reloop

Littered with evidence

Proof that deposit return systems work

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Foreword

Litter is one of the most visible and persistent symptoms of our throwaway culture, a challenge that continues to impact communities, ecosystems, and economies around the world. Among the most commonly found items in the environment are beverage containers: the cans and bottles we use every day and too often discard. Despite decades of clean-up efforts and public education campaigns, this waste continues to pollute our landscapes and waterways, strain municipal budgets, and contribute to the global plastic crisis.

At Reloop, we believe that effective policy must be grounded in solid data. This report brings together the most comprehensive international analysis to date on the relationship between deposit return systems (DRS) and beverage container litter. Drawing on litter composition data from more than 100 jurisdictions, both with and without DRS, we show that where deposits are in place, beverage container litter drops dramatically.

We are proud to launch this report at the 2025 UN Ocean Conference, where governments, civil society, and other stakeholders are gathering to advance solutions to the growing threats facing our oceans. The findings shared here are not just timely, they are actionable. They provide clear, compelling evidence that well-designed deposit systems can play a vital role in reducing plastic pollution at the source, helping to keep bottles and cans out of our rivers, lakes, and seas.

As the world continues to move toward a binding global agreement on plastic pollution, we hope this report helps inform the policies and partnerships needed to build a cleaner, more circular future.

Clarissa Morawski
CEO and Co-Founder, Reloop

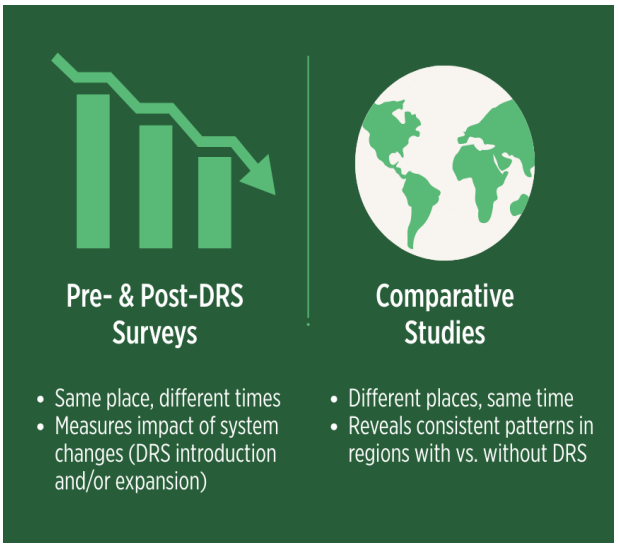
Executive summary

Deposit return systems (DRS) are widely recognised for their ability to reduce beverage container litter. In fact, litter reduction has been one of the primary motivations for introducing DRS in many jurisdictions around the world. Despite this, comprehensive documentation of the evidence has been limited, until now.

This report is the most extensive review to date of the impact of DRS on litter reduction. Drawing on over 20 case studies and datasets from across Europe, North America, Australia, and other regions, it brings together decades of evidence in a single place to answer a critical question: How effective is DRS at reducing beverage container litter?

Two key types of evidence are used to assess this impact:

- **Before-and-after studies**, which examine changes in beverage container litter following the introduction or expansion of a DRS.
- **Comparative studies**, which look at the prevalence of beverage container litter in jurisdictions with and without a DRS in place.



Both lines of evidence tell a consistent story: jurisdictions that implement or expand DRS see substantial reductions in beverage container litter. Across Europe, the US, and Australia, deposit systems cut beverage container litter by more than 50% on average, with individual studies showing reductions between 40% to 70%, and in some cases even higher (see Figure 1). These reductions are evident across different geographies and hold true regardless of whether the studies focus on roadside, urban, or coastal litter. Based on all available data, it's clear that implementing a DRS can rapidly cut beverage container litter by substantial margins, often within a short timeframe, delivering an immediate and meaningful reduction in pollution and biodiversity harm. It also eases the growing financial burden of litter clean-up, which is becoming increasingly costly for municipalities and beverage brand owners.

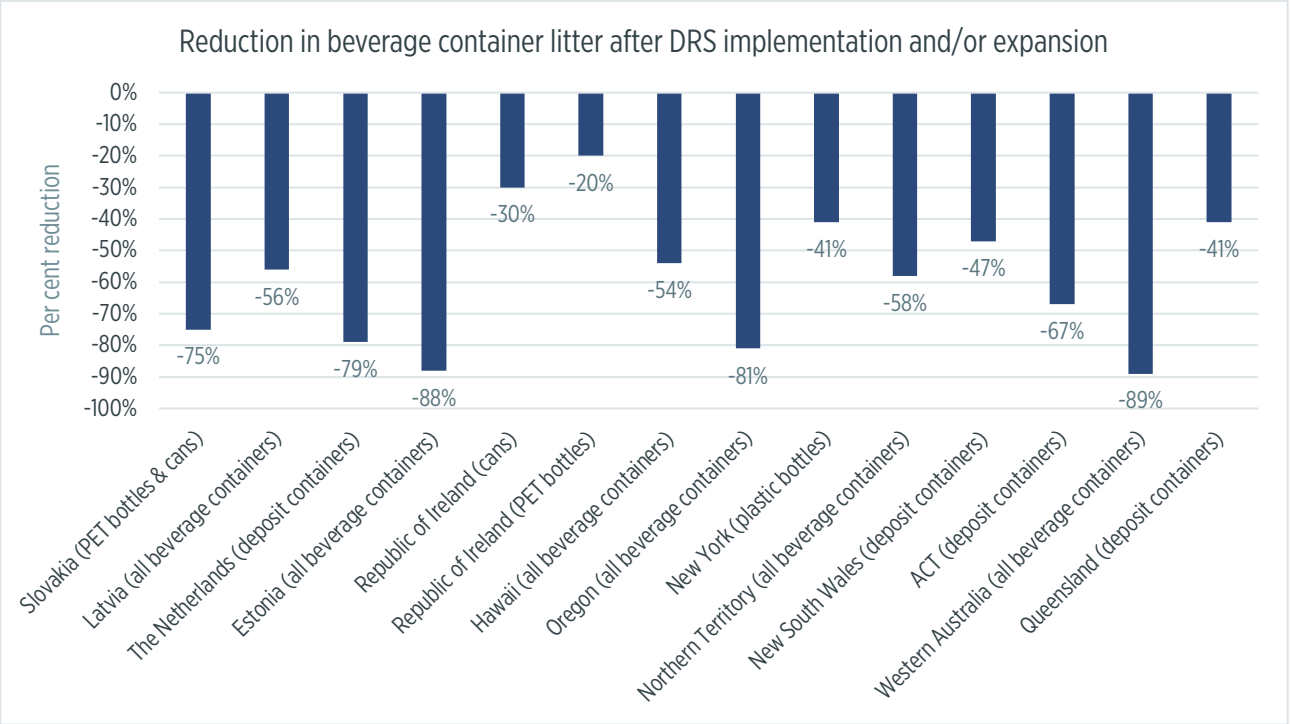


Figure 1: Summary of reductions in beverage container litter pre- and post-DRS implementation/expansion

Comparative data reinforce these findings. A global analysis of the Ocean Conservancy's 2021 *International Coastal Cleanup* (*ICC*) data from 114 jurisdictions (18 with a DRS and 96 without) spanning more than 80 countries found that beverage cans and bottles (glass and plastic) made up a significantly smaller share of litter in places with a DRS. On average, the proportion of these items in the litter stream was 54% lower by count in DRS jurisdictions. When broken down by material, litter from plastic beverage bottles was 63% lower, beverage cans 40% lower, and glass bottles 41% lower in jurisdictions with a DRS.

While many policies aim to address waste and litter, DRS stands out as the single most effective tool for reducing beverage container litter. No other approach has demonstrated similar results, and few enjoy the same level of public and political support. With rising concern about plastic pollution and increased demand for policy solutions that deliver measurable results, DRS offers a proven pathway forward.

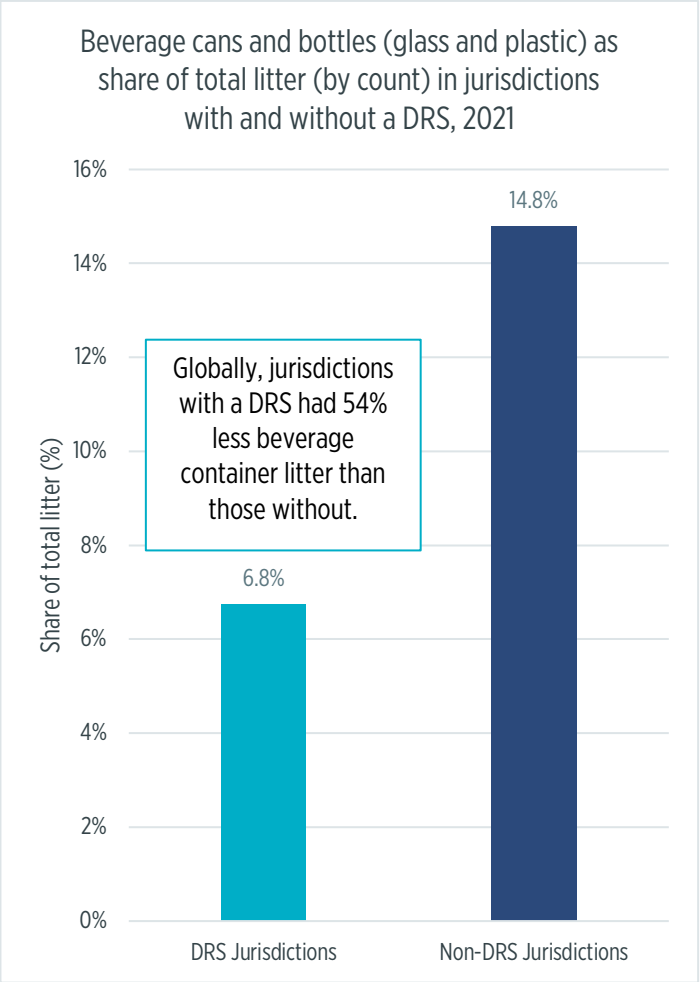


Figure 2: Global comparison of beverage can and bottle litter in DRS vs. non-DRS jurisdictions, 2021

This report not only strengthens the case for introducing or expanding deposit return systems but also clarifies why litter reduction results may vary across studies. It outlines the range of factors that can influence litter outcomes, including survey methodology (e.g., whether litter is measured by item count, weight, or volume), timing and location of surveys, population density, and the waste and recycling infrastructure already in place. This is important because critics of DRS often argue that beverage containers make up only a small share of the litter stream, typically relying on item count data to downplay the problem.

However, count-based approaches tend to emphasise small items like cigarette butts and food wrappers, which are numerous but smaller (i.e. less voluminous). Large quantities of ubiquitous cigarette butts are often higher in number than most other items and so appear at the top of the list by count. This can underrepresent the impact of larger, bulkier items like beverage containers. For example, a UK study[i] found that while beverage cans and small non-alcoholic plastic bottles accounted for just 4% of litter by count, they made up 50% by volume (see Figure 3). Non-alcoholic plastic bottles alone represented nearly a quarter of total litter volume, yet only 1% by count.

This report also presents global evidence showing that beverage containers consistently rank among the top litter items in many regions. For example, Ocean Conservancy's 2024 *International Coastal Cleanup* data show that plastic beverage bottles were the second most collected item globally, and the number one item in parts of Asia, Latin America, and the Caribbean.

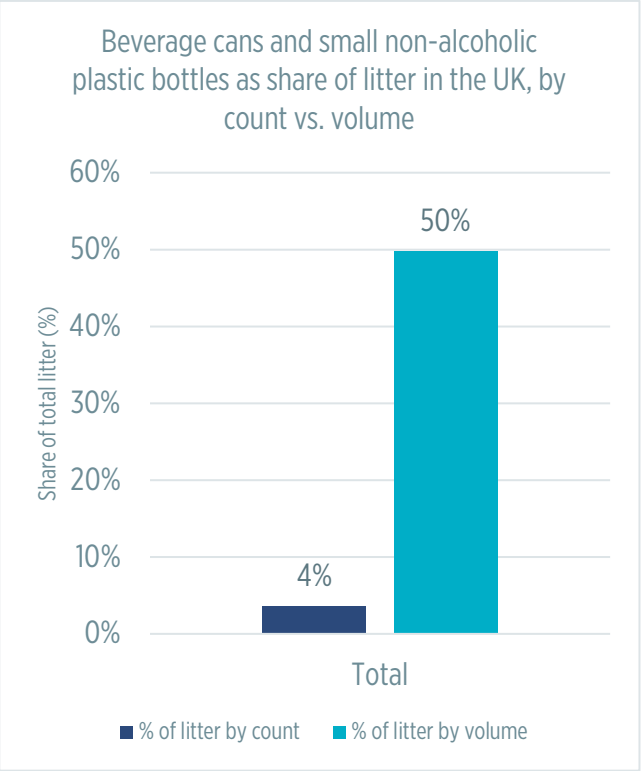


Figure 3: Beverage cans and small non-alcoholic plastic bottles as share of litter in the UK, by count vs. volume

Importantly, DRS is not a stand-alone solution that competes with other waste management systems. It is fully compatible with extended producer responsibility (EPR) schemes and kerbside recycling, and in fact, most regions that have implemented DRS already had such systems in place. What sets DRS apart and makes it particularly effective at reducing litter is the direct financial incentive it provides. Not only are consumers motivated to return containers to reclaim their deposits, but others are also encouraged to collect discarded containers for a refund. DRS is especially effective at capturing containers consumed away from home, where public recycling options are often limited or absent. These factors explain why DRS consistently delivers stronger results, even in jurisdictions with well-established recycling programmes.

Ultimately, the evidence is clear: beverage containers are a major and persistent component of the litter stream, and DRS is the most effective tool available to eliminate them. Governments seeking to reduce pollution, protect public spaces, and cut waste management costs will find in DRS a solution that is both proven and scalable.

Introduction

Litter can be found everywhere: on roadsides, in parks, and along waterways. Not only is it unsightly, but it also causes significant environmental and health problems. Many commonly littered materials, particularly plastics, do not break down quickly or at all, and when not properly cleaned up, they degrade into microplastics, which can seep into waterways, contaminating water supplies and threatening aquatic life. The presence of litter in a community also has significant social and economic consequences. Ninety per cent of US residents report that litter is a problem in their state (Figure 4), and large majorities recognise that it negatively impacts property values, tourism, businesses, quality of life, and health and safety. In the UK, public concern is similarly high; 83% of people say litter is a problem, and 77% believe it has worsened in recent years, according to a 2025 report by Keep Britain Tidy.[ii]

What is litter?

Litter refers to any discarded items that are improperly thrown away in public spaces, such as streets, parks, waterways, and natural areas. It includes a wide variety of materials, ranging from plastic bottles and beverage containers to cigarette butts, food wrappers, and even large items like furniture or appliances. Litter can be both large and small, but its impact is always harmful. Not only does it disrupt the beauty and cleanliness of our environment, but it also poses threats to wildlife, ecosystems, and human health. Commonly littered materials like plastics can take hundreds of years to decompose, leading to long-lasting environmental consequences.

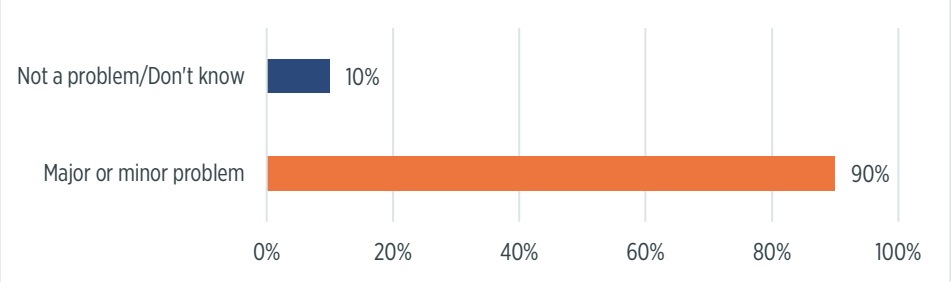


Figure 4: Percentage of US residents that consider litter a problem in their state[iii]

Litter also imposes a significant financial burden on governments and communities. Across Europe, cleaning up ground litter is estimated to cost up to €13 billion[iv] (USD$15.8 billion) annually, while in the UK, local authorities spend an estimated £660 million (€776 million) each year managing litter.[v] In the US, the country's largest litter study found that litter cleanup costs the US approximately USD$11.5 billion (€10 billion) each year.[vi] In Canada, a recent study[vii] revealed that municipalities in Ontario, the country's most populous province, spend about CAD$36 million (€23.1 million, USD$25.8 million) per year managing ground litter, with beverage containers alone accounting for around $3 million, or 8% of total costs.

Beverage containers: A major contributor to litter

Despite the well-documented environmental, social, and economic harms caused by litter, critics of deposit return systems (DRS) often argue that beverage containers make up only a small share of the overall litter stream, casting doubt on the need for a separate collection system. However, both global and regional data consistently tell a different story. The Ocean Conservancy's *2024 International Coastal Cleanup (ICC) Report*[viii] found that plastic beverage bottles were the second most collected item worldwide, with more than 1.3 million units recovered—second only to cigarette butts. In many regions, including the Caribbean, Latin America, Africa, Central and South Asia, and East and Southeast Asia, plastic beverage bottles ranked as the #1 item collected. Beverage cans also featured in the top five in several regions, including Oceania and Africa.

Additional studies reinforce the central role beverage containers play in litter:

- **Canada:** Ocean Wise's 2024 *Shoreline Cleanup Impact Report* lists beverage cans, plastic bottles, and bottle caps among the 12 most frequently found litter items on Canadian shorelines.[ix]
- **US:** Keep America Beautiful (KAB)'s *2020 National Litter Study* listed beer containers, soda containers, and other beverage packaging among the top 20 most frequently littered items nationwide, In total, the study estimates nearly 2.8 billion pieces of beverage container litter were near US roadways and waterways, accounting for approximately 5.6% of all litter in the US.[x]
- **Australia**: Beverage containers were the third most littered category nationwide in fiscal year 2023, making up 14.5% of all litter by count.[xi] In Tasmania, the last Australian state to introduce a DRS (in May 2025), beverage containers accounted for 8.3% of litter by count and 23.9% by volume in a 2023-24 survey.[xii] This was higher than comparable states, demonstrating the effectiveness of a DRS.
- **UK:** In 2024, the Marine Conservation Society found beverage container waste on 99% of surveyed Welsh beaches, with glass bottles present on 49%.[xiii]
- **Scotland:** By count, plastic bottles and drink cans were among the most frequently littered items in Scotland, both regionally and nationally, in 2024. Plastic bottles ranked first, while drink cans were the fourth most common item overall.[xiv] Nearly one-third of people (32%) believe plastic bottle litter has increased over the past year, while 29% feel the same about drink cans, and 19% think glass drinks containers have become more littered. [xv,]

- **Northern Ireland:** According to Keep Northern Ireland Beautiful, beverage containers accounted for just over 20% of all litter, by count, in fiscal year 2022-23.[xvi]
- **Cambodia:** A comprehensive assessment of 243 coastal, river, and inland sites across Cambodia found that single-use plastic water bottles were the most common whole plastic item recorded, particularly abundant along coastal sites, where they made up 68% of the items found in 2023. Water bottles were also the most common fragmented plastic item across all site types.[xvii]

These findings, along with those compiled in Appendix A, underscores a crucial reality: beverage containers are a persistent and significant contributor to global litter. Tackling this issue demands solutions that are both proven and scalable, and deposit return systems (DRS) stand out as one of the most effective tools. Historically, the adoption of DRS has been driven by the urgent need to combat litter. The very first system, established in British Columbia, Canada in 1970[xviii] under "The Litter Act," was a direct response to the growing problem of discarded beverage containers. This initiative was followed by similar measures in South Australia, Oregon, Vermont, and California, with the latter's legislation aptly titled the "Beverage Container Recycling and Litter Reduction Act."

Fast forward to today, and litter reduction continues to be a primary motivator for DRS adoption. In the UK, for example, DEFRA's Impact Assessment of the proposed system emphasises that the core aim of the policy is to "reduce littering of in-scope containers."[xix] This enduring focus on litter highlights the central role that DRS plays not just as a recycling mechanism but as a critical tool in curbing the environmental and social costs of littering worldwide.

Spotlight on New Zealand: A DRS under debate

New Zealand is currently considering the introduction of a DRS for drink containers. According to a 2022 Cabinet paper, just 45% of drink containers were recovered for recycling by weight in 2020/21, leaving many to end up in landfills or as litter. Keep New Zealand Beautiful's *2019 National Litter Audit* found that drink containers made up more than a quarter (26%) of total litter, by volume, in 2019. Beverage cans alone make up 10.8% of all litter, followed by plastic bottles (8.3%) and glass bottles (5.7%).

Projections from Reloop's *What We Waste Dashboard* indicate that if current collection for recycling rates persist, 4.5 billion glass, metal, and PET beverage containers will be landfilled or littered between 2025 and 2029. A well-designed DRS could raise the country's recycling rate from 54% to over 85% and cut litter by at least half.

Deposit return systems are a proven solution for litter, and people agree

According to a 2022 report by the Organisation for Economic Co-operation and Development (OECD),[xx] littering strongly depends on consumer behaviour, an externality that individuals have limited control over. This makes it difficult to address litter through Extended Producer Responsibility (EPR) fee structures such as Advance Disposal Fees (ADFs) or product take-back programmes managed by Producer Responsibility Organisations (PROs).
Unlike these approaches, **deposit return systems provide a direct financial incentive to prevent littering**, both by encouraging people to recycle (since people want to reclaim their deposits) and by making littered containers valuable for collection. A producer-financed DRS is thus an effective way to integrate littering externalities into EPR. [xxi] The effectiveness of DRS in reducing litter has been recognised by policymakers. The European Union's recently adopted Packaging and Packaging Waste Regulation (PPWR) states that:

"well-functioning deposit and return systems ensure a very high collection rate and high-quality recycling, especially of beverage bottles and cans" and "reduce beverage containers litter."[xxii]

The public also recognises the effectiveness of DRS, viewing it as a proven solution for keeping beverage containers off streets and out of the environment. Surveys consistently show that litter reduction is one of the top reasons people support DRS, whether for introducing new systems or expanding existing ones:

- **Alberta, Canada:** A 2024 survey found that litter reduction is the most important reason Albertans recycle beverage containers, with 71% of respondents calling it a "very important" reason motivator.[xxiii] (is 'reason motivator' the correct term?)
- **Massachusetts, US:** 82% of respondents to a 2024 survey support expanding the state's DRS and doubling the deposit value from USD$0.05 to USD$0.10. A key factor is the overwhelming (95%) belief that reducing litter and waste is essential for quality of life.[xxiv]
- **Vermont, US:** A 2021 survey identified "reducing litter" as one of the top two reasons residents support the state's DRS, alongside increasing recycling and protecting the environment.[xxv]
- **Latvia:** A 2023 survey found that 52% of respondents saw "less waste in the environment" as a key reason for using the deposit system.[xxvi]
- **Portugal:** A 2021 survey of consumer attitudes towards a proposed DRS found that a leading motivation for returning containers would be its ability to reduce waste in oceans and on land (86.7%), decrease beach litter (86.5%), and make cities cleaner (85%).[xxvii]
- **UK:** Sixty per cent of respondents to a 2023 survey identified "a reduction in littering" as one of the top benefits of implementing a DRS, and 40% said they would be likely to pick up litter to claim the deposit.[xxviii]

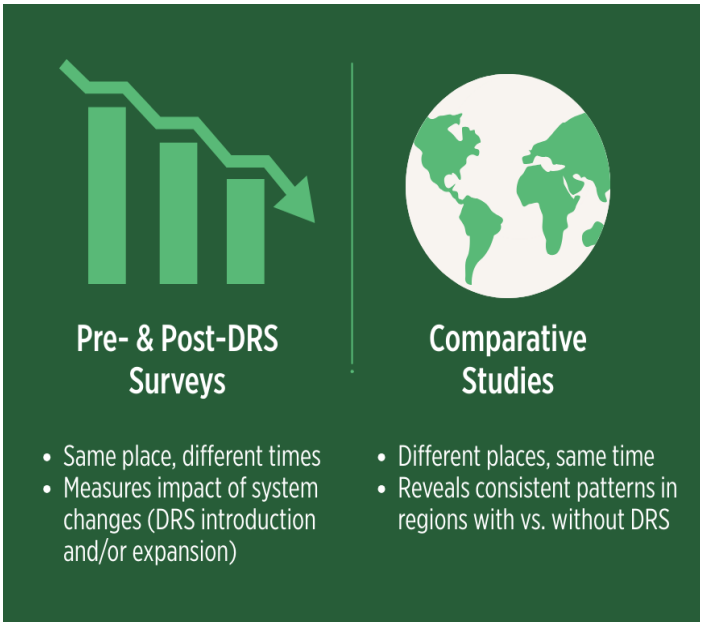
The impact of DRS on litter: Key evidence

As policymakers and communities seek proven strategies to tackle litter, a growing body of research is helping to clarify how deposit systems influence litter outcomes. To assess the impact of DRS on litter reduction, we can examine two main types of evidence:

- **Pre- and post- implementation litter surveys**, which compare litter levels in a single jurisdiction before and after a DRS is introduced or expanded (i.e., deposit increased, additional container types included). These studies provide direct, real-world evidence of the system's effect and help attribute observed changes in beverage container litter to the DRS.
- **Comparative studies,** which analyse litter data from jurisdictions with and without deposit systems. Although they don't track changes over time, these studies provide valuable insights by highlighting consistent differences in beverage container litter levels, with DRS jurisdictions typically showing lower rates.

Together, these studies provide complementary insights into the effectiveness of deposit return systems in reducing litter. While Reloop acknowledges that other factors can influence litter levels, the consistent findings across dozens of studies suggests a strong link between the presence of a DRS and lower beverage container litter.

The case studies that follow highlight this relationship across different geographies and policy contexts. Additional studies and supporting data are summarised in **Appendices B** and **C**.



Pre- and post-DRS implementation surveys

Case study #1: Slovakia

Slovakia launched its DRS in January 2022, introducing a flat-rate deposit of €0.15 (USD$0.16) on metal beverage cans and plastic PET bottles. Since then, the system has driven a dramatic reduction in beverage container litter (Figure 5).

In summer 2021, six months before implementation, metal cans made up roughly 10% of overall litter by count. By autumn 2022, that share had fallen to 4%, and by summer 2023, just 2%, a 78% reduction compared to pre-DRS levels. PET bottles followed a similar trend, declining from 11% in summer 2021 to 5% in autumn 2022, and 2% by summer 2023, a 72% reduction.[xxix,xxx]

By contrast, litter from glass drink packaging, which is not included in the DRS, declined modestly from 5.5% in summer 2021 to 5% in autumn 2022 (a 9% drop) before rising again in 2023.

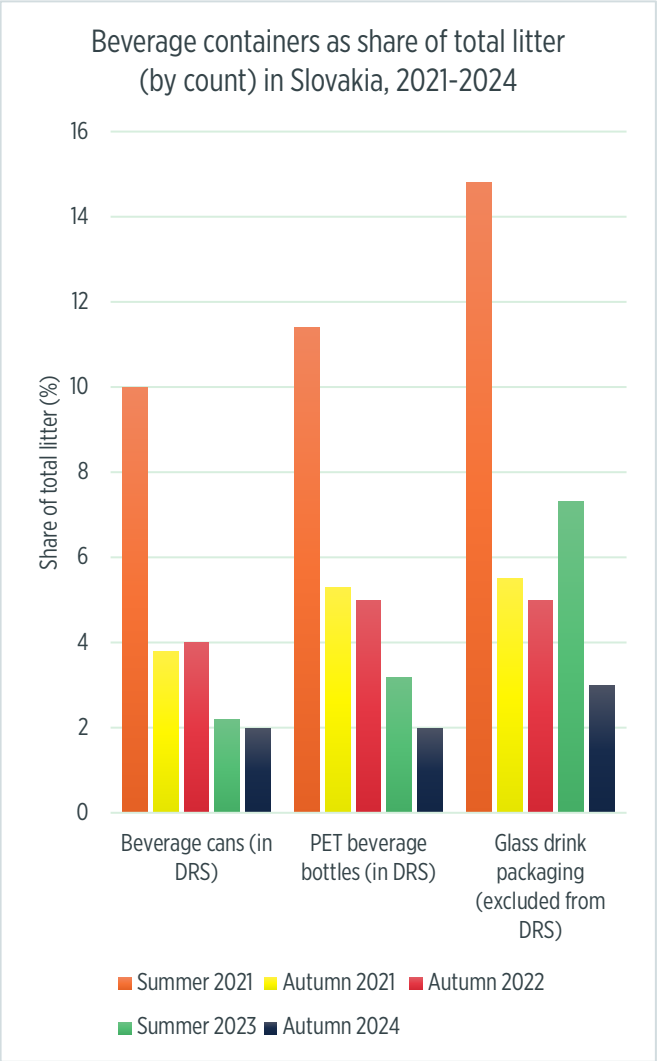


Figure 5: Beverage containers as share of litter in Slovakia, pre- and post-DRS, by material type (2021-2024) [1,1]

Case study #2: Latvia

Latvia launched its deposit return system (DRS) in February 2022, applying a flat-rate deposit of €0.10 (USD$0.11) to plastic, metal, and glass beverage containers. Since then, monitored coastal sites have seen significant reductions in beverage container litter. A 2024 study[xxxi] assessed litter levels along the Latvian coastline during the post-season autumn period (weeks 3–4 in October and week 1 in November), comparing data from 2021

(pre-DRS) to 2022 and 2023 (post-DRS). Within 8–9 months of implementation, litter from deposit containers in selected public coastal areas dropped by 43%. This downward trend continued in 2023, with a further 22% reduction compared to 2022, resulting in a total decrease of 56% compared to pre-DRS levels in 2021 (Figure 6). By material, litter from plastic bottles declined by an average of 69% between 2021 and 2023. Aluminium cans dropped by 52%, while glass bottles saw a decline of 48%.

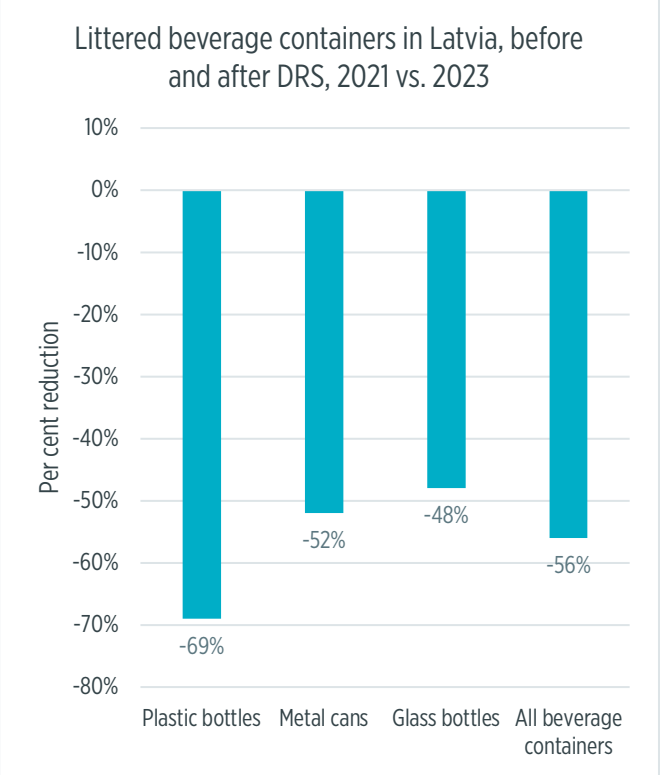


Figure 6: Reduction in beverage container litter in Latvia, pre- and post-DRS (2021 vs. 2023)

Case study #3: The Netherlands

The Netherlands expanded its DRS to include small plastic bottles (<1L) in July 2021 and beverage cans in April 2023, setting a deposit of €0.15 (USD$0.16) for both. The impact on litter was both immediate and substantial. Before deposits were introduced on small plastic bottles, an average of 9.4 bottles per kilometre were found in litter (second half of 2020).[xxxii] By the end of 2021, just six months after small plastic bottles were added to the system, this had fallen to 4.4 bottles per kilometre, a 53% decrease. By the end of 2024, the number had dropped even further to 2.7 bottles per kilometre, marking a 71% reduction compared to pre-DRS levels (Figure 7). Of the plastic bottles still appearing in litter in 2024, 54% were bottles that are exempt from the system, including those for juice, dairy, and alcoholic beverages.

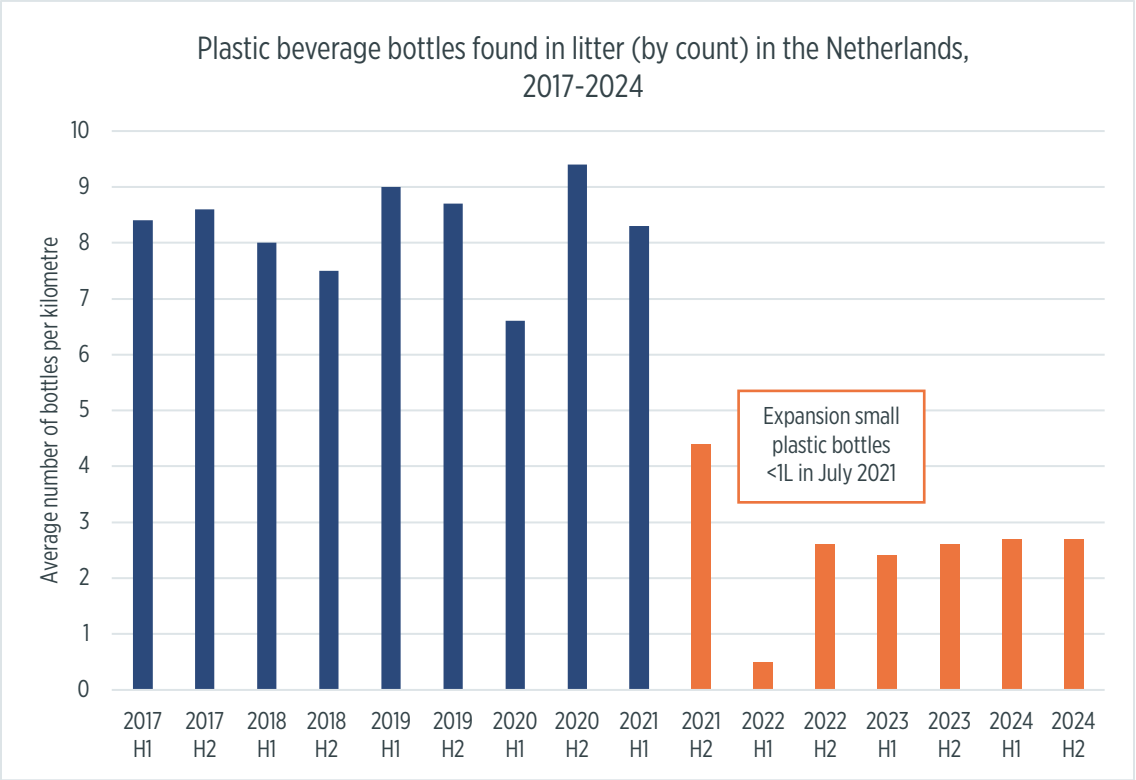


Figure 7: Plastic bottles found in litter (units/km) in the Netherlands, 2017-2024[1]

A similar pattern emerged for beverage cans (Figure 8). Before the deposit was introduced, an average of 23.2 cans per kilometre were recorded in litter between 2017 and 2022. In 2022, the final year before the system expanded, this figure stood at 25.3 cans per kilometre. After cans were added to the DRS, can litter dropped sharply to an average of just 4.9 cans per kilometre in 2024, an 80% reduction compared to 2022.[xxxiii]

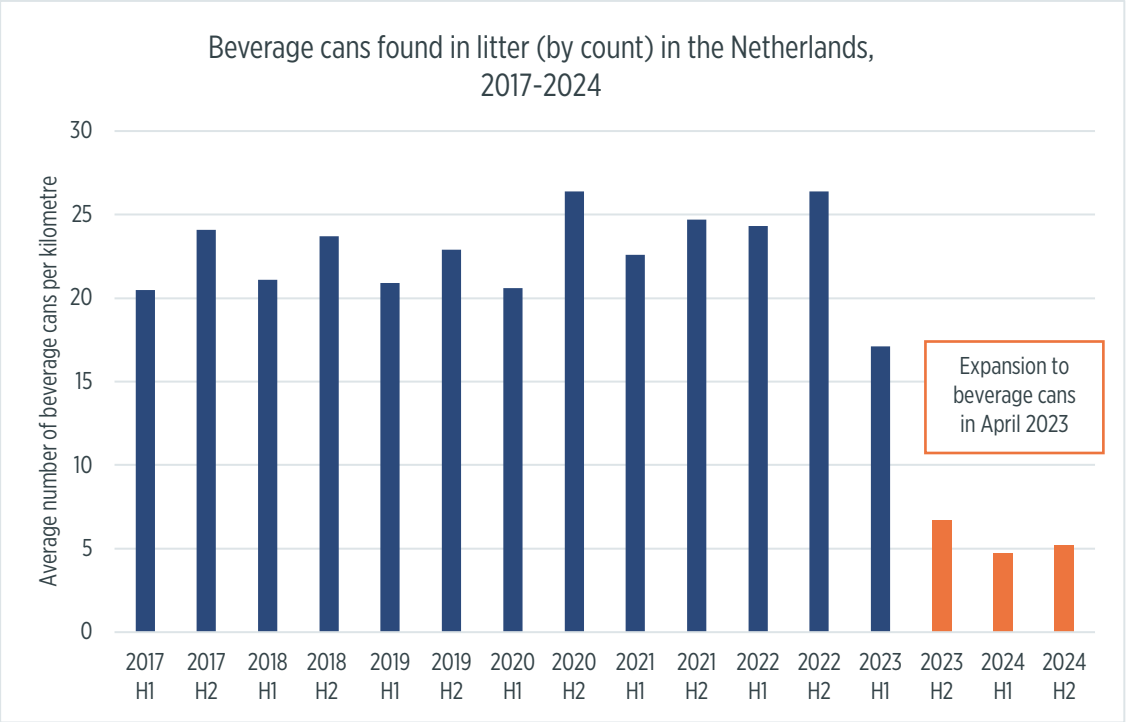


Figure 8: Beverage cans found in litter (units/km) in the Netherlands, 2017-2024[xxxiv]

The table below compares the number of beverage containers found in litter per kilometre in 2020, the last full year before the DRS was expanded, and in 2024. It includes all beverage packaging types, both covered and not covered by the deposit system, enabling a clear side-by-side comparison. The results show a sharp decline in littered plastic bottles (68%) and cans (80%) following inclusion in the DRS, while littering of non-deposit containers like glass bottles, drink cartons, and pouches actually increased by 3%, 22% and 66%, respectively. Overall, litter from non-DRS beverage containers rose by 20%, while litter from deposit containers fell by 79%.

Table 1: Changes in beverage container litter before and after DRS expansion, 2020 vs. 2024[xxxv]

Beverage container type	Included in DRS?	Containers found per kilometre (2020)	Containers found per kilometre (2024)	Per cent reduction
Metal cans	Yes	24.31	4.95	-80%
Plastic bottles	Yes	8.34	2.71	-68%
Glass bottles	No	1.34	1.38	+3%
Cartons	No	1.54	1.88	+22%
Pouches	No	1.14	1.90	+66%
Total		36.66	12.82	-65%
Total deposit containers	Yes	31.45	6.57	-79%
Total non-deposit containers	No	5.21	6.25	+20%

Case study #4: Estonia

Estonia launched its DRS in 2005, covering plastic, metal, and glass beverage containers with a deposit of €0.10 (USD$0.11). Before implementation, beverage containers comprised up to 80% of roadside litter. However, a survey conducted in 2007, just two years after the system was introduced, found that this share had dropped below 10%.[xxxvi]

Case study #5: Republic of Ireland

The Republic of Ireland introduced its DRS in February 2024, applying to plastic and metal beverage containers with a variable-rate deposit of €0.15 (USD$0.16) to €0.25 (USD$0.27) depending on volume. Two separate surveys highlight the system's early impact. A national litter survey conducted in June 2024 found a 30% reduction in drinks can litter and a 20% drop in plastic bottle litter.[xxxvii] Additionally, Coastwatch Ireland's annual marine litter survey recorded the lowest bottle and can counts in 25 years, with bottles per kilometre declining from a peak of 100 in 2010 to below eight in 2024.[xxxviii]

Case study #6: Hawaii, US

Established in January 2005, Hawaii's DRS covers plastic, metal, and glass beverage containers with a deposit of USD$0.05 (€0.04). Litter clean-up data from 2004, before the system was implemented, showed that beverage containers made up 14.5% of total debris collected. By 2006, this share had dropped to 8.7% (a 40% reduction), and by 2007, it had fallen to 6.7% (a 54% reduction).[xxxix]

Case study #7: Oregon, US

Oregon's DRS, introduced in 1971, had an immediate and long-lasting impact on litter reduction. Before the deposit system came into effect in October 1971, beverage containers made up as much as 40% of litter (by count) found along Oregon's roads. Just two years after implementation, in 1973, beverage container litter had dropped to 10.8% (a 73% reduction), and by 1974, it was 7.7% (an 81% reduction compared to pre-DRS levels). By 1979, the proportion of beverage containers in roadside litter had shrunk to just 6%, representing an overall reduction of 85%.

Within two years, Oregon's DRS cut beverage container litter by nearly three-quarters.

The total litter reduction was also substantial. By the second year of the DRS, total litter had decreased by 39% by count and 47% by volume, demonstrating the system's effectiveness in curbing waste beyond just beverage containers.[xl]

Case study #8: New York, US

In 2009, New York expanded its DRS to include plastic water bottles. Prior to the expansion, plastic bottles accounted for 7.0%-8.4% of total litter between 2004 and 2008. Following the expansion, their share dropped to 6.9% in 2009 and 6.1% in 2010, continuing to decrease to 4.3% in 2015 (Figure 9). This represents a 41.1% reduction in the proportion of plastic bottles in litter from 2008 to 2015. These findings are based on Reloop's analysis of *ICC* data for New York from 2004-2015, with no data available for 2005, 2011, and 2012.

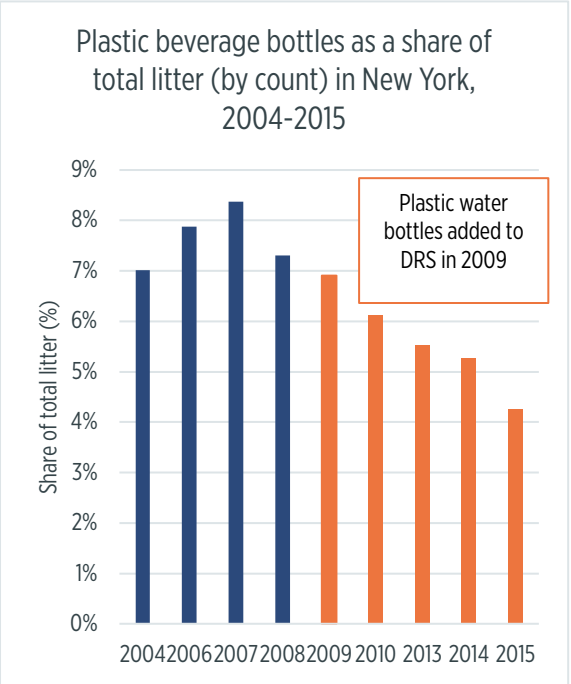


Figure 9: Plastic beverage bottles as a share of total litter (by count) in New York, 2004-2015

Case study #9: Northern Territory, Australia

The Northern Territory introduced its DRS in January 2012, offering a AUD$0.10 (€0.06, USD$0.06) refund on a wide range of beverage containers, including plastic, aluminium, glass, and liquid paperboard (LPB). The programme covers both carbonated and non-carbonated drinks, including water, soft drinks, beer, cider, flavoured milk, and some wine-based beverages, in containers up to 3 L.

Litter data from Keep Northern Territory Beautiful show a sharp decline in beverage container litter just months after the DRS was implemented (Figure 10).[xli] Comparing data from May 2011 (seven months pre-DRS) to May 2012 (five months post-DRS implementation), overall beverage container litter fell by 46%. Reductions were observed across all material types, including a 55% drop in plastic, 25% in glass, 17% in aluminium cans, and an 80% reduction in LPB containers.

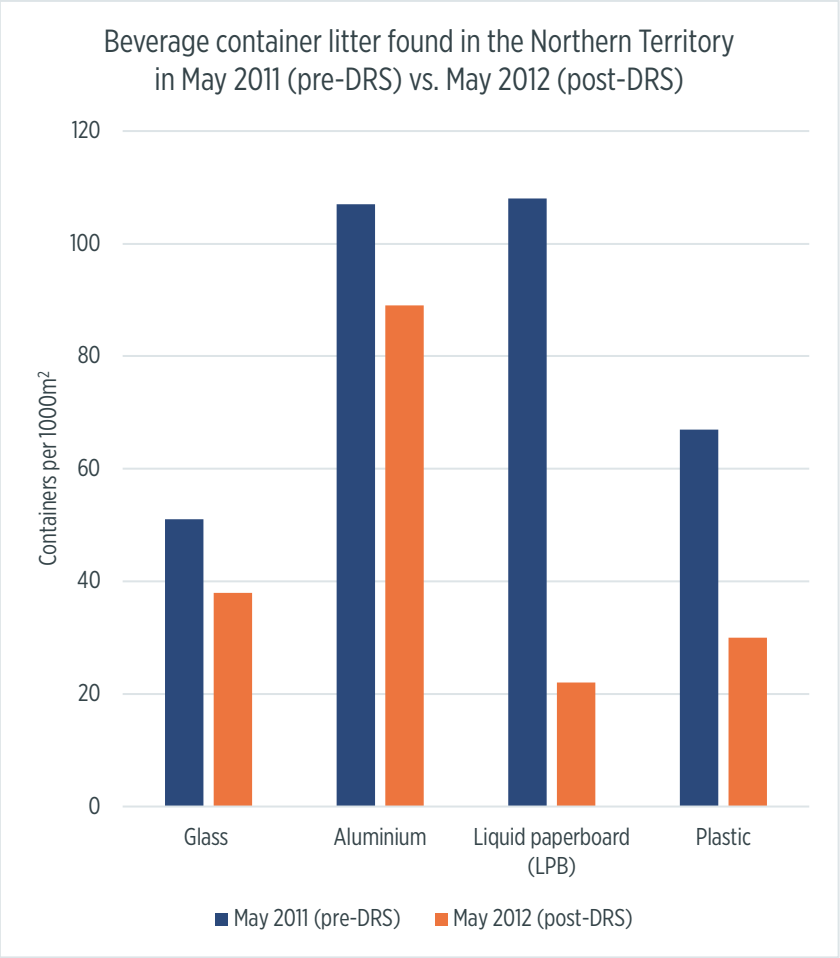


Figure 10: Deposit beverage containers found littered in the Northern Territory pre- and post-DRS implementation (May 2011 vs. May 2012) [xlii]

Case study #10: New South Wales, Australia

New South Wales (NSW) implemented its DRS in December 2017. The system offers a AUD$0.10 (€0.06, USD$0.06) refund for eligible beverage containers ranging from 150 mL to 3 L and includes a wide range of container materials—plastic (PET and HDPE), metal (aluminium and steel), glass, and liquid paperboard. It applies to sealed, ready-to-drink alcohol and non-alcohol beverages such as water, soft drinks, beer, juice, and flavoured milk.

Litter data from 2016 to 2020 demonstrates the effectiveness of the system.[xliii] Over this four-year period, deposit beverage containers saw a 52% reduction in litter volume, dropping from 2.9 L per 1,000 m^2 in 2016–17 (prior to implementation) to 1.4 L in 2019–20, 2.5 years after the system was launched. For comparison, non-deposit beverage containers saw a 39% decrease over the same period, from 0.36 L to 0.22 L per 1,000 m^2. Overall litter volume in the state also declined by 39%, falling from 6.6 L to 4.0 L per 1,000 m^2.

In just 2.5 years, NSW's DRS cut littered deposit containers nearly in half—down 47% by count and 52% by volume.

When measured by item count, littered deposit containers dropped by 47%, from 4.7 items per 1,000 m^2 in 2016 to 2.5 in 2020. The total number of litter items in NSW fell more modestly, by 6%, from 49 to 46 items per 1,000 m^2 over the same period.

Case study #11: Australian Capital Territory, Australia

The Australian Capital Territory (ACT) introduced its DRS in June 2018, offering a AUD$0.10 (€0.06, USD$0.06) refund for eligible beverage containers ranging in size from 150 mL to 3 L. The programme covers a broad spectrum of material types, including plastic (PET and HDPE), metal (aluminium and steel), glass, and liquid paperboard.

Data from the Keep Australia Beautiful National Litter Index (KAB NLI) shows a substantial decline in beverage container litter following the scheme's introduction (Figure 8). In the year prior to the DRS (2017–18), 1.8 DRS beverage containers were recorded per 1,000 m^2. By 2018–19, this had dropped to just 0.7 containers, a 61% reduction, demonstrating the immediate effectiveness of the programme in reducing litter.[xliv] By 2019–20, the figure had decreased even further to 0.6 containers, representing a total reduction of 67% compared to pre-DRS levels.

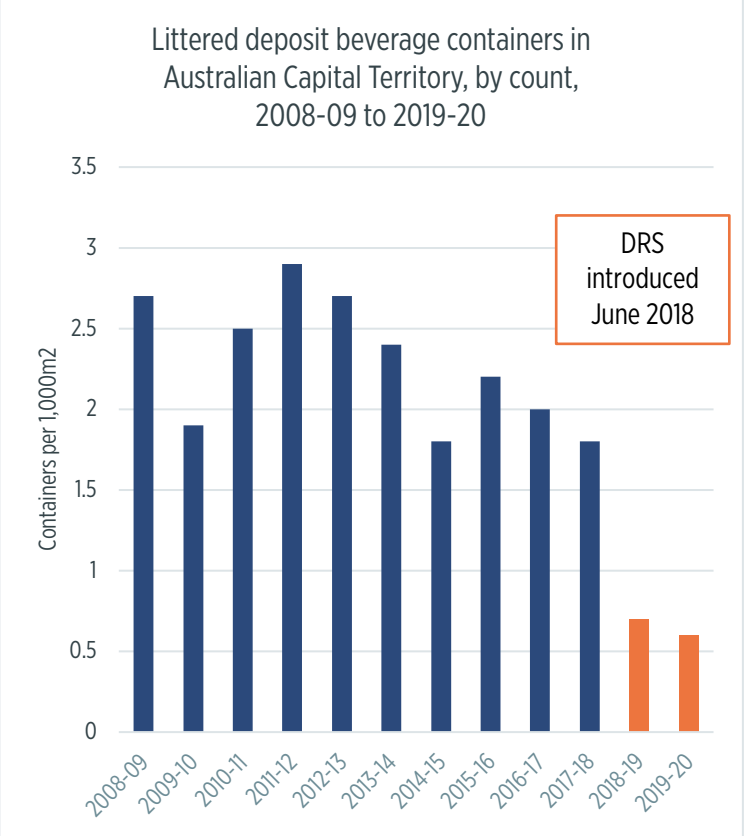


Figure 11: Deposit beverage containers found littered in Australian Capital Territory, by count, 2008-09 to 2019-2020[1]

Case study #12: Queensland, Australia

Queensland launched its DRS in November 2018, offering a AUD$0.10 (€0.06, USD$0.06) refund for each returned eligible beverage container. Litter data from the KAB NLI[xlv] shows a marked decline in beverage container litter following the scheme's introduction (Figure 12). Between the 2017–18 and 2018–19 litter monitoring periods, the number of DRS beverage containers found in litter fell by 41%, from 3.4 items per 1,000 m^2 to just 2.0. This figure represented the lowest level of beverage container litter recorded in Queensland over the previous decade, highlighting the early impact of the scheme.

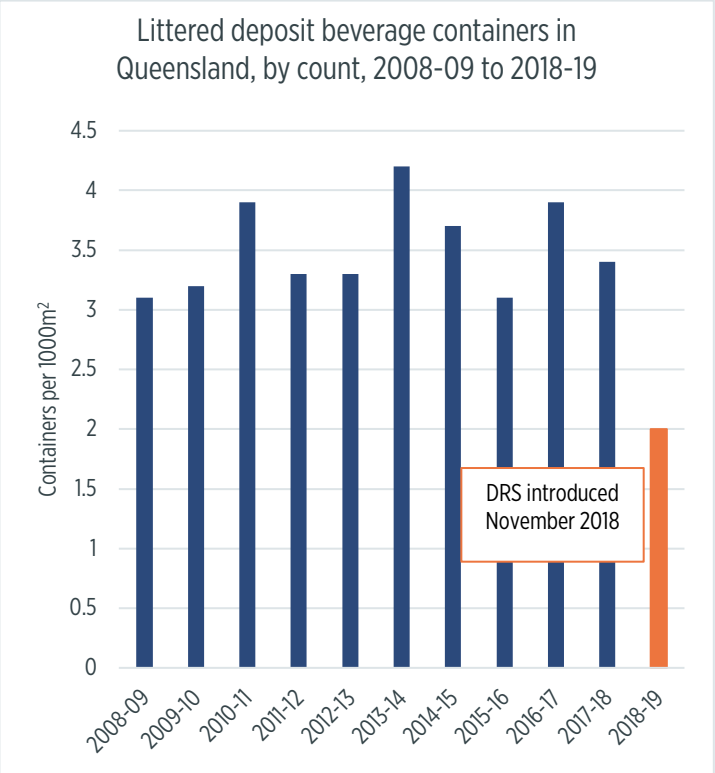


Figure 12: Deposit beverage containers found littered in Queensland, by count, 2008-09 to 2018-19[1]

Comparative studies between regions with and without DRS

Case study #13: Beverage container litter in coastal areas across the US and Australia

A large-scale comparative study[xlvi] drawing on data from over 26,000 debris surveys assessed the impact of deposit systems on the presence of beverage container litter in coastal areas across Australia and the US. For the US, the analysis was based on data collected through Ocean Conservancy's *ICC* programme between 2007 and 2015. For Australia, the data came from Keep Australia Beautiful's litter surveys over the same period.

At the time the study was conducted, not all Australian states had a DRS in place. As of May 2025, however, all Australian states and territories now operate a DRS.

In both the US and Australia, coastal areas in states with a DRS had around 40% less beverage container litter than those without.

In both countries, states with a DRS had a significantly lower proportion of beverage containers in coastal litter compared to states without such legislation. In the US, beverage containers accounted for 11.9% of all debris items in non-DRS states, compared to 7.4% in states with DRS (a 38% decrease). In Australia, the trend was similar: beverage containers accounted for 4.2% of coastal litter in non-DRS states, versus 2.5% in DRS states (a 40% decrease). Importantly, the reduction in beverage container litter was most pronounced in areas with low socio-economic status, where overall debris loads tend to be highest. This underscores the added value of DRS in helping to address litter in communities that are disproportionately affected by environmental pollution.

The study also found that DRS states had a significantly higher ratio of lids to bottles. This is a critical finding: under current deposit laws, beverage containers have monetary value when returned, but lids do not. If DRS is responsible for removing bottles from the environment, no similar effect would be expected for lids. The higher proportion of lids to bottles in DRS states supports the conclusion that fewer containers are ending up as litter because of the financial incentive to return them (not because fewer beverages are being consumed in those areas). However, this trend may change as more jurisdictions, particularly in the EU, implement tethered cap requirements under the Single-Use Plastics Directive (SUPD), which mandates that caps remain attached to bottles. As tethered caps become more common, the litter-reducing benefits of DRS will extend to caps as well, further strengthening the system's overall impact.

Case study #14: Beverage container litter in US states with and without DRS (ICC data)

A 2019 study[xlvii] by Clean Virginia Waterways of Longwood University used data from the Ocean Conservancy's *ICC* to compare beverage container litter in US states with DRS to those without.

The study found that in states with DRS, the share of plastic beverage bottles in total litter was 55% less than in states without a DRS (3.9% vs. 8.6%). Similar patterns were observed for other beverage containers: the share of aluminium cans in litter was 58% lower in DRS states (2.5% vs. 5.9%), and the share of glass bottles was 28% lower (2.3% vs. 3.2%). Overall, beverage containers (plastic and glass bottles, plus cans) accounted for 51% less litter in DRS states, making up just 8.7% of total litter compared to 17.7% in non-DRS states (Figure 13).

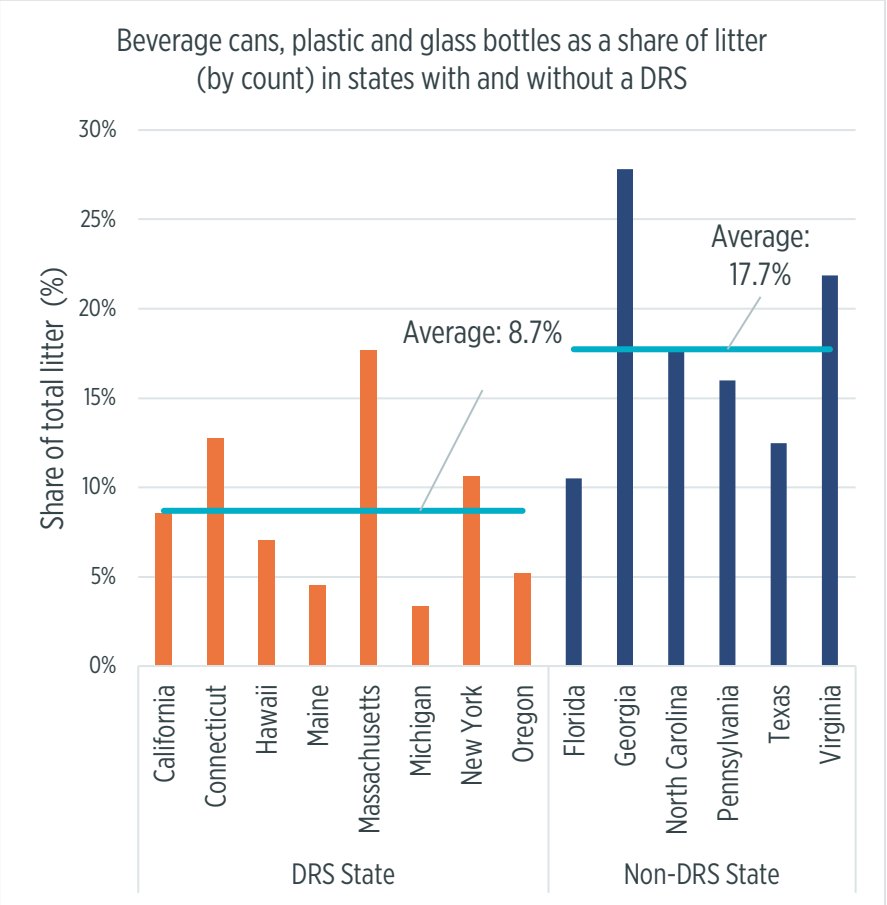


Figure 13: Litter from beverage cans, plastic and glass bottles in US states with and without DRS, by count, 2019

The study also examined the prominence of beverage containers among the most frequently littered items in each state. In non-DRS states, plastic bottles consistently ranked among the top three most littered items, while in DRS states, they averaged sixth place—and in Oregon, which has one of the highest deposit values of all US deposit programmes, they did not appear in the top ten at all. Beverage cans similarly ranked higher in non-DRS states (5th place on average) than in DRS states (10th place). Glass bottles ranked slightly lower in both contexts but were still more common in non-DRS states, where they averaged 9th place compared to 11th in DRS jurisdictions.

Building on this earlier work, Reloop conducted its own analysis using the same methodology and more recent data from the 2023 *ICC* cleanup.[xlviii] The updated analysis, based on 42 data points (including litter data from all 10 DRS states and 32 non-DRS states), reinforced the findings of the Virginia study: in DRS states, plastic bottles and beverage cans together accounted for an average of 5.2% of all littered items, compared to 10.2% in non-DRS states (nearly double the share) (Figure 14). When considered separately, plastic beverage bottles made up 3.0%, on average, of total litter in DRS states versus 5.3% in non-DRS states, while beverage cans represented 2.2% versus 4.9%, respectively.

Reloop's analysis also found that Oregon and Michigan, the only two states with a minimum deposit of USD$0.10 (€0.09) at the time, had the lowest beverage container litter rates, at just 2.8% and 2.3% of total litter, respectively (Figure 15). In contrast, DRS states with a minimum USD$0.05 (€0.04) deposit had higher beverage container litter rates on average, ranging from 2.9% to 11.5%. Although glass bottles were not included in this updated comparison due to data limitations, the findings further demonstrate the strong link between deposit systems, especially those with higher deposit values, and reduced beverage container litter.

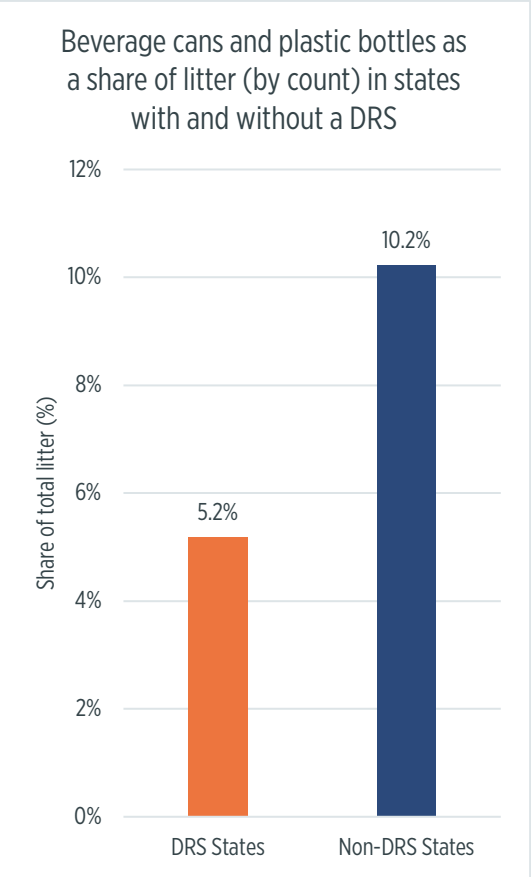


Figure 14: Beverage cans and plastic bottles as a share of total litter (by count) in US states with and without DRS, 2023

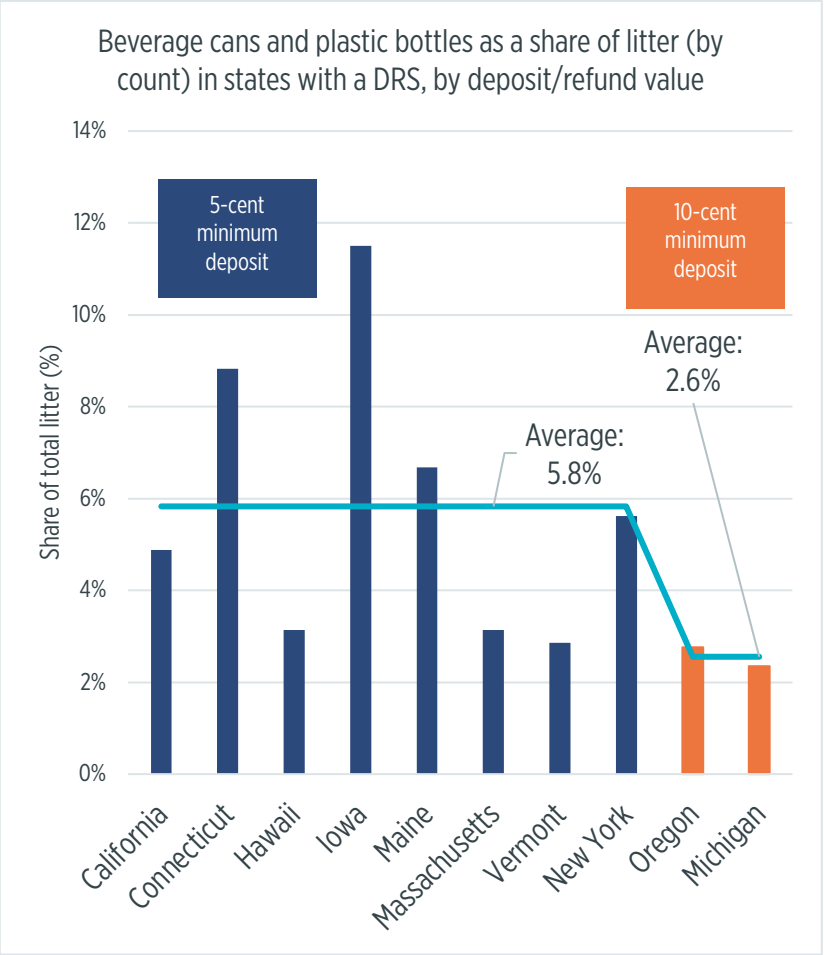


Figure 15: Beverage cans and plastic bottles as a share of total litter (by count) in US states with a DRS, by minimum deposit/refund value (USD$)

Case study #15: Beverage container litter in US states with and without DRS (KAB data)

By comparing US states with and without deposit return legislation, Keep America Beautiful (KAB)'s *2020 National Litter Study* revealed that beverage container litter is significantly lower in DRS states.

On a per capita basis, soda and beer container litter, which are among the most common deposit-eligible items, were littered more than twice as often in non-DRS states (averaging 5.3 items per person) than in DRS states (2.5 items). In other words, there was 53% less soda and beer container litter in states with a DRS. The disparity was even more pronounced in aggregate terms: non-DRS states accounted for 85% of all soda and beer container litter nationwide, with eight times more soda litter and five times more beer litter than DRS states.

This trend extended to all deposit-material litter, including water, sports drinks, and other deposit-eligible containers. On average, DRS states saw 4.1 deposit-container items littered per capita, compared to 8.5 in non-DRS states, meaning states with a DRS had over 50% less deposit-container litter (Figure 16).

Notably, the study also found that non-deposit litter (i.e., food wrappers, plastic straws, cigarette butts, PPE) was 30% lower in DRS states (112.2 items per capita) than in non-DRS states (157.8 items) (Figure 17). This suggests that DRS may have a broader litter-reduction effect, beyond just containers covered by deposits. As the authors explained, if the monetary incentive were the only factor at play, we would not expect to see lower rates of non-deposit litter—but the data showed otherwise.

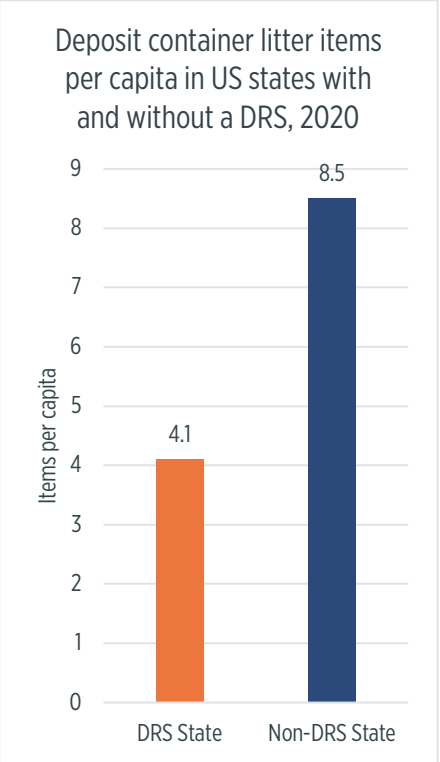


Figure 16: Deposit container material litter items per capita in US states with and without a DRS

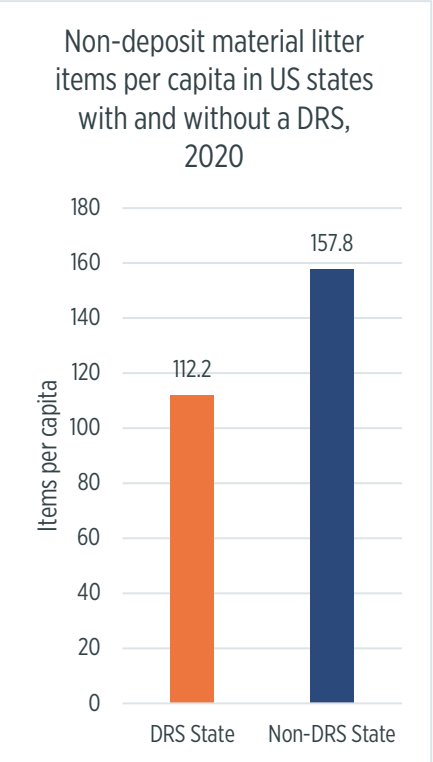


Figure 17: Non-deposit material litter items per capita in US states with and without a DRS

Case study #16: Beverage container litter in six Australian cities with and without DRS

A national field survey[xlix] conducted by Australia's science agency, CSIRO, assessed debris across inland, riverine, and coastal habitats within a 100-kilometre radius of six major metropolitan regions: Hobart (Tasmania), Newcastle (New South Wales), Perth (Western Australia), Port Augusta (South Australia), Sunshine Coast (Queensland), and Alice Springs (Northern Territory). Over 8,300 debris items were recorded across nearly 2,000 surveys.

One of the clearest findings from the study was the difference in beverage container litter between regions with and without deposit return systems. Hobart (at the time the only city surveyed without a DRS) had the highest occurrence of beverage containers, both whole and fragmented, among all six regions. In contrast, the cities located in states or territories with existing deposit systems consistently reported lower levels of beverage container litter.

Beverage container litter was highest in Hobart, the only surveyed city without a DRS.

Case study #17: Global comparison of beverage container litter in jurisdictions with and without DRS

To assess the impact of DRS on beverage container litter at a global scale, Reloop conducted an analysis of 2021 *ICC* litter data[l] across 114 jurisdictions (spanning more than 80 countries), including 18 with a DRS and 96 without.

While more recent *ICC* data exist for 2022 and 2023, the annual Clean Up reports for those years did not include figures for beverage cans or glass bottles, only plastic bottles. As a result, 2021 remains the most recent year for which complete data are available across all three major beverage container types.

The results reveal a stark difference: in jurisdictions with a DRS, beverage cans and bottles (glass and plastic) made up an average of 6.8% of total litter (by count), compared to 14.8% in jurisdictions without a DRS (a 54% lower share) (Figure 18). When broken down by material, litter from plastic beverage bottles was 63% lower, beverage cans 40% lower, and glass bottles 41% lower in jurisdictions with a DRS.

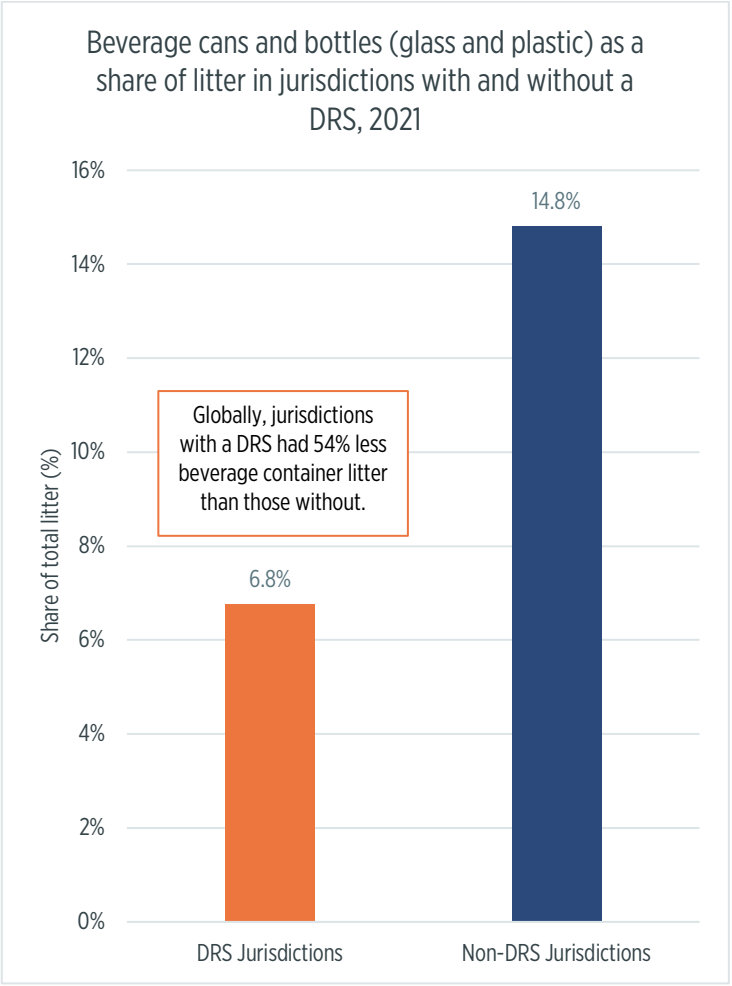


Figure 18: Beverage cans and bottles (glass and plastic) as share of litter in jurisdictions with and without DRS, global analysis, 2021

Case study #18: Beverage container litter in European countries with and without DRS

In addition to the global analysis, Reloop examined 2021 *ICC* litter data[li] across 20 European countries where sufficient data was available. This included five countries with a DRS and 15 without. Once again, the analysis showed a clear correlation between the presence of a DRS and reduced littering of beverage cans and bottles (glass and plastic). In European countries with a DRS, beverage containers accounted for an average of just 5.0% of total litter (by count), compared to 8.7% in countries without a DRS (an 43% lower share) (Figure 19).

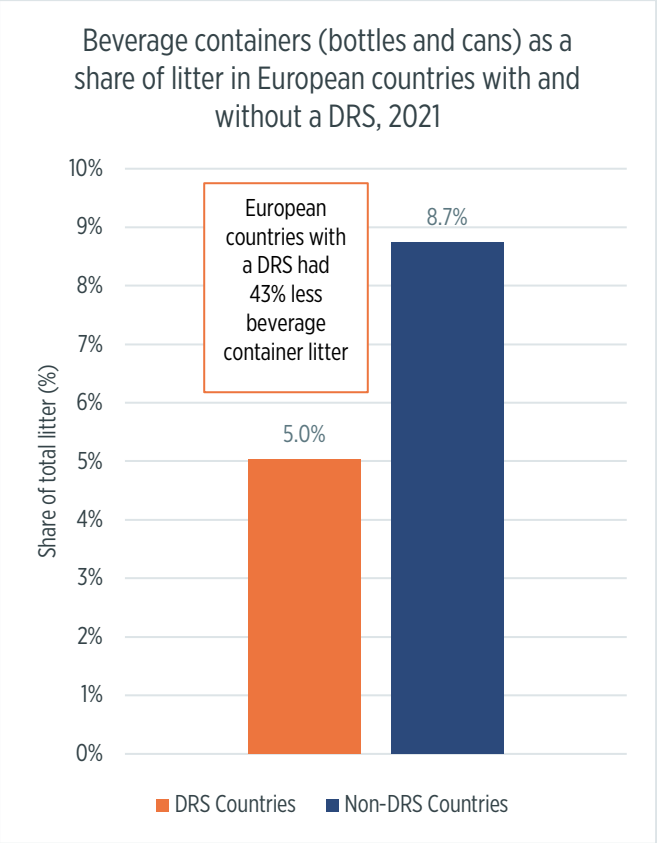


Figure 19: Beverage containers (bottles and cans) as share of litter in European countries with and without a DRS, 2021

To understand whether this trend has continued, Reloop also analysed data from the most recent *ICC* report (2024)[lii], which includes data collected in 2023. While a direct comparison with 2021 is not possible, since the 2024 report does not include data on beverage cans or glass bottles, we were able to assess litter levels for plastic beverage bottles. This follow-up analysis covered 18 European countries with sufficient 2023 data: seven with a DRS and 11 without.

The results again point to a strong link between deposit systems and reduced plastic bottle litter. In countries with a DRS, plastic bottles accounted for an average of just 0.5% of total litter (by count) in 2023, compared to 3.2% in countries without a DRS, an 86% lower share (Figure 20).

Apart from Latvia (10.3%), where the DRS is still relatively new, plastic bottles made up between 0.2% and 1.4% of litter in DRS countries. In contrast, non-DRS countries showed significantly higher levels, ranging from 1.4% to as high as 17%, with Türkiye and Poland among the most affected. Both countries are expected to introduce DRS by the end of 2025.

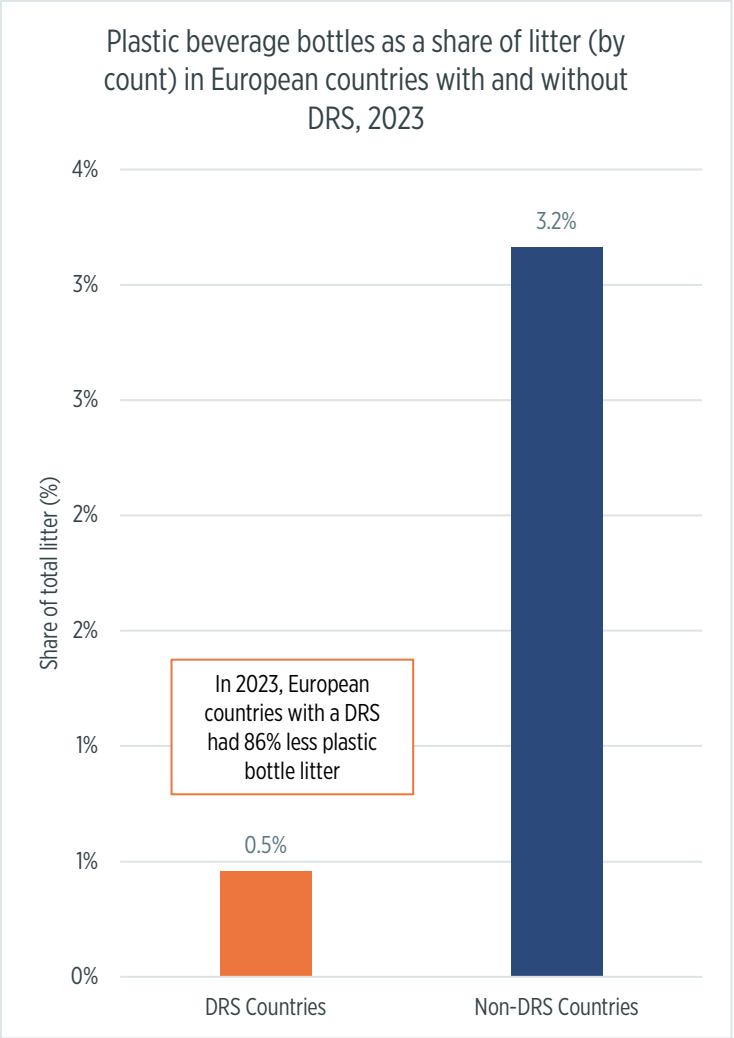


Figure 20: Plastic beverage bottles as share of litter (by count) in European countries with and without a DRS, 2023

How litter is measured and why it matters

Now that it's clear DRS can play a meaningful role in reducing litter, it's equally important to understand how litter is measured and why this matters. Currently, there is no universally accepted method for measuring beverage container litter, and the approach used can lead to substantial differences in the reported amounts of litter. These variations can result in very different interpretations of the problem, influencing both the perceived scale of the issue and the effectiveness of potential policy responses. In short, the choice of metric can dramatically alter how the issue is understood, and which solutions are considered.

Most litter studies use one of three methods to quantify beverage container litter or its share of overall litter:

- **Weight:** Measuring litter by weight offers a precise quantification method, particularly useful for assessing fragmented or broken items, which can be challenging to categorise visually. This approach captures the total mass of litter, providing insights into the environmental burden of littered materials. It allows for a better understanding of the scale of the issue, particularly in cases where lighter items may not accurately reflect the overall impact on ecosystems or cleanup efforts. With that said, measuring litter by weight means we do not know whether there was a small number of heavy items or many small/light items.
- **Volume:** This methodology focuses on the physical space that litter occupies, which is particularly valuable for evaluating its visual impact on the environment.
- **Item count:** This method involves tallying the number of individual litter items, which is often prioritised for consistency in tracking smaller items like cigarette butts or beverage containers. Counting items provides straightforward data that can be easily communicated and understood by stakeholders, such as local governments and community organisations. By tracking the frequency of specific items, researchers can identify trends and hotspots, ultimately guiding targeted litter prevention strategies. However, measuring litter by the number of items doesn't consider the weight or type of material, nor does it reflect the life cycle impact of the litter. Additionally, this method doesn't necessarily capture the impact on visual amenity, as a small number of large items may make a place appear far more heavily littered than a greater number of small items.

While survey protocols often recommend combining methods, item count remains the most widely used, primarily due to its simplicity. However, Reloop's view is that the choice of metric should reflect the specific issue being investigated. If the concern is rising waste collection costs, for example, volume offers a more relevant metric. Beverage containers, despite being less numerous, take up substantial space relative to their weight, leading to fuller bins, more frequent collections, and increased costs. Volume is also key when considering visual impact. Large or conspicuous food and drink packaging is often perceived as the most disruptive form of litter, regardless of how frequently it appears.

This disconnect between perception and count-based data is evident in studies from several countries, which show that while beverage containers may not dominate by number, they often have an outsized impact when measured by volume or weight:

- In **Australia**, 2019-20[liii] data showed that cigarette butts and their packaging made up 40% of all litter items by count (the largest share), while DRS-eligible beverage containers accounted for just 5%. Yet when measured by volume, beverage containers represented the largest share at 27%, far outweighing their numerical presence.

- In the **UK**, a national survey by Keep Britain Tidy and DEFRA[liv] found that cigarette butts made up 66% of all litter items yet were absent from the top 15 litter types by volume. In contrast, beverage containers dominated by volume: non-alcoholic small plastic bottles (under 750ml) made up 24% and beverage cans 25% (Figure 21), meaning together they represented nearly half (49.8%) of all litter by volume, despite accounting for just 3.6% by count.
- A survey of beach litter in **Sierra Leone** found that while plastic bottles were the most common item by count (25%), they were even more dominant by weight (36%).
- In **New Zealand,** the 2019 *National Litter Audit*[lv] found that beverage containers made up just 9% of total litter by count, but 26% by volume (Figure 22). This mismatch was most striking for plastic bottles, which accounted for only 2% of littered items yet made up 8% of total litter by volume.
- In **Belgium**, a study in Flanders[lvi] focusing on plastic packaging in land litter found that plastic beverage bottles made up 50.4% of littered plastic by mass, even though they were only the third most common item by count (10.1%). When beverage packaging was considered more broadly—including cups, caps, and pouches—it accounted for 58.1% of plastic litter by mass, but just 20.7% by item count. Notably, bottles alone made up nearly 87% of the beverage packaging mass (Figure 23).

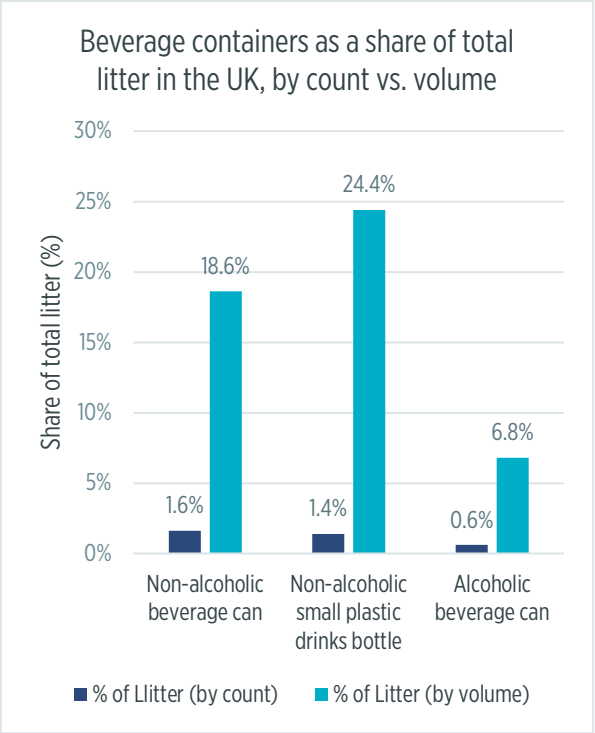


Figure 21: Beverage container litter in the UK, by count vs. volume

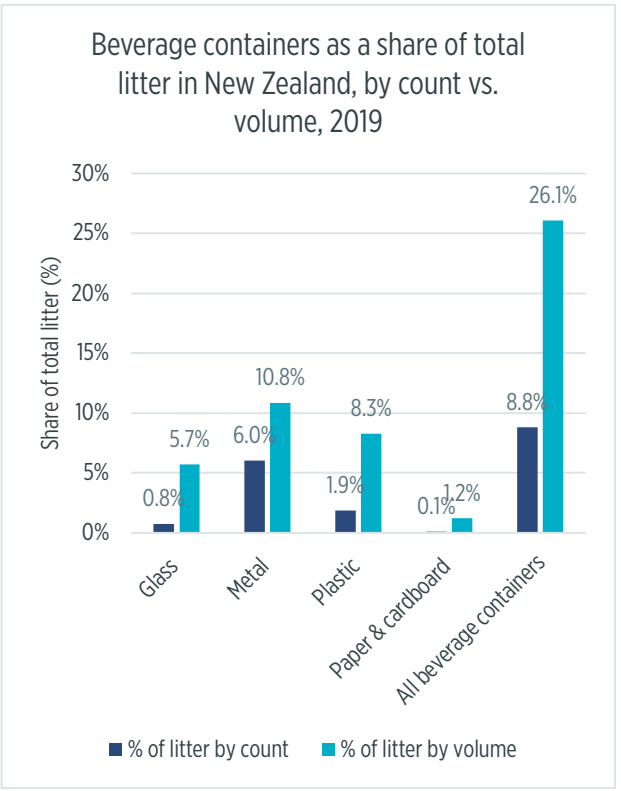


Figure 22: Beverage container litter in New Zealand, by count and volume, 2019

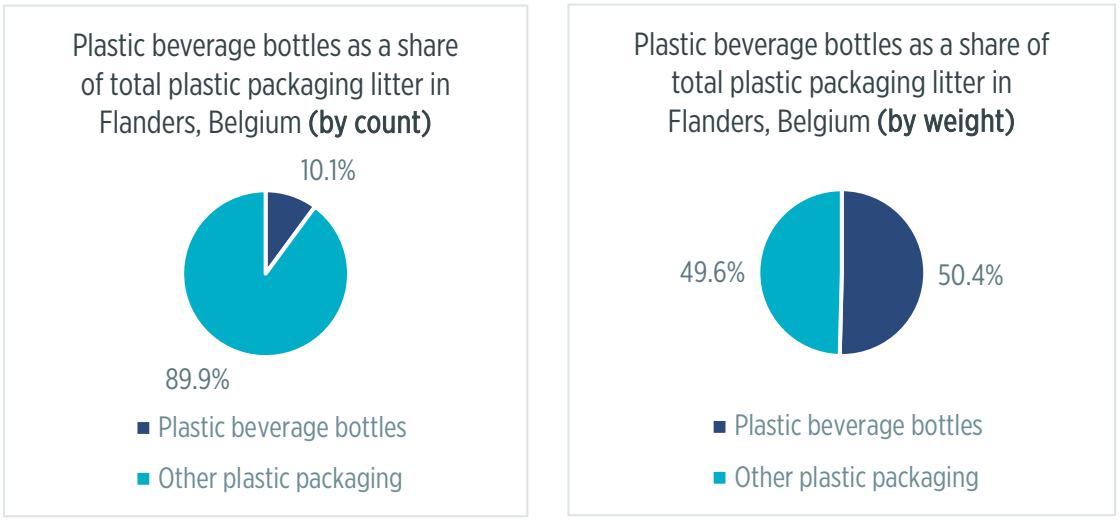


Figure 23: Plastic beverage bottles as a share of total plastic packaging litter in Flanders, Belgium, by count vs. by weight

A global example further illustrates the importance of how litter is measured. Reloop analysed *ICC* data for 2023, which is based solely on item count. The results showed that that cigarette butts were the most commonly littered item worldwide. However, when Reloop converted the top littered items to weight, plastic bottles emerged as the most littered item globally by mass.

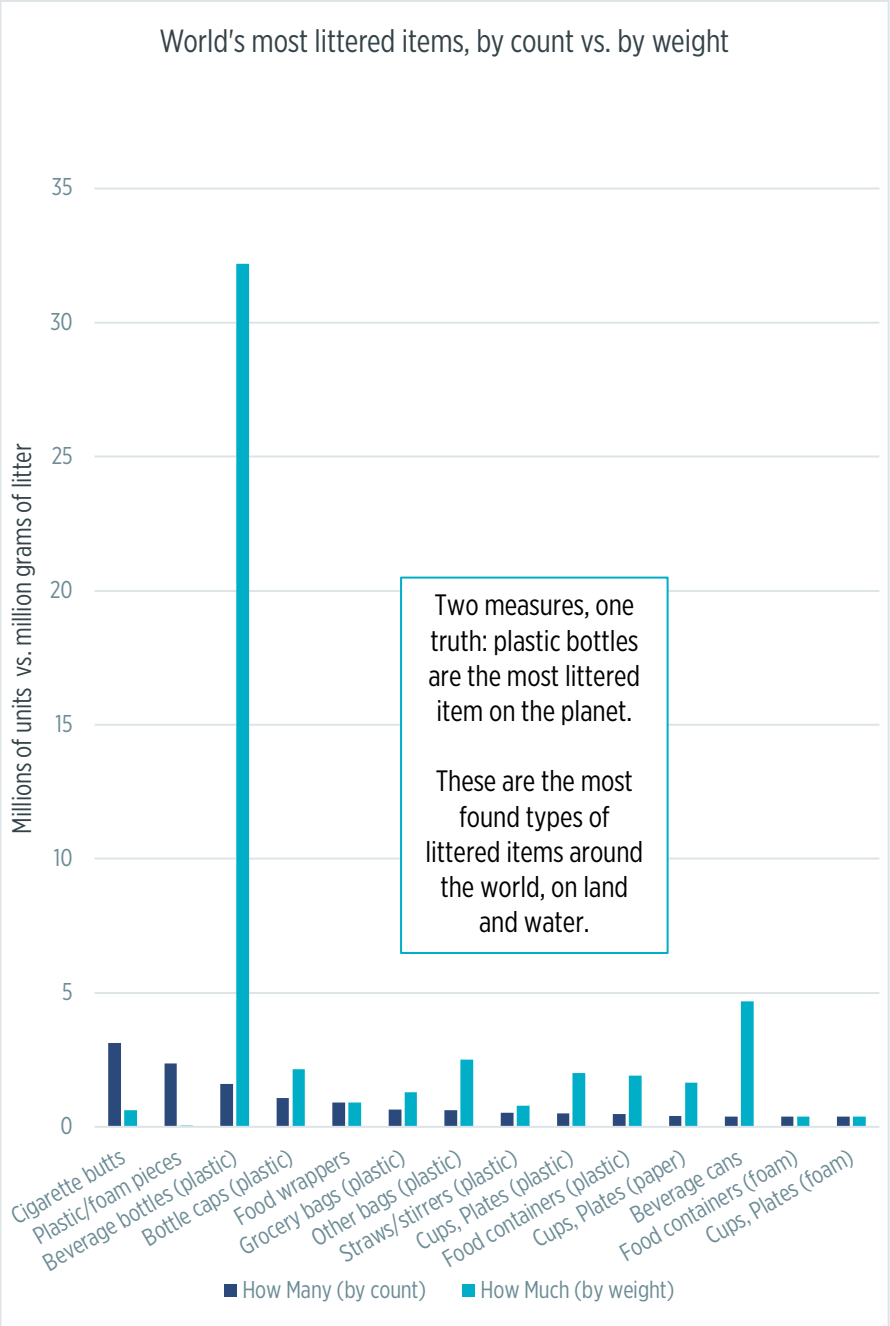


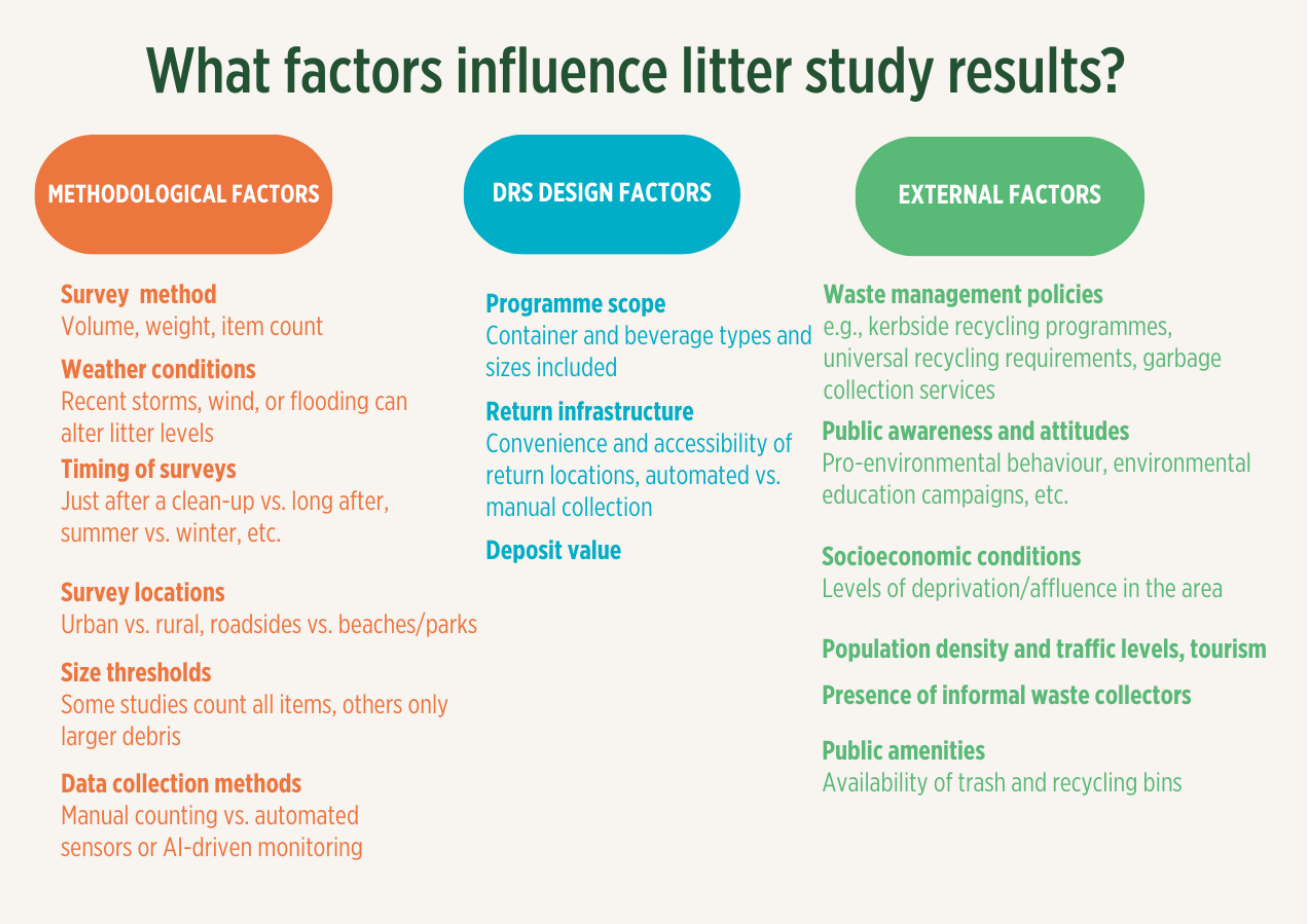
Figure 24: World's most littered items by count vs. weight, Reloop analysis of ICC 2023-2024 data

Together, these examples illustrate how the chosen measurement method can dramatically shape both our understanding of litter and the policy responses that follow. Relying on item counts alone can downplay the true impact of beverage containers, particularly in terms of visual blight, environmental impact, and cost to municipal systems.

But measurement is only one piece of the puzzle. Accurately interpreting litter data also requires consideration of system design features and external contextual factors that can influence outcomes. The next section explores these in more detail.

Interpreting litter data: Influencing factors

When analysing litter results, it's important to consider not only the specific metric used to measure litter, such as weight, count, or volume, but also other methodological factors. These include elements like the timing of surveys, survey locations, and litter size thresholds, all of which can impact the results. Beyond methodology, the design of the DRS itself, including factors like deposit value and programme scope, also plays a role. Additionally, external influences such as the existence (or not) of kerbside recycling programmes, enforcement of anti-littering laws, as well as the socioeconomic conditions of a region can further affect litter levels. Below, we explore each of these factors in more detail.



Methodological factors

- **Litter size threshold:** Even when studies use similar methodologies, the size threshold for counting litter can lead to significant differences in results. For example, some studies may include all litter items regardless of their size, while others may focus only on larger, more visible debris, such as items over a certain length (e.g., 4 inches). The choice of threshold can drastically alter the reported proportions of

different litter types. A study in the US[lvii], for instance, found that beverage containers comprised 2.7% of total litter when all items, regardless of size, were considered. However, when the analysis was restricted to items larger than 4 inches, essentially excluding smaller items like cigarette butts and tobacco products, beverage containers represented a much larger share, making up 14.5% of the total litter.

- **Timing of surveys:** The timing of data collection affects results. Surveys conducted just days after a cleanup effort will record less litter than those conducted weeks or months later. Also, some types of litter, such as chewing gum, tend to be harder to remove and so can accumulate more than other items despite frequent cleaning. This temporal disparity can skew results and hinder accurate assessments of litter dynamics in specific areas.
- **Survey locations:** Litter surveys conducted in different environments, such as roadsides, rivers, beaches, or parks, will capture different types and amounts of litter. For example, highways and retail areas may have higher litter levels, while recreational spaces tend to have less. The type of litter also varies by location: for instance, retail areas may see more cigarette butts, while highways may have more plastic items. [lviii] This variation in survey locations complicates cross-study comparisons and can affect the overall picture of littering in a region.
- **Local context**: Different geographical and contextual factors, such as population density, traffic density and local population behaviours, all influence litter accumulation. Urban areas with higher traffic densities typically generate more litter, but rural areas are more difficult to reach for cleaning and so litter may persist there for longer. Additionally, the presence of public amenities, such as trash bins and recycling infrastructure, also plays a role in littering behaviour.

System design factors

- **Deposit value:** The level of the deposit plays a key role in consumer behaviour. Higher deposit amounts provide a stronger financial incentive for consumers to return containers rather than discard them, which can reduce litter. In systems with lower deposit values, litter rates may be higher due to weaker incentives (see *Case Study #13*).
- **Programme scope:** The types of containers included in a DRS directly affect litter outcomes. For example, if a system only covers beer and soft drink bottles but excludes bottled water or juice containers, the excluded items may continue to be littered at higher rates.
- **System convenience:** The ease of returning containers is another crucial factor. If return points are widely available, such as in supermarkets or other high-traffic locations, people are more likely to hold onto their containers and return them. In systems with fewer or more inconvenient return locations, people may be more inclined to improperly dispose of their containers, especially when they are on the go.

External influences beyond the DRS

- **Waste management policies:** Whether a jurisdiction has universal recycling requirements, kerbside recycling programmes, kerbside garbage collection, and formal cleanup initiatives (e.g., Adopt-A-Highway programmes) can all affect overall litter levels. The presence of public amenities such as trash bins and recycling infrastructure also contributes to litter rates.
- **Public awareness and pro-environmental attitudes**: Education campaigns, enforcement efforts, and the percentage of residents holding pro-environmental attitudes influence consumer behaviour. Communities with higher levels of environmental awareness tend to engage more in proper waste disposal and recycling, which can lead to lower litter rates.
- **Socioeconomic conditions:** Research has shown that litter levels are often linked to deprivation. A 2025 report by Keep Britain Tidy[lix] found that litter is almost three times more prevalent in the most deprived areas compared to the least deprived. Moreover, litter-free spaces were seven times less likely to be found in these communities. Public perception aligns with these findings; 71% of people in the most deprived areas reported litter as a problem in their neighbourhood, compared to 56% in more affluent areas.

Final thoughts

Litter is far more than just an eyesore, it has far-reaching environmental, social, and economic consequences. From harming wildlife and polluting waterways to lowering property values and straining public budgets, the costs of unmanaged litter are significant and widespread. Beverage containers, in particular, make up a substantial portion of litter in many regions and contribute to these challenges.

Well-designed deposit return systems offer a practical, proven solution. By significantly reducing beverage container litter, and often cutting general litter levels as well, DRS helps address the issue at its source. What's more, the financial savings from reduced litter management costs can be reinvested into other community priorities, strengthening local economies and improving quality of life.

At the same time, litter data itself is emerging as a powerful tool for change. It's not only helping measure progress, it's driving accountability. Recent audits[lx] have highlighted the role of major brand owners in global plastic pollution. In one high-profile case, New York's Attorney General cited community-sourced litter data in a lawsuit against PepsiCo, arguing that the company's packaging was harming public health and the environment.[lxi] While the case was ultimately dismissed, it marks a turning point. Much like the tobacco industry was once sued for the health impacts of smoking, plastics litigation is gaining momentum, and packaging producers are increasingly in the crosshairs.

And it's not just legal liability on the rise; cost liability is growing too. In the EU, the Single-Use Plastics Directive (SUPD) and its associated Extended Producer Responsibility (EPR) schemes for some plastic products including beverage packaging, now require producers to cover the costs of litter cleanup, including collection, transport, and treatment. In this shifting landscape, deposit return systems are more than just a waste management tool, they're a strategic investment especially when you consider that producers will get access to high value bottles and cans for closed-loop recycling. As evidence mounts and regulatory pressure builds, one thing is clear: stopping litter at the source is no longer optional, it's essential.

Appendix A: Beverage containers in the litter stream

Below are key findings from studies conducted at different times across various regions, including Asia, Africa, Oceania, North America, the UK, and Europe, that quantified the proportion of beverage containers in total litter. These studies collectively challenge the argument that beverage containers are insignificant contributors to litter. By adopting deposit return systems, we can significantly reduce the presence of these containers in litter, improving human and environmental health while also lowering costs for taxpayers who fund litter cleanup efforts.

Table 2: Key findings from studies that quantified the proportion of beverage containers in total litter

Study area	Key findings
Latvia[lxii]	Beverage containers with identifiable deposit system labels make up a minority of the total litter for their respective waste fractions: 18% in 2022 and 25% in 2023. A significant share of beverage containers without deposit system labels remains, comprising 49% in 2022 and 44% in 2023. Notably, a high concentration of these containers is found at monitoring sites near the Latvian-Estonian and Latvian-Lithuanian borders.
Denmark[lxiii]	In 2024, cans and bottles included in the DRS account for just 0.35% of discarded waste.
Belgium[lxiv]	A study conducted in Flanders analysed the composition of plastic packaging in land litter. The research found that plastic beverage bottles constituted the largest fraction by mass, accounting for 50.4% of the plastic packaging found in litter. This makes beverage bottles the most significant target for reducing the mass of plastic litter. However, in terms of number of items, plastic bottles were the third-largest fraction, representing only 10.1%, behind food packaging films (37.9%) and non-food packaging films (26.2%). When looking at beverage packaging more broadly, it represented 58.1% by mass of the plastic packaging litter, although it accounted for only 20.7% by number of items. This difference is explained by the larger mass of plastic beverage bottles (which make up 86.8% of beverage packaging mass) compared to smaller and lighter items like cups, lids, loose bottle caps, and beverage pouches. Consequently, while plastic bottles accounted for a relatively smaller proportion by number, beverage packaging as a whole represented a significant portion of the plastic litter in terms of both mass and number of items.
France[lxv]	Between 2019 and 2020, a study was conducted to quantify macro litter along the Durance Riverbank and Lake Serre-Ponçon's beach in the Provence-Alpes-Côte d'Azur region of southeastern France. Using citizen science data collected across multiple sampling occasions (autumn, winter, and spring), a total of 25,423 litter items were recorded, of which 82% were plastics. Notably, single-use plastic items represented 8.13%

Study area	Key findings
	of the total litter and single-use beverage bottles were consistently among the top 10 litter items at each site. Single-use glass beverage bottles were also among the most abundant identifiable litter items.
France[lxvi]	A 2024 litter cleanup in France revealed that beverage packaging remains a major contributor to waste in the environment. Among the top 15 most frequently found litter items, beverage cans, plastic bottles, and glass bottles ranked 2nd, 3rd, and 4th respectively, just behind cigarette butts, which took the top spot.
France[lxvii]	A comprehensive 2024 analysis of 2,596 litter surveys across France (covering 4 million waste items) confirms the significant presence of beverage packaging in the environment. Excluding cigarette butts, the most commonly found litter items were glass bottles (2nd), plastic bottles (3rd), metal caps and pull tabs (4th), aluminium cans (5th), and plastic bottle caps (6th). Altogether, beverage-related packaging made up five of the top ten most frequently recorded waste types (by count).
Germany[lxviii]	Prior to the mandatory DRS, single-use beverage containers made up about 20% of total litter volume. After the DRS implementation, littering of beverage containers subject to deposits has become negligible.
Northern Ireland[lxix]	In 2019/20, drinks packaging made up approximately 28.4% (by count) of street litter. Among these, 37.3% was non-alcoholic beverage packaging. Rural roads are particularly affected, with 82% of transects containing at least one drink container (plastic bottles, cans, coffee cups).
Northern Ireland[lxx]	In 2022/23, drinks packaging made up 18.8% (by count) of litter found on Northern Ireland streets, beaches, and parks. Breakdown by container type: non-alcoholic cans (10.2%), non-alcoholic bottles (2.9%), alcohol bottles (1.2%), alcohol cans (2.4%), and coffee cups (2.1%).
Norway[lxxi]	In 2023, plastic beverage bottles made up 1.1% of total litter observed along Norwegian roads while metal beverage cans made up 2.4%. The study found that foreign beverage packaging without a deposit has a higher littering risk compared to beverage packaging with a Norwegian deposit. In areas with significant cross-border shopping, there is also a higher occurrence of beverage bottles and cans without a deposit. It was also identified that certain types of beverages are littered more, namely energy drinks and beer cans.
Slovakia[lxxii,lxxiii]	Before the DRS was introduced, metal beverage cans made up between 10% and 21% of litter by count (based on surveys from summer 2020 to summer 2021), while PET bottles accounted for 11% to 18%. By autumn 2024, both PET bottles and cans had dropped to just 2% of litter. In contrast, glass drink bottles, which are not included in the DRS, made up between 3% and 7% of litter, according to surveys conducted in summer 2023 and autumn 2024.
Wales[lxxiv]	By weight, plastic drinks containers made up 3.4% and 5.5% of total litter bin waste and litter pick waste, respectively. By count, plastic drinks containers made up 4.5% and 5.5% of total litter bin waste and litter pick waste, respectively.

Study area	Key findings
Republic of Ireland[lxxv]	In 2023, beverage-related litter in Ireland made up 7.9% of all litter by count, with cans accounting for 2.7%, bottles 2.0%, drink cartons 0.8%, and bottle caps 2.4%
UK[lxxvi]	Beverage containers accounted for 33.4% (by count) of all litter logged at different locations across the UK. When it came to litter associated with the beverage industry, metal cans were highest in abundance (33.6%) and then plastic bottles (29.7%).
UK[lxxvii]	In the UK, beverage containers accounted for a significant portion of total litter, comprising approximately 75% by volume. Among these, non-alcoholic small plastic bottles represented the largest category, making up 24.4% of all litter, followed by non-alcoholic cans at 18.6%. When combining both alcoholic and non-alcoholic categories, small plastic bottles (regardless of alcohol content) accounted for 24.5%, and cans (both alcoholic and non-alcoholic) totaled 25.4%. By count, beverage containers made up about 5% of total litter. Small plastic bottles (non-alcoholic) and non-alcoholic cans were the most frequently littered items, together accounting for 3% of the total litter. Additionally, alcoholic cans (0.6%) and fast-food drink containers (excluding coffee) (0.4%) also ranked among the top 15 most common littered items by count.
UK[lxxviii]	Discarded packaging from drinks, snacks and fast food were second only to smoking-related litter in prevalence in the latest survey data. Sweets and chocolate wrappers were found in more than half (52%) of surveyed sites, followed by drinks bottles and cans, which were present in almost a third of all locations (31%). Fast food-related litter was present in 22% of areas, and crisps and snack packets in 16%. However, when it comes to public perceptions, drinks-related litter is cited by more than nine in ten survey respondents (92%) as the most problematic type of litter. Drinks-related litter was found to be almost three times as prevalent in the most deprived areas compared with the least deprived locations.
New South Wales, Australia[lxxix]	In 2015/16, prior to the implementation of the state's DRS, beverage containers made up the largest proportion (43%) of total litter volume in New South Wales.
New South Wales, Australia[lxxx]	The NSW Key Littered Items Study for 2022-23 shows that deposit beverage containers accounted for 42.1% (by volume) of NSW litter. Non-deposit beverage containers make up an additional 5.2% (by volume) of litter.
Western Australia, Australia[lxxxi]	In 2018-19, beverage containers (classified as eligible for the DRS in SA, NT, NSW, QLD, and ACT) made up 14% of litter by count and 44.3% by volume.

Study area	Key findings
Western Australia, Australia[lxxxii]	Keep Australia Beautiful's 2022 litter survey found beverage containers (both DRS and non-eligible) accounted for 0.83% of litter items, down from 12.05% pre-scheme.
Perth Metropolitan Area, Western Australia, Australia[lxxxiii]	Total beverage containers (including DRS and non-DRS eligible containers) made up 0.94% of total litter items, by count. By volume, they made up 6.9%.
Perth Metropolitan Area, Western Australia, Australia[lxxxiv]	From June 2023 to June 2024, deposit-bearing beverage containers accounted for 0.82% by count of total litter by count, or 6.28% by volume. The majority of deposit-bearing beverage containers are littered in industrial areas (48.6%) followed by 'main road' areas (17.4%) and residential areas (14.3%).
Tasmania, Australia[lxxxv]	Of the 7,275 litter items identified across 24 sites, 601 were beverage containers, accounting for 8.3% by count and 23.9% by volume (297.06L out of 1,245L). Most beverage containers eligible for the yet-to-be-introduced DRS that were found in litter were found in main road sites, with this site type alone accounting for 79% of items counted. Soft drink, flavoured water, sports drinks, and energy drinks were the largest contributor to beverage container litter, accounting for 37.4%. Beer was the second highest, accounting for 28.3% of containers.
Australia (National)[lxxxvi]	In total, beverage containers accounted for 14.5% (by count) of total litter items collected and counted in Australia, ranking as the third most littered category of items. Single-use plastic beverage bottles made up 6.7% (by count) of total litter, while aluminium beverage cans made up 5.3% (by count). Take-away coffee cups represented an additional 2.7% of total litter (by count).
Australian states[lxxxvii]	In the 2018/19 comparison of beverage container litter across Australian states, South Australia, which has had its DRS in place since 1977, had the lowest proportion of DRS-covered litter items at 2.9%. Similarly, Queensland, which introduced its DRS in November 2018, recorded 4.0%, and the Northern Territory, with a DRS since 2012, had 4.9% of beverage container litter attributed to DRS items. In contrast, states without a DRS, such as Victoria and Western Australia, had significantly higher percentages, with Victoria at 6.1% and Western Australia at 14.7%. New South Wales, which launched its DRS in December 2017, showed a rate similar to Victoria at 6.6%. This is likely due to the fact that the data for 2018/19 was collected just one year after its system was implemented, giving it less time to achieve the lower litter rates seen in more established systems.

Study area	Key findings
New Zealand[lxxxviii]	Keep New Zealand Beautiful's 2022 National Litter Audit reveals that while beverage containers account for a modest share of total litter by count and volume, they make up a disproportionately large share by weight. Overall, beverage containers accounted for 26.9% of total litter by weight, with glass bottles contributing the largest portion (13.6%), followed by plastic bottles (7.7%), metal cans (5.7%), and paper and cardboard beverage containers (0.4%). In fact, glass beer bottles under 750ml were the single largest contributor to national litter by weight, representing 7.7% of all litter collected. By contrast, beverage containers made up only 9% of litter by count and the same share by volume. When broken down by count, metal cans accounted for 6.0%, plastic bottles 1.9%, glass containers 1.0%, and paper or cardboard beverage packaging just 0.1%. In terms of volume, metal cans made up 3.7%, plastic bottles 3.1%, glass bottles 2.0%, and paper/cardboard containers 0.4%. Looking at branded litter specifically, alcoholic and non-alcoholic beverage containers, including milk beverage containers and packaging, made up 47.5% (by count) of recognisable branded litter in 2022.
New Zealand[lxxxix]	The 2019 Keep New Zealand Beautiful National Litter Audit revealed that while beverage containers made up just 8.8% of litter by count, they accounted for a much larger share by weight (36.4%) and by volume (26.1%). Among the material types, glass beverage containers contributed disproportionately to the overall litter weight—comprising only 0.8% of litter by count but 26.1% by weight and 5.7% by volume. Metal cans made up 6.0% of litter by count, 5.7% by weight, and 10.8% by volume. Plastic beverage containers accounted for 1.9% by count, 4.4% by weight, and 8.3% by volume. Paper and cardboard beverage packaging made up the smallest share across all categories: 0.1% by count, 0.3% by weight, and 1.2% by volume. When looking specifically at branded litter, alcoholic beverage containers and packaging accounted for 49.6%, with non-alcoholic beverages contributing another 14.3%, and milk beverage packaging 2.1%—bringing the total share of branded litter linked to beverage products to 66%.
Prince Edward Island, Canada[xc]	In 2022, beverage containers accounted for 13.2% (by count) of roadside litter collected, a decrease from the 17% of the 2010 litter survey. By material type, cans represented 10.4% of roadside litter collected during the survey, while plastic bottles represented 2.6%. Glass bottles represented 0.6% of total roadside litter found (a massive drop from the 2010 result of 5.5%).
Nova Scotia, Canada[xci]	In 2021, beverage containers accounted for 8% (by count) of all large litter observed. The largest sub-categories were DRS metal alcohol cans (42%), DRS plastic non-alcohol bottles (23%), and DRS non-alcohol metal cans (14%). Glass bottles subject to the DRS accounted for 8% of beverage container litter.

Study area	Key findings
Ontario, Canada[xcii]	A 2024 study by Eunomia Research and Consulting found that beverage containers (including alcohol containers covered by the DRS) make up about 8% of ground litter by weight, and 20% of Blue Box (packaging and printed paper) materials. That translates to approximately 1,500 tonnes of beverage container litter annually.
Ontario, Canada[xciii]	Between May and October 2024, the Toronto Harbour Trash Trapping Programme successfully diverted over 642 kg of debris from Lake Ontario. The programme uses a variety of technologies, including WasteSharks, Seabins, LittaTraps, and manual skimming, to capture plastic pollution from the water. The waste collected is counted and characterised by University of Toronto researchers. Among the 53,886 large items removed, plastic beverage bottles were among the top 10 most frequently collected items.
New Brunswick, Canada[xciv]	Beverage containers represented 7% (by count) of all large litter observed in the 2022 roadside litter audit. The largest sub-categories were DRS metal alcohol cans (57%), DRS metal non-alcohol cans (20%), and DRS plastic non-alcohol bottles (16%). Cups also accounted for 7% of all large litter observed.
Newfoundland and Labrador, Canada[xcv]	By count, beverage packaging accounted for 4.6% of large litter, defined as litter greater than one square inch. The majority of littered beverage containers were aluminium (56%), followed by plastic bottles (31%), glass bottles (9%), and then Tetra Pak (4%).
City of Vancouver, British Columbia, Canada[xcvi]	Beverage containers accounted for 2% of all large litter observed (by count) in 2023. The largest tertiary categories evaluated for beverage containers were beer cans (20%) followed by soft drink cans (16%), soft drink plastic bottles (16%), and plastic water bottles (16%).
City of Toronto, Ontario, Canada[xcvii]	By count, beverage packaging accounted for 5.7% of large litter (equal to or greater than 4 square inches) found in 2022. A total of 9.2 kg of recyclable litter was collected from the 300 litter site locations across the city. PET beverage bottles was the largest material found, by weight, representing 27.9% of the total recyclable litter audited. Coloured glass alcohol beverage bottles made up 7.6% (by weight) of recyclable litter.
US[xcviii]	The study estimated nearly 2.8 billion pieces of beverage container litter were near US roadways and waterways, accounting for approximately 5.6% of all litter in the US. Four out of every 10 pieces of beverage container litter (41%) were beer cans and bottles. The next largest contributor to beverage container litter was single-serve wine and liquor (14%). In sum, there were nearly twice as many alcoholic litter beverage containers as there are non-alcoholic litter beverage containers on the ground in the US.
US[xcix]	Beverage containers comprised 2.7% of the total litter (regardless of size). Breaking down the beverage container category into its component parts shows that beer containers (31%) and soft drink containers (25%) were most frequently littered beverage container types. However, these results are likely understated because over 30% of the beverage containers observed in the study were unrecognizable due to damage sustained

Study area	Key findings
	before or after littering occurred. Aside from beer and soft drink containers, no other type of container contributed more than 6% (water 5.9%, wine and liquor 2.3%, sports and health drinks 3.1%, juice 1.4%, and tea 0.6%). If looking only at the results for 4"+ litter items, which effectively removes tobacco products, beverage containers represent a far larger contribution (14.5%) to total litter. This is quite significant as items over 4" are more likely to be visible to pedestrians and motorists. The majority of beverage containers 4"+ were soft drink (30%) and beer (31%) containers, followed by water (11%), sports and health drinks (6%), juice (3%), and tea (1%). Thirteen (13%) per cent were unrecognisable.
Washington, US[c]	Beverage containers, including glass, metal, plastic, and paper cartons, represent a significant portion of litter in Washington, particularly along roadways and on Department of Natural Resources (DNR) and Department of Fish and Wildlife lands. Annually, these containers account for approximately 2,313 metric tonnes of litter, making up 13% of the total litter accumulation in the state. Certain site types, such as off-ramps, have seen a substantial increase in beverage container litter. Current accumulation rates in these areas are seven times higher than in 2004, underscoring a growing litter problem. The breakdown of beverage container litter by material type is as follows: • Paper beverage containers: 0.02% of total litter by weight (0.00% by count) • Plastic beverage containers: 1.32% of total litter by weight (0.17% by count) • Glass beverage containers: 8.24% of total litter by weight (1.46% by count) • Metal beverage containers: 3.71% of total litter by weight (0.45% by count) Altogether, beverage containers account for 13.29% of litter by weight and 2.08% by count of the total pieces found across all sites in the study. The report notes that implementing a DRS could help reduce this growing issue.
Ohio, US[ci]	Beverage containers represented the largest category (18%) of all visible litter in 2019. Beer cans and bottles made up 6.2%.
Texas, US[cii]	In 2023, beverage containers made up 29% (by count) of large litter in Texas, with plastic water bottles accounting for 8% of the total. The study revealed a statistically significant correlation between the proximity of schools and increased littering, suggesting that either individuals are more likely to litter near schools, or that these areas may have less consistent litter cleanup. In contrast, sites near businesses showed a negative, statistically significant correlation, indicating fewer beverage containers were littered in those areas.

Study area	Key findings
Texas, US[ciii]	By count, beverage containers accounted for 12.47% of all litter recorded in 2019. Of this, plastic bottles made up 7.04%, beverage cans 3.65%, and glass bottles 1.78%.
Pennsylvania, US[civ]	Beverage containers represented 23.8% of litter over four inches in size and 2.8% of litter under four inches. About 93.9% of the bottles littered on Pennsylvania roadways were plastic (56.9%) or metal (37.1%), with only 6.1% glass. Plastic beverage containers comprised 25.8% of plastic litter over 4".
Pennsylvania, US[cv]	By count, beverage containers accounted for 15.99% of all litter recorded in 2019. Plastic bottles accounted for 7.64%, beverage cans 5.74%, and glass bottles 2.61%.
Louisiana, US[cvi]	Beverage containers were the second most prevalent type of aggregate litter (13.7%, by count) found on Louisiana roadways. Plastic water bottles represented the largest percentage of these containers (24.1%), followed by aluminium beer cans (23.6%) and metal soft drinks (11.9%). In terms of 'Visible Litter', the most commonly found category was beverage containers (34.3%), including beer, soda, sports, energy, water, wine and liquor, juice, and tea containers. The second highest Visible Litter category was drinking cups (14.1%), including cups for hot or cold drinks, lids, straws, and wrappers. Plastic bottles were the most common visible litter, found at 80% of all surveyed sites.
North Carolina, US[cvii]	By count, beverage containers accounted for 17.73% of all litter recorded in 2019. Plastic bottles accounted for 8.75%, beverage cans 6.05%, and glass bottles 2.93%.
New Jersey, US[cviii]	Overall, beverage containers represented the most littered category (25.5%, by count) along waterway sites, followed by cup-related items (e.g. paper and plastic cups, lids, pieces, straws and wrappers) (11.4%). Water bottles were the single most littered component, comprising 8.4% of all litter. Combined, recyclable water bottles and beer containers comprised 14.1% of all littered items. Sites adjacent to rivers had significantly more litter than all other sites.
New Jersey, US[cix]	A 2017 litter survey across 94 roadway sites in New Jersey found beverage containers ranked third in litter composition, making up 14.1% of the total items. Among them, plastic water bottles were the most common, comprising 3.8% of the litter.
Tennessee, US[cx]	In 2022, beverage containers accounted for approximately 20.6% (by count) of total litter items (including all sizes of litter, 4" minus and 4" plus), state-wide. The highest contributors included metal beer cans (6.0%), plastic water bottles (2.3%), metal soda cans (2.4%), and plastic juice/tea/sports drink bottles (1.7%). Other notable beverage containers were plastic soda bottles (1.4%), glass beer bottles (1.5%), and plastic wine/liquor bottles (0.8%). Juice and soft drink containers alone made up 16.3% of all litter found.

Study area	Key findings
Virginia, US[cxi]	By count, beverage containers accounted for 21.88% of all litter recorded in 2019. Plastic bottles made up 11.49%, beverage cans 6.66%, and glass bottles 3.73%.
California, US[cxii]	By count, beverage containers accounted for 8.54% of all litter recorded in 2019. Plastic bottles made up 3.65%, beverage cans 2.42%, and glass bottles 2.47%.
California, US[cxiii]	Together, beverage cans, plastic beverage bottles, and glass beverage bottles made up 8.3% of litter items removed from California's coastlines and inland waterways on Coastal Cleanup Day from 1989-2014. By material, beverage cans accounted for 2.46%, plastic beverage bottles accounted for 3.24%, and glass beverage bottles accounted for 3.24%.
Connecticut, US[cxiv]	By count, beverage containers accounted for 12.72% of litter in 2019. Plastic bottles made up 5.92%, beverage cans 3.45%, and glass bottles 3.35%.
Maine, US[cxv]	By count, beverage containers accounted for 4.52% of litter in 2019. Plastic bottles made up 1.99%, beverage cans 1.47%, and glass bottles 1.06%.
Michigan, US[cxvi]	By count, beverage containers accounted for 3.31% of litter in 2019. Plastic bottles made up 2.01%, beverage cans 0.79%, and glass bottles 0.51%.
Massachusetts, US[cxvii]	By count, beverage containers accounted for 17.69% of litter in 2019. Plastic bottles made up 8.27%, beverage cans 5.47%, and glass bottles 3.95%.
Hawaii, US[cxviii]	By count, beverage containers accounted for 7.01% of litter in 2019. Plastic bottles made up 2.53%, beverage cans 2.00%, and glass bottles 2.48%.
Oregon, US[cxix]	By count, beverage containers accounted for 5.16% of litter in 2019. Plastic bottles made up 1.99%, beverage cans 1.65%, and glass bottles 1.52%.
New York, US [cxx]	By count, beverage containers accounted for 10.56% of litter in 2019. Plastic bottles made up 5.07%, beverage cans 2.81%, and glass bottles 2.68%.
New York, US[cxxi]	Litter from non-carbonated beverage containers (bottled water, juice, sports drinks, etc.), which are not included in the state's DRS, far outnumber litter from beverage containers covered by the DRS (soda, beer, sparkling water, malt beverages, and wine coolers). Beverage containers accounted for 35% of total litter by volume. The majority (61%) consisted of non-deposit beverage containers, which alone accounted for 21% of total litter volume. Deposit containers accounted for 39% of beverage litter collected, and 14% of total litter.
Florida, US[cxxii]	By count, beverage containers accounted for 10.51% of all litter recorded in 2019. Plastic bottles made up 5.08%, beverage cans 3.05%, and glass bottles 2.38%.

Study area	Key findings
Rhode Island, US[cxxiii]	According to Rhode Island's 2024 International Coastal Cleanup Report, beverage-related items made up a significant portion—29%—of all litter collected by count. This category includes beverage bottles, cans, sachets, pouches, bottle caps, lids, cups, straws, and stirrers. Plastic beverage bottles alone accounted for 5.7% of total litter items, while glass bottles made up 4% and beverage cans 3.9%.
Georgia, US[cxxiv]	By count, beverage containers accounted for 27.81% of all litter recorded in 2019. Plastic bottles made up 11.83%, beverage cans 10.11%, and glass bottles 5.87%.
Great Lakes (Canada/US)[cxxv]	Through analysis of 20 years of litter data from over 14,000 cleanups covering beaches along all five Great Lakes, it was found that beverage packaging materials consistently represented a significant portion of the litter collected. Between 2003-2013, plastic beverage bottles (#7), glass beverage bottles (#9), and beverage cans (#10) were among the top 10 litter items. From 2014-2023, plastic beverage bottles remained in the top 10 (ninth place).
Cambodia[cxxvi]	A comprehensive assessment of 243 coastal, river, and inland sites across Cambodia found that single-use plastic water bottles were the most common whole plastic item recorded, particularly abundant along coastal sites, where they made up 68% of the items found. Water bottles were also the most common fragmented plastic item across all site types.
Morocco[cxxvii]	A study conducted in June 2023 focused on marine litter found on the beaches near Marchica Lagoon in Morocco, specifically at Al Mohandis, Bocana, and Nador Artificial Beach. Over a three-day data collection period, 731 items of marine debris were recorded. Among the top 10 categories of debris, the most abundant item by quantity was plastic caps and lids from drinks, which represented 32.15% of the total debris., followed by plastic drink bottles larger than 500ml (accounting for 9.03% of total debris). Additionally, plastic drink bottles of 500ml or less were the fifth most common debris type, further highlighting the prominence of beverage-related plastic waste on these beaches.
Kenya[cxxviii]	A study conducted on Dunga Beach in Lake Victoria, Kenya, characterised anthropogenic litter pollutants across the beach, riparian, and benthic zones along a 100-metre reach over a six-day sampling period. The findings revealed that bottle caps, plastic and glass beverage bottles were among the top 10 litter items found.
Somalia[cxxix]	By count, plastic drinks bottles and containers made up 13.9% of all litter items found on Liido Beach on the Somalian coast.
Algeria[cxxx]	A study of 17 sites along the Algerian coastline found that plastic drink bottles over 500ml accounted for 7.5% of all litter by count, while smaller plastic bottles (500ml or less) made up another 3.6%. Metal drink cans represented an additional 3.1%. Taken together, plastic bottles and metal drink cans made up 14.2% of all litter items collected and were both among the top 10 most frequently found items across the surveyed sites.
Türkiye[cxxxi]	A seasonal study conducted between June 2016 and March 2017 on a beach in the Southeastern Black Sea recorded a total 17,015 litter items. Beverage packaging, comprising caps and lids (10%) and drink containers (6%), accounted for 16% of all litter items by count and ranked among the 10 most common litter types found.

Study area	Key findings
Sierra Leone[cxxxii]	In a comprehensive assessment of beach litter in Sierra Leone, plastic bottles were the most abundant item by both count (25%) and weight (36%). Plastic caps/lids and plastic water sachets made up an additional 13% and 12%, respectively. All three of the most common items, by count, were beverage-related, with plastic bottles appearing at an average density of 405 items per 100m.

Appendix B: Evidence from pre- and post-DRS implementation surveys that deposit systems reduce litter

This table summarises the evidence of the positive impact of DRS on litter reduction, drawn from pre- and post-implementation surveys conducted in more than 20 jurisdictions. The studies cover a diverse range of regions, with DRS implementation dates spanning from 1972 to 2024. The findings consistently show notable reductions in beverage container litter following the introduction of DRS in these areas.

Table 3: Evidence of litter reduction from DRS – Pre- and post-DRS implementation surveys

Study area	DRS start	Key findings
Slovakia[cxxxiii, cxxxiv]	January 2022	There has been a decline in the percentage of litter made up of metal beverage cans and plastic PET bottles since the DRS was introduced in January 2022: • Cans: 20.5% (summer 2020), 20.8% (autumn 2020), 10% (summer 2021), 3.8% (autumn 2022), 2.2% (summer 2023), 2% (autumn 2024) • PET: 15% (summer 2020), 17.8% (autumn 2020), 11.4% (summer 2021), 5.3% (autumn 2022), 3.2% (summer 2023), 2% (autumn 2024) There has also been a reduction in the proportion of DRS containers in mixed municipal waste.[cxxxv] According to waste composition analyses for the years 2020-2021 and 2022-2023, the proportion of PET in mixed municipal waste decreased from 1.32% to 0.07% following the introduction of the DRS.
Latvia[cxxxvi]	February 2022	As of 2022, there was a significant overall reduction of 43% in monitored coastal sites when compared to 2021 (average amounts of selected litter types across 17 chosen coastal locations), with significant reductions at 11 out of 17 sites. This positive trend continued in 2023, with a further 22% decrease when comparing data from 2022 and 2023, and an overall reduction of 56% compared to 2021, the year preceding the introduction of the DRS. Impact on specific material types: • In 2022, data revealed a substantial reduction in selected litter fractions for two materials, with a 54% decrease for plastic beverage containers and a 58% decrease for aluminium cans. The decrease in glass beverage containers was smaller at 8%.

Study area	DRS start	Key findings
		• In 2023, positive trends persisted for plastic and glass bottles, showing respective decreases of 69% and 48% compared to the situation in 2021. However, the situation regarding aluminium cans did not improve further and stayed at -47% compared to pre-DRS implementation. • Overall, when comparing data from before the DRS was launched (2021) to average data from 2022 and 2023, the decreases were as follows: 62% for plastic bottles, 55% for aluminium cans, 28% for glass bottles, and 50% for all beverage containers combined.
Germany[cxxxvii]	January 2003	In Germany, prior to the introduction of the mandatory DRS, single-use beverage containers were estimated to represent about one-fifth (20%) of the total litter volume (in 1998). Approximately 1 to 2 billion single-use beverage containers were littered across the country in 2002. After the introduction of the DRS, littering of beverage containers subject to deposits was reduced to 'almost zero.'
The Netherlands [cxxxviii]	2007 (expansion to small plastic bottles in 2021, and cans in 2023)	The Netherlands expanded its DRS to include small plastic bottles (<1L) in July 2021 and beverage cans in April 2023, setting a deposit of €0.15 (USD$0.16) for both. Following the introduction of deposits on small plastic bottles, there was a 63% reduction in plastic bottle litter by mid-2024. Similarly, before cans were included in the system, an average of 23.5 cans per kilometre were found on streets between 2017 and 2022. In 2022, the last year before the introduction, there were an average of 25.1 cans per kilometre. After deposits were introduced, this number dropped to just 4.8 cans per kilometre, an 82% decrease compared to 2022.
Estonia[cxxxix]	May 2005	In 2003, prior to the introduction of the DRS, beverage containers comprised up to 80% of the litter collected. A roadside litter survey was carried out in 2007 (two years after the DRS was implemented in 2005) showed that the share of beverage containers had dropped below 10% of total litter.
Republic of Ireland[cxl]	February 2024	A national litter survey conducted by Irish Businesses Against Waste (IBAL) and published in June 2024 found a 30% reduction in drinks cans litter and a 20% reduction in plastic bottle litter since the introduction of the DRS in February 2024. The survey also found that 23 out of 40 towns they visited were either cleaner than European norms or met European norm, and that there were overall lower litter levels compared to the previous year.
Republic of Ireland[cxli]	February 2024	In its annual autumn marine litter survey of 542 sites, Coastwatch Ireland registered the lowest average bottle and can count in 25 years of surveys. From a peak of 100 bottles per kilometre in 2010, it dropped to just below eight bottles per kilometre in 2024.

Study area	DRS start	Key findings
Northern Territory, Australia[cxlii]	January 2012	The proportion of regulated containers in the litter stream decreased from 5-10% prior to the commencement of the DRS to 3.1% in the first year of the DRS and maintained an average of 3.1% across the first five years of operation.
Northern Territory, Australia[cxliii]	January 2012	Northern Territory's DRS started in January 2012. In May 2012, there was 39% (by count) less beverage container litter than found in November 2011 and 46% less litter from the May 2011 period. By material: • Glass beverage containers covered by the DRS saw a 25.5% decrease between May 2011 and May 2012 • Aluminium beverage containers covered by the DRS saw a 16.8% decrease between May 2011 and May 2012 • Plastic beverage containers covered by the DRS saw a 55.2% decrease between May 2011 and May 2012 There were also a 52% reduction in beverage container related litter (bottle tops, straws, and hi-cone rings) between November 2011 and May 2012. Bottle tops in litter decreased by 88.7% while straws decreased by 30.1%.
South Australia, Australia[cxliv]	January 1977	In 2008, South Australia increased the refund per container from 5-cents to 10-cents. This resulted in a meaningful impact on beverage container litter with counted litter falling by 24% during the next year.
New South Wales, Australia[cxlv]	December 2017	In New South Wales, deposit beverage containers saw a 52% reduction in litter volume following the introduction of the DRS, dropping from 2.9 litres per 1,000 m^2 in 2016–17 (prior to implementation) to 1.4 litres in 2019–20, 2.5 years after the system was launched. For comparison, non-deposit beverage containers saw a 39% decrease over the same period, from 0.36 L to 0.22 L per 1,000 m^2. Overall litter volume in the state also declined by 39%, falling from 6.6 L to 4.0 L per 1,000 m^2. When measured by item count, littered deposit containers dropped by 47%, from 4.7 items per 1,000 m^2 in 2016 to 2.5 in 2020. The total number of litter items in NSW fell more modestly, by 6%, from 49 to 46 items per 1,000 m^2 over the same period.
Australian Capital Territory, Australia[cxlvi]	June 2018	An analysis of the deposit beverage containers counted in the Keep Australia Beautiful National Litter Index reveals there was 61% decrease (by count) in deposit beverage container litter recorded in the 2018/19 survey (post-DRS implementation) compared to the 2017/18 survey (pre-DRS implementation).

Study area	DRS start	Key findings
Queensland, Australia[cxlvii]	November 2018	An analysis of the deposit beverage containers counted in the Keep Australia Beautiful National Litter Index reveal that the number of deposit beverage containers found in litter decreased by 41% (by count) between the 2017/18 survey—prior to the DRS being introduced—and the 2018/19 survey—post-DRS implementation.
Western Australia, Australia[cxlviii]	October 2020	Prior to the introduction of the DRS, about 44% of the volume of litter was made up of beverage containers using the National Litter Index. Although not directly comparable, the volume of beverage containers measured in 2022–23 is now about 5% using the AusLM methodology.
Hawaii, US[cxlix]	January 2005	In 2004, the year before the deposit return system (DRS) was introduced, beverage bottles and cans (glass, metal, and plastic) made up 14.5% of total litter collected during a clean-up. By 2006—one year after implementation—that share had dropped to 8.7% (a 40% reduction), and by 2007, it fell further to 6.7%, marking a total reduction of 53.7%.
New York, US[cl]	July 1983	New York's DRS reduced beverage container litter by 70 to 80%, and total litter by 30%.
Michigan, US[cli]	December 1978	In the first full year post-DRS (1979), total litter items dropped by 41% compared to the year prior and 29% compared to two years before (1977). Beverage cans—both deposit and non-deposit—saw reductions of 82% and 84%, respectively, over the same period. Beverage bottles also declined significantly, with an 84% reduction compared to pre-DRS levels in 1977 and an 86% drop compared to 1978.
Iowa, US[clii]	May 1979	76% reduction in beverage container litter 39% reduction in total litter
Oregon, US[cliii]	October 1972	Beverage container litter in Oregon dropped by 83% within two years of the DRS being introduced. Prior to implementation, beverage containers made up as much as 40% (by count) of roadside litter. One year after the system began, this fell to 10.8%, and by the second year, to just 7.7%. By 1979, beverage containers accounted for only 6% of litter. The DRS also contributed to a broader reduction in overall litter: in its second year, total litter declined by 39% by count and 47% by volume.
Vermont, US[cliv]	July 1973	A Vermont Highway Department study compared the litter found during the annual summer clean-up in June, July and August 1973, just before the DRS was introduced, and again during the same three months in 1974. Before the DRS, 25,403 bottles and cans were collected; after the DRS was implemented, only 6,082 were collected, translating into an impressive reduction of 76%. There was also a significant (32.9%) reduction in total litter collected.
Maine, US[clv]	January 1978	According to the Maine Department of Conservation, beverage container litter on Maine roadsides declined by 69% to 77% after the DRS was introduced, while total litter by item count dropped 34-64%. Very few containers found on the roadways were deposit containers. If non-deposit containers are excluded from the analysis, the decline in container litter was 96%.

Study area	DRS start	Key findings
		A separate study by the Maine Department of Transportation reported a 15% overall litter reduction in 1978 and 10% in 1979. Combined container litter dropped by 55% in 1978 and 56% in 1979.

Appendix C: Evidence from comparative studies that deposit systems reduce litter

This table presents the results of five studies that analyse litter reduction outcomes in regions with and without a deposit return system (DRS). These studies provide valuable insights into the differences in litter levels between areas with and without DRS, further supporting the effectiveness of deposit systems in reducing beverage container litter.

Table 4: Evidence of litter reduction from DRS – Comparative studies

Study area	Key findings
US states with vs. without DRS[clvi]	Soda and beer litter On a per capita basis, there was about half as much soda and beer litter in states with DRS than in non-DRS states (2.5 soda and beer litter items per capita in DRS states vs. 5.3 in non-DRS states). States with DRS also saw less litter per capita of other types of material (112.8 per capita vs. 161.0). If comparing aggregate counts of litter between DRS and non-DRS states, the number of soda litter items in non-DRS states was 8 times higher than that in states with DRS. For beer litter, the number of items was 5 times higher in states without DRS compared to those with DRS. Of all soda and beer litter items counted across the US, 85% were observed in states without DRS. All deposit-material litter On a per capita basis, there was substantially less deposit-material litter in states with DRS than in those without (4.1 vs. 8.5 litter items per capita). There was also less non-deposit litter per capita in states with DRS than those without (111.2 vs. 157.8 littered items per capita). The differences found in beverage container deposit litter per capita between states with and without DRS were relatively consistent regardless of the definition of a deposit container (about 50% fewer pieces of deposit litter per capita in states with DRS than in non-DRS states). For non-deposit material litter, states with DRS saw about 30% fewer pieces than states without DRS.

Study area	Key findings
US states with vs. without DRS[clvii]	Plastic bottles, glass bottles, and aluminium cans are approximately 2.5 times more frequently littered in Virginia, a non-DRS state, than in states with DRS. In Virginia, plastic bottles accounted for 11.49% of all litter, which is higher than in states with DRS, where plastic bottles account for 1.99% to 8.27%. In states with DRS, beverage cans made up 0.79% to 5.47% of total litter, for an average of 2.51%. In states without a DRS, cans accounted for 3.05% to 10.11%, for an average of 5.88% of the litter. Glass bottles accounted for 3.73% of litter recorded in Virginia (non-DRS state), which is higher than the average for states with DRS, where they account for 2.25% of all littered items. In states with DRS, bottles and cans consistently were found littered less frequently and often were not in the Top Ten list produced by ICC data. In states without DRS, plastic bottles averaged about 3rd place in the ICC's Top Ten lists of littered items in those states. In states with DRS, they averaged in 6th place. Beverage cans averaged in 5th place for stats without DRS< and in 10th place for states with DRS. The ranking of glass bottles between DRS vs. non-DRS states was more similar, 11th in DRS states and 9th in non-DRS states.
Australian states with vs. without DRS[clviii]	South Australia (which has the longest-standing DRS in Australia, in place since 1977) had the lowest percentage of DRS beverage containers in their litter stream in 2018/19 compared to other Australian states. The percentage of DRS litter items in the litter stream for states and territories in 2018/19 were: • South Australia: 2.9% • Northern Territory: 4.9% • Queensland (*no DRS at the time*): 4.0% • Victoria (*no DRS at the time)*: 6.1% • New South Wales (DRS implemented in 2017): 6.6% • Western Australia (*no DRS at the time):* 14.2%
Australia and US states[clix]	A comprehensive study analysing over 26,000 litter surveys across coastal regions in Australia and the US found compelling evidence that deposit return systems (DRS) are highly effective at reducing beverage container litter. The research compared data from states with and without DRS, focusing on saltwater beach sites and other coastal areas within 5 km of the shore. In both countries, the mean proportion of containers found in coastal debris surveys in states with a DRS is approximately 40% lower than non-DRS states. Moreover, the reduction in beverage container litter was most pronounced in areas with low socio-economic status, where overall debris loads tend to be highest. This underscores the added value of DRS in helping to address litter in communities that are disproportionately affected by environmental pollution. Another key finding was that states with DRS tend to have proportionately more littered lids than beverage containers. This supports the hypothesis that the reduction in beverage container litter is due to the effectiveness of the DRS rather than a reduction in beverage consumption in those regions.

Study area	Key findings
Cities in Australia with vs. without DRS[clx]	A study conducted by CSIRO, Australia's national science agency, surveyed debris in inland, riverine, and coastal habitats across six major metropolitan regions in Australia: Hobart (Tasmania), Newcastle (New South Wales), Perth (Western Australia), Port Augusta (South Australia), Sunshine Coast (Queensland), and Alice Springs (Northern Territory). A total of 8,383 debris items were recorded across 1,907 surveys within a 100-kilometre radius of each city. One key finding from the study highlighted that Hobart, which was the only region in the survey without a DRS at the time, had the highest occurrence of beverage containers, both fragmented and whole. In contrast, the other cities in the study, which had DRS programmes in place, generally reported lower levels of beverage container litter.

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