KEEP AMERICA BEAUTIFUL

Keep America Beautiful

2020 NATIONAL LITTER STUDY

Summary Report: May 2021

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STUDY HIGHLIGHTS

Keep America Beautiful® is the nation's leading community improvement nonprofit organization. For nearly 70 years, Keep America Beautiful has cleaned and beautified public spaces for the benefit of humanity and the world around us by mobilizing millions of volunteers and participants through its network of 700 affiliates. The organization's legacy is built on education, partnerships, and its science-based Model for Change. This combination of expertise and grassroots engagement makes Keep America Beautiful a truly unique and trusted force for community improvement. Through the organization's efforts to end litter and create vibrant green spaces, Keep America Beautiful works to ensure **Everyone in America Lives in a Beautiful Community**.

Keep America Beautiful works to end litter because litter affects environmental, community, and individual health, as well as quality of life, economic development, the circularity of the economy, the safety of our water, environmental justice, and climate. A key component of the organization's work is a rich history of conducting research about litter and littering in America to inform new and innovative solutions that individuals, partners, policy makers, and Keep America Beautiful affiliates can implement across the United States. The Keep America Beautiful 2020 National Litter Study builds on the organization's landmark research studies from 1969 and 2009, and, in doing so, is the most extensive research conducted in U.S. history to estimate the scope, scale, causes, and impacts of litter. With much of the work accomplished in the spring and fall of 2020, the study also provides insights about the impact of the COVID-19 pandemic on litter.

The Keep America Beautiful 2020 National Litter Study (hereafter referred to as the "Study") comprises four major components: a survey examining public attitudes about litter, a visible litter survey that provides an estimate of the litter on the ground across the United States, behavioral observations that shed light on littering behavior in public, and a survey that estimates the public costs of litter in the United States. In a major expansion of the scope of litter research, the Study provides the first scientific national estimate of the litter along U.S. waterways. Furthermore, the Study provides the country's only estimate of how much personal protective equipment (PPE) was littered at the time of the Study during the COVID-19 pandemic. Together, the components of the Study provide a comprehensive view of litter in the United States today.

The Study estimates nearly 50 billion pieces of litter along U.S. roadways and waterways at the time of the Study.[1] For many, that is an unfathomable number. However, when accounting for the U.S. population, 50 billion pieces of litter equate to 152 pieces of litter for every U.S. resident. This is a large number but is something to which individuals can relate. People can visualize 152 pieces of litter where they live, and they can begin to see that the litter problem can be solved.

Significant progress has been made reducing litter on U.S. roadways in the past decade. The Study estimates litter on America's roads was down 54 percent since 2009. That decrease of roadway litter builds on the 2009 National Visible Litter Survey that estimated that visible litter had been reduced 61 percent between 1969 and 2009.[2]

The Study drives a broader understanding of litter across America by providing a national estimate of litter near our waterways based on scientific sampling methodology. As a result of this groundbreaking component of Keep America Beautiful research, the Study shows that the problem of litter is slightly greater along waterways (25.9 billion pieces of litter) than it is along roadways (23.7 billion pieces).[3]

Tracking specific product categories across time, the Study shows that major progress has been made in reducing roadway litter since 2009 in several key product categories, including fast-food packaging, soft drink (soda) containers, and construction debris. However, no single change in litter is more impactful than the estimate that cigarette butt litter along roads has decreased from 18.6 billion cigarette butts in 2009 to 5.7 billion cigarette butts today. Nonetheless, challenges remain with particular types of littered products as the Study also finds increased amounts of litter since 2009 for cardboard, beer containers, food packaging film, sports drinks containers, and water containers. During the COVID-19 pandemic, littered personal protective equipment (PPE), both gloves and masks, received a great deal of attention. While PPE gloves and masks are both relatively large in size and noticeable as littered items, they also are novel pieces of litter and very much confined to the COVID-19 pandemic. At the time of the Study, it was estimated that approximately 207 million pieces of PPE gloves and masks could be found across America's roads and along our waterways. As a point of comparison, this is about the same as plastic straws. Though PPE represented a relatively small proportion of litter (0.4% of all litter), the introduction of this new type of litter on a large scale may provide important insights about how litter moves through the environment.

[1] Readers should note that the Study provides point-in-time estimates of litter on the ground in the continental United States and that these estimates are not annual estimates. The estimated annual amount of litter in America is expected to be significantly greater than 50 billion pieces of litter. Keep America Beautiful will continue to build systems that estimate the replacement and decay rates of litter to develop over-time estimates, including annual estimates of litter in the United States.

[2] In this same period, the U.S. witnessed massive growth in the number of consumer products in the marketplace and, furthermore, the U.S. population grew by approximately 50% between 1969 and 2009 and 6.3% from 2010 to 2019. *U.S. Census Bureau QuickFacts: United States*. (2019). United States Census Bureau. https://www.census.gov/quickfacts/fact/table/US/PST120219

[3] Litter on roadways and waterways comes from many sources and, over time, can move around the environment. This Study examines litter where it is discovered along roadways and waterways with the understanding that litter may have moved from one environment to another because of many factors including wind, rain, and other natural and man-made phenomena. Alongside waterways in particular, litter may have floated downstream or come from storm drains, nearby roads, or other human activities. The Study only examines litter along the shores of waterways, not in the waterways themselves.

In addition to tracking the types of products littered, the Study tracks the material and size of the products littered. At the material level, litter from all material types has decreased along roadways since 2009, but litter composed of plastic has decreased less than other types of materials. Overall, litter made from plastic comprises 38.6 percent of all litter across waterways and roadways combined.[4] Nine out of ten pieces of litter on the ground in the U.S. were under four inches in size. Though smaller litter may be less visible, it remains the dominant type of litter in the United States.

For the first time, the Keep America Beautiful 2020 National Litter Study compares litter in states with bottle deposit legislation and areas without such legislation. The Study estimates there was substantially more deposit-material litter per capita in non-bottle bill states than in bottle bill states, by a difference of a two-to-one ratio. There was also more non-deposit litter per capita in non-bottle bill states, though the difference in litter per capita for these non-deposit items in non-bottle bill versus bottle bill states was significantly less than for deposit materials. The difference in non-deposit litter raises the question of the extent to which deposit legislation itself or other factors that may be associated with deposit legislation (such as enhanced infrastructure, more frequent and accessible services, and attitudes) are contributing the difference in litter between states.

These highlights are among the many important estimates that emerge from the Keep America Beautiful 2020 National Litter Study. This report summarizes the initial findings from the Study, offers historical comparisons to the 2009 study, and begins to explore new questions that the Study raises. The data from the Study will provide many more insights that cannot be covered in a summary. In the coming months, deeper analyses of the various components of the Study will be completed, and further research products will be released that explore the meaning of the data and how the data can inform solutions to ending littering and litter.

Keep America Beautiful retained Burns & McDonnell, Cascadia Consulting Group, Salinas-Davis LLC, and the Docking Institute of Public Affairs, collectively referred to as the Burns & McDonnell Project Team, to conduct the Study. Sponsors of the Keep America Beautiful 2020 National Litter Study include dozens of individuals, corporations, industry groups, and foundations highlighting our belief in the strength of bringing everyone to the table. The largest supporters include Altria, American Beverage Association, American Chemistry Council, Dow, Food Packaging Institute, Garver Black Hilyard Family Foundation, National Association of Convenience Stores, Plastics Industry Association, and Santa Fe Natural Tobacco.

[4] Following the convention of previous research, cigarette butts are included in discussions of both product litter and the material composition of litter in the Study. The percentage of litter composed of plastic (38.6%) does not include the proportion of all litter that is cigarette butts (19.6%), even though the filter that makes up the majority of a cigarette butt is made of cellulose acetate, a type of plastic.

SCALE OF THE LITTER PROBLEM

- Nearly 50 billion pieces of litter along United States roadways and waterways. Overall, there was more litter near waterways (25.9 billion pieces on 10.7 million miles) than on roadways (23.7 billion pieces on 8.3 million miles) though, proportionally, roadway and waterway litter represent similar quantities of the total litter items discarded nationwide (47.8 percent and 52.2 percent, respectively).
- There were 152 items of litter for each U.S. resident. Roadway and waterway litter items per capita were comparable (73 and 80 litter items per capita, respectively).5 While still a large number, 152 pieces of litter per person in the United States is a number that residents can grasp and provides a tangible goal that every individual can strive to help eliminate. Everyone, whether they litter or not, can be part of the solution to ending litter.
- More than 2,000 pieces of litter per mile. Roadways had more litter items per mile than waterways (2,857 and 2,411 litter items per mile on average, respectively).
- Across the nation, U.S. residents agree that litter is a problem where they live. Ninety percent (90%) of U.S. residents reported that litter is a problem in their state.
- Americans understand that litter has a strong negative impact on their communities. Large majorities of U.S. residents (75 to 97 percent) recognize that litter negatively affects the environment, waterways, property taxes, home values, tourism and businesses, quality of life, and health and safety in their communities.
- The great majority of litter was smaller in size but, at 6 billion pieces, larger items were both prevalent and highly visible. Most litter (43.6 billion pieces or 87.9 percent) across the United States was four inches or smaller in size. However, larger and often more visible litter still represented a significant quantity (6.0 billion pieces or 12.1 percent) of litter.
- Cigarette butts continue to be the single most littered item in the United States, even though cigarette butt litter has declined dramatically since 2009. Plastic films, both general use films and food-packaging films, such as candy wrappers or snack bags, represent the second and third most littered items in America.
- There is twice as much litter from alcoholic beverage containers as from non-alcoholic beverage containers. Beer container litter is up 27 percent from 2009. In terms of the most frequently littered items, beer containers and single-serve wine and liquor containers (e.g., 50 ml minis and nips) are both ranked ahead of any non-alcoholic beverage product (e.g., soda, water, juice, tea & coffee).

[5] Throughout the report, some numbers may not sum to 100 percent of their components due to rounding.

- Product litter made from all different material types decreased from 2009 and items made from plastic are the largest material type among littered products. Litter made of plastic comprised 38.6 percent of all litter, paper 15.2 percent, metal 7.9 percent, glass 7.2 percent, organics 2.6 percent, and all other types of litter made up 28.6 percent of litter.
- On a per capita basis, there were fewer deposit materials and non-deposit materials found as litter in bottle bill states than in states without bottle bills. On a per capita basis, the Study found substantially less deposit material litter in bottle bill states than in non-bottle bill states (about half as many deposit litter items per capita in bottle bill states). The Study also found there was less non-deposit litter per capita in bottle bill states than in non-bottle bill states, though the size of that difference was significantly smaller than it was for littered items covered by deposit legislation (30 percent fewer non-deposit litter items per capita compared to more than 50 percent fewer deposit litter items per capita). The Study was not designed to examine the causal relationship between bottle deposit legislation and litter but does provide data from a national perspective to enable a more informed conversation about how policy, infrastructure, community services, and individual behavior change contribute to reduced litter and littering. In terms of public opinion, the Public Attitudes Survey component of the Study finds that large majorities of U.S. residents support refundable deposits or rebate incentives to increase recycling.

CHARACTERISTICS OF LITTER

- **Tracking individual product litter presents significant challenges due to continuous introduction of new products with new packaging.** Thirty thousand (30,000) new consumer packaged goods are launched each year, many with new packaging innovations.
- **The Keep America Beautiful 2020 National Litter Study provides the first national estimate of the scale and scope of the PPE (gloves and masks) litter problem. The Study estimates 207.1 million PPE items were littered along United States roadways and waterways**. The Study estimates that much of that PPE litter (127.4 million pieces) lies along U.S. waterways. PPE gloves represented 72.1 percent of the PPE littered.
- **Over 800 million pieces of fast-food packaging were littered on United States roadways and waterways.** An estimated 394.7 million fast-food cups and 423 million other fast-food packaging items were identified as litter along United States roadways and waterways.
- **An estimated 2.6 billion food-packaging film items (which include snack bags and candy wrappers) were identified as litter along United States roadways and waterways, making food-packaging film the second most littered product after cigarette butts.**
- **Nearly 350 million plastic bags were littered on United States roadways and waterways.** The vast majority (94.6 percent) of plastic bags littered were not trash bags, but other types of bags (i.e., retail store plastic bags).

LITTER ALONG AMERICA'S WATERWAYS AND IN OUR COMMUNITIES

- **Nearly 26 billion pieces of litter along United States waterways.** An estimated 25.9 billion pieces of litter were identified along the shores of 10.7 million miles of United States waterways.
- **Nearly 24 billion pieces of litter along United States roadways.** An estimated 23.7 billion pieces of litter were identified along 8.3 million miles of United States roadways**.**
- **Large perennial waterways had the most pieces of litter per mile.** Large perennial waterways had the most litter per mile (3,654 litter items per mile on average). Small perennial and intermittent waterways had fewer litter items per mile (3,141 litter items and 1,960 litter items per mile on average, respectively).
- **Local roadways had the most litter, but freeways and expressways had the most litter per mile.** Accounting for almost 70 percent of total roadway miles, local roadways had the most total littered items, but freeways and expressways had over six times as much litter per mile than local roads.
- **Litter does not vary predictably along roadways or waterways based on product type or size alone.** Most paper litter items and cigarette butts were more likely to be found along roadways than along waterways. These are items that readily degrade near water and, in the case of cigarette butts, are easily trapped and trampled when they are littered along roadways and in communities. Littered products made from other materials (plastic, metal, and glass) are not consistently more likely to appear on roadways or waterways.
- **The great majority of waterways are very close to roadways and, consequently, waterway litter and roadway litter may be closely linked.** Over 70 percent of the waterway segments covered in the Study (intermittent and perennial waterways) fall within one-quarter mile of a road. The proximity of waterways to roads and their associated human activity provides evidence in support of a hypothesis that litter along waterways is related to litter along roadways, at least when considering the origin of the litter. Further research is necessary to understand the extent to which litter along roadways and waterways are related.
- **The shores of our waterways, especially those that are hard to reach, are not regularly serviced for litter cleanup.** There is no shoreline equivalent of street sweeping that cleans the shores of waterways on a large scale or on a consistent basis. With the decreased likelihood of being cleaned up, litter along waterways is more likely to accumulate and degrade in the natural environment over time than litter along roadways.
- **PPE gloves and masks provide a natural experiment of what happens when new products and litter are generated.** One hypothesis to consider is that products that resulted in a limited amount of litter prior to the pandemic (e.g., PPE gloves and masks) may provide key insights to how, and in what degree, litter moves from roadways and populated areas to our waterways.

- **PPE glove litter was twice as likely to be found along waterways as it was along roadways.** In contrast, the amount of PPE mask litter was similar along roadways and waterways.
- **PPE litter suggests that a significant proportion of waste that is littered in our communities and along our roads will end up along waterways.** Forty-five percent (45%) of PPE mask litter was discovered along waterways while 68 percent of PPE glove litter was discovered along waterways. While more studies of this topic are necessary, the data provide critical insights and, more importantly, a greater impetus to prevent and manage litter before it can get into America's waterways.

TRENDS IN LITTER

- **Decrease of 54 percent in litter along United States roadways in the past decade.** In 2009, Keep America Beautiful conducted a national litter research study to document the quantity, composition, and sources of litter on United States roadways. Approximately 51.2 billion pieces of litter were estimated along United States roadways in 2009. The Keep America Beautiful 2020 National Litter Study estimated approximately 23.7 billion pieces of litter were along United States roadways in 2020.
- **Litter in most product material categories went down from 2009 to 2020.** However, those decreases were not uniform across all categories, and there is still much work to be done to eliminate litter in the United States. Notably, several high-profile litter categories, including cigarette butts, fast food, and soft-drink containers, saw large decreases in the number of littered items from 2009 to 2020. Several key product categories saw increases in the amount of litter from 2009 to 2020, including cardboard, beer containers, food-packaging film, sports drinks containers, and water containers.
- **The nearly 70 percent decrease in cigarette butt litter far outpaces the decline in the percentage of U.S. cigarette smokers.** Electronic cigarettes, also known as vapes, vape pens, or e-cigs, and their cartridges do not constitute a significant amount of litter (approximately 895,000 littered items).
- **The COVID-19 pandemic had differing impacts on litter; increasing litter in some communities and decreasing litter elsewhere.** At the time of the Study, automobile traffic had decreased nationally as had pedestrian traffic in downtown areas. However, human activity had increased in other parts of our communities, including neighborhoods and parks. Many communities across the nation reported increases in littering and illegal dumping during the pandemic. Applying its Community Appearance Index tool that is used by hundreds of affiliates around the country to randomly sampled areas of their communities to track litter, Keep America Beautiful reported a slight uptick in litter from 2019 to 2020, after several years of a downward trend. Taken as a whole, the data suggest more of a K-shaped impact of the pandemic on litter, which sees the dynamics of litter varying across communities, rather than a V-shaped impact where one sees a sharp consistent spike in litter.

SOLUTIONS TO LITTER

- **The solution to litter starts with a better understanding about the nature of the problem and the data to support continuous improvement.** Research allows us to understand the progress that we are making against litter, uncovers new challenges posed by litter, and spurs innovations to combat litter.
- **Based on environmental and behavioral science, research into litter provides the framework for combating litter effectively at scale across the United States.** Resources like the Keep America Beautiful Model for Change show an end-to-end process for changing littering behavior through key activities like cleaning up public spaces (because individuals are more likely to litter in spaces that are already littered), implementing the appropriate infrastructure for the waste in question, and putting the correct messaging and education in place for the relevant task.[6]
- **In policy conversations around the country, the front end of our waste system, including preventing litter, needs to be an important part of the dialogue.** America and the world cannot only focus on waste that is already in the managed waste system if we are to protect our natural environment and support vibrant communities. Rather, we need to focus on reducing mismanaged waste, starting with education, clean spaces, and ensuring the appropriate infrastructure is in place to allow everyone to make the correct decision when disposing of the products they use. Supporting this work and ensuring that the organizations around the country who do the work are part of the conversation and have the resources to implement these solutions are the best ways to eliminate litter and mismanaged waste in America.
- **Partnership and scale are necessary to solve the problem of litter.** Keep America Beautiful and its network of 700 affiliates will not end litter across the United States alone. The work to end litter and improve and beautify communities is rooted in the belief in tri-sector solutions that bring together government representatives, community organizations and leaders, and committed businesses. Everyone needs a voice and a seat at the table to successfully address this issue.
- **The decreases that we have seen in litter represent systemic change.** However, much more work is needed to reach our common goals. When we do that work equitably, it will lead to cleaner rivers, lakes, and oceans, more vibrant green spaces, and healthier communities. The goal of Keep America Beautiful is to help ensure that **Everyone in America Lives in a Beautiful Community**.

[6] Schultz, P. W., Bator, R. J., Large, L. B., Bruni, C. M., & Tabanico, J. J. (2011). Littering in Context. Environment and Behavior, 45(1), 35–59. https://doi.org/10.1177/0013916511412179 . Schultz, P. W. (2014). Strategies for Promoting Proenvironmental Behavior. European Psychologist, 19(2), 107–117. https://doi.org/10.1027/1016-9040/a000163

INTRODUCTION

With the Keep America Beautiful 2020 National Litter Study, Keep America Beautiful builds on a long history of conducting landmark research studies that examine the scope, scale, and causes of the litter and littering problem in the United States, and provides the foundation for new and innovative solutions for ending litter and littering in America. Significantly reducing, and eventually ending, littering and litter is key to developing clean, beautiful, sustainable, healthy, equitable, and more prosperous communities across the United States.

Litter is improperly managed waste and littering is a person's behavior that results in misplaced waste. Litter includes waste that is intentionally and improperly disposed of by humans, such as cigarette butts, food packaging, and other trash discarded by pedestrians and motorists. Litter also includes waste that is unintentionally improperly disposed, such as overflowing containers (e.g., trash from overflowing litter cans), improperly secured loads (e.g., trash from garbage trucks or pick-up truck beds), and vehicle debris (e.g., trash from vehicle accidents). Whether intentional or unintentional, litter negatively impacts humans and our natural environment daily, and poses a threat to our way of life and a sustainable future. Litter affects environmental, community, and individual health, as well as quality of life, economic development, the circularity of the economy, the safety of our water, environmental justice, and our climate. In addition to the negative impacts that litter has on our communities and natural environment, litter also carries a significant financial cost. Through decades of experience and hundreds of partners across the nation, Keep America Beautiful and its affiliates understand that managing litter on the ground is the costliest way of addressing waste in society. As such, preventing litter not only makes our communities healthier and safer places to live and protects our natural environment, it also relieves a significant strain on government budgets and taxpayers.

This Study uses several approaches to examine litter and littering. Building on the Keep America Beautiful 1969 and 2009 studies and informed by advances in environmental and behavioral science, the Keep America Beautiful 2020 National Litter Study documents the quantity, composition, and sources of litter, attitudes toward litter and littering, observations of littering, and estimates the cost of litter in the United States. While Keep America Beautiful values and promotes citizen science throughout its network of affiliates, the Keep America Beautiful 2020 National Litter Study utilizes rigorous scientific methodology led by professional environmental engineers

and scientists to produce generalizable and valid estimates about the scope and nature of the litter problem in the United States. Understanding the scale of this problem cannot be achieved through non-random citizen science alone.[7]

The result is that the Keep America Beautiful 2020 National Litter Study produces a deep and broad set of data and insights that will support new solutions and strategies to ending litter and littering. In addition to its highly structured scientific methodology, the Study incorporates data collection processes and architecture that enable replication in various geographies in the future. Partnering with communities to implement this infrastructure will increase access to reliable information about litter in communities, thereby improving the response to litter. Keep America Beautiful and its affiliates will continue to track the impact they have on litter reduction and prevention in the United States.

However, these are only the latest innovations in the research conducted by Keep America Beautiful and its partners. Through both internal efforts and external partnerships, Keep America Beautiful will continue to use research to drive innovative solutions to litter and littering through messaging and programming and support the infrastructure to apply those solutions to the entire United States.

The objective of this Study is to gain a comprehensive understanding of the quantity, composition, and sources of litter, the factors that impact littering and litter, the cost of litter, as well as gauge the public's attitude towards litter issues in the United States. A thorough understanding of the litter issue in the United States is key to the development of tailored strategies and initiatives to combat litter, littering, and mismanaged waste. In addition, the Study provides a standardized methodology and infrastructure for future measurement of progress towards reducing litter that can be implemented by Keep America Beautiful, its national network of affiliates, and key partners. As with much scientific inquiry, this Study is about exploring the dynamics of a problem as much as it is about generating conclusions. The report points to further research questions and testable hypotheses about litter and its sources that Keep America Beautiful and others can study in the future.

Keep America Beautiful retained Burns & McDonnell, Cascadia Consulting Group, Salinas-Davis LLC, and the Docking Institute of Public Affairs, collectively referred to as the Burns & McDonnell Project Team, to conduct the Keep America Beautiful 2020 National Litter Study using this enhanced methodology. The Burns & McDonnell Project Team, in collaboration with Keep America Beautiful, developed the following key components that provided the foundation for the Study:

- A Public Attitudes Survey of over 1,100 randomly selected U.S. residents, conducted in the fall and winter of 2019-2020, provides an understanding of their opinions about the effects of litter, the

[7] Unless noted otherwise, the estimates generated in the Study refer to the continental United States as a whole. Litter may vary significantly by state and community because of numerous regional factors, not limited to litter prevention resources, investments in education and infrastructure, the presence of local organizations (like Keep America Beautiful affiliates) who are dedicated to litter prevention, local policies, as well as local attitudes and norms.

prevalence of litter, littering behavior, the consequences of littering, and litter prevention and abatement in the United States.

- Conducted in the late summer and early fall of 2020, the Visible Litter Survey provides a comprehensive understanding of the quantity, composition, and sources of litter on roadways, waterways, and non-roadway sites. Extending the methodologies adopted in the 1969 and 2009 studies conducted for Keep America Beautiful, the Burns & McDonnell Project Team conducted visible litter surveys at over 600 randomly selected sites nationwide, including both roadway and waterway components, and produced generalizable data that are representative of those sites across the nation. The Team used this information to estimate the amount and types of litter on America's roadways and waterways at the time of the Study. At each site, the Burns & McDonnell Project Team categorized litter into six material groups that were subdivided into 86 product material categories (see Table 1-1). In addition, the Burns & McDonnell Project Team assigned each litter item to one of five sources (motorist, pedestrian, improperly secured loads, overflowing containers, and vehicle debris).
- Behavioral Observations were conducted in the late summer and early fall of 2020 at over 120 sites with traditionally high traffic and density of consumer and recreational behavior, including retail shopping areas, local recreation areas, gas stations, mixed use developments, coastal areas, and outside of bars and restaurants. The Keep America Beautiful 2020 National Litter Study replicates the observation methodology from the 2009 study to understand the behavior of littering and to address questions of who litters, where they litter, how they litter, and how the context of the behavior affects littering.
- A fourth component of the Study which assesses the Financial Cost of Litter in America is still underway; these results will be reported later in 2021. Through the four components of the Study described above, the Keep America Beautiful 2020 National Litter Study includes a deep and broad set of information that provides critical insights on the problem of litter and littering in America. The Study provides the largest overview of what litter and littering look like in the United States, where and how litter occurs, and what the public believes about the problem of litter and littering and the solutions to the problems.

In the coming months, deeper analyses of the various components of the Study will be completed and further research products will be released that explore the meaning of the data and how the data can inform solutions to end littering and litter. This report is not intended to provide explanatory or predictive analyses or to answer all of the many questions that emerge from the data. However, by providing a broad review of the data in the Study, this summary provides the foundation for future explanatory and predictive analyses.

Table 1-1: List of Visible Litter Survey Groups and Categories

Groups	Categories	
Paper	Fast-food paper bags	Office paper/ mail
	Fast-food paper cups	Newspaper/ inserts
	Other paper fast-food service items	Magazines
	Cardboard	Books
	Kraft bags	Aseptic/ gable top containers
	Receipts	Beverage carriers/ cartons
	Political signs	Paper home food packaging
	Other advertising signs	Other paper
Plastic	Soda	Other beverage packaging
	Single-serve wine & liquor	Plastic trash bags
	Other wine & liquor	Other plastic bags
	Sports & energy drinks	Food-packaging film
	Juice	Other film
	Tea & coffee	Plastic food service items
	Still water	Expanded polystyrene food service items
	Other water	Other expanded polystyrene
	Other plastic beverage bottles	Other plastic food packaging
	Fast-food plastic cups	Other plastic
	Plastic straws	
Metal	Beer	Other metal beverage bottles
	Soda	Other beverage packaging
	Sports & energy drinks	Still water
	Juice	Other water
	Tea & coffee	Other metal
Glass	Beer	Still water
	Soda	Other water
	Single-serve wine & liquor	Other glass beverage bottles
	Other wine & liquor	Broken glass or ceramic
	Sports & energy drinks	Other glass food packaging
	Juice	Other glass
	Tea & coffee	
Organics	Pet waste	Other food waste
	Human waste	Other organics
	Confection	
Other	Medical waste	Electronic cigarettes
	PPE gloves	Other tobacco-related products & packaging
	PPE masks	Toiletries/ personal hygiene products
	Hazardous waste	Entertainment items
	Vehicle debris	Flat screen TVs and computer monitors
	Tires	CRT televisions and computer monitors
	Tire tread	Portable electronics
	Construction and demolition debris	Electronic cords
	Textiles/ small rugs	Other electronics
	Bulky items	Other items
	Cigarette butts	

SCALE OF THE LITTER PROBLEM

At the time of the Study, it was estimated that approximately 49.6 billion pieces of litter were found near United States roadways and waterways.[8] Overall, there was more litter near waterways (25.9 billion pieces on 10.7 million miles) than on roadways (23.7 billion on 8.3 million miles) though, proportionally, roadway and waterway litter represent similar quantities of the total litter items discarded nationwide (47.8 percent and 52.2 percent, respectively).[9] However, roadways had more litter items per mile than waterways (2,857 and 2,411 litter items per mile on average, respectively).

With nearly 50 billion pieces of litter on the ground, litter is too big of a problem for people *not* to understand. Therefore, it is important to communicate what those 49.6 billion pieces mean relative to the population of the United States. At the population level, 49.6 billion pieces of litter equates to 152 littered items for every single person in the United States at the time the study was conducted. That is still a big number and one that is far too high. However, every American can visualize what 152 pieces of litter looks like where they live and, more importantly, can begin to see that the litter problem can be solved and that they can be part of the solution.

Tables 2-1 & 2-2 present the estimated count of roadway and waterway litter in aggregate, per mile, and per capita.[10]

Table 2-1: Aggregate Count of Litter per Mile, Roadway and Waterway

	Roadway	Waterway	Total
Total Litter Items	23,678,026,500	25,895,018,900	49,573,045,400
Miles[1]	8,287,647	10,740,317	19,027,963
Litter Items Per Mile	**2,857**	**2,411**	**2,605**

1. Source: Roadway distance based on Federal Highway Administration (FHWA) Highway Performance Monitoring System (HPMS). Waterway distance based on U.S. Geological Survey (USGS) National Hydrography Dataset Plus High Resolution (NHDPlus HR).

[8] The estimates provided in this study are point-in-time estimates of litter on the ground in the continental United States and not an annual estimate. As litter gets picked up and/or washes away, it may be replaced by newly littered items. As such, any annual estimate of litter would be significantly higher than 49.6 billion pieces of litter.

[9] Roadways were defined using the Federal Highway Administration's Highway Performance Monitoring System (HPMS), which classifies roads based on function. For the Study, the Burns & McDonnell Project Team combined the seven roadway functions defined in HPMS data into the following four roadway types: Freeways and Expressways, Arterials, Collectors, and Local Roads. Waterways were defined using the United States Geological Survey's National Hydrography Dataset (NHD), a geospatial database that catalogs the presence of potential surface waters across the United States. For the Study, waterways included only the waterways from two main categories of surface waters (perennial and intermittent streams) and therefore did not include ephemeral streams or coastlines. Coastlines were examined separately and will be discussed in future analyses.

[10] Litter quantities in tables are rounded to the nearest hundred and, consequently, the sum of individual items may not equal the totals reported.

Table 2-2: Aggregate Count of Litter per Capita, Roadway and Waterway

	Roadway	Waterway	Total
Total Litter Items	23,678,026,500	25,895,018,900	49,573,045,400
Population[1]	325,386,357	325,386,357	325,386,357
Litter Items Per Capita	**73**	**80**	**152**

1. Source: U.S. Census 2020

The Study shows that the American public does realize that litter is a significant problem. Ninety percent (90%) of U.S. residents reported that litter is a problem in their state (Figure 2-1).

One of the reasons why U.S. residents believe that litter is a problem in their state is because they know that litter negatively impacts their communities. A large majority of U.S. residents agree that the presence of litter affects the environment, waterways, property taxes, home values, tourism and businesses, quality of life, and health and safety in their communities (Figure 2-2). Americans understand that litter is a problem that has numerous and varied negative impacts in their communities. While an individual piece of litter is often very small, the aggregate problem of litter has substantial consequences.

Figure 2-1: Percentage of U.S. Residents that Consider Litter a Problem in their State

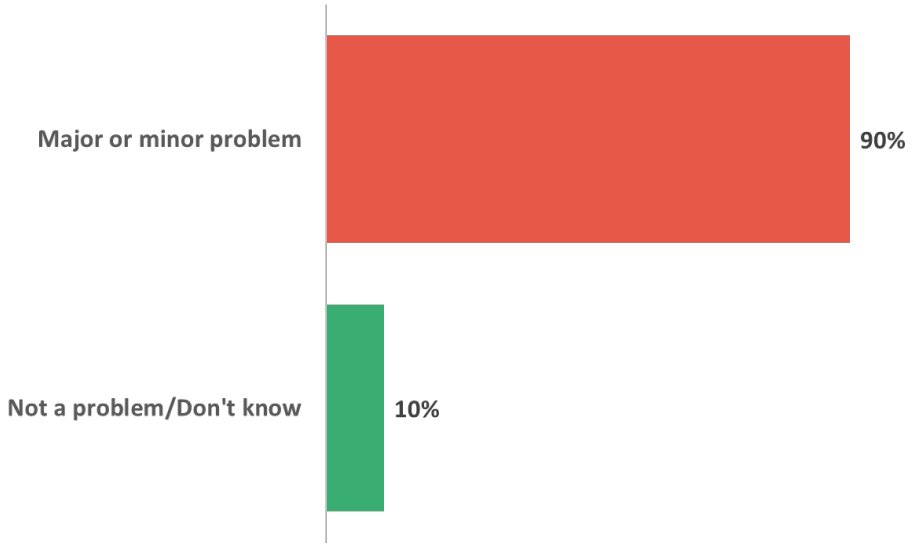
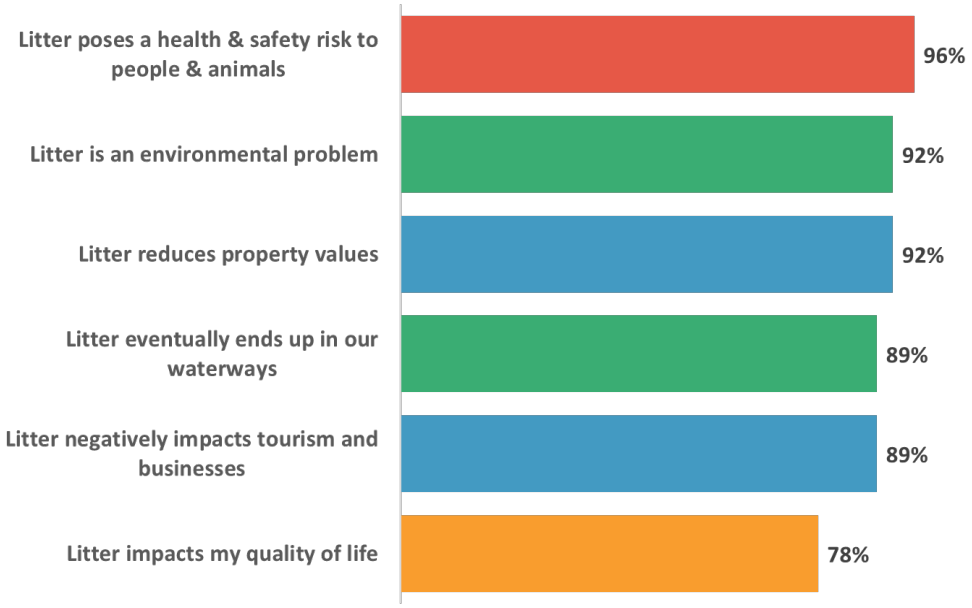


Figure 2-2: Percentage of U.S. Residents who Agree or Strongly Agree with Litter Statements



The typical piece of litter in America is, in fact, very small. The vast majority of litter (43.6 billion pieces or 87.9 percent) across United States roadways and waterways collectively was four inches or smaller in size. However, larger littered items still represented a significant quantity (6.0 billion pieces or 12.1 percent) of litter and often are more visible to the naked eye.

Table 2-3 provides a breakdown of some of the most commonly littered larger items versus littered smaller items. It shows that many of the larger littered items, which often are the face of public litter, were overwhelmed in number by smaller items. For instance, there are over two-and-a-half times as many pieces of plastic food-packaging film (such as snack bags and wrappers) littered as there are littered plastic beverage containers, but 85 percent of the food-packaging film is smaller and less perceptible to the human eye than the beverage containers.[11] Of the 152 pieces of the litter per person in America, 18 of them are over four inches in size while 134 are under four inches in size.

[11] When examining the negative visual impact that litter has on communities and the work needed to abate the litter, litter counts are the most impactful metric. In this example of two different types and sizes of littered items (food packaging film and beverage containers), both need to be picked up or cleaned in another method (e.g., street sweeping). For other impacts of litter (e.g., how it degrades in the environment), the mass or weight of the litter becomes an important metric.

Table 2-3: Aggregate Composition of Litter by Size and Count, Roadway and Waterway Combined

Groups	Categories	4-inch plus	4-inch less	Total Count	Percent of Total
Paper	Fast-food paper bags	37,885,400	44,967,800	82,853,200	0.2%
	Fast-food paper cups	102,561,700	1,453,000	104,014,600	0.2%
	Other paper fast-food service items	117,269,300	316,164,000	433,433,300	0.9%
	Cardboard	78,857,700	154,187,100	233,044,800	0.5%
	Kraft bags	5,663,300	4,731,900	10,395,200	0.0%
	Receipts	27,775,200	136,963,600	164,738,800	0.3%
	Political signs	144,000	-	144,000	0.0%
	Other advertising signs	5,264,500	4,261,200	9,525,600	0.0%
	Office paper/ mail	23,714,700	284,828,600	308,543,300	0.6%
	Newspaper/ inserts	31,417,400	234,275,900	265,693,300	0.5%
	Magazines	1,760,900	1,036,600	2,797,500	0.0%
	Books	734,800	-	734,800	0.0%
	Aseptic/ gable top containers	3,777,000	-	3,777,000	0.0%
	Beverage carriers/ cartons	5,365,600	20,883,100	26,248,700	0.1%
	Paper home food packaging	18,571,900	89,461,600	108,033,500	0.2%
	Other paper	561,053,300	5,199,690,400	5,760,743,700	11.6%
	Subtotal Paper	**1,021,816,500**	**6,492,904,800**	**7,514,721,300**	**15.2%**
Plastic	Soda	89,763,200	-	89,763,200	0.2%
	Single-serve wine & liquor	38,904,700	286,571,800	325,476,500	0.7%
	Other wine & liquor	5,364,900	-	5,364,900	0.0%
	Sports & energy drinks	81,416,300	2,127,600	83,543,900	0.2%
	Juice	19,092,800	-	19,092,800	0.0%
	Tea & coffee	8,210,600	-	8,210,600	0.0%
	Still water	221,465,600	53,907,100	275,372,600	0.6%
	Other water	18,176,700	2,991,400	21,168,100	0.0%
	Other plastic beverage bottles	38,906,500	11,091,100	49,997,500	0.1%
	Fast-food plastic cups	152,886,700	44,443,400	197,330,100	0.4%
	Plastic straws	143,324,700	78,180,800	221,505,400	0.4%
	Other beverage packaging	84,501,400	502,574,600	587,076,000	1.2%
	Plastic trash bags	12,481,700	4,930,700	17,412,400	0.0%
	Other plastic bags	214,254,000	93,111,600	307,365,600	0.6%
	Food-packaging film	380,645,900	2,193,963,800	2,574,609,700	5.2%
	Other film	337,180,900	2,502,305,700	2,839,486,700	5.7%
	Plastic food service items	45,743,000	150,255,200	195,998,200	0.4%
	Expanded polystyrene food service items	118,537,200	464,698,400	583,235,600	1.2%
	Other expanded polystyrene	83,537,600	1,272,926,800	1,356,464,400	2.7%
	Other plastic food packaging	75,517,100	574,170,900	649,688,000	1.3%
	Other plastic	692,546,000	8,059,048,500	8,751,594,600	17.7%
	Subtotal Plastic	**2,862,457,400**	**16,297,299,400**	**19,159,756,800**	**38.6%**
Metal	Beer	493,804,900	154,143,600	647,948,500	1.3%
	Soda	174,837,600	62,039,400	236,876,900	0.5%
	Sports & energy drinks	33,546,000	28,690,200	62,236,200	0.1%
	Juice	6,679,800	-	6,679,800	0.0%
	Tea & coffee	8,410,400	589,000	8,999,400	0.0%
	Other metal beverage bottles	51,819,800	129,348,600	181,168,300	0.4%
	Other beverage packaging	23,632,900	358,158,700	381,791,700	0.8%
	Still water	365,200	-	365,200	0.0%
	Other water	3,199,000	-	3,199,000	0.0%
	Other metal	185,276,100	2,197,025,400	2,382,301,500	4.8%
	Subtotal Metal	**981,571,800**	**2,929,994,800**	**3,911,566,700**	**7.9%**

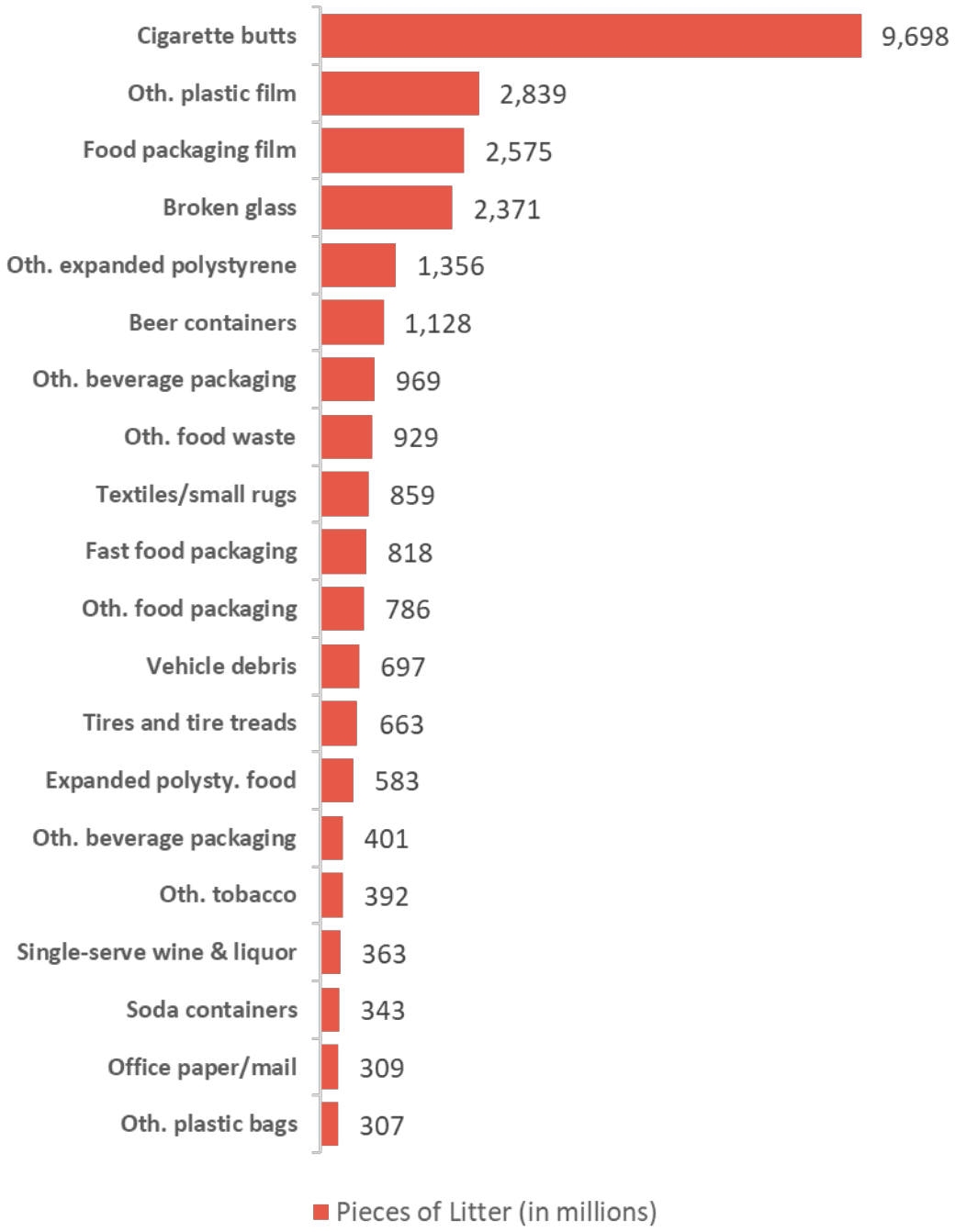
Table 2-3: Aggregate Composition of Litter by Size and Count, Roadway and Waterway Combined

Groups	Categories	4-inch plus	4-inch less	Total Count	Percent of Total
Glass	Beer	167,894,200	311,770,200	479,664,400	1.0%
	Soda	16,176,100	-	16,176,100	0.0%
	Single-serve wine & liquor	8,125,100	29,659,400	37,784,500	0.1%
	Other wine & liquor	30,402,600	525,400	30,928,000	0.1%
	Sports & energy drinks	1,086,700	-	1,086,700	0.0%
	Juice	684,100	-	684,100	0.0%
	Tea & coffee	1,317,000	-	1,317,000	0.0%
	Still water	-	-	-	0.0%
	Other water	236,600	-	236,600	0.0%
	Other glass beverage bottles	16,641,400	152,820,000	169,461,400	0.3%
	Broken glass or ceramic	73,057,800	2,298,040,400	2,371,098,300	4.8%
	Other glass food packaging	28,410,800	-	28,410,800	0.1%
	Other glass	35,474,800	389,375,300	424,850,100	0.9%
	Subtotal Glass	**379,507,100**	**3,182,190,900**	**3,561,698,000**	**7.2%**
Organics	Pet waste	14,965,000	141,465,800	156,430,800	0.3%
	Human waste	3,587,800	2,439,400	6,027,200	0.0%
	Confection	-	77,875,700	77,875,700	0.2%
	Other food waste	21,120,000	907,627,200	928,747,300	1.9%
	Other organics	24,229,300	75,496,700	99,726,000	0.2%
	Subtotal Organics	**63,902,200**	**1,204,904,800**	**1,268,807,000**	**2.6%**
Other	Medical waste	5,130,700	1,202,100	6,332,700	0.0%
	PPE gloves	57,774,500	91,504,500	149,279,000	0.3%
	PPE masks	31,726,300	26,136,900	57,863,200	0.1%
	Hazardous waste	546,300	-	546,300	0.0%
	Vehicle debris	70,571,300	626,026,100	696,597,400	1.4%
	Tires	8,822,000	61,360,000	70,182,000	0.1%
	Tire tread	61,149,500	531,543,700	592,693,200	1.2%
	Construction and demolition debris	70,803,700	461,232,100	532,035,800	1.1%
	Textiles/ small rugs	108,250,500	750,981,800	859,232,300	1.7%
	Bulky items	813,600	-	813,600	0.0%
	Cigarette butts	1,124,300	9,696,527,800	9,697,652,100	19.6%
	Electronic cigarettes	894,700	-	894,700	0.0%
	Other tobacco-related products & packaging	97,852,100	294,143,100	391,995,200	0.8%
	Toiletries/ personal hygiene products	106,527,200	2,054,000	108,581,200	0.2%
	Entertainment items	1,944,500	601,000	2,545,600	0.0%
	Flat screen TVs and computer monitors	-	-	-	0.0%
Other	CRT televisions and computer monitors	-	-	-	0.0%
	Portable electronics	836,800	-	836,800	0.0%
	Electronic cords	8,098,200	72,184,000	80,282,200	0.2%
	Other electronics	9,792,900	40,045,300	49,838,200	0.1%
	Other items	58,211,200	800,083,000	858,294,200	1.7%
	Subtotal Other	**700,870,300**	**13,455,625,300**	**14,156,495,600**	**28.6%**
Total		**6,010,125,400**	**43,562,919,900**	**49,573,045,400**	**100.0%**

Broad categories that capture unidentifiable or miscellaneous products (e.g., "Other paper") represent more than one-third of all littered items (36.9 percent) in the United States. Putting aside those large catchall categories, Figure 2-3 shows the top 20 most littered products in America. Cigarette butts continue to be the single most

littered item in the United States, as they were in 2009. However, the Trends in Litter section below examines how cigarette butt litter, as well as litter from several other products, has dramatically declined on U.S. roadways since 2009, while litter from other products has grown. Plastic films, both general use films and food-packaging films such as candy wrappers or snack bags, represent the second and third most littered items. Several specific product types of litter are discussed below in the Characteristics of Litter section. One of the challenges of building solutions designed to address specific litter problems while tackling the massive scale of litter in the United States is the fact that, after the top 15 items, the remaining items individually represent less than one percent of the total litter in America.

Figure 2-3: Top 20 Most Littered Items in the United States



While individuals litter products and not materials, the material composition of litter affects the impact that particular litter has on the natural environment, as well as the types of infrastructure needed to promote the proper disposal and management of product waste. For this reason, Keep America Beautiful has paid close attention to the material composition of litter since its first national visible litter study in 1969, and that work carries on through 2020 where the Burns & McDonnell Project Team assigned the material composition of litter to one of six categories: paper, plastic, metal, glass, organic, or other. The estimated roadway litter from each of the material categories decreased from 2009 to 2020. This represents a shift from the 2009 study, which estimated a large increase in total roadway litter from plastic materials between 1969 and 2009 (a 165 percent increase). Between 2009 and 2020, total litter amounts from plastic materials along all roadways decreased 17 percent while litter amounts from other material types decreased at least 39 percent. In 2020, when one examines all litter, litter materials made of plastic comprised 38.6 percent of litter, paper 15.2 percent, metal 7.9 percent, glass 7.2 percent, organics 2.6 percent, while all other types of litter (including cigarette butts) made up 28.6 percent of litter. Because total roadway litter from plastic materials decreased less than other materials, the proportion of all litter made from plastic materials increased between 2009 and 2020. In recent years, plastic has been the focus of conversation around litter and mismanaged waste in general because of its negative impacts on the natural environment, including its contribution to marine debris and the fact that it does not decompose. Nonetheless, it is important to note that other littered materials, which represent over 60 percent of all litter, cannot be ignored because littered items of all types contribute to the community and environmental problems created by litter.

More total litter was found near United States roadways and waterways in rural areas. However, when accounting for the higher amount of roadway and waterway miles in rural areas, urban roadways and waterways had significantly more littered items per mile than rural roadways and waterways. Table 2-4 presents the estimated count of roadway and waterway litter in aggregate and per mile by urban and rural region.

Table 2-4: Aggregate Count of Litter per Mile, Urban and Rural

	Roadway		Waterway	
	Urban	**Rural**	**Urban**	**Rural**
Total Litter Items	10,204,225,600	13,473,800,900	1,152,542,300	24,742,476,600
Miles[1]	2,425,331	5,862,316	278,991	10,461,325
Litter Items Per Mile	**4,207**	**2,298**	**4,131**	**2,365**

1. Source: Roadway distance based on Federal Highway Administration (FHWA) Highway Performance Monitoring System (HPMS). Waterway distance based on U.S. Geological Survey (USGS) National Hydrography Dataset Plus High Resolution (NHDPlus HR).

The wide variety of policies that are applied across different geographies in the United States (including in cities, counties, and states) make it challenging to conduct national-level examinations of the impact of policies on litter.

Of the various policies that have been implemented to decrease litter, the state-level implementation of bottle bills (also known as beverage container deposit laws or deposit return systems) provide the best opportunity to examine the impact of policy on a relatively broad set of product litter. Therefore, for the first time in a public national study based on scientific methodology, the Keep America Beautiful 2020 National Litter Study compared the dynamics of litter in states with bottle bills and states without bottle bills. While state deposit systems vary, bottle deposit systems generally require the consumer to pay a deposit upon purchase of a beverage and the consumer (or whomever returns the container) receives a refund when the beverage container is returned for recycling. Bottle bill regulations vary from state to state, though all bottle bills cover soda and beer containers (which represent three percent of litter nationally). All bottle bills also cover other beverage containers but the definition of which containers that are included varies by state.[12] This report provides two sets of analyses of how litter varies by states with and without bottle bills. Focusing only on containers covered by all bottle bill legislation, the report compares soda and beer litter across bottle bill and non-bottle bill states (Tables 2-5 and 2-6). The report also provides a comparison of litter across a broader range of products that are regularly covered by bottle bills including water, sports drinks, and other alcoholic product containers, even though these containers are not all treated the same across all bottle bill states (Tables 2-7 and 2-8).[13] As discussed below, regardless of whether one defines beverage containers covered by bottle bills narrowly (soda and beer only) or broadly, the conclusions about the variation in beverage litter between bottle bill and non-bottle bill states do not change.

In total, the Study estimates nearly 2.8 billion pieces of beverage container litter were near U.S. roadways and waterways, accounting for approximately 5.6 percent of all litter in the United States. Four out of every ten pieces of beverage container litter (41 percent) were beer cans and bottles. The next largest contributor to beverage container litter was single-serve wine and liquor (14 percent). In sum, there are nearly twice as many alcoholic litter beverage containers as there are non-alcoholic litter beverage containers on the ground in the United States.

On a per capita basis, there was about half as much soda and beer litter in bottle bill states than in non-bottle bill states (2.5 soda and beer litter items per capita in bottle bill states compared to 5.3 soda and beer litter items per capita in non-bottle bill states, Table 2-6). In comparison, on a per capita basis, there were 30 percent fewer pieces all other types of litter in bottle bill states than in non-bottle bill states (112.8 pieces per capita versus 161 pieces per capita).

[12] *State Beverage Container Deposit Laws*. (2020). National Conference of State Legislatures. https://www.ncsl.org/research/environment-and-natural-resources/state-beverage-container-laws.aspx

[13] To compare a multitude of products across states with varying policies, this simplifying assumption was made even though not all the products are covered at all or in the same manner across different states. Some states exclude products in the same category based on factors such as carbonation or product size and some states do not cover certain products at all.

Table 2-5: Aggregate Count of Soda and Beer Litter, Bottle Bill and Non-Bottle Bill

Product Type	Bottle Bill	Non-Bottle Bill	Total Containers
Soda	37,753,100	305,063,200	342,816,300
Beer	181,741,500	945,871,400	1,127,612,900
Total	**219,494,600**	**1,250,934,600**	**1,470,429,200**

Table 2-6: Aggregate Count of Soda and Beer Litter per Capita, Bottle Bill and Non-Bottle Bill

	Bottle Bill	Non-Bottle Bill	Total
Soda and Beer Litter Items	219,494,600	1,250,934,600	1,470,429,200
Other Material Litter Items	10,014,001,700	38,088,614,500	48,102,616,200
Total Litter Items	10,233,496,300	39,339,549,100	49,573,045,400
Population[1]	88,751,439	236,634,918	325,386,357
Soda and Beer Litter Items Per Capita	**2.5**	**5.3**	**4.5**
Other Material Litter Items Per Capita	**112.8**	**161.0**	**147.8**
Litter Items Per Capita	**115.3**	**166.2**	**152.4**

1. Source: U.S. Census 2020

Taking a wider view of the items that constitute deposit-material litter (Table 2-7), the study finds the same dynamics at play as found for soda and beer litter only. On a per capita basis, there was substantially less deposit-material litter in bottle bill states than in non-bottle bill states (4.1 litter items per capita in bottle bill states versus 8.5 litter items in non-bottle bill states, Table 2-8).[14] When the Project Team examined differences between other littered items (non-deposit) between states with bottle deposit legislation and those without such legislation, they found that there was also less non-deposit litter per capita in bottle bill states (111.2 littered items per capita) than in non-bottle bill states (157.8 littered items per capita).

The analyses show that the differences found in beverage container deposit litter per capita between bottle bill states and non-bottle bill states are relatively consistent regardless of the definition of a deposit container (about 50 percent fewer pieces of deposit litter per capita in bottle bill states than in non-bottle bill states). The analyses also showed that the differences in non-deposit material litter between bottle bill states and non-bottle bill states are relatively consistent regardless of the definition of non-deposit material (about 30 percent fewer pieces of non-deposit litter per capita in bottle bill states than in non-bottle bill states). A question that emerges from these data is identifying the cause of the underlying difference in the rate of litter in deposit states and non-deposit states.

[14] In a third analysis that looked at soda, beer, and still water combined as deposit litter, the differences between bottle bill and non-bottle bill states were the same as the analyses discussed in this section. There is about half as much soda, beer, and still water bottle litter per capita in bottle bill states as in non-bottle bill states and there are thirty percent fewer pieces of all other types of litter per capita in bottle bill states than in non-bottle bill states.

Table 2-7: Aggregate Count of Deposit Material Litter by Product Type, Bottle Bill and Non-Bottle Bill

Product Type	Bottle Bill	Non-Bottle Bill	Total Containers
Soda	37,753,100	305,063,200	342,816,300
Beer	181,741,500	945,871,400	1,127,612,900
Single-serve wine & liquor	67,205,900	296,055,200	363,261,100
Other wine & liquor	3,069,800	33,223,200	36,293,000
Sports & energy drinks	16,034,000	130,832,900	146,866,900
Still water	42,070,100	233,667,700	275,737,800
Other water	5,359,200	19,244,500	24,603,700
Other plastic beverage bottles	12,472,200	37,525,300	49,997,500
Total	**365,705,800**	**2,001,483,400**	**2,367,189,200**

Table 2-8: Aggregate Count of Litter per Capita, Bottle Bill and Non-Bottle Bill

	Bottle Bill	Non-Bottle Bill	Total
Deposit Material Litter Items	365,705,800	2,001,483,400	2,367,189,200
Non-deposit Material Litter Items	9,867,790,500	37,338,065,700	47,205,856,200
Total Litter Items	10,233,496,300	39,339,549,100	49,573,045,400
Population[1]	88,751,439	236,634,918	325,386,357
Deposit Material Litter Items Per Capita	**4.1**	**8.5**	**7.3**
Non-deposit Material Litter Items Per Capita	**111.2**	**157.8**	**145.1**
Litter Items Per Capita	**115.3**	**166.2**	**152.4**

1. Source: U.S. Census 2020

The Study was not designed to examine the causal relationship between bottle deposit legislation and litter and other factors that may also contribute to differences in rates of litter between bottle bill and non-bottle bill states. However, the Study does provide data from a national perspective to enable a more informed conversation. If the monetary incentive of deposits were the driving factor behind lower litter rates then, all else being equal, we would not expect to see a difference in non-deposit material litter between bottle bill and non-bottle bill states. That is not the case as the study shows a significant underlying difference (30 percent) in per capita litter rates for non-deposit material between bottle bill states and non-bottle bill states. Characteristics other than bottle bills, including factors that are associated with bottle bills, also should be considered as potentially contributing to the difference in litter between bottle bill and non-bottle bill states. These characteristics include access to robust services and public investment, including universal recycling requirements, curbside recycling, curbside garbage collection or convenient transfer stations in rural areas, formal cleanup programs (including Adopt-A-Highway), and statewide education campaigns aimed at litter prevention, as well as a larger proportion of residents holding

pro-environmental attitudes.[15] These factors are also important to consider in the conversation around the efficacy of deposit legislation and, for that matter, producer responsibility legislation more generally.[16]

In addition to examining the relationship between bottle bills and litter, the Study also explored public opinion, which showed strong support for bottle deposit legislation as a means for increasing recycling. In the Public Attitudes Survey, respondents were asked about two types of policies targeted at increasing recycling. Half of respondents were asked whether they support a "refundable deposit" policy in their state and the other half were asked whether they support a "rebate incentive." Across both questions, and across all respondents (nationally, in bottle bill states and in non-bottle bill states), over 75 percent of respondents supported the implementation of these policies within their state.

[15] Though more suggestive than conclusive, the Keep America Beautiful 2020 National Litter Study finds that a larger proportion of residents in bottle bill states (63.8%) agree that "litter is an environmental problem" than residents of non-bottle bill states (57.3%). The General Social Survey's question that assesses support for environmental spending shows more support in, for example, Northeastern states than in the South and Southeast. Other studies note various contributing factors to litter that have potential correlations at the state level. Viscusi, W. K., Huber, J., & Bell, J. (2011). Promoting Recycling: Private Values, Social Norms, and Economic Incentives. American Economic Review, 101(3), 65–70. https://doi.org/10.1257/aer.101.3.65. Wagner, T. P., & Broaddus, N. (2016). The generation and cost of litter resulting from the curbside collection of recycling. Waste Management, 50, 3–9. https://doi.org/10.1016/j.wasman.2016.02.004. Campbell, B., Khachatryan, H., Behe, B., Hall, C., & Dennis, J. (2016). Crunch the can or throw the bottle? Effect of "bottle deposit laws" and municipal recycling programs. Resources, Conservation and Recycling, 106, 98–109. https://doi.org/10.1016/j.resconrec.2015.11.006

[16] Also to be considered are differences in consumption patterns across states. For instance, the Study cannot account for the differences in beverage container unit sales per capita as a potential correlate of differences in beverage container litter.

CHARACTERISTICS OF LITTER

Understanding the characteristics of litter—including what it is and where the problem exists—as well as associated littering behaviors, is critical to developing effective solutions to litter (see Solutions to Litter section below). While there are common principles to apply when tackling litter and littering, often the best solution is targeted for a particular litter and littering problem.

Taking a strategic approach to litter is made even more challenging by the fact that new consumer products are introduced in the United States at a massive rate every year. NielsenIQ estimates that approximately 30,000 new consumer packaged goods launch each year—a new product every two minutes—many with new packaging innovations.[17] With any consumer good, there is always the possibility that the item can be littered rather than properly managed (either through correct recycling or trash disposal).

With 86 different products tracked in the Study, this section will focus on several key products. Beverage containers were discussed in the Scope of Litter section and cigarette butts will be discussed below in Trends in Litter. This section will highlight fast-food packaging, food-packaging film, plastic bags, and PPE.

An estimated 817.6 million fast-food packaging products were littered along United States roadways and waterways, making fast-food packaging the tenth most commonly found litter item in the Study. Fast-food products represent 1.8 percent of litter along roadways and 1.4 percent of litter along waterways. Conservatively, the Study assumed fast-food products included littered materials that could be identified as originating from fast-food service restaurants, such as fast-food paper bags, paper cups, and plastic cups. Materials that could be from other sources such as non-fast-food restaurants or homes, such as straws, were excluded from Table 3-1. "Other paper fast-food service items" (a category that includes napkins and beverage holders) represented 53 percent of the fast-food products littered. Fast-food cups represented 37 percent of the fast-food products littered. Table 3-1 presents the composition of fast-food product litter by roadways, waterways, and aggregate by material category.

[17] NielsenIQ. (2019, December 5). Bursting with new products, there's never been a better time for breakthrough innovation. https://nielseniq.com/global/en/insights/analysis/2019/bursting-with-new-products-theres-never-been-a-better-time-for-breakthrough-innovation/

Table 3-1: Aggregate Composition of Fast-Food Product Litter by Count, Roadway and Waterway

Groups	Categories	Roadway	Waterway	Total Count	Percent of Total
Paper	Fast-food paper bags	57,104,900	25,748,400	82,853,200	10.1%
	Fast-food paper cups	46,086,000	57,928,600	104,014,600	12.7%
	Other paper fast-food service items	244,792,500	188,640,800	433,433,300	53.0%
	Subtotal Paper	**347,983,400**	**272,317,800**	**620,301,100**	**75.9%**
Plastic	Fast-food plastic cups	86,919,000	110,411,000	197,330,100	24.1%
	Subtotal Plastic	**86,919,000**	**110,411,000**	**197,330,100**	**24.1%**
Total		**434,902,400**	**382,728,800**	**817,631,200**	**100.0%**

An estimated 2.6 billion food-packaging film items, which include products like snack bags and candy wrappers, were found littered along United States roadways and waterways. That equates to more than three times as many littered items as fast-food items, more than seven times the amount of littered soda containers, and more than twice the amount of beer containers. Not including materials that do not fit into other categories, food-packaging film was the second most littered material category after cigarette butts. Approximately half (55.3 percent) of all food-packaging film was along roadways and the other half (44.7 percent) was along waterways. Table 3-2 presents the composition of food-packaging film litter by roadways, waterways, and aggregate.

Table 3-2: Aggregate Composition of Food-Packaging Film Litter by Count, Roadway and Waterway

	Categories	Roadway	Waterway	Total Count	Percent of Total
Plastic	Food-packaging film	1,424,362,100	1,150,247,600	2,574,609,700	100.0%
Total		**1,424,362,100**	**1,150,247,600**	**2,574,609,700**	**100.0%**

An estimated 324.8 million littered plastic bags were found along United States roadways and waterways. The vast majority, 94.6 percent, of plastic bags littered were not trash bags but were other plastic bags that include items such as retail store plastic bags, newspaper bags, and other consumer packaging (thin film) plastic bags. Table 3-3 presents the composition of plastic bags by roadways, waterways, and aggregate by material category.

Table 3-3: Aggregate Composition of Plastic Bag Litter by Count, Roadway and Waterway

Groups	Categories	Roadway	Waterway	Total Count	Percent of Total
Plastic	Plastic trash bags	4,069,600	13,342,700	17,412,400	5.4%
	Other plastic bags	125,201,000	182,164,600	307,365,600	94.6%
Total		**129,270,600**	**195,507,300**	**324,778,000**	**100.0%**

The past year saw a dramatic increase in the use of PPE masks and gloves to reduce the transmission of COVID-19. However, as evidenced by pictures around the world, many people did not properly dispose of their PPE masks and gloves. The Keep America Beautiful 2020 National Litter Study provides the first national estimate of the scale and scope of the PPE litter problem. The Study estimates 207.1 million PPE items were littered along U.S. roadways and waterways, which equates to one piece of PPE litter on the ground for nearly two out of every three U.S. residents. The Study estimates that much of that PPE litter (127.4 million pieces) lies along U.S. waterways. PPE gloves represented 72.1 percent of the PPE littered and were much more likely to be found along waterways than masks. PPE masks accounted for a smaller percentage of PPE littered items, most likely due to the increased use of reusable masks. In both cases, future research will be critical to understanding if and to what extent PPE litter decreases over time as concerns about surface transmission erode (in particular, for PPE gloves), as consumers continue to adopt reusable masks, and as COVID-19 and its variants subside. Table 3-4 presents the composition of PPE litter by roadways, waterways, and aggregate by material category.

Table 3-4: Aggregate Composition of Litter by Count, Roadway and Waterway

Groups	Categories	Roadway	Waterway	Total Count	Percent of Total
	PPE gloves	48,098,900	101,180,000	149,279,000	**72.1%**
	PPE masks	31,615,000	26,248,300	57,863,200	**27.9%**
Total		**79,713,900**	**127,428,300**	**207,142,200**	**100.0%**

LITTER ALONG AMERICA'S WATERWAYS AND IN OUR COMMUNITIES

An estimated 23.7 billion pieces of litter were found along 8.3 million miles of United States roadways, which represents a 54 percent decrease in litter from the landmark 2009 Litter in America study from Keep America Beautiful. A comparison of the 2020 Study results to the results of the 2009 Litter in America study is presented in the Trends in Litter section below. An estimated 25.9 billion pieces of litter were along the shores of 10.7 million center miles of United States waterways.[18]

Intermittent waterways (e.g., storm runoff and seasonal streams) represent the great majority of miles in the population of waterways that the Study covered and, consequently, had the most total littered items. However, large perennial waterways (e.g., rivers) had more litter items per mile than all other waterway types (3,654 litter items per center mile on average). Table 4-1 presents the estimated count of waterway litter in aggregate and per mile in the United States.

Table 4-1: Aggregate Count of Litter per Mile, Waterway

	Large Perennial	Small Perennial	Intermittent	Total
Total Litter Items	2,588,286,000	9,692,176,800	13,614,556,100	25,895,018,900
Miles[1]	708,360	3,086,074	6,945,882	10,740,317
Litter Items Per Mile	**3,654**	**3,141**	**1,960**	**2,411**

1. Source: Waterway distance based on U.S. Geological Survey (USGS) National Hydrography Dataset Plus High Resolution (NHDPlusHR).

As shown in Table 4-2, accounting for almost 70 percent of total roadway miles, local roadways had the most total littered items followed by collector and arterial roadways. Freeways and expressways had less total litter than the other roadway types nationwide. However, freeways and expressways had more litter items per mile than all other roadway types (12,764 litter items per mile on average).

[18] For this study, waterways included only the waterways from two main categories of surface waters (perennial and intermittent streams) and therefore did not include ephemeral streams or coastlines. A roadway or waterway center mile (or centerline mile) is the estimated measure of a mile along the center of the roadway or waterway.

Table 4-2: Aggregate Count of Litter per Mile, Roadway

	Freeways & Expressways	Arterial	Collector	Local	Total
Total Litter Items	1,679,673,100	4,029,013,200	6,019,761,500	11,949,578,700	23,678,026,500
Miles[1]	131,598	800,187	1,623,373	5,732,488	8,287,647
Litter Items Per Mile	**12,764**	**5,035**	**3,708**	**2,085**	**2,857**

1. Source: Roadway distance based on Federal Highway Administration (FHWA) Highway Performance Monitoring System (HPMS).

Data at the product level (Table 4-3) show that the amount of product litter varies significantly along roadways and waterways. Some product litter is more likely to be found along roadways and others along waterways. Some of these differences are predictable. Most paper litter items and cigarette butts were more likely to be found along roadways than along waterways. These are items that readily degrade near water and, in the case of cigarette butts, are easily trapped and trampled when they are littered along roadways and in communities, theoretically making them less likely to be transported from roadways to waterways. However, it is not necessarily a function of cigarette butts' size that prevents them from reaching waterways because small litter (under four inches) comprised an equal proportion of litter along U.S. roadways and waterways.

Table 4-3: Aggregate Composition of Litter by Count, Roadway and Waterway

	Categories	Roadway	Waterway	Total Count	Percent of Total
Paper	Fast-food paper bags	57,104,900	25,748,400	82,853,200	0.2%
	Fast-food paper cups	46,086,000	57,928,600	104,014,600	0.2%
	Other paper fast-food service items	244,792,500	188,640,800	433,433,300	0.9%
	Cardboard	185,754,400	47,290,400	233,044,800	0.5%
	Kraft bags	6,920,200	3,475,000	10,395,200	0.0%
	Receipts	89,817,700	74,921,200	164,738,800	0.3%
	Political signs	122,400	21,500	144,000	0.0%
	Other advertising signs	9,406,600	119,000	9,525,600	0.0%
	Office paper/ mail	98,398,500	210,144,800	308,543,300	0.6%
	Newspaper/ inserts	249,109,000	16,584,300	265,693,300	0.5%
	Magazines	2,399,100	398,300	2,797,500	0.0%
	Books	734,800	-	734,800	0.0%
	Aseptic/ gable top containers	3,747,500	29,400	3,777,000	0.0%
	Beverage carriers/ cartons	22,059,200	4,189,500	26,248,700	0.1%
	Paper home food packaging	35,608,400	72,425,100	108,033,500	0.2%
	Other paper	3,283,630,000	2,477,113,800	5,760,743,700	11.6%
	Subtotal Paper	**4,335,691,200**	**3,179,030,200**	**7,514,721,300**	**15.2%**
Plastic	Soda	56,981,800	32,781,400	89,763,200	0.2%
	Single-serve wine & liquor	244,512,800	80,963,800	325,476,500	0.7%
	Other wine & liquor	4,976,300	388,500	5,364,900	0.0%
	Sports & energy drinks	42,393,900	41,150,000	83,543,900	0.2%
	Juice	16,786,800	2,306,000	19,092,800	0.0%
	Tea & coffee	4,695,900	3,514,800	8,210,600	0.0%
	Still water	98,475,000	176,897,600	275,372,600	0.6%
	Other water	18,068,700	3,099,400	21,168,100	0.0%
	Other plastic beverage bottles	31,364,600	18,632,900	49,997,500	0.1%
	Fast-food plastic cups	86,919,000	110,411,000	197,330,100	0.4%
	Plastic straws	135,613,600	85,891,800	221,505,400	0.4%
	Other beverage packaging	206,239,700	380,836,300	587,076,000	1.2%
	Plastic trash bags	4,069,600	13,342,700	17,412,400	0.0%
	Other plastic bags	125,201,000	182,164,600	307,365,600	0.6%
	Food-packaging film	1,424,362,100	1,150,247,600	2,574,609,700	5.2%
	Other film	1,173,815,800	1,665,670,900	2,839,486,700	5.7%
	Plastic food service items	68,064,200	127,934,000	195,998,200	0.4%
	Expanded polystyrene food service	184,746,400	398,489,200	583,235,600	1.2%
	Other expanded polystyrene	319,254,000	1,037,210,400	1,356,464,400	2.7%
	Other plastic food packaging	252,332,300	397,355,600	649,688,000	1.3%
	Other plastic	3,728,975,800	5,022,618,800	8,751,594,600	17.7%
	Subtotal Plastic	**8,227,849,400**	**10,931,907,400**	**19,159,756,800**	**38.6%**
Metal	Beer	401,334,300	246,614,200	647,948,500	1.3%
	Soda	143,062,500	93,814,400	236,876,900	0.5%
	Sports & energy drinks	38,382,300	23,853,900	62,236,200	0.1%
	Juice	6,658,300	21,500	6,679,800	0.0%
	Tea & coffee	2,998,200	6,001,100	8,999,400	0.0%
	Other metal beverage bottles	100,263,100	80,905,300	181,168,300	0.4%
	Other beverage packaging	178,007,900	203,783,800	381,791,700	0.8%
	Still water	365,200	-	365,200	0.0%
	Other water	3,148,000	51,000	3,199,000	0.0%
	Other metal	939,223,800	1,443,077,800	2,382,301,500	4.8%
	Subtotal Metal	**1,813,443,600**	**2,098,123,100**	**3,911,566,700**	**7.9%**
Glass	Beer	126,131,000	353,533,400	479,664,400	1.0%
	Soda	6,061,600	10,114,500	16,176,100	0.0%

Table 4-3: Aggregate Composition of Litter by Count, Roadway and Waterway

	Categories	Roadway	Waterway	Total Count	Percent of Total
	Single-serve wine & liquor	30,825,500	6,959,100	37,784,500	0.1%
	Other wine & liquor	8,837,200	22,090,900	30,928,000	0.1%
	Sports & energy drinks	42,400	1,044,300	1,086,700	0.0%
	Juice	662,500	21,500	684,100	0.0%
	Tea & coffee	1,073,300	243,700	1,317,000	0.0%
	Still water	-	-	-	0.0%
	Other water	236,600	-	236,600	0.0%
	Other glass beverage bottles	39,345,300	130,116,100	169,461,400	0.3%
	Broken glass or ceramic	855,631,400	1,515,466,900	2,371,098,300	4.8%
	Other glass food packaging	1,966,100	26,444,700	28,410,800	0.1%
	Other glass	100,646,100	324,204,000	424,850,100	0.9%
	Subtotal Glass	**1,171,458,900**	**2,390,239,000**	**3,561,698,000**	**7.2%**
Organic	Pet waste	65,963,600	90,467,200	156,430,800	0.3%
	Human waste	175,000	5,852,200	6,027,200	0.0%
	Confection	10,312,400	67,563,400	77,875,700	0.2%
	Other food waste	281,227,000	647,520,300	928,747,300	1.9%
	Other organics	39,458,300	60,267,700	99,726,000	0.2%
	Subtotal Organics	**397,136,200**	**871,670,800**	**1,268,807,000**	**2.6%**
Other	Medical waste	2,486,200	3,846,500	6,332,700	0.0%
	PPE gloves	48,098,900	101,180,000	149,279,000	0.3%
	PPE masks	31,615,000	26,248,300	57,863,200	0.1%
	Hazardous waste	546,300	-	546,300	0.0%
	Vehicle debris	339,971,000	356,626,500	696,597,400	1.4%
	Tires	64,805,700	5,376,300	70,182,000	0.1%
	Tire tread	338,714,300	253,978,800	592,693,200	1.2%
	Construction and demolition debris	368,440,300	163,595,500	532,035,800	1.1%
	Textiles/small rugs	362,780,500	496,451,800	859,232,300	1.7%
	Bulky items	425,300	388,300	813,600	0.0%
	Cigarette butts	5,703,542,200	3,994,110,000	9,697,652,100	19.6%
	Electronic cigarettes	865,200	29,400	894,700	0.0%
	Other tobacco-related products &	241,412,900	150,582,300	391,995,200	0.8%
	Toiletries/personal hygiene products	25,186,600	83,394,500	108,581,200	0.2%
	Entertainment items	216,600	2,329,000	2,545,600	0.0%
Other	Flat screen TVs and computer	-	-	-	0.0%
	CRT televisions and computer	-	-	-	0.0%
	Portable electronics	836,800	-	836,800	0.0%
	Electronic cords	11,327,000	68,955,200	80,282,200	0.2%
	Other electronics	20,928,700	28,909,600	49,838,200	0.1%
	Other items	170,247,600	688,046,500	858,294,200	1.7%
	Subtotal Other	**7,732,447,200**	**6,424,048,400**	**14,156,495,600**	**28.6%**
Total		**23,678,026,500**	**25,895,018,900**	**49,573,045,400**	**100.0%**

The mass (or weight) of the littered product also may play a role in whether it makes it to waterways. One question that requires additional analysis is the extent to which new material innovations that are developed to decrease product packaging (e.g., lightweighting) impact how litter gets to waterways.

The sampling methodology for the Study provides some insights about the relationship between litter along America's roads and waterways. Specifically, analysis of the National Hydrography Dataset indicates that just over

70 percent of the stream segments considered for inclusion in the Study (intermittent and perennial) fall within one-quarter mile of a road. The proximity of waterways to roads and their associated traffic, storm drains, and human activity provide evidence in support of a hypothesis that litter along waterways is related to litter along roadways, at least from a source standpoint.[19] Preventing litter in our communities is a critical step because that litter may be likely to reach our waterways if it is not cleaned up. Cleaning up litter once it reaches waterways is a much more difficult problem. The shores of our waterways, especially those that are hard to reach, are not regularly serviced for litter cleanup and there is no equivalent of street sweeping that can clean the shores of waterways on a large scale and consistently. With the decreased likelihood of being cleaned up, litter along waterways is more likely to degrade than litter along roadways and create further problems (e.g., microplastics) that are practically impossible to mitigate.

The Study provides other key insights into how, and in what degree, litter moves from roadways and populated areas to our waterways due to the entry of a new type of litter in our environment: personal protective equipment (PPE). While PPE gloves and masks were well established in certain commercial and industrial sectors prior to COVID-19 (e.g., medicine, food service), for all intents and purposes, PPE represented a new consumer product with a massive new market when individuals were encouraged or required to wear PPE during the pandemic. Furthermore, during the early weeks of the pandemic in particular, surface transmission was a major concern of the public and some residents did not take the appropriate levels of care in disposing of their PPE after use and, instead, littered the used PPE. Consequently, images of littered PPE exploded across media.

As new mass-market consumer products with huge adoption in a short period of time, PPE gloves and masks provide a natural experiment of what happens when new products and litter are generated. Revisiting data previously discussed, Table 3-4 shows the estimated PPE glove and mask litter along U.S. roadways and waterways. The Project Team assumes that the overwhelming majority of these littered products did not begin along waterways. Instead, they likely were littered where we often saw them during the pandemic, in places like grocery store parking lots, local parks, and gas stations. These types of locations all are near roads, often as a matter of feet more than miles, making these items likely to become litter along roadways. While none (or very little) of the PPE litter that is estimated to be along U.S. waterways originated there, it is estimated that two-thirds of littered PPE gloves and 45 percent of littered PPE masks were found along U.S. waterways (Table 3-4).

Table 3-4: Aggregate Composition of Litter by Count, Roadway and Waterway

Groups	Categories	Roadway	Waterway	Total Count	Percent of Total
	PPE gloves	48,098,900	101,180,000	149,279,000	**72.1%**
	PPE masks	31,615,000	26,248,300	57,863,200	**27.9%**
Total		**79,713,900**	**127,428,300**	**207,142,200**	**100.0%**

[19] Future studies should examine how litter along waterways varies as function of proximity to roadways and storm drain outflows.

How did the PPE litter get to the waterways and why is it estimated that there are more gloves than masks along waterways? To revisit a point made earlier, litter in our communities and along our roadways has a high potential to end up in waterways. If litter is not cleaned up in our neighborhoods and along our roads, either through organized cleanups or by municipal investments like street sweeping and storm drain traps, it is only going away if it degrades, which can take hundreds of years for some materials. And even when it does degrade, litter can create significant new problems (e.g., microplastics). If litter is not cleaned up, it can be swept into storm drains that lead to nearby streams or be blown into the surrounding natural environment, which often includes streams. Litter may move based on several factors, including the characteristics of the litter itself (e.g., size, weight, and the ratio of the two) and factors like the weather, the place where it is littered (i.e., easily trapped by natural barriers or infrastructure like walls and curbs or is it easily washed down a storm drain), and whether the area is serviced for litter cleanup either by street sweeping or by litter crews and volunteers.

While PPE masks can be as lightweight as PPE gloves, they are often made of cloth, can be quite large, and may even include metal adjustments, leading them to weigh two or even three times as much as gloves. In contrast, PPE gloves are lightweight and relatively large which make it easier for littered gloves to move around the environment than masks. With that in mind, the Study suggests that a large proportion of litter that starts away from waterways can end up along waterways. For PPE masks, the percentage that made it to waterways was 45 percent of all litter. For lightweight PPE gloves, it was 68 percent of all litter. While more studies of this issue are necessary, the data provide critical insights and, more importantly, a greater impetus to prevent and manage litter before it can get to America's waterways.

TRENDS IN LITTER

In 2009, Keep America Beautiful conducted a national litter research study to document the quantity, composition, and sources of litter on United States roadways. Approximately 51.2 billion pieces of litter were estimated to be littered along United States roadways in 2009. The Keep America Beautiful 2020 National Litter Study estimated approximately 23.7 billion pieces of litter along United States roadways in 2020, a decrease of 54 percent. The finding of a decrease in roadway litter is consistent with other recent statewide litter studies including Tennessee, which reported a 43 percent decrease from 2006 to 2016, Texas, which reported a 28 percent decrease from 2013 to 2019, and New Jersey, which reported a 53 percent reduction in litter between 2004 and 2017.

On a per capita basis, United States residents' littering behavior has decreased from 167 to 73 items for each U.S. resident on roadways from 2009 to 2020.[20] While this represents significant progress, there is still more work needed to achieve the goal of eradicating litter in the United States when we still find nearly 24 billion pieces of litter along U.S. roads and nearly 26 billion pieces of litter along U.S. waterways.

For specific products, the 2009 and 2020 studies allow us to compare changes in littered items in material categories over time (Table 5-1).[21] At this level of detail, there is significant variation in both the degree of change and the direction (increase or decrease) of change in the amount of littered material. Most of the products tracked saw declines in the amount of litter from 2009 to 2020. Among high-profile material categories, fast-food packaging litter was down, as was soft drink litter (including plastic and glass bottles and aluminum cans), construction debris, and other tobacco-related litter. The large decline in cigarette butt litter—a decrease of 69.3 percentage points from 18.6 billion cigarette butts to 5.7 billion—far outpaces the decline in the percentage of U.S. residents who smoke from 2009 to 2020 and, therefore, cannot be completely explained by declining smoking rates.[22] A significant decline in newspaper, magazine, and receipt litter occurred during this period in which we saw an accelerating shift to electronic media and digital transactions. While most litter types went down between

[20] The 152 items for each U.S. resident discussed above includes both roadways and waterways.
[21] The material categories were expanded in 2020 to better capture newly emerging litter trends (e.g., PPE litter). For the sake of comparison, 2020 material categories that do not have an appropriate match in the other study were consolidated for comparison purposes.
[22] According to the Centers for Disease Control, in 2009 an estimated 20.6% U.S. adults were current cigarette smokers. In 2019, 14% of U.S. adults currently smoked, representing a 33% decrease.

2009 and 2020, several key categories saw increases in the amount of litter from 2009, including plastic wine, liquor, and beer containers, food-packaging film, sports drink bottles, and water bottles.

Table 5-1: Comparison of Aggregate Composition of Litter by Count from 2009 to 2020 Study, Roadway

Groups	Categories	2009 Study	2020 Study	Difference	Change
Paper	Cardboard	122,748,649	185,754,400	63,005,751	51.3%
	Paper Fast-Food Service Items	1,418,382,582	347,983,300	(1,070,399,282)	-75.5%
	Kraft bags	81,119,139	6,920,200	(74,198,939)	-91.5%
	Office Paper & Discarded Mail	307,199,436	98,398,500	(208,800,936)	-68.0%
	Newspaper & Inserts	1,070,057,748	249,109,100	(820,948,648)	-76.7%
	Magazines & Books	16,054,870	3,134,000	(12,920,870)	-80.5%
	Receipts	295,900,297	89,817,600	(206,082,697)	-69.6%
	Advertising Signs & Cards	45,081,108	9,529,100	(35,552,008)	-78.9%
	Aseptic & Gable-Top Containers	18,406,868	3,747,500	(14,659,368)	-79.6%
	Beverage Carriers & Cartons	10,575,416	22,059,200	11,483,784	108.6%
	Paper Home Food Packaging	524,368,324	35,608,300	(488,760,024)	-93.2%
	Other Paper	7,286,712,760	3,283,630,000	(4,003,082,760)	-54.9%
	Subtotal Paper	**11,196,607,196**	**4,335,691,200**	**(6,860,915,996)**	**-61.3%**
Plastic	Plastic Soft Drink Bottles	154,949,833	56,981,800	(97,968,033)	-63.2%
	Plastic Wine & Liquor Bottles	16,516,500	249,489,100	232,972,600	1,410.5%
	Plastic Sports & Health Drink Bottles	34,670,688	42,393,900	7,723,212	22.3%
	Plastic Juice Bottles	12,590,150	16,786,800	4,196,650	33.3%
	Plastic Tea Bottles	4,669,276	4,695,900	26,624	0.6%
	Plastic Water Bottles	80,284,274	116,543,700	36,259,426	45.2%
	Plastic Beverage Bottles or Packaging	328,846,938	237,604,300	(91,242,638)	-27.7%
	Plastic Fast-Food Service Items	960,797,419	290,597,000	(670,200,419)	-69.8%
	Plastic Bags	309,272,707	129,270,600	(180,002,107)	-58.2%
	Food-packaging Film	936,445,509	1,424,362,100	487,916,591	52.1%
	Other Plastic Film	1,140,801,568	1,173,815,800	33,014,232	2.9%
	EPS Fast-Food Service Items	308,741,691	184,746,400	(123,995,291)	-40.2%
	Other Expanded Polystyrene	1,827,283,778	319,254,000	(1,508,029,778)	-82.5%
	Plastic Home Food Packaging	658,644,850	252,332,300	(406,312,550)	-61.7%
	Other plastic	3,092,054,964	3,728,975,800	636,920,836	20.6%
	Subtotal Plastic	**9,866,570,146**	**8,227,849,500**	**(1,638,720,646)**	**-16.6%**
Metal	Aluminum Beer Cans	213,392,185	401,334,300	187,942,115	88.1%
	Aluminum Soft Drink Cans	161,133,171	143,062,500	(18,070,671)	-11.2%
	Metal Sports & Health Drink Cans	5,434,139	38,382,300	32,948,161	606.3%
	Metal Juice Cans	4,915,001	6,658,300	1,743,299	35.5%
	Metal Tea Cans	3,246,355	2,998,200	(248,155)	-7.6%
	Other Metal Beverage Packaging	185,093,018	178,007,900	(7,085,118)	-3.8%
	Other Metal & Foil Packets	2,389,922,003	1,043,000,100	(1,346,921,903)	-56.4%
	Subtotal Metal	**2,963,135,873**	**1,813,443,600**	**(1,149,692,273)**	**-38.8%**
Glass	Glass Beer Bottles	201,368,896	126,131,100	(75,237,796)	-37.4%
	Glass Soft Drink Bottles	18,621,883	6,061,600	(12,560,283)	-67.4%
	Glass Wine & Liquor Bottles	14,360,099	39,662,500	25,302,401	176.2%
	Glass Sports & Health Drink Bottles	1,655,143	42,400	(1,612,743)	-97.4%
	Glass Juice Bottles	971,841	662,500	(309,341)	-31.8%
	Glass Tea Bottles	338,468	1,073,300	734,832	217.1%
	Glass Water Bottles	338,468	236,600	(101,868)	-30.1%
	Other Glass Bottles	105,225,926	39,345,300	(65,880,626)	-62.6%
Glass	Broken Glass or Ceramic	1,704,648,831	855,631,400	(849,017,431)	-49.8%
	Other Glass	278,865,558	102,612,200	(176,253,358)	-63.2%

Groups	Categories	2009 Study	2020 Study	Difference	Change
	Subtotal Glass	**2,326,395,114**	**1,171,458,900**	**(1,154,936,214)**	**-49.6%**
Organics	Human waste	4,528,799	175,000	(4,353,799)	-96.1%
	Food waste	2,160,555,194	291,539,400	(1,869,015,794)	-86.5%
	Other organics	-	105,421,700	105,421,700	NA
	Subtotal Organics	**2,165,083,993**	**397,136,100**	**(1,767,947,893)**	**-81.7%**
Cigarette Butts	Cigarette Butts	18,583,533,952	5,703,542,100	(12,879,991,852)	-69.3%
	Subtotal Cigarette Butts	**18,583,533,952**	**5,703,542,100**	**(12,879,991,852)**	**-69.3%**
Vehicle Debris	Vehicle Debris	782,430,919	743,491,000	(38,939,919)	-5.0%
	Subtotal Vehicle Debris	**782,430,919**	**743,491,000**	**(38,939,919)**	**-5.0%**
Other	Construction Debris	1,330,457,440	368,440,300	(962,017,140)	-72.3%
	Hazardous	9,623,943	546,300	(9,077,643)	-94.3%
	Other Tobacco-Related	699,707,631	242,278,100	(457,429,531)	-65.4%
	Textiles & Small Rugs	174,606,629	362,780,600	188,173,971	107.8%
	Toiletries & Sundries	119,275,202	25,186,700	(94,088,502)	-78.9%
	Entertainment Items	18,835,305	216,600	(18,618,705)	-98.9%
	Bulky Items	880,871	425,300	(455,571)	-51.7%
	Other items	938,745,608	285,540,200	(653,205,408)	-69.6%
	Subtotal Other	**3,292,132,629**	**1,285,414,100**	**(2,006,718,529)**	**-61.0%**
Total		**51,175,889,822**	**23,678,026,500**	**(27,497,863,322)**	**-53.7%**

It is important to consider how conducting this Study in the middle of a global pandemic affected the results. The evidence shows that the pandemic had a mixed impact on litter; some communities saw an uptick in litter while others saw a decrease. Where you live in America had a strong influence on how you experienced the impact of the pandemic on litter. Some perceived there was more litter as individuals were increasingly at home, recreating locally, all while their access to trash and recycling services and other community services (e.g., street sweeping, park servicing) may have been curtailed due to the pandemic. In communities with these dynamics, litter spiked during the pandemic. Conversely, downtown areas were vacated in large numbers and automobile travel decreased, both of which drove down litter across other communities.

Post-pandemic studies over time will be necessary to definitively establish the impact of the pandemic on litter at the national level. However, using its Community Appearance Index tool that is applied by hundreds of affiliates around the country to randomly sampled areas of their community to track litter, Keep America Beautiful can report a slight uptick in litter from 2019 to 2020, after several years of a downward trend. Taken as a whole, the data suggests more of a K-shaped impact of the pandemic on litter (varying across communities) rather than a V-shaped impact (sharp consistent spike in litter) at the national level.

SOLUTIONS TO LITTER

Fifty billion pieces of litter is a lot of litter. There is no doubt about it. Solving that large of a problem requires a number of efforts by Keep America Beautiful, other organizations committed to removing litter from our communities and natural environment, businesses, governments, and individuals around the country and the world.

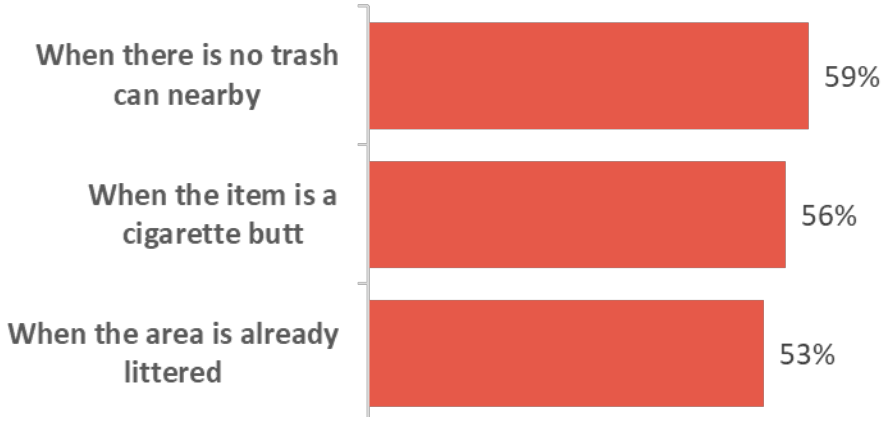
The solution starts with a better understanding about the nature of the problem and the data to support continuous improvement. Research like this Study provides a foundation for communities, policy makers, and committed organizations to begin to make the necessary changes. Keep America Beautiful has been conducting research about litter since the late 1960s, providing data and frameworks that have been adopted across the globe. This research has been used to drive some of the most important conversations around communities and sustainability.[23] Keep America Beautiful uses this research to drive action and to inform and improve its programming. It helps formulate education campaigns that reach millions of people with the intention of helping individuals make better decisions about the products they use and to take better care of their communities.

With this Study, Keep America Beautiful takes the next big step in using data to drive better solutions. Not only does the Study provide a single point-in-time research product and lessons, but it also delivers foundational data and technological infrastructure to advance solutions to litter. The data collection tools, methodology, processes, and data architecture developed for this Study enable future research at scale and continuous improvement through programs, experimentation, and policy. These new tools can provide more structured data to empower community leaders and policy makers, allowing communities, states, and the nation to highlight problems, track progress against litter and mismanaged waste, and make sure that everyone in America lives in a beautiful community. This dataset can also provide the foundation to take advantage of large data sources (either open source or built through partnerships) and the benefits of artificial intelligence and machine learning as means of providing better information about where litter is and how it is being managed. Through our programs, Model for Change, network of affiliates, and our ability to mobilize millions, Keep America Beautiful can also maintain the critical human component of activating communities for the 21st century. Research collaborations with leading

[23] Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Plastic waste inputs from land into the ocean. Science, 347(6223), 768–771. https://doi.org/10.1126/science.1260352.

environmental and behavioral scientists led to the development of the Keep America Beautiful Model for Change in 2016, which lays out an end-to-end process for engaging Americans to change littering behavior through key activities like cleaning up spaces because individuals are more likely to litter in a space that is already littered, putting in the appropriate infrastructure for the waste in question, and placing the correct messaging in place for the relevant task. To take one specific example, the Keep America Beautiful Cigarette Litter Prevention Program (CLPP) helps communities and organizations implement the Model for Change to tackle the number one most littered item in the world: cigarette butts. On average, communities that implement CLPP witness a 50 percent reduction in cigarette butt litter. These types of solutions resonate with U.S. residents. In the Public Attitudes Survey, individuals who have observed people littering were asked, "when have you seen people litter?" The top three reasons from U.S. residents all are highly related to the Model for Change implemented in CLPP (Figure 6-1).

Figure 6-1: When Have U.S. Residents Seen People Litter

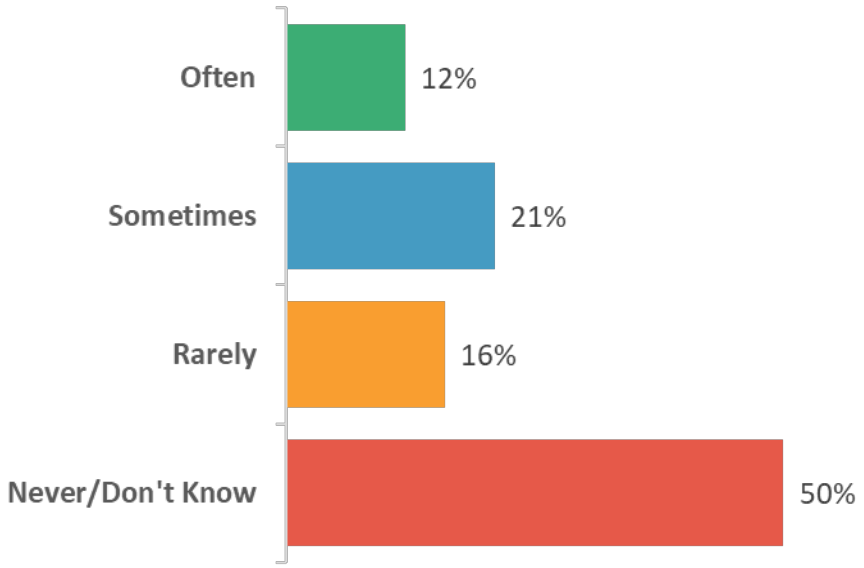


What we see is that reductions in litter are no accident. They are the result of data-driven solutions that are consistently applied and systemically adopted across a wide range of communities in a coordinated manner.

One area that has witnessed significant growth over a long period of time is a commitment to educating the public and encouraging them not to litter. Targeted education programs (often in schools or in extra-curricular programs) provide a strong basis for change as do behavior change campaigns targeting specific anti-social behaviors. Likewise, general population education campaigns, often adopted by state and local departments of transportation, tourism, environmental protection, or economic development, can be effective when focusing on the beauty and pride of the communities they serve. These programs can be an important part of influencing individual attitudes, norms, and beliefs that underlie littering behavior, but can take a long period of time to shift.

Yet, there is still much work to be done to reach enough individuals for these messages to be effective. Based on the Public Attitudes Survey, the Study finds that only about one-third of U.S. residents are receiving litter prevention messaging even "sometimes" (Figure 6-2). These levels of outreach are not enough to address the scale of the littering problem in the United States or to educate the public about how to become part of the solution.

Figure 6-2: Frequency of Exposure to Litter Prevention Messaging in Resident's State



Beyond education, broader adoption of successful programs, such as CLPP, and new program innovations are needed to move the needle forward on reducing litter. The Public Attitudes Survey indicates that the U.S. public understands the importance of taking action against litter and, to some degree, the type of action necessary to end litter and littering. Organizations like Keep America Beautiful need to continue that work and, importantly, continue to engage the public in what it takes to succeed and how they can be part of the solution.

Keep America Beautiful is already using the results of the Study to inform its programs and impact goals. For example, in its work to end litter and littering, Keep America Beautiful will implement proven solutions at scale:

- Grow and build the Keep America Beautiful affiliate network to expand the scale at which it can address litter and littering across America.
- Emphasize its focus on waterways with education programs, healthy waterways community initiatives, waterway-focused cleanups, and waterway-specific infrastructure such as SeaBins.
- Increase support for local litter cleanup efforts throughout the nation, particularly during the Great American Cleanup®.

- Implement a “litter app” leveraging the toolset used for the litter study for consistent ongoing measurement.
- Update the Keep America Beautiful community toolkit for communities to holistically end litter and littering.
- Expand infrastructure for public space recycling and trash bins to promote on-the-go recycling and waste containment and continue to drive education and behavior change through the Keep America Beautiful America Recycles Day® and Great American Cleanup®.
- Increase efforts to drive grassroots volunteerism.
- Help educate and inform policy makers on issues related to litter and littering.
- Build coalitions with other NGOs and community groups using the data in the report to end litter and littering in communities across America.
- Create compelling data-driven public education materials for all audiences – individuals, corporate partners, government, and local affiliates. These include social media, digital advertising, infographics, updated development materials, earned media, website content, and public service announcements (PSAs).

Through coordinated activities, such as organized cleanups like the Great American Cleanup and TrashDash™ or individual actions like the “152 and you” social media challenge (#152AndYou), Keep America Beautiful and its network of 700 affiliates around the country can help communities take the first step that research shows is necessary to prevent littering: start with a clean public space.

In addition to clean public spaces, American communities need the correct infrastructure in place to prevent litter and littering. Research, including the 2009 Litter in America Study from Keep America Beautiful, shows that littering is more likely to occur when individuals do not have access to the proper receptacles or waste solutions. For cigarette butts, that solution is having cigarette-specific receptacles. In public spaces, it is about co-locating recycling bins next to litter receptables, as well as ensuring that these receptacles have lids and are regularly serviced so that waste does not leak or overflow and become litter in the process. During the pandemic, it is ensuring that Americans continue to have access to recycling and waste services so that they do not resort to littering and illegal dumping to dispose of their waste. Keep America Beautiful supports these solutions around the country, both in its affiliate communities and elsewhere, by providing grants that allow organizations and local governments to take the first step, or in some cases the next step, to provide the appropriate waste management infrastructure in their communities. Keep America Beautiful believes that change starts with the individual and consistent programmatic efforts can transform communities for national impact.

As conversations around creating a sustainable society and a circular economy continue in communities, state capitals, and Washington, D.C., it is important that the dialogue prioritizes the front end of the waste system, including preventing litter. America and the world cannot only focus on waste that is already in the managed waste system. We must also focus on reducing mismanaged waste, which starts with education, clean spaces, and the correct infrastructure to allow everyone to make the right decision when disposing of the products they use. Supporting this work and ensuring that the organizations around the country who do the work are part of the conversation and have the resources to implement these solutions is the only way that we can eliminate litter in America. When we do that work equitably, it will lead to cleaner rivers, lakes, and oceans, more vibrant green spaces, and healthier communities, and will ensure that **Everyone in America Lives in a Beautiful Community**.

Keep America Beautiful and its network of 700 affiliates will not end litter across the United States alone. The affiliate network works in thousands of communities across the United States, but there are more communities and residents who are yet to be served, more than 15,000 as estimated by Keep America Beautiful. This work is rooted in the belief in tri-sector solutions that bring together government leaders, community organizations, community leaders and committed businesses. Everyone needs a voice and a seat at the table. Yet this work requires collaboration at an even bigger scale across even more communities to end litter in America. The decreases that we have witnessed in litter—54 percent since 2009 on top of a 61 percent decrease between 1969 and 2009—represent systemic change. Expanding this work, driving greater reductions in litter and, in the process, building healthier and safer communities, requires individuals to engage with their community, governments, companies, foundations, education institutions, media, and nonprofits. As the research and programmatic impact of Keep America Beautiful shows, when we work together with a shared purpose, true change occurs.

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