Trash Fact Sheet

What is Trash?

Trash is all discarded materials generated by human activities. Improperly discarded items may end up in our waters and cause environmental degradation or harm to our waterways and their beneficial uses.

Trash as defined in California Government Code Section 68055.1(g) : "Litter means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling or manufacturing [….]."

Marine debris is defined by the National Oceanic and Atmospheric Administration (NOAA) and the United States Coast Guard (USCG) as 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 (*33 USC 1951 et seq. as amended by Title VI of Public Law 112-213*).

Trash consisting of litter and particles of litter that are retained by a 5-mm mesh screen are sometimes referred to as "gross pollutants" in European and Australian scientific literature. This definition excludes sediments, and it also excludes oil and grease, and vegetation, except for yard waste that is illegally disposed of in the storm drain system.

Many additional laws and Agencies may also address litter, trash and or marine debris

- **City/County:** Illegal dumping, littering, nuisance abatement codes, environmental degradation statutes, street sweeping ordinances…
- **State:** CA Vehicle Code Fish and Game Code, Water Quality Control Plans, State Park Code…
- **Federal:** NPS, NFS, USFWS, NOAA…
- **International:** The Marine Pollution Convention (known as MARPOL), Annex V; Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972, commonly called the "London Convention" or "LC '72…

Why is Trash an important parameter to monitor?

Clean water is vital to California's public health, economy, recreation and wildlife. Trash in our waters has many negative impacts on society and the environment and is one of the most highly visible expressions of human impacts on environment. Not only has trash and marine debris become a persistent problem in California and many coastal areas of the United States, it has also become one of the most pervasive pollution problems facing the world's oceans and waterways.

More than an aesthetic issue, debris can threaten the lives of marine mammals, birds, fish and turtles through ingestion and entanglement. Some debris items are much more harmful than others and differ in the potential impact they have on the environment and wildlife.

Trash in water bodies can threaten the health of people that use them for activities such as wading, swimming or fishing. Some trash items such as containers or tires can pond water that supports mosquito production and associated risks of diseases like encephalitis and the West Nile virus which have negative impacts beyond a particular waterbody.

The costs of preventing litter from entering streams and removing trash from the environment also has high economic costs to society. For example, Los Angeles County, California, spends over $18 million annually to clean up and prevent litter (Inside Solid Waste, 2011). Beach visitors are likely to be concerned about marine debris both because it poses potential physical harm due to lacerations, bacterial infections, or entanglements during swimming, and because it may detract from the perceived natural beauty of an area. These concerns affect resident and visitor decisions as to their potential beach recreation trips and activities which then also have an economic impact. In a recent study looked at this and it was found that reducing marine debris by 25 percent at certain beaches would save Orange County, California residents $32 million over three months in the summer.

How is Trash measured?

Residential solid waste generated everyday day by each member of the population in the county is typically *measured in volume or weight* and used to calculate the average waste generated per year. Beach cleanups document the *total weight* of trash picked up and the *total square footage* of the beach cleaned. Beach cleanups sometimes also use a data card to record the *type of trash* item identified. Many urban trash studies record *land use activities that generated* the volume of trash measured. In the ocean, surface and subsurface samples can be collected using a various types of trawl nets. These samples are then sorted often times using a dissecting microscope in order to separate micro-plastics from the plankton. The debris then gets sorted into basic categories and then

classified by size classes. The dry weight of each sample group is taken to figure out how plastic and zooplankton compare. Then a measurement of the *total weight of plastic pollution compared to the area and volume of the sea sampled* will be calculated.

Knowing how trash, litter and marine debris is measured allows scientists, watershed stewardship organizations and natural resource managers to collect data in a manner so it can be readily used for analysis and decision making.

Examples of trash monitoring projects.

- Defining baseline conditions
- Identify trash generating activities and or land uses
- Measure daily generation rates (DGR)
- Measure best management practices (BMPs) effectiveness
    - Trash traps (deflectors, mesh bags…)
    - Sweeping (street sweeping, parking lot sweeping…)
    - LIDs (low impact development technologies)
    - Recycling programs
    - Education and outreach efforts
- Trash Total Maximum Daily Load (TMDL) reductions
- Prioritize trash impacted areas

What factors does Trash affect?

Trash affects our world in many ways from human health, tourism and navigation to marine life, food chains and the economy. In the most polluted part of the ocean, *The Great Pacific Garbage Patch*, the mass of plastic exceeds the amount of plankton six times over. A 2012 study from the Scripps Institution of Oceanography at University of California, San Diego found that the size of the Pacific Garbage Patch has increased 100-fold over in the past 40 years to about the size of Texas and this is just one out of the 5 gyres.

The small plastic particles that float in the ocean can attract and absorb heavy metal contamination and other pollutants. Those particles may become ingested by fish that we will eventually eat. Some studies have linked chemicals in plastic to abnormal male sexual development, male infertility, premature breast development, cancer, miscarriage, premature birth and asthma.

The impacts of trash can also negatively impact society's economy. The costs to prevent and remove trash and marine debris can be very high. Trash can also entangle propellers and machinery for commercial and recreational ships leading to consumers paying more for products and services in the marketplace. Beaches with dirty shorelines can be unattractive and hazardous and cause tourist and recreational users to stay away which can make local economies suffer.

Impacts to Wildlife:

Thousands of animals are caught in, wounded, or strangled by trash. Wildlife (birds, turtles, fish marine mammals, sharks…) may ingest, consume various forms of trash. This poses a danger to marine life due to ingestion of plastic debris which cause blockage of gastric enzyme secretion, reduction of feeding stimulus, lowered steroid levels, delayed ovulation and reproductive failure.

Entanglement in packaging bands, synthetic ropes and lines or drift nets also poses a threat to marine life because entangled animals may drown, have its ability to catch food or to avoid predators, other impairment or wounds can also be caused from marine debris. Trash can cover and crush sensitive communities like coral reefs and smother sea grasses which then harm the fish and other aquatic organisms that use them. Trash in rivers and stream may also act as barriers to migration.

Marine debris can also affect oceanic communities. The floating debris can disperse species into areas they previously were absent and could disrupt local environments. Marine debris can contribute to the transfer and movement of invasive species. The floating marine debris can carry invasive species from one location to another. Invasive species use the marine debris as a type of "raft" to move from one body of water to another. Ocean research has also found that tiny sea skaters are flourishing because they are laying their eggs on the mass of floating debris. Before they use to lay their eggs in naturally existing surfaces like seashells, seabird feathers and pumice but now plastic has added itself to that list.

Some trash is also toxic. It has been demonstrated that cigarette butts, whether smoked or unsmoked, are toxic to some aquatic organisms. Plastic debris accumulates persistent organic pollutants (POPs) such as PCBs (polychlorinated biphenyls) up to 100,000 to 1,000,000 times the levels found in seawater. Many of these pollutants, such as PCBs and DDTs, are known endocrine disruptors and developmental toxicants. It is possible for these PCBs to transfer from contaminated plastic into the tissue of wildlife. Researchers are currently looking at the effects trash and these compounds have on food chains.

Impacts to Human Health

Trash in water bodies can threaten the health of people that use them for activities such as wading, swimming, fishing or sunbathing. Of particular concern are the bacteria and viruses associated with diapers, medical waste (e.g., used hypodermic needles and pipettes), and human or pet waste.

There is a high potential for dermal contact with trash on beaches as visitors frequently go barefoot, lie directly on the sand, or dig into the sand. Harmful trash (glass, syringes and needles, metal, medical and personal hygiene-related debris) pose potential physical harm due to lacerations, bacterial infections, or entanglements during swimming. Broken glass or sharp metal fragments in streams can cause puncture or laceration injuries.

Some trash such as diapers and medical waste poses a direct threat to human health because it can carry bacteria or viruses. Other trash items such as containers or tires can pond water and support mosquito production and associated risks of diseases like encephalitis and the West Nile virus.

Impacts to Navigation

Trash can also impact boating. Debris can clog cooling water intake valves; fishing lines can entangle vessel propellers causing costly damage to boats. Significant types or amount of debris can impact navigation and prevent boat passage.

Economic Impacts

Trash in our waters causes various impacts to our economy. There are costs associated with trash removal and prevention, policy and regulation of trash and water quality standards, impacts due to the loss of recreation & tourism and costs to implement and recover lost beneficial uses caused by trash.

Removal and prevention

A variety of economic impacts are associated with trash and marine debris removal, including costs incurred by local governments and volunteer organizations.

- The Natural Resources Defense Council estimates that California spends about 430 million dollars a year to clean up trash (Waste in Our Waterways, 2013).
- Los Angeles County, California, spends over $18 million annually to clean up and prevent litter (Inside Solid Waste, 2011).

Policy and Legislation

Funding is required for the creation and implementation of policies and legislation regulating trash and marine debris.

- To establish a program within the National Oceanic and Atmospheric Administration and the United States Coast Guard to help identify, determine sources of, assess, reduce, and prevent marine debris and its adverse impacts on the marine environment and navigation safety, in coordination with non-Federal entities, and for other purposes.
    - Marine Debris Research, Prevention, and Reduction Act
    - International Convention for the Prevention of Pollution from Ships (MARPOL)

Total Maximum Daily Load (TMDL)

The State Water Resources Control Board and the California Regional Water Quality Control Boards have developed and are in the process of developing total maximum daily load (TMDL) designations to attain the water quality standards for trash in several waterbodies. There will be regulatory costs and implementation costs to recover lost beneficial uses.

Cause of Impairment	Number of Impairments	Source: 2010 Impaired Water Bodies303(d) List
Trash	45 Waterbodies	
(Marine) Debris	146,645 acres (Santa Monica Bay Offshore/Nearshore)	

Recreation & Tourism
One of the more significant potential economic losses involves beach visitors who are impacted by the presence of marine debris. Dirty beaches discourage visitors and cause local beach communities to lose money from tourism.

Sources

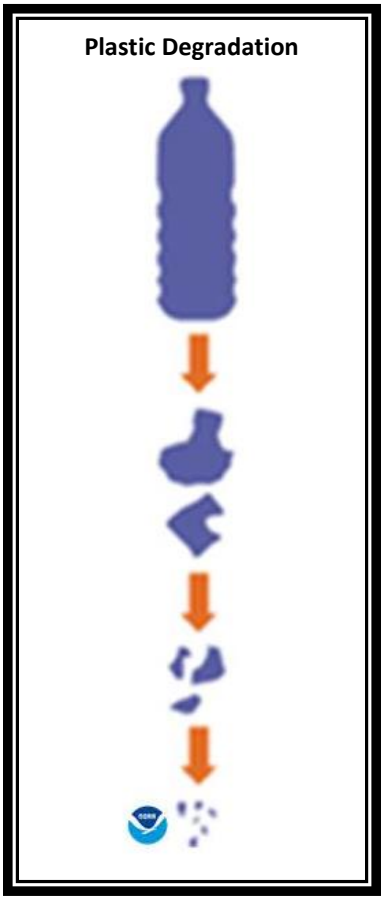
Trash may enter a waterbody directly due to human action or indirectly such as when trash is wash into it from a storm drain or is wind deposited in it. Once a piece of trash inters a storm drain or stream it may continue downstream and affect many other waterbodies (creeks, streams, rivers, lakes, estuaries, bays, ocean…).

Most of the trash in our nation's waters is made up of disposable items we use every day. The items listed below made up 80 percent of the more than 9 million pounds of trash collected during the 2011 International Coastal Cleanup.

1. Cigarettes & cigarette filters 2. Caps & lids 3. Plastic beverage bottles 4. Plastic Bags 5. Food wrappers & containers 6. Cups, plates, forks, knives, & spoons 7. Glass beverage bottles 8. Straws & stirrers 9. Beverage cans 10. Paper bags (*Ocean Conservancy, Trash Free Seas 2012 Report*)

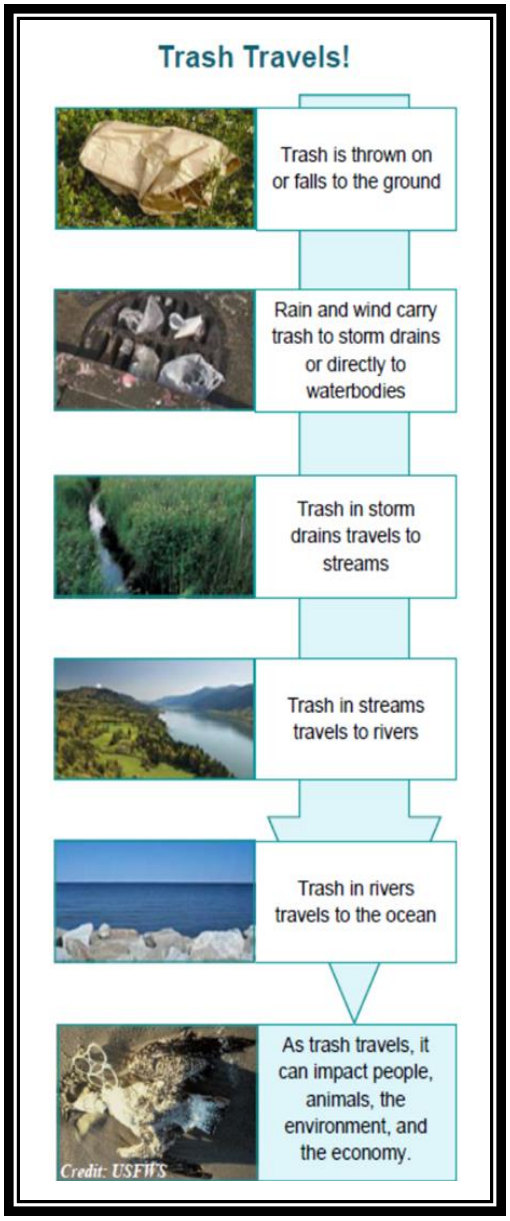
One study conducted in southern California estimated that approximately 106 million items, weighing 12 metric tons, occur on Orange County Beaches. The most abundant items (99%) were preproduction plastic pellets, foamed plastics and hard plastics which also accounted for 51% of the total weight. Cigarette butts accounted for 1% of the weight but were 4th in abundance. (*Composition and Distribution of Beach Debris in Orange County, California 2001*).

Eventually, plastics in the environment will degrade into small pieces. This process takes longer in the ocean than on land due to lower temperatures. The rate of degradation depends on chemical composition, molecular weight, additives, environmental conditions, and other factors (Mechanistic implications of plastic degradation 2008).



Examples of trash sources:

- **Littering by beachgoers**
  - Beachgoers sometimes leave behind trash
- **Wind**
  - The wind may blow improperly disposed trash from the land into the water.
- **Runoff from land-based activities**
  - Illegal dumping and littering
  - Homeless camps
  - Marijuana grows
  - Other improper waste disposal activities and containment practices.
- **Overboard disposal from boating activities and accidental spills**
  - Ships and other vessels
  - Offshore oil and gas platforms
  - Recreational and commercial fishermen sometimes lose or discard large fishing nets and lines in the ocean.
- **Stormwater sewers and combined sewer overflow**
  - Trash that enters sewer systems may continue through the system and affect downstream waters.



Trash pollution prevention?

In 2012, Americans generated about 251 million tons of trash and recycled or composted almost 87 million tons of this material (equivalent to a 34.5% recycling rate). On average, we recycled and composted 1.51 pounds of our individual waste generation of 4.38 pounds per person per day. Unfortunately not all of our trash is recycled, composted or disposed of properly.

Land use, population density and economic profiles can have effects on the amount of trash being created. Studies have shown that communities with low levels of education, high poverty, high proportions of minorities and no access to public amenities like curbside services, suffer from higher levels of litter. Lowering the risk of trash entering the environment can be conceivable through education, reduction, reusing, recycling and technology.

Millions of pounds of trash and litter are removed from waterways each year during cleanup activities, (In 2014, nearly 67,000 volunteers removed more than 1,190,000 pounds of trash and recyclables from California's beaches, lakes, and waterways on Coastal Cleanup Day) but to effectively tackle the problem, communities must also focus on preventing trash and litter from entering waterways in the first place.

- *Source Reduction* is using fewer resources by buying or consuming less.
- *Reusing* is keeping new resources from being used for a while longer and old resources from entering the waste stream.
- *Recycling* is extracting valuable material from items that might otherwise be considered trash and turning them into new products. Although the EPA estimates that 75 percent of solid waste is recyclable, only about 30 percent is actually recycled.
- *Composting* involves collecting organic waste, such as food scraps and yard trimmings, and storing it under conditions designed to help it break down naturally. This resulting compost can then be used as a natural fertilizer.
- *Education and outreach* programs can make a significant difference in the amount of land based debris that enters the oceans because once a community becomes aware of the problem solutions can be made.

There are various *technologies and management practices* that help prevent trash and marine debris. These can range from street sweeping, the installation of curb screens for trash reduction and full capture systems in stormwater management systems, to the placement of trash cans with lids that prevent gulls and other wildlife from scattering its contents, and the banning of smoking in public spaces (i.e. beaches). These methods help prevent trash from getting into our waterways but do not eliminate the trash that already calls the ocean its home. Novel conceptual solutions are being developed to help clean the ocean of the trash that already exists in it.

Thinking globally but acting locally is a fundamental attitude to have in order to reduce this environmental threat.

What are the Water Quality Objectives for Trash?

The protection of beneficial uses of the State's water resources is important. Water quality standards consist of a combination of beneficial uses, water quality objectives and the State's Antidegradation Policy* to protect beneficial uses.

Examples of *narrative water quality objectives* applicable to trash are:

• floating materials: "Waters shall not contain floating materials, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses"

• solid, suspended, or settleable materials: “Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.”

The SWRCB has amended the *California Ocean Plan* (2015) and will incorporate into the *Inland Surface Waters, Enclosed Bays and Estuaries Plan* to protect California’s waters and their beneficial uses from trash. The amendment provides a framework for implementing its provisions that would be incorporated into the respective NPDES storm water discharge permits, waste discharge requirements, and waivers of waste discharge requirements.

- Establish a narrative water quality objective for trash,
- Establish a prohibition on the discharge of trash,
- Provide implementation requirements for permitted storm water and other dischargers,
- Set a time schedule for compliance, and
- Provide a framework for monitoring and reporting requirements.

*The States’ Antidegradation Policy is formally referred to as the Statement of Policy with Respect to Maintaining High Quality Waters in California (State Board Resolution No. 68-16).

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