



Plastic Bag Bans Work

Well-designed single-use plastic bag bans
reduce waste and litter



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Contents

Executive summary	4
Introduction	6
Discarded plastic bags pollute land and water in areas without bans	7
Cities and states are tackling the plastic bag problem	8
Bag bans reduce plastic bag litter and pollution.	10
Well-designed bag bans encourage the adoption of reusable bags	11
Loopholes reduce the environmental benefits of some bag bans	13
Shoppers often treat thicker “reusable” plastic bags as single-use	14
Consumers shift to paper bags without a paper bag fee	14
Policymakers should adopt strong bans on single-use plastic bags to minimize plastic waste	16
Methodology	17
Notes	19

Executive summary

Single-use plastic bags are common sights at the supermarkets, convenience stores and shopping centers where they're distributed ... and along the roadsides, rivers and coastal areas where many end up after being discarded. Single-use plastic bags aren't just unsightly; they can also be deadly to sea life and harmful to our health. Littered plastic bags and films are frequently ingested by marine animals and cause more sea turtle and cetacean (whales, dolphins and porpoises) deaths than any other type of plastic.¹ The production, use and disposal of single-use plastic bags also releases water and air pollution that harms our health.² Plastic bags are not biodegradable, so they can continue to pollute the environment with harmful microplastics for hundreds of years after use.³

The good news is that states and cities with well-designed single-use plastic bag bans have successfully reduced plastic bag use and associated litter and pollution. Bans in five states and cities that cover more than 12 million people combined have cut single-use plastic bag consumption by about **6 billion bags** per year – enough bags to circle the earth 42 times. Other, similar bans have reduced the number of bags found in the environment in particular cities or states by **one-third or more**.

Plastic bag bans have reduced plastic waste across the country.

Ten states – California, Connecticut, Delaware, Hawaii, Maine, New Jersey, New York, Oregon, Vermont and Washington – had some form of statewide ban on single-use plastic bags as of 2023 and bans in Colorado and Rhode Island went into effect on the first day of 2024.⁴

As of 2021, more than 500 cities and towns across 28 states had a plastic bag ordinance in effect.⁵

Based on five studied plastic bag bans – in New Jersey; Vermont; Philadelphia; Portland, Ore.; and Santa Barbara, Calif. – a similar policy can be expected to eliminate almost 300 single-use plastic bags per person per year, on average. That means a ban covering all of Allegheny County (the heart of the Pittsburgh metropolitan area) could save 365 million plastic bags per year compared with a scenario in which no ban is in effect.⁶ A statewide ban covering all of Massachusetts could save over 2 billion bags annually.⁷

Plastic bag bans reduce litter and pollution.

Nonprofits, government agencies and others have found that plastic bag bans successfully reduced plastic bag litter by at least **one-third**, with far greater litter reductions in some jurisdictions.⁸ Such reductions, particularly in coastal areas, likely reduce the risk plastic bags pose to marine animals.

Well-designed bag bans encourage consumers to adopt sustainable bag options.

Four studies of single-use plastic bag bans – from San Mateo County, Calif.; Mountain View, Calif.; Philadelphia; and Santa Monica, Calif. – show significant increases in reusable bag use and increases in the number of customers not using bags at all after a single-use bag ban was implemented. For example, in San Mateo County, the proportion of customers with at least one reusable bag at 13 surveyed retailers increased 162% after the county's ban was implemented, and in Mountain View, the proportion of customers using no bag nearly tripled once a ban was imposed.⁹

Loopholes reduce the environmental benefits of some bag bans.

Single-use plastic bag bans have significantly reduced the number of plastic bags used – proving that customers can get by with far fewer plastic shopping bags and likely reducing litter. But loopholes in some bans have encouraged the distribution of other types of bags with significant environmental impacts.

- **Loopholes can encourage a switch to thicker plastic bags:** Jurisdictions that allow stores to offer thicker “reusable” plastic bags for a token fee at checkout allow thicker bags – often used only once – to substitute for thinner ones.

California banned single-use plastic bags beginning in 2016 but allowed thicker “reusable” plastic bags to be sold for a 10-cent fee.¹⁰ The amount of plastic bag waste discarded per person (by weight) actually increased in the years following the law’s implementation to the highest level on record – proving the ban ineffective at reducing the total amount of plastic waste.¹¹

A similar policy in Alameda County, Calif., led to the sale of an estimated 13 million thicker bags at sampled stores in 2021, consuming an amount of plastic that,

when measured by weight, may have surpassed the 37 million single-use plastic bags purchased in those same stores across the county in the year before the ban was implemented.¹²

- **Lack of a fee can encourage paper bag use:** Single-use plastic bag bans that lack a fee on paper bags cause a similar substitution of paper bags for plastic bags. Paper bags are widely recyclable, but using new ones for every grocery trip is more wasteful than bringing the same set of reusable bags.

For example, a 2021 study in Philadelphia, which has no paper bag fee as part of its plastic bag ban, observed a 157% increase in the proportion of supermarket customers with at least one paper bag after its single-use plastic bag ban went into effect.¹³ A study in Mountain View, Calif., whose ordinance included a minimum 10-cent fee on paper bags at the time of the cited report, observed a 67% decline in the proportion of customers using a paper bag after the ban was implemented.¹⁴

To reduce the plastic pollution that threatens our health and our environment, policymakers should adopt strong bans on single-use plastic bags to minimize plastic waste and should close loopholes that weaken or counteract the effectiveness of existing bans.

Introduction

Plastic shopping bags are so prevalent in our world that it's hard to imagine a time when they didn't exist. But for generations, until not that long ago, people conducted their daily or weekly shopping without familiar "t-shirt"-style plastic bags.

Single-use plastic bags were patented in Europe in 1965. Advertised as "stronger than paper" and "moisture proof," they rapidly replaced paper bags.¹⁵ They spread to the United States by the end of the 1970s, and Kroger and Safeway, two of the largest supermarket chains in the country at the time, started bagging groceries in plastic in 1982. Other grocery chains soon followed suit.¹⁶

By the time sailor and researcher Charles Moore found the Great Pacific Garbage Patch – a huge swath of the Pacific Ocean containing vast amounts of tiny plastic particles known as microplastics – in 1997, plastic bags had become the norm at supermarket checkout counters across the country and around the world.¹⁷

Beyond polluting the ocean, plastic bags contributed to local litter and increased demand for the fossil fuels from which they were made.¹⁸ When San Francisco passed the nation's first plastic bag ban in 2007, Supervisor Ross Mirkarimi, the author of the ordinance, cited as a reason the "obvious problem that global warming is not going away soon."¹⁹

Once San Francisco got the ball rolling, San Jose passed its own ordinance in 2011, Los Angeles did so in 2013, and more than 100 other California cities implemented bag laws by 2014, paving the way for California's first-in-the-nation statewide ban in that same year.²⁰

The momentum behind banning single-use plastic bags wasn't limited to the Golden State. Seattle and Portland,

Ore., passed ordinances in 2011, Austin, Texas, did so in 2012, Santa Fe, N.M., followed suit in 2013 and many other cities (and several counties) gradually hopped on board the plastic bag "ban-wagon" over the next several years.²¹

In 2018, Forbes counted 349 jurisdictions across the country with some form of plastic bag policy in place, but California and Hawaii remained the only two states with statewide bans.²²

However, the plastic bag ban movement has reached new heights in the last few years, with eight new statewide bag laws and an updated count of over 500 municipal plastic bag ordinances spread across 28 states.²³ Outside the U.S., plastic bag laws had been proposed or enacted in 188 countries as of July 2021.²⁴

As U.S. cities, counties and states consider new actions to reduce pollution from plastic bags, it's important to take a step back and evaluate whether bans on single-use plastic bags have actually worked. Doing so presents an opportunity to highlight the most effective policies and identify reasons why others came up short so that policymakers can avoid and repair past mistakes.

Studies across the country show that well-designed bans on single-use plastic bags have led to dramatic reductions in their consumption and in the number of bags found littering communities and coastal areas. Those studies also show that cities, counties and states have taken different approaches to reducing single-use plastic bags – and that those differences have led to some bag bans being more effective than others.

In the last 20 years, 12 states covering more than one-quarter of the U.S. population have prioritized reducing plastic waste by banning plastic bags.²⁵ How many states will join them in the next 20 years?

Discarded plastic bags pollute land and water in areas without bans

The average American uses 365 plastic bags per year – or an average of one per day.²⁶ Most of those bags are used briefly and discarded, with an average life span of 12 minutes.²⁷ But because they're not biodegradable, they pollute the environment for hundreds of years.²⁸

Plastic grocery bags represented 7% of all littered items gathered in shoreline cleanups of Virginia's "rivers, lakes, bays, and beaches" from 2015 to 2020.²⁹

Plastic bag litter has an outsized impact on marine life. Littered plastic bags and films are frequently ingested by marine animals and cause more sea turtle and cetacean (whales, dolphins and porpoises) deaths than any other type of plastic.³⁰

There is no good option for the disposal of plastic bags. Plastic bags are typically not accepted for curbside

recycling and can cause costly delays at recycling centers.³¹ For example, they're responsible for most of the \$1 million in annual losses due to "improper recycling" estimated by City of Phoenix officials.³² Some grocery stores and other retailers offer "take back" programs to send plastic bags to specific facilities that claim to recycle them.³³ However, studies by The Last Beach Cleanup and ABC News tracking plastic bags supposedly headed to recycling facilities found that very few even got there – many were last tracked at landfills or incinerators.³⁴

Specific data for single-use plastic bags are unavailable, but based on U.S. Environmental Protection Agency (EPA) solid waste data, almost three-quarters of the plastic bags and wraps disposed of by Americans are landfilled.³⁵



A plastic bag floating in the water. (Source: Unsplash User Oleksandr Sushko)

Cities and states are tackling the plastic bag problem

Ten states – California, Connecticut, Delaware, Hawaii, Maine, New Jersey, New York, Oregon, Vermont and Washington – had some form of statewide ban on single-use plastic bags as of 2023 and bans in Colorado and Rhode Island went into effect on the first day of 2024.³⁶

Similar bills have been introduced in Georgia and Massachusetts.³⁷ Large cities with ordinances banning single-use plastic bags include Boston and Philadelphia.³⁸

In this section, we review studies of five state and local single-use plastic bag bans to estimate the impact of the bans on plastic bag waste.

- **New Jersey’s** plastic bag law, which went into effect in May 2022, bans the use of plastic bags at grocery stores, restaurants and retail shops and prohibits grocery stores larger than 2,500 square feet from distributing paper bags as well.³⁹ It does not allow thicker plastic film bags to be distributed.⁴⁰ Based on

data from the New Jersey Plastics Advisory Council and the U.S. Census Bureau, the ban eliminates an estimated 5.51 billion single-use plastic bags per year.⁴¹ (See methodology.)

- **Vermont’s** ban on plastic bags and other single-use products (including expanded polystyrene containers and plastic straws) took effect in 2020.⁴² It covers restaurants and retail stores and includes a minimum 10-cent fee for paper bags at checkout.⁴³ It does not allow thicker plastic film bags to be distributed.⁴⁴ Based on data from a survey comparing self-reported plastic bag use before and after the ban’s implementation, the bag ban saves an estimated 191 million bags per year.⁴⁵ (See methodology.)
- **Santa Barbara, Calif.’s** ban on plastic bags in supermarkets, drug stores and convenience stores, which took effect in 2014, established a minimum 10-cent fee on paper bags.⁴⁶ The ban is estimated to save nearly 45 million bags per year.⁴⁷

Table 1. Estimates of plastic bags saved based on five studies of single-use plastic bag bans.⁵³

Jurisdiction	Bags saved	Population in year of estimate	Year of estimate	Bags saved per person
New Jersey	5,505,990,000	9,261,699	2022	594
Vermont	191,484,355	647,064	2022	296
Philadelphia	200,000,000	1,576,251	2021	127
Portland, Ore.	100,000,000	603,106	2012	166
Santa Barbara, Calif.	44,937,415	91,635	2015	490
<i>Total</i>	<i>6,042,411,770</i>	<i>12,179,755</i>		<i>(Median) 296</i>

- **Philadelphia's** ban on plastic bags in restaurants and retail stores went into effect in 2021, and the city estimates it saved over 200 million bags from city grocery stores alone in its first year.⁴⁸ It does not include a paper bag fee.⁴⁹
- **Portland, Ore.'s** ban on plastic bags at some large retailers, which did not include a fee on paper bags, went into effect in 2011.⁵⁰ Based on the ban's performance over its first six months, the policy likely saves at least 100 million plastic bags per year.⁵¹ It was superseded by Oregon's statewide ban, which does include a paper bag fee, when that policy went into effect in 2020.⁵²

All told, these bans cover over 12 million people and save about 6 billion single-use plastic bags per year. That means a new ban comparable to those analyzed could save about 300 bags per person per year, with variation depending on the specific details of the policy. (See Table 1, p. 8.)

For example, a ban covering all of Allegheny County, the heart of the Pittsburgh metropolitan area, could save 365 million plastic bags per year, including those already saved by local bans within the county.⁵⁴ A statewide ban in Massachusetts could save over 2 billion bags annually, including those saved by existing bag policies across the state.⁵⁵

Bag bans reduce plastic bag litter and pollution

It's bad enough when plastic bags end up in a landfill after being used for just one trip home from the grocery store, but those that are littered can do even more harm.

Plastic pollution kills at least 100,000 marine mammals and 1 million seabirds every year and entanglement in plastic and other types of litter kills roughly 1,000 turtles per year.⁵⁶ Plastic bags are an important part of the problem. Littered plastic bags and films are frequently ingested by marine animals and cause more sea turtle and cetacean (whales, dolphins and porpoises) deaths than any other type of plastic.⁵⁷

The production, use and disposal of single-use plastic bags also releases water and air pollution that harms our health.⁵⁸ Plastic bags are not biodegradable, so they can continue to pollute the environment with harmful microplastics for hundreds of years after use.⁵⁹

Several studies of plastic bag bans by nonprofits, government agencies and others have found reductions in plastic bag litter of at least **one-third**, and frequently more, after bag bans are put into effect.

For example, after New Jersey's ban went into effect in May 2022, Clean Ocean Action's fall 2022 beach sweeps along the New Jersey coast gathered 46% fewer single-use plastic bags than the April 2022 cleanups collected.⁶⁰

San Francisco experienced a 33% reduction in single-use plastic bag litter on beaches after its ordinance went into effect in 2012.⁶¹ Elsewhere in California, San Jose recorded a 78% decrease in single-use plastic

bags as a proportion of litter gathered in creek and river cleanups, 89% fewer plastic bags in storm drains (which flow to the ocean) and 59% fewer plastic bags in residential areas after its ban took effect in 2012.⁶² Alameda County, which stretches south along the San Francisco Bay from Berkeley to Fremont and east to Altamont, passed its ordinance in 2013 and achieved a 44% decrease in the number of littered single-use plastic bags found in storm drains between 2011 and 2014.⁶³ Even though sales of thicker "reusable" plastic bags skyrocketed from 2015 to 2021, the significant drop in overall sales of plastic bags across the county since the ban went into effect suggests that at least some reduction in plastic bag litter has likely endured.⁶⁴

Local bans on single-use plastic bags in California, which covered more than 40% of the state's population in 2016, had a noticeable effect on litter across the state.⁶⁵ Plastic bag litter gathered in statewide coastal cleanups declined by more than half from 2010 to 2016.⁶⁶

The plastic bag ban in Austin, Texas, had a remarkable impact, with 90% less plastic bag litter in the six months after it went into effect in 2013.⁶⁷ Enforcement ceased in 2018 after the Texas Supreme Court struck down a similar ordinance in Laredo.⁶⁸

Plastic bag bans also keep plastics out of landfills. Seattle, where an ordinance went into effect in 2011, had 48% fewer plastic bags in residential waste in 2014 than in 2010.⁶⁹

Well-designed bag bans encourage the adoption of reusable bags

Single-use plastic bag bans are an effective tool to reduce the consumption of plastic bags and limit plastic bag pollution in our environment. However, the design of single-use plastic bag bans shapes how consumers respond to the change – by switching to a different type of disposable bag, bringing reusable bags or skipping bags altogether. Well-designed plastic bag bans encourage a shift toward truly sustainable options such as reusable bags.

Some jurisdictions allow stores to offer thicker “reusable” plastic bags for a fee at checkout in much the same way that they offered single-use plastic bags before ban implementation. While theoretically “reusable,” it appears that many shoppers are disposing of these bags in the same ways as single-use bags. Thus, in this section, “reusable bags” refers only to durable bags brought to a store by a customer.

Several studies have sought to learn how consumers behave after a single-use plastic bag ban goes into effect. In this section, we review studies of four state and local single-use plastic bag bans to estimate their impact on consumers’ bag choices.

- **San Mateo County, Calif.**, bordered by San Francisco to the north and the Pacific Ocean and San Francisco Bay to the east and west, banned single-use plastic bags in retail stores (but not restaurants) and imposed a minimum 10-cent fee on paper bags beginning in 2013.⁷⁰
- **Mountain View, Calif.**, located just northwest of San Jose, also banned single-use plastic bags in retail stores (but not restaurants) and imposed a minimum 10-cent fee on paper bags beginning in 2013.⁷¹
- **Philadelphia’s** ban on plastic bags in restaurants and retail stores went into effect in 2021, eliminating an estimated 200 million plastic bags annually from city grocery stores alone.⁷² There is no fee required for distributing paper bags.⁷³
- **Santa Monica, Calif.**, a coastal suburb of Los Angeles, banned single-use plastic bags in retail stores (but not restaurants) and imposed a minimum 10-cent fee on paper bags beginning in 2011.⁷⁴

Studies have taken different approaches to measuring consumers’ bag choices, but the overarching results are similar. In San Mateo County, Calif., the proportion of customers with at least one reusable bag at 13 surveyed retailers increased 162% after the ban was implemented.⁷⁵

In Santa Monica, Calif., high school students performed observational surveys at both “regular” grocery stores (which “used primarily plastic bags prior to the ban”) and “eco-friendly” stores Trader Joe’s and Whole Foods (which “used few if any plastic bags prior to the ban”).⁷⁶ The proportion of customers using reusable bags at “regular” grocery stores in the city nearly quadrupled, while the proportion of customers

using reusable bags at Trader Joe’s and Whole Foods doubled, after the ban was implemented.⁷⁷ In Mountain View, Calif., the proportion of customers at surveyed grocery stores with a reusable bag roughly doubled after the ban was implemented.⁷⁸

While increased adoption of reusable bags is an important measure of bag ban effectiveness, transactions in which customers do not use any bags also represent a win for the environment. In Mountain View, the proportion of customers using no bag nearly tripled once the ban was implemented.⁷⁹ In Santa Monica, the proportion of customers using no bags at “regular” grocery stores (which had primarily offered single-use plastic bags before the ban) more than doubled once the ban was in effect.⁸⁰ (See Table 2.)

The much less dramatic increase in the proportion of customers not using bags at Whole Foods and Trader Joe’s (“eco-friendly” stores) is likely a result of far fewer bag transactions needing to be replaced, as just 2% of customers used single-use plastic bags at those stores before the ban.⁸¹

In San Mateo County, the proportion of customers at 13 surveyed retailers using no bag for at least one item more than doubled, to 53%, once the ban was in effect.⁸² In Philadelphia, the proportion of customers at sampled grocery stores hand-carrying at least one item almost doubled after the ban was imposed.⁸³

In summary, plastic bag bans have consistently caused a significant increase in customers choosing each of the two most sustainable checkout options – using reusable bags brought from home and carrying items by hand.

Table 2. Change in proportion of customers using no bag based on two studied bans.

Jurisdiction	Before	After	Percent increase
Mountain View, Calif.	14%	39%	179%
Santa Monica, Calif. ("regular")	15%	36%	133%
Santa Monica, Calif. ("eco-friendly")	19%	21%	8%

Loopholes reduce the environmental benefits of some bag bans

Not all plastic bag bans are created equal. The policies often vary based on the kinds of stores that are required to comply, the types of bags that are allowed to be used, the fees assessed on substitute bags, and other factors. Some cities and states have adopted policies that deliver reductions in overall plastic bag use but also contain loopholes that allow for the continued use of plastic bags, or that fail to discourage consumers from shifting to single-use paper bags.

Even bans with loopholes have driven significant reductions in the number of plastic bags used overall, and in the amount of plastic bag litter found in coastal areas.

Alameda County, Calif., for example, implemented a single-use plastic bag ban in 2013 that permitted stores to sell thicker “reusable” plastic bags at checkout for a 10-cent fee.⁸⁴ The combined number of single-use and thicker plastic bags per shopping trip at sampled stores dropped more than 90%, proving that consumers could get by with far fewer plastic shopping bags of any kind.⁸⁵ Even though sales of thicker plastic bags at sampled stores increased from about 2 million in 2015 to roughly 13 million in 2021, they didn’t come close to the roughly 37 million single-use plastic bags distributed at those stores before the ban went into effect, so the ban very likely drove a significant decrease in the total number of plastic bags discarded and littered across the county.⁸⁶

Similarly, California’s ban on thin single-use plastic bags, which went into effect in November 2016, also allowed thicker “reusable” plastic bags to be sold for a 10-cent fee.⁸⁷ Despite this loophole, the ban reduced plastic bag



Thicker “reusable” plastic bags like these are being distributed in California and many other jurisdictions with single-use plastic bag bans. (Source: Tony Dutzik)

consumption significantly – from nearly 435 million single-use plastic bags provided at sampled stores in the first half of 2016 to 66 million thicker plastic bags provided at sampled stores in the first half of 2017 – and led to a decline in the share of plastic bags in litter gathered in coastal cleanups across the state.⁸⁸

Loopholes in some plastic bag bans, however, can reduce their effectiveness in limiting the overall environmental impact of shopping.

Table 3. Plastic bag disposal rate in California over time.

	2004	2008	2014	2018	2021
Tons of plastic bags discarded	147,038	123,405	157,395	139,810	231,072
California population	35,570,000	36,600,000	38,590,000	39,440,000	39,240,000
Tons of plastic bags discarded per 1,000 people	4.13	3.37	4.08	3.54	5.89

Shoppers often treat thicker “reusable” plastic bags as single-use

In jurisdictions that allow stores to offer thicker so-called “reusable” plastic bags for a fee at checkout, customers who previously relied on single-use plastic bags at grocery stores and other shops can easily switch to thicker plastic bags for a small fee. While theoretically “reusable,” it appears that many shoppers are disposing of those bags in the same ways as single-use bags, potentially undermining the effectiveness of plastic bag bans at reducing plastic waste overall.

Because of the loophole in California’s single-use plastic bag ban allowing the use of thicker plastic bags, the amount of plastic bags discarded per person (by weight) actually increased in the years after the implementation of the ban – to the highest level on record.⁸⁹ (See Table 3.)

A plastic bag ban that allows the weight of plastic bags discarded to increase, let alone establish a new peak level of plastic bag waste, cannot be considered a complete success. Policymakers pursuing plastic bag bans should heed the lessons from California’s ban and prohibit the sale of both thin and thick plastic film bags.

The thicker “reusable” plastic bag loophole in Alameda County’s single-use plastic bag ban similarly allowed a wasteful substitution of thicker “reusable” plastic bags for typical single-use ones.⁹⁰ It appears that many customers did not treat the thicker plastic bags as reusable, because their consumption rose significantly after the ban was implemented instead of leveling off quickly once shoppers had enough bags for a grocery store trip.⁹¹ Since these “reusable” plastic bags are at least four times thicker than typical single-use plastic bags, the estimated 13 million of them sold in Alameda County in 2021

likely surpassed the 37 million single-use plastic bags sold annually pre-ban on a plastic weight basis.⁹²

Customers’ use of their own reusable bags more than doubled right after Alameda County’s ban went into effect, peaking in 2015, but it has declined since with the rise of thicker plastic bags.⁹³ This provides further evidence of backsliding since the ban went into effect in 2013.⁹⁴ As noted below, allowing plastic film bags of any thickness at checkout can reduce the benefits of banning single-use plastic bags.

Consumers shift to paper bags without a paper bag fee

Single-use plastic bag bans that lack a fee on paper bags cause many customers to substitute paper bags for plastic bags. Paper bags are widely recyclable, but using new ones for every grocery trip is more wasteful than bringing the same set of reusable bags each time.

For example, in Portland, Ore., where the city’s bag ban lacked a paper bag fee, paper bag use increased nearly 500% post-ban.⁹⁵ This increase came before the ordinance was superseded by Oregon’s statewide ban, which does include a paper bag fee, in 2020.⁹⁶ Philadelphia, another city with no paper bag fee as part of its single-use plastic bag ordinance, had a 157% increase in the proportion of customers using at least one paper bag once it went into effect.⁹⁷

In contrast, Vermont’s plastic bag ban, which includes a minimum 10-cent fee on paper bags, resulted in an estimated 3.6% increase in paper bag use.⁹⁸ The plastic bag ordinance in Mountain View, Calif., which included a minimum 10-cent fee on paper bags at the time of the cited report, resulted in a 67% decline in the proportion of customers using a paper bag.⁹⁹

Percent increases alone can sometimes fail to tell the whole story due to different baselines. Before-and-after data from Philadelphia and Mountain View allow a closer comparison of changes in paper bag use for those two cities.

In Philadelphia, the proportion of grocery store customers using at least one paper bag rose from 18% to 46%, while in Mountain View, the proportion of grocery shoppers using a paper bag declined from 30% to 10%.¹⁰⁰ These data confirm opposite outcomes in these two cities. Without a paper bag fee in Philadelphia, many customers switched from single-use plastic bags to single-use paper ones, but the paper bag fee in Mountain View discouraged shoppers from making that switch enough for them to largely ditch paper bags even as they adjusted to single-use plastic bags being unavailable.

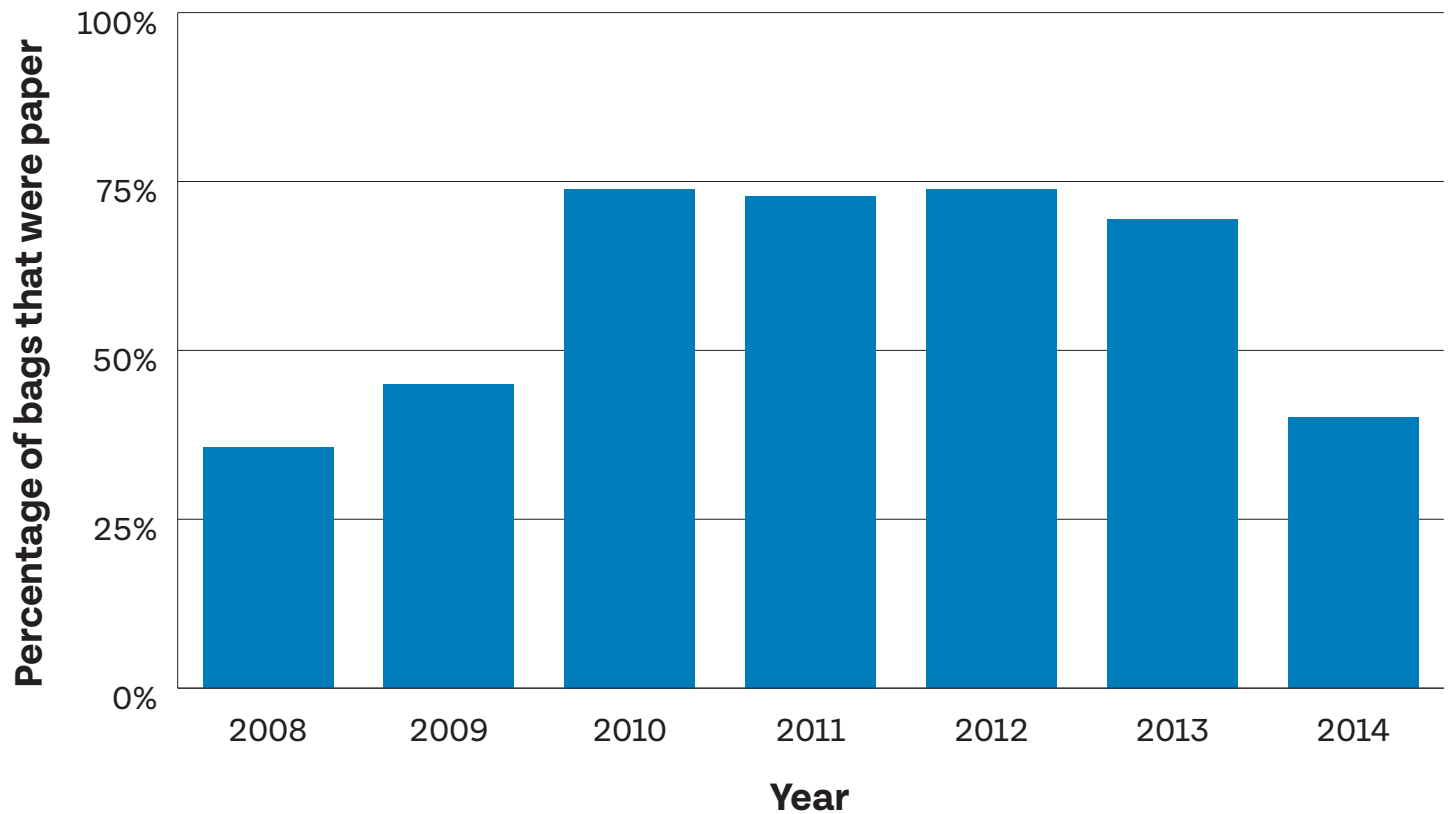
The experience of Palo Alto, Calif. further demonstrates the impact of paper bag fees because of its unique policy trajectory: the city implemented its

original plastic bag ban in September 2009 but did not have a paper bag fee until the updated law took effect in June 2013.¹⁰¹ (See Figure 1.)

The proportion of bags that were paper in Palo Alto grocery store surveys increased from 45% in 2009 to 74% in 2010, the first full year that the ban was in effect.¹⁰³ Just like in Philadelphia and Portland, many customers switched from single-use plastic bags to single-use paper bags in the absence of a paper bag fee.

The proportion of bags that were paper remained steady over the next few years and then declined slightly to 69% in 2013.¹⁰⁴ However, in 2014, the first full year of the paper bag fee, the proportion of bags that were paper dropped to 40% – below pre-ban levels.¹⁰⁵ Thus the paper bag fee was successful at preventing the substitution of paper bags for single-use plastic bags in Palo Alto. It's never too late for a jurisdiction with a plastic bag ban to shore up the ban's effectiveness by adding a paper bag fee.

Figure 1. Observed percentage of bags that were paper in surveys of customers exiting Palo Alto grocery stores.¹⁰²



Policymakers should adopt strong bans on single-use plastic bags to minimize plastic waste

Well-designed single-use plastic bag bans across the country have successfully reduced single-use plastic bag consumption, cut down on plastic bag litter and driven consumers to make more sustainable bag choices. Policymakers should pursue these policies at the state and local levels.

Despite the effectiveness of local single-use plastic bag bans, 18 states had laws preempting local governments from adopting bag bans as of February 2021.¹⁰⁶ Given the effectiveness of single-use plastic bag bans, state policymakers should repeal preemption laws to restore this policy tool to local leaders.

Poorly designed or loophole-ridden bans on single-use bags are less effective than well-designed bans. In some cases, they may actually make some problems associated with plastic bag use worse. Policymakers should eliminate harmful loopholes in single-use bag bans in existing laws and refuse to include them in future bag bans:

- Grocery stores, restaurants and retail shops should not be permitted to distribute plastic film bags of any thickness at checkout.

- Stores should be required to charge a fee of at least 10 cents for single-use paper bags. A 10-cent paper bag fee will limit the expected increase in paper bag use after a bag ban is imposed and may even reduce paper bag consumption altogether.
- Local and state governments should conduct regular enforcement to ensure compliance.

State and local governments should provide education and assistance to smooth the transition away from single-use plastic bags, including by giving away durable, genuinely reusable bags. Such actions also provide opportunities to answer questions about new policies and explain why they're important.

Many grocery stores offer durable, genuinely reusable bags at checkout. As with other bag types, charging a fee per bag discourages customers from treating them as single-use. Cities and states should set minimum charges for these bags to prevent them from being treated as single-use bags.

Methodology

Bags saved

Estimates of the number of plastic bags reduced by bag bans are based on data from a variety of reports, articles, fact sheets and other sources. In most cases, these data were reported in terms of “total bags saved per year” in the given area. Census Bureau data for the appropriate area and year facilitated a calculation of total bags saved per person per year.¹⁰⁷

Vermont

The cited analysis of Vermont’s plastic bag ban included self-reported single-use plastic bag consumption per person per week before and after the ban’s implementation.¹⁰⁸ Finding the difference between those plastic bag consumption figures and multiplying by 52 weeks per year resulted in a plastic bags saved per person per year figure comparable to those derived from other studies.

New Jersey

A state government analysis of New Jersey’s plastic bag ban presented a special case that demanded more in-depth calculations.¹⁰⁹

Grocery stores

A sample of 160 New Jersey grocery stores reported plastic bag consumption data to the New Jersey Food Council (NJFC), a grocery store industry group, before and after the ban was in place, suggesting sampled grocery stores saved 55 million bags per month in total, which translates to 343,750 plastic bags saved per store per month and ~11,500 plastic bags saved per store per day.¹¹⁰

The state government analysis refers to roughly 2,000 grocery store members of the NJFC and an estimated 6,000 total grocery stores throughout the state (excluding convenience stores) and scales up the estimated impact of the ban accordingly:¹¹¹

- 343,750 plastic bags saved per store per month multiplied by 2,000 stores yields 687.5 million bags saved by the ~2,000 NJFC grocery store members in total per month.¹¹²
- 343,750 plastic bags saved per store per month multiplied by 6,000 stores yields 2.06 billion bags saved by all grocery stores in the state per month.¹¹³

However, these estimates assume that each store is large enough to have provided ~11,500 plastic bags per day before the ban was in effect. While supermarkets and large grocery stores may maintain a volume of >10,000 plastic bags provided per day, it seems unlikely that smaller grocery stores assumedly included in the 6,000 figure often do so. Based on U.S. Census Bureau data, there were 830 grocery stores with at least 10 employees in the state in 2021, providing a more conservative figure from which to scale up the bags saved per store per month figure of 343,750.¹¹⁴

343,750 plastic bags saved per store per month multiplied by 830 grocery stores yields **285,312,500 plastic bags saved across the state per month.**

Convenience Stores

A similar calculation was carried out based on the sampled convenience store data. The 275 sampled convenience stores saved 33 million plastic bags per month in total. That's 120,000 plastic bags saved per convenience store per month.

According to U.S. Census Bureau data, there were 1,446 convenience stores in New Jersey in 2021.¹¹⁵ 120,000 plastic bags saved per convenience store per month multiplied by 1,446 convenience stores across the state yields **173,520,000 plastic bags saved per month at New Jersey convenience stores.**

Total

Adding the per-month figures for supermarkets and convenience stores yields 458,832,500 plastic bags saved in total across the state per month. Multiplying by 12 months derives an annual estimate of **5.51 billion plastic bags saved per year by New Jersey's plastic bag ban.**

Notes

- 1 Lauren Roman et al., “Plastic pollution is killing marine megafauna, but how do we prioritize policies to reduce mortality,” *Conservation Letters* 14, no. 2 (December 3, 2020): <https://doi.org/10.1111/conl.12781>.
- 2 David Azoulay et al., Center for International Environmental Law, “Plastic & Health: The Hidden Costs of a Plastic Planet,” February 2019, archived at <https://web.archive.org/web/20231122175532/https://www.ciel.org/wp-content/uploads/2019/02/Plastic-and-Health-The-Hidden-Costs-of-a-Plastic-Planet-February-2019.pdf>, pp. 1-2.
- 3 Extent of pollution: Kate Breimann, Environment Maryland, Testimony: Plastic Bag Reduction Act, February 23, 2021, archived at <https://web.archive.org/web/20230330034723/https://environmentamerica.org/maryland/resources/testimony-plastic-bag-reduction-act/>; Harms posed by microplastics: David Azoulay et al., Center for International Environmental Law, “Plastic & Health: The Hidden Costs of a Plastic Planet,” February 2019, archived at <https://web.archive.org/web/20231122175532/https://www.ciel.org/wp-content/uploads/2019/02/Plastic-and-Health-The-Hidden-Costs-of-a-Plastic-Planet-February-2019.pdf>, p. 2.
- 4 List of existing state bans: National Conference of State Legislatures, *State Plastic Bag Legislation*, updated February 8, 2021, accessed October 20, 2023, available at <https://www.ncsl.org/environment-and-natural-resources/state-plastic-bag-legislation>; Colorado: Colorado Department of Revenue, *Carryout Bag Fee*, 2023, archived at <https://web.archive.org/web/20230603091105/https://tax.colorado.gov/carryout-bag-fee>; Rhode Island: Alyssa Azzara, “Department of Environmental Management seeks public’s opinion ahead of statewide plastic bag ban,” *Rhode Island News*, September 19, 2023, archived at <https://web.archive.org/web/20230927032217/https://www.abc6.com/department-of-environmental-management-seeks-public-opinion-ahead-of-state-wide-plastic-bag-ban/>.
- 5 Jennie Romer, Surfrider Foundation, *Round-Up of Statewide Bag Laws and Preemption* (blog post), February 24, 2021, archived at <https://web.archive.org/web/20230829182153/https://www.surfrider.org/news/round-up-of-statewide-bag-laws-and-preemption>.
- 6 U.S. Census Bureau, *QuickFacts Allegheny County, Pennsylvania* (data set), archived at <https://web.archive.org/web/20230820220524/https://www.census.gov/quickfacts/fact/table/alleghenycountypennsylvania/PST045222>.
- 7 U.S. Census Bureau, *QuickFacts Massachusetts* (data set), archived at <https://web.archive.org/web/20230711031221/https://www.census.gov/quickfacts/fact/table/MA/>.
- 8 See “Bag bans reduce plastic bag litter and pollution” for a full analysis of several studies.
- 9 San Mateo County: *San Mateo County Reusable Bag Ordinance Survey and Reporting Report*, 2014, archived at <https://web.archive.org/web/20220121115333/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a2ae4b0edd30aa3cb9c/1435867690341/San+Mateo+County+Bag+Report+2014.pdf>, p. 1; Mountain View: Mountain View City Council, *Amend Chapter 16, Section 16.82, of the Mountain View City Code to Retain Current Charges for Carry-Out Bags*, September 16, 2014, archived at <https://web.archive.org/web/20220121115334/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a55e4b03cf942d4e812/1435867733101/Mtn+View+Council+Report+9.16.14+Reusable+Bag+Amendment+2014.pdf>, p. 3, Chart 2.
- 10 Kelly O’Mara, “Are Plastic Bag Bans Actually Helping The Environment,” *KQED*, May 18, 2017, archived at <https://web.archive.org/web/20230530233354/https://www.kqed.org/news/11461251/are-plastic-bag-bans-good-for-the-environment>.

11 Based on reports published by CalRecycle, California's recycling agency, covering 2004, 2008, 2014, 2018 and 2021. There is a similar report for 1999, but it does not contain data specific to plastic bags and was not included in this analysis. 2004: Cascadia Consulting Group, *Statewide Waste Characterization Study: Significant Tables and Figures*, December 2004, accessed November 30, 2023, available at <https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/34004005/Tables.pdf>, p. 4; 2008: Cascadia Consulting Group, *California 2008 Statewide Waste Characterization Study: Significant Tables and Figures*, August 2009, accessed November 30, 2023, available at <https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2009023/Tables.pdf>, p. 4; 2014: Cascadia Consulting Group, *2014 Disposal-Facility-Based Characterization of Solid Waste in California: Significant Tables and Figures*, October 6, 2015, accessed November 30, 2023, available at <https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2014/SigTableFig.pdf>, p. 7; 2018: Cascadia Consulting Group, *2018 Facility-Based Characterization of Solid Waste in California*, May 15, 2020, accessed November 30, 2023, available for download at <https://www2.calrecycle.ca.gov/Publications/Details/1666>, p. 155; 2021: CalRecycle, *2021 Disposal Facility-Based Waste Characterization Data Tables*, accessed November 30, 2023, available at <https://www2.calrecycle.ca.gov/Docs/Web/122544>, p. 2.

12 "Reusable" thicker plastic bags are required by the California ban to be at least 2.25 mils thick, which is more than four times thicker than typical single-use bags (0.5 mils). Thicker plastic bags: California Public Resources Code, division 30, part 3, chapter 5.3, art. II, § 42281, cl. (6)(b)(1)€, archived at https://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=30.&title=&part=3.&chapter=5.3.&article=2; Single-use bags: 1 bag at a time, *Bag Thickness Standards: What is a mil?*, 2023, archived at <https://web.archive.org/web/20230604232515/http://1bagatatime.com/learn/what-is-a-mil/>; Plastic bag counts: Both bag figures estimated off the table entitled "Bag Purchasing Trends over Time." Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

13 Plastic bag ban analysis: Daniel Banko Ferran and Syon Bhanot, City of Philadelphia, *Evaluating the Ban: Philadelphia's Plastic Bag Ban and Changes in Bag Usage in the City*, April 2023, archived at <https://web.archive.org/web/20231016102917/https://www.phila.gov/media/20230428110156/PlasticBagBanReportApril2023.pdf>, p. 8; Absence of paper bag fee: PennEnvironment, *New study by Philadelphia shows dramatic drop in plastic bag use since ban* (press release), April 27, 2023, archived at <https://web.archive.org/web/20231014134820/https://environmentamerica.org/pennsylvania/media-center/new-study-by-philadelphia-shows-dramatic-drop-in-plastic-bag-use-since-ban/>.

14 Mountain View City Council, *Amend Chapter 16, Section 16.82, of the Mountain View City Code to Retain Current Charges for Carry-Out Bags*, September 16, 2014, archived at <https://web.archive.org/web/20220121115334/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a55e4b03cf942d4e812/1435867733101/Mtn+View+Council+Report+9.16.14+Reusable+Bag+Amendment+2014.pdf>, p. 3.

15 United Nations Environment Programme, *From birth to ban: a history of the plastic shopping bag* (blog post), December 20, 2021, archived at <https://web.archive.org/web/20230823053231/https://www.unep.org/news-and-stories/story/birth-ban-history-plastic-shopping-bag>.

16 Ibid.

17 Great Pacific Garbage Patch: National Geographic, *Great Pacific Garbage Patch*, accessed November 3, 2023, available at <https://education.nationalgeographic.org/resource/great-pacific-garbage-patch/>; Discovery date: United Nations Environment Programme, *From birth to ban: a history of the plastic shopping bag* (blog post), December 20, 2021, archived at <https://web.archive.org/web/20230823053231/https://www.unep.org/news-and-stories/story/birth-ban-history-plastic-shopping-bag>.

18 *The Economist*, The Economist Newspaper Limited, "Plastics of evil," March 29, 2007, archived at <https://web.archive.org/web/20230804081014/https://www.economist.com/united-states/2007/03/29/plastics-of-evil>.

19 Jesse McKinley, “San Francisco Board Votes to Ban Some Plastic Bags,” *The New York Times*, March 28, 2007, archived at <https://web.archive.org/web/20230519170510/https://www.nytimes.com/2007/03/28/us/28plastic.html>.

20 San Jose: “The Battle Against Plastic Bags in California; A Brief History,” *San Diego Free Press*, September 2, 2016, archived at <https://web.archive.org/web/20230601124002/https://sandiegofreepress.org/2016/09/the-battle-against-plastic-bags-in-california-a-brief-history/>; Los Angeles: Californians Against Waste, *Plastic Bags: Local Ordinances*, archived at <https://web.archive.org/web/20230830165704/https://www.cawrecycles.org/list-of-local-bag-bans>; 100 local laws and California statewide ban: “The Battle Against Plastic Bags in California; A Brief History,” *San Diego Free Press*, September 2, 2016, archived at <https://web.archive.org/web/20230601124002/https://sandiegofreepress.org/2016/09/the-battle-against-plastic-bags-in-california-a-brief-history/>.

21 Seattle: A look at Seattle’s recycling program and plastic bag ban,” *Seattle City Council Insight*, July 12, 2016, archived at <https://web.archive.org/web/20230402055457/https://sccinsight.com/2016/07/12/look-seattles-composting-program/#:~:text=In%20Seattle%2C%20it%27s%20clearly%20working,to%2059%20tons%20in%202012>; Portland: Matthew Spencer and Sarah Higginbotham, “Portland needs to expand the plastic bag ban,” *The Oregonian*, updated January 10, 2019, archived at https://web.archive.org/web/20200903132705/https://www.oregonlive.com/opinion/2012/10/portland_needs_to_expand_the_p.html; Austin: Austin Resource Recovery, *Single-Use Carryout Bags*, archived at <https://web.archive.org/web/20230605163902/https://www.austintexas.gov/bags>; Santa Fe: Joey Peters, “Santa Fe City Council Votes To Ban Plastic Bags,” *Santa Fe Reporter*, August 27, 2013, archived at <https://web.archive.org/web/20230402014538/https://www.sfreporter.com/news/2013/08/28/santa-fe-city-council-votes-to-ban-plastic-bags/>.

22 349 jurisdictions: Trevor Nace, “Here’s A List Of Every City In The US To Ban Plastic Bags, Will Your City Be Next?,” *Forbes*, September 20, 2018, accessed October 31, 2023, available at <https://www.forbes.com/sites/trevornace/2018/09/20/heres-a-list-of-every-city-in-the-us-to-ban-plastic-bags-will-your-city-be-next/?sh=7cfa0e6a3243>; Hawaii: In 2015, Honolulu County became the last county in Hawaii to adopt a plastic bag ban, creating a de facto statewide ban. Conference of State Legislatures, *State Plastic Bag Legislation*, updated February 8, 2021, accessed October 20, 2023, available at <https://www.ncsl.org/environment-and-natural-resources/state-plastic-bag-legislation>.

23 Jennie Romer, Surfrider Foundation, *Round-Up of Statewide Bag Laws and Preemption* (blog post), February 24, 2021, archived at <https://web.archive.org/web/20230829182153/https://www.surfrider.org/news/round-up-of-statewide-bag-laws-and-preemption>.

24 The Last Beach Cleanup, *Country Laws on Plastic Products*, updated July 20, 2021, archived at <https://web.archive.org/web/20230529080336/https://www.lastbeachcleanup.org/countrylaws>.

25 Analysis of 2022 Census Bureau data for all fifty states and the District of Columbia. U.S. Census Bureau, *Annual Estimates of the Resident Population for the United States, Regions, States, District of Columbia and Puerto Rico, April 1, 2020 to July 1, 2022, Population Totals and Components of Change, 2020-2022* (data set), 2022, available at <https://www2.census.gov/programs-surveys/popest/tables/2020-2022/state/totals/NST-EST2022-POP.xlsx>.

26 Center for Biological Diversity, *10 Facts about Single-Use Plastic Bags*, archived at https://web.archive.org/web/20231127032500/https://www.biologicaldiversity.org/programs/population_and_sustainability/sustainability/plastic_bag_facts.html.

27 Baltimore Office of Sustainability, *Plastic Bag Ban: Information for Residents*, archived at <https://web.archive.org/web/20230918172340/https://www.baltimoresustainability.org/for-residents/>.

28 Kate Breimann, Environment Maryland, *Testimony: Plastic Bag Reduction Act*, February 23, 2021, archived at <https://web.archive.org/web/20230330034723/https://environmentamerica.org/maryland/resources/testimony-plastic-bag-reduction-act/>.

29 7%: Clean Virginia Waterways, *Single-use Plastic Bags: Common Litter in Virginia*, accessed October 20, 2023, archived at <https://web.archive.org/web/20230607155726/https://www.longwood.edu/cleanva/bags.html>; Scope of cleanups: Clean Virginia Waterways, *Virginia Waterways Cleanup*, archived at <https://web.archive.org/web/20230527234508/http://www.longwood.edu/CLEANVA/VolunteerForCleanup.html>.

30 Lauren Roman et al., “Plastic pollution is killing marine megafauna, but how do we prioritize policies to reduce mortality,” *Conservation Letters* 14, 2 (December 3, 2020): <https://doi.org/10.1111/conl.12781>.

31 Plastic Bag Laws, *Plastic Bag Recycling*, archived at <https://web.archive.org/web/20230928040646/https://www.plasticbaglaws.org/get-involved/plastic-bag-recycling>.

32 Nicole Randock, “Phoenix recycling officials: Plastic bags contribute to lost time worth about \$1 million,” *Cronkite News*, February 1, 2018, archived at <https://web.archive.org/web/20230828063733/https://cronkitenews.azpbs.org/2018/02/01/plastic-bags-recycling-bins-contribute-1-million-lost-time/>.

33 ABC News: Matt Gutman et al., “We put dozens of trackers in plastic bags for recycling. Many were trashed,” *ABC News*, May 23, 2023, archived at <https://web.archive.org/web/20231128215312/https://abcnews.go.com/US/put-dozens-trackers-plastic-bags-recycling-trashed/story?id=99509422>.

34 The Last Beach Cleanup: Jessica Roy, “California’s plastic bag ban is failing. Here’s why,” *Los Angeles Times*, August 24, 2023, archived at <https://web.archive.org/web/20231201220550/https://www.latimes.com/environment/story/2023-08-24/whats-the-deal-with-single-use-plastic-bag-bans>; ABC News: Matt Gutman et al., “We put dozens of trackers in plastic bags for recycling. Many were trashed,” *ABC News*, May 23, 2023, archived at <https://web.archive.org/web/20231128215312/https://abcnews.go.com/US/put-dozens-trackers-plastic-bags-recycling-trashed/story?id=99509422>.

35 Environmental Protection Agency, *Advancing Sustainable Materials Management: Facts and Figures* (fact sheet), updated April 4, 2023, available at https://www.epa.gov/sites/default/files/2021-01/documents/2018_tables_and_figures_dec_2020_fnl_508.pdf.

36 List of existing state bans: National Conference of State Legislatures, *State Plastic Bag Legislation*, updated February 8, 2021, accessed October 20, 2023, available at <https://www.ncsl.org/environment-and-natural-resources/state-plastic-bag-legislation>; Colorado: Colorado Department of Revenue, *Carryout Bag Fee*, 2023, archived at <https://web.archive.org/web/20230603091105/https://tax.colorado.gov/carryout-bag-fee>. Rhode Island: Alyssa Azzara, “Department of Environmental Management seeks public’s opinion ahead of statewide plastic bag ban,” *Rhode Island News*, September 19, 2023, archived at <https://web.archive.org/web/20230927032217/https://www.abc6.com/department-of-environmental-management-seeks-publics-opinion-ahead-of-state-wide-plastic-bag-ban/>.

37 Georgia: Brianna Andrews, “Will Georgia become the next state to ban plastic bags,” *News4Jax*, March 4, 2023, archived at <https://web.archive.org/web/20230401174719/https://www.news4jax.com/news/georgia/2023/03/04/will-georgia-become-the-next-state-to-ban-plastic-bags/>; Massachusetts: Ellen Fleming, “Bills look to limit single use plastic bags in Massachusetts,” *22 News*, June 20, 2023, archived at <https://web.archive.org/web/20230629162824/https://www.wvlp.com/news/state-politics/bills-look-to-limit-single-use-plastic-bag-usage-in-massachusetts/>.

38 Boston: City of Boston, *Understanding the Plastic Bag Ordinance* (fact sheet), accessed October 20, 2023, archived at <https://web.archive.org/web/20230525171311/https://www.boston.gov/departments/environment/understanding-plastic-bag-ordinance>; Philadelphia: Daniel Banko Ferran and Syon Bhanot, City of Philadelphia, *Evaluating the Ban: Philadelphia’s Plastic Bag Ban and Changes in Bag Usage in the City*, April 2023, archived at <https://web.archive.org/web/20231016102917/https://www.phila.gov/media/20230428110156/PlasticBagBanReportApril2023.pdf>.

39 Effective date: Debbie Waldeyer, “Everything you need to know about NJ’s ban on plastic bags,” *northjersey.com*, updated May 6, 2022, archived at <https://web.archive.org/web/20220803201211/https://www.northjersey.com/story/news/new-jersey/2022/04/27/nj-plastic-bag-ban-date/7432059001/>; Ban details: New Jersey Code, Chapter 117, “An act concerning single-use plastic carryout bags, single-use paper carryout bags, polystyrene foam food service products, and single-use plastic straws, supplementing Title 13 of the Revised Statutes, and amending P.L.2002, c.128,” archived at <https://web.archive.org/web/20230824125443/https://dep.nj.gov/wp-content/uploads/plastic-ban-law/docs/plastic-bag-law-c117.pdf>, p. 3.

40 See the definition of “Reusable carryout bag.” It must have stitched handles, eliminating the thicker plastic film bags distributed in California and elsewhere. New Jersey Code, Chapter 117, “An act concerning single-use plastic carryout bags, single-use paper carryout bags, polystyrene foam food service products, and single-use plastic straws, supplementing Title 13 of the Revised Statutes, and amending P.L.2002, c.128,” archived at <https://web.archive.org/web/20230824125443/https://dep.nj.gov/wp-content/uploads/plastic-ban-law/docs/plastic-bag-law-c117.pdf>, p. 3.

41 New Jersey plastic bag data: New Jersey Plastics Advisory Council, *First-year Report*, May 4, 2023, archived at <https://web.archive.org/web/20230610142251/https://dep.nj.gov/wp-content/uploads/pac-first-year-report-2023.pdf>; New Jersey store counts by type: U.S. Census Bureau, *All Sectors: County Business Patterns, including ZIP Code Business Patterns, by Legal Form of Organization and Employment Size Class for the U.S., States, and Selected Geographies: 2021*, accessed December 11, 2023, available at <https://data.census.gov/table/CBP2021.CB2100CBP?q=CBP2021.CB2100CBP&g=040XX00US34&n=445110:445120>.

42 Vermont Department of Environmental Conservation, *Single-Use Products Law* (fact sheet), archived at <https://web.archive.org/web/20231117151331/https://dec.vermont.gov/waste-management/solid/materials-mgmt/single-use-products-law>.

43 Ibid.

44 Ibid.

45 Emily H. Belarmino et al., “Impact of Vermont’s Single-Use Plastics Ban on Consumers and Food Businesses,” *College of Agriculture and Life Sciences Faculty Publications*, 197 (January 30, 2023), accessed October 24, 2023, available at <https://scholarworks.uvm.edu/cgi/viewcontent.cgi?article=1200&context=calsfac>, p. 2.

46 Santa Barbara Municipal Code, Chapter 9.150, “Single-Use Carry-Out Bags,” accessed October 27, 2023, available at <https://santabarbaraca.gov/sites/default/files/documents/Environmental%20Services/Environmental%20Services%20/%20Trash%20%26%20Recycling/Single-Use%20Carryout%20Bag%20Ordinance.pdf>, p. 2.

47 City of Santa Barbara Environmental Services Division, Finance Department, *Council Agenda Report: Two Year Review of Single-Use Carryout Bag Ordinance*, April 26, 2016, archived at https://web.archive.org/web/20171208064142/http://services.santabarbaraca.gov/CAP/MG131792/AS131796/AS131810/AS131816/AI135427/DO135428/DO_135428.PDF, p. 2. Subtracting 2,365,127 (“Plastic bags (from non-regulated stores)”) from 47,302,542 (“Total Plastic Bags Used Annually 2013”) yields 44,937,415 plastic bags saved per year.

48 Daniel Banko Ferran and Syon Bhanot, City of Philadelphia, *Evaluating the Ban: Philadelphia’s Plastic Bag Ban and Changes in Bag Usage in the City*, April 2023, archived at <https://web.archive.org/web/20231016102917/https://www.phila.gov/media/20230428110156/PlasticBagBanReportApril2023.pdf>, p. 3.

49 PennEnvironment, *New study by Philadelphia shows dramatic drop in plastic bag use since ban* (press release), April 27, 2023, archived at <https://web.archive.org/web/20231014134820/https://environmentamerica.org/pennsylvania/media-center/new-study-by-philadelphia-shows-dramatic-drop-in-plastic-bag-use-since-ban/>.

50 Ban scope: Portland City Council, *Promoting Reusable Checkout Bags in Portland One-Year Report*, October 3, 2012, archived at <https://web.archive.org/web/20220420004227/https://www.portlandonline.com/shared/cfm/image.cfm?id=419069>, p. 1; No paper bag fee: Matthew Spencer and Sarah Higginbotham, “Portland needs to expand the plastic bag ban,” *The Oregonian*, updated January 10, 2019, archived at https://web.archive.org/web/20200903132705/https://www.oregonlive.com/opinion/2012/10/portland_needs_to_expand_the_p.html; Implementation date: Portland City Council, *Promoting Reusable Checkout Bags in Portland One-Year Report*, October 3, 2012, archived at <https://web.archive.org/web/20220420004227/https://www.portlandonline.com/shared/cfm/image.cfm?id=419069>, p. 1.

51 This estimate is derived by extrapolating the estimated more than 50 million plastic bags saved in the first six months of the ban’s implementation to one year. Matthew Spencer and Sarah Higginbotham, “Portland needs to expand the plastic bag ban,” *The Oregonian*, updated January 10, 2019, archived at https://web.archive.org/web/20200903132705/https://www.oregonlive.com/opinion/2012/10/portland_needs_to_expand_the_p.html.

52 KGW Staff, “Getting Oregon’s plastic bag ban back on track,” *KGW8 Local News*, March 24, 2021, archived at <https://web.archive.org/web/20220930215749/https://www.kgw.com/article/news/local/oregons-plastic-bag-ban-takes-hit-pandemic/283-9289ee15-f24a-4d90-b12e-5891ff53f232>.

53 See methodology section below for population data sources. Variations in estimated bags saved are caused by several factors, possibly including legislative details, extent of enforcement and sampling and estimation methodology. The total bags saved estimate for New Jersey is surprisingly high relative to the other estimates. According to Jonathan Jaffe of the New Jersey Clean Communities Council, it’s a result of double-bagging and customers taking extras home or using them for “meat and other products” while shopping. Scott Fallon, “A year into NJ’s plastic bag ban, what impact has it had?,” *northjersey.com*, May 11, 2023, archived at <https://web.archive.org/web/20230721184039/https://www.northjersey.com/story/news/environment/2023/05/11/nj-plastic-bag-ban-impact-after-one-year/70192915007/>; Philadelphia: “...we estimate that the ban led to the elimination of over 200 million plastic bags in the city.” Because the source does not include any more specific number, we use 200 million in this analysis. Daniel Banko Ferran and Syon Bhanot, City of Philadelphia, *Evaluating the Ban: Philadelphia’s Plastic Bag Ban and Changes in Bag Usage in the City*, April 2023, archived at <https://web.archive.org/web/20231016102917/https://www.phila.gov/media/20230428110156/PlasticBagBanReportApril2023.pdf>, p. 3; Portland: “...the policy led to a reduction of more than 50 million plastic bags consumed in just the first six months.” Because the source does not any more specific number, we extrapolate to a full year and use 100 million in this analysis. Matthew Spencer and Sarah Higginbotham, “Portland needs to expand the plastic bag ban,” *The Oregonian*, updated January 10, 2019, archived at https://web.archive.org/web/20200903132705/https://www.oregonlive.com/opinion/2012/10/portland_needs_to_expand_the_p.html.

54 U.S. Census Bureau, *QuickFacts Allegheny County, Pennsylvania* (data set), archived at <https://web.archive.org/web/20230820220524/https://www.census.gov/quickfacts/fact/table/alleghenycountypennsylvania/PST045222>.

55 U.S. Census Bureau, *QuickFacts Massachusetts* (data set), archived at <https://web.archive.org/web/20230711031221/https://www.census.gov/quickfacts/fact/table/MA/>.

56 Marine mammals and seabirds: UNESCO, *On World Oceans Day, UNESCO reinforces the importance of preserving the largest ecosystem on the planet* (blog post), updated May 26, 2023, archived at <https://web.archive.org/web/20230731085501/https://www.unesco.org/en/articles/world-oceans-day-unesco-reinforces-importance-preserving-largest-ecosystem-planet>; Turtles: Emily Duncan et al., “A global review of marine turtle entanglement in marine anthropogenic debris: a baseline for further action,” *Endangered Species Research* 34, (December 11, 2017): 431-448, <https://doi.org/10.3354/esr00865>, p. 438.

57 Lauren Roman et al., “Plastic pollution is killing marine megafauna, but how do we prioritize policies to reduce mortality,” *Conservation Letters* 14, no. 2 (December 3, 2020): <https://doi.org/10.1111/conl.12781>.

58 David Azoulay et al., Center for International Environmental Law, “Plastic & Health: The Hidden Costs of a Plastic Planet,” February 2019, archived at <https://web.archive.org/web/20231122175532/https://www.ciel.org/wp-content/uploads/2019/02/Plastic-and-Health-The-Hidden-Costs-of-a-Plastic-Planet-February-2019.pdf>, pp. 1-2.

59 Extent of pollution: Kate Breimann, Environment Maryland, Testimony: Plastic Bag Reduction Act, February 23, 2021, archived at <https://web.archive.org/web/20230330034723/https://environmentamerica.org/maryland/resources/testimony-plastic-bag-reduction-act/>; Harms posed by microplastics: David Azoulay et al., Center for International Environmental Law, “Plastic & Health: The Hidden Costs of a Plastic Planet,” February 2019, archived at <https://web.archive.org/web/20231122175532/https://www.ciel.org/wp-content/uploads/2019/02/Plastic-and-Health-The-Hidden-Costs-of-a-Plastic-Planet-February-2019.pdf>, p. 2.

60 Ban implementation: Scott Fallon, “A year into NJ’s plastic bag ban, what impact has it had?,” *northjersey.com*, May 11, 2023, archived at <https://web.archive.org/web/20230721184039/https://www.northjersey.com/story/news/environment/2023/05/11/nj-plastic-bag-ban-impact-after-one-year/70192915007/>; Clean Ocean Action: Clean Ocean Action, *2022 Beach Sweeps Report*, accessed October 22, 2023, available at https://cleanoceanaction.org/fileadmin/editor_group3/2022_Beach_Sweeps_Annual_Report.pdf, p. 6.

61 Kelly O’Mara, “Are Plastic Bag Bans Actually Helping The Environment,” KQED, May 18, 2017, archived at <https://web.archive.org/web/20230530233354/https://www.kqed.org/news/11461251/are-plastic-bag-bans-good-for-the-environment>.

62 Creek and river cleanups: City of San Jose, *Bring Your Own Bag Ordinance*, accessed October 23, 2023, archived at <https://web.archive.org/web/20230512013405/https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/recycling-garbage/waste-reduction/bring-your-own-bag-ordinance>; Storm drains: Kerri Romanow, memo to City of San Jose Transportation and Environment Committee, November 21, 2012, archived at https://web.archive.org/web/20230527025625/http://www3.sanjoseca.gov/clerk/CommitteeAgenda/TE/20121203/TE20121203_d5.pdf, p. 5; Litter reduction in residential areas: Reusethisbag.com, *Where are Plastic Bags Banned Around the World* (fact sheet), accessed October 23, 2023, available at <https://dpw.lacounty.gov/epd/SBR/pdfs/PlasticBagsBannedAroundWorld.pdf>, p. 1.

63 Stop Waste, *Reusable Bag Ordinance – Update and Change in Bag Price Recommendation* (memo to the Alameda County Waste Management Authority and Recycling Boards), September 11, 2014, archived at <https://web.archive.org/web/20230403142045/https://www.stopwaste.org/sites/default/files/Documents/Bag%20Update%209.17.14%20joint%20meeting.pdf>, p. 2.

64 Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

65 “One Year Later: Voter Approval of Bag Ban Results in Substantially Reduced Plastic Bag Litter and Waste,” *Californians Against Waste*, November 8, 2017, archived at <https://web.archive.org/web/20220409013819/https://www.cawrecycles.org/recycling-news/xtj9dcga9bmh5daxn4sw4kry4zpn dg>.

66 Ocean Conservancy, *California Coastal Cleanup Day - Litter Data Summary 2010 - 2017* (data summary), accessed October 23, 2023, available at <https://web.archive.org/web/20230824122955/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/5a0237d7652deae895d2df1c/1510094808473/California+Coastal+Cleanup+Data+2010.2016.2017.pdf>, pp. 1, 3.

67 Aaron Waters, Austin Resource Recovery, *Environmental Effects of the Single Use Bag Ordinance in Austin, Texas*, June 10, 2015, archived at <http://nebula.wsimg.com/ae9ad3fb6e2a02e0b1da01c078920330?AccessKeyId=1C31A3B4B1A73412F089&alloworigin=1&disposition=0>, p. 10.

68 Cassandra Pollock, “Report: Austin to end its bag ban after Texas Supreme Court ruling,” *The Texas Tribune*, July 3, 2018, archived at <https://web.archive.org/web/20230721003709/https://www.texastribune.org/2018/07/03/report-austin-end-its-bag-ban-after-texas-supreme-court-ruling/#:~:text=2023%20Elections-,Report%3A%20Austin%20to%20end%20its%20bag%20ban%20after%20Texas%20Supreme,violated%20state%20law%2C%20KUT%20reported.>

69 *Seattle City Council Insight*, “A look at Seattle’s recycling program and plastic bag ban,” July 12, 2016, archived at <https://web.archive.org/web/20230402055457/https://sccinsight.com/2016/07/12/look-seattles-composting-program/#:~:text=In%20Seattle%2C%20it%27s%20clearly%20working,to%2059%20tons%20in%202012.>

70 Ban scope: San Mateo County Health Environmental Health Services, *San Mateo County’s Reusable Bag Ordinance: Frequently Asked Questions for Retailers* (fact sheet), revised January 1, 2023, accessed October 26, 2023, available at <https://www.smchealth.org/sites/main/files/file-attachments/retailersfaq.pdf?1673562985#:~:text=What%20does%20the%20Reusable%20Bag,that%20have%20adopted%20the%20Ordinance,> p. 1; Paper bag fee and ban timing: *San Mateo County Reusable Bag Ordinance Survey and Reporting Report*, 2014, archived at <https://web.archive.org/web/20220121115333/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a2ae4b0edd30aa3cb9c/1435867690341/San+Mateo+County+Bag+Report+2014.pdf>, pp. 1-2.

71 Retail stores: Mountain View City Council, *Amend Chapter 16, Section 16.82, of the Mountain View City Code to Retain Current Charges for Carry-Out Bags*, September 16, 2014, archived at <https://web.archive.org/web/20220121115334/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a55e4b03cf942d4e812/1435867733101/Mtn+View+Council+Report+9.16.14+Reusable+Bag+Amendment+2014.pdf>, p. 1; Restaurant exemption and paper bag fee: Claudia Cruz, “Mountain View’s Plastic Bag Ban in Effect Monday,” *Patch*, Updated May 7, 2013, archived at <https://web.archive.org/web/20221206025308/https://patch.com/california/mountainview/mountain-view-s-plastic-bag-ban-in-effect-monday.>

72 Daniel Banko Ferran and Syon Bhanot, City of Philadelphia, *Evaluating the Ban: Philadelphia’s Plastic Bag Ban and Changes in Bag Usage in the City*, April 2023, archived at <https://web.archive.org/web/20231016102917/https://www.phila.gov/media/20230428110156/PlasticBagBanReportApril2023.pdf>, p. 3

73 PennEnvironment, *New study by Philadelphia shows dramatic drop in plastic bag use since ban* (press release), April 27, 2023, archived at [https://environmentamerica.org/pennsylvania/media-center/new-study-by-philadelphia-shows-dramatic-drop-in-plastic-bag-use-since-ban/.](https://environmentamerica.org/pennsylvania/media-center/new-study-by-philadelphia-shows-dramatic-drop-in-plastic-bag-use-since-ban/)

74 Surfrider Foundation, *Santa Monica Bag Ban*, January 25, 2011, archived at <https://web.archive.org/web/20231102144304/https://www.surfrider.org/campaigns/Santa%20Monica%20Bag%20Ban.>

75 From 13% pre-ban to 34% after implementation. *San Mateo County Reusable Bag Ordinance Survey and Reporting Report*, 2014, archived at <https://web.archive.org/web/20220121115333/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a2ae4b0edd30aa3cb9c/1435867690341/San+Mateo+County+Bag+Report+2014.pdf>, p. 1.

76 Angelina Hwang and Benjamin Kay, Team Marine, Santa Monica High School, *The Effects of the Plastic Bag Ban on Consumer Bag Choice at Santa Monica Grocery Stores*, May 8, 2013, archived at https://web.archive.org/web/20220901054615/https://www.teammarine.org/wp-content/uploads/2013/05/Grocery-Store-Bag-Research_Press-Release-12-13.pdf, p. 1.

77 *Ibid*, p. 4.

78 Mountain View City Council, *Amend Chapter 16, Section 16.82, of the Mountain View City Code to Retain Current Charges for Carry-Out Bags*, September 16, 2014, archived at <https://web.archive.org/web/20220121115334/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a55e4b03cf942d4e812/1435867733101/Mtn+View+Council+Report+9.16.14+Reusable+Bag+Amendment+2014.pdf>, p. 3.

79 Ibid, p. 3.

80 Angelina Hwang and Benjamin Kay, Team Marine, Santa Monica High School, *The Effects of the Plastic Bag Ban on Consumer Bag Choice at Santa Monica Grocery Stores*, May 8, 2013, archived at https://web.archive.org/web/20220901054615/https://www.teammarine.org/wp-content/uploads/2013/05/Grocery-Store-Bag-Research_Press-Release-12-13.pdf, p. 4.

81 Ibid, p. 5.

82 *San Mateo County Reusable Bag Ordinance Survey and Reporting Report*, 2014, archived at <https://web.archive.org/web/20220121115333/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a2ae4b0edd30aa3cb9c/1435867690341/San+Mateo+County+Bag+Report+2014.pdf>, p. 1.

83 Daniel Banko Ferran and Syon Bhanot, City of Philadelphia, *Evaluating the Ban: Philadelphia's Plastic Bag Ban and Changes in Bag Usage in the City*, April 2023, archived at <https://web.archive.org/web/20231016102917/https://www.phila.gov/media/20230428110156/PlasticBagBanReportApril2023.pdf>, p. 4

84 See “Information for Shoppers” and “When did the law take effect?” Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

85 See the chart entitled “Average Bag Use per Shopping Trip.” Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

86 See the chart entitled “Bag Purchasing Trends over Time.” Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

87 Kelly O'Mara, “Are Plastic Bag Bans Actually Helping The Environment,” *KQED*, May 18, 2017, archived at <https://web.archive.org/web/20230530233354/https://www.kqed.org/news/11461251/are-plastic-bag-bans-good-for-the-environment>.

88 Plastic bag use: CalRecycle, *SB270 Report to the Legislature*, February 25, 2019, available at <https://www2.calrecycle.ca.gov/Publications/Download/1476>, p. 15; Plastic bag litter: Ocean Conservancy, *California Coastal Cleanup Day - Litter Data Summary 2010 - 2017* (data summary), accessed October 23, 2023, available at <https://web.archive.org/web/20230824122955/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/5a0237d7652deae895d2df1c/1510094808473/California+Coastal+Cleanup+Data+2010.2016.2017.pdf>, pp. 3, 5.

89 Based on reports published by CalRecycle, California’s recycling agency, covering 2004, 2008, 2014, 2018 and 2021. There is a similar report for 1999, but it does not contain data specific to plastic bags and was not included in this analysis. These figures exclude plastic trash bags. 2004: Cascadia Consulting Group, *Statewide Waste Characterization Study: Significant Tables and Figures*, December 2004, accessed November 30, 2023, available at <https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/34004005/Tables.pdf>, p. 4; 2008: Cascadia Consulting Group, *California 2008 Statewide Waste Characterization Study: Significant Tables and Figures*, August 2009, accessed November 30, 2023, available at <https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2009023/Tables.pdf>, p.4; 2014: Cascadia Consulting Group, *2014 Disposal-Facility-Based Characterization of Solid Waste in California: Significant Tables and Figures*, October 6, 2015, accessed November 30, 2023, available at <https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2014/SigTableFig.pdf>, p.7; 2018: Cascadia Consulting Group, *2018 Facility-Based Characterization of Solid Waste in California*, May 15, 2020, accessed November 30, 2023, available for download at <https://www2.calrecycle.ca.gov/Publications/Details/1666>, p. 155; 2021: CalRecycle, *2021 Disposal Facility-Based Waste Characterization Data Tables*, accessed November 30, 2023, available at <https://www2.calrecycle.ca.gov/Docs/Web/122544>, p. 2.

90 Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

91 See the chart entitled “Bag Purchasing Trends over Time.” Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

92 “Reusable” thicker plastic bags are required by the California ban to be at least 2.25 mils thick, which is more than four times thicker than typical single-use bags (0.5 mils). Thicker plastic bags: California Public Resources Code, division 30, part 3, chapter 5.3, art. II, § 42281, cl. (6)(b)(1)€, archived at https://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=30.&title=&part=3.&chapter=5.3.&article=2; Single-use bags: 1 bag at a time, *Bag Thickness Standards: What is a mil?*, 2023, archived at <https://web.archive.org/web/20230604232515/http://1bagatatime.com/learn/what-is-a-mil/>; Plastic bag counts: Both bag figures estimated off the table entitled “Bag Purchasing Trends over Time.” Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

93 “Average Bag Use per Shopping Trip.” Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information>.

94 See “When did it take effect” for ban implementation timing: Alameda County Waste Management Authority, *Reusable Bag Ordinance*, accessed October 24, 2023, available at <https://web.archive.org/web/20230205081950/https://reusablebagsac.org/shoppers/information#when>.

95 Matthew Spencer and Sarah Higginbotham, “Portland needs to expand the plastic bag ban,” *The Oregonian*, updated January 10, 2019, archived at https://web.archive.org/web/20200903132705/https://www.oregonlive.com/opinion/2012/10/portland_needs_to_expand_the_p.html.

96 KGW Staff, “Getting Oregon’s plastic bag ban back on track,” *KGW8 Local News*, March 24, 2021, archived at <https://web.archive.org/web/20220930215749/https://www.kgw.com/article/news/local/oregons-plastic-bag-ban-takes-hit-pandemic/283-9289ee15-f24a-4d90-b12e-5891ff53f232>.

97 Daniel Banko Ferran and Syon Bhanot, City of Philadelphia, *Evaluating the Ban: Philadelphia’s Plastic Bag Ban and Changes in Bag Usage in the City*, April 2023, archived at <https://web.archive.org/web/20231016102917/https://www.phila.gov/media/20230428110156/PlasticBagBanReportApril2023.pdf>, p. 4.

98 From 1.68 paper bags per respondent per week before the ban to 1.74 paper bags per respondent per week after the ban. Emily H. Belarmino et al., “Impact of Vermont’s Single-Use Plastics Ban on Consumers and Food Businesses,” *College of Agriculture and Life Sciences Faculty Publications*, 197 (January 30, 2023), accessed October 24, 2023, available at <https://scholarworks.uvm.edu/cgi/viewcontent.cgi?article=1200&context=calsfac>, p. 2.

99 Mountain View City Council, *Amend Chapter 16, Section 16.82, of the Mountain View City Code to Retain Current Charges for Carry-Out Bags*, September 16, 2014, archived at <https://web.archive.org/web/20220121115334/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a55e4b03cf942d4e812/1435867733101/Mtn+View+Council+Report+9.16.14+Reusable+Bag+Amendment+2014.pdf>, p. 3.

100 Philadelphia: Daniel Banko Ferran and Syon Bhanot, City of Philadelphia, *Evaluating the Ban: Philadelphia’s Plastic Bag Ban and Changes in Bag Usage in the City*, April 2023, archived at <https://web.archive.org/web/20231016102917/https://www.phila.gov/media/20230428110156/PlasticBagBanReportApril2023.pdf>, p. 8; Mountain View: Mountain View City Council, *Amend Chapter 16, Section 16.82, of the Mountain View City Code to Retain Current Charges for Carry-Out Bags*, September 16, 2014, archived at <https://web.archive.org/web/20220121115334/https://static1.squarespace.com/static/54d3a62be4b068e9347ca880/t/55959a55e4b03cf942d4e812/1435867733101/Mtn+View+Council+Report+9.16.14+Reusable+Bag+Amendment+2014.pdf>, p. 3.

101 2009 ban: Will Oremus, “Groceries fall in line with Palo Alto’s plastic bag ban,” *The Mercury News*, updated August 13, 2016, archived at <https://web.archive.org/web/20210505232250/https://www.mercurynews.com/2009/09/16/groceries-fall-in-line-with-palo-altos-plastic-bag-ban/>; 2013 ban: ABC7, “Palo Alto’s carry-out plastic bag ban starts Monday,” ABC7, accessed November 15, 2023, available at <https://abc7.com/archive/9157429/>.

102 City of Palo Alto, *Palo Alto Disposable Bag Checkout Ordinance* (data set), accessed November 15, 2023, available at <https://www.cityofpaloalto.org/files/assets/public/v/1/public-works/environmental-compliance/source-control/plastics/2012-plastic-bag-ordinance-expansion/store-exit-bag-survey-summary-2008-2014.pdf>.

103 Ibid.

104 Ibid.

105 Ibid.

106 Jennie Romer, Surfrider Foundation, *Round-Up of Statewide Bag Laws and Preemption* (blog post), February 24, 2021, archived at <https://web.archive.org/web/20230829182153/https://www.surfrider.org/news/round-up-of-statewide-bag-laws-and-preemption>.

107 Population of New Jersey on July 1, 2022: U.S. Census Bureau, *QuickFacts New Jersey* (data set), archived at <https://web.archive.org/web/20231205063911/https://www.census.gov/quickfacts/fact/table/NJ/PST045222>; Population of Vermont on July 1, 2022: U.S. Census Bureau, *QuickFacts Vermont* (data set), archived at <https://web.archive.org/web/20230701060136/https://www.census.gov/quickfacts/fact/table/VT/PST045222>; Population of Philadelphia on July 1, 2021: U.S. Census Bureau, *Annual Estimates of Resident Population Change for Incorporated Places of 50,000 or More in 2020, Ranked by Percent Change: July 1, 2020 to July 1, 2021* (data set), archived at <https://web.archive.org/web/20230213080302/https://www2.census.gov/programs-surveys/popest/tables/2020-2021/cities/totals/SUB-IP-EST2021-ANNCHG.xlsx>; Population of Portland, Ore. on July 1, 2012: U.S. Census Bureau, *Annual Estimates of Resident Population Change for Incorporated Places Over 50,000, Ranked by Percent Change: July 1, 2011 to July 1, 2012 - United States - Places of 50,000+ Population* (data set), accessed December 8, 2023, available at <https://www2.census.gov/programs-surveys/popest/tables/2010-2012/cities/totals/PEPANNCHIP.pdf>, p. 1; Population of Santa Barbara, Calif. on July 1, 2015: U.S. Census Bureau, *Annual Estimates of Resident Population Change for Incorporated Places of 50,000 or More in 2015, Ranked by Percent Change: July 1, 2015 to July 1, 2016 - United States - Places of 50,000+ Population* (data set), accessed December 8, 2023, available at <https://www2.census.gov/programs-surveys/popest/tables/2010-2016/cities/totals/PEPANNCHIP.pdf>.

108 Emily H. Belarmino et al., “Impact of Vermont’s Single-Use Plastics Ban on Consumers and Food Businesses,” *College of Agriculture and Life Sciences Faculty Publications*, 197 (January 30, 2023), accessed October 24, 2023, available at <https://scholarworks.uvm.edu/cgi/viewcontent.cgi?article=1200&context=calsfac>, p. 2, Figure 2.

109 New Jersey Plastics Advisory Council, *First-year Report*, May 4, 2023, archived at <https://web.archive.org/web/20230610142251/https://dep.nj.gov/wp-content/uploads/pac-first-year-report-2023.pdf>.

110 *Ibid.*, pp. 24-25.

111 *Ibid.*, p. 25.

112 See the chart entitled “Estimated Single-Use Plastic Bags Eliminated per Month by NJFC Members,” where this figure is rounded to 688 million. *Ibid.*, p. 25.

113 The report calculates the eight-month (May-December) savings of the ban as ~16.5 billion plastic bags, but this is equivalent to ~2.06 billion plastic bags per month. *Ibid.*, p. 25.

114 Categorized as “Supermarkets and other grocery (except convenience) stores” under 2017 NAICS code 445110. U.S. Census Bureau, *All Sectors: County Business Patterns, including ZIP Code Business Patterns, by Legal Form of Organization and Employment Size Class for the U.S., States, and Selected Geographies: 2021*, accessed December 11, 2023, available at <https://data.census.gov/table/CBP2021.CB2100CBP?q=CBP2021.CB2100CBP&g=040XX00US34&n=445110:445120>.

115 Categorized as “Convenience stores” under 2017 NAICS code 445120. *Ibid.*