fur seal in Alaska.

The figures cited here are from another study by Fowler (1983) of fur seals in the North Pacific, and not from Wallace's research. Keep in mind that this 1983 paper predates MARPOL Annex V, an international treaty implemented in 1988, which prohibits the dumping of plastics (including fishing gear) anywhere at sea.

Many of NOAA's marine debris projects work to help protect marine mammal and turtle populations across the nation through debris removal as well as prevention.

Laysan albatross feeding its chick. *Photo courtesy NOAA PIFSC.*

Is it true that marine debris kills a million seabirds each year?

This statement is currently unknown. We are so far unable to find a scientific reference for this figure. The closest we have found is "214,500 to 763,000 seabirds are killed annually incidental to driftnet fishing by Japanese fishermen in the North Pacific Ocean (US Department of Commerce, 1981)" from Laist, 1987. This refers to active fishing gear bycatch and not marine debris; it also predates the high seas driftnet ban adopted by the United Nations General Assembly in 1992.

Seabirds live much of their lives at sea or in remote locations. While the number of deaths can be estimated, it is difficult to determine causes of mortality when the carcasses can't be retrieved.

What happens when albatross or other seabirds ingest debris?

We have all seen and been moved by photos of a seabird carcass (typically a Laysan albatross) laden with plastic debris. The detrimental effects of marine debris ingestion on Laysan albatross have been an object of research interest for many years, but like most ecological issues the answers are not straightforward. Regardless, the problem of marine debris ingestion is real; not just in seabirds, but species of fish, marine mammals, and sea turtles.

Albatross:
Ingestion of debris may cause a blockage in the digestive tract, perforate the gut, result in a loss of nutrition (due to displacement of food), or cause a false feeling of being "full". Studies have found that ingested plastic debris is problem for seabirds; however may not be a significant direct cause of mortality (e.g., on a population level) (Sievert and Sileo, 1993; Auman et al., 1997). More research is needed to see if these results (mid-1990's) have changed.

Other Seabird Species:
There are numerous studies on ingestion of debris in seabird species other than the Laysan albatross. The results of a recent study conducted by Ryan (2008) show the number of ingested plastic particles in five species of seabirds, sampled in the 1980s and again in 1999–2006, have not changed significantly in the southern Atlantic and southwestern Indian Oceans. He found that the proportion of pre-production plastic pellets decreased 44-79% in all five species. "More data are needed on the relationship between plastic loads in seabirds and the density of plastic at sea in their foraging areas, but the consistent decrease in pellets in birds suggests there has been a global change in the composition of small plastic debris at sea over the last two decades."

What happens to marine debris once it is removed from the marine environment?

Depending on the type of debris, methods of disposal may include recycling, reusing, or even using debris to create electricity.

Two great examples of marine debris disposal are:

- Nets to Energy Program and Partnership in Hawaii http://marinedebris.noaa.gov/projects/netstoenergy.html
- Fishing for Energy Program http://marinedebris.noaa.gov/projects/fishing4energy.html

When options are limited or unavailable, debris is disposed of in a landfill.

Much like Hawaii's Nets to Energy program, the northeast coast of the US implemented Fishing for Energy. *Photo courtesy of B. Haskell.*

What is being done to address marine debris in the US and around the world?

While this is a global problem, local efforts are ongoing to solve it. Together, through partnerships, work is being done nationwide to research, prevent, and reduce marine debris as well as educate the public to be better stewards of our ocean.

The NOAA Marine Debris Program has funded and helped support over 140 projects working with partners and addressing marine debris across the nation.

Much is also being done on an international level to raise awareness and address this pervasive problem. One great example is the International Coastal Cleanup coordinated by the Ocean Conservancy. The event is the largest marine debris and litter cleanup event in the world. It is held on the 3rd Saturday of every September and is coordinated by the Ocean Conservancy. The NOAA Marine Debris Program is a proud sponsor of this event.

Everyone, no matter how close to or far from the ocean, can contribute to the solution. It's simple: Reduce, Reuse, and Recycle - (1) Try to reduce the amount of trash you produce (e.g., try to purchase items with minimal additional packaging); (2) Make use of items that are reusable rather than disposable; and (3) when you do use disposable items, remember to recycle!

Join Ecofinley and be ECO-FRIENDLY!

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Acknowledgement

This information was compiled with the input and assistance of the US Fish and Wildlife Service.

Volunteers help clean up marine debris. *Photo courtesy of NOAA RC.*

Plastic Marine Debris
What We Know

http://marinedebris.noaa.gov/info/plastic.html

Do plastics degrade in the environment?

This is a very good question and the answer you get depends on who you ask and their definition of the term "degrade." Many assume that degrade means an item "disappears," or in scientific terms, mineralizes (breakdown into inorganic components of carbon dioxide and water via oxidative or biological (bio-) degradation). Some interpret degrade to mean simply breaking down into smaller pieces (to the point of embrittlement; i.e., fragmentation). The end result of both interpretations is quite different. A bit more information and details are needed to fully understand plastics degradation and be able to answer the question posed above.

Plastic bottle, such as those shown above, are some of the more common types of debris found on beaches in Hawaii.

One source of microplastics is through the fragmentation of larger pieces. *Photo courtesy of NOAA Restoraction Center.*

What we know: Based on research to date, most commonly used plastics do not ever fully "go away," but rather break down into smaller and smaller pieces, sometimes referred to as microplastics.

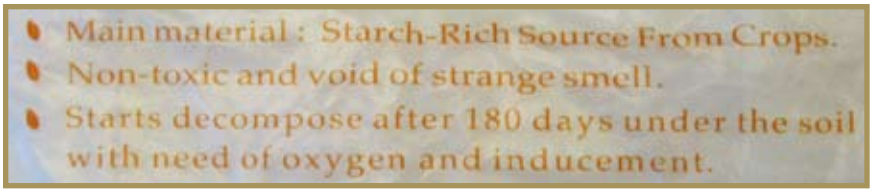
Degradation depends on:

- Density of the plastic – density will affect sunlight availability and whether the piece floats or sinks
- Temperature of water – if the water is warmer there will likely be greater degradation
- Type of plastic – the structure of the plastic affects degradation
- How the plastic is compounded – for example, what types of additives are included in the plastic (e.g., light stabilizers, anti-oxidants)?

Photodegradation: Most plastics photodegrade in the marine environment, breaking down into smaller and smaller pieces due to exposure to solar ultraviolet radiation. When in water, plastic may not get direct sunlight exposure; therefore

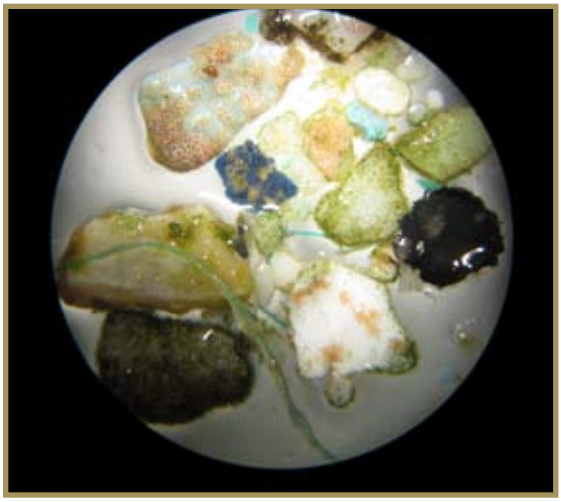
breakdown happens much more slowly in the aquatic environment.

Thermal (thermo-) degradation: This type of degradation, caused by increased temperatures, leads mainly to the loss in extensibility (i.e., "stretchiness") of most plastics, except polystyrene.



Example text from a bio-based plastic bag. Note the location for decomposition--not in the ocean!

Biodegradation & bio-based plastics: There are some bio-based (e.g., corn, wheat, tapioca, algae) and biodegradable plastics on the market and in development. There are also products that call themselves "biodegradable," but simply break down into smaller pieces faster, so be careful! Remember that biodegradability still depends on numerous factors, including the environment that the plastic is in. Many of the bio-based and truly biodegradable plastics were created to biodegrade in a compost pile and will not biodegrade in the ocean.



Microplastics skimmed from the North Pacific Ocean. *Photo courtesy of J. Foley, C-MORE.*

What are "microplastics"?

A new term has been introduced and used in the field of marine debris--microplastics. Typically, when used it encompasses a range of small pieces of plastic marine debris. For its purposes, the NOAA Marine Debris Program defines microplastics as plastic debris pieces in the size range of 0.3-5mm (i.e., the thickness of two human hairs side by side to the size of a grain of rice).

There are two categories of microplastics:
1) Primary microplastics: Intentionally produced for direct use, or as pre-cursors to other products. Examples of sources include point-of-origin or manufacturing losses (e.g., pre-production plastic pellets) and plastic spherules in personal care products like facial scrubs (typically made of polyethylene).
2) Secondary microplastics: Formed from the breakdown of larger plastic material. Examples of sources include point-of-use losses, any polymer fragment formed by weathering, and breakdown of "bio-degradable" polymers.

Is it true that our fish are being poisoned by marine debris? (plastics and pollutants)

There have been a number of studies on persistent organic pollutants (POPs) binding to plastic debris in the oceans. One of the leading scientists on the topic is Dr. Richard Thompson (Marine ecologist, University of Plymouth, UK), who along with other experts in this topic area, was invited to an international workshop on the occurrence, effects, and fate of microplastic debris in September of 2008 hosted by the MDP and the University of Washington - Tacoma.

Recent studies have focused on the uptake potential of organic contaminants from the marine environment to plastic debris.

Plastic debris found in the belly of an opah. *Photo courtesy of NOAA PIRO Observer Program.*

Plastic debris can transport organic contaminants in the oceans.

Plastics have the potential to adsorb organic contaminants from the marine environment. It is possible, though not proven, that plastics could also desorb these contaminants to biota that ingest plastics.

Plastic debris attracts and accumulates hydrophobic organic toxins such as PCBs (polychlorinated biphenyls) up to 100,000-1,000,000 times ambient seawater concentrations (Mato et al., 2001).

Research on benthic-feeding invertebrates suggests that toxins may be transferred from plastics, to sediment, to the organism. Further research is needed, taking into consideration the range of contaminant types, types of plastic, and environmental exposure effects (Teuten et al., 2007).

Have there been studies by NOAA on impacts of plastics to marine mammals and fish?

The NOAA Marine Debris Program and other NOAA offices have supported numerous studies on the impacts of plastics to marine mammals, fish, and their habitats. Many of these studies have dealt with plastic derelict fishing gear (e.g., nylon fishing nets), a debris type that can pose a significant threat to a wide range of marine species and habitats.

Is it true that 100,000 marine mammals and/or sea turtles die each year due to marine debris/plastics/ plastic bags?

Origin of statement:
Wallace, N. 1985. Debris entanglement in the marine environment: A review. Pp. 259-277. In: R.S. Shomura, H.O. Yoshida (eds.) Proceedings of the Workshop on the Fate and Impact of Marine Debris 27-29 November 1984, Honolulu, Hawaii, July 1985. NOAA-TM-NMFS-SWFC-54.

NOTE: This proceedings document was published prior to the implementation of MARPOL Annex V.
"Debris entanglement is estimated to cause 50,000 to 90,000 deaths per year in the northern fur seal. The population in 1983 was dropping on the main rookery in Alaska at about 8% per year. At least 50,000 deaths are thought to be due to entanglement; the other 40,000 deaths possible entanglement or possibly some unknown factor such as disease (Fowler 1983)."*

Derelict fishing gear, such as the net shown above, are entanglement hazards for marine life. *Photo courtesy of NOAA.*

Stomach content of a green sea turtle. *Photo courtesy of Australia Seabird Rescue, Inc., Marine PhotoBank.*

In Conclusions: "Up to one hundred thousand marine mammals and possibly more die each year. Half or more of the individuals of certain marine reptile species are affected by the plastic litter, and beachcombing land mammals become snarled in nets and die."

*Fowler, 1983 is a background paper for the 26th Annual Meeting of the Standing Scientific Committee of the North Pacific Fur Seal Commission.

Origin of plastic bag statement: We were able to find no information to support this statement. An erroneous statement attributing these figures to plastic bags was published in a 2002 report published by the Australian Government; it was corrected in 2006. See the 2002 report published by Environment Australia entitled, "Plastic Shopping Bags – Analysis of Levies and Environmental Impacts" or click here.

In 2006, Environment Canada recanted the statement "A figure of 100,000 marine animals killed annually has been widely quoted by environmental groups; this was from a study in Newfoundland which estimated the number of animals entrapped by plastic bags in that area from a four-year period from 1981-1984" and replaced it with "A figure of 100,000 marine animals killed annually has been widely quoted by environmental groups; this was from a study in Newfoundland which estimated the number of animals entrapped by plastic debris in that area from a four-year period from 1981-1984."

The original study cited by Environment Canada, and thus, Environment Australia, is:
Piatt, J.F. and D.N. Nettleship. 1987. Incidental catch of marine birds and mammals in fishing nets off Newfoundland, Canada. Marine Pollution Bulletin 18(6B): 344-349.

In terms of marine debris and impacts to the environment, all plastic debris are not created equal. Above you have a plastic bath toy and a derelict fishing net. *Photos courtesy (left to right) of Wolf Hartt Images, and Elaine Blum, 2009 from Marine PhotoBank.*

Are all plastics created equal once they are in the environment? Do some cause more damage than others?

In terms of what we know, derelict fishing gear (DFG) (much of which is made of plastic) has numerous and quite severe impacts not only to living marine resources, but navigation safety as well. Numerous studies have documented the impacts of DFG to wildlife, including entanglement, ghostfishing (continuation of derelict fishing gear to capture marine life), habitat degradation, and even alien species transport. All of these likely having a related economic cost.

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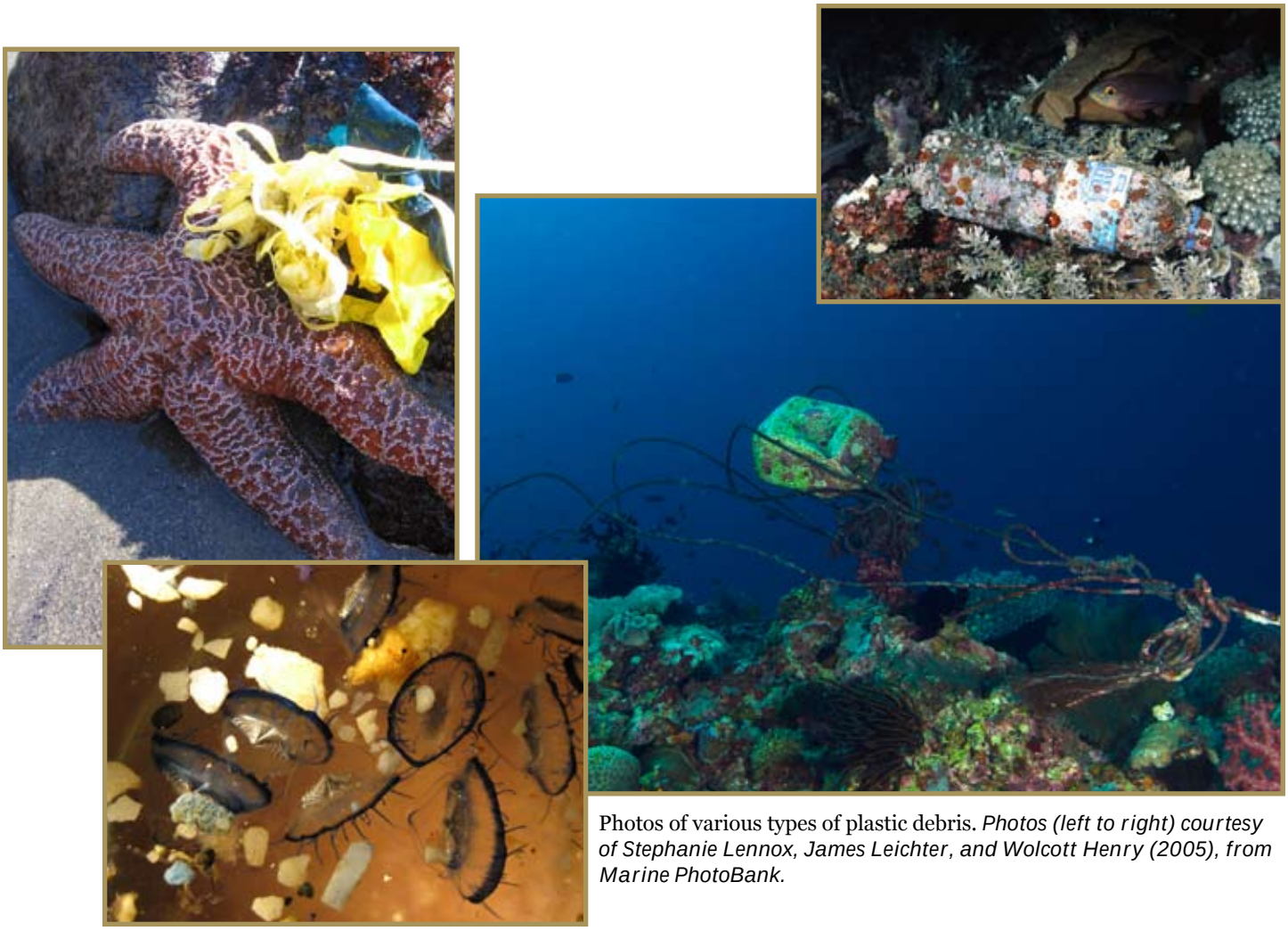
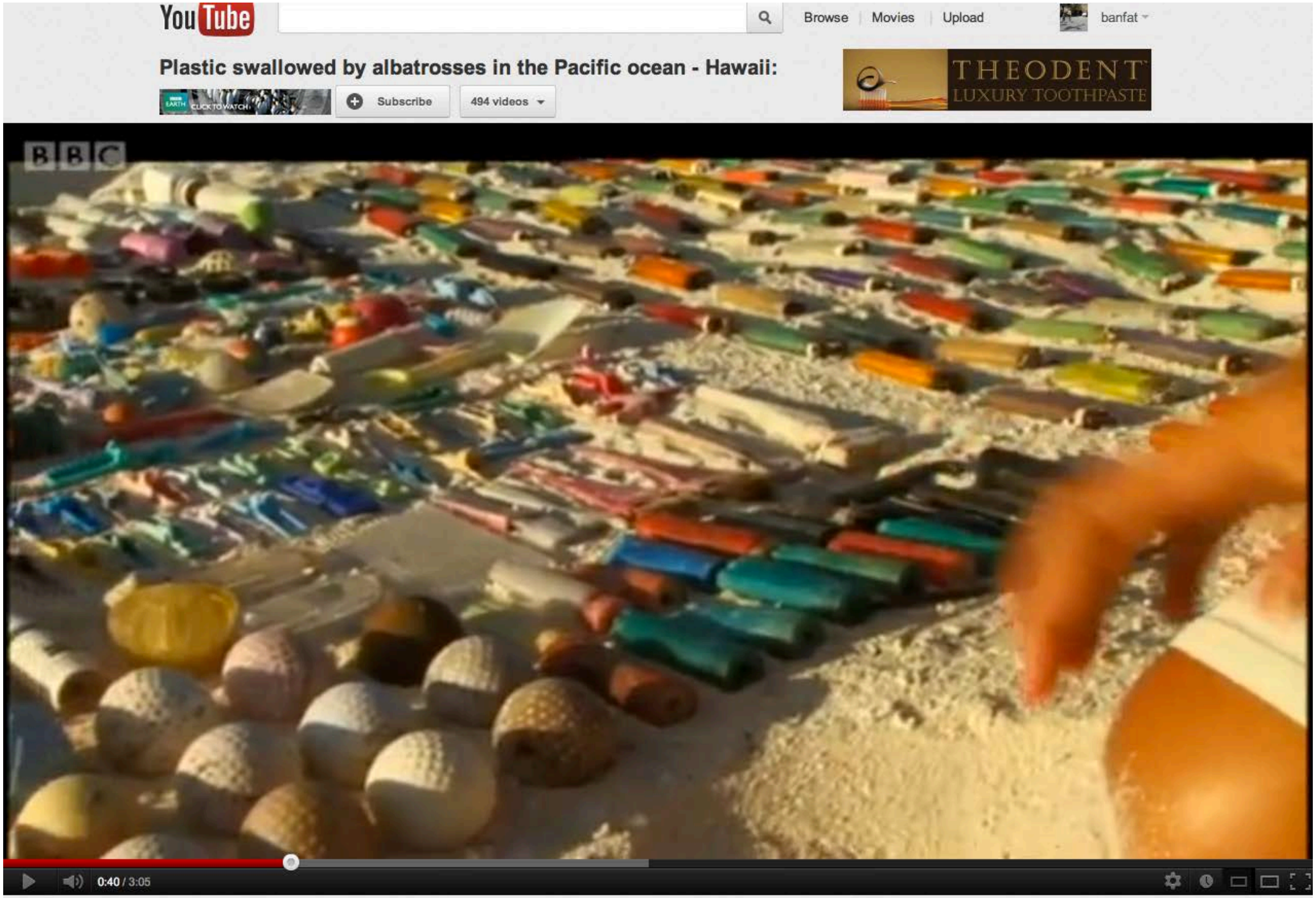
Acknowledgements

This information was compiled with information gathered from participants of the International Workshop on the Occurrence, Effects, and Fate of Microplastic Debris (September 2008) as well as from Dr. Anthony Andrady, Research Triangle Institute, leading expert in plastics degradation in the marine environment, and Dr. Joel Baker, University of Washington-Tacoma, microplastics researcher.

http://marinedebris.noaa.gov/info/plastic.html



Photos of various types of plastic debris. *Photos (left to right) courtesy of Stephanie Lennox, James Leichter, and Wolcott Henry (2005), from Marine PhotoBank.*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BIRD ENTANGLEMENTS OBSERVED DURING BEACH MONITORING SURVEYS

EMMA MOORE[1], SHANNON LYDAY[2], JAN ROLETTO[3], KATE LITLE[4], JULIA K. PARRISH[4], HANNAH NEVINS[5], JAMES T. HARVEY[5] & JEAN DE MARIGNAC[6]

ABSTRACT

COASST[4], Beach Watch[2] and BeachCOMBERS[5] conduct long-term monitoring surveys providing baseline data on seabird mortality along the West Coast of the United States. This study investigates entanglement among bird carcasses from data collected by these citizen scientist programs between 2001-2005. The bird carcasses recorded as entangled ranged from 0.2% - 1.2% annually. Of the sixteen bird species documented as entangled, the most frequently observed were Common Murre *(Uria aalge)* and Western Gull *(Larus occidentalis)*. The entanglement materials identified were primarily fishing related. In order to determine the sources of the entanglement materials, it is recommended that the programs record additional details in standardized categories. Entanglements observed in carcasses during beached bird monitoring surveys are a conservative view of the actual entanglement rate that is occurring at sea.

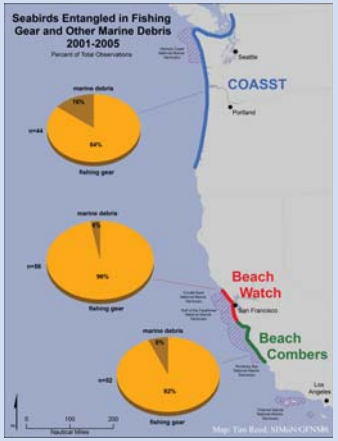


Figure 1. Areas covered by beach monitoring programs.

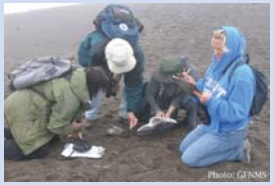
INTRODUCTION

Entanglement is defined as 'an interaction between marine life and entanglement material whereby the loops and openings of various types of debris entangle animal appendages or entrap animals' (Laist 1997). The materials observed in entanglements can be categorized into three groups:

- active fishing gear
- discarded fishing gear
- other marine debris

Observations of entanglements at sea are often chance encounters, hence entanglement studies tend to be made from land-based observations, where live or dead animals strand on beaches, or are viewed as visibly entangled during population surveys (Laist 1997).

METHODOLOGY



Beach monitoring survey data in this study were collected by trained volunteers from 2001-2005. Surveyors monitor designated beaches during monthly or bi-monthly surveys and collect data on bird carcasses encountered (Figure 1). During data collection entanglements are recorded as fishing gear or as other marine debris. However, further details about the type of entanglement material are recorded arbitrarily. Data fields extracted from each program included: data source, date, area, species, entanglement material and any comments. Species were identified to the lowest possible taxonomic level.

RESULTS

- 152 entanglement records (0.59% of total bird carcasses) were extracted from the three beach monitoring programs during 2001-2005. Records of entanglements occurred in 16 identified species (Table 1).
- Common Murre and Western Gull were the most frequently documented beached bird species. Common Murre accounted for 27.6% of all the entanglement records (Table 1).
- Entanglement materials were primarily fishing related, constituting 84% - 96% of entanglement records (Figure 1). Additional details recorded informally included type of fishing gear, e.g. net, salmon flasher, line and hook.

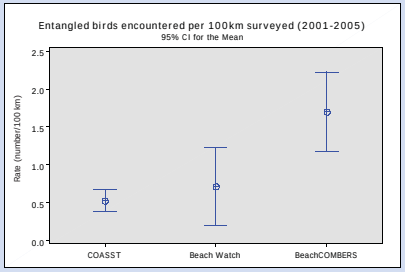


Figure 2. Mean rate of entangled carcasses encountered per 100 km for 2001-2005.

- The mean rate of entangled carcasses encountered ranged from 0.5 - 1.7 birds per 100 km surveyed (Figure 2).
- The annual percentage of entangled birds documented by each beach survey program ranged from 0.2% to 1.2% (Figure 3).

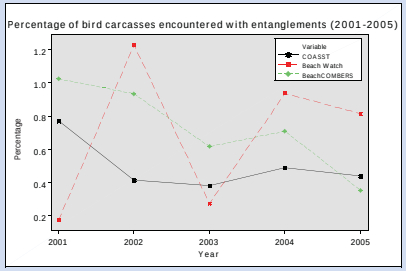


Figure 3. Percentage of entangled carcasses encountered.

Table 1. Entangled birds (n=152) recorded from 2001-2005.

Common name	n	Entanglement material (where identified)
Black-footed Albatross	1	Rope
Brandt's Cormorant	11	Fishing line, fishing hook, rope and metal
Brown Pelican	5	Fishing hook, hook and sinker
California Gull	4	Fishing line
Common Merganser	1	Fishing line
Common Murre	42	Balloon, fishing line, fishing hook, fishing net, hook, line and sinker, plastic, salmon gear
Double-crested Cormorant	3	Fishing line
Glaucous-winged Gull	5	Fishing line, fishing hook, fishing net
Heermann's Gull	1	Fishing line
Northern Fulmar	3	Balloon & string, fishing line and sinker
Pelagic Cormorant	6	Fishing line, fishing hook, line and sinker
Short-tailed Shearwater	1	Fishing line
Sooty Shearwater	11	Fishing line, fishing hook
Surf Scoter	1	Fishing line
Western Grebe	8	Fishing line, string
Western Gull	25	Fishing line, fishing hook, line and sinker
Unidentified spp.	24	Fishing line, fishing hook, plastic, rope and string

DISCUSSION AND CONCLUSION

Entanglements were seen in a wide range of birds that inhabit the California Current; the most frequently documented species were Common Murre and Western Gull. Both species breed locally and population numbers are relatively abundant (Leet et al. 2001). Although the beach monitoring data indicates entanglement is not a major cause of mortality, these land based observations represent an unknown fraction of entanglements occurring at sea. To address the sources of entanglement, the programs should adopt new survey categories providing details of material type. Continued monitoring will be valuable in providing an overview of the impacts for each species, identifying trends and highlighting any particular areas of concern.

RECOMMENDATIONS

Recommendations for further understanding entanglement issues in order to develop solutions include:

- standardized protocols for recording entanglements and materials;
- refined documentation of types of entanglement materials to address sources;
- continued documentation of entanglements by surveyors;
- promotion of outreach materials and programs on the impacts and reduction of marine debris; and
- continued involvement in beach clean-ups.

REFERENCES

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Leet, W.S., Dewees, C.M., Klingbeil, R. and Larson, E.J. (eds) (2001) California's Living Resources: A Status Report. The Resources Agency. The California Department of Fish and Game, University of California.

ACKNOWLEDGEMENTS

COASST, Beach Watch and BeachCOMBERS extend special thanks to the hundreds of volunteers who have spent thousands of hours surveying beaches. Thank you to Bridget Watts and Tim Reed.

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From The Times

March 8, 2008

Climate change: the burning issues

Thoughtful use of solid science must underpin environmental protection

Climate change is one of the unfolding calamities of our times. It is our moral responsibility as a country, and as individuals, to address the global threat that may engulf our children. We are compelled to make difficult choices and change our lifestyles. It is essential that we make changes based on reason, but not group-think. There is a danger that the green herd, in pursuit of a good cause, stumbles into misguided campaigns.

Analysis without facts is guesswork. Sloppy analysis of bad science is worse. Poor interpretation of good science wastes time and impedes the fight against obnoxious behaviour. There is no place for bad science, or weak analysis, in the search for credible answers to difficult questions.

The most troubling recent example of bad science is Andrew Wakefield's allegation, subsequently comprehensively quashed, of a link between the MMR vaccine and autism. History is sadly overpopulated with other examples. In 1995 environmental lobbyists obliged Shell, the oil giant, to abandon plans to scupper its Brent Spar platform in the Atlantic and instead tow it to a Norwegian fjord to be dismantled. Break-up came at a high energy cost. and was subsequently shown to be a greater risk to marine pollution.

Airliners are accused of speeding climate change by fouling the upper atmosphere. But cold analysis of hard facts shows that the damage done is more perceived than real. Imports of cut flowers from Africa were subject to a vociferous consumer campaign because it was assumed that the air freight cost was scandalous. A 2007 report published by Cranfield University showed that imported flowers created just 17 per cent of the carbon emissions of Dutch growers using heated greenhouses. Hilary Benn, as Secretary of State for International Development, said British shoppers should buy African flowers because it helped to sustain African livelihoods. The environmental benefits of biofuels have been exaggerated. By using land that might otherwise be used to grow edible crops, biofuels have created shortages of food and price rises. Brazilian rainforest is also endangered, as additional land is cleared for food production. Development of genetically modified (GM) disease-resistant crops was needlessly impeded by fears that mutant weeds would cause lasting damage. Almost no scientific evidence exists to support the scaremongering.

Wilful ignorance of good science is as depressing as the misinterpretation of bad science. Rising demand for low-carbon energy will be best met from nuclear science. Unfounded fears about the size of nuclear risks, however, threatens the pursuit of this commonsense answer.

Many of those who have demonised plastic bags have enlisted scientific study to their cause. By exaggerating a grain of truth into a larger falsehood they spread misinformation, and abuse the trust of their unwitting audiences. Gordon Brown's Government may be about to fall for a spurious argument, while

simultaneously pandering to wrong-headed populism.

In this case an apparently fair piece of scientific research has been dragooned into the attack. In 1997 David Laist, an American, published a paper suggesting that every year 100,000 sea animals, and one million birds, meet an untimely end thanks to plastic pollution. Dr Laist never suggested this was an incontrovertible fact. But the assertion was, and is, respected as a reasonable estimate. Upon this unassuming foundation, however, is built an edifice of mistaken assumptions. Plastic nets entrap animals and off-cuts from the manufacture of everything from credit cards to watering cans poison or choke. Another piece of work, analysing 243 dead albatrosses, suggests that 90 per cent had come into contact with plastic but only one had died because of a plastic bag.

Plastic bags are objectionable because they make litter, but containers, such as water bottles, are a greater evil because they degrade more slowly. Plastic bags create some emissions but on this really large concern they are marginal. Carbon emissions will only come under control with fundamental shifts in domestic, corporate industrial and agricultural practice. Little good will come from fiddling with the small things while burning issues are ignored.

ARE YOU BEING TOLD THE TRUTH ABOUT PLASTIC BAGS?

Watch our video and decide for yourself.

If you would like to contact us, our e-mail address is savetheplasticbag@earthlink.net.

SHARE THIS PAGE:

The Karen Beasley Sea Turtle Rescue and Rehabilitation Center

Topsail Island, North Carolina, USA

INDEX OF SEA TURTLES BY ADMISSION DATE

[1996-97][1998][1999]
[2000][2001][2002][2003][2004][2005][2006][2007][2008][2009]
[2010][2011][2012]

Admitted 2012				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
USS NC	Caretta caretta	Cold stun, missing flipper	1-4-12	Current patient
RC	Caretta caretta	Cold stun, missing flipper	1-4-12	Current patient
Admitted 2011				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
VETERAN	Chelonia mydas	Internal - Viral, Fungal or Unknown	11-11-11	Current patient
BISHOP	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	10-13-11	Current patient
ANDERSON II	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	10-12-11	Current patient
SNAGGLE	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	10-9-11	Current patient
WATERWAY	Lepidochelys kempi	Internal - Viral, Fungal or Unknown		Current patient
CANADY	Caretta caretta	Fracture - Flipper, **Carapace**, **Beak,** Plastron, Cranial	8-24-11	Current patient
COASTLINE	Lepidochelys kempi	**Hook ,** Entanglement**,** Net or Other	8-11	released 9-13-11

VONDA K	Lepidochelys kempi	Fracture - Flipper, **Carapace**, Plastron, or Cranial	7-12-11	released 9-13-11
WESTY	Caretta caretta	Internal - Viral, Fungal or Unknown	6-29-11	Current patient
IC	Chelonia mydas	Internal - Viral, Fungal or Unknown	June 2011	Current patient
MAJOR	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	June 2011	Released 9-13-11
GILLIS	Lepidochelys kempi	Fracture - Flipper, **Carapace**, Plastron, or Cranial	June 2011	Released 9-11-11
FRIDAY	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	June 2011	Current patient
DURHAM	Caretta caretta	Fracture - **Flipper,** Carapace, Plastron, or Cranial	June 2011	Current patient
MINT	Chelonia mydas	Internal - Viral, Fungal or Unknown	May 2011	release 9-11-11
JOLLY	Lepidochelys kempi	**Hook ,** Entanglement**,** Net or Other	April 2011	Released 6-1-2011
SCUTER	Chelonia mydas	Internal - Viral, Fungal or Unknown	April 2011	Current patient
RIPTIDE	Chelonia mydas	Internal - Viral, Fungal or Unknown	April 2011	released 9-13-11
Admitted 2010				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
FIESTY		Cold Stun	DEC 2010	Released 6-1-11
TICO	Lepidochelys kempi	Cold Stun	DEC 2010	Released 6-1-11
RICA	Lepidochelys kempi	Cold Stun	DEC 2010	Released 6-1-11
EAGLE	Lepidochelys kempi	Cold Stun	DEC 2010	Released 6-1-11
AJ	Lepidochelys kempi	Cold Stun	DEC 2010	Released 9-13-11
HOLLY	Chelonia mydas	Cold Stun	DEC 2010	Released 6-1-11
MOSS	Chelonia mydas	Cold Stun	DEC 2010	Released 6-1-11
KELLY	Chelonia mydas	Cold Stun	DEC 2010	Released 6-1-11
JADE	Chelonia mydas	Cold Stun	DEC 2010	Released 6-1-11
LIME	Chelonia mydas	Cold Stun	DEC 2010	Released 6-1-11
HUNTER	Chelonia mydas	Cold Stun	DEC 2010	Released 6-1-11
PEACE	Caretta caretta	Cold Stun	DEC 2010	Released 6-1-11
DILIGENCE	Caretta caretta	Cold Stun	DEC 2010	Released 6-1-11
GRAVELY	Caretta caretta	Cold Stun	DEC 2010	Released 6-1-11

BALDWIN	Caretta caretta	Cold Stun	DEC 2010	Released 6-1-11
HAIRY	Caretta caretta	Cold Stun	DEC 2010	Released 3-24-11
PEANUT	Chelonia mydas	Fracture - Flipper, **Carapace**, **Plastron**, or Cranial	Fall 2010	Released 6-1-11
LITTLE SUNNY	Lepidochelys kempi	**Hook ,** Entanglement**, Net** or Other	Fall 2010	Released 6-1-11
FREEMAN	Caretta caretta	Internal - Viral, Fungal or Unknown	8-22-10	Current patient
RANGER	Chelonia mydas	Fracture - **Flipper-shark bite** Carapace, Plastron**,** or Cranial	8-15-10	Current patient
CHIEF	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	7-25-10	Released 9-14-10
CHASE	Caretta caretta	Fracture - **Flipper,** Carapace, Plastron**,** or Cranial	7-18-10	Current patient
SEYMOUR	Lepidochelys kempi	**Hook ,** Entanglement**,** Gill Net or Other	7-8-10	Released 6-1-11
JOHNSON II	Caretta caretta	Fracture - **Flipper,** Carapace, Plastron**,** or Cranial	7-8-10	Released 6-1-11
OAKIE II	Chelonia mydas	Fracture - Flipper, **Carapace**, **Plastron**, or Cranial	6-8-10	Released 6-1-11
RACQUET	Chelonia mydas	Internal - Viral, Fungal or Unknown	6-4-10	Died 6-8-10
LIGHTENING	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	6-3-10	Released 6-1-11
REMEMBRANCE	Caretta caretta	Internal - Viral, Fungal or Unknown	5-31-10	Released 6-1-11
SC II	Lepidochelys kempi	**Hook ,** Entanglement**,** Gill Net or Other	5-10	Released 9-14-10
TRIPOD	Lepidochelys kempi	Hook **,** Entanglemen**t, Gill Net** or Other	5-10	Released 9-14-10
WALLY	Caretta caretta	Internal - Viral, Fungal or Unknown	5-10	Died
PIP SQUEAK	Lepidochelys kempi	**Hook ,** Entanglement**,** Gill Net or Other	5-10	Released 7-14-10
LIL BIT	Lepidochelys kempi	**Hook ,** Entanglement**,** Gill Net or Other	5-10	Released 7-14-10
MONGO	Lepidochelys kempi	**Hook ,** Entanglement**,** Gill Net or Other	5-10	Released 7-14-10
FIONA	Lepidochelys kempi	**Hook ,** Entanglement**,** Gill Net or Other	5-10	Released 7-14-10
SHREK	Lepidochelys kempi	**Hook ,** Entanglement**,** Gill Net or Other	5-10	Released 6-1-11
CORAL	Chelonia mydas	Internal - Viral, Fungal or Unknown	4-10	Released 9-14-10

GOA	Chelonia mydas	Internal - Viral, Fungal or Unknown	4-10	Released 6-1-11
KNOLL	Chelonia mydas	Internal - Viral, Fungal or Unknown	4-10	Released 7-14-10
Admitted 2009				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
MOTT	Chelonia mydas	Cold Stun		Released 6-3-10
OCEANS ELEVEN	Caretta caretta	Fracture - Flipper, **Carapace**, **Plastron**, or Cranial	11-09-09	Current patient
MYDAS	Chelonia mydas	Internal - Viral, Fungal or Unknown	10-29-09	Released 6-3-10
POQUITO	Lepidochelys kempi	Fracture - Flipper, Carapace, **Plastron**, or Cranial	10-28-09	Died 4-10
WARRIOR	Lepidochelys kempi	Fracture - Flipper, **Carapace**, Plastron, or Cranial	10-28-09	Released 9-14-10
VIRGINIA	Caretta caretta	Fracture - Flipper, **Carapace**, Plastron, or Cranial	10-28-09	Released 3-24-11
SUNNY	Lepidochelys kempi	Hook **, Entanglement,** Gill Net or Other	10-19-09	Released 9-14-10
OAK	Cheonia mydas	Hook **, Entanglement, Gill Net** or Other	10-9-09	Released 4-22-10
PIER 2	Lepidochelys kempi	**Hook ,** Entanglement**,** Gill Net or Other	10-8-09	Released 6-1-11
QUEST	Cheonia mydas	Fracture - Flipper, **Carapace**, Plastron, or Cranial	10-7-09	Released 6-3-10
HYDE	Caretta caretta	**Hook ,** Entanglement**,** Gill Net or Other	10-1-09	Released 6-3-10
WASHINGTON II	Cheonia mydas	Hook **, Entanglement,** Gill Net or Other	9-12-09	Released 4-22-10
KUGAR	Cheonia mydas	Hook **, Entanglement, Gill Net** or Other	9-6-09	Released 10-1-09
CALABASH	Caretta caretta	Fracture - Flipper, **Carapace**, Plastron, or Cranial	8-27-09	Released 6-3-10
SUMMER	Caretta caretta	Hook **, Entanglement, Gill Net** or Other	8-26-09	Released 6-3-10
LOLLIPOP	Chelonia mydas	Fracture - Flipper, **Carapace**, Plastron, or Cranial	8-12-09	Released 4-22-10
GALE	Caretta caretta	Internal - Viral, Fungal or Unknown	8-1-09	Released 6-3-10
YACHTIE	Lepidochelys kempi	Net Capture	7-28-09	Died 8-13-09
OPHELIA	Caretta caretta	Fracture - Flipper, **Carapace**, Plastron, or Cranial	7-20-09	Released 6-3-10
RAIN	Caretta caretta	Internal -	7-13-09	Died July 27, 209

		Viral, Fungal or Unknown		
BOGUE II	Caretta caretta	Internal - Viral, Fungal or Unknown	7-3-09	Released 6-3-10
SQUIRT II	Lepidochelys kempi	**Hook ,** Entanglement or Other	6-30-09	Released 9-16-09
COASTIE II	Caretta caretta	Fracture - Flipper, **Carapace**, Plastron, or Cranial	6-21-09	Died 6-25-09
BEAR II	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	6-15-09	Current patient
SEMPER FI	Caretta caretta	Internal - Viral, Fungal or Unknown	6-15-09	Released 6-3-10
ONSLOW	Caretta caretta	Internal - Viral, Fungal or Unknown	6-12.09	Released 6-3-10
HAMMOCK II	Caretta caretta	Internal - Viral, Fungal or Unknown	6-03-09	Released 6-3-10
MARINA II	Chelonia mydas	Internal - Viral, Fungal or Unknown	5-28-09	Released 9-16-09
NOAH	Caretta caretta	Fracture - Flipper, **Carapace**, **Plastron**, or Cranial	5-12-09	Released 9-16-09
ANCHOR	Caretta caretta	Internal - Viral, Fungal or Unknown	5-6-09	Released 4-22-10
WILLIE	Lepidochelys kempi	Lost	4-23-09	Released 6-10-09
CRYSTAL II	Chelonia mydas	Cold Stun	4-5-09	Released 9-16-09
PIGGLY WIGGLY	Chelonia mydas	Cold Stun	2-5-09	Released 6-3-09
Admitted 2008				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
O-NINE	Caretta caretta	Cold Stun	11-23-08	Released 2-9-09
O-EIGHT(aka SB)	Chelonia mydas	Cold Stun	11-23-08	Released 2-9-09
O-FIVE aka lighths	Chelonia mydas	Cold Stun	11-23-08	Released 6-3-09
O-THREE(aka mcneil)	Chelonia mydas	Cold Stun	11-23-08	Released 2-9-09
O-ONE(aka beach)	Chelonia mydas	Cold Stun	11-23-08	Released 6-3-09
PENNY	Chelonia mydas	Cold Stun	11-23-08	Released 6-3-09
DECEMBER	Chelonia mydas	Cold Stun	11-22-08	Released 9-16-09
NOVEMBER	Chelonia mydas	Cold Stun	11-22-08	Released 9-16-09
PRIUS (OCTOBER)	Chelonia mydas ??	Cold Stun	11-22-08	Released 4-22-10
SEPTEMBER	Chelonia mydas	Cold Stun	11-22-08	Died 12-20-08

AUGUST	Chelonia mydas	Cold Stun	11-22-08	Released 2-9-09
JULY	Chelonia mydas	Cold Stun	11-22-08	Released 2-9-09
JUNE	Chelonia mydas	Cold Stun	11-22-08	Released 2-9-09
MAY 2	Chelonia mydas	Cold Stun	11-22-08	Released 2-9-09
APRIL	Chelonia mydas	Cold Stun	11-22-08	Released 4-22-10
MARCH	Chelonia mydas	Cold Stun	11-22-08	Released 2-9-09
FEBRUARY	Caretta caretta	Cold Stun w./other complications	11-22-08	Released 6-3-09
JANUARY	Caretta caretta	Cold Stun w./other complications	11-22-08	Released 2-9-09
SNEEZY	Chelonia mydas	Cold Stun	11-20-08	Released 6-3-09
SLEEPY	Chelonia mydas	Cold Stun	11-20-08	Released 6-3-09
HAPPY	Chelonia mydas	Cold Stun	11-20-08	Released 6-3-09
GRUMPY	Chelonia mydas	Cold Stun	11-20-08	Released 2-9-09
DOPEY	Chelonia mydas	Cold Stun	11-20-08	Released 9-16-09
DOC	Chelonia mydas	Cold Stun	11-20-08	Released 6-3-09
BASHFUL	Chelonia mydas	Cold Stun	11-20-08	Released 6-3-09
BIGHT	Chelonia mydas	Cold Stun	11-20-08	Released 6-3-09
DIXON	Caretta caretta	Cold Stun	11-20-08	Released 6-3-09
BAYB	Chelonia mydas	Cold Stun	11-20-08	Released 6-3-09
LOLA	Caretta caretta	Internal - Viral, Fungal or Unknown	11-12-08	Released 6-3-10
SENNET	Caretta caretta	Internal - Viral, Fungal or Unknown	11-07-08	Released 9-16-09
CIRCLE	Caretta caretta	**Hook , Entanglement** or Other	10-8-08	Released 6-3-09
MAY	Caretta caretta	Internal - Viral, Fungal or Unknown - Floater	8-28-08	Released 6-3-09
BLUFF	Chelonia mydas	Fracture - Flipper, **Carapace**, Plastron, or Cranial	8-08	Released 6-3-09
BROWNIE	Lepidochelys kempi	Hook and Fracture - Flipper, **Carapace**, Plastron, or Cranial	7-31-08	Released 6-3-09
JANELL	Caretta caretta	Internal - Viral, Fungal or Unknown	6-25-08	Released 6-3-09
WAVES	Caretta caretta	Internal - Viral, Fungal or Unknown	6-23-08	Died 6-23-08
SURF	Caretta caretta	Internal - Viral, Fungal or Unknown	6-20-08	Released 2-9-09
SOLSTICE	Chelonia mydas	Fracture - Flipper, **Carapace**, Plastron, or Cranial	6-20-08	Released 9-20-08
NETTIE II	Caretta caretta	Hook , Entanglement or Other	6-13-08	Released 2-9-09
LOCKWOOD	Chelonia mydas	Fracture - Flipper,	6-12-08	Released 6-3-09

		Carapace, Plastron, or Cranial		Dead Strand 6-26-09
CHANNEL II	Chelonia mydas		6-01-08	Released 9-20-08
WRIGHTSVILLE	Chelonia mydas	Fracture - Flipper, **Carapace**, Plastron, or Cranial	5-30-08	Died 6-4-10
FISHER 4	Lepidochelys kempi	Hook , **Entanglement** or Other	5-15-08	Released 9-20-08
SHACKLEFORD III	Chelonia mydas	Cold Stun	4-02-08	Released 9-20-08
MACON II	Chelonia mydas	Cold Stun	3-28-08	Released 9-20-08
LEAP	Chelonia mydas	Cold Stun	2-29-08	Released 9-20-08
PUMPKIN	Chelonia mydas	Cold Stun	1-08-08	Released 9-20-08
Admitted 2007				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
QUATRO II	Chelonia mydas	Cold Stun	12-7-07	Released 6-3-08
TRES II	Chelonia mydas	Cold Stun	12-7-07	Released 6-3-08
DOS II	Chelonia mydas	Cold Stun	12-7-07	Released 9-20-08
UNO II	Chelonia mydas	Cold Stun	12-7-07	Released 6-3-08
SCUTE	Chelonia mydas	Cold Stun	11-17-07	Released 6-3-08
BARNEY	Caretta caretta	Cold Stun	11-17-07	Released 6-3-08
OCRACOKE	Caretta caretta	Fracture - **Flipper** (shark bite) Carapace, Plastron, or Cranial	11-13-07	Released 6-3-08
LOOKOUT	Caretta caretta	Internal - Viral, Fungal or Unknown	10-13-07	Released 6-3-08
CHESTNUT	Caretta caretta	**Hook** , Entanglement or Other	10-12-07	Released 3-13-08
CARTER II	Chelonia mydas	Fracture - Flipper, Carapace, **Plastron**, or Cranial	10-10-07	Died 9-14-11
SWAN II	Caretta caretta	Internal - Viral, Fungal or Unknown	9-26-07	Released 6-3-09
ANDERSON	Caretta caretta	Internal - Viral, Fungal or Unknown	9-25-07	Died 9-27-07
EIGHT	Caretta caretta	Fracture - Flipper, **Carapace**, Plastron, or Cranial	9-23-07	Released 6-3-09
BOATER	Caretta caretta	Fracture - Flipper, **Carapace**, Plastron, or **Cranial**	9-16-07	Current patient
SNOW	Caretta caretta	Fracture - **Flipper**, Carapace, Plastron, or **Cranial**	9-15-07	Released 6-3-09
WASHINGTON	Caretta caretta	Hook , **Entanglement** or Other	9-8-07	Died 9-9-07
BRADLEY	Caretta caretta	Fracture - **Flipper**, **Carapace**, Plastron, or **Cranial**	9-5-07	Released 6-3-08
POUND	Lepidochelys kempi	Fracture - Flipper, **Carapace**, Plastron, or **Cranial**	9-4-07	Released 6-3-08

CANAL	Caretta caretta	Fracture - **Flipper** (shark bite) Carapace, Plastron, or Cranial	8-25-07	Released 6-3-08
TRAIL	Caretta caretta	Internal - Viral, Fungal or Unknown	8-16-07	Died 8-17-07
JF	Caretta caretta	Internal - Viral, Fungal or Unknown	8-15-07	Died 8-15-07
LAGOON	Caretta caretta	Internal - Viral, Fungal or Unknown	7-22-07	Released 6-3-08
JOLLY ROGER	Caretta caretta	Hook , **Entanglement** or Other	7-05-07	Released 6-3-08
WAVES	Caretta caretta	Internal - Viral, Fungal or Unknown	6-27-07	Died 6-28-07
CORA	Caretta caretta	Internal - Viral, Fungal or Unknown	6-26-07	Released 6-3-08
CHARLOTTE	Caretta caretta	Internal - Viral, Fungal or Unknown	6-24-07	Died 6-25-07
CMAST	Caretta caretta	Fracture - Flipper, **Carapace**, Plastron, or Cranial	6-17-07	Released 6-3-08
CINDY	Lepidochelys kempi	Fracture - Flipper, **Carapace**, Plastron, or Cranial	6-8-07	Died 8-10-07
BIG GIRL	Caretta caretta	Internal - Viral, Fungal or Unknown	5-31-07	Died 6-7-07
CARTERET II	Caretta caretta	Internal - Viral, Fungal or Unknown	5-25-07	Released 9-17-07
BUZZ	Caretta caretta	Fracture - Flipper, **Carapace**, Plastron, or Cranial	1-27-07	Released 6-6-07
PROGRESS II	Caretta caretta	Cold Stun	1-21-07	Released 6-6-07
JB	Chelonia mydas	Hook , **Entanglement** or Other	1-12-07	Released 9-17-07
Admitted 2006				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
HARLEY	Chelonia mydas	Internal - Viral, Fungal or Unknown	5/11/06	Released 6-6-07
FAYETTEVILLE	Caretta caretta	Internal - Viral, Fungal or Unknown	5/06	Died 5-24-06
RODEO II	Caretta caretta	Internal - Viral, Fungal or Unknown	5-26-06	Released 10-4-06
NC	Caretta caretta	Fracture - **Flipper, Carapace**, **Plastron**, or Cranial	5-29-06	Died 6-2-06
SC	Caretta caretta	Internal - Viral, Fungal or Unknown	6-1-06	Died 6-14-06
SHACKLEFORD II	Caretta caretta	Internal - Viral, Fungal or Unknown	6-10-06	Released 6-6-07
FISHER III	Caretta caretta	Internal - Viral, Fungal or Unknown	6-11-06	Released 6-6-07

TAYLOR	Caretta caretta	Internal - Viral, Fungal or Unknown	7-3-06	Released 6-6-07
SURF CITY	Caretta caretta	Internal - Viral, Fungal or Unknown	7-4-06	Released 6-6-07
CEDAR III	Caretta caretta	Internal - Viral, Fungal or Unknown	7-10-06	Released 6-6-07
KAYAK	Caretta caretta	Internal - Viral, Fungal or Unknown	7-12-06	Released 6-6-07
PI	Caretta caretta	Internal - Viral, Fungal or Unknown	7-16-06	Released 6-6-07
BOOGIE	Caretta caretta	Internal - Viral, Fungal or Unknown	7-18-06	Died 7-19-06
CAROLINA	Lepidochelys kempi	**Hook** , Entanglement or Other	7-24-06	Released 9-20-06
NELSON	Caretta caretta	Fracture - **Flipper,** Carapace, Plastron, or Cranial	8-2-06	Released 6-6-07
TOPSY	Caretta caretta	Internal - Viral, Fungal or Unknown	9-23-06	Died 9-24-06
NETTIE	Caretta caretta	Internal - Viral, Fungal or Unknown	10-5-06	Released 6-6-07
JERSEY GIRL	Lepidochelys kempi	Fracture - **Flipper,** Carapace, Plastron, or Cranial	10-7-06	Released 6-3-08
LENNIE	Lepidochelys kempi	Fracture - Flipper, Carapace, Plastron, or **Cranial Blind**	10-18-06	Permanent Resident
MORA	Caretta caretta	Internal - Viral, Fungal or Unknown	9-06	Released 11/2006
SIMA	Lepidochelys kempi	Fracture - Flipper, Carapace, Plastron, or **Cranial**	11-06	Released 6-3-08
FROSTY	Chelonia mydas	Cold Stun	12-12-06	Released 6-6-07
Admitted 2005				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
EMERALD II	Chelonia mydas	Internal - Viral, Fungal or Unknown	4-04-05	Released 9/2005
HAMMOCK	Caretta caretta	Internal - Viral, Fungal or Unknown	4-25-05	Released 9/2005
SULLIVAN	Caretta caretta	Internal - Viral, Fungal or Unknown	6-07-05	Released 9/2005
QUARTER	Caretta caretta	Internal - Viral, Fungal or Unknown	6-08-05	Released 9/2005
STACY III	Caretta caretta	Fracture - Flipper**,** **Carapace**, Plastron, or Cranial	6-15-05	Released 6-7-06
	Caretta caretta		7-01-05	Released 6-7-06

HANOVER		Internal - Viral, Fungal or Unknown		
BORYK	Caretta caretta	Internal - Viral, Fungal or Unknown	7-04-05	Released 6-7-06
HOPE	Caretta caretta	Internal - Viral, Fungal or Unknown	7-06-05	Released 6-7-06
POUNDER II	Caretta caretta	Internal - Viral, Fungal or Unknown	7-19-05	Released 6-7-06
BRUNWICK II	Caretta caretta	Fracture - **Flipper,** Carapace, Plastron, or Cranial	7-26-05	Released 6-7-06
SPLASH	Caretta caretta	Internal - Viral, Fungal or Unknown	8-03-05	Released 6-7-06
BRIGGY	Lepidochelys kempi	Fracture - **Flipper,** Carapace, Plastron, or Cranial	8-06-05	Released 6-7-06
LUMINA	Caretta caretta	Internal - Viral, Fungal or Unknown - Floater	2005	Released 6-7-06
JAY	Caretta caretta	Internal - Viral, Fungal or Unknown - Floater	2005	Released 6-7-06
SOUTHPORT	Lepidochelys kempi	Cold Stun	2005	Released 9-20-06

Admitted 2004

TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
ATLANTIC II	Caretta caretta	Internal - Viral, Fungal or Unknown	4-04	Released 6-8-05 Dead Strand 5-8-09
BREAKERS	Caretta caretta	Internal - Viral, Fungal or Unknown	5-12-04	Released 9-15-04
DUB	Caretta caretta	Internal - Viral, Fungal or Unknown	5-13-04	Died 5-13-04
WAVES	Caretta caretta	Internal - Viral, Fungal or Unknown	5-13-04	Died 5-13-04
P.E.	Caretta caretta	Fracture - **Flipper,** Carapace, Plastron, or Cranial	5-14-04	Died 5-21-04
IV	Caretta caretta	Internal - Viral, Fungal or Unknown	5-20-04	Died 5-27-04
OBEY	Caretta caretta	Internal - Viral, Fungal or Unknown	6-07-04	Released 6-8-05 Resighted nesting 7-25-05
MOREHEAD	Caretta caretta	Fracture - **Carapace**, Plastron, or **Cranial**	6-13-04	Released 6-8-05
DOREY	Caretta caretta	Floater	6-16-04	Released 10-14-04
	Caretta			

BRUCE	caretta	Floater	6-16-04	Released
MARLIN	Caretta caretta	Floater	6-16-04	Released 10-06-04
NEMO	Caretta caretta	Floater	6-16-04	Released 9-15-04 **Satellite tracked**
SHINN	Caretta caretta	Internal - Viral, Fungal or Unknown	6/20/04	Released 6-8-05
SUNSET	Caretta caretta	Fracture - **Carapace**, Plastron, or **Cranial**	7-08-04	Died 8-04-04
CRUSH II aka PROGRESS	Caretta caretta	**Hook** , Entanglement or Other	7-09-04	Released 9-15-04 **Satellite tracked**
BOGUE	Caretta caretta	Internal - Viral, Fungal or Unknown	7-09-04	Released 6-8-05
BLUE	Caretta caretta	Fracture - Carapace, Plastron, or **Cranial**	7-18-04	Died 8-20-04
HOLDEN II	Chelonia mydas	Fracture - Carapace, Plastron, or **Cranial**	8-05-04	Released 6-7-06
MARSH	Lepidochelys kempi	Fracture - Carapace, Plastron, or Cranial	8-17-04	Released 6-8-05
BRUNSWICK II	Caretta caretta	Fracture - **Carapace**, Plastron, or Cranial	8-24-04	Died 8-25-04
SHACKLEFORD	Chelonia mydas	Fracture - Carapace, Plastron, or **Cranial**	8-27-04	Released 6-8-05
BEECHWOOD	Caretta caretta	Internal - Viral, Fungal or Unknown	8-28-04	Died 8-31-04
OCEANA	Caretta caretta	Drown	8-28-04	Died 8-28-04
LINE	Lepidochelys kempi	Hook , Entanglement or **Other - Swallowed monofilament line**	9-7-04	Released 6-8-05
MASON	Lepidochelys kempi	Puncture - Carapace	9-8-04	Released 6-8-05
CORENETTA	Caretta caretta	Hook , Entanglement or **Other - Possible shark bite**	10-19-04	Released 6-7-06
NOAA	Caretta caretta		11-04	Released 6-8-05
CB	Chelonia mydas	Hook , Entanglement or **Other**	12-04	Released 6-8-05
WENDY	Caretta caretta	Hatchling, Eye problem	6-04	Released 9-17-07

Admitted 2003				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
		Cold-Stunned		

SEA II	Chelonia mydas	w/ other complications	3/00/03	Released 09/24/03
STORMY	Chelonia mydas		4/03	Released 9//24/03
SWAN	Caretta caretta	Fracture **Carapace**, Plastron or **Cranial**	5/10/03	Released 6-8-05
WICK	Lepidochelys kempi	Fracture Humerus bone of flipper	5/17/03	Released 9//24/03
CASPER	Caretta caretta	Hook , Entanglement or Other FP	5/17/03	Released 6-8-05
NET	Caretta caretta	Internal - Viral, Fungal or Unknown	5/22/03	Released 9//24/03
CORE	Caretta caretta	Internal - Viral, Fungal or Unknown	5/28/03	Released 9//24/03
C.S.TA	Caretta caretta	Internal - Viral, Fungal or Unknown	6/05/03	Released 6//02/04
PINE	Chelonia mydas	Internal - Viral, Fungal or Unknown	6/06/03	Released 9//24/03
OAKLEY	Caretta caretta	Fracture **Carapace**, Plastron or **Cranial**	6/10/03	Released 6-3-05
VIVA	Caretta caretta	External - Viral, Fungal or Unknown	7/26/03	Released 6//02/04
MYRTLE	Caretta caretta	Internal - Viral, Fungal or Unknown	7/26/03	Died 9/14/03
CARETTA	Caretta caretta	Fracture **Carapace**, Plastron or Cranial	7/29/03	Released 9/05
CAP'N HOOK	Caretta caretta	**Hook** , Entanglement or Other	8/08/03	Released 9-24-03
RICHIE	Caretta caretta	Fracture **Carapace**, Plastron or Cranial	8/10/03	Released 9-15-04
GALVESTON	Caretta caretta	Fracture **Carapace**, Plastron or Cranial	8/15/03	Released 6//02/04
CHEYENNE	Chelonia mydas	Fracture **Carapace**, Plastron or Cranial	9/09/03 re-admit 6/7/04	Release A 6-2-04 Release B 6-8-05
CRUSH	Caretta caretta	Fracture **Carapace**, Plastron or Cranial	10/17/03	Released 6//02/04
SQUIRT	Chelonia mydas	Internal - Viral, Fungal or Unknown	10/22/03	Released 6//02/04
GT	Chelonia mydas	Internal - Viral, Fungal or Unknown	10/25/03	Released 6//02/04
CHILLY	Caretta caretta	Cold-Stunned w/ other complications	11/15/03	Released 6//02/04 Satellite tracked
DUKE	Caretta caretta	Fracture **Carapace**, **Plastron** or Cranial	11/26/03	Released 9-15-04
BEAUFORT	Caretta caretta	Fracture **Carapace**, Plastron or Cranial	12-03	Released 9-15-04

KANE	Chelonia mydas	Cold-Stunned	12/19/03	Released 6//02/04

Admitted 2002				
TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
NEUSE Re-admit	Caretta caretta	Internal - Viral, Fungal or Unknown	3/04/02	Re-Released 06/05/02
BANKS	Lepidochelys kempi	Hook , Entanglement or Other (hopper dredge)	4/11/02	Released 9/18/02
STACY II	Caretta caretta	Internal - Viral, Fungal or Unknown	5/16/02	Released 9/18/02
MARKER	Caretta caretta	Internal - Viral, Fungal or Unknown	5/17/02	Released 9/18/02
FLIP	Caretta caretta	Internal - Viral, Fungal or Unknown	5/20/02	Released 9/18/02
INDIA	Caretta caretta	Fracture **Carapace**, Plastron or Cranial	5/31/02	Released 9-15-04
HILTON	Lepidochelys kempi	Fracture Carapace, **Plastron** or Cranial	6/6/02	Released 9/18/02
FISHER II	Caretta caretta	Fracture Carapace, Plastron or Cranial **Soft tissue/flipper**	6/13/02	Released 9/18/02
ATLANTIC	Caretta caretta	Internal - Viral, Fungal or Unknown	6/17/02	Released 06/4/03
JAYBIRD	Caretta caretta	**Hook** , Entanglement or Other	7/10/02	Released 9/18/02
BOSTON	Lepidochelys kempi	Cold-Stunned w/ other complications	7/19/02	Released 9/18/02
ABBOTT	Caretta caretta	Hook , **Entanglement** or Other	7/26/02	Released 06/4/03
LINER	Caretta caretta	Hook , **Entanglement** or Other	7/26/02	Released 9/18/02
SOUNDER	Caretta caretta	Internal - Viral, Fungal or Unknown	7/26/02	Released 06/4/03
WALKER	Caretta caretta	Fracture **Carapace**, Plastron or Cranial	8/03/02	Released 06/4/03
BRUNSWICK	Caretta caretta	Fracture Carapace, Plastron or Cranial **Soft tissue/flipper**	8/06/02	Released 06/4/03
CJ	Caretta caretta	Internal - Viral, Fungal or Unknown	10/02/02	Released 6//02/04
CATHERINE	Caretta caretta	Internal - Viral, Fungal or Unknown	10/24/02	Released 9//24/03
SHELLIE	Lepidochelys kempi	Fracture Carapace, Plastron or **Cranial**	11/13/02	Released 06/4/03
DAVIS	Chelonia mydas	Cold-Stunned w/ other complications	11/14/02	Released 06/4/03

CARTERET	Lepidochelys kempi	Probable Cold-Stun	11/29/02	Released 06/4/03
CP	Chelonia mydas	Power Plant Grate	11/30/02	Released 06/4/03
HARK	Chelonia mydas	Cold-Stunned	12/01/02	Released 06/4/03
COASTIE	Chelonia mydas	Fracture **Carapace**, Plastron or Cranial	12/02/02	Released 09/24/03
HATTERAS	Chelonia mydas	Cold-Stunned	12/08/02	Released 06/4/03

Admitted 2001

TURTLE	SPECIES	INJURY OR ILLNESS	ADMIT	OUTCOME
MACON	Chelonia mydas	Internal - Viral, Fungal or Unknown	03/30/01	Released 06/20/01
HOOK	Caretta caretta	Hook , Entanglement or Other	05/13/01	Released 10/03/01
STACY (NMFS)	Lepidochelys kempi	Internal - Viral, Fungal or Unknown	05/21/01	Released 10/03/01
KIAWAH	Caretta caretta	Internal - Viral, Fungal or Unknown	06/04/01	Released 06/05/02
BALDY aka marsh	Chelonia mydas	Internal - Viral, Fungal or Unknown	06/07/01	Released 10/03/01
BAY	Chelonia mydas	Fracture Carapace, Plastron or Cranial	06/08/01	Placed 10-29-06 Minnesota Zoo
ISLE	Caretta caretta	Hook , Entanglement or Other	06/18/01	Released 10/03/01
CAPE	Caretta caretta	Internal - Viral, Fungal or Unknown	07/12/01	Released 06/05/02
SEA	Caretta caretta	Internal - Viral, Fungal or Unknown	07/16/01	Released 06/05/02
NiMFS	Caretta caretta	Internal - Viral, Fungal or Unknown, (floater)	07/20/01	Released 10/03/01
A.T.	Caretta caretta	Internal - Viral, Fungal or Unknown, (floater)	07/20/01	Released 06/05/02
Corey II	Caretta caretta	Internal - Viral, Fungal or Unknown, (floater)	07/23/01	Released 06/05/02
CALO	Caretta caretta	Fracture Carapace, Plastron or Cranial	08/2/01	Died 08/01
OK	Caretta caretta	Fracture Carapace, Plastron or Cranial	08/21/01	Died 09/07/01
CARTER	Caretta caretta	Fracture Carapace, Plastron or Cranial	09/14/01	Died 10/09/01
BARNIE	Caretta caretta	Internal Viral, Fungal or Unknown	09/28/01	Released 06/05/02
CHARLESTON	Lepidochelys kempi	Internal Viral, Fungal or Unknown	10/2/01	Died 12/18/01
CEDAR II	Caretta caretta	Hook , Entanglement or Other	10/25/01	Released 06/05/02
CHANNEL	Caretta caretta	Internal - Viral, Fungal or Unknown, (floater)	10/26/01	Died 11/29/01

PAMLICO	Caretta caretta	Hook , Entanglement or Other	11/29/01	Released 06/4/03
GILL	Caretta caretta	Internal - Viral, Fungal or Unknown	12/19/01	Released 9/18/02
BALTIMORE	Chelonia mydas	Internal - Viral, Fungal or Unknown - Cold Stun	12/27/01	Released 9/18/02
Admitted 2000				
RIVER	Caretta caretta	Cold-Stunned w/ other complications	01/21/00	Released 6/21/00
LEWIS	Caretta caretta	Cold-Stunned w/ other complications	01/21/00	Released 6/21/00
CHEESECAKE	Chelonia mydas	Cold-Stunned w/ other complications	04/08/00	Released 6/21/00
TIDES	Chelonia mydas	Hook , Entanglement or Other	05/17/00	Released 7/17/00
BEAR	Carretta caretta	Fracture Carapace, Plastron or Cranial	06/04/00	Released 06/05/02
FISHER	Chelonia mydas	Hook , Entanglement or Other	06/13/00	Released 7/17/00
ZEKE	Lepidochelys kempi	Hook , Entanglement or Other	06/13/00	Released 09/12/00
SHARKY	Caretta caretta	Fracture Carapace, Plastron or Cranial	06/19/00	Released 10/03/01
ROCKY	Lepidochelys kempi	Hook , Entanglement or Other	06/20/00	Released 7/17/00
RAY	Caretta caretta	Hook , Entanglement or Other	07/08/00	Released 06/20/01
STING	Caretta caretta	Hook , Entanglement or Other	07/10/00	Released 10/12/00
AVON	Caretta caretta	Fracture Carapace, Plastron or Cranial	07/12/00	Released 10/03/01
NEUSE Re-admit	Caretta caretta	Internal - Viral, Fungal or Unknown (floater) re-admit - net entanglement	07/13/00 03/04/02	Released 06/20/01 Re-Released 6/02 **DEAD STRAND 6/03**
OAKIE	Caretta caretta	Something from each category	07/23/00	Released 10/03/01
RODEO	Caretta caretta	Hook , Entanglement or Other	08/12/00	Released 06/20/01
HOLDEN	Caretta caretta	Hook , Entanglement or Other	08/19/00	Released 06/20/01
COQUINA	Caretta caretta	Fracture Carapace, Plastron or Cranial	08/29/00	Released 06/05/02
POWER	Lepidochelys kempi	Hook , Entanglement or Other	09/07/00	Released 06/20/01
GRID	Chelonia mydas	Hook , Entanglement or Other	09/07/00	Released 10/12/00
JERSEY II	Lepidochelys kempi	Hook , Entanglement or Other (floater)	09/07/00	Released 06/20/01
HONEY	Caretta caretta	Fracture Carapace, Plastron or Cranial	09/27/00	Released 6//02/04
				Released 06/20/01

TRUMP	Caretta caretta	Internal - Viral, Fungal or Unknown	10/03/00	**Dead strand 7/01**
Admitted 1999				
TOPPER	Caretta caretta	Cold-Stunned w/ other complications	03/04/99	Released 06/23/99
REEF	Lepidochelys kempi	Cold-Stunned w/ other complications	03/25/99	Released 06/23/99
DARE	Lepidochelys kempi	Internal Viral, Fungal or Unknown	06/15/99	Died 03/10/05
PEPPER	Chelonia mydas	Internal Viral, Fungal or Unknown	07/03/99	Released 10/03/01 Re-Capture FL 9-2008
BETTIE	Caretta caretta	Internal Viral, Fungal or Unknown	7/07/99	Released 10/27/99
JR	Caretta caretta	Hook or Entanglement	7/28/99	Released 10/27/99
MARINA	Caretta caretta	Fracture Carapace, Plastron or Cranial	8/10/99	Died 08/16/99
EMERALD	Caretta caretta	Hook or Entanglement	10/15/99	Released 12/13/99
CEDAR	Caretta caretta	Hook or Entanglement	11/04/99	Released 06/21/00
POUNDER	Caretta caretta	Cold-Stunned w/ other complications	11/29/99	Released 06/21/00
ANDY	Caretta caretta	Cold-Stunned w/ other complications	12/17/99	Released 06/21/00
UNO	Lepidochelys kempi	Cold-Stunned w/ other complications	12/17/99	Released 09/12/00
DOS	Lepidochelys kempi	Cold-Stunned w/ other complications	12/17/99	Released 06/20/01
TRES	Lepidochelys kempi	Cold-Stunned w/ other complications	12/17/99	Released 09/12/00
CUATRO	Lepidochelys kempi	Cold-Stunned w/ other complications	12/17/99	Released 6/21/00
CINCO	Lepidochelys kempi	Cold-Stunned w/ other complications	12/17/99	Released 6/21/00
SEIS	Lepidochelys kempi	Cold-Stunned w/ other complications	12/17/99	Released 6/21/00
SIETE	Lepidochelys kempi	Cold-Stunned w/ other complications	12/17/99	Released 09/12/00 **Dead strand in VA 6/18/01**
Admitted 1998				
PIER	Lepidochelys kempi	Hook or Entanglement	06/06/98	Released 06/10/98
BEAU	Caretta caretta	Fracture Carapace, Plastron or Cranial	06/18/98	Euthanized 06/22/98
	Caretta caretta	Fracture	08/09/98	Died 09/26/98

SNEAD		Carapace, Plastron or Cranial		
JERSEY	Lepidochelys kempi	Hook or Entanglement	08/18/98	Released 11/12/98
HARKER	Caretta caretta	Fracture Carapace, Plastron or Cranial	09/27/98	Died 01/04/99
WINDY	Caretta caretta	Internal Viral, Fungal or Unknown	05/31/98	Released 10/27/99 **DEAD STRAND 5/09/2003**
CHARLIE	Caretta caretta	Fracture Carapace, Plastron or Cranial	06/22/98	Released 09/12/00
SMYRNA	Caretta caretta	Fracture Carapace, Plastron or Cranial	06/24/98	Released 10/27/99
OCEAN	Caretta caretta	Internal Viral, Fungal or Unknown	08/23/98	Released 09/12/00
HUNTINGTON	Caretta caretta	Internal Viral, Fungal or Unknown	09/4/98	Released 06/23/99
PIVER	Caretta caretta	Fracture Carapace, Plastron or Cranial	11/01/98	Released 10/03/01
DRUM	Chelonia mydas	Hook , Entanglement or Other	11/09/98	Released 06/23/99
Admitted 1996 and 1997				
KAREN	Caretta caretta	Fracture Carapace, Plastron or Cranial	1996	Released 07/24/97
COREY	Caretta caretta	Fracture Carapace, Plastron or Cranial	Fall 1996	Released 06/10/98
HUFFY	Caretta caretta	Fracture Carapace, Plastron or Cranial	08/96	Released 07/24/97
KITTY	Caretta caretta	Fracture Carapace, Plastron or Cranial	05/23/97	Released 06/23/99
CORNCAKE	Caretta caretta	Prolapsed cloaca Hemiovariosalpingectomy	July 1997	Released 10/22/97 ***Resighted* Nesting 06/09/99**
CC	Caretta caretta	Cold-Stunned w/ other complications	12/11/97	Released 06/10/98

DOES THE "GREAT PACIFIC GARBAGE PATCH" REALLY EXIST?

Is it "twice the size of Texas" as environmentalists allege?

Or is it a Great Pacific Garbage Myth?

ARE 100,000 MARINE MAMMALS AND A MILLION SEABIRDS BEING KILLED EACH YEAR BY PLASTIC BAGS, AS ENVIRONMENTALISTS ALLEGE?

Or are they being killed by something else?

FIND OUT THE ANSWERS HERE – WITH PHOTOGRAPHIC EVIDENCE!

SAVE THE PLASTIC BAG COALITION
350 Bay Street, Suite 100-328
San Francisco, CA 94133
Phone: (415) 577-6660
Fax: (415) 869-5380
E-mail: savetheplasticbag@earthlink.net
Website: www.savetheplasticbag.com

THE PURPOSE OF THE COALITION

Save The Plastic Bag Coalition was formed in 2008 to respond to the myths, misinformation, and exaggerations about plastic bags created and disseminated by environmental groups and their overzealous supporters.

An editorial in the London Times on March 8, 2008 stated:

> ***"Many of those who have demonized plastic bags have enlisted scientific study to their cause. By exaggerating a grain of truth into a larger falsehood, they spread misinformation and abuse the trust of their unwitting audiences."***

David Laist, a senior policy and program analyst with the federal Marine Mammal Commission, has stated:

> ***"In their eagerness to make their case, some of the environmental groups make up claims that are really not supportable."***

The chief scientist on the Scripps Seaplex expedition, which went out to the Pacific to survey marine debris, states as follows regarding the "Great Pacific Garbage Patch":

> ***"Misinformation on this issue is rampant."***

The Algalita Marine Research Foundation created the idea of a "Great Pacific Garbage Patch." In December 2011, Dr. Marcus Eriksen of Algalita admitted:

> ***"The idea of a single, Texas-size garbage patch is the myth of media sensationalism."***

ARE 100,000 MARINE MAMMALS AND A MILLION SEABIRDS BEING KILLED EACH YEAR BY PLASTIC BAGS?

The following statement was contained in editorials published in the Daily Breeze and the San Jose Mercury News:

> ***"Plastic bags kill an estimated 1 million seabirds and 100,000 other animals every year, whether from eating the things or getting tangled in them."***

On January 22, 2008, the Los Angeles County Board of Supervisors considered adoption of a plastic bag reduction program. The following statements were made at that meeting:

> Emily Utter of Chico Bag Company (reusable bag maker): ***"And as we've heard, plastic bags pose a huge environmental threat to our marine environment, 100,000 marine deaths per year due to plastic bags."***
>
> Heal the Bay: ***"You've all heard the numbers 6 billion bags, which is a million bags a minute worldwide are used throughout the world. We have a global environmental crisis. You've heard the numbers on a million sea birds, 100,000 marine mammals annually."***

In fact, the allegation that 100,000 marine mammals and a million seabirds die each year as a result of plastic bags is ***untrue***. An article in the The Times of London on March 8, 2008 entitled "Series of blunders turned the plastic bag into global villain" states in part as follows:

> *"The central claim of campaigners is that the bags kill more than 100,000 marine mammals and one million seabirds every year. However, this figure is based on a misinterpretation of a 1987 Canadian study in Newfoundland, which found that, between 1981 and 1984, more than 100,000 marine mammals, including birds, were killed by discarded nets. The Canadian study did not mention plastic bags.*
>
> *Fifteen years later in 2002, when the Australian Government commissioned a report into the effects of plastic bags, its authors*

misquoted the Newfoundland study, mistakenly attributing the deaths to "plastic bags".

The figure was latched on to by conservationists as proof that the bags were killers. For four years the "typo" remained uncorrected. It was only in 2006 that the authors altered the report, replacing "plastic bags" with "plastic debris". But they admitted: "The actual numbers of animals killed annually by plastic bag litter is nearly impossible to determine."

In a postscript to the correction they admitted that the original Canadian study had referred to fishing tackle, not plastic debris, as the threat to the marine environment.

Regardless, the erroneous claim has become the keystone of a widening campaign to demonise plastic bags.

David Santillo, a marine biologist at Greenpeace, told The Times that bad science was undermining the [British] Government's case for banning the bags. "It's very unlikely that many animals are killed by plastic bags," he said. "The evidence shows just the opposite."

The U.S. National Oceanic and Atmospheric Administration ("NOAA") states as follows:

Question: "Is it true that 100,000 marine mammals and/or sea turtles die each year due to marine debris/plastics/plastic bags?"

Answer: "We were able to find no information to support this statement. An erroneous statement attributing these figures to plastic bags was published in a 2002 report published by the Australian Government; it was corrected in 2006."

Question: "Is it true that marine debris kills a million seabirds each year?"

Answer: "This statement is currently unknown. We are so far unable to find a scientific reference for this figure. The closest we have found is "214,500 to 763,000 seabirds are killed annually incidental to driftnet fishing by Japanese fishermen in the North Pacific Ocean (US Department of Commerce, 1981)" from Laist, 1987."

WHAT IS REALLY KILLING TURTLES? NOT PLASTIC BAGS!

Click here for an index of all sea turtles admitted to the Sea Turtle Rescue and Rehabilitation Center from 1996 to 2012. Plastic bags and plastics are not even mentioned.

Click here to read about the approximately 4,600 turtles that are killed every year in US fisheries by fishing nets and hooks.

Click here for a study entitled: "Estimates of marine mammal, sea turtle, and seabird mortality in the California drift gillnet fishery for swordfish and thresher shark, 1996-2002." Large numbers of turtles, marine mammals, and seabirds are killed by fishing activities.

SURVEY OF 152 BIRD ENTANGLEMENTS OFF THE U.S. WEST COAST FROM 2001 TO 2005

Table 1. Entangled birds (n=152) recorded from 2001-2005.

Common name	n	Entanglement material (where identified)
Black-footed Albatross	1	Rope
Brandt's Cormorant	11	Fishing line, fishing hook, rope and metal
Brown Pelican	5	Fishing hook, hook and sinker
California Gull	4	Fishing line
Common Merganser	1	Fishing line
Common Murre	42	Balloon, fishing line, fishing hook, fishing net, hook, line and sinker, plastic, salmon gear
Double-crested Cormorant	3	Fishing line
Glaucous-winged Gull	5	Fishing line, fishing hook, fishing net
Heermann's Gull	1	Fishing line
Northern Fulmar	3	Balloon & string, fishing line and sinker
Pelagic Cormorant	6	Fishing line, fishing hook, line and sinker
Short-tailed Shearwater	1	Fishing line
Sooty Shearwater	11	Fishing line, fishing hook
Surf Scoter	1	Fishing line
Western Grebe	8	Fishing line, string
Western Gull	25	Fishing line, fishing hook, line and sinker
Unidentified spp.	24	Fishing line, fishing hook, plastic, rope and string

http://www.farallones.org/volunteer/documents/PSGPoster.pdf

WHAT ARE ALBRATROSSES INGESTING? NOT PLASTIC BAGS!

Anti-plastic bag activists claim that albatrosses are ingesting "plastic" and dying as a result. They say that this is a major justification for banning plastic bags.

You be the judge.

Click here for a BBC video and tell us what you think. Does the video justify the banning of plastic bags?

The image below is from the video. Lots of “plastic” was found in the albatrosses, but not plastic bags! Not one!

DOES THE "GREAT PACIFIC GARBAGE PATCH" EXIST?

On June 24, 2010, the Los Angeles Times stated in an editorial:

> ***"The Great Pacific Garbage Patch is an area of the ocean larger than Texas and thick with floating plastic debris: bottles, bottle caps, bits of packaging and uncountable plastic bags."***

The statement is untrue. We challenge you to check Google Images and find a single photograph of it.

The chief scientist on the Scripps Seaplex expedition, which went to the Pacific to survey marine debris, states as follows regarding whether there is area of trash the size of Texas:

> ***"There is no evidence for this. There certainly is a lot of trash, but there have been no measurements of either the trash's total area or its growth rate."***

Dr. Marcus Eriksen of the Algalita Marine Research Foundation sailed a from Long Beach to Hawaii to find the "Great Pacific Garbage Patch." He states:

> ***"There is no island of plastic trash."***

He says that there is a confetti of waste on the ocean surface.

The U.S. National Oceanic and Administration (NOAA) states as follows:

> ***"The name "garbage patch" is a misnomer. There is no island of trash forming in the middle of the ocean nor a blanket of trash that can be seen with satellite or aerial photographs. This is likely because much of the debris found here is small bits of floating plastic not easily seen from a boat."***
>
> ***"The reported size and mass of these "patches" have differed from media article to article. Due to the limited sample size, as well as a tendency for observing ships to explore only areas thought to concentrate debris, there is really no accurate estimate on the size or mass of the "garbage patch" or any other concentrations of marine debris in the open ocean."***

The Sea Education Association in Woods Hole, Massachusetts has surveyed plastic debris in the Atlantic Ocean for the past 22 years. They are now reporting that the concentration of plastic in the Atlantic Ocean has not increased over the past 22 years, despite the increased production of plastics during that period. They were surprised to find that there was no overall change in the amount of plastic snared from 1986 to 2008. Karen Lavender, an oceanographer at the Sea Education Association said:

> ***"I expected to see the line go right up. It took us a good year to decide no, we have not seen an increase, no matter how you slice it."***

Each half-hour trawl in the area where the concentration was the highest typically turned up just 20 tiny pieces, equivalent to about 0.3 grams in all. By comparison, a U.S. nickel weighs 5 grams.

Karen Lavender says:

> ***"If scientists sifted through 2,000 bathtubs' worth of plastic-contaminated seawater, they'd find just enough micro particles to fill the palm of a person's hand."***

In 2008, the Algalita Marine Research Foundation sent a vessel called the JUNK from Long Beach to Hawaii to prove the existence of the "Great Pacific Garbage Patch." The captain of the vessel was Dr. Marcus Eriksen. In this image, the JUNK drags the trawl device through the North Pacific Gyre. There are no visible plastic bags or any other trash.

http://www.youtube.com/watch?v=3d3_fLsjC8U

24 hours and 50 miles **later, Dr. Eriksen pulls the trawl device aboard the boat. There are no visible plastic bags or any other trash.**

Dr. Eriksen shows the inside of the trawl device containing debris.

Dr. Eriksen empties the contents of the trawl device into a pan, a tiny amount considering this is the result of a 24-hour 50-mile trawl.

Dr. Eriksen shows the results a jar. It appears that there are at least two fish. Based on a 24-hour 50-mile trawl through the Gyre, the amount of debris is tiny and insignificant.

Since returning from the JUNK voyage, Dr. Eriksen has stated:

"There is no island of plastic trash."

Dr. Eriksen maintains that there is a "confetti of waste" spread across the entire ocean surface, but as we have seen from the YouTube video, the amount even in the Gyre is tiny.

THE RESULT OF A ONE-MILE TRAWL IN THE WORST AREA OF THE PACIFIC GYRE ACCUMULATION ZONE

This is the photograph that Los Angeles County claims is substantial evidence of a "Great Pacific Garbage Patch" that justifies banning plastic bags.

The sample in the photograph was collected from a one-mile trawl in an accumulation zone in the particular area of the Pacific Ocean that has the most concentrated debris. *This is not an instant scoop up from the ocean.* We cannot ascertain what exactly is in the jar. As suggested by the label on the jar, much of the contents may be zooplankton, which are tiny animals. This is apparently as bad as it gets. It is a tiny amount over a one-mile distance.

Oregon State University Press Release

OCEANIC "GARBAGE PATCH" NOT NEARLY AS BIG AS PORTRAYED IN MEDIA

January 4, 2011

CORVALLIS, Ore. – There is a lot of plastic trash floating in the Pacific Ocean, but claims that the "Great Garbage Patch" between California and Japan is twice the size of Texas are grossly exaggerated, according to an analysis by an Oregon State University scientist.

Further claims that the oceans are filled with more plastic than plankton, and that the patch has been growing tenfold each decade since the 1950s are equally misleading, pointed out Angelicque "Angel" White, an assistant professor of oceanography at Oregon State.

"There is no doubt that the amount of plastic in the world's oceans is troubling, but this kind of exaggeration undermines the credibility of scientists," White said. "We have data that allow us to make reasonable estimates; we don't need the hyperbole. Given the observed concentration of plastic in the North Pacific, it is simply inaccurate to state that plastic outweighs plankton, or that we have observed an exponential increase in plastic."

White has pored over published literature and participated in one of the few expeditions solely aimed at understanding the abundance of plastic debris and the associated impact of plastic on microbial communities. That expedition was part of research funded by the National Science Foundation through C-MORE, the Center for Microbial Oceanography: Research and Education.

The studies have shown is that if you look at the actual area of the plastic itself, rather than the entire North Pacific subtropical gyre, the hypothetically "cohesive" plastic patch is actually less than 1 percent of the geographic size of Texas.

"The amount of plastic out there isn't trivial," White said. "But using the highest concentrations ever reported by scientists produces a patch that is a small fraction of the state of Texas, not twice the size."

Another way to look at it, White said, is to compare the amount of plastic found to the amount of water in which it was found. "If we were to filter the

surface area of the ocean equivalent to a football field in waters having the highest concentration (of plastic) ever recorded," she said, "the amount of plastic recovered would not even extend to the 1-inch line."

Recent research by scientists at the Woods Hole Oceanographic Institution found that the amount of plastic, at least in the Atlantic Ocean, hasn't increased since the mid-1980s – despite greater production and consumption of materials made from plastic, she pointed out.

"Are we doing a better job of preventing plastics from getting into the ocean?" White said. "Is more plastic sinking out of the surface waters? Or is it being more efficiently broken down? We just don't know. But the data on hand simply do not suggest that 'plastic patches' have increased in size. This is certainly an unexpected conclusion, but it may in part reflect the high spatial and temporal variability of plastic concentrations in the ocean and the limited number of samples that have been collected."

The hyperbole about plastic patches saturating the media rankles White, who says such exaggeration can drive a wedge between the public and the scientific community. One recent claim that the garbage patch is as deep as the Golden Gate Bridge is tall is completely unfounded, she said.

To read the rest of the press release and for an article in the Oregonian about the findings, click on the following link:

http://www.savetheplasticbag.com/ReadContent717.aspx

HEAL THE BAY VIDEO IMAGE 1

Note the wording on this image of intact plastic bags floating in water: "GREAT PACIFIC GARBAGE PATCH"

SEE CAPTION ON NEXT PAGE

HEAL THE BAY VIDEO IMAGE 2

These are images from a recent Heal the Bay video about plastic bags. In the image on the previous page, intact plastic bags are portrayed as floating in the ocean. The image morphs into the above map of the "Great Pacific Garbage Patch."

Note that the image overlaying the "Great Pacific Garbage Patch" is a gigantic white plastic bag along with scattered images of small plastic bags.

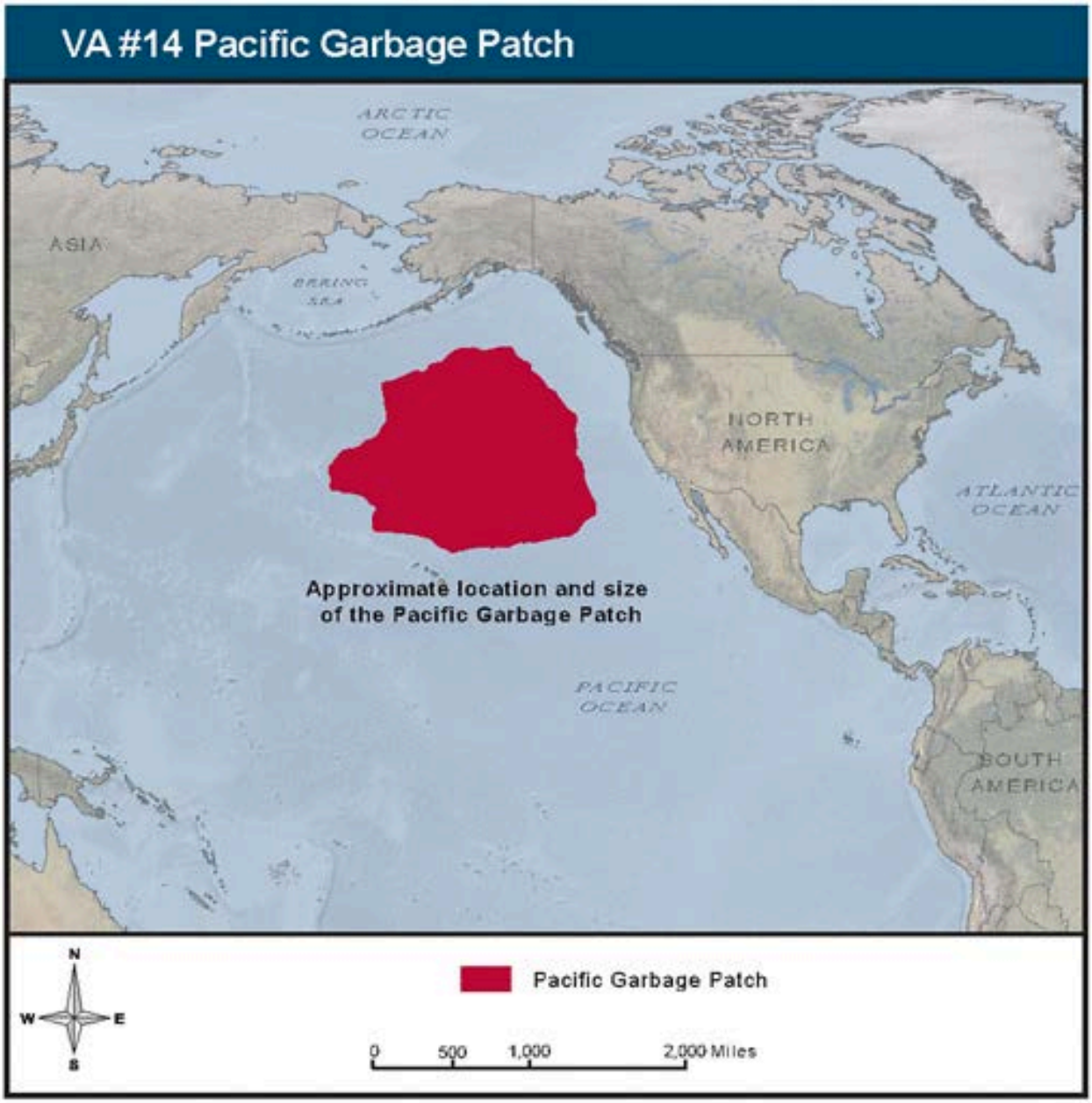
The commentary on the video says that the Great Pacific Garbage Patch is "said to be twice the size of Texas." The video misinforms and deceives the public. The "Great Pacific Garbage Patch" does not exist. The video has been viewed more than 1.2 million times.

PLASTIC BAG CARTOON AIMED AT CHILDREN
PORTRAYING ISLAND OF PLASTIC BAGS IN THE PACIFIC OCEAN

This is an image from a children's cartoon video falsely portraying the Great Pacific Garbage Patch as a massive island in the Pacific Ocean consisting of 1 billion plastic bags.

Californians Against Waste ("CAW") publicized the video on its website.

CALIFORNIA STUDENT TEXTBOOK



This is the map of the "Pacific Garbage Patch" in the California textbook initially approved by the California State Board of Education. We protested and the map was removed.

A MISINFORMED SENATOR

Senator Mark Leno stated as follows during the floor debate on AB 1998:

"There are plastic patches now in our oceans which are twice the size of Texas."

Senator Leno was misinformed.