Litter Lifeline Activity Kit

Core Activity: Litter Lifeline

Activity Summary:
Have you seen litter around town? Ever wonder how long it will stay there? With this activity, explore types of litter, common reasons for littering, and just how long it takes for common litter items to decompose.
Subjects: Decomposition, Environment, and Water Quality

UNIT: Water Quality

GRADES: Kinder and up

MATERIALS:
- Set of Printed Slides (1-3)
- 3 bags of litter:
  - Newspaper
  - Paper Cup
  - Plastic Food
  - Cigarette filters
  - Plastic water bottle
  - Tin Can
  - Chip bag
  - Aluminum Soda can
  - Styrofoam
  - Glass jar
  - Plastic Bag
- 3 Litter Lifeline Banners

TIME REQUIRED: 35 minutes

OBJECTIVES:
Students will be able to:
- Discuss the impact of litter on the environment, including the time it takes litter to decompose, where it ends up, and how it gets there
- Give examples of how people adapt to and modify their environment.

TEKS CORE CONCEPTS:
- +++

For specific TEKS, see document in Instructor Resources Tab

Introduction (*15 minutes*)

1. Ask participants: *Have you seen litter around town? What have you seen?*
2. Use the printed "slides" to lead the discussion. Talking points for each slide are found on the back.
3. Slide 1 – What is litter?
   - Ask students to define litter: something that is somewhere it does not belong.
   - Talk about the pictures of common litter items.
4. Slide 2 – Why do people litter?
   - Ask students to brainstorm reasons.
   - Be sure to touch on a variety of reasons (listed on the back of the slide)
5. Slide 3 – Commonly Littered Items
   - Have students give examples of litter in each category.
   - This Keep America Beautiful Study found 6,729 pieces of litter for every mile of roadway in America. Write out the fraction of pieces of litter to feet in a mile for the students and ask them if this is more or less than one piece per foot. (6,729/5,280 ft)

Litter Lifeline (15 *minutes*)

1. Drop a piece of litter on the ground. Ask participants: *What happens to the item? Blows away? Gets trapped under a rock? Will it still be there in 2 weeks, 2 months, 2 years?*
2. Review the process of decomposition (ex: organic decomposition is the natural process of dead animal or plant tissue being rotted or broken down by insects, bacteria, and fungi) and decay (to decrease usually gradually in size, quantity, activity, or force) as well as what a timeline is.
3. Review the activity: Each group will receive a "bag of litter" and a timeline. They will sort their items and place them on the timeline for how long they think it takes for the litter items to completely disintegrate or decompose.
4. Reminders:
   - There will be at least one piece of litter for each slot on the

timeline.
    - Ask students to not rip up the litter, it travels to many schools for others to use!
    - Do not take items out of small Ziploc bags (ie. cigarettes)
    - Be careful when emptying bags, take items out one by one to not break the glass jar.
    - Plastic bags are common litter items; include the bags in your timeline.
    - If students are stuck, ask them to think about what materials the items are made of.
5. Give students 5-8 minutes to discuss and sort their litter. Prompt students to think about what the items are made of, how it would break down (Rot? Rust? Break?), and if they have seen old examples of these items.
6. Once the groups are finished, review the correct order of decomposition using the Litter Lifeline Answer Chart found in the Instructor Resource Tab,
7. Allow students to shuffle items at some point during the lesson so they may observe or record the correct order.

Closing (*5 minutes*)

1. Ask the students to share their findings; Anything unusual, surprising, or interesting their learned or observed.
    - Litter that takes hundreds of years to decompose is essentially unable to be broken down efficiently by natural processes. Even when placed in a landfill, these items can linger much longer than the litter lifeline numbers which is why it's so important to remember to **Reduce, Reuse, and Recycle.** Go through each item on the timeline and discuss whether it can be recycled or reused.
2. Make connections to what participants know about watersheds.
    - Much of the litter seen on streets or neighborhoods will end up moving downhill to creeks and rivers after a heavy rain.
3. Discuss importance of individual action and review ways to prevent litter and improve the environment.
    - If you walk past litter will you pick it up or think someone else will get it? Imagine if everyone picked up a piece of litter every day. Would that have an impact?
    - What are ways to encourage people from littering? Cleanup, fines, etc.
    - Report illegal dumping by calling 311.
    - Report citizens throwing out cigarette butts from cars by writing down their license plate number and reporting it at http://dontmesswithtexas.org/.
    - Host a campus or neighborhood cleanup with friends or family and remember to spread the word about the real effects of litter in Austin. www.keepaustinbeautiful.org/clean

Next Steps: See Supplemental Activities

Litter Lifeline Activity Kit

Background Information

ADDITIONAL INFORMATION

- **Keep America Beautiful Litter Survey –** http://www.kab.org/site/PageServer?pagename=litterfactsheets
- **Don't Mess With Texas Litter Facts –** http://www.dontmesswithtexas.org/about/litter-facts/#research
- **Project Kaisei -** http://www.projectkaisei.org

What is litter?

You've spotted it before - paper blowing in the wind, plastic bags tangled in tree branches, cans swirling out of truck beds these visible forms of pollution also known as litter find their way onto our streets and into our neighborhoods. Every person can think of an example of littering but may have a different definition of what it is. Generally speaking, **litter is any waste or refuse that has unintentionally (blown out of a truck) or intentionally (illegal dumping) made its way into the environment such as streets, parks, or waterways.** The difference between litter and trash is location.

Why People Litter

With all those reasons not to litter, it's hard to imagine why people continue to do so. A great discussion can take place when debating whether people are deliberately hurting the environment or just lazy, forgetful, or simply don't know any different. Sometime it is someone leaving a drink can at a sports game or tossing a wrapper out of the car window thinking someone else will pick it up. Or perhaps they litter without thinking about it, as is often the case with cigarette butts. Some people litter because they think the litter is biodegradable. Yet still others litter because they cannot afford to take or put trash where it belongs and therefore dump it. These examples illustrate why it's up to the community to educate others and take active steps with friends and family to solve Austin's litter problem.

Commonly Littered Items

A peek at the most common littered items tells us a little bit of our consumer lives. Check out some of the most common littered items: (from Keep America Beautiful 2009 Litter Survey)

- Cups & Cans – 24%
- Food Wrappers – 20%
- Household/Personal Items – 19%
- Tobacco –37.7%
- Construction Materials – 8%
- Printed Goods – 6%
- Other 4%

These misplaced items of trash weren't always misplaced. They found their way as litter through these common sources:

- Household Refuse
- Commercial Refuse
- Construction/Demolition
- Uncovered Vehicles
- Loading Docks
- Motorists
- Pedestrians
- Overflowing Trash Cans

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Background Information

Litter Impact

People often don't realize that litter is not only aesthetically displeasing but it also poses a threat to wildlife, natural ecosystems, human health and safety, and communities. Below is a chart highlighting just a few of the ways that litter affects wildlife, water quality, and people:

Wildlife	Water Quality	Human and Financial
1. Plastic ring entanglement around beaks, necks, and flippers 2. Ingestion, choking, or starvation can occur due to waste mimicking food – sea birds will often feed plastic on shore to offspring. 3. Harmful chemicals leaching into soils and food sources	1. Liquid litter such as oil and paint entering aquifer recharge zones, creeks, and storm drains 2. As plastic degrades, chemicals such as BPA leach into water 3. Waste can affect microscopic organisms and bacteria levels 4. Damage to fishing and recreational boats 5. Litter blocks storm drains which can cause flooding	1. A piece of litter costs 10 cents every time a city worker picks it up 2. Physical harm to swimmers or hikers from broken glass or buried metal 3. Decrease in tourism and use of recreation areas 4. Even though we have our water cleaned, more research is needed on body harm from chemicals

City staff and volunteers clean up more than 6,200 tons of trash and debris from roadways and another 250 tons that wash to our waterways each year. That's the equivalent weight of more than 4,300 cars!

There are two major examples of deliberate littering that can be discussed further with students. One of them is the **Great Pacific Garbage Patch** that exists where the ocean currents meet in the Pacific Ocean. Before we had regulated landfill systems for our waste, much of the trash including debris from fishing industries was dumped into the ocean. Litter also makes its way to the ocean from creeks and rivers. The garbage has collected to form a thick patch that floats just under the water due to the density of plastic which makes up the majority of the waste. Scientists estimate that throughout the Pacific Ocean there is up to six times more plastic than plankton biomass (dry weight). Check out one group's mission to clean it up at http://www.projectkaisei.org. The other major source of litter is illegal dumping. To avoid landfill fees large items such as old couches, appliances, or industrial waste are often illegally dumped in lakes, rivers, and wooded areas. In Austin, call 311 to report illegal dumping.

What Happens to Litter?

When litter is not removed from our streets, waterways and neighborhoods it lingers! View KAB's Litter Lifeline to see just how long litter lingers before **decomposing**.

Solutions

Despite these large scale problems, keeping Austin litter free is easy and can start with just a few steps. Consider bringing reusable items, instead of disposable to waterway picnics, dispose of waste properly in trash cans or recycling bins, and cover truck beds so that items don't fly out, organize a neighborhood or campus cleanup. By taking these simple actions you are performing a community service to cleanup the environment and decrease solid waste. Let's not forget the savings to tax payers like you – litter costs millions of dollars to remove each year.

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Background Information

Vocabulary

Litter	Trash, wastepaper, or garbage lying scattered about in the environment or water.
Decomposition	Decomposition is the natural process by which large organic materials and molecules are broken down into simpler ones. The ultimate products of decomposition are simple molecules, such as carbon dioxide and water.
Trash	Something that is discarded as worthless or useless; rubbish; garbage.
Contaminant	A minor and unwanted constituent in another material, metal, chemical or mixture, often at the trace level.

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Supplemental Activities

Pre-K – 2nd grades

- Read The Wartzville Wizard. The story is true of our society - ask students why they think people litter. Brainstorm what the most common litter items are.

3rd – 5th grades

- Debate: What is litter?
  - Ask students if they have ever thrown out an apple core or banana peel from their car window onto the side of a busy highway.
  - Discuss as a class or divide into teams to debate why some people might consider this to be litter or not.
  - Apple cores are organic and break down into soil over time, but this doesn't happen right away. Animals could be attracted to the food and we don't want them to see a busy road as a place to find food. Remember our definition of litter – trash in the wrong spot!
- Archeology Dig
  - Distribute a piece of litter/trash to each group.
  - Students tap into their creative writing skills to write a backstory for their piece of litter – where it came from, who used it, how it could have ended up as litter in a creek, road, or neighborhood.

6th - Adult

- Start a litter awareness campaign
  - Students make posters to teach others about litter.
  - Students teach other students about what they have learned about litter.
  - After their service project, students study what litter their found on campus and what might be needed (reusable materials, reminders, new trash cans).

SERVICE ACTIVITIES

- **Litter Cleanup**
- **Seedballs**

Additional Resources

- http://www.greatgarbagepatch.org/
- http://science.howstuffworks.com/environmental/earth/oceanography/great-pacific-garbage-patch.htm
- http://www.projectkaisei.org/index.html
- Teracycle.net

Litter Lifeine Activity Kit

Instructor Resources

INCLUDED TEACHER RESOURCES AND HANDOUTS

- Activity TEKS
- Activity Materials
- Litter Lifeline Correct Answers
- Litter Lifeline Printed PowerPoint

TEKS:

Timelines, group work, making connections

3rd grade: 1B, 2A, 2C, 2E

4th grade: 1B, 2A, 2C, 2E, 3B-C

5th grade: 1B; 2A, 2D, 2E; 5B; 9A-B

6th grade: 1B, 2A, 2C, 2E, 3B-C

7th grade: 1B, 2A, 2D-E, 3C, 7A

8th grade: 1B, 2A, 2D-E, 3C, 14C

Materials

- 3 Bags of "trash" - items that are commonly found as litter: notebook paper, cardboard, newspaper, plastic piece of food, cigarette filter, plastic bag, plastic bottle, aluminum can, tin can, glass jar, Styrofoam, battery, straw, plastic spoon, juice box, chip bag, and six pack ring
- Litter Lifeline Chart (poster displays the length of time it takes materials to degrade)
- Photos of wildlife impacts or stuffed animal (frog) caught in plastic
- Optional-The Wartzville Wizard by Don Madden (Elementary Extension)
- Optional – PowerPoint presentation for Middle School

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Instructor Resources

Litter Lifeline

Timeline	Item	Notes	Historical Perspectives
2-6 months	Newspaper, notebook paper	• Newspaper may have been recycled several times before, speeding up decomposition	You were enjoying a hot Texas summer! Maybe you were back to school shopping or on vacation?
6 months – 1 year	Food scraps, paper cup, cardboard, paperboard	• Food can take longer due to preservatives • A paper cup can take longer due to a waxy coat	You were taking the TAKS test (or starting school). *Newspaper, food scraps and some paper cups can be composted.*
10 – 12 years	Cigarette butts	• Filter is made of cellulose acetate, a type of plastic	You might have been born around this year! What's your earliest memory? The last original Peanuts comic strip was printed.
20 – 30 years	Chewing gum, plastic bag	• A plastic bag will thin and turn brittle, resembling tissue paper	*Plastic bags can be recycled outside of most Austin grocery stores.*
40 – 50 years	All plastics (except Styrofoam)	• Each of the seven kinds of plastic decomposes at a different speed and releases different chemical • Plastic bags decompose much faster in water	A gallon of gas costs $0.25! Neil Armstrong lands on the moon.
80-100 years	Tin can, battery	Batteries are especially dangerous as litter due to heavy metals such as cadmium inside	The longest film to date, 12 minutes, is produced. Plastic were invented and put into production in 1905. *Batteries can be recycled at Austin Recycle and Reuse Drop-off Center.*
200-500 years	Aluminum can, chip bag, juice box, diaper	• Aluminum is produced from Bauxite, an extremely durable mineral good for withstanding high pressure (carbonation from soda) • The juice box is lined with aluminum	America is referred to as the "New World" while being explored by Spain and Portugal. The *Mona Lisa* is painted in 1503.
Never	Styrofoam tray, glass	• The oils used to make Styrofoam never decompose	*Styrofoam can be recycled at Austin Recycle and Reuse Drop-off Center.*

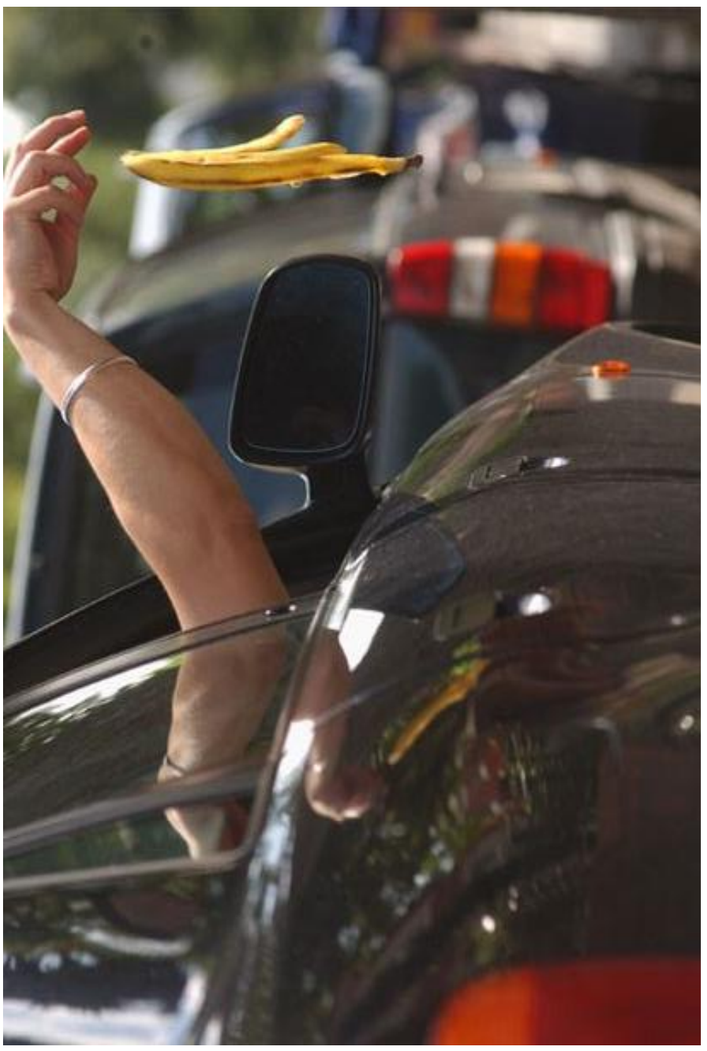
* Items in blue can be recycled.
* Items in red can be recycled in a special location (noted in the columns).

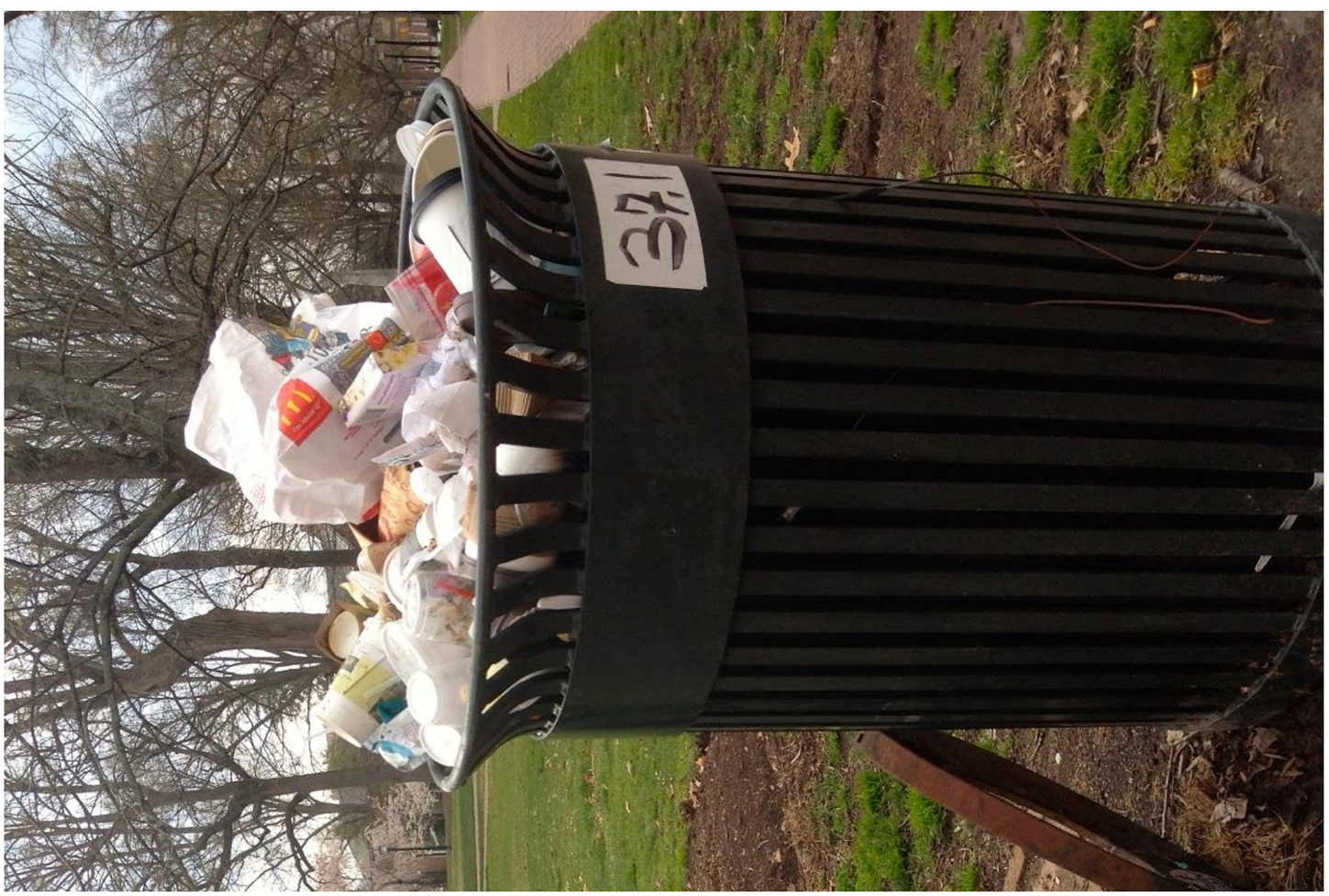
What Is Litter?

What Is Litter?

- Examples of litter
- Where is litter found?
- Active Life Austin collected with volunteer, cigarette butts in Austin over a period of a Month. They collected 54,142 cigarette butts!

Why do people litter?

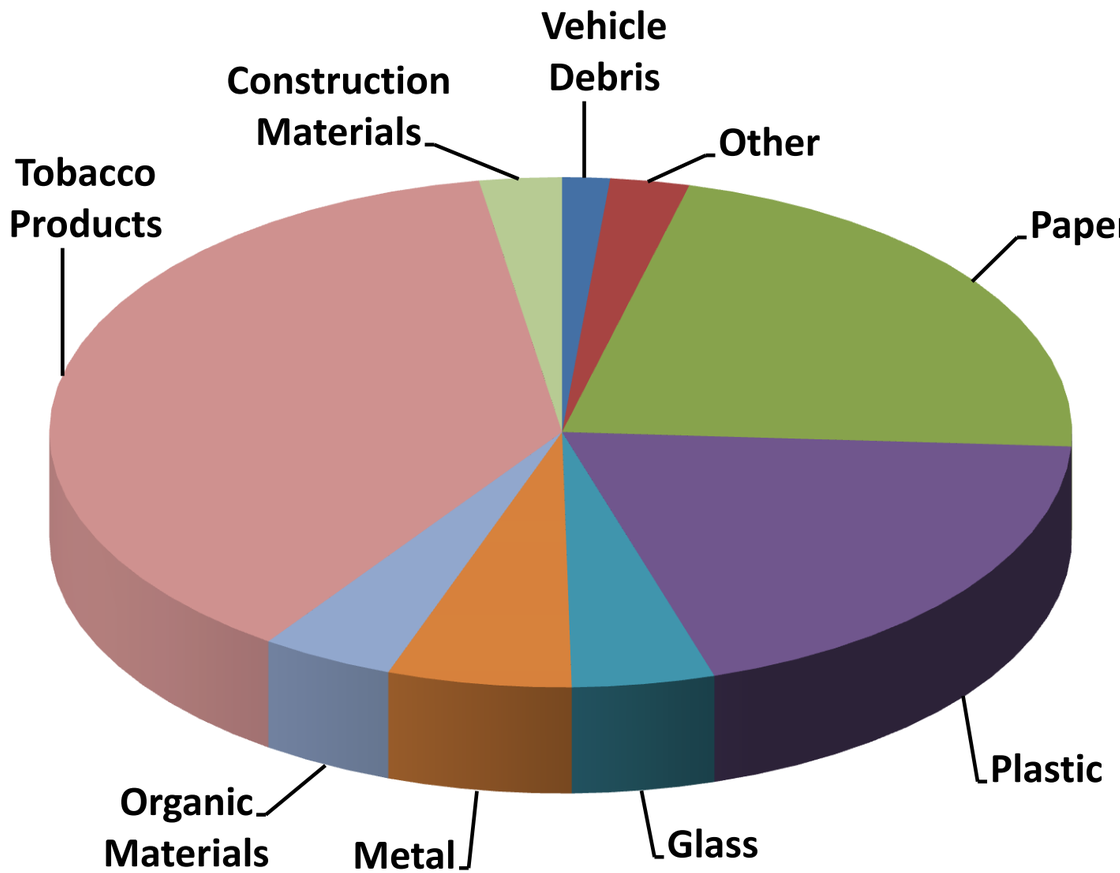




Why do people litter?

- Too lazy to dispose of trash properly
- Don't care
- Think others will pick it up
- Not aware they are littering
- The item littered is culturally littered
- They think the litter is biodegradable

Commonly Littered Items



Tobacco Products	37.7%
Paper	21.9%
Plastic	19.3%
Metal	5.8%
Glass	4.5%
Organic Materials	4.2%
Construction Materials	2.6%
Other	2.5%
Vehicle Debris	1.5%

Litter by pieces along US roadways

"Litter In America 2009 Litter Survey"

Commonly Littered Items

- This litter index study completed by Keep America Beautiful found that on average there are 6,729 pieces of litter per mile of roadway (on each side).

Bouldin Creek

Before rain

After rain

Bouldin Creek

- Much of this litter travels to the creek from roadways, storm drains, and sidewalks where people have littered.
- Bouldin Creek drains into Lady Bird Lake
- Most Austinites get their drinking water from the Colorado River.
- Many in Central Austin get their water from LBL, near this area.
- The barrier is designed to confine the litter so city crews can clean it up.

Litter Impact on Wildlife

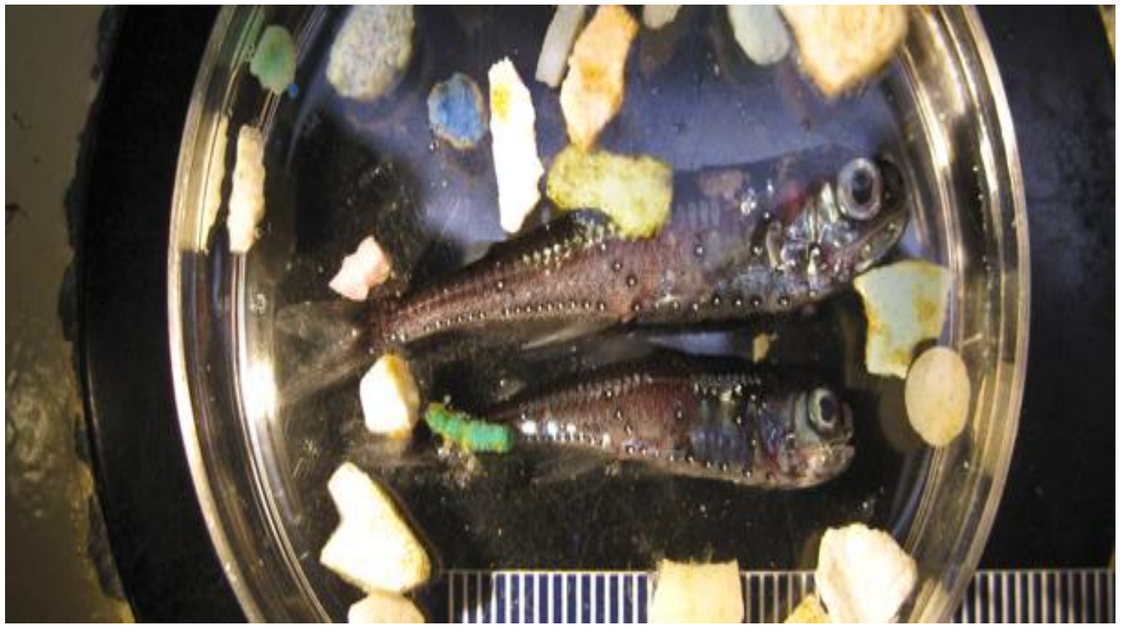
Litter Impact on Wildlife

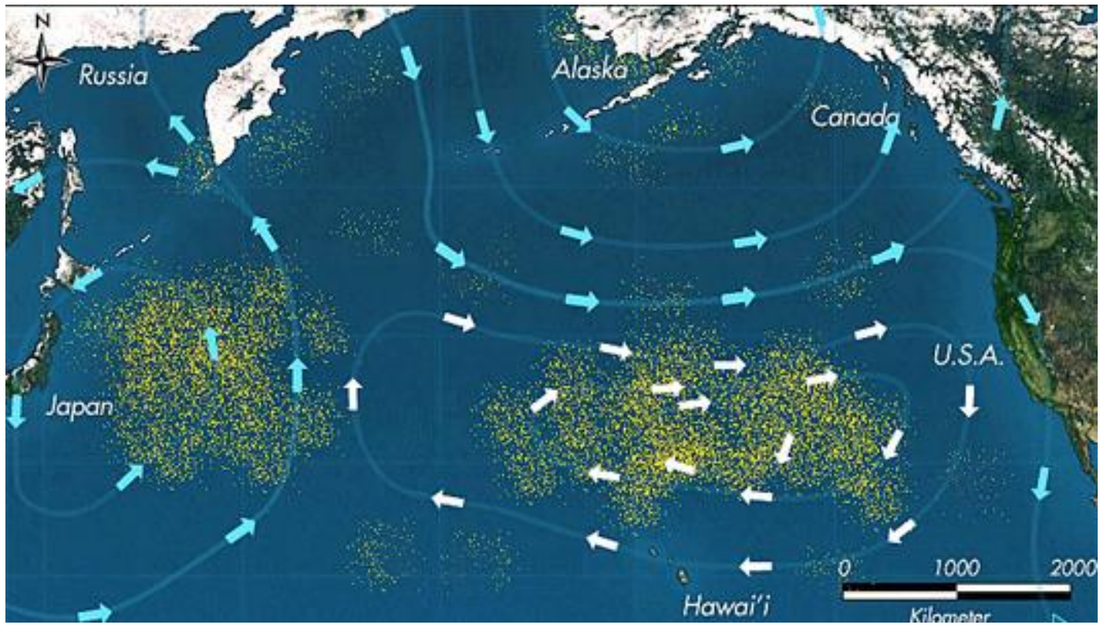
- Litter travels through creeks and rivers to eventually reach the ocean.
- Animals can ingest or be caught in litter

- *The Red Eared Slider was caught in a soda can ring at a young age. Since their shells grow slowly, the shell did not break the ring but rather became deformed. This turtle was rescued, named Peanut, and now lives at a conservation facility in Missouri. Her shell will never grow normally.*

- *The skunk was also rescued and given medical attention after a plastic lid became stuck around her neck.*

The Great Pacific Garbage Patch





The Great Pacific Garbage Patch

- Photodegraded plastic and metals usually the size of a fingernail or smaller, called nurdles, collect in areas of the ocean.
- Formed from ocean currents, these meeting points are called Gyres. There are 5 major Gyres on Earth, with two occurring in the Pacific ocean.
- The nurdles float below the surface of the water and are not visible above the water.
- These nurdles become part of the ecosystem and are mistakenly consumed as food.
- Scientists are investigating how far up the food chain the toxins in nurdles go. It is possible that humans are consuming fish that have ingested large of amounts of plastics containing toxins.
- Increased surface area from the nurdles floating around also increases marine insect reproduction which unbalances the ecosystem.


chris jordan

Litter Impact on Wildlife in the Ocean

- This is a photo of a baby Albatross found on Midway Island in the Pacific Ocean.
- This bird was fed too much plastic, which the parents thought was food. Ultimately, this baby Albatross starved to death since it could not digest the plastic and ran out of room for real food.
- The photographer, Chris Jordan, visited Midway island to document how plastic is affecting this colony of Albatross.